DC Electronic Load

PEL-3000A/AH

PROGRAMMING MANUAL

VERSION: 1.11

ISO-9001 CERTIFIED MANUFACTURER

GW INSTEK

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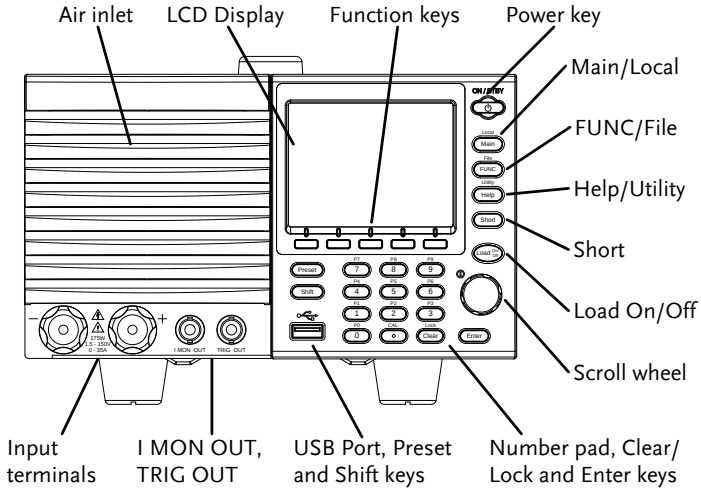
INTERFACE OVERVIEW

This chapter describes basic configuration of IEEE488.2 based remote control.

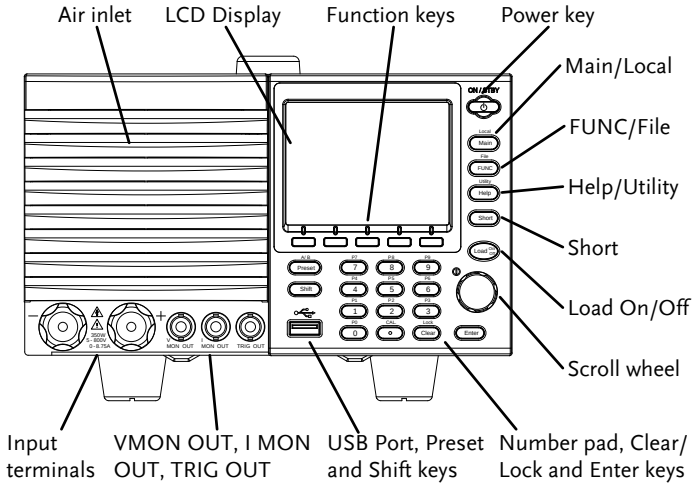
Appearance

Front Panel

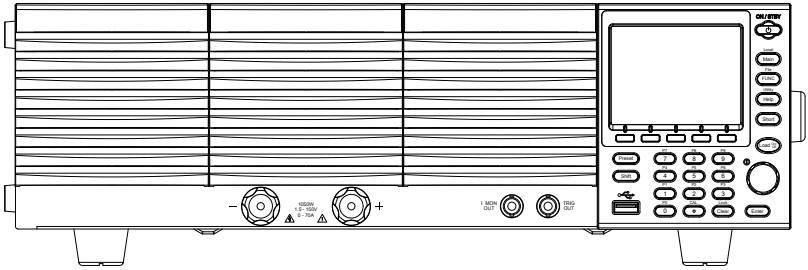
PEL-3021A/ PEL-3041A



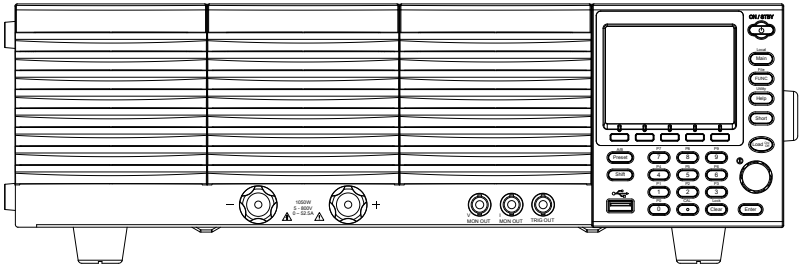
PEL-3021AH/ PEL-3041AH



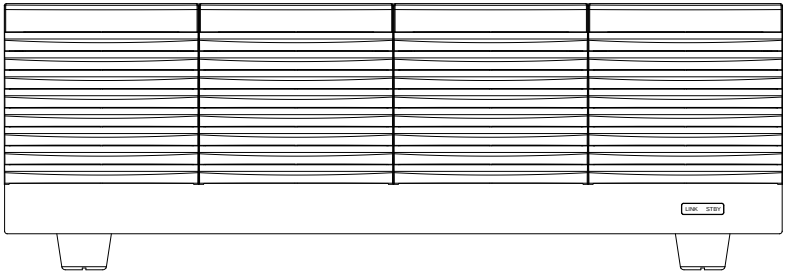
PEL-3111A



PEL-3111AH

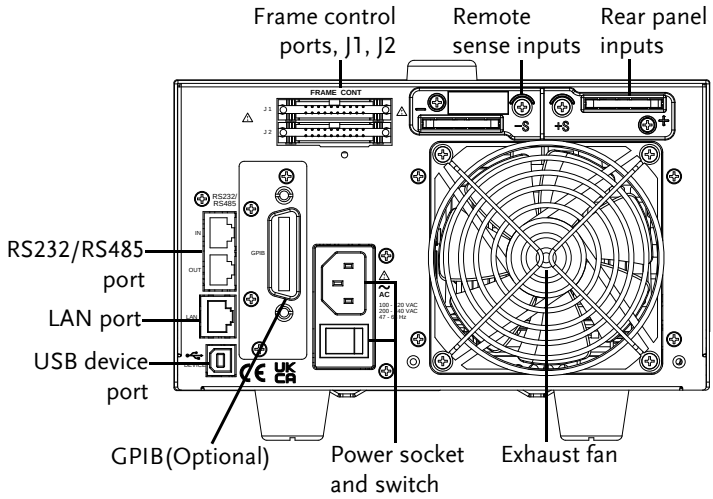


PEL-3211A/AH Booster Pack

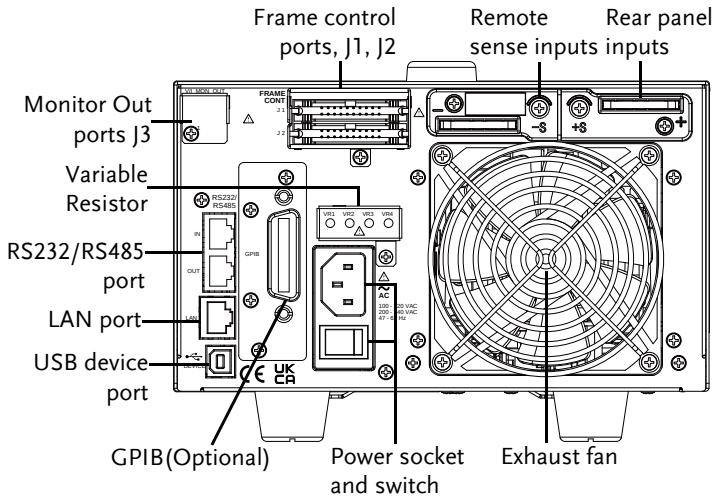


Rear Panel

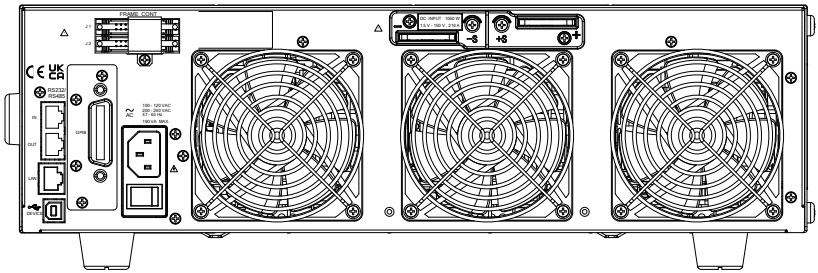
PEL-3021A/ PEL-3041A



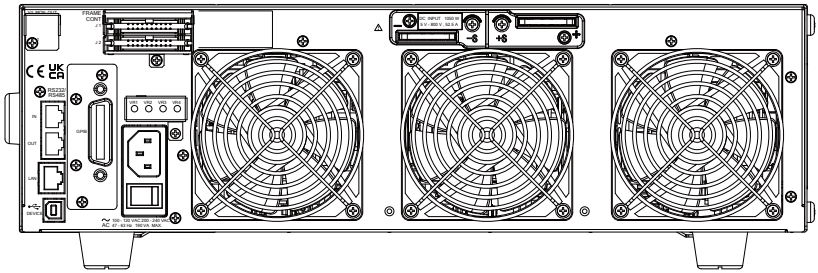
PEL-3021AH/ PEL-3041AH



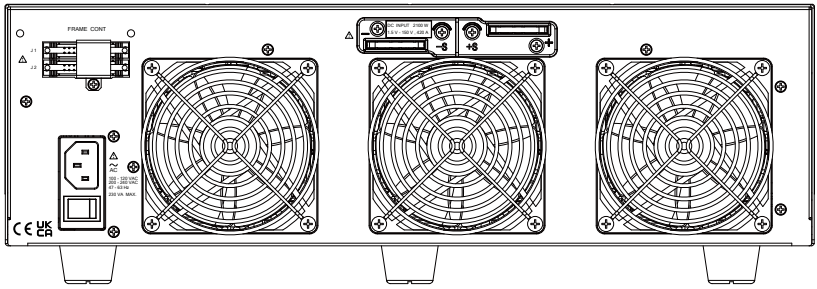
PEL-3111A



PEL-3111AH



PEL-3211A Booster Pack



Interface Configuration

Configure to USB Remote Interface

USB configuration	PC side connector	Type A, host
	PEL-3000A/AH side connector	Rear panel Type B, slave
	Speed	2.0 (full speed)
	USB Class	USB CDC ACM

⚠ Note	Before USB can be used for remote control, it is necessary to install the PEL-3000A/AH USB device driver, located on the accompanying User Manual CD.

Operation

1. Connect the USB cable to the rear panel USB B port.
2. Press Shift + Utility Help > *Interface[F3]* and set the *Interface* setting to *USB*.

Configure GPIB Interface

To use GPIB, the optional GPIB port must be installed.

Operation

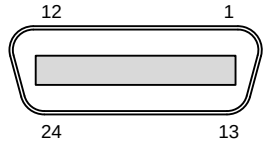
1. Ensure the PEL-3000A/AH is off before proceeding.
2. Connect a GPIB cable from a GPIB controller to the GPIB port on the PEL-3000A/AH.
3. Turn the PEL-3000A/AH on.
4. Press Shift + Utility Help > *Interface[F3]* and set the *Interface* setting to *GPIB*.
5. Set the GPIB address.

GPIB address	0-30

GPIB constraints

- *Maximum 15 devices altogether, 20m cable length, 2m between each device*
- *Unique address assigned to each device*
- *At least 2/3 of the devices turned On*
- *No loop or parallel connection*

Pin Assignment



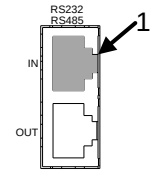
Pin	Signal	Pin	Signal
1-4	Data I/O 1-4	13-16	Data I/O 5-8
5	EOI	17	REN
6	DAV	18	Ground (DAV)
7	NRFD	19	Ground (NRFD)
8	NDAC	20	Ground (NDAC)
9	IFC	21	Ground (IFC)
10	SRQ	22	Ground (SRQ)
11	ATN	23	Ground (ATN)
12	SHIELD Ground	24	Single GND

Configure RS232 or RS485

RS232C Configuration	Connector	RJ-45
	Baud Rate	2400/ 4800/ 9600/ 19200/ 38400/ 57600/ 115200
	Data Bits	7bits/ 8bits
	Stop Bits	1bit/ 2bits
	Parity	None/ Odd/ Even

Operation

1. Connect an RS232 or RS485 series cable from the PC to the Remote IN port on the real panel.
2. Connect the other end of the cable to the PC.



3. Press Shift + Utility Help > *Interface[F3]* and set the *Interface* setting to UART> *Mode* and set the Mode to *RS232* or *RS485*.
4. Set the *Baud Rate*, *Stop Bit* and *Parity* settings.

Set the UART settings

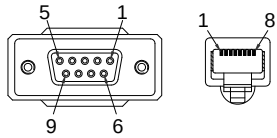
Overview

The PEL-3000A/AH series uses the IN & OUT ports for UART communication coupled with RS232 (GW Instek Part number: GTL-259) or RS485 adapters (GW Instek part number: GTL-260).

The pin outs for the adapters are shown below.

RS232 cable with DB9 & RJ-45 shielded connectors from GTL-259 connection kit

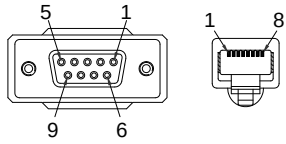
DB-9 Connector		Remote IN Port		Remarks
Pin No.	Name	Pin No.	Name	
Housing	Shield	Housing	Shield	
2	RX	7	TX	Twisted pair
3	TX	8	RX	
5	SG	1	SG	



Connection diagram

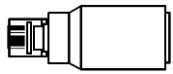
RS485 cable with DB9 & RJ-45 shielded connectors from GTL-260 connection kit

DB-9 Connector		Remote IN Port		Remarks
Pin No.	Name	Pin No.	Name	
Housing	Shield	Housing	Shield	
9	TXD -	6	RXD -	Twisted pair
8	TXD +	3	RXD +	
1	SG	1	SG	
5	RXD -	5	TXD -	Twisted pair
4	RXD +	4	TXD +	



Connection diagram

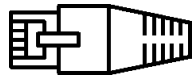
Diagram of Intermediate connector



Intermediate connector from GTL-259 or GTL-260 connection kit.

Intermediate connector					
8 Pin (Male)			8 Pin (Female)		
Pin No.	Name		Pin No.	Name	Remarks
Housing	Shield	↔	Case	Shield	
1	SG	↔	1	SG	
6	TXD -	↔	6	TXD -	Internal paralleled by 120 ohm
3	TXD +	↔	3	TXD +	
5	RXD -	↔	5	RXD -	Internal paralleled by 120 ohm
4	RXD +	↔	4	RXD +	

Diagram of End terminal connector



End terminal connector from GTL-259 or GTL-260 connection kit.

End terminal connector	
8 Pin Connector	
Pin No.	Remarks
3	Internal shorted
7	
4	Internal shorted
8	

Multiple Unit Connection

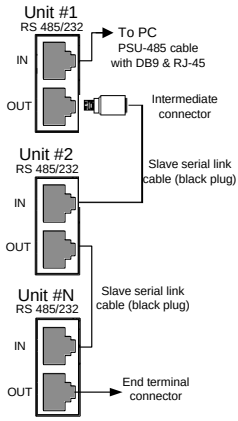
The PEL-3000A/AH can have up to 16 units daisy-chained together using the 8 pin connectors (IN OUT ports) on the rear panel. The first unit in the chain is remotely connected to a PC using RS485. Each subsequent unit is daisy-chained to the next using a RS485 local bus. The OUT port of the first unit must be connected to intermediate connector and the OUT port of the last unit must be connected to end terminal connector.

Each unit is assigned a unique address and can then be individually controlled from the host PC.

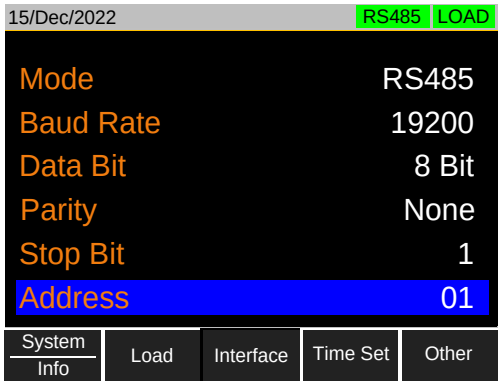
Operation

1. Connect the first unit's IN port to a PC using RS485 serial cable. Use the serial cables supplied in the GTL-260 connection kit.
2. Plug in intermediate connector to the OUT port on the first unit then using the slave serial link cable (black plug) to connect intermediate connector to the IN port of the second unit.

   Terminate the OUT port of the last unit with the end terminal connector included in the GTL-260 connection kit.



3. Power up all units.
4. Press Shift + Utility Help > *Interface[F3]* and set the *Interface* setting to UART> *Mode* and set the Mode to *RS485*.
5. Set the addresses and mode of all units using UART menu. It must be a unique address identifier and mode select is RS485.



6. Multiple units can be operated using SCPI commands now. See the programming manual or see the function check below for usage details.

RS232 or RS485/USB Remote Control Function Check

Functionality check	Invoke a terminal application such as Realterm. For RS-232C, set the COM port, baud rate, stop bit, data bit and parity accordingly. The USB connection emulates a COM port on the PC. To check the COM settings in Windows, see the Device Manager. For example, for Win 7 go to the Control panel → Hardware and Sound → Device Manager.
⚠ Note	If you are not familiar with using a terminal application to send/receive remote commands from the serial port or via a USB connection, please page 22 (Using Realterm to Establish a Remote Connection for more information.
	Run this query command via the terminal after the instrument has been configured for RS-232C/USB remote control. *idn? This should return the Manufacturer, Model number, Serial number, and Firmware version in the following format. • *GW-INSTEK,PEL-3000A/AH, XXXXXXXXXXXX, V.X.X.X.X* Manufacturer: GW-INSTEK Model number : PEL-3000A/AH Serial number : XXXXXXXXXXX

	Firmware version : V.X.X.X
⚠ Note	For further details, please see the programming manual, available on the GW Instek web site @ www.gwinstek.com.

Using Realterm to Establish a Remote Connection

Background

Realterm is a terminal program that can be used to communicate with a device attached to the serial port of a PC or via an emulated serial port via USB.

The following instructions apply to version 2.0.0.70. Even though Realterm is used as an example to establish a remote connection, any terminal program can be used that has similar functionality.

Note

Realterm can be downloaded on Sourceforge.net free of charge.

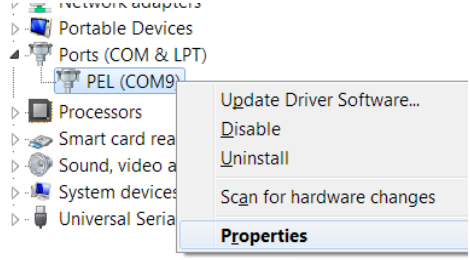
For more information please see http://realterm.sourceforge.net/

Operation

1. Download Realterm and install according to the instructions on the Realterm website.
2. Connect the PEL-3000A/AH via USB (page 9) or via RS232.
3. If using RS232, make note of the configured baud rate, stop bits and parity.
4. Go to the Windows device manager and find the COM port number for the connection.
   For example, go to the Start menu > Control Panel > Device Manager

   Double click the *Ports* icon to reveal the connected serial port devices and the COM port for the each connected device.

   If using USB, the baud rate, stop bit and parity settings can be viewed by right-clicking connected device and selecting the *Properties* option.



5. Start Realterm on the PC as an administrator. Click:
   Start menu>All Programs>RealTerm>realterm

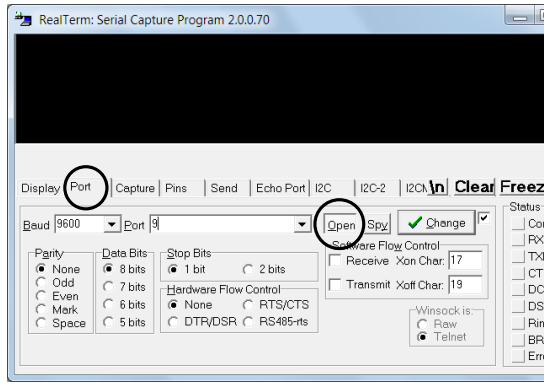
   Tip: to run as an administrator, you can right click the Realterm icon in the Windows Start menu and select the *Run as Administrator* option.

6. After Realterm has started, click on the *Port* tab.

   Enter the *Baud*, *Parity*, *Data bits*, *Stop bits* and *Port* number configuration for the connection.

   The *Hardware Flow Control*, *Software Flow Control* options can be left at the default settings.

7. Press *Open* to connect to the PEL-3000A/AH.

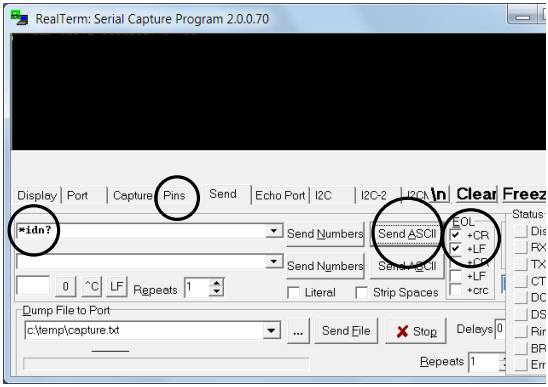


8. Click on the *Send* tab.

   In the *EOL* configuration, check on the *+CR* and *+LF* check boxes.

   Enter the query:
   **idn?*

   Click on *Send ASCII*.



9. The terminal display will return the following:

   GW, PEL-3XXXA/AH,EXXXXXXX,VX.XX.XXX

   (manufacturer, model, serial number, version)

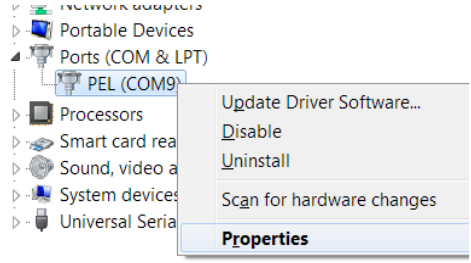
10. If Realterm fails to connect to the PEL-3000A/AH, please check all the cables and settings and try again.

RS232C/USB Remote Control Function Check

Functionality check	Invoke a terminal application such as Realterm. For RS-232C, set the COM port, baud rate, stop bit, data bit and parity accordingly. The USB connection emulates a COM port on the PC. To check the COM settings in Windows, see the Device Manager. For example, for Win 7 go to the Control panel → Hardware and Sound → Device Manager.
⚠ Note	If you are not familiar with using a terminal application to send/receive remote commands from the serial port or via a USB connection, please page 22 for more information.
	Run this query command via the terminal after the instrument has been configured for RS-232C/USB remote control *idn? This should return the Manufacturer, Model number, Serial number, and Firmware version in the following format. • *GW-INSTEK,PEL-3000A/AH, XXXXXXXXXXXX, V.X.X.X.X* Manufacturer: GW-INSTEK Model number : PEL-3000A/AH Serial number : XXXXXXXXXXXX Firmware version : V.X.X.X
⚠ Note	For further details, please see the programming manual, available on the GW Instek web site @ www.gwinstek.com.

Using Realterm to Establish a Remote Connection

Background	Realterm is a terminal program that can be used to communicate with a device attached to the serial port of a PC or via an emulated serial port via USB. The following instructions apply to version 2.0.0.70. Even though Realterm is used as an example to establish a remote connection, any terminal program can be used that has similar functionality.
Note	Realterm can be downloaded on Sourceforge.net free of charge. For more information please see http://realterm.sourceforge.net/
Operation	1. Download Realterm and install according to the instructions on the Realterm website. 2. Connect the PEL-3000A/AH via USB (page 9) or via RS232. 3. If using RS232, make note of the configured baud rate, stop bits and parity. 4. Go to the Windows device manager and find the COM port number for the connection. For example, go to the Start menu > Control Panel > Device Manager Double click the *Ports* icon to reveal the connected serial port devices and the COM port for the each connected device. If using USB, the baud rate, stop bit and parity settings can be viewed by right-clicking connected device and selecting the *Properties* option.



5. Start Realterm on the PC as an administrator. Click:
   Start menu>All Programs>RealTerm>realterm

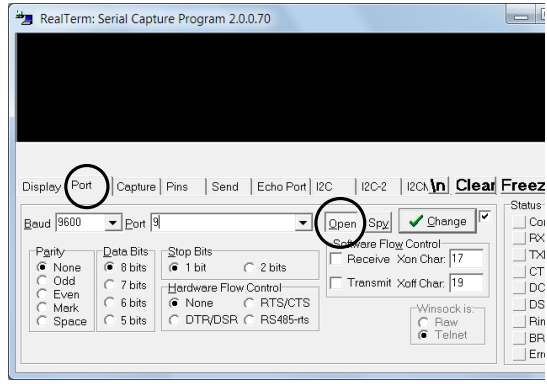
   Tip: to run as an administrator, you can right click the Realterm icon in the Windows Start menu and select the *Run as Administrator* option.

6. After Realterm has started, click on the *Port* tab.

   Enter the *Baud*, *Parity*, *Data bits*, *Stop bits* and *Port* number configuration for the connection.

   The *Hardware Flow Control*, *Software Flow Control* options can be left at the default settings.

7. Press *Open* to connect to the PEL-3000A/AH.

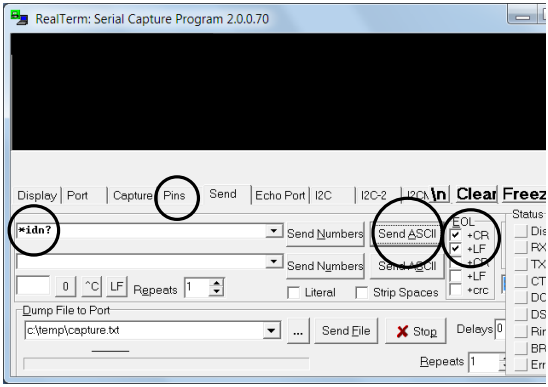


8. Click on the *Send* tab.

   In the *EOL* configuration, check on the *+CR* and *+LF* check boxes.

   Enter the query:
   **idn?*

   Click on *Send ASCII*.



9. The terminal display will return the following:

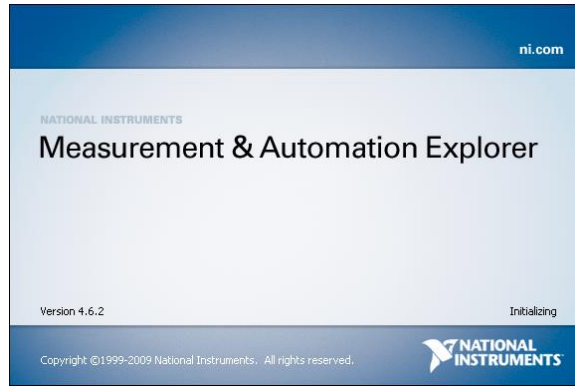
   GW, PEL-3XXXA/AH,EXXXXXXX,VX.XX.XXX

   (manufacturer, model, serial number, version)

10. If Realterm fails to connect to the PEL-3000A/AH, please check all the cables and settings and try again.

GPIB Function Check

Functionality check	Please use the National Instruments Measurement & Automation Controller software to confirm GPIB functionality. See the National Instrument website, http://www.ni.com for details.
Note	For further details, please see the programming manual, available on the GW Instek web site @ www.gwinstek.com.
Operation	1. Start the NI Measurement and Automation Explorer (MAX) program. Using Windows, press: Start>All Programs>National Instruments>Measurement & Automation



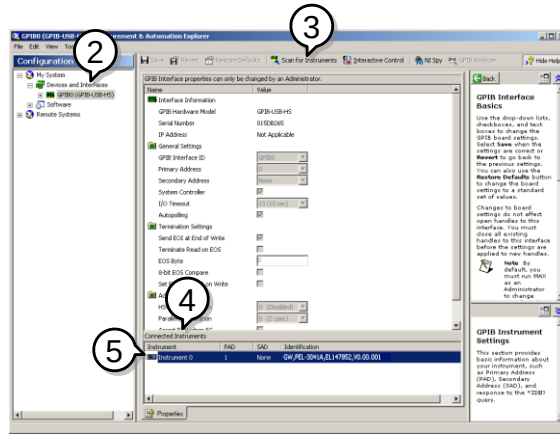
2. From the Configuration panel access;

   My System>Devices and Interfaces>GPIB0

3. Press the Scan for Instruments button.

4. In the *Connected Instruments* panel the PEL-3000A/AH should be detected as *Instrument 0* with the address the same as that configured on the PEL-3000A/AH.

5. Double click the *Instrument 0* icon.



6. Click on Communicate with Instrument.

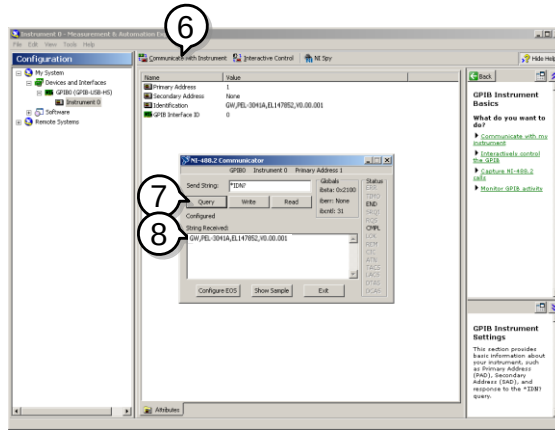
7. In the *NI-488.2 Communicator* window, ensure **IDN?* is written in the *Send String*: text box.

   Click on the *Query* button to send the **IDN?* query to the instrument.

8. The *String Received* text box will display the query return:

   GW, PEL-3XXXA/AH,EXXXXXXX,VX.XX.XXX

   (manufacturer, model, serial number, version)



9. The function check is complete.

Configuring Ethernet Connection

Background	When using Ethernet a number of parameters need to be set. These include DHCP On/Off, IP Address, Subnet Mask and Gateway. When setting Ethernet parameters, ensure they match that of the network.				
Parameters	DHCP	On/Off			
	IP Address	0~255	0~255	0~255	0~255
	Subnet Mask	None/Odd/Even			
	Gateway	0~255	0~255	0~255	0~255
Configuration	This configuration example will configure the PEL-3000A/AH socket server. The following configuration settings will manually assign the PEL-3000A/AH an IP address and enable the socket server. The socket server port number is fixed at 2268.				
Steps	1. Connect an Ethernet cable from the network to the rear panel Ethernet port. You will see the led indicator next to Ethernet port lighting.				

