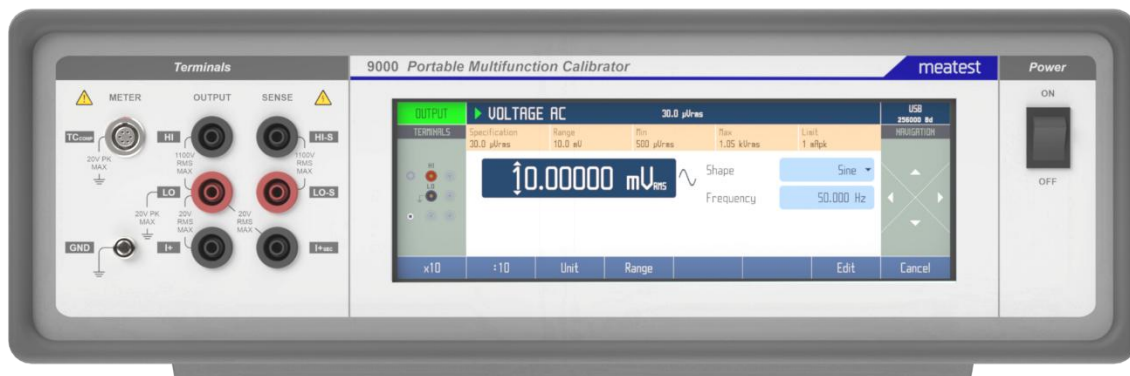


9000 Portable Multifunction Calibrator

remote control manual



ANALOG
DIGITAL



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GERÄTE UND SYSTEME FÜR FORSCHUNG · ENTWICKLUNG · VERSUCH · SERVICE

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1. Connection Setup

The calibrator can be integrated into automated calibration systems (ATS) and generally controlled from remote computer via USB, GPIB (IEEE488) or Ethernet interface. When controlled remotely, maximum ratings of calibrator's output signals as well as all other specifications are the same as in manual mode.

Only one interface can be used for communication at any given time. To establish connection between the calibrator and computer, select preferred interface in MENU->Interface->Active bus (USB is active by default) and follow instructions from relevant subchapter below.

1.1. USB Connection

Connect the calibrator to your remote controller (PC) using:

- USB 2.0 A-B cable

And set the remote controller as follows:

- COM port see available COM ports in Windows Device Manager
 USB appears as serial converter "USB Serial Port (COMxx)"
- Baudrate 9600 (can be changed to 1200 – 115200 in calibrator Menu->Interface)
- Data bits 8
- Stop bits 1
- Parity None
- Handshake (Xon/Xoff) Off

1.2. GPIB Connection

Set GPIB address of controlled device in your remote controller (PC) to match value in calibrator's MENU->Interface->GPIB Address (2 by default).

Connect the calibrator to your remote controller (PC) using IEEE488 cable. When using converters, make sure you use National Instruments converters as other types (e.g. Agilent) might not work properly. Once connected, the calibrator automatically executes IEEE488 bus commands SH1, AH1, T5, L3, RL1, and DC1 (in that order). Calibrator also recognizes following general commands:

- DCL Device Clear – resets device to its basic state
- SDC Selected Device Clear – resets device to its basic state
- LLO Local Lock Out – puts device into Remote mode and locks keyboard
- GTL Go To Local – returns device from Remote mode and unlocks keyboard

1.3. Ethernet Connection

Ethernet connection uses IPv4 and Telnet protocols to communicate with remote controller (PC). By default, calibrator is set to establish Telnet server with DHCP hostname "9000_SNxxxxxx" ("xxxxxx" stands for serial number), listening to port 23. All IPv4 parameters can be changed in calibrator Menu > Interface > LAN Settings:

- DHCP discovery ON/OFF
- Port number
- Host name (with DHCP ON)
- IP address, subnet mask and default gateway (with DHCP OFF; in this case use IP address instead of hostname from now on)

Connect remote controller (PC) using at least category 4 UTP cable. It is recommended to check LAN connection with ping utility afterwards (type "ping " and hostname into Windows command line and see if the calibrator responds).

Once connected, you'll be able to log into the calibrator as Telnet client using Microsoft Telnet Client, Putty or similar. To start MS Telnet Client, open your command line and type in „Telnet“. Then proceed with „o 9000_SNxxxxxx yy“, where “xxxxxx” is serial number and “yy” is communication port:



```
C:\Windows\System32\telnet.exe
Welcome to Microsoft Telnet Client
Escape Character is 'Ctrl+]'
Microsoft Telnet> o 9000_SN750021 23
```



```
C:\Windows\System32\telnet.exe
Welcome to 9000 device
9000>
```

2. Executing Commands

Most commands can be executed in Remote mode only. In Remote mode, device blocks manual entry interfaces (keyboard, touchscreen) to prevent unintended manipulation during remote control session. GPIB interface switches device into and out of Remote mode automatically. Other interfaces (RS232, USB and Ethernet) need to use following commands:

- SYSTem:REMOte Puts device into Remote mode and locks keyboard except Local button
- SYSTem:RWLock Puts device into Remote mode and locks entire keyboard
- SYSTem:LOCal Returns device from Remote mode and unlocks keyboard

2.1. Command Syntax

All commands listed in this chapter are made of KEYWORDS and PARAMETERS.

One or more KEYWORDS divided by colons (:) make up name of a command. When typing a command, keywords in square brackets ([]) can be omitted as well as lowercase letters and leading colons. For example “:OUTPut:STATe ON”, “:OUTPut ON” and “OUTP 1” are considered the same.

Different PARAMETER types describe what kind of data is expected. For more details on parameter types, see table below. In command reference parameters are indicated by sharp brackets (< >) and separated by commas (,). Square brackets ([]) indicate non-mandatory parameters, vertical lines (|) indicate parameter alternatives.

Multiple commands can be executed at once if separated by semicolon (;). In any case, command (or set of commands) has to end with line feed (LF) terminator in order to be executed. With exception of GPIB interface, the device will also accept carriage return (CR) and combination of both (CRLF) as terminators. Inversely, device will always terminate its reply with CRLF or just LF in case of GPIB. The communication may look like this:

1. Controller> „RES 100;OUTP ON“+LF (ASCII code 10)
2. Device> „1.000000E+02 OHM“+LF
3. Device> „1“+LF

Used parameter types

Type	Description
<DNPD>	Decimal Numeric Program Data, this format is used to express decimal number with or without the exponent.
<CPD>	Character Program Data. Usually, it represents a group of alternative character parameters. E.g. {SERial GPIB USB LAN}.
<SPD>	String Program Data (quoted string). This type of parameter is similar to CPD, but allows transmission of more ISO characters.
<BOOL>	Boolean Program Data. This type of parameter has only two states 0 and 1. Parameter can take form of integer value (0 or 1), or character alias (ON or OFF). Device always returns integer value (0 or 1).
<UNIT>	Unit parameter works in conjunction with DNPD parameter and specifies unit of DNPD (numeric) value. Unit must be selected from predefined ones. If UNIT part is omitted, default one is used. Query always returns actual unit.
<N>	Numeric suffix - unique identifier with NR1 format (an integer without a decimal point).
?	A flag indicating a request for the value of the parameter specified by the command. No other parameter than the question mark can be used.
(?)	A flag indicating a request for the parameter specified by the command. This command permits a value to be set as well as requested.

3. Status Reporting

3.1. Status Data Structure-Register Model

Device meets standard protocol according to the standard IEEE488.2. The protocol can be used for checking of error and status behavior of the device. It enables single-wire transmitting of SRQ command. The conditions on which SRQ signal (local control request) is sent can be set with commands *STB?, *SRE?, *SRE, *ESR?, *ESE?, *ESE a *CLS.

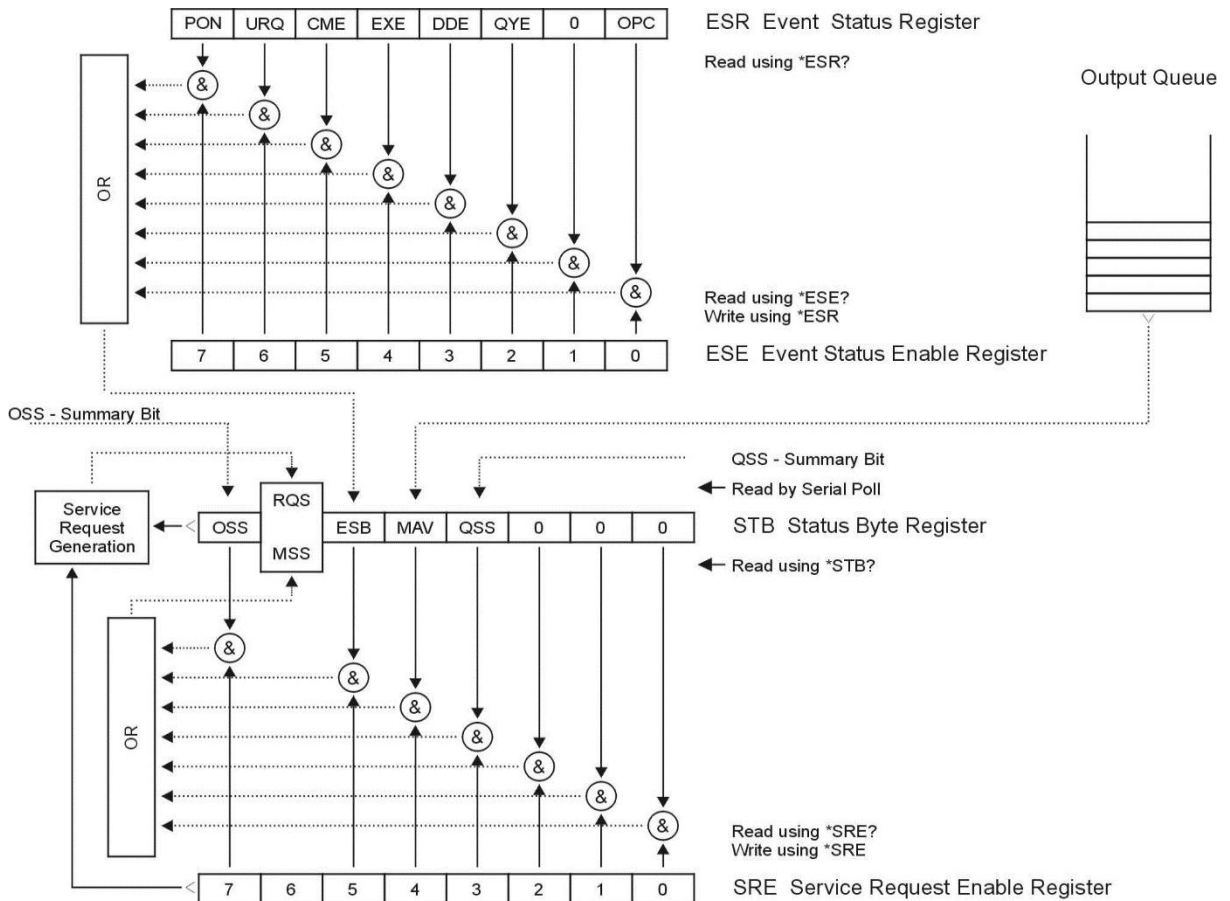


Figure 1 Status register overview

Status data structure contains following registers:

- STB – Status Byte Register
- SRE – Service Request Enable Register
- ESR – Event Status Register
- ESE – Event Status Enable Register
- Output Queue

3.2. Status Data Structure Registers

STB Status Byte Register

STB is main register where information from other status registers and from output queue is collected. Value of STB register is reset after switching on the device or after sending command *CLS. This command reset the STB register except bit MAV, which remains set if the output queue is not empty. STB register value can be read via serial message or through general query *STB?. Bit configuration of Status Byte Register is as follows:

- OSS Operation Summary Status, bit 7. SCPI-defined. The OSS bit is set to 1 when the data in the OSR (Operation Status Register) contains one or more enabled bits which are true.
- RQS Request Service, bit 6. The bit is read as a part of status byte only when serial message is sent.
- MSS Master Summary Status, bit 6. The MSS bit is set to 1 whenever bits ESB or MAV are 1 and enabled (1) in the SRE. This bit can be read using the *STB? command. Its value is derived from STB and SRE status.
- ESB Event Summary Bit, bit 5. His value is derived from STB and SRE status. The ESB bit is set to 1 when one or more enabled ESR bits are set to 1.
- MAV Message Available, bit 4. The MAV bit is set to 1 whenever data is available in the IEEE488 Output Queue (the response on query is ready).
- QSS Questionable Summary Status, bit 3. SCPI-defined. The QSS bit is set to 1 when the data in the QSR (Questionable Status Register) contains one or more enabled bits which are true.

SRE Service Request Enable Register

The Service Request Enable Register suppresses or allows the STB bits. “0” value of a SRE bit means, that the bit does not influence value of MSS bit. Value of any unmasked STB bit results in setting of the MSS bit to the level “1”. SRE bit 6 is not influenced and its value is “0”. The SRE register value can be set via the command *SRE followed by mask register value (0 – 191). The register can be read with the command *SRE?. The register is automatically resets after switching the device on. The register is not reset by the command *CLS.

ESR Event Status Register

Every bit of the EventStatusRegister corresponds to one event. Bit is set when the event is changed and it remains set also when the event passed. The ESR is cleared when the power is turned on (except bit PON which is set), and every time it is read via command *ESR? Or cleared with *CLS. Bit configuration of Event Status Register is as follows:

- PON Power On, bit 7. This event bit indicates that an off-to-on transition has occurred in the device’s power supply.
- URQ User Request, bit 6. Bit is not used and it is always “0”.
- CME Command Error, bit 5. This event bit indicates that an incorrectly formed command or query has been detected by the instrument.
- EXE Execution Error, bit 4. This event bit indicates that the received command cannot be executed, owing to the device state or the command parameter being out of limits.
- DDE Device Dependent Error, bit 3. This event bit indicates that an error has occurred which is neither a Command Error, a Query Error, nor an Execution Error. A Device-specific Error is any executed device operation that did not properly complete due to some condition, such as overload.
- QYE Query Error, bit 2. The bit is set if the device is addressed as talker and output queue is empty or if control unit did not pick up response before sending next query.
- OPC Operation Complete, bit 0. This event bit is generated in response to the *OPC command. It indicates that the device has completed all selected pending operations.

ESE Event Status Enable Register

The Event Status Enable Register allows one or more events in the Event Status Register to be reflected in the ESB summary-message bit. This register is defined for 8 bits, each corresponding to the bits in the Event Status Register. The Event Status Enable Register is read with the common query *ESE?. Data is returned as a binary-weighted value. The Event Status Enable Register is written to by the common command, *ESE. Sending the *ESE common command followed by a zero clears the ESE. The Event Status Enable Register is cleared upon power-on.

It suppresses or allows bits in ESR register. Value „0“ of a bit of ESE register suppresses influence of appropriate bit of ESR register on value of sum bit of ESB status register. Setting of any unmask bit of ESR register results in setting of ESB status register. ESE register value can be modified by command *ESE followed by value of mask register (integer in range 0 –255). Reading of the register can be performed with command *ESE?. The register is automatically reset after switching on. The register is not reset with *CLS command.

Operation Status Register

The device does not use any bit.

Questionable Status Register

The device uses bit 11 to query reaching the lower limit for the Test Limiting function.

The device uses bit 12 to query reaching the upper limit for the Test Limiting function.

Output Queue

The Output Queue stores response messages until they are read from control unit. If there is at minimum one sign in the output queue, MAV register (message available) is set. The Output Queue is cleared upon power-on and after reading all signs from output queue.

Error Queue

The Error Queue stores error messages. They are placed in a “first in, first out” queue.

The queue is read destructively using the query command “SYSTem:ERRor?” to obtain a code number and error message. The query “SYSTem:ERRor?” can be used to read errors in the queue until it is empty, when the message “0, No Error” will be returned.

3.3. Error Messages

SCPI Remote control errors

Code	Name	Description
-440	Query UNTERMINATED after indefinite response	Indicates that a query was received in the same program message after an query requesting an indefinite response was executed
-430	Query DEADLOCKED	Indicates that a condition causing a DEADLOCKED Query error occurred; for example, both input buffer and output buffer are full and the device cannot continue.
-420	Query UNTERMINATED	Indicates that a condition causing an UNTERMINATED Query error occurred; for example, the device was addressed to talk and an incomplete program message was received.
-410	Query INTERRUPTED	Indicates that a condition causing an INTERRUPTED Query error occurred; for example, a query followed by DAB or GET before a response was completely sent.
-400	Query error	This is the generic query error.
-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.
-283	Illegal variable name	An attempt was made to reference a nonexistent variable in a program.
-241	Option is not present	Indicates that a legal program command or query could not be

		executed because of missing device hardware; for example, an option was not installed.
-230	Data corrupt or stale	Possibly invalid data; new reading started but not completed since last access.
-224	Illegal parameter value	Used where exact value, from a list of possible, was expected.
-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.
-221	Setting conflict	Indicates that a legal program data element was parsed but could not be executed due to the current device state.
-220	Parameter error	Indicates that a program data element related error occurred.
-213	Init ignored	Indicates that a request for a measurement initiation was ignored as another measurement was already in progress.
-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; for example, the device was not ready to respond.
-203	Command protected	Indicates that a legal password-protected program command or query could not be executed because the command was disabled.
-161	Invalid block data	A block data element was expected, but was invalid for some reason; for example, an END message was received before the length was satisfied.
-151	Invalid string data	A string data element was expected, but was invalid for some reason; for example, an END message was received before the terminal quote character.
-144	Character data too long	The character data element contains more than twelve characters.
-141	Invalid character data	Either the character data element contains an invalid character or the particular element received is not valid for the header.
-131	Invalid suffix	The suffix does not follow the syntax, or the suffix is inappropriate for this device.
-130	Suffix error	This error is generated when parsing a suffix.
-121	Invalid character in number	An invalid character for the data type being parsed was encountered; for example, an alpha in a decimal numeric.
-120	Numeric data error	This error is generated when parsing a data element which appears to be numeric, including the nondecimal numeric types.
-114	Header suffix out of range	The value of a numeric suffix attached to a program mnemonic makes the header invalid.
-113	Undefined header	The header is syntactically correct, but it is undefined for this specific device; for example, *XYZ is not defined for any device.
-112	Program mnemonic too long	The header contains more that twelve characters.
-109	Missing parameter	Fewer parameters were received than required for the header; for example, the *EMC common command requires one parameter, so receiving *EMC is not allowed.
-108	Parameter not allowed	More parameters were received than expected for the header; for example, the *EMC common command only accepts one parameter, so receiving *EMC 0,1 is not allowed.
-105	GET not allowed	A Group Execute Trigger was received within a program message.
-104	Data type error	The parser recognized a data element different than one allowed; for example, numeric or string data was expected but block data was encountered.
-103	Invalid separator	The parser was expecting a separator and encountered an illegal character.
-102	Syntax error	An unrecognized command or data type was encountered; for example, a string was received when the device does not accept strings.
-101	Invalid character	A syntactic element contains a character which is invalid for that type; for example, a header containing an ampersand, OUTPUT&.
-100	Command error	This is the generic syntax error.
263	Not able to execute while instrument is measuring	The command cannot be executed because the measurement is in progress.
311	Not able to specify resolution	The resolution parameter was ignored because automatic range

	with autorange	selection is used.
514	Command not allowed with GPIB	The command is not supported for GPIB.
515	The command is only supported for the RS232 bus	This command can only be used with the RS232 bus.
532	Not able to achieve requested resolution	The desired resolution cannot be set.
535	Value exceeded user global limit	The user-defined Master Limit has been exceeded.

