Programming Manual

HVL Series
High Voltage DC Electronic Loads



BK PRECISION

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About this Manual

This manual describes how to use the Standard Commands for Programming Instruments (SCPI) to communicate with the HVL Series.

1.1 Intended Audience

This document is designed for instrument programmers tasked with creating SCPI-based programs for the HVL Series.

1.2 Related Documents

Refer to the following documents for more information:

- HVL Series User's Manual. This manual describes the operation of the HVL Series.
- Standard Commands for Programming Instruments (SCPI), Volume1-4, Version 1990.0 May 1999, SCPI Consortium, 2515 Camino del Rio South, Suite 340, San Diego, Ca 92108.
- IEEE Std 488.2-1992, The Institute of Electrical and Electronics Engineers, Inc., 345 East 47th Street, New York, NY 10017-2394, USA (ISBN 1-55937-238-9)

Syntax Convention

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2.1 Introduction

SCPI (Standard Commands for Programmable Instruments) serves as a universal programming language designed for electronic test and measurement instruments. It is grounded in the IEEE 488.1 and IEEE 488.2 standards. The HVL series aligns with the SCPI language and incorporates the IEEE 488.2 STD status structure.
The commands can be issued over VISA or socket using TCP port 5025.

2.1.1 Types of SCPI Messages

In order to program an HVL instrument, it is necessary to create a program message. This message comprises one or more appropriately formatted SCPI commands transmitted from the controller to the HVL instrument. The program message, which can be sent at any time, requests the instrument to execute a specific action or provide data or status information. These requests are also referred to as queries.
Upon receiving a query, the HVL instrument responds by sending a response message back to the controller. This response message contains data formatted in a specific SCPI format.
The following documents provide more information about SCPI programming:

- Standard Commands for Programming Instruments (SCPI), Volume1-4, Version 1990.0 May 1999, SCPI Consortium, 2515 Camino del Rio South, Suite 340, San Diego, Ca 92108.
- IEEE Std 488.2-1992, The Institute of Electrical and Electronics Engineers, Inc., 345 East 47th Street, New York, NY 10017-2394, USA (ISBN 1-55937-238-9)

2.2 Types of SCPI Commands

Two types of SCPI commands are available: common commands, described below, and device-specific subsystem commands.

2.2.1 Common Commands

Common SCPI commands, as defined by IEEE 488.2, are responsible for controlling and managing generic system functions like reset, self-test, configuration storage, and device identification. Typically, common commands start with an asterisk (*), have a length of four to five characters, and may involve one or more parameters. The command keyword is separated from the initial parameter by a space. Multiple commands can be separated using a semicolon (;), as demonstrated below:
`*RST; *CLS; *ESE 32; *OPC?`
Refer to **Table 2.1** for a summary of these common SCPI commands applicable to programming the HVL series. For a detailed description of these commands, consult **Chapter**.

Command	Description
*CLS	Clears all Event Registers summarized in the status byte.
*ESR?	Returns an <NR1>, representing the value of the Standard Event Status Register. Reading the value of the register will result in its clearance.
*IDN?	Returns the unique identification string of the instrument.
*TRG	Generates a bus trigger to the instrument.
*SAV	Stores the present state and calibration data to the internal nonvolatile memory.

Table 2.1 Common SCPI Commands

2.3 Syntax of Program Messages

A program message consist of one or more properly formatted SCPI commands, a parameter (if necessary, and a terminator sent from the controller to the HVL instrument to request some action or to query the instrument for a response.
A semicolon (;) is used to link commands from different groups.

SCPI Data Types

SCPI defines various data types for use in program messages and response messages. The HVL series uses the following subset of SCPI data types:

- Character
- <NR1>
- <NR2>
- <NRf>
- <Boolean>

This section summarizes these data types. Refer to the SCPI standards document for more information about these data types.

3.1 Character Data Types 12
3.2 <NR1> Value Data Type 12
3.3 <NR2> Value Data Type 13
3.4 <NRf> Value Data Type 13
3.5 Boolean Data Type 13

3.1 Character Data Types

Description: If a command parameter takes a character data type, a specific number of settings are allowed for the parameter.
Character data types have the following characteristics:

- Can be expressed in either the short or long form, while response messages return them exclusively in the short form.
- Are case insensitive in program messages but in response messages are standardized to uppercase.
- Must have a specific length.

Parameters: <Character Settings> : { UI | UIP | UIR | PVSIM | USER | SKRIPT }
Example:
Command `MODE UI`

3.2 <NR1> Value Data Type

Description: The data type <NR1> is utilized to indicate zero, positive, and negative integer values, including optional signs.

Example:
Command `0` `100` `-10`

3.3 <NR2> Value Data Type

Description: The data type <NR2> is utilized to indicate zero, positive, and negative decimal values, including optional signs and decimal points.
The difference between <NR1> and <NR2> is the explicit decimal point.

Example:

Command	`200.50`	`100.0`	`0.0`

NOTICE **Note: 0 is a special case and redundant decimal points are ignored.**

3.4 <NRf> Value Data Type

Description: The <NRf> data type is employed to define floating-point values. These values encompass digits with an implied decimal point, an explicit decimal point, or an explicit decimal point along with an exponent.

Example:

Command	`200`	`15.000e-3`	`0.015`

3.5 Boolean Data Type

Description: A Boolean data type for a parameter and response represents a single binary condition that is either True or False. Boolean values are defined as follows:

Parameters: `<0 or OFF>` : Indicates that the condition is False. `<1 or ON>` : Indicates that the condition is True.

NOTICE **Note: The characters OFF and ON are not case sensitive.**

About Commands & Queries

This section lists and describes the remote control commands and queries recognized by the instrument. All commands and queries can be executed in either local or remote state.

The description, command syntax, query syntax, example and respond can be found in a section. The commands are given in both long and short form. All examples are shown in short form. Queries perform actions such as obtaining information, and are recognized by the question mark (?) following the header.

4.1 How They are Listed

The commands are listed by subsystem and alphabetical order according to their short form.

4.2 How They are Described

In the descriptions themselves, a brief explanation of the function performed is given. This is followed by a presentation of the formal syntax, with the header given in Upper-and-Lower-Case characters and the short form derived from it in ALL UPPER-CASE characters. Where applicable, the syntax of the query is given with the format of its response.

4.3 When can they be used?

The commands and queries listed here can be used for the HVL seires.

4.4 Command Notation

The following notation is used in the commands:

< > Angular brackets enclose words that are used as placeholders, of which there are two types: the header path and the data parameter of a command.

:= A colon followed by an equals sign separates a placeholder from the description of the type and range of values that may be used in a command instead of the placeholder.

{ } Braces enclose a list of choices, one of which one must be made.

[ ] Square brackets enclose optional items.

… An ellipsis indicates that the items both to its left and right may be repeated a number of times.

Common SCPI Commands

IEEE standard defines the common commands used for querying the basic information of the instrument or executing basic operations. These commands usually start with "*" and the length of the keywords of the command is usually 3 characters.

5.1 *CLS 16
5.2 *ESR? 17
5.3 *IDN? 17
5.4 *SAV 18
5.5 *TRG 18

5.1 *CLS

Description: This command clears all status data structures in a device. For a device which minimally complies with SCPI, these registers are:

- **SESR** (IEEE 488.2)
- **OPERation Status Register** (SCPI)
- **QUEStionable Status Register** (SCPI)
- **Error/Event Queue** (SCPI)

Execution of *CLS shall also clear any additional status data structures implemented in the device. The corresponding enable registers are unaffected.
***CLS** forces the device into OCIS and OQIS without setting the **No Operation Pending** flag TRUE and without setting the OPC bit of the SESR TRUE and without placing a “1” into the Output Queue.
For example, suppose a device implements **INITiate[:IMMediate]** as an overlapped command. Assuming that the trigger model is programmed so that it will eventually return to the IDLE state, and that INITiate[:IMMediate] takes longer to execute than *OPC, sending these commands to this device:
INITiate;*OPC
results in initiating the trigger model and, after some time, setting the OPC bit in the SESR. However, sending these commands:
INITiate;*OPC;*CLS
still initiates the trigger model. Since the operation is still pending when the device executes ***CLS**, the device does not set the OPC bit until it executes another ***OPC** command.

Syntax:
Command *CLS

Parameters: None

Example:
Command *CLS

5.2 *ESR?

Description: Query the Standard Event Status Register. Once a bit is set, it remains set until cleared by a *CLS (clear status) command or queried by this command. A query of this register returns a decimal value which corresponds to the binary-weighted sum of all bits set in the register.

Syntax:

Command `*ESR <value>`

Query `*ESR?`

Parameters: `<value>` : 0 to 255

Example:

Command `*ESR?`

NOTICE

Returns: <value> (e.g., 0)

Related: *CLS, *ESE

5.3 *IDN?

Description: The *IDN? query causes the instrument to identify itself. The response comprises manufacturer, model, serial number, software version and firmware version.

Syntax:

Query `*IDN?`

Parameters: None

Example:

Command `*IDN?`

NOTICE

Returns: <device id>,<model>,<serial number>,<software version>,<hardware version>

<device id> := "BK" is used to identify instrument.

<model> := A model identifier less than 14 characters will contain the model number.

<serial number> := Number that uniquely identifies the instrument.

<firmware version> := Firmware revision number.

<hardware version> := Hardware revision number.

Example Return: B&K Precision,HVL6003008K,000000000,0.13-2.12-2-1-A1.23

5.4 *SAV

Description: Store (save) the current instrument state in the specified non-volatile storage location. Any state previously stored in the same location will be overwritten. The instrument state can be stored in any of the 10 storage locations (0-9).
An instrument reset (*RST command) does not affect the configurations stored in memory. Once a state is stored, it remains until it is overwritten or specifically deleted.
If OUTPut:PN:STATe is set to LAST the settings set when the instrument is powered off will be save in the selected User Settings, overwriting any previous saved settings in this location.

Syntax:
Command `*SAV <memory address>`

Parameters: `<memory address>` : 0 to 9
Example:
Command `*SAV 0`

NOTICE **Related: *RCL**

5.5 *TRG

Description: The *TRG command generates an immediate trigger when the trigger source is set to **BUS**.

Syntax:
Command `*TRG`

Parameters: None
Example:
Command `*TRG`

NOTICE **Related: TRIGger:SOURce**

Input Subsystem

The INPut subsystem controls the characteristics of the load's input port.

6.1 INPut[:STATe] <Boolean> 20
6.2 INPut:DELay:FALL <NRf> 20
6.3 INPut:DELay:RISE <NRf> 21
6.4 INPut:INHibit <Boolean> 21
6.5 INPut:PROTection:CLEar 22
6.6 INPut:SHORt <Boolean> 22

6.1 INPut[:STATe] <Boolean>

Description: Enables/Disables the input. When the input is disabled, it signifies a state of zero input voltage and zero source current.
The query returns the electronic load's input state, with the returned value being "0" (OFF) or "1" (ON).

Syntax:
Command `INPut[:STATe] <Boolean>`
Query `INPut[:STATe]?`
Parameters: `<Boolean>` : 0 | 1 | OFF | ON
Example:
Command `INP 1`
Query `INP?`

NOTICE **Note: Upon resetting the instrument, the input state is off.**

6.2 INPut:DELay:FALL <NRf>

Description: Sets the input off delay of the instrument.

Syntax:
Command `INPut:DELay:FALL <NRf>`
Query `INPut:DELay:FALL?`
Parameters: `<NRf>` : 0 to 3600.000
Example:
Command `INP:DEL:FALL 1.1`
Query `INP:DEL:FALL?`

NOTICE **Update info: This command is available in UI version 1.10 and later.**

6.3 INPut:DELay:RISE <NRf>

Description: Sets the input on delay of the instrument.

Syntax:

Command `INPut:DELay:RISE <NRf>`
Query `INPut:DELay:RISE?`

Parameters: `<NRf>` : 0 to 3600.000

Example:

Command `INP:DEL:RISE 0.5`
Query `INP:DEL:RISE?`

NOTICE **Update info: This command is available in UI version 1.10 and later.**

6.4 INPut:INHibit <Boolean>

Description: Sets the inhibit input function when RI pin is configured as a remote inhibit input. Please also see the table in User manual - Table 6.2 Analog Digital IO Connector.
The query returns the inhibit input function status, with the returned value being "0" (DISABLE), "1" (LIVE) and "2" (LATCH).

Syntax:

Command `INPut:INHibit <Boolean>`
Query `INPut:INHibit?`

Parameters: `<Boolean>` : 0 | 1 | 2

Value	Definition
0	disable
1	Live
2	Latch

Table 6.1 Remote Inhibit Parameters

Example:

Command `INP:INH 2`
Query `INP:INH?`

NOTICE **Update info: This command is available in UI version 1.10 and later.**

6.5 INPut:PROTection:CLEar

Description: Clears the latched protection status.

Syntax:

Command `INPut:PROTection:CLEar`

Parameters: none

Example:

Command `INP:PROT:CLE`

NOTICE **Update info: This command is available in UI version 1.10 and later.**

6.6 INPut:SHORt <Boolean>

Description: At rated current, the command simulates a short circuit on the input of the electronic load. The query returns the input short state of the electronic load. The returned value is "0" (OFF) or "1" (ON).

Syntax:

Command `INPut:SHORt <Boolean>`

Query `INPut:SHORt?`

Parameters: `<Boolean>` : 0 | 1 | ON | OFF

Mode	Rating Current (A)
HVL150250	250
HVL150480	480
HVL150750	750
HVL600150	150
HVL600300	300
HVL80075	75
HVL800150	150
HVL100025	25
HVL100050	50

Table 6.2 Input Rated Current

Example:

Command `INP:SHOR 1`

Query `INP:SHOR?`

NOTICE **Update info: This command is available in UI version 1.10 and later.**

Current System

The CURRent subsystem controls the current's amplitude characteristics of the source.

