

SimPowerSystems Release Notes

The “SimPowerSystems 3.0 Release Notes” describe the changes introduced in SimPowerSystems since Version 2.3. The following topics are discussed in these Release Notes:

- “New Features” on page 1-2
- “Major Bug Fixes” on page 1-4
- “Upgrading from an Earlier Release” on page 1-5
- “Known Software and Documentation Limitations” on page 1-7

If you are upgrading from a release earlier than Release 13, you should also see the “SimPowerSystems 2.3 Release Notes” on page 2-1.

Note Previous versions of SimPowerSystems before Release 13 were called Power System Blockset.

Printing the Release Notes

If you would like to print the Release Notes, you can link to a PDF version.



SimPowerSystems 3.0 Release Notes

1

| | |
|---|-----|
| New Features | 1-2 |
| Terminal Ports and Connection Lines | 1-2 |
| Renamed SimPowerSystems Commands | 1-3 |
| Major Bug Fixes | 1-4 |
| FFT Block Input Ports | 1-4 |
| Synchronous Machine Block Parameter | 1-4 |
| Simplified Synchronous Machine Block Parameter | 1-4 |
| Upgrading from an Earlier Release | 1-5 |
| Converting Version 2 Models to Version 3 | 1-5 |
| Keeping Version 2 and Version 3 Blocks Separate | 1-5 |
| Building and Running Models with the Version 2 Library | 1-5 |
| Using the Version 2 Commands | 1-6 |
| Accessing the Version 2 Documentation | 1-6 |
| Known Software and Documentation Limitations | 1-7 |
| Discrete Simulation Mode Bug | 1-7 |
| Undocumented Extras Library Blocks | 1-7 |

SimPowerSystems 2.3 Release Notes

2

| | |
|---|-----|
| New Features | 2-2 |
| Simulation Enhancements with Phasors | 2-2 |
| Powergui Enhancements | 2-2 |
| Electrical Sources Library Enhancements | 2-2 |
| Elements Library Enhancements | 2-3 |
| Power Electronics Library Enhancements | 2-3 |
| Machines Library Enhancements | 2-3 |
| Extras Library Enhancements | 2-3 |

| | |
|--|------------|
| Major Bug Fixes | 2-4 |
| Parasitic Currents | 2-4 |
| | |
| Upgrading from an Earlier Release | 2-5 |
| Synchronous Machine Block Output | 2-5 |

SimPowerSystems 3.0

Release Notes

| | |
|--|------------|
| New Features | 1-2 |
| Terminal Ports and Connection Lines | 1-2 |
| Renamed SimPowerSystems Commands | 1-3 |
| | |
| Major Bug Fixes | 1-4 |
| FFT Block Input Ports | 1-4 |
| Synchronous Machine Block Parameter | 1-4 |
| Simplified Synchronous Machine Block Parameter | 1-4 |
| | |
| Upgrading from an Earlier Release | 1-5 |
| Converting Version 2 Models to Version 3 | 1-5 |
| Keeping Version 2 and Version 3 Blocks Separate | 1-5 |
| Building and Running Models with the Version 2 Library | 1-5 |
| Using the Version 2 Commands | 1-6 |
| Accessing the Version 2 Documentation | 1-6 |
| | |
| Known Software and Documentation Limitations | 1-7 |
| Discrete Simulation Mode Bug | 1-7 |
| Undocumented Extras Library Blocks | 1-7 |

New Features

This section summarizes the new features and enhancements introduced in SimPowerSystems 3.0 since Version 2.3 (Release 13).

If you are upgrading from a release earlier than Release 13, then you should also see “New Features” on page 2-2 in the SimPowerSystems 2.3 Release Notes.

Terminal Ports and Connection Lines

SimPowerSystems 3.0 introduces the terminal port, specific to the electrical domain of Physical Modeling and different from the Simulink input and output ports. It is represented on blocks by a small white square □. You can branch the electrical connection lines connecting such terminal ports. The electrical connection lines of the Physical Modeling domain, unlike Simulink signal lines, are intrinsically nondirectional.

