BENCHTOP INSTRUMENT

Programmable DC Electronic Load Programming Manual

CE

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1. Electronic Load Programming Manual

This manual provides users with guidelines in writing commands for remote control of the electronic load. It is considered that readers of this manual have carefully read the User Operation Manual of this product and are familiar with operation methods this product.

The electronic load communicates with PC via RS232 or USB interface. For details of communication methods, please refer to different chapters of this manual.

After the electronic load is reliably connected to PC, user can control the electronic load via programming commands. All commands are sent to the electronic load from the PC as an ASCII string and will be recognized by the PC to achieve remote operation, control and extended development.

SCPI Commands Introduction
Command System

2. SCPI Commands Introduction

SCPI (Standard Commands for Programmable Instrument) is standard commands for programmable instruments based on IEEE 488.2 common commands. SCPI commands include two parts: IEEE 488.2 Common Commands and Control Commands defined for SCPI instruments.

Common Commands are defined by IEEE 488.2, which the instrument must support. Syntax and semantics of common commands must follow the application of IEEE 488.2. Common commands work independently of measurement and are generally used for controlling reset, self-test and status operations. For more details, please refer to chapter IEEE 488.2 Common Commands.

Control Commands defined for SCPI instruments are used to measure, read data, switch ON/OFF a function or a mode and so on. This chapter includes the following contents:

Syntax

Symbol Description

Parameter Type

Command Abbreviation

2.1 Syntax

The SCPI commands is to be seen as a tree, originating at the root keyword and dispersing into different branches depending on the function required. Each sub-system contains a root keyword and one or more sub-kerwords. A command usually starts with a colon ":" (it can omitted). Two keywords are separated by a colon ":". Parameters are permitted to follow a keyword. A command ending with a question mark "?" means for query. Command and parameter are separated by a blank space.

For example:
[:SOURce:]CURRent[:LEVel][:IMMediate][:AMPLitude] {<current>|MINimum|MAXimum}
[: SOURce:]CURRent[:LEVel][:IMMediate][:AMPLitude]? [MINimum|MAXimum]

From the above commands we can see that: SOURce is root keyword of the command. CURRent, LEVel, IMMediate and AMPLitude are keywords of the 2nd, 3rd, 4th and 5th levels respectively. The command starts with a colon ":"; keywords of each levels are separated by a colon ":"; <current> means the parameter is assignable; question mark "?" means for query.
Commands [:SOURce:]CURRent[:LEVel][:IMMediate][:AMPLitude] and parameter <current> are separated by a blank space.

A comma "," is generally used for separating different parameters contained in the same command.

2.2 Symbol Description

The following four symbols are not contents of the SCPI commands. However, they are usually used in instances of the parameters from an Explanation command.

Braces {}

Parameters enclosed in braces are optional. Only one of them should be chosen. For example:

[:SOURce:]CURRent[:LEVel][:IMMediate][:AMPLitude] {<current>|MINimum|MAXimum}

In this command, {<current>|MINimum|MAXimum} means that "MINimum", "MAXimum", self-defined value <current> are parameters, and only one of them can be chosen.

Vertical Bar |

Vertical bar is used to separate two or more optional parameters. Before sending commands, only one of the parameters can be chosen. For example:

[:]SYSTem:BEEPer:STATe {ON|OFF}

In this command, users can choose a parameter command from "ON" or "OFF".

Triangle Brackets <>

Parameters enclosed in triangle brackets must be replaced by an effective value. For example:

[:SOURce:]CURRent[:LEVel] {<current>|MINimum|MAXimum}

[:SOURce:]CURRent[:LEVel] 5

In the above command, “5” is the defined value for current.

Square Brackets [ ]

Contents (keywords) enclosed in square brackets are optional. They would be executed regardless of the square brackets are omitted or not. For example:

[:SOURce:]CURRent[:LEVel]?

Sending the follow four commands, the electronic load will give same response:

CURRent?

:CURRent?

:SOURce:CURRent?

:SOURce:CURRent:LEVel?

2.3 Parameter Type

Parameters introduced in this manual are categorized into 4 types: Boolean, Keyword, Consecutive Integer, and Consecutive Real Number.

Boolean

Parameter should be "ON" or "OFF". For example:

[:]SYSTem:BEEPer:STATe {ON|OFF}

Keyword

Parameter value is values as listed in the command. For example:

[:SOURce:]CURRent[:LEVel] {<current>|MINimum|MAXimum}

Parameter is "MINimum"or "MAXimum".

Consecutive Integer

Unless specified, parameters can be any integer within the valid range.

Remarks: Parameters cannot be set with numbers behind decimal points. Otherwise, there will be abnormal response.

For example:

*RCL {0|1|2|3...}

Parameter can be any integer number within 0 to the maximum value.

Consecutive Real Number

According to the request of accuracy (normally the default accuracy is to take 6 digits of effective values behind decimal points), parameters can be any value within the valid range. For example:

[:SOURce:]CURRent[:LEVel] {<current>|MINimum|MAXimum}

Parameter {<current> can be any real number within 0 to the maximum value.

2.4 Command Abbreviation

All commands are case insensitive. Commands can be written in all uppercase or lowercase. If commands need to be written in abbreviation, all capital letters specified in a command must be completely entered. For example:

[:]SYSTem:BEEPer:STATe?
The above command can be abbreviated as:

SYST:BEEP:STAT?
SysT:Beep:STAT?
syst:beep:state?

3. Command System

This chapter will introduce commands system in the order of command's function.
Commands supported by this product are mainly categorized into the following types:
IEEE 488.2 Common Commands
ABORt Commands
BATTery Commands
CALibration Commands
CV Commands
INPut Commands
LIST Commands
MEASure Commands
MODE Commands
SOURce Commands
STATus Commands
SYSTem Commands
TRIGger Commands

Remarks: In this command system, all commands related to setup commands such as voltage, current, it is allowed to be followed with parameter's unit. Different parameter's units and omitted units are listed as below:

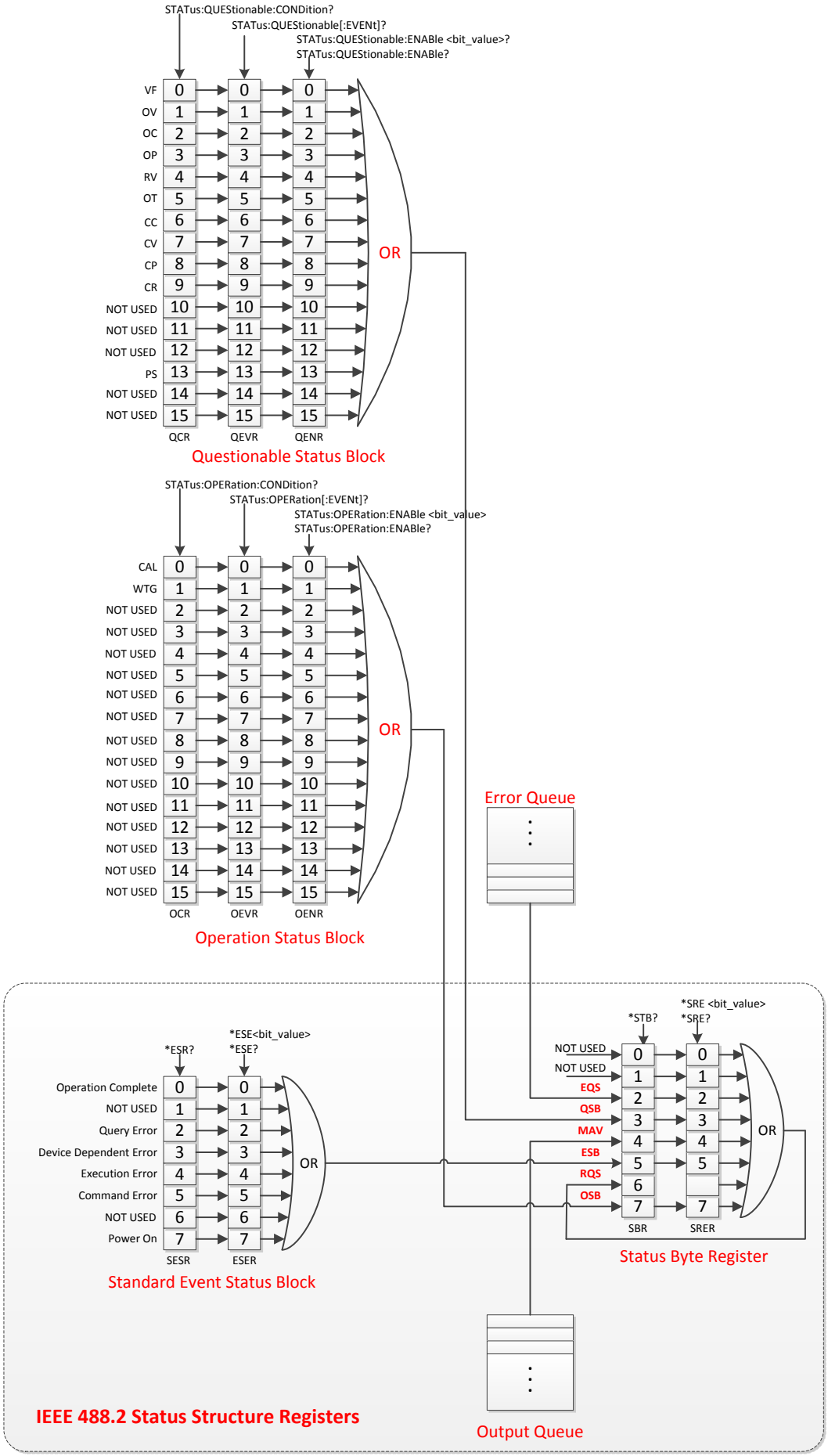
Parameter	Supported Unit	Omitted Unit
Voltage	V	V
Current	A	A
Cycle numbers	CYC	CYC
Time	s	s

3.1 IEEE 488.2 Common Commands

IEEE 488.2 standard defines a common command set for querying or executing some basic operations. These commands usually start with a "*" and hold a keyword that is 3 characters long.

***CLS**
***ESE**
***ESR?**
***IDN?**
***OPC**
***PSC**
***RCL**
***RST**
***SAV**
***SRE**
***STB?**
***TRG**

In the IEEE 488.2 Common Commands and STATus Commands, some of the commands are generally used for setup, query and operation status registers. The principle of the register is shown as below figure, which contains Questionable Status Register groups, Operation Status Register groups, Standard Event Status Register (SESR), Status Byte Register (SBR), Output Buffer, and Error Queue. Some of the commands from IEEE 488.2 and SYSTem sub-system can operate Standard Event Status Register, Status Byte Register, Output Buffer, and Error Queue. STATus sub-system commands are used to set up and query Questionable Status Register groups as well as Operation Status Register groups.


STATus:QUEStionable:CONDition?
STATus:QUEStionable[:EVENt]?
STATus:QUEStionable:ENABle <bit_value>?
STATus:QUEStionable:ENABle?
VF
OV
OC
OP
RV
OT
CC
CV
CP
CR
NOT USED
NOT USED
NOT USED
PS
NOT USED
NOT USED
OR
QCR
QEVR
QENR
Questionable Status Block
STATus:OPERation:CONDition?
STATus:OPERation[:EVENt]?
STATus:OPERation:ENABle <bit_value>
STATus:OPERation:ENABle?
CAL
WTG
NOT USED
OR
OCR
OEVR
OENR
Operation Status Block
Error Queue
*ESR?
*ESE<bit_value>
*ESE?
Operation Complete
NOT USED
Query Error
Device Dependent Error
Execution Error
Command Error
NOT USED
Power On
OR
SESR
ESER
Standard Event Status Block
*STB?
*SRE <bit_value>
*SRE?
NOT USED
NOT USED
EQS
QSB
MAV
ESB
RQS
OSB
OR
SBR
SRER
Status Byte Register
IEEE 488.2 Status Structure Registers
Output Queue

3.1.1 *CLS

Syntax:
*CLS

Function:
This command clears the event registers in all register groups. This command also clears the Error queue.

Example:
*CLS

3.1.2 *ESE

Syntax:
*ESE <value>
*ESE?

Function:
Set the bits in the Event Status Enable Register (ESER).
Query the bits in the Event Status Enable Register (ESER)

Parameters:

Name	Type	Range	Default
<value>	Consecutive Integer	0 to 255	0

Remarks:
Different bits of the Event Status Enable Register (ESER) are defined as in the following table. Bit 1 and Bit 6 are unused and are always regarded as 0. Parameter <value> is a number from 0 (00000000, in decimal value as 0) to 255 (11111111, in decimal value as 255) of the binary bits of the ESER.

Bit	Weights	Name	Enable
7	128	PON	Power On
6	Not Used	--	Not Used
5	32	CME	Command Error
4	16	EXE	Execution Error
3	8	DOE	Device-Specific Error
2	4	QYE	Query Error
1	Not Used	--	Not Used
0	1	OPC	Operation Complete

Examples:
*ESE 128
Returns: Enable bit 7 (in decimal value as 128) of the ESER.

*ESE?
Returns:“128”

3.1.3 *ESR

Syntax:
*ESR?

Function:
Return the contents of the Standard Event Status Register (SESR).

Remarks:
Different bits of the Standard Event Status Register SESR) are defined as in the following table. Bit 1 and Bit 6 are unused and are always regarded as 0. Parameter <value> is a number from 0 (00000000, in decimal value as 0) to 255 (11111111, in decimal value as 255) of the binary bits of the SESR.

Bit	Weights	Name	Enable
7	128	PON	Power On
6	Not Used	--	Not Used
5	32	CME	Command Error
4	16	EXE	Execution Error
3	8	DOE	Device-Specific Error
2	4	QYE	Query Error
1	Not Used	--	Not Used
0	1	OPC	Operation Complete

Examples:
*ESR?
Returns: “128” (Bit 7 is already setup)

3.1.4 *IDN

Syntax:
*IDN?

Function:
Query the instrument ID and return a string (unique identification code of the instrument).

Examples:
*IDN?
Remarks: Different models have different returned value.

3.1.5 *OPC

Syntax:
*OPC
*OPC?

Function:
The command form (*OPC) sets the Operation Complete bit (bit 0) in the Standard Event Status Register (SESR) in bit 1 when all pending operations are finished.
The query form (*OPC?) returns the pending operation is finished or not.

Examples:
*OPC
*OPC?
Returns: If pending operations are finished, returns “1”
If pending operations are not finished, returns “0”.

3.1.6 *PSC

Syntax:
*PSC <value>
*PSC?

Function:
Set the Power-on-Status-Clean-Flag.
Query the Power-on-Status-Clean-Flag.

Parameters:

Parameter value	Power-on-Status-Clean-Flag
0	When power on, the registers will not be removed.
1	When power on, the registers will be removed.

Examples:
*PSC 0
When power on, the registers will not be removed.

*PSC?
Query the Power-on-Status-Clean-Flag.

3.1.7 *RCL

Syntax:
*RCL {0|1|2...|9}

Function:
Recall the saved instrument status.

Examples:
*RCL 0
Recall the setting data saved in memroy location 0.

3.1.8 *RST

Syntax:
*RST

Function:
Restore the instrument to the defaults.

Examples:
*RST

3.1.9 *SAV

Syntax:
*SAV {0|1|2...|9}

Function:
Save the current system status into the non-volatile memory with a specified location.

Examples:
*SAV 0
Save the current system status into memory location 0.

3.1.10 *SRE

Syntax:
*SRE <value>
*SRE?

Function:
Set the bits in the Service Request Enable Register (SRER).
Query the bits in the Service Request Enable Register (SRER).

Parameters:

Name	Type	Range	Default value
<value>	Consecutive Integer	0 to 255	0

Remarks:
Different bits of the SRER are defined as in below table. Bit 0 and bit 1 are not used and are always regarded as 0. No need to set bit 6. Parameter <value> is a number from 0 (00000000, in decimal value as 0) to 255 (11111111, in decimal value as 255) of the binary bits of the SRER.

Bit	Weights	Name	Enable
7	128	OPE	Standard Operation Summary
6	64	RQS	Request Service
5	32	ESB	Standard Event Summary
4	16	MAV	Message Available Summary
3	8	QUES	Questionable Data Summary
2	4	EQ	Error Queue
1	Not Used	--	Not Used
0	Not Used	--	Not Used

Examples:
*SRE 16
Enable bit 4 (in decimal number as 16) of the SRER.

*SRE?
Returns: 16

3.1.11 *STB

Syntax:
*STB?

Function:
The query returns the contents of the Status Byte Register (SBR).

Remarks:
Different bits of the SBR are defined as in below table. Bit 0 and bit 1 are not used and are always regarded as 0.

Bit	Weights	Name	Enable
7	128	OPE	Standard Operation Summary
6	64	RQS	Request Service
5	32	ESB	Standard Event Summary
4	16	MAV	Message Available Summary
3	8	QUES	Questionable Data Summary
2	4	EQ	Error Queue
1	Not Used	--	Not Used
0	Not Used	--	Not Used

Examples:
*STB?
Returns: 4 (bit 2 is set up)

3.1.12 *TRG

Syntax:

*TRG

Function:

One trigger occurs in remote control mode.

Examples:

*TRG

3.2 ABORt Commands

The ABORt Commands are used to suspend the present operation.

[:]ABORt

3.2.1 [:]ABORt

Syntax:
[:]ABORt

Function:
Cancel the present operation [:LEVel]:TRIG (example: CURR:TRIG).

Examples:
:ABOR

Related commands:
None

3.3 BATTery Commands

The BATTery Commands are used for settings of battery charge and battery discharge. The BATTery Commands include the following:

[:]BATTery:CAPacity?
[:]BATTery:DISCharge:CURRent
[:]BATTery[:STATe]
[:]BATTery:TIME?
[:]BATTery:VOLTage:OFF

3.3.1 [:]BATTery:CAPacity?

Syntax:
[:]BATTery:CAPacity?

Function:
The query returns the battery discharge capacity.

Examples:
:BATT:CAP?

Related commands:
[:]BATTery:DISCharge:CURRent
[:]BATTery[:STATe]
[:]BATTery:TIME?
[:]BATTery:VOLTage:OFF
[:]BATTery: CURRent:OFF

3.3.2 [:]BATTery:DISCharge:CURRent

Syntax:

[:]BATTery:DISC:CURR {<value|DEFault|MINimum|MAXimum>}

[:]BATTery:DISC:CURR? [MIN|MAX]

Function:

Set the battery discharge current.

The query returns the battery discharge current.

Examples:

:BATT:DISC:CURR MAX

Set the battery discharge current at maximum value.

:BATT:DISC:CURR?

Return the battery discharge current.

Related commands:

[:]BATTery:CAPacity?

[:]BATTery[:STATe]

[:]BATTery:TIME?

[:]BATTery:VOLTage:OFF

[:]BATTery: CURRent:OFF

3.3.3 [:]BATTery[:STATe]

Syntax:
[:]BATTery :STATe {ON | OFF}
[:]BATTery :STATe?

Function:
Turn on or off battery discharge capacity test.
The query returns the status of battery discharge capacity test.

Examples:
:BATT ON
Turn on or off battery discharge capacity test.

:BATT?
The query returns the status of battery discharge capacity test.
Return: “ON” or “OFF”.

Related commands:
[:]BATTery:CAPacity?
[:]BATTery:DISCharge:CURRent
[:]BATTery:TIME?
[:]BATTery:VOLTage:OFF
[:]BATTery: CURRent:OFF

3.3.4 [:]BATTery:TIME?

Syntax:
[:]BATTery:TIME?

Function:
The query returns the battery discharge time.

Examples:
:BATT:TIME?

Related commands:
[:]BATTery:CAPacity?
[:]BATTery:DISCharge:CURRent
[:]BATTery[:STATe]
[:]BATTery:VOLTage:OFF
[:]BATTery: CURRent:OFF

3.3.5 [:]BATTery:VOLTage:OFF

Syntax:

[:]BATTery:VOLTage:OFF {<value|DEFault|MINimum|MAXimum>}

[:]BATTery:VOLTage:OFF? [MIN|MAX]

Function:

Set the battery terminated voltage.

The query returns the present battery terminated voltage.

Examples:

:BATT:VOLT:OFF MAX

Set the battery terminated voltage at maximum value

:BATT:VOLT:OFF?

Return the present battery terminated voltage.

Related commands:

[:]BATTery:CAPacity?

[:]BATTery:DISCharge:CURRent

[:]BATTery[:STATe]

[:]BATTery:TIME?

[:]BATTery: CURRent:OFF

3.3.6 [:]BATTery: CURRent:OFF

Syntax:

[:]BATTery: CURRent:OFF {<value|DEFault|MINimum|MAXimum>}

[:]BATTery: CURRent:OFF? [MIN|MAX]

Function:

Set the battery terminated current.

The query returns the present battery terminated current.

Examples:

:BATT:CURRent:OFF MAX

Set the battery terminated current at maximum value.

:BATT:CURRent:OFF?

Return the present battery terminated current.

Related commands:

[:]BATTery:CAPacity?

[:]BATTery:DISCharge:CURRent

[:]BATTery[:STATe]

[:]BATTery:TIME?

[:]BATTery:VOLTage:OFF

3.4 CALibration Commands

The CALibration Commands are used for calibration of the electronic load. The CALibration Commands include the following:

[:]CALibration:COUNt?
[:]CALibration:LEVel
[:]CALibration:SECure:CODE
[:]CALibration:SECure:STATe
[:]CALibration:STEP

3.4.1 [:]CALibration:COUNt?

Syntax:
[:]CALibration:COUNt?

Function:
The query returns the number of times that the electronic load has been calibrated.

Examples:
:CAL:COUN?
Retruns:1(it means that the electronic load has been calibrated for 1 time.)

Related commands:
[:]CALibration:LEVel
[:]CALibration:SECure:CODE
[:]CALibration:SECure:STATe
[:]CALibration:STEP

3.4.2 [:]CALibration: LEVel

Syntax:
[:]CALibration:LEVel <value>

Function:
Set calibration value.

Examples:
:CAL: LEV <value>
Set calibration value as <value>.

Related commands:
[:]CALibration:COUNt?
[:]CALibration:SECure:CODE
[:]CALibration:SECure:STATe
[:]CALibration:STEP

3.4.3 [:]CALibration:SECure:CODE

Syntax:
[:]CALibration:SECure:CODE <password>

Function:
Set new calibration password (security code). The password must be 4 characters long.

Examples:
:CAL:SEC:CODE <password>
Set new calibration password.

Related commands:
[:]CALibration:COUNt?
[:]CALibration:LEVel
[:]CALibration:SECure:STATe
[:]CALibration:STEP

3.4.4 [:]CALibration:SECure:STATe

Syntax:
[:]CALibration:SECure:STATe {ON | OFF},<password>
[:]CALibration:SECure:STATe?

Function:
Turn on or off calibration protection. Calibration of the electronic load can only be executed after the calibration protection is turned off.
The query returns calibration protection state.

Examples:
:CAL:SEC:STAT ON,<password>
Turn on calibration.

:CAL:SEC:STAT?
Returns:“ON” or “OFF”.

Related commands:
[:]CALibration:COUNt?
[:]CALibration:LEVel
[:]CALibration:SECure:CODE
[:]CALibration:STEP

3.4.5 [:]CALibration:STEP

Syntax:
[:]CALibration:STEP <value>

Function:
Set calibration point.

Examples:
:CAL:STEP <value>
Set calibration point as <value>.

Related commands:
[:]CALibration:COUNt?
[:]CALibration:LEVel
[:]CALibration:SECure:CODE
[:]CALibration:STEP

3.5 CV Commands

The CV Commands are used to configure the upper limit of current in CV mode. The CV Commands include the following:

[:]CV:CURRent:LIMit

3.5.1 [:]CV:CURRent:LIMit

Syntax:

[:]CV:CURRent:LIMit{<value|DEFault|MINimum|MAXimum>}

[:]CV:CURRent:LIMit? [MIN|MAX]

Function:

Set current upper limit in CV mode.

The query returns the upper limit of set current in CV mode.

Examples:

:CV:CURR:LIM MAX

Set current upper limit as the maximum level in CV mode.

:CV:CURR:LIM?

Return the upper limit of set current in CV mode.

Related commands:

None

3.6 INPut Commands

The INPut Commands are used to configure the input settings of the electronic load. The INPut Commands include the following:

[:]INPut:PROTection:CLEar
[:]INPut[:STATe]
[:]INPut:SHORt[:STATe]
[:]INPut:VOLTage:ON
[:]INPut:VOLTage:ON:LATCh

3.6.1 [:]INPut:PROTection:CLEar

Syntax:
[:]INPut:PROTection:CLEar

Function:
Clear the protection status of electronic load.

Examples:
:INP:PROT:CLE

Related commands:
[:]INPut[:STATe]
[:]INPut:SHORt[:STATe]
[:]INPut:VOLTage:ON
[:]INPut:VOLTage:ON:LATCh

3.6.2 [:]INPut[:STATe]

Syntax:
[:]INPut[:STATe]{ON |OFF}
[:]INPut[:STATe]?

Function:
Turn on or off the present input.
The query returns “ON” or “OFF”.

Examples:
:INP ON
Turn on the input.

:INP?
Retruns: “ON” or “OFF”.

Related commands:
[:]INPut:PROTection:CLEar
[:]INPut:SHORt[:STATe]
[:]INPut:VOLTage:ON
[:]INPut:VOLTage:ON:LATCh

3.6.3 [:]INPut:SHORt[:STATe]

Syntax:
[:]INPut:SHORt[:STATe]{ON |OFF}
[:]INPut:SHORt[:STATe]?

Function:
Turn on or off the short circuit operation.
The query returns the status of short circuit operation.

Examples:
:INP:SHOR ON
Turn on the short circuit operation.

:INP:SHOR?
Retruns: “ON” or “OFF”.

Related commands:
[:]INPut:PROTection:CLEar
[:]INPut[:STATe]
[:]INPut:VOLTage:ON
[:]INPut:VOLTage:ON:LATCh

3.6.4 [:]INPut:VOLTage:ON

Syntax:

[:]INPut:VOLT:ON {<value|DEFault|MINimum|MAXimum>}

[:]INPut:VOLT:ON? [MIN|MAX]

Function:

Set the Von voltage point.

The query returns the present Von voltage point.

Examples:

:INP:VOLT:ON MAX

Set the Von voltage point to the maximum value.

:INP:VOLT:ON?

Return the present Von voltage point.

Related commands:

[:]INPut:PROTection:CLEar

[:]INPut[:STATe]

[:]INPut:SHORt[:STATe]

[:]INPut:VOLTage:ON:LATCh

3.6.5 [:]INPut:VOLTage:ON:LATCh

Syntax:

[:]INPut:VOLTage:ON:LATCh {ON|OFF}

[:]INPut:VOLTage:ON:LATCh?

Function:

Turn on or off the Von latch.

The query returns the status of the Von latch.

Examples:

:INP:VOLT:ON:LATC ON

Turn on the Von latch.

:INP:VOLT:ON:LATC?

Retruns: “ON” or “OFF”.

Related commands:

[:]INPut:PROTection:CLEar

[:]INPut[:STATe]

[:]INPut:SHORt[:STATe]

[:]INPut:VOLTage:ON

3.6.6 [:]INPut:VOLTage:OFF

Syntax:

[:]INPut:VOLT:OFF{<value|DEFault|MINimum|MAXimum>}

[:]INPut:VOLT:OFF? [MIN|MAX]

Function:

Set the Voff voltage point.

The query returns the present Voff voltage point.

Examples:

:INP:VOLT:OFF MAX

Set the Voff voltage point to the maximum value.

:INP:VOLT:OFF?

Return the present Voff voltage point.

Related commands:

[:]INPut:PROTection:CLEar

[:]INPut[:STATe]

[:]INPut:SHORt[:STATe]

[:]INPut:VOLTage:ON:LATCh

3.7 LIST Commands

The LIST Commands are used to set the sequence (list) operation of the electronic load.

The LIST Commands include the following:

[:]LIST:ADD
[:]LIST:CHAin
[:]LIST:CLE
[:]LIST:COUNt
[:]LIST:DELete
[:]LIST:DELete:ALL
[:]LIST:EDIT
[:]LIST:INSert
[:]LIST:MEMO
[:]LIST:NUMBer
[:]LIST:SAVE
[:]LIST[:STATe]

3.7.1 [:]LIST:ADD

Syntax:
[:]LIST:ADD { CCL|CCH|CRL|CRM|CRH|VLCRL|VLCRM|VLCRH|CVL|CVH,
<value|DEFault|MINimum|MAXimum>, <time|DEFault|MINimum|MAXimum>}

Function:
Add one new sequence step. This command includes three parameters: operation mode, load value and operation time.