7.1 CURRent:DUTY <NR1> 25
7.2 CURRent:FREQuency <NRf> 25
7.3 CURRent[:LEVel]:[IMMediate] <NRf> 26
7.4 CURRent:LIMit:MAXimum <NRf> 28
7.5 CURRent:LIMit:OVER <NRf> 28
7.6 CURRent:LOOP <NR1> 30
7.7 CURRent:PROTection:OVER <NRf> 31
7.8 CURRent:PROTection:OVER:DELay <NR1> 33
7.9 CURRent:PROTection:OVER:STATe <boolean> 33
7.10 CURRent:SLEW:NEGative <NRf> 34
7.11 CURRent:SLEW:POSitive <NRf> 35
7.12 CURRent:TLEVel <NRf> 36
7.13 CURRent:TWIDth <NRf> 37

7.1 CURRent:DUTY <NR1>

Description: The command sets the duty cycle of the continuous transient operation in constant current mode. Units are in percentage.
The query returns the programmed duty cycle for the continuous transient function in CC mode. The data is returned in the <NR1> data type.

Syntax:
Command `CURRent:DUTY <NR1>`
Query `CURRent:DUTY?`
Parameters: <NR1> : 1 to 99 | MIN | MAX
Example:
Command `CURR:DUTY 50`
Query `CURR:DUTY?`

7.2 CURRent:FREQuency <NRf>

Description: The command sets the pulse frequency for the continuous transient operation in constant current mode. Units are in hertz.
The query returns the programmed frequency for the continuous transient function in CC mode. The data is returned in the <NRf> data type.

Syntax:
Command `CURRent:FREQuency <NRf>`
Query `CURRent:FREQuency?`
Parameters: For UI versions below 1.10:
<NRf> : 0.03 to 10000
For UI version 1.10 and later:
<NRf> : 0.1 to 10000.0 | MIN | MAX
Example:
Command `CURR:FREQ 1000`
Query `CURR:FREQ?`

7.3 CURRent[:LEVel]:[IMMediate] <NRf>

Description: The command sets the immediate current level when the input is in constant current mode. Units are in amperes.
The query returns the programmed current level in the <NRf> data type.

Syntax:
Command `CURRent[:LEVel][:IMMediate] <NRf>`
Query `CURRent[:LEVel][:IMMediate]?`

Parameters: For UI versions below 1.10:
<NRf> : 0.000 to max current range

Model		HVL150250	HVL150480	HVL600150	HVL80075	HVL100025
Range	Low	0.25 A to 25 A	0.48 A to 48 A	0.15 to 15 A	0.075 to 7.5 A	0.025 to 2.5 A
	High	0.25 A to 250 A	0.48 A to 480 A	0.15 to 150 A	0.075 to 75 A	0.025 to 25 A

Table 7.1 Current Ranges

For UI version 1.10 and later:
<NRf> : min value ~ MAX value | MIN | MAX

Model	Minimum (A)	Maximum (A)
HVL150250	0.25	250.00
HVL150480	0.48	480.00
HVL150750	0.75	750.00
HVL600150	0.150	150.00
HVL600300	0.300	300.00
HVL80075	0.075	75.00
HVL800150	0.150	150.00
HVL100025	0.025	25.00
HVL100050	0.050	50.00

Table 7.2 Configurable Current Level in High Range

Example:
Command `CURR 300.00`
Query `CURR?`

NOTICE

Note: If the electronic load is not in CC mode, the programmed value that is saved will apply when the electronic load is changed to CC mode.

Model	Minimum (A)	Maximum (A)
HVL150250	0.25	25.00
HVL150480	0.48	48.00
HVL150750	0.75	75.00
HVL600150	0.150	15.00
HVL600300	0.300	30.00
HVL80075	0.075	7.50
HVL800150	0.150	15.00
HVL100025	0.025	2.50
HVL100050	0.050	5.00

Table 7.3 Configurable Current Level in Low Range

7.4 CURRent:LIMit:MAXimum <NRf>

Description: The command sets the maximum current limit level when the input is in constant current mode. Units are in amperes.
The query returns the programmed maximum current limit in the <NRf> data type.

Syntax:
Command `CURRent:LIMit:MAXimum <NRf>`
Query `CURRent:LIMit:MAXimum?`
Parameters: **For UI versions below 1.10:**
`<NRf>` : 0.000 to max current range | MIN | MAX

Model		HVL150250	HVL150480	HVL600150	HVL80075	HVL100025
Range	Low	0.25 A to 25 A	0.48 A to 48 A	0.15 to 15 A	0.075 to 7.5 A	0.025 to 2.5 A
	High	0.25 A to 250 A	0.48 A to 480 A	0.15 to 150 A	0.075 to 75 A	0.025 to 25 A

Table 7.4 Current Ranges

For UI version 1.10 and later:
`<NRf>` : min value ~ MAX value | MIN | MAX
*(Please refer to the CC High Range and CC Low Range tables located in section **CURRent[:LEVel]:[IMMediate] <NRf>**)*
Example:
Command `CURR:LIM:MAX 300`
Query `CURR:LIM:MAX?`

NOTICE

Note: If the electronic load is not in CC mode, the programmed value that is saved will apply when the electronic load is changed to CC mode.

7.5 CURRent:LIMit:OVER <NRf>

Description: This command sets the input level for triggering the input over current limit function. The unit is amperes.
The query returns the programmed level for triggering the input over current limit function; the data type is <NRf>.

Syntax:
Command `CURRent:LIMit:OVER <NRf>`
Query `CURRent:LIMit:OVER?`
Parameters: `<NRf>` : min value ~ MAX value | MIN | MAX

HVL150250	12.50	275.00
HVL150480	24.00	528.00
HVL150750	30.00	820.00

Table 7.5 Over Current Limit Parameters

Model	Minimum (A)	Maximum (A)
HVL150250	12.50	275.00
HVL150480	24.00	528.00
HVL150750	30.00	820.00

Table 7.5 Over Current Limit Parameters

Example:

Command `CURR:LIM:OVER 100`

Query `CURR:LIM:OVER?`

NOTICE

Update info: This command is available in UI version 1.10 and later. Only HVL150250, HVL150750, and HVL150480 support this command.

7.6 CURRent:LOOP <NR1>

Description: The command sets the loop response speeds to adjust the system bandwidth in constant current mode.
The query returns the programmed loop control mode, with the returned value being "0" (fast), "1" (normal), "2" (slow), and "3" (slowest).

Syntax:
Command `CURRent:LOOP <NR1>`
Query `CURRent:LOOP?`
Parameters: `<NR1>` : 0 | 1 | 2 | 3

Value	Definition
0	Fast
1	Normal
2	Slow
3	Slowest

Table 7.6 Loop Response Parameters

Example:
Command `CURR:LOOP 0`
Query `CURR:LOOP?`

NOTICE

Update info: The command "LOOP:CONTrol" was split into individual commands in UI version 1.10 and later. Pre-1.10 users should refer to the Utility Subsystem chapter for the original LOOP:CONTrol command.

7.7 CURRent:PROTection:OVER <NRf>

Description: For UI versions below 1.10:
The command sets the output level at which the output's over current protection function will trip. Units are in amperes. The query returns the programmed level at which the output's over current protection function will trip in the <NRf> data type.

For UI version 1.10 and later:
The command sets the input level at which the input's over current protection function will trip. Units are in amperes. The query returns the programmed level at which the input's over current protection function will trip in the <NRf> data type.

Syntax:
Command `CURRent:PROTection:OVER <NRf>`
Query `CURRent:PROTection:OVER?`
Parameters: For UI versions below 1.10:
`<NRf>` : 0 to maximum current | MIN | MAX

Model		HVL150250	HVL150480	HVL600150	HVL80075	HVL100025
Range	Low	0.25 A to 25 A	0.48 A to 48 A	0.15 to 15 A	0.075 to 7.5 A	0.025 to 2.5 A
	High	0.25 A to 250 A	0.48 A to 480 A	0.15 to 150 A	0.075 to 75 A	0.025 to 25 A

Table 7.7 Current Ranges

For UI version 1.10 and later:
`<NRf>` : min value ~ MAX value | MIN | MAX

Model	Minimum (A)	Maximum (A)
HVL150250	3	275
HVL150480	3	528
HVL150750	3	820
HVL600150	0.15	157.5
HVL600300	0.30	315
HVL80075	0.075	78.75
HVL800150	0.15	157.5
HVL100025	0.025	26.25
HVL100050	0.05	52.5

Table 7.8 Over Current Protection Parameters

Example:
Command `CURR:PROT:OVER 300`
Query `CURR:PROT:OVER?`

7.8 CURRent:PROTection:OVER:DELay <NR1>

Description: The command sets the over current protection delay time in milliseconds. The output protection function will not trip during the delay time. After the delay time elapses, the protection function will trip.
The query returns the programmed delay time in the <NR1> data type.

Syntax:
Command `CURRent:PROTection:OVER:DELay <NR1>`
Query `CURRent:PROTection:OVER:DELay?`
Parameters: For UI versions below 1.10:
<NR1> : 10 to 10000 | MIN | MAX
For UI version 1.10 and later:
<NR1> : 100 to 10000 | MIN | MAX
Example:
Command `CURR:PROT:OVER:DEL 300`
Query `CURR:PROT:OVER:DEL?`

7.9 CURRent:PROTection:OVER:STATe <boolean>

Description: The command enables/disables the output's over current protection function.
The query returns the over current protection state, with the returned value being "0" (OFF) or "1" (ON).

Syntax:
Command `CURRent:PROTection:OVER:STATe <boolean>`
Query `CURRent:PROTection:OVER:STATe?`
Parameters: <boolean> : 0 | 1 | OFF | ON
Example:
Command `CURR:PROT:OVER:STAT 1`
Query `CURR:PROT:OVER:STAT?`

7.10 CURRent:SLEW:NEGative <NRf>

Description: For UI versions below 1.10:
The command sets the negative slew rate from transient level to main level in CC mode. Units are in amperes per milliseconds. The query returns the programmed negative slew rate of the transient operation in CC mode. The returned value is in the <NRf> data type.

For UI version 1.10 and later:
The command sets the slew rate from B level to A level in transient CC mode. This parameter also affects the slew rate in normal operation in CV mode. Units are in amperes per milliseconds. The query returns the programmed slew rate from B level to A level in transient CC mode. The returned value is in the <NRf> data type.

Syntax:
Command `CURRent:SLEW:NEGative <NRf>`
Query `CURRent:SLEW:NEGative?`
Parameters: For UI versions below 1.10:
`<NRf>` : 0.1 to 5400 | MIN | MAX
For UI version 1.10 and later:
`<NRf>` : min value ~ MAX value | MIN | MAX

Model	Minimum (A/ms)	Maximum (A/ms)
HVL150250	0.083	12500.00
HVL150480	0.16	24000.00
HVL150750	0.25	37500.00
HVL600150	0.05	3000.00
HVL600300	0.10	6000.00
HVL80075	0.025	1500.00
HVL800150	0.05	3000.00
HVL100025	0.008	500.00
HVL100050	0.017	1000.00

Table 7.9 Slew Rate Parameters

Example:
Command `CURR:SLEW:NEG 1`
Query `CURR:SLEW:NEG?`

7.11 CURRent:SLEW:POSitive <NRf>

Description: For UI versions below 1.10:
The command sets the positive slew rate from main level to transient level in CC mode. Units are in amperes per milliseconds. The query returns the programmed positive slew rate of the transient operation in CC mode. The returned value is in the <NRf> data type.

For UI version 1.10 and later:
The command sets the slew rate from A level to B level in transient CC mode. Units are in amperes per milliseconds. The query returns the programmed slew rate from A level to B level in transient CC mode. The returned value is in the <NRf> data type.

Syntax:
Command `CURRent:SLEW:POSitive <NRf>`
Query `CURRent:SLEW:POSitive?`
Parameters: For UI versions below 1.10:
`<NRf>` : 0.1 to 5400 | MIN | MAX
For UI version 1.10 and later:
`<NRf>` : min value ~ MAX value | MIN | MAX
*(Please refer to the Slew Rate Parameters table located in section **CURRent:SLEW:NEGative <NRf>**)*
Example:
Command `CURR:SLEW:POS 1`
Query `CURR:SLEW:POS?`

7.12 CURRent:TLEVel <NRf>

Description: For UI versions below 1.10:
The command specifies the transient of the input current level. The transient function switches between the **immediate setting** and the transient level. Units are in amperes. The query returns the programmed transient current level in the <NRf> data type.

For UI version 1.10 and later:
The command specifies the transient of the input current B level. The transient function switches between the setting A level and B level. Units are in amperes. The query returns the programmed transient current B level in the <NRf> data type.

Syntax:
Command `CURRent:TLEVel <NRf>`
Query `CURRent:TLEVel?`

Parameters: For UI versions below 1.10:
`<NRf>` : 0 to maximum | MIN | MAX

Model		HVL150250	HVL150480	HVL600150	HVL80075	HVL100025
Range	Low	0.25 A to 25 A	0.48 A to 48 A	0.15 to 15 A	0.075 to 7.5 A	0.025 to 2.5 A
	High	0.25 A to 250 A	0.48 A to 480 A	0.15 to 150 A	0.075 to 75 A	0.025 to 25 A

Table 7.10 Current Ranges

For UI version 1.10 and later:
`<NRf>` : min value ~ MAX value | MIN | MAX

Model	Minimum (A)	Maximum (A)
HVL150250	0.25	250.00
HVL150480	0.48	480.00
HVL150750	0.75	750.00
HVL600150	0.150	150.00
HVL600300	0.300	300.00
HVL80075	0.075	75.00
HVL800150	0.150	150.00
HVL100025	0.025	25.00
HVL100050	0.050	50.00

Table 7.11 Configurable Current B Level in High Range

Model	Minimum (A)	Maximum (A)
HVL150250	0.25	25.00
HVL150480	0.48	48.00
HVL150750	0.75	75.00
HVL600150	0.150	15.00
HVL600300	0.300	30.00
HVL80075	0.075	7.50
HVL800150	0.150	15.00
HVL100025	0.025	2.50
HVL100050	0.050	5.00

Table 7.12 Configurable Current B Level in Low Range

Example:
Command `CURR:TLEV 25`
Query `CURR:TLEV?`

7.13 CURRent:TWIDth <NRf>

Description: The command sets the pulse width of transient pulse operation in CC mode. Units are in milliseconds.
The query returns the programmed pulse width of the transient pulse operation in CC mode. The value returned is in the <NRf> data type.