Slave processor errors

1001	Internal communication with <module_name> failed.	The Slave processor received the command when it did not complete the previous commands. Please restart the device.
1002	Internal communication with <module_name> failed.	The Slave processor received a command with a wrong checksum. The command was not executed.
1003	Internal communication with <module_name> failed.	The Slave processor received an unknown command. Please update the device's FW.
1004	Internal communication with <module_name> failed.	The slave processor received the data, but its length is incorrect. Please update the device's FW.
1005	Internal communication with <module_name> failed.	The received parameter value is out of range. Please update the device's FW.
1006	Internal communication with <module_name> failed.	The command cannot be executed because the FW loading mode is active. Please restart the device.
1007	Internal communication with <module_name> failed.	The requested internal function does not exist. Please update the device's FW.
1008	Internal meter in <module_name> module does not measure	Internal meter returns invalid result.
1009	Internal meter in <module_name> module is overloaded	Internal meter is overloaded.
1010	Flash memory error in <module_name> module	Internal Flash operation error on slave processor.
1011	Flash memory error in <module_name> module	Writing or reading from the cell was not performed because the cell is out of range.
1012	Flash memory error in <module_name> module	Cannot write cell because it does not fit in Flash memory.
1013	Flash memory error in <module_name> module	Internal flash memory not found.

Master processor errors

2001 ... 2009	Internal communication with <module_name> failed.	General communication error between Master and Slave processor.
2010	<module_name> module disconnected!	The internal module has stopped communicating. Restart the device.
2011	<module_name> module is missing!	One of the basic modules of the device does not communicate.
2012	The <module_name> module has not completed the required function.	The device was not able to set the function even after a given timeout.

Execution errors

3001 ... 3011	Internal communication with <module_name> failed.	Obsolete function data. Please upload the latest FW.
------------------	---	--

Flash memory errors

4001 ... 4015	Flash memory error
------------------	--------------------

Data transmitting errors

5001 ... 5005	Data transmitting module error
------------------	--------------------------------

User interface errors

6001	Unknown command
6002	Invalid parameter
6003	Not setable
6004	Not questionable
6005	Unknown variable
6006	Value too low
6007	Value too high
6008	Not number
6009	Access denied
6011	Unknown format for displaying a variable
6012	Not initialized
6019	Empty string not allowed
6022	This name already exists
6032	Device is in remote mode. Activate the "Go to Local" key to go to Local mode.
6033	The code is invalid.
6034	Serial number is invalid.
6035	Invalid calibration index.
6036	The code is invalid.
6037	Unlock data failed to write.
6038 ... 6042	Invalid parameter
6043	Value exceeded user global limit

MODBUS errors

6050	MODBUS: Wrong control sum
6051	MODBUS: Not ASCII
6052	MODBUS: Outland message
6053	MODBUS: Invalid function
6054	MODBUS: Invalid location
6055	MODBUS: Invalid register count

Device errors

7001 ... 7005	A device error has occurred in the <module_name> module.
7006	Internal fan stopped!
7018	A device error has occurred in the <module_name> module.
7019	External synchronization lost
7020	External synchronization is not accomplished
7021	This function is unavailable!
7022	Meter function is unavailable!
7023	Current supply is too hot. Wait for it to cool down.

7024	Calibration is unavailable!
------	-----------------------------

Hard overload checking

7100	1V Range overload!
7101	10V Range overload!
7102	Hi-Current amplifier overload!
7103	Lo-Current amplifier overload!
7104	Simulator current overload!
7105	Simulator voltage overload!
7106	The current terminals are open!

Calibration data errors

8001	Invalid calibration index
8002	Invalid calibration mode
8003	Value too low
8004	Value too high
8005	Output is switched off
8006	Invalid measure
8007	Measurement is overloaded
8008	Measurement out of limit
8009	The device is in the warm state. <time> minutes left.
8010	Could not clear the preset!
8011	Required preset does not exist!
8012	Preset size exceeded!
8013	Could not write the preset!
8014	Could not read the preset!
8015	Preset is damaged!
8016	The preset is empty!
8017	The memory is full. You cannot create a new record. First remove older one.
8018	Access denied
8019	Input is switched off
8022	Current shunt temperature is high for calibration

Device presets errors

9002	The preset is empty!
9003	Required preset does not exist!
9004	Could not clear the preset!
9005	Could not write the preset!
9006	Could not read the preset!
9007	Preset is damaged!
9008	Preset size exceeded!

Harmonic presets errors

10001	Required preset does not exist!
10002	Invalid channel index
10003	Invalid harmonic index
10004	Could not write the preset!
10005	Could not read the preset!
10006	The preset is not editable!

10007	The preset cannot be deleted!
10008	It can be deleted only the last preset!
10009	Preset cannot be deleted because it is active on the voltage channel!
10010	Preset cannot be deleted because it is active on the current channel!
10011	Maximal preset count reached!
10012	Invalid parameter

Meter overload errors

11004	The Hi-Current amplifier temperature is too high.
11005	The Hi-Current amplifier temperature is too high.
11006	The Hi-Current amplifier temperature is too high.
11007	The current terminals are open!
11008	Power supply temperature is too high.

External options errors

12001 ... 12020	Communication with external option failed.
12021	External option error. <device name> <error code>
12022	The external <device name> unit is HW obsolete.
12023	The external <device name> unit is SW obsolete. Please upload the new FW to the external unit.
12024	The external <device name> unit does not have the required features.
12025	The external unit <device name> is not available.
12026	The external unit <device_name> has not completed the required function.
12027	The external <device_name> unit is SW obsolete. Please upload the new FW to the external unit.
12028	The 9000 device has outdated FW. Please upload the new FW to the 9000 device.
12028	The 9000 device has outdated FW. Please upload the new FW to the 9000 device.

4. 9000 SCPI Command Reference

:CALCulate:AVERage:AVERage?

Syntax:

:CALCulate:AVERage:AVERage?

Description:

Returns the average value for all meter measurements since the averaging was enabled.

Parameters:

<DNPD> - average value, (default 0.0).

Remarks:

Averaging is started after enabling by the CALC:AVER ON command.

The value is cleared after receiving the CALC:AVER:CLE command.

The value is cleared after power on.

The value is cleared on *RST command.

Overlapped command.

Example:

CALC:AVER:AVER? Response: 4.524123E+000

:CALCulate:AVERage:CLEar[:IMMEDIATE]

Syntax:

:CALCulate:AVERage:CLEar[:IMMEDIATE]

Description:

Clears all averaging values for the meter.

Parameters:

None

Remarks:

Overlapped command.

Example:

CALC:AVER:CLE

:CALCulate:AVERage:COUNT?

Syntax:

:CALCulate:AVERage:COUNT?

Description:

Returns the number of readings taken since averaging was enabled.

Parameters:

<DNPD> - number of readings, (default 0.0).

Remarks:

Averaging is started after enabling by the CALC:AVER ON command.

The value is cleared after receiving the CALC:AVER:CLE command.

The value is cleared after power on.

The value is cleared on *RST command.

Overlapped command.

Example:

CALC:AVER:COUN? Response: 3.82E+002

:CALCulate:AVERage:MINimum?

Syntax:

:CALCulate:AVERage:MINimum?

Description:

Returns the minimum value found during the averaging.

Parameters:

<DNPD> - minimum value, (default 0.0).

Remarks:

Averaging is started after enabling by the CALC:AVER ON command.

The value is cleared after receiving the CALC:AVER:CLE command.
The value is cleared after power on.
The value is cleared on *RST command.
Overlapped command.

Example:

CALC:AVER:MIN? Response: 4.513743E+000

:CALCulate:AVERage:MAXimum?

Syntax:

:CALCulate:AVERage:MAXimum?

Description:

Returns the maximum value found during the averaging.

Parameters:

<DNPD> - maximum value, (default 0.0).

Remarks:

Averaging is started after enabling by the CALC:AVER ON command.
The value is cleared after receiving the CALC:AVER:CLE command.
The value is cleared after power on.
The value is cleared on *RST command.
Overlapped command.

Example:

CALC:AVER:MAX? Response: 4.533872E+000

:CALCulate:AVERage:PTPeak?

Syntax:

:CALCulate:AVERage:PTPeak?

Description:

Returns the spanning value (peak to peak) found during the averaging.

Parameters:

<DNPD> - spanning value, (default 0.0).

Remarks:

Averaging is started after enabling by the CALC:AVER ON command.
The value is cleared after receiving the CALC:AVER:CLE command.
The value is cleared after power on.
The value is cleared on *RST command.
Overlapped command.

Example:

CALC:AVER:PTP? Response: 2.0129E-002

:CALCulate:AVERage:SDEVIation?

Syntax:

:CALCulate:AVERage:SDEVIation?

Description:

Returns the standard deviation value calculated during the averaging.

Parameters:

<DNPD> - standard deviation, (default 0.0).

Remarks:

Averaging is started after enabling by the CALC:AVER ON command.
The value is cleared after receiving the CALC:AVER:CLE command.
The value is cleared after power on.
The value is cleared on *RST command.
Overlapped command.

Example:

CALC:AVER:SDEV? Response: 1.329125E-007

:CALCulate:AVERage[:STATe]

Syntax:

:CALCulate:AVERage[:STATe] <BOOL>
:CALCulate:AVERage[:STATe]?

Description:

Disables or enables the averaging math function for meter.

Parameters:

<BOOL> - averaging state {ON|OFF|1|0} (default 0).
·ON enables the averaging math function.
·OFF disables the averaging math function.
·1 enables the averaging math function.
·0 disables the averaging math function.

Remarks:

The value is stored in each preset.
The value is set according to "Start-up" preset after power on.
The value is set to default on *RST command.
Overlapped command.

Example:

CALC:AVER ON
CALC:AVER? Response: 1

:CALCulate:CLEar[:IMMEDIATE]

Syntax:

:CALCulate:CLEar[:IMMEDIATE]

Description:

Clears all math functions (Averaging, Smoothing, Limit testing).

Parameters:

None

Remarks:

Overlapped command.

Example:

CALC:CLE

:CALCulate:LIMit:CLEar[:IMMEDIATE]

Syntax:

:CALCulate:LIMit:CLEar[:IMMEDIATE]

Description:

Clears the limit testing function.

Parameters:

None

Remarks:

Overlapped command.

Example:

CALC:LIM:CLE

:CALCulate:LIMit:LOWer[:DATA]

Syntax:

:CALCulate:LIMit:LOWer[:DATA] <DNPD>
:CALCulate:LIMit:LOWer[:DATA]?

Description:

Sets the lower limit for limit testing.

Parameters:

<DNPD> - lower limit, (default 0.0).

Remarks:

The value is stored in each preset.

The value is set according to "Start-up" preset after power on.
The value is set to default on *RST command.
Overlapped command.

Example:

```
CALC:LIM:LOW 9.0  
CALC:LIM:LOW? Response: 9.000000E+00
```

:CALCulate:LIMit[:STATe]

Syntax:

```
:CALCulate:LIMit[:STATe] <BOOL>  
:CALCulate:LIMit[:STATe]?
```

Description:

Disables or enables the limit testing function for meter.

Parameters:

<BOOL> - limit state {ON|OFF|1|0} (default 0)

- ON enables the limit testing function for meter.
- OFF disables the limit testing function for meter.
- 1 enables the limit testing function for meter.
- 0 disables the limit testing function for meter.

Remarks:

The value is stored in each preset.
The value is set according to "Start-up" preset after power on.
The value is set to default on *RST command.
Overlapped command.

Example:

```
CALC:LIM ON  
CALC:LIM? Response: 1
```

:CALCulate:LIMit:UPPer[:DATA]

Syntax:

```
:CALCulate:LIMit:UPPer[:DATA] <DNPd>  
:CALCulate:LIMit:UPPer[:DATA]?
```

Description:

Sets the upper limit for limit testing.

Parameters:

<DNPd> - upper limit, (default 0.0).

Remarks:

The value is stored in each preset.
The value is set according to "Start-up" preset after power on.
The value is set to default on *RST command.
Overlapped command.

Example:

```
CALC:LIM:UPP 11.0  
CALC:LIM:UPP? Response: 1.100000E+01
```

:CALCulate:SCALE:FUNCTion

Syntax:

```
:CALCulate:SCALE:FUNCTion <CPD>  
:CALCulate:SCALE:FUNCTion?
```

Description:

Selects desired scaling function if the scaling is enabled.

Parameters:

<CPD> - scale function {PCT|SCALE} (default PCT).

- PCT meter value is recalculated relative to the reference $Y = ((X-R)/R) * 100$.
- SCALE meter value is recalculated according to the formula $Y = A * X - B$.

Remarks:

The value is stored in each preset.
The value is set according to "Start-up" preset after power on.
The value is set to default on *RST command.
Overlapped command.

Example:

CALC:SCAL:FUNC PCT
CALC:SCAL:FUNC? Response: PCT

:CALCulate:SCALe:GAIN

Syntax:

:CALCulate:SCALe:GAIN <DNPD>
:CALCulate:SCALe:GAIN?

Description:

Sets the gain (A component) for scaling function $Y=A*X-B$.

Parameters:

<DNPD> - gain, (default 1.0).

Remarks:

The value is stored in each preset.
The value is set according to "Start-up" preset after power on.
The value is set to default on *RST command.
Overlapped command.

Example:

CALC:SCAL:GAIN 1.0
CALC:SCAL:GAIN? Response: 1.000000E+00

:CALCulate:SCALe:OFFSet

Syntax:

:CALCulate:SCALe:OFFSet <DNPD>
:CALCulate:SCALe:OFFSet?

Description:

Sets the offset (B component) for scaling function $Y=A*X-B$.

Parameters:

<DNPD> - offset, (default 0.0).

Remarks:

The value is stored in each preset.
The value is set according to "Start-up" preset after power on.
The value is set to default on *RST command.
Overlapped command.

Example:

CALC:SCAL:OFFS 0.0
CALC:SCAL:OFFS? Response: 0.000000E+00

:CALCulate:SCALe:REFerence

Syntax:

:CALCulate:SCALe:REFerence <DNPD>
:CALCulate:SCALe:REFerence?

Description:

Sets the reference value (R component) for percentage scaling function $Y=((X-R)/R)*100$.

Parameters:

<DNPD> - scale reference, (default 0.0).

Remarks:

The value must not be zero to operate.
The value is stored in each preset.

The value is set according to "Start-up" preset after power on.
The value is set to default on *RST command.
Overlapped command.

Example:

```
CALC:SCAL:REF 1.0  
CALC:SCAL:REF? Response: 1.000000E+00
```

:CALCulate:SCALe:REFerence:AUTO

Syntax:

```
:CALCulate:SCALe:REFerence:AUTO <BOOL>  
:CALCulate:SCALe:REFerence:AUTO?
```

Description:

Sets the reference value for the percentage function according to the measured value.

Parameters:

<BOOL> - auto reference {ON|OFF|1|0} (default 0).
·ON new reference value will be automatically set.
·OFF reference value will not change.
·1 new reference value will be automatically set.
·0 reference value will not change.

Remarks:

The value is automatically cleared after setting a new reference value.
The value is set according to "Start-up" preset after power on.
The value is set to default on *RST command.
Overlapped command.

Example:

```
CALC:SCAL:REF:AUTO ON  
CALC:SCAL:REF:AUTO? Response: 1
```

:CALCulate:SCALe[:STATe]

Syntax:

```
:CALCulate:SCALe[:STATe] <BOOL>  
:CALCulate:SCALe[:STATe]?
```

Description:

Disables or enables the scaling function for meter.

Parameters:

<BOOL> - scale state {ON|OFF|1|0} (default 0).
·ON enables the scaling function for meter.
·OFF disables the scaling function for meter.
·1 enables the scaling function for meter.
·0 disables the scaling function for meter.

Remarks:

The value is stored in each preset.
The value is set according to "Start-up" preset after power on.
The value is set to default on *RST command.
Overlapped command.

Example:

```
CALC:SCAL ON  
CALC:SCAL? Response: 1
```

:CALCulate:SCALe:UNIT

Syntax:

```
:CALCulate:SCALe:UNIT <SPD>  
:CALCulate:SCALe:UNIT?
```

Description:

Sets the unit for scale function. Unit is shown on display.

Parameters:

<SPD> - unit. Upper alpha, lower alpha, digits and underscores are allowable. Maximal length is 4 characters (default "").

Remarks:

It must be enabled by the CALC:SCAL:UNIT:STAT command for the unit to be displayed.

The unit is not valid for the percentage function.

The value is stored in each preset.

The value is set according to "Start-up" preset after power on.

The value is set to default on *RST command.

Overlapped command.

Example:

CALC:SCAL:UNIT "W"

CALC:SCAL:UNIT? Response: "W"

:CALCulate:SCALe:UNIT:STATe

Syntax:

:CALCulate:SCALe:UNIT:STATe <BOOL>

:CALCulate:SCALe:UNIT:STATe?

Description:

Disables or enables the unit for scaling function.

Parameters:

<BOOL> - unit state {ON|OFF|1|0} (default 0).

·ON enables the unit.

·OFF disables the unit.

·1 enables the unit.

·0 disables the unit.

Remarks:

The value is stored in each preset.

The value is set according to "Start-up" preset after power on.

The value is set to default on *RST command.

Overlapped command.

Example:

CALC:SCAL:UNIT:STAT ON

CALC:SCAL:UNIT:STAT? Response: 1

:CALCulate:SMOothing:RESPonse

Syntax:

:CALCulate:SMOothing:RESPonse <CPD>

:CALCulate:SMOothing:RESPonse?

Description:

Sets the measurement filtering using a moving average.

Parameters:

<CPD> - smoothing response {SLOW|MEDIum|FAST} (default FAST).

·SLOW strong filtering using 100 measurements.

·MEDIum medium filtering using 50 measurements.

·FAST slight filtering using 10 measurements.

Remarks:

Filtering must be enabled by the CALC:SMO ON command.

The value is stored in each preset.

The value is set according to "Start-up" preset after power on.

The value is set to default on *RST command.

Overlapped command.

Example:

CALC:SMO:RESP SLOW

CALC:SMO:RESP? Response: SLOW

:CALCulate:SMOothing[:STATe]

Syntax:

:CALCulate:SMOothing[:STATe] <BOOL>
:CALCulate:SMOothing[:STATe]?