Examples:
:LIST:ADD CCL,MAX,MAX

Related commands:
[:]LIST:CHAin
[:]LIST:CLE
[:]LIST:COUNt
[:]LIST:DELete
[:]LIST:DELete:ALL
[:]LIST:EDIT
[:]LIST:INSert
[:]LIST:MEMO
[:]LIST:NUMBer
[:]LIST:SAVE
[:]LIST[:STATe]

3.7.2 [:]LIST:CHAin

Syntax:
[:]LIST:CHAin {0～7|OFF}

Function:
Set the chained position of present sequence.

Examples:
:LIST:CHA 0
Set the chained position of present sequence to 0.

Related commands:
[:]LIST:ADD
[:]LIST:CLE
[:]LIST:COUNt
[:]LIST:DELete
[:]LIST:DELete:ALL
[:]LIST:EDIT
[:]LIST:INSert
[:]LIST:MEMO
[:]LIST:NUMBer
[:]LIST:SAVE
[:]LIST[:STATe]

3.7.3 [:]LIST:CLE

Syntax:
[:]LIST:CLEar

Function:
Set the present sequence at default value.

Examples:
:LIST:CLE

Related commands:
[:]LIST:ADD
[:]LIST:CHAin
[:]LIST:COUNt
[:]LIST:DELete
[:]LIST:DELete:ALL
[:]LIST:EDIT
[:]LIST:INSert
[:]LIST:MEMO
[:]LIST:NUMBer
[:]LIST:SAVE
[:]LIST[:STATe]

3.7.4 [:]LIST:COUNt

Syntax:
[:]LIST:COUNt <0~65535>
[:]LIST:COUNt?

Function:
Set the cycle times in sequence operation.
The query returns the cycle times of present sequence operation.

Examples:
:LIST:COUN 1
Set the cycle times to 1.

:LIST:COUN?
Return the cycle times of present sequence operation.

Related commands:
[:]LIST:ADD
[:]LIST:CHAin
[:]LIST:CLE
[:]LIST:DELete
[:]LIST:DELete:ALL
[:]LIST:EDIT
[:]LIST:INSert
[:]LIST:MEMO
[:]LIST:NUMBer
[:]LIST:SAVE
[:]LIST[:STATe]

3.7.5 [:]LIST:DELete

Syntax:
[:]LIST:DELete<step>

Function:
Delete one step of present sequence.

Examples:
:LIST:DEL 1
Delete the step1 of present sequence.

Related commands:
[:]LIST:ADD
[:]LIST:CHAin
[:]LIST:CLE
[:]LIST:COUNt
[:]LIST:DELete:ALL
[:]LIST:EDIT
[:]LIST:INSert
[:]LIST:MEMO
[:]LIST:NUMBer
[:]LIST:SAVE
[:]LIST[:STATe]

3.7.6 [:]LIST:DELete:ALL

Syntax:
[:]LIST:DELete:ALL

Function:
Delete all steps of present sequence.

Examples:
:LIST:DEL:ALL

Related commands:
[:]LIST:ADD
[:]LIST:CHAin
[:]LIST:CLE
[:]LIST:COUNt
[:]LIST:DELete
[:]LIST:EDIT
[:]LIST:INSert
[:]LIST:MEMO
[:]LIST:NUMBer
[:]LIST:SAVE
[:]LIST[:STATe]

3.7.7 [:]LIST:EDIT

Syntax:
[:]LIST:EDIT {<step>, CCL|CCH|CRL|CRM|CRH|VLCRL|VLCRM|VLCRH|CVL|CVH,
<value|DEFault|MINimum|MAXimum>, <time|DEFault|MINimum|MAXimum>}

Function:
Edit one step of present sequence. There are four parameters following this command: step, operation mode, load value, and operation time.

Examples:
:LIST:EDIT 1,CCH,0.5,3

Related commands:
[:]LIST:ADD
[:]LIST:CHAin
[:]LIST:CLE
[:]LIST:COUNt
[:]LIST:DELete
[:]LIST:DELete:ALL
[:]LIST:INSert
[:]LIST:MEMO
[:]LIST:NUMBer
[:]LIST:SAVE
[:]LIST[:STATe]

3.7.8 [:]LIST:INSert

Syntax:
[:]LIST:INSert {<step>, CCL|CCH|CRL|CRM|CRH|VLCRL|VLCRM|VLCRH|CVL|CVH, <value|DEFault|MINimum|MAXimum>, <time|DEFault|MINimum|MAXimum>}

Function:
Insert a new sequence step. There are four parameters following this command: step, operation mode, load value, and operation time.

Examples:
LIST:INSert1,CCH,0.5,3

Related commands:
[:]LIST:ADD
[:]LIST:CHAin
[:]LIST:CLE
[:]LIST:COUNt
[:]LIST:DELete
[:]LIST:DELete:ALL
[:]LIST:EDIT
[:]LIST:MEMO
[:]LIST:NUMBer
[:]LIST:SAVE
[:]LIST[:STATe]

3.7.9 [:]LIST:MEMO

Syntax:
[:]LIST:MEMO<string>
[:]LIST:MEMO?

Function:
Set sequence memo.
The query returns the sequence memo.

Examples:
:LIST:MEMO "list1"
Set the sequence memo as “list1”. The maximum sequence memo is 10 characters long.

:LIST:MEMO ?
Return the sequence memo.

Related commands:
[:]LIST:ADD
[:]LIST:CHAin
[:]LIST:CLE
[:]LIST:COUNt
[:]LIST:DELete
[:]LIST:DELete:ALL
[:]LIST:EDIT
[:]LIST:INSert
[:]LIST:NUMBer
[:]LIST:SAVE
[:]LIST[:STATe]

3.7.10 [:]LIST:NUMBer

Syntax:
[:]LIST:NUMBer　<0～7>

Function:
Set sequence number.

Examples:
:LIST:NUMB 0
Set the sequence number to 0.

Related commands:
[:]LIST:ADD
[:]LIST:CHAin
[:]LIST:CLE
[:]LIST:COUNt
[:]LIST:DELete
[:]LIST:DELete:ALL
[:]LIST:EDIT
[:]LIST:INSert
[:]LIST:MEMO
[:]LIST:SAVE
[:]LIST[:STATe]

3.7.11 [:]LIST:SAVE

Syntax:
[:]LIST:SAVE

Function:
Save the sequence value according to sequence number.

Examples:
:LIST:SAVE

Related commands:
[:]LIST:ADD
[:]LIST:CHAin
[:]LIST:CLE
[:]LIST:COUNt
[:]LIST:DELete
[:]LIST:DELete:ALL
[:]LIST:EDIT
[:]LIST:INSert
[:]LIST:MEMO
[:]LIST:NUMBer
[:]LIST[:STATe]

3.7.12 [:]LIST[:STATe]

Syntax:
[:]LIST[:STATe] {ON|OFF}
[:]LIST[:STATe]?

Function:
Activate or stop sequence operation.
The query returns the present sequence status.

Examples:
:LIST ON
Activate sequence operation.

:LIST?
Retruns: “ON” or “OFF”.

Related commands:
[:]LIST:ADD
[:]LIST:CHAin
[:]LIST:CLE
[:]LIST:COUNt
[:]LIST:DELete
[:]LIST:DELete:ALL
[:]LIST:EDIT
[:]LIST:INSert
[:]LIST:MEMO
[:]LIST:NUMBer
[:]LIST:SAVE

3.8 MEASure Commands

The MEASure Commands are used for query the present values of input voltage, current, resistance and power on the electronic load's input terminals.

The MEASure Commands include the following:
[:]MEASure[:SCALar]:CURRent[:DC]?
[:]MEASure[:SCALar]:POWer[:DC]?
[:]MEASure[:SCALar]:RESistance[:DC]?
[:]MEASure[:SCALar][:VOLTage][:DC]?

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

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

Function:
The query returns the value of input current on input terminals.

Examples:
:MEAS:CURR?
Return the value of input current on input terminals.

Related commands:
[:]MEASure[:SCALar]:POWer[:DC]?
[:]MEASure[:SCALar]:RESistance[:DC]?
[:]MEASure[:SCALar][:VOLTage][:DC]?

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

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

Function:
The query returns the value of input power on input terminals.

Examples:
:MEAS:POW?
Return the value of input power on input terminals.

Related commands:
[:]MEASure[:SCALar]:CURRent[:DC]?
[:]MEASure[:SCALar]:RESistance[:DC]?
[:]MEASure[:SCALar][:VOLTage][:DC]?

3.8.3 [:]MEASure[:SCALar]:RESistance[:DC]?

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

Function:
The query returns the value of input resistance on input terminals.

Examples:
:MEAS?
Return the value of input resistance on input terminals.

Related commands:
[:]MEASure[:SCALar]:CURRent[:DC]?
[:]MEASure[:SCALar]:POWer[:DC]?
[:]MEASure[:SCALar][:VOLTage][:DC]?

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

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

Function:
The query returns the value of input voltage on input terminals.

Examples:
:MEAS?
Return the value of input voltage on input terminals.

Related commands:
[:]MEASure[:SCALar]:CURRent[:DC]?
[:]MEASure[:SCALar]:POWer[:DC]?
[:]MEASure[:SCALar]:RESistance[:DC]?

3.9 MODE Commands

The MODE Commands are used for setting the test mode of the electronic load. The MODE Commands include the following:

[:]MODE

3.9.1 [:]MODE

Syntax:

[:]MODE{CCL|CCH|CRL|CRM|CRH|VLCRL|VLCRM|VLCRH|CVL|CVH|CPC|CPV}

[:]MODE?

Function:

Select the basic test modes of the electronic load.

The query returns the present test mode.

Examples:

:MODE CVL

Set constant voltage mode.

:MODE?

Return the present test mode.

Related commands:

None

3.10 SOURce Commands

The SOURce Commands are used to set the values of current, voltage, power, resistance and transient parameters.