Syntax:
Command `CURRent:TWIDth <NRf>`
Query `CURRent:TWIDth?`
Parameters: <NRf> : 1 to 17500 | MIN | MAX
Example:
Command `CURR:TWID 1000`
Query `CURR:TWID?`

Voltage Subsystem

The VOLTage subsystem controls the voltage's amplitude characteristics of the source.

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8.1 VOLTage:DUTY <NR1>

Description: The command sets the duty cycle of the continuous transient operation in constant voltage mode. Units are in percentage.
The query returns the programmed duty cycle for the continuous transient function in CV mode. The data is returned in the <NR1> data type.

Syntax:
Command `VOLTage:DUTY <NR1>`
Query `VOLTage:DUTY?`
Parameters: <NR1> : 1 to 99 | MIN | MAX
Example:
Command `VOLT:DUTY 50`
Query `VOLT:DUTY?`

8.2 VOLTage:FREQuency <NRf>

Description: The command sets the pulse frequency for the continuous transient operation in constant voltage mode. Units are in hertz.
The query returns the programmed frequency for the continuous transient function in CV mode. The data is returned in the <NRf> data type.

Syntax:
Command `VOLTage:FREQuency <NRf>`
Query `VOLTage:FREQuency?`
Parameters: For UI versions below 1.10:
<NRf> : 0.03 to 10000
For UI version 1.10 and later:
<NRf> : 0.1 to 10000.0 | MIN | MAX
Example:
Command `VOLT:FREQ 1000`
Query `VOLT:FREQ?`

8.3 VOLTage[:LEVel]:[IMMediate] <NRf>

Description: The command sets the immediate voltage level when the input is in constant voltage mode. Units are in volts.
The query returns the programmed voltage level in the <NRf> data type.

Syntax:
Command `VOLTage[:LEVel][:IMMediate] <NRf>`
Query `VOLTage[:LEVel][:IMMediate]?`

Parameters: For UI versions below 1.10:
`<NRf>` : 0.000 to max voltage range

MODEL		HVL-600-150	HVL-800-75	HVL-1000-25	HVL-600-300	HVL-800-150	HVL-1000-50
CV Mode							
Range	Low	0 - 60 V	0 - 80 V	0 - 100 V	0 - 60 V	0 - 80 V	0 - 100 V
	High	0 - 600 V	0 - 800 V	0 - 1000 V	0 - 600 V	0 - 800 V	0 - 1000 V
Resolution		400 mV	50 mV	100 mV	40 mV	50 mV	100 mV

Table 8.1 Voltage Ranges

For UI version 1.10 and later:
`<NRf>` : min value ~ MAX value | MIN | MAX

Model	Minimum (V)	Maximum (V)
HVL150250	0.15	150.00
HVL150480	0.15	150.00
HVL150750	0.15	150.00
HVL600150	0.50	600.00
HVL600300	0.50	600.00
HVL80075	0.50	800.00
HVL800150	0.50	800.00
HVL100025	0.50	1000.00
HVL100050	0.50	1000.00

Table 8.2 Configurable Voltage Level in High Range

Example:
Command `VOLT 50.00`
Query `VOLT?`

NOTICE

Note: If the electronic load is not in CV mode, the programmed value that is saved will apply when the electronic load is changed to CV mode.

Model	Minimum (V)	Maximum (V)
HVL150250	0.15	15.00
HVL150480	0.15	15.00
HVL150750	0.15	15.00
HVL600150	0.50	60.00
HVL600300	0.50	60.00
HVL80075	0.50	80.00
HVL800150	0.50	80.00
HVL100025	0.50	100.00
HVL100050	0.50	100.00

Table 8.3 Configurable Voltage Level in Low Range

8.4 VOLTage:LIMit:MAXimum <NRf>

Description: The command sets the maximum voltage limit level when the input is in constant voltage mode. Units are in volts.
The query returns the programmed maximum voltage limit in the <NRf> data type.

Syntax:
Command `VOLTage:LIMit:MAXimum <NRf>`
Query `VOLTage:LIMit:MAXimum?`

Parameters: For UI versions below 1.10:
<NRf> : 0.000 to max voltage range | MIN | MAX

MODEL		HVL-600-150	HVL-800-75	HVL-1000-25	HVL-600-300	HVL-800-150	HVL-1000-50
CV Mode							
Range	Low	0 - 60 V	0 - 80 V	0 - 100 V	0 - 60 V	0 - 80 V	0 - 100 V
	High	0 - 600 V	0 - 800 V	0 - 1000 V	0 - 600 V	0 - 800 V	0 - 1000 V
Resolution		400 mV	50 mV	100 mV	40 mV	50 mV	100 mV

Table 8.4 Voltage Ranges

For UI version 1.10 and later:
<NRf> : min value ~ MAX value | MIN | MAX
*(Please refer to the CV High Range and CV Low Range tables located in section **VOLTage[:LEVel]:[IMMediate] <NRf>**)*

Example:
Command `VOLT:LIM:MAX 100.00`
Query `VOLT:LIM:MAX?`

NOTICE

Note: If the electronic load is not in CV mode, the programmed value that is saved will apply when the electronic load is changed to CV mode.

8.5 VOLTage:LOOP <NR1>

Description: The command sets the loop response speeds to adjust the system bandwidth in constant voltage mode.
The query returns the programmed loop control mode, with the returned value being "0" (fast), "1" (normal), "2" (adaptive), and "3" (low).

Syntax:
Command `VOLTage:LOOP <NR1>`
Query `VOLTage:LOOP?`
Parameters: `<NR1>` : 0 | 1 | 2 | 3

Value	Definition
0	Fast
1	Normal
2	Adaptive *This feature was "slow" in UI firmware versions prior to 1.10.
3	Low *This feature was "slowest" in UI firmware versions prior to 1.10.

Table 8.5 Loop Response Parameters

Example:
Command `VOLT:LOOP 0`
Query `VOLT:LOOP?`

NOTICE

Update info: The command "LOOP:CONTrol" was split into individual commands in UI version 1.10 and later. Pre-1.10 users should refer to the Utility Subsystem chapter for the original LOOP:CONTrol command.

8.6 VOLTage:PROTection:OVER <NRf>

Description: For UI versions below 1.10:
The command sets the output level at which the output's over voltage protection function will trip. Units are in volts. The query returns the programmed level at which the output's over voltage protection function will trip in the <NRf> data type.

For UI version 1.10 and later:
The command sets the input level at which the input's over voltage protection function will trip. Units are in volts. The query returns the programmed level at which the input's over voltage protection function will trip in the <NRf> data type.

Syntax:
Command `VOLTage:PROTection:OVER <NRf>`
Query `VOLTage:PROTection:OVER?`
Parameters: For UI versions below 1.10:
`<NRf>` : 0 to maximum voltage | MIN | MAX

MODEL	HVL-600-150	HVL-800-75	HVL-1000-25	HVL-600-300	HVL-800-150	HVL-1000-50
Programmable Protection						
Over Voltage	630 ±12 V	840 ±16 V	1050 ±20 V	630 ±12 V	840 ±16 V	1050 ±20 V

Table 8.6 Over Voltage Protection

For UI version 1.10 and later:
`<NRf>` : min value ∼ MAX value | MIN | MAX

Model	Minimum (V)	Maximum (V)
HVL150250	1.5	160.00
HVL150480	1.5	160.00
HVL150750	1.5	160.00
HVL600150	0.500	630.00
HVL600300	0.500	630.00
HVL80075	0.525	840.00
HVL800150	0.525	840.00
HVL100025	0.656	1050.00
HVL100050	0.656	1050.00

Table 8.7 Over Voltage Protection Parameters

Example:
Command `VOLT:PROT:OVER 800`
Query `VOLT:PROT:OVER?`

8.7 VOLTage:PROTection:OVER:DELay <NR1>

Description: The command sets the over voltage protection delay time in milliseconds. The output's voltage protection function will not trip during the delay time. After the delay time elapses, the protection function will trip.
The query returns the programmed delay time in the <NR1> data type.

Syntax:
Command `VOLTage:PROTection:OVER:DELay <NR1>`
Query `VOLTage:PROTection:OVER:DELay?`
Parameters: For UI versions below 1.10:
<NR1> : 10 to 10000 | MIN | MAX
For UI version 1.10 and later:
<NR1> : 100 to 10000 | MIN | MAX
Example:
Command `VOLT:PROT:OVER:DEL 300`
Query `VOLT:PROT:OVER:DEL?`

8.8 VOLTage:PROTection:OVER:STATe <boolean>

Description: The command enables/disables the output's over voltage protection function.
The query returns the over voltage protection state, with the returned value being "0" (OFF) or "1" (ON).

Syntax:
Command `VOLTage:PROTection:OVER:STATe <boolean>`
Query `VOLTage:PROTection:OVER:STATe?`
Parameters: <boolean> : 0 | 1 | OFF | ON
Example:
Command `VOLT:PROT:OVER:STAT 1`
Query `VOLT:PROT:OVER:STAT?`

8.9 VOLTage:PROTection:UNDer:HIGH <NRf>

Description: For UI versions below 1.10:
The command sets the output high level at which the output's under voltage protection function will trip. Units are in volts. The query returns the programmed high level at which the output's under voltage protection function will trip in the <NRf> data type.

For UI version 1.10 and later:
The command sets the input high level at which the input's under voltage protection function will trip. The setting value should not be lower than "VOLTage:PROTection:UNDer:LOW". Units are in volts. The query returns the programmed high level at which the input's under voltage protection function will trip in the <NRf> data type.

Syntax:
Command `VOLTage:PROTection:UNDer:HIGH <NRf>`
Query `VOLTage:PROTection:UNDer:HIGH?`
Parameters: For UI versions below 1.10:
`<NRf>` : 0 to maximum voltage | MIN | MAX

MODEL	HVL-600-150	HVL-800-75	HVL-1000-25	HVL-600-300	HVL-800-150	HVL-1000-50
Programmable Protection						
Under Voltage	0.45 - 600 V	0.6 - 800 V	0.75 - 1000 V	0.45 - 600 V	0.6 - 800 V	0.75 - 1000 V

Table 8.8 Programmable Under Voltage Protection

For UI version 1.10 and later:
`<NRf>` : min value ~ MAX value | MIN | MAX

Model	Minimum (V)	Maximum (V)
HVL150250	0.15	135.00
HVL150480	0.15	135.00
HVL150750	0.15	135.00
HVL600150	0.450	600.00
HVL600300	0.450	600.00
HVL80075	0.600	800.00
HVL800150	0.600	800.00
HVL100025	0.750	1000.00
HVL100050	0.750	1000.00

Table 8.9 Under Voltage Protection Parameters

Example:

Command `VOLT:PROT:UNDER:HIGH 50`
Query `VOLT:PROT:UNDer:HIGH?`

8.10 VOLTage:SENSe <Boolean>

Description: The command sets sense to either local or remote mode.
The query returns the programmed sense mode, with the returned string being "INT" (internal, local sense) or "EXT" (External, remote sense).

Syntax:
Command `VOLTage:SENSe <Boolean>`
Query `VOLTage:SENSe?`
Parameters: `<Boolean>` : INT | EXT

Value	Definition
INTernal	Local Sense Mode
EXTernal	Remote Sense Mode

Table 8.10 Sense Mode Parameters

Example:
Command `VOLT:SENS EXT`
Query `VOLT:SENS?`

NOTICE

Update info: This command is available in UI version 1.10 and later.

8.11 VOLTage:SLEW:NEGative <NRf>

Description: For UI versions below 1.10:
The command sets the negative slew rate from transient level to main level in CV mode. Units are in volts per milliseconds. The query returns the programmed negative slew rate of the transient operation in CV mode. The returned value is in the <NRf> data type.

For UI version 1.10 and later:
The command sets the slew rate from B level to A level in transient CV mode. This parameter also affects the slew rate in normal operation in CV mode. Units are in Voltages per milliseconds. The query returns the programmed slew rate from B level to A level in transient CV mode. The returned value is in the <NRf> data type.

Syntax:
Command `VOLTage:SLEW:NEGative <NRf>`
Query `VOLTage:SLEW:NEGative?`
Parameters: For UI versions below 1.10:
`<NRf>` : 0.1 to 5400 | MIN | MAX
For UI version 1.10 and later:
`<NRf>` : min value ~ MAX value | MIN | MAX

Model	Minimum (V/ms)	Maximum (V/ms)
HVL150250	0.05	7500.00
HVL150480	0.05	7500.00
HVL150750	0.05	7500.00
HVL600150	0.20	1200.00
HVL600300	0.20	1200.00
HVL80075	0.267	1600.00
HVL800150	0.267	1600.00
HVL100025	0.333	2000.00
HVL100050	0.333	2000.00

Table 8.11 Slew Rate Parameters

Example:
Command `VOLT:SLEW:NEG 1`
Query `VOLT:SLEW:NEG?`

8.12 VOLTage:SLEW:POSitive <NRf>

Description: For UI versions below 1.10:
The command sets the positive slew rate from main level to transient level in CV mode. Units are in volts per milliseconds. The query returns the programmed positive slew rate of the transient operation in CV mode. The returned value is in the <NRf> data type.

For UI version 1.10 and later:
The command sets the slew rate from A level to B level in transient CV mode. This parameter also affects the slew rate in normal operation in CV mode. Units are in Voltages per milliseconds. The query returns the programmed slew rate from A level to B level in transient CV mode. The returned value is in the <NRf> data type.

