

Programming Manual

1696B Series

Programmable DC Power Supplies



1696B Series Programming Manual Contents

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SCPI Syntax

SCPI(Standard Commands for Programmable Instruments) is standard programmable commands to use in controlling measurement devices. The standard commands is based on ASCII command language.

Basic Syntax explanation:

- Command syntax** Each command in SCPI is defined in Upper case and lower case part. The upper case part is mandate and lower case part is optional.
e.g. “VOLTage?” is same as “VOLT?”
SCPI command is not case sensitive. It means “VOLTage?” is same as “VOLTAGE?” and “voltage?” during communication.
- Square bracket []** - The command in bracket is optional.
e.g. “[:SOURce]VOLTage?” can be replaced by
“VOLTage” The [:SOURce] is skipped.
- Angle bracket < >** - Indicate this is parameter for command. For example “VOLTage <value>”, it means the VOLTage need to pass a value.
e.g. VOLTage 5V

e.g. Command “[:SOURce]VOLTage[:LEVel][:IMMediate][:AMPLitude]?” can be write as “volt?”

Remark: It need “\n” at the end of each command for power supply. e.g. “volt?\n”

General SCPI Command list

Set and read output Voltage

[[:SOURce]VOLTage[:LEVel][:IMMEDIATE][:AMPLitude]
<value> Description: Set output voltage, (Unit: V or mV) Return Value: none
Example: "VOLT 1.00V"
means set output voltage to 1.00V

[[:SOURce]VOLTage[:LEVel][:IMMEDIATE][:AMPLitude]?
Description: Read output voltage setting
Return Value: set value of out voltage in Volt.
Example: "VOLT?"
return "1.00V"
means the output voltage is set to 1.00V

Set and read output Current limit

[[:SOURce]CURRent[:LEVel][:IMMEDIATE][:AMPLitude]
<value> Description: Set output current limit. (Unit: A or mA)
Return Value: none
Example: "CURR 1.00A"
means set output current limit to 1.00A

[[:SOURce]CURRent[:LEVel][:IMMEDIATE][:AMPLitude]?
Description: Read output current limit setting
Return Value: set value of out current limit in Amp.
Example: "CURR?"
return "1.00A"
means the output current limit is set to 1.00A

Read actual output voltage

MEASure[:SCALar]:VOLTage[:DC]? Description:
Read the actual output voltage. Return Value:
actual value of output voltage in Volt. Example:
"MEAS:VOLT?"
return "5.00V"
means the actual output voltage is 5.00V

Read actual output current

MEASure[:SCALar]:CURRent[:DC]? Description:

Read the actual output current. Return Value:

actual value of output current in Amp. Example:

“MEAS:CURR?”

return “1.00A”

means the actual output current is 1.00A

Read actual output power

MEASure[:SCALar]:POWER[:DC]?

Description: Read the actual output power

Return Value: actual value of output power in Watt

Example: “MEAS:POW?”

return “20.00W”

means the actual output power is 20.00W

Set and read Upper Voltage Limit(UVL)

[:SOURce]VOLTage:LIMit <value>

Description: Set Upper Voltage Limit value

Return Value: none

Example: “VOLT:LIM 5.00V”

means set UVL to 5.00V

[:SOURce]VOLTage:LIMit?

Description: Read Upper Voltage Limit setting

Return Value: set value of Upper Voltage Limit

Example: “VOLT:LIM?”

return “5.00V”

means set value of UVL is 5.00V

Read Upper Current Limit(UCL)

[:SOURce]:CURRent:LIMit?

Description: Read Upper Current Limit setting

Return Value: set value of Upper Current Limit

Example: “CURR:LIM?”

return “1.00A”

means set value of UCL is 1.00A

Set and read output ON/OFF status

OUTPut[:STATe] <bool>

Description: Set output ON/OFF. <bool> = 0|1|ON|OFF

Return Value: none

Example: "OUTP 0" or "OUTP ON"
means set OUTPUT to ON

OUTPut[:STATe]?

