SM7110
SM7120

HIOKI

Communications Command
Instruction Manual

SUPER MEGOHM METER

Check for the latest edition and other language versions.

✓ This manual explains the communication commands for Model SM7110, SM7120 Super Megohm Meter.
✓ Please refer to the instruction manual for Model SM7110, SM7120 for details regarding command settings.
✓ Although all reasonable care has been taken in the production of this manual, should you find any points which are unclear or in error, please contact your Hioki distributor or reseller.
✓ In the interest of product development, the contents of this manual may be subject to revision without notice.
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Contents

1 Introduction

If the [COMMAND MONITOR] function is used at the time of program creation, commands and responses will be conveniently displayed on the measurement screen. For information on the [COMMAND MONITOR] function, see the instruction manual of the instruments.

Various messages are supported for controlling the instrument through the interfaces.
Messages can be either program messages, sent from the controller such as PC to the instrument, or response messages, sent from the instrument to the controller.

Program Messages

| Controller | → | Instrument |

Response Messages

Message types are further categorized as follows.

```
                                  ┌─ Command Messages
              ┌─ Program Messages ─┤
              │                   └─ Query Messages
Messages ─────┤
              │
              └─ Response Message
```

When issuing commands that contain data, make sure that the data is provided in the specified format.

Message Format

■ Program Messages

Program messages can be either Command Messages or Query Messages.

(1) Command Messages

Instructions to control the instrument, such as to change settings or reset
Example: (instruction to set the measurement average)

:AVERage:COUNt☐5

Header section   Space   Data section

(2) Query Messages

Requests for responses relating to results of operation or measurement, or the state of instrument settings
Example: (request for the current measurement average)

:AVERage:COUNt?

Header section   Question mark

■ **Response Messages**

When a query message is received, its syntax is checked and a response message is generated. **:SYSTem:HEADer** command determines whether headers are prefixed to response messages.

Header ON   **:RANGE 200pA**

Header OFF   **200pA**

                                  (The current measurement range is 200pA)

At power-on, Header OFF is selected.

If an error occurs when a query message is received, no response message is generated for that query.

Some query message has no header, such as **:MEASure?**.

■ **Command Syntax**

Command names are chosen to mnemonically represent their function, and can be abbreviated. The full command name is called the "long form", and the abbreviated name is called the "short form". The command references in this manual indicate the short form in upper-case letters, extended to the long form in lower case letters, although the commands are not case-sensitive in actual usage.

:CALibration?	OK (long form)
:CALIBRATION?	OK (long form)
:CAL?	OK (short form)
:CALIB?	Error
:CA?	Error

Response messages generated by the instrument are in long form and in upper case letters.

■ **Headers**

Headers must always be prefixed to program messages.

(1) Command Program Headers

There are three types of commands: Simple, Compound and Standard.

- **Headers for Simple Commands**

    This header type is a sequence of letters and digits

    :RANGe
- **Headers for Compound Commands**

    These headers consist of multiple simple command type headers separated by colons ":"

    :RANGe:AUTO
- **Headers for Standard Commands**

    This header type begins with an asterisk "*", indicating that it is a standard command defined by IEEE 488.2.

    *RST

(2) Query Program Header

These commands are used to interrogate the instrument about the results of operations, measured values and the current states of instrument settings.

As shown by the following examples, a query is formed by appending a question mark "**?**" after a program header.

:RANGe?

:RANGe:AUTO?

:MEASure?

:MEASure:MONItor?

■ **Message Terminators**

This instrument recognizes the following message terminators (delimiters):

USB、RS-232C	GPIB
・CR ・LF ・CR + LF	・LF ・CR + LF ・EOI ・LF + EOI

Also the terminator for response messages is as follows:

USB、RS-232C	GPIB
・CR + LF	・LF + EOI　(Default) ・CR + LF + EOI

■ **Separators**

(1) Message Unit Separator

Multiple messages can be written in one line by separating them with semicolons ";"

:RANGe 200pA;*IDN?

- When messages are combined in this way and if one command contains an error, all subsequent messages up to the next terminator will be ignored.

(2) Header Separator

In a message consisting of both a header and data, the header is separated from the data by a space " " (ASCII code 20H).

:AVERage:COUNt 5

Header section　Space　　Data Section

(3) Data Separator

In a message containing multiple data items, commas "," are required to separate the data items from one another.

:COMParator:BEEPer HI,TYPE1,1

Header section　　Data section　Comma　Data section

■ **Data Formats**

The instrument uses character data, decimal numeric data and character string data depending on the command.

(1) Character Data

Character data always begins with an alphabetic character, and subsequent characters may be either alphabetic or numeric. Character data is not case-sensitive, although response messages from the instrument are only upper case. When the command data section contains <1/0/ON/OFF>, the operation will be similar to when 0 is OFF and 1 is ON.

:HEADER OFF
:HEADER 0

(2) Decimal Numeric Data

Three formats are used for numeric data, identified as NR1, NR2 and NR3. Numeric values may be signed or unsigned. Unsigned numeric values are handled as positive values. Values exceeding the precision handled by the instrument are rounded to the nearest valid digit.
- NR1　　Integer data (e.g.: +12, -23, 34)
- NR2　　Fixed-point data (e.g.: +1.23, -23.45, 3.456)
- NR3　　Floating-point exponential representation data (e.g.: +1.0E-2, -2.3E+4)

The term "NRf format" includes all three of the above numeric decimal formats.

The instrument accepts NRf format data. The format of response data is specified for each command, and the data is sent in that format.

- e.g.: NR1　**:AVERage:COUNt 5**
- e.g.: NR3　**:OPEN:WORK 50E-12**

■ Compound Command Header Omission

When several commands having a common header are combined to form a compound command (for example, **:SEQuence:TIME:DISCharge1** and **:SEQuence:TIME:CHARge**), if they are written together in sequence, the common section (here, **:SEQuence:TIME:**) may be omitted after its initial occurrence.

This common section is called the "current path" (analogous to the path concept in computer file storage), and until it is cleared, the interpretation of subsequent commands presumes that they share the same common section.

This usage of the current path is shown in the following example:

Full expression
:SEQuence:TIME:DISCharge1 1,10; :SEQuence:TIME:CHARge 1,20

Compacted expression
:SEQuence:TIME:DISCharge1 1,10; CHARge 1,20

This section becomes the current path, and can be omitted from the messages immediately following.

The current path is cleared when the power is turned on, when reset by key input, by a colon ":" at the start of a command, and when a message terminator is detected.
Standard command messages can be executed regardless of the current path. They have no effect upon the current path.

A colon ":" is not required at the start of the header of a Simple or Compound command. However, to avoid confusion with abbreviated forms and operating mistakes, we recommend always placing a colon at the start of a header.

Output Queue and Input Buffer

■ Output Queue

Response messages are stored in the output queue until read by the controller. The output queue is also cleared in the following circumstances:
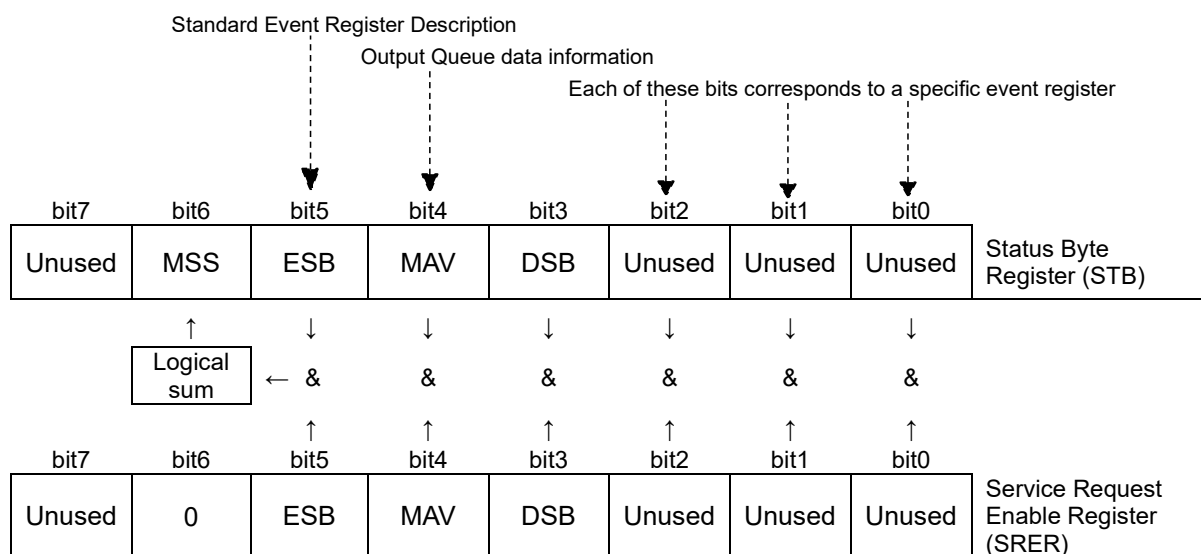• Power on

■ Input Buffer

The input buffer capacity of the instrument is 256 bytes.
If 10k bytes are allowed to accumulate in this buffer so that it becomes full, the interface will not accept data beyond 10k bytes.

Note: Ensure that no command ever exceeds 10k bytes.

Status Byte Register

Standard Event Register Description

Output Queue data information

Each of these bits corresponds to a specific event register

bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0	
Unused	MSS	ESB	MAV	DSB	Unused	Unused	Unused	Status Byte Register (STB)

	↑ Logical sum	↓ ← &	↓ &	↓ &	↓ &	↓ &	↓ &	
bit7	bit6	↑ bit5	↑ bit4	↑ bit3	↑ bit2	↑ bit1	↑ bit0	
Unused	0	ESB	MAV	DSB	Unused	Unused	Unused	Service Request Enable Register (SRER)

Overview of Service Request Occurrence

The Status Byte Register contains information about the event registers and the output queue. Required items are selected from this information by masking with the Service Request Enable Register. When any bit selected by the mask is set, bit 6 (MSS; the Master Summary Status) of the Status Byte Register is also set.

■ **Status Byte Register (STB)**

When any Status Byte Register bit enabled by the Service Request Enable Register has switched from 0 to 1, the MSS bit becomes 1.

Although the MSS bit is only read by an *STB? query, it is not cleared until a clear event is initiated by the *CLS command.

Bit 7	ERR	
Bit 6	MSS	This is the logical sum of the other bits of the Status Byte Register.
Bit 5	ESB	Standard Event Status (logical sum) bit This is logical sum of the Standard Event Status Register.
Bit 4	MAV	Message arrival
Bit 3	DSB	Event summary (logical sum) bit 1 This is logical sum of the Event Status Register.
Bit 2	-	Unused
Bit 1	-	Unused
Bit 0	-	Unused

■ **Service Request Enable Register (SRER)**

This register masks the Status Byte Register. Setting a bit of this register to 1 enables the corresponding bit of the Status Byte Register to be used.

Event Registers

◼ Standard Event Status Register (SESR)

The Standard Event Status Register is an 8-bit register. If any bit in the Standard Event Status Register is set to 1 (after masking by the Standard Event Status Enable Register), bit 5 (ESB) of the Status Byte Register is set to 1.
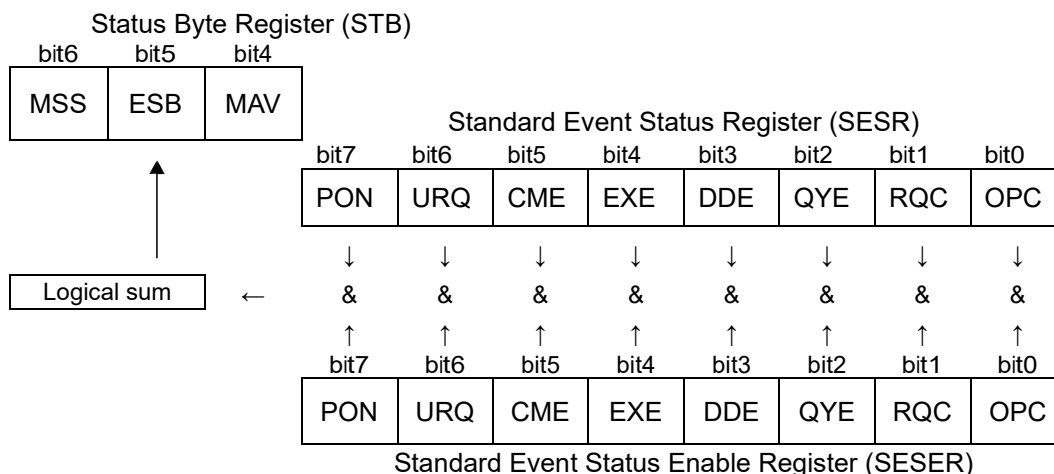
The Standard Event Status Register is cleared in the following situations:
• When a *CLS command is executed
• When an event register query (*ESR?) is executed
• When the instrument is powered on

Bit 7	PON	**Power-On Flag** Set to 1 when the power is turned on, or upon recovery from an outage.
Bit 6	(Unused) URQ	**User Request**
Bit 5	CME	**Command error (The command to the message terminator is ignored.)** This bit is set to 1 when a received command contains a syntactic or semantic error: • Program header error • Incorrect number of data parameters • Invalid parameter format • Received a command not supported by the instrument
Bit 4	EXE	**Execution Error** This bit is set to 1 when a received command cannot be executed for some reason. • The specified data value is outside of the set range • The specified setting data cannot be set • Execution is prevented by some other operation being performed
Bit 3	(Unused) DDE	**Device-Dependent Error** This bit is set to 1 when a command cannot be executed due to some reason other than a command error, a query error or an execution error.
Bit 2	(Unused) QYE	**Query Error (the output queue is cleared)** This bit is set to 1 when a query error is detected by the output queue control. • When an attempt has been made to read an empty output queue (GP-IB only) • When the data overflows the output queue • When data in the output queue has been lost • When the next command is received while there is data in the output queue
Bit 1	(Unused) RQC	**Request Control**
Bit 0	OPC	**Operation Complete** This bit is set to 1 in response to an "*OPC" command. • It indicates the completion of operations of all messages up to the "*OPC" command

■ Standard Event Status Enable Register (SESER)

Setting any bit of the Standard Event Status Enable Register to 1 enables access to the corresponding bit of the Standard Event Status Register.

