Hantek®

Internal resistance tester programming manual

（V 1.0）

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Introduction to SCPI command

SCPI (Standard Commands for ProgrammMable Instruments abbreviation), that is, the standard command set of program control instruments (programmable instruments). SCPI is a standardized instrument based on the existing standard IEEE 488.1 and IEEE 488.2, and follows the standardized instruments of the floating-point computing rules of the IEEE 754 standard, ISO 646 information exchange 7-bit encoding symbols (equivalent to ASCII programming). programming language. The SCPI command is a tree-like structure, including multiple subsystems. Each subsystem consists of a root keyword and one or several layers of keywords.

Command format

The command usually starts with the colon ":". The keywords are separated by the colon ":", followed by the optional parameter settings behind the keywords. Add a question mark "?" Behind the command line, indicating that this function is queried. The command keyword and the first parameter are separated by space, for example:

:ACQuire:TYPE <type>

:ACQuire:TYPE?

Acquire is the root keyword of the command, and Type is the second-level keyword. The command line starts with the colon ":", and at the same time use the colon "::" to separate the keywords at all levels. <Type> indicates the settable parameter. The question mark "?" Indicates the query. Command keywords: Acquire: Type and parameters <Type> are separated by spaces.

In some commands with parameters, the comma ",", "separate multiple parameters, for example:

[:TRACe[<n>]]:DATA:VALue volatile,<points>,<data>

Symbol Description

The following symbols are not sent with commands.

1. Braces {}

The content in the brackets is the parameter option. Parameters are usually separated by vertical lines "|". When using the command, one of the parameters must be selected.

2. Vertical line |

The vertical line is used to separate multiple parameter options, and one of the parameters must be selected when using the command.

3. Square bracket []

The content in square brackets is omitted.

4. Triangle bracket <>

The parameters in the triangular bracket must be replaced with an effective value.

Parameter Type

1. Bool

The parameter is ON, OFF, 1 or 0. For example:

:MEASure:ADISplay <bool> :MEASure:ADISplay?

Among them:

<bool>can be set to:{{1|ON}|{0|OFF}}. Query back 1 or 0

2. Discrete

The parameter takes the option listed. For example:

:ACQuire:TYPE <type> :ACQuire:TYPE? Among them: <type>can be set as: NORMal|AVERages|PEAK|HRESolution. Query Return to abbreviations: NORM, AVER, PEAK or HRES.

3. Integer

Unless there is another instructions, the parameters can be an arbitrary integer (NR1 format) within the effective value range. Note that at this time, please do not set the parameter as a decimal format, otherwise there will be abnormalities. For example:

:DISPlay:GBRightness <brightness> :DISPlay:GBRightness? Among them: <brightness>can be set to:0ur integer between 0 and 100. The query returns an integer between 0 and 100.

4. Real

The parameters can be arbitrarily numbered within the valid value range. The command accepts the parameter input of the decimal (NR2 format) and the scientific count (NR3 format) format.

For example:

:TRIGger:TIMeout:TIMe <NR3> :TRIGger:TIMeout:TIMe?

Among them: The parameter<NR3>can be set to a real number between 1.6e-08 (ie 16ns) and 1e+01 (ie 10s). The query returns a real number in the scientific counting format.

5. ASCII String

The combination of the parameter is the combination of ASCII characters, for example:

:SYSTem:OPTion:INSTall <license> Among them: <license>can be set to: PDUY9N9QTS9PQSWPLAETRD3UJHYA

Order abbreviation

All commands are not sensitive to the case, you can use uppercase or lowercase. However, if you want to abbreviate, you must lose all the capital letters in the command format.

For example:

:MEASure:ADISplay? Can be abbreviated as MEAS:ADIS?

Measuring command

:SAMPle:RATE

This command is used to set the sampling rate.

Command grammar

SAMPle:RATE <SLOW|HORO|FAST>

Exemplary example

SAMPle:RATE SLOW

Query command

SAMPle:RATE?

Return parameter

SLOW|HORO|FAST

:CALCulate:AVERage

This command is used to set the average number of times.