Syntax:
Command `VOLTage:SLEW:POSitive <NRf>`
Query `VOLTage:SLEW:POSitive?`
Parameters: For UI versions below 1.10:
`<NRf>` : 0.1 to 5400 | MIN | MAX
For UI version 1.10 and later:
`<NRf>` : min value ~ MAX value | MIN | MAX
*(Please refer to the Voltage Slew Rate Parameters table located in section **VOLTage:SLEW:NEGative <NRf>**)*
Example:
Command `VOLT:SLEW:POS 1`
Query `VOLT:SLEW:POS?`

8.13 VOLTage:TLEVel <NRf>

Description: For UI versions below 1.10:
The command specifies the transient of the input voltage level. The transient function switches between the **immediate setting** and the transient level. Units are in volts. The query returns the programmed transient voltage level in the <NRf> data type.

For UI version 1.10 and later:
The command specifies the transient of the input voltage B level. The transient function switches between the setting A level and B level. Units are in voltages. The query returns the programmed transient voltage B level in the <NRf> data type.

Syntax:
Command `VOLTage:TLEVel <NRf>`
Query `VOLTage:TLEVel?`
Parameters: For UI versions below 1.10:
`<NRf>` : 0 to maximum | MIN | MAX

MODEL		HVL-600-150	HVL-800-75	HVL-1000-25	HVL-600-300	HVL-800-150	HVL-1000-50
CV Mode							
Range	Low	0 - 60 V	0 - 80 V	0 - 100 V	0 - 60 V	0 - 80 V	0 - 100 V
	High	0 - 600 V	0 - 800 V	0 - 1000 V	0 - 600 V	0 - 800 V	0 - 1000 V
Resolution		400 mV	50 mV	100 mV	40 mV	50 mV	100 mV

Table 8.12 Voltage Ranges

For UI version 1.10 and later:
`<NRf>` : min value ~ MAX value | MIN | MAX

Model	Minimum (V)	Maximum (V)
HVL150250	0.15	150.00
HVL150480	0.15	150.00
HVL150750	0.15	150.00
HVL600150	0.50	600.00
HVL600300	0.50	600.00
HVL80075	0.50	800.00
HVL800150	0.50	800.00
HVL100025	0.50	1000.00
HVL100050	0.50	1000.00

Table 8.13 Configurable Voltage B Level in High Range

Model	Minimum (V)	Maximum (V)
HVL150250	0.15	15.00
HVL150480	0.15	15.00
HVL150750	0.15	15.00
HVL600150	0.50	60.00
HVL600300	0.50	60.00
HVL80075	0.50	80.00
HVL800150	0.50	80.00
HVL100025	0.50	100.00
HVL100050	0.50	100.00

Table 8.14 Configurable Voltage B Level in Low Range

Example:

Command `VOLT:TLEV 50`

Query `VOLT:TLEV?`

8.14 VOLTage:TWIDth <NRf>

Description: The command sets the pulse width of transient pulse operation in CV mode. Units are in milliseconds.
The query returns the programmed pulse width of the transient pulse operation in CV mode. The value returned is in the <NRf> data type.

Syntax:
Command `VOLTage:TWIDth <NRf>`
Query `VOLTage:TWIDth?`
Parameters: <NRf> : 1 to 17500 | MIN | MAX
Example:
Command `VOLT:TWID 1000`
Query `VOLT:TWID?`

8.15 VOLTage:PROTection:UNDer:LOW <NRf>

Description: For UI versions below 1.10:
The command sets the output low level at which the output's under voltage protection function will trip. Units are in volts. The query returns the programmed low level at which the output's under voltage protection function will trip in the <NRf> data type.

For UI version 1.10 and later:
The command sets the input low level at which the input's under voltage protection function will trip. The setting value must not exceed "VOLTage:PROTection:UNDer:HIGH". Units are in volts. The query returns the programmed low level at which the input's under voltage protection function will trip in the <NRf> data type.

Syntax:
Command `VOLTage:PROTection:UNDer:LOW <NRf>`
Query `VOLTage:PROTection:UNDer:LOW?`
Parameters: For UI versions below 1.10:
<NRf> : minimum to maximum voltage | MIN | MAX
For UI version 1.10 and later:
<NRf> : min value ~ MAX value | MIN | MAX
Example:
Command `VOLT:PROT:UNDER:LOW 1`
Query `VOLT:PROT:UNDer:LOW?`

HVL150250	0.15	135.00
HVL150480	0.15	135.00
HVL150750	0.15	135.00
HVL600150	0.450	600.00
HVL600300	0.450	600.00
HVL80075	0.600	800.00
HVL800150	0.600	800.00
HVL100025	0.750	1000.00
HVL100050	0.750	1000.00

Table 8.15 Under Voltage Lockout Parameters

MODEL	HVL-600-150	HVL-800-75	HVL-1000-25	HVL-600-300	HVL-800-150	HVL-1000-50
Programmable Protection						
Under Voltage	0.45 - 600 V	0.6 - 800 V	0.75 - 1000 V	0.45 - 600 V	0.6 - 800 V	0.75 - 1000 V

Table 8.15 Programmable Under Voltage Protection

Model	Minimum (V)	Maximum (V)
HVL150250	0.15	135.00
HVL150480	0.15	135.00
HVL150750	0.15	135.00
HVL600150	0.450	600.00
HVL600300	0.450	600.00
HVL80075	0.600	800.00
HVL800150	0.600	800.00
HVL100025	0.750	1000.00
HVL100050	0.750	1000.00

Table 8.16 Under Voltage Lockout Parameters

8.16 VOLTage:PROTection:UNDer:STATe <Boolean>

Description: For UI versions below 1.10:
The command enables/disables the output's under voltage protection function. The query returns the under voltage protection state, with the returned value being "0" (OFF) or "1" (ON).

For UI version 1.10 and later:
The command enables/disables the input's under voltage protection function. The query returns the under voltage protection state, with the returned value being "0" (Once), "1" (Live) or "2" (Protect).

Syntax:
Command `VOLTage:PROTection:UNDer:STATe <Boolean>`
Query `VOLTage:PROTection:UNDer:STATe?`

Parameters: For UI versions below 1.10:
`<Boolean>` : 0 | 1 | OFF | ON

For UI version 1.10 and later:
`<Boolean>` : 0 | 1 | 2

Value	Definition
0	Once
1	Live
2	Protect

Table 8.17 Under Voltage Protection Status Parameters

Example:
Command `VOLT:PROT:UND:STAT 0`
Query `VOLT:PROT:UND:STAT?`

Power Subsystem

The POWer subsystem controls the power's characteristics of the source.

9.1 POWer:DUTY <NR1> 58
9.2 POWer:FREQuency <NRf> 58
9.3 POWer[:LEVel]:[IMMediate] <NRf> 59
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9.10 POWer:SLEW:NEGative <NRf> 66
9.11 POWer:SLEW:POSitive <NRf> 68
9.12 POWer:TLEVel <NRf> 69
9.13 POWer:TWIDth <NRf> 70

9.1 POWer:DUTY <NR1>

Description: The command sets the duty cycle of the continuous transient operation in constant power mode. Units are in percentage.
The query returns the programmed duty cycle for the continuous transient function in CW mode. The data is returned in the <NR1> data type.

Syntax:
Command `POWer:DUTY <NR1>`
Query `POWer:DUTY?`
Parameters: <NR1> : 1 to 99 | MIN | MAX
Example:
Command `POW:DUTY 50`
Query `POW:DUTY?`

9.2 POWer:FREQuency <NRf>

Description: The command sets the pulse frequency for the continuous transient operation in constant power mode. Units are in hertz.
The query returns the programmed frequency for the continuous transient function in CW mode. The data is returned in the <NRf> data type.

Syntax:
Command `POWer:FREQuency <NRf>`
Query `POWer:FREQuency?`
Parameters: For UI versions below 1.10:
<NRf> : 0.03 to 10000
For UI version 1.10 and later:
<NRf> : 0.1 ~ 10000.0 | MIN | MAX
Example:
Command `POW:FREQ 1000`
Query `POW:FREQ?`

9.3 POWer[:LEVel]:[IMMediate] <NRf>

Description: The command sets the immediate power level when the input is in constant power mode. Units are in watts.
The query returns the programmed power level in the <NRf> data type.

Syntax:
Command `POWer[:LEVel][:IMMediate] <NRf>`
Query `POWer[:LEVel][:IMMediate]?`

Parameters: For UI versions below 1.10:
`<NRf>` : 0.000 to max power range

MODEL		HVL-600-150	HVL-800-75	HVL-1000-25	HVL-600-300	HVL-800-150	HVL-1000-50
CP Mode							
Range	Low	0 to 400 W			0 - 800 W		
	High	0 to 4000 W			0 - 8000 W		
Resolution		25 mW / 250 mW			50 mW / 500 mW		

Table 9.1 Power Ranges

For UI version 1.10 and later:
`<NRf>` : min value ~ MAX value | MIN | MAX

Model	Minimum (W)	Maximum (W)
HVL600150	3.00	3000.00
HVL600300	6.00	6000.00
HVL80075	3.00	3000.00
HVL800150	6.00	6000.00
HVL100025	3.00	3000.00
HVL100050	6.00	6000.00

Table 9.2 Configurable Power Level in High Range

Model	Minimum (W)	Maximum (W)
HVL600150	3.00	300.00
HVL600300	6.00	600.00
HVL80075	3.00	300.00
HVL800150	6.00	600.00
HVL100025	3.00	300.00
HVL100050	6.00	600.00

Table 9.3 Configurable Power Level in Low Range

Model	Minimum (W)	Maximum (W)
HVL150250	4.00	2000.00
HVL150480	6.00	3000.00
HVL150750	12.00	6000.00

Table 9.4 Configurable Power Level (For HVL150 Series)

Example:

Command `POW 400.00`

Query `POW?`

NOTICE

Note: If the electronic load is not in CW mode, the programmed value that is saved will apply when the electronic load is changed to CW mode.

9.4 POWer:LIMit:MAXimum <NRf>

Description: The command sets the maximum power limit level when the input is in constant power mode. Units are in watts.
The query returns the programmed maximum power limit in the <NRf> data type.

Syntax:
Command `POWer:LIMit:MAXimum <NRf>`
Query `POWer:LIMit:MAXimum?`

Parameters: **For UI versions below 1.10:**
<NRf> : 0.000 to max power range | MIN | MAX

MODEL		HVL-600-150	HVL-800-75	HVL-1000-25	HVL-600-300	HVL-800-150	HVL-1000-50
CP Mode							
Range	Low	0 to 400 W			0 - 800 W		
	High	0 to 4000 W			0 - 8000 W		
Resolution		25 mW / 250 mW			50 mW / 500 mW		

Table 9.5 Power Ranges

For UI version 1.10 and later:
<NRf> : min value ~ MAX value | MIN | MAX
*(Please refer to the CW High Range, CW Low Range, and CW HVL150 Series tables located in section **POWer[:LEVel]:[IMMediate] <NRf>**)*

Example:
Command `POW:LIM:MAX 4000.00`
Query `POW:LIM:MAX?`

NOTICE **Note: If the electronic load is not in CW mode, the programmed value that is saved will apply when the electronic load is changed to CW mode.**

9.5 POWer:LIMit:OVER <NRf>

Description: This command sets the input level for triggering the input over power limit function. The unit is watts.
The query returns the programmed level for triggering the input over power limit function; the data type is <NRf>.

Syntax:
Command `POWer:LIMit:OVER <NRf>`
Query `POWer:LIMit:OVER?`

HVL150250	100.00	2200.00
HVL150480	100.00	3300.00
HVL150750	200.00	6600.00

Table 9.6 Over Power Limit Parameters

Model	Minimum (W)	Maximum (W)
HVL150250	100.00	2200.00
HVL150480	100.00	3300.00
HVL150750	200.00	6600.00

Table 9.6 Over Power Limit Parameters

Parameters: <NRf> : min value ~ MAX value | MIN | MAX

Example:

Command `POW:LIM:OVER 1000`

Query `POW:LIM:OVER?`

NOTICE

Update info: This command is available in UI version 1.10 and later. Only HVL150250, HVL150750, and HVL150480 support this command.

9.6 POWer:LOOP <NR1>

Description: The command sets the loop response speeds to adjust the system bandwidth in constant power mode.
The query returns the programmed loop control mode, with the returned value being "0" (fast), "1" (normal), "2" (slow), and "3" (slowest).

Syntax:
Command `POWer:LOOP <NR1>`
Query `POWer:LOOP?`
Parameters: `<NR1>` : 0 | 1 | 2 | 3

Value	Definition
0	Fast
1	Normal
2	Slow
3	Slowest

Table 9.7 Loop Response Parameters

Example:
Command `POW:LOOP 0`
Query `POW:LOOP?`

NOTICE

Update info: The command "LOOP:CONTrol" was split into individual commands in UI version 1.10 and later. Pre-1.10 users should refer to the Utility Subsystem chapter for the original LOOP:CONTrol command.

9.7 POWer:PROTection:OVER <NRf>

Description: This command sets the input level for triggering the input over power protection function. The unit is watts.
The query returns the programmed level for triggering the input over power protection function; the data type is <NRf>.

Syntax:
Command `POWer:PROTection:OVER <NRf>`
Query `POWer:PROTection:OVER?`
Parameters: <NRf> : min value ~ MAX value | MIN | MAX

Model	Minimum (W)	Maximum (W)
HVL150250	100.00	2200.00
HVL150480	100.00	3300.00
HVL150750	200.00	6600.00

Table 9.8 Over Power Protection Parameters

Example:
Command `POW:PROT:OVER 1500`
Query `POW:PROT:OVER?`

NOTICE

Update info: This command is available in UI version 1.10 and later. Only HVL150250, HVL150750, and HVL150480 support this command.

