

TM 500 / 5000

MODULAR TEST INSTRUMENTS

- PS 503A Triple Power Supply
- PS 5004 Programmable Precision Power Supply
- PS 5010 Programmable Triple Power Supply

TEGAM TM 500/5000 power supplies offer a broad range of output and limiting adjustments in extremely compact plug-in units. They allow a complete, custom-designed test system to fit neatly on a crowded workbench or in a system rack.

Several levels of performance give you the flexibility to configure the most cost-effective measurement system for a specific application. For ATE, where it is routinely necessary to observe a test system's performance at the limits of the supply voltage, programmability is a requirement. On the other hand, the non-programmable PS 503A is well suited for development breadboarding.

TEGAM's modular approach ensures versatility and convenience in your test system. TM 500/5000 power supplies can be rear-interfaced with other instruments to reduce front-panel clutter while providing capabilities not otherwise available.

For example, the output level can be monitored via the rear interface by a companion TM 500/5000 digital multimeter without the need for extra cabling at the front of the instruments. Remote sensing terminals available at the rear interface allow sensing of the applied voltage at the load, thereby minimizing the effects of loading on the supply.

Compact, Modular Power Supplies for Systems or Benchtop Testing

The single wide PS 5004 and two wide PS 5010 fit in a TM 5006A or TM 5003 mainframe. The manual PS 503A can be used in any TM 500/5000 mainframe. All modules, manual and programmable, are interchangeable within TM 5000 mainframes.

Whether it's a single plug-in unit or a complete measurement package, you can count on TEGAM to offer more in support of your purchase, including comprehensive manuals, applications assistance, updates and a worldwide service network.

Power Supply Comparison of Characteristics

	PS 503A	PS 5004	PS 5010
Number of Supplies	3	1	3
Floating Supplies	0 to +20 V 0 to -20 V 100 mA to 1 A ²	0 to 20 V 10 mA to 305 mA	0 to +32 V 0 to -32 V 50 mA to 1.6 A ¹
Logic Supply	5 V Nominal 1 A Max		+4.5 to +5.5 V 3 A Max
IEEE-488 Interface	No	Yes	Yes
Module Width	1	1	2

1. Limited to 48 W in high-current compartment or 24 W in standard compartments.
2. Limited to 40 W in high-current compartment or 15 W in standard compartments.



TEGAM

THE GLOBAL SOURCE FOR PROVEN TEST
AND MEASUREMENT TECHNOLOGY.

PS 503A Triple Power Supply

- Independent Controls
- Dual Tracking Voltage Control
- 0 to +20 V and 0 to -20 V at 1 A (in High-Power Compartment)
- Fixed Output 5 V at 1 A
- Remote Resistance Programming

The PS 503A Power Supply provides dual floating variable 20 V supplies, plus a fixed 5 V, 1 A supply. Features include superior tracking, over-voltage protection and remote resistance programming of voltage.

When operated in the high-power compartment of a TM 506A or TM 5006A mainframe, the PS 503A can provide up to 1 A from both of the 20 V supplies. A 0 to 40 V variable supply with up to 1 A of current can be configured by grounding one of the two outside terminals of the variable supplies.

The two variable supplies can be set individually, then varied in a tracked mode with a single control. In addition, the plus and minus floating outputs can be programmed remotely, by either voltage programming or resistance programming via the rear interface.

Specifications

Positive and Negative Floating Supplies

Range — 0 to +20 V and 0 to -20 V dc with respect to the common terminal or 0 to 40 V dc across the + and - terminals. Outputs can be varied independently or at a constant ratio.

Isolation — 350 V (dc + peak ac above ground).

Maximum Rated Current — 400 mA (1 A in high-power compartment) to +30°C derating to 300 mA (750 mA) at +50°C.

Tracking Mode Offset Error — If the two supplies are set independently to any given voltage ratio and then varied by use of the VOLTS DUAL TRACKING control, the two supplies will maintain the same voltage ratio as initially set within ± 50 mV.

Current Limit — Adjustable from <100 mA to 1 A (high-power compartment) or <40 mA to 400 mA (standard compartment) on each supply.

Load Regulation — Within 3 mV for 1 A change (high-power compartment) or 1 mV for 400 mA change (standard compartment).

PARD (Ripple and Noise) — 3 mV p-p or less at 1 A load (high-power compartment); 0.5 mV p-p or less at 400 mA load (standard compartment).

Stability — Typically (0.1% +5 mV) or less drift in 8 hours of constant line, load and temperature.

Indicators — Individual voltage indicators and current limiting indicators for both + and - supplies. Standard compartment (400 mA) indicator.

Logic Supply

Range — 5 V nominal, ± 0.25 V at 1 A.

Load Regulation — Within 100 mV with a 1 A load change.

Line Regulation — Within 50 mV for a 10% line voltage change.

PARD (Ripple and Noise) (1A) — 5 mV p-p or less, 20 Hz to 5 MHz.

Stability — Typically 30 mV or less drift in 8 hours.

Overload Protection — Automatic current limiting and over-temperature shutdown.