Command grammar

:CALCulate:AVERage <1|2|4|8>

Exemplary example

:CALCulate:AVERage 2

Query command

:CALCulate:AVERage?

Return parameter

1|2|4|8

:TRIGger:SOURce

This command is used to set the trigger mode.

Command grammar

:TRIGger:SOURce<INT|EXT|MAN>

Exemplary example

:TRIGger:SOURce MAN

Query command

:TRIGger:SOURce?

Return parameter

INT|EXT|MAN

:TRIGger:DELay

This command is used to set the trigger delay time(ms).

Command grammar

:TRIGger:DELay<1 - 9999>

Exemplary example

:TRIGger:DELay 10

Query command

:TRIGger:DELay?

Return parameter

10

:ABSolute

This command is used to set the absolute value function.

Command grammar

:ABSolute <ON|OFF>

Exemplary example

:ABSolute OFF

Query command

:ABSolute?

Return parameter

ON|OFF

:FETCh?

This command is used to read the latest measurement value.

Query command

:FETCh?

Return parameter

<Resistance measurement value>, <Voltage measurement value> (ΩV function)

<Resistance measurement value> (Ω function)

<Voltage measurement value> (V function)

Exemplary example

Example: Query :FETC?

Response 288.02E-3 , 1.3921E+0 (ΩV function)

The resistance measurement value is 288.02mΩ, and the voltage measurement

value is1.3921V.

:READ?

Make a trigger and read the measurement value.

Query command

:READ?

Return parameter

<Resistance measurement value>, <Voltage measurement value> (ΩV function)

<Resistance measurement value> (Ω function)

<Voltage measurement value> (V function)

Exemplary example

Example: Query :READ?

Response 288.02E-3 , 1.3921E+0 （ΩV function）

The resistance measurement value is 288.02mΩ, and the voltage measurement value is1.3921V.

Range command

:AUTorange

This command is used to set and query the automatic range.

Command grammar

:AUTorange<1/0/ON/OFF>

Query command

:AUTorange?

Return parameter

ON/OFF

Exemplary example

:AUT ON

:FUNCtion

This command is used to set the measurement type.

Command grammar

FUNCtion< RV|VOLTage|RESistance>

Exemplary example

FUNCtion RV

Query command

FUNCtion?

Return parameter

RV

:VOLTage:RANGe

This command is used to set the measurement voltage range.

Command grammar

VOLTage:RANGe <Range | AUTO>

Range(Low voltage):6| 60 | >60

Range(High voltage):15 | 150 | >150

Exemplary example

VOLTage:RANGe 6V

Query command

VOLTage:RANGe?

Return parameter

6E+0

:RESistance:RANGe

This command is used to set the measurement resistance schedule.

Command grammar

RESistance:RANGe <Range|AUTO>

Range:3E-3 | 3E-2 | 3E-1 | 3 | 3E1| 3E2 | >3E2

Exemplary example

RESistance:RANGe 3E-3

Query command

RESistance:RANGe?

Return parameter

3E-3

Statistical command

:CALCulate:STATistics:STATe

This command is used to set the statistical function to open and close.

Command grammar

:CALCulate:STATistics:STATe <ON|OFF|1|0>

Exemplary example

:CALCulate:STATistics:STATe OFF

Query command

:CALCulate:STATistics:STATe?

Return parameter

ON|OFF

:CALCulate:STATistics:CLEAr

This command is used to clear the statistical operation results

:CALCulate:STATistics:RESistance:NUMBer?

This command is used to query the data of the resistance.

Command grammar

Query :CALCulate:STATistics:RESistance:NUMBer?

Response <Total data number(NR1)>, <Effective data number(NR1)>

<Total data number (NR1)> = 0 - 1000

<Effective data number (NR1)> = 0-1000

Example

Query :CALC:STAT:RES:NUMB?

Response 22 , 20

:CALCulate:STATistics:VOLTage:NUMBer?

This command is used to query the voltage measurement data.

Command grammar

Query :CALCulate:STATistics:VOLTage:NUMBer?

Response <Total data number(NR1)>, <Effective data number(NR1)>

<Total data number(NR1)> = 0 - 1000

<Effective data number(NR1)>= 0 - 1000

Example

Query :CALC:STAT:VOLT:NUMB?