Separating SimPowerSystems and Simulink Lines and Ports

In the previous versions of SimPowerSystems and Power System Blockset, the electrical block ports were modeled by Simulink input and output ports. The distinction between Simulink ports and electrical terminal ports is now clearly defined. You cannot connect terminal ports to Simulink input and output ports. For example, you cannot by mistake connect a Simulink Scope block directly to the phase terminals of a Synchronous Machine block.

You must also keep Simulink signal lines and SimPowerSystems electrical connection lines separate. You cannot connect one type of line to the other by branching.

Blocks That Interface Between Simulink and SimPowerSystems Domains

The blocks of SimPowerSystems 3.0 can have only terminal ports or only Simulink ports, or both types. Blocks such the Synchronous Machine block and the Thyristor block feature both port types. Such blocks serve as interfaces between the part of your model connected by Simulink signal lines and the part connected by electrical connection lines.

Renamed SimPowerSystems Commands

In SimPowerSystems 3.0, the analysis commands of earlier SimPowerSystems and Power System Blockset versions have been renamed.

power_analyze

`power_analyze` is the new name for the old `power2sys` command. With it, you can analyze models built with the new block library of SimPowerSystems 3.0.

You should use the `power2sys` command only for old models built with previous versions of SimPowerSystems or Power System Blockset. See “Using the Version 2 Commands” on page 1-6 for details about the use of the `power2sys` command in SimPowerSystems 3.0.

power_init

`power_init` is the new name for the old `powerinit` command. You use it exactly the same way you would use the `powerinit` command.

power_statespace

`power_statespace` is the new name for the old `circ2ss` command. You use it exactly the same way you would use the `circ2ss` command.

Major Bug Fixes

This section describes the important Version 3.0 bug fixes.

If you are upgrading from a release earlier than Release 13, see “Major Bug Fixes” on page 2-4 of the SimPowerSystems 2.3 Release Notes.

FFT Block Input Ports

The FFT block in the Discrete Measurements library of **powerlib_extras** now implements the FFT analysis for a vector signal of any number of components and is no longer limited to the analysis of three components. The number of input ports has been reduced to one vector input. If you used this block in your old models, you must use a Mux block to combine the three input signals into one vector signal.

Synchronous Machine Block Parameter

The parameter **F** of the Synchronous Machine block in the Machines library quantifies the machine’s friction factor. This parameter’s was not correctly described in previous releases. The block reference page has been corrected.

Simplified Synchronous Machine Block Parameter

The parameter **Kd** of the Simplified Synchronous Machine block in the Machines library quantifies the machine’s damping factor. This parameter’s role in the block was not correctly described in previous releases. The block reference page has been corrected.

Upgrading from an Earlier Release

This section presents issues involved in upgrading from SimPowerSystems 2.3 to SimPowerSystems 3.0.

If you are upgrading from a release earlier than Release 13, see “Upgrading from an Earlier Release” on page 2-5 of the SimPowerSystems 2.3 Release Notes.

Converting Version 2 Models to Version 3

SimPowerSystems 3.0 provides the `psbupdate` command to convert your old Version 2 models to the new block library and interface of Version 3. See the HTML or PDF forms of the special documentation for model conversion. If you are viewing these Release Notes in PDF form, note that the HTML form of the Release Notes provides links to both forms of the conversion guide.

Keeping Version 2 and Version 3 Blocks Separate

The Version 3 **powerlib** and Version 2 **powerlib2** block libraries form separate, parallel resources for creating power system models. These two block libraries and their interfaces are not compatible.

Building and Running Models with the Version 2 Library

For your convenience, you can open and simulate your old Version 2 models in Version 3.0 and obtain the same simulation results you would get with previous releases. You can also build new models with the old Version 2 block library, **powerlib2**.

