VOLTCRAFT

Triple Output

Linear Programmable DC Power Supply

Programming Manual

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Introduction to the SCPI Language

Syntax

SCPI commands present a hierarchical tree structure and contain multiple sub-systems, each of which is made up of a root keyword and one or more sub-keywords. The command string usually starts with ":", the keywords are separated by ":" and are followed by the parameter settings available, "?" is added at the end of the command string to indicate query and the command and parameter are separated by "space".

For example,
SOURce:CHANnel:OUTPut {0|1|ON|OFF}
SOURce:CHANnel:OUTPut?

SOURce is the root keyword of the command. **CHANnel** and **OUTPut** are the second-level and third-level l keywords respectively. The command string starts with "**:**" which separates the multiple-level keywords. **{0|1|ON|OFF}** represents parameters available for setting, "**?**" represents query and the command **SOURce:CHANnel:OUTPut** and the parameter **{0|1|ON|OFF}** are separated by "space".

Syntax Rules

SCPI language itself defines a group of sub-system keywords, and at the same time allows users to add or reduce keywords. Those keywords can be some meaningful English words and are easy to remember, which are called mnemonics. Mnemonic has long and short types. The short are the abbreviation of the long.

➢ **Rule to format mnemonics:**
1) If the letter number of an English word is less than or equal to 4, then the word itself can be the mnemonic.(such as "Free" can be "FREE")
2) If the letter number of an English word exceeds 4, then the first four letters will be the mnemonic.(such as "Frequency" can be "FREQ")
3) If the forth letter is vowel, then mnemonic uses the former three letters. Vowels consists of a, e, i, o, and u.(such as "Power" can be "POW")
4) If it is not a word but a sentence, then use the first letters of the former words and the whole of the last word. (such as "Input Voltage" can be "IVOLtage")

➢ **Usage of symbols**
1) Space
The space is used to separate command and parameter.

2) Colon :

If the colon is in front of the first character, it means the following is Root Command. When the colon is set between two keywords, then it means moving from the current level to the next level.

3) *asterisk

The commands start with asterisk are named Common Command, which is used to execute IEEE488.2 common commands.

4) Braces ⦃⦄

The parameters enclosed in the braces are optional and are usually separated by the vertical bar "|". When using this command, one of the parameters must be selected.

5) Vertical Bar |

The vertical bar is used to separate multiple parameters and one of the parameters must be selected when using the command.

6) Triangle Brackets < >

The parameter enclosed in the triangle brackets must be replaced by an effective value.

7) Square Brackets [ ]

The content (command keyword) enclosed in the square brackets can be omitted. When the parameter is omitted, the instrument will set the parameter to its default.

➢ **Parameter Type**

1) **Real Number**

   Commands that require numeric parameters accept all commonly used decimal representations of numbers including optional signs, decimal points, and scientific notation. Special values for numeric parameters such as MIN, MAX and DEF are also accepted.
   For example,
   [SOURce:]CURRent:LIMit:ALL {<value1>[,<value2>[,<value3>]]|MAX}

2) **Discrete**

   The parameter should be one of the values listed. For example,
   INSTrument[:SELect] {CH1|CH2|CH3}

3) **Integer**

   Unless otherwise noted, the parameter can be any integer (NR1 format) within the effective value range. Note that, do not set the parameter to a decimal, otherwise errors will occur.

4) **Bool**

   The parameter could be "OFF", "ON". For example,
   OUTPut[:STATe][:ALL] {0|1|ON|OFF}

Command Abbreviation

Each SCPI command can be written mixed with uppercase and lowercase according to the syntax rules, and the capital letter part is just the abbreviation of the command. If abbreviation is used, all the capital letters in the command must be written completely. For parameters with units, please refer to the detail parameter specifications in the sub-system.

Example：
MEASure[:SCALar]:VOLTage
Abbreviation Below：
MEAS:VOLT

Third-party API

The SCPI protocol of this instrument is based on COM port, USB port and LAN communication.

IEEE488.2 Common Commands

*IDN

Return the ID character string of the instrument.
Description
The query returns the ID character string of the instrument.

Return Format
<manufacturer>,<model>,<serial number>,FV:X.XX.XX
<model>：the model number of the instrument.
<serial number>：the serial number of the instrument.
FV:X.XX.XX：the software version of the instrument.