Description: Read output ON/OFF status

Return Value: return 0|1

Example: "OUTP ?"
return "0"
means the output is ON

Set and read value of 9 preset programs

SYSTem:PRESet# <value1>, <value2>

Description: Set voltage and current of preset program #. # is between 1 to 9. Voltage value unit is V|mV and Current value unit is A|mA Return Value: none

Example: "SYST:PRES3 5.00V, 1.00A"
means set preset program 3 to 5.00V and 1.00A

SYSTem:PRESet#?

Description: Read voltage and current of preset program#. # is between 1 to 9.

Return Value: return set value of voltage and current of preset program #

Example: "SYST:PRES4?"
return "10.00V, 2.00A"
means the set value of preset program 4 is 10.00V and 2.00A

Read SCPI version and Serial number

SYSTem:VERSion?

Description: read SCPI version

Return Value: "YYYY.V", YYYY is year, V is version.

Example: "SYST:VER?"

return "1999.0"

means year 1999, version 0

SYSTem:SN?

Description: Read Serial Number

Return Value: Serial number of power supply

Example: "SYST:SN?"

return "2015091813"

Read Identity of power supply

***IDN?**

Description: Read identity of power supply

Return Value: "Manufacturer Name, Model, S/N, Software Version"

Example: "*IDN?"

return "B&K Precision,169XB,XXXXXXXXXX, 01-01"

Internal Program Operation commands

Introduction of Internal Programs

The power supply has 20 points internal program which customer can be define. These program can be run in defined number of cycles.

Set number of points and cycle to run

PROG:LEVel <Value1> <Value2>

Description: Set number of points to run and number of cycle to run. <Value1> is range of points to be run. Its value range from 2~20. The starting point should be from point 1.

<Value2> is cycle time from 0~9999. 0 means run forever. Return Value: none

Example: "PROG:LEV 2,9999"

means run points 1 to 2 and 9999 cycl

Read number of points and cycle to run setting

PROG:LEVel?

Description: Read setting of number of points to run and number cycle to run

Return Value: return number of points and number of cycle

Example: "PROG:LEVel?"

Return Value:2,9999

means point 1 to 2 and run 9999 cycle

Edit value for internal program

PROG:DATA# <value1>,<value2>,<value3>

Description:Edit value for program #.If # is ignored, it use point defined in

PROG:LEVel. <value1> is Voltage value with unit V|mV. <value2> is Current value with unit A|mA. <value3> is run duration with unit S. Return Value: none

Example: "PROG:DATA2 5.00V, 2.00A, 35S"

means set program 2 to 5V, 2A and duration 35s

Read set value of internal program

PROG:DATA#?

Description: Read set value of internal program #. # is between 0~19

Return Value: return set value of Voltage, Current and Duration of program #

Example: "PROG:DATA1?"

return "5.00V, 1.00A, 15S"

means the program 1 has set 5.00V, 1.00A and duration 15S

Start to run of internal program

PROG:STARt

Description: Start running of internal program.

Return Value: none

Example: "PROG:STAR"

means run from program 1 to program 5 for 100 cycles.

Stop the current running internal program

PROG:STOP

Description: Stop the current running internal program.

Return Value: none

Example: "PROG:STOP"

Proprietary Command Set

These commands are used when SCPI is disabled in the power supply. See the 1696B Series user manual for instructions on how to disable SCPI.

Notes:

{ }- command data, [] - return data, [OK] = "OK", [CR] = 0dh
 ???? = 30h, 30h, 30h, 30h - 39h, 39h, 39h, 39h (4 bytes data)
 ??? = 30h, 30h, 30h - 39h, 39h, 39h (3 bytes data)
 ?? = 30h, 30h - 39h, 39h (2 bytes data)
 <address> 30h, 30h - 3fh, 3fh (2 bytes data).

- Anything in **BLUE** colors indicate the command string to send to the instrument
- Anything in **RED** colors indicate the return string that returns immediately after the associated command string is sent.

Command Protocol	Description	Example (address = 00)
SESS <address><CR> [OK][CR]	Disables front panel keypad and sets power supply into remote mode	SESS00 <CR>
ENDS <address><CR> [OK][CR]	Enables front panel keypad and sets power supply into local mode	ENDS00 <CR>
Setting up communication		
CCOM <address><RS>{000-256}<CR> [OK][CR]	<RS> = 1 for RS485	CCOM001002 <CR> Note: This will set supply into RS485 mode with address set to 002.
GCOM <address><CR> [OK][CR]	Gets the RS485 address configured on the power supply.	GCOM00 <CR>

Setting up power supply parameters

VOLT<address><voltage><CR> [OK][CR] Note: <voltage> = 010 to XXX where XXX is the maximum voltage rated by the power supply. Format: XX.X V i.e. 234 = 23.4 V Minimum value: 010 -> 1.0 V (decimal point does not change)	Sets the voltage output of the power supply.	VOLT00123<CR> Note: This will set voltage to 12.3V
CURR<address><current><CR> [OK][CR] Note: <current> = 001 – XXX where XXX is the maximum current rated by the power supply Format: X.XX A i.e. 123 = 1.23 A (decimal point does not change)	Sets the current limit of the power supply	CURR00456<CR> Note: This will set current limit to 4.56A
SOVP<address><voltage><CR> [OK][CR] Note: <voltage> = 010 to XXX where XXX is the maximum voltage rated by the power supply. Format: XX.X V i.e. 234 = 23.4 V Minimum value: 010 -> 1.0 V (decimal point does not change)	Sets the upper voltage limit of the power supply (OVP limit)	SOVP00105<CR> Note: This will set the upper voltage limit (OVP) to 10.5V
GETS<address><CR> Voltage[???]Current[???][CR] [OK][CR]	Gets the set voltage and set current values from power supply.	GETS00<CR> i.e. If set voltage = 12.3 V and set current = 4.56 A, the return string will be: 123456[CR] [OK][CR]
GOVP<address><CR> Voltage[???][CR] [OK][CR]	Gets the upper voltage limit setting (OVP)	GOVP00<CR> i.e. If upper voltage limit = 10.0 V, the return string will be: 100[CR] [OK][CR]

<p>GETD<address><CR></p> <p>Voltage[???]Current[???][mode][CR] [OK][CR]</p> <p>Note: [mode] = 0 for CV mode = 1 for CC mode</p>	<p>Gets the measured voltage and current reading and the mode of operation.</p>	<p>GETD00<CR></p> <p>i.e. If measured/read voltage = 1.0 V and current = 4.56 A and in CC mode, return string will be: 0104561[CR] [OK][CR]</p>
<p>GMAX<address><CR></p> <p>Voltage[???]Current[???][CR] [OK][CR]</p>	<p>Gets the maximum voltage and current settable by the power supply</p>	<p>GMAX00<CR></p> <p>i.e. 1696 rated for 20.0 V and 9.99 , return string will be: 200999[CR] [OK][CR]</p>
<p>Output control</p>		
<p>SOUT<address><status><CR></p> <p>Voltage[???]Current[???][CR] [OK][CR]</p> <p>Note: <status> = 0 for Enable output (ON) = 1 for Disable output (OFF)</p>	<p>Enables or disables the output of the power supply.</p>	<p>SOUT000<CR></p> <p>Note: This will enable the output (ON).</p>
<p>Display status</p>		
<p>GPAL<address><CR></p> <p>[68 characters][CR] [OK][CR]</p> <p>Note: [68 characters] – The 68 characters represent all the LCD display information. (See “Explain of GPAL Command” section for details.)</p>	<p>This gets all the information as displayed on the LCD screen. This command is useful to get the current status of the power supply, including measured voltage, current, and power, set voltage and current, key lock status, remote status, output status, and more.</p>	<p>GPAL00<CR></p>