PS 5004 Programmable Precision Power Supply

- 0 to 20 V Floating Output
- 0.01% Accuracy
- 500 μ V/0.1 mA Resolution
- Constant Voltage or Constant Current with Autocrossover
- Voltage- and/or Current-Monitoring Display
- Remote Sensing

The PS 5004 Precision Power Supply provides high-resolution voltages and currents necessary in the characterization of transistor, IC and other semiconductor and hybrid circuits and in the operation of high performance strain gauges and other transducer systems. Its 0 to 20 V output is covered with coarse and fine adjustments to provide rapid setability and ± 500 μ V resolution without the necessity of changing ranges. Setability resolution over the GPIB is also ± 500 μ V. The supply output is available at the rear interface and the front-panel terminals. Overall accuracy is $\pm 0.01\% \pm 2$ mV.

The PS 5004 operates in either a constant-voltage or constant-current mode with autocrossover between the two. Front-panel annunciators indicate the mode at all times. The operating mode is also reported over the bus, and the PS 5004 can be programmed to assert SRQ when operating conditions cause it to change modes.

The internal 4 1/2-digit DVM measures and displays the actual output voltage, selected current limit or actual output current. The actual output voltage is shown even when the PS 5004 is operating in the current-limited or unregulated mode. Display resolution is 1 mV or 0.1 mA.

The buffered high-impedance sense terminals provide great flexibility in test systems where the supply output must pass through relay scanners or other resistive paths. This allows proper regulation of the supply with up to 3 Ω of resistance in either of the sense leads.

Specifications

Constant Voltage Mode

Range — 0 to 20 V in 0.5 mV steps.

Overall Accuracy (Total Effect) — $\pm(0.01\% + 2 \text{ mV})$ from +15°C to +30°C, derating to $\pm(0.035\% + 3 \text{ mV})$ at 0°C and +50°C.

Source Effect — 500 μV .

Load Effect — 1 mV for a no load to full load change in load current measured at sense terminals.

Step Size Accuracy — 0.5 mV $\pm 0.2 \text{ mV}$.

PARD¹ (Ripple and Noise) — <1 mV p-p, 10 Hz to 1 MHz; <3 mVp-p, 10 Hz to 5 MHz.

Load Transient Recovery^{1,2} — <200 μs to recover within 5.0 mV of final value for a 100 mA load change.

Isolation Voltage (Maximum Allowable Voltage Between Any Output or Sense Terminal and Chassis Ground) — 42 V (peak ac + dc).

Constant Current Mode

Range — 10 mA to 305 mA in 2.5 mA steps.

Overall Accuracy — $\pm(2\% + 5 \text{ mA})$.

Digital Meter

Configuration — True 4 1/2-digit free running voltmeter. Meter can be selected by front-panel controls or via GPIB to monitor output voltage, current or current limit setting. Measurements are displayed on the front panel and are available over the GPIB.

Resolution — 1 mV or 0.1 mA.

Accuracy — Output voltage: $\pm(0.15\% + 6 \text{ mV})$; Output current: $\pm(1.5\% + 1 \text{ mA})$; Current limit: $\pm(1.5\% + 5 \text{ mA})$.

Reading Rate — $\approx 5/\text{s}$.

Other Specifications

Power Consumption — 35 VA Maximum.

IEEE 488.1-1987 Interface Function Subsets Implemented — SH1, AH1, T6, L4, SR1, RL1, PP0, DC1, DT1, C0.

Power Module Compatibility — A TM 5000 mainframe is required to operate the PS 5004.

¹ Characteristic measured at front-panel terminals without using remote sense.

² Without external energy storage components.

PS 5010 Programmable Triple Power Supply

- Dual Floating Supplies 0 to 32 V, to 0.75 A (1.6 A to 15 V)
- Logic Supply 4.5 to 5.5 V, to 3 A
- 0.5% Accuracy
- Programmable Current Limits
- Three Independent Digital Displays
- Automatic Crossover

The PS 5010 Triple Programmable Power Supply offers a complete and rapid high-performance solution for many system power-supply applications. Its three supplies provide the most commonly used voltages, and the three digital displays automatically indicate all six voltage- and current-limit parameters. Automatic crossover from voltage to current limit and a powerful set of GPIB status reporting messages keep you constantly aware of the instrument's status.

The PS 5010's dual floating supply provides 0 to +32 V and 0 to -32 V, both with respect to a common front-panel terminal; or 0 to 64 V across the terminals of both supplies together with current up to 0.75 A throughout the total voltage

range and 1.6 A below 15 V. The logic supply provides 4.5 to 5.5 V with respect to ground, with current to 3 A. The three supplies can be independently programmed for voltage and current limits.

The PS 5010's microprocessor monitors the voltage and feedback loops of each supply, so a simulation of true DMM output monitoring of all supplies is possible. This allows each display to automatically indicate the appropriate voltage or current limit which will be the true output voltage or current of that supply. Whenever a load change causes a supply to change modes from constant voltage to constant current (or vice-versa), the display also changes to show the known current or voltage value. This condition can be reported over the bus via an interrupt when the PS 5010 is in a remote state.

Specifications

Positive and Negative Floating Supplies

Configuration — Dual floating with shared common terminal.