Example
Manufacturer_XXXX, model_XXXXX,1715040,FV:V1.0.2

SCPI Commands

Apply Commands

Apply commands set or query the output voltage or current of all channels without changing the selected channel.

[SOURce:]APPly:VOLTage[:LEVel][:IMMediate][:AMPLitude]

Syntax
[SOURce:]APPly:VOLTage[:LEVel][:IMMediate][:AMPLitude] value1[,value2[,value3]]
[SOURce:]APPly:VOLTage[:LEVel][:IMMediate][:AMPLitude]?

Description
Sets the output voltage of all channels without changing the selected channel.

Parameter
value1: Voltage of CH1
value2 (Optional): Voltage of CH2
value3 (Optional): Voltage of CH3 (only for the triple output models)

Example

(1) The command below sets the output voltage to CH1 1V, CH2 2V, CH3 3V.
   APP:VOLT 1,2,3

(2) The command below queries the setting voltage of all channels.
   APP:VOLT?
   Returns
   1.000, 2.000, 3.000

[SOURce:]APPly:CURRent[:LEVel][:IMMediate][:AMPLitude]

Syntax
[SOURce:]APPly:CURRent[:LEVel][:IMMediate][:AMPLitude] value1[,value2[,value3]]
[SOURce:]APPly:CURRent[:LEVel][:IMMediate][:AMPLitude]?

Description
Sets the output current of all channels without changing the selected channel.

Parameter
value1: Current of CH1
value2 (Optional): Current of CH2
value3 (Optional): Current of CH3 (only for the triple output models)

Example

(1) The command below sets the current to CH1 1A, CH2 2A, CH3 3A.
   APP:CURR 1,2,3

(2) The command below queries the current setting value of all channels.
   APP:CURR?
   Returns
   1.000, 2.000, 3.000

Measurement Commands

Measurement commands query the voltage, current and power measured on the output terminal of the channels.

MEASure[:SCALar]:VOLTage[:DC]?

Syntax
MEASure[:SCALar]:VOLTage[:DC]?

Description
Query the voltage measured on the output terminal of the selected channel.

Parameter
(none)

Example
The voltage measured on the output terminal of the selected channel is 1V.
MEAS:VOLT?
Returns
1.000

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

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

Description
Query the current measured on the output terminal of the selected channel.

Parameter
(none)

Example
The current measured on the output terminal of the selected channel is 1A.
MEAS:CURR?
Returns
1.000

MEASure[:SCALar]:POWer[:DC]?

Syntax
MEASure[:SCALar]:POWer[:DC]?

Description

Query the power measured on the output terminal of the selected channel.

Parameter

(none)

Example

The power measured on the output terminal of the selected channel is 1W.

MEAS:CURR?

Returns

1.000

MEASure[:SCALar]:VOLTage:ALL[:DC]?

Syntax

MEASure[:SCALar]:VOLTage:ALL[:DC]?

Description

Query the voltage measured on the output terminal of all channels.

Parameter

(none)

Example

The voltage measured on the output terminal is CH1 1V, CH2 2V, CH3 3V.

MEAS:VOLT:ALL?

Returns

1.000, 2.000, 3.000

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

Syntax

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

Description

Query the current measured on the output terminal of all channels.

Parameter

(none)

Example

The voltage measured on the output terminal is CH1 1A, CH2 2A, CH3 3A.

MEAS:CURR:ALL?

Returns

1.000, 2.000, 3.000

INSTrument Commands

INSTrument commands select the current channel.

INSTrument[:SELect]

Syntax

INSTrument[:SELect] {CH1|CH2|CH3}

INSTrument[:SELect]?

Description

Selects the current channel.

Query the channel currently selected.

Parameter

Name	Type	Range	Default Value
{CH1|CH2|CH3}	Discrete	CH1|CH2|CH3	CH1

Note: CH3 is only for triple output models.

Example

(1) The command below select CH1 as the current channel.

INST CH1

(2) The query returns the current channel.

INST?

returns

CH1

INSTrument:NSELect

Syntax
INSTrument:NSELect {1|2|3}
INSTrument:NSELect?

