

## Communication Command Instruction Manual

PW3335(-01,-02,-03,-04)  
Power Meter

- ✓ This manual explains the communication commands for the above Power Meter models only.
- ✓ Be sure to review the Instruction Manual for your Power Meter before using the instrument.
- ✓ Please refer to the instruