DeltaV™ Simulate

- Allows DeltaV configuration on a single PC or in a multi-node system.
- Provides integrated simulation of control system (BPCS) and safety system (SIS).
- Enables development and testing of batch and continuous control applications in an off-line simulation environment.
- Supports testing of smart field devices and OPC interfaces.
- Provides an ideal environment for operator training and process simulation.
- Enhances training with simulation playback.
- Reduces training and testing effort.
- Supports rigorous testing of control configurations, operator graphics.
- Supports virtualization of DeltaV workstations and controller hardware.

Introduction

Don’t delay development of your automation system configuration, logic checkout, and operator training until your automation system is delivered. Do it now with the DeltaV Simulate suite of products.

DeltaV Simulate lets you use all DeltaV software for training and development without purchasing duplicate system hardware. This means you can use exactly the same software provided with your actual DeltaV system at a fraction of the cost. With the simulate suite you can also explore features of the DeltaV system that you have not yet purchased.

Get the most out of your process simulation package using the features of DeltaV SimulatePro. Execute dynamic process simulation using DeltaV control modules or with simulation packages such as MIMiC™ that access data via OPC. With DeltaV SimulatePro, you can control DeltaV execution with speed-up, slow-down, save and restore functionality.

And starting in release v10.3, DeltaV Simulate for SIS provides a complete simulation environment for design, testing, and training of both BPCS and SIS systems.
Benefits

Allows DeltaV configuration on a single PC or in a multi-node system. All features supported by the DeltaV system—such as continuous control, batch control, advanced control and the associated workstation displays, alarms, and historian data collection—may be configured without the need for DeltaV hardware or licenses. By having access to all software, you can try every one of the powerful DeltaV capabilities in your control strategies.

Provides integrated simulation of basic process control system (BPCS) and safety instrumented systems (SIS). Now all of your BPCS and SIS control modules can be designed and tested on a common simulation platform for rigorous checkout and training.

Enables development and testing of batch and continuous control applications in an off-line workstation environment. Check out control logic and operator interface using controller software that runs in a stand-alone ProPLUS or in networked Application Stations. After developing and testing your software configuration in DeltaV Simulate, you can transfer the configuration to your online system using the standard DeltaV export/import utilities.

Supports testing of smart field devices and OPC interfaces. DeltaV Simulate Multi-node supports the addition of DeltaV controllers, allowing you to checkout smart field devices, incorporate DeltaV hardware for maintenance training, and test your control configurations with smart field devices. DeltaV Simulate also supports all DeltaV OPC features for development and testing of applications that execute in the DeltaV Application Station.

Provides an ideal environment for operator training and process simulation. DeltaV Simulate uses the same configuration and operator graphics used by your on-line DeltaV system, and is easily integrated with dynamic process simulation to provide a realistic training environment. Process simulation may be done using DeltaV function blocks or by incorporating an OPC-compliant process simulation package such as MiMiC™.

Enhances training with simulation playback. DeltaV SimulatePro significantly enhances the operator training experience by allowing the instructor to save, restore, and playback operator entries during training sessions.

Reduces training and testing effort. The DeltaV SimulatePro interface allows modules in a workstation to be initialized and set up for simulation with a single easy to use interface. Also, through this interface, the module may be easily set to execute faster/slower than real time. These features reduce the time and effort required to perform operator training or control design evaluation.

Supports rigorous testing of control configurations, operator graphics. Easily simulate process I/O for both classic I/O and CHARMS I/O cards for non-intrusive control system testing prior to field commissioning, without any changes to your control system configuration.

Supports virtualization of DeltaV workstations and controller hardware. Reduce equipment costs and increase flexibility with virtual workstations, controllers and CHARMS I/O cards. DeltaV Simulate virtualization is made easy with DeltaV Virtual Studio.
Product Description

DeltaV Simulate Standalone

With DeltaV Simulate Standalone or DeltaV SimulatePro Standalone, all DeltaV system features are available in a single PC environment that acts as a ProfessionalPLUS Station. Using your PC, it is possible to create controllers and workstations that will be on your DeltaV system. DeltaV devices may be configured offline, including any fieldbus devices that will be included in your automation system.

With DeltaV Simulate, the transition between on-line and off-line control is easy. On-line modules are normally assigned to a controller and used to implement DeltaV system specific monitoring, process control, and calculation functions. Also, modules designed for performance calculations are normally assigned to the DeltaV Application Station. With DeltaV Simulate, process control and calculation functions are easily tested by simply reassigning the associated control modules to your PC.

When your Simulate workstation is downloaded, the assigned modules will automatically begin to execute at the assigned execution rate. The execution of a module in the PC may be examined from Control Studio’s online mode.

DeltaV Simulate and SimulatePro support the full range of advanced control products normally requiring additional system licenses. This allows you to try out products like DeltaV InSight, DeltaV Fuzzy and DeltaV Predict in your simulation environment.

The following example shows the online view of a module in Control Studio where the process is simulated using DeltaV function blocks.

All function blocks that access process inputs and outputs are designed to support simulation. A simulation parameter is included in each of these blocks that may be used to enable simulation capability. When simulation is enabled, the value and status of the input may be manually entered or supplied by another function block or application.

Module execution may be simulated and examined.

The execution engine in the PC is limited by memory. You will be notified when this limit is exceeded. Typically, the modules that would be assigned to a single DeltaV controller can be assigned and downloaded to your PC for execution.
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DeltaV Simulate

The DeltaV Simulate Standalone Virtual Machine comes on an USB flash memory drive which you insert into your computer’s USB 2.0 or 3.0 port. The virtual machine can be run from the memory stick if your computer supports USB 3.0, or you can copy the virtual machine to your local hard drive. The media includes a set-up program which checks to insure your computer has the necessary resources and Windows 7 virtualization options enabled.

DeltaV Simulate Multi-node
DeltaV Simulate Multi-node allows you to add other nodes to your simulation environment. Application Stations may be added to run control modules for distributed control execution. Operator Stations and controllers may be added to support your training or development system requirements.

A special access key and licenses are utilized by a DeltaV Simulate system. With a DeltaV Simulate Standalone license, communication with other DeltaV nodes is not supported. With DeltaV Simulate Multi-node licenses, connections to an off-line DeltaV network are supported. A license is required for each workstation in the DeltaV Simulate Multi-node environment. DeltaV controllers and I/O cards may be connected to this network without any additional DST licenses.

DeltaV Simulate Multi-node also supports the use of real and virtual machine controllers with simulated I/O for rigorous testing of your control configurations. For real controllers, classic I/O simulation is easily implemented via a Virtual I/O Module (VIM) which connects directly to the DeltaV controller I/O bus. For real and virtual machine controllers, process simulation is supported using either an actual CHARMS I/O card in simulate mode, or via a virtual CHARMS I/O card running on a host computer connected to the DeltaV network. Refer to DeltaV Virtual CHARMS I/O Card Simulation and DeltaV Virtual S-series and M-series Controller Simulation product data sheets for more information.

Application packages that support an OPC interface may be used in the DeltaV Simulate environment. For example, the OPC version of the MiMiC™ process simulation may be used with DeltaV Simulate for automation system checkout and operator training. The MiMiC™ OPC interface uses the simulate capability of the DeltaV system and I/O blocks.

DeltaV Simulate Standalone Virtual Machine

The DeltaV Simulate Standalone Virtual Machine (a.k.a., “Simulate on a Stick”) makes it simple to run DeltaV simulate on your laptop or desktop computer without any software installation. Not only is it easy to run, but the separate virtual machine helps protect your host PC integrity because you do not modify services or system registry settings which is required with a traditional DeltaV software installation.

DeltaV Simulate Standalone Virtual Machine

OPC Client Driver
OPC Read of OUT

Process simulation may interface to DeltaV using OPC.

Process Simulation Applications

 OPC Write to Simulate

DeltaV Module

DeltaV Simulate Standalone Virtual Machine
DeltaV Simulate

DeltaV Simulate Multi-node

DeltaV SimulateMulti-node for training and development systems.

DeltaV SimulatePro

You can install DeltaV SimulatePro Standalone on a single PC, or assign a SimulatePro Multi-node license to a ProfessionalPLUS and/or Application Workstation in a DeltaV Simulate Multi-node system.

When SimulatePro capability is assigned to a workstation, you may coordinate execution of the DeltaV control modules running in the workstation with a dynamic process simulation package.

The number of control modules that can be simulated in a workstation with a SimulatePro license is limited only by the memory and processing power of the workstation. A node with SimulatePro capability assigned to it can simulate execution, in real-time, of the modules that would be assigned to approximately four MD controllers (depending on the controllers’ loading). Workstation loading, which is a function of the real-time execution multiplier setting, more than doubles at 2X execution speed.

Application packages that support an OPC interface may be used in the DeltaV SimulatePro environment. For example, Mynah’s MiMiC dynamic process simulation software may be used with DeltaV Simulate. The MiMiC interface uses the simulation capability of DeltaV I/O function blocks.

A process simulation package used with DeltaV SimulatePro may read and write the parameters assigned to the module node through OPC. By writing to these parameters, the simulation package may enable/disable simulation in all I/O blocks with a single request. All dynamic blocks assigned to the node may be initialized with a single request. Also, these modules may be set to execute faster or slower than real time.

Use MiMiC process simulation with DeltaV SimulatePro.
DeltaV SimulatePro has additional features to greatly enhance operator training. With SimulatePro you can snapshot, save, and restore your entire control simulation. With a single click of a mouse, one or all of the workstations in your system will freeze control execution and save every single control parameter away to be recalled later. After finishing a training scenario, an instructor can use this feature to load initial conditions back into any or all of your workstation control modules.

DeltaV SimulatePro also lets you record and playback all of the operator entries made during a simulation session. This means that after a training exercise you can go back and restore the simulation and automatically playback the simulation with all the operator entries. An instructor can also stop the simulation where an operator error was made, and allow the operator to resume operation before the error. This powerful functionality makes DeltaV SimulatePro an absolute must for operator training systems.

For control system checkout, DeltaV SimulatePro enables simulation and checkout of control strategies using Fieldbus and external I/O references. A Simulate Conversion utility is provided with SimulatePro that converts Fieldbus control blocks to their equivalent DeltaV function blocks, and external I/O references are mapped to internal DeltaV function block parameters so they can be simulated.

Note: SimulatePro does not support “Save and Restore” of modules using phase algorithms, which may include Unit Modules, Equipment Modules, Phase Logic Modules (PLMs), and Phase Classes.

DeltaV Simulate for SIS
DeltaV Simulate for SIS provides a complete simulated environment you can use to design and test a safety instrumented system without logic solver hardware. The simulation can run in either a single PC or in a DeltaV Simulate multi-node system. Simulate for SIS uses the exact same logic solver modules and operator graphics that are used in the on-line system, enabling rigorous testing of configurations and operator interfaces prior to field implementation.

Simulated Logic Solvers
DeltaV Simulate for SIS supports simulation of up to 32 logic solvers per workstation, with up to 32 workstations on a multi-node simulation system.

Simulated logic cards are easily configured on ProfessionalPLUS and Application Stations, and support both simplex and redundant configurations. Simulate for SIS also supports both local and global peer-to-peer communications of secure parameter references.
Support for SIS Testing

Transferring logic configurations between on-line and simulation environments is easy using DeltaV export and import functions. For additional SIS integrity, Simulate for SIS supports CRC validation to insure configurations are identical between on-line and testing environments.

DeltaV Simulate for SIS also provides the ability to write simulated process inputs to virtual SIS module input parameters, without any manual confirmation. Process values, signal status, and secure global parameters may be easily entered via an I/O simulator for rigorous logic checkout.

DeltaV Simulate for SIS also supports the use of comprehensive process simulators. A SIS network OPC server provides the ability to read SIS output parameters and write SIS input parameters by external process simulators, like MiMic.

Note: DeltaV Simulate for SIS does not support simulation for CHARMS Smart Logic Solvers (CSLS) in v12.3 Delta SIS with Electronic Marshalling. Also, SimulatePro for SIS does not support “Save and Restore” of simulated SIS logic solver modules.

DeltaV Virtual Studio

DeltaV Virtual Studio is an integrated DeltaV application environment designed for easy implementation and management of virtual DeltaV control systems for both off-line and on-line production systems. DeltaV Virtual Studio is used to create, modify, start, stop, and move DeltaV virtual machines. DeltaV Simulate Multi-node virtual workstations are easily created and assigned to host computers using DeltaV Virtual Studio.

DeltaV Simulate Multi-node virtual workstations are easy to create and implement using virtual machine templates. These templates allow you to easily add workstations from a single configuration dialog. Simply specify the host computer, enter a computer name, select the DeltaV workstation template, select the network connections from a drop down menu, and press OK. Within a few minutes the new DeltaV workstation will be automatically generated from a prebuilt template. For more information, see the product data sheet for DeltaV Virtual Studio.
Licensing
DeltaV Simulate consists of the following license options.

1. **DeltaV Simulate, or DeltaV SimulatePro Standalone.** A single PC license that can be used only in a training or development system. DeltaV DVDs and an access key are included so you may install DeltaV software on your PC. Communications to other DeltaV workstations or to DeltaV controllers is not supported.

2. **DeltaV Simulate Standalone with Basic SIS Simulation.** Provides all the capabilities of DeltaV Simulate Standalone plus simulation of up to 32 logic solvers assigned to a workstation; but does NOT include support for SIS Network OPC server.

3. **DeltaV Simulate ProfessionalPLUS Networked (PPN).** Same capabilities as DeltaV Simulate Standalone, but license enables communication with other DeltaV workstations and DeltaV controllers to form a multiple node training and development system.

4. **DeltaV Simulate Professional Station Networked (PSN).** The DeltaV Simulate PSN license allows you to perform engineering, configuration, and operations activities in a multi-node system. DeltaV Simulate PSN includes all of the base and optional software available on a normal Professional Station.

5. **DeltaV Simulate Operator Station Networked (OSN).** The DeltaV Simulate OSN license allows you to perform all operator activities in a multi-node system. Multiple OSN workstations allow you to simultaneously train multiple operators on the same process simulation system.

6. **DeltaV Simulate Application Station Networked (ASN).** The DeltaV Simulate ASN license includes all standard and optional components available for a normal on-line Application Station in an off-line Simulate Multi-node environment.

7. **DeltaV SimulatePro—Multi-node Add-on.** This license may be assigned in conjunction with DeltaV Simulate PPN or DeltaV Simulate ASN license. The SimulatePro capability enables more memory for module execution (of any type) and a user interface for coordination of module execution. SimulatePro also provides save, restore, speed-up, slowdown, playback, and simulation conversion functionality.

8. **DeltaV SIS SimulatePro — Add-on.** These licenses may be assigned in conjunction with DeltaV Simulate PPN, ASN, and Standalone licenses. The SIS SimulatePro capability enables simulation of up to 32 logic solvers for the assigned workstation, plus support for OPC access to logic solver I/O via a SIS Network OPC server. This add-on license does not include DeltaV SimulatePro add-on features which may be added separately.

Real DeltaV controllers and associated I/O hardware can be added to a DeltaV Simulate Multi-node system with no additional license. This includes classic, HART, Serial, and all supported bus I/O.

DeltaV controllers, I/O, and additional DeltaV workstations may not be used with either DeltaV Simulate Standalone or with DeltaV SimulatePro Standalone.

Related Products
- **DeltaV Virtual Studio** is an integrated DeltaV application environment designed for easy implementation and management of virtual DeltaV control systems for both off-line and on-line production systems. Virtual machine templates are provided for automatic generation and configuration of DeltaV workstations and controller hardware. **For more information, see product data sheet for DeltaV Virtual Studio.**

- **DeltaV Virtual S-series and M-series Controller Simulation.** For off-line use, virtual hardware controllers provide an effective way to checkout control configuration and I/O assignments for both classic I/O and CHARMS I/O cards. The virtual controllers can be named and configured the same as real controllers so that no configuration changes or module re-assignments are required. S-series and M-series controllers are supported for DeltaV v11.3.1, v12.3 and v12.3.1, and are available for both DeltaV Virtual Studio and VMware environments. **For more information see product data sheet for DeltaV Virtual S-series and M-series Controller Simulation.**

- **DeltaV Virtual CHARMS I/O Card Simulation.** Simulation of CHARMS I/O cards using virtual machines running in a workstation PC. Virtual CHARMS I/O cards function in DeltaV the same as real CHARMS I/O cards and can be used for rigorous checkout of I/O assignments, operator displays, and control functionality. **For more information, see product data sheet for DeltaV Virtual CHARMS I/O Card Simulation.**
## Product Specifications

<table>
<thead>
<tr>
<th>DeltaV Simulate Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Simulation scope: All DeltaV system features. The number of modules that may be executed in a single PC at one time is approximately equal to that which may be assigned to one MD controller.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Laptop or office PC</th>
<th>System Guidelines — Simulate Standalone*</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU</td>
<td>2.0 GHz dual core processor or better</td>
</tr>
<tr>
<td>Memory</td>
<td>Minimum: 4 GB</td>
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<tr>
<td>Display</td>
<td>Minimum: 1024 X 768 with 65K colors</td>
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<tr>
<td>Operating system</td>
<td>Windows XP Professional for v9.3 – v10.3</td>
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<td></td>
<td>Windows 7 32-bit Professional for v11.3</td>
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<tr>
<td></td>
<td>Windows 7 64-bit or 32-bit Professional for v12.3 (and virtualization)</td>
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<tr>
<td>Disk space</td>
<td>20 GB free space on Drive C before installing DeltaV Simulate</td>
</tr>
<tr>
<td>Ports</td>
<td>A USB port is required for the DeltaV Simulate system dongle (hardware key).</td>
</tr>
</tbody>
</table>

### SimulatePro Specifications

| Range of module execution speedup | 30X to 1/30, but no faster than 100 milliseconds. |
| Modules coordinated               | Those assigned to the Assigned Modules folder of the DeltaV Application Station or Professional PLUS Station on which the license is installed. The number of modules is limited only by the memory and processing power of the workstation. |

### Notes:

- All workstation hardware used in the DeltaV Simulate Multi-node environment must be purchased from Emerson Process Management.
- No hardware is included with DeltaV Simulate. Technical support is provided for 90 days from the date of delivery for questions related to the installation of DeltaV Simulate. Full Foundation Support Services are available for DeltaV Simulate to provide help-desk support and all DeltaV software upgrades released during the covered period.
- DeltaV Simulate may not be used in or be connected to any system involving a live process. It must be used only for software configuration development, process and control design, system operation checkout and training in a strictly off-line environment.

* DeltaV software is only tested and supported on DeltaV workstation PC’s. The guidelines provided are recommended specifications for using DeltaV Simulate Standalone on non-DeltaV workstation.
## Ordering Information

<table>
<thead>
<tr>
<th>Description: DeltaV Simulate—Single PC</th>
<th>Model Number</th>
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<tbody>
<tr>
<td>DeltaV Simulate, Standalone; for v12.3 and newer systems</td>
<td>VE9921R123L39</td>
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<tr>
<td>DeltaV SimulatePro, Standalone; for v12.3 and newer systems</td>
<td>VE9922R123L39</td>
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<tr>
<td>DeltaV Simulate, Standalone with Basic SIS Simulation; for v12.3 and newer systems²</td>
<td>VE9923R123L39</td>
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<td>DeltaV Simulate, Standalone; for pre-v12.3 systems</td>
<td>VE9921</td>
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<tr>
<td>DeltaV SimulatePro, Standalone; for pre-v12.3 systems</td>
<td>VE9922</td>
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<td>DeltaV Simulate, Standalone with Basic SIS Simulation; for pre-v12.3 systems</td>
<td>VE9923</td>
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<tr>
<td>DeltaV Simulate Standalone Virtual Machine for v12.3.1 – Media only¹</td>
<td>VX1020R1230</td>
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<td>DeltaV Simulate Standalone Virtual Machine for v11.3.1 – Media only¹</td>
<td>VX1020R1131</td>
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<td>DeltaV Simulate, ProfessionalPLUS Networked (PPN); for v12.3 and newer systems</td>
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<td>DeltaV Simulate, ProfessionalPLUS Networked (PPN); for pre-v12.3 systems</td>
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<td>DeltaV Simulate, Application Station Networked (ASN)</td>
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<th>Description: DeltaV SIS SimulatePro—Add-On²</th>
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<tr>
<td>DeltaV SIS SimulatePro —Full SIS Simulation Add-on for DeltaV Standalone (Add-on for VE9921 or VE9922)</td>
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<tr>
<td>DeltaV SIS SimulatePro —Full SIS Simulation Add-on for DeltaV Multi-Node (Add-on for VX2101 or VX2201)</td>
<td>VX3201</td>
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</table>

Note 1 – DeltaV Simulate Standalone Virtual Machine media includes all standalone versions (i.e., DeltaV Simulate, DeltaV SimulatePro, DeltaV SIS Simulate); No DeltaV Simulate Standalone licenses are included with media only; DeltaV licenses must be ordered separately. A Windows 7 Retail OS license is included for the virtual machine.

Note 2 - DeltaV SIS Simulate supports the DeltaV SIS Logic Solver SLS1508. DeltaV SIS Simulate does not support CHARMS Smart Logic Solver (CSLS) which is part of v12.3 DeltaV SIS with Electronic Marshalling. DeltaV SIS SimulatePro Add-on license does not include DeltaV SimulatePro features which may be purchased separately.