Description:

Disables or enables the smoothing meter readings.

Parameters:

<BOOL> - smoothing state {ON|OFF|1|0} (default 0).
·ON enables smoothing.
·OFF disables smoothing.
·1 enables smoothing.
·0 disables smoothing.

Remarks:

The value is stored in each preset.
The value is set according to "Start-up" preset after power on.
The value is set to default on *RST command.
Overlapped command.

Example:

CALC:SMO ON
CALC:SMO? Response: 1

:CALibration:DATE

Syntax:

:CALibration:DATE <DNPD>,<DNPD>,<DNPD>
:CALibration:DATE?

Description:

Sets the date of last calibration.

Parameters:

<DNPD> - year, range 2000...2063.
<DNPD> - month, range 1...12.
<DNPD> - day, range 1...31.

Remarks:

This command requires "Calibration" access to write date.
Overlapped command.

Example:

CAL:DATE 2020,3,28
CAL:DATE? Response: 2020,3,28

:CALibration:INTerval

Syntax:

:CALibration:INTerval <DNPD>
:CALibration:INTerval?

Description:

Sets the calibration interval. If the current instrument date is greater than the calibration date extended by the calibration interval, the instrument will announce the outdated calibration.

Parameters:

<DNPD>- calibration interval [months], range 0 ... 240 (default 12).

Remarks:

This command requires "Calibration" access to write interval.
Overlapped command.

Example:

CAL:INT 12
CAL:INT? Response: 12

:CALibration:POINt:AMPLitude

Syntax:

:CALibration:POINt:AMPLitude <DNPd>
:CALibration:POINt:AMPLitude?

Description:

Sets the actual calibration amplitude during calibration. The calibration mode and point must be selected beforehand.

Parameters:

<DNPd> - calibration point amplitude.

Remarks:

This command requires "Calibration" access.
Overlapped command.

Example:

CAL:POIN:AMPL 65.3257
CAL:POIN:AMPL? Response: 6.532570E+01

:CALibration:POINt:CONVerter?

Syntax:

:CALibration:POINt:CONVerter?

Description:

Returns actual converter value during calibration meter.

Parameters:

<DNPd> - converter value.

Remarks:

Overlapped command.

Example:

CAL:POIN:CONV? Response: 1.000000E+00

:CALibration:POINt:DATE

Syntax:

:CALibration:POINt:DATE?

Description:

Returns calibration date for selected calibration point. The calibration date is updated automatically after saving calibration point by CAL:POIN:SAVE command.

Parameters:

<DNPd> - year, range 2020...2063

<DNPd> - month, range 1...12

<DNPd> - day, range 1...31

Remarks:

Overlapped command.

Example:

CAL:POIN:DATE? Response: 2020,1,14

:CALibration:POINt:MEASure?

Syntax:

:CALibration:POINt:MEASure?

Description:

Returns the actual measured value during meter calibration.

Parameters:

<DNPd> - measured value.

Remarks:

Overlapped command.

Example:

CAL:POIN:MEAS? Response: 1.000000E+00

:CALibration:POINt:MODE

Syntax:

:CALibration:POINt:MODE <DNPD>

:CALibration:POINt:MODE?

Description:

Selects the calibration mode.

Parameters:

<DNPD> - calibration mode, see table below for more details

Remarks:

This command requires "Calibration" access.

Overlapped command.

Example:

CAL:POIN:MODE 10

CAL:POIN:MODE? Response: 10

Cal. mode	Calibration function	Cal. mode	Calibration function
1	Voltage DC > Range 10 mV	19	Current AC > Range 200 uA
2	Voltage DC > Range 100 mV	20	Current AC > Range 2 mA
3	Voltage DC > Range 1 V	21	Current AC > Range 20 mA
4	Voltage DC > Range 10 V	22	Current AC > Range 200 mA
5	Voltage DC > Range 100 V	23	Current AC > Range 2 A
6	Voltage DC > Range 1050 V	24	Current AC > Range 20.5 A
7	Voltage AC > Range 10 mV	33	Current Harmonic > Range 200 uA
8	Voltage AC > Range 100 mV	34	Current Harmonic > Range 2 mA
9	Voltage AC > Range 1 V	35	Current Harmonic > Range 20 mA
10	Voltage AC > Range 10 V	36	Current Harmonic > Range 200 mA
11	Voltage AC > Range 100 V	37	Current Harmonic > Range 2 A
12	Voltage AC > Range 1050 V	38	Current Harmonic > Range 20.5 A
25	Voltage Harmonic > Range 10 mV	86	Resistance > Fixed
26	Voltage Harmonic > Range 100 mV	87	Resistance > Variable > Nominal
27	Voltage Harmonic > Range 1 V	88	Resistance > Variable > Extended
28	Voltage Harmonic > Range 10 V	96	Resistance > Variable > Offset corrections
29	Voltage Harmonic > Range 100 V	89	Capacitance > Fixed
30	Voltage Harmonic > Range 1050 V	90	Capacitance > Variable > Nominal
13	Current DC > Range 200 uA	91	Capacitance > Variable > Extended
14	Current DC > Range 2 mA	79	Meter > Resistance > Range 2 kOhm
15	Current DC > Range 20 mA	80	Meter > Resistance > Range 20 kOhm
16	Current DC > Range 200 mA		
17	Current DC > Range 2 A		
18	Current DC > Range 20.5 A		

:CALibration:POINt:SElect

Syntax:

:CALibration:POINt:SElect <DNPD>

:CALibration:POINt:SElect?

Description:

Selects a calibration point within one calibration mode.

Parameters:

<DNPD> - calibration point, range 1 ... calibration point count for actual calibration mode.

Remarks:

This command requires "Calibration" access.

Overlapped command.

Example:

CAL:POIN:SEL 1
CAL:POIN:SEL? Response: 1

:CALibration:POINt:SAVE

Syntax:

:CALibration:POINt:SAVE

Description:

Saves the actual calibration point.

Parameters:

None

Remarks:

This command requires "Calibration" access.
Overlapped command.

Example:

CAL:POIN:SAVE

:CALibration:SECure:EXIT

Syntax:

:CALibration:SECure:EXIT

Description:

Exits calibration mode and makes calibration backup.

Parameters:

None

Remarks:

Overlapped command.

Example:

CAL:SEC:EXIT

:CALibration:SECure:PASSword

Syntax:

:CALibration:SECure:PASSword <DNPD>

Description:

Enters calibration mode. Valid calibration password is required.

Parameters:

<DNPD> - calibration password, range 0 ... 4294967295 (default 9000).

Remarks:

Overlapped command.

Example:

CAL:SEC:PASS 9000

:CALibration:STATus<N>?

Syntax:

:CALibration:STATus<N>?

Description:

Returns device status.

Parameters:

<N> - status index, range 1 ... 6 (1 - if omitted)

1	Warmup state
2	Try mode
3	Calibration passed
4	Uncalibrated point

- 5 Damaged service calibration
- 6 Faulty or damaged HW

<DNPD> - status 0 – false, 1 - true

Remarks:

Overlapped command

Example:

CAL:STAT1? Response: 0

:CONFigure?

Syntax:

:CONFigure?

Description:

Returns actual meter configuration.

Parameters:

<SPD> - meter configuration "function range,resolution".

Remarks:

Overlapped command.

Example:

CONF? Response: "VOLT 1.200000E+01,1.000000E-5"

:CONFigure:RESistance

Syntax:

:CONFigure:RESistance[<DNPD>[,<DNPD>]]
:CONFigure:RESistance?

Description:

Configures meter in Resistance mode.

Parameters:

<DNPD> - range [Ohm], range 0.0 ... 20000.0.

<DNPD> - resolution [Ohm] - this parameter is ignored and device sets fixed resolution by selected range.

Remarks:

The value is set to default after power on.

The value is set to default on *RST command.

Overlapped command.

Example:

CONF:RES 20000.0

CONF:RES? Response: 2.000000E+04,1.000000E-02

:CONFigure:TEMPerature:RTD

Syntax:

:CONFigure:TEMPerature:RTD[<DNPD>[,<DNPD>]]
:CONFigure:TEMPerature:RTD?

Description:

Configures meter in Temperature RTD mode.

Parameters:

<DNPD> - resistance range [Ohm], range 0.0 ... 20000.0.

<DNPD> - resolution [Ohm] - this parameter is ignored and device sets fixed resolution by selected range.

Remarks:

The value is set to default after power on.

The value is set to default on *RST command.

Overlapped command.

Example:

CONF:TEMP:RTD 20000.0

CONF:TEMP:RTD? Response: 2.000000E+04,1.000000E-02

:DISPlay:ACCuracy:FORM

Syntax:

:DISPlay:ACCuracy:FORM <CPD>
:DISPlay:ACCuracy:FORM?

Description:

Sets the specification format used on the device's display.

Parameters:

<CPD> - specification format {AUTO|ABSolute|PERcentage|PPM} (default AUTO).
·AUTO The device selects the appropriate specification type by itself.
·ABSolute The specification in the unit of the displayed quantity is used.
·PERcentage The specification is expressed as a percentage.
·PPM The specification is expressed in PPM.

Remarks:

The setting is stored in non-volatile memory.
The value is not affected by the * RST command or the stored preset.
Overlapped command.

Example:

DISP:ACC:FORM AUTO
DISP:ACC:FORM? Response: AUTO

:DISPlay:ACCuracy:METer?

Syntax:

:DISPlay:ACCuracy:METer?

Description:

Returns absolute accuracy for actual selected meter function, range and measured value.

Parameters:

<DNPD> - accuracy.

Remarks:

Returns -1.000000E+20 if actual measurement is invalid.
Overlapped command.

Example:

DISP:ACC:MET? Response: 1.681000E-05

:DISPlay:ACCuracy[:SOURce]?

Syntax:

:DISPlay:ACCuracy[:SOURce]?

Description:

Returns absolute accuracy for actual selected source function, range and amplitude.

Parameters:

<DNPD> - accuracy.

Remarks:

Overlapped command.

Example:

DISP:ACC? Response: 3.900000E-04

:DISPlay:ACTivate

Syntax:

:DISPlay:ACTivate <DNPD>
:DISPlay:ACTivate?

Description:

Activates control on the display.

Parameters:

<DNPD> - control to activate. Order is from top-left, 0-deselects control.

Remarks:

The value is set to default after power on.
The value is set to default on *RST command.
Overlapped command.

Example:

DISP:ACT 1
DISP:ACT? Response: 1

:DISPlay:ANNotation:CLOCK:DATE:FORMat

Syntax:

:DISPlay:ANNotation:CLOCK:DATE:FORMat <CPD>
:DISPlay:ANNotation:CLOCK:DATE:FORMat?

Description:

Sets the date format used on the device's display.

Parameters:

<CPD> - date format {MDYS|MDYA|DMYS|DMYO|DMYA|YMDS|YMDO}
(default MDYS).

·MDYS	MM/DD/YYYY
·MDYA	MM-DD-YYYY
·DMYS	DD/MM/YYYY
·DMYO	DD.MM.YYYY
·DMYA	DD-MM-YYYY
·YMDS	YYYY/MM/DD
·YMDO	YYYY.MM.DD

Remarks:

The setting is stored in non-volatile memory.
The value is not affected by the * RST command or the stored preset.
Overlapped command.

Example:

DISP:ANN:CLOC:DATE:FORM MDYS
DISP:ANN:CLOC:DATE:FORM? Response: MDYS

:DISPlay:ANNotation:CLOCK[:STATe]

Syntax:

:DISPlay:ANNotation:CLOCK[:STATe] <BOOL>
:DISPlay:ANNotation:CLOCK[:STATe]?

Description:

Enables or disables clock in the title bar.

Parameters:

<BOOL> - clock state {ON|OFF|1|0} (default 0).

·ON	enables clock.
·OFF	disables clock.
·1	enables clock.
·0	disables clock.

Remarks:

The setting is stored in non-volatile memory.
The value is not affected by the * RST command or the stored preset.
Overlapped command.

Example:

DISP:ANN:CLOC ON
DISP:ANN:CLOC? Response: 1

:DISPlay:BRIGhtness

Syntax:

:DISPlay:BRIGhtness <DNPD>
:DISPlay:BRIGhtness?

Description:

Sets display backlight intensity.

Parameters:

<DNPD> - brightness, range 0.0 ... 1.0 (default 1.0).

Remarks:

Overlapped command.

Example:

DISP:BRIG 1.0
DISP:BRIG? Response: 1.000000E+00

:DISPlay:LANGuage

Syntax:

:DISPlay:LANGuage <CPD>
:DISPlay:LANGuage?

Description:

Language selection for display.

Parameters:

<CPD> - language {ENGLish} (default ENGL).
·ENGLish English language.

Remarks:

Overlapped command.

Example:

DISP:LANG ENGL
DISP:LANG? Response: ENGL

:DISPlay:LAYout

Syntax:

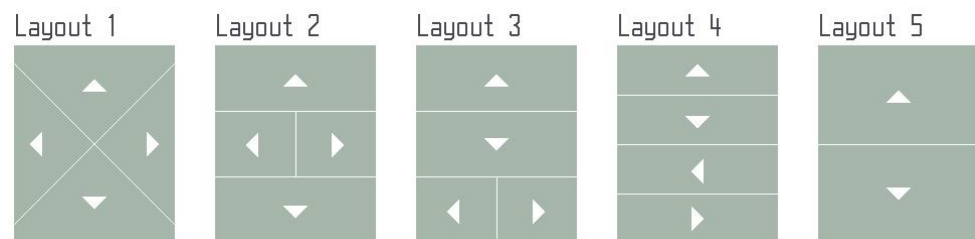
:DISPlay:LAYout <DNPD>
:DISPlay:LAYout?

Description:

Selects the layout of the navigation keys in the right part of the display.

Parameters:

<DNPD> - navigation key's layout, range 1 ... 5 (default 1)



Remarks:

The value is stored in non-volatile memory.
The value is not affected by the * RST command or the stored preset.
Overlapped command.

Example:

DISP:LAY 5
DISP:LAY? Response: 5

:HARMonic:CURRent:CALCulate

Syntax:

:HARMonic:CURRent:CALCulate

Description:

Calculates the harmonic signal for the current channel. Must be called after all harmonic amplitude and phase changes and before switching output on.

Parameters:

None

Remarks:

Overlapped command.

Example:

HARM:CURR:CALC

:HARMonic:CURRent:CLEar

Syntax:

:HARMonic:CURRent:CLEar

Description:

Resets all harmonic amplitudes and phases for the current channel.

Parameters:

None

Remarks:

Overlapped command.

Example:

HARM:CURR:CLE

:HARMonic:CURRent:ORDer<N>:AMPLitude

Syntax:

:HARMonic:CURRent:ORDer<N>:AMPLitude <DNPD>
:HARMonic:CURRent:ORDer<N>:AMPLitude?

Description:

Sets the harmonic amplitude for the current channel.

Parameters:

<N> - harmonic, range 2 ... 50.

<DNPD> - amplitude [%], range 0.0 ... 30.0 (default 0.0).

Remarks:

The value can be stored in harmonic preset.

The value is set according to "Start-up" preset after power on.

The value is set to default on *RST command.

Overlapped command.

Example:

HARM:CURR:ORD2:AMPL 10.0

HARM:CURR:ORD2:AMPL? Response: 1.000000E+01

:HARMonic:CURRent:ORDer<N>:PHASe

Syntax:

:HARMonic:CURRent:ORDer<N>:PHASe <DNPD>
:HARMonic:CURRent:ORDer<N>:PHASe?

Description:

Sets the harmonic phase for the current channel.

Parameters:

<N> - harmonic, range 2 ... 50.

<DNPD> - phase [°], range 0.0 ... 360.0 (default 0.0).

Remarks:

The value can be stored in harmonic preset.

The value is set according to "Start-up" preset after power on.

The value is set to default on *RST command.

Overlapped command.

Example:

```
HARM:CURR:ORD2:PHAS 60.0
HARM:CURR:ORD2:PHAS? Response: 6.000000E+01
```

:HARMonic:CURRent[:PRESet]:NAME

Syntax:

```
:HARMonic:CURRent[:PRESet]:NAME <SPD>
:HARMonic:CURRent[:PRESet]:NAME?
```

Description:

Sets the name for the selected preset. Presets are common for voltage and current channel. The preset must first be selected with the HARM:CURR:SEL command.

Parameters:

<SPD> preset name. The characters A ... Z, a ... z, 0 ... 9, space, underscore, dot, plus, minus can be used. The name can contain up to 8 characters.

Remarks:

Overlapped command.

Example:

```
HARM:CURR:NAME "Harm 5"
HARM:CURR:NAME? Response: "Harm 5"
```

:HARMonic:CURRent[:PRESet]:SAVE

Syntax:

```
:HARMonic:CURRent[:PRESet]:SAVE
```

Description:

Stores the currently adjusted harmonic preset on the current channel in non-volatile memory. The voltage and current channels share the same presets. The preset name remains unchanged.

Parameters:

None

Remarks:

Overlapped command.

Example:

```
HARM:CURR:SAVE
```

:HARMonic:CURRent[:PRESet]:SElect

Syntax:

```
:HARMonic:CURRent[:PRESet]:SElect <DNPD>
:HARMonic:CURRent[:PRESet]:SElect?
```

Description:

Selects harmonic preset for the current channel.

Parameters:

<DNPD> - preset index, range 1 ... 23 (default 1).

Remarks:

The value is stored in each preset.
The value is set according to "Start-up" preset after power on.
The value is set to default on *RST command.
Overlapped command.

Example:

```
HARM:CURR:SEL 1
```

HARM:CURR:SEL? Response: 1

:HARMonic:VOLTage:CALCulate

Syntax:

:HARMonic:VOLTage:CALCulate

Description:

Calculates the harmonic signal for the voltage channel. Must be called after all harmonic amplitude and phase changes and before switching output on.

Parameters:

None

Remarks:

Overlapped command.

Example:

HARM:VOLT:CALC

:HARMonic:VOLTage:CLEar

Syntax:

:HARMonic:VOLTage:CLEar

Description:

Resets all harmonic amplitudes and phases for the voltage channel.

Parameters:

None

Remarks:

Overlapped command.

Example:

HARM:VOLT:CLEAR

:HARMonic:VOLTage:ORDer<N>:AMPLitude

Syntax:

:HARMonic:VOLTage:ORDer<N>:AMPLitude <DNPD>

:HARMonic:VOLTage:ORDer<N>:AMPLitude?

Description:

Sets the harmonic amplitude for the voltage channel.

Parameters:

<N> - harmonic, range 2 ... 50.

<DNPD> - amplitude [%], range 0.0 ... 30.0 (default 0.0).

Remarks:

The value can be stored in harmonic preset.

The value is set according to "Start-up" preset after power on.

The value is set to default on *RST command.

Overlapped command.