Response 22 , 20

:CALCulate:STATistics:RESistance:MEAN?

This command is used to query the average value of resistance measurement data.

Command grammar

Query :CALCulate:STATistics:RESistance:MEAN?

Response <Average(NR3)>

Example

Query :CALC:STAT:RES:MEAN?

Response 30.370E+0

:CALCulate:STATistics:VOLTage:MEAN?

This command is used to query the average value of the voltage measurement data.

Command grammar

Query :CALCulate:STATistics:VOLTage:MEAN?

Response <Average(NR3)>

Example

Query :CALC:STAT:VOLT:MEAN?

Response 0.000124E+0

:CALCulate:STATistics:RESistance:MAXimum?

This command is used to query the maximum value in the measurement of resistance measurement data.

Command grammar

Query :CALCulate:STATistics:RESistance:MAXimum?

Response <Maximum value (NR3)>, <Data number of the maximum value (NR1)

Example

Query :CALC:STAT:RES:MAX?

Response 3.5044E+0 , 142

:CALCulate:STATistics:VOLTage:MAXimum?

This command is used to query the maximum value in the voltage measurement data.

Command grammar

Query :CALCulate:STATistics:VOLTage:MAXimum?

Response <maximum value (NR3)>, <data number of the maximum value (NR1)

Example

Query :CALC:STAT:VOLT:MAX?

Response 30.384E+0 , 26

:CALCulate:STATistics:RESistance:MINimum?

This command is used to query the minimum value in the resistance measurement data.

Command grammar

Query :CALCulate:STATistics:RESistance:MINimum?

Response <Minimum value (NR3)> , <Minimum data number (NR1)

Example

Query :CALC:STAT:RES:MIN?

Response 3.5044E+0 , 142

:CALCulate:STATistics:VOLTage:MINimum?

This command is used to query the minimum value in the voltage measurement data.

Command grammar

Query :CALCulate:STATistics:VOLTage:MINimum?

Response <Minimum value (NR3)> , <Minimum data number (NR1)>

Example

Query :CALC:STAT:VOLT:MIN?

Response 30.384E+0 , 26

:CALCulate:STATistics:RESistance:LIMit?

This command is used to query the results of the resistance comparator under the statistical interface.

Command grammar

Query :CALCulate:STATistics:RESistance:LIMit?

Response <Hi number>,<In number>,<Lo number>,<test exception number>

Example

Query :CALC:STAT:RES:LIMit?

Response 6 , 160 , 0 , 2

:CALCulate:STATistics:VOLTage:LIMit?

This command is used to query the result of the voltage comparator under the statistical interface.

Command grammar

Query :CALCulate:STATistics:VOLTage:LIMit?

Response <Hi number>,<In number>,<Lo number>,< test exception number>

Example

Query :CALC:STAT:VOLT:LIMit?

Response 2 , 110 , 0 , 2

:CALCulate:STATistics:RESistance:DEViation?

This command is used to query the standard deviation under the statistical interface.

Command grammar

Query :CALCulate:STATistics:RESistance:DEViation??

Response $<\sigma_n(NR3)>,<\sigma_{n-1}(NR3)>$

Example

Query :CALC:STAT:RES:DEV?

Response 0.0195E-3 , 0.0196E-3

:CALCulate:STATistics:VOLTage:DEViation?

This command is used to query the standard deviation under the statistical interface.

Command grammar

Query :CALCulate:STATistics:VOLTage:DEViation?

Response $<\sigma_n(NR3)>,<\sigma_{n-1}(NR3)>$

Example

Query :CALC:STAT:VOLT:DEV?

Response 0.000000E+0 , 0.000000E+0

:CALCulate:STATistics:RESistance:CP?

This command is used to query the statistical resistance process capability index.

Command grammar

Query :CALCulate:STATistics:RESistance:CP?

Response <Cp(NR2)>,<CpK(NR2)>

Example

Query :CALC:STAT:RES:CP?

Response 99.99 , 99.99

:CALCulate:STATistics:VOLTage:CP?

This command is used to query the statistical voltage process capability index.

Command grammar

Query :CALCulate:STATistics:VOLTage:CP?