Standard Event Status Register (SESR) and Standard Event Status Enable Register (SESER)

Status Byte Register (STB)

bit6	bit5	bit4
MSS	ESB	MAV

Standard Event Status Register (SESR)

bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
PON	URQ	CME	EXE	DDE	QYE	RQC	OPC

↓	↓	↓	↓	↓	↓	↓	↓
&	&	&	&	&	&	&	&
↑	↑	↑	↑	↑	↑	↑	↑

Logical sum ←

bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
PON	URQ	CME	EXE	DDE	QYE	RQC	OPC

Standard Event Status Enable Register (SESER)

■ Device-Specific Event Status Registers (DESR)

This instrument provides two Event Status Registers for controlling events. Each event register is an 8-bit register.

When any bit in one of these Event Status Registers enabled by its corresponding Event Status Enable Register is set to 1, Status Byte Register, bit 3 (DSB) is set to 1.

Event Status Registers are cleared in the following situations:
• When a *CLS command is executed
• When an Event Status Register query (:DSR?) is executed
• When the instrument is powered on

Device Event Status Register (DESR)		
Bit 7		Unused
Bit 6		Unused
Bit 5	BOV	**Measured data buffer overflow** Set when data is lost due to overflow of the measured data buffer. Reset by reading this register.
Bit 4	BFL	**Measure data buffer full** Set when the measured data buffer becomes full. Reset when the buffer becomes empty.
Bit 3	STP	**Measurement stop event** Set by one of the following factors: The [STOP] key is pressed. The interlock function was activated. STOP was input by the handler interface. Reset by reading this register.
Bit 2	ITL	**Interlock state** Set when the interlock function is activated and start is disabled Reset when start is enabled.
Bit 1	LM2	Reserved bit
Bit 0	LM1	Reserved bit

■ Device-Specific Event Status Enable Register (DESER)

Setting any bit of the Device-Specific Event Status Enable Register to 1 enables access to the corresponding bit of the Standard Event Status Register.

Device-Specific Event Status Register (DESR) and Device-Specific Event Status Enable Register (DESER)

Status Byte Register (STB)

Bit4	Bit3	Bit2
MAV	DSB	

Device Event Status Register (DESR)

bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
Unused	Unused	BOV	BFL	STP	ITL	LM2	LM1
↓	↓	↓	↓	↓	↓	↓	↓
&	&	&	&	&	&	&	&
↑	↑	↑	↑	↑	↑	↑	↑
bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
Unused	Unused	BOV	BFL	STP	ITL	LM2	LM1

Device Event Status Enable Register (DESER)

Logical sum
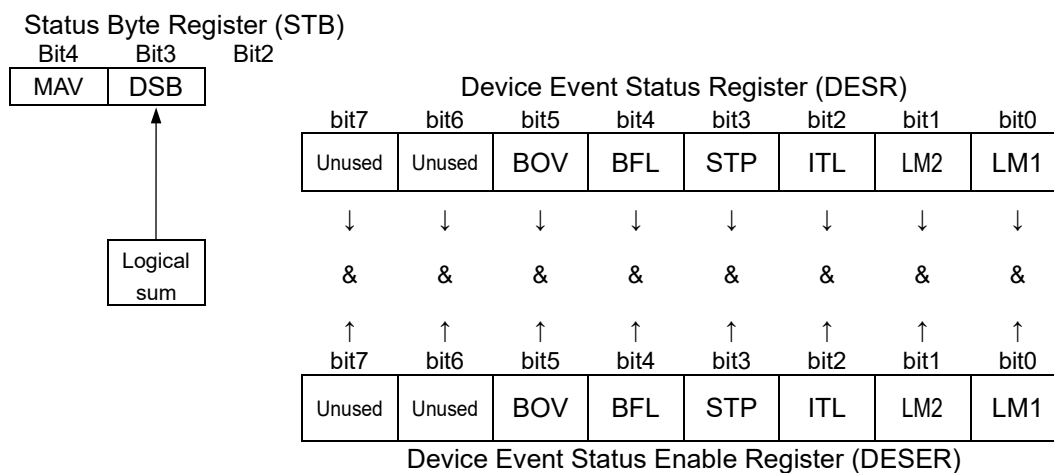
■ Register Reading and Writing

Register	Read	Write
Status Byte Register	*STB?	-
Service Request Enable Register	*SRE?	*SRE
Standard Event Status Register	*ESR?	-
Standard Event Status Enable Register	*ESE?	*ESE
Device Event Status Register 0	:DSR?	-
Device Event Status Enable Register 0	:DSE?	:DSE

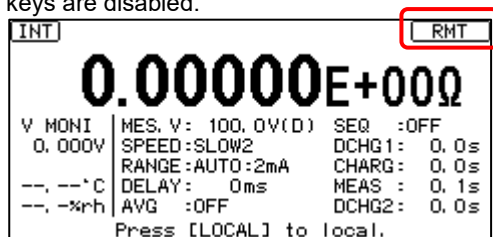## Initialization Items

Item / Initialization Method	At Power-on	*RST Command	:RESet:SYSTem Command	:RESet:NORMal Command	*CLS Command
Interface setting	-	-	-	-	-
Device-specific functions (range, etc.)	-	●	●	●	-
Panel save data	-	-	●	-	-
Input buffer	●	-	-	-	-
Status Byte Register	●	-	-	-	●
Event registers	●*1	-	-	-	●
Enable register	●	-	-	-	-
Current path	●	-	-	-	-
Headers on/off	OFF	-	-	-	-

*1. Except the PON bit (bit 7).

Local Function

The Remote state is entered during communication. [RMT] is displayed in the measurement display and operation keys are disabled.

```
┌─────────────────────────────────────────────┐
│ [INT]                              [RMT]     │
│     0.00000E+00Ω                             │
│ V MONI │MES.V: 100.0V(D) SEQ  :OFF           │
│  0.000V│SPEED:SLOW2      DCHG1:  0.0s         │
│        │RANGE:AUTO:2mA   CHARG:  0.0s         │
│ --.--`C│DELAY:    0ms    MEAS :  0.1s         │
│ --.-%rh│AVG  :OFF        DCHG2:  0.0s         │
│          Press [LOCAL] to local.             │
└─────────────────────────────────────────────┘
```

■ Canceling the Remote state
• Pressing the [LOCAL] key on the front panel cancels the Remote state and enables key operations.

• Sending **:SYSTem:LOCal** command can also cancel the Remote state.

Command Execution Time

Command execution time indicates the time for analyzing and processing long form commands.

• Display delays may occur depending on the frequency of communication processes and process contents.
• In communications with the controller, time must be added for data transmission. Transfer time depends on the controller.
  The Transfer time, with start bit 1, data length 8, no parity, and stop bit 1, has a total of 10-bit. When the transfer speed (baud rate) setting is N bps, the general result will be as follows:
    Transfer time T [1 character/sec] = Baud rate N [bps]/10 [bits]
    If a measurement value is 11 characters, a 1 data transfer time will be 11/T.
    (Example) For 9600 bps, 11/(9600/10) = Approx. 11 ms

Errors During Communications

An error occurs when messages are executed in the following cases:
• Command Error
  When message syntax (spelling) is invalid
  When the data format in a command or query is invalid
• Execution Error
  When invalid character or numeric data is present

2 Message List

category	command	function
Standard Commands	*IDN?	Query Instrument ID (Identification Code)
	*RST	Internal Operation
	*TST?	Execute Self-Test and Query Result
	*OPC	Set OPC bit of SESR when Finished with All Pending Operations
	*OPC?	Respond with ASCII "1" when Finished with All Pending Operations
	*WAI	Wait for Pending Commands to Finish
	*CLS	Clear Event Register, Status Byte Register (Except Output Queue)
	*ESE	Set Standard Event Status Enable Register (SESER)
	*ESE?	Query Standard Event Status Enable Register (SESER)
	*ESR?	Query and Clear Standard Event Status Register (SESR)
	*SRE	Set Service Request Enable Register (SRER)
	*SRE?	Query Service Request Enable Register (SRER)
	*STB?	Query Status Byte and MSS Bit
	*TRG	Request a Sample
Measurement status	:STARt	Measurement start
	:STOP	Measurement stop
	:STOP:CONDition	Set output condition
	:STOP:CONDition?	Query output condition
	:STATe?	Query measurement status
Reading Measured Values	:MEASure?	Query Measurement value
	:MEASure:COMParator?	Query Judgment of Measured Value
	:MEASure:RESult?	Query Measurement value and Judgment
	:MEASure:CLEar	Clear Measuremt Value and Judgment Value
Voltage Monitor	:MEASure:MONItor?	Query Voltage Monitor value
Tempureture and Humidity value	:MEASure:TEMPerature?	Query Tempureture value
	:MEASure:HUMidity?	Query Humidity value
Measured value display mode	:MEASure:MODE	Set Measured value display mode
	:MEASure:MODE?	Query Measured value display mode
Measuremt Format	:MEASure:FORMat	Set Measuremt format
	:MEASure:FORMat?	Query Measuremt format
The Number of Displayed digits	:MEASure:DIGit	Set The Number of Displayed digits
	:MEASure:DIGit?	Query The Number of Displayed digits
Applied Voltage	:VOLTage	Set Applied Voltage
	:VOLTage?	Query Applied Voltage
Power Source	:POWer:SOUrce	Set Power Source
	:POWer:SOUrce?	Query Power Source
Measurement Speed	:SPEEd	Set Measurement Speed
	:SPEEd?	Query Measurement Speed
Range	:RANGe	Set Current Range
	:RANGe?	Query Current Range
	:RANGe:AUTO	Set Auto Range
	:RANGe:AUTO?	Query Auto Range
	:RANGe:AUTO:TIMeout	Set Auto Range Timeout
	:RANGe:AUTO:TIMeout?	Query Auto Range Timeout
Delay	:DELay	Set Delay time
	:DELay?	Query Delay time
Average	:AVERage	Set Average
	:AVERage?	Query Average
	:AVERage:COUNt	Set average hold times
	:AVERage:COUNt?	Query average hold times

category	command	function
Sequence Program function	:SEQuence:STATe	Set Sequence Program
	:SEQuence:STATe?	Query Sequence Program
	:SEQuence:NUMBer	Set Sequence program number
	:SEQuence:NUMBer?	Query Sequence program number
	:SEQuence:TIME	Set Sequence time
	:SEQuence:TIME?	Query Sequence time
	:SEQuence:TIME:DISCharge1	Set Sequence Discharge time
	:SEQuence:TIME:DISCharge1?	Qery Sequence Discharge time
	:SEQuence:TIME:CHARge	Set Sequence charge time
	:SEQuence:TIME:CHARge?	Query Sequence charge time
	:SEQuence:TIME:MEASure	Set Sequence measurement time
	:SEQuence:TIME:MEASure?	Query Sequence measurement time
	:SEQuence:TIME:DISCharge2	Set Sequence Discharge time
	:SEQuence:TIME:DISCharge2?	Query Sequence Discharge time
	:SEQuence:MEASure?	Start sequence measurement and query results
Voltage value setting for resistance calculation	:VMODe	Set Vltage value setting for resistance calculation
	:VMODe?	Query Voltage value setting for resistance calculation
	:VMODe:VOLTage	Set External Voltage value
	:VMODe:VOLTage?	Query External Voltage value
Trigger	:TRIGger	Set Trigger Source
	:TRIGger?	Query Trigger Source
Self-Calibration	:CALibration?	Execute and Query Self-Calibration
	:CALibration:AUTO	Set Self-Calibration AUTO
	:CALibration:AUTO?	Query Self-Calibration AUTO
	:CALibration:TIME	Set Self-Calibration time
	:CALibration:TIME?	Query Self-Calibration time
Interlock	:INTerlock	Set Interlock state
	:INTerlock?	Query Interlock state
Current Limit	:CHARge:LIMit	Set current limit
	:CHARge:LIMit?	Query current limit
	:CHARge:LIMit:CURRent	Set total current limit
	:CHARge:LIMit:CURRent?	Query total current limit
Contact check	:CONTactcheck:FREQuency	Set contact check frequency
	:CONTactcheck:FREQuency?	Query contact check frequency
	:CONTactcheck:WORKc	Set contact check range
	:CONTactcheck:WORKc?	Query contact check range
	:CONTactcheck:CABLe	Set contact check cable length
	:CONTactcheck:CABLe?	Query contact check cable length
	:CONTactcheck:CABLe:AUTO?	Query contact check cable length auto
	:CONTactcheck:DELay	Set contact check delay
	:CONTactcheck:DELay?	Query contact check delay
	:OPEN?	Query Jig capacity open correction
	:OPEN:VALue?	Query Jig capacity open value
	:OPEN:ERRor?	Query Jig capacity open judgment
	:CONTactcheck:STATe	Set contact check state
	:CONTactcheck:STATe?	Query contact check state
	:CONTactcheck:LIMit	Set contact check limit
	:CONTactcheck:LIMit?	Query contact check limit
	:CONTactcheck?	Execute and Query contact check
	:CONTactcheck:VALue?	Query contact check value