Description
Selects the current channel.
Query the channel currently selected.

Parameter

Name	Type	Range	Default Value
{1|2|3}	Discrete	1|2|3	1

Note: 3 is only for triple output models.

Example

(1) The command below select CH1 as the current channel.
     INST:NSEL 1

(2) The query returns the current channel.
     INST:NSEL?
     returns
     1

Output Setup Commands

The Output setup commands are used to enable or disable the channel output, switch the output mode, as well as set the output value and limit value.

OUTPut[:STATe][:ALL]

Syntax
OUTPut[:STATe][:ALL] {0|1|ON|OFF}
OUTPut[:STATe][:ALL]?

Description
Controls on/off of power supply output.

Parameter

Name	Type	Range	Default Value
{0|1|ON|OFF}	Bool	0|1|ON|OFF	OFF

Example

(1) The command below enables the output of all channels.
OUTP ON

(2) The command below queries if there is any channel is on. If there is at least a channels is on, return 1, otherwise return 0.
OUTP?
returns
1

OUTPut:TRACk[:STATe]

Syntax
OUTPut:TRACk {0|1|ON|OFF}
OUTPut:TRACk?

Description
Enable or disable the track mode of CH1 and CH2. (Only for triple output models)

Parameter

Name	Type	Range	Default Value
{0|1|ON|OFF}	Bool	0|1|ON|OFF	OFF

Example

(1) The command below enables the track mode of CH1 and CH2.
OUTP:TRAC ON

(2) The command below queries the status of the track mode of CH1 and CH2.
OUTP:TRAC?
returns
1

OUTPut:SERies[:STATe]

Syntax

OUTPut:SERies {0|1|ON|OFF}

OUTPut:SERies?

Description

Enable or disable the series mode of CH1 and CH2. (Only for triple output models)

Parameter

Name	Type	Range	Default Value
{0|1|ON|OFF}	Bool	0|1|ON|OFF	OFF

Example

(1) The command below enables the series mode of CH1 and CH2.

OUTP:SERies ON

(2) The command below queries the status of the series mode of CH1 and CH2.

OUTP:SERies?

returns

1

OUTPut:PARallel[:STATe]

Syntax

OUTPut:PARallel {0|1|ON|OFF}

OUTPut:PARallel?

Description

Enable or disable the parallel mode of CH1 and CH2. (Only for triple output models)

Parameter

Name	Type	Range	Default Value
{0|1|ON|OFF}	Bool	0|1|ON|OFF	OFF

Example

(1) The command below enables the parallel mode of CH1 and CH2.

OUTP:PARallel ON

(2) The command below queries the status of the parallel mode of CH1 and CH2.

OUTP:PARallel?

returns

1

[SOURce:]CHANnel:OUTPut[:STATe]

Syntax：

[SOURce:]CHANnel:OUTPut[:STATe] {0 | 1 | ON | OFF}
[SOURce:]CHANnel:OUTPut[:STATe]?

Description：

Enable or disable the output of the channel, you may switch to the corresponding channel before using this command.

Parameter：

Name	Type	Range	Default Value
{0|1|ON|OFF}	Bool	0|1|ON|OFF	OFF

Example：

(1) The command below enable the output of the current selected channel.

CHAN:OUTP ON

(2) The command below queries the output state of the current selected channel.

CHAN:OUTP?

Returns：1

[SOURce:]CHANnel:OUTPut:ALL[:STATe]

Syntax

[SOURce:]CHANnel:OUTPut:ALL[:STATe] <value1>,<value2>,<value3>
[SOURce:]CHANnel:OUTPut:ALL[:STATe]?

Description

Enable or disable the output of each channel without changing the selected channel.

Parameter

value1: Output state of CH1, ON or 1 for enable, OFF or 0 for disable
value2: Output state of CH2, ON or 1 for enable, OFF or 0 for disable
value3: Output state of CH3, ON or 1 for enable, OFF or 0 for disable (only for the triple output models)

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Example

(1) The command below enable the output of CH1 and CH3, disable the output of CH2.
   CHAN:OUTP:ALL 1,0,1

(2) The command below queries the output state of all channels. (CH1 and CH3 is enabled, CH2 is disabled.)
   CHAN:OUTP:ALL?
   Returns
   1, 0, 1

[SOURce:]CURRent[:LEVel][:IMMediate][:AMPLitude]

Syntax
[SOURce:]CURRent[:LEVel][:IMMediate][:AMPLitude] <value>
[SOURce:]CURRent[:LEVel][:IMMediate][:AMPLitude]?