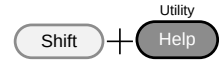
Rear panel of PEL-3000A

Rear panel of PEL-3000AH

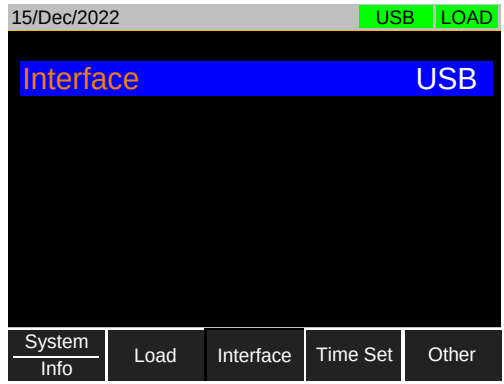
2. Power on the PEL-3000A/AH.

Panel operation

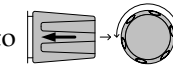
3. Press the Shift key then the Help key to access the Utility menu.



4. Press F3 (Interface Menu).

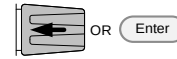


5. If the Interface mode is not Ethernet, use the Selector knob to edit Interface.

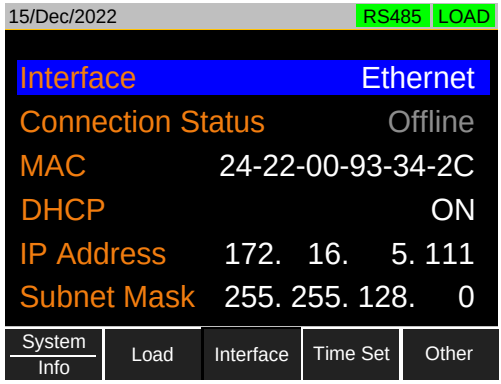


6. Choose Ethernet.

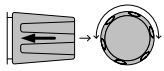
7. Press the Selector knob to confirm.



8. The Ethernet Menu appears.



Use the Selector knob to edit DHCP, IP Address, Subnet Mask and Gateway setting.



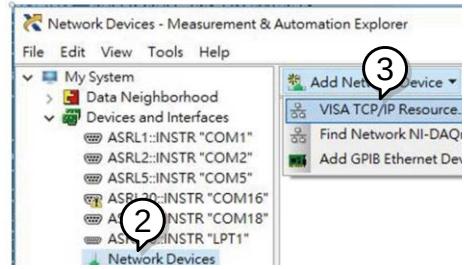
Note

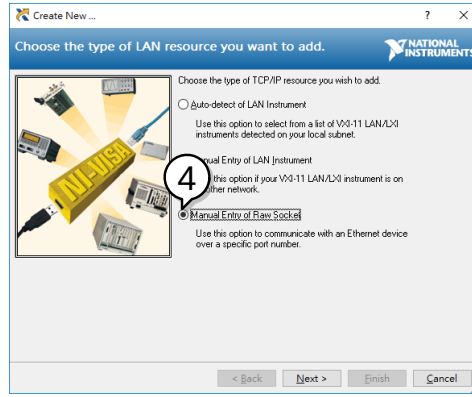
If the DHCP set to ON, the IP Address, Subnet Mask and Gateway settings will be configured by the DHCP Server of the network automatically. These settings will show up after the PEL-3000A/AH get the information by DHCP.

Note

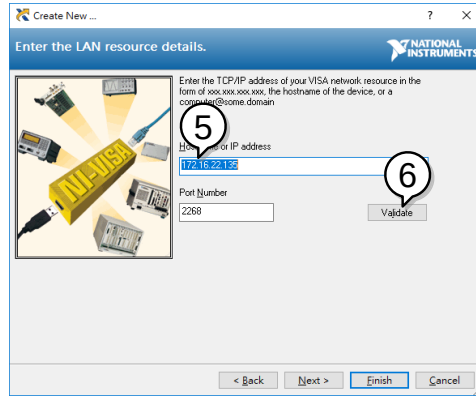
If the DHCP set to OFF, make sure the IP address, Subnet Mask, and Gateway settings match that of the network.

Socket Server Function Check

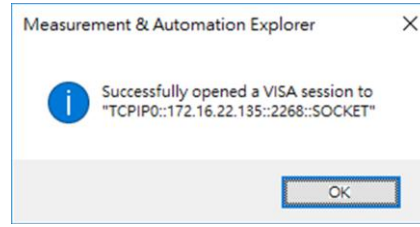
Background	To test the socket server functionality, National Instruments Measurement and Automation Explorer can be used. This program is available on the NI website, www.ni.com., via a search for the VISA Run-time Engine page, or "downloads" at the following URL, http://www.ni.com/visa/
Requirements	Operating System: Windows XP, 7, 8, 10
Functionality check	1. Start the NI Measurement and Automation Explorer (MAX) program. Using Windows, press: Start>All Programs>National Instruments>Measurement & Automation 2. From the Configuration panel access; My System>Devices and Interfaces>Network Devices 3. Press Add New Network Device>Visa TCP/IP Resource.  4. Select *Manual Entry of Raw Socket* from the popup window.



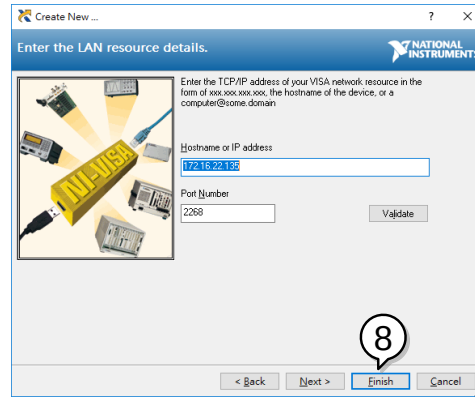
5. Enter the IP address and the port number of the PEL-3000A/AH. The port number is fixed at 2268.
6. Click the Validate button.



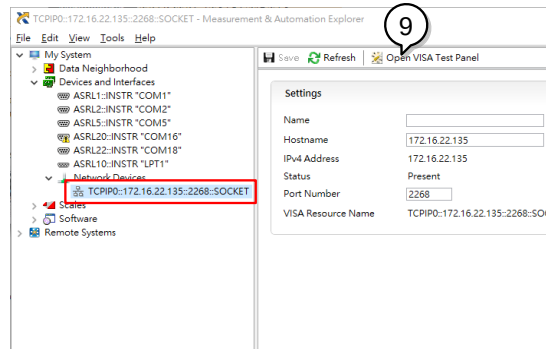
7. A popup will appear if a connection is successfully established. If not,check the Load device IP address configuare. Then click OK botton and Next botton.



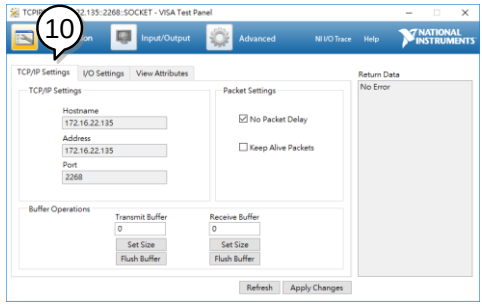
8. Click the Finish button.



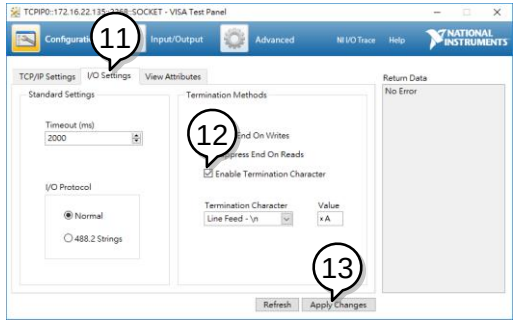
9. You can see the network device is setup successful. Click *Open VISA Test Panel.*



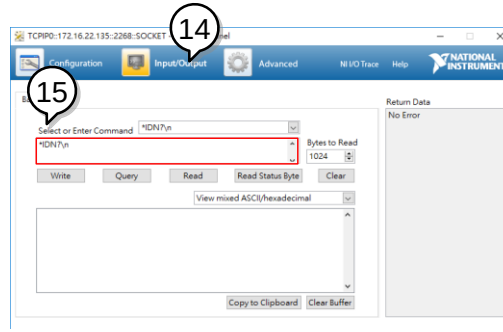
10. In the TCP/IP Settings page. You can see the information of TCP/IP.



11. Click on I/O Settings.
12. Make sure the *Enable Termination Character* check box is checked, and the terminal character is \n (Value: xA).
13. Click *Apply Changes*.

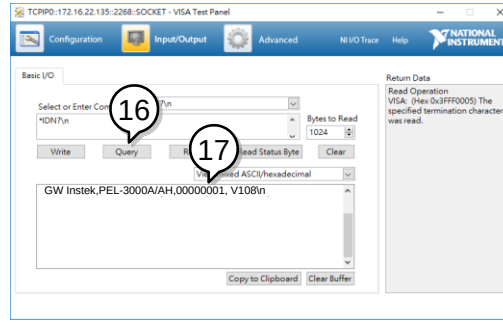


14. Click the *Input/Output* icon.
15. Enter *IDN?\n in the *Select or Enter Command* dialog box if it is not already.

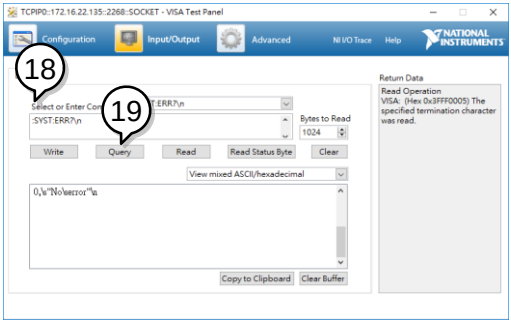


16. Click the *Query* button.
17. The *IDN?\n query will return the Manufacturer, model name, serial number and firmware version in the dialog box.

GW Instek,PEL-3000A/AH,00000001, V108\n



18. You can key in the command ":SYST:ERR\n"
19. Click the *Query* button. You will get the return messagn of error.


TCPIP0::172.16.22.135::2268::SOCKET - VISA Test Panel
Configuration
Input/Output
Advanced
NI I/O Trace
Help
NATIONAL INSTRUMENTS
18
19
Select or Enter Com
:SYST:ERR?\n
:SYST:ERR?\n
Bytes to Read
1024
Write
Query
Read
Read Status Byte
Clear
View mixed ASCII/hexadecimal
0,\e"No\serror"\n
Copy to Clipboard
Clear Buffer
Return Data
Read Operation
VISA: (Hex 0x3FFF0005) The specified termination character was read.

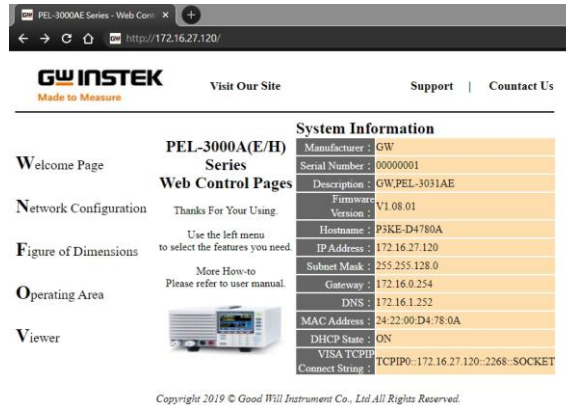
Web Server Function Check

Functionality check

The web server allows you to check the function settings of the PEL-3000A/AH.

Enter the IP address of the PEL-3000A/AH in a web browser.

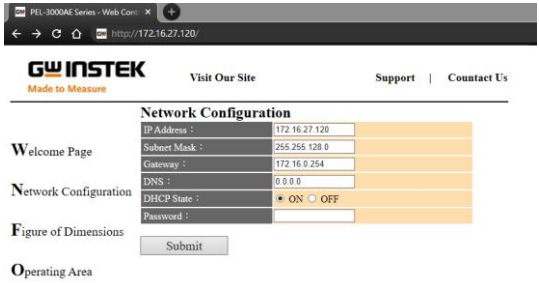
The web browser interface appears.



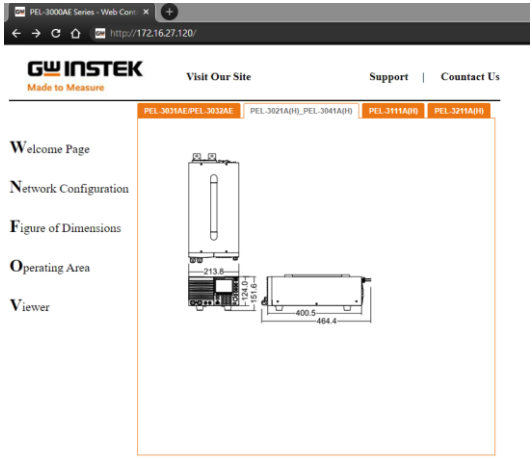
The web browser interface allows you to access the following:

- Network configuration settings
- PEL-3000A/AH dimensions
- Operating area diagram

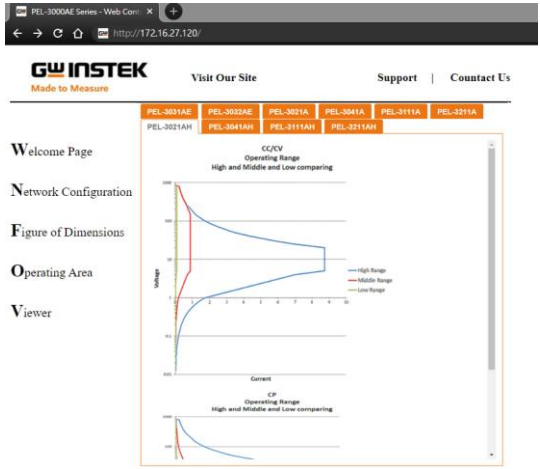
You can click the Network Configuration to see the configuration information.



You can click the Figure of dimension to see the device dimensions information.



You can click the Operating area to see the Load operating area.


PEL-3000AE Series - Web Conf
http://172.16.27.120/
GW INSTEK
Made to Measure
Visit Our Site
Support | Countact Us
PEL-3031AE
PEL-3032AE
PEL-3021A
PEL-3041A
PEL-3111A
PEL-3211A
PEL-3021AH
PEL-3041AH
PEL-3111AH
PEL-3211AH
Welcome Page
Network Configuration
Figure of Dimensions
Operating Area
Viewer
CC/CV
Operating Range
High and Middle and Low comparing
Voltage
Current
High Range
Middle Range
Low Range
CP
Operating Range
High and Middle and Low comparing

COMMAND OVERVIEW

The Command overview chapter lists all PEL-3000A/AH commands in functional order as well as alphabetical order. The command syntax section shows you the basic syntax rules you have to apply when using commands.

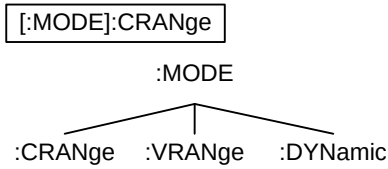
Command Syntax

Compatible Standard	IEEE488.2	Partial compatibility
	SCPI, 1999	Partial compatibility

Command Structure

SCPI (Standard Commands for Programmable Instruments) commands follow a tree-like structure, organized into nodes. Each level of the command tree is a node. Each keyword in a SCPI command represents each node in the command tree. Each keyword (node) of a SCPI command is separated by a colon (:).

For example, the diagram below shows an SCPI sub-structure and a command example.



Command types

There are a number of different instrument commands and queries. A command sends instructions or data to the unit and a query receives data or status information from the unit.

Command types

Simple	A single command with/without a parameter
Example	:CONFigure:SHORt HOLD

Query	A query is a simple or compound command followed by a question mark (?). A parameter (data) is returned.
Example	:CONFigure:SHORt?
Compound	Two or more commands on the same command line. Compound commands are separated with either a semi-colon (;) or a semi-colon and a colon (;:). A semi-colon is used to join two related commands, with the caveat that the last command must begin at the last node of the first command. A semi-colon and colon are used to combine two commands from different nodes.
Example	CONFigure:VON MAX;:CONFigure:VDELay MIN

Command Forms

Commands and queries have two different forms, long and short. The command syntax is written with the short form of the command in capitals and the remainder (long form) in lower case.

The commands can be written in capitals or lower-case, just so long as the short or long forms are complete. An incomplete command will not be recognized.

Below are examples of correctly written commands.

Long form	:CURRent:LEVel? :CURRENT:LEVEL? :current:level?
Short form	:CURR:LEV? :curr:lev?

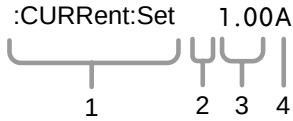
Square Brackets

Commands that contain square brackets indicate that the contents are optional. The function of the command is the same with or without the square bracketed items, as shown below

For example for the query:
"[:CONFigure]:GNG [:PASS]?"

Both ":CONFigure:GNG:PASS?" and ":GNG?" are both valid forms.

Command Format



1. Command header
2. Space
3. Parameter 1
4. Unit or suffix.

Common Unit Parameters

Type	Description	Example
<Boolean>	boolean logic	0, 1
<NR1>	integers	0, 1, 2, 3
<NR2>	decimal numbers	0.1, 3.14, 8.5
<NR3>	floating point	4.5e-1, 8.25e+1
<NRf>	any of NR1, 2, 3	1, 1.5, 4.5e-1

[MIN] (Optional parameter)	For commands, this will set the setting to the lowest value. This parameter can be used in place of any numerical parameter where indicated. For queries, it will return the lowest possible value allowed for the particular setting.	
[MAX] (Optional parameter)	For commands, this will set the setting to the highest value. This parameter can be used in place of any numerical parameter where indicated. For queries, it will return the highest possible value allowed for the particular setting.	
Unit Suffixes (Optional parameters)	Unit suffixes can be optionally used with most NRf type input parameters.	
[A]	Amps	1.00A
[%]	Percentage	10%
[V]	Volts	5.00V
[W]	Watts	3.00W
[ms]	milliseconds	20ms
[mV]	Millivolts	150mV
[s]	Seconds	5s
[mS]	Reciprocal of 1000 ohms	20mS
[OHM]	Ohm	50OHM
[mA/us]	Millamps/ microsecond	100mA/us
[Hz]	Hertz	1000Hz

⚠ Note	For [OHM] return values, an infinite resistance (open) will be returned as $9.9e^{37}$.

Message Terminator	LF	Line feed code (0x0A)

Command List

Normal sequence Commands

Fast sequence Commands

Common Commands

*CLS

Set →

Description	Clears all Event registers and queues.
Syntax	*CLS
Example	*CLS Clears all Event registers and queues.

*ESE

Set →
→ Query

Description	Queries or sets the Standard Event Status Enable register. The Standard Event Status Enable register determines which events can set the Event Summary bit (ESB) in the Status Byte Register. Any bits that are set to 1 enable the corresponding event. Each event is represented by a bit in the Standard Event Status Enable register. Refer to section "**Standard Event Status register group**" on page 232 for more information on bit.
Syntax	*ESE <NRf>
Query Syntax	*ESE?

Parameter	<NR1> 1	Sets the Standard Event Status Enable register.
Return parameter	Return in "<NR1>" the set value of the Standard Event Status Enable register.	
Example	*ESE 8 Sets bit 3 of the ESE register.	
Query example	*ESE? >12 Bits 2 and 3 are set in the Standard Event Status Enable register.	

*ESR → Query

Description	Reads the Standard Event Status register. This command will also clear the Standard Event Status register. Refer to section "**Standard Event Status register group**" on page 232 for more information on bit.
Query Syntax	*ESR?
Return parameter	Return in "<NR1>" the set value of the Standard Event Status register.
Query example	*ESR? >48 Bits 5 and 6 are set in the Standard Event register.

*IDN → Query

Description	Queries the manufacturer, model number, serial number, and firmware version of the instrument.
Query Syntax	*IDN?

Return parameter	<string>	Returns the manufacturer name.
	<string>	Returns the model number.
	<NR1>	Returns the serial number.
	<string>	Returns the version of firmware
Query example	* IDN? > GWInstek, PEL-3111AH,12345678,V1.01.001 It is a response equipment manufacturer, model number, serial number, and firmware version.	

*OPC

Set →
→ Query

Description	This command sets the OPC (Operation Command Bit) bit (bit 0) of the Standard Event Status Register after the instrument has completed all pending operations. The query will return the status of the OPC bit.
Syntax	*OPC
Query Syntax	*OPC?
Return parameter	1 Operation complete
Example	*OPC
Query Example	*OPC? >1 Indicates that all pending operations are complete.

*RCL

Set →

Description	The Recall Instrument State command restores the instrument settings from a previously saved memory setting.
Syntax	*RCL <NR1>
Parameter	<NR1> Memory number 1 to 256
Example	*RCL 20 Recall setting memory 20.

Same function command	:MEMory:RECall

*RST

Set →

Description	Resets the unit. This is command forces the ABORt, and *CLS
Syntax	*RST
Example	*RST Resets the unit.

*SAV

Set →

Description	The Save Instrument State command saves the instrument settings to one of the memory setting slots.	
Syntax	*SAV <NR1>	
Parameter	<NR1>	Memory number 1 to 256
Example	*SAV 20 Saves the current setting to memory 20.	
Same function command	:MEMory:SAVe	

*SRE

Set →
→ Query

Description	Queries or sets the Service Request Enable register. The Service Request Enable register determines which events in the Status Byte register can set the Master Summary bit (MSB) in the Status Byte Register. Any bits that are set to 1 will cause the MSS bit to be set. Refer to section "**Status byte register group**" on page 234 for more information on bit.
Syntax	*SRE <NRf>

Query Syntax	*SRE?	
Parameter	<NR1>	Sets the set value of the Service Request Enable register.
Return parameter	Return in "<NR1>" the set value of the Service Request Enable register.	
Example	*SRE 8 Sets bit 3 of the Service Request Enable register.	
Query example	*SRE? >12 Bits 2 and 3 are set in the Service Request Enable register.	

*STB

→ Query

Description	Reads the Status Byte register. This command will not clear the Status Byte register. If the Master Summary Status bit (MSS) is set, it indicates that there is a reason for a service request. Refer to section "**Status byte register group**" on page 234 for more information on bit.
Query Syntax	*STB?
Return parameter	Return in "<NR1>" the value of the Status Byte register.
Query example	*STB? >36 Bits 2 and 5 are set in the Status Byte register.

*TRG

Set →

Description	This command triggers the unit.
Syntax	*TRG

Example	*TRG Issue the enforcement trigger.
Related Commands	:INITiate:CONTinuous, :INITiate[:IMMediate]

*TST

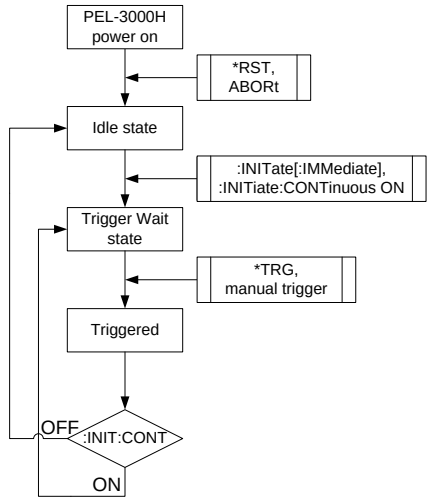
→ Query

Description	This command is a standard SCPI self-test command. The PEL-3000A/AH does not perform any self-tests so will always return 0 (pass) for this command.	
Query Syntax	*TST?	
Return parameter	<NR1>	Pass
Query example	*TST? >0	

Trigger Commands

Trigger States

Trigger System Control Flow



:ABORt

Set

Description	Clears the trigger wait status and returns to the idle state.
Query Syntax	:ABORt
Example	:ABOR Clears the trigger wait status.

:INPut[:STATe]:TRIGgered

Set → / → Query

Description	Sets whether to turn on the load input when the trigger is activated. Sets when PEL-3000AH is on idle state.	
Syntax	:INPut[:STATe]:TRIGgered {<Boolean>|OFF | ON }	
Query Syntax	:INPut[:STATe]:TRIGgered?	
Parameter	OFF or 0	Not change the load input in when the trigger active.
	ON or 1	Turn on the load input in when the trigger active.
	2	The trigger is not initialed. Please follow the trigger system control flow.
Example	:INP:TRIG ON Turn on the load input in when the trigger active.	
Related Commands	*TRG, :INITiate:CONTinuous, :INITiate[:IMMediate]	

:INITiate[:IMMediate]

Set →

Description	Sets the trigger to the wait state. If the trigger is activated, the trigger will automatically go to the idle state.
Query Syntax	:INITiate[:IMMediate]
Example	:INIT Sets the trigger to the wait state.
Related Commands	*TRG, :INPut[:STATe]:TRIGered, :CURRent[:VA]:TRIGgered, :RESistance[:VA]:TRIGgered

:INITiate:CONTinuous

Set → / → Query

Description	Sets or queries for state of the continuous waiting for the trigger.	
Note	Release of the trigger wait state requires activation of the trigger.	
Syntax	:INITiate:CONTinuous {<Boolean>|OFF | ON }	
Query Syntax	:INITiate:CONTinuous?	
Parameter	OFF or 0	Remove the continuous waiting for the trigger.
	ON or 1	Sets to continuous waiting for the trigger.
Example	:INIT:CONT ON Sets to continuous waiting for the trigger.	
Query example	:INITiate:CONT? >1 Setting in a continuous wait for trigger, and wait for the trigger.	
Related Commands	*TRG, :INPut[:STATe]:TRIGered, :CURRent[:VA]:TRIGgered, :RESistance[:VA]:TRIGgered	

:TRIGger[:DELay]:TIME

Set → / → Query

Description	The command determines how long to delay any action after a trigger is received. Equivalent to using the "Trig In Delay" setting on the front panel.	
Syntax	:TRIGger[:DELay]:TIME <NR2>|MINimum|MAXimum	
Query Syntax	:TRIGger[:DELay]:TIME? [MINimum|MAXimum]	
Parameter	<NR2>	0 ~ 0.005s (0.01ms ~ 100ms)
	MINimum	Minimum delay time
	MAXimum	Maximum delay time

Return parameter	Returns the delay time
Example	:TRIG:TIME 0.005 Sets the trigger in delay to 5ms.
Query example	:TRIG:TIME? >0.0050000 Returns the delay time in seconds.

:TRIGger[:PULSe]:WIDTh

Set → / → Query

Description	Sets and queries for the trigger output signal's pulse width.	
Syntax	:TRIGger[:PULSe]:WIDTh <NR2>|MINimum|MAXimum	
Query Syntax	:TRIGger[:PULSe]:WIDTh? [MINimum|MAXimum]	
Parameter	<NR2>	0.0000025~0.005s (2.5us ~ 5000us)
	MINimum	
	MAXimum	
Return parameter	Returns the pulse width	
Example	:TRIG:WIDT 0.005 Sets the trigger pulse width to 5ms.	
Query example	TRIG:WIDT? >0.0050000 Returns the pulse width of the trigger output.	

Input Commands

:INPut

Set
Query

Description	Sets and queries for the status of the load. Setting stop and restart of program, sequence, OCP test.	
Syntax	:INPut {<Boolean>|OFF | ON }	
Query Syntax	:INPut?	
Parameter	OFF or 0	Sets the off the load input setting. Sets stop of program, sequence, OCP test.
	ON or 1	Sets the on the load input setting. Sets restart of program, sequence, OCP test.
Return parameter	Return in "<Boolean>" the set value of the load input.	
Example	:INP ON the on the load input setting.	
Query example	:INP? >1 Load input setting is on.	

:INPut:MODE

Set
Query

Description	Sets and queries for the operating function of the load.	
Syntax	:INPut:MODE{LOAD|PROG|NSEQ|FSEQ|OCP|OPP|BATT}	
Query Syntax	:INPut:MODE	
Parameter	LOAD	Sets the manual operation.
	PROG	Sets the program function.

	NSEQ	Sets the normal sequence function.
	FSEQ	Sets the fast sequence function.
	OCP	Sets the OCP test function.
	OPP	Sets the OPP test function.
	BATT	Sets the Battery test function.
Example	:INPut:MODE LOAD Sets to the manual operation.	
Query example	:INPut:MODE? >LOAD Mode of operation is the manual operation.	

[:INPut]:SHORt

Set → / → Query

Description	Sets and queries for the input terminals state (open or short).
Syntax	[:INPut]:SHORt {<Boolean>|OFF | ON }
Query Syntax	[:INPut]:SHORt?
Parameter	OFF or 0 — Sets the open. ON or 1 — Sets the short.
Return parameter	Return in "<Boolean>" the input terminals state.
Example	:SHOR ON Sets the short.
Query example	:SHOR? >1 The input terminals state is short.

Measurement Commands

:MEASure:CURRent → Query

Description	Query of current measurement.
Query Syntax	:MEASure:CURRent?
Return parameter	Return the current measurement (<NR2>). The unit is the [A].
Query example	:MEAS:CURR? >0.50000 Current measurement is 0.5A.

:MEASure:ETIMe → Query

Description	Query of the elapsed time of the load-on.
Query Syntax	:MEASure:ETIMe?
Return parameter	Return the elapsed time (<NR2>) of the load-on. The unit is the seconds.
Query example	:MEAS:ETIM? >10.0 The elapsed time of the load-on is 10 seconds.

:MEASure:POWer → Query

Description	Query of power measurement.
Query Syntax	:MEASure:POWer?
Return parameter	Return the power measurement (<NR2>). The unit is the [W].

Query example	:MEAS:POWer? >15.00000 Power measurement is 15W.

:MEASure:VOLTage → Query

Description	Query of voltage measurement.
Query Syntax	:MEASure:VOLTage?
Return parameter	Return the voltage measurement (<NR2>). The unit is the [V].
Query example	:MEAS:VOLT? >5.00000 Voltage measurement is 5V.

Fetch Subsystem

:FETCh:CURRent → Query

Description	This query returns the real-time current of the load input.
Query syntax	:FETCh:CURRent?
Return parameter	Returns the real-time current .The unit is [A]
Query example	:FETC:CURR? >0.5000 The load has a current of 0.5 amps at the input.

:FETCh:POWer → Query

Description	This query returns the real-time power of the load input.
Query syntax	:FETCh:POWer?
Return parameter	Returns the real-time power. The unit is [W].
Query example	:FETC:POW? >15.00000 The load is at 15 watts.

:FETCh:VOLTage → Query

Description	This query returns the real-time voltage of the load input.
Query syntax	:FETCh:VOLTage?
Return parameter	Returns the real-time voltage. The unit is [V].

Query example :FETC:VOLT?
>5.00000

The load has a voltage of 5 volts at the input.

Configure Subsystem Commands

[:CONFigure]:OCP

Set → / → Query

Description	Sets and queries for the OCP trip settings. The OCP limit can be set to a specific value or the trip setting can be set to either limit the current or to turn the load off.
Syntax	[:CONFigure]:OCP {<NRf>[A] | MINimum | MAXimum | LIMit | LOFF}
Query Syntax	[:CONFigure]:OCP?