category	command	function
Drawing update during measurement	:DISPlay:UPDate	Set drawing update during measurement
	:DISPlay:UPDate?	Query drawing update during measurement
Resistivity measurement	:ELECtric:D1	Set Diameter of the main electrode (D1)
	:ELECtric:D1?	Query Diameter of the main electrode (D1)
	:ELECtric:D2	Set Internal Diameter of the counter electrode (D2)
	:ELECtric:D2?	Query Internal Diameter of the counter electrode (D2)
	:ELECtric:T	Set Thickness of sample(t)
	:ELECtric:T?	Query Thickness of sample(t)
	:ELECtric:K	Set Electrode constant (K)
	:ELECtric:K?	Query Electrode constant (K)
Sweep function	:SWEep:STATe	Set Sweep measurement
	:SWEep:STATe?	Query Sweep measurement
	:SWEep:AUTOlist:STEP	Set start volt, end volt and step volt
	:SWEep:AUTOlist:STEP?	Query start volt, end volt and step volt
	:SWEep:AUTOlist:NUMBer	Set start volt, end volt and step number
	:SWEep:AUTOlist:NUMBer?	Query start volt, end volt and step number
	:SWEep:TIME:HOLD	Set hold delay time
	:SWEep:TIME:HOLD?	Query hold delay time
	:SWEep:TIME:DELay	Set measurement delay time
	:SWEep:TIME:DELay?	Query measurement delay time
	:SWEep:TIME:STEP	Set step time
	:SWEep:TIME:STEP?	Query step time
	:SWEep:COMParator:FAIL:STOP	Set fail stop function
	:SWEep:COMParator:FAIL:STOP?	Query fail stop function
	:SWEep:COMParator:FINE:AUTO	Set automatic detail step function
	:SWEep:COMParator:FINE:AUTO?	Query automatic detail step function
	:SWEep:REVerse	Set reverse function
	:SWEep:REVerse?	Query reverse function
	:SWEep:LIST:CLEar	All steps clear
	:SWEep:LIST:DATA	Set list data
	:SWEep:LIST:DATA?	Query list data
	:SWEep:LIST:COUNt	Set step number
	:SWEep:LIST:COUNt?	Query step number
	:SWEep:MEASure?	Start sweep measurement and query results
	:SWEep:MEASure:EXECute?	Start sweep measurement and query completion of measurement
Comparator	:COMParator:LIMit	Set Comparator
	:COMParator:LIMit?	Query Comparator
	:COMParator:BEEPer	Set Comparator Beeper
	:COMParator:BEEPer?	Query Comparator Beeper
Panel saving and loading	:PANel:SAVE	Set Panel saving
	:PANel:SAVE?	Query already panel saving
	:PANel:LOAD	Load panel data
	:PANel:NAME	Set panel name
	:PANel:NAME?	Query panel name
	:PANel:CLEar	Delete panel data
Key Beeper	:KEY:BEEPer	Set Key Beeper
	:KEY:BEEPer?	Query Key Beeper
Key-lock	:SYSTem:KLOCk	Set Key-Lock State
	:SYSTem:KLOCk?	Query Key-Lock State
Internal memory	:MEMory?	Query measurement value in memory
	:MEMory:RANGe?	Query measurement value in memory (range specification)
	:MEMory:STATe	Set memory state
	:MEMory:STATe?	Query memory state
	:MEMory:COUNt?	Query number of measurement value
	:MEMory:CLEar	Set Memory clear

category	command	function
Voltage monitor check	:VCHeck?	Set and Query Voltage monitor check
	:VCHeck:STATe	Query Voltage monitor check state
	:VCHeck:STATe?	Set Voltage monitor check state
	:VCHeck:LIMit	Set Voltage monitor check limit
	:VCHeck:LIMit?	Query Voltage monitor check limit
Double action	:DOUBleaction	Set double action
	:DOUBleaction?	Query double action
LCD	:DISPlay:MODE	Set Display Mode
	:DISPlay:MODE?	Query Display Mode
	:DISPlay:CONTrast	Set Contrast
	:DISPlay:CONTrast?	Query Contrast
	:DISPlay:BACKlight	Set Backlight
	:DISPlay:BACKlight?	Query Backlight
Line Frequency	:SYSTem:LFRequency	Set Line Frequency
	:SYSTem:LFRequency?	Query Line Frequency
	:SYSTem:LFRequency:AUTO?	Query Automatic detection Line Frequency
Reset	:RESet	Initialize Instrument (System Reset)
ExternalI/O	:IO:EDGE	Set Trigger edge
	:IO:EDGE?	Query Trigger edge
	:IO:FILTer:STATe	Set TRIG Signal's Filter
	:IO:FILTer:STATe?	Query TRIG Signal's Filter
	:IO:FILTer:TIME	Set TRIG Signal's Filter Tim
	:IO:FILTer:TIME?	TRIG Signal's Filter Tim
	:IO:GOLogic	Set GO-signal outputting logic level
	:IO:GOLogic?	Query GO-signal outputting logic level
	:IO:EOM:MODE	Set EOM Output Method
	:IO:EOM:MODE?	Query EOM Output Method
	:IO:EOM:PULSe	Set EOM Pulse Width
	:IO:EOM:PULSe?	Query EOM Pulse Width
	:IO:OUTPin?	Query Output Pin Status
	:IO:MODE?	Query NPN/PNP Switch Status
Device Event Status Enable Register	:DSE	Set Device Event Status Enable Register
	:DSE?	Query Device Event Status Enable Register
	:DSR?	Query Device Event Status Register
Command header	:HEADer	Set Header Presence
	:HEADer?	Query Header Presence
Communication setting	:SYSTem:LOCal	Return to Local Control
	:SYSTem:TERMinator	Set Delimiter
	:SYSTem:TERMinator?	Query Delimiter

3 Message Reference

Message Reference Interpretation

> < >: Indicates the contents (character or numeric parameters) of the data section of a message. Character parameters are returned as all capital letters.
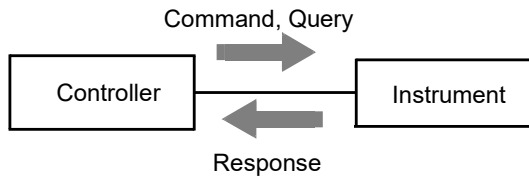>
> **Numeric Parameters:**
> - NRf   Number format may be any of NR1, NR2 and NR3
> - NR1   Integer data (e.g.: +12, -23, 34)
> - NR2   Fixed-point data (e.g.: +1.23, -23.45, 3.456)
> - NR3   Floating-point exponential representation data (e.g.: +1.0E-2, -2.3E+4)

Shows the command description.

Shows the message syntax.
Explains the command data or response message. Describes the message.

Shows an example of an actual command application. (Normally described with HEADER OFF [except the HEADER command itself].)

Read/Write the Standard Event Status Enable Register (SESER)

Syntax	Command	***ESE** <0 to 255 (NR1)>
	Query	***ESE?**
	Response	<0 to 255 (NR1)>
Description	Command	The SESER mask is set to the numerical value 0 to 255. The initial value (at power-on) is 0.
	Query	The contents of the SESER, as set by the *ESE command, are returned as an NR1 value (0 to 255).

128	64	32	16	8	4	2	1
bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
PON	URQ	CME	EXE	DDE	QYE	RQC	OPC

Example   ***ESE 36**
(Sets bits 5 and 2 of SESER)

Command, Query

Controller → Instrument

Response

Standard Commands

(1) System Data Command

Query Instrument ID (Identification Code)

Syntax	Query	***IDN?**
	Response	\<Manufacturer name\>,\<Model name\>,\<Serial number\>,\<Software version\>

Example
*IDN?
HIOKI, SM7110,123456,V1.00
The Instrument ID is HIOKI SM7110, serial number 123456, software version 1.00.

(2) Internal Operation Command

Initialize Instrument (Normal Reset)

Syntax	Command	***RST**

Description Command Resets the instrument to factory settings excluding the communication state, ,
zero adjustment value and saved data.(Normal Reset)
The initial display is displayed after initialization.

Note The communication state is not initialized.
Use the **:RESet:SYSTem** command to initialize the zero adjustment value
and saved data.

Execute Self-Test and Query Result

Syntax	Query	***TST?**
	Response	\<0 to 1 (NR1)\>

\<0\> = No error
\<1\> = ROM error

Description Perform the instrument self-test and return the result as NR1 value 0 or 1.
Returns zero when no error occurs.

Example *TST?
1
A ROM error occurred.

(3) Synchronization Commands

Set OPC bit of SESR when Finished with All Pending Operations

Syntax	Command	***OPC**

Description Sets OPC bit 0 of the Standard Event Status Register (SESR) when all commands prior
to *OPC have finished processing.

Example A;B;*OPC;C
The OPC bit of SESR is set after A and B command processing has been completed.

Respond with ASCII "1" when Finished with All Pending Operations

Syntax	Query	***OPC?**
	Response	**1**

Description Response with ASCII "1" when all commands prior to *OPC have finished processing.

Wait for Pending Commands to Finish

Syntax	Command	***WAI**

Description The instrument waits until all prior commands finish before executing any subsequent commands.

Example :TRIGger EXTernal
*TRG;*WAI;MEASure?
Reads the measurement value after waiting for the measurement triggered by the *TRG command to finish.

Note The *WAI command is accepted, as it is a mandatory command under IEEE Standard 488.2-1987. However, since all the device-specific commands implemented in this instrument, except the *TRG are sequential, the *WAI command has no effect even if used.

(4) Status and Event Control Commands

Clear Event Register, Status Byte Register (Except Output Queue)

Syntax	Command	***CLS**

Description Clears the event status registers. The Status Byte Register bits corresponding to the event status registers are also cleared. (STB, SESR, DESR)

Note The output queue is unaffected.

Set and Query Standard Event Status Enable Register (SESER)

Syntax	Command	***ESE** <0 to 255(NR1)>
	Query	***ESE?**
	Response	<0 to 255(NR1)>

Description

Command	The SESER mask is set to the numerical value 0 to 255. The initial value (at power-on) is 0.
Query	The contents of the SESER, as set by the *ESE command, are returned as an NR1 value (0 to 255).

128	64	32	16	8	4	2	1
bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
PON	Unused	CME	EXE	Unused	Unused	Unused	OPC

Example *ESE 32
Sets bit 5 of SESER.

Query and Clear Standard Event Status Register (SESR)

Syntax	Query	***ESR?**
	Response	<0 to 255 (NR1)>

Description Returns the contents of the SESR as an NR1 value from 0 to 255, then clears register contents.
The response message has no header.

128	64	32	16	8	4	2	1
bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
PON	Unused	CME	EXE	Unused	Unused	Unused	OPC

Example *ESR?
32
Bit 5 of the SESR has been set to 1.

Set and Query Service Request Enable Register (SRER)

Syntax	Command	***SRE** <0 to 255 (NR1)>
	Query	***SRE?**
	Response	<0 to 255 (NR1)>

Description

Command   The SRER mask is set to the numerical value 0 to 255.
Although NRf numerical values are accepted, values to the right of the decimal are rounded to the nearest integer.
Bit 6 and unused bits 2, 3 and 7 are ignored. The data is initialized to 0 at power-on.

Query   The contents of the SRER, as set by the *SRE command, are returned as an NR1 value (0 to 255). Bit 6 and unused bits 2, 3 and 7 always return as zero.

128	64	32	16	8	4	2	1
bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
ERR	0	ESB	MAV	DSB	Unused	Unused	MEC

Example

*SRE 33
Set SRER bits 0 and 5 to 1.

*SRE?
33
SRER bits 0 and 5 have been set to 1.

Query Status Byte and MSS Bit

Syntax	Query	***STB?**
	Response	<0 to 255 (NR1)>

Description

The contents of the STB are returned as an NR1 value (0 to 255).
The response message has no header.

128	64	32	16	8	4	2	1
bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
ERR	MSS	ESB	MAV	DSB	Unused	Unused	MEC

Example

*STB?
1
STB bit 0 has been set to 1.

Request a Sample

Syntax	Command	***TRG**

Description   Performs one measurement when external triggering (trigger source <EXTERNAL>) is enabled.

Example   :TRIGger EXTernal
*TRG;MEASure?
Reads the measurement value after waiting for the measurement triggered by *TRG command to finish.

Note   An execution error occurs when the trigger source is :TRIGger INTernal

Device-Specific Commands

(1) Measurement status
Measurement start

Syntax	command	**:STARt**
Description		Measuremet start.
Example		:STARt
		Measuremet start.

Measurement stop

Syntax	command	**:STOP**
Description		Measuremet stop.
Example		:STOP
		Measuremet stop.

Set and Query output condition

Syntax	Command	**:STOP:CONDition** <DISCharge/HIZ>
	Query	**:STOP:CONDition?**
	Response	<DISCHARGE/HIZ>

Description   DISCharge:Discharge
HIZ:High inpeadance
Example   :STOP:CONDition DISCharge
Setting the Discharge mode.

:STOP:CONDition?
DISCHARGE
Now Setting is Discharge mode.

Query measurement status

Syntax	Query	**:STATe?**
	Response	<0∼4 (NR1)>

Description

Response	Normal mode	Sequence mode
0	Stop	Stop
1	Trigger wait	Discharge1
2	INDEX	Charge
3	EOM	Measurement
4	-	Discharge2

Example   :STATe?
0
Now stopping.

(2) Reading Measured Values
  Query Measurement value

Syntax	Query	**:MEASure?**
	Response	<measurement value(NR3)>

Description Returns the measurement value for measured value display mode and the number of displayed digits

Example
:MEASure?
6.33802E-12

Measurement data is 6.33802pA (For current measurement mode)

Query Judgment of Measured Value

Syntax	Query	**:MEASure:COMParator?**
	Response	<NO/HI/IN/LO>

Description Return the judgment of measured value

Example
:MEASure:COMParator?
HI

Judgment of Measured Value has been HI

Query Measurement value and Judgment

Syntax   Query   **:MEASure:RESult? <1～255>**

           Response   <Measurent value and judgment value>

Description   Return the measurement value and judgment value for camma

Response data is set to 0 to 255

128 bit 7	64 bit 6	32 bit 5	16 bit 4	8 bit 3	4 bit 2	2 bit 1	1 bit 0
Voltage check result	Contact check result	Humidity	Tempereture	Voltage Monitor	Judgment value	Measurement value	Status

Status:

Priority	Response	Status	Example of measured values
HIGH ↑ ↓ LOW	5	Contact check function is ON and result is NG (Unchecked is NG).	55.5555E+30
	1	No measurement after power turned on No measurement after clearing value.	00.0000E-12
	9	Current Over Range.	99.9999E+30
	7	Voltage monitor check function is ON and result is NG (Unchecked is NG).	(Normal measurement value)
	3	Outside of fuaranteed accuracy range.	(Normal measurement value)
	0	Normal.	(Normal measurement value)

Measurement value: Please refer to "4 Measurement Value Format".