Response <Cp(NR2)>,<CpK(NR2)>

Example

Query :CALC:STAT:VOLT:CP?

Response 99.99 , 0.00

Comparison command

:CALCulate:LIMit:STATe

This command is used to set the comparator to open and close.

Command grammar

:CALCulate:LIMit:STATe<ON|OFF|1|0>

Exemplary example

:CALCulate:LIMit:STATe ON

Query command

:CALCulate:LIMit:STATe?

Return parameter

ON|OFF

:CALCulate:LIMit:BEEPer

This command is used to set the comparator decision buzzer

Command grammar

:CALCulate:LIMit:BEEPer <OFF|HL|IN|BT1|BT2>

Exemplary example

:CALCulate:LIMit:BEEPer OFF

Query command

:CALCulate:LIMit:BEEPer?

Return parameter

OFF|HL|IN|BT1|BT2

:CALCulate:LIMit:COMParator

This command is used to set the comparator comparison mode.

Command grammar

:CALCulate:LIMit:COMParator <AUTO| MANUAL>

Exemplary example

:CALCulate:LIMit:COMParator AUTO

Query command

:CALCulate:LIMit:COMParator?

Return parameter

AUTO| MANUAL

:CALCulate:LIMit:RESistance:MODE

This command is used to set the resistor mode.

Command grammar

:CALCulate:LIMit:RESistance:MODE <HL|REF>

Exemplary example

:CALCulate:LIMit:RESistance:MODE HL

Query command

:CALCulate:LIMit:RESistance:MODE?

Return parameter

HL|REF

:CALCulate:LIMit:VOLTage:MODE

This command is used to set the voltage comparator mode.

Command grammar

:CALCulate:LIMit:VOLTage:MODE <HL|REF>

Exemplary example

:CALCulate:LIMit:VOLTage:MODE HL

Query command

:CALCulate:LIMit:VOLTage:MODE?

Return parameter

HL|REF

:CALCulate:LIMit:RESistance:UPPer

This command is used to set the resistance of the resistor comparator.

Command grammar

:CALCulate:LIMit:RESistance:UPPer <0 - 99999>

Exemplary example

:CALCulate:LIMit:RESistance:UPPer 20200

(When the current instrument is 3Ω, the upper limit value is set to 2.0200Ω; if the resistance of the current instrument is 30Ω, the upper limit value is set to 20.200Ω)

Query command

:CALCulate:LIMit:RESistance:UPPer?

Return parameter

20200

:CALCulate:LIMit:RESistance:LOWer

This command is used to set the lower limit of the resistor comparator.

Command grammar

:CALCulate:LIMit:RESistance:LOWer <0 - 99999>

Exemplary example

:CALCulate:LIMit:RESistance:LOWer 10100

(When the resistance of the current instrument is 3Ω, the upper limit value is set to 1.0100Ω; if the resistance of the current instrument is 30Ω, the upper limit value is set to 10.100Ω)

Query command

:CALCulate:LIMit:RESistance:LOWer?

Return parameter

10100

:CALCulate:LIMit:RESistance:REFerence

This command is used to set the benchmark value of the resistor comparator.

Command grammar:

:CALCulate:LIMit:RESistance:REFerence <0 - 99999>

Exemplary example

:CALCulate:LIMit:RESistance:REFerence 10000

(When the current instrument is 3Ω, the upper limit value is set to 1.0000Ω; if the resistance of the current instrument is 30Ω, the upper limit value is set to 10.000Ω)

Query command

:CALCulate:LIMit:RESistance:REFerence?

Return parameter

10000

:CALCulate:LIMit:RESistance:PERCent

This command is used to set the setting of the resistance range.

Command grammar

:CALCulate:LIMit:RESistance:PERCent <0 - 99.99>

Exemplary example

:CALCulate:LIMit:RESistance:PERCent 0.5

Query command

:CALCulate:LIMit:RESistance:PERCent?