	<NRf>[A]	Current limit value.
	MINimum	Minimum current limit value.
	MAXimum	Maximum current limit value.
	LIMit	Limit the current.
	LOFF	Turn the load off.
Return parameter	Returns OCP setting followed by the OCP value, by the "{Load off | LIMIT},<NR2>" string.	
Example1	:OCP LIM Sets the OCP setting to limit.	
Example2	:OCP 19.250 Sets the OCP value to 19.25A.	
Query example	:OCP? >LIMIT, 19.250 The OCP setting is LIMIT and the OCP value is 19.25A.	

[:CONFigure]:OPP

Set / Query

Description	Sets or queries for the OPP trip settings. The OPP limit can be set to a specific value or the trip setting can be set to either limit the power or to turn the load off.	
Syntax	[:CONFigure]:OPP {<NRf> [W] | MINimum | MAXimum | LIMit | LOFF}	
Query Syntax	[:CONFigure]:OPP?	
Parameter	<NRf>[W]	Power limit value.
	MINImum	Minimum power limits value.
	MAXImum	Maximum power limits value.
	LIMit	Limit the power
	LOFF	Turn the load off
Return parameter	Returns a string with OPP setting followed by the OPP value, by the "{Load off | LIMIT},<NR2>" string.	

Example1	:OPP LIM Sets the OCP setting to limit.
Example2	:OPP 10.000 Sets the OPP value to 10W.
Query example	:OPP? >LIMIT, 10.000 The OPP setting is limited and the OPP value is 10.000W.

[:CONFigure]:UVP

Set → Query

Description	Sets or queries for the UVP trip settings.	
Syntax	[:CONFigure]:UVP {<NRf>[V] |MINimum | MAXimum }	
Query Syntax	[:CONFigure]:UVP?	
Parameter	<NRf>[V]	Under voltage limit value. ; 0 = OFF
	MINimum	Minimum value. (UVP setting is OFF.)
	MAXimum	Maximum value.
Return parameter	Return the set value of the UVP, by the "<NR2>" string	
Example1	:UVP 10.0 Sets the UVP setting to 10V.	
Query example	:UVP? > 10.0 The UVP setting is 10V.	

[:CONFigure]:UVP:TIME

Set → Query

Description	Sets and queries for the UVP ring time setting.
Syntax	:[CONFigure]:UVP:TIME {<NR1> | MINimum | MAXimum | INFinity}
Query Syntax	:[CONFigure]:UVP:TIME? [MINimum | MAXimum]

Parameter	<NR1>[s]	The ring time in seconds (0～600); 0 = OFF
	MINimum	Minimum ring time
	MAXimum	Maximum ring time
	INFinity	Sets the ring time to infinity.
Return parameter	<NR1>	The ring time in seconds
	Infinity	Infinite
	OFF	Function complete ring time is off.
Example	:UVP:TIME 5 Sets the UVP ring time to 5 seconds.	
Query example	:UVP:TIME? >5 The UVP ring time is 5 seconds.	

[:CONFigure]:OVP

Set → Query

Description	Sets or queries for the OVP trip settings.	
Syntax	[:CONFigure]:OVP {<NRf>[V] | MINimum| MAXimum}	
Query Syntax	[:CONFigure]:OVP?	
Parameter	<NRf>[V]	Over voltage limit value.
	MINimum	Minimum value.
	MAXimum	Maximum value. (OVP setting is OFF.)
Return parameter	Return the set value of the OVP, by the "{<NR2> | OFF}" string. "OFF" is a function off.	
Example1	:OVP 10.00 Sets the OVP setting to 10V.	
Query example	:OVP? > 10.0000 The OVP setting is 10.0000V.	

[:CONFigure]:SSTart

Set → Query

Description	Sets and queries for the Soft Start time setting.	
Syntax	[:CONFigure]:SSTart {<NRf>[s] | MINimum| MAXimum | OFF}	
Query Syntax	[:CONFigure]:SSTart?	
Parameter	<NRf>[s]	The soft start time in seconds.
	MINimum	Minimum time = 0 second
	MAXimum	Maximum time
	OFF	OFF = 0 second
Return parameter	Return the set value of the soft-start time, by the "{<NR2> | OFF}" string. "OFF" is a function off.	
Example	:SST OFF Turns the soft start function off.	
Query example	:SST? >OFF The soft start function is off.	

[:CONFigure]:VON

Set → Query

Description	Sets and queries for the Von voltage settings and latch.	
Syntax	[:CONFigure]:VON {<NRf>[V] | MINimum| MAXimum | LON | LOFF}	
Query Syntax	[:CONFigure]:VON?	
Parameter	{<NRf>[V]	The Von voltage value.
	MINimum	Minimum Von voltage value.
	MAXimum	Maximum Von voltage value.
	LON	Latch on
	LOFF	Latch off

Return parameter	Return the Von value and the mode of operation, by the "Latch:{OFF | ON},<NR2>" string.
Example	:VON 10.0V LON Sets the Von voltage value to 10.0 volts. And Von latch ON.
Query example	:VON? >Latch OFF, 0.00 The Von voltage value is 0V.

[:CONFigure]:VDELay

Set → Query

Description	Sets and queries for the Von Delay settings in seconds.	
Syntax	[:CONFigure]:VDELay {<NRf>[s] | MINimum | MAXimum}	
Query Syntax	[:CONFigure]:VDELay?	
Parameter	<NRf>[s]	The delay time in seconds
	OFF	Disable the delay time
	MINimum	Minimum delay time
	MAXimum	Maximum delay time
Return parameter	Return the set value of the delay time, by the "{<NR2> | OFF}" string. "OFF" is a function off.	
Example 1	:VDEL 2.5 ms Sets the delay time to 2.5ms.	
Example 2	:VDEL 0.0025s Sets the delay time to 2.5ms.	
Query example	:VDEL? >0.0025 The delay time is 2.5ms.	

:CONFigure:RESPonse

Set → / → Query

Description	Sets and queries for the response speed of the CC, CR and CP mode.	
Syntax	:CONFigure:RESPonse{<NR2> | MINimum | MAXimum}	
Query Syntax	:CONFigure:RESPonse?	
Parameter	<NR2>	0.1, 0.2, 0.5, 1.0
	MINimum	Minimum response speed
	MAXimum	Maximum response speed
Return parameter	Return the set value of the response speed, by the "<NR2>" string.	
Example	:CONF:RESP MAX Sets the response to the maximum of the CC, CR and CP mode.	
Query example	:CONF:RESP? >1.0 Response speed of the CC, CR and CP mode is 1.0.	

[:CONFigure]:CNTime

Set → / → Query

Description	Sets and queries for the Count Timer function.	
Syntax	[:CONFigure]:CNTime {<Boolean> |OFF | ON }	
Query Syntax	[:CONFigure]:CNTime?	
Parameter	OFF	Turns the Count Time timer off.
	ON	Turns the Count Time timer on
Example	:CNT ON Turns the Count Time timer on.	
Query example	CNT? >ON Count Time timer is turned on.	

[:CONFigure]:COTime

Set → / → Query

Description	Sets and queries for the load cutoff time. A cutoff time of 0 seconds is the equivalent of disabling the cutoff time.	
Syntax	[:CONFigure]:COTime {<NRf>[s] |OFF|MINimum | MAXimum}	
Query Syntax	[:CONFigure]:COTime?	
Parameter	<NRf>[s]	Cut off time in seconds (1~3599999)
	OFF	Turns the cutoff time off.
	MINimum	Sets the cutoff time to the maximum
	MAXimum	Sets the cutoff time to the minimum
Return parameter	Return the set value of the Cut-off time, by the "{<NR1> | OFF}" string. "OFF" is a function off.	
Example	:COT MAX Sets the cutoff time to the maximum.	
Query example	:COT? >500 The cutoff time is set to500 seconds.	

[:CONFigure]:CRUNit

Set → / → Query

Description	Sets and queries for the CR mode setting units.	
Syntax	[:CONFigure]:CRUNit {OHM|MHO}	
Query Syntax	[:CONFigure]:CRUNit?	
Parameter	OHM	Set the units to "Ω".
	MHO	Set the units to "mS" (conductance)
Example	:CRU OHM Sets the CR mode units to ohms.	

Query example	:CRU? >OHM The CR mode units are ohms.

:CONFigure:DYNamic

Set → Query

Description	Sets and queries for the setting conditions of dynamic mode. Setting conditions can select the duty cycle or the timer, the percentage or the value.
Syntax	:CONFigure:DYNamic { VALue | PERCent | TIME | FDUTy }
Query Syntax	:CONFigure:DYNamic?
Parameter	VALue — Set the units to Value. PERCent — Set the units to Percent. TIME — Use timers for timing. FDUTy — Use duty cycle for timing.
Return parameter	Return the unit and the timing mode, by the "{Value | Percent},{T1/T2 | Fre./Duty }" string.
Example	:CONF:DYN VAL Sets the dynamic mode units to value.
Query example	:CONF:DYN? > Value,T1,T2 The dynamic mode becomes a value setup and timer setup.

:CONFigure:MEMory

Set → Query

Description	This command configures the how the files are recalled Local operation mode. By default when you try to recall a file or setting from memory, a message will appear asking you to press the Enter key to confirm each time you wish to recall. This command enables (SAFety) or disables this feature

	(DIRect).	
Syntax	:CONFigure:MEMory {SAFety | DIRect }	
Query Syntax	:CONFigure:MEMory?	
Parameter	SAFety	Safety setting.
	DIRect	Directly recall the chosen file.
Return parameter	Return the presence or absence of confirmation of recall, by the "{ Safety | Direct }" string.	
Example	:CONF:MEM SAF Enables the safety setting.	
Query example	:CONF:MEM? >Safety The safety setting is enabled.	

:CONFigure:SHORt

Set → Query

Description	Sets and queries for the short key behavior.	
Syntax	:CONFigure:SHORt { TOGGle | HOLD }	
Query Syntax	:CONFigure:SHORt?	
Parameter	HOLD	Sets the short key configuration to hold
	TOGGle	Sets the short key configuration to toggle
Return parameter	Return the short key Action, by the "{Toggle | Hold}" string.	
Example	:CONF:SHOR TOGG Sets the short key configuration to toggle.	
Query example	:CONF:SHOR? >Toggle The short key is configured to toggle.	

:CONFigure:SHORt:SAFety

Set → / → Query

Description	Turns the Short Safety function on/off. The short safety function requires the load to already be turned on before the load can be shorted using the Short key or :INPut:SHORt command.	
Syntax	:CONFigure:SHORt:SAFety {<bool>|OFF|ON}	
Query Syntax	:CONFigure:SHORt:SAFety?	
Parameter	OFF | 0	OFF
	ON | 1	ON
Return parameter	Return the short safety function on/off.	
Example	:CONF:SHOR:SAF OFF Sets the Short Safety off.	
Query example	:CONF:SHOR:SAF? >OFF Short safety is turned off.	

:CONFigure:SHORt:FUNCtion

Set → / → Query

Description	Enables or disables the short function by short key. The load cannot be shorted until the short function has been enabled with this function.	
Syntax	CONFigure:SHORt:FUNCtion {<Boolean>|OFF|ON}	
Query Syntax	:CONFigure:SHORt:FUNCtion?	
Parameter	OFF | 0	Disables the short function
	ON | 1	Enables the short function
Return parameter	Return the short key/short function.	
Example	:CONF:SHOR:FUNC ON Enables the short function.	

Query example	:CONF:SHOR:FUNC? >ON Indicates that the short function is enabled.

[:CONFigure]:GNG:MODE

Set → / → Query

Description	Sets and queries for the entry mode for the Go-NoGo settings. The entry mode determines whether the Go-NoGo limits are set as values or as a percentage value from a center reference value.	
Syntax	[:CONFigure]:GNG:MODE {PERCent | VALue }	
Query Syntax	[:CONFigure]:GNG:MODE?	
Parameter	PERCent	Sets the entry mode to %.
	VALue	Sets the entry mode to value
Return parameter	Returns the Setting value of Go-NoGo input mode, by the "{Percent | Value}" string.	
Example	:GNG:MODE PERC Sets the entry mode to %.	
Query example	:GNG:MODE? >Percent The entry mode is %.	
Related Commands	[:CONFigure]:GNG:H [:CONFigure]:GNG:L [:CONFigure]:GNG:C	

[:CONFigure]:GNG:H

Set → / → Query

Description	Sets and queries for the high voltage/current limit value. If the entry mode is set to value, the high voltage/current limit value units are in volts/amps. If the entry mode is set to percent, the high voltage/current limit value units are in percent. Besides, the percent value is related to the center voltage/current value. For Example :GNG:C 10 :GNC:H 100 The high voltage limit value is 100%. Once the entry mode returns back to value, this high voltage limit will be 20(10 + 100% x 10).	
Syntax	[:CONFigure]:GNG:H <NRf>	
Query Syntax	[:CONFigure]:GNG:H?	
Parameter	<NRf>	Sets the high voltage/current limit value in volts/amps or in percent.
Return parameter	Returns the voltage/current upper limit value, by the "{<NR2>}" string.	
Example	:GNG:H 100.0 Sets the high voltage limit value to 100%.	
Query example	:GNG:H? >100.0 Returns the high voltage limit value as 100.0%.	
Related Commands	[:CONFigure]:GNG:Mode [:CONFigure]:GNG:L	

[:CONFigure]:GNG:L

Set → / → Query

Description	Sets and queries for the low voltage/current limit value. If the entry mode is set to value, the low voltage/current limit value units are in volts/amps. If the entry mode is set to percent, the low voltage/current limit value units are in percent. Besides, the percent value is related to the center voltage/current value. For Example :GNG:C 10 :GNC:L 100 The low voltage limit value is 100%. Once the entry mode returns back to value, this low voltage limit will be 0(10 - 100% x 10).	
Syntax	[:CONFigure]:GNG:L <NRf>	
Query Syntax	[:CONFigure]:GNG:L?	
Parameter	<NRf>	Sets the low voltage/current limit value in volts/amps or in percent.
Return parameter	Returns the voltage/current lower limit value, by the "{<NR2>}" string.	
Example	:GNG:L 10.0 Sets the low voltage limit value to 10%.	
Query example	:GNG:L? >10.0 Returns the low voltage limit value as 10.0%.	
Related Commands	[:CONFigure]:GNG:Mode [:CONFigure]:GNG:H	

[:CONFigure]:GNG:C

Set → Query

Description	Sets and queries for the center voltage/current limit value. The center voltage limit value is used as the center reference value when the entry mode is set to percent.	
Syntax	[:CONFigure]:GNG:C <NRf>	
Query Syntax	[:CONFigure]:GNG:C?	
Parameter	<NRf>	Sets the center voltage/current limit value in volts/amps.
Return parameter	Returns the Center value of voltage/current, by the "{<NR2>}" string.	
Example	:GNG:C 10.0 Sets the center voltage/current limit value to 10V or 10A.	
Query example	:GNG:C? >10.0 Returns the center voltage/current limit value of 10V or 10A.	
Related Commands	[:CONFigure]:GNG:Mode	

[:CONFigure]:GNG:DTIMe

Set → Query

Description	Sets and queries for the Go-NoGo delay time.	
Syntax	[:CONFigure]:GNG:DTIMe {<NRf>[s] | MINimum |MAXimum }	
Query Syntax	[:CONFigure]:GNG:DTIMe?	
Parameter	<NRf>[s]	Sets the Go-NoGo delay time in seconds (0.0~1.0) with 0.1 second resolution.
	MINimum	Minimum delay time
	MAXimum	Maximum delay time

Return parameter	Returns the delay time in seconds, by the "<NR2>" string.
Example	:GNG:DTIM 0.5 Sets the delay time to 0.5 seconds.
Query example	:GNG:DTIM? >0.5 The delay time is 0.5 seconds.

[:CONFigure]:GNG:SPECtest

Set → → Query

Description	Sets and queries for Go-NoGo testing	
Syntax	[:CONFigure]:GNG:SPECtest {<Boolean>|OFF | ON }	
Query Syntax	[:CONFigure]:GNG:SPECtest?	
Parameter	OFF	SPEC test = OFF
	ON	SPEC test = ON
Example	:GNG:SPECtest ON Turns Go-NoGo testing on.	
Query example	:GNG:SPECtest? >OFF Indicates that Go-NoGo testing is off.	

[:CONFigure]:GNG[:PASS]

→ Query

Description	Queries the Go-NoGo test result(s). This command can be used for all test modes (CC, CV, CR, CP).	
Query Syntax	[:CONFigure]:GNG[:PASS]?	
Return parameter	NG	No Go (fail)
	GO	Go (Pass)
	INACTIVE	Inactive (Go-NoGo test is On, however the input is not load on.)
Query example	:GNG? >GO Returns the Go-NoGo test result.	

Parallel Command

[:CONFigure]:PARallel

Set → / → Query

Description	Configures the unit for parallel operation, or queries its state. This command configures the unit as a Master or Slave, and configures how many slave units are connected if the unit is configured as a master.	
Syntax	[:CONFigure]:PARallel { MASTer | SLAVe | OFF | P2 | P3 | P4 | P5 | B1 | B2 | B3 | B4}	
Query Syntax	[:CONFigure]:PARAllel?	
Parameter	P2,P3,P4 or P5	Number of connected slaves
	B1,B2,B3 or B4	Number of connected Booster.
	OFF	Turn parallel mode off
	MASTer	Sets the unit to Master
	SLAVe	Sets the unit to Slave
Return parameter	Return the connections number and mode(master / slave). Response of master mode is the "Mode:Master,{Number:OFF|Parallel Number:{2|3|4|5} | Booster Number: {1|2|3|4} }". Response of Slave mode is the "Mode:Slave".	
Example 1	:PAR MAST Sets the unit to Master.	
Example 2	:PAR B2 Configures the unit for use with 2 booster units.	
Query example	:PAR? >Mode:Master, Number:OFF The unit is set to Master and there are no connected slaves.	

Step Resolution Commands

Set → / → Query

:CONFigure:STATus

Description	Sets the mode used for the set resolution when using the scroll wheel to edit parameters.	
Syntax	:CONFigure:STATus { STEP | CURSOR }	
Query Syntax	:CONFigure:STATus?	
Parameter	STEP	Knob Status = Step (coarse/fine)
	CURSOR	Knob Status = Cursor
Return parameter	<ASCII string>	Returns the Knob Status configuration as a string.
Example	:CONF:STAT STEP Sets the mode to STEP.	
Query example	:CONF:STAT? >Step Returns the mode.	

[:CONFigure]:STEP:CC

Query

Description	Queries the step resolution for each CC Mode range.
Query Syntax	[:CONFigure]:STEP:CC?
Return parameter	Returns the step resolution for each CC Mode range, by the "CCH:<NR2>, CCM:<NR2>, CCL:<NR2>" string. Unit is [A]
Query example	:STEP:CC? >CCH:0.0300, CCM:0.00300, CCL:0.000300 Returns the CC mode step resolution for each range.

[:CONFigure]:STEP:CCH

Set
Query

Description	Sets and queries for the step resolution for CC High Range.	
⚠ Note	The step resolution setting will be automatically rounded to the closest multiple of the base resolution.	
Syntax	[:CONFigure]:STEP:CCH { <NRf>[A] | MINimum | MAXimum }	
Query Syntax	[:CONFigure]:STEP:CCH?	
Parameter	<NRf>[A]	Step resolution. Unit is [A]
	MINimum	Minimum step resolution
	MAXimum	Maximum step resolution
Return parameter	Returns the range and the step resolution, by the "CCH:<NR2>" string.	
Example	:STEP:CCH 0.03A Sets the step resolution to 0.03A.	
Query example	:STEP:CCH? >CCH:0.0300 Returns the step resolution (0.03A).	

Set →
[:CONFigure]:STEP:CCM
→ Query

Description	Sets and queries for the step resolution for CC medium Range.	
⚠ Note	The step resolution setting will be automatically rounded to the closest multiple of the base resolution.	
Syntax	[:CONFigure]:STEP:CCM {<NRf>[A] | MINimum | MAXimum }	
Query Syntax	[:CONFigure]:STEP:CCM?	
Parameter	<NRf>[A]	Step resolution. Unit is [A]
	MINimum	Minimum step resolution
	MAXimum	Maximum step resolution
Return parameter	Returns the range and the step resolution, by the "CCM:<NR2>" string.	
Example	:STEP:CCM 0.003A Sets the step resolution to 0.003A.	
Query example	:STEP:CCM? >CCM:0.00300 Returns the step resolution (0.003A).	

Set →
[:CONFigure]:STEP:CCL
→ Query

Description	Sets and queries for the step resolution for CC low Range.	
⚠ Note	The step resolution setting will be automatically rounded to the closest multiple of the base resolution.	
Syntax	[:CONFigure]:STEP:CCL {<NRf>[A] | MINimum | MAXimum }	
Query Syntax	[:CONFigure]:STEP:CCL?	
Parameter	<NRf>[A]	Step resolution. Unit is [A]

	MINimum	Minimum step resolution
	MAXimum	Maximum step resolution
Return parameter	Returns the range and the step resolution, by the "CCL:<NR2>" string.	
Example	:STEP:CCL 0.0003A Sets the step resolution to .0003A.	
Query example	:STEP:CCL? > CCL:0.000300 Returns the step resolution (0.0003A).	

[:CONFigure]:STEP:CR → Query

Description	Queries the step resolution for each CR Mode range.
Query Syntax	[:CONFigure]:STEP:CR?
Return parameter	Returns the step resolution for each CR Mode range, by the "CRH:<NR2>, CRM:<NR2>, CRL:<NR2>" string. Unit is [mS]
Query example	:STEP:CR? >CRH:3.00, CRM:0.300, CRL:0.0300 Returns the CR mode step resolution for each range.

[:CONFigure]:STEP:CRH → Set → Query

Description	Sets and queries for the step resolution for CR High Range.
⚠ Note	The step resolution setting will be automatically rounded to the closest multiple of the base resolution.
Syntax	[:CONFigure]:STEP:CRH {<NRf>[mS] | MINimum | MAXimum }
Query Syntax	[:CONFigure]:STEP:CRH?
Parameter	<NRf>[mS] Step resolution. Unit is [mS] MINimum Minimum step resolution

	MAXimum	Maximum step resolution
Return parameter	Returns the range and the step resolution, by the "CRH:<NR2>" string.	
Example	:STEP:CRH 3 Sets the step resolution to 3mS.	
Query example	:STEP:CRH? >CRH:3.00 Returns the step resolution (3mS).	

[:CONFigure]:STEP:CRM

Set → → Query

Description	Sets and queries for the step resolution for CR Medium Range.	
⚠ Note	The step resolution setting will be automatically rounded to the closest multiple of the base resolution.	
Syntax	[:CONFigure]:STEP:CRM {<NRf>[mS] | MINimum | MAXimum }	
Query Syntax	[:CONFigure]:STEP:CRM?	
Parameter	<NRf>[mS]	Step resolution. Unit is [mS]
	MINimum	Minimum step resolution
	MAXimum	Maximum step resolution
Return parameter	Returns the range and the step resolution, by the "CRM:<NR2>" string.	
Example	:STEP:CRM 0.3 Sets the step resolution to 0.3mS.	
Query example	:STEP:CRM? >CRM:0.300 Returns the step resolution (0.3mS).	

[:CONFigure]:STEP:CRL

Set → → Query

Description	Sets and queries for the step resolution for CR Low Range.	
⚠ Note	The step resolution setting will be automatically rounded to the closest multiple of the base resolution.	
Syntax	[:CONFigure]:STEP:CRL {<NRf>[mS] | MINimum | MAXimum }	
Query Syntax	[:CONFigure]:STEP:CRL?	
Parameter	<NRf>[mS]	Step resolution. Unit is [mS]
	MINimum	Minimum step resolution
	MAXimum	Maximum step resolution
Return parameter	Returns the range and the step resolution, by the "CRL:<NR2>" string.	
Example	:STEP:CRL 0.03 Sets the step resolution to 0.03mS.	
Query example	:STEP:CRL? >CRL:0.0300 Returns the step resolution (0.03mS).	

[:CONFigure]:STEP:CV

→ Query

Description	Queries the step resolution for each CV Mode range.
Query Syntax	[:CONFigure]:STEP:CV?
Return parameter	Returns the step resolution for each CV Mode range, by the "CVH:<NR2>, CVL:<NR2>" string. Unit is [V]
Query example	:STEP:CV? >CVH:2.00, CVL:0.200 Returns the CV mode step resolution for each range.

Set →
[:CONFigure]:STEP:CVH
→ Query

Description	Sets and queries for the step resolution for CV High Range.	
⚠ Note	The step resolution setting will be automatically rounded to the closest multiple of the base resolution.	
Syntax	[:CONFigure]:STEP:CVH {<NRf>[V] | MINimum | MAXimum }	
Query Syntax	[:CONFigure]:STEP:CVH?	
Parameter	<NRf>[V]	Step resolution. Unit is [V]
	MINimum	Minimum step resolution
	MAXimum	Maximum step resolution
Return parameter	Returns the range and the step resolution, by the "CVH:<NR2>" string.	
Example	:STEP:CVH 2V Sets the step resolution to 2V.	
Query example	:STEP:CVH? > CVH:2.00 Returns the step resolution (2V).	

Set →
[:CONFigure]:STEP:CVL
→ Query

Description	Sets and queries for the step resolution for CV Low Range.	
⚠ Note	The step resolution setting will be automatically rounded to the closest multiple of the base resolution.	
Syntax	[:CONFigure]:STEP:CVL {<NRf>[V] | MINimum | MAXimum }	
Query Syntax	[:CONFigure]:STEP:CVL?	
Parameter	<NRf>[V]	Step resolution. Unit is [V]

	MINimum	Minimum step resolution
	MAXimum	Maximum step resolution
Return parameter	Returns the range and the step resolution, by the "CVL:<NR2>" string.	
Example	:STEP:CVL 0.2V Sets the step resolution to 0.2V.	
Query example	:STEP:CVL? > CVL:0.200 Returns the step resolution (0.2V).	

[:CONFigure]:STEP:CP → Query

Description	Queries the step resolution for each CP Mode range.
Query Syntax	[:CONFigure]:STEP:CP?
Return parameter	Returns the step resolution for each CP Mode range, by the "CPH:<NR2>, CPM:<NR2>, CPL:<NR2>" string. Unit is [W]
Query example	:STEP:CP? > CPH:1.00, CPM:0.100, CPL:0.0100 Returns the CP mode step resolution for each range.

[:CONFigure]:STEP:CPH → Set → Query

Description	Sets and queries for the step resolution for CP High Range.
⚠ Note	The step resolution setting will be automatically rounded to the closest multiple of the base resolution.
Syntax	[:CONFigure]:STEP:CPH {<NRf>[W] | MINimum | MAXimum }
Query Syntax	[:CONFigure]:STEP:CPH?

Parameter	<NRf>[W]	Step resolution. Unit is [W]
	MINimum	Minimum step resolution
	MAXimum	Maximum step resolution
Return parameter	Returns the range and the step resolution, by the "CPH:<NR2>" string.	
Example	:STEP:CPH 1 Sets the step resolution to 1W.	
Query example	:STEP:CPH? >CPH:1.00 Returns the step resolution (1W).	

[:CONFigure]:STEP:CPM

Set → / → Query

Description	Sets and queries for the step resolution for CP Medium Range.
Note	The step resolution setting will be automatically rounded to the closest multiple of the base resolution.
Syntax	[:CONFigure]:STEP:CPM {<NRf>[W] | MINimum | MAXimum }
Query Syntax	[:CONFigure]:STEP:CPM?

Parameter	<NRf>[W]	Step resolution. Unit is [W]
	MINimum	Minimum step resolution
	MAXimum	Maximum step resolution
Return parameter	Returns the range and the step resolution, by the "CPM:<NR2>" string.	
Example	:STEP:CPM 0.1 Sets the step resolution to 0.1W.	
Query example	:STEP:CPM? >CPM:0.100 Returns the step resolution (0.1W).	

Set →
[:CONFigure]:STEP:CPL
→ Query

Description	Sets and queries for the step resolution for CP Low Range.	
⚠ Note	The step resolution setting will be automatically rounded to the closest multiple of the base resolution.	
Syntax	[:CONFigure]:STEP:CPL {<NRf>[W] | MINimum | MAXimum }	
Query Syntax	[:CONFigure]:STEP:CPL?	
Parameter	<NRf>[W]	Step resolution. Unit is [W]
	MINimum	Minimum step resolution
	MAXimum	Maximum step resolution
Return parameter	Returns the range and the step resolution, by the "CPL:<NR2>" string.	
Example	:STEP:CPL 0.01 Sets the step resolution to 0.01W.	
Query example	:STEP:CPL? >CPM:0.0100 Returns the step resolution (0.01W).	

External Control Commands

[:CONFigure]:EXTernal[:CONTrol]

Set → / → Query

Description	Sets and queries for the external control of CC, CR, CV, CP mode.	
Syntax	[:CONFi gure]:EXTernal[:CONTrol]{ OFF | VOLTage | RESistance | RINV }	
Query Syntax	[:CONFi gure]:EXTernal[:CONTrol]?	
Parameter	OFF	Disables external control
	VOLTage	Sets the unit to external voltage control
	RESistance	Sets the unit to external resistance control
	RINV	Sets the unit to external resistance (inverted) control
Return parameter	Returns mode of the external control, by the "Control:{OFF | Volt | Res | Rinverse}" string.	
Example	:EXT OFF Turns external control off.	
Query example	:EXT? >Control:OFF External control is setting is off.	

[:CONFigure]:EXTernal:CV

Set → / → Query

Description	Sets and queries for the external control of +CV mode.
⚠ Note	Please set the unit to external control of CC, CR, CV, CP mode.

Syntax	[:CONFigure]:EXTernal:CV { OFF | ON }	
Query Syntax	[:CONFigure]:EXTernal:CV?	
Parameter	OFF	Disables external control of +CV mode
	ON	Sets the unit to external control of +CV mode
Return parameter	Returns the external control of +CV mode configuration, by the "CV:{OFF | ON}" string.	
Example	:EXT:CV ON Turns external control of +CV mode on.	
Query example	:EXT:CV? >CV:ON Uses external control of +CV mode.	

