

SPECIFICATION

Introduction

This PS 5010 Programmable Power Supply provides a floating dual supply and a ground referenced logic supply. Each supply has independent constant voltage or constant current modes with automatic crossover.

The floating supply provides 0 to +32 Vdc and 0 to -32 Vdc, both with respect to a common front panel terminal. All floating supply terminals may be elevated above ground to a maximum 150 V peak. Voltages from 0 to 64 V are available across the dual supply terminals. When the PS 5010 is installed in a TM 5000 series power module with one high power compartment, currents to 750 mA (from 0 to 32 V) and 1.6 A (from 0 to 15 V) are available. When the PS 5010 is installed in two low power compartments of the TM 5000 series power module, currents to 400 mA (from 0 to 32 V) and 750 mA (from 0 to 15 V) are available. The floating supplies are programmable in increments of 10 mV from 0 to 10.0 V and in increments of 100 mV from 10.1 V to 32.0 V. The current is programmed in 50 mA increments from 50 mA to 1.6 A.

The logic supply provides 4.5 Vdc to 5.5 Vdc at currents to 3 A. The logic supply is programmable in increments of 10 mV from 4.50 V to 5.50 V and in current increments of 100 mA over a range of 100 mA to 3.0 A.

The front panel LED display is divided into three sections. Each section indicates the programmed current or voltage for one supply. Each display contains a three digit segmented numeric LED display and two separate LEDs. These LEDs are located at the bottom of the numeric displays. They indicate whether voltage or current is being displayed.

In the operating mode, the displays show the true output voltage in constant voltage mode or current in the constant current mode. Since the display parameter changes with the automatic crossover the displays always indicate the true output values.

Complete information for programming the PS 5010 via the GPIB is found in the Programming section of this manual. A sample program is provided in the Programming section to verify the operation of the instrument on the GPIB.

NOTE

The PS 5010 operates only in a TM 5000 series power module.

IEEE 488 (GPIB) Function Capability

The PS 5010 is programmable via the digital interface specified in IEEE Standard 488-1978, "Standard Digital Interface for Programmable Instrumentation". In this manual, the interface is commonly called the General Purpose Interface Bus (GPIB).

The IEEE Standard identifies the interface function repertoire of an instrument on the GPIB in terms of interface function subsets. The subsets are defined in the standard. The subsets that apply to the PS 5010 are listed in Table 1-1.

Table 1-1
IEEE 488-1978
INTERFACE FUNCTION SUBSETS

Function	Subset	Capability
Source Handshake	SH1	Complete.
Acceptor Handshake	AH1	Complete.
Basic Talker	T6	Responds to Serial Poll.
Basic Listener	L4	Unlisten if My Talk Address (MTA) is received.
Service Request	SR1	Complete.
Remote-Local	RL1	Complete.
Parallel Poll	PP0	Does not respond to Parallel Poll.
Device Clear	DC1	Complete
Device Trigger	DT1	Complete.
Controller	C0	No controller function.

Performance Conditions

The electrical characteristics in this specification are valid only if the PS 5010 has been adjusted at an ambient temperature between +20°C and +30°C. The instrument must be in a noncondensing environment whose limits are described under the environmental part. Allow twenty minutes warm-up time for operation to specified accuracy; sixty minutes after exposure to or storage in a high humidity (condensing) environment. Any conditions that are unique to a particular characteristic are expressly stated as part of that characteristic.

The electrical and environmental performance limits, together with their related validation procedures, comprise a complete statement of the electrical and environmental performance of a calibrated instrument.

Items listed in the Performance Requirements column of the Electrical Characteristics are verified by completing the Performance Check in the Calibration section of this manual. Items listed in the Supplemental Information column are not verified in this manual.

Table 1-2
ELECTRICAL CHARACTERISTICS

Characteristics	Performance Requirements	Supplemental Information
POSITIVE and NEGATIVE FLOATING SUPPLIES		
Configuration		Dual floating supplies with shared common terminal. Independent constant voltage or constant current modes with automatic crossover.
Constant voltage mode		
Range		
Positive supply	0 to +32.0 V	
Negative supply	0 to – 32.0 V	
Step size (resolution)	10 mV \pm 10 mV to 10.0 V	Typically 10 mV \pm 2 mV at 20°C to 30°C.
	100 mV \pm 40 mV above 10.1 V	Typically 100 mV \pm 10 mV at 20°C to 30°C.
Overall accuracy (total effect)	\pm (0.5% + 20 mV)	Measured at front panel output terminals.
Source effect (line regulation)	(0.01% + 2 mV)	
Load effect (load regulation)	10 mV for a 1 A change in load current	
	1 mV when using rear interface output connections with remote sensing.	Maximum allowable combined voltage drop in output leads is 500 mV. This may be less when output conditions exceed 14.5 V and 1.3 A at low line. Maximum allowable combined sense line resistance is 400 m Ω .
Drift		Typically <(0.1% + 2 mV) for 8 hours.
Temperature coefficient		Typically <(0.01% + 0.1 mV)/°C
PARD (ripple and noise)	10 mV peak-to-peak, 1 mV rms	20 Hz to 20 MHz measured at front panel.
Load transient recovery	500 μ s to recover within 20 mV of nominal value	For a 1A change measured at the front panel.

