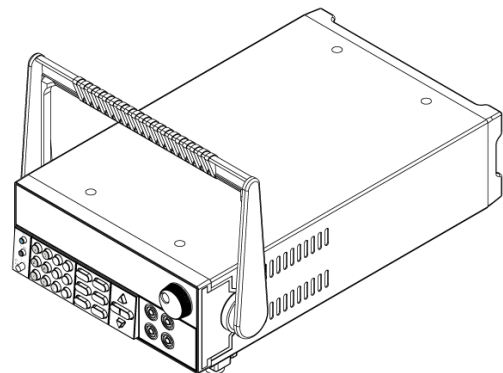


Internal Resistance Tester

IT5102 Programming Guide



Model: IT5102/IT5102E
Version: 1.0

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NOTE

A NOTE sign denotes important hint. It calls attention to tips or supplementary information that is essential for users to refer to.

Quality Certification and Assurance

We certify that IT5102 meets all the published specifications at time of shipment from the factory.

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ITECH warrants that the product will be free from defects in material and workmanship under normal use for a period of one (1) year from the date of delivery (except those described in the Limitation of Warranty below).

For warranty service or repair, the product must be returned to a service center designated by ITECH.















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Limitation of Warranty

This Warranty will be rendered invalid if the product is:

- Damaged resulting from customer-wired circuits or customer-supplied parts or accessories;
- Modified or repaired by customer without authorization;
- Damaged resulting from customer-wired circuits or use in an environment not designated by us;
- The product model or serial number is altered, deleted, removed or made illegible by customer;
- Damaged as a result of accidents, including but not limited to lightning, moisture, fire, improper use or negligence.

Safety Symbols

	Direct current		ON (power)
	Alternating current		OFF (power)
	Both direct and alternating current		Power-on state
	Chassis (earth ground) symbol.		Power-off state
	Earth (ground) terminal		Reference terminal
	Caution		Positive terminal
	Warning (refer to this manual for specific Warning or Caution information)		Negative terminal

	A chassis terminal	-	-
---	--------------------	---	---

Safety Precautions

The following safety precautions must be observed during all phases of operation of this instrument. Failure to comply with these precautions or specific warnings elsewhere in this manual will constitute a default under safety standards of design, manufacture and intended use of the instrument. ITECH assumes no liability for the customer's failure to comply with these precautions.

WARNING

- Do not use the instrument if it is damaged. Before operation, check the casing to see whether it cracks. Do not operate the instrument in the presence of inflammable gasses, vapors or dusts.
- The instrument is provided with a power line during delivery and should be connected to junction box. Before operation, be sure that the instrument is well grounded. Make sure to use the power cord supplied by ITECH.
- Check all marks on the instrument before connecting the instrument to power supply.
- Use electric wires of appropriate load. All loading wires should be capable of bearing maximum short-circuit of electronic load without overheating. If there are multiple loads, each pair of the load power cord must be carry out the full rated short-circuit output current of the power securely.
- Ensure the voltage fluctuation of mains supply is less than 10% of the working voltage range in order to reduce risks of fire and electric shock.
- Do not install alternative parts on the instrument or perform any unauthorized modification.
- Do not use the instrument if the detachable cover is removed or loosen.
- To prevent the possibility of accidental injuries, be sure to use the power adapter supplied by the manufacturer only.
- We do not accept responsibility for any direct or indirect financial damage or loss of profit that might occur when using the instrument.
- This instrument is used for industrial purposes. Do not apply this product to IT power supply system.
- Never use the instrument with a life-support system or any other equipment subject to safety requirements.

CAUTION

- Failure to use the instrument as directed by the manufacturer may render its protective features void.
- Always clean the casing with a dry cloth. Do not clean the internals.
- Make sure the vent hole is always unblocked.

Environmental Conditions

The instrument is designed for indoor use and an area with low condensation. The table below shows the general environmental requirements for the instrument.




Environmental Conditions	Requirements
Operating temperature	0°C to 40°C
Operating humidity	20%-80% (non-condensation)
Storage temperature	-10°C to 70 °C
Altitude	Operating up to 2,000 meters
Installation category	II
Pollution degree	Pollution degree 2



Note

To make accurate measurements, allow the instrument to warm up for 30 min.