Description
Sets and queries the current of the selected channel.

Parameter
value: Current setting value

Example

(1) The command below sets the current of the selected channel to 1A.
   CURR 1
(2) The command below queries the current setting value of the selected channel.
   CURR?
   Returns
   1.000

[SOURce:]CURRent:LIMit

Syntax
[SOURce:]CURRent:LIMit <value>
[SOURce:]CURRent:LIMit?

Description
Sets and queries the overcurrent protection (OCP) value of the selected channel.

Parameter

value: Overcurrent protection (OCP) value

Example

(1) The command below sets the overcurrent protection (OCP) value of the selected channel to 1A.

CURR:LIM 1

(2) The command below queries the overcurrent protection (OCP) value of the selected channel.

CURR:LIM?

Returns

1.000

[SOURce:]CURRent:LIMit:ALL

Syntax

[SOURce:]CURRent:LIMit:ALL <value1>[,<value2>[,<value3>]]
[SOURce:]CURRent:LIMit:ALL?
[SOURce:]CURRent:LIMit:ALL? MAX

Description

Sets and queries the overcurrent protection (OCP) value of all channels.

Parameter

value1: OCP value of CH1
value2 (Optional): OCP value of CH2
value3 (Optional): OCP value of CH3 (only for the triple output models)
MAX: The maximum value

Example

(1) The command below sets the OCP value to CH1 1A, CH2 2A, CH3 3A.

CURR:LIM:ALL 1,2,3

(2) The command below queries the OCP value of all channels.

CURR:LIM:ALL?

Returns

1.000, 2.000, 3.000

(3) The command below queries the maximum OCP value of all channels.

CURR:LIM:ALL? MAX

Returns

3.100, 3.100, 3.100 (DLP-3603)

[SOURce:]VOLTage[:LEVel][:IMMediate][:AMPLitude]

Syntax

[SOURce:]VOLTage[:LEVel][:IMMediate][:AMPLitude] <value>
[SOURce:]VOLTage[:LEVel][:IMMediate][:AMPLitude]?

Description

Sets and queries the voltage of the selected channel.

Parameter

value: Voltage setting value

Example

(1) The command below sets the voltage of the selected channel to 1V.
   VOLT 1
(2) The command below queries the voltage setting value of the selected channel.
   VOLT?
   Returns
   1.000

[SOURce:]VOLTage:LIMit

Syntax

[SOURce:]VOLTage:LIMit <value>
[SOURce:]VOLTage:LIMit?

Description

Sets and queries the overvoltage protection (OVP) value of the selected channel.

Parameter

value: Overvoltage protection (OVP) value

Example

(1) The command below sets the overvoltage protection (OVP) value of the selected channel to 1V.
   VOLT:LIM 1
(2) The command below queries the overvoltage protection (OVP) value of the selected channel.
   VOLT:LIM?
   Returns
   1.000

[SOURce:]VOLTage:LIMit:ALL

Syntax

[SOURce:]VOLTage:LIMit:ALL <value1>[,<value2>[,<value3>]]
[SOURce:]VOLTage:LIMit:ALL?
[SOURce:]VOLTage:LIMit:ALL? MAX

Description

Sets and queries the overvoltage protection (OVP) value of all channels.

Parameter

value1: OVP value of CH1
value2 (Optional): OVP value of CH2
value3 (Optional): OVP value of CH3 (only for the triple output models)
MAX: The maximum value

Example

(1) The command below sets the OVP value to CH1 1V, CH2 2V, CH3 3V.
    VOLT:LIM:ALL 1,2,3
(2) The command below queries the OVP value of all channels.
    VOLT:LIM:ALL?
    Returns
    1.000, 2.000, 3.000
(3) The command below queries the maximum OVP value of all channels.
    VOLT:LIM:ALL? MAX
    Returns
    61.000, 61.000, 6.600 (DLP-3603)