The SOURce Commands include the following:
[:SOURce:]CURRent:FALL:RATE
[:SOURce:]CURRent:HLEVel
[:SOURce:]CURRent[:LEVel]
[:SOURce:]CURRent[:LEVel]:TRIGgered
[:SOURce:]CURRent:LLEVel
[:SOURce:]CURRent:PROTection:DELay
[:SOURce:]CURRent:PROTection[:LEVel]
[:SOURce:]CURRent:PROTection:STATe
[:SOURce:]CURRent:RISE:RATE

[:SOURce:]POWer[:LEVel]
[:SOURce:]POWer[:LEVel]:TRIGgered
[:SOURce:]POWer:PROTection[:LEVel]

[:SOURce:]RESistance:HLEVel
[:SOURce:]RESistance[:LEVel]
[:SOURce:]RESistance[:LEVel]:TRIGgered
[:SOURce:]RESistance:LLEVel

[:SOURce:]TRANsient:FTIMe
[:SOURce:]TRANsient:HTIMe
[:SOURce:]TRANsient:LTIMe
[:SOURce:]TRANsient:MODE
[:SOURce:]TRANsient:RTIMe
[:SOURce:]TRANsient[:STATe]

[:SOURce:]VOLTage:HLEVel
[:SOURce:]VOLTage[:LEVel]
[:SOURce:]VOLTage[:LEVel]:TRIGgered
[:SOURce:]VOLTage:LLEVel
[:SOURce:]VOLTage:PROTection[:LEVel]

3.10.1 CURRent Commands

The CURRent commands are used to set the parameters related to current of electronic load.

The CURRent commands include the following:
[:SOURce:]CURRent:FALL:RATE
[:SOURce:]CURRent:HLEVel
[:SOURce:]CURRent[:LEVel]
[:SOURce:]CURRent[:LEVel]:TRIGgered
[:SOURce:]CURRent:LLEVel
[:SOURce:]CURRent:PROTection:DELay
[:SOURce:]CURRent:PROTection[:LEVel]
[:SOURce:]CURRent:PROTection:STATe
[:SOURce:]CURRent:RISE:RATE

3.10.1.1 [:SOURce:]CURRent:FALL:RATE

Syntax:

[:SOURce:]CURRent:FALL:RATE {<current>|DEFault|MINimum|MAXimum}

[:SOURce:]CURRent:FALL:RATE? {DEFault|MINimum|MAXimum}

Function:

Set the current fall rate in CC mode.

The query returns the current fall rate in CC mode.

Examples:

:CURR:FALL:RATE MAX

Set the current fall rate at maximum value in CC mode.

:CURR:FALL:RATE?

Return the current fall rate in CC mode.

Related commands:

[:SOURce:]CURRent:HLEVel

[:SOURce:]CURRent[:LEVel]

[:SOURce:]CURRent[:LEVel]:TRIGgered

[:SOURce:]CURRent:LLEVel

[:SOURce:]CURRent:PROTection:DELay

[:SOURce:]CURRent:PROTection[:LEVel]

[:SOURce:]CURRent:PROTection:STATe

[:SOURce:]CURRent:RISE:RATE

3.10.1.2 [:SOURce:]CURRent:HLEVel

Syntax:
[:SOURce:]CURRent:HLEVel{<current>|DEFault|MINimum|MAXimum}
[:SOURce:]CURRent:HLEVel? {DEFault|MINimum|MAXimum}

Function:
Set the transient current high level.
The query returns the transient current high level.

Examples:
:CURR:HLEV MAX
Set the transient current high level at maximum value.

:CURR:HLEV?
Return the transient current high level.

Related commands:
[:SOURce:]CURRent:FALL:RATE
[:SOURce:]CURRent[:LEVel]
[:SOURce:]CURRent[:LEVel]:TRIGgered
[:SOURce:]CURRent:LLEVel
[:SOURce:]CURRent:PROTection:DELay
[:SOURce:]CURRent:PROTection[:LEVel]
[:SOURce:]CURRent:PROTection:STATe
[:SOURce:]CURRent:RISE:RATE

3.10.1.3 [:SOURce:]CURRent[:LEVel]

Syntax:

[:SOURce:]CURRent[:LEVel] {<current>|DEFault|MINimum|MAXimum}

[:SOURce:]CURRent[:LEVel]? {DEFault|MINimum|MAXimum}

Function:

This command is used to set the constant current level when the electronic load is in CC Mode.

This command is used to query the constant current level when the electronic load is in CC Mode.

Examples:

:CURR MAX

Set the constant current level at maximum value.

:CURR?

Return the present constant current level.

Related commands:

[:SOURce:]CURRent:FALL:RATE

[:SOURce:]CURRent:HLEVel

[:SOURce:]CURRent[:LEVel]:TRIGgered

[:SOURce:]CURRent:LLEVel

[:SOURce:]CURRent:PROTection:DELay

[:SOURce:]CURRent:PROTection[:LEVel]

[:SOURce:]CURRent:PROTection:STATe

[:SOURce:]CURRent:RISE:RATE

3.10.1.4 [:SOURce:]CURRent[:LEVel]:TRIGgered

Syntax:

[:SOURce:]CURRent[:LEVel]:TRIGgered {<current>|DEFault|MINimum|MAXimum}

[:SOURce:]CURRent[:LEVel]:TRIGgered? {DEFault|MINimum|MAXimum}

Function:

Set the triggered current level.

The query returns the triggered current level.

Examples:

:CURR:TRIG MAX

Set the triggered current level at maximum value.

:CURR:TRIG?

Return the triggered current level.

Related commands:

[:SOURce:]CURRent:FALL:RATE

[:SOURce:]CURRent:HLEVel

[:SOURce:]CURRent[:LEVel]

[:SOURce:]CURRent:LLEVel

[:SOURce:]CURRent:PROTection:DELay

[:SOURce:]CURRent:PROTection[:LEVel]

[:SOURce:]CURRent:PROTection:STATe

[:SOURce:]CURRent:RISE:RATE

3.10.1.5 [:SOURce:]CURRent:LLEVel

Syntax:

[:SOURce:]CURRent:LLEVel {<current>|DEFault|MINimum|MAXimum}

[:SOURce:]CURRent:LLEVel? {DEFault|MINimum|MAXimum}

Function:

Set the transient current low level.

The query returns the transient current low level.

Examples:

:CURR:LLEV MAX

Set the transient current low level as maximum value.

:CURR:LLEV?

Return the transient current low level.

Related commands:

[:SOURce:]CURRent:FALL:RATE

[:SOURce:]CURRent:HLEVel

[:SOURce:]CURRent[:LEVel]

[:SOURce:]CURRent[:LEVel]:TRIGgered

[:SOURce:]CURRent:PROTection:DELay

[:SOURce:]CURRent:PROTection[:LEVel]

[:SOURce:]CURRent:PROTection:STATe

[:SOURce:]CURRent:RISE:RATE

3.10.1.6 [:SOURce:]CURRent:PROTection:DELay

Syntax:

[:SOURce:]CURRent:PROTection:DELay {<value>|DEFault|MINimum|MAXimum}

[:SOURce:]CURRent:PROTection:DELay? {DEFault|MINimum|MAXimum}

Function:

Set the software current protection delay time.

The query returns the software current protection delay time.

Examples:

:CURR:PROT:DEL MAX

Set the software current protection delay time.

:CURR:PROT:DEL?

Return the software current protection delay time.

Related commands:

[:SOURce:]CURRent:FALL:RATE

[:SOURce:]CURRent:HLEVel

[:SOURce:]CURRent[:LEVel]

[:SOURce:]CURRent[:LEVel]:TRIGgered

[:SOURce:]CURRent:LLEVel

[:SOURce:]CURRent:PROTection[:LEVel]

[:SOURce:]CURRent:PROTection:STATe

[:SOURce:]CURRent:RISE:RATE

3.10.1.7 [:SOURce:]CURRent:PROTection[:LEVel]

Syntax:

[:SOURce:]CURRent:PROTection[:LEVel] {<value>|DEFault|MINimum|MAXimum}

[:SOURce:]CURRent:PROTection[:LEVel]?{DEFault|MINimum|MAXimum}

Function:

Set the software current protection upper limit.

The query returns the software current protection upper limit.

Examples:

:CURR:PROT MAX

Set the software current protection upper limit at maximum value.

:CURR:PROT?

Return the software current protection upper limit.

Related commands:

[:SOURce:]CURRent:FALL:RATE

[:SOURce:]CURRent:HLEVel

[:SOURce:]CURRent[:LEVel]

[:SOURce:]CURRent[:LEVel]:TRIGgered

[:SOURce:]CURRent:LLEVel

[:SOURce:]CURRent:PROTection:DELay

[:SOURce:]CURRent:PROTection:STATe

[:SOURce:]CURRent:RISE:RATE

3.10.1.8 [:SOURce:]CURRent:PROTection:STATe

Syntax:
[:SOURce:]CURRent:PROTection:STATe {OFF|ON}
[:SOURce:]CURRent:PROTection:STATe?

Function:
Disable or enable the OCP state.
The query returns the OCP state..

Examples:
:CURR:PROT:STAT OFF
Disable the OCP.

:CURR:PROT:STAT?
Query the OCP state.
Return “ON” (enabled) or “OFF” (disabled).

Related commands:
[:SOURce:]CURRent:FALL:RATE
[:SOURce:]CURRent:HLEVel
[:SOURce:]CURRent[:LEVel]
[:SOURce:]CURRent[:LEVel]:TRIGgered
[:SOURce:]CURRent:LLEVel
[:SOURce:]CURRent:PROTection:DELay
[:SOURce:]CURRent:PROTection[:LEVel]
[:SOURce:]CURRent:RISE:RATE

3.10.1.9 [:SOURce:]CURRent:RISE:RATE

Syntax:

[:SOURce:]CURRent:RISE:RATE {<current>|DEFault|MINimum|MAXimum}

[:SOURce:]CURRent:RISE:RATE? {DEFault|MINimum|MAXimum}

Function:

Set the current rise rate in CC mode.

The query returns the current rise rate in CC mode.

Examples:

:CURR:RISE:RATE MAX

Set the current rise rate at maximum value in CC mode.

:CURR:RISE:RATE?

Return the current rise rate in CC mode.

Related commands:

[:SOURce:]CURRent:FALL:RATE

[:SOURce:]CURRent:HLEVel

[:SOURce:]CURRent[:LEVel]

[:SOURce:]CURRent[:LEVel]:TRIGgered

[:SOURce:]CURRent:LLEVel

[:SOURce:]CURRent:PROTection:DELay

[:SOURce:]CURRent:PROTection[:LEVel]

[:SOURce:]CURRent:PROTection:STATe

3.10.2 POWer Commands

The POWer commands are used to set the parameters related to power of electronic load. The POWer commands include the following:
[:SOURce:]POWer[:LEVel]
[:SOURce:]POWer[:LEVel]:TRIGgered
[:SOURce:]POWer:PROTection[:LEVel]

3.10.2.1 [:SOURce:]POWer[:LEVel]

Syntax:

[:SOURce:]POWer[:LEVel] {<value>|DEFault|MINimum|MAXimum}

[:SOURce:]POWer[:LEVel]? {DEFault|MINimum|MAXimum}

Function:

This command is used to set the constant power level when the electronic load is in CP Mode.

This command is used to query the constant power level when the electronic load is in CP Mode.

Examples:

:POW MAX

Set the constant power level at maximum value.

:POW?

Return the constant power level.

Related commands:

[:SOURce:]POWer[:LEVel]:TRIGgered

[:SOURce:]POWer:PROTection[:LEVel]

3.10.2.2 [:SOURce:]POWer[:LEVel]:TRIGgered

Syntax:

[:SOURce:]POWer[:LEVel]:TRIGgered {<value>|DEFault|MINimum|MAXimum}

[:SOURce:]POWer[:LEVel]:TRIGgered? {DEFault|MINimum|MAXimum}

Function:

Set the triggered power level.

The query returns the triggered power level.

Examples:

:POW:TRIGMAX

Set the triggered power level at maximum value.

:POW:TRIG?

Return the triggered power level.

Related commands:

[:SOURce:]POWer[:LEVel]

[:SOURce:]POWer:PROTection[:LEVel]

3.10.2.3 [:SOURce:]POWer:PROTection[:LEVel]

Syntax:

[:SOURce:]POWer:PROTection[:LEVel] {<value>|DEFault|MINimum|MAXimum}

[:SOURce:]POWer:PROTection[:LEVel]? {DEFault|MINimum|MAXimum}

Function:

Set the software power upper limit.

The query returns the software power upper limit.

Examples:

:POW:PROT MAX

Set the software power upper limit at maximum value.

:POW:PROT?

Return the software power upper limit.

Related commands:

[:SOURce:]POWer[:LEVel]

[:SOURce:]POWer[:LEVel]:TRIGgered

3.10.3 RESistance Commands

The RESistance commands are used to set the parameters related to resistance of electronic load. The RESistance commands include the following:

[:SOURce:]RESistance:HLEVel

[:SOURce:]RESistance[:LEVel]

[:SOURce:]RESistance[:LEVel]:TRIGgered

[:SOURce:]RESistance:LLEVel

3.10.3.1 [:SOURce:]RESistance:HLEVel

Syntax:

[:SOURce:]RESistance:HLEVel {< value >|DEFault|MINimum|MAXimum}

[:SOURce:]RESistance:HLEVel? {DEFault|MINimum|MAXimum}

Function:

Set the transient resistance high level.

The query returns the transient resistance high level.

Examples:

:RES:HLEV MAX

Set the transient resistance high level at maximum value.

:RES:HLEV?

Return the transient resistance high level.

Related commands:

[:SOURce:]RESistance[:LEVel]

[:SOURce:]RESistance[:LEVel]:TRIGgered

[:SOURce:]RESistance:LLEVel

3.10.3.2 [:SOURce:]RESistance[:LEVel]

Syntax:

[:SOURce:]RESistance[:LEVel] {<value>|DEFault|MINimum|MAXimum}

[:SOURce:]RESistance[:LEVel]? {DEFault|MINimum|MAXimum}

Function:

Set the constant resistance level.

The query returns the constant resistance level.

Examples:

:RES MAX

Set the constant resistance level at maximum value.

:RES?

Return the constant resistance level.

Related commands:

[:SOURce:]RESistance:HLEVel

[:SOURce:]RESistance[:LEVel]:TRIGgered

[:SOURce:]RESistance:LLEVel

3.10.3.3 [:SOURce:]RESistance[:LEVel]:TRIGgered

Syntax:

[:SOURce:]RESistance[:LEVel]:TRIGgered {<value>|DEFault|MINimum|MAXimum}

[:SOURce:]RESistance[:LEVel]:TRIGgered? {DEFault|MINimum|MAXimum}

Function:

Set the triggered resistance level.

The query returns the triggered resistance level.

Examples:

:RES:TRIG MAX

Set the triggered resistance level at maximum value.

:RES:TRIG?

Return the triggered resistance level.

Related commands:

[:SOURce:]RESistance:HLEVel

[:SOURce:]RESistance[:LEVel]

[:SOURce:]RESistance:LLEVel

3.10.3.4 [:SOURce:]RESistance:LLEVel

Syntax:

[:SOURce:]RESistance:LLEVel {< value >|DEFault|MINimum|MAXimum}

[:SOURce:]RESistance:LLEVel? {DEFault|MINimum|MAXimum}

Function:

Set the transient resistance low level.

The query returns the transient resistance low level.

Examples:

:RES:LLEVMAX

Set the transient resistance low level at maximum value.

:RES:LLEV?

Return the transient resistance low level.

Related commands:

[:SOURce:]RESistance:HLEVel

[:SOURce:]RESistance[:LEVel]

[:SOURce:]RESistance[:LEVel]:TRIGgered

3.10.4 TRANsient Commands

The TRANsient commands are used to set the transient parameters. The TRANsient commands include the following:

[:SOURce:]TRANsient:FTIMe
[:SOURce:]TRANsient:HTIMe
[:SOURce:]TRANsient:LTIMe
[:SOURce:]TRANsient:MODE
[:SOURce:]TRANsient:RTIMe
[:SOURce:]TRANsient[:STATe]

3.10.4.1 [:SOURce:]TRANsient:FTIMe

Syntax:
[:SOURce:]TRANsient:FTIMe {<value>|DEFault|MINimum|MAXimum}
[:SOURce:]TRANsient:FTIMe? {DEFault|MINimum|MAXimum}

Function:
Set the time for transient falling edge.
The query returns the time for transient falling edge.

Examples:
:TRAN:FTIM MAX
time for transient falling edge at maximum value.

:TRAN:FTIM?
Return the time for transient falling edge.

Related commands:
[:SOURce:]TRANsient:HTIMe
[:SOURce:]TRANsient:LTIMe
[:SOURce:]TRANsient:MODE
[:SOURce:]TRANsient:RTIMe
[:SOURce:]TRANsient[:STATe]

3.10.4.2 [:SOURce:]TRANsient:HTIMe

Syntax:

[:SOURce:]TRANsient:HTIMe {<value>|DEFault|MINimum|MAXimum}

[:SOURce:]TRANsient:HTIMe? {DEFault|MINimum|MAXimum}

Function:

Set the time for transient high level.

The query returns the time for transient high level.

Examples:

:TRAN:HTIM MAX

Set the time for transient high level at maximum value.

:TRAN:HTIM?

Return the time for transient high level.

Related commands:

[:SOURce:]TRANsient:FTIMe

[:SOURce:]TRANsient:LTIMe

[:SOURce:]TRANsient:MODE

[:SOURce:]TRANsient:RTIMe

[:SOURce:]TRANsient[:STATe]

3.10.4.3 [:SOURce:]TRANsient:LTIMe

Syntax:

[:SOURce:]TRANsient:LTIMe{<value>|DEFault|MINimum|MAXimum}

[:SOURce:]TRANsient:LTIMe? {DEFault|MINimum|MAXimum}

Function:

Set the time for transient low level.

The query returns the time for transient low level.

Examples:

:TRAN:LTIM MAX

Set the time for transient low level at maximum value.

:TRAN:LTIM?

Return the time for transient low level.

Related commands:

[:SOURce:]TRANsient:FTIMe

[:SOURce:]TRANsient:HTIMe

[:SOURce:]TRANsient:MODE

[:SOURce:]TRANsient:RTIMe

[:SOURce:]TRANsient[:STATe]

3.10.4.4 [:SOURce:]TRANsient:MODE

Syntax:
[:SOURce:]TRANsient:MODE{CONTinuous|PULSe|TOGGle}
[:SOURce:]TRANsient:MODE? {DEFault|MINimum|MAXimum}

Function:
Set the transient operation mode.
The query returns the transient operation mode.

Examples:
:TRAN:MODE CONT
Set the continuous transient operation.

:TRAN:MODE?
Return the transient operation mode.

Related commands:
[:SOURce:]TRANsient:FTIMe
[:SOURce:]TRANsient:HTIMe
[:SOURce:]TRANsient:LTIMe
[:SOURce:]TRANsient:RTIMe
[:SOURce:]TRANsient[:STATe]

3.10.4.5 [:SOURce:]TRANsient:RTIMe

Syntax:

[:SOURce:]TRANsient:RTIMe {<value>|DEFault|MINimum|MAXimum}

[:SOURce:]TRANsient:RTIMe ? {DEFault|MINimum|MAXimum}

Function:

Set the time for transient rising edge.

