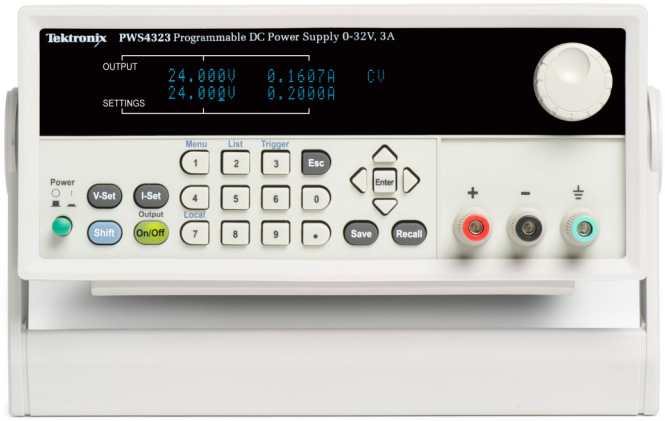
Programmable DC Power Supplies

Tektronix PWS4000 Series Data Sheet



Features & Benefits

Key Performance Specifications

- Linear Regulation
- Up to 72 V Output Voltage
- 0.03% Basic Voltage Accuracy
- 0.05% Basic Current Accuracy
- Less than 5 mV_{p-p} Ripple and Noise

Available Functions and Features

- Output Voltage, Current, and Limits Displayed Simultaneously on a Bright Display
- Up to 40 User-defined Setup Memories
- Direct Parameter Entry using Numeric Keypad
- Adjustable Overvoltage Protection
- List Mode for Stepping through Stored Test Sequences
- Remote Sense to Compensate for Lead Resistance

Connectivity

- Rear Outputs and Trigger/Status Lines
- USB Device Port on Rear Panel for Quick PC Connectivity and Remote Programming
- Includes National Instrument's LabVIEW SignalExpress™ Tektronix Edition Software for Connecting Your Bench

3-year Warranty

Tektronix®

Choose Your Voltage and Current – Quickly, Precisely

A wide current and voltage range, and flexible features, make the PWS4000 Power Supply Series a versatile addition to your bench. With 0.03% basic voltage accuracy and 0.05% basic current accuracy, you can be confident in the power supply's output value. Remote sense capability to eliminate the effect of voltage drop in your lead wires and noise of less than 5 mV_{p-p} further ensures accurate power delivery. List mode and a USB port for remote programming accelerate complex test development. The PWS4000 Power Supply Series generates the power you need for your application – quickly and precisely.

Total Control Over Your Output

All models of the PWS4000 Series include an overvoltage protection circuit that reduces the output voltage if it exceeds a user-specified threshold for any reason. The PWS4000 Series also allows you to prevent the voltage from being accidentally adjusted above a limit that you specify.

Setting an appropriate current limit can be critical for preventing damage to your device under test. With the PWS4000 numeric keypad, you can quickly and precisely specify a current limit before you start your test. The current limit is always visible on the display to keep you aware of this important setting. A user-definable password allows you to lock the front panel to prevent unwanted adjustments during critical tests.

Designed to Make Your Work Easier

The PWS4000 Power Supply Series is designed with the ease-of-use and familiar operation you expect from Tektronix.

Intuitive Operation

A rotary knob, with user-selectable step size, makes it easy to check circuit response to changing voltage or current. The direct-entry numeric keypad simplifies setting precise voltage and current values.

Bright Display

A bright vacuum fluorescent display provides excellent readability at a distance, at an angle, or under dim lighting conditions. Meter readings and limits are always visible. You don't need to push buttons just to see your limits.

Setup Memories

To save time when repeating tests, you can save your instrument settings in one of the 40 internal memory locations by simply pressing the Save button. Each time you want to recall that setting, just push the Recall button and choose the desired setup.

Accelerate Complex Test Development

The built-in List mode allows you to define a custom sequence of voltage and current steps for your test. You can define up to 7 lists, and each list can have up to 80 steps. Lists can be configured to step through the sequence based on external triggers or front-panel button presses. Alternatively, you can specify a duration for each step and the instrument will automatically step through the sequence. For even more flexibility, a USB device port on the back panel makes it easy to connect the power supply to your PC for remote programming.

Connect Your Bench for Intelligent Debug

You can use your preferred programming environment to control the PWS4000 using a USBTMC-compliant device port, or you can get quick results with the special Tektronix Edition of National Instrument's LabVIEW SignalExpress™ software. The PWS4000 Power Supply Series includes the Tektronix Edition of SignalExpress for basic instrument control, data logging, and analysis. The optional Professional Edition offers over 200 built-in functions that provide additional signal processing, advanced analysis, sweeping, limit testing, and user-defined step capabilities.