You can access the Version 2 block library by entering `powerlib2` at the command line. It is strongly recommended, however, that you use the **powerlib** block library to take the full advantage of SimPowerSystems 3.0.

Note You cannot put Version 2 and Version 3 blocks in the same model file.

Using the Version 2 Commands

You can still use the analysis commands of earlier versions of SimPowerSystems and Power System Blockset with old models.

The `powerinit` and `circ2ss` commands are compatible with either Version 2 or Version 3 models.

The `power2sys` command can only be used to analyze Version 2 models. If you want to analyze Version 3 models, you must use the new `power_analyze` command.

Accessing the Version 2 Documentation

For your convenience, the documentation of SimPowerSystems 3.0 includes the old documentation of Version 2.3. This documentation is available in HTML format and PDF format. If you are viewing these Release Notes in PDF form, note that the HTML form of the Release Notes provides links to both forms of the old documentation.

You can also access the old Version 2.3 documentation from the special Version 2 model conversion chapter in the online Help. See “Converting Version 2 Models to Version 3” on page 1-5 preceding.

Known Software and Documentation Limitations

This section describes known software and documentation problems in Version 3.0.

Discrete Simulation Mode Bug

If you use the Three-Phase V-I Measurement block in a model and discretize the simulation with a Powergui block, you might encounter an initial invalid port dimension error. To work around this bug, close the error dialog and restart the simulation.

An example of this bug occurs in the power_dynamicload demo.

Undocumented Extras Library Blocks

All SimPowerSystems blocks have block mask descriptions and have been tested and validated. But many blocks in the Extras library do not have block reference pages in the user's guide. These blocks are listed here.

The Extras library blocks without block references pages are listed below. The blocks shown in bold have corresponding continuous blocks that are documented. The rest of the blocks are undocumented.

Active & Reactive Power (Phasor Type)

Bistable

Discrete Active & Reactive Power

Discrete Bistable

Discrete Butterworth Filter

Discrete Edge Detector

Discrete 1st-order Discrete Filter

Discrete Fourier

Discrete Gamma Measurement

Discrete Lead-Lag

Discrete Mean Value

Discrete Monostable

Discrete On/Off Delay

Discrete 1-phase PLL

Discrete PI Controller

Discrete PID Controller

Discrete PLL-Driven Fundamental Value

Discrete PWM Generator

Discrete Rate Limiter

Discrete RMS Value

Discrete Sample and Hold

Discrete 2nd-order Filter

Discrete 2nd-order Variable-Tuned Filter

Discrete Synchronized 6-Pulse Generator

Discrete Synchronized 12-Pulse Generator

Discrete 3-phase PLL

Discrete 3-phase PLL-Driven Positive-Sequence Active & Reactive Power

Discrete 3-phase PLL-Driven Positive-Sequence Fundamental Value

Discrete 3-phase Positive-Sequence Active & Reactive Power

Discrete 3-phase Positive-Sequence Fundamental Value

Discrete 3-phase Programmable Source

Discrete 3-phase PWM Generator

Discrete 3-phase Sequence Analyzer

Discrete 3-phase Total Power

Discrete Total Harmonic Distortion

Discrete 12-Pulse HVDC Control

Discrete Variable Frequency Mean Value

Discrete Variable Transport Delay
Discrete Virtual PLL
dq0-based Active & Reactive Power
Edge Detector
FFT
1st-order Filter
Monostable
On/Off Delay
1-phase PLL
Sample & Hold
2nd-order Filter
Sequence Analyzer (Phasor Type)
3-phase Active & Reactive Power (Phasor Type)
3-phase Instantaneous Active & Reactive Power
3-phase PLL