[:CONFigure]:EXTernal:LOADonin

Set → / → Query

Description	Sets and queries for turned on and off with the external switch. External switch (LoadOn IN) is whether or not turned on the load setting of at the time of the open(HIGH) or closed(LOW).	
Syntax	[:CONFigure]:EXTernal:LOADonin {OFF | High | Low}	
Query Syntax	[:CONFigure]:EXTernal:LOADonin?	
Parameter	OFF	LoadOn IN = off
	HIGH	LoadOn IN = open
	LOW	LoadOn IN = closed
Return Parameter	Returns the setting value of external switch, by the "LoadOn In:{OFF | High | Low}" string.	
Example	:EXT:LOAD OFF Turns The LoadOn IN off.	
Query example	: EXT:LOAD? >LoadOn In:OFF The LoadOn In setting is off.	

Mode Subsystem Commands

:MODE

Set → / → Query

Description	Sets and queries for the operating modes.	
Syntax	:MODE {CC | CR | CV | CP | CCCV | CRCV | CPCV}	
Query Syntax	:MODE?	
Parameter	CC	CC mode
	CR	CR mode
	CV	CV mode
	CP	CP mode
	CCCV	CC + CV mode
	CRCV	CR + CV mode
	CPCV	CP + CV mode
Example	:MODE CC Sets the mode to CC mode.	
Query example	:MODE? >CC Returns the operating mode (CC mode).	

[:MODE]:CRANge

Set → / → Query

Description	Sets and queries for the current range of all the operating modes.	
Syntax	[:MODE]:CRANge {HIGH | MIDDle | LOW}	
Query Syntax	[:MODE]:CRANge?	
Parameter	HIGH	High range

	MIDDle	Middle range
	LOW	Low range
Return parameter	Returns the setting of Setting of the current range, by the "{High | Mid | Low}" string.	
Example	:CRAN LOW Sets the current range to Low.	
Query example	:CRAN? >Low The current range is set to Low.	

[:MODE]:VRANge

Set → / → Query

Description	Sets and queries for the voltage range of all operating modes.	
Syntax	[:MODE]:VRANge { HIGH | LOW }	
Query Syntax	[:MODE]:VRANge?	
Parameter	HIGH	High range
	LOW	Low range
Return parameter	Returns the setting of Setting of the voltage range, by the "{High | Low}" string.	
Example	:VRAN LOW Sets the voltage range to Low.	
Query example	:VRAN? >Low The voltage range is set to Low.	

[:MODE]:RESPonse

Set → / → Query

Description	Sets and queries for The response speed of the CV and +CV mode. The default is fast response.
Syntax	[:MODE]:RESPonse { FAST | RESP{ 6 | 5 | 4 | 3 | 2 | 1 } | SLOW }
Query Syntax	[:MODE]:RESPonse?

Parameter / Return parameter	FAST | RESP6 | RESP5 | RESP4 | RESP3 | RESP2 | RESP1 | SLOW	Response speed
Example	:RESP FAST Sets the CV and +CV response to fast.	
Query example	:RESP? >FAST The speed response of CV and +CV mode is set to fast.	

[:MODE]:DYNamic

Set → / → Query

Description	Sets and queries for the Switching function.	
Syntax	[:MODE]:DYNamic { DYNamic | STATic }	
Query Syntax	[:MODE]:DYNamic?	
Parameter	DYNamic	Set to Dynamic mode
	STATic	Set to Static mode
Return parameter	Returns the Setting of Switching function, by the "{Dynamic | Static}" string.	
Example	:DYN DYN Set the switching function to dynamic	
Query example	:DYN? >Dynamic The switching function is set to dynamic mode.	

Current Subsystem Commands

:CURRent[:VA]

Set → / → Query

Description	Sets and queries for the "A Value" current of the CC static mode.	
Note	A different current value can be set for each current range (High/Mid/Low). The [:VA] node can only be omitted when in static mode.	
Syntax	:CURRent[:VA] {<NRf>[A] | MINimum | MAXimum }	
Query Syntax	:CURRent[:VA]?	
Parameter	<NRf>[A]	"A Value" current value
	MINimum	Minimum current level
	MAXimum	Maximum current level
Return parameter	Return the current value of "A Value", by the "<NR2>" string.	
Example	:CURR MIN Sets the current value to the minimum.	

Query example	:CURR? >1.0000 Current setting of "A Value" is set to 1A.

:CURRent[:VA]:TRIGgered

Set

Description	Set the current value when the trigger is activated.	
Syntax	:CURRent[:VA]:TRIGgered {<NR2>[A] | MINimum | MAXimum }	
Parameter	<NRf>[A]	"A Value" current value
	MINimum	Minimum current level
	MAXimum	Maximum current level
Example	:CURR:TRIG MIN Set the minimum current value when the trigger is activated.	
Related Commands	*TRG, :INITiate:CONTinuous, :INITiate[:IMMediate]	

:CURRent:VB

Set / Query

Description	Sets and queries for the "B Value" current of the CC static mode.	
Note	A different current value can be set for each current range (High/Mid/Low).	
Syntax	:CURRent:VB {<NRf>[A] | MINimum | MAXimum }	
Query Syntax	:CURRent:VB?	
Parameter	<NRf>[A]	"B Value" current value
	MINimum	Minimum current level
	MAXimum	Maximum current level
Return parameter	Return the Current value of "B Value", by the "<NR2>" string.	
Example	:CURR:VB MIN Sets the current value to the minimum.	

Query example	:CURR:VB? >1.0000 Current setting of "B Value" is set to 1A.

:CURRent:SRATe

Set →
→ Query

Description	Sets and queries for the current slew rate of CC static mode.	
Syntax	:CURRent:SRATe {<NRf> | MINimum | MAXimum }	
Query Syntax	:CURRent:SRATe?	
Parameter	<NRf>	Sets the slew rate in mA/us
	MINimum	Set to the lowest slew rate
	MAXimum	Set to the highest slew rate
Return parameter	Return the slew rate, by the "<NR2>" string.	
Example	:CURR:SRAT MIN Sets the slew rate to the minimum.	
Query example	:CURR:SRAT? >5.0000 The slew rate is set to 5mA/us.	

:CURRent:L1

Set →
→ Query

Description	Sets and queries for the "Level1" current of the CC dynamic mode. This command applies in "Dyna.Level" is "Value".	
⚠ Note	A different current value can be set for each range (High/Mid/Low).	
Syntax	:CURRent:L1 {<NRf>[A] | MINimum | MAXimum }	
Query Syntax	:CURRent:L1?	
Parameter	<NRf>[A]	"Level1" current value
	MINimum	Minimum current level

	MAXimum	Maximum current level
Return parameter	Return the current value of "Level1", by the "<NR2>" string.	
Example	:CURR:L1 MIN Sets the current value to the minimum.	
Query example	:CURR:L1? >1.0000 Current setting of "Level1" is set to 1A.	

:CURRent:L2

Set → / → Query

Description	Sets and queries for the "Level2" current of the CC dynamic mode. This command applies in "Dyna.Level" is "Value".	
Note	A different current value can be set for each range (High/Mid/Low).	
Syntax	:CURRent:L2 {<NRf>[A] | MINimum | MAXimum }	
Query Syntax	:CURRent:L2?	
Parameter	<NRf>[A]	"Level2" current value
	MINimum	Minimum current level
	MAXimum	Maximum current level
Return parameter	Return the current value of "Level2", by the "<NR2>" string.	
Example	:CURR:L2 MIN Sets the current value to the minimum.	
Query example	:CURR:L2? >1.0000 Current setting of "Level2" is set to 1A.	

Set →
→ Query

:CURRent:SET

Description	Sets and queries for the "Set" current of the CC dynamic mode. This command applies in "Dyna.Level" is "Percent".	
Syntax	:CURRent:SET{<NRf>[A] | MINimum | MAXimum}	
Query Syntax	:CURRent:SET?	
Parameter	<NRf>[A]	The current value at the time of "Level = 100%"
	MINimum	Minimum current value
	MAXimum	Maximum current value
Return parameter	Return the current value of "Level = 100%", by the "<NR2>" string.	
Example	:CURR:SET MIN Sets the minimum current value of "Level = 100%".	
Query example	:CURR:SET? >1.0 Current value of "Level = 100%" is set to 1A.	
Related Commands	:CURRent:LEVel	

Set →
→ Query

:CURRent:LEVel

Description	Sets and queries for the "Level" % of the CC dynamic mode. This command applies in "Dyna.Level" is "Percent".	
Syntax	:CURRent:LEVel {<NRf> | MINimum | MAXimum }	
Query Syntax	:CURRent:LEVel?	
Parameter	<NRf>	% of "SET" current level (unit is [%])
	MINimum	Minimum % of "SET" current level

	MAXimum	Maximum % of "SET" current level
Return parameter	Return the current of "% Level", by the "<NR2>" string.	
Example	:CURR:LEV MIN Sets the % level current value to the minimum.	
Query example	:CURR:LEV? >50 Percentage of the set current value is set to 50%.	
Related Commands	:CURRent:SET	

:CURRent:RISE

Set → / → Query

Description	Sets and queries for the rising current slew rate of the CC dynamic mode.	
Syntax	:CURRent:RISE {<NRf> | MINimum | MAXimum }	
Query Syntax	:CURRent:RISE?	
Parameter	<NRf>	Rising current slew rate(unit is [mA/us])
	MINimum	Minimum slew rate
	MAXimum	Maximum slew rate
Return parameter	Return the rise of the current slew rate, by the "<NR2>" string.	
Example	:CURR:RISE MIN Sets the rising slew rate to the minimum.	
Query example	:CURR:RISE? >5000 Returns the rising slew rate as 5000mA/us.	
Related Commands	:CURRent:FALL	

Set →
:CURRent:FALL
→ Query

Description	Sets and queries for the falling of the current slew rate of the CC dynamic mode.	
Syntax	:CURRent:FALL {<NRf> | MINimum | MAXimum }	
Query Syntax	:CURRent:FALL?	
Parameter	<NRf>	Falling current slew rate (unit is [mA/us])
	MINimum	Minimum slew rate
	MAXimum	Maximum slew rate
Return parameter	Return the falling of the current slew rate, by the "<NR2>" string.	
Example	:CURR:FALL MIN Sets the falling slew rate to the minimum.	
Query example	:CURR:FALL? >5000 Returns the falling slew rate as 5000mA/us.	
Related Commands	:CURRent: RISE	

Set →
:CURRent:T1
→ Query

Description	Sets and queries for the "Timer1" time of CC dynamic mode. This command applies in "Dyna.Time" is "T1/T2".	
Syntax	:CURRent:T1 {<NRf>[s] | MINimum | MAXimum }	
Query Syntax	:CURRent:T1?	
Parameter	<NRf>[s]	T1 timer setting. (unit is seconds)
	MINimum	Minimum time
	MAXimum	Maximum time

Return parameter	Return the setting of the timer T1, by the "<NR2>" string.
Example	:CURR:T1 0.2 Sets the setting of the timer T1.
Query example	:CURR:T1? >0.2 Return the setting of the timer T1.
Related Commands	:CURRent:T2

:CURRent:T2

Set → / → Query

Description	Sets and queries for the "Timer2" time of CC dynamic mode. This command applies in "Dyna.Time" is "T1/T2".	
Syntax	:CURRent:T2 {<NRf>[s] | MINimum | MAXimum }	
Query Syntax	:CURRent:T2?	
Parameter	<NRf>[s]	T2 timer setting. (unit is seconds)
	MINimum	Minimum time
	MAXimum	Maximum time
Return parameter	Return the setting of the timer T2, by the "<NR2>" string.	
Example	:CURR:T2 0.2 Sets the setting of the timer T2.	
Query example	:CURR:T2? >0.2 Returns the setting of the timer T2.	
Related Commands	:CURRent:T1	

Set → / → Query

:CURRent:FREQuency

Description	Sets and queries for "Frequency" value of the CC dynamic mode. This command applies in "Dyna.Time" is "Freq/Duty".	
Syntax	:CURRent:FREQuency {<NRf> | MINimum | MAXimum }	
Query Syntax	:CURRent:FREQuency?	
Parameter	<NRf>	Sets the switching frequency.(unit is Hz)
	MINimum	Minimum frequency
	MAXimum	Maximum frequency
Return parameter	Return the switching frequency, by the "<NR2>" string.	
Example	:CURR:FREQ 60 Sets frequency to 60Hz.	
Query example	:CURR:FREQ? >60 Returns the switching frequency as 60Hz.	
Related Commands	:CURRent:DUTY	

Set → / → Query

:CURRent:DUTY

Description	Sets and queries for "Duty" % of the CC dynamic mode. This command applies in "Dyna.Time" is "Freq/Duty".	
Syntax	:CURRent:DUTY {<NRf> | MINimum | MAXimum }	
Query Syntax	:CURRent:DUTY?	
Parameter	<NRf>	Sets the duty cycle as a percentage.

	MINimum	Minimum duty cycle
	MAXimum	Maximum duty cycle
Return parameter	Return the duty cycle of positive, by the "<NR2>" string.	
Example	:CURR:DUTY 50 Sets the duty cycle 50%.	
Query example	:CURR:DUTY? >50 Returns the duty cycle as 50%.	
Related Commands	:CURRent:FREQuency	

:CURRent:RECall

Set → / → Query

Description	Sets or queries whether A Value or B Value is the currently active value in CC static mode.	
Syntax	:CURRent:RECall {A | 0 | B | 1}	
Query Syntax	:CURRent:RECall?	
Parameter	A or 0	CC active setting = A value
	B or 1	CC active setting = B value
Return parameter	0	CC active setting = A value
	1	CC active setting = B value
Example	:CURR:REC A Sets A value of CC setting mode to active.	
Query example	:CURR:REC? >0 Return the CC active setting.	

Resistance Subsystem Commands

:RESistance[:VA]

Set → / → Query

Description	Sets and queries for the "A Value" resistance of the CR static mode.
Note	A different value can be set for each current range (High/Mid/Low). The optional command node [:VA] can only be omitted when in static mode.
Syntax	:RESistance[:VA] {<NRf>[OHM] | MINimum | MAXimum }
Query Syntax	:RESistance[:VA]?
Parameter	<NRf>[OHM] "A Value" resistance value

	MINimum	Minimum resistance level
	MAXimum	Maximum resistance level
Return parameter	Return the resistance value of "A Value", by the "<NR2>" string.	
Example	:RES:VA MIN Sets the resistance value to the minimum.	
Query example	:RES:VA? >9.840 Return the resistance value(Ω) of "A Value".	

:RESistance[:VA]:TRIGgered

Set

Description	Set the resistance value when the trigger is activated.	
Syntax	:RESistance[:VA]:TRIGgered {<NRf>[OHM] | MINimum | MAXimum }	
Parameter	<NRf>[OHM]	"A Value" resistance value
	MINimum	Minimum resistance level
	MAXimum	Maximum resistance level
Example	:RES:TRIG MIN Set the minimum resistance value when the trigger is activated.	
Related Commands	*TRG, :INITiate:CONTinuous, :INITiate[:IMMediate]	

:RESistance:VB

Set / Query

Description	Sets and queries for the "B Value" resistance of the CR static mode.
⚠ Note	A different value can be set for each current range (High/Mid/Low).
Syntax	:RESistance:VB {<NRf>[OHM] | MINimum | MAXimum }

Query Syntax	:RESistance:VB?	
Parameter	<NRf>[OHM]	"B Value" resistance value
	MINimum	Minimum resistance level
	MAXimum	Maximum resistance level
Return parameter	Return the resistance value of "B Value", by the "<NR2>" string.	
Example	:RES:VB MIN Sets the resistance value to the minimum.	
Query example	:RES:VB? >9.840 Return the resistance value(Ω) of "B Value".	

:RESistance:SRATe

Set → / → Query

Description	Sets and queries for the current slew rate of CR static mode.	
Syntax	:RESistance:SRATe {<NRf> | MINimum | MAXimum }	
Query Syntax	:RESistance:SRATe?	
Parameter	<NRf>	Sets the slew rate in mA/us
	MINimum	Set to the lowest slew rate
	MAXimum	Set to the highest slew rate
Return parameter	Return the slew rate, by the "<NR2>" string.	
Example	:RES:SRAT MIN Sets the slew rate to the minimum.	
Query example	:RES:SRAT? >5.0000 Return the slew rate.	

Set →
→ Query

:RESistance:L1

Description	Sets and queries for the "Level1" resistance of the CR dynamic mode. This command applies in "Dyna.Level" is "Value".
⚠ Note	A different value can be set for each current range (High/Mid/Low).
Syntax	:RESistance:L1 {<NRf>[OHM] | MINimum | MAXimum }
Query Syntax	:RESistance:L1?
Parameter	<NRf>[OHM] "level1" resistance value MINimum Minimum resistance level MAXimum Maximum resistance level
Return parameter	Return the resistance value of "Level1", by the "<NR2>" string.
Example	:RES:L1 MIN Sets the resistance value to the minimum.
Query example	:RES:L1? >9.840 Return the resistance value(Ω) of "Level1".

Set →
→ Query

:RESistance:L2

Description	Sets and queries for the "Level2" resistance of the CR dynamic mode. This command applies in "Dyna.Level" is "Value".
⚠ Note	A different value can be set for each current range (High/Mid/Low).
Syntax	:RESistance:L2 {<NRf>[OHM] | MINimum | MAXimum }

Query Syntax	:RESistance:L2?	
Parameter	<NRf>[OHM]	"level2" resistance value
	MINimum	Minimum resistance level
	MAXimum	Maximum resistance level
Return parameter	Return the resistance value of "Level2", by the "<NR2>" string.	
Example	:RES:L2 MIN Sets the resistance value to the minimum.	
Query example	:RES:L2? >9.840 Return the resistance value (Ω) of "Level2".	

:RESistance:SET

Set → / → Query

Description	Sets and queries for the "Set" resistance of the CR dynamic mode. This command applies in "Dyna.Level" is "Percent".	
Syntax	:RESistance:SET {<NRf>[OHM] | MINimum | MAXimum }	
Query Syntax	:RESistance:SET?	
Parameter	<NRf>[OHM]	The resistance value at the time of "Level = 100%"
	MINimum	Minimum resistance value
	MAXimum	Maximum resistance value
Return parameter	Return the resistance value of "Level = 100%", by the "<NR2>" string.	
Example	:RES:SET MIN Sets the minimum resistance value of "Level = 100%".	

Query example	:RES:SET? >9.840 Return the resistance value (Ω) of "Level = 100%".

Set →
→ Query

:RESistance:LEVel

Description	Sets and queries for the "Level" % (percentage of the Set conductance value) of the CR dynamic mode. This command applies in "Dyna.Level" is "Percent".	
Syntax	:RESistance:LEVel {<NRf> | MINimum | MAXimum }	
Query Syntax	:RESistance:LEVel?	
Parameter	<NRf>	% of "Set" value level (unit is %)
	MINimum	Minimum % of "Set" conductance level
	MAXimum	Maximum % of "Set" conductance level
Return parameter	Return the Millisiemens of "% Level", by the "<NR2>" string.	
Example	:RES:LEV MIN Sets the % level Millisiemens value to the minimum.	
Query example	:RES:LEV? >50 Return the Millisiemens of "50% Level".	
Related Commands	:RESistance:SET	

Set →
→ Query

:RESistance:RISE

Description	Sets and queries for the rising current slew rate of the CR dynamic mode.	
Syntax	:RESistance:RISE {<NRf> | MINimum | MAXimum }	
Query Syntax	:RESistance:RISE?	
Parameter	<NRf>	Rising current slew rate(unit is [mA/us])

	MINimum	Minimum slew rate
	MAXimum	Maximum slew rate
Return parameter	Return the rise of the slew rate, by the "<NR2>" string.	
Example	:RES:RISE MIN Sets the rising slew rate to the minimum.	
Query example	:RES:RISE? >50.000 Return the rise of the slew rate.	
Related Commands	:RESistance:FALL	

:RESistance:FALL

Set → / → Query

Description	Sets and queries for the falling current slew rate of the CR dynamic mode.	
Syntax	:RESistance:FALL {<NRf> | MINimum | MAXimum }	
Query Syntax	:RESistance:FALL?	
Parameter	<NRf>	Falling slew rate (unit is [mA/us])
	MINimum	Minimum slew rate
	MAXimum	Maximum slew rate
Return parameter	Return the falling of the conductance slew rate, by the "<NR2>" string.	
Example	:RES:FALL MIN Sets the falling slew rate to the minimum.	
Query example	:RES:FALL? >50.000 Return the falling of the slew rate.	
Related Commands	:RESistance:RISE	

Set →
:RESistance:T1
→ Query

Description	Sets and queries for the "Timer1" time of CR dynamic mode. This command applies in "Dyna.Time" is "T1/T2".	
Syntax	:RESistance:T1 {<NRf>[s] | MINimum | MAXimum }	
Query Syntax	:RESistance:T1?	
Parameter	<NRf>[s]	T1 timer setting. (unit is seconds)
	MINimum	Minimum time
	MAXimum	Maximum time
Return parameter	Return the setting of the timer T1, by the "<NR2>" string.	
Example	:RES:T1 0.2 Sets the setting of the timer T1.	
Query example	: RES:T1? >0.2 Return the setting of the timer T1.	
Related Commands	:RESistance:T2	

Set →
:RESistance:T2
→ Query

Description	Sets and queries for the "Timer2" time of CR dynamic mode. This command applies in "Dyna.Time" is "T1/T2".	
Syntax	:RESistance:T2 {<NRf>[s] | MINimum | MAXimum }	
Query Syntax	:RESistance:T2?	
Parameter	<NRf>[s]	T2 timer setting. (unit is seconds)
	MINimum	Minimum time

	MAXimum	Maximum time
Return parameter	Return the setting of the timer T2, by the "<NR2>" string.	
Example	:RES:T2 0.2 Sets the setting of the timer T2.	
Query example	:RES:T2? >0.2 Return the setting of the timer T2.	
Related Commands	:RESistance:T1	

:RESistance:FREQuency

Set → / → Query

Description	Sets and queries for "Frequency" value of the CR dynamic mode. This command applies in "Dyna.Time" is "Freq/Duty".	
Syntax	:RESistance:FREQuency {<NRf> | MINimum | MAXimum }	
Query Syntax	:RESistance:FREQuency?	
Parameter	<NRf>	Sets the switching frequency. (unit is hertz)
	MINimum	Minimum frequency
	MAXimum	Maximum frequency
Return parameter	Return the switching frequency, by the "<NR2>" string.	
Example	:RES:FREQ 60 Sets frequency to 60Hz.	
Query example	:RES:FREQ? >60 Returns the switching frequency as 60Hz.	
Related Commands	:RESistance:DUTY	

Set →
:RESistance:DUTY
→ Query

Description	Sets and queries for "Duty" % of the CR dynamic mode. This command applies in "Dyna.Time" is "Freq/Duty".	
Syntax	:RESistance:DUTY {<NRf> | MINimum | MAXimum }	
Query Syntax	:RESistance:DUTY?	
Parameter	<NRf>	Sets the duty as a percentage.
	MINimum	Minimum duty
	MAXimum	Maximum duty
Return parameter	Return the duty cycle of positive, by the "<NR2>" string.	
Example	:RES:DUTY 50 Sets the duty cycle 50%.	
Query example	:RES:DUTY? >50 Returns the duty cycle as 50%.	
Related Commands	:RESistance:FREQuency	

Set →
:CONDuctance[:VA]
→ Query

Description	Sets and queries for the "A Value" conductance of the CR static mode.
⚠ Note	A different value can be set for each current range (High/Mid/Low). The optional command node [:VA] can only be omitted when in static mode.
Syntax	:CONDuctance [:VA] {<NRf>[mS] | MINimum | MAXimum }
Query Syntax	:RESistance[:VA]?

Parameter	<NRf>[mS]	"A Value" conductance value. Unit is [mS]
	MINimum	Minimum conductance level
	MAXimum	Maximum conductance level
Return parameter	Return the conductance value of "A Value", by the "<NR2>" string.	
Example	:COND:VA MIN Sets the conductance value to the minimum.	
Query example	:COND:VA? >9.840 Return the conductance value (mS) of "A Value".	

:CONDuctance[:VA]:TRIGgered

Set

Description	Set the conductance value when the trigger is activated.	
Syntax	:CONDuctance[:VA]:TRIGgered {<NRf>[mS] | MINimum | MAXimum }	
Parameter	<NRf>[mS]	"A Value" conductance value. Unit is mS
	MINimum	Minimum conductance level
	MAXimum	Maximum conductance level
Example	:COND:TRIG MIN Set the minimum conductance value when the trigger is activated.	
Related Commands	*TRG, :INITiate:CONTinuous, :INITiate[:IMMediate]	

:CONDuctance:VB

Set / Query

Description	Sets and queries for the "B Value" conductance of the CR static mode.
Note	A different value can be set for each current range (High/Mid/Low).

Syntax	:CONDuctance:VB {<NRf>[mS] | MINimum | MAXimum }	
Query Syntax	:CONDuctance:VB?	
Parameter	<NRf>[mS]	"B Value" conductance value. Unit is [mS]
	MINimum	Minimum conductance level
	MAXimum	Maximum conductance level
Return parameter	Return the conductance value of "B Value", by the "<NR2>" string.	
Example	:COND:VB MIN Sets the conductance value to the minimum.	
Query example	:COND:VB? >9.840 Return the conductance value ([mS]) of "B Value".	

:CONDuctance:L1

Set → / → Query

Description	Sets and queries for the "Level1" conductance of the CR dynamic mode. This command applies in "Dyna.Level" is "Value".	
Note	A different value can be set for each current range (High/Mid/Low).	
Syntax	:CONDuctance:L1 {<NRf>[mS] | MINimum | MAXimum }	
Query Syntax	:CONDuctance:L1?	
Parameter	<NRf>[mS]	"level1" conductance value. Unit is [mS]
	MINimum	Minimum conductance level
	MAXimum	Maximum conductance level
Return parameter	Return the conductance value of "Level1", by the "<NR2>" string.	

Example	:COND:L1 MIN Sets the conductance value to the minimum.
Query example	:COND:L1? >9.840 Return the conductance value ([mS]) of "Level1".

Set → → Query

:CONDuctance:L2

Description	Sets and queries for the "Level2" conductance of the CR dynamic mode. This command applies in "Dyna.Level" is "Value".	
⚠ Note	A different value can be set for each current range (High/Mid/Low).	
Syntax	:CONDuctance:L2 {<NRf>[mS] | MINimum | MAXimum }	
Query Syntax	:CONDuctance:L2?	
Parameter	<NRf>[mS]	"level2" conductance value. Unit is [mS]
	MINimum	Minimum conductance level
	MAXimum	Maximum conductance level
Return parameter	Return the Millisiemens value of "Level2", by the "<NR2>" string.	
Example	:COND:L2 MIN Sets the conductance value to the minimum.	
Query example	:COND:L2? >9.840 Return the conductance value ([mS]) of "Level2".	

Set → / → Query

:CONDuctance:SET

Description	Sets and queries for the "Set" conductance of the CR dynamic mode. This command applies in "Dyna.Level" is "Percent".	
Syntax	:CONDuctance:SET {<NRf>[mS] | MINimum | MAXimum }	
Query Syntax	:CONDuctance:SET?	
Parameter	<NRf>[mS]	The conductance value at the time of "Level = 100%". Unit is [mS]
	MINimum	Minimum conductance level
	MAXimum	Maximum conductance level
Return parameter	Return the conductance value of "Level = 100%", by the "<NR2>" string.	
Example	:COND:SET MIN Sets the minimum conductance value of "Level = 100%".	
Query example	:COND:SET? >9.840 Return the conductance value ([mS]) of "Level = 100%".	

Set → / → Query

:CONDuctance:RECall

Description	Sets or queries whether A Value or B Value is the currently active value in CR static mode when the units are set to Siemens.	
Syntax	:CONDuctance:RECall {A | 0 | B | 1}	
Query Syntax	:CONDuctance:RECall?	
Parameter	A or 0	CR Value = A Value
	B or 1	CR Value = B Value

Return parameter	0	CR Value = A Value
	1	CR Value = B Value
Example	:COND:REC A Sets A value of CR conductance setting mode to active.	
Query example	:RES:REC? >0 Return the CR conductance mode active setting.	

Set →
→ Query

:RESistance:RECall

Description	Sets or queries whether A Value or B Value is the currently active value in CR static mode when the units are set to ohm.	
Syntax	:RESistance:RECall {A | 0 | B | 1}	
Query Syntax	:RESistance:RECall?	
Parameter	A or 0	CR Value = A Value
	B or 1	CR Value = B Value
Return parameter	0	CR Value = A Value
	1	CR Value = B Value
Example	:RES:REC A Sets A value of CR resistance setting mode to active.	
Query example	:RES:REC? >0 Return the CR resistance mode active setting.	

Voltage Subsystem Commands

:VOLTage[:VA]

Set → Query

Description	Sets and queries for the CV mode "A Value" voltage or the +CV voltage value.	
Note	The same value applies for each current range (High/Mid/Low). The optional command node [:VA] can only be omitted when in static mode.	
Syntax	:VOLTage[:VA] {<NRf>[V] | MINimum | MAXimum }	
Query Syntax	:VOLTage[:VA]?	
Parameter	<NRf>[V]	"A Value" voltage value
	MINimum	Minimum voltage level
	MAXimum	Maximum voltage level
Return parameter	Return the voltage value of "A Value", by the "<NR2>" string.	
Example	:VOLT:VA MIN Sets the voltage value to the minimum.	
Query example	:VOLT:VA? >1.00 Voltage setting of "A Value" is set to 1V.	

:VOLTage:VB

Set → Query

Description	Sets and queries for the CV mode "B Value".
Note	The same value applies for each current range (High/Mid/Low).

Syntax	:VOLTage:VB {<NRf>[V] | MINimum | MAXimum }	
Query Syntax	:VOLTage:VB?	
Parameter	<NRf>[V]	"B Value" voltage value
	MINimum	Minimum voltage level
	MAXimum	Maximum voltage level
Return parameter	Return the voltage value of "B Value", by the "<NR2>" string.	
Example	:VOLT:VB MIN Sets the voltage value to the minimum.	
Query example	:VOLT:VB? >1.00 Voltage setting of "B Value" is set to 1V.	

:VOLTage:RECall

Set → / → Query

Description	Sets or queries whether A Value or B Value is the currently active value in CV mode.	
Syntax	:VOLTage:RECall {A | 0 | B | 1}	
Query Syntax	:VOLTage:RECall?	
Parameter	A or 0	CV active setting = A Value
	B or 1	CV active setting = B Value
Return parameter	0	CV active setting = A Value
	1	CV active setting = B Value
Example	:VOLT:REC A Sets A value of CV setting mode to active.	
Query example	:VOLT:REC? >0 Return the CV active setting.	