The query returns the time for transient rising edge.

Examples:

:TRAN:RTIM MAX

Set the time for transient rising edge at maximum value.

:TRAN:RTIM?

Return the time for transient rising edge.

Related commands:

[:SOURce:]TRANsient:FTIMe

[:SOURce:]TRANsient:HTIMe

[:SOURce:]TRANsient:LTIMe

[:SOURce:]TRANsient:MODE

[:SOURce:]TRANsient[:STATe]

3.10.4.6 [:SOURce:]TRANsient[:STATe]

Syntax:
[:SOURce:]TRANsient[:STATe] {ON|OFF}
[:SOURce:]TRANsient[:STATe]?

Function:
Enable or disable transient operation.
The query returns the transient operation.

Examples:
:TRAN ON
Disable transient operation.。

:TRAN?
Return the transient operation.

Related commands:
[:SOURce:]TRANsient:FTIMe
[:SOURce:]TRANsient:HTIMe
[:SOURce:]TRANsient:LTIMe
[:SOURce:]TRANsient:MODE
[:SOURce:]TRANsient:RTIMe

3.10.5 VOLTage Commands

The VOLTage commands are used to set the parameters related to volatage of electronic load. The VOLTage commands include the following:

[:SOURce:]VOLTage:HLEVel

[:SOURce:]VOLTage[:LEVel]

[:SOURce:]VOLTage[:LEVel]:TRIGgered

[:SOURce:]VOLTage:LLEVel

[:SOURce:]VOLTage:PROTection[:LEVel]

3.10.5.1 [:SOURce:]VOLTage:HLEVel

Syntax:
[:SOURce:]VOLTage:HLEVel {<voltage>|DEFault|MINimum|MAXimum}
[:SOURce:]VOLTage:HLEVel? {DEFault|MINimum|MAXimum}

Function:
Set the transient voltage high level.
The query returns the transient voltage high level.

Examples:
:VOLT:HLEV MAX
Set the transient voltage high level at maximum value.

:VOLT:HLEV?
Return the transient voltage high level.

Related commands:
[:SOURce:]VOLTage[:LEVel]
[:SOURce:]VOLTage[:LEVel]:TRIGgered
[:SOURce:]VOLTage:LLEVel
[:SOURce:]VOLTage:PROTection[:LEVel]

3.10.5.2 [:SOURce:]VOLTage[:LEVel]

Syntax:

[:SOURce:]VOLTage[:LEVel] {<voltage>|DEFault|MINimum|MAXimum}

[:SOURce:]VOLTage[:LEVel]? {DEFault|MINimum|MAXimum}

Function:

This command is used to set the constant voltage level when the electronic load is in CV Mode.

This command is used to query the constant voltage level when the electronic load is in CV Mode.

Examples:

:VOLT MAX

Set the constant voltage level at maximum value.

:VOLT?

Return the present constant voltage level.

Related commands:

[:SOURce:]VOLTage:HLEVel

[:SOURce:]VOLTage[:LEVel]:TRIGgered

[:SOURce:]VOLTage:LLEVel

[:SOURce:]VOLTage:PROTection[:LEVel]

3.10.5.3 [:SOURce:]VOLTage[:LEVel]:TRIGgered

Syntax:

[:SOURce:]VOLTage[:LEVel]:TRIGgered {<voltage>|DEFault|MINimum|MAXimum}

[:SOURce:]VOLTage[:LEVel]:TRIGgered? {DEFault|MINimum|MAXimum}

Function:

Set the triggered voltage level.

The query returns the triggered voltage level.

Examples:

:VOLT:TRIG MAX

Set the triggered voltage level at maximum value.

:VOLT:TRIG?

Return the triggered voltage level.

Related commands:

[:SOURce:]VOLTage:HLEVel

[:SOURce:]VOLTage[:LEVel]

[:SOURce:]VOLTage:LLEVel

[:SOURce:]VOLTage:PROTection[:LEVel]

3.10.5.4 [:SOURce:]VOLTage:LLEVel

Syntax:

[:SOURce:]VOLTage:LLEVel {<voltage>|DEFault|MINimum|MAXimum}

[:SOURce:]VOLTage:LLEVel? {DEFault|MINimum|MAXimum}

Function:

Set the transient voltage low level.

The query returns the transient voltage low level.

Examples:

:VOLT:LLEV MAX

Set the transient voltage low level at maximum value.

:VOLT:LLEV?

Return the transient voltage low level.

Related commands:

[:SOURce:]VOLTage:HLEVel

[:SOURce:]VOLTage[:LEVel]

[:SOURce:]VOLTage[:LEVel]:TRIGgered

[:SOURce:]VOLTage:PROTection[:LEVel]

3.10.5.5 [:SOURce:]VOLTage:PROTection[:LEVel]

Syntax:

[:SOURce:]VOLTage:PROTection[:LEVel] {<voltage>|DEFault|MINimum|MAXimum}

[:SOURce:]VOLTage:PROTection[:LEVel]?{DEFault|MINimum|MAXimum}

Function:

Set the software voltage upper limit.

The query returns the software voltage upper limit.

Examples:

:VOLT:PROT MAX

Set the software voltage upper limit at maximum value.

:VOLT:PROT?

Return the software voltage upper limit.

Related commands:

[:SOURce:]VOLTage:HLEVel

[:SOURce:]VOLTage[:LEVel]

[:SOURce:]VOLTage[:LEVel]:TRIGgered

[:SOURce:]VOLTage:LLEVel

3.11 STATus Commands

The STATus Commands are used to set and query the contents of the Questionable Status Register group and Operation Status Register group.

The STATus Commands include the following:

[:]STATus:OPERation:CONDition?
[:]STATus:OPERation:ENABle
[:]STATus:OPERation[:EVENt]?
[:]STATus:PRESet
[:]STATus:QUEStionable:CONDition?
[:]STATus:QUEStionable:ENABle
[:]STATus:QUEStionable[:EVENt]?

3.11.1 [:]STATus:OPERation:CONDition?

Syntax:
[:]STATus:OPERation:CONDition?

Function:
This command returns the contents of the Operation Condition Register (OCR).

Examples:
:STAT:OPER:COND?
Return the status of the Operation Condition Register (OCR).

Related commands:
[:]STATus:OPERation:ENABle
[:]STATus:OPERation[:EVENt]?
[:]STATus:PRESet
[:]STATus:QUEStionable:CONDition?
[:]STATus:QUEStionable:ENABle
[:]STATus:QUEStionable[:EVENt]?

3.11.2 [:]STATus:OPERation:ENABle

Syntax:

[:]STATus:OPERation:ENABle <enable_value>

[:]STATus:OPERation:ENABle?

Function:

This command sets the contents of the Operation Enable Register (OENR).

This command queries the contents of the Operation Enable Register (OENR).

Examples:

:STAT:OPER:ENAB?

Return the status of the Operation Enable Register (OENR).

Related commands:

[:]STATus:OPERation:CONDition?

[:]STATus:OPERation[:EVENt]?

[:]STATus:PRESet

[:]STATus:QUEStionable:CONDition?

[:]STATus:QUEStionable:ENABle

[:]STATus:QUEStionable[:EVENt]?

3.11.3 [:]STATus:OPERation[:EVENt]?

Syntax:
[:]STATus:OPERation[:EVENt]?

Function:
The query returns the status of the Operation Event Register (OEVR).

Examples:
:STAT:OPER?
Return the status of the Operation Event Register (OEVR).

Related commands:
[:]STATus:OPERation:CONDition?
[:]STATus:OPERation:ENABle
[:]STATus:PRESet
[:]STATus:QUEStionable:CONDition?
[:]STATus:QUEStionable:ENABle
[:]STATus:QUEStionable[:EVENt]?

3.11.4 [:]STATus:PRESet

Syntax:
[:]STATus:PRESet

Function:
This command is used to clear the Operation Enable Register (OENR) and the Questionable Enable Register (QENR).

Examples:
:STAT:PRES

Related commands:
[:]STATus:OPERation:CONDition?
[:]STATus:OPERation:ENABle
[:]STATus:OPERation[:EVENt]?
[:]STATus:QUEStionable:CONDition?
[:]STATus:QUEStionable:ENABle
[:]STATus:QUEStionable[:EVENt]?

3.11.5 [:]STATus:QUEStionable:CONDition?

Syntax:
[:]STATus:QUEStionable:CONDition?

Function:
This command is used to query the status of the Questionable Condition Register (QCR).

Examples:
:STAT:QUES:COND?
Return the status of the Questionable Condition Register (QCR).

Related commands:
[:]STATus:OPERation:CONDition?
[:]STATus:OPERation:ENABle
[:]STATus:OPERation[:EVENt]?
[:]STATus:PRESet
[:]STATus:QUEStionable:ENABle
[:]STATus:QUEStionable[:EVENt]?

3.11.6 [:]STATus:QUEStionable:ENABle

Syntax:

[:]STATus:QUEStionable:ENABle <enable value>

[:]STATus:QUEStionable:ENABle?

Function:

Set the status of the Questionable Enable Register (QENR).

The query returns the status of the Questionable Enable Register (QENR).

Examples:

:STAT:QUES:ENAB?

Return the status of the Questionable Enable Register (QENR).

Related commands:

[:]STATus:OPERation:CONDition?

[:]STATus:OPERation:ENABle

[:]STATus:OPERation[:EVENt]?

[:]STATus:PRESet

[:]STATus:QUEStionable:CONDition?

[:]STATus:QUEStionable[:EVENt]?

3.11.7 [:]STATus:QUEStionable[:EVENt]?

Syntax:
[:]STATus:QUEStionable[:EVENt]?