SimPowerSystems 2.3

Release Notes

| | |
|--|------------|
| New Features | 2-2 |
| Simulation Enhancements with Phasors | 2-2 |
| Powergui Enhancements | 2-2 |
| Electrical Sources Library Enhancements | 2-2 |
| Elements Library Enhancements | 2-3 |
| Power Electronics Library Enhancements | 2-3 |
| Machines Library Enhancements | 2-3 |
| Extras Library Enhancements | 2-3 |
| | |
| Major Bug Fixes | 2-4 |
| Parasitic Currents | 2-4 |
| | |
| Upgrading from an Earlier Release | 2-5 |
| Synchronous Machine Block Output | 2-5 |

New Features

This section summarizes the new features and enhancements introduced in SimPowerSystems 2.3 since Version 2.2 (Release 12.1).

Simulation Enhancements with Phasors

The SimPowerSystems 2.3 enables you to simulate almost any circuit with the phasor simulation feature. The simulation time is reduced dramatically with this method (the differential equations representing the network are replaced by a set of algebraic equations at a fixed frequency). The phasor simulation facilitates transient stability studies of multimachine systems. The Transient Stability of 2 Machines demo illustrates a phasor simulation.

Powergui Enhancements

The Powergui block features these new tools and enhancements:

- The Powergui block now replaces the old Discrete System block that was used in the previous versions to discretize models. The Discrete System block is still in the library for backward compatibility.
- The **Phasor simulation** feature is activated directly from the Powergui dialog. You specify in the dialog the frequency used during the simulation.
- The **Impedance vs Frequency Measurement** tool now displays the Bode plots directly in the Powergui dialog in order to limit the number of windows.
- The **FFT Analysis** tool is now available in the Powergui dialog. New parameters have been added to refine the calculations.
- A **Hysteresis Design** tool has been added to enable you to define and edit any hysteresis characteristics for use with the Saturable Transformer block.

Electrical Sources Library Enhancements

The Three-Phase Programmable Voltage Source block has been moved to the Electrical Sources library. This block implements a three-phase voltage source, with programmable time variation for the amplitude, phase, and frequency of the fundamental frequency, and two superposable harmonics.

Elements Library Enhancements

The following new blocks and enhancements have been added to the Elements library:

- The Three-Phase Dynamic Load block implements a three-phase dynamic load where the active power and reactive power can be programmed or controlled by external Simulink signals.
- The Zigzag Phase-Shifting Transformer block implements a three-phase transformer where you can specify the phase angle and phase shift.
- You can activate an optional hysteresis characteristic in the Saturable Transformer, Three-Phase Transformer (Two-Windings), and Three-Phase Transformer (Three-Windings) blocks.

Power Electronics Library Enhancements

The Three-Level Bridge block has been added to the Power Electronics library. You can use this block to model complex converter configurations

Machines Library Enhancements

The following new blocks and enhancements have been added to the Machines library:

- The Generic Power System Stabilizer and Multiband Power System Stabilizer blocks
- Four new measurements have been added to the Machine Measurement Demux block for use with the Synchronous Machine block. See “Synchronous Machine Block Output” on page 2-5 for a possible associated upgrade issue.

Extras Library Enhancements

The Static Var Compensator block has been added for use with the phasor solution in the Phasor Library.

Major Bug Fixes

The SimPowerSystems Version 2.3 includes one important bug fix made since Version 2.2.

Parasitic Currents

Parasitic currents no longer flow in Power Electronics blocks when the block is not conducting.

Upgrading from an Earlier Release

This section describes an upgrade issue involved in moving from the Power System Blockset 2.2 to SimPowerSystems 2.3.

Note SimPowerSystems will automatically update your Power System blocks when you save your model. If you are using a model that contains Power System blocks from a previous version of the blockset, simply save your model when you open it from the newer version.

Synchronous Machine Block Output

If you were using a Selector block in your Version 2.2 models to output the Synchronous Machine block measurements, you need to set the Selector block's **Input Port Width** parameter to the value 22. If you were using a Demux block, the number of elements in Demux is now 22. (It was previously 18.)