Power Subsystem Commands

:POWer[:VA]

Set → / → Query

Description	Sets and queries for the "A Value" power of the CP static mode.	
Note	A different current value can be set for each current range (High/Mid/Low). The [:VA] node can only be omitted when in static mode.	
Syntax	:POWer[:VA] {<NRf>[W] | MINimum | MAXimum }	
Query Syntax	:POWer[:VA]?	
Parameter	<NRf>[W]	"A Value" power value
	MINimum	Minimum power level
	MAXimum	Maximum power level
Return parameter	Return the power value of "A Value", by the "<NR2>" string.	
Example	:POW:VA MIN Sets the power value to the minimum.	
Query example	:POW:VA? >10 Power setting of "A Value" is set to 10W.	

:POWer:VB

Set → / → Query

Description	Sets and queries for the "B Value" power of the CP static mode.
Note	A different current value can be set for each current range (High/Mid/Low).
Syntax	:POWer:VB {<NRf>[W] | MINimum | MAXimum }
Query Syntax	:POWer:VB?
Parameter	<NRf>[W] "B Value" power value MINimum Minimum power level MAXimum Maximum power level
Return parameter	Return the power value of "B Value", by the "<NR2>" string.
Example	:POW:VB MIN Sets the power value to the minimum.
Query example	:POW:VB? >10 Power setting of "B Value" is set to 10W.

:POWer:L1

Set → / → Query

Description	Sets and queries for the "Level1" power of the CP dynamic mode. This command applies in "Dyna.Level" is "Value".
Note	A different "Level1" value can be set for different current ranges.
Syntax	:POWer:L1 {<NRf>[W] | MINimum | MAXimum }
Query Syntax	:POWer:L1?
Parameter	<NRf>[W] "Level1" power value MINimum Minimum power level

	MAXimum	Maximum power level
Return parameter	Return the power value of "Level1", by the "<NR2>" string.	
Example	:POW:L1 MIN Sets the power value to the minimum.	
Query example	:POW:L1? >10 Power setting of "Lewel1" is set to 10W.	

:POWer:L2

Set → → Query

Description	Sets and queries for the "Level2" power of the CP dynamic mode. This command applies in "Dyna.Level" is "Value".	
⚠ Note	A different "Level2" value can be set to different current ranges.	
Syntax	:POWer:L2 {<NRf>[W] | MINimum | MAXimum }	
Query Syntax	:POWer:L2?	
Parameter	<NRf>[W]	"Level2" power value
	MINimum	Minimum power level
	MAXimum	Maximum power level
Return parameter	Return the power value of "Level2", by the "<NR2>" string.	
Example	:POW:L2 MIN Sets the power value to the minimum.	
Query example	:POW:L2? >10 Power setting of "Lewel2" is set to 10W.	

:POWer:SET

Set → / → Query

Description	Sets and queries for the "Set" power of the CP dynamic mode. This command applies in "Dyna.Level" is "Percent".	
Syntax	:POWer:SET {<NRf>[W] | MINimum | MAXimum }	
Query Syntax	:POWer:SET?	
Parameter	<NRf>[W]	The power value at the time of "Level = 100%"
	MINimum	Minimum power value
	MAXimum	Maximum power value
Return parameter	Return the power value of "Level = 100%", by the "<NR2>" string.	
Example	:POW:SET MIN Sets the minimum power value of "Level = 100%".	
Query example	:POW:SET? >10 power value of "Level = 100%" is set to 10W.	
Related Commands	:POWer:LEVel	

:POWer:LEVel

Set → / → Query

Description	Sets and queries for the "Set" power of the CP dynamic mode. This command applies in "Dyna.Level" is "Percent".	
Syntax	:POWer:LEVel {<NRf> | MINimum | MAXimum }	
Query Syntax	:POWer:LEVel?	
Parameter	<NRf>	% of "Set" power level (unit is %)
	MINimum	Minimum % power level

	MAXimum	Maximum % power level
Return parameter	Return the power of "% Level", by the "<NR2>" string.	
Example	:POW:LEV MIN Sets the % level power value to the minimum.	
Query example	:POW:LEV? >50 Percentage of the set power value is set to 50%.	
Related Commands	:POWer:Set	

:POWer:T1

Set → / → Query

Description	Sets and queries for the "Timer1" time of CP dynamic mode. This command applies in "Dyna.Time" is "T1/T2".	
Syntax	:POWer:T1 {<NRf>[s] | MINimum | MAXimum }	
Query Syntax	:POWer:T1?	
Parameter	<NRf>[s]	T1 timer setting. (unit is seconds)
	MINimum	Minimum time
	MAXimum	Maximum time
Return parameter	Return the setting of the timer T1, by the "<NR2>" string.	
Example	:POW:T1 0.2 Sets the setting of the timer T1.	
Query example	:POW:T1? >0.2 Return the setting of the timer T1.	
Related Commands	:POWer:T2	

Set →
:POWer:T2
→ Query

Description	Sets and queries for the "Timer2" time of CP dynamic mode. This command applies in "Dyna.Time" is "T1/T2".	
Syntax	:POWer:T2 {<NRf>[S] | MINimum | MAXimum }	
Query Syntax	:POWer:T2?	
Parameter	<NRf>[S]	T2 timer setting. (unit is seconds)
	MINimum	Minimum time
	MAXimum	Maximum time
Return parameter	Return the setting of the timer T2, by the "<NR2>" string.	
Example	:POW:T2 0.2 Sets the setting of the timer T2.	
Query example	:POW:T2? >0.2 Returns the setting of the timer T2.	
Related Commands	:POWer:T1	

Set →
:POWer:FREQuency
→ Query

Description	Sets and queries for "Frequency" value of the CP dynamic mode. This command applies in "Dyna.Time" is "Freq/Duty".	
Syntax	:POWer:FREQuency {<NRf> | MINimum | MAXimum }	
Query Syntax	:POWer: FREQuency?	
Parameter	<NRf>	Sets the switching frequency. (unit is hertz).

	MINimum	Minimum frequency
	MAXimum	Maximum frequency
Return parameter	Return the switching frequency, by the "<NR2>" string.	
Example	:POW: FREQ 60 Sets the frequency to 60Hz.	
Query example	:POW: FREQ? >60 Returns the switching frequency as 60Hz.	
Related Commands	:POWer: DUTY	

:POWer:DUTY

Set → / → Query

Description	Sets and queries for "Duty" % of the CP dynamic mode. This command applies in "Dyna.Time" is "Freq/Duty".	
Syntax	:POWer:DUTY {<NRf> | MINimum | MAXimum }	
Query Syntax	:POWer:DUTY?	
Parameter	<NRf>	Sets the duty cycle as a percentage.
	MINimum	Minimum duty
	MAXimum	Maximum duty
Return parameter	Return the duty cycle of positive, by the "<NR2>" string.	
Example	:POW:DUTY 50 Sets the duty cycle 50%.	
Query example	:POW:DUTY? >50 Returns the duty cycle as 50%.	
Related Commands	:POWer:FREQuency	

Set →
→ Query

:POWer:RECall

Description	Sets or queries whether A Value or B Value is the currently active value in CP mode.	
Syntax	:POWer:RECall {A | 0 | B | 1}	
Query Syntax	:POWer:RECall?	
Parameter	A or 0	CP active setting = A Value
	B or 1	CP active setting = B Value
Return parameter	0	CP active setting = A Value
	1	CP active setting = B Value
Example	:POW:REC A Sets A value of CP setting mode to active.	
Query example	:POW:REC? >0 Return the CP active setting.	

Program Commands

To execute / stop the program function, use: INPUT command.

:FUNCtion[:COMPlete][:RING]:TIME

Set → / → Query

Description	Sets and queries for how long the alarm will buzz for after a program, NSEQ, FSEQ or OCP test function has finished.	
Syntax	:FUNCtion[:COMPlete][:RING]:TIME {<NR1> | MINimum | MAXimum | INFinity}	
Query Syntax	:FUNCtion[:COMPlete][:RING]:TIME? [MINimum | MAXimum]	
Parameter	<NR1>	Alarm time in seconds (0~600); 0 = OFF
	MINimum	Minimum alarm time
	MAXimum	Maximum alarm time
	INFinity	Sets the alarm time to infinity.
Return parameter	<NR1>	Alarm time in seconds

	Infinity	Infinite
	OFF	Function complete ring time is off.
Example	:FUNC:TIME 5 Sets the function complete ring time to 5s.	
Query example	:FUNC:TIME? >5 The function complete ring time is set as 5s.	

:PROGram:STATe

Set → / → Query

Description	Sets and queries for the state of the program function.	
Syntax	:PROGram:STATe {ON | OFF | PAUSe | CONTinue | NEXT}	
Query Syntax	:PROGram:STATe?	
Parameter	ON	Turn program function on
	OFF	Program function off
	PAUSe	Program function pause
	RUN	Program function running
	CONTinue	Program function continue
	NEXT	Next step in the program function
Return parameter	Return the state of the program function. Return the on status of program function, by the "ON,{STOP | RUN | PAUSE }" string. ("STOP": stopped, "RUN": running, "PAUSE": paused) Return the off status of program function, by the "OFF" string: Program function is off.	
Example	:PROG:STAT ON Turn program function on.	

Query example	:PROG:STAT? >ON,STOP Return the state of the program function.

:PROGram

Set → / → Query

Description	Sets and queries for all parameters to specified step of the program function. Parameters of "Timing Edit for Program"	
Syntax	:PROGram (1),(2),(3),(4),(5),(6),(7),(8)	
Query Syntax	:PROGram?	
Parameter	(1) <NR1>	Program number (1~16)
	(2) <NR1>	Step number (1~16)
	(3) <NR1>	Internal memory number (1~256)
	(4) <ASCII string>	Processing settings AUTO: Run processing MANUAL: Wait for the start-up process. SKIP: Proceed to the next step
	(5) <NRf>	On-time (0.1~60)s
	(6) <NRf>	Off-time (Off,0.1~60)s
	(7) <NRf>	Delay time of the P/F (Off,0.0 ~119.9)s
	(8) <NRf>	Short time (Off,0.1 ~ On-Time)s
Return parameter	(1) <ASCII string>	Return the program function.{ON|OFF}
	(2) <ASCII string>	Program number
	(3) <ASCII string>	Step number
	(4) <ASCII string>	Internal memory number
	(5) <ASCII string>	Processing is returned by Auto/Manual/Skip.

	(6) <ASCII string>	On-time (unit is seconds)
	(7) <ASCII string>	Off-time (unit is seconds)
	(8) <ASCII string>	Delay time of the P/F(unit is seconds)
	(9) <ASCII string>	Short time (unit is seconds)
Example	:PROG 2,3,1,AUTO,40.1,0,0,0 Set all the parameters to specified program step.	
Query example	:PROG? >Program:OFF; Start:1, Step:1, Memory:1, Run:Skip, On-Time:0.1, Off-Time:0.0, P/F-Time:0.0, Short-Time:0.0 Return the parameters of the program step that is selected after the state of the program function.	

:PROGram[:RECall]:DEFault

Set

Description	All steps of a selected program are set by default value.
Syntax	:PROGram[:RECall]:DEFault
Example	:PROG:DEF All steps of a selected program are set by default value.

:PROGram:STARt

Set / Query

Description	Sets and queries for select program number. (Contents of PROG:)	
Syntax	:PROGram:STARt <NR1>	
Query Syntax	:PROGram:STARt?	
Parameter	<NR1>	Program number to select. (1~16)
Return parameter	Return the Program number in selected, by the "Start:<NR1>" string.	

Example	:ROG:STAR 1 Sets to 1 of program number.
Query example	:PROG:STAR? >Start:1 Return The selected program number.

Set → → Query

:PROGram:STEP

Description	Sets and queries for the step number of the program to select. (Contents of STEP:)
Syntax	:PROGram:STEP <NR1>
Query Syntax	:PROGram:STEP?
Parameter	<NR1> Step number to select. (1~16)
Return parameter	Return the step number of the program, by the "Step:<NR1>" string.
Example	:PROG:STEP 1 Sets to 1 of step number.
Query example	:PROG:STEP? >Step:1 Return the step number of the program.

Set → → Query

:PROGram:MEMory

Description	Sets and queries for memory number of selected program steps. (Contents of Memory:)
Syntax	:PROGram:MEMory <NR1>
Query Syntax	:PROGram:MEMory?
Parameter	<NR1> Sets the memory number. (1~256)
Return parameter	Return the memory number of selected, by the "Memory:M<NR1>" string.
Example	:PROG:MEM 1 Sets to 1 of memory number.

Query example	:PROG:MEM? >Memory:M 1 Return the memory number of selected.

Set →
→ Query

:PROGram:RUN

Description	Sets and queries for execution process of selected program steps. (Contents of Run:)	
Syntax	:PROGram:RUN { AUTO | MANual | SKIP}	
Query Syntax	:PROGram:RUN?	
Parameter	AUTO	Sets to auto-run processing.
	MANual	Sets to wait run.
	SKIP	Sets to the next processing steps.
Return parameter	Return the execution process, by the "Run:{Auto | Manual | Skip}" string.	
Example	:PROG:RUN AUTO Sets to auto-run processing.	
Query example	:PROG:RUN? >Run:Auto Return the execution process.	

Set →
→ Query

:PROGram:ONTime

Description	Sets and queries for On time of selected program steps. (Contents of On-Time:)	
Syntax	:PROGram:ONTime <NRf>	
Query Syntax	:PROGram:ONTime?	
Parameter	<NRf>	On time (0.1~60 seconds)
Return parameter	Return the On time of selected program steps, by the "On-Time:<NR2>" string.	
Example	:PROG:ONT 1 Sets to 1 second On time.	

Query example	:PROG:ONT? >On-Time:0.1 Return in seconds On time.
Related Commands	:PROGram:PFTime :PROGram:STIMe

Set → Query

:PROGram:OFFTime

Description	Sets and queries for Off time of selected program steps. (Contents of Off-Time:)	
Syntax	:PROGram:OFFTime {<NRf> | OFF}	
Query Syntax	:PROGram:OFFTime?	
Parameter	<NRf>	Off time (Off,0.1~60 seconds) Setting of 0 is off Setting function.
	OFF	Setting off function
Return parameter	Return the Off time of selected program steps, by the "Off-Time:<NR2>" string. "Off-Time:0.0" is a function off.	
Example	:PROG:PFT 1 Sets to 1 second Off time.	
Query example	:PROG:OFFT? >Off-Time:1.0 Return the Off time.	
Related Commands	:PROGram:PFTime	

Set → Query

:PROGram:PFTime

Description	The pass / fail judgment (Go-NoGo Test) of the program selected step. Sets and queries for the judgment delay time. (Contents of P/F-Time:)
Syntax	:PROGram:PFTime {<NRf> | OFF}

Query Syntax	:PROGram:PFTime?	
Parameter	<NRf>	Set in seconds the judgment delay time. (Off,0.0~119.9)s 0 setting is off a judgment function.
	OFF	Sets off Judgment function
Return parameter	Return the judgment delay time, by the "P/F-Time:<NR2>" string. "P/F-Time:0.0" is a function off.	
Example	:PROG:PFT 1 Delay time of the judgment sets 1 second.	
Query example	:PROG:PFT >P/F-Time:1.0 Return the judgment delay time.	
Related Commands	:PROGram:OFFTime :PROGram:ONTime	

:PROGram:STIMe

Set → Query

Description	Sets and queries for load short time of selected program step. (Contents of Short-Time:)	
Syntax	:PROGram:STIMe <NR1>	
Query Syntax	:PROGram:STIMe?	
Parameter	<NRf>	Sets in time seconds of load short time. (Off,0.1 ~ On-Time)s 0 setting is the off feature of load short.
	OFF	Sets the off feature of load short.
Return parameter	Return the setting time of load short, by the "Short-Time:<NR2>" string.	
Example	:PROG:STIM 1 Sets to 1 second of load short.	

Query example	:PROG:STIM? >Short-Time:0.0 Return the setting time of load short.
Related Commands	:PROGram:ONTime

[:PROGram]:CHAin:STARt

Set → / → Query

Description	Sets and queries for the start program number of the program chain. (Contents of Start) Parameters of "Program Chain Set"
Syntax	[:PROGram]:CHAin:STARt <NR1>
Query Syntax	[:PROGram]:CHAin:STARt?
Parameter	<NR1> Start program number.
Return parameter	Return the start program number, by the "P<NR1>"string.
Example	:CHA:STAR 1 Sets to number 1 start program.
Query example	:CHA:STAR? >P1 Return the start program number.

[:PROGram]:CHAin

Set → / → Query

Description	Sets and queries for all chain of the program chain. (Contents of PXX)
Syntax	[:PROGram]:CHAin (1),(2),(3),(4),(5),(6),(7),(8),(9),(10),(11),(12),(13),(14),(15),(16)
Query Syntax	[:PROGram]:CHAin?
Parameter	(1)~(16) <NR1> Is a program number to be chain. "OFF" sets off the chain.

Return parameter	<ASCII string>	Return the setting value of all program chain. “Off” is the end of the chain.
Example	:CHA 4,OFF,OFF,5,6,OFF,OFF,OFF,OFF,OFF,OFF,OFF,OFF,OFF,OFF Configures the program chain as follows: P01→P04→P05→P06→OFF	
Query example	:CHA? >P1->P4;P2->Off;P3->Off;P4->P5;P5->P6;P6->Off;P7->Off;P8->Off;P9->Off;P10->Off;P11->Off;P12->Off;P13->Off;P14->Off;P15->Off;P16->Off Return the setting value of all program chain.	

[:PROGram]:CHAin:P2P

Set → / → Query

Description	Sets and queries for a single link in the program chain.	
Syntax	[:PROGram]:CHAin:P2P (1),(2)	
Query Syntax	[:PROGram]:CHAin:P2P? PX	
Parameter	(1) <NR1>	(1~16) Program number of single link.
	(2) {<NR1> | OFF}	(1~16) Program number that follows.
Query parameter	PX	P1~P16 The program number of the first link of the chain that you are inquiring about.
Return parameter	PX→PX|OFF	Returns the program number that follows or OFF.
Example	:CHA:P2P 4,3 Program 4 will chain set in the program 3.P4→P3	

Query example	:CHA:P2P? P4 >P4->3 Indicates that program 3 follows from program 4 in the chain.P4→P3

[:PROGram]:CHAin[:RECall]:DEFault

Set ⟶

Description	Turn off all the program chains.
Syntax	[:PROGram]:CHAin[:RECall]:DEFault
Example	:CHA:DEF Turn off all the program chain.

:PROGram:SAVE

Set ⟶

Description	Save program.
Syntax	:PROG:SAVE
Example	:PROG:SAVE Save program.

Normal sequence Commands

To execute / stop the test, use: INPUT command.

:NSEQuence:STATe

Set → / → Query

Description	Sets and queries for the state of the Normal Sequence function.	
Syntax	:NSEQuence:STATe {OFF|ON|PAUSe|CONTinue|EXT}	
Query Syntax	:NSEQuence:STATe?	
Parameter	OFF	Normal sequence function Off
	ON	Normal sequence function On
	PAUSe	Pause sequence function
	CONTinue	Continue sequence function
	NEXT	Go to next sequence function

Return parameter	Return the state of the normal sequence function. Return the on status of the normal sequence function, by the "ON, {STOP | RUN | PAUSE}" string. ("STOP": stopped, "RUN": running, "PAUSE": Suspended) Return the off status of the normal sequence function, by the "OFF" string. Normal sequence function is off
Example	:PROG:STAT ON Turn on the normal sequence function.
Query example	:PROG:STAT? >ON,STOP Return the state of the normal sequence function.

:NSEQuence

Set → / → Query

Description	Sets and queries for parameters of the Normal Sequence function. Parameters of "Timing Edit for Normal Sequence"
⚠ Note	Cannot change the range and mode of the load when there is a step data.
Syntax	:NSEQuence (1),(2),(3),(4),(5),(6),(7),(8),(9)
Query Syntax	:NSEQuence?

Parameter		
	(1) <NR1>	Sets the start sequence number.(1~10)
	(2) <NR1>	Sets the sequence number. (1~10)
	(3) <ASCII string>	Sets the note of up to 12 characters. Enclose the string in double coat.
	(4) <ASCII string>	Sets the load mode. {CC | CR | CV | CP}

	(5) <ASCII string>	Sets the load range. {IHVH | IMVH | ILVH | IHVL | IMVL | ILVL}
	(6) <ASCII string>	Sets the loop count of the sequence. <NR1> 0 is infinite times. 1~9999. INFinity
	(7) <ASCII string>	Sets the Last Load after the end. {ON | OFF}
	(8) <NRf>	Sets the Last Value after the end. (The Last Load ON is enabled by ON.)
	(9) <ASCII string>	Sets the chain of the next sequence. <NR1> : Sequence number OFF : No chain
Return parameter	(1) <ASCII string>	Return whether it is in normal sequence function state. {ON|OFF}
	(2) <ASCII string>	Return the start sequence number setting.
	(3) <ASCII string>	Return the sequence number setting.
	(4) <ASCII string>	Return the contents of the memo.
	(5) <ASCII string>	Return the load mode setting. {CC | CR | CV | CP}
	(6) <ASCII string>	Return the load range setting.{IHVH | IMVH | ILVH | IHVL | IMVL | ILVL}
	(7) <ASCII string>	Return the loop count of the sequence. (Infinite times is the string “Infinity”.)

	(8) <ASCII string>	Return the Last Load after the end. {ON|OFF}
	(9) <ASCII string>	Return the Last Value after the end.
	(10)<ASCII string>	Return the chain setting of the next sequence. (No-chain is a string "OFF".)
Example	:NSEQ 1,1, "ABC",CC,ILVL,5,ON,1.5000,OFF Sets the parameters of "Timing Edit for Normal Sequence".	
Query example	:NSEQ? >NSeq:ON; Start:1, Seq No:1, Memo:ABC, Mode:CC, Range:ILVL, Loop:5, Last Load:ON, Last:1.5000, Chain:Off Return the parameters of "Timing Edit for Normal Sequence".	

:NSEQuence:STARt

Set → / → Query

Description	Sets and queries for the start sequence number of the normal sequence. (Contents of Start:)	
Syntax	:NSEQuence:STARt <NR1>	
Query Syntax	:NSEQuence:STARt?	
Parameter	<NR1>	Sets the start sequence number. (1~10)
Return parameter	Return the start sequence number of the normal sequence, by the "Start:<NR1>" string.	
Example	:NSEQ:STAR 1 Sets the start sequence number of the normal sequence.	
Query example	:NSEQ:STAR? >Start:1 Return the start sequence number of normal sequence.	

Set →
:NSEQuence:NUMBer
→ Query

Description	Sets and queries for the sequence number of the normal sequence. (Contents of Seq.No:)
Syntax	:NSEQuence:NUMBer <NR1>
Query Syntax	:NSEQuence:NUMBer?
Parameter	<NR1> Sets the sequence number. (1~10)
Return parameter	Return the sequence number of the normal sequence by the "Seq No:<NR1>" string.
Example	:NSEQ:NUMB 1 Sets to 1 of normal sequence number.
Query example	:NSEQ:NUMB? >Seq No:1 Return a sequence number that is selected.

Set →
:NSEQuence:MEMO
→ Query

Description	Sets and queries for the memo string of normal sequence. (Contents of Memo:)
Syntax	:NSEQuence:MEMO <ASCII string>
Query Syntax	:NSEQuence:MEMO?
Parameter	<ASCII string> Set the characters up to 8 characters. Enclose the string in double coat.
Return parameter	Return the memo of normal sequence that is selected, by the "Memo:<ASCII string>" string.
Example	:NSEQ:MEMO "ABCD" Sets the memo of step.
Query example	:NSEQ:MEMO? >Memo:ABCD Return the memo of step.

Set →
:NSEQuence:MODE
→ Query

Description	Sets and queries for the operating mode of the selected normal sequence. (Contents of Mode:)	
Syntax	:NSEQuence:MODE {CC | CR | CV | CP}	
Query Syntax	:NSEQuence:MODE?	
Parameter	CC	Sets to constant current mode.
	CR	Sets to constant resistance mode.
	CV	Sets to constant voltage mode.
	CP	Sets to constant power mode.
Return parameter	Return the operating mode of the normal sequence, by the "Mode:{CC | CR | CV | CP}" string.	
Example	:NSEQ:MODE CC Sets the operating mode of the normal sequence.	
Query example	:NSEQ:MODE? >Mode:CC Return the operating mode of the normal sequence.	

Set →
:NSEQuence:RANGe
→ Query

Description	Sets and queries for the operating range of the selected normal sequence. (Contents of Range:)	
Syntax	:NSEQuence:RANGe { IHVH | IMVH | ILVH | IHVL | IMVL | ILVL}	
Query Syntax	:NSEQuence:RANGe?	
Parameter	IHVH	Sets High current range and High voltage range.
	IMVH	Sets Middle current range and High voltage range.
	ILVH	Sets Low current range and High voltage range.

	IHVL	Sets High current range and Low voltage range.
	IMVL	Sets Middle current range and Low voltage range.
	ILVL	Sets Low current range Low voltage range.
Return parameter	Return the operating range of the normal sequence, by the "Range:{IHVH | IMVH | ILVH | IHVL | IMVL | ILVL}" string.	
Example	:NSEQ:RANG IHVL Sets operating of High current range and Low voltage range.	
Query example	:NSEQ:RANG? > Range:IHVL Return the operating range of settings.	

:NSEQuence:LOOP

Set → / → Query

Description	Sets and queries for number of loops of normal sequence. (Contents of Loop:)	
Syntax	:NSEQuence:LOOP {<NR1> | INFinity }	
Query Syntax	:NSEQuence:LOOP?	
Parameter	<NR1>	Loop count setting. (1~9999)
	INFinity	Infinite number of times.
Return parameter	Return the number of loops of normal sequence, by the "Loop:{<NR1> | Infinity}" string.	
Example	:NSEQ:LOOP 1 Sets 1 to loop count of normal sequence.	
Query example	:NSEQ:LOOP? >Loop:Infinity Return the loop number of normal sequence.	

Set →
:NSEQuence:LLOAD
→ Query

Description	Sets and queries for the Last Load state after the end of the normal sequence. (Contents of Last Load:)	
Syntax	:NSEQuence:LLOAD {ON | OFF}	
Query Syntax	:NSEQuence:LLOAD?	
Parameter	ON	Turns Last Load on.
	OFF	Turns Last Load off.
Return parameter	Return the Last Load state of the load after the end of the step, by the "Last Load:{ON | OFF}" string.	
Example	:NSEQ:LLOAD ON Turns Last Load on.	
Query example	:NSEQ:LLOAD? >Last Load:OFF Return the Last Load state after the end of the step.	
Related Commands	:NSEQuence:LAST	

Set →
:NSEQuence:LAST
→ Query

Description	Sets and queries for load value after the end of the normal sequence. (Contents of Last:)	
Syntax	:NSEQuence:LAST <NR2>	
Query Syntax	:NSEQuence:LAST?	
Parameter	<NR2>	Sets load value after the end of step.
Return parameter	Return load value of after the step the end, by the "Last:<NR2>" string.	
Example	:NSEQ:LAST 1 Sets load value of after the step the end.	

Query example	:NSEQ:LAST? >Last:1.00 Return load value of after the step the end.
Related Commands	:NSEQuence:LLOAD

:NSEQuence:CHAin

Set → Query

Description	Query and settings for the next sequence in the chain. (Contents of Chain:)	
Syntax	:NSEQuence:CHAin {<NR1> | OFF}	
Query Syntax	:NSEQuence:CHAin?	
Parameter	<NR1>	The sequence number of the next sequence in the chain.
	OFF	chain is end.
Return parameter	Return the chain of Normal sequence number, by the "Chain:{<NR1>|Off}" string. "Off" is the end of the chain.	
Example	:NSEQ:CHA 1 Sets the next sequence in the chain as S01.	
Query example	:NSEQ:CHA? >Chain:1 Returns the next sequence in the chain (S01).	

:NSEQuence:EDIT

Set → Query

Description	Sets and queries for the data edit of normal sequence. Parameters of "Data Edit for Normal Sequence"	
Syntax	:NSEQuence:EDIT (1),(2),(3),(4),(5),(6),(7),(8),(9),(10),(11)	
Query Syntax	:NSEQuence:EDIT?	
Parameter	(1) <NR1>	The edit step number.

	(2) <NR1>	The total number of steps.
	(3) <NRf>	Sets a load value of operation mode.
	(4) <NR1>	Sets hours.
	(5) <NR1>	Sets minute.
	(6) <NR1>	Sets seconds.
	(7) <NR1>	Sets milliseconds.
	(8) <ASCII string>	Load setting. {ON | OFF}
	(9) <ASCII string>	Ramp operation setting. {ON | OFF}
	(10)<ASCII string>	Trigger Output setting. {ON | OFF}
	(11)<ASCII string>	PAUSE Setting. {ON | OFF}
Return parameter	(1) <ASCII string>	Return the edit step number/total step number.
	(2) <ASCII string>	Return the setting value of the load of the operating mode.
	(3) <ASCII string>	Return the set time.
	(4) <ASCII string>	Return the setting of the load state.
	(5) <ASCII string>	Return the setting of the ramp operation.
	(6) <ASCII string>	Return the setting of TRIG OUT.
	(7) <ASCII string>	Return the setting of pause.
Example	:NSEQ:EDIT 1,2,1,1,2,3,4,OFF,OFF,OFF,OFF Sets the data of normal step sequence program.	
Query example	:NSEQ:EDIT? > Step:1/2, Value:1.000, Time:1H:2M:3S:4mS, LOAD:OFF, RAMP:OFF, TRIG OUT:OFF, PAUSE:OFF Return the selected step data of normal sequence program.	

Set →

:NSEQuence:EDIT:POINt

→ Query

Description	Sets and queries for the edit step number of the normal sequence.	
Syntax	:NSEQuence:EDIT:POINt {<NR1>}	
Query Syntax	:NSEQuence:EDIT:POINt?	
Parameter/ Return parameter	<NR1>	1~1000 The edit step number of the normal sequence.
Example	:NSEQuence:EDIT:POINt 10 Sets the edit step number 10.	
Query example	:NSEQuence:EDIT:POINt? >10 Returns the edit step number.	
Related Commands	:NSEQuence:EDIT:END?	