Judgment value:

Response	Judgment
NO	Comparator function is OFF or No judgment
HI	(Upper limit) < (Measured value)
IN	(Lower limit) ≤ (Measured value) ≤ (Upper limit)
LO	(Measured value) < (Lower limit)

Voltage Monitor:
  Responds to the voltage monitor value when the command is received.
  Please refer to "4 Measurement Value Format".

Temperature:
  Responds to the temperature value when the command is received.
  When Z2011 has not set, return tempreture value has been 99.99.

Humidity:
  Responds to the humidity value when the command is received.
  When Z2011 has not set, return tempreture value has been 99.9.

Contact check result:
  Contact check function is OFF: Respond to the results of the last manual contact check.
  Contact check function is ON: Response to the results of the contact check.
  performed at the time of measurement

Response	Result
0	Unchecked or contact check result is NG.
1	Contact check result is OK.

Voltage check result:
  Voltage monitor check function is OFF: Respond to the results of the last manual voltage monitor check.
  Voltage monitor function is ON: Response to the results of the Voltage monitor check performed at the time of measurement.

Response	Result
0	Unchecked or voltage monitor check result is NG.
1	Voltage monitor check result is OK.

Example   :MEASure:RESult? 14
       6.33802E-12,HI,500.2

    Measuremt value has been 6.33802pA. Judgment value has been HI
    Voltage monitor value has been 500.2V

Note   When sweep measurement is ON, the voltage setpoint is responded instead of the voltage monitor value.

Clear Measuremt Value and Judgment Value

Syntax command **:MEASure:CLEar**

Description Clear Measuremt Value and Judgment Value

Example :MEASure:CLEar

Clear Measuremt Value and Judgment Value

(3) Voltage Monitor
Query Voltage Monitor value

Syntax Query **:MEASure:MONItor?**

Response <Voltage monitor (NR2)>

Description Return the Voltage monitor value

Example :MEASure:MONItor?

500.2

Voltage monitor value has been 500.2V

Note When sweep measurement is ON, the voltage setpoint is responsed instead of the voltage monitor value.

(4) Tempureture and Humidity value
Query Tempureture value

Syntax Query **:MEASure:TEMPerature?**

Response <Tempureture(℃)(NR2)>

Description Return tempureture value

When Z2011 has not set, return tempreture value has been 99.99

Example :MEASure:TEMPerature?

23.45

Tempureture has been 23.45℃

Query Humidity value

Syntax Query **:MEASure:HUMidity?**

Response <Humidity(%rh)(NR2)>

Description Return humidity value

When Z2011 has not set, return humidity value has been 99.99

Example :MEASure:HUMidity?

50.1

Humidity has been 50.1 %rh

(5) Measured value display mode
Set and Query Measured value display mode

Syntax	command	**:MEASure:MODE** <R/A/RS/RV/RL>
	Query	**:MEASure:MODE?**
	Response	<R/A/RS/RV/RL>

Description	R	… Resistance
	A	… Current
	RS	… Surface resistivity
	RV	… Volume resistivity
	RL	… Liquid volume resistivity

Example :MEASure:MODE R
Set Resistance mode

:MEASure:MODE?
R
Measured value mode has been Resistance

Note Execution error occurs during sweep measurement.

(6) Measuremt Format
Set and Query Measuremt format

Syntax	command	**:MEASure:FORMat** <UNIT/EXP>
	Query	**:MEASure:FORMat?**
	Response	<UNIT/EXP>

Description	UNIT	… Unit format
	EXP	… Exponent format

Example :MEASure:FORMat UNIT
Set unit format

:MEASure:FORMat?
UNIT
Measurement format has been Unit

(7) The Number of Displayed digits
Set and Query The Number of Displayed digits

Syntax	command	**:MEASure:DIGit** <3～6(NR1)>
	Query	**:MEASure:DIGit?**
	Response	<3～6(NR1)>

Example :MEASure:DIGit 3
Set the number of displayed digits to 3

:MEASure:DIGit?
3
The number of displayed digits has been 3

(8) Applied Voltage
Set and Query Applied Voltage

Syntax	command	**:VOLTage** <Applied Voltage(V)(NR2)>
	Query	**:VOLTage?**
	Response	< Applied Voltage (V)(NR2)>

Description SM7110 … <Applied Voltage (V)(NR2)> = 0.1～1000.0
SM7120 … <Applied Voltage (V)(NR2)> = 0.1～2000.0

Example :VOLTage 100
Set to Applied Voltage to 100V.

:VOLTage?
100
Applied Voltage has been set to 100V.

(9) Measurement Speed
Set and Query Measurement Speed

Syntax	command	**:SPEEd** <SLOW2/SLOW/MED/FAST2/FAST>
	Query	**:SPEEd?**
	Response	<SLOW2/SLOW/MED/FAST2/FAST>

Example :SPEEd SLOW2
Set measurement speed to SLOW2.

:SPEEd?
SLOW2
Measurement speed has been set to SLOW2.

(10) Range
Set and Query Current Range

Syntax	command	**:RANGe** <20pA/200pA/2nA/20nA/200nA/2uA/20uA/200uA/2mA>
	Query	**:RANGe?**
	Response	<20pA/200pA/2nA/20nA/200nA/2uA/20uA/200uA/2mA>

Example :RANGe 20pA
Set current range to 20pA.

:RANGe?
20pA
Current range has been set to 20pA.

Set and Query Auto Range

Syntax	command	**:RANGe:AUTO** <ON/OFF>
	Query	**:RANGe:AUTO?**
	Response	<ON/OFF>

Description ON   … Auto range is ON.
OFF   … Auto range is OFF (HOLD range)

Example :RANGe:AUTO ON
Set auto range to ON.

:RANGe:AUTO?
ON
Auto range has been set to ON.

Set and Query Auto Range Timeout

Syntax	command	**:RANGe:AUTO:TIMeout** <ON/OFF>
	Query	**:RANGe:AUTO:TIMeout?**
	Response	<ON/OFF>

Description   ON   … Auto range timeout is ON.
               OFF   … Auto range timeout is OFF.

Example   :RANGe:AUTO:TIMeout ON
Set auto range timeout to ON.

:RANGe:AUTO:TIMeout?
ON
Auto range timeout has been set to ON.

(11) Delay

Set and Query Delay time

Syntax	command	**:DELay** <Delay time(s)(NR2)>
	Query	**:DELay?**
	Response	<Delay time(s)(NR2)>

Description   <Delay time(s)(NR2)> = 0.0～999.9

Example   :DELay 12.3
Set delay time to 12.3 seconds

:DELay?
12.3
Delay time has been 12.3 seconds

(12) Average

Set and Query Average

Syntax	command	**:AVERage** <OFF/HOLD/AUTO>
	Query	**:AVERage?**
	Response	<OFF/HOLD/AUTO>

Description   OFF   … Average is OFF
               HOLD   … Moving average
               AUTO   … The number of times of averaging is automatically changed based on the variation of the measured values

Example   :AVERage HOLD
Set average to moving average

:AVERage?
HOLD
Average has been moving average

Set and Query average hold times

Syntax	command	**:AVERage:COUNt** <2～255(NR1)>
	Query	**:AVERage:COUNt?**
	Response	<2～255(NR1)>

Example   :AVERage:COUNt 5
Set average hold time to 5

:AVERage:COUNt?
5
Average hold time has been 5

(13) Sequence Program function

Set and Query Sequence Program

Syntax	command	**:SEQuence:STATe** <ON/OFF>
	Query	**:SEQuence:STATe?**
	Response	<ON/OFF>

Example   :SEQuence:STATe ON
Set sequence program to ON

:SEQuence:STATe?
ON
Sequence program has been ON

Set and Query Sequence program number

Syntax	command	**:SEQuence:NUMBer** <0～9(NR1)>
	Query	**:SEQuence:NUMBer?**
	Response	<0～9(NR1)>

Example   :SEQuence:NUMBer 2
Set Sequence program number to 2

:SEQuence:NUMBer?
2
Sequence program number has been 2

Set and Query Sequence time

Syntax	command	**:SEQuence:TIME** <sequence number(NR1)>,
		<discharge time(s)(NR2)>,
		<charge time(s) (NR2)>,
		<measurement time(s) (NR2)>,
		< discharge time (s) (NR2)>
	Query	**:SEQuence:TIME?** < sequence number (NR1)>
	Response	< sequence number (NR1)>,< discharge time (s) (NR2)>,
		< charge time (s) (NR2)>,< measurement time (s) (NR2)>,
		< discharge time (s) (NR2)>

Description
< sequence number (NR1)>	= 0～9
< discharge time (s)(NR2)>	= 0.000～999.999
< charge time (s) (NR2)>	= 0.001～999.999
< measurement time (s) (NR2)>	= 0.00～999.999
< discharge time (s) (NR2)>	= 0.000～999.999

Example   :SEQuence:TIME 1,0.1,0.5,3.0,4.5
Set sequence 1

discharge time	= 0.1 seconds		charge time	= 0.5 seconds
measurement time	= 3.0 seconds		discharge time	= 4.5 seconds

:SEQuence:TIME? 1
1,0.100,0.500,3.000,4.500
sequence 1 has been upper times

Set and Query Sequence Discharge time

Syntax　command　**:SEQuence:TIME:DISCharge1** < sequence number (NR1)>,
< discharge time (s)(NR2)>

Query　**:SEQuence:TIME:DISCharge1?** < sequence number (NR1)>
Response　< sequence number (NR1)>,< discharge time (s) (NR2)>

Description　< sequence number (NR1)>　　　= 0～9
< discharge time (s)(NR2)> = 0.000～999.999

Example　:SEQuence:TIME:DISCharge1 1,0.1
Set sequence 1 discharge time to 0.1 seconds

:SEQuence:TIME:DISCharge1? 1
1,0.100
Sequence 1 discharge time has been 0.1 seconds

Set and Query Sequence charge time

Syntax　command　**:SEQuence:TIME:CHARge** < sequence number (NR1)>,
< charge time (s) (NR2)>

Query　**:SEQuence:TIME:CHARge?** < sequence number (NR1)>
Response　< sequence number (NR1)>,< charge time (s) (NR2)>

Description　< sequence number (NR1)>　　　= 0～9
< charge time (s) (NR2)>　　= 0.000～999.999

Example　:SEQuence:TIME:CHARge 1,0.5
Set sequence 1 charge time to 0.5 seconds

:SEQuence:TIME:CHARge? 1
1,0.500
Sequence 1 charge time has been 0.5 seconds

Set and Query Sequence measurement time

Syntax　command　**:SEQuence:TIME:MEASure** < sequence number (NR1)>,
<measurement time(s) (NR2)>

Query　**:SEQuence:TIME:MEASure?** < sequence number (NR1)>
Response　< sequence number (NR1)>, < measurement time (s) (NR2)>

Description　< sequence number (NR1)>　　　= 0～9
< measurement time (s) (NR2)>　　　= 0.001～999.999

Example　:SEQuence:TIME:MEASure 1,3.0
Set sequence 1 measurement time to 3.0 seconds

:SEQuence:TIME:MEASure? 1
1,3.000
Sequence 1 measurement time has been 3.0 seconds

Set and Query Sequence Discharge time

Syntax   command   **:SEQuence:TIME:DISCharge2** < sequence number (NR1)>,
  < discharge time (s) (NR2)>

Query   **:SEQuence:TIME:DISCharge2?** < sequence number (NR1)>
Response   < sequence number (NR1)>,< discharge time (s) (NR2)>

Description   < sequence number (NR1)>   = 0〜9
< discharge time (s) (NR2)>= 0.000〜999.999

Example   :SEQuence:TIME:DISCharge2 1,4.5
Set sequence 1 discharge time to 4.5 seconds

:SEQuence:TIME:DISCharge2? 1
1,4.500
Sequence 1 discharge time has been 4.5 seconds

Start sequence measurement and query results

Syntax   Query   **:SEQuence:MEASure? <1〜255>**

Response   <Measurent value and judgment value>

Description   Starts sequence measurement and responds with a comma-delimited list of measured values, judgment results, and other data after measurement is complete.
Response data is set to 0 to 255
See the description of the :MEASure:RESult? command for details on each bit.

128	64	32	16	8	4	2	1
bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
Voltage check	Contact check	Humidity	Tempereture	Voltage Monitor	Judgment value	Measurement value	Status

Example   :SEQuence:MEASure? 14
6.33802E-12,HI,500.2
Measuremt value has been 6.33802pA. Judgment value has been HI
Voltage monitor value has been 500.2V

Note   Execution error when sequence function is off.
Once this command has been sent, no other commands will be accepted until the sequence measurement is completed.

(14) Voltage value setting for resistance calculation
Set and Query Voltage value setting for resistance calculation

Syntax	command	**:VMODe** <MESV/VMONi/EXTV>
	Query	**:VMODe?**
	Response	<MESV/VMONi/EXTV>

Description   MESV   … set output voltage value
    VMONI … measured voltage value
    EXTV   … set external voltage value

Example   :VMODe MESV
Set Voltage value setting for resistance calculation to MESV

:VMODe?
MESV
Voltage value setting for resistance calculation hs been MESV

Note   Execution error when setting <EXTV> while sweep function is on.

Set and Query External Voltage value

Syntax	command	**:VMODe:VOLTage** < external voltage value (V) (NR2)>
	Query	**:VMODe:VOLTage?**
	Response	< external voltage value (V) (NR2)>

Description   < external voltage value (V) (NR2)> = 0.1～5000.0

Example   :VMODe:VOLTage 100
Set external voltage value to 100V

:VMODe:VOLTage?
100
External voltage value has been 100V

(15) Trigger
Set and Query Trigger Source

Syntax	command	**:TRIGger** <INTernal/EXTernal>
	Query	**:TRIGger?**
	Response	<INTERNAL/EXTERNAL>

Description   INTernal ... Internal triggering
    EXTernal ... External triggering

Example   :TRIGger INTernal
Set the trigger source to internal triggering.