Regulatory Markings

	<p>The CE mark indicates that the product complies with all the relevant European legal directives. The specific year (if any) affixed refers to the year when the design was approved.</p>
	<p>The instrument complies with the WEEE Directive (2002/96/EC) marking requirement. This affix product label indicates that you must not discard the electrical/electronic product in domestic household waste.</p>
	<p>This symbol indicates the time period during which no hazardous or toxic substances are expected to leak or deteriorate during normal use. The expected useful life of the product is 10 years. The product can be used safely during the 10-year Environment Friendly Use Period (EFUP). Upon expiration of the EFUP, the product must be immediately recycled.</p>

Waste Electrical and Electronic Equipment (WEEE) Directive



2002/96/EC Waste Electrical and Electronic Equipment (WEEE) Directive

This product complies with the WEEE Directive (2002/96/EC) marking requirement. This affix product label indicates that you must not discard the electrical/electronic product in domestic household waste.

Product Category

With reference to the equipment classifications described in the Annex 1 of the WEEE Directive, this instrument is classified as

a “Monitoring and Control Instrument”.
To return this unwanted instrument, contact your nearest
ITECH office.

Compliance Information

Complies with the essential requirements of the following applicable European Directives, and carries the CE marking accordingly:

- Electromagnetic Compatibility (EMC) Directive 2014/30/EU
- Low-Voltage Directive (Safety) 2014/35/EU

Conforms with the following product standards:

EMC Standard

IEC 61326-1:2012/ EN 61326-1:2013 ¹²³

Reference Standards

CISPR 11:2009+A1:2010/ EN 55011:2009+A1:2010 (Group 1, Class A)

IEC 61000-4-2:2008/ EN 61000-4-2:2009

IEC 61000-4-3:2006+A1:2007+A2:2010/ EN 61000-4-3:2006+A1:2008+A2:2010

IEC 61000-4-4:2004+A1:2010/ EN 61000-4-4:2004+A1:2010

IEC 61000-4-5:2005/ EN 61000-4-5:2006

IEC 61000-4-6:2008/ EN 61000-4-6:2009

IEC 61000-4-11:2004/ EN 61000-4-11:2004

1. The product is intended for use in non-residential/non-domestic environments. Use of the product in residential/domestic environments may cause electromagnetic interference.
2. Connection of the instrument to a test object may produce radiations beyond the specified limit.
3. Use high-performance shielded interface cable to ensure conformity with the EMC standards listed above.

Safety Standard

IEC 61010-1:2010/ EN 61010-1:2010

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Chapter1 SCPI Command Introduction

1.1 Overview

SCPI is short for Standard Commands for Programmable Instruments which defines a communication method of bus controller and instrument. It is based on ASCII and supply for testing and measuring instruments. SCPI command is based on hierarchical architecture which also known as tree system. In this system, Relevant Command is returned to a common node or root, so that a subsystem is formed.

A part of OUTPut subsystem is listed below:

OUTPut:

SYNC {OFF|0|ON|1}

SYNC:

MODE {NORMal|CARRier}

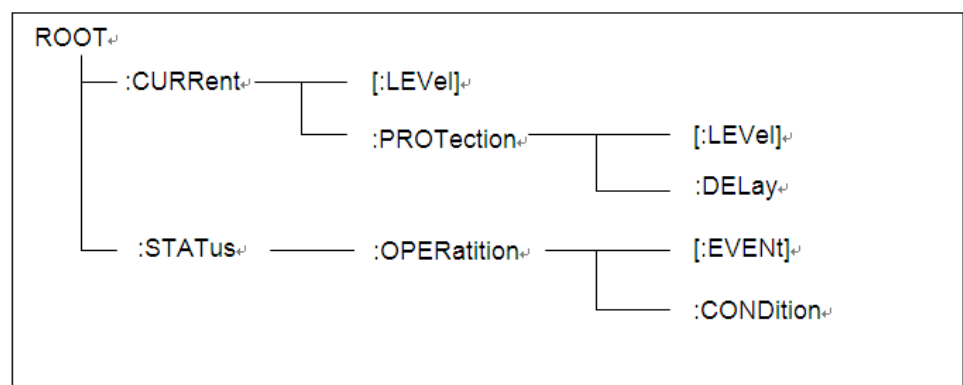
POLarity {NORMal|INVerted}

OUTPut is the root class keyword, SYNC is the second keyword, MODE and POLarity are the third keyword. Colon(:) is used for separating the command keyword and the next level keyword.

1.2 Command Type of SCPI

SCPI has two types of commands, common and subsystem.

- Common commands generally are not related to specific operation but to controlling overall instrument functions, such as reset, status, and synchronization. All common commands consist of a three-letter mnemonic preceded by an asterisk: *RST *IDN? *SRE 8.
- Subsystem commands perform specific instrument functions. They are organized into an inverted tree structure with the "root" at the top. The following figure shows a portion of a subsystem command tree, from which you access the commands located along the various paths.



Multiple commands in a message

Multiple SCPI commands can be combined and sent as a single message with one message terminator. There are two important considerations when sending several commands within a single

message:

- Use a semicolon to separate commands within a message.
- Head paths influence how the instrument interprets commands.

We consider the head path as a string which will be inserted in front of every command of a message. As for the first command of a message, the head path is a null string; for each subsequent command, the head path is a string which is defined to form the current command until and including the head of the last colon separator. A message with two combined commands: `CURR:LEV 3;PROT:STAT OFF`

The example indicates the effect of semicolon and explains the concept of head path. Since the head path is defined to be "CURR" after "curr: lev 3", the head of the second command, "curr", is deleted and the instrument explains the second command as: `CURR:PROT:STAT OFF`

If "curr" is explicitly included in the second command, it is semantically wrong. Since combining it with the head path will become "CURR:CURR:PROT:STAT OFF", resulting in wrong command.

Movement in the subsystem

In order to combine commands from different subsystems, you need to be able to reset the header path to a null string within a message. You do this by beginning the command with a colon (:), which discards any previous header path. For example, you could clear the output protection and check the status of the Operation Condition register in one message by using a root specifier as follows:

```
PROTection:CLEAr;:STATus:OPERation:CONDition?
```

The following message shows how to combine commands from different subsystems as well as within the same subsystem:

```
POWeR:LEVeL 200;PROTection 28; :CURReNt:LEVeL 3;PROTection:STATe ON
```

Note the use of the optional header `LEVeL` to maintain the correct path within the voltage and current subsystems, and the use of the root specifier to move between subsystems.

Including Common Commands

You can combine common commands with subsystem commands in the same message. Treat the common command as a message unit by separating it with a semicolon (the message unit separator). Common commands do not affect the header path; you may insert them anywhere in the message.

```
VOLTage:TRIGgered 17.5;:INITialize;*TRG
```

```
OUTPut OFF;*RCL 2;OUTPut ONIT872X-3X SCPI Communication protocol 17
```

Case sensitivity

Common commands and SCPI commands are not case sensitive. You can use upper or lower for example:

```
*RST = *rst
```

```
:DATA? = :data?  
:SYSTem:PRESet = :system:preset
```

Long-form and short-form versions

A SCPI command word can be sent in its long-form or short-form version. However, the short-form version is indicated by upper case characters. Examples:

```
:SYSTem:PRESet long-form  
:SYST:PRES short form  
:SYSTem:PRES long-form and short-form combination
```

Note that each command word must be in long-form or short-form, and not something in between.

For example, :SYSTe:PRESe is illegal and will generate an error. The command will not be executed.

Query

Observe the following precautions with queries:

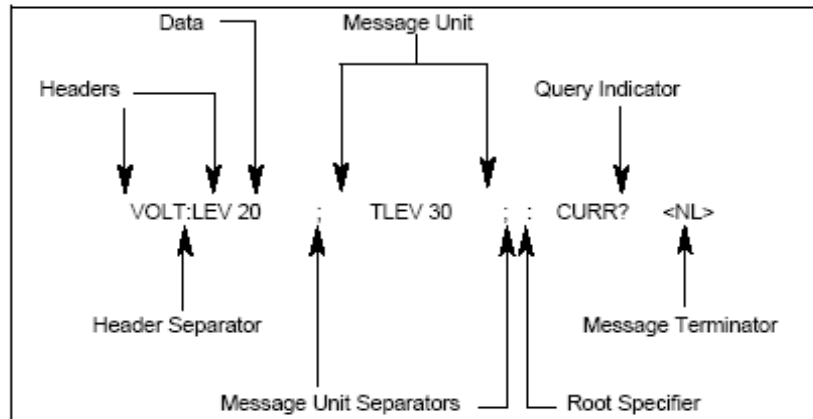
- Set up the proper number of variables for the returned data. For example, if you are reading back a measurement array, you must dimension the array according to the number of measurements that you have placed in the measurement buffer.
- Read back all the results of a query before sending another command to the instrument. Otherwise a Query Interrupted error will occur and the unreturned data will be lost.

1.3 Message Type of SCPI

There are two types of SCPI messages, program and response.

- program message: A program message consists of one or more properly formatted SCPI commands sent from the controller to the instrument. The message, which may be sent at any time, requests the instrument to perform some action.
- response message: A response message consists of data in a specific SCPI format sent from the instrument to the controller. The instrument sends the message only when commanded by a program message called a "query."

The next figure illustrates SCPI message structure:



The Message Unit

The simplest SCPI command is a single message unit consisting of a command header (or keyword) followed by a message terminator. The message unit may include a parameter after the header. The parameter can be numeric or a string.

ABORt<NL>

VOLTage 20<NL>

Headers

Headers, also referred to as keywords, are instructions recognized by the instrument. Headers may be either in the long form or the short form. In the long form, the header is completely spelled out, such as VOLTAGE, STATUS and DELAY. In the short form, the header has only the first three or four letters, such as VOLT, STAT and DEL.

Query Indicator

Following a header with a question mark turns it into a query (VOLTage?, VOLTage:PROTection?). If a query contains a parameter, place the query indicator at the end of the last header (VOLTage:PROTection?MAX).

Message Unit Separator

When two or more message units are combined into a compound message, separate the units with a semicolon (STATus:OPERation?;QUEStionable?).

Root Specifier

When it precedes the first header of a message unit, the colon becomes the root specifier.

Message Terminator

A terminator informs SCPI that it has reached the end of a message. Three permitted message terminators are:

- newline (<NL>), decimal 10 or hexadecimal 0X0A in ASCII.
- end or identify (<END>)
- both of the above (<NL><END>).

In the examples of this guide, there is an assumed message terminator at the

end of each message.

Command execution rules

- Commands execute in the order that they are presented in the program message.
- An invalid command generates an error and, of course, is not executed.
- Valid commands that precede an invalid command in a multiple command program message are executed.
- Valid commands that follow an invalid command in a multiple command program message are ignored.

1.4 Response Data Type

Character strings returned by query statements may take either of the following forms, depending on the length of the returned string:

- **<CRD>**: Character Response Data. Permits the return of character strings.
- **<AARD>**: Arbitrary ASCII Response Data. Permits the return of unlimited 7-bit ASCII. This data type has an implied message terminator.
- **<SRD>**: String Response Data. Returns string parameters enclosed in double quotes.
- **<Block>**: arbitrary block data.

Response messages

A response message is the message sent by the instrument to the computer in response to a query command.

Sending a response message

After sending a query command, the response message is placed in the Output Queue. When the instrument is then addressed to talk, the response message is sent from the Output Queue to the computer.

Multiple response messages

If you send more than one query command in the same program message, the multiple response messages for all the queries is sent to the computer when the instrument is addressed to talk. The responses are sent in the order that the query commands were sent and are separated by semicolons (;). Items within the same query are separated by commas (,). The following example shows the response message for a program message that contains four single item query commands:

```
0; 1; 1; 0
```

Response message terminator (RMT)

Each response is terminated with an LF (line feed) and EOI (end or identify). The following example shows how a multiple response message is terminated:

```
0; 1; 1; 0; <RMT>
```

Message exchange protocol

Two rules summarize the message exchange protocol:

Rule 1. You must always tell the IT6500 Series what to send to the computer.

The following two steps must always be performed to send information from the instrument other computer:

1. Send the appropriate query command(s) in a program message.
2. Address the IT6500 Series to talk.

Rule 2. The complete response message must be received by the computer before another program message can be sent to the IT6500 Series.

1.5 Command Format

Formats for command display are as follows:

```
[SOURce[1|2]:]VOLTage:UNIT {VPP|VRMS|DBM}
```

```
[SOURce[1|2]:]FREQuency:CENTer  
{<frequency>|MINimum|MAXimum|DEFault}
```

Based on the command syntax, most commands (and certain Parameter) are expressed in both upper and lower cases. Upper case refers to abbreviation of commands. Shorter program line may send commands in abbreviated format. Long-format commands may be sent to ensure better program readability.

For example, both formats of VOLT and VOLTAGE are acceptable in the above syntax statements. Upper or lower case may be used. Therefore, formats of VOLTAGE, volt and Volt are all acceptable. Other formats (such as VOL and VOLTAG) are invalid and will cause errors.

- Parameter options with given command strings are included in the brace ({ }). The brace is not sent along with command strings.
- Vertical stripes (|) separate several parameter options with given command strings. For example, {VPP|VRMS|DBM} indicates that you may assign "APP", "VRMS" or "DBM" in the above commands. Vertical stripes are not sent along with command strings.
- Angle brackets (< >) in the second example indicates that a value must be assigned to the parameter in the brace. For example, the parameter in the angle bracket is <frequency> in the above syntax statements. Angle brackets are not sent along with command strings. You must assign a value (such as "FREQ:CENT 1000") to the parameter, unless you select other options displayed in the syntax (such as "FREQ:CENT MIN").
- Some syntax elements (such as nodes and Parameter) are included in square brackets ([]). It indicates that these elements can be selected and omitted. Angle brackets are not sent along with command strings. If no value is assigned to the optional Parameter, the instrument will select a default value. In the above examples, "SOURce[1|2]" indicates that you may refer to source channel 1 by "SOURce" or "SOURce1" or "SOUR1" or "SOUR". In addition, since the whole SOURce node is optional (in the square bracket), you can refer to the channel 1 by omitting the whole SOURce node. It is because the channel 1 is the default channel for SOURce language node. On the other hand, if you want to refer to channel 2, "SOURce2" or "SOUR2" must be used in the program line.

Colon (:)

It is used to separate key words of a command with the key words in next level. As shown below:

```
APPL:SIN 455E3,1.15,0.0
```

In this example, APPLy command assigns a sine wave with frequency of 455

KHz, amplitude of 1.15 V and DC offset of 0.0 V.

Semicolon (;)

It is used to separate several commands in the same subsystem and can also minimize typing. For example, to send the following command string:

```
TRIG:SOUR EXT; COUNT 10
```

has the same effect as sending the following two commands:

```
TRIG:SOUR EXT  
TRIG:COUNT 10
```

Question mark (?)

You can insert question marks into a command to query current values of most Parameter. For example, the following commands will trigger to set the count as 10:

```
TRIG:COUN 10
```

Then, you may query count value by sending the following command:

```
TRIG:COUN?
```

You may also query the allowable minimum or maximum count as follows:

```
TRIG:COUN?MIN  
TRIG:COUN?MAX
```

Comma (,)

If a command requires several Parameter, then a comma must be used to separate adjacent Parameter.

Space

You must use blank characters, [TAB] or [Space] to separate Parameter with key words of commands.

Generic commands (*)

The IEEE-488.2 standard defines a set of common commands that perform functions such as reset, self-test, and status operations. Generic commands always start with an asterisk (*) and occupy 3 character sizes, including one or more Parameter. Key words of a command and the first parameter are separated by a space. Semicolon (;) can separate several commands as follows:

```
*RST; *CLS; *ESE 32; *OPC?
```

Command terminator

Command strings sent to the instrument must end with a <Newline> (<NL>) character. IEEE-488 EOI (End or Identify) information can be used as <NL> character to replace termination command string of <NL> character. It is acceptable to place one <NL> after a <Enter>. Termination of command string always resets current SCPI command path to root level.

 **NOTE**

As for every SCPI message with one query sent to the instrument, the instrument will use a <NL> or newline sign (EOI) to terminate response of return. For example, if "DISP:TEXT?" is sent, <NL> will be placed after the returned data string to terminate response. If an SCPI message includes several queries separated by semicolon (such as "DISP?;DISP:TEXT?"), <NL> will terminate response returned after response to the last query. In all cases, the program must read <NL> in response before another command is sent to the instrument, otherwise errors will be caused.

1.6 Data Type

SCPI language defines several data types used for program message and response messages.

- Numerical parameter

Commands requiring numerical parameter support the notations of all common decimal notations, including optional signs, decimal points, scientific notation, etc. Special values of numerical parameter are also acceptable, such as MIN, MAX and DEF. In addition, suffixes for engineering units can also be sent together with numerical Parameter (including M, k, m or u). If the command accepts only some specific values, the instrument will automatically round the input parameter to acceptable values. The following commands require numerical Parameter of frequency value:

[SOURce[1|2]:]FREQUency:CENTer {<Frequency>|MINimum|MAXimum}

- ◆ <NR1>: represents an integer value, such as 273;
- ◆ <NR2>: represents a real number in floating-point format, such as 0.273;
- ◆ <NR3>: represents a real number in scientific notation, such as 2.73E+2;
- ◆ <Nrf>: The extensible form includes <NR1>, <NR2> and <NR3>;
- ◆ <Nrf+>: The extensible decimal form includes <Nrf> and MIN MAX DEF, MIN and MAX represent the minimum and maximum finite number. DEF is the default of the parameter.

- Discrete parameter

Discrete Parameter are used for settings with limited number of programming values (such as IMMEDIATE, EXTERNAL or BUS). They can use short and long format like key words of commands. They may be expressed in both upper and lower case. The query response always returns uppercase Parameter in short format. The following commands require discrete Parameter in voltage unit:

[SOURce[1|2]:]VOLTage:UNIT {VPP|VRMS|DBM}

- Boolean parameter

Boolean Parameter refer to true or false binary conditions. In case of false conditions, the instrument will accept "OFF" or "0". In case of true conditions, the instrument will accept "ON" or "1". In query of Boolean settings, the instrument will always return "0" or "1". Boolean Parameter are required by the following commands:

DISPlay {OFF|0|ON|1}

- ASCII string Parameter

String Parameter may actually include all ASCII character sets. Character strings must start and end with paired quotation marks; and single quotation marks or double quotation marks are both allowed. Quotation mark separators may also act as one part of a string, they can be typed twice without any character added between them. String parameter is used in the following command:

```
DISPlay:TEXT <quoted string>
```

For example, the following commands display message of "WAITING..." (without quotation marks) on the front panel of the instrument.

```
DISP:TEXT "WAITING..."
```

Single quotation marks may also be used to display the same message.

```
DISP:TEXT 'WAITING...'
```

- ◆ <CPD>: character program data;
- ◆ <SPD>: string program data. String parameters enclosed in single or double quotes.

1.7 Communication Interface

IT5102 have two standard communication interfaces: RS232, USB, GPIB, LAN and CAN. The customer can choose any one according to his demands.

Please refer to user manual for detailed introductions of the remote interface connections.

Chapter2 System Command

SYSTem:VERSion?

This command is used to query the current SCPI version. The returned parameter is a string like "YYYY.V ", in which the YYYY is the year of that version, V is the software version of that year.

Command syntax

SYSTem:VERSion?

Parameters

None

Example

SYST:VERS?

Return Parameters

<NR2>,

For example: 1.00,1991.1

SYSTem:ERRor?

This command return the next error number, followed by a remote programming error message string. There is an ERROR lighted in the front panel when a fault or several faults are occurred. The maximum 20 items message can be saved in instrument. once the command is sent, one piece of error message is read.

1. Sequence is a FIFO buffer FIFO (first-in, first-out), when the error occurs, the error is stored in the cache. When it is read out, it is deleted from the sequence.
2. After reading all the errors, the query Returned "0, No Error". If the error accumulates too much that is more than the cache can bear, the last error of the sequence will be "-350, Too Many Errors".
3. If power off the instrument or send *CLS(clear status) command, the error informations will be cleared.

Command syntax

SYSTem:ERRor?

Parameters

None

Example

SYST:ERR?

Returned Parameters

Error code, error information
140, "Wrong type of parameter"

Related command

*CLS

SYSTem:CLEar

This command is used to clear the error information.

Command syntax

SYSTem:CLEar

Parameters

None

Example

SYST:CLE

Returned Parameters

None

Related command

*CLS

SYSTem:LOCal

This command is used to switch the instrument to local control mode(control from panel). In this mode ,all of keys on front panel is valid.

Command syntax

SYSTem:LOCal

Arguments

None

Query syntax

None

Example

SYST:LOC

SYSTem:REMOte

This command is used to switch to the remote control mode(PC control).
In this mode, the keys on front panel is invalid except Local.

Command syntax

SYSTem:REMOte

Arguments

None

Query syntax

None

Example

SYST:REM

SYSTem:RWLock

This command is transmit through RS232 interface, the same function as **SYSTem:REMOte**, but the difference is: this command can lock “ LOCAL “ button as well. When this command is executed, the “ Local “ button can't switch to local control mode.

Command syntax

SYSTem:RWLock

Arguments

None

Example:

SYST:RWL

Chapter3 Configuration Commands

[CHANnel:]VOLTage:GROUp[:ENABLE] <NR1>,<NR2>

This command sets the voltage measurement function to enable or disable for all channels in the corresponding group. The parameter NR1 is the group number, one instrument is a group, and when multiple instruments cascade, the slave instrument address is a group number.

NR2 is a decimal number. The 16 bits corresponding to the conversion of NR2 into binary represent the enabling/disabling of the voltage measurement function of the corresponding channel; 1 represents the disabling, and 0 represents the enabling.

Command syntax

VOLTage:GROUp[:ENABLE] <NR1>,<NR2>

Parameter

NR1: Group 0~16

NR2: enable or disable, 0~255 (IT5102E) , 0~65535(IT5102)

Example

VOLT:GROU 1,7

Set voltage measurement function of channel 1, channel 2 and channel 3 in group 1 to enable.

Query Syntax

VOLT:GROU?

Return Parameters

<NR1>,<NR2>

Relevant Command

VOLT:GROU?

[CHANnel:]RESistance:GROUp[:ENABLE] <NR1>,<NR2>

This command sets the internal resistance measurement function to enable or disable for all channels in the corresponding group. The set method is the same as [CHANnel:]VOLTage:GROUp[:ENABLE] <NR1>,<NR2>.

Command syntax

RESistance: [:ENABLE] <NR1>,<NR2>

Parameter

NR1: Group number 0~16

NR2: Disable or enable, 0~255 (IT5102E), 0~65535(IT5102)

Example

RES:GROU 1,7

Query Syntax

RES:GROU?

Return Parameters

<NR1>,<NR2>

Relevant Command

RES:GROU?

CHANnel:SET <NRf>

This command selects channel, setting the parameter after select the channel number.

Command syntax

CHANnel:SET <NRf>

Parameters

1~136 (IT5102E), 1~272 (IT5102)

Example

CHAN:SET 1

Query Syntax

CHANnel:SET?

Return Parameters

None

Relevant Command

CHAN:SET?

CHANnel:VOLTage[:ENABLE] <bool>

This command sets the voltage measurement function to enable or disable for corresponding channel.

Command syntax

CHANnel:VOLTage[:STATe] <bool>

Parameters

0|1|ON|OFF

Default Value

ON

Example

CHAN:VOLT 0

Query Syntax

CHANnel:VOLTage[:STATe]?

Return Parameters

0 | 1

Relevant Command

CHAN:VOLT?

CHANnel:RESistance[:ENABLE] <bool>

This command sets the internal resistance measurement function to enable or disable for corresponding channel. 0: disable, 1: enable.

Command syntax

CHANnel:RESistance[:STATe] <bool>

Parameters

0|1|ON|OFF

Default Value

ON

Example

CHAN:RES 0

Query Syntax

CHANnel:RESistance[:STATe]?

Return Parameters

Channel number: which consist of group number and channel number. Take the 1208 for an example, 12 is the slave number, and 8 is the channel number. If channels are belonged to master instrument, will be displayed as 8, the master number is 0 and can be omit.

5102: 1-16, 101-116 ---, 1601-1616

5102E: 1-8, 101-108 ---, 1601-1608

Relevant Command

CHAN:RES?

[CHANnel:]MEASure:VOLTage?

This command is used to query the voltage measurement value of present channel.

Command syntax

MEASure:VOLTage?

Parameters

None

Example

MEAS:VOLT?

Return Parameters

Voltage Value

Relevant Command

CHAN:SET

[CHANnel:]MEASure: RESistance?

This command is used to query the internal resistance measurement value of present channel.

Command syntax

MEASure: RESistance?

Parameters

None

Example

MEAS:RES?

Return Parameters

Channel number, resistance value.

Relevant Command

CHAN:SET

[CHANnel:]QUESTionable:ALL?

This command is used to query the voltage and resistance value of all channels.

Command syntax

CHANnel: QUESTionable:ALL?

Parameters

None

Example

CHAN:QUES:ALL?

Return Parameters

Channel number, voltage value, resistance value.

For example: 0001,0.0325,12.742,0011,0.0355,2000.0

Relevant Command

None

[CHANnel:]QUESTionable:NUMber?

This command is used to query the counts of channels.

Command syntax

CHANnel:QUEStionable:NUMber?

Parameters

None

Example

CHAN:QUES:NUM?

Return Parameters

NRf

Relevant Command

None

[CHANnel:]MANUal[:STATe]

This command sets range of measurement, include manual or auto.

0 indicates auto range. 1 indicates manual setting range.

Command syntax

[CHANnel:]MANUal[:STATe] <bool>+

Parameters

0|1|ON|OFF

Default Value

ON

Example

MANUal 0

Query Syntax

MANUal [:STATe]?