9.8 POWer:PROTection:OVER:DELay <NR1>

Description: The command sets the over power protection delay time in milliseconds. The output's power protection function will not trip during the delay time. After the delay time elapses, the protection function will trip.
The query returns the programmed delay time in the <NR1> data type.

Syntax:
Command `POWer:PROTection:OVER:DELay <NR1>`
Query `POWer:PROTection:OVER:DELay?`
Parameters: For UI versions below 1.10:
<NR1> : 10 to 10000 | MIN | MAX
For UI version 1.10 and later:
<NR1> : 100 to 10000 | MIN | MAX

Example:

Command `POW:PROT:OVER:DEL 300`

Query `POW:PROT:OVER:DEL?`

9.9 POWer:PROTection:OVER:STATe <boolean>

Description: The command enables/disables the output's over power protection function.
The query returns the over power protection state, with the returned value being "0" (OFF) or "1" (ON).

Syntax:
Command `POWer:PROTection:OVER:STATe <boolean>`
Query `POWer:PROTection:OVER:STATe?`
Parameters: <boolean> : 0 | 1 | OFF | ON
Example:
Command `POW:PROT:OVER:STAT 1`
Query `POW:PROT:OVER:STAT?`

9.10 POWer:SLEW:NEGative <NRf>

Description: For UI versions below 1.10:
The command sets the negative slew rate from transient level to main level in CW mode. Units are in amperes per milliseconds. The query returns the programmed negative slew rate of the transient operation in CW mode. The returned value is in the <NRf> data type.

For UI version 1.10 and later:
The command sets the slew rate from B level to A level in transient CW mode. This parameter also affects the slew rate in normal operation in CW mode. Units are in amperes per milliseconds. The query returns the programmed slew rate from B level to A level in transient CW mode. The returned value is in the <NRf> data type.

Syntax:
Command `POWer:SLEW:NEGative <NRf>`
Query `POWer:SLEW:NEGative?`
Parameters: For UI versions below 1.10:
<NRf> : 0.1 to 5400 | MIN | MAX
For UI version 1.10 and later:
<NRf> : min value ~ MAX value | MIN | MAX
Example:
Command `POW:SLEW:NEG 1`
Query `POW:SLEW:NEG?`

HVL150250	0.083	12500.00
HVL150480	0.16	24000.00
HVL150750	0.25	37500.00
HVL600150	0.05	3000.00
HVL600300	0.10	6000.00
HVL80075	0.025	1500.00
HVL800150	0.05	3000.00
HVL100025	0.008	500.00
HVL100050	0.017	1000.00

Table 9.9 Slew Rate Parameters

Model	Minimum (A/ms)	Maximum (A/ms)
HVL150250	0.083	12500.00
HVL150480	0.16	24000.00
HVL150750	0.25	37500.00
HVL600150	0.05	3000.00
HVL600300	0.10	6000.00
HVL80075	0.025	1500.00
HVL800150	0.05	3000.00
HVL100025	0.008	500.00
HVL100050	0.017	1000.00

Table 9.9 Slew Rate Parameters

9.11 POWer:SLEW:POSitive <NRf>

Description: For UI versions below 1.10:
The command sets the positive slew rate from main level to transient level in CW mode. Units are in amperes per milliseconds. The query returns the programmed positive slew rate of the transient operation in CW mode. The returned value is in the <NRf> data type.

For UI version 1.10 and later:
The command sets the slew rate from A level to B level in transient CW mode. Units are in amperes per milliseconds. The query returns the programmed slew rate from A level to B level in transient CW mode. The returned value is in the <NRf> data type.

Syntax:
Command `POWer:SLEW:POSitive <NRf>`
Query `POWer:SLEW:POSitive?`
Parameters: For UI versions below 1.10:
`<NRf>` : 0.1 to 5400 | MIN | MAX
For UI version 1.10 and later:
`<NRf>` : min value ~ MAX value | MIN | MAX
*(Please refer to the Slew Rate Parameters table located in section **POWer:SLEW:NEGative <NRf>**)*
Example:
Command `POW:SLEW:POS 1`
Query `POW:SLEW:POS?`

9.12 POWer:TLEVel <NRf>

Description: For UI versions below 1.10:
The command specifies the transient of the input power level. The transient function switches between the **immediate setting** and the transient level. Units are in watts. The query returns the programmed transient power level in the <NRf> data type.

For UI version 1.10 and later:
The command specifies the transient of the input power B level. The transient function switches between the setting A level and B level. Units are in watts. The query returns the programmed transient power B level in the <NRf> data type.

Syntax:
Command `POWer:TLEVel <NRf>`
Query `POWer:TLEVel?`

Parameters: For UI versions below 1.10:
`<NRf>` : 0 to maximum power range

MODEL		HVL-600-150	HVL-800-75	HVL-1000-25	HVL-600-300	HVL-800-150	HVL-1000-50
CP Mode							
Range	Low	0 to 400 W			0 - 800 W		
	High	0 to 4000 W			0 - 8000 W		
Resolution		25 mW / 250 mW			50 mW / 500 mW		

Table 9.10 Power Ranges

For UI version 1.10 and later:
`<NRf>` : min value ~ MAX value | MIN | MAX

Model	Minimum (W)	Maximum (W)
HVL600150	3.00	3000.00
HVL600300	6.00	6000.00
HVL80075	3.00	3000.00
HVL800150	6.00	6000.00
HVL100025	3.00	3000.00
HVL100050	6.00	6000.00

Table 9.11 Configurable Power B Level in High Range

Example:
Command `POW:TLEV 400`
Query `POW:TLEV?`

Model	Minimum (W)	Maximum (W)
HVL600150	3.00	300.00
HVL600300	6.00	600.00
HVL80075	3.00	300.00
HVL800150	6.00	600.00
HVL100025	3.00	300.00
HVL100050	6.00	600.00

Table 9.12 Configurable Power B Level in Low Range

Model	Minimum (W)	Maximum (W)
HVL150250	4.00	2000.00
HVL150480	6.00	3000.00
HVL150750	12.00	6000.00

Table 9.13 Configurable Power B Level (For HVL150 Series)

9.13 POWer:TWIDth <NRf>

Description: The command sets the pulse width of transient pulse operation in CW mode. Units are in milliseconds.
The query returns the programmed pulse width of the transient pulse operation in CW mode. The value returned is in the <NRf> data type.

Syntax:
Command `POWer:TWIDth <NRf>`
Query `POWer:TWIDth?`
Parameters: `<NRf>` : 1 to 17500 | MIN | MAX
Example:
Command `POW:TWID 1000`
Query `POW:TWID?`

Resistance Subsystem

The RESistance subsystem controls the resistance's characteristics of the source.

10.1 RESistance:DUTY <NR1> 72
10.2 RESistance:FREQuency <NRf> 72
10.3 RESistance[:LEVel]:[IMMediate] <NRf> 73
10.4 RESistance:LIMit:MAXimum <NRf> 75
10.5 RESistance:LOOP <NR1> 75
10.6 RESistance:TRACking <Boolean> 77
10.7 RESistance:SLEW:NEGative <NRf> 77
10.8 RESistance:SLEW:POSitive <NRf> 80
10.9 RESistance:TLEVel <NRf> 81
10.10 RESistance:TWIDth <NRf> 83

10.1 RESistance:DUTY <NR1>

Description: The command sets the duty cycle of the continuous transient operation in constant resistance mode. Units are in percentage.
The query returns the programmed duty cycle for the continuous transient function in CR mode. The data is returned in the <NR1> data type.

Syntax:
Command `RESistance:DUTY <NR1>`
Query `RESistance:DUTY?`
Parameters: <NR1> : 1 to 99 | MIN | MAX
Example:
Command `RES:DUTY 50`
Query `RES:DUTY?`

10.2 RESistance:FREQuency <NRf>

Description: The command sets the pulse frequency for the continuous transient operation in constant resistance mode. Units are in hertz.
The query returns the programmed frequency for the continuous transient function in CR mode. The data is returned in the <NRf> data type.

Syntax:
Command `RESistance:FREQuency <NRf>`
Query `RESistance:FREQuency?`
Parameters: For UI versions below 1.10:
<NRf> : 0.03 to 10000
For UI version 1.10 and later:
<NRf> : 0.1 ~ 10000.0 | MIN | MAX
Example:
Command `RES:FREQ 1000`
Query `RES:FREQ?`

10.3 RESistance[:LEVel]:[IMMediate] <NRf>

Description: The command sets the immediate resistance level when the input is in constant resistance mode. Units are in ohms.
The query returns the programmed resistance level in the <NRf> data type.

Syntax:
Command `RESistance[:LEVel][:IMMediate] <NRf>`
Query `RESistance[:LEVel][:IMMediate]?`

Parameters: For UI versions below 1.10:
`<NRf>` : 0.000 to max resistance range

MODEL		HVL-600-150	HVL-800-75	HVL-1000-25	HVL-600-300	HVL-800-150	HVL-1000-50
CR Mode							
Range	Low	0.03 to 4 Ω	0.03 to 10.66 Ω	0.2 to 40 Ω	0.015 - 2 Ω	0.015 - 5.33 Ω	0.1 - 20 Ω
	High	4 to 3200 Ω	10.66 to 5000 Ω	40 to 10 kΩ	2 - 1600 Ω	5.33 - 4000 Ω	20 - 5 kΩ
Resolution		0.5 mΩ	1.33 mΩ	5 mΩ	0.25 mΩ	0.666 mΩ	2.5 mΩ

Table 10.1 Resistance Ranges

For UI version 1.10 and later:
`<NRf>` : min value ~ MAX value | MIN | MAX

Model	Minimum (Ω)	Maximum (Ω)
HVL600150	4.00	3200.00
HVL600300	10.66	5000.00
HVL80075	40.00	10000.00
HVL800150	2.00	1600.00
HVL100025	5.33	4000.00
HVL100050	20.00	5000.00

Table 10.2 Configurable Resistance Level in High Range

Model	Minimum (Ω)	Maximum (Ω)
HVL600150	0.030	4.000
HVL600300	0.030	10.660
HVL80075	0.200	40.000
HVL800150	0.015	2.000
HVL100025	0.015	5.330
HVL100050	0.100	20.000

Table 10.3 Configurable Resistance Level in Low Range

Model	Minimum (Ω)	Maximum (Ω)
HVL150250	0.006	480.000
HVL150480	0.007	300.000
HVL150750	0.002	200.000

Table 10.4 Configurable Resistance Level (For HVL150 Series)

Example:

Command `RES 100.00`

Query `RES?`

NOTICE

Note: If the electronic load is not in CR mode, the programmed value that is saved will apply when the electronic load is changed to CR mode.

10.4 RESistance:LIMit:MAXimum <NRf>

Description: The command sets the maximum resistance limit level when the input is in constant resistance mode. Units are in ohms.
The query returns the programmed maximum resistance limit in the <NRf> data type.

Syntax:
Command `RESistance:LIMit:MAXimum <NRf>`
Query `RESistance:LIMit:MAXimum?`

Parameters: For UI versions below 1.10:
<NRf> : 0.000 to max resistance range | MIN | MAX

MODEL		HVL-600-150	HVL-800-75	HVL-1000-25	HVL-600-300	HVL-800-150	HVL-1000-50
CR Mode							
Range	Low	0.03 to 4 Ω	0.03 to 10.66 Ω	0.2 to 40 Ω	0.015 - 2 Ω	0.015 - 5.33 Ω	0.1 - 20 Ω
	High	4 to 3200 Ω	10.66 to 5000 Ω	40 to 10 kΩ	2 - 1600 Ω	5.33 - 4000 Ω	20 - 5 kΩ
Resolution		0.5 mΩ	1.33 mΩ	5 mΩ	0.25 mΩ	0.666 mΩ	2.5 mΩ

Table 10.5 Resistance Ranges

For UI version 1.10 and later:
<NRf> : min value ~ MAX value | MIN | MAX
*(Please refer to the CR High Range, CR Low Range, and CR HVL150 Series tables located in section **RESistance[:LEVel]:[IMMediate] <NRf>**)*

Example:
Command `RES:LIM:MAX 10000.00`
Query `RES:LIM:MAX?`

NOTICE

Note: If the electronic load is not in CR mode, the programmed value that is saved will apply when the electronic load is changed to CR mode.

10.5 RESistance:LOOP <NR1>

Description: The command sets the loop response speeds to adjust the system bandwidth in constant resistance mode.
The query returns the programmed loop control mode, with the returned value being "0" (fast), "1" (normal), "2" (slow), and "3" (slowest).

Syntax:
Command `RESistance:LOOP <NR1>`
Query `RESistance:LOOP?`

0	Fast
1	Normal
2	Slow
3	Slowest

Table 10.6 Loop Response Parameters

Value	Definition
0	Fast
1	Normal
2	Slow
3	Slowest

Table 10.6 Loop Response Parameters

Parameters: <NR1> : 0 | 1 | 2 | 3

Example:

Command `RES:LOOP 0`

Query `RES:LOOP?`

NOTICE

Update info: The command "LOOP:CONTrol" was split into individual commands in UI version 1.10 and later. Pre-1.10 users should refer to the Utility Subsystem chapter for the original LOOP:CONTrol command.

10.6 RESistance:TRACking <Boolean>

Description: Enables/Disables fine tune tracking method used for the loop control.
The query provides the electronic load's fine tune tracking state, with the returned value being "0" (fine tune off) or "1" (fine tune on).

Syntax:
Command `RESistance:TRACking <Boolean>`
Query `RESistance:TRACking?`
Parameters: `<Boolean>` : 0 | 1 | ON | OFF

Value	Definition
0	Fine Tune off
1	Fine Tune on

Table 10.7 Fine Tune function Parameters

Example:
Command `RES:TRAC 1`
Query `RES:TRAC?`

10.7 RESistance:SLEW:NEGative <NRf>

Description: For UI versions below 1.10:
The command sets the negative slew rate from transient level to main level in CR mode. Units are in amperes per milliseconds for CRH mode and volts per milliseconds for CRL mode. The query returns the programmed negative slew rate of the transient operation in CR mode. The returned value is in the <NRf> data type.