Memory Presets		
<p>PROM<address><memory_location><voltage><current><CR></p> <p>[OK][CR]</p> <p>Note: <memory_location> = 1 to 9 ; <voltage> = voltage value to set for the assigned memory location. Format: XX.X V <current> = current value to set for the assigned memory location. Format: X.XX A (decimal point does not change)</p>	<p>Saves the defined voltage and current into the specified memory location.</p>	<p>PROM005145020<CR></p> <p>Note: This will set 14.5 V and 0.20 A into memory location 5.</p>
<p>GETM<address><CR></p> <p>Memory 1 Voltage[???]Current[???][CR] Memory 2 Voltage[???]Current[???][CR] Memory 9 Voltage[???]Current[???][CR] [OK][CR]</p> <p>Note: Only the characters in [] are returned. The words "Memory 1" or "Voltage" or "Current" are NOT part of the return string.</p>	<p>Returns all of the voltage and current values that are stored in all memory locations of the power supply</p>	<p>GETM00<CR></p> <p>Note: This will return all voltage and current values stored into memory of the power supply.</p> <p>i.e. If location 1 has 1.0 V/1.00A, location 2 has 2.0V/2.00A.....location 9 has 9.0V/9.00A, the return string will be: 010100[CR] 020200[CR] 090900[CR]</p>
<p>GETM<address><location><CR></p> <p>Voltage[???]Current[???][CR] [OK][CR]</p> <p>Note: <location> = 1 to 9 Only the characters in [] are returned. The words "Voltage" or "Current" are NOT part of the return string.</p>	<p>Returns only the stored voltage and current settings from the specified memory location.</p>	<p>GETM002<CR></p> <p>Note: This will return the voltage and current values stored into memory location 2.</p>
<p>RUNM<address><location><CR></p> <p>[OK][CR]</p> <p>Note: <location> = 1 to 9</p>	<p>Recalls the voltage and current values stored in the specified memory location</p>	<p>RUNM006<CR></p> <p>Note: This will recall the voltage and current settings stored in memory location 6.</p>

Timer Program		
<p>PROP<address><location><voltage><current><minute><second><CR></p> <p>[OK][CR]</p> <p>Note: <location> = 00 to 19 This is the location for the step. Timed program can store up to 20 steps (i.e. 00 – 19) <voltage> = 010 to XXX Format: XX.X V <current> = 001 to XXX Format: X.XX A <minute> = 00 to 99 This is the time in minutes to hold the programmed step values <second> = 00 to 59 This is the time in seconds to hold the programmed step values</p>	<p>Sets the parameters (voltage, current, minutes, seconds) for one step indicated by the step location.</p>	<p>PROP00151234560435<CR></p> <p>Note: This will set the parameters: Voltage = 12.3 V, Current = 4.56 A, Minutes = 4 Seconds = 35 Step = 15</p>
<p>GETP<address><CR></p> <p>Program 00 Voltage[???]Current[???]Minute[??]Second[??]][CR] Program 01Voltage[???]Current[???]Minute[??]Second[??]][CR] Program 19 Voltage[???]Current[???]Minute[??]Second[??]][CR] [OK][CR]</p> <p>Note: Only the characters in [] are returned. The words “Program 00”, “Voltage”, “Current”, “Minute”, or “Second” are NOT part of the return string.</p>	<p>Returns all 20 steps of the timed program stored parameter values from memory.</p>	<p>GETP00<CR></p>

<p>GETP<address><location><CR></p> <p>Voltage[???]Current[???]Minute[??]Second[??]][CR] [OK][CR]</p> <p>Note: <location> = 00 to 19 Only the characters in [] are returned. The words “Voltage”, “Current”, “Minute”, or “Second” are NOT part of the return string.</p>	<p>Returns only the specified step location’s stored parameters in timed program.</p>	<p>GETP0010<CR></p> <p>Note: This will return the voltage, current, minutes, and seconds parameters stored in step location 10 of the timed program.</p>
<p>RUNP<address><cycle><CR></p> <p>[OK][CR]</p> <p>Note: <cycle> = 0000 to 0256 This defines how many cycles to repeat the timed program, up to 256 cycles 0000 = infinite cycles</p>	<p>Runs the timed program and repeats for the specified number of cycles.</p>	<p>RUNP000182<CR></p> <p>Note: This will run the timed program and repeat for 182 cycles.</p>
<p>STOP<address><CR></p> <p>[OK][CR]</p>	<p>Stops the timed program from running.</p>	<p>STOP00<CR></p>