SignalExpress supports the range of Tektronix bench instruments*[1], enabling you to connect your entire test bench. You can then access the feature-rich tools packed into each instrument from one intuitive software interface. This allows you to automate complex measurements requiring multiple instruments, and easily capture and analyze your results, all from your PC. Only Tektronix offers a connected test bench of intelligent instruments to simplify and speed debug of your complex design.

Performance You Can Count On

In addition to industry-leading service and support, the PWS4000 Power Supply Series comes backed with a three-year standard warranty.

*[1] For a complete listing of Tektronix instruments supported by NI LabVIEW SignalExpress, visit www.tektronix.com/signalexpress.

Characteristics

Electrical

Specifications	PWS4205	PWS4305	PWS4323	PWS4602	PWS4721
DC Output Rating					
Voltage	0 to 20 V	0 to 30 V	0 to 32 V	0 to 60 V	0 to 72 V
Current	0 to 5 A	0 to 5 A	0 to 3 A	0 to 2.5 A	0 to 1.2 A
Maximum Power	100 W	150 W	96 W	150 W	86 W
Load Regulation					
Voltage			<0.01% + 2 mV		
Current	<0.05% + 0.1 mA	<0.05% + 1.5 mA	<0.05% + 0.1 mA	<0.05% + 0.5 mA	<0.05% + 0.5 mA
Line Regulation					
Voltage	<0.01 % + 1 mV	<0.01 % + 1 mV	<0.01 % + 1 mV	<0.01 % + 2 mV	<0.01 % + 1 mV
Current	<0.05 % + 0.1 mA	<0.05 % + 0.1 mA	<0.05 % + 0.1 mA	<0.05 % + 0.05 mA	<0.05 % + 0.1 mA
Ripple and Noise (20 Hz to 7 MHz)					
Voltage	<1 mV_{RMS} <3 mV_{p-p}	<1 mV_{RMS} <4 mV_{p-p}	<1 mV_{RMS} <4 mV_{p-p}	<1 mV_{RMS} <5 mV_{p-p}	<1 mV_{RMS} <3 mV_{p-p}
Current	<3 mA_{RMS}	<4 mA_{RMS}	<3 mA_{RMS}	<3 mA_{RMS}	<3 mA_{RMS}
Setting Resolution					
Voltage			1 mV		
Current			0.1 mA		
Setting Accuracy (using remote sense, 25 °C ± 5 °C)					
Voltage	±0.03% + 3 mV	±0.03% + 3 mV	±0.03% + 3 mV	±0.03% + 6 mV	±0.03% + 6 mV
Current	±0.05% + 2 mA	±0.05% + 2.5 mA	±0.05% + 2 mA	±0.05% + 1.5 mA	±0.05% + 1 mA
Readback Resolution					
Voltage			1 mV		
Current			0.1 mA		
Readback Accuracy (25 °C ± 5 °C)					
Voltage	±0.02% + 3 mV	±0.02% + 2.5 mV	±0.02% + 3 mV	±0.02% + 6 mV	±0.02% + 5 mV
Current	±0.05% + 2 mA	±0.05% + 2.5 mA	±0.05% + 2 mA	±0.05% + 1.5 mA	±0.05% + 1 mA
Voltage Transient Response – Settling Time					
Load Change	<400 µs to within 75 mV following a change from 0.1 A to 1 A				
Setting Change					
Rising	<35 ms from beginning of excursion to within 75 mV of terminal value following a change from 1 V to 11 V with a 1 A load (**Note**: Specification does not include command decode time)				
Falling	<35 ms from beginning of excursion to within 75 mV of terminal value following a change from 11 V to 1 V with a 1 A load (**Note**: Specification does not include command decode time)				
Overvoltage Protection					
Range (typical)	1 V to 19 V	1 V to 29 V	1 V to 31 V	1 V to 59 V	1 V to 71 V
Accuracy			±0.5% + 0.5 V		
Response time (typical)			<10 ms		

Display

Vacuum fluorescent display.

Memory

40 setup memories.

List Mode

Up to 7 lists can be defined, each with up to 80 steps. Each step includes a voltage limit and a current limit. For continuous sequences each step also includes a duration.