Example:

HARM:VOLT:ORD2:AMPL 10.0

HARM:VOLT:ORD2:AMPL? Response: 1.000000E+01

:HARMonic:VOLTage:ORDer<N>:PHASe

Syntax:

:HARMonic:VOLTage:ORDer<N>:PHASe <DNPD>

:HARMonic:VOLTage:ORDer<N>:PHASe?

Description:

Sets the harmonic phase for the voltage channel.

Parameters:

<N> - harmonic, range 2 ... 50.

<DNPD> - phase [°], range 0.0 ... 360.0 (default 0.0).

Remarks:

The value can be stored in harmonic preset.
The value is set according to "Start-up" preset after power on.
The value is set to default on *RST command.
Overlapped command.

Example:

```
HARM:VOLT:ORD2:PHAS 60.0
HARM:VOLT:ORD2:PHAS? Response: 6.000000E+01
```

:HARMonic:VOLTage[:PRESet]:NAME

Syntax:

```
:HARMonic:VOLTage[:PRESet]:NAME <SPD>
:HARMonic:VOLTage[:PRESet]:NAME?
```

Description:

Sets the name for the selected preset. Presets are common for voltage and current channel. The preset must first be selected with the HARM:VOLT:SEL command.

Parameters:

<SPD> preset name. The characters A ... Z, a ... z, 0 ... 9, space, underscore, dot, plus, minus can be used. The name can contain up to 8 characters.

Remarks:

Overlapped command.

Example:

```
HARM:VOLT:NAME "Harm 5"
HARM:VOLT:NAME? Response: "Harm 5"
```

:HARMonic:VOLTage[:PRESet]:SAVE

Syntax:

```
:HARMonic:VOLTage[:PRESet]:SAVE
```

Description:

Stores the currently adjusted harmonic preset on the voltage channel in non-volatile memory. The voltage and current channels share the same presets. The preset name remains unchanged.

Parameters:

None

Remarks:

Overlapped command.

Example:

```
HARM:VOLT:SAVE
```

:HARMonic:VOLTage[:PRESet]:SElect

Syntax:

```
:HARMonic:VOLTage[:PRESet]:SElect <DNPD>
:HARMonic:VOLTage[:PRESet]:SElect?
```

Description:

Selects harmonic preset for the voltage channel.

Parameters:

<DNPD> - preset index, range 1 ... 23 (default 1).

Remarks:

The value is stored in each preset.
The value is set according to "Start-up" preset after power on.

The value is set to default on *RST command.
Overlapped command.

Example:

HARM:VOLT:SEL 1
HARM:VOLT:SEL? Response: 1

:MEASure:RESistance?

Syntax:

:MEASure:RESistance?

Description:

Configures meter for Resistance function in default mode and takes measurement.

Parameters:

<DNPD> - measurement.

Remarks:

Overlapped command.

Example:

MEAS:RES? Response: 4.000140E+03

:MEASure:TEMPerature:RTD?

Syntax:

:MEASure:TEMPerature:RTD?

Description:

Configures meter for Temperature RTD function in default mode and takes measurement.

Parameters:

<DNPD> - measurement.

Remarks:

The value is set to default after power on
The value is set to default on *RST command
Overlapped command

Example:

MEAS:TEMP:RTD? Response: 2.210000E+02

:OUTPut:CURRent:AC:LIMit[:LEVel]

Syntax:

:OUTPut:CURRent:AC:LIMit[:LEVel] <DNPD>[<UNIT>]
:OUTPut:CURRent:AC:LIMit[:LEVel]?

Description:

Sets the global AC current limit on all functions. This value limits both the amplitude setting and the range setting. This protects the connected devices from setting the calibrator to a value greater than the allowed one. When using Coil current mode, the limit applies to the current going to the coil.

Parameters:

<DNPD> - AC current limit level [A], range 0.01 ... 20.5 (default 20.5)

<UNIT> - limit unit {A}

·A limit will be set in Amperes.

Remarks:

Setting the limit turns on the limit state.
The limit can be turned off with the command OUTP:CURR:AC:LIM:STAT.
The value is not affected by the * RST command or the stored preset.
This command requires "Calibration" access.
Overlapped command.

Example:

OUTP:CURR:AC:LIM 20.5
OUTP:CURR:AC:LIM? Response: 2.050000E+01 A

:OUTPut:CURRent:AC:LIMit:STATe

Syntax:

:OUTPut:CURRent:AC:LIMit:STATe <BOOL>
:OUTPut:CURRent:AC:LIMit:STATe?

Description:

Turns the global AC current limit state on or off. If the state is off, then the maximum current value generated by the device is given by the capability of the device. If the status is on, then the maximum value is limited by the AC current limit level setting.

Parameters:

<BOOL> - AC current limit state {ON|OFF|1|0} (default OFF)

- ON Current limit is active.
- OFF The current limit is not active.
- 1 Current limit is active.
- 0 The current limit is not active.

Remarks:

The limit level is set with the OUTP:CURR:AC:LIM:LEV command.
The value is not affected by the * RST command or the stored preset.
This command requires "Calibration" access.
Overlapped command.

Example:

OUTP:CURR:AC:LIM:STAT ON
OUTP:CURR:AC:LIM:STAT? Response: 1

:OUTPut:CURRent:COIL:TURNs

Syntax:

:OUTPut:CURRent:COIL:TURNs <DNPD>
:OUTPut:CURRent:COIL:TURNs?

Description:

Number of coil turns connected to the current output.

Parameters:

<DNPD> Range 2 ... 200 (default 50), VAR_COIL_TURNS, (UCHAR8, RAM)

Remarks:

The value is stored in each preset
The value is set according to "Startup" preset after power on
The value is set to default on *RST command
Overlapped command

Example:

OUTP:CURR:COIL:TURN 50
OUTP:CURR:COIL:TURN? Response: 50

:OUTPut:CURRent:DC:LIMit[:LEVe]

Syntax:

:OUTPut:CURRent:DC:LIMit[:LEVe] <DNPD>[<UNIT>]
:OUTPut:CURRent:DC:LIMit[:LEVe]?

Description:

Sets the global DC current limit on all functions. This value limits both the amplitude setting and the range setting. This protects the connected devices from setting the calibrator to a value greater than the allowed one. When using Coil current mode, the limit applies to the current going to the coil.

Parameters:

<DNPD> - DC current limit level [A], range 0.01 ... 20.5 (default 20.5)
<UNIT> - limit unit {A}
·A limit will be set in Amperes.

Remarks:

Setting the limit turns on the limit state.
The limit can be turned off with the command OUTP:CURR:DC:LIM:STAT.
The value is not affected by the * RST command or the stored preset.
This command requires "Calibration" access.
Overlapped command.

Example:

OUTP:CURR:DC:LIM 20.5
OUTP:CURR:DC:LIM? Response: 2.050000E+01 A

:OUTPut:CURRent:DC:LIMit:STATe

Syntax:

:OUTPut:CURRent:DC:LIMit:STATe <BOOL>
:OUTPut:CURRent:DC:LIMit:STATe?

Description:

Turns the global DC current limit state on or off. If the state is off, then the maximum current value generated by the device is given by the capability of the device. If the status is on, then the maximum value is limited by the DC current limit level setting.

Parameters:

<BOOL> - DC current limit state {ON|OFF|1|0} (default OFF)
·ON Current limit is active.
·OFF The current limit is not active.
·1 Current limit is active.
·0 The current limit is not active.

Remarks:

The limit level is set with the OUTP:CURR:DC:LIM:LEV command.
The value is not affected by the * RST command or the stored preset.
This command requires "Calibration" access.
Overlapped command.

Example:

OUTP:CURR:DC:LIM:STAT ON
OUTP:CURR:DC:LIM:STAT? Response: 1

:OUTPut:CURRent:MODE

Syntax:

:OUTPut:CURRent:MODE <CPD>
:OUTPut:CURRent:MODE?

Description:

Sets the mode in which the current output operates. The value of current amplitude on the display is recalculated accordingly.

Parameters:

<CPD> - current mode {NORMal| COIL} (default NORM).
·NORMal direct setting of current. No recalculation is performed.
·COIL the current value will be multiplied by the number of turns of the coil.

Remarks:

Current mode is valid for both current and power function.
The value is stored in each preset.
The value is set according to "Start-up" preset after power on.
The value is set to default on *RST command.
Overlapped command.

Example:

OUTP:CURR:MODE NORM
OUTP:CURR:MODE? Response: NORM

:OUTPut:CURRent:PHASe

Syntax:

:OUTPut:CURRent:PHASe <DNPD>[<UNIT>]
:OUTPut:CURRent:PHASe?

Description:

Sets the phase shift between the reference signal and the current output. The setting is valid for the IAC function.

Parameters:

<DNPD> - phase shift, range 0.0 ... 360.0 ° (default 0.0).
<UNIT> - phase unit {DEG}
·DEG the phase shift will be set in degrees.

Remarks:

The value is stored in each preset.
The value is set according to "Start-up" preset after power on.
The value is set to default on *RST command.
Overlapped command.

Example:

OUTP:CURR:PHAS 0.0
OUTP:CURR:PHAS? Response: 0.000000E+00 DEG

:OUTPut:LOW<N>

Syntax:

:OUTPut:LOW<N> <CPD>
:OUTPut:LOW<N>?

Description:

Sets the ground for the source Lo output terminal.

Parameters:

<N> Function index, range 1 ... 8 (1 - if omitted)
1 – Voltage
2 – Current
3 – Resistance
4 – Capacitance
5 – Thermocouple
6 – RTD
7 – Frequency
8 – Duty Cycle
<CPD> {FLOat|GROund} (default GRO)
·FLOat
·GROund

Remarks:

The value is stored in each preset
The value is set according to "Startup" preset after power on
The value is set to default on *RST command
Overlapped command

Example:

OUTP:LOW1 FLO
OUTP:LOW1? Response: FLO

:OUTPut:OPEN[:STATe]

Syntax:

:OUTPut:OPEN[:STATe] <BOOL>
:OUTPut:OPEN[:STATe]?

Description:

Sets the OPEN state for the capacity function. The command also works in capacity calibration.

Parameters:

<BOOL> - open state, {ON|OFF|1|0} (default 0).
·ON turns on the open state.
·OFF turns off the open state.
·1 turns on the open state.
·0 turns off the open state.

Remarks:

To set the OPEN state, the terminals must also be switched on.
The value is set to default after power on.
The value is set to default on *RST command.
Overlapped command.

Example:

OUTP:OPEN ON
OUTP:OPEN? Response: 1

:OUTPut:ROSCilator:MODE

Syntax:

:OUTPut:ROSCilator:MODE <CPD>
:OUTPut:ROSCilator:MODE?

Description:

Selects function of rear panel Ext Sync Output BNC – either SYNC or SAMPlE output. Both outputs generate squarewave signal with rising edge phase-locked to internal AC voltage reference.

“Sync output” is phase and frequency reference of main output signal, used to synchronize with other devices. Sync output frequency is limited to 1200 Hz (2400 Hz if main signal frequency is 19200 Hz or more). Higher frequencies are divided by powers of two so that Sync output frequency is always kept below 1200 Hz (2400 Hz for main frequency of 19200 Hz or more).

“Sample output” is meant to trigger an external voltmeter to synchronize sampling measurements with main voltage output, useful for calibration of 9000. Sample output must be enabled using OUTP:ROSC:STAT command. Frequency multiplier can be selected using OUTP:ROSC:MULT command.

Parameters:

<CPD> {OFF|SYNC|SAMPlE} (default OFF)
OFF Ext Sync Output BNC is switched to Hi-Z state.
SYNC Sync signal is active at Ext Sync Output BNC.
SAMPlE Sample signal is active at Ext Sync Output BNC (if switched ON).

Remarks:

The value is stored in each preset.
The value is set according to "Startup" preset after power on.
The value is set to default on *RST command.
Overlapped command.

Example:

OUTP:ROSC:MODE OFF
OUTP:ROSC:MODE? Response: OFF

:OUTPut:ROSCilator:MULTiplier

Syntax:

:OUTPut:ROSCilator:MULTiplier <CPD>
:OUTPut:ROSCilator:MULTiplier?

Description:

Sets ratio between frequency of the internal Sync signal and output frequency at Ext Sync Output BNC connector when OUTP:ROSC:MODE is set to SAMP.

“Sample multiplier” set to “Auto” multiplies main signal frequency up to 850 Hz by factors 2048 – 64, keeping the sample output at around 30 – 65 kHz. Main signal frequency above 850 Hz gets multiplied by factors 32 – 8, rising sample output frequency up to its limit of 5 MHz.

Parameters:

<CPD> {AUTO|16|32|64|128|256|512|1024|2048} (default AUTO)

AUTO Multiplies main signal frequency (instead of Sync signal) up to 850 Hz by ratios 2048 – 64, keeping the sample output at around 30 – 65 kHz. Main signal frequency above 850 Hz gets multiplied by ratios 32 – 8, rising sample output frequency up to its limit of 5 MHz:

2048:1	main signal frequency < 33 Hz
1024:1	33 – 66 Hz
512:1	66 – 128 Hz
256:1	128 – 266 Hz
128:1	266 – 512 Hz
64:1	512 – 850 Hz
32:1	850 – 153600 Hz
16:1	153600 – 307200 Hz
8:1	≥ 307200 Hz

16	A frequency 16 times higher than the Sync signal will be generated
32	A frequency 32 times higher than the Sync signal will be generated
64	A frequency 64 times higher than the Sync signal will be generated
128	A frequency 128 times higher than the Sync signal will be generated
256	A frequency 256 times higher than the Sync signal will be generated
512	A frequency 512 times higher than the Sync signal will be generated
1024	A frequency 1024 times higher than the Sync signal will be generated
2048	A frequency 2048 times higher than the Sync signal will be generated

Remarks:

The value is stored in each preset.
 The value is set according to "Startup" preset after power on.
 The value is set to default on *RST command.
 Overlapped command.

Example:

OUTP:ROSC:MULT AUTO
 OUTP:ROSC:MULT? Response: AUTO

:OUTPut:ROSCilator[:STATe]

Syntax:

:OUTPut:ROSCilator[:STATe] <BOOL>
 :OUTPut:ROSCilator[:STATe]?

Description:

Activates or deactivates the sampling signal, which is synchronous with the voltage or current output signal.

Parameters:

<BOOL> - sampling state {ON|OFF|1|0} (default 0).
 ·ON The sampling signal is run when the reference signal passes zero.
 ·OFF The sampling signal is stopped immediately.
 ·1 The sampling signal is run when the reference signal passes zero.
 ·0 The sampling signal is stopped immediately.

Remarks:

The value is stored in each preset.
 The value is set according to "Start-up" preset after power on.
 The value is set to default on *RST command.
 Overlapped command.

Example:

OUTP:ROSC ON

OUTP:ROSC? Response: 1

:OUTPut[:STATe]

Syntax:

:OUTPut[:STATe] <BOOL>
:OUTPut[:STATe]?

Description:

Turns the output terminals on or off.

Parameters:

<BOOL> - output state, {ON|OFF|1|0} (default 0).
·ON turns on the output terminals.
·OFF turns off the output terminals.
·1 turns on the output terminals.
·0 turns off the output terminals.

Remarks:

It may take a few seconds for the terminals to turn on. The * OPC? command can be used to determine the completion of the operation.

The value is set to default after power on.

The value is set to default on *RST command.

Overlapped command.

Example:

OUTP ON
*OPC? Response: 1
OUTP? Response: 1

:OUTPut:SYNChro:FREQuency

Syntax:

:OUTPut:SYNChro:FREQuency?

Description:

Returns the actual frequency of the generated signal if external synchronization is selected.

Parameters:

<DNPD> - actual frequency
<UNIT> - frequency unit {HZ}
·HZ frequency is returned in hertz.

Remarks:

Overlapped command.

Example:

OUTP:SYNC:FREQ? Response: 1.200000E+02 HZ

:OUTPut:SYNChro:SOURce

Syntax:

:OUTPut:SYNChro:SOURce <CPD>
:OUTPut:SYNChro:SOURce?

Description:

Selects the source for synchronizing the voltage and current output.

Parameters:

<CPD> - source {INT}
·INT internal signal is used.

Remarks:

The value is stored in each preset.

The value is set according to "Start-up" preset after power on.

The value is set to default on *RST command.

Overlapped command.

Example:

OUTP:SYNC:SOUR INT
OUTP:SYNC:SOUR? Response: INT

:OUTPut:VOLTage:AC:LIMit[:LEVel]

Syntax:

:OUTPut:VOLTage:AC:LIMit[:LEVel] <DNPD>[<UNIT>]
:OUTPut:VOLTage:AC:LIMit[:LEVel]?

Description:

Sets the global AC voltage limit on all functions. This value limits both the amplitude setting and the range setting. This protects the connected devices from setting the calibrator to a value greater than the allowed one.

Parameters:

<DNPD> - AC voltage limit level [V], range 1.0 ... 1050.0 (default 1050.0)
<UNIT> - limit unit {V}
·V limit will be set in Volts.

Remarks:

Setting the limit turns on the limit state.
The limit can be turned off with the command OUTP:VOLT:AC:LIM:STAT.
The value is not affected by the * RST command or the stored preset.
This command requires "Calibration" access.
Overlapped command.

Example:

OUTP:VOLT:AC:LIM 1050.0
OUTP:VOLT:AC:LIM? Response: 1.050000E+03 V

:OUTPut:VOLTage:AC:LIMit:STATe

Syntax:

:OUTPut:VOLTage:AC:LIMit:STATe <BOOL>
:OUTPut:VOLTage:AC:LIMit:STATe?

Description:

Turns the global AC voltage limit state on or off. If the state is off, then the maximum voltage value generated by the device is given by the capability of the device. If the status is on, then the maximum value is limited by the AC voltage limit level setting.

Parameters:

<BOOL> - AC voltage limit state {ON|OFF|1|0} (default OFF)
·ON Voltage limit is active.
·OFF The voltage limit is not active.
·1 Voltage limit is active.
·0 The voltage limit is not active.

Remarks:

The limit level is set with the OUTP:VOLT:AC:LIM:LEV command.
The value is not affected by the * RST command or the stored preset.
This command requires "Calibration" access.
Overlapped command.

Example:

OUTP:VOLT:AC:LIM:STAT ON
OUTP:VOLT:AC:LIM:STAT? Response: 1

:OUTPut:VOLTage:AC:PROTection[:LEVel]

Syntax:

:OUTPut:VOLTage:AC:PROTection[:LEVel] <DNPd>[<UNIT>]
:OUTPut:VOLTage:AC:PROTection[:LEVel]?

Description:

This is a warning of dangerous contact voltage. If the user sets the voltage value on the calibrator higher than this limit, the ⚡ symbol will light up on the screen. The warning is further highlighted by an intermittent beep. It is possible to select the setting for switching off the terminals when this voltage is exceeded.

Parameters:

<DNPd> - AC voltage threshold, range 20 ... 100 (default 50)
<UNIT> - threshold unit {V}
·V threshold will be set in Volts.