Return parameter

0.5

:CALCulate:LIMit:VOLTage:UPPer

This command is used to set the upper limit of the voltage comparator

Command grammar

:CALCulate:LIMit:VOLTage:UPPer <0 - 999999>

Exemplary example

:CALCulate:LIMit:VOLTage:UPPer 100000

(Low - voltage version: If the voltage range of the current instrument is 6V, the upper limit value is set to 1.00000V;

If the voltage range of the current instrument is 60V, the upper limit value is set to 10.0000V

High - voltage version: If the voltage range of the current instrument is 15V, the upper limit value is set to 10.0000V;

If the voltage range of the current instrument is 150V, the upper limit value is set to 100.000V)

Query command

:CALCulate:LIMit:VOLTage:UPPer?

Return parameter

100000

:CALCulate:LIMit:VOLTage:LOWer

This command is used to set the lower limit of the voltage comparator.

Command grammar

:CALCulate:LIMit:VOLTage:LOWer <0 - 999999>

Exemplary example

:CALCulate:LIMit:VOLTage:LOWer 100000

(Low - voltage version: If the voltage range of the current instrument is 6V, the lower limit value is set to 1.00000V;

If the voltage range of the current instrument is 60V, the lower limit value is set to 10.0000V

High - voltage version: If the voltage range of the current instrument is 15V, the lower limit value is set to 10.0000V;
If the voltage range of the current instrument is 150V, the lower limit value is set to 100.000V)

Query command

:CALCulate:LIMit:VOLTage:LOWer?

Return parameter

100000

:CALCulate:LIMit:VOLTage:REFerence

This command is used to set the benchmark value of the voltage comparator.

Command grammar:

:CALCulate:LIMit:VOLTage:REFerence <0 - 999999>

Exemplary example

:CALCulate:LIMit:VOLTage:REFerence 120000

(Low -voltage version: If the voltage range of the current instrument is 6V, the benchmark value is set to 1.20000V;
If the voltage range of the current instrument is 60V, the benchmark value is set to 12.0000V
High -voltage version: If the voltage range of the current instrument is 15V, the benchmark value is set to 12.0000V;
If the voltage range of the current instrument is 150V, the benchmark value is set to 120.000V)

Query command

:CALCulate:LIMit:VOLTage:REFerence?

Return parameter

120000

:CALCulate:LIMit:VOLTage:PERCent

This command is set to set the voltage range.

Command grammar

:CALCulate:LIMit:VOLTage:PERCent <0 - 99.99>

Exemplary example

:CALCulate:LIMit:VOLTage:PERCent 1.523

Query command

:CALCulate:LIMit:VOLTage:PERCent?

Return parameter

1.523

Auxiliary command

:SYSTem:BEEPer:STATe

This command is used to set the system key sound.

Command grammar

:SYSTem:BEEPer:STATe<ON|OFF|1|0>

Exemplary example

:SYSTem:BEEPer:STATe ON

Query command

:SYSTem:BEEPer:STATe?

Return parameter

ON|OFF

:SYSTem:KLOCk

This command is used to set the key lock.

Command grammar

:SYSTem:KLOCk <ON|OFF|1|0>

Exemplary example

:SYSTem:KLOCk OFF

Query command

:SYSTem:KLOCk?

Return parameter

ON|OFF

:SYSTem:DATE

This command is used to set the instrument date.

Command grammar

:SYSTem:DATE <Year-Moon-Day>

Exemplary example

:SYSTem:DATE "2024-2-22"

Query command

:SYSTem:DATE?

Return parameter

2024-02-22

:SYSTem:TIME

This command is used to set the instrument time.

Command grammar

:SYSTem:TIME <Time: Sub: second>

Exemplary example

:SYSTem:TIME "13:14:15"

Query command

:SYSTem:TIME?

Return parameter

13:14:15

:SYSTem:LOCal

This command is used to set the machine from the remote state (the upper right corner is Remote) to the local state (the Local can be pressed in the upper right corner

:ADJust?

This command is used to set the automatic zero-zero and return the zero-zero result.

Query command

:ADJust?

Return parameter

<0 ,1>

Note: 0 Represents success 1 represents failure

It takes a certain amount of time to adjust the zero process. After the input command is entered for about eight seconds, the zero-adjustment result is returned

:ADJust:CLEAr

This command is used to remove zero-adjusting data.