Return Parameters

0|1

Relevant Command

MANUal?

[CHANnel:]VOLTage:RANGe[:STATe]

This command selects voltage range to high range or low range. 1 indicates low range, and 0 indicates high range.

Command syntax

[CHANnel:]VOLTage:RANGe[:STATe] <bool>

Parameters

0|1|ON|OFF

Default Value

ON

Example

VOLT:RANG 0

Query Syntax

VOLTage:RANGe[:STATe]?

Return Parameters

0|1

Relevant Command

VOLT:RANG?

[CHANnel:]RESistance:RANGe[:STATe]

This command selects resistance range to high range or low range. 1 indicates low range, and 0 indicates high range.

Command syntax

[CHANnel:]RESistance:RANGe[:STATe] <bool>

Parameters

0|1|ON|OFF

Default Value

ON

Example

RES:RANG 0

Query Syntax

RESistance:RANGe[:STATe]?

Return Parameters

0|1

Relevant Command

RES:RANG?

[CHANnel:]FREQuency[:STATe]

This command selects the excitation frequency for measurement. 0 indicates 500HZ, and 1 indicates 1000HZ.

Command syntax

[CHANnel:]FREQuency[:STATe] <bool>

Parameters

0 | 1 or ON| OFF

Default Value

ON

Example

FREQuency 0

Query Syntax

FREQuency [:STATe]?

Return Parameters

0 | 1

Relevant Command

FREQuency?

[CHANnel:]PANEI[:STATe]

This command switches the measurement mode to front panel or rear panel. 1 indicates rear panel. 0 indicates front panel.

Command syntax

[CHANnel:]PANEI[:STATe] <bool>

Parameters

0 | 1 or ON| OFF

Default Value

1

Example

PANE 0

Query Syntax

PANEI[:STATE]?

Return Parameters

0 | 1

Relevant Command

PANE?

[CHANnel:]FILTer[:STATE]

This command enables the filter function or disables the filter function.

Command syntax

[CHANnel:]FILTer[:STATE] <bool>

Parameters

0|1|ON|OFF

Default Value

ON

Example

FILT 0

Query Syntax

FILTer[:STATE]?

Return Parameters

0|1

Relevant Command

FILTer?

Chapter4 IEEE-488 Commands

This chapter introduced often-used IEEE-488 commands.

***CLS**

This command clears the following registers:

- Standard event register
- Query event register
- Status byte register

Command syntax

*CLS

Parameters

None

***ESE**

This command can set the parameter of standard event enable register. Setting parameter can determine which bit of standard event register is 1 and the byte will enable ESB of status byte register is 1.

Command syntax

*ESE <NR1>

Parameters

0~255

Example

*ESE 128

Query Syntax

*ESE?

Return Parameters

<NR1>

Relevant Command

*ESR? *PSC *STB?

***ESR?**

This command can read the value of standard event status register. After executing this command, standard event status register is reset. Bit definition of standard event status register is as the same as the standard event status enable register.

Query Syntax

*ESR?

Parameters

None

Return Parameters

<NR1>

Relevant Command

*CLS *ESE *ESE? *OPC

***IDN?**

This command can read information about power supply. The returns parameter contains 4 segments divided by comma.

Query Syntax

*IDN?

Parameters

None

Return Parameters

<AARD>

Example

ITECH,IT5102,KN34243232,01.00

***RST**

This command reset the power supply to default settings.

Command syntax

*RST

Parameters

None

***SRE <n>**

This command can set the parameter of state byte enable register. Setting parameter can determine which byte value of state byte register is 1 and the byte will set RQS of state byte register to 1. Bit definition of state byte enable register is as the same as the state byte register.

Command syntax

*SRE <NRf>

Parameters

0~255

Example

*SRE 128

Query Syntax

*SRE?

Return Parameters

<NR1>

Relevant Command

*ESE *ESR? *PSC *STB?

***STB?**

This command can read the data from status byte register. After execute this command, the value of bit6 in status byte register will be clean.

Query Syntax

*STB?

Parameters

None

Return Parameters

<NR1>

Relevant Command

*CLS *ESE *ESR

***WAI**

This command instructs the internal resistance tester not to process any further commands until all pending operations are completed. Pending operations are as defined under the *OPC command. *WAI can be aborted only by sending the power meter a device clear command.

Command syntax

*WAI

Parameters

None

Relevant Command

*OPC

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