Remarks:

Terminal switching can be set with the command OUTP:VOLT:PROT:STAT.
The volume of the beep can be set with the command SYST:BEEP:PROT:VOL.
The value is not affected by the * RST command or the stored preset.
This command requires "Calibration" access.
Overlapped command.

Example:

OUTP:VOLT:AC:PROT 50
OUTP:VOLT:AC:PROT? Response: 50 V

:OUTPut:VOLTage:DC:LIMit[:LEVel]

Syntax:

:OUTPut:VOLTage:DC:LIMit[:LEVel] <DNPd>[<UNIT>]
:OUTPut:VOLTage:DC:LIMit[:LEVel]?

Description:

Sets the global DC voltage limit on all functions. This value limits both the amplitude setting and the range setting. This protects the connected devices from setting the calibrator to a value greater than the allowed one.

Parameters:

<DNPd> - AC voltage limit limit [V], range 1.0 ... 1050.0 (default 1050.0)
<UNIT> - limit unit {V}
·V limit will be set in Volts.

Remarks:

Setting the limit turns on the limit state.
The limit can be turned off with the command OUTP:VOLT:DC:LIM:STAT.
The value is not affected by the * RST command or the stored preset.
This command requires "Calibration" access.
Overlapped command.

Example:

OUTP:VOLT:DC:LIM 1050.0
OUTP:VOLT:DC:LIM? Response: 1.050000E+03 V

:OUTPut:VOLTage:DC:LIMit:STATe

Syntax:

:OUTPut:VOLTage:DC:LIMit:STATe <BOOL>
:OUTPut:VOLTage:DC:LIMit:STATe?

Description:

Turns the global DC voltage limit state on or off. If the state is off, then the maximum voltage value generated by the device is given by the capability of the device. If the status is on, then the maximum value is limited by the DC voltage limit level setting.

Parameters:

- <BOOL> - DC voltage limit state {ON|OFF|1|0} (default OFF)
- ON Voltage limit is active.
- OFF The voltage limit is not active.
- 1 Voltage limit is active.
- 0 The voltage limit is not active.

Remarks:

The limit level is set with the `OUTP:VOLT:DC:LIM:LEV` command.
The value is not affected by the * RST command or the stored preset.
This command requires "Calibration" access.
Overlapped command.

Example:

```
OUTP:VOLT:DC:LIM:STAT ON
OUTP:VOLT:DC:LIM:STAT? Response: 1
```

:OUTPut:VOLTage:DC:PROTection[:LEVel]

Syntax:

```
:OUTPut:VOLTage:DC:PROTection[:LEVel] <DNPD>[<UNIT>]
:OUTPut:VOLTage:DC:PROTection[:LEVel]?
```

Description:

This is a warning of dangerous contact voltage. If the user sets the voltage value on the calibrator higher than this limit, the ⚡ symbol will light up on the screen. The warning is further highlighted by an intermittent beep. It is possible to select the setting for switching off the terminals when this voltage is exceeded.

Parameters:

- <DNPD> - DC voltage threshold, range 20 ... 100 (default 50)
- <UNIT> - threshold unit {V}
- V threshold will be set in Volts.

Remarks:

Terminal switching can be set with the command `OUTP:VOLT:PROT:STAT`.
The volume of the beep can be set with the command `SYST:BEEP:PROT:VOL`.
The value is not affected by the * RST command or the stored preset.
This command requires "Calibration" access.
Overlapped command.

Example:

```
OUTP:VOLT:DC:PROT 50
OUTP:VOLT:DC:PROT? Response: 50 V
```

:OUTPut:VOLTagePHASe

Syntax:

```
:OUTPut:VOLTage:PHASe <DNPD>[<UNIT>]
```

:OUTPut:VOLTagE:PHASe?

Description:

Sets the phase shift between the reference signal and the voltage output. The setting is valid for the VAC and PAC function.

Parameters:

<DNPD> - phase shift, range 0.0 ... 360.0 ° (default 0.0).

<UNIT> - phase unit {DEG}

·DEG the phase shift will be set in degrees.

Remarks:

The value is stored in each preset.

The value is set according to "Start-up" preset after power on.

The value is set to default on *RST command.

Overlapped command.

Example:

OUTP:VOLT:PHAS 0.0

OUTP:VOLT:PHAS? Response: 0.000000E+00 DEG

:OUTPut:VOLTagE:PROTection[:STATe]

Syntax:

:OUTPut:VOLTagE:PROTection[:STATe] <BOOL>

:OUTPut:VOLTagE:PROTection[:STATe]?

Description:

Protection terminal switch off settings. If the protection is enabled, the terminals switch off when the terminals are switched on and the voltage amplitude changes from safe to dangerous. The terminals can then be switched on again with a dangerous voltage value.

Parameters:

<BOOL> - automatic switch off {ON|OFF|1|0} (default 1)

·ON the terminals will be switched off when the voltage is exceeded.

·OFF the state of the terminals remains unchanged.

·1 the terminals will be switched off when the voltage is exceeded.

·0 the state of the terminals remains unchanged.

Remarks:

The terminal switch-off voltage threshold can be set with command OUTP:VOLT:DC:PROT or OUTP:VOLT:AC:PROT.

The value is not affected by the * RST command or the stored preset.

This command requires "Calibration" access.

Overlapped command.

Example:

OUTP:VOLT:PROT ON

OUTP:VOLT:PROT? Response: 1

:READ?

Syntax:

:READ?

Description:

Triggers the measurement and returns the measurement result.

Parameters:

<DNPD> - measured value.

Remarks:

Before using READ? command, the meter must be configured.
Overlapped command.

Example:

READ? Response: 2.050751E+00

:ROUTE:TERMIal:SECOndary:ENABle

Syntax:

:ROUTE:TERMIal:SECOndary:ENABle <BOOL>
:ROUTE:TERMIal:SECOndary:ENABle?

Description:

Enable switching of the current output to the I+SEC terminal.

Parameters:

<BOOL> - enable I+SEC terminal switchng {ON|OFF|1|0} (default 1).
·ON enabled.
·OFF disabled.
·1 enabled.
·0 disabled.

Remarks:

The value is stored in each preset.
The value is set according to "Start-up" preset after power on.
The value is set to default on *RST command.
Overlapped command.

Example:

ROUT:TERM:SEC:ENAB ON
ROUT:TERM:SEC:ENAB? Response: 1

:ROUTE:TERMIal:SECOndary:LIMit

Syntax:

:ROUTE:TERMIal:SECOndary:LIMit <DNPD>[<UNIT>]
:ROUTE:TERMIal:SECOndary:LIMit?

Description:

Current value at which switching from/to the I+SEC terminal occurs.

Parameters:

<DNPD> - current limit, range 0.0 ... 2.0 A (default 2.0 A)
<UNIT> - current unit {A}
·A Ampere unit is used

Remarks:

The value is stored in each preset.
The value is set according to "Start-up" preset after power on.
The value is set to default on *RST command.
Overlapped command.

Example:

ROUT:TERM:SEC:LIM 2.0
ROUT:TERM:SEC:LIM? Response: 2.000000E+00 A

:SENSE:FUNCTion[:ON]

Syntax:

:SENSE:FUNCTion[:ON] <SPD>
:SENSE:FUNCTion[:ON]?

Description:

Sets the desired meter function or returns the set function.

Parameters:

<SPD> - meter function
"OFF" turns off meter function.
"VOLT" Voltage DC

"CURR"	Current DC
"CURR:LO"	Lo DC Current
"RES"	Resistance
"FREQ"	Frequency
"TEMP:RTD"	Temperature RTD
"TEMP:TC"	Temperature TC

Remarks:

The value is stored in each preset.
 The value is set according to "Start-up" preset after power on.
 The value is set to default on *RST command.
 Overlapped command.

Example:

SENS:FUNC "VOLT"
 SENS:FUNC? Response: "VOLT"

:SENSe:RESistance:APERture

Syntax:

:SENSe:RESistance:APERture <DNPD>
 :SENSe:RESistance:APERture?

Description:

Sets the integration time for the measurement.

Parameters:

<DNPD> - aperture time [s], range 0.05 ... 0.8 (supported times are 0.05, 0.06, 0.1, 0.2, 0.4, 0.8).

Remarks:

The value is stored in each preset.
 The value is set according to "Start-up" preset after power on.
 The value is set to default on *RST command.
 Overlapped command.

Example:

SENS:RES:APER 0.8
 SENS:RES:APER? Response: 8.00000E-01

:SENSe:RESistance:NULL[:STATe]

Syntax:

:SENSe:RESistance:NULL[:STATe] <BOOL>
 :SENSe:RESistance:NULL[:STATe]?

Description:

Turns the null state on or off for the Resistance meter function. When null state is turned on, it takes measurement and uses it as an offset (NULL value).

Parameters:

<BOOL> - null state {ON|OFF|1|0} (default 0).
 ·ON Turns the null state ON.
 ·OFF Turns the null state OFF.
 ·1 Turns the null state ON.
 ·0 Turns the null state OFF.

Remarks:

The value is set to default after power on.
 The value is set to default on *RST command.
 Overlapped command.

Example:

SENS:RES:NULL ON
 SENS:RES:NULL? Response: 1

:SENSe:RESistance:NULL:VALue

Syntax:

:SENSe:RESistance:NULL:VALue <DNPD>
:SENSe:RESistance:NULL:VALue?

Description:

Sets the offset value for the Resistance meter function directly, or allows you to read the offset value.

Parameters:

<DNPD> - null value, the null value range is directly dependent on the range of the meter function.

Remarks:

The value is set to default after power on.
The value is set to default on *RST command.
Overlapped command.

Example:

SENS:RES:NULL:VAL 0.035
SENS:RES:NULL:VAL? Response: 3.500000E-02

:SENSe:RESistance:RANGe

Syntax:

:SENSe:RESistance:RANGe <DNPD>
:SENSe:RESistance:RANGe?

Description:

Sets the resistance range for the Resistance meter function manually.

Parameters:

<DNPD> - resistance range [Ohm], range 0.0 ... 20000.0 (2 kOhm, 20 kOhm ranges are available, default 20 kOhm).

Remarks:

The closest upper range to the entered value will be selected.
Setting the range turns off the automatic range selection.
The value is stored in each preset.
The value is set according to "Start-up" preset after power on.
The value is set to default on *RST command.
Overlapped command

Example:

SENS:RES:RANG 2000
SENS:RES:RANG? Response: 2.000000E+03

:SENSe:RESistance:RANGe:AUTO

Syntax:

:SENSe:RESistance:RANGe:AUTO <BOOL>
:SENSe:RESistance:RANGe:AUTO?

Description:

Sets the automatic resistance range selection for Resistance meter function.

Parameters:

<BOOL> - automatic range selection {ON|OFF|1|0} (default 1).
·ON turns on automatic range selection.
·OFF turns off automatic range selection.
·1 turns on automatic range selection.
·0 turns off automatic range selection.

Remarks:

The value is stored in each preset.
The value is set according to "Start-up" preset after power on.
The value is set to default on *RST command.
Overlapped command.

Example:

```
SENS:RES:RANG:AUTO ON
SENS:RES:RANG:AUTO? Response: 1
```

:SENSe:TEMPerature:RTD:COEFficient<N>

Syntax:

```
:SENSe:TEMPerature:RTD:COEFficient<N> <DNPD>
:SENSe:TEMPerature:RTD:COEFficient<N>?
```

Description:

Sets user coefficients for resistance calculation to the RTD Temperatures function. Calculation is done using this formula $R=R0*(1+t*(A+t*(B+t*C*(t-100))))$.

Parameters:

<N> - coefficient index:
1 coefficient A, coefficient value range from 3.0e-3 to 5.0e-3.
2 coefficient B, coefficient value range from -7.0e-7 to -5.0e-7.
3 coefficient C, coefficient value range from -5.0e-12 to -3.0e-12.
<DNPD> - coefficient value.

Remarks:

These coefficients are common to both the meter and the source see SOUR:TEMP:RTD:COEF command.
The value is stored in each preset.
The value is set according to "Start-up" preset after power on.
The value is set to default on *RST command.
Overlapped command.

Example:

```
SENS:TEMP:RTD:COEF1 3.9083e-3
SENS:TEMP:RTD:COEF1? Response: 3.908300E-03
```

:SENSe:TEMPerature:RTD:NULL[:STATe]

Syntax:

```
:SENSe:TEMPerature:RTD:NULL[:STATe] <BOOL>
:SENSe:TEMPerature:RTD:NULL[:STATe]?
```

Description:

Turns the null state on or off for the Temperature RTD meter function. When null state is turned on, it takes measurement and uses it as an offset (NULL value).

Parameters:

<BOOL> - null state {ON|OFF|1|0} (default 0).
·ON turns the null state ON.
·OFF turns the null state OFF.
·1 turns the null state ON.
·0 turns the null state OFF.

Remarks:

The value is set to default after power on.
The value is set to default on *RST command.
Overlapped command.

Example:

```
SENS:TEMP:RTD:NULL ON
SENS:TEMP:RTD:NULL? Response: 1
```

:SENSe:TEMPerature:RTD:NULL:VALue

Syntax:

```
:SENSe:TEMPerature:RTD:NULL:VALue <DNPD>
:SENSe:TEMPerature:RTD:NULL:VALue?
```

Description:

Sets the offset value for the Temperature RTD meter function directly, or allows you to read the offset value.

Parameters:

<DNPD> - null value [Ohm], the null value range is directly dependent on the range of the meter function.

Remarks:

The value is set to default after power on.
The value is set to default on *RST command.
Overlapped command.

Example:

```
SENS:TEMP:RTD:NULL:VAL 0.3
SENS:TEMP:RTD:NULL:VAL? Response: 3.000000E-01
```

:SENSe:TEMPerature:RTD:RANGe

Syntax:

```
:SENSe:TEMPerature:RTD:RANGe <DNPD>
:SENSe:TEMPerature:RTD:RANGe?
```

Description:

Sets the resistance range for Temperature RTD meter function manually.

Parameters:

<DNPD> - resistance range [Ohm], range 0.0 ... 20000.0 (2 kOhm, 20 kOhm ranges are available, default 20 kOhm).

Remarks:

The closest upper range to the entered value will be selected.
Setting the range turns off the automatic range selection.
The value is stored in each preset.
The value is set according to "Start-up" preset after power on.
The value is set to default on *RST command.
Overlapped command.

Example:

```
SENS:TEMP:RTD:RANG 2000
SENS:TEMP:RTD:RANG? Response: 2.000000E+03
```

:SENSe:TEMPerature:RTD:RANGe:AUTO

Syntax:

```
:SENSe:TEMPerature:RTD:RANGe:AUTO <BOOL>
:SENSe:TEMPerature:RTD:RANGe:AUTO?
```

Description:

Sets the automatic resistance range selection for Temperature RTD meter function.

Parameters:

<BOOL> - automatic range selection {ON|OFF|1|0} (default 1).
·ON turns on automatic range selection.
·OFF turns off automatic range selection.
·1 turns on automatic range selection.
·0 turns off automatic range selection.

Remarks:

The value is stored in each preset.
The value is set according to "Start-up" preset after power on.
The value is set to default on *RST command.
Overlapped command.

Example:

```
SENS:TEMP:RTD:RANG:AUTO ON
SENS:TEMP:RTD:RANG:AUTO? Response: 1
```

:SENSe:TEMPerature:RTD:RESistance[:REFerence]

Syntax:

:SENSe:TEMPerature:RTD:RESistance[:REFerence] <DNPD>[<UNIT>]
:SENSe:TEMPerature:RTD:RESistance[:REFerence]?

Description:

Sets resistance R0 at 0 °C for Temperature RTD meter function.

Parameters:

<DNPD> - resistance R0, range 20.0 ... 2000.0 Ohm (default 1000.0 Ohm).
<UNIT> - resistance unit {OHM}.
·OHM Ohm unit is used.

Remarks:

The value is stored in each preset.
The value is set according to "Start-up" preset after power on.
The value is set to default on *RST command.
Overlapped command.

Example:

SENS:TEMP:RTD:RES 1000.0
SENS:TEMP:RTD:RES? Response: 1.000000E+03 OHM

:SENSe:TEMPerature:RTD:STANdard

Syntax:

:SENSe:TEMPerature:RTD:STANdard <CPD>
:SENSe:TEMPerature:RTD:STANdard?

Description:

Sets the standard for resistance calculation to the RTD Temperature meter function.

Parameters:

<CPD> - RTD standard {PT385A|PT385B|PT3916|PT3926|USER} (default PT385B).
·PT385A resistance is calculated using PT3850 standard.
·PT385B resistance is calculated using PT3851 standard.
·PT3916 resistance is calculated using PT3916 standard.
·PT3926 resistance is calculated using PT3826 standard.
·USER resistance is calculated using user coefficients A, B, C.

Remarks:

The value is stored in each preset.
The value is set according to "Start-up" preset after power on.
The value is set to default on *RST command.
Overlapped command.

Example:

SENS:TEMP:RTD:STAN PT385A
SENS:TEMP:RTD:STAN? Response: PT385A

:SENSe:TEMPerature:RTD:TYPE

Syntax:

:SENSe:TEMPerature:RTD:TYPE <CPD>
:SENSe:TEMPerature:RTD:TYPE?

Description:

Sets the RTD simulator type to the RTD Temperature meter function.

Parameters:

<CPD> - RTD type {PLATinum|NICKel} (default PLAT).
·PLATinum simulation for platinum RTD.
·NICKel simulation for nickel RTD.

Remarks:

The value is stored in each preset.
The value is set according to "Start-up" preset after power on.
The value is set to default on *RST command.

Overlapped command.

Example:

```
SENS:TEMP:RTD:TYPE PLAT
SENS:TEMP:RTD:TYPE? Response: PLAT
```

[[:SOURce]:CAPacitance[:AMPLitude]

Syntax:

```
[[:SOURce]:CAPacitance[:AMPLitude] <DNPD>[<UNIT>]
[:SOURce]:CAPacitance[:AMPLitude]?
```

Description:

Sets the capacitance amplitude in Variable or Fixed capacitance mode.

Parameters:

<DNPD> - capacitance amplitude, range 2 nF ... 120 mF in variable mode (default 100 nF), 1 nF ... 10 uF in fixed mode.
<UNIT> - capacitance unit {F}
·F Farad unit is used.

Remarks:

Calibration value can be obtained in fixed mode.
The value is stored in each preset.
The value is set according to "Start-up" preset after power on.
The value is set to default on *RST command.
Overlapped command.

Example:

```
CAP 1e-7
CAP? Response: 1.000000E-07 F
```

[[:SOURce]:CAPacitance:CORRection

Syntax:

```
[[:SOURce]:CAPacitance:CORRection <CPD>
[:SOURce]:CAPacitance:CORRection?
```

Description:

Sets the capacitance correction for Capacitance source function. In absolute mode, the capacitance value directly corresponds to the capacitance at the terminals. In relative mode, the capacitance value is relative to the open state.

Parameters:

<CPD> - capacitance correction {ABSolute|RELative} (default ABS)
·ABSolute absolute correction.
·RELative relative correction.

