

# SimPowerSystems Release Notes

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The “SimPowerSystems 2.3 Release Notes” on page 1-1 describe the changes introduced in SimPowerSystems, the renamed version of the Power System Blockset. The following topics are discussed in these Release Notes:

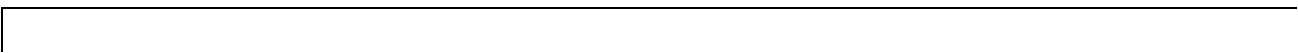
- “New Features” on page 1-2
- “Major Bug Fixes” on page 1-5
- “Upgrading from an Earlier Release” on page 1-6

If you are upgrading from a release earlier than Release 12.1, you should also see these sections:

- “Power System Blockset 2.2 Release Notes” on page 2-1
- “Power System Blockset 2.1 Release Notes” on page 3-1

## **Printing the Release Notes**

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



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# SimPowerSystems 2.3

## Release Notes

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## New Features

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

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

If you are upgrading from a release earlier than Release 12.1, then you should also see “New Features” on page 2-2 in the Power System Blockset 2.2 Release Notes.

### Simulation Enhancements

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.

### Electrical Sources Library Enhancements

The 3-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 3-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 1-6 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.

## 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.



## 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.

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**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.

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### 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.)

## **Known Software and Documentation Limitations**

### **Undocumented Blocks**

Many blocks in the Extras library do not have block reference pages in the User's Guide. All SimPowerSystems blocks have block mask descriptions, however.



# Power System Blockset 2.2 Release Notes

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## New Features

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**Note** Power System Blockset was renamed SimPowerSystems as of Release 13, Version 2.3.

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This section introduces the new features and enhancements added in the Power System Blockset Version 2.2 (Release 12.1) since the Power System Blockset Version 2.1 (Release 12.0).

For information about Power System Blockset features that are incorporated from recent releases, see “New Features” on page 3-2 in the Power System Blockset 2.1 Release Notes.

### **New Extras Library Documentation**

The Extras library of Power System Blockset 2.2 consists of miscellaneous, previously undocumented, power blocks. Fifteen of these blocks now have online block reference pages. The other blocks have short block descriptions or block documentation in their masks.

# Power System Blockset 2.1 Release Notes

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## New Features

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**Note** Power System Blockset was renamed SimPowerSystems as of Release 13, Version 2.3.

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This section introduces the new features and enhancements added in the Power System Blockset Version 2.1 since the Power System Blockset Version 1.1 (Release 11.0).

### Faster Circuit Topology Analysis

Power System Blockset now dramatically speeds up circuit topology analysis, allowing your power system simulations to start much more quickly. The blockset can now handle larger, more complex models with reduced simulation overhead.

### Simulation Enhancements

Powerful discretization features have been added to Power System Blockset. These can dramatically speed up your simulations – especially those with Power Electronics blocks.

- In addition to the continuous simulation of power systems, you can now also discretize your models, using the fixed-step trapezoidal method (illustrated in the Current Transformer Saturation demo). See the Powergui block in the Power System Blockset library for more information.
- You also now have – especially those with power electronics devices, the ability to generate code from discretized Power System Blockset models through Real-Time Workshop for even more simulation speed.

The forward voltage of discretized power electronic devices (e.g., diode, thyristor, IGBT, and GTO) is now simulated in all cases, including discrete and continuous (with  $L_{on}=0$ ).

### Elements Library Enhancements

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



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- The new 3-Phase Fault block implements a three-phase circuit breaker with external or internal control.
  - The new Three-Phase Transformer (Two Windings) and Three-Phase Transformer (Three Windings) blocks implement a three-phase transformer with a configurable phase connection.
  - The 3-Phase Breaker block now includes internal and external control.
  - You now have the option to specify two and three windings for the Universal Three-Phase Transformer block.
  - You now have the option to specify internal or external breaker timing for the Circuit Breaker block.

## Power Electronics Library Enhancements

The following new blocks have been added to the Power Electronics library:

- The Universal Bridge block allows continuous or discrete simulation of the three-phase bridges of diodes, thyristors, IGBT diodes, GTO diodes, or MOSFET diodes.
- The IGBT block implements a semiconductor device controllable by a gate signal.

## Machines Library Enhancements

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

- The Steam Turbine and Governor (STG) block and DC Machine block have been added.
- In all three Synchronous Machine blocks, a choice of **Rotor type** between Salient-pole or Round has been added.
- In both Simplified Synchronous Machine blocks, a choice of **Connection type** between three or four wires has been added. Use the 3-wire Y option to set the initial conditions with the Powergui dialog, then come back to the 4-wire Y option to simulate transients.
- For both Asynchronous Machine blocks, you can choose a **Reference frame** for the dq transformation.

## Measurements Library Enhancements

The following new block and enhancement have been added to the Measurements library:

- The Impedance Measurement block has been added (see the Linear Filter and the Single-Phase Line demos).
- You can now use the Multimeter block to measure the voltage, current, and flux of transformers without adding voltage or current measurement blocks (see the Three-Phase Saturable Transformer demo).

## Extras/Measurements Library Enhancements

The following new blocks have been added to the Extras/Measurements library:

- 3-Phase Sequence Analyzer
- Total Harmonic Distortion
- abc\_to\_dq0 Transformation
- dq0\_to\_abc Transformation

## Extras/Control Blocks Library Enhancements

The following new blocks have been added to the Extras/Control Blocks library:

- PWM Generator
- Synchronized 6-Pulse Generator
- Synchronized 12-Pulse Generator

## Extras/Discrete Control Blocks Library Enhancements

The following new blocks have been added to the Extras/Discrete Control Blocks library:

- Discrete Virtual PLL, Discrete 1-Phase PLL, and Discrete 3-Phase PLL
- Discrete Synchronized 6-Pulse Generator
- Discrete Synchronized 12-Pulse Generator
- Discrete 12-Pulse HVDC Control

- 
- Discrete 3-Phase Programmable Source

## **Powergui Enhancements**

The Power System Blockset 2.1 includes a redesigned Powergui block. You can now:

- Resize the Powergui dialog box windows
- Display phasor magnitude in peak or rms values

## **New Demos and Improved Documentation**

Several new demos have been added to the Demos library. The new demos illustrate multimeters, discretization, and several new blocks. Examples include the Complete 12-Pulse HVDC Transmission System and the Three-Phase Series Compensated Network demos.

The tutorial chapter of the Power System Blockset User's Guide has been expanded, including new test cases and an explanation of how to customize your blocks.