:NSEQuence:EDIT:END

→ Query

Description	Returns the end of edit step number in the normal sequence.	
Query Syntax	:NSEQuence:EDIT:END?	
Return parameter	<NR1>	1~1000
Query Example	:NSEQuence:EDIT:END? > 20 Returns the end of edit step number.	

:NSEQuence[:DELet]:ALL

Set →

Description	Delete all the steps of the selected normal sequence.
Syntax	:NSEQuence[:DELet]:ALL

Example	:NSEQ:ALL Delete all the steps of the selected normal sequence.

:NSEQuence:SAVE

Set →

Description	Save program of normal sequence.
Syntax	:NSEQuence:SAVE
Example	:NSEQ:SAVE Save program of normal sequence.

:NSEQuence:COTime

Set → / → Query

Description	Sets and queries for the display timer of the normal sequence.	
Syntax	:NSEQuence:COTime {UP|DOWN}	
Query Syntax	:NSEQuence:COTime?	
Parameter	UP	Elapsed time (Count up)
	DOWN	Remaining (Count down)
Return parameter	:NSEQ:COT UP Sets the display timer to UP (elapsed time).	
Example	:NSEQ:COT? >UP Returns the display timer as UP (elapsed time).	

Fast sequence Commands

To execute / stop the test, use: INPUT command.

:FSEQuence:STATe

Set → / → Query

Description	Sets and queries for the state of the fast sequence function.	
Syntax	:FSEQuence:STATe {OFF | ON}	
Query Syntax	:FSEQuence:STATe?	
Parameter	OFF	Turn fast sequence function off
	ON	Turn fast sequence function on
Return parameter	Return the state of the fast sequence function. "ON,{STOP | RUN }" string. ("STOP": stopped, "RUN": running) "OFF" string means that fast sequence is off.	
Example	:FSEQ:STAT ON Turn on the fast sequence.	

Query example	:FSEQ:STAT?	
	>ON,STOP	
	The fast sequence function is on, and stopped	

:FSEQuence

Set → / → Query

Description	Sets and queries for parameters of fast sequence. parameters of "Timing Edit Fast Sequence"	
Syntax	:FSEQuence (1),(2),(3),(4),(5),(6),(7)	
Query Syntax	:FSEQuence?	
Parameter	(1) <ASCII string>	Sets the note of up to 12 characters. Enclose the string in double coat.
	(2) <ASCII string>	Sets the load mode. {CC | CR}
	(3) <ASCII string>	Sets the load range. {IHVH | IMVH | ILVH | IHVL | IMVL | ILVL}
	(4) <ASCII string>	Return the loop count of the sequence. (An infinite time is the string "Infinity".)
	(5) <NRf>	Sets the time base. (unit is seconds)
	(6) <ASCII string>	Sets the Last Load after the end. {ON | OFF}
	(7) <NRf>	Sets the Last Value after the end. (It is enabled by the Last Load ON.)
	(8) <NR1>	Sets the step number setting of the loop last.
Return parameter	(1) <ASCII string>	Return whether it is in fast sequence function state. {ON|OFF}
	(2) <ASCII string>	Return the contents of the memo.

	(3) <ASCII string>	Return the load mode setting. {CC | CR}
	(4) <ASCII string>	Return the load range setting.{IHVH | IMVH | ILVH | IHVL | IMVL | ILVL}
	(5) <ASCII string>	Return the loop count of the sequence. (An infinite time is the string "Infinity".)
	(6) <ASCII string>	Return the time base. (unit is m seconds)
	(7) <ASCII string>	Return the Last Load after the end. {ON|OFF}
	(8) <ASCII string>	Return the Last Value after the end.
	(9) <ASCII string>	Return the step number of the last loop.
Example	:FSEQ "ABC",CC,IHVL,1,0.025,OFF,1.0,1 Sets the parameters of "Timing Edit Fast Sequence".	
Query example	:FSEQ? > FSeq:OFF; Memo:ABC, Mode:CC, Range:IHVL, Loop:1, Time Base:25.000, Last Load:OFF, Last:1.00, RPTSTEP:1 Return the parameters of "Timing Edit Fast Sequence".	

:FSEQuence:MEMO

Set → / → Query

Description	Sets and queries for the memo of fast sequence. (Contents of Memo:)	
Syntax	:FSEQuence:MEMO <ASCII string>	
Query Syntax	:FSEQuence:MEMO?	
Parameter	<ASCII string>	Set the characters up to 8 characters. Enclose the string in double coat.

Return parameter	Return the memo of fast sequence, by the "Memo:<ASCII string>" string.
Example	:FSEQ:MEMO "ABC" Sets the memo of fast sequence.
Query example	:FSEQ:MEMO? >Memo: ABCD Return the memo of fast sequence.

:FSEQuence:MODE

Set → Query

Description	Sets and queries for the operating mode of fast sequence. (Contents of Mode:)	
Syntax	:FSEQuence:MODE {CC | CR}	
Query Syntax	:FSEQuence:MODE?	
Parameter	CC	Sets to constant current mode.
	CR	Sets to constant resistance mode.
Return parameter	Return the operating mode of fast sequence, by the "Mode:{CC | CR}" string.	
Example	:FSEQ:MODE CC Sets the operating mode of the fast sequence.	
Query example	:FSEQ:MODE? >Mode:CC Return the operating mode of the fast sequence.	

:FSEQuence:RANGe

Set → Query

Description	Sets and queries for the operating range of the fast sequence. (Contents of Range:)	
Syntax	:FSEQuence:RANGe { IHVH | IMVH | ILVH | IHVL | IMVL | ILVL}	
Query Syntax	:FSEQuence:RANGe?	
Parameter	IHVH	Sets High current range and High voltage range.

	IMVH	Sets Middle current range and High voltage range.
	ILVH	Sets Low current range and High voltage range.
	IHVL	Sets High current range and Low voltage range.
	IMVL	Sets Middle current range and Low voltage range.
	ILVL	Sets Low current range Low voltage range.
Return parameter	Return the operating range of the fast sequence, by the "Range:{IHVH | IMVH | ILVH | IHVL | IMVL | ILVL}" string.	
Example	:FSEQ:RANG IHVL Sets operating of High current range and Low voltage range.	
Query example	:FSEQ:RANG? >Range:IHVH Return the operating range of settings.	

:FSEQuence:LOOP

Set → / → Query

Description	Sets and queries for number of loops of fast sequence. (Contents of Loop:)	
Syntax	:FSEQuence:LOOP {<NR1> | INFinity}	
Query Syntax	:FSEQuence:LOOP?	
Parameter	<NR1>	Loop count setting. (1~9999)
	INFinity	Infinite number of times.
Return parameter	Return the number of loops of fast sequence, by the "Loop:{<NR1> | Infinity}" string.	
Example	:FSEQ:LOOP 1 Sets 1 to loop count of fast sequence.	

Query example	:FSEQ:LOOP? >Loop:Infinity Return the loop number of fast sequence.

:FSEQuence:TBASe

Set → / → Query

Description	Sets and queries for the time-based of fast sequence. (Contents of Time Base:)	
Syntax	:FSEQuence:TBASe <NRf>	
Query Syntax	:FSEQuence:TBASe?	
Parameter	<NRf>	Sets the time-base. (Unit is second.)
Return parameter	Return the time-based of fast sequence, by the "Time Base:<NR2>" string.	
Example	:FSEQ:TBAS 0.6 Sets the 0.6 seconds to the time-base of fast sequence.	
Query example	:FSEQ:TBAS? >Time Base:0.60000 Return the time-base.	

:FSEQuence:LLOAD

Set → / → Query

Description	Sets and queries for the Last Load state of Fast sequence. (Contents of Last Load:)	
Syntax	:FSEQuence:LLOAD {ON | OFF}	
Query Syntax	:FSEQuence:LLOAD?	
Parameter	ON	Turns Last Load on.
	OFF	Turns Last Load off.
Return parameter	Return the Last Load state, by the "Last Load:{ON | OFF}" string.	
Example	:FSEQ:LLOAD ON Turns Last Load on.	

Query example	:FSEQ:LLOAD? >Last Load:OFF Return the Last Load state of Fast sequence.
Related Commands	:FSEQuence:LAST

:FSEQuence:LAST

Set → / → Query

Description	Sets and queries for the Load Value after the end of Fast sequence. (Contents of Last:)	
Syntax	:FSEQuence:LAST <NRf>	
Query Syntax	:FSEQuence:LAST?	
Parameter	<NRf>	Sets the load setting value of after the end of step. (It is enabled by load conditions ON.)
Return parameter	Return the load setting value of after the end of step, by the "Last:<NR2>" string.	
Example	:FSEQ:LAST1 Sets the load setting value of after the end of step.	
Query example	:FSEQ:LAST? >Last:0.070000 Return the load setting value of after the end of step.	
Related Commands	:FSEQuence:LLOAD	

:FSEQuence:RPTStep

Set → / → Query

Description	Sets and queries for the last step number per loop of the fast sequence. (Contents of RPTSTEP:)	
Syntax	:FSEQuence:RPTStep <NR1>	
Query Syntax	:FSEQuence:RPTStep?	
Parameter	<NR1>	Sets the step number of the last loop.

Return parameter	Return the step number of the loop end of the fast sequence, by the "RPTSTEP:<NR1>" string.
Example	:FSEQ:RPTS 1 Sets the last step number per loop.
Query example	:FSEQ:RPTS? >RPTSTEP:1 Return the last step number per loop.

:FSEQuence:EDIT

Set → / → Query

Description	Sets and queries for data of fast sequence. Parameters of "Data Edit for Fast Sequence"	
Syntax	:FSEQuence:EDIT (1),(2),(3),(4)	
Query Syntax	:FSEQuence:EDIT?	
Parameter	(1) <NR1>	Editing step.
	(2) <NR1>	Step total number.
	(3) <NRf>	Sets the load value of the operation mode.
	(4) <ASCII string>	Sets the TRIG OUT. {ON | OFF}
Return parameter	(1) <ASCII string>	Return the total of an edit step and a step.
	(2) <ASCII string>	Return the load setting value of the operation mode.
	(3) <ASCII string>	Return the TRIG OUT.
Example	:FSEQ:EDIT 2,6,1,ON Sets the data of the fast sequence.	
Query example	:FSEQ:EDIT? > Step:0001/0003; Value:0.00, TRIG OUT:OFF Return the data of the fast sequence.	

Set →
:FSEQuence:EDIT:POINt
→ Query

Description	Sets and queries for the edit step number of the fast sequence.	
Syntax	:FSEQuence:EDIT:POINt {<NR1>}	
Query Syntax	:FSEQuence:EDIT:POINt?	
Parameter / Return parameter	<NR1>	1~1000 The edit step number of the fast sequence.
Example	:FSEQuence:EDIT:POINt 10 Sets the edit step number 10.	
Query example	:FSEQuence:EDIT:POINt? >10 Returns the edit step number.	
Related Commands	:FSEQuence:EDIT:END?	

:FSEQuence:EDIT:END
→ Query

Description	Returns the end of edit step number in the fast sequence.	
Query Syntax	:FSEQuence:EDIT:END?	
Return parameter	<NR1>	1~1000
Query Example	:FSEQuence:EDIT:END? > 20 Returns the end of edit step number.	

:FSEQuence[:DELet]:ALL
Set →

Description	Delete all programs of the fast sequence.
Syntax	:FSEQuence[:DELet]:ALL
Example	:FSEQ:ALL Delete all programs of the fast sequence.

Set →
:FSEQuence[:EDIT]:FILL
→ Query

Description	Query and setting for FILL of fast sequence. Parameters of "Fill Edit for Fast Sequence"	
Syntax	:FSEQuence[:EDIT]:FILL (1),(2),(3),(4)	
Query Syntax	:FSEQuence[:EDIT]:FILL?	
Parameter	(1) <NRf>	Sets the start load value of the operating mode.
	(2) <NRf>	Sets the end load value of the operating mode.
	(3) <NR1>	Sets the step number of start.
	(4) <NR1>	Sets the step number of end.
Return parameter	(1)<ASCII string>	Return the start load value of the operating mode.
	(2)<ASCII string>	Return the end load value of the operating mode.
	(3)<ASCII string>	Return the step number of start.
	(4)<ASCII string>	Return the step number of end.
Example	:FSEQ:FILL 0,5,1,6 Sets the terms of the FILL to Fast sequence program.	
Query example	:FSEQ:FILL? >Start Value:0.00, End Value:5.00, Start Step:1, End Step:6 Return the setting value of FILL of fast sequence.	

:FSEQuence:SAVE
Set →

Description	Save program of fast sequence.
Syntax	:FSEQuence:SAVE
Example	:FSEQ:SAVE Save program of fast sequence.

OCP Commands

To execute / stop the test, use: INPUT command.

:OCP:STATe

Set → / → Query

Description	Sets and queries for the state of the OCP function.	
Syntax	:OCP:STATe {<Boolean> | OFF | ON}	
Query Syntax	:OCP:STATe?	
Parameter	ON / 1	Turns the OCP function on
	OFF / 0	Turns the OCP function off
Return Parameter	ON, RUN	OCP function is on. OCP test is running.
	ON, END	OCP function is on. OCP test is finished.
	ON, INACTIVE	OCP function is on. OCP test is inactive (Load OFF).
	OFF	OCP function is off.
Return	Return the OCP function state.	
example	:OCP:STATe ON Turns the OCP function on.	

Query example	:OCP:STATe? OFF Indicates that the OCP function is turned off

:OCP:EDIT[:CHANnel]

Set / Query

Description	Sets and queries for the settings of the selected OCP memory number. Parameters of "OCP Function"	
Syntax	:OCP:EDIT[:CHANnel] (1), (2), (3), (4), (5), (6), (7), (8), (9), (10)	
Query Syntax	:OCP:EDIT?	
Parameter	(1) <NR1>	Memory Number (OCP.No:1~12)
	(2)MEMO	<ASCII string>
	(3) LOW | MIDDle | HIGH	Current range (Range:)
	(4) <NR2>	Start current value (Start C: unit A)
	(5) <NR2>	End current value (End C: unit A)
	(6) <NR2>	Current step value (Step C: unit A)
	(7) <NR2>	Time step value (Step T:unit s)
	(8) <NR2>	Delay time value (Delay:unit s)
	(9) <NR2>	Trigger voltage (Trig V:unit V)
	(10) <NR2>	Steady state current after test has finished (last C:unit A)
Return Parameter	Return all the settings for the selected OCP memory number. No:<NR1>, Memo:<ASCII String>, Range:<High|Middle|Low>, Start C:<NR2>, End C:<NR2>, Step C:<NR2>,Step T:<NR2>, Delay: <NR2>, TrigV :<NR2>, Last C:<NR2>	
example	:OCP:EDIT 2, "OCP001", Middle, 0.00999, 0.49998, 0.00498, 0.1, 5, 0.09999	

Query example	:OCP:EDIT? No:02, Memo:OCP001, Range:Middle, Start C:0.00999, End C:0.49998, Step C:0.00498, Step T:0.10, Delay:0.00, Trig V:5.00, Last C:0.09999

:OCP[:CHANnel]:NUMBer

Set → Query

Description	Sets and queries for the OCP memory number. (Contents of OCP.No:)	
Syntax	:OCP[:CHANnel]:NUMBer <NR1>	
Query Syntax	:OCP[:CHANnel]:NUMBer?	
Parameter	<NR1>	Sets the OCP memory number
Return	Returns the OCP memory number	
example	:OCP:NUMB 1 Sets the OCP number is 1.	
Query example	:OCP:NUMB? 1 The OCP number is 1.	

:OCP:MEMO

Set → Query

Description	Sets and queries for user-created note of the currently selected OCP function.	
Setting syntax	:OCP:MEMO <string>	
Setting parameter	<string>	Set the OCP note.
	<ASCII string>	Set the characters up to 8 characters. Enclose the string in double coat.
Setting example	:OCP:MEMO abc Set the OCP note is “abc”.	
Query syntax	:OCP:MEMO?	
Return parameter	<string>	Return the OCP note.

Query example	:OCP:MEMO? abc The OCP note is “abc”.

:OCP[:CHANnel]:RANGe

Set → / → Query

Description	Sets and queries for the channel range. (Contents of Range:)	
Syntax	:OCP[:CHANnel]:RANGe {LOW|MIDDle|HIGH}	
Query Syntax	:OCP[:CHANnel]:RANGe?	
Parameter	LOW	CC Mode Low range.
	MIDDle	CC Mode Middle range.
	HIGH	CC Mode High range.
Return	Return the OCPtest current range.	
example	:OCP:RANG LOW Set CC Mode Low range.	
Query example	:OCP:RANG? Low The range is CC Mode Low range.	

:OCP[:CHANnel]:STARt

Set → / → Query

Description	Sets and queries for the starting current value. (Contents of Start C:)	
Setting syntax	:OCP[:CHANnel]:STARt {<NR2>|MINimum|MAXimum}	
Setting parameter	<NR2>	The START current value in Amps.
	MINimum	Minimum starting current value.
	MAXimum	Maximum starting current value.
Setting example	:OCP:STAR 2 Set the start current to 2A.	

Query syntax	:OCP[:CHANnel]:STARt?	
Return parameter	<NR2>	Return the START current value in Amps.
Query example	:OCP:STAR?	
	0.1000	
	Returns the starting current as 0.1A.	

:OCP[:CHANnel]:END

Set → / → Query

Description	Sets and queries for the ending current value of the test. The value must be higher than the DUT OCP value. (Contents of End C:)	
Setting syntax	:OCP[:CHANnel]:END {<NR2>|MINimum|MAXimum}	
Setting parameter	<NR2>	The END current value in Amps.
	MINimum	Minimum ending current value.
	MAXimum	Maximum ending current value.
Setting example	:OCP:END 2	
	Set the END current to 2A.	
Query syntax	:OCP[:CHANnel]:END?	
Return parameter	<NR2>	Return the END current value in Amps.
Query example	:OCP:END?	
	0.1000	
	Returns the END current as 0.1A.	

:OCP[:CHANnel]:STEP:CURRent

Set → / → Query

Description	Sets and queries for the current step resolution of the OCP Test Automation. (Contents of Step C:)	
Setting syntax	:OCP[:CHANnel]:STEP:CURRent {<NR2>|MINimum|MAXimum}	
Setting parameter	<NR2>	The current value in Amps.
	MINimum	Minimum current step resolution.
	MAXimum	Maximum current step resolution.
Setting example	:OCP:STEP:CURR 0.1 Set the step resolution as 0.1A.	
Query syntax	:OCP[:CHANnel]: STEP:CURRent?	
Return parameter	<NR2>	Returns the current step resolution in Amps.
Query example	:OCP:STEP:CURR? 0.1000 Returns the step resolution as 0.1A.	

:OCP[:CHANnel]:STEP:TIME

Set → / → Query

Description	Sets and queries for how long the step times of the OCP Test Automation function. (Contents of Step T:)	
Setting syntax	:OCP[:CHANnel]:STEP:TIME {<NR2>|MINimum|MAXimum}	
Setting parameter	<NR2>	The step time in seconds.
	MINimum	Minimum step times.
	MAXimum	Maximum step times.
Setting example	:OCP:STEP:TIME 2 Set the step time to 2second.	
Query syntax	:OCP[:CHANnel]:STEP:TIME?	
Return parameter	<NR2>	Return the step time in seconds.

:OCP[:CHANnel]:DELay

Set → / → Query

Description	Sets and queries for the test delay time of the OCP Test Automation function. (Contents of Delay:)	
Setting syntax	:OCP[:CHANnel]:DELay {<NR2>|MINimum|MAXimum}	
Setting parameter	<NR2>	The delay time in seconds
	MINimum	Minimum test delay time.
	MAXimum	Maximum test delay time.
Setting example	:OCP:DEL 2	
	Set the delay time to 2s.	
Query syntax	:OCP[:CHANnel]:DELay?	
Return parameter	<NR2>	Return the delay time in seconds.
Query example	:OCP:DEL?	
	0.10	
	Returns the delay time in seconds	

:OCP[:CHANnel]:TRIGger

Set → / → Query

Description	Sets and queries for the voltage trigger for when the power supply OCP has been triggered. (Contents of Trig V:)	
Setting syntax	:OCP[:CHANnel]:TRIGger {<NR2>|MINimum|MAXimum}	
Setting parameter	<NR2>	The trigger voltage level.
	MINimum	Minimum voltages trigger level.
	MAXimum	Maximum voltage triggers level.
Setting example	:OCP:TRIG 2	
	Set the trigger voltage level to 2V.	
Query syntax	:OCP[:CHANnel]:TRIGger?	

Return parameter	<NR2>	Return the trigger voltage level.
Query example	:OCP:TRIG?	
	2.0	
	Returns the trigger level.	

:OCP[:CHANnel]:LAST

Set → / → Query

Description	Sets and queries for the current value of after the DUT OCP protection has been activated. (Contents of last C:)	
Setting syntax	:OCP[:CHANnel]:LAST {<NR2>|MINimum|MAXimum}	
Setting parameter	<NR2>	The current value in Amps.
	MINimum	Minimum current value.
	MAXimum	Maximum current value.
Setting example	:OCP:LAST 2	
	Set the current value to 2A.	
Query syntax	:OCP[:CHANnel]:LAST?	
Return parameter	<NR2>	Returns the current value in Amps.
Query example	:OCP:LAST?	
	0.1000	
	Returns the current value.	

:OCP:CHANnel:STATus

→ Query

Description	Queries the status of the OCP Test Automation function.	
Query Syntax	:OCP:CHANnel:STATus?	
Return Parameter	0	Test ended
	1	OCP test active

Query example	:OCP:CHAN:STAT? 0 The test has ended.

:OCP:RESult

Query

Description	Returns the OCP Test Automation results.
Query Syntax	:OCP:RESult?
Return Parameter	<NR2>,<NR2> Returns the OCP current, voltage.
Query example	:OCP:RES? 3.6750,0.10 OCP Current:3.675A, OCP Voltage:0.10V

:OCP:RUN

Set

Description	Turns the load on for the OCP Test Automation function. Same as :INPUT ON command.
Syntax	:OCP:RUN

OPP test Commands

To execute / stop the test, use: INPUT command.

:OPP:STATe

Set → / → Query

Description	Sets and queries for the state of the OPP function.	
Setting syntax	:OPP:STATe {<bool>|OFF|ON}	
Setting parameter	OFF | 0	Turns the OPP function off.
	ON | 1	Turns the OPP function on.
Setting example	:OPP:STATe ON Turns the OPP function on.	
Query syntax	:OPP:STATe?	
Return Parameter	ON, RUN	OPP function is on. OPP test is running
	ON, END	OPP function is on. OPP test is finished.
	ON, INACTIVE	OPP function is on. OPP test is inactive (Load OFF).

	OFF	OPP function is off.
Query example	:OPP:STATe?	
	OFF	
	Indicates that the OPP function is turned off.	

:OPP:EDIT[:CHANnel]

Set → / → Query

Description	Sets and queries for the settings of the selected OPP memory number.	
	Parameters of "OPP Function"	
Setting syntax	:OPP:EDIT[:CHANnel] (1), (2), (3), (4), (5), (6), (7), (8), (9), (10)	
Setting parameter	(1) <NR1>	Memory Number (OPP.No:1~12)
	(2)MEMO	<ASCII string>
	(3) LOW | MIDDle | HIGH	Current range (Range:)
	(4) <NR2>	Start current value (Start W: unit W)
	(5) <NR2>	End current value (End W: unit W)
	(6) <NR2>	Current step value (Step W: unit W)
	(7) <NR2>	Time step value (Step T:unit s)
	(8) <NR2>	Delay time value (Delay:unit s)
	(9) <NR2>	Trigger voltage (Trig V:unit V)
	(10) <NR2>	Steady state current after test has finished (last W:unit W)
Setting example	:OPP:EDIT 1, "OPP001", LOW, 0, 1, 0.01, 5, 3, 4.8, 0	
Query syntax	:OPP:EDIT[:CHANnel]?	
Return Parameter	In the following order, return all the settings for the selected OPP memory number.	
	(1) Temp:Seq_<NR1>	OPP.No:1~12.
	(2) MEMO	<String>

	(3) Range: High | Middle | Low	current range.
	(4) Start W:<NR2>	Start watt value.
	(5) End W:<NR2>	End watt value.
	(6) Step W:<NR2>	Watt step value.
	(7) Step T:<NR2>	Time step value.
	(8) Delay: <NR2>	Delay time value.
	(9) TrigV :<NR2>	Trigger voltage.
	(10) Last W:<NR2>	Steady state watt after test has finished.
Query example	:OPP:EDIT?	
	No:03, MEMO:OPP003, Range:High, Start W:0.00, End W: 1.00, Step W:0.01, Step T:3.00, Delay:1.00, Trig V:4.80, Last W:0.40	

:OPP[:CHANnel]:NUMBer

Set / Query

Description	Sets and queries for the OPP memory number. (Contents of OPP.No:)	
Setting syntax	:OPP[:CHANnel]:NUMBer <NR1>	
Setting parameter	<NR1>	Sets the OPP memory number
Setting example	:OPP:NUMB 1	
	Sets the OPP number is 1.	
Query syntax	:OPP[:CHANnel]:NUMBer?	
Return parameter	<NR1>	Returns the OPP memory number.
Query example	:OPP:NUMB?	
	1	
	The OPP number is 1.	

:OPP:MEMO

Set → / → Query

Description	Sets and queries for user-created note of the currently selected OPP function.	
Setting syntax	:OPP:MEMO <string>	
Setting parameter	<string>	Set the OPP note.
	<ASCII string>	Set the characters up to 8 characters. Enclose the string in double coat.
Setting example	:OPP:MEMO abc	
	Set the OPP note is “abc”.	
Query syntax	:OCP:MEMO?	
Return parameter	<string>	Return the OCP note.
Query example	:OCP:MEMO?	
	abc	
	The OCP note is “abc”.	

:OPP[:CHANnel]:RANGe

Set → / → Query

Description	Sets and queries for the channel range. (Contents of Range:)	
Setting syntax	:OPP[:CHANnel]:RANGe {LOW|MIDDle|HIGH}	
Setting parameter	LOW	CC Mode Low range.
	MIDDle	CC Mode Middle range.
	HIGH	CC Mode High range.
Setting example	:OPP:RANG LOW	
	Set CP Mode Low range.	
Query syntax	:OPP[:CHANnel]:RANGe?	
Return parameter	LOW | MIDDle | HIGH	Return the OPP test current range.

Query example	:OPP:RANG? Low The range is CP Mode Low range.

:OPP[:CHANnel]:STARt

Set → Query

Description	Sets and queries for the starting current value. (Contents of Start W:)	
Setting syntax	:OPP[:CHANnel]:STARt {<NR2>|MINimum|MAXimum}	
Setting parameter	<NR2>	The START watt value in Watts.
	MINimum	Minimum starting watt value.
	MAXimum	Maximum starting watt value.
Setting example	:OPP:STAR 2 Set the start watt to 2W.	
Query syntax	:OPP[:CHANnel]:STARt?	
Return parameter	<NR2>	Return the START watt value in Watts.
Query example	:OPP:STAR? 0.1000 Returns the starting watt as 0.1W.	

:OPP[:CHANnel]:END

Set → Query

Description	Sets and queries for the ending watt value of the test. The value must be higher than the DUT OPP value. (Contents of End W:)	
Setting syntax	:OPP[:CHANnel]:END {<NR2>|MINimum|MAXimum}	
Setting parameter	<NR2>	The END watt value in Amps.
	MINimum	Minimum starting watt value.
	MAXimum	Maximum starting watt value.

Setting example	:OPP:END 2 Set the END watt to 2A.	
Query syntax	:OPP[:CHANnel]:END?	
Return parameter	<NR2>	Return the END watt value in Watts.
Query example	:OPP:END? 0.1000 Returns the END watt as 0.1W.	

Set → Query

:OPP[:CHANnel]:STEP:WATT

Description	Sets and queries for the current step resolution of the OPP Test Automation. (Contents of Step W:)	
Setting syntax	:OPP[:CHANnel]:STEP:WATT {<NR2>|MINimum|MAXimum}	
Setting parameter	<NR2>	The watt value in Watts.
	MINimum	Minimum watt step resolution.
	MAXimum	Maximum watt step resolution.
Setting example	:OPP:STEP:WATT 0.1 Set the step resolution as 0.1W.	
Query syntax	:OPP[:CHANnel]:STEP:WATT?	
Return parameter	<NR2>	Returns the Watt step resolution in Watts.
Query example	:OPP:STEP:WATT? 0.1000 Returns the step resolution as 0.1W.	

Set → Query

:OPP[:CHANnel]:STEP:TIME

Description	Sets and queries for how long the step times of the OPP Test Automation function. (Contents of Step T:)

Setting syntax	:OPP[:CHANnel]:STEP:TIME {<NR2>|MINimum|MAXimum}	
Setting parameter	<NR2>	The step time in seconds.
	MINimum	Minimum step times.
	MAXimum	Maximum step times.
Setting example	:OPP:STEP:TIME 2	
	Set the step time to 2second.	
Query syntax	:OPP[:CHANnel]:STEP:TIME?	
Return parameter	<NR2>	Return the step time in seconds.
Query example	:OPP:STEP:TIME?	
	0.10	
	Returns the step time.	

:OPP[:CHANnel]:DELay

Set → → Query

Description	Sets and queries for the test delay time of the OPP Test Automation function. (Contents of Delay:)	
Setting syntax	:OPP[:CHANnel]:DELay {<NR2>|MINimum|MAXimum}	
Setting parameter	<NR2>	The delay time in seconds
	MINimum	Minimum test delay time.
	MAXimum	Maximum test delay time.
Setting example	:OPP:DEL 2	
	Set the delay time to 2s.	
Query syntax	:OPP[:CHANnel]:DELay?	
Return parameter	<NR2>	Return the delay time in seconds.
Query example	:OPP:DEL?	
	0.10	
	Returns the delay time in seconds.	

:OPP[:CHANnel]:TRIGger

Set → / → Query

Description	Sets and queries for the voltage trigger for when the power supply OPP has been triggered. (Contents of Trig V:)	
Setting syntax	:OPP[:CHANnel]:TRIGger {<NR2>|MINimum|MAXimum}	
Setting parameter	<NR2>	The trigger voltage level.
	MINimum	Minimum voltages trigger level.
	MAXimum	Maximum voltage triggers level.
Setting example	:OPP:TRIG 2	
	Set the trigger voltage level to 2V.	
Query syntax	:OPP[:CHANnel]:TRIGger?	
Return parameter	<NR2>	Return the trigger voltage level.
Query example	:OPP:TRIG?	
	2.0	
	Returns the trigger level.	