Remarks:

The value is stored in each preset.
The value is set according to "Start-up" preset after power on.
The value is set to default on *RST command.
Overlapped command.

Example:

```
CAP:CORR ABS
CAP:CORR? Response: ABS
```

[[:SOURce]:CAPacitance:FIXed

Syntax:

```
[[:SOURce]:CAPacitance:FIXed <CPD>
[:SOURce]:CAPacitance:FIXed?
```

Description:

Sets the capacitance amplitude in Fixed Capacitance mode.

Parameters:

<CPD> - capacitance standard {1N|3N3|10N|33N|100N|330N|1U|3U3|10U}
(default 1N).

- 1N 1 nF capacitance standard.
- 3N3 3.3 nF capacitance standard.
- 10N 10 nF capacitance standard.
- 33N 33 nF capacitance standard.
- 100N 100 nF capacitance standard.
- 330N 330 nF capacitance standard.
- 1U 1 uF capacitance standard.
- 3U3 3.3 uF capacitance standard.
- 10U 10 uF capacitance standard.

Remarks:

Calibration value can be obtained using CAP? command.
The value is stored in each preset.
The value is set according to "Start-up" preset after power on.
The value is set to default on *RST command.
Overlapped command.

Example:

```
CAP:FIX 1N
CAP:FIX? Response: 1N
CAP? Response: 1.002415E-09
```

[[:SOURce]:CAPacitance:MODE

Syntax:

```
[[:SOURce]:CAPacitance:MODE <CPD>
[:SOURce]:CAPacitance:MODE?
```

Description:

Sets the capacitance mode for Capacitance source function.

Parameters:

<CPD> - capacitance mode {FIXed|VARiable} (default VAR)
·FIXed capacitance is set using discrete internal standards.
·VARiable capacitance is set continuously using the simulator.

Remarks:

The value is stored in each preset.
The value is set according to "Start-up" preset after power on.
The value is set to default on *RST command.
Overlapped command.

Example:

```
CAP:MODE FIX
CAP:MODE? Response: FIX
```

[[:SOURce]:CURRent:AC[:AMPLitude]

Syntax:

```
[[:SOURce]:CURRent:AC[:AMPLitude] <DNPD>[<UNIT>]
[:SOURce]:CURRent:AC[:AMPLitude]?
```

Description:

Sets the current amplitude for Current AC source function.

Parameters:

<DNPD> - current amplitude, range 0.00001 ... 20.5 A RMS in normal mode (default 1.0 A).
<UNIT> - unit used for current amplitude {ARMS|APK|APP|AAVG} (default

ARMS).

- ARMS Ampere RMS
- APK Ampere Peak
- APP Ampere Peak to Peak
- AAVG Ampere Average

Remarks:

The amplitude setting is affected by the current mode setting, see OUTP:CURR:MODE command.

The value is stored in each preset.

The value is set according to "Start-up" preset after power on.

The value is set to default on *RST command.

Overlapped command.

Example:

CURR:AC 1.0

CURR:AC? Response: 1.000000E+00 ARMS

[[:SOURce]:CURRent:AC:FREQuency

Syntax:

[[:SOURce]:CURRent:AC:FREQuency <DNPD>[<UNIT>]

[[:SOURce]:CURRent:AC:FREQuency?

Description:

Sets the frequency for Current AC source function.

Parameters:

<DNPD> - frequency [Hz], range 10.0 ... 10000.0 depending on the shape and current amplitude (default 50.0).

<UNIT> - frequency unit {HZ}.

·HZ Hertz unit is used.

Remarks:

The value is stored in each preset.

The value is set according to "Start-up" preset after power on.

The value is set to default on *RST command.

Overlapped command.

Example:

CURR:AC:FREQ 1000.0

CURR:AC:FREQ? Response: 1.000000E+03 HZ

[[:SOURce]:CURRent:AC:RANGe

Syntax:

[[:SOURce]:CURRent:AC:RANGe <DNPD>

[[:SOURce]:CURRent:AC:RANGe?

Description:

Sets the current range for Current AC source function manually.

Parameters:

<DNPD> - current range [A], range 0.0 ... 20.5 in normal mode (200 uA, 2 mA, 20 mA, 200 mA, 2 A, 20,5 A ranges are available, default 2 A).

Remarks:

The range setting is affected by the current mode setting, see OUTP:CURR:MODE command.

The closest upper range to the entered value will be selected.

Setting the range turns off the automatic range selection.

The value is stored in each preset.

The value is set according to "Start-up" preset after power on.

The value is set to default on *RST command.

Overlapped command.

Example:

CURR:AC:RANG 0.02

CURR:AC:RANG? Response: 2.000000E-02

[[:SOURce]:CURRent:AC:RANGe:AUTO

Syntax:

`[[:SOURce]:CURRent:AC:RANGe:AUTO <BOOL>`
`[[:SOURce]:CURRent:AC:RANGe:AUTO?`

Description:

Sets the automatic range selection for Current AC source function.

Parameters:

<BOOL> - automatic range selection {ON|OFF|1|0} (default 1).
·ON turns on automatic range selection.
·OFF turns off automatic range selection.
·1 turns on automatic range selection.
·0 turns off automatic range selection.

Remarks:

The value is stored in each preset.
The value is set according to "Start-up" preset after power on.
The value is set to default on *RST command.
Overlapped command.

Example:

`CURR:AC:RANG:AUTO ON`
`CURR:AC:RANG:AUTO? Response: 1`

[[:SOURce]:CURRent:AC:SHAPE

Syntax:

`[[:SOURce]:CURRent:AC:SHAPE <CPD>`
`[[:SOURce]:CURRent:AC:SHAPE?`

Description:

Selects the signal waveform for Current AC source function.

Parameters:

<CPD> - shape {SINE|LSINE|SQUare|TRIangle|URAMp|DRAMp|HARMonic}
(default SINE).
·SINE sine waveform.
·LSINE limited sine waveform.
·SQUare square waveform.
·TRIangle triangle waveform.
·URAMp rising ramp waveform.
·DRAMp falling ramp waveform.
·HARMonic harmonic waveform, see HARM:CURR commands.

Remarks:

The value is stored in each preset.
The value is set according to "Start-up" preset after power on.
The value is set to default on *RST command.
Overlapped command.

Example:

`CURR:AC:SHAP SINE`
`CURR:AC:SHAP? Response: SINE`

[[:SOURce]:CURRent[:DC]][:AMPLitude]

Syntax:

`[[:SOURce]:CURRent[:DC]][:AMPLitude] <DNPD>[<UNIT>]`
`[[:SOURce]:CURRent[:DC]][:AMPLitude]?`

Description:

Sets amplitude for Current DC source function.

Parameters:

<DNPD> - current amplitude, range 0.0 ... ±20.5 A in normal mode (default 1.0).
<UNIT> - unit used for current amplitude {A} (default A).
·A Ampere unit is used.

Remarks:

The amplitude setting is affected by the current mode setting, see OUTP:CURR:MODE command.

The value is stored in each preset.

The value is set according to "Start-up" preset after power on.

The value is set to default on *RST command.

Overlapped command.

Example:

CURR 1.0

CURR? Response: 1.000000E+00 A

[[:SOURce]:CURRent[:DC]:RANGe

Syntax:

[[:SOURce]:CURRent[:DC]:RANGe <DNPD>

[[:SOURce]:CURRent[:DC]:RANGe?

Description:

Sets the current range for Current DC source function.

Parameters:

<DNPD> - current range [A], range 0.0 ... 20.5 in normal mode (200 uA, 2 mA, 20 mA, 200 mA, 2 A, 20.5 A ranges are available, default 2 A).

Remarks:

The range setting is affected by the current mode setting, see OUTP:CURR:MODE command.

The closest upper range to the entered value will be selected.

Setting the range turns off the automatic range selection.

The value is stored in each preset.

The value is set according to "Start-up" preset after power on.

The value is set to default on *RST command.

Overlapped command.

Example:

CURR:RANG 0.002

CURR:RANG? Response: 2.000000E-03

[[:SOURce]:CURRent[:DC]:RANGe:AUTO

Syntax:

[[:SOURce]:CURRent[:DC]:RANGe:AUTO <BOOL>

[[:SOURce]:CURRent[:DC]:RANGe:AUTO?

Description:

Sets the automatic current range selection for Current DC source function.

Parameters:

<BOOL> - automatic range selection {ON|OFF|1|0} (default 1).

·ON turns on automatic range selection.

·OFF turns off automatic range selection.

·1 turns on automatic range selection.

·0 turns off automatic range selection.

Remarks:

The value is stored in each preset.

The value is set according to "Start-up" preset after power on.

The value is set to default on *RST command.

Overlapped command.

Example:

CURR:RANG:AUTO ON

CURR:RANG:AUTO? Response: 1

[[:SOURce]:DUTY[:CYCLE]

Syntax:

[[:SOURce]:DUTY[:CYCLe] <DNPD>

[[:SOURce]:DUTY[:CYCLe]?

Description:

Sets the duty cycle of the rectangular signal for Duty cycle source function.

Parameters:

<DNPD> - duty cycle, range 0.1 ... 99.9 % (default 50.0 %)

Remarks:

The value is stored in each preset.

The value is set according to "Start-up" preset after power on.

The value is set to default on *RST command.

Overlapped command.

Example:

DUTY 10.0

DUTY? Response: 1.000000E+01

[[:SOURce]:DUTY:FREQuency

Syntax:

[[:SOURce]:DUTY:FREQuency <DNPD>

[[:SOURce]:DUTY:FREQuency?

Description:

Sets the frequency for Duty cycle source function.

Parameters:

<DNPD> - frequency, range 0.1 ... 1000 Hz (default 1000 Hz).

Remarks:

The value is stored in each preset.

The value is set according to "Start-up" preset after power on.

The value is set to default on *RST command.

Overlapped command.

Example:

DUTY:FREQ 1000

DUTY:FREQ? Response: 1.000000E+03

[[:SOURce]:DUTY:VOLTag[:AMPLitude]

Syntax:

[[:SOURce]:DUTY:VOLTag[:AMPLitude] <DNPD>[<UNIT>]

[[:SOURce]:DUTY:VOLTag[:AMPLitude]?

Description:

Sets voltage amplitude for Duty cycle source function.

Parameters:

<DNPD> - voltage amplitude, range 1 mVPk ... 14.1 VPk (default 1 VPk)

<UNIT> - voltage unit {VPK}

·VPK Volt Peak.

Remarks:

The value is stored in each preset.

The value is set according to "Start-up" preset after power on.

The value is set to default on *RST command.

Overlapped command.

Example:

DUTY:VOLT 1.0

DUTY:VOLT? Response: 1.000000E+00 VPK

[[:SOURce]:DUTY:VOLTage:RANGe

Syntax:

[[:SOURce]:DUTY:VOLTage:RANGe <DNPD>

[[:SOURce]:DUTY:VOLTage:RANGe?

Description:

Sets the voltage range for Duty cycle source function manually.

Parameters:

<DNPD> - voltage range [V], range 0.0 ... 14.1 V (10 mV, 100 mV, 1 V, 10 V ranges are available, default 1 V).

Remarks:

The closest upper range to the entered value will be selected.

Setting the range turns off the automatic range selection.

The value is stored in each preset.

The value is set according to "Start-up" preset after power on.

The value is set to default on *RST command.

Overlapped command.

Example:

DUTY:VOLT:RANG 0.5

DUTY:VOLT:RANG? Response: 1.000000E+00

[[:SOURce]:DUTY:VOLTage:RANGe:AUTO

Syntax:

[[:SOURce]:DUTY:VOLTage:RANGe:AUTO <BOOL>

[[:SOURce]:DUTY:VOLTage:RANGe:AUTO?

Description:

Sets the automatic voltage range selection for Duty cycle source function.

Parameters:

<BOOL> - automatic range selection {ON|OFF|1|0} (default 1).

·ON turns on automatic range selection.

·OFF turns off automatic range selection.

·1 turns on automatic range selection.

·0 turns off automatic range selection.

Remarks:

The value is stored in each preset.

The value is set according to "Start-up" preset after power on.

The value is set to default on *RST command.

Overlapped command.

Example:

DUTY:VOLT:RANG:AUTO ON

DUTY:VOLT:RANG:AUTO? Response: 1

[[:SOURce]:FREQUency[:AMPLitude]

Syntax:

[[:SOURce]:FREQuency[:AMPLitude] <DNPd>[<UNIT>]
[:SOURce]:FREQuency[:AMPLitude]?

Description:

Sets amplitude for Frequency source function.

Parameters:

<DNPd> - range 0.1 Hz ... 20.0 MHz (default 1 MHz),
<UNIT> - unit used for current amplitude {HZ} (default HZ).
·HZ Hz unit is used.

Remarks:

The value is stored in each preset.
The value is set according to "Startup" preset after power on.
The value is set to default on *RST command.
Overlapped command.

Example:

FREQ 1e6
FREQ? Response: 1.000000E+06 HZ

[[:SOURce]:FREQuency:VOLTagE:AMPLitude

Syntax:

[[:SOURce]:FREQuency:VOLTagE:AMPLitude <DNPd>[<UNIT>]
[:SOURce]:FREQuency:VOLTagE:AMPLitude?

Description:

Sets the voltage amplitude for Frequency source function. The amplitude is set in three fixed steps and is equivalent to the attenuator setting.

Parameters:

<DNPd> - voltage amplitude, range 0.0 ... 5.0 V (default 0.1).
<UNIT> - voltage unit {V}.
·V Volt unit is used.

Remarks:

The value is stored in each preset.
The value is set according to "Start-up" preset after power on.
The value is set to default on *RST command.
Overlapped command.

Example:

FREQ:VOLT:AMPL 1.0
FREQ:VOLT:AMPL? Response: 1.000000E+00 V

[[:SOURce]:FREQuency:VOLTagE:ATTenuator

Syntax:

[[:SOURce]:FREQuency:VOLTagE:ATTenuator <CPD>
[:SOURce]:FREQuency:VOLTagE:ATTenuator?

Description:

Sets the voltage attenuator for Frequency source function.

Parameters:

<CPD> - voltage attenuator {100MV|1V|5V} (default 100MV).
·100MV 100 mV output amplitude.
·1V 1 V output amplitude.
·5V 5 V output amplitude.

Remarks:

The value is stored in each preset.
The value is set according to "Start-up" preset after power on.
The value is set to default on *RST command.
Overlapped command.

Example:

FREQ:VOLT:ATT 100MV
FREQ:VOLT:ATT? Response: 100MV

[[:SOURce]:FUNction[:ON]

Syntax:

[[:SOURce]:FUNction[:ON] <SPD>
[:SOURce]:FUNction[:ON]?

Description:

Sets the desired source function or returns the set function.

Parameters:

<SPD> - source function
"VOLT" Voltage DC
"VOLT:AC" Voltage AC
"CURR" Current DC
"CURR:AC" Current AC
"RES" Resistance LVR
"CAP" Capacitance
"TEMP:RTD" Temperature RTD
"TEMP:TCO" Temperature TC
"FREQ" Frequency

Remarks:

The value is stored in each preset.
The value is set according to "Start-up" preset after power on.
The value is set to default on *RST command.
Overlapped command.

Example:

FUNC "CURR:AC"
FUNC? Response: "CURR:AC"

[[:SOURce]:RESistance[:LVOLtage][:AMPLitude]

Syntax:

[[:SOURce]:RESistance[:LVOLtage][:AMPLitude] <DNPD>[<UNIT>]
[:SOURce]:RESistance[:LVOLtage][:AMPLitude]?

Description:

Sets the resistance amplitude for Low Voltage Resistance source function.

Parameters:

<DNPD> - resistance amplitude, range 0.0 ... 600.0e6 Ohm (default 100.0).
<UNIT> - resistance unit {OHM}.
·OHM Ohm unit is used.

Remarks:

The value is stored in each preset.
The value is set according to "Start-up" preset after power on.
The value is set to default on *RST command.
Overlapped command.

Example:

RES 100.0
RES? Response: 1.000000E+02 OHM

[[:SOURce]:RESistance[:LVOLtage]:COMPensation]

Syntax:

[[:SOURce]:RESistance[:LVOLtage]:COMPensation <DNPD>[<UNIT>]
[:SOURce]:RESistance[:LVOLtage]:COMPensation?

Description:

Sets the compensation for Low Voltage Resistance source function.

Parameters:

<DNPD> - compensation, range 0.0 ... 1.0 Ohm (default 0.0).
<UNIT> - compensation unit {OHM}.
·OHM Ohm unit is used.

Remarks:

The compensation is valid only for Variable 2-wire mode.
The value is stored in each preset.
The value is set according to "Start-up" preset after power on.
The value is set to default on *RST command.
Overlapped command.

Example:

```
RES:COMP 0.012
RES:COMP? Response: 1.200000E-02 OHM
```

[[:SOURce]:RESistance[:LVOLtage]:FIXed

Syntax:

```
[[:SOURce]:RESistance[:LVOLtage]:FIXed <CPD>
[:SOURce]:RESistance[:LVOLtage]:FIXed?
```

Description:

Selects the fixed resistance standard for Low Voltage Resistance source function.

Parameters:

<CPD> - fixed resistance standard
{0R|10R|33R|100R|330R|1K|3K3|10K|33K|100K|330K|1M|3M3|10M|33M|100M|330M} (default 0R).

- 0R 0 Ohm (SHORT) resistance standard.
- 10R 10 Ohm resistance standard.
- 33R 33 Ohm resistance standard.
- 100R 100 Ohm resistance standard.
- 330R 330 Ohm resistance standard.
- 1K 1 kOhm resistance standard.
- 3K3 3.3 kOhm resistance standard.
- 10K 10 kOhm resistance standard.
- 33K 33 kOhm resistance standard.
- 100K 100 kOhm resistance standard.
- 330K 330 kOhm resistance standard.
- 1M 1 MOhm resistance standard.
- 3M3 3.3 MOhm resistance standard.
- 10M 10 MOhm resistance standard.
- 33M 33 MOhm resistance standard.
- 100M 100 MOhm resistance standard.
- 330M 330 MOhm resistance standard.

Remarks:

The display shows the real calibrated resistance value in this mode.
The real calibrated resistance value can be read using the RES? command.
The value is stored in each preset.
The value is set according to "Start-up" preset after power on.
The value is set to default on *RST command.
Overlapped command.

Example:

```
RES:FIX 0R
RES:FIX? Response: 0R
```

[[:SOURce]:RESistance[:LVOLtage]:MODE

Syntax:

```
[[:SOURce]:RESistance[:LVOLtage]:MODE <CPD>
[:SOURce]:RESistance[:LVOLtage]:MODE?
```

Description:

Sets the resistance mode for Low Voltage Resistance source function.

Parameters:

<CPD> - resistance mode {FIXed|VARiable} (default FIX)

- FIXed resistance is set using discrete internal standards.
- VARiable resistance is set continuously using the simulator.

Remarks:

The value is stored in each preset.
 The value is set according to "Start-up" preset after power on.
 The value is set to default on *RST command.
 Overlapped command.