:TRIGger?
INTERNAL
The trigger source has been set to internal triggering.

Note   Execution error when setting <EXTernal> while sweep function is on.

(16) Self-Calibration
Execute and Query Self-Calibration

Syntax	Query	**:CALibration?**
	Response	<0～1(NR1)>

Description   Execute self-calibration, return judgement
    0 … Fail (NG)
    1 … Success(OK)

Example   :CALibration?
1
Self-calibration has been success

Set and Query Self-Calibration AUTO

Syntax	command	**:CALibration:AUTO** <ON/OFF>
	Query	**:CALibration:AUTO?**
	Response	<ON/OFF>

Example   :CALibration:AUTO ON
Set Self-calibration to AUTO

:CALibration:AUTO?
ON
Self-calibration has been AUTO

Set and Query Self-Calibration time

Syntax	command	**:CALibration:TIME** <time(s)(NR1)>
	Query	**:CALibration:TIME?**
	Response	<time(s)(NR1)>

Description   <time(s)(NR2)> = 1～600

Example   :CALibration:TIME 60
Set self-calibration time to 60 seconds

:CALibration:TIME?
60
Self-calibration time has been 60 seconds

(17) Interlock

Set and Query Interlock state

Syntax	command	**:INTerlock** <ON/OFF>
	Query	**:INTerlock?**
	Response	<ON/OFF>

Description   < ON/ OFF >

Example   :INTerlock ON
Set interlock to ON

:INTerlock?
ON
Interlock has been ON

(18) Current Limit

Set and Query current limit

Syntax	command	**:CHARge:LIMit** <ON/OFF>
	Query	**:CHARge:LIMit?**
	Response	<ON/OFF>

Description   < ON / OFF >

Example   :CHARge:LIMit ON
Set current limit to ON

:CHARge:LIMit?
ON
Current limit has been ON

Set and Query total current limit

Syntax	command	**:CHARge:LIMit:CURRent** <1.8mA/5mA/10mA/50mA>
	Query	**:CHARge:LIMit:CURRent?**
	Response	<1.8mA/5mA/10mA/50mA>

Description   Set total current limit

Example   :CHARge:LIMit:CURRent 5mA
Set total current limit to 5mA

:CHARge:LIMit:CURRent?
5mA
Total current limit has been 5mA

(19) Contact check

Set and Query contact check frequency

Syntax	command	**:CONTactcheck:FREQuency** <245kHz/300kHz>
	Query	**:CONTactcheck:FREQuency?**
	Response	<245kHz/300kHz>

Example   :CONTactcheck:FREQuency 245kHz
Set contact check frequency to 245kHz

:CONTactcheck:FREQuency?
245kHz
Contact check frequency has been 245kHz

Set and Query contact check range

Syntax	command	**:CONTactcheck:WORKc** <NORMal/LOW>
	Query	**:CONTactcheck:WORKc?**
	Response	<NORMAL/LOW >

Description   NORMal   …capacitor upper 10pF
LOW   … capacitor Lower 10pF

Example   :CONTactcheck:WORKc NORMal
Set contact check frequency to Normal

:CONTactcheck:WORKc?
NORMAL
Contact check frequency has been Normal

Set and Query contact check cable length

Syntax	command	**:CONTactcheck:CABLe** <cable length(m)(NR2)>
	Query	**:CONTactcheck:CABLe?**
	Response	< cable length (m)(NR2)>

Description   < cable length (m)(NR2)> = 0.5～3.0

Example   :CONTactcheck:CABLe 2.0
Set contact check cable length to 2.0m

:CONTactcheck:CABLe?
2.0
Contact check cable length has been 2.0m

Query contact check cable length auto

Syntax   Query   **:CONTactcheck:CABLe:AUTO?**

        Response   <0～1(NR1)>

Description   0 … cable length auto OFF
               1 … cable length auto ON

Example   :CONTactcheck:CABLe:AUTO?
           1
           Contact check calbe length auto has been ON

Set and Query contact check delay

Syntax   command   **:CONTactcheck:DELay** <delay time(s)(NR2)>
        Query   **:CONTactcheck:DELay?**
        Response   < delay time(s)(NR2)>

Description   <delay time(s)(NR2)> = 0.0～9.999

Example   :CONTactcheck:DELay 1.23
           Set delay time to 1.23 seconds

           :CONTactcheck:DELay?
           1.230
           Delay time has been 1.23 seconds

Query Jig capacity open correction

Syntax   Query   **:OPEN?**
        Response   <0～1(NR1)>

Description   Execute jig capacity open, return the judgnent
             0 … Fail (NG)
             1 …Success (OK)

Example   :OPEN?
           1
           Success jig capacity open

Query Jig capacity open value

Syntax   Query   **:OPEN:VALue?**
        Response   <open value(F)(NR3)>

Description   Return jig open value
             Unexecuted … 99.999E-99
             Over   … 99.999E-12

Example   :OPEN:VALue?
           1.412E-12
           Jig open value has been 1.412pF

Set and Query contact check state

Syntax	command	**:CONTactcheck:STATe** <ON/OFF>
	Query	**:CONTactcheck:STATe?**
	Response	<ON/OFF>

Description ON … Auto execute before measurement
OFF … No execute

Example :CONTactcheck:STATe ON
Set contact check auto execute to ON

:CONTactcheck:STATe?
ON
Contact check auto execute has been ON

Set and Query contact check limit

Syntax	command	**:CONTactcheck:LIMit** < Judgment reference value(NR3)>
	Query	**:CONTactcheck:LIMit?**
	Response	< Judgment reference value (F)(NR3)>

Description < Judgment reference value (NR3)> = 0.00～99.99E-12

Example :CONTactcheck:LIMit 50E-12
Set contact check limit to 50pF

:CONTactcheck:LIMit?
50.00E-12
Contact check limit has been 50pF

Execute and Query contact check

Syntax	Query	**:CONTactcheck?**
	Response	<0～1(NR1)>

Description Execute contact check, retuen judgment
0 … contact check NG
1 …contact check OK

Example :CONTactcheck?
1
Contact check has been OK

Query contact check value

Syntax	Query	**:CONTactcheck:VALue?**
	Response	<contact check value(NR3)>

Description Retuen contact check value
Unexecuted jig capacity open correction … 99.999E-12
Unexecuted contact check … 99.999E-12

Example :CONTactcheck:VALue?
+1.301311E-14
Contact check value has been 1.301311E-14F

(20) Drawing update during measurement
Set and Query drawing update during measurement

Syntax command **:DISPlay:UPDate** <ON/OFF>
Query   **:DISPlay:UPDate?**
Response <ON/OFF>

Description ON ⋯ Drawing update for each measurement
OFF ⋯ Drawing update for only at STOP

Example :DISPlay:UPDate ON
Set Drawing update during measurement to ON

:DISPlay:UPDate?
ON
Drawing update during measurement has been ON

(21) Resistivity measurement function
Set and Query Diameter of the main electrode (D1)

Syntax command **:ELECtric:D1** <diameter(m)(NR2)>
Query   **:ELECtric:D1?**
Response < diameter (m)(NR2)>

Description < diameter (m)(NR2)> = 0.0000〜0.1000

Example :ELECtric:D1 0.001
Set Diameter of the main electrode to 0.001m

:ELECtric:D1?
0.0010
Diameter of the main electrode has been 0.001m

Set and Query Internal Diameter of the counter electrode (D2)

Syntax command **:ELECtric:D2** <diameter of the counter(m)(NR2)>
Query   **:ELECtric:D2?**
Response < diameter of the counter (m)(NR2)>

Description < diameter of the counter(m)(NR2)> = 0.0000〜0.1000

Example :ELECtric:D2 0.001
Set diameter of the counter electrode (D2) to 0.001m

:ELECtric:D2?
0.0010
Diameter of the counter electrode (D2) has been 0.001m

Set and Query Thickness of sample(t)

Syntax command **:ELECtric:T** < Thickness (m)(NR2)>
Query   **:ELECtric:T?**
Response < Thickness (m)(NR2)>

Description < Thickness (m)(NR2)> = 0.0000〜0.1000

Example :ELECtric:T 0.001
Set Thickness of sample(t) to 0.001m

:ELECtric:T?
0.0010
Thickness of sample(t) has been 0.001m

Set and Query Electrode constant (K)

Syntax	command	**:ELECtric:K** <electrode constact(NR2)>
	Query	**:ELECtric:K?**
	Response	< electrode constact (NR2)>

Description < electrode constact (NR2)> = 0.01～999.99

Example :ELECtric:K 0.05
Set electrode constact(k) to 0.05

:ELECtric:K?
0.05
Electrode constact(k) has been 0.05

(22) Sweep function

Set and Query Sweep measurement

Syntax	command	**:SWEep:STATe** <ON/OFF>
	Query	**:SWEep:STATe?**
	Response	<ON/OFF>

Example :SWEep:STATe ON
Set Sweep measurement to ON

:SWEep:STATe?
ON
Sweep measurement has been ON

Note Setting sweep measurement to ON may change setting of trigger, sequence measurement, memory function, and voltage value for resistance calculation.
For detail information, see the instruction manual of the instruments

Set and Query start volt, end volt and step volt

Syntax	command	**:SWEep:AUTOlist:STEP** <start volt(V)(NR2)>,<end volt(V)(NR2)>, <step volt(V)(NR2)>
	Query	**:SWEep:AUTOlist:STEP?**
	Response	<start volt(V)(NR2)>,<end volt(V)(NR2)>,<step volt(V)(NR2)>

Description

SM7110 ···	<start volt(V)(NR2)>	= 0.1～1000.0
	<end volt(V)(NR2)>	= 0.1～1000.0
	<step volt(V)(NR2)>	= 0.1～1000.0
SM7120 ···	<start volt(V)(NR2)>	= 0.1～2000.0
	<end volt(V)(NR2)>	= 0.1～2000.0
	<step volt(V)(NR2)>	= 0.1～2000.0

Example :SWEep:AUTOlist:STEP 10,100,10
Set sweep list start volt to 10V, end volt to 100V and step volt to 10V

:SWEep:AUTOlist:STEP?
10,100,10
Sweep list start volt has been 10V, end volt has been 100V and step volt has been 10V

Note Immediately reflected in sweep list when configured by command.
Response of query is a configured parameter.
It may not match current sweep list.

Set and Query start volt, end volt and step number

Syntax	command	**:SWEep:AUTOlist:NUMBer** \<start volt(V)(NR2)>, \<end volt(V)(NR2)>,\<step number(NR1)>
	Query	**:SWEep:AUTOlist:NUMBer?**
	Response	\<start volt(V)(NR2)>,\<end volt(V)(NR2)>,\<step number(NR1)>

Description

SM7110 ···	\<start volt(V)(NR2)>	= 0.1～1000.0
	\<end volt(V)(NR2)>	= 0.1～1000.0
SM7120 ···	\<start volt(V)(NR2)>	= 0.1～2000.0
	\<end volt(V)(NR2)>	= 0.1～2000.0
	\<step number(NR1)>	= 1～999

Example

:SWEep:AUTOlist:NUMBer 10,100,10
Set sweep list start volt to 10V, end volt to 100V and step number to 10

:SWEep:AUTOlist:NUMBer?
10,100,10
Sweep list start volt has been 10V, end volt has been 100V and step number has been 10

Note

Immediately reflected in sweep list when configured by command.
Response of query is a configured parameter.
It may not match current sweep list.

Set and Query hold delay time

Syntax	command	**:SWEep:TIME:HOLD** \<hold delay time(s)(NR2)>
	Query	**:SWEep:TIME:HOLD?**
	Response	\<hold delay time(s)(NR2)>

Description

\<hold delay time(s)(NR2)> = 0.000～999.9

Example

:SWEep:TIME:HOLD 0.1
Set sweep measurement hold delay time to 0.1 seconds

:SWEep:TIME:HOLD?
0.100
Sweep measurement hold delay time has been 0.1 seconds

Set and Query measurement delay time

Syntax	command	**:SWEep:TIME:DELay** \<measurement delay time(s)(NR2)>
	Query	**:SWEep:TIME:DELay?**
	Response	\<measurement delay time(s)(NR2)>

Description

\<measurement delay time(s)(NR2)> = 0.010～999.9

Example

:SWEep:TIME:DELay 0.1
Set sweep measurement delay time to 0.1 seconds

:SWEep:TIME:DELay?
0.100
Sweep measurement delay time has been 0.1 seconds

Set and Query step time

Syntax	command	**:SWEep:TIME:STEP** <step time(s)(NR2)>
	Query	**:SWEep:TIME:STEP?**
	Response	<step time(s)(NR2)>

Description   <hold time(s)(NR2)>   = 0.015～999.9

Example   :SWEep:TIME:STEP 0.1
Set sweep measurement step time to 0.1 seconds

:SWEep:TIME:STEP?
0.100
Sweep measurement step time has been 0.1 seconds

Set and Query fail stop function

Syntax	command	**:SWEep:COMParator:FAIL:STOP** <ON/OFF>
	Query	**:SWEep:COMParator:FAIL:STOP?**
	Response	<ON/OFF>

Description   ON   … Use fail stop function
OFF   … Not use fail stop function
For information on the fail stop function, see the instruction manual of the instruments

Example   :SWEep:COMParator:FAIL:STOP ON
Set fail stop function to ON

:SWEep:COMParator:FAIL:STOP?
ON
Fail stop function has been ON

Set and Query automatic detail step function

Syntax	command	**:SWEep:COMParator:FINE:AUTO** <ON/OFF>
	Query	**:SWEep:COMParator:FINE:AUTO?**
	Response	<ON/OFF>

Description   ON   … Use automatic detail step function
OFF   … Not use automatic detail step function
For information on the automatic detail step function, see the instruction manual of the instruments

Example   :SWEep:COMParator:FINE:AUTO ON
Set automatic detail step function to ON

:SWEep:COMParator:FINE:AUTO?
ON
Automatic detail step function has been ON

Set and Query reverse function

Syntax	command	**:SWEep:REVerse** <ON/OFF>
	Query	**:SWEep:REVerse?**
	Response	<ON/OFF>

Example   :SWEep:REVerse ON
Set reverse function to ON

:SWEep:REVerse?
ON
Reverse function has been ON

All steps clear

Syntax   command   **:SWEep:LIST:CLEar**

Description   Clear all steps

Remove the configuration for all steps and set 0.1V in step 001

Example   :SWEep:LIST:CLEar

Clear all steps

Note   Can't return once clear

Set and Query list data

Syntax   command   **:SWEep:LIST:DATA**   <step No.(NR1)>,<voltage(V)(NR2)>

Query   **:SWEep:LIST:DATA?**   <step No.(NR1)>

Response   <step No.(NR1)>,<voltage(V)(NR2)>

Description

	<step No.(NR1)>	= 1～999
SM7110 ⋯	<voltage(V)(NR2)>	= 0.1～1000.0
SM7120 ⋯	<voltage(V)(NR2)>	= 0.1～2000.0

Example   :SWEep:LIST:DATA 1,10

Set voltage of step No.1 to 10V

:SWEep:LIST:DATA? 1

1,10

Voltage of step No.1 has been 10V

Set and Query step number

Syntax   command   **:SWEep:LIST:COUNt** <step number(NR1)>

Query   **:SWEep:LIST:COUNt?**

Response   <step number(NR1)>

Description   <step number(NR1)> = 1～999

Example   :SWEep:LIST:COUNt 10

Set step number to 10

:SWEep:LIST:COUNt?