Table 1-2 (cont)

Characteristics	Performance Requirements		Supplemental Information
POSITIVE and NEGATIVE FLOATING SUPPLIES (cont)			
Voltage change response time	No load	Max load	
Up	1 ms	1 ms	
Down	20 ms	1 ms	
Constant current mode			
Range			
High power compartment	50 mA to 0.750 A (1.60 A at 15 V and below)		
Standard compartment	50 mA to 400 mA (0.750 A at 15 V and below)		
Step size (resolution)	50 mA \pm 15 mA		
Overall accuracy	\pm (5% + 20 mA)		
Source effect (line regulation)	1 mA		
Load effect (load regulation)	10 mA		Output impedance is typically 5 k Ω shunted by 10 μ F.
Drift			Typically <(0.5% + 5 mA) for 8 hours.
Temperature coefficient			Typically <(0.1% + 1 mA)/ $^{\circ}$ C
PARD (ripple and noise)	10 mA peak-to-peak, 5 mA rms		20 Hz to 20 MHz measured at front panel output terminals.
Current change response time			
Up	20 ms		
Down	20 ms		
Isolation voltage (maximum allowable voltage on any terminal with respect to ground)			
Front panel operation			150 V peak
Rear interface operation			42 V peak
Typical shunting capacitance between floating supplies and ground			0.015 μ F
Output on-off response time			Typically 12 ms
Programming Time			
GET time			
Without output on-off change			10 ms typical
With output on-off change			30 ms typical

Table 1-2 (cont)

Characteristics	Performance Requirements	Supplemental Information
LOGIC SUPPLY		
Configuration		Single supply with negative terminal internally connected to chassis ground. Constant voltage mode with current limit and automatic crossover. Foldback current limiting starts below 4.5 V.
Constant voltage mode		
Voltage range	4.50 to 5.50 V	Ground referenced
Voltage step size	10 mV \pm 10 mV	
Overall accuracy	\pm 50 mV	
Source effect (line regulation)	1 mV	
Load effect (load regulation)	10 mV for a 1 A change in load current 1 mV when using rear interface output with remote sensing	Maximum allowable combined voltage drop in output leads is 500 mV. Maximum allowable combined sense line resistance is 400 m Ω .
Drift		Typically <5 mV/hour
Temperature coefficient		Typically 500 μ V/ $^{\circ}$ C
PARD (ripple and noise)	10 mV peak to peak, 2 mV rms	20 Hz to 20 MHz measured at front panel output terminals.
Transient recovery	500 μ s to within 20 mV of nominal value.	
Current limit		
Range	100 mA to 3.0 A	Foldback characteristic below 4.5 V. Maximum short circuit output current is <1.5 A.
Step size	100 mA \pm 30 mA	
Accuracy	\pm (5% + 20 mA)	
Scaled current out (rear interface only)		
Scale factor	10 mA = 1 mV \pm (2% + 2 mV)	Not ground referenced. Requires two terminal measurement.
Output impedance		1k Ω
Programming time		
GET time		
Without output on-off change		3 ms typical
With output on-off change		35 ms typical
Overvoltage protection		SCR crowbar. Typically trips at 6 V to 7 V.

Table 1-2 (cont)

Characteristics	Description
MISCELLANEOUS	
Fuse Data	
25 Vac input from power module	2 ea 2.5 A medium blow, 3 AG, 125 V 2 ea 1.6 A, slow blow, 3 AG, 250 V
+26 Vdc from power module	1 A, fast blow, 3 AG, 250 V
−26 Vdc from power module	1 A, fast blow, 3 AG, 250 V
+8 Vdc from power module	6 A, fast blow, 3 AG, 250 V
Logic supply output	6 A, fast blow, 3 Ag, 250 V
Power consumption	250 VA maximum in high power compartment, 200 VA in standard compartment
Calibration interval	1000 hours or 6 months whichever occurs first
Warm-up time	20 minutes

Table 1-3
ENVIRONMENTAL CHARACTERISTICS^a

Characteristics	Description	
Temperature	Meets MIL-T-28800B, class 5.	
Operating	0°C to +50°C	
Nonoperating	–55°C to +75°C	
Humidity	95% RH, 0°C to 30°C 75% RH, to 40°C 45% RH, to 50°C	Exceeds MIL-T-28800B, class 5.
Altitude	Exceeds MIL-T-28800B, class 5.	
Operating	4.6 Km (15,000 ft)	
Nonoperating	15 Km (50,000 ft)	
Vibration	0.38 mm (0.015 in) peak to peak, 5 Hz to 55 Hz, 75 minutes.	Meets MIL-T-28800B, class 5, when installed in qualified power modules. ^b
Shock	30 g's (1/2 sine) 11 ms duration, 3 shocks in each direction ^d along 3 major axes, 18 total shocks.	Meets MIL-T-28800B, class 5, when installed in quali- fied power modules. ^b
Bench handling ^c	12 drops from 45°, 4 inches or equilibrium, whichever occurs first.	Meets MIL-T-28800B, class 5, when installed in quali- fied power modules. ^b
Transportation ^c	Qualified under National Safe Transit Association Preshipment Test Procedures 1A-B-1 and 1A-B-2.	
EMC ^e	Within limits of F.C.C. Regulations, Part 15, Subpart J, Class A; VDE 0871; and MIL-461A tests RE01, RE02, CE01, CE03, RS01, RS03, CS01, and CS02.	
Electrical discharge	15 kV maximum charge applied to instrument case.	

^a With power module.^b Refer to TM 5000 power module specifications.^c Without power module.^d Requires retainer clip in plug-in exit direction.^e System performance subject to exceptions of power module or other individual plug-ins.

Table 1-4
PHYSICAL CHARACTERISTICS

Characteristics	Description
Maximum overall dimensions	
Height	126.0 mm (4.96 in)
Width	134.47 mm (5.29 in)
Length	285.37 mm (11.24 in)
Net weight	≈27 kg (6 lbs)
Finish	Laminated polycarbonate front panel with anodized aluminum chassis.
Enclosure type and style per MIL-T-28800B	
Type	III
Style	E (style F in rackmount power modules)