Example:

```
RES:MODE FIX
RES:MODE? Response: FIX
```

[[:SOURce]:RESistance[:LVOLtage]:WIRE

Syntax:

```
[[:SOURce]:RESistance[:LVOLtage]:WIRE <CPD>
[:SOURce]:RESistance[:LVOLtage]:WIRE?
```

Description:

Sets the 2-wire, 4-wire or 2-wire compensated terminal mode for Low Voltage Resistance source function.

Parameters:

<CPD> - terminal mode {2W|4W|COMP} (default 2W).
 ·2W 2-wire resistance connection.
 ·4W 4-wire resistance connection.
 ·COMP 2-wire compensated resistance connection.

Remarks:

2-wire compensated terminal mode is only available for variable resistance.
 The value is stored in each preset.
 The value is set according to "Start-up" preset after power on.
 The value is set to default on *RST command.
 Overlapped command.

Example:

```
RES:WIRE 2W
RES:WIRE? Response: 2W
```

[[:SOURce]:TEMPerature:RTD[:AMPLitude]

Syntax:

```
[[:SOURce]:TEMPerature:RTD[:AMPLitude] <DNPD>[<UNIT>]
[:SOURce]:TEMPerature:RTD[:AMPLitude]?
```

Description:

Sets the temperature for Temperature RTD source function.

Parameters:

<DNPD> - temperature, range -200.0 ... 850.0 °C (default 100.0 °C).
 <UNIT> - temperature unit {CEL|FAR|K}.
 ·CEL degrees Celsius unit is used.
 ·FAR degrees Fahrenheit unit is used.
 ·K Kelvin unit is used.

Remarks:

Default unit can be selected using UNIT:TEMP command
 The value is stored in each preset
 The value is set according to "Start-up" preset after power on
 The value is set to default on *RST command
 Overlapped command

Example:

```
TEMP:RTD 100.0
TEMP:RTD? Response: 1.000000E+02 CEL
```

[[:SOURce]:TEMPerature:RTD:RESistance[:REFerence]

Syntax:

[[:SOURce]:TEMPerature:RTD:RESistance[:REFerence] <DNPD>[<UNIT>]
[:SOURce]:TEMPerature:RTD:RESistance[:REFerence]?

Description:

Sets resistance R0 at 0 °C for Temperature RTD source function.

Parameters:

<DNPD> - resistance R0, range 20.0 ... 2000.0 Ohm (default 1000.0 Ohm).
<UNIT> - resistance unit {OHM}.
·OHM unit for R0 resistance.

Remarks:

The value is stored in each preset.
The value is set according to "Start-up" preset after power on.
The value is set to default on *RST command.
Overlapped command.

Example:

TEMP:RTD:RES 1000.0
TEMP:RTD:RES? Response: 1.000000E+03 OHM

[[:SOURce]:TEMPerature:RTD:STANdard

Syntax:

[[:SOURce]:TEMPerature:RTD:STANdard <CPD>
[:SOURce]:TEMPerature:RTD:STANdard?

Description:

Sets the standard for resistance calculation to the RTD Temperature source function.

Parameters:

<CPD> - RTD standard {PT385A|PT385B|PT3916|PT3926|USER} (default PT385B).
·PT385A resistance is calculated using PT3850 standard.
·PT385B resistance is calculated using PT3851 standard.
·PT3916 resistance is calculated using PT3916 standard.
·PT3926 resistance is calculated using PT3826 standard.
·USER resistance is calculated using user coefficients A, B, C.

Remarks:

The value is stored in each preset.
The value is set according to "Start-up" preset after power on.
The value is set to default on *RST command.
Overlapped command.

Example:

TEMP:RTD:STAN PT385A
TEMP:RTD:STAN? Response: PT385A

[[:SOURce]:TEMPerature:RTD:TYPE

Syntax:

[[:SOURce]:TEMPerature:RTD:TYPE <CPD>
[:SOURce]:TEMPerature:RTD:TYPE?

Description:

Sets the RTD simulator type to the RTD Temperature source function.

Parameters:

<CPD> - RTD type {PLATinum|NICKel} (default PLAT).
·PLATinum simulation for platinum RTD.
·NICKel simulation for nickel RTD.

Remarks:

The value is stored in each preset.
The value is set according to "Start-up" preset after power on.
The value is set to default on *RST command.

Overlapped command.

Example:

```
TEMP:RTD:TYPE PLAT
TEMP:RTD:TYPE? Response: PLAT
```

[[:SOURce]:TEMPerature:TCouple[:AMPLitude]

Syntax:

```
[[:SOURce]:TEMPerature:TCouple[:AMPLitude] <DNPD>[<UNIT>]
[:SOURce]:TEMPerature:TCouple[:AMPLitude]?
```

Description:

Sets the temperature for Temperature TC source function.

Parameters:

<DNPD> - temperature, range is dependent on the TC type (default 100.0).
<UNIT> temperature unit {CEL|FAR|K}.
·CEL degrees Celsius unit is used.
·FAR degrees Fahrenheit unit is used.
·K Kelvin unit is used.

Remarks:

Default unit can be selected using UNIT:TEMP command.
The value is stored in each preset.
The value is set according to "Start-up" preset after power on.
The value is set to default on *RST command.
Overlapped command.

Example:

```
TEMP:TCO 100.0
TEMP:TCO? Response: 1.000000E+02 CEL
```

[[:SOURce]:TEMPerature:TCouple:RJUNction:TYPE

Syntax:

```
[[:SOURce]:TEMPerature:TCouple:RJUNction:TYPE <CPD>
[:SOURce]:TEMPerature:TCouple:RJUNction:TYPE?
```

Description:

Sets the method of obtaining cold junction temperature for Temperature TC source function.

Parameters:

<CPD> - cold junction temperature type {FIX|EXT} (default FIX).
·FIX temperature is fixed and can be set using TEMP:TCO:RJUN
command.
·EXT temperature is measured using external sensor.

Remarks:

The value is stored in each preset.
The value is set according to "Start-up" preset after power on.
The value is set to default on *RST command.
Overlapped command.

Example:

```
TEMP:TCO:RJUN:TYPE FIX
TEMP:TCO:RJUN:TYPE? Response: FIX
```

[[:SOURce]:TEMPerature:TCouple:RJUNction[:VALue]

Syntax:

```
[[:SOURce]:TEMPerature:TCouple:RJUNction[:VALue] <DNPD>[<UNIT>]
[:SOURce]:TEMPerature:TCouple:RJUNction[:VALue]?
```

Description:

Sets the remote junction temperature for Temperature TC source function.

Parameters:

<DNPD> - remote junction temperature, range is dependent on the TC type (default 23.0).

<UNIT> - remote junction temperature unit {CEL|FAR|K}.

- CEL degrees Celsius unit is used.
- FAR degrees Fahrenheit unit is used.
- K Kelvin unit is used.

Remarks:

Default unit can be selected using UNIT:TEMP command.
The value is stored in each preset.
The value is set according to "Start-up" preset after power on.
The value is set to default on *RST command.
Overlapped command.

Example:

TEMP:TCO:RJUN 23.0
TEMP:TCO:RJUN? Response: 2.300000E+01 CEL

[[:SOURce]:TEMPerature:TCOuple:STANdard

Syntax:

[[:SOURce]:TEMPerature:TCOuple:STANdard <CPD>
[:SOURce]:TEMPerature:TCOuple:STANdard?

Description:

Sets the standard for calculation voltage for Temperature TC source function.

Parameters:

<CPD> - standard {PTS68|ITS90} (default ITS90).
·PTS68 voltage is calculated using older PTS68 standard.
·ITS90 voltage is calculated using newer ITS90 standard.

Remarks:

The value is stored in each preset.
The value is set according to "Start-up" preset after power on.
The value is set to default on *RST command.
Overlapped command.

Example:

TEMP:TCO:STAN PTS68
TEMP:TCO:STAN? Response: PTS68

[[:SOURce]:TEMPerature:TCOuple:TYPE

Syntax:

[[:SOURce]:TEMPerature:TCOuple:TYPE <CPD>
[:SOURce]:TEMPerature:TCOuple:TYPE?

Description:

Sets the thermocouple type for Temperature TC source function.

Parameters:

<CPD> - TC type {R|S|B|J|T|E|K|N|M|C|D|G2} (default R).
·R thermocouple type R
·S thermocouple type S
·B thermocouple type B
·J thermocouple type J
·T thermocouple type T
·E thermocouple type E
·K thermocouple type K
·N thermocouple type N
·M thermocouple type M
·C thermocouple type C
·D thermocouple type D
·G2 thermocouple type G2

Remarks:

The value is stored in each preset.
The value is set according to "Start-up" preset after power on.
The value is set to default on *RST command.
Overlapped command.

Example:

```
TEMP:TCO:TYPE R
TEMP:TCO:TYPE? Response: R
```

[[:SOURce]:VOLTage:AC[:AMPLitude]

Syntax:

```
[[:SOURce]:VOLTage:AC[:AMPLitude] <DNPD>[<UNIT>]
[:SOURce]:VOLTage:AC[:AMPLitude]?
```

Description:

Sets voltage amplitude for Voltage AC source function.

Parameters:

<DNPD> - voltage amplitude, range 0.001 ... 1050.0 V RMS (default 10.0).
<UNIT> - voltage unit {VRMS|VPK|VPP|VAVG}.
·VRMS Volt RMS.
·VPK Volt Peak.
·VPP Volt Peak to Peak.
·VAVG Volt Average.

Remarks:

The value is stored in each preset.
The value is set according to "Start-up" preset after power on.
The value is set to default on *RST command.
Overlapped command.

Example:

```
VOLT:AC 10.0
VOLT:AC? Response: 1.000000E+01 VRMS
```

[[:SOURce]:VOLTage:AC:FREQuency]

Syntax:

```
[[:SOURce]:VOLTage:AC:FREQuency <DNPD>[<UNIT>]
[:SOURce]:VOLTage:AC:FREQuency?
```

Description:

Sets the frequency for Voltage AC source function.

Parameters:

<DNPD> - frequency, range 10.0 ... 300000.0 Hz depending on the shape and voltage amplitude (default 50.0 Hz).
<UNIT> - frequency unit {HZ}.
·HZ Hertz unit is used.

Remarks:

The value is stored in each preset.
The value is set according to "Start-up" preset after power on.
The value is set to default on *RST command.
Overlapped command.

Example:

```
VOLT:AC:FREQ 1000.0
VOLT:AC:FREQ? Response: 1.000000E+03 HZ
```

[[:SOURce]:VOLTage:AC:RANGe]

Syntax:

```
[[:SOURce]:VOLTage:AC:RANGe <DNPD>
[:SOURce]:VOLTage:AC:RANGe?
```

Description:

Sets the voltage range for Voltage AC source function manually.

Parameters:

<DNPD> - voltage range [V], range 0.0 ... 1050.0 (10 mV, 100 mV, 1 V, 10 V, 100 V, 1050 V ranges are available, default 10 V).

Remarks:

The closest upper range to the entered value will be selected.
Setting the range turns off the automatic range selection.
The value is stored in each preset.
The value is set according to "Start-up" preset after power on.
The value is set to default on *RST command.
Overlapped command.

Example:

```
VOLT:AC:RANG 0.02
VOLT:AC:RANG? Response: 2.000000E-02
```

[[:SOURce]:VOLTage:AC:RANGe:AUTO

Syntax:

```
[[:SOURce]:VOLTage:AC:RANGe:AUTO <BOOL>
[:SOURce]:VOLTage:AC:RANGe:AUTO?
```

Description:

Sets the automatic voltage range selection for Voltage AC source function.

Parameters:

<BOOL> - automatic range selection {ON|OFF|1|0} (default 1).
·ON turns on automatic range selection.
·OFF turns off automatic range selection.
·1 turns on automatic range selection.
·0 turns off automatic range selection.

Remarks:

The value is stored in each preset.
The value is set according to "Start-up" preset after power on.
The value is set to default on *RST command.
Overlapped command.

Example:

```
VOLT:AC:RANG:AUTO ON
VOLT:AC:RANG:AUTO? Response: 1
```

[[:SOURce]:VOLTage:AC:SHAPE

Syntax:

```
[[:SOURce]:VOLTage:AC:SHAPE <CPD>
[:SOURce]:VOLTage:AC:SHAPE?
```

Description:

Selects the signal waveform for Voltage AC source function.

Parameters:

<CPD> - shape {SINE|LSINE|SQUare|TRIangle|URAMp|DRAMp|HARMonic}
(default SINE).
·SINE sine waveform.
·LSINE limited sine waveform.
·SQUare square waveform.
·TRIangle triangle waveform.
·URAMp rising ramp waveform.
·DRAMp falling ramp waveform.
·HARMonic harmonic waveform, see HARM:VOLT commands.

Remarks:

The value is stored in each preset.
The value is set according to "Start-up" preset after power on.
The value is set to default on *RST command.

Overlapped command.

Example:

```
VOLT:AC:SHAP SINE
VOLT:AC:SHAP? Response: SINE
```

[[:SOURce]:VOLTage[:DC]][:AMPLitude]

Syntax:

```
[[:SOURce]:VOLTage[:DC]][:AMPLitude] <DNPD>[<UNIT>]
[:SOURce]:VOLTage[:DC]][:AMPLitude]?
```

Description:

Sets the voltage amplitude for Voltage DC source function.

Parameters:

```
<DNPD> - voltage amplitude, range 0.0 ... ±1050.0 V (default 10.0 V).
<UNIT> - voltage unit {V}.
·V      volt used as unit.
```

Remarks:

The value is stored in each preset.
The value is set according to "Start-up" preset after power on.
The value is set to default on *RST command.
Overlapped command.

Example:

```
VOLT 10.0
VOLT? Response: 1.000000E+01 V
```

[[:SOURce]:VOLTage[:DC]:RANGe]

Syntax:

```
[[:SOURce]:VOLTage[:DC]:RANGe <DNPD>
[:SOURce]:VOLTage[:DC]:RANGe?
```

Description:

Sets the voltage range for Voltage DC source function manually.

Parameters:

```
<DNPD> - voltage range [V], range 0.0 ... 1050.0 (10 mV, 100 mV, 1 V, 10 V, 100 V,
1050 V ranges are available, default 10 V).
```

Remarks:

The closest upper range to the entered value will be selected.
Setting the range turns off the automatic range selection.
The value is stored in each preset.
The value is set according to "Start-up" preset after power on.
The value is set to default on *RST command.
Overlapped command.

Example:

```
VOLT:RANG 1000
VOLT:RANG? Response: 1.000000E+03
```

[[:SOURce]:VOLTage[:DC]:RANGe:AUTO]

Syntax:

```
[[:SOURce]:VOLTage[:DC]:RANGe:AUTO <BOOL>
[:SOURce]:VOLTage[:DC]:RANGe:AUTO?
```

Description:

Sets the automatic voltage range selection for Voltage DC source function.

Parameters:

```
<BOOL> - automatic range selection {ON|OFF|1|0} (default 1).
·ON     turns on automatic range selection.
·OFF    turns off automatic range selection.
·1      turns on automatic range selection.
```

·0 turns off automatic range selection.

Remarks:

The value is stored in each preset.
The value is set according to "Start-up" preset after power on.
The value is set to default on *RST command.
Overlapped command.

Example:

VOLT:RANG:AUTO ON
VOLT:RANG:AUTO? Response: 1

:STATus:OPERation:CONDition

Syntax:

:STATus:OPERation:CONDition?

Description:

Returns the content of Operational Condition register. It is a decimal value which corresponds to the binary-weighted sum of all bits in the register. The response to the query therefore represents an instantaneous 'Snapshot' of the register state, at the time that the query was accepted.

Parameters:

<DNPD> Operational Condition register.
Bit 12 contains ENERGY active status.

Remarks:

Register is not cleared after this query.
Overlapped command.

Example:

STAT:OPER:COND? Response: 4096

:STATus:OPERation:ENABLE

Syntax:

:STATus:OPERation:ENABLE <DNPD>
:STATus:OPERation:ENABLE?

Description:

Enables bits in the Operational Data Enable register. Selected bits are summarized at bit 7 (OSS) of the IEEE488.2 Status Byte register.

Parameters:

<DNPD> Operational Data Enable register.

Remarks:

Overlapped command.

Example:

STAT:OPER:ENAB 4096
STAT:OPER:ENAB? Response: 4096

:STATus:OPERation[:EVENT]?

Syntax:

:STATus:OPERation[:EVENT]?

Description:

Returns the content of Operational Data Event register. It is a decimal value which corresponds to the binary-weighted sum of all bits set in the register.

Parameters:

<DNPD> Operational Data Event register.

Remarks:

Register is cleared after this query.
Overlapped command

Example:

STAT:OPER? Response: 0

:STATus:OPERation:NTRansition

Syntax:

:STATus:OPERation:NTRansition <DNPD>
:STATus:OPERation:NTRansition?

Description:

Sets the Operation Negative Transition Register. It is a decimal value which corresponds to the binary-weighted sum of all bits set in the register. Setting a bit in the negative transition filter shall cause a 1 to 0 transition in the corresponding bit of the associated condition register to cause a 1 to be written in the associated bit of the corresponding event register.

Parameters:

<DNPD> Operation Negative Transition Register, range 0 ... 32767

Remarks:

Overlapped command

Example:

STAT:OPER:NTR 4096
STAT:OPER:NTR? Response: 4096

:STATus:OPERation:PTRansition

Syntax:

:STATus:OPERation:PTRansition <DNPD>
:STATus:OPERation:PTRansition?

Description:

Sets Operation Positive Transition Register. It is a decimal value which corresponds to the binary-weighted sum of all bits set in the register. Setting a bit in the positive transition filter shall cause a 0 to 1 transition in the corresponding bit of the associated condition register to cause a 1 to be written in the associated bit of the corresponding event register.

Parameters:

<DNPD> Operation Positive Transition Register, range 0 ... 32767

Remarks:

Overlapped command

Example:

STAT:OPER:PTR 0
STAT:OPER:PTR? Response: 0

:STATus:QUEStionable:CONDition

Syntax:

:STATus:QUEStionable:CONDition?

Description:

Returns the content of Questionable Condition register. It is a decimal value which corresponds to the binary-weighted sum of all bits in the register. The response to the query therefore represents an instantaneous 'Snapshot' of the register state, at the time that the query was accepted.

Parameters:

<DNPD> Questionable Condition register.
Bit 11 contains the lower limit for the LIMIT testing function exceeded.
Bit 12 contains the upper limit for the LIMIT testing function exceeded.

Remarks:

Register is not cleared after this query.
Overlapped command.

Example:

STAT:QUES:COND? Response: 2048

:STATus:QUEStionable:ENABle

Syntax:

:STATus:QUEStionable:ENABle <DNPD>
:STATus:QUEStionable:ENABle?

Description:

Enables bits in the Questionable Data Enable register. Selected bits are summarized at bit 3 (QSS) of the IEEE488.2 Status Byte register.