For UI version 1.10 and later:
The command sets the slew rate from B level to A level in transient CR mode. This parameter also affects the slew rate in normal operation in CR mode. Units are in amperes per milliseconds or Voltages per milliseconds. The query returns the programmed slew rate from B level to A level in transient CR mode. The returned value is in the <NRf> data type.

Syntax:
Command `RESistance:SLEW:NEGative <NRf>`
Query `RESistance:SLEW:NEGative?`
Parameters: For UI versions below 1.10:
`<NRf>` : 0.1 to 5400 | MIN | MAX
For UI version 1.10 and later:
`<NRf>` : min value ~ MAX value | MIN | MAX

HVL600150	0.05	300.00
HVL600300	0.10	600.00
HVL80075	0.025	150.00
HVL800150	0.05	300.00
HVL100025	0.008	50.00
HVL100050	0.017	100.00

Table 10.8 High Range slew rate parameters

HVL600150	1000.00	1000.00
HVL600300	1000.00	1000.00
HVL80075	1000.00	1000.00
HVL800150	1000.00	1000.00
HVL100025	1000.00	1000.00
HVL100050	1000.00	1000.00

Table 10.8 Low range slew rate parameters

Example:

Command `RES:SLEW:NEG 1`

Query `RES:SLEW:NEG?`

HVL150250	0.083	12500.00
HVL150480	0.16	24000.00
HVL150750	0.25	37500.00

Table 10.8 slew rate parameters (HVL150 Series)

Model	Minimum (A/ms)	Maximum (A/ms)
HVL600150	0.05	300.00
HVL600300	0.10	600.00
HVL80075	0.025	150.00
HVL800150	0.05	300.00
HVL100025	0.008	50.00
HVL100050	0.017	100.00

Table 10.8 High Range slew rate parameters

Model	Minimum (V/ms)	Maximum (V/ms)
HVL600150	1000.00	1000.00
HVL600300	1000.00	1000.00
HVL80075	1000.00	1000.00
HVL800150	1000.00	1000.00
HVL100025	1000.00	1000.00
HVL100050	1000.00	1000.00

Table 10.9 Low range slew rate parameters

Model	Minimum (A/ms)	Maximum (A/ms)
HVL150250	0.083	12500.00
HVL150480	0.16	24000.00
HVL150750	0.25	37500.00

Table 10.10 slew rate parameters (HVL150 Series)

10.8 RESistance:SLEW:POSitive <NRf>

Description: For UI versions below 1.10:
The command sets the positive slew rate from main level to transient level in CR mode. Units are in amperes per milliseconds for CRH mode and volts per milliseconds for CRL mode. The query returns the programmed positive slew rate of the transient operation in CR mode. The returned value is in the <NRf> data type.

For UI version 1.10 and later:
The command sets the slew rate from A level to B level in transient CR mode. This parameter also affects the slew rate in normal operation in CR mode. Units are in amperes per milliseconds or Voltages per milliseconds. The query returns the programmed slew rate from A level to B level in transient CR mode. The returned value is in the <NRf> data type.

Syntax:
Command `RESistance:SLEW:POSitive <NRf>`
Query `RESistance:SLEW:POSitive?`
Parameters: For UI versions below 1.10:
`<NRf>` : 0.1 to 5400 | MIN | MAX
For UI version 1.10 and later:
`<NRf>` : min value ~ MAX value | MIN | MAX
*(Please refer to the Slew Rate Parameters tables located in section **RESistance:SLEW:NEGative <NRf>**)*
Example:
Command `RES:SLEW:POS 1`
Query `RES:SLEW:POS?`

10.9 RESistance:TLEVel <NRf>

Description: For UI versions below 1.10:
The command specifies the transient of the input resistance level. The transient function switches between the **immediate setting** and the transient level. Units are in ohms. The query returns the programmed transient resistance level in the <NRf> data type.

For UI version 1.10 and later:
The command specifies the transient of the input resistance B level. The transient function switches between the setting A level and B level. Units are in ohms. The query returns the programmed transient resistance B level in the <NRf> data type.

Syntax:
Command `RESistance:TLEVel <NRf>`
Query `RESistance:TLEVel?`

Parameters: For UI versions below 1.10:
`<NRf>` : 0 to maximum resistance range

MODEL		HVL-600-150	HVL-800-75	HVL-1000-25	HVL-600-300	HVL-800-150	HVL-1000-50
CR Mode							
Range	Low	0.03 to 4 Ω	0.03 to 10.66 Ω	0.2 to 40 Ω	0.015 - 2 Ω	0.015 - 5.33 Ω	0.1 - 20 Ω
	High	4 to 3200 Ω	10.66 to 5000 Ω	40 to 10 kΩ	2 - 1600 Ω	5.33 - 4000 Ω	20 - 5 kΩ
Resolution		0.5 mΩ	1.33 mΩ	5 mΩ	0.25 mΩ	0.666 mΩ	2.5 mΩ

Table 10.11 Resistance Ranges

For UI version 1.10 and later:
`<NRf>` : min value ~ MAX value | MIN | MAX

Model	Minimum (Ω)	Maximum (Ω)
HVL600150	4.00	3200.00
HVL600300	10.66	5000.00
HVL80075	40.00	10000.00
HVL800150	2.00	1600.00
HVL100025	5.33	4000.00
HVL100050	20.00	5000.00

Table 10.12 Configurable Resistance B Level in High Range

Example:
Command `RES:TLEV 50`
Query `RES:TLEV?`

Model	Minimum (Ω)	Maximum (Ω)
HVL600150	0.030	4.000
HVL600300	0.030	10.660
HVL80075	0.200	40.000
HVL800150	0.015	2.000
HVL100025	0.015	5.330
HVL100050	0.100	20.000

Table 10.13 Configurable Resistance B Level in Low Range

Model	Minimum (Ω)	Maximum (Ω)
HVL150250	0.006	480.000
HVL150480	0.007	300.000
HVL150750	0.002	200.000

Table 10.14 Configurable Resistance B Level (For HVL150 Series)

10.10 RESistance:TWIDth <NRf>

Description: The command sets the pulse width of transient pulse operation in CR mode. Units are in milliseconds.
The query returns the programmed pulse width of the transient pulse operation in CR mode. The value returned is in the <NRf> data type.

Syntax:
Command `RESistance:TWIDth <NRf>`
Query `RESistance:TWIDth?`
Parameters: <NRf> : 1 to 17500 | MIN | MAX
Example:
Command `RES:TWID 1000`
Query `RES:TWID?`

Measure Subsystem

The MEASure subsystem acquires data from the dc load using a set of high-level instructions.

11.1 MEASure:CURRent[:DC]? 85
11.2 MEASure:POWer[:DC]? 86
11.3 MEASure:VOLTage[:DC]? 87

11.1 MEASure:CURRent[:DC]?

Description: The query returns the averaged measured input current. The averaging parameter allows for the adjustment of the sample count utilized for computing the average values.
Values are returned in the <NRf> data type, with units in amperes.

Syntax:

Query `MEASure:CURRent[:DC]?`

Parameters: `<NRf>` : 0.000 to max current range

Model		HVL150250	HVL150480	HVL600150	HVL80075	HVL100025
Range	Low	0.25 A to 25 A	0.48 A to 48 A	0.15 to 15 A	0.075 to 7.5 A	0.025 to 2.5 A
	High	0.25 A to 250 A	0.48 A to 480 A	0.15 to 150 A	0.075 to 75 A	0.025 to 25 A

Table 11.1 Current Ranges

Example:

Query `MEAS:CURR?`

11.2 MEASure:POWer[:DC]?

Description: The query returns the averaged measured input power.
Values are returned in the <NRf> data type, with units in watts.

Syntax:
Query `MEASure:POWer[:DC]?`
Parameters: `<NRf>` : 0.000 to max power range

MODEL		HVL-600-150	HVL-800-75	HVL-1000-25	HVL-600-300	HVL-800-150	HVL-1000-50
CP Mode							
Range	Low	0 to 400 W			0 - 800 W		
	High	0 to 4000 W			0 - 8000 W		
Resolution		25 mW / 250 mW			50 mW / 500 mW		

Table 11.2 Power Ranges

Example:
Query `MEAS:POW?`

11.3 MEASure:VOLTage[:DC]?

Description: The query returns the averaged measured input voltage. The averaging parameter allows for the adjustment of the sample count utilized for computing the average values.
Values are returned in the <NRf> data type, with units in volts.

Syntax:

Query `MEASure:VOLTage[:DC]?`

Parameters: `<NRf>` : 0.000 to max voltage range

MODEL		HVL-600-150	HVL-800-75	HVL-1000-25	HVL-600-300	HVL-800-150	HVL-1000-50
CV Mode							
Range	Low	0 - 60 V	0 - 80 V	0 - 100 V	0 - 60 V	0 - 80 V	0 - 100 V
	High	0 - 600 V	0 - 800 V	0 - 1000 V	0 - 600 V	0 - 800 V	0 - 1000 V
Resolution		400 mV	50 mV	100 mV	40 mV	50 mV	100 mV

Table 11.3 Voltage Ranges

Example:

Query `MEAS:VOLT?`

Mode Subsystem

The Mode subsystem allows for the configuration of the instrument's operation mode, range selection, and analog control functions.

12.1 INPut:MODe <character> 89
12.2 MODe <character> 89
12.3 MODe:RANGe <boolean> 90
12.4 SYSTem:EXTernal:STATe <Boolean> 91

12.1 INPut:MODe <character>

Description: Configures the operation mode of the instruments. If List mode is selected the list to be executed must be specified in the command's parameter.
The query returns the electronic load's operation mode in the <character> data type.

Syntax:
Command `INPut:MODe <character>`
Query `INPut:MODe?`
Parameters: `<character>` : { FIX | LIST,<NR1> } `<NR1>` : { 1 to 10 }
Example:
Command `INP:MOD LIST,1`
Query `INP:MOD?`

NOTICE **Update info: The "OUTPut:MODE" command has been changed to the "INPut:MODe" command in UI version 1.10 and later.**

12.2 MODe <character>

Description: Sets the primary operation mode of the electronic load.

Syntax:
Command `MODe <character>`
Query `MODe?`
Parameters: `<character>` : { CURRent | VOLTage | POWer | RESistance }
Example:
Command `MODE CURR`
Query `MODE?`

12.3 MODe:RANGe <boolean>

Description: Sets the measurement/operation range for the active mode.
The query returns the currently active range (0 for Low, 1 for High).

Syntax:
Command `MODe:RANGe <boolean>`
Query `MODe:RANGe?`
Parameters: `<boolean>` : { 0 | 1 }

Mode	Minimum	Maximum
CC High Range	0.25 A	25.00 – 750.00 A
CV High Range	0.15 V	150.00 – 1000.00 V
CR High Range	2.00 Ω	1600.00 – 10000.00 Ω
CW High Range	3.00 W	3000.00 – 6000.00 W

Table 12.1 Mode range sets to "1"

Mode	Minimum	Maximum
CC Low Range	0.25 A	2.50 – 75.00 A
CV Low Range	0.15 V	15.00 – 100.00 V
CR Low Range	0.015 Ω	2.000 – 40.000 Ω
CW Low Range	3.00 W	300.00 – 600.00 W

Table 12.2 Mode range sets to "0"

Mode	Minimum	Maximum
CR	0.002 Ω	200.000 – 480.000 Ω
CW	4.00 W	2000.00 – 6000.00 W

Table 12.3 Mode range sets to "1" (for HVL150 Series)

Example:
Command `MODE:RANG 1`
Query `MODE:RANG?`

NOTICE

Note: The SYSTem:RANGe? query can be used to return the set ranges of all four modes. In the HVL150 series, CW and CR do not have a distinction between high and low ranges. The command "MODE:RANGe" will always return "1" and the setting cannot be changed.

12.4 SYSTem:EXTernal:STATe <Boolean>

Description: This command sets the analog control status of the electronic load.
The query returns the analog control state of the electronic load. The returned value is "0" (OFF) or "1" (ON).

Syntax:
Command `SYSTem:EXTernal:STATe <Boolean>`
Query `SYSTem:EXTernal:STATe?`
Parameters: `<Boolean>` : { 0 | 1 | ON | OFF }

Value	Definition
0	analog control status disable
1	analog control status enable

Table 12.4 Analog Control Status Parameters

Example:
Command `SYST:EXT:STAT 1`
Query `SYST:EXT:STAT?`

NOTICE **Update info: This is a new command.**

Utility Subsystem

The UTILity subsystem configures the additional system functions and transient operations provided by the HVL series.

13.1 LOOP:CONTrol <NR1> 93
13.2 [UTILity:]TRIGger:SOURce <NR1> 93
13.3 [UTILity:]TRIGger:SEQuence:SOURce <NR1> 95
13.4 [UTILity:]TRANsient[:STATe] <boolean> 95
13.5 [UTILity:]TRANsient:MODe <NR1> 96
13.6 SOFT:START:STATe <Boolean> 97

13.1 LOOP:CONTrol <NR1>

Description: Sets the loop response speeds to adjust the system bandwidth.
The query returns the programmed loop control mode: "0" (fast), "1" (normal), "2" (slow), and "3" (slowest).

Syntax:
Command `LOOP:CONTrol <NR1>`
Query `LOOP:CONTrol?`
Parameters: `<NR1>:{0|1|2|3}`

Mode	Description
0	fast
1	normal
2	slow
3	slowest

Table 13.1 Loop Control Parameters (Legacy)

Example:
Command `LOOP:CONT 1`
Query `LOOP:CONT?`

NOTICE

Update info: This global command is used in UI versions below 1.10. In UI version 1.10 and later, it has been split into individual subsystem commands (e.g., CURRent:LOOP, VOLTage:LOOP).