:OPP[:CHANnel]:LAST

Set → / → Query

Description	Sets and queries for the watt value of after the DUT OPP protection has been activated. (Contents of last W:)	
Setting syntax	:OPP[:CHANnel]:LAST {<NR2>|MINimum|MAXimum}	
Setting parameter	<NR2>	The watt value in Watts.
	MINimum	Minimum watt value.
	MAXimum	Maximum watt value.
Setting example	:OPP:LAST 2	
	Set the watt value to 2W.	
Query syntax	:OPP[:CHANnel]:LAST?	

Return parameter	<NR2>	Returns the watt value in Watts.
Query example	:OPP:LAST?	
	0.1000	
	Returns the watt value.	

:OPP:CHANnel:STATus → Query

Description	Queries the status of the OPP Test Automation function.	
Query syntax	:OPP:CHANnel:STATus?	
Return parameter	0	Test ended
	1	OPP test active
Query example	:OPP:CHAN:STAT?	
	0	
	The test has ended.	

:OPP:RESult → Query

Description	Returns the OPP Test Automation results.	
Query syntax	:OPP:RESult?	
Return parameter	<NR2>,<NR2>	Returns the OPP Power, voltage.
Query example	:OCP:RES?	
	3.6750,0.10	
	OPP Power:3.675W, OPP Voltage:0.10V	

:OPP:RUN Set →

Description	Turns the load on for the OPP Test Automation function. Same as :INPUT ON command.
Setting syntax	:OPP:RUN

BATT test Commands

To execute / stop the test, use: INPUT command.

:BATTery:STATe

Set → / → Query

Description	Sets and queries for the state of the BATT function.	
Setting syntax	:BATTery:STATe {<Boolean>|OFF|ON}	
Setting parameter	OFF | 0	Turns the BATT function off.
	ON | 1	Turns the BATT function on.
Setting example	:BATT:STATe ON Turns the BATT function on.	
Query syntax	:BATTery:STATe?	
Return Parameter	ON, RUN	BATT function is on. BATT test is running.
	ON, END	BATT function is on. BATT test is finished.

	ON, INACTIVE	BATT function is on. BATT test is inactive (Load OFF).
	OFF	BATT function is off.
Query example	:BATT:STATe? OFF Indicates that the BAtt function is turned off.	

:BATT:EDIT

Set → / → Query

Description	Sets and queries for the settings of the selected BATT memory number. Parameters of "BATT Function".	
Setting syntax	:BATTery:EDIT[:CHANnel] {<NR1>, "<ASCII String>", CC| CR| CP, ILVL| IMVL| IHVL| ILVH| IMVH| IHVH, <NR2>, <NR2>, <NR2>, <NR2>, <NR2>, <NR2>	
Setting parameter	(1)<NR1>	Memory Number (BATT.No:1~12).
	(2)"<ASCII string>"	Battery MEMO, Set the characters up to 8 characters. Enclose the string in double coat.
	(3) CC| CR| CP	Operation mode (Mode :). CC|CR|CP
	(4)ILVL| IMVL| IHVL| ILVH| IMVH| IHVH	I and V range (Range :) ILVL|IMVL|IHVL|ILVH|IMVH|IHVH
	(5) <NR2>	Setting value of operation mode (Setting :).
	(6) <NR2>	Rising slew rate (Slew Rate↑ : unit mA/us).
	(7) <NR2>	Falling slew rate (Slew Rate↓ : unit mA/us).
	(8) <NR2>	Stop Voltage (Stop Volt: unit V).

	(9) <NR2>	Stop Time (Stop Time: unit s).
	(10) <NR2>	Stop AH (Stop AH: unit Ah)
	(11)<NR2>	The time interval for data capture (Datalog timer: unit s).

Setting example :BATT:EDIT 1, "MEMO", CC, ILVL, 0.1, 8.4, 8.4, 5, 50, 1

Query syntax :BATTery:EDIT?

Return Parameter In the following order, return all the settings for the selected BATT memory number.

(1) No:<NR1>	BATT.No:1~12.
(2) Memo: <ASCII string>	BATT MEMO.
(3) Mode:CC|CR|CP	Operation mode.
(4) Range: ILVL|IMVL|IHVL| ILVH|IMVH|IHVH	I and V range
(5) Set:<NR2>	Setting value.
(6) SRUP :<NR2>	Rising slew rate.
(7) SRDW:<NR2>	Falling slew rate.
(8) Stop/sV:<NR2>	Stop Voltage.
(9) Stop/sT:<NR2>	Stop Time.
(10) Stop/sAH :<NR2>	Stop AH
(11) Datalog:<NR2>/n	The time interval for data capture.

Query example :BATT:EDIT?

No:01, Memo:ABC, Mode:CC, Range:ILVL, Set:0.0000, SRUP:250, SRDW:250, Stop V:1.500, Stop T:0, Stop AH:0.20, Datalog:1

:BATTery [:CHANnel]:NUMBer

Set → / → Query

Description Sets and queries for the BATT memory number. (Contents of BATT.No:)

Setting syntax	:BATTery[:CHANnel]:NUMBer <NR1 >
Setting parameter	<NR1> Sets the BATT memory number
Setting example	:BATT:NUMB 1
	Sets the BATT number is 1.
Query syntax	:BATTery[:CHANnel]:NUMBer?
Return parameter	<NR1> Returns the BATT memory number.
Query example	:BATT:NUMB?
	1
	The BATT number is 1.

:BATTery:MEMO

Set → / → Query

Description	Sets and queries for user-created note of the currently selected BATT function.
Setting syntax	:BATTery:MEMO <string>
Setting parameter	<string> Set the BATT note.
	<ASCII string> Set the characters up to 8 characters. Enclose the string in double coat.
Setting example	:BATT:MEMO “abc”
	Set the BATT note is “abc”.
Query syntax	:BATTery:MEMO?
Return parameter	<string> Return the BATT note.
Query example	:BATT:MEMO?
	abc
	The BATT note is “abc”.

:BATTery:MODE

Set → / → Query

Description	Sets and queries for the operation mode. (Contents of Mode:)
Setting syntax	:BATTery:MODE {CC|CR|CP}
Setting parameter	CC Set the CC mode.

	CR	Set the CR mode.
	CP	Set the CP mode.
Setting example	:BATT:MODE CC	
	Set the operation mode to CC.	
Query syntax	:BATTery:MODE?	
Return parameter	CC | CR | CP	Return the operation mode.
Query example	: BATT:MODE?	
	CC	
	The operation mode is CC.	

:BATTery:RANGe

Set → Query

Description	Sets and queries for the channel range. (Contents of Range:)	
Setting syntax	:BATTery:RANGe {ILVL|IMVL|IHVL|ILVH|IMVH|IHVH}	
Setting parameter	ILVL	Set the I range is L, and V range is L.
	IMVL	Set the I range is M, and V range is L.
	IHVL	Set the I range is H, and V range is L.
	ILVH	Set the I range is L, and V range is H.
	IMVH	Set the I range is M, and V range is H.
	IHVH	Set the I range is H, and V range is H.
Setting example	:BATT:RANG ILVL	
	Set the range are I range L, and V range L.	
Query syntax	:BATTery:RANGe?	
Return parameter	ILVL|IMVL|IHVL|ILVH|IMVH|IHVH	Return the BATT test I and V range.
Query example	:BATT:RANG?	
	ILVL	
	The setting range is I range L, and V range L.	

:BATTery:VALue

Set → / → Query

Description	Sets and queries for the setting value of the selected operation mode. (Contents of Setting:)	
Setting syntax	:BATTery:VALue {<NR2>|MINimum|MAXimum}	
Setting parameter	<NR2>	The setting value
	MINimum	Minimum setting value.
	MAXimum	Maximum setting value.
Setting example	:BATT:VAL 2 Set the value to 2A.	
Query syntax	:BATTery:VALue?	
Return parameter	<NR2>	Return the setting value.
Query example	:BATT:VAL? 2 Returns the starting current as 2A.	

:BATTery:RISE

Set → / → Query

Description	Sets and queries for the test falling slew rate in mA/us except CP Mode. The CP Mode does not support slew rate control. Set or Query this command will generate a command error (-221, "Settings conflict"). (Contents of Slew Rate↥:)	
Setting syntax	:BATTery:RISE {<NR2>|MINimum|MAXimum}	
Setting parameter	<NR2>	The test rising slew rate.
	MINimum	Minimum test rising slew rate.
	MAXimum	Maximum test rising slew rate.
Setting example	:BATT:RISE 8.4 Set the test rising slew to 8.4mA/us.	
Query syntax	:BATTery:RISE?	

Return parameter	<NR2>	Return the test rising slew.
Query example	:BATT:RISE?	
	8.4	
	Returns the test rising slew as 8.4mA/us.	

:BATTery:FALL

Set → Query

Description	Sets and queries for the test falling slew rate in mA/us except CP Mode.	
	The CP Mode does not support slew rate control. Set or Query this command will generate a command error (-221, "Settings conflict"). (Contents of Slew Rate↴:)	
Setting syntax	:BATTery:FALL {<NR2>|MINimum|MAXimum}	
Setting parameter	<NR2>	The test falling slew rate.
	MINimum	Minimum test falling slew rate.
	MAXimum	Maximum test falling slew rate.
Setting example	:BATT:FALL 8.4	
	Set the test falling slew to 8.4mA/us.	
Query syntax	:BATTery:FALL?	
Return parameter	<NR2>	Return the test falling slew.
Query example	:BATT:FALL?	
	8.4	
	Returns the test falling slew as 8.4mA/us.	

:BATTery:STOP:VOLTage

Set → Query

Description	Sets and queries for the voltage at which the test should be interrupted. (Contents of Stop Volt:)	
Setting syntax	:BATTery:STOP:VOLTage {<NR2>|MINimum|MAXimum}	
Setting parameter	<NR2>	The stop voltage in V.
	MINimum	Minimum stop voltage.

	MAXimum	Maximum stop voltage.
Setting example	:BATT:STOP:VOLT 5	
	Set the stop voltage to 5V.	
Query syntax	:BATTery:STOP:VOLTage?	
Return parameter	<NR2>	Return the stop voltage in V.
Query example	:BATT:STOP:VOLT?	
	5	
	Returns the stop voltage as 5V.	

Set →
:BATTery:STOP:TIME
→ Query

Description	Sets and queries for the time after which the test should be interrupted. (Contents of Stop Time:)	
Setting syntax	:BATTery:STOP:TIME {<NR1>|MINimum|MAXimum|OFF}	
Setting parameter	<NR1>	The stop time in seconds. (0～3599999)
	MINimum	Minimum stop times.
	MAXimum	Maximum stop times.
	OFF	“OFF” is 0 second.
Setting example	:BATT:STOP:TIME 2	
	Set the stop time to 2second.	
Query syntax	:BATTery:STOP:TIME?	
Return parameter	<NR1>	Return the stop time in seconds.
Query example	:OPP:STOP:TIME?	
	2	
	Returns the step time as 2 seconds.	

Set →
:BATTery:STOP:AH
→ Query

Description	Sets and queries for the discharged energy rate at which the test should be interrupted. (Contents of Stop AH:)

Setting syntax	:BATTery:STOP:AH {<NR2>|MINimum|MAXimum|OFF}	
Setting parameter	<NR2>	The stop AH in Ah. (0～9999.99)
	MINimum	Minimum stop AH.
	MAXimum	Maximum stop AH.
	OFF	"OFF" is 0 AH.
Setting example	:BATT:STOP:AH 2	
	Set the stop AH to 2 Ah.	
Query syntax	:BATTery:STOP:AH?	
Return parameter	<NR2>	Return the stop AH in Ah.
Query example	:OPP:STOP:AH?	
	2	
	Returns the step AH as 2 Ah.	

:BATTery:DATalog:TIMer

Set → Query

Description	Sets and queries for the time interval for data capture. (Contents of Datalog timer:)	
Setting syntax	:BATTery:DATalog:TIMer {<NR1>|MINimum|MAXimum}	
Setting parameter	<NR1>	The interval time in seconds. (1～120)
	MINimum	Minimum interval times.
	MAXimum	Maximum interval times.
Setting example	:BATT:DAT:TIM 2	
	Set the interval time to 2 seconds.	
Query syntax	:BATTery:DATalog:TIMer?	
Return parameter	<NR1>	Return the interval time in seconds.
Query example	:OPP:DAT:TIM?	
	2	
	Returns the interval time as 2 seconds.	

:BATT:CHANnel:STATus → Query

Description	Queries the status of the BATT Test Automation function.	
Query syntax	:BATT:CHANnel:STATus?	
Return parameter	0	Test ended
	1	BATT test active
Query example	:BATT:CHAN:STAT?	
	0	
	The test has ended.	

:BATT:RESult → Query

Description	Returns the BATT Test Automation results.	
Query syntax	:BATT:RESult?	
Return parameter	<NR2>,<NR2>	Returns the BATT Ah, Wh.
Query example	:BATT:RES?	
	3.6750,0.10	
	Battery discharged 3.6750Ah 0.10Wh	

:BATT:RUN Set →

Description	Turns the load on for the BATT Test Automation function. Same as :INPUT ON command.
Setting syntax	:BATT:RUN

Utility Commands

:UTILity:SYSTem

→ Query

Description	Query for model number, serial number, and firmware version.	
Query Syntax	:UTILity:SYSTem?	
Return parameter	<ASCII string>	Return the model name.
	<NR1>	Return the serial number.
	<ASCII string>	Return the firmware version.
Query example	:UTIL:SYST? >PEL-3021AH,12345678,V1.01.001 Return the model number, serial number, and firmware version.	

Set →
:UTILity:LOAD
→ Query

Description	Sets and queries for Auto Load and load function at power on. (Contents of Auto Load and Auto Load On)	
	Parameters of "Load Setting For Power On"	
Syntax	:UTILity:LOAD {ON | OFF | LOAD | PROG | NSEQ | FSEQ}	
Query Syntax	:UTILity:LOAD?	
Parameter	ON	Turn on Auto Load.
	OFF	Turn off Auto Load.
	LOAD	Sets to manual operation.
	PROG	Sets to program function.
	NSEQ	Sets to normal sequence function.
	FSEQ	Sets to fast sequence function.
Return parameter	<ASCII string>	Return the Auto Load and load function at power on, by the "Load:{On | Off}, Load On:{Load | Prog | NSeq | FSeq}" string.
Example 1	:UTIL:LOAD ON	
	Sets on the manual operation at power on.	
Example 2	:UTIL:LOAD PROG	
	Sets to the program function at power on.	
Query example	:UTIL:LOAD? >Load:Off, Load On:Prog	
	Return the Auto Load and load function at power on.	

Set →
:UTILity:LOAD:MODE
→ Query

Description	Sets and queries for the Load Off (Mode) setting.
	Parameters of "Load Setting For Power On"
Syntax	:UTILity:LOAD:MODE {< Boolean > | ON | OFF}

Query Syntax	:UTILity:LOAD:MODE?	
Parameter	ON / 1	Sets Load Off (Mode) to ON.
	OFF / 0	Sets Load Off (Mode) to OFF.
Return parameter	Return the Load Off (Mode) setting.	
Example	:UTIL:LOAD:MODE ON Turns Load Off (Mode) to on.	
Query example	:UTIL:LOAD:MODE? >Off Load Off (Mode) is off.	

:UTILity:LOAD:RANGe

Set → Query

Description	Sets and queries for the Load Off (Range) setting. Parameters of "Load Setting For Power On"	
Syntax	:UTILity:LOAD:RANGe {<Boolean> | OFF | ON}	
Query Syntax	:UTILity:LOAD:RANGe?	
Parameter	ON / 1	Sets Load Off (Range) to OFF.
	OFF / 0	Sets Load Off (Range) to ON.
Return parameter	Return the Load Off (Range) setting.	
Example	:UTILity:LOAD:RANGe ON Turns Load Off (Range) to on.	
Query example	:UTILity:LOAD:RANGe? > Off Load Off (Range) is off.	

:UTILity:TIME

Set → Query

Description	Sets and queries for the date and time. Parameters of "Date/Time"
Syntax	:UTILity:TIME (1),(2),(3),(4),(5)
Query Syntax	:UTILity:TIME?

Parameter	(1) <NR1>	Sets the month.
	(2) <NR1>	Sets the day.
	(3) <NR1>	Sets the year.
	(4) <NR1>	Sets the hour.
	(5) <NR1>	Sets the minutes.
Return parameter	(1) <NR1>	Return the month.
	(2) <NR1>	Return the day.
	(3) <NR1>	Return the year.
	(4) <NR1>	Return the hour.
	(5) <NR1>	Return the minutes.
Example	:UTIL:TIME 9,1,2013,10,11 Sets the date and time.	
Query example	:UTIL:TIME? >Month:9, Day:1, Year:2013, Hour:10, Minute:11 Return the date and time.	

:UTILity:KNOB

Set → / → Query

Description	Sets and queries for operational setting of the knob. Parameters of "Other Setting"	
Syntax	:UTILity:KNOB { UPDated | OLD }	
Query Syntax	:UTILity:KNOB?	
Parameter	UPDated	Sets real-time updates.
	OLD	Sets update at the settlement after Enter.
Return parameter	Return the operational settings of the knob, by the "{Updated | Old }" string.	
Example	:UTIL:KNOB UPD Sets the operation of the knob.	

Query example	:UTIL:KNOB? >Updated Return the operational settings of the knob.

:UTILity:SPEaker

Set →
→ Query

Description	Sets and queries for the speakers sound during scrolling and key input. Parameters of "Other Setting"	
Syntax	:UTILity:SPEaker {< Boolean > | ON | OFF}	
Query Syntax	:UTILity: SPEaker?	
Parameter	ON or 1	Sets on the speakers sound during scrolling and key input.
	OFF or 0	Sets off the speakers sound during scrolling and key input.
Return parameter	Return the setting value of speaker sound during scrolling and key input, by the "{On | Off}" string.	
Example	:UTIL:SPE ON Sets on the speakers sound during scrolling and key input.	
Query example	:UTIL:SPE? >On Return the setting value of speaker sound during scrolling and key input.	

:UTILity:ALARm

Set →
→ Query

Description	Sets and queries for the speaker sound of the alarm. Parameters of "Other Setting"
Syntax	:UTILity:ALARm {< Boolean > | ON | OFF}
Query Syntax	:UTILity:ALARm?

Parameter	ON or 1	Sets ON of the speaker sound of the alarm.
	OFF or 0	Sets OFF of the speaker sound of the alarm.
Return parameter	Return the speaker sound of the alarm, by the "{On | Off}" string.	
Example	:UTIL:ALAR ON Sets the speaker sound of the alarm.	
Query example	:UTIL:ALAR? >On Return the speaker sound of the alarm.	

:UTILity:UNReg

Set → / → Query

Description	Sets and queries for the speaker sound of Anne-regulation. Parameters of "Other Setting"	
Syntax	:UTILity:UNReg {< Boolean > | ON | OFF}	
Query Syntax	:UTILity:UNReg?	
Parameter	ON or 1	Sets on the speaker sound of Anne-regulation.
	OFF or 0	Sets off the speaker sound of Anne-regulation.
Return parameter	Return the setting value of speaker sound of Anne-regulation, by the "{On | Off}" string.	
Example	:UTIL:UNR ON Sets on the speaker sound of Unregulation.	
Query example	:UTIL:UNR? >On Return the setting value of speaker sound of Unregulation.	

Set →
:UTILity:GNG
→ Query

Description	Sets and queries for the speaker sound of the "Go-NoGo" judgment time. Parameters of "Other Setting"	
Syntax	:UTILity:GNG {< Boolean > | ON | OFF}	
Query Syntax	:UTILity:GNG?	
Parameter	ON or 1	Sets ON of the speaker sound of the "Go-NoGo" judgment time.
	OFF or 0	Sets OFF of the speaker sound of the "Go-NoGo" judgment time.
Return parameter	Return the speaker sound of the "Go-NoGo" judgment time, by the "{On | Off}" string.	
Example	:UTIL:GNG ON Sets the speaker sound of the "Go-NoGo" judgment time.	
Query example	:UTIL:GNG? >On Return the setting of the speaker sound of the "Go-NoGo" judgment time.	

Set →
:UTILity:CONTrast
→ Query

Description	Sets and queries for the contrast of the LCD display. Parameters of "Other Setting"	
Syntax	:UTILity:CONTrast <NR1>	
Query Syntax	:UTIlity:CONTrast?	
Parameter	<NR1>	Sets contrast of the LCD display. 3~13 (low ~ high)
Example	:UTIL:CONT 8 Sets the 8 at contrast of the LCD display.	

Query example	:UTIL:CONT? >8 Return contrast of the LCD display.

:UTILity:BRIGhtness

Set → / → Query

Description	Sets and queries for brightness of the LCD display. Parameters of "Other Setting"	
Syntax	:UTILity:BRIGhtness <NR1>	
Query Syntax	:UTILity:BRIGhtness?	
Parameter	<NR1>	Sets brightness of the LCD display. 50~90 (low ~ high)
Example	:UTIL:BRIG 70 Sets the 70 at brightness of the LCD display.	
Query example	:UTIL:BRIG? >70 Return brightness of the LCD display.	

:UTILity:LANGuage

Set → / → Query

Description	Sets and queries for the language of the operation panel. Parameters of "Other Setting"	
⚠ Note	Language is English only.	
Syntax	:UTILity:LANGuage ENGLish	
Query Syntax	:UTILity:LANGuage?	
Parameter	ENGlish	Sets to English language.
Return parameter	Return the language of the operation panel, by the "English" string.	
Example	:UTIL:LANG ENGL Sets to English language.	

Query example	:UTIL:LANG? >English Return the language.

:UTILity:REMote

Set

Description	Turns the remote control on or off.	
Syntax	:UTILity:REMote {OFF | 0 | ON | 1}	
Parameter	OFF/0	Turns Remote control off
	ON/1	Turns remote control on
Example	:UTIL:REM 1 Turns remote control on.	

:UTILity:REMote:MODE

Set

Description	Sets the remote mode to fast or normal. When in fast mode, the panel interface is deactivated with an interface time of no more than 10ms. Normal mode has an interface time of 30~130ms. In normal mode the display interface continues to update the screen in real-time.	
Syntax	:UTILity:REMote:MODE {NORMAL |0 | FAST | 1}	
Parameter	FAST/1	FAST
	NORMAL/0	NORMAL
Example	:UTIL:REM:MODE 1 Turns remote mode to fast.	

Interface Commands

:UTILity:INTerface

Set → Query

Description	Sets and queries for the interface.
Note	Command is only valid for RS-232Control and USB.
Syntax	:UTILity:INTerface {USB | RS232}
Query Syntax	:UTILity:INTerface?
Parameter	Sets after the transmission, but require power cycle to enable the feature.
	USB — Sets the USB interface.
	RS232 — Sets the RS-232C interface.
Example	:UTIL:INT RS232 Sets the RS-232C interface.
Query example	:UTIL:INT? >RS232 Return the interface setting value.

:UTILity:BRATe

Set → Query

Description	Sets and queries for the baud rate of RS-232C.
Note	Command is only valid for interface setting of RS-232C
Syntax	:UTILity:BRATe {2400 | 4800 | 9600 | 19200 | 38400}
Query Syntax	:UTILity:BRATe?
Parameter	<NR1> — Sets the baud rate.

Return parameter	<NR1>	Return the baud rate.
Example	:UTIL:BRAT 38400 Sets the baud rate.	
Query example	:UTIL:BRAT? >38400 Return the baud rate.	

:UTILity:SBIT

Set → / → Query

Description	Sets and queries for the stop bit of the RS-232C interface.
Note	Command is only valid for interface setting of RS232C
Syntax	:UTILity:SBIT {1 | 2}
Query Syntax	:UTILity:SBIT?

Parameter	<NR1>	Sets the stop bit.
Example	:UTIL:SBIT 1 Sets the stop bit.	
Query example	:UTIL:SBIT? >1 Return the stop bit.	

:UTILity:PARity

Set → / → Query

Description	Sets and queries for the parity bit of RS-232C interface.
Note	Command is only valid for interface setting of RS-232C
Syntax	:UTILity:PARity { NONE | ODD | EVEN}
Query Syntax	:UTILity:PARity?

Parameter	NONE	Sets no parity.
	ODD	Sets the odd parity.

	EVEN	Sets the even parity.
Return parameter	Return the parity bit of RS-232C interface, by the "{None | Odd | Even}" string.	
Example	:UTIL:PAR NONE Sets no parity.	
Query example	:UTIL:PAR? >None Return the setting of parity.	

File Commands

:MEMory:SAVE

Set

Description	Save in the internal memory of the specified.	
Syntax	:MEMory:SAVE < NR1>	
Parameter	<NR1>	Specify the internal memory number. (1 to 256)
Example	:MEM:SAVE 20 Saves the current setting to internal memory 20.	
Same function command	*SAV	

:MEMory:RECall

Set

Description	Recall settings from the internal memory.	
Syntax	:MEMory:RECall <NR1>	
Parameter	<NR1>	Specify the internal memory number. (1 to 256)
Example	:MEM:REC 20 Recall setting internal memory 20.	
Same function command	*RCL	

:PREset:SAVE

Set

Description	Save to the preset memory of the specified.	
Syntax	:PREset:SAVE < NR1>	
Parameter	<NR1>	Specify the preset memory number. (0 to 9)
Example	:PRE:SAVE 1 Saves the setting value to preset memory 1.	

:PREset:RECall

Set

Description	Recall settings from the preset memory.	
Syntax	:PREset:RECall <NR1>	
Parameter	<NR1>	Specify the preset memory number. (0 to 9)
Example	:PRE:REC 1 Recall setting preset memory 1.	

:SETup:SAVE

Set

Description	Save to the setup data of the specified.	
Syntax	:SETup:SAVE < NR1>	
Parameter	<NR1>	Specify the setup data number. (1 to 100)
Example	:SET:SAVE 1 Saves the setting value to setup data 1.	

:SETup:RECall

Set

Description	Recall settings from the setup data.	
Syntax	:SETup:RECall <NR1>	
Parameter	<NR1>	Specify the setup data number. (1 to 100)

Example	:SET:REC 1 Recall setting setup data 1.

:FACTory[:RECall]

Set

Description	Sets factory defaults.
Note	Interface will switch to as follows. Interface:RS-232C, Baud rate:38400, Stop bit:1, parity :None
Syntax	:FACTory[:RECall]
Example	:FACT Sets factory defaults.

:USER[:DEFault]:SAVE

Set

Description	Save to the default settings for the user.
Syntax	:USER[:DEFault]:SAVE
Example	:USER:SAVE Save as user default settings the current settings value.

:USER[:DEFault]:RECall

Set

Description	Recall the default settings for the user.
Syntax	:USER[:DEFault]:RECall
Example	:USER:REC Recall the default settings for the user.

SCPI Status Commands

:SYSTem:ERRor

Query

Description	Queries the error queue. The last error message is return. A maximum of 32 errors are stored in the error queue.
Query Syntax	:SYSTem:ERRor?
Return parameter	Returns the error queue, by the "<NR1>,<string>" string.
Query example	:SYST:ERR? >-113, "Undefined header"

:STATus:PRESet

Set

Description

Is the setting of the initial value for the Csummary status and the Questionable status and the Operation status. PTR (positive transition) filter is set, enable register and (negative transition) NTR filter is reset.

Initial value of Register / Filter	Setting
Csummary status enable	0x0000
Csummary status PTR (positive transition)	0x7FFF
Csummary status NTR (negative transition)	0x0000
Operation status enable	0x0000
Operation status PTR (positive transition)	0x7FFF
Operation status NTR (negative transition)	0x0000
Questionable status enable	0x0000

	Questionable status PTR (positive transition)	0x7FFF
	Questionable status NTR (negative transition)	0x0000
Syntax	:STATus:PRESet	
Example	:STAT:PRES It set the initial value for the Csummary status and the Questionable status and the Operation status.	

Csummary Status Commands

:STATus:CSUMmary:CONDition → Query

Description	Query the Csummary Status Condition register.
Query Syntax	:STATus:CSUMmary:CONDition?
Return parameter	Return the Csummary Status Condition register, by the "<NR1>" string.
Query example	:STAT:CSUM:COND? >1 Return the Csummary Status Condition register

:STATus:CSUMmary:ENABle → Set / → Query

Description	Sets and queries for the Event Enable register of Csummary.	
Syntax	:STATus:CSUMmary:ENABle <NR1>	
Query Syntax	:STATus:CSUMmary:ENABle?	
Parameter	<NR1>	Sets the Event Enable register of Csummary.
Example	:STAT:CSUM:ENAB 1 Sets the Event Enable register of Csummary.	
Query example	:STAT:CSUM:ENAB? >1 Return the Event Enable register of Csummary.	

:STATus:CSUMmary[:EVENt] → Query

Description	Query and setting for the Event register of Csummary.
Query Syntax	:STATus:CSUMmary[:EVENt]?
Return parameter	Return the Event register of Csummary, by the "<NR1>" string.
Query example	:STAT:CSUM? >1 Return the Event register of Csummary.

:STATus:CSUMmary:NTRansition → Set → Query

Description	Sets and queries for detection bit of Csummary status of changes of from positive to negative.	
Syntax	:STATus:CSUMmary:NTRansition <NR1>	
Query Syntax	:STATus:CSUMmary:NTRansition?	
Parameter	<NR1>	Sets the detection bit of Csummary status of changes from positive to negative.
Example	:STAT:CSUM:NTR 1 Sets the detection bit of Csummary status of changes from positive to negative.	
Query example	:STAT:CSUM:NTR? >1 Return the detection bit of Csummary status of changes from positive to negative.	

:STATus:CSUMmary:PTRansition → Set → Query

Description	Sets and queries for detection bit of Csummary status of changes of from negative to positive.
Syntax	:STATus:CSUMmary:PTRansition <NR1>

Query Syntax	:STATus:CSUMmary:PTRansition?	
Parameter	<NR1>	Sets the detection bit of Csummary status of changes from negative to positive.
Example	:STAT:CSUM:PTR 1 Sets the detection bit of Csummary status of changes from negative to positive.	
Query example	:STAT:CSUM:PTR? >1 Return the detection bit of Csummary status of changes from negative to positive.	

Operation Status Commands

:STATus:OPERation:CONDition → Query

Description	Query the Operation Status Condition register.
Query Syntax	:STATus:OPERation:CONDition?
Return parameter	Return the Operation Status Condition register, by the "<NR1>" string.
Query example	:STAT:OPER:COND? >1 Return the Operation Status Condition register.