Rear-panel Connections

Characteristic	Description
Communications	USB Device Port, Type B connector, USBTMC compatible GPIB, optional (requires TEK-USB-488 GPIB to USB adapter)
Output, Sense, Status, and Control	Removable screw terminal block carries the following signals:
Output channel	Duplicates the front-panel outputs
Remote sense lines	Connection for remote sense
Control input	Multifunction TTL input which can function as a trigger input, output control line, or digital input
Status output	Multifunction TTL output which can function as a fault indication, or digital output

Power Source

Characteristic	Description
110 V AC Setting	99 V_{RMS} to 132 V_{RMS}
220 V AC Setting	198 V_{RMS} to 264 V_{RMS}
Frequency	50/60 Hz
Power Consumption	
PWS4205/4323/4721	350 VA
PWS4305/4602	500 VA

Physical Characteristics

Dimension	mm	in.
With Boot:		
Height	106	4.15
Width	242	9.52
Depth	384	15.12
Without Boot:		
Height	91	3.57
Width	218	8.55
Depth	362	14.24
Shipping Weight	**kg**	**lb.**
PWS4205	9.0	19.8
PWS4305	9.6	21.2
PWS4323	9.0	19.8
PWS4602	9.6	21.2
PWS4721	9.0	19.8
Net Weight	**kg**	**lb.**
PWS4205	7.3	16.0
PWS4305	7.3	16.0
PWS4323	7.3	16.0
PWS4602	7.0	15.3
PWS4721	7.3	16.0

Environmental and Safety

Characteristic	Description
Temperature	
Operating	0 °C to +40 °C
Storage	–20 °C to +70 °C
Relative Humidity (Noncondensing)	
Operating	5% to 95% relative humidity at up to +40 °C
Storage	5% to 95% relative humidity at up to +40 °C 5% to 60% RH above +40 °C up to +70 °C
Altitude	
Operating	Up to 2,000 m
Storage	Up to 4,000 m
Floating Voltage Rating	Up to 100 V (DC + peak AC) between earth ground and any output terminal
Electromagnetic Compatibility	European Union: EN 55011, Class A; IEC 61000-3-2; IEC 61000-3-3, IEC 61000-4-2, IEC 61000-4-3, IEC 61000-4-4, IEC 61000-4-5, IEC 61000-4-6, IEC 61000-4-8, IEC 61000-4-11 USA: FCC, CFR Title 47, Part 15, Subpart B, Class A Australia: EMC Framework, demonstrated per Emission Standard AS/NZS 2064 (Industrial, Scientific, and Medical Equipment)
Safety	European Union: Low Voltage directive 2006/95/EC; EN61010-1 2001 USA: Nationally recognized testing laboratory listing UL61010-1-2004 Canada: CAN/CSA C22.2 No. 61010-1 2004

Warranty

Three years.

Ordering Information

Models

Model	Description
PWS4205	Programmable DC Power Supply, 20 V, 5 A
PWS4305	Programmable DC Power Supply, 30 V, 5 A
PWS4323	Programmable DC Power Supply, 32 V, 3 A
PWS4602	Programmable DC Power Supply, 60 V, 2 A
PWS4721	Programmable DC Power Supply, 72 V, 1.2 A

PWS4000 Includes: Power supply, line cord, Quick Start User Manual, Traceable Certificate of Calibration, documentation CD (includes user manuals, programmer's manual, and technical reference), and National Instruments LabVIEW SignalExpress Tektronix Edition CD.

Note: Please specify power plug and preferred language option when ordering.

Optional Accessories

Accessory	Description
RMU2U*2	Rackmount Shelf Kit for 1 or 2 Units
386-7598-00	Rackmount Cosmetic Filler Panel

*2 PWS4000 Series power supplies require 3U of height in a rack. The instrument's height, without boots, is 3 mm greater than 2U and 42 mm less than 3U. Filler panel 386-7598-00 may be used to fill the 42 mm gap above power supplies.

Instrument Options

Power Plug Options

Option	Description
A0	North America
A1	Universal Euro
A2	United Kingdom
A3	Australia
A5	Switzerland
A10	China
A11	India
A12	Brazil

Language Options

Option	Description
L0	English
L1	French
L2	Italian
L3	German
L4	Spanish
L6	Portuguese
L7	Simplified Chinese
L8	Traditional Chinese
L9	Korean
L10	Russian

Service Options

Option	Description
C3	Calibration Service 3 Years
C5	Calibration Service 5 Years
CA1	Provides a single calibration event, or coverage for the designated calibration interval, whichever comes first
D1	Calibration Data Report
D3	Calibration Data Report 3 Years (with Option C3)
D5	Calibration Data Report 5 Years (with Option C5)
R5	Repair Service 5 Years

CE

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For Further Information. Tektronix maintains a comprehensive, constantly expanding collection of application notes, technical briefs and other resources to help engineers working on the cutting edge of technology. Please visit **www.tektronix.com**

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OCEAN CHIPS
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