13.2 [UTILity:]TRIGger:SOURce <NR1>

Description: Sets the trigger source that will be used to trigger events.
The query returns the programmed trigger source: "0" (hold), "1" (bus), or "2" (external).

Syntax:
Command `[UTILity:]TRIGger:SOURce <NR1>`
Query `[UTILity:]TRIGger:SOURce?`
Parameters: `<NR1>:{0|1|2}`
Example:
Command `TRIG:SOUR 1`
Query `TRIG:SOUR?`

Mode	Description
0	Hold
1	Bus
2	External

Table 13.2 Trigger Source Parameters

13.3 [UTILity:]TRIGger:SEQuence:SOURce <NR1>

Description: Sets the trigger source that will be used to trigger list events.

Syntax:

Command `[UTILity:]TRIGger:SEQuence:SOURce <NR1>`

Query `[UTILity:]TRIGger:SEQuence:SOURce?`

Parameters: `<NR1>` : { 0 | 1 | 2 } *(Refer to the Trigger Source Parameters table in section **TRIGger:SOURce**)*

Example:

Command `TRIG:SEQ:SOUR 1`

Query `TRIG:SEQ:SOUR?`

13.4 [UTILity:]TRANsient[:STATe] <boolean>

Description: Enables/Disables the transient function.

The query returns the transient state: "0" (OFF) or "1" (ON).

Syntax:

Command `[UTILity:]TRANsient[:STATe] <boolean>`

Query `[UTILity:]TRANsient[:STATe]?`

Parameters: `<boolean>` : { 0 | 1 | OFF | ON }

Example:

Command `TRAN 1`

Query `TRAN?`

NOTICE

Note: To use the transient function, this command must be enabled before setting INPut[:STATe] ON.

13.5 [UTILity:]TRANsient:MODe <NR1>

Description: Sets the transient's operation mode.
The query returns the set transient operation mode in the <NR1> data type.

Syntax:
Command `[UTILity:]TRANsient:MODe <NR1>`
Query `[UTILity:]TRANsient:MODe?`

Parameters: For UI versions below 1.10:
`<NR1>:{1|2|3|4}`

For UI version 1.10 and later:
`<NR1>:{0|1|2|3}`

Value	Definition
0	Normal Operation mode
1	Continuous mode
2	Toggle mode
3	Pulse mode

Table 13.3 Transient Mode Parameters (UI 1.10+)

Example:
Command `TRAN:MOD 2`
Query `TRAN:MOD?`

NOTICE

Note: This command will switch functionality; there should be at least a 2∼3 second delay between it and the next command.

13.6 SOFT:START:STATe <Boolean>

Description: This command sets the soft start function of the electronic load. When enabled, it mitigates sudden current or voltage surges during input activation.
The query returns the soft start function state: "0" (OFF) or "1" (ON).

Syntax:
Command `SOFT:START:STATe <Boolean>`
Query `SOFT:START:STATe?`
Parameters: `<Boolean>` : { 0 | 1 | ON | OFF }

Value	Definition
0	soft start function disable
1	soft start function enable

Table 13.4 Soft start function Parameters

Example:
Command `SOFT:START:STAT 1`
Query `SOFT:START:STAT?`

NOTICE **Update info: This command is available in UI version 1.10 and later.**

Digital Subsystem

The Digital Subsystem allows for configuration of the digital functions. This subsystem allows users to control, query, and configure digital parameters such as digital output lines, trigger settings.

14.1 DIGital:OUTPut:STATe 99
14.2 DIGital:OUTPut:DELay 100

14.1 DIGital:OUTPut:STATe

Description: The command sets the state of the digital output (pin 4 on the analog DIO connector). The query returns the programmed digital output state in the <NR1> data type.

Syntax:

Command `DIGital:OUTPut:STATe <NR1>`

Query `DIGital:OUTPut:STATe?`

Parameters: `<NR1>` : 0 | 1 | 2 | 3

State	Description
0	force low
1	force high
2	low on load's input ON
3	high on load's input ON

Table 14.1 Digital Output States

Example:

Command `DIG:OUTP:STAT 0`

Query `DIG:OUTP:STAT?`

NOTICE

Note: State "0" and "1" force the output to a specific state regardless of any other parameters. State "2" and "3" cause the digital output to be controlled by the input state of the electronic load.

14.2 DIGital:OUTPut:DELay

Description: The command sets the digital output delay time in milliseconds. The digital output will not output for the specified delay time. After the delay time elapses, the digital output signal will be available. The query returns the programmed digital output delay time in the <NR1> data type.

Syntax:

Command `DIGital:OUTPut:DELay <NR1>`
Query `DIGital:OUTPut:DELay?`

Parameters: <NR1> : 0 to 500 ms

Example:

Command `DIG:OUTP:DEL 10`
Query `DIG:OUTP:DEL?`

Initiate Subsystem

The INITiate subsystem allows users to issue commands that trigger specific actions, such as starting the list function.

15.1 INITiate[:IMMediate] 102
15.2 INITiate:CONTinuous 102

15.1 INITiate[:IMMediate]

Description: The command issues the trigger to run the selected programmed list.

Syntax:

Command `INITiate[:IMMediate]`

Parameters: None

Example:

Command `INIT`

NOTICE **Related: OUTPut:MODE <NR1> for more information on selecting a list.**

15.2 INITiate:CONTinuous

Description: The command issues the trigger to run the selected programmed list with a continuous trigger enabled.

Syntax:

Command `INITiate:CONTinuous`

Parameters: None

Example:

Command `INIT:CONT`

NOTICE **Related: OUTPut:MODE <NR1> for more information on selecting a list.**

List Subsystem

The LIST subsystem allows for the configuration and execution of complex sequences of steps. Changes made to a list are stored in a buffer and are only committed to non-volatile memory when the save command is issued.

16.1 ABORt . . . 104
16.2 [SOURce:]LIST:CLEar . . . 104
16.3 [SOURce:]LIST:COUNt <NR1> . . . 104
16.4 [SOURce:]LIST:DELete <NR1> . . . 106
16.5 [SOURce:]LIST:DWELl <NRf> . . . 106
16.6 [SOURce:]LIST:LEVel <NRf> . . . 106
16.7 [SOURce:]LIST:MODe <character> . . . 109
16.8 [SOURce:]LIST:NEXT <NR1> . . . 110
16.9 [SOURce:]LIST:NUMBer <NR1> . . . 110
16.10 [SOURce:]LIST:SAVE . . . 110
16.11 [SOURce:]LIST:STATe? . . . 112
16.12 [SOURce:]LIST:STEP <NR1> . . . 112
16.13 [SOURce:]LIST:STEP:NUMBer <NR1> . . . 112
16.14 [SOURce:]LIST:TERMINATE:LAST <NR1> . . . 114
16.15 [SOURce:]LIST:TOUTput:BOSTep[:DATA] <Boolean> . . . 114
16.16 [SOURce:]LIST:TOUTput:EOSTep[:DATA] <Boolean> . . . 115

16.1 ABORt

Description: This command stops the execution of a list or transient operation immediately and returns the instrument to its idle state.

Syntax:
Command `ABORt`

Parameters: none

Example:
Command `ABOR`

16.2 [SOURce:]LIST:CLEar

Description: The command clears all the step and List Run parameters of the selected list.
The command can only be used once the Edit List mode is enabled. Refer to section **LIST:NUMBer**.

Syntax:
Command `[SOURce:]LIST:CLEar`

Parameters: none

Example:
Command `LIST:CLE`

NOTICE **Note: Changes made in Edit List will not be saved until the command [SOURce:]LIST:SAVE is sent.**

16.3 [SOURce:]LIST:COUNt <NR1>

Description: The command configures the count parameter of the selected list, which dictates the number of repetitions the list will undergo. The list can be programmed to run infinitely by using the parameter INF.
The command can only be used once the Edit List mode is enabled.

Syntax:
Command `[SOURce:]LIST:COUNt <NR1>`
Query `[SOURce:]LIST:COUNt?`

Parameters: <NR1> : { 0 to 100000 | INF }

Example:
Command `LIST:COUN 5`
Query `LIST:COUN?`

NOTICE

Note: Changes made in Edit List will not be saved until the command [SOURce:]LIST:SAVE is sent.

16.4 [SOURce:]LIST:DELete <NR1>

Description: This command deletes the selected list step and all subsequent steps. The command can only be used once the Edit List mode is enabled.

Syntax:

Command `[SOURce:]LIST:DELete <NR1>`

Parameters: <NR1> : { 1 to 100 }

Example:

Command `LIST:DEL 3`

Query `Deletes step 3 and all subsequent steps.`

NOTICE **Note: Changes made in Edit List will not be saved until the command [SOURce:]LIST:SAVE is sent.**

16.5 [SOURce:]LIST:DWELl <NRf>

Description: Sets the duration (dwell time) for the current list step.
The command can only be used once the Edit List mode is enabled.

Syntax:

Command `[SOURce:]LIST:DWELl <NRf>`

Query `[SOURce:]LIST:DWELl?`

Parameters: <NRf> : { 0.1 to 9999 s }

Example:

Command `LIST:DWEL 10`

Query `LIST:DWEL?`

NOTICE **Note: Changes made in Edit List will not be saved until the command [SOURce:]LIST:SAVE is sent.**

16.6 [SOURce:]LIST:LEVel <NRf>

Description: Sets the amplitude level for the current list step. The units depend on the selected mode (Amperes, Volts, Ohms, or Watts).
The query returns the current step's set level.

Syntax:

CC High Range	0.25 A	25.00 – 750.00 A
CV High Range	0.15 V	150.00 – 1000.00 V
CR High Range	2.00 Ω	1600.00 – 10000.00 Ω
CW High Range	3.00 W	3000.00 – 6000.00 W

Table 16.1 List Level Range (High)

CC Low Range	0.25 A	2.50 – 75.00 A
CV Low Range	0.15 V	15.00 – 100.00 V
CR Low Range	0.015 Ω	2.000 – 40.000 Ω
CW Low Range	3.00 W	300.00 – 600.00 W

Table 16.1 List Level Range (Low)

Command `[SOURce:]LIST:LEVel <NRf>`
Query `[SOURce:]LIST:LEVel?`
Parameters: `<NRf>` : min value ~ MAX value | MIN | MAX
Example:
Command `LIST:LEV 10`
Query `LIST:LEV?`

NOTICE **Note: Changes made in Edit List will not be saved until the command [SOURce:]LIST:SAVE is sent.**

CR	0.002 Ω	200.000 – 480.000 Ω
CW	4.00 W	2000.00 – 6000.00 W

Table 16.1 List Level Range (HVL150 Series)

Mode	Minimum	Maximum
CC High Range	0.25 A	25.00 – 750.00 A
CV High Range	0.15 V	150.00 – 1000.00 V
CR High Range	2.00 Ω	1600.00 – 10000.00 Ω
CW High Range	3.00 W	3000.00 – 6000.00 W

Table 16.1 List Level Range (High)

Mode	Minimum	Maximum
CC Low Range	0.25 A	2.50 – 75.00 A
CV Low Range	0.15 V	15.00 – 100.00 V
CR Low Range	0.015 Ω	2.000 – 40.000 Ω
CW Low Range	3.00 W	300.00 – 600.00 W

Table 16.2 List Level Range (Low)

Mode	Minimum	Maximum
CR	0.002 Ω	200.000 – 480.000 Ω
CW	4.00 W	2000.00 – 6000.00 W

Table 16.3 List Level Range (HVL150 Series)

16.7 [SOURce:]LIST:MODe <character>

Description: The command configures the operation mode to be used in the selected list. The command can only be used once the Edit List mode is enabled.
The query returns the programmed operation mode for the selected list.

Syntax:
Command `[SOURce:]LIST:MODe <character>`
Query `[SOURce:]LIST:MODe?`

Parameters: For UI versions below 1.10 (Numeric):

Value	Definition
0	Constant Current (CC)
1	Constant Voltage (CV)
2	Constant Resistance (CR)
3	Constant Power (CP)

Table 16.4 Legacy List Operation Parameters

For UI version 1.10 and later (Character):

String	Definition
CCH | CCL	CC mode (High | Low Range)
CVH | CVL	CV mode (High | Low Range)
CRH | CRL	CR mode (High | Low Range)
CPH | CPL	CP mode (High | Low Range)
CR | CP	Standard CR | CP mode

Table 16.5 Modern List Operation Parameters

Example:
Command `LIST:MOD CVH`
Query `LIST:MOD?`

NOTICE

Update info: The parameter type has been changed from <NR1> to <character> in UI version 1.10 and later.

16.8 [SOURce:]LIST:NEXT <NR1>

Description: Specifies the next list to be executed after the current list completes its repetition count.

Syntax:

Command `[SOURce:]LIST:NEXT <NR1>`
Query `[SOURce:]LIST:NEXT?`

Parameters: <NR1> : { 0 to 10 }

Example:

Command `LIST:NEXT 2`
Query `LIST:NEXT?`

NOTICE **Note: Changes made in Edit List will not be saved until the command [SOURce:]LIST:SAVE is sent.**

16.9 [SOURce:]LIST:NUMBer <NR1>

Description: Selects the list number to edit or query. This command enables the Edit List mode for the specified list.

Syntax:

Command `[SOURce:]LIST:NUMBer <NR1>`
Query `[SOURce:]LIST:NUMBer?`

Parameters: <NR1> : { 1 to 10 }

Example:

Command `LIST:NUMB 1`
Query `LIST:NUMB?`

NOTICE **Note: Changes made in Edit List will not be saved until the command [SOURce:]LIST:SAVE is sent.**

16.10 [SOURce:]LIST:SAVE

Description: Stores the parameters of the currently edited list into non-volatile memory.

Syntax:

Command `[SOURce:]LIST:SAVE`

Parameters: none

Example:

Command LIST:SAVE

NOTICE

Note: Under the same [SOURce:]LIST:NUMBer, multiple commands can be accumulated before using [SOURce:]LIST:SAVE to commit all changes at once.