:STATus:OPERation:ENABle → Set / → Query

Description	Sets and queries for the Event Enable register of Operation.	
Syntax	:STATus:OPERation:ENABle <NR1>	
Query Syntax	:STATus:OPERation:ENABle?	
Parameter	<NR1>	Sets the Event Enable register of Operation.
Example	:STAT:OPER:ENAB 1 Sets the Event Enable register of Operation.	
Query example	:STAT:OPER:ENAB? >1 Return the Event Enable register of Operation.	

:STATus:OPERation[:EVENt] → Query

Description	Query for the Event register of Operation.
Query Syntax	:STATus:OPERation[:EVENt]?
Return parameter	Return the Event register of Operation, by the "<NR1>" string.
Query example	:STAT:OPER? >1 Return the Event register of Operation.

:STATus:OPERation:NTRansition → Set / Query

Description	Sets and queries for detection bit of Operation status of changes of from positive to negative.	
Syntax	:STATus OPERation:NTRansition <NR1>	
Query Syntax	:STATus:OPERation:NTRansition?	
Parameter	<NR1>	Sets the detection bit of Operation status of changes from positive to negative.
Example	:STAT:OPER:NTR 1 Sets the detection bit of Operation status of changes from positive to negative.	
Query example	:STAT:OPER:NTR? >1 Return the detection bit of Operation status of changes from positive to negative.	

:STATus:OPERation:PTRansition → Set / Query

Description	Sets and queries for detection bit of Operation status of changes of from negative to positive.
Syntax	:STATus:OPERation:PTRansition <NR1>
Query Syntax	:STATus OPERation:PTRansition?

Parameter	<NR1>	Sets the detection bit of Operation status of changes from negative to positive.
Example	:STAT:OPER:PTR 1 Sets the detection bit of Operation status of changes from negative to positive.	
Query example	:STAT:OPER:PTR? >1 Return the detection bit of Operation status of changes from negative to positive.	

Questionable Status Commands

:STATus:QUEStionable:CONDition → Query

Description	Query the Questionable Status Condition register.
Query Syntax	:STATus:QUEStionable:CONDition?
Return parameter	Return the Questionable Status Condition register, by the "<NR1>" string.
Query example	:STAT: QUES:COND? >1 Return the Questionable Status Condition register.

:STATus:QUEStionable:ENABle → Set → Query

Description	Sets and queries for the Event Enable register of Questionable.	
Syntax	:STATus:QUEStionable:ENABle <NR1>	
Query Syntax	:STATus:QUEStionable:ENABle?	
Parameter	<NR1>	Sets the Event Enable register of Questionable.
Example	:STAT:QUES:ENAB 1 Sets the Event Enable register of Questionable.	
Query example	:STAT:QUES:ENAB? >1 Return the Event Enable register of Questionable.	

:STATus:QUEStionable[:EVENt] → Query

Description	Query for the Event register of Questionable.
Query Syntax	:STATus:QUEStionable[:EVENt]?
Return parameter	Return the Event register of Questionable, by the "<NR1>" string.
Query example	:STAT:QUES? >1 Return the Event register of Questionable.

:STATus:QUEStionable:NTRansition → Set / → Query

Description	Sets and queries for detection bit of Questionable status of changes of from positive to negative.	
Syntax	:STATus:QUEStionable:NTRansition <NR1>	
Query Syntax	:STATus:QUEStionable:NTRansition?	
Parameter	<NR1>	Sets the detection bit of Questionable status of changes from positive to negative.
Example	:STAT:QUES:NTR 1 Sets the detection bit of Questionable status of changes from positive to negative.	
Query example	:STAT:QUES:NTR? >1 Return the detection bit of Questionable status of changes from positive to negative.	

:STATus:QUEStionable:PTRansition → Set / → Query

Description	Sets and queries for detection bit of Questionable status of changes of from negative to positive.
Syntax	:STATus:QUEStionable:PTRansition <NR1>
Query Syntax	:STATus:QUEStionable:PTRansition?

Parameter	<NR1>	Sets the detection bit of Questionable status of changes from negative to positive.
Example	:STAT:QUES:PTR 1 Sets the detection bit of Questionable status of changes from negative to positive.	
Query example	:STAT:QUES:PTR? >1 Return the detection bit of Questionable status of changes from negative to positive.	

Status Register Overview

This section explains in detail how the Status registers are used and how to configure them.

It will also be able to create an effective program by understand the Status register.

Introduction to the Status Registers

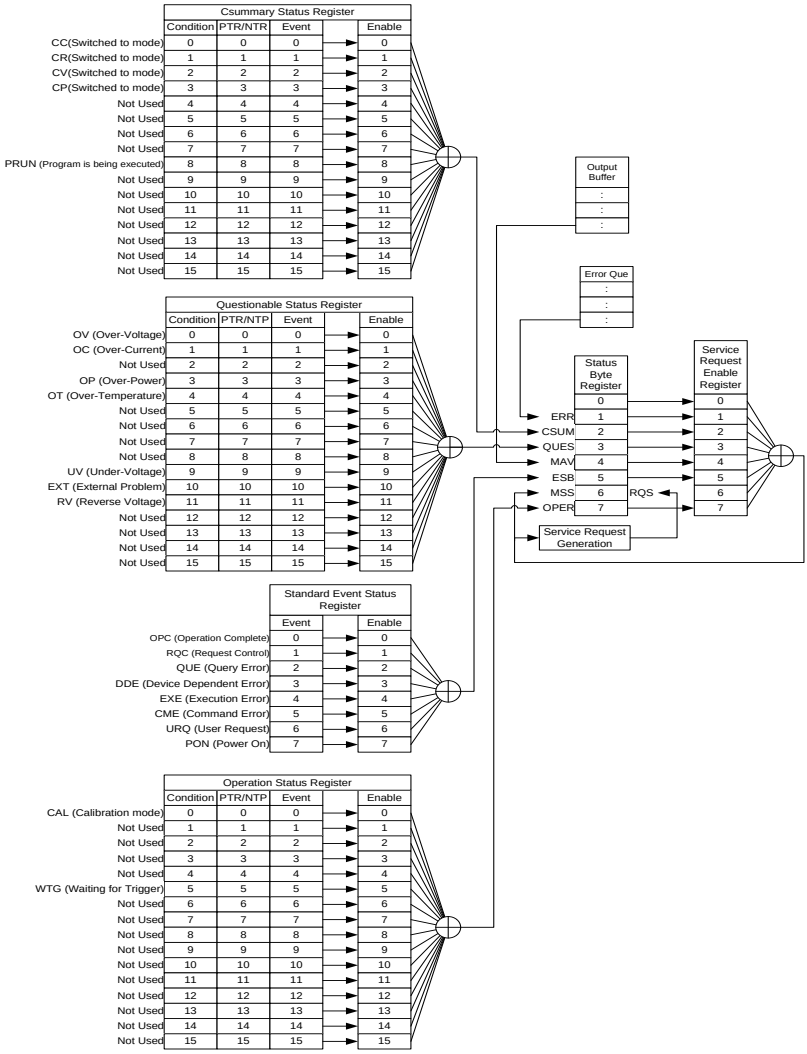
Overview

The status registers are used to determine the status of the electronic load. The status registers maintain the status of the protection conditions, load conditions and channel conditions of the load modules.

The PEL-3000AH series have a number of register groups:

- CSummary Registers
- Operation Status Register Group
- Questionable Status Register Group
- Standard Event Status Register Group
- Status Byte Register Group

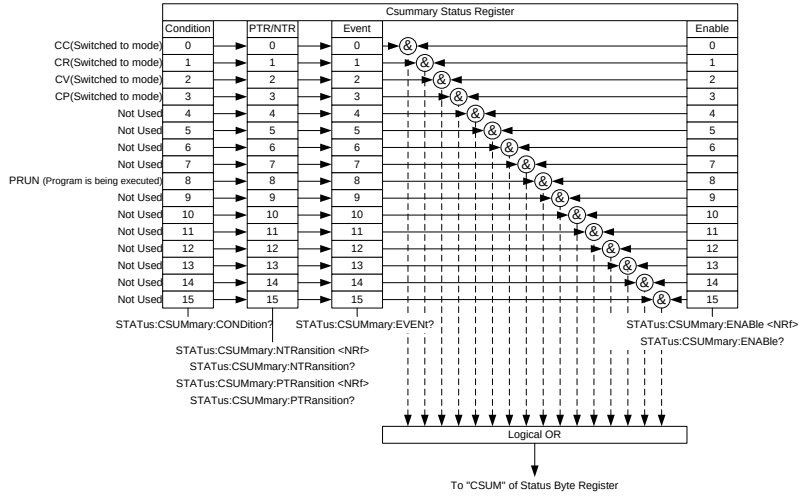
Configuration in the Status register



Csummary Status Register Group

Overview

Csummary Status register group, you can check the operating status of the load mode and sequence or program mode.



Bit Summary

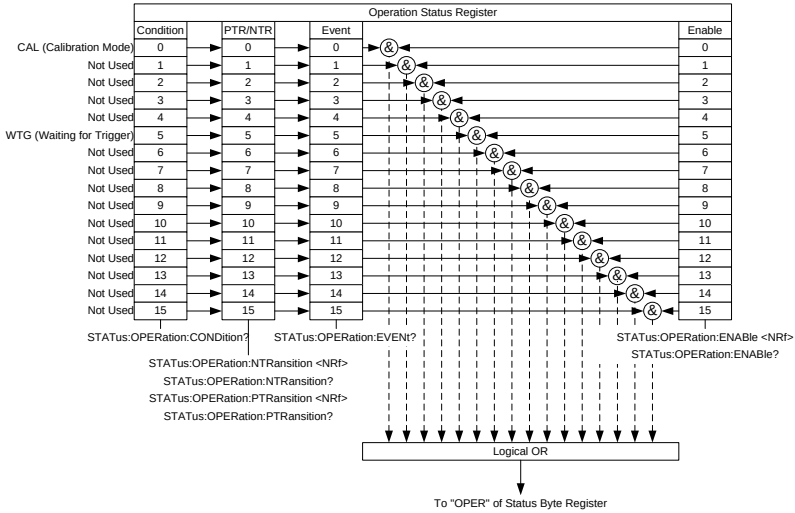
Bit name	Event	Bit #	Bit Weight
CC	Indicate the Constant Current mode setting.	0	1
CR	Indicate the Constant Resistance mode setting.	1	2
CV	Indicate the Constant Voltage mode setting.	2	4
CP	Indicate the Constant Power mode setting.	3	8
PRUN	Indicate the operation mode of Sequence or Program.	8	256

Condition Register	Csummary Status Condition register can be read the current state of the load mode and program mode or sequence operation mode.
PTR/NTR Filter	The PTR/NTR (Positive/Negative transition) register determines the type of transition conditions that will set the corresponding bit in the Event Registers. Use the Positive transition filter to view events that change from false to positive, and use the negative transition filter to view events that change from positive to negative. Positive Transition 0→1 Negative Transition 1→0
Event Register	The PTR/NTR Register will dictate the type of transition conditions will set the corresponding bits in the Event Register. If the Event Register is read, it will be cleared to 0.
Enable Register	The Enable register determines which Events in the Event Register will be used to set the CSUM bit in the Status Byte Register.

Operation Byte Register Group

Overview

Operation Status register group, you can check the operating status of the Trigger wait or the Calibration mode.



	Bit name	Event	Bit #	Bit Weight
	CAL	Indicate the Calibration mode.	0	1
	WTG	Indicate the Trigger wait.	5	32

Condition Register

Operation Status Condition register can be read by the current state of the Trigger waiting and Calibration mode.

PTR/NTR Filter

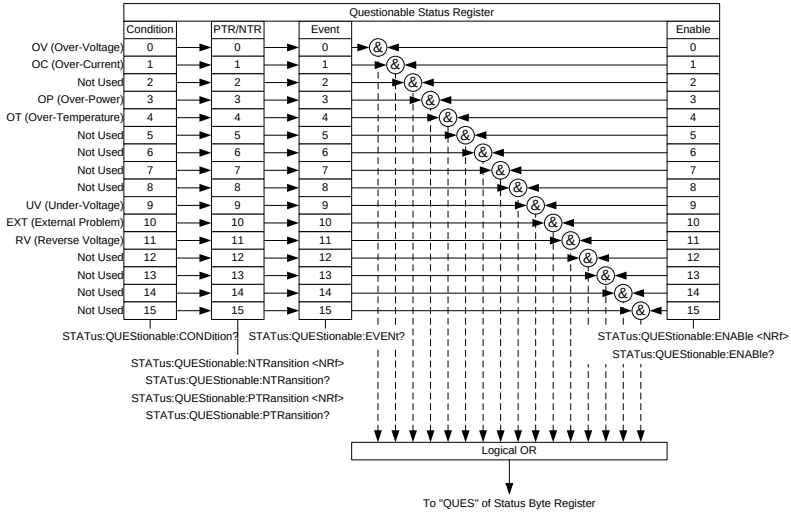
The PTR/NTR (Positive/Negative transition) register determines the type of transition conditions that will set the corresponding bit in the Event Registers. Use the Positive transition filter to view events that change from false to positive, and use the negative transition filter to view events that change from positive to negative.

	Positive Transition	0→1
	Negative Transition	1→0
Event Register	The PTR/NTR Register will dictate the type of transition conditions will set the corresponding bits in the Event Register. If the Event Register is read, it will be cleared to 0.	
Enable Register	The Enable register determines which Events in the Event Register will be used to set the OPER bit in the Status Byte Register.	

Questionable Status Register Group

Overview

Questionable Status register group, you can check the operating status of the protection function.



Bit Summary

Bit name	Event	Bit #	Bit Weight
OV	Indicate the Over-Voltage condition.	0	1
OC	Indicate the Over-Current condition.	1	2

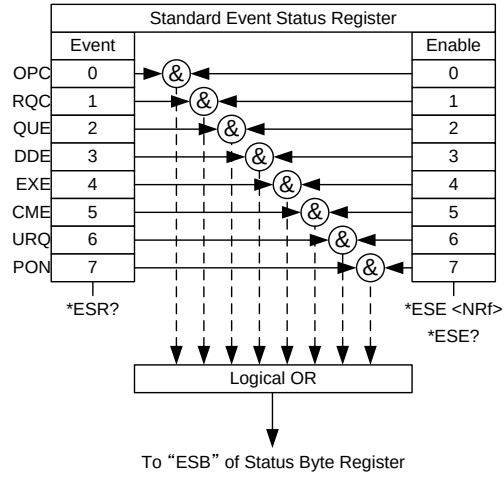
	OP	Indicate the Over-Power condition.	3	8
	OT	Indicate the Over-Temperature condition.	4	16
	PRUN	Indicate the operation mode of Sequence or Program.	8	256
	UV	Indicate the Under-Voltage condition.	9	512
	EXT	Indicate the abnormality state of the external control.	10	1024
	RV	Indicate the reverse connection state.	11	2048

Condition Register	Questionable Status Condition register can be read the current state of the protection function.
PTR/NTR Filter	The PTR/NTR (Positive/Negative transition) register determines the type of transition conditions that will set the corresponding bit in the Event Registers. Use the Positive transition filter to view events that change from false to positive, and use the negative transition filter to view events that change from positive to negative.
	Positive Transition 0→1 Negative Transition 1→0
Event Register	The PTR/NTR Register will dictate the type of transition conditions will set the corresponding bits in the Event Register. If the Event Register is read, it will be cleared to 0.
Enable Register	The Enable register determines which Events in the Event Register will be used to set the QUES bit in the Status Byte Register.

Standard Event Status Register Group

Overview

The Standard Event Status register group indicates whether an error occurred. Bit in the event register is set by the error event queue.



Bit Summary

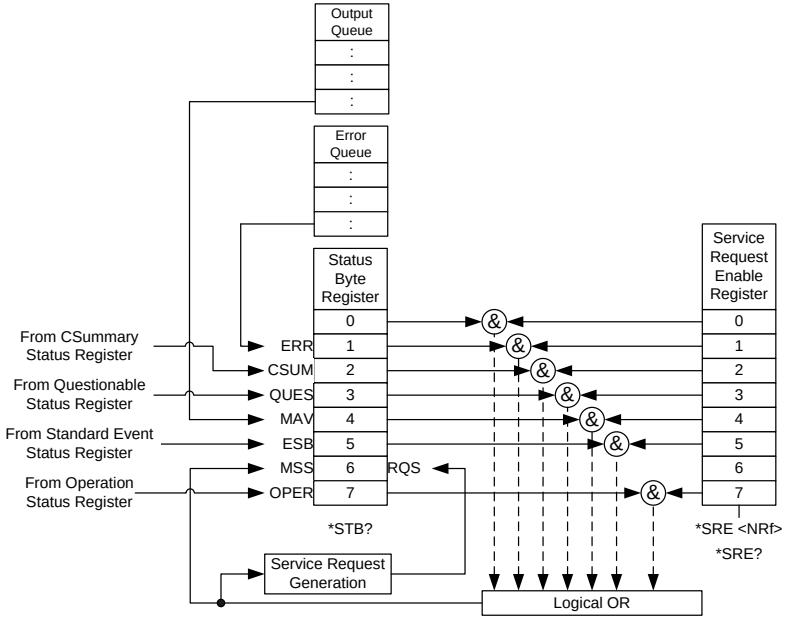
Bit name	Event	Bit #	Bit Weight
OPC	Operation complete The OPC bit is set when all selected pending operations are complete. This bit is set in response to the *OPC command.	0	1
RQC	Request control	1	2
QUE	Query Error The Query Error bit is set in response to an error reading the Output Queue. This can be caused by trying to read the Output Queue when there is no data present.	2	4

	DDE	Device Dependent Error Device specific error.	3	8
	EXE	Execution Error The EXE bit indicates an execution error due to one of the following: illegal command parameter, parameter out of range, invalid parameter, the command didn't execute due to an overriding operation condition.	4	16
	CME	Command Error The CME bit is set when a syntax error has occurred. The CME bit can also be set when a <GET> command is received within a program message.	5	32
	URQ	User Request	6	64
	PON	Power On Indicates the power is turned on.	7	128
Event Register	Any bits set in the event register indicate that an error has occurred. Reading the Event register will reset the register to 0.			
Enable Register	The Enable register determines which Events in the Event Register will be used to set the ESB bit in the Status Byte Register.			

Status Byte Register Group

Overview

The Status Byte register groups, you can check the status of the event in the status register of all. You can read the status byte register in "* STB?" Query command.



Bit name	Event	Bit #	Bit Weight
ERR	Error Event/Queue If data is present in the Error queue, the ERR bit will be set.	1	2
CSUM	Csummary Status Register The summary bit for the Csummary Status Register group.	2	4

	QUES	Questionable Status Register The summary bit for the Questionable Status Register group.	3	8
	MAV	Message Available This is set when there is data in the Output Queue waiting to be read.	4	16
	ESB	Event Summary Bit. The ESB is the summary bit for the Standard Event Status Register group.	5	32
	MSS /RQS	The MSS Bit is the summary of the Status Byte Register and Service Request register (bits 1-5, 7). This will be set to 1.	6	64
	OPER	Operation Status Register OPER bit is the summary bit for the Operation Status Register Group.	7	128
Status Byte Register	Any bits set in the Status byte register acts as a summary register for all the four other status registers and indicates if there is a service request, an error in the Error Queue or data in the Output Queue. Reading the Status Byte register will reset the register to 0.			

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Service Request Enable Register

Service Request Enable register specifies the bits in the Status Byte register for setting the MSS / RQS bit in the Status Byte register.

Also, MSS bit, can see in the "*STB?" Query command.

RQS bit is used to RQS bit of the GP-IB interface managed by the service request generator a bit of MSS. RQS bit is initialized after reading.

Error Messages

The following error messages may be encountered when reading the error queue.

Error Code and string	Description
Command Errors	
0 NoError	No error
-100 Command Error	This is the generic syntax error for devices that cannot detect more specific errors.
-101 Invalid character	A syntactic element contains a character which is invalid for that type.
-102 Syntax error	An unrecognized command or data type was encountered.
-103 Invalid separator	The parser was expecting a separator and encountered an illegal character.
-104 Data type error	The parser recognized a data element different than the one allowed.
-105 GET not allowed	A Group Execute Trigger was received within a program message.
-108 Parameter not allowed	More parameters were received than expected for the header.
-109 Missing parameter	Fewer parameters were received than required for the header.
-110 Command header error	An error was detected in the header.
-111 Header separator error	A character which is not a legal header separator was encountered while parsing the header.
-112 Program mnemonic too long	The header contains more than twelve characters.
-113 Undefined header	The header is syntactically correct, but it is undefined for this specific device.

-114 Header suffix out of range	The value of a numeric suffix attached to a program mnemonic.
-115 Unexpected number of parameters	The number of parameters received does not correspond to the number of parameters expected.
-120 Numeric data error	This error is generated when parsing a data element which appears to be numeric, including the nondecimal numeric types.
-121 Invalid character in number	An invalid character for the data type being parsed was encountered.
-123 Exponent too large	The magnitude of the exponent was larger than 32000.
-124 Too many digits	The mantissa of a decimal numeric data element contained more than 255 digits excluding leading zeros.
-128 Numeric data not allowed	A legal numeric data element was received, but the device does not accept one in this position for the header
-130 Suffix error	This error, as well as errors -131 through -139, are generated when parsing a suffix.
-131 Invalid suffix	The suffix does not follow the syntax described in IEEE 488.2 or the suffix is inappropriate for this device.
-134 Suffix too long	The suffix contained more than 12 characters.
-138 Suffix not allowed	A suffix was encountered after a numeric element which does not allow suffixes.
-140 Character data error	This error is generated when parsing a character data element.
-141 Invalid character data	Either the character data element contains an invalid character or the particular element received is not valid for the header.
-144 Character data too long	The character data element contains more than twelve characters

-148 Character data not allowed	A legal character data element was encountered where prohibited by the device.
-150 String data error	This error is generated when parsing a string data element.
-151 Invalid string data	A string data element was expected, but was invalid for some reason.
-158 String data not allowed	A string data element was encountered but was not allowed by the device at this point in parsing.
-160 Block data error	This error is generated when parsing a block data element.
-161 Invalid block data	A block data element was expected, but was invalid for some reason.
-168 Block data not allowed	A legal block data element was encountered but was not allowed by the device at this point in parsing.
-170 Expression error	This error is generated when parsing an expression data element.
-171 Invalid expression	The expression data element was invalid.
-178 Expression data not allowed	A legal expression data was encountered but was not allowed by the device at this point in parsing.
-180 Macro error	This error is generated when defining a macro or executing a macro.
-181 Invalid outside macro definition	Indicates that a macro parameter placeholder ($<number) was encountered outside of a macro definition.
-183 Invalid inside macro definition	Indicates that the program message unit sequence, sent with a *DDT or *DMC command, is syntactically invalid.
-184 Macro parameter error	Indicates that a command inside the macro definition had the wrong number or type of parameters.

Execution Errors	
-200 Execution error	This is the generic syntax error for devices that cannot detect more specific errors. This code indicates only that an Execution Error as defined in IEEE 488.2 has occurred.
-201 Invalid while in local	Indicates that a command is not executable while the device is in local due to a hard local control
-202 Settings lost due to rtl	Indicates that a setting associated with a hard local control was lost when the device changed to LOCS from REMS or to LWLS from RWLS.
-203 Command protected	Indicates that a legal password-protected program command or query could not be executed because the command was disabled.
-210 Trigger error	
-211 Trigger ignored	Indicates that a GET, *TRG, or triggering signal was received and recognized by the device but was ignored because of device timing considerations.
-212 Arm ignored	Indicates that an arming signal was received and recognized by the device but was ignored.
-213 Init ignored	Indicates that a request for a measurement initiation was ignored as another measurement was already in progress.
-214 Trigger deadlock	Indicates that the trigger source for the initiation of a measurement is set to GET and subsequent measurement query is received. The measurement cannot be started until a GET is received, but the GET would cause an INTERRUPTED error.

-215 Arm deadlock	Indicates that the arm source for the initiation of a measurement is set to GET and subsequent measurement query is received. The measurement cannot be started until a GET is received, but the GET would cause an INTERRUPTED error.
-220 Parameter error	Indicates that a program data element related error occurred.
-221 Settings conflict	Indicates that a legal program data element was parsed but could not be executed due to the current device state.
-222 Data out of range	Indicates that a legal program data element was parsed but could not be executed because the interpreted value was outside the legal range as defined by the device.
-223 Too much data	Indicates that a legal program data element of block, expression, or string type was received that contained more data than the device could handle due to memory or related device-specific requirements.
-224 Illegal parameter value	Used where an exact value, from a list of possibilities, was expected.
-225 Out of memory.	The device has insufficient memory to perform the requested operation.
-226 Lists not same length.	Attempted to use LIST structure having individual LIST's of unequal lengths.
-230 Data corrupt or stale	Possibly invalid data; new reading started but not completed since last access.
-231 Data questionable	Indicates that measurement accuracy is suspect.
-232 Invalid format	Indicates that a legal program data element was parsed but could not be executed because the data format or structure is inappropriate.

-233 Invalid version	Indicates that a legal program data element was parsed but could not be executed because the version of the data is incorrect to the device.
-240 Hardware error	Indicates that a legal program command or query could not be executed because of a hardware problem in the device.
-241 Hardware missing	Indicates that a legal program command or query could not be executed because of missing device hardware.
-250 Mass storage error	Indicates that a mass storage error occurred.
-251 Missing mass storage	Indicates that a legal program command or query could not be executed because of missing mass storage.
-252 Missing media	Indicates that a legal program command or query could not be executed because of a missing media.
-253 Corrupt media	Indicates that a legal program command or query could not be executed because of corrupt media.
-254 Media full	Indicates that a legal program command or query could not be executed because the media was full.
-255 Directory full	Indicates that a legal program command or query could not be executed because the media directory was full.
-256 File name not found	Indicates that a legal program command or query could not be executed because the file name on the device media was not found.
-257 File name error	Indicates that a legal program command or query could not be executed because the file name on the device media was in error.

-258 Media protected	Indicates that a legal program command or query could not be executed because the media was protected.
-260 Expression error	Indicates that a expression program data element related error occurred.
-261 Math error in expression	Indicates that a syntactically legal expression program data element could not be executed due to a math error.
-270 Macro error	Indicates that a macro-related execution error occurred.
-271 Macro syntax error	Indicates that that a syntactically legal macro program data sequence, according to IEEE 488.2 could not be executed due to a syntax error within the macro definition.
-272 Macro execution error	Indicates that a syntactically legal macro program data sequence could not be executed due to some error in the macro definition.
-273 Illegal macro label	Indicates that the macro label defined in the *DMC command was a legal string syntax, but could not be accepted by the device.
-274 Macro parameter error	Indicates that the macro definition improperly used a macro parameter placeholder.
-275 Macro definition too long	Indicates that a syntactically legal macro program data sequence could not be executed because the string or block contents were too long for the device to handle.
-276 Macro recursion error	Indicates that a syntactically legal macro program data sequence could not be executed because the device found it to be recursive.

-277 Macro redefinition not allowed	Indicates that a syntactically legal macro label in the *DMC command could not be executed because the macro label was already defined.
-278 Macro header not found	Indicates that a syntactically legal macro label in the *GMC? query could not be executed because the header was not previously defined.
-280 Program error	Indicates that a downloaded program-related execution error occurred.
-281 Cannot create program	Indicates that an attempt to create a program was unsuccessful. A reason for the failure might include not enough memory.
-282 Illegal program name	The name used to reference a program was invalid.
-283 Illegal variable name	An attempt was made to reference a nonexistent variable in a program.
-284 Program currently running	Certain operations dealing with programs may be illegal while the program is running.
-285 Program syntax error	Indicates that a syntax error appears in a downloaded program.
-286 Program runtime error	
-290 Memory use error	Indicates that a user request has directly or indirectly caused an error related to memory or <data_handle>s, this is not the same as “bad” memory.
-291 Out of memory	
-292 Referenced name does not exist	
-293 Referenced name already exists	

-294 Incompatible type	Indicates that the type or structure of a memory item is inadequate.

Device Specific Errors	
-300 Device-specific error	This is the generic device-dependent error for devices that cannot detect more specific errors.
-310 System error	Indicates that some error, termed "system error" by the device, has occurred.
-311 Memory error	Indicates some physical fault in the device's memory, such as parity error.
-312 PUD memory lost	Indicates that the protected user data saved by the *PUD command has been lost.
-313 Calibration memory lost	Indicates that nonvolatile calibration data used by the *CAL? command has been lost.
-314 Save/recall memory lost	Indicates that the nonvolatile data saved by the *SAV? command has been lost.
-315 Configuration memory lost	Indicates that nonvolatile configuration data saved by the device has been lost.
-320 Storage fault	[Indicates that the firmware detected a fault when using data storage. This error is not an indication of physical damage or failure of any mass storage element.
-321 Out of memory	An internal operation needed more memory than was available.
-330 Self-test failed	Fail of Self Test.
-340 Calibration failed	Fail of Calibration.
-350 Queue overflow	A specific code entered into the queue in lieu of the code that caused the error. This code indicates that there is no room in the queue and an error occurred but was not recorded.

-360 Communication error	This is the generic communication error.
-361 Parity error in program message	Parity bit not correct when data received.
-362 Framing error in program message	A stop bit was not detected when data was received.
-363 Input buffer overrun	Software or hardware input buffer on serial port overflows with data caused by improper or nonexistent pacing.
-365 Time out error	This is a generic device-dependent error.
Query Errors	
-400 Query error	This is the generic query error.
-410 Query INTERRUPTED	Indicates that a condition causing an INTERRUPTED Query error occurred.
-420 Query UNTERMINATED	Indicates that a condition causing an UNTERMINATED Query error occurred.
-430 Query DEADLOCKED	Indicates that a condition causing an DEADLOCKED Query error occurred.
-440 Query UNTERMINATED after indefinite response	Indicates that a query was received in the same program message after a query requesting an indefinite response was executed
Power On Event Commands	
-500 Power on	The instrument has detected an off to on transition in its power supply.
User Request Event	
-600 User request	The instrument has detected the activation of a user request local control.

Request Control Event	
-700 Request control	The instrument requested to become the active IEEE 488.1 controller-in-charge.

Operation Complete Event	
-800 Operation complete	The instrument has completed all selected pending operations in accordance with the IEEE 488.2 synchronization protocol.