10

Step number has been 10

Start sweep measurement and query results

Syntax   Query   **:SWEep:MEASure? <1～255>**

Response   <Measurent value and judgment value>

Description   Starts sweep measurement and responds with a comma-delimited list of measured values, judgment results, and other data after measurement is complete.

Response starts with result of step No.1

Response data is set to 0 to 255

See the description of the :MEASure:RESult? command for details on each bit.

128	64	32	16	8	4	2	1
bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
Voltage check	Contact check	Humidity	Tempereture	Voltage Setpoint	Judgment value	Measurement value	Status

Example   :SWEep:MEASure? 14

6.33802E-12,HI, 500.2,633833E-12,HI, 500.3,⋯⋯

Note   Execution error when sweep function is off.

Once this command has been sent, no other commands will be accepted until the sweep measurement is completed.

Start sweep measurement and query completion of measurement

Syntax	Query	**:SWEep:MEASure:EXECute?**
	Response	<1(NR1)>

Description Starts sweep measurement and responds with 1 after measurement is complete.

Example :SWEep:MEASure:EXECute?
1
Sweep measurement was executed and measurement is complete.

Note Execution error when sweep function is off.
Once this command has been sent, no other commands will be accepted until the sweep measurement is completed.

(23) Comparator

Set and Query Comparator

Syntax	command	**:COMParator:LIMit** <OFF/upper limit(NR3)>,<OFF/lower limit(NR3)>
	Query	**:COMParator:LIMit?**
	Response	<OFF/ upper limit (NR3)>,<OFF/ lower limit (NR3)>

Description <Uppew limit (NR3)>,<Lower limit (NR3)> =

Resistance (Ohm)	20.000E+18～50.000E+0
Current (A)	-1.99999E-03～-1.00000E-16, 0, 1.00000E-16～1.99999E-03
Surface resistivity (Ohm)	20.000E+20～50.000E+2
Volume resistivity (Ohm/cm)	20.000E+20～50.000E+2
Liquid volume resistivity(Ohm/cm)	20.000E+20～50.000E+2

Example :COMParator:LIMit 50E9,20E9
Set comparator upper limit to 50E9, lower limit to 20E9

:COMParator:LIMit?
50E9,20E9
Comparator upper limit to 50E9, lower limit to 20E9

Note Execution error when upper limit < lower limit

Set and Query Comparator Beeper

Syntax	command	**:COMParator:BEEPer** <HI/IN/LO>,<TYPE1/TYPE2/TYPE3/OFF>,<times>
	Query	**:COMParator:BEEPer?** <HI/IN/LO>
	Response	<HI/IN/LO>,<TYPE1/TYPE2/TYPE3/OFF>,<times (NR1)>

Description <Times(NR1)> = 1/2/3/4/5/CONT

Example :COMParator:BEEPer HI,TYPE2,3
Set comparator beeper to TYPE2, 3 times when HI judgment

:COMParator:BEEPer? HI
HI,TYPE2,3
Comparator beeper has been TYPE2, 3 times when HI judgment

(24) Panel saving and loading
Set Panel saving

Syntax	command	**:PANel:SAVE** <1～50(NR1)>

Description Save measurement conditions

Example :PANel:SAVE 1
Save measurement conditions at panel 1

Note Overweite when already save this panel

Query already panel saving

Syntax	Query	**:PANel:SAVE?** <1～50(NR1)>
	Response	<0/1(NR1)>

Description 0 … no saving data
1 … exist saving data

Example :PANel:SAVE? 1
1
Exist saving data at panel 1

Load panel data

Syntax	command	**:PANel:LOAD** <1～50(NR1)>

Description Load panel data

Example :PANel:LOAD 1
Load panel 1 data

Note Execute error when panel data has no exist

Set and Query panel name

Syntax	command	**:PANel:NAME** <1～50(NR1)>,<panel name>
	Query	**:PANel:NAME?** <1～50(NR1)>
	Response	<1～50(NR1)>,<panel name> = 0～9,A～Z,_

Description Set panel name.
A panel name is 10 character effective characters above-mentioned。

Example :PANel:NAME 1,HOGEPIYO2
Set panel name [HOGEPIYO2]

:PANel:NAME? 1
1,HOGEPIYO2
Panel name has been [HOGEPIYO2]

Note When designating the occasion as which the panel number by which setting isn't preserved in command was designated and the invalid name, it'll be an execution error. The occasion and the panel name as which the panel number by which setting isn't preserved in Query was designated, "----------",

Delete panel data

Syntax	command	**:PANel:CLEar** <1～50(NR1)>

Description   Delete panel data

Example   :PANel:CLEar 1
Delete panel 1 data

Note   Can't return the panel data once delete

(25) Key Beeper
Set and Query Key Beeper

Syntax	command	**:KEY:BEEPer** <ON/OFF>
	Query	**:KEY:BEEPer?**
	Response	<ON/OFF>

Description   < ON / OFF >

Example   :KEY:BEEPer ON
Set key beeper to ON

:KEY:BEEPer?
ON
Key beeper has been ON

(26) Key-lock
Set and Query Key-Lock State

Syntax	command	**:SYSTem:KLOCk** <OFF/MENU/ALL>
	Query	**:SYSTem:KLOCk?**
	Response	<OFF/MENU/ALL>

Description   OFF   … Disable keylock
MENU   … Disable COMP, LOAD/SAVE, MENU key
ALL   … Disable ALL key exept MENU[UNLOCK] key

Example   :SYSTem:KLOCk MENU
Set disable COMP, LOAD/SAVE, MENU key

:SYSTem:KLOCk?
MENU
COMP, LOAD/SAVE, MENU key has been disable

(27) Internal memory
Query measurement value in memory

Syntax	Query	**:MEMory? <1～255>**
	Response	< Retuen measurement value and judgment >

Description   Retuen measurement value and judgment
See the description of the :MEASure:RESult? command for details on each bit.

128	64	32	16	8	4	2	1
bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
Voltage check result	Contact check result	Humidity	Tempereture	Voltage Monitor	Judgment value	Measurement value	Status

Example   :MEMory? 14
6.33802E-12,HI,500.2, 6.33533E-12,HI,500.1, 6.33833E-12,HI,500.3,……

Note   When sweep measurement is ON, the voltage setpoint is responded instead of the voltage monitor value.

Query measurement value in memory (range specification)

Syntax Query **:MEMory:RANGe?** <1〜255>,
<Start memory number>,<End memory number>

Response < Return measurement value and judgment >

Description Return measurement value and judgment

Set the data you wish to query as a value from 1 to 255. For example, to query measured values only you would set the value 2. To query measured values along with judgment results, you would set 2 and 4 for a total of 6.

<Start memory number> = 1 to 999

<End memory number> = 1 to 999

If there is no data stored in its memory, the instrument will return "0." Specifying a memory number in which no data is stored will result in an execution error.

See the description of the :MEASure:RESult? command for details on each bit.

128	64	32	16	8	4	2	1
bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
Voltage check result	Contact check result	Humidity	Tempereture	Voltage Monitor	Judgment value	Measurement value	Status

Example :MEMory:RANGe? 6,10,20
6.33802E-12,HI, 6.33533E-12,HI, 6.33833E-12,HI,……

Note When sweep measurement is ON, the voltage setpoint is responsed instead of the voltage monitor value.

Set and Query memory state

Syntax command **:MEMory:STATe** <ON/OFF>
Query **:MEMory:STATe?**
Response <ON/OFF>

Description ON … save measurement value
OFF … no save

Example :MEMory:STATe ON
Set measurement value to save

:MEMory:STATe?
ON
Measurement value has been save

Query number of measurement value

Syntax command **:MEMory:COUNt?**

Response <0〜50(NR1)>

Description Return number of measuremet value

Example :MEMory:COUNt?
23
Mumber of measuremet value has been 23

Set Memory clear

Syntax   command   **:MEMory:CLEar**

Description   Clear all measurement value in memory

Example   :MEMory:CLEar

Clear all measurement value in memory

Note   Can't return the panel data once delete.

Execution error occurs during sweep measurement.

(28) Voltage monitor check

Set and Query Voltage monitor check

Syntax   Query   **:VCHeck?**

Response   <0～1(NR1)>

Description   Execute voltage monitor check, retuen judge

0 … NG

1 … OK

Example   :VCHeck?

1

Voltage monitor check has been OK

Set and Query Voltage monitor check state

Syntax   command   **:VCHeck:STATe** <ON/OFF>

Query   **:VCHeck:STATe?**

Response   <ON/OFF>

Description   < ON / OFF >

Example   :VCHeck:STATe ON

Set Voltage monitor check to ON

:VCHeck:STATe?

ON

Voltage monitor check has been ON

Set and Query Voltage monitor check limit

Syntax   command   **:VCHeck:LIMit** <settable range(%)>

Query   **:VCHeck:LIMit?**

Response   < settable range (%)>

Description   < settable range(%)> = 2～20

Example   :VCHeck:LIMit 10

Set voltage monitor check limit to +-10%

:VCHeck:LIMit?

10

Voltage monitor check limit has been +-10%

(29) Double action
Set and Query double action

Syntax	command	**:DOUBleaction** <ON/OFF>
	Query	**:DOUBleaction?**
	Response	<ON/OFF>

Description   ON   … start measurement at push START key init 1seond untill push stop key push
OFF   … start measurement at push START key

Example   :DOUBleaction ON
Set double action to ON

:DOUBleaction?
ON
Double action has been ON

(30) LCD
Set and Query Display Mode

Syntax	command	**:DISPlay:MODE** <NORMal/SEQuence/SWPList/SWPNorm>
	Query	**:DISPlay:MODE?**
	Response	<NORMAL/SEQUENCE/SWPLIST/SWPNORM>

Description   NORMal   … normally display
SEQuence   … time display for sequence program mode
SWPList   … sweep list display for sweep measurement mode
SWPNorm   … normally display for sweep measurement mode

Example   :DISPlay:MODE NORMal
Set display mode to normal

:DISPlay:MODE?
NORMAL
Display mode has been normal

Note   Execution error when setting <SWPList/SWPNorm> while sweep function is off.
Execution error when setting <NORMal/SEQuence> while sweep function is on.

Set and Query Contrast

Syntax	command	**:DISPlay:CONTrast** <0～100(NR1)>
	Query	**:DISPlay:CONTrast?**
	Response	<0～100(NR1)>

Example   :DISPlay:CONTrast 50
Set the display contrast to 50%.

:DISPlay:CONTrast?
50
The display contrast has been set to 50%.

Set and Query Backlight

Syntax	command	**:DISPlay:BACKlight** <0～100(NR1)>
	Query	**:DISPlay:BACKlight?**
	Response	<0～100(NR1)>

Example   :DISPlay:BACKlight 50
Set the backlight brightness to 50%.

:DISPlay:BACKlight?
50
The backlight brightness has been set to 50%.

(31) Line Frequency
Set and Query Line Frequency

Syntax	command	**:SYSTem:LFRequency** <AUTO/50/60>
	Query	**:SYSTem:LFRequency?**
	Response	<AUTO/50/60>

Description	AUTO	… Auto detect line frequency (When power on)
	50	… 50Hz
	60	… 60Hz

Example :SYSTem:LFRequency AUTO
Set the line frequency to AUTO.

:SYSTem:LFRequency?
AUTO
Line frequency has been set to AUTO.

Query Automatic detection Line Frequency

Syntax	Query	**:SYSTem:LFRequency:AUTO?**
	Response	<ERROR/50/60>

Description	ERROR	⋯ Detection error
	50	⋯ 50Hz
	60	⋯ 60Hz

Example :SYSTem:LFRequency:AUTO?
60
Detected 60Hz

(32) Reset
Initialize Instrument (System Reset)

Syntax	command	**:RESet** <SYSTem/NORMal>
Description	SYSTem	… Initializes all data incluse panel data settings
	NORMal	… Initializes all data except panel data settings
Example		:RESet SYSTem

Execute system reset.

(33) EXT I/O
Set and Query Trigger edge

Syntax	command	**:IO:EDGE** <ON/OFF>
	Query	**:IO:EDGE?**
	Response	<ON/OFF>

Description	Set trigger edge	
	ON	… PNP：fall、NPN：rise
	OFF	… PNP：rise、NPN：fall

Example :IO:EDGE ON
Set trigger edge to ON edge

:IO:EDGE?
ON
Trigger edge has been ON edge

Set and Query TRIG Signal's Filter Function

Syntax	command	**:IO:FILTer:STATe** <ON/OFF>
	Query	**:IO:FILTer:STATe?**
	Response	<ON/OFF>

Description Set to use the trigger filter.
ON … Use trigger filter.
OFF … Not use trigger filter.

Example :IO:FILTer:STATe ON
Set trigger filter to ON

:IO:FILTer:STATe?
ON
Trigger filter has been set to ON.

Set and Query TRIG Signal's Filter Time

Syntax	command	**:IO:FILTer:TIME** < Filter time (s)(NR2)>
	Query	**:IO:FILTer:TIME?**
	Response	< Filter time (s)(NR2)>

Description < Filter time (s)(NR2)> = 0.001～0.500

Example :IO:FILTer:TIME 0.123
Set trigger filter time to 0.133 seconds.

:IO:FILTer:TIME?
0.123
Trigger filter time has been set to 0.123 seconds.

Set and Query GO-signal outputting logic level

Syntax	command	**:IO:GOLogic** <NORMal/ INVert >
	Query	**:IO:GOLogic?**
	Response	<NORMAL/INVERT>

Description NORMAL …When a pass judgment is given for the contact check or
voltage monitor check: Outputs a low-level signal.
When a fail judgment is given for the contact check or
voltage monitor check: Outputs a high-level signal.

INVERT …When a pass judgment is given for the contact check or
voltage monitor check: Outputs a high-level signal.
When a fail judgment is given for the contact check or
voltage monitor check: Outputs a low-level signal.

Example :IO:GOLogic NORMal
Set GO-signal outputting logic level to NORMAL.

:IO:GOLogic?
NORMAL
GO-signal outputting logic level has been set to NORMAL.

Set and Query EOM Output Method

Syntax	command	**:IO:EOM:MODE** <HOLD/PULSe>
	Query	**:IO:EOM:MODE?**
	Response	<HOLD/PULSe>

Description   HOLD   … Holds the EOM signal until measurement starts by the next trigger signal.
PULSE   … Sets EOM=OFF according to the specified pulse width

Example   :IO:EOM:MODE HOLD
Set EOM output method to HOLD.

:IO:EOM:MODE?
HOLD
EOM output method has been set to HOLD.

Set and Query EOM Pulse Width

Syntax	command	**:IO:EOM:PULSe** < Pulse width (s)(NR2)>
	Query	**:IO:EOM:PULSe?**
	Response	< Pulse width (s)(NR2)>

Description   < Pulse width (s)(NR2)> = 0.001〜0.100

Example   :IO:EOM:PULSe 0.023
Set Pulse width to 0.023 seconds.

:IO:EOM:PULSe?
0.23
Pulse width has been set to 0.023 seconds.

Query Output Pin Status

Syntax	Query	**:IO:OUTPin?** <ERR/CCHecgo/OPENgo/IN/PASS/EOM/INDEx/ VCHeckgo/VON/HI/LO/FAIL>
	Response	<0/1(NR1)>

Description   Return the output pin status.

Example   :IO:OUTPin? INDEx
1
INDEX pin is ON.

Query NPN/PNP Switch Status

Syntax	Query	**:IO:MODE?**
	Response	<NPN/PNP>

Description   Return the NPN/PNP Switch status.

Example   :IO:MODE?
NPN
NPN/PNP Switch has been set to NPN.

(34) Device Event Status Enable Register
Set and Query Device Event Status Enable Register

Syntax	Command	**:DSE** <0 ~ 255(NR1)>
	Query	**:DSE?**
	Response	<0 ~ 255(NR1)>

Example	Command	Set Device Event status enable register
	Query	Query Device Event status enable register

128	64	32	16	8	4	2	1
bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
Unused	Unused	BOV	BFL	STP	ITL	LM2 Unused	LM1 Unused

Query Device Event Status Register

Syntax	Query	**:DSR?**
	Response	<0 ~ 255(NR1)>

Note	When execute DSE command, DSR register is clear

(35) Command Header

Set and Query Header Presence

Syntax	Command	**:HEADer** <ON/OFF>
	Query	**:HEADer?**
	Response	<ON/OFF>

Description Sets whether or not there is a header in the response message.

Example :HEADer ON
Adds a header to the response message.

:HEADer?
:HEADER ON
A header is set to be added to the response message.

Note When turning the power on or after the ***RST** command, this is initialized to OFF (no header).

(36) Communications Settings

Return to Local Control

Syntax	Command	**:SYSTem:LOCal**

Description Disables communications remote control and re-enables local control. The panel keys are re-enabled.

Example :SYSTem:LOCal

Set Delimiter [GP-IB]

Syntax	Command	**:SYSTem:TERMinator** <LF/CRLF>
	Query	**:SYSTem:TERMinator?**
	Response	<LF/CRLF>

Description LF … Set delimiter to LF.
CRLF … Set delimiter to CRLF.

Example :SYSTem:TERMinator LF
Set delimiter to LF.

:SYSTer:TERMminator?
LF
Delimiter has been set to LF.

4 Measurement Value Format

・Current（A）

Format	Range	Max	Current Over Range	Contact check NG
	2mA	±1.99999E-03A	＋9.99999E+30	＋5.55555E+30
	200uA	±199.999E-06A	＋999.999E+30	＋555.555E+30
	20uA	±19.9999E-06A	＋99.9999E+30	＋55.5555E+30
	2uA	±1.99999E-06A	＋9.99999E+30	＋5.55555E+30
UNIT/EXP	200nA	±199.999E-09A	＋999.999E+30	＋555.555E+30
	20nA	±19.9999E-09A	＋99.9999E+30	＋55.5555E+30
	2nA	±1.99999E-09A	＋9.99999E+30	＋5.55555E+30
	200pA	±199.999E-12A	＋999.999E+30	＋555.555E+30
	20pA	±19.9999E-12A	＋99.9999E+30	＋55.5555E+30

Note: A "+" sign is returned as a SPACE (ASCII code 20H).
The priority of contact check NG is higher than Current Over Range.

・Resistance（Ohm）、Resistivity（Ohm$_{RS}$、Ohm$_{RV}$、Ohm$_{RL}$）

Format	Range	Max	Current Over Range	Contact check NG
UNIT	2mA～20pA	＋999.999E±□	＋000.000E-30	＋555.555E-30
EXP	2mA～20pA	＋9.99999E±□	＋0.00000E-30	＋5.55555E-30

Note: A "+" sign is returned as a SPACE (ASCII code 20H).
The priority of contact check NG is higher than Current Over Range.

・Voltage Monitor（V）

Value	Reference
□□□□.□	:MEASure:MONItor?

・Tempureture （℃）

Value	Reference
±□□.□□	:MEASure:TEMPerature?

・Humidity（%rh）

Value	Reference
＋□□.□	:MEASure:HUMidity?

・Jig capacity open correction（F）

Value	Reference
□□.□□□E-12	:OPEN:VALue?

・Contact check value（F）

Value	Reference
□□.□□□E-12	:CONTactcheck:VALue?

5 Sample Application

Sample application can be downloaded from the Hioki website.
It can perform the following operations on the SM7110 and SM7120:

●Measuring instrument settings
●Time Interval Measurement (By setting up the time interval)
●Voltage sweep measurement (measurement using a varying voltage)
●Loading by Return key (Single Measurement)
●Acquisition of measured values and saving in Excel or CSV format
●Graph display
●Testing communications command transmit/receive functionality
●Backing up and restoring instrument settings
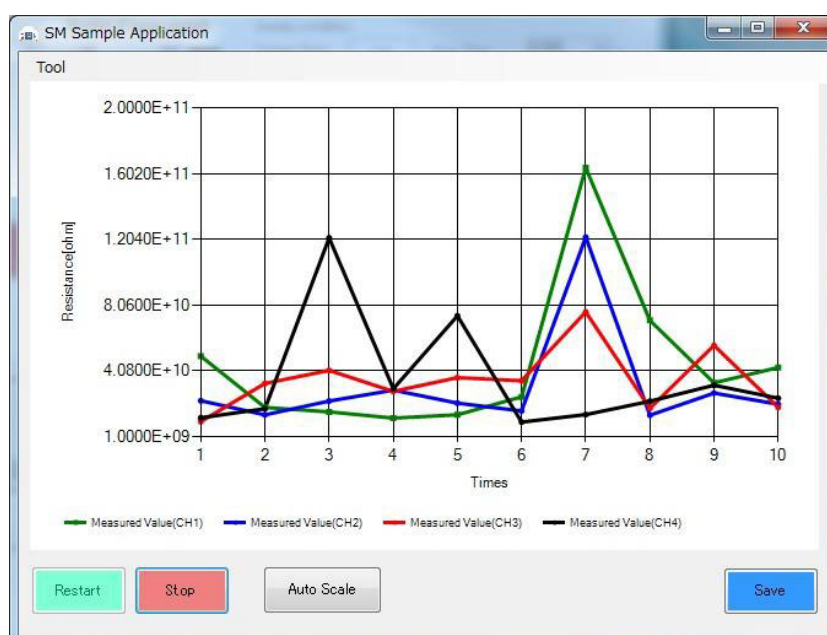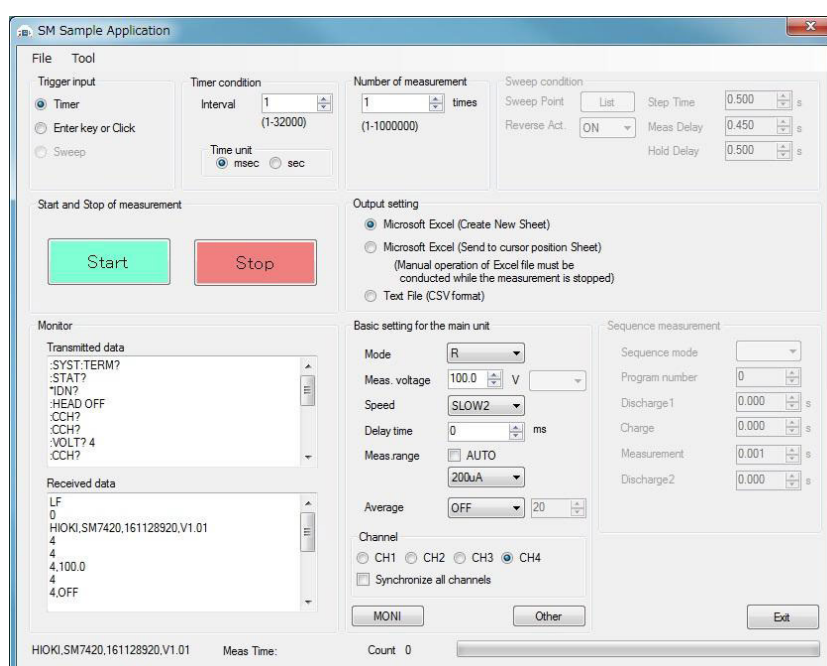
Super Megohm Meter SM7110,7120 Programming Command Compatibility with DSM8104

Setting Control Program Messages

DSM8104	Function	Format	Compatibility Notes	SM7110、SM7120
DLM	Delimiter designation in talker mode.	DLM <0~2>	·Specifying "2:<EOI>" will result in a setting of "0:LF<EOI>." ·Because this setting is backed up, cycling the power will Not cause the default value to be restored.	:SYSTem:TERMinator <LF/CRLF>
DLM?	Delimiter query.	DLM?	· Because the instrument does Not support the "2:<EOI>" setting, the response will be "0."	:SYSTem:TERMinator?
DFM	Output data format designation.	DFM <0~3>		Not compatible
DFM?	Query response in output data format.	DFM?		Not compatible
MOD	Measuring mode setting.	MOD <0~3>		:MEASure:MODE <R/A/RS/RV/RL>
MOD?	Query response in screen state is same as setting.	MOD?	· When the instrument is set to liquid volume resistivity measurement mode, this query will result in a response of	:MEASure:MODE?
MON	Changeover between regular measurement.	MON <0~1>		:DISPlay:MODE <NORMal/SEQuence>
MON?	Query response in measuring mode is same as setting.	MON?		:DISPlay:MODE?
LCD	LCD display mode setting.	LCD <0~1>	· Specifying "0" will set the LCD and backlight to 0 and disable measured value render updates. · Specifying "1" will set the LCD to 50 and the backlight to 80 and enable measured value render updates.	:DISPlay:CONTrast <0~100(NR1)> :DISPlay:BACKlight <0~100(NR1)> :DISPlay:UPDate <ON/OFF>
LCD?	Query response in LCD display mode is same as setting.	LCD?	· The instrument will return "0" if the LCD and backlight are set to 0 and measured value render updates are disabled. · Otherwise, it will return "1."	:DISPlay:CONTrast? :DISPlay:BACKlight? :DISPlay:UPDate?
FIG	Setting number of effective columns for measured value display.	FIG <2~5>	· Specifying "2" will cause the command to be igNored.	:MEASure:DIGit <3~6(NR1)>
FIG?	Query response on setting number of effective columns for measured value display is same as setting.	FIG?	· Because the instrument does Not support the "2" setting, the response will be a value from "3" to "6."	:MEASure:DIGit?
DSP	Display mode setting.	DSP <0~1>		:MEASure:FORMat <UNIT/EXP>
DSP?	Query response in display mode is same as setting.	DSP?		:MEASure:FORMat?
DLY	Trigger delay time (ms) setting.	DLY <0~9999>		:DELay <Delay time(s)(NR2)>
DLY?	Query response on trigger delay time is same as setting.	DLY?		:DELay?
AVE	Averaging setting.	AVE <0~1>	· Specifying "1" will cause the auto averaging function to be set. · Specifying "2: will cause the average hold function to be set (Not supported by the DSM8104).	:AVERage <OFF/HOLD/AUTO>
AVE?	Query response in averaging is same as setting.	AVE?	· When the average hold function is enabled, this query will result in a response of "2."	:AVERage?
SPL	Integral time setting (Unit, set values).	SPL <0~1>,<1~15>/<2~300>	· Different combinations of units and settings can be used to make the settings listed in the following table (see tables below)	:SPEEd <SLOW2/SLOW/MED/FAST2/FAST>
SPL?	Query response on setting number of integral time (unit, set value) is same as setting.	SPL?	· The response will vary with the instrument's SPEED setting as described in the following table (see below)	:SPEEd?
RNG	Current range setting.	RNG <0~1>,<0~7>	· The instrument will be configured as described in the following table based on its SPEED setting (see below)	:RANGe <20pA/200pA/2nA/20nA/200nA/2uA/20uA/200uA/2mA>
RNG?	Query response on current range is same as setting	RNG?	· The response (HOLD) will vary with the instrument's SPEED setting as described in the following table (see below)	:RANGe?

SPL Compatibility Notes tables

■0:PLC setting

PLC	1~3	4~12	13~15
SPEED	MED	SLOW	SLOW2

■1:ms setting

ms（Line frequency50Hz）	2~9	10~19	20~79	80~259	260~300
SPEED	FAST	FAST2	MED	SLOW	SLOW2

ms（Line frequency60Hz）	2~7	8~15	16~65	66~215	216~300
SPEED	FAST	FAST2	MED	SLOW	SLOW2

SPL? Compatibility Notes table

SPEED	FAST	FAST2	MED	SLOW	SLOW2
Response	1,2	1,10（50Hz） 1,8（60Hz）	0,1	0,4	0,13

RNG Compatibility Notes table

Range setting during	FAST	FAST2	MED	SLOW	SLOW2
0	2mA	2mA	2mA Change	2mA Change	200uA
1	2mA	200uA	200uA	200uA	20uA
2	200uA	20uA	20uA	20uA	2uA
3	20uA	2uA	2uA	2uA	200nA
4	2uA	200nA	200nA	200nA	20nA
5	200nA	20nA	20nA	20nA	2nA
6	20nA	2nA	2nA	2nA	200pA
7	2nA	2nA	200pA	20pA	20pA

RNG? Compatibility Notes table

SM7420 Range setting	FAST	FAST2	MED	SLOW	SLOW2
2mA	0,1	0,0			
200uA	0,2	0,1	0,1	0,1	0,0
20uA	0,3	0,2	0,2	0,2	0,1
2uA	0,4	0,3	0,3	0,3	0,2
200nA	0,5	0,4	0,4	0,4	0,3
20nA	0,6	0,5	0,5	0,5	0,4
2nA	0,7	0,6	0,6	0,6	0,5
200pA			0,7	0,6	0,6
20pA				0,7	0,7

SRT	Function to interact with measuring voltage ON or measurement start.	SRT		:STARt
STP	Function to interact with measuring stop (measuring voltage OFF).	STP		:STOP
MTG	Generates manual trigger.	MTG		*TRG
IVS	Setting Measuring Voltage .	IVS ⟨0.1～1000.0⟩		:VOLTage ⟨Voltage(V)(NR2)⟩
IVS?	Query response of Measuring Voltage is same as setting.	IVS?		:VOLTage?
PWS	Measuring power source setting.	PWS ⟨0～2⟩,⟨0～1⟩,⟨0～1⟩	· Because the instrument does Not support the Noise filter will be igNored.	:CHARge:LIMit:CURRent ⟨1.8mA/5mA/10mA/50mA⟩ :CHARge:LIMit ⟨ON/OFF⟩
PWS?	Measuring power source setting query. Query response in display mode is same as setting.	PWS?	· Because the instrument does Not support the Noise filter will always be "0."	:CHARge:LIMit:CURRent? :CHARge:LIMit?
DEV	Deviation value display mode setting.	DEV ⟨0～1⟩,⟨-9.9999E+30～9.9999E+30⟩	· Because the instrument does Not support deviation value display mode, this command will be igNored and will Not result in a command error.	Not compatible
DEV?	Query response in deviation value display mode is same as setting.	DEV?	· Because the instrument does Not support deviation value display mode, this command will be igNored and will Not result in a command error.	Not compatible
ELC	Electrode data setting.	ELC ⟨0～1⟩,⟨0.0～999.9⟩,⟨0.1～1199.9⟩,⟨0.001～30.000⟩,⟨0.01～999.99⟩	· Because the instrument does Not support SIZE/ACTL selection, the SIZE/ACTL setting will be igNored.	:ELECtric:D1 ⟨diameter(m)(NR2)⟩ :ELECtric:D2 ⟨diameter of theconter(m)(NR2)⟩ :ELECtric:T ⟨Thickness (m)(NR2)⟩ :ELECtric:K ⟨Electrode constact(NR2)⟩
ELC?	Query response electrode data is same as setting.	ELC?	· Because the instrument does Not support SIZE/ACTL selection, the SIZE/ACTL response will always be "0."	:ELECtric:D1? :ELECtric:D2? :ELECtric:T? :ELECtric:K?
VCM	Selection of auto voltage check execute mode.	VCM ⟨0～1⟩		:VCHeck:STATe ⟨ON/OFF⟩
VCM?	Query response of auto voltage monitoring execute mode is same as setting.	VCM?		:VCHeck:STATe?
CCM	Selection of auto contact check execute mode.	CCM ⟨0～1⟩		:CONTactcheck:STATe ⟨ON/OFF⟩
CCM?	Query response of auto contact check execute mode is same as	CCM?		:CONTactcheck:STATe?
WCP	Work capacity setting Capacity of work for open correction value calculation.	WCP ⟨0.5～99.9⟩		:CONTactcheck:LIMit ⟨Judgment reference value (F)(NR3)⟩
WCP?	Query response of work capacity is same as setting.	WCP?		:CONTactcheck:LIMit?
OST?	Executes open correction once and capacity value measured during open correction is returned as a response.	OST?	· The response range is 0 to 99.999. · In the event of an error, the query will result in a response of 999.9.	:OPEN? :OPEN:VALue?
VCK?	Executes voltage check once and returns result of it as a response.	VCK?		:VCHeck?
CCK?	Executes contact check once and returns result of it as a response.	CCK?		:CONTactcheck?
TGM	Trigger mode setting.	TGM ⟨0～2⟩	· Because the instrument does Not support the "1: Manual trigger" setting, specifying "1" will cause an external trigger to be set.	:TRIGger ⟨INTernal/EXTernal⟩
TGM?	Query response of trigger mode is same as setting.	TGM?	· Because the instrument does Not support the "1" setting, the response will be either "0" or "2."	:TRIGger?
RDT?	Measured data query.	RDT? ⟨0～2⟩		:MEASure? :MEASure:COMParator? :MEASure:RESult? ⟨1～255⟩
CMP	Comparison Measuring mode setting.	CMP ⟨0～1⟩,⟨0～2⟩,⟨-9.9999E+30～9.9999E+30⟩,⟨-9.9999E+30～9.9999E+30⟩	· Because the instrument does Not support mode selection, the "Mode" setting will be igNored.	:COMParator:LIMit ⟨OFF/Upper-limit(NR3)⟩,⟨OFF/Lower-limit(NR3)⟩
CMP?	Query response of Comparison Measuring mode is same as setting.	CMP?	· The "Comparison execution" query will result in a response of "1" if either the upper limit value or lower limit value is enabled. · The "Mode" query will always result in a response of "1."	:COMParator:LIMit?
SEQ	Sequential mode setting.	SEQ ⟨0～1⟩,⟨0～9⟩,⟨0.0～999.9⟩,⟨0.0～999.9⟩,⟨0.0～999.9⟩,⟨0.0～999.9⟩		:SEQuence:STATe ⟨ON/OFF⟩ :SEQuence:NUMBer ⟨0～9(NR1)⟩ :SEQuence:TIME ⟨Sequential Measuring No.(NR1)⟩,⟨Discharge time before measurement starts(s)(NR2)⟩,⟨Charging (voltage applied) time(s)(NR2)⟩,⟨Measuring Time(s) (NR2)⟩,⟨Discharge time after completion of measurement(s) (NR2)⟩
SEQ?	Same as set items of query SEQ command message in sequential mode.	SEQ?		:SEQuence:STATe? :SEQuence:NUMBer? :SEQuence:TIME? ⟨Sequential Measuring No.(NR1)⟩
CNF	Operation environment setting.	CNF ⟨0～1⟩,⟨0～1⟩,⟨0～1⟩,⟨0～1⟩	· Specifying "0" for the "Beep tone" parameter will disable all comparator judgment tones. · Specifying "1: for the "Beep tone" parameter and "0" for the "Beep tone PASS/FAIL" parameter will set the comparator judgment tone for HI and LO judgments to Type 1 and while disabling the judgment tone for IN judgments. · Specifying "1" for both the "Beep tone" parameter and the "Beep tone PASS/FAIL" parameter will disable the comparator judgment tone for HI and LO judgments while setting the tone for IN judgments to Type 1.	:INTerlock ⟨ON/OFF⟩ :COMParator:BEEPer ⟨HI/IN/LO⟩,⟨TYPE1/TYPE2/TYPE3/OFF⟩,⟨Times⟩ :KEY:BEEPer ⟨ON/OFF⟩
CNF?	Query response of operation environment is same as setting.	CNF?	· "Beep tone" queries will result in a response of "0" when all comparator judgment tones are disabled. · "Beep tone PASS/FAIL" queries will result in a response of "1" when the comparator judgment tone for IN judgments is Not disabled.	:INTerlock? :COMParator:BEEPer? ⟨HI/IN/LO⟩ :KEY:BEEPer?
THL	Histogram display threshold setting.		· The instrument does Not provide a histogram display.This command will be igNored and will Not result in a command error.	Not compatible
THL?	Query response of threshold is same as setting.		· The instrument does Not provide a histogram display.This command will be igNored and will Not result in a command error.	Not compatible
RHS?	Histogram counter readout.		· The instrument does Not provide a histogram display.This command will be igNored and will Not result in a command error.	Not compatible
CHS	Histogram counter clear.		· The instrument does Not provide a histogram display.This command will be igNored and will Not result in a command error.	Not compatible

BSZ?	Reads number of data groups in the measured data buffer.			:MEMory:COUNt?
RBF?	Measured data buffer readout.	RBF? ⟨0〜1⟩		:MEMory? ⟨1〜255⟩
CBF	Measured data buffer clear.	CBF		:MEMory:CLEar
ACL	Auto self-calibration (current range calibration) setting.	ACL ⟨0〜1⟩,⟨10〜9999⟩	· Because the upper limit on the instrument's automatic self-calibration interval time is 600 sec., specifying a time from 601 to 9999 sec. will cause the parameter to be set to 600 sec.	:CALibration:AUTO ⟨ON/OFF⟩ :CALibration:TIME ⟨Time(s)(NR1)⟩
ACL?	Query response of auto self-calibration (current range calibration) is same as setting.	ACL?	· Because the valid setting range for the instrument's automatic self-calibration interval time is 1 to 600 sec., the response will be a value from "1" to "600."	:CALibration:AUTO? :CALibration:TIME?

Execution And Execution Result Program Messages

DSM8104	Function	Format	Compatibility Notes	SM7110、SM7120
ERR?	Error information clear.	ERR?	· The instrument does Not have an error register. This command will be igNored and will Not result in a command	Not compatible
DSE	Sets the device event status enable register.	DSE ⟨0〜255⟩		:DSE ⟨0〜255(NR1)⟩
DSE?	Query response data of the device event status enable register is same as setting.	DSE?		:DSE?
DSR?	Query about data of the device event status enable register.	DSR?		:DSR?
*SAV	Environmental data save.	*SAV ⟨0〜9⟩	· The instrument uses panel numbers 1 through 10. For example, specifying "0" will cause the settings to be saved as Panel 1.	:PANel:SAVE ⟨1〜10(NR1)⟩
*RCL	Environmental data recall.	*RCL ⟨0〜9⟩	· The instrument uses panel numbers 1 through 10. For example, you would specify "0" to load Panel 1.	:PANel:LOAD ⟨1〜10(NR1)⟩
*IDN?	Equipment ID query.	*IDN?	· This query generates a response of "⟨Name of manufacturer⟩,⟨Name of model⟩,⟨Serial number⟩,⟨Software	*IDN?
*CAL?	Self-calibration (current range calibration) execute.	*CAL?	· Auto-calibration takes about 5 sec.	:CALibration?
*TST	Self-diagNosis result query.	*TST?	· This query returns "0" if there is No error, or "1" if there is a ROM error. The DSM8104 uses the opposite logic.	*TST?
*TRG	The same function as the GET message.	*TRG	· Attempting to use the internal trigger will result in an execution error. · Using the external trigger will generate one trigger event if the start state is in effect. · The instrument will return the measured value if it is set to DSM mode: "⟨Channel⟩,⟨Measured value⟩,⟨Status⟩,⟨Comparison result⟩."	*TRG
*CLS	Status register clear.	*CLS		*CLS
*SRE	Sets the service request enable register.	*SRE ⟨0〜255⟩	· The instrument does Not support "Bit 0: MEC."	*SRE ⟨0〜255 (NR1)⟩
*SRE	Query of data in the service request enable register.	*SRE?	· The instrument does Not support "Bit 0: MEC."	*SRE?
*STB?	Query of data in the status byte register.	*STB?		*STB?
*ESE	Sets the standard event status enable register.	*ESE ⟨0〜255⟩		*ESE ⟨0〜255(NR1)⟩
*ESE?	Query of data in the standard event status enable register.	*ESE?		*ESE?
*ESR?	Query of data in the standard event status register.	*ESR?		*ESR?
*RST	Initialize.	*RST	· This command reverts the instrument to its factory defaults, with the exception of communication settings and panel data (i.e., it initiates a Normal reset).	*RST
*OPC	Sets OPC bit of the standard event status register after all operations being executed are finished.	*OPC	· This command sets the OPC bit after processing of the command received before the "*OPC" command completes.	*OPC
*OPC?	Returns "1" after all operations being executed are finished.	*OPC?	· This command returns "1" after processing of the command received before the "*OPC" command completes.	*OPC?

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