16.11 [SOURce:]LIST:STATe?

Description: The query returns the List operation status.
Use the command **INITiate[:IMMediate] to enable List operation, and use the ABORt command to stop it.**

Syntax:
Query `[SOURce:]LIST:STATe?`
Parameters: `<NR1>` **: { 0 (disabled List)** | **1 (running List) }**
Example:
Query `LIST:STAT?`

NOTICE **Note: Under the same [SOURce:]LIST:NUMBer, multiple commands can be accumulated before using [SOURce:]LIST:SAVE.**

16.12 [SOURce:]LIST:STEP <NR1>

Description: Sets the active step for the selected list.

Syntax:
Command `[SOURce:]LIST:STEP <NR1>`
Query `[SOURce:]LIST:STEP?`
Parameters: `<NR1>` **: { 0** | **1 }**
Example:
Command `LIST:STEP 1`
Query `LIST:STEP?`

16.13 [SOURce:]LIST:STEP:NUMBer <NR1>

Description: The command enables Edit Step mode for the designated step, allowing for configuration of parameters such as setting Level, BOST, EOST, and Dwell.
Accessing Edit Step requires the instrument to be in Edit List mode initially. The query returns the step currently being modified.

Syntax:
Command `[SOURce:]LIST:STEP:NUMBer <NR1>`
Query `[SOURce:]LIST:STEP:NUMBer?`
Parameters: `<NR1>` **: { 1 to 100 }**
Example:

Command `LIST:STEP:NUMB 5`
Query `LIST:STEP:NUMB?`

NOTICE

Note: Changes made in Edit List will not be saved until the command [SOURce:]LIST:SAVE is sent.

16.14 [SOURce:]LIST:TERMINATE:LAST <NR1>

Description: The command configures the After List parameter which determines the load's input level upon the completion of any list.
The query returns the configured after list parameter in the <NR1> data type.

Syntax:
Command `[SOURce:]LIST:TERMINATE:LAST <NR1>`
Query `[SOURce:]LIST:TERMINATE:LAST?`
Parameters: `<NR1>` : { **0** | **1** }

Value	Definition
0	Previous state *This feature was "DC" in UI firmware versions prior to 1.10.
1	Last (Retain the level of the last step)

Table 16.6 After List Parameters

Example:
Command `LIST:TERM:LAST 1`
Query `LIST:TERM:LAST?`

NOTICE **Update info: In UI versions after 1.10, "DC" in this feature has been changed to "Previous".**

16.15 [SOURce:]LIST:TOUTput:BOSTep[:DATA] <Boolean>

Description: Sets the status of the trigger output at the Begin Of Step (BOST).

Syntax:
Command `[SOURce:]LIST:TOUTput:BOSTep[:DATA] <Boolean>`
Query `[SOURce:]LIST:TOUTput:BOSTep[:DATA]?`
Parameters: `<Boolean>` : { **0** | **1** }
Example:
Command `LIST:TOUT:BOST 1`
Query `LIST:TOUT:BOST?`

NOTICE **Note: Changes made in Edit List will not be saved until the command [SOURce:]LIST:SAVE is sent.**

16.16 [SOURce:]LIST:TOUTput:EOSTep[:DATA] <Boolean>

Description: Sets the status of the trigger output at the End Of Step (EOST).

Syntax:

Command `[SOURce:]LIST:TOUTput:EOSTep[:DATA] <Boolean>`

Query `[SOURce:]LIST:TOUTput:EOSTep[:DATA]?`

Parameters: `<Boolean>` : { **0** | **1** }

Example:

Command `LIST:TOUT:EOST 1`

Query `LIST:TOUT:EOST?`

NOTICE **Note: Changes made in Edit List will not be saved until the command [SOURce:]LIST:SAVE is sent.**

Protection Subsystem

The PROTection subsystem configures the protection features of the instrument.

17.1 PROTection:OSCillation:STATe <Boolean> 117
17.2 PROTection:OSCillation:DELay <NR1> 117

17.1 PROTection:OSCillation:STATe <Boolean>

Description: The command enables/disables the oscillation protection feature.
The query returns the state of the oscillation protection feature. The state is returned in the <Boolean> data type.

Syntax:
Command `PROTection:OSCillation:STATe <Boolean>`
Query `PROTection:OSCillation:STATe?`
Parameters: `<Boolean>` **: { 0 | 1 | OFF | ON }**
Example:
Command `PROT:OSC:STAT 1`
Query `PROT:OSC:STAT?`

17.2 PROTection:OSCillation:DELay <NR1>

Description: The command sets the oscillation delay time in milliseconds. The oscillation protection function will not trip during the delay time. After the delay time elapses, the protection function will trip.
The query returns the programmed oscillation protection delay. The value is returned in the <NR1> data type.

Syntax:
Command `PROTection:OSCillation:DELay <NR1>`
Query `PROTection:OSCillation:DELay?`
Parameters: For UI versions below 1.10:
`<NR1>` **: { 10 to 10000 | MIN | MAX }**
For UI version 1.10 and later:
`<NR1>` **: { 400 to 30000 | MIN | MAX }**
Example:
Command `PROT:OSC:DEL 500`
Query `PROT:OSC:DEL?`

NOTICE **Update info: The configurable range has been updated in UI version 1.10 and later.**

System Subsystem

The SYSTem subsystem collects the functions that are not related to instrument performance, including status registers, error handling, local/remote control, and real-time clock configuration.

18.1 STATus:QUEStionable? 119
18.2 STATus:OPERationable? 120
18.3 SYSTem:ERRor? 121
18.4 SYSTem:LOCal 121
18.5 SYSTem:RANGe? 123
18.6 SYSTem:DATE <YY>,<MM>,<DD> 123
18.7 SYSTem:TIME <HH>,<MM>,<SS> 123

18.1 STATus:QUEStionable?

Description: This command returns the value of Status Code 1. Status Code 1 is a 16-bit status register that indicates the current measurement and protection related flags. The returned value is in hexadecimal (0x0000–0xFFFF).

Syntax:

Query `STATus:QUEStionable?`

Parameters: `<character>` **: { 0000 to FFFF }**

Bit	Bit Name	Decimal	Definition
0	OTW	0x0001	Over temperature warning
1	OCP	0x0002	Over current protection
2	OTS	0x0004	Over temperature on power stage
3	OPP	0x0008	Over power protection
4	N/A	0x0010	—
5	OTP	0x0020	Over temperature protection
6	RCP	0x0040	Reverse current protection
7	RSF	0x0080	Remote sense fault
8	UVL	0x0100	Under voltage lockout *This response is only for this command; the status log will not record this status.
9	RI	0x0200	Remote inhibit
10	UNR	0x0400	Unregulated on power stage
11	OVP	0x0800	Over voltage protection
12	UVP	0x1000	Under voltage protection
13	PS	0x2000	Protect of system shutdown
14	OSC	0x4000	Oscillation
15	LV	0x8000	Low voltage

Table 18.1 Status Code 1

Example:

Query `STAT:QUES?`

NOTICE **Update info: This command is available in UI version 1.10 and later.**

18.2 STATus:OPERationable?

Description: This command returns the value of Status Code 2. Status Code 2 is a 16-bit status register that indicates the current operational and functional states of the instrument. The returned value is in hexadecimal (0x0000–0xFFFF).

Syntax:

Query `STATus:OPERationable?`

Parameters: `<character>` **: { 0000 to FFFF }**

Bit	Bit Name	Decimal	Definition
0	ACF	0x0001	Internal communication failure
1	OPL	0x0002	Over power lock/clamping
2	INF	0x0004	MOSFET failure
3	ACL	0x0008	AC lost or internal power supply fail
4	WTG	0x0010	Wait for trigger
5	PAD	0x0020	Parallel disabled
6	PAE	0x0040	Parallel error
7	N/A	0x0080	—
8	N/A	0x0100	—
9	OCL	0x0200	Over current lock/clamping
10–13	N/A	—	—
14	INT	0x4000	RESERVE: interlock event *This feature is no longer used after UI FW version 1.10.
15	FLT	0x8000	General Fault

Table 18.2 Status Code 2

Example:

Query `STAT:OPER?`

NOTICE **Update info: This command is available in UI version 1.10 and later.**

18.3 SYSTem:ERRor?

Description: The query returns the system-defined error/event.

Syntax:

Query `SYSTem:ERRor?`

Parameters:

Value	Code Description
0	No error
-102	Syntax error
-103	Invalid separator
-104	Data type error
-105	GET not allowed
-108	Parameter not allowed
-109	Missing parameter
-110	Command header error
-111	Header separate error
-113	Undefined header
-131	Invalid suffix
-238	Suffix not allowed
-203	Command protected
-221	Settings conflict
-222	Data out of range
-223	Too much data
-240	Hardware error
-350	Error queue overflow

Table 18.3 System Error Codes

Example:

Query `SYST:ERR?`

18.4 SYSTem:LOCal

Description: The command returns the instrument to local state, unlocking the controls of the instrument (front panel, keyboard, etc.) that are locked in remote mode.

Syntax:

Command `SYSTem:LOCal`

Parameters: **none**

Example:

Command `SYST:LOC`

18.5 SYSTem:RANGe?

Description: The query returns the currently active range for the operation modes.

Syntax:

Query `SYSTem:RANGe?`

Parameters: `<character>` : { **LOW** | **HIGH** }

Example:

Query `SYST:RANG?`

NOTICE **Note: In the HVL150 series, CR and CP only return the string "High".**

18.6 SYSTem:DATE <YY>,<MM>,<DD>

Description: Programs the date of the real-time clock of the instrument. All parameters should be entered comma-separated and in NR1 format.

Syntax:

Command `SYSTem:DATE <YY>,<MM>,<DD>`

Query `SYSTem:DATE?`

Parameters: `<NR1 (Year)>` : { **00 to 99** } `<NR1 (Month)>` : { **01 to 12** } `<NR1 (Day)>` : { **01 to 31** }

Example:

Command `SYST:DATE 26, 1, 6`

Query `SYST:DATE?`

NOTICE **Update info: This command is available in UI version 1.10 and later.**

18.7 SYSTem:TIME <HH>,<MM>,<SS>

Description: Programs the time of the real-time clock of the instrument. All parameters should be entered comma-separated and in NR1 format.

Syntax:

Command `SYSTem:TIME <HH>,<MM>,<SS>`

Query `SYSTem:TIME?`

Parameters: <NR1 (Hour)> : { 00 to 23 } <NR1 (Minute)> : { 00 to 59 } <NR1 (Second)> : { 00 to 59 }

Example:

Command SYST:TIME 12, 22, 23

Query SYST:TIME?

NOTICE **Update info: This command is available in UI version 1.10 and later.**

Trigger Subsystem

The TRIGger subsystem is used to configure the trigger sources for various instrument functions, including data logging, list execution, and transient operations.

19.1 TRIGger:DLOG:SOURce <NR1> 126
19.2 TRIGger[:IMMediate] 126
19.3 TRIGger:SEQuence:SOURce <NR1> 127
19.4 [UTILity:]TRIGger:SOURce <NR1> 128

19.1 TRIGger:DLOG:SOURce <NR1>

Description: In the data log function, this command sets the data log trigger source which will be used to trigger the event.
The query returns the data log trigger source: "0" (manual), "1" (remote), or "2" (Digital I/O).

Syntax:
Command `TRIGger:DLOG:SOURce <NR1>`
Query `TRIGger:DLOG:SOURce?`
Parameters: `<NR1>` **: { 0 | 1 | 2 }**

Value	Definition
0	Manual control
1	Remote control
2	Digital I/O control

Table 19.1 Data log trigger source Parameters

Example:
Command `TRIG:DLOG:SOUR 1`
Query `TRIG:DLOG:SOUR?`

NOTICE **Update info: This is a new command available in UI version 1.10 and later.**

19.2 TRIGger[:IMMediate]

Description: This command sends a trigger signal immediately. The trigger event for lists or transients is triggered by this command.

Syntax:
Command `TRIGger[:IMMediate]`
Parameters: none
Example:
Command `TRIG`

NOTICE **Update info: This is a new command available in UI version 1.10 and later.**
Note: If the previous command sent was INPut[:STATe] ON, there should be a delay of at least 5 seconds before sending this command.

19.3 TRIGger:SEQuence:SOURce <NR1>

Description: When using the List mode, the command sets the trigger source for remote control, which will be used to trigger the event.
The query returns the programmed trigger source: "0" (manual), "1" (remote), or "2" (Digital I/O).

Syntax:

Command `TRIGger:SEQuence:SOURce <NR1>`
Query `TRIGger:SEQuence:SOURce?`
Parameters: `<NR1>` **: { 0 | 1 | 2 }**

Value	Definition
0	Manual control
1	Remote control
2	Digital I/O control

Table 19.2 List trigger source Parameters

Example:

Command `TRIG:SEQ:SOUR 1`
Query `TRIG:SEQ:SOUR?`

NOTICE

Update info: This command was moved from the Utility subsystem to the Trigger subsystem in UI version 1.10 and later.

19.4 [UTILity:]TRIGger:SOURce <NR1>

Description: When using transient mode, the command sets the trigger source for pulse and toggle modes that will be used to trigger events.
The query returns the programmed trigger source: "0" (Hold), "1" (Bus), or "2" (External).

Syntax:
Command `[UTILity:]TRIGger:SOURce <NR1>`
Query `[UTILity:]TRIGger:SOURce?`
Parameters: `<NR1>` **: { 0 | 1 | 2 }**

Value	Definition
0	Hold
1	Bus
2	External

Table 19.3 Trigger source Parameters (Transient)

Example:
Command `TRIG:SOUR 1`
Query `TRIG:SOUR?`

NOTICE

Note: This command is categorized under the Trigger subsystem in UI version 1.10 and later. For compatibility with legacy firmware, the [UTILity:] prefix may be used.

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