Function:
This command is used to query the status of the Questionable Event Register (QEVR).

Examples:
:STAT:QUES?
Return the status of the Questionable Event Register (QEVR).

Related commands:
[:]STATus:OPERation:CONDition?
[:]STATus:OPERation:ENABle
[:]STATus:OPERation[:EVENt]?
[:]STATus:PRESet
[:]STATus:QUEStionable:CONDition?
[:]STATus:QUEStionable:ENABle

3.12 SYSTem Commands

The SYSTem Commands are used for controlling beeper, interface setup, error query, and functions related to remote control.

The SYSTem Commands include the following:

[:]SYSTem:BEEPer:STATe
[:]SYSTem:BEEPer[:IMMediate]
[:]SYSTem:COMMunicate:SERial[:RECeive]:BAUD
[:]SYSTem:ERRor:COUNt?
[:]SYSTem:ERRor[:NEXT]?
[:]SYSTem:LOCal
[:]SYSTem:REMote
[:]SYSTem:RWLock
[:]SYSTem:VERSion?

3.12.1 [:]SYSTem:BEEPer:STATe

Syntax:
[:]SYSTem:BEEPer:STATe {ON | OFF}
[:]SYSTem:BEEPer:STATe?

Function:
Set the present beeper state.
The query returns the present beeper status.

Examples:
:SYST:BEEP:STAT ON
Turn on the beeper.

:SYST:BEEP:STAT?
Return “ON” (beeper is on) or “OFF” (beeper is off).

Related commands:
[:]SYSTem:BEEPer[:IMMediate]
[:]SYSTem:COMMunicate:SERial[:RECeive]:BAUD
[:]SYSTem:ERRor:COUNt?
[:]SYSTem:ERRor[:NEXT]?
[:]SYSTem:LOCal
[:]SYSTem:REMote
[:]SYSTem:RWLock
[:]SYSTem:VERSion?

3.12.2 [:]SYSTem:BEEPer[:IMMediate]

Syntax:
[:]SYSTem:BEEPer[:IMMediate]

Function:
To issue a single beep immediately.

Examples:
:SYST:BEEP
The beeper beeps for a single time.

Related commands:
[:]SYSTem:BEEPer:STATe
[:]SYSTem:COMMunicate:SERial[:RECeive]:BAUD
[:]SYSTem:ERRor:COUNt?
[:]SYSTem:ERRor[:NEXT]?
[:]SYSTem:LOCal
[:]SYSTem:REMote
[:]SYSTem:RWLock
[:]SYSTem:VERSion?

3.12.3 [:]SYSTem:COMMunicate:SERial[:RECeive]:BAUD

Syntax:

[:]SYSTem:COMMunicate:SERial[:RECeive]:BAUD

Function:

Set baud rate of the electronic load's interface.

Remarks:

A baud rate codes is corresponding to a baud rate as shown in below table:

Code	0	1	2	3	4	5	6	7	8	9
Baud rate	1200	2400	4800	9600	14400	19200	28800	38400	57600	115200

Examples:

:SYST:COMM:SER:BAUD 3

Set baud rate as 9600.

Related commands:

[:]SYSTem:BEEPer:STATe

[:]SYSTem:BEEPer[:IMMediate]

[:]SYSTem:ERRor:COUNt?

[:]SYSTem:ERRor[:NEXT]?

[:]SYSTem:LOCal

[:]SYSTem:REMote

[:]SYSTem:RWLock

[:]SYSTem:VERSion?

3.12.4 [:]SYSTem:ERRor:COUNt?

Syntax:
[:]SYSTem:ERRor:COUNt?

Function:
The query returns the number of error records to be read from the electronic load.

Remarks:
The maximum recorded error records is 20 sets.

Examples:
:SYST:ERR:COUN?
Return 3, means that there are 3 error records to read from the electronic load.

Related commands:
[:]SYSTem:BEEPer:STATe
[:]SYSTem:BEEPer[:IMMediate]
[:]SYSTem:COMMunicate:SERial[:RECeive]:BAUD
[:]SYSTem:ERRor[:NEXT]?
[:]SYSTem:LOCal
[:]SYSTem:REMote
[:]SYSTem:RWLock
[:]SYSTem:VERSion?

3.12.5 [:]SYSTem:ERRor[:NEXT]?

Syntax:
[:]SYSTem:ERRor[:NEXT]?

Function:
To read the next error message from the electronic load.

Remarks:
The possible returned messages are listed as below:
0,"No error"
-100,"Command error"
-108,"Parameter not allowed"
-109,"Missing parameter"
-112,"Program mnemonic too long"
-123,"Exponent too large"
-151, "Invalid string data"
-200,"Execution error"
-220,"Parameter error"
-221,"Settings conflict"
-222,"Data out of range"
-224,"Illegal parameter value"
-350,"Queue overflow"
-702,"Cal secured"
-703,"Invalid secure code"
-704,"Secured code too long"

Examples:
:SYST:ERR?
Return 0, means there is no error.

Related command:
[:]SYSTem:BEEPer:STATe
[:]SYSTem:BEEPer[:IMMediate]
[:]SYSTem:COMMunicate:SERial[:RECeive]:BAUD
[:]SYSTem:ERRor:COUNt?
[:]SYSTem:LOCal
[:]SYSTem:REMote
[:]SYSTem:RWLock
[:]SYSTem:VERSion?

3.12.6 [:]SYSTem:LOCal

Syntax:
[:]SYSTem:LOCal

Function:
Set the electronic load to the local mode.

Examples:
:SYST:LOC
Set the electronic load to the local mode. All control knobs on the front panel are enabled in local mode.

Related commands:
[:]SYSTem:BEEPer:STATe
[:]SYSTem:BEEPer[:IMMediate]
[:]SYSTem:COMMunicate:SERial[:RECeive]:BAUD
[:]SYSTem:ERRor:COUNt?
[:]SYSTem:ERRor[:NEXT]?
[:]SYSTem:REMote
[:]SYSTem:RWLock
[:]SYSTem:VERSion?

3.12.7 [:]SYSTem:REMote

Syntax:
[:]SYSTem:REMote

Function:
Set the electronic load to remote control mode. In remote control mode, all knobs on the front panel are disabled, except “Local” key. During remote control, press “Local” key to return the electronic load to local mode.

Examples:
:SYST:REM
Set the electronic load to remote control mode.

Related commands:
[:]SYSTem:BEEPer:STATe
[:]SYSTem:BEEPer[:IMMediate]
[:]SYSTem:COMMunicate:SERial[:RECeive]:BAUD
[:]SYSTem:ERRor:COUNt?
[:]SYSTem:ERRor[:NEXT]?
[:]SYSTem:LOCal
[:]SYSTem:RWLock
[:]SYSTem:VERSion?

3.12.8 [:]SYSTem:RWLock

Syntax:
[:]SYSTem:RWLock

Function:
Set the electronic load to remote control mode. In remote control mode, all knobs on the front panel are disabled.

Examples:
:SYST:RWL
Set the electronic load to remote control mode.

Related commands:
[:]SYSTem:BEEPer:STATe
[:]SYSTem:BEEPer[:IMMediate]
[:]SYSTem:COMMunicate:SERial[:RECeive]:BAUD
[:]SYSTem:ERRor:COUNt?
[:]SYSTem:ERRor[:NEXT]?
[:]SYSTem:LOCal
[:]SYSTem:REMote
[:]SYSTem:VERSion?

3.12.9 [:]SYSTem:VERSion?

Syntax:
[:]SYSTem:VERSion?

Function:
Return the SCPI version of the electronic load.

Examples:
:SYST:VERS?
Return 1999.0

Related commands:
[:]SYSTem:BEEPer:STATe
[:]SYSTem:BEEPer[:IMMediate]
[:]SYSTem:COMMunicate:SERial[:RECeive]:BAUD
[:]SYSTem:ERRor:COUNt?
[:]SYSTem:ERRor[:NEXT]?
[:]SYSTem:LOCal
[:]SYSTem:REMote
[:]SYSTem:RWLock

3.13 TRIGger Commands

The TRIGger commands are used to set the remote trigger control of the electronic load. The The TRIGger commands include the following:

[:]TRIGger:FUNCtion

[:]TRIGger[:IMMediate]

[:]TRIGger:SOURce

3.13.1 [:]TRIGger:FUNCtion

Syntax:
[:]TRIGger:FUNCtion {LIST|TRAN}
[:]TRIGger:FUNCtion?

Function:
Set trigger function.
The query returns the trigger function.

Examples:
:TRIG:FUNC LIST
Set the trigger function as LIST.

:TRIG:FUNC?
Return the present trigger function.

Related commands:
[:]TRIGger[:IMMediate]
[:]TRIGger:SOURce

3.13.2 [:]TRIGger[:IMMediate]

Syntax:
[:]TRIGger[:IMMediate]

Function:
This command will generate a trigger signal when the trigger source is command style.

Examples:
:TRIG
One trigger occurs.

Related commands:
[:]TRIGger:FUNCtion
[:]TRIGger:SOURce

3.13.3 [:]TRIGger:SOURce

Syntax:
[:]TRIGger:SOURce{HOLD|EXTernal|BUS|PULSe}
[:]TRIGger:SOURce?

Function:
Set the triggering modes of the electronic load.
HOLD: Use the command TRIGger:IMMediate as the trigger source. At this time, all other triggering methods including *TRG become invalid.
EXTernal: external trigger;
BUS: remote command trigger;
PULSe: TTL level trigger.

The query returns the triggering modes.

Examples:
:TRIG:SOUR EXTernal
Set the triggering mode to external trigger.

:TRIG:SOUR?
Return the present triggering mode.

Related commands:
[:]TRIGger:FUNCtion
[:]TRIGger[:IMMediate]