Parameters:

<DNPD> Questionable Data Enable register.

Remarks:

Overlapped command.

Example:

STAT:QUES:ENAB 6144
STAT:QUES:ENAB? Response: 6144

:STATus:QUEStionable[:EVENT]?

Syntax:

:STATus:QUEStionable[:EVENT]?

Description:

Returns the content of Questionable Data Event register. It is a decimal value which corresponds to the binary-weighted sum of all bits set in the register.

Parameters:

<DNPD> Questionable Data Event register.

Remarks:

Register is cleared after this query.
Overlapped command.

Example:

STAT:QUES? Response: 0

:STATus:QUEStionable:NTRansition

Syntax:

:STATus:QUEStionable:NTRansition <DNPD>
:STATus:QUEStionable:NTRansition?

Description:

Sets Questionable Negative Transition Register. It is a decimal value which corresponds to the binary-weighted sum of all bits set in the register. Setting a bit in the negative transition filter shall cause a 1 to 0 transition in the corresponding bit of the associated condition register to cause a 1 to be written in the associated bit of the corresponding event register.

Parameters:

<DNPD> Questionable Negative Transition Register, range 0 ... 32767

Remarks:

Overlapped command.

Example:

STAT:QUES:NTR 2048
STAT:QUES:NTR? Response: 2048

:STATus:QUEStionable:PTRansition

Syntax:

:STATus:QUEStionable:PTRansition <DNPD>
:STATus:QUEStionable:PTRansition?

Description:

Sets Questionable Positive Transition Register. It is a decimal value which corresponds to the binary-weighted sum of all bits set in the register. Setting a bit in the positive transition filter shall cause a 0 to 1 transition in the corresponding bit of

the associated condition register to cause a 1 to be written in the associated bit of the corresponding event register.

Parameters:

<DNPD> Questionable Positive Transition Register, range 0 ... 32767

Remarks:

Overlapped command.

Example:

STAT:QUES:PTR 2048
STAT:QUES:PTR? Response: 2048

:SYSTem:BEEPer:STATe

Syntax:

:SYSTem:BEEPer:STATe <BOOL>
:SYSTem:BEEPer:STATe?

Description:

Sets the device beeper state.

Parameters:

<BOOL> beeper state {ON|OFF|1|0} (default 1)
·ON device system beeper is enabled.
·OFF device system beeper is disabled.
·1 device system beeper is enabled.
·0 device system beeper is disabled.

Remarks:

Overlapped command.

Example:

SYST:BEEP:STAT ON
SYST:BEEP:STAT? Response: 1

:SYSTem:BEEPer:VOLume

Syntax:

:SYSTem:BEEPer:VOLume <DNPD>
:SYSTem:BEEPer:VOLume?

Description:

Sets the device beeper volume.

Parameters:

<DNPD> - beeper volume, range 0.0 ... 1.0 (default 0.03)

Remarks:

Overlapped command.

Example:

SYST:BEEP:VOL 0.01
SYST:BEEP:VOL? Response: 1.000000E-02

:SYSTem:COMMunicate:BUS

Syntax:

:SYSTem:COMMunicate:BUS <CPD>
:SYSTem:COMMunicate:BUS?

Description:

Selects the device remote interface.

Parameters:

<CPD> - remote interface {GPIB|USB|LAN} (default USB).
·GPIB GPIB interface.
·USB USB interface.
·LAN LAN interface.

Remarks:

Sequential command.

Example:

```
SYST:COMM:BUS SER
SYST:COMM:BUS? Response: SER
```

:SYSTem:COMMunicate:GPIB:ADDRess

Syntax:

```
:SYSTem:COMMunicate:GPIB:ADDRess <DNPD>
:SYSTem:COMMunicate:GPIB:ADDRess?
```

Description:

Sets the GPIB address.

Parameters:

<DNPD> - GPIB address, range 1 ... 31 (default 2).

Remarks:

Overlapped command.

Example:

```
SYST:COMM:GPIB:ADDR 2
SYST:COMM:GPIB:ADDR? Response: 2
```

:SYSTem:COMMunicate:LAN:ADDRess

Syntax:

```
:SYSTem:COMMunicate:LAN:ADDRess <CPD>
:SYSTem:COMMunicate:LAN:ADDRess?
```

Description:

Sets the IP address.

Parameters:

<CPD> - LAN address, Range 000.000.000.000 ... 255.255.255.255 (default 192.168.001.100).

Remarks:

DHCP must be set to off to take effect.

Interface must be restarted to take effect (see SYST:COMM:REST command).

Overlapped command.

Example:

```
SYST:COMM:LAN:ADDR 192.168.001.100
SYST:COMM:LAN:ADDR? Response: 192.168.001.100
```

:SYSTem:COMMunicate:LAN:DHCP

Syntax:

```
:SYSTem:COMMunicate:LAN:DHCP <BOOL>
:SYSTem:COMMunicate:LAN:DHCP?
```

Description:

Enables or disables the DHCP.

Parameters:

<BOOL> - DHCP {ON|OFF|1|0} (default 1)

·ON DHCP is enabled.

·OFF DHCP is disabled.

·1 DHCP is enabled.

·0 DHCP is disabled.

Remarks:

Overlapped command.

Example:

```
SYST:COMM:LAN:DHCP ON
SYST:COMM:LAN:DHCP? Response: 1
```

:SYSTem:COMMunicate:LAN:GATE

Syntax:

:SYSTem:COMMunicate:LAN:GATE <CPD>
:SYSTem:COMMunicate:LAN:GATE?

Description:

Sets the default gateway.

Parameters:

<CPD> - default gateway, range 000.000.000.000 ... 255.255.255.255 (default 255.255.255.255).

Remarks:

DHCP must be set to off to take effect.
Interface must be restarted to take effect (see SYST:COMM:REST command).
Overlapped command.

Example:

SYST:COMM:LAN:GATE 255.255.255.255
SYST:COMM:LAN:GATE? Response: 255.255.255.255

:SYSTem:COMMunicate:LAN:HOST

Syntax:

:SYSTem:COMMunicate:LAN:HOST <CPD>
:SYSTem:COMMunicate:LAN:HOST?

Description:

Sets the host name.

Parameters:

<CPD> - host name. Upper alpha, lower alpha, digits, underscores and spaces are allowable. Maximum string size is 14 characters.

Remarks:

DHCP must be set to on to take effect.
Interface must be restarted to take effect (see SYST:COMM:REST command).
Overlapped command.

Example:

SYST:COMM:LAN:HOST 9000_SN750051
SYST:COMM:LAN:HOST? Response: 9000_SN750051

:SYSTem:COMMunicate:LAN:MASK

Syntax:

:SYSTem:COMMunicate:LAN:MASK <CPD>
:SYSTem:COMMunicate:LAN:MASK?

Description:

Sets the subnet mask.

Parameters:

<CPD> - subnet mask, range 000.000.000.000 ... 255.255.255.255 (default 255.255.255.000).

Remarks:

DHCP must be set to off to take effect.
Interface must be restarted to take effect (see SYST:COMM:REST command).
Overlapped command.

Example:

SYST:COMM:LAN:MASK 255.255.255.000
SYST:COMM:LAN:MASK? Response: 255.255.255.000

:SYSTem:COMMunicate:LAN:PORT

Syntax:

:SYSTem:COMMunicate:LAN:PORT <DNPD>
:SYSTem:COMMunicate:LAN:PORT?

Description:

Sets the port number.

Parameters:

<DNPD> - port number, range 0 ... 9999 (default 23)

Remarks:

Interface must be restarted to take effect (see SYST:COMM:REST command).

Overlapped command.

Example:

SYST:COMM:LAN:PORT 23

SYST:COMM:LAN:PORT? Response: 23

:SYSTem:COMMunicate:REStart

Syntax:

:SYSTem:COMMunicate:REStart

Description:

Restarts communication interface. It will take several seconds. During this period device will not respond to any commands. Restart is needed for all LAN setting changes.

Parameters:

None

Remarks:

Overlapped command.

Example:

SYST:COMM:REST

:SYSTem:COMMunicate:USB:BAUD

Syntax:

:SYSTem:COMMunicate:USB:BAUD <CPD>

:SYSTem:COMMunicate:USB:BAUD?

Description:

Sets the baudrate for USB interface.

Parameters:

<CPD> - baudrate {1200|2400|4800|9600|19200|38400|57600|115200|256000}
(default 9600).

·1200	1200 Bd
·2400	2400 Bd
·4800	4800 Bd
·9600	9600 Bd
·19200	19200 Bd
·38400	38400 Bd
·57600	57600 Bd
·115200	115200 Bd
·256000	256000 Bd

Remarks:

Overlapped command.

Example:

SYST:COMM:USB:BAUD 1200

SYST:COMM:USB:BAUD? Response: 1200

:SYSTem:DATE

Syntax:

:SYSTem:DATE <DNPD>,<DNPD>,<DNPD>

:SYSTem:DATE?

Description:

Sets the device system date.

Parameters:

<DNPD> - year, range 2000 ... 2063

<DNPd> - month, range 1 ... 12

<DNPd> - day, range 1 ... 31

Remarks:

This command requires "Calibration" access.

Overlapped command.

Example:

SYST:DATE 2020,7,16

SYST:DATE? Response: 2020,7,16

:SYSTem:ERRor[:NEXT]?

Syntax:

:SYSTem:ERRor[:NEXT]?

Description:

Queries the error queue for the next item and removes it from the queue.

Parameters:

<DNPd> - error code

<SPD> - quoted error message

Remarks:

Error queue is cleared by reading all errors or by issuing *CLS command.

Overlapped command.

Example:

SYST:ERR? Response:

:SYSTem:LOCal

Syntax:

:SYSTem:LOCal

Description:

Places device in the LOCAL mode and unlocks all keys on front panel of the device.

The device will not respond to commands in LOCAL mode except for written exceptions.

Parameters:

None

Remarks:

This command is valid only for RS232, LAN and USB interfaces.

Overlapped command.

Example:

SYST:LOC

:SYSTem:PRESet

Syntax:

:SYSTem:PRESet

Description:

Set all device parameters to default. Effect is the same as *RST command do.

Parameters:

None

Remarks:

Overlapped command.

Example:

SYST:PRES

:SYSTem:REMote

Syntax:

:SYSTem:REMote

Description:

Places device in the REMOTE mode and locks all keys except LOCAL key. The device will not respond to any other command until is in REMOTE mode.

Parameters:

<action> REMOTE

Remarks:

The Command is valid only for RS232, LAN and USB interfaces.
Overlapped command.

Example:

SYST:REM

:SYSTem:REStart

Syntax:

:SYSTem:REStart

Description:

Restarts the device. The same initialization procedure is performed as after turning device on with the power ON / OFF button.

Parameters:

None

Remarks:

Overlapped command.

Example:

SYST:REST

:SYSTem:RWLock

Syntax:

:SYSTem:RWLock

Description:

Places device in the REMOTE mode and locks all keys including LOCAL key. The device will not respond to any other command until is in REMOTE mode.

Parameters:

None

Remarks:

The Command is valid only for RS232, LAN, USB interfaces.
Overlapped command.

Example:

SYST:RWL

:SYSTem:SETup:CLEar

Syntax:

:SYSTem:SETup:CLEar

Description:

Clears preset selected by SYST:SET:SEL command.

Parameters:

None

Remarks:

Overlapped command.

Example:

SYST:SET:CLE

:SYSTem:SETup:LOAD

Syntax:

:SYSTem:SETup:LOAD

Description:

Loads preset selected by SYST:SET:SEL command. All volatile device parameters will be set according to this preset.

Parameters:

None

Remarks:

Overlapped command.

Example:

SYST:SET:LOAD

:SYSTem:SETup:NAME

Syntax:

:SYSTem:SETup:NAME <SPD>

:SYSTem:SETup:NAME?

Description:

Sets preset name. The name is not saved until the entire preset is saved with the SYST:SET:SAVE command. Therefore, the preset name must be set first and then the preset must be saved.

Parameters:

<SPD> - preset name. Upper alpha, lower alpha, digits, underscores and spaces are allowable. Maximum string size is 18 characters.

Remarks:

Overlapped command.

Example:

SYST:SET:NAME "Test voltage"

SYST:SET:NAME? Response: "Test voltage"

:SYSTem:SETup:SAVE

Syntax:

:SYSTem:SETup:SAVE

Description:

Saves actual device parameter's set as preset.

Parameters:

None

Remarks:

Overlapped command.

Example:

SYST:SET:SAVE

:SYSTem:SETup:SElect

Syntax:

:SYSTem:SETup:SElect <DNPD>

:SYSTem:SETup:SElect?

Description:

Selects the system preset index. All other SYST:SET commands will use this preset number.

Parameters:

<DNPD> - preset index, range 0 ... 99 (default 0). Preset index corresponds to display preset number labelled "Location". Preset number 0 is "Start-up" preset.

Remarks:

The value is set to default after power on.

The value is set to default on *RST command.

Overlapped command.

Example:

SYST:SET:SEL 0

SYST:SET:SEL? Response: 0

:SYSTem:TIME

Syntax:

:SYSTem:TIME <DNPD>,<DNPD>,<DNPD>
:SYSTem:TIME?

Description:

Sets the device real time.

Parameters:

<DNPD> - hours, range 0 ... 23
<DNPD> - minutes, range 0 ... 59
<DNPD> - seconds, range 0 ... 59

Remarks:

This command requires "Calibration" access.
The value is set to default after power on.
The value is set to default on *RST command.
Overlapped command.

Example:

SYST:TIME 10,43,0
SYST:TIME? Response: 10,43,0

:SYSTem:VERSion?

Syntax:

:SYSTem:VERSion?

Description:

Returns version of implemented SCPI language.

Parameters:

<CPD> SCPI language version.

Remarks:

Overlapped command.

Example:

SYST:VERS? Response: 1999.0

:UNIT:CURRent

Syntax:

:UNIT:CURRent <CPD>
:UNIT:CURRent?

Description:

Sets Current AC amplitude unit. The unit is reflected on the display, and also affects the parameter settings via the remote control.

Parameters:

<CPD> - current unit {ARMS|APK|APP|AAVG} (default ARMS)
·ARMS Ampere RMS
·APK Ampere Peak
·APP Ampere Peak to Peak
·AAVG Ampere Average

Remarks:

The value is stored in each preset.
The value is set according to "Start-up" preset after power on.
The value is set to default on *RST command.
Overlapped command.

Example:

UNIT:CURR ARMS
UNIT:CURR? Response: ARMS

:UNIT:TEMPerature

Syntax:

:UNIT:TEMPerature <CPD>
:UNIT:TEMPerature?

Description:

Sets the temperature unit. The unit is reflected on the display, and also affects the parameter settings via the remote control.

Parameters:

<CPD> unit for temperature {CEL|FAR|K} (default CEL)
·CEL degrees Celsius
·FAR degrees Fahrenheit
·K Kelvin

Remarks:

The value is stored in each preset.
The value is set according to "Start-up" preset after power on.
The value is set to default on *RST command.
Overlapped command.

Example:

UNIT:TEMP CEL
UNIT:TEMP? Response: CEL

:UNIT:VOLTage

Syntax:

:UNIT:VOLTage <CPD>
:UNIT:VOLTage?

Description:

Sets the Voltage AC amplitude unit. The unit is reflected on the display, and also affects the parameter settings via the remote control.

Parameters:

<CPD> - voltage unit {VRMS|VPK|VPP|VAVG} (default VRMS)
·VRMS Volt RMS
·VPK Volt Peak
·VPP Volt Peak to Peak
·VAVG Volt Average

Remarks:

The value is stored in each preset.
The value is set according to "Start-up" preset after power on.
The value is set to default on *RST command.
Overlapped command.

Example:

UNIT:VOLT VRMS
UNIT:VOLT? Response: VRMS

IEEE 488.2 Mandatory Commands

***CLS**

Syntax:

*CLS

Description:

This command clears all status data structures in the device i.e. Event Status Register, Status Byte Register except the MAV bit, Operation Status Register, Questionable Status Register. Also, error queue is cleared. Output queue is unaffected.

Parameters:

None

Remarks:

Overlapped command.

Example:

*CLS

***ESE**

Syntax:

*ESE
*ESE?

Description:

This command programs the Event Status Enable register bits.

Parameters:

<DNPD> - Event Status Enable register, range 0 ... 255

Remarks:

Overlapped command.

Example:

*ESE 2
*ESE? Response: 2

***ESR?**

Syntax:

*ESR?

Description:

This query returns the contents of the Event Status Register and clears the register.

Parameters:

<DNPD> - Event Status Register

Remarks:

Overlapped command.

Example:

*ESR? Response: 0

***IDN?**

Syntax:

*IDN?

Description:

This command returns the identification of the manufacturer, model, serial number and firmware revision.

Parameters:

<CPD> - manufacturer

<CPD> - model

<DNPD> - serial number

<DNPD> - firmware version

Remarks:

Overlapped command.

Example:

*IDN? Response: MEATEST,9000,750151,1.000

***OPC**

Syntax:

*OPC

Description:

This command sets the OPC bit in the ESR (Event Status Register) when all pending operations are complete.

Parameters:

None

Remarks:

Overlapped command.

Example:

*OPC

***OPC?**

Syntax:

*OPC?

Description:

This command returns “1” to the output queue after all pending operations inside decade box are complete.

Parameters:

<DNPD> - always returns 1

Remarks:

Sequential command

Example:

*OPC? Response: 1

***OPT?**

Syntax:

*OPT?

Description:

This command returns the instrument's hardware fitment. The answer consists of individual numbers, where 0 means absence of option and 1 means that the option is installed in the device.

Parameters:

<DNPD> - Extended interface

<DNPD> - Resistance LVR and Capacitance option

Remarks:

Overlapped command.

Example:

*OPT? Response: 1,0

***RST**

Syntax:

*RST

Description:

This command resets the device to its initial factory-set state. This state may be different from the "Start-up" preset.

Parameters:

None

Remarks:

Sequential command.

Example:

*RST

***SRE**

Syntax:

*SRE

*SRE?

Description:

This command allows set condition of the Service Request Enable register. Since bit 6 is not used, the maximum value is 191.

Parameters:

<DNPD> - Service Request Enable register

Remarks:

Overlapped command.

Example:

*SRE 2

*SRE? Response: 2

***STB?**

Syntax:

*STB?

Description:

This query returns content of STB register, which carries the MSS bit status.

Parameters:

<DNPD> - Status byte register, range 0 ... 255

Remarks:

Overlapped command.

Example:

*STB? Response: 0

***TST?**

Syntax:

*TST?

Description:

This command launches internal self-test and returns result.

Parameters:

<DNPD> - test result, 0 –passed, 1 – failed

Remarks:

Sequential command.

Example:

*TST? Response: 0

***WAI**

Syntax:

*WAI

Description:

Prevents the instrument from executing any further commands or queries until all previous remote commands have been executed.

Parameters:

None

Remarks:

Sequential command.

Example:

*WAI