Constant Voltage Mode

Range — 0 to +32 V; 0 to -32 V.

Accuracy — $\pm(0.5\% + 20 \text{ mV})$ overall; $\pm(0.01\% + 2 \text{ mV})$ line regulation.

Load Effect (Load Regulation) — $\pm 10 \text{ mV}$ for 1A load current change (1 mV when using rear interface output with remote sensing).

PARD (Ripple and Noise) — 10 mV p-p; 20 Hz to 20 MHz.

Step Size Accuracy — 10 mV step, $\pm 10 \text{ mV}$ (typ $\pm 2 \text{ mV}$) to 10 V; 100 mV step, $\pm 40 \text{ mV}$ (typ $\pm 10 \text{ mV}$) >10 V.

Load Transient Recovery — 500 μs to recover within 20 mV of nominal value for a 1A change.



Voltage Change Response Time — 1 ms for up or down change with max load, 20 ms for down change with no load.

Isolation (Vdc + peak ac) — 150 V peak front panel, 42 V peak from rear interface, 0.015 μ F typical shunt capacitance to ground.

Constant Current Mode

Range — 50 mA to 0.75 A (1.60 A at 15 V and below) in high-power compartment; 50 mA to 400 mA (0.75 A at 15 V and below) in two standard power compartments.

Accuracy — $\pm(5\% + 20 \text{ mA})$ overall; $\pm 1 \text{ mA}$ line regulation; $\pm 10 \text{ mA}$ load regulation. Output impedance is typically 5 k Ω shunted by 20 μ F.

PARD (Ripple and Noise) — 10 mA p-p, 5 mA RMS, 20 Hz to 20 MHz.

Current Change Response Time — 20 ms up or down.

Step Size Accuracy — 50 mA step, $\pm 15 \text{ mA}$.

Logic Supply Constant Voltage Mode

Range — +4.50 to +5.50 V, ground referenced.

Accuracy — $\pm 50 \text{ mV}$ overall; $\pm 1 \text{ mV}$ line regulation.

Load Effect (Load Regulation) — $\pm 10 \text{ mV}$ for 1 A load current change (1 mV when using rear interface output with remote sensing).

PARD (Ripple and Noise) — 10 mV p-p, 20 Hz to 20 MHz.

Step Size Accuracy — 10 mV step, $\pm 10 \text{ mV}$ (typ $\pm 2 \text{ mV}$).

Load Transient Recovery — 500 μ s to recover within 20 mV of nominal value.

Logic Supply Constant Current Mode

Range — 100 mA to 3.0 A (Foldback characteristic below 4.5 V, max short circuit current is $< 1.5 \text{ A}$).

Accuracy — $\pm(5\% + 20 \text{ mA})$.

Step Size Accuracy — 100 mA step, $\pm 30 \text{ mA}$.

Scaled Current Output — 10 mA $\approx 1 \text{ mV}$ $+(2\% + 2 \text{ mV})$ available at rear interface (not ground referenced).

Overvoltage Protection — SCR crowbar typically trips at 6 to 7 V.

Other Specifications

Power Consumption — 250 VA maximum in high-power compartment, 200 VA in standard compartment.

IEEE-488.1-1987 Interface Function

Subsets Implemented — SH1, AH1, T6, L4, SR1, RL1, PP0, DC1, DT1, C0.

Power Module Compatibility — A TM 5000 mainframe is required to operate the PS 5010.

Ordering Information

PS 503A Triple Power Supply

Includes: Instruction Manual (070-1834-01)

PS 5004 Prgm. Precision Power Supply

Includes: Instruction Manual (070-4442-00), Instrument Interfacing Guide (070-4789-00), Reference Guide (070-4596-00)

PS 5010 Prgm. Triple Power Supply

Includes: Instruction Manual (070-3391-00), Instrument Interfacing Guide (070-4610-00), Reference Guide (070-3402-00)

TM 502A	2 Wide Power Module Mainframe
TM 502A/TB	TM 502A w/Tool Box Plug-In
TM 503B	3 Wide Power Module Mainframe
TM 5003	3 Wide Power Module Mainframe, GPIB
TM 5003/RI	TM 5003 w/Rear Interface
TM 5006A	6 Wide Power Module Mainframe, GPIB
TM 5006A/R	TM 5006A w/Rack Mount

TM 5006A/RI	TM 5006A w/Rear Interface
TM 5006A/R/RI	TM 5006A w/Rack Mt & Rear Interface
TM 5006A/EMC	TM 5006A w/EMC Shielding

Mainframe Power Plug Options

Standard	120V North American
UE220	220V Universal Euro & Switzerland
UK240	240V United Kingdom
A240	240V Australian
NA240	240V North American
S220	220V Switzerland

Warranty

One year on materials and workmanship.

Calibration Documentation

Contact TEGAM for OPTION Z540 NIST Traceable Compliance Certificate and Test Data.

Calibration & Technical Services

For warranty and remedial repair, calibration services and spare parts, or for additional information on TEGAM sales and service offices around the world, contact us at 440-466-6100 (ph) or 440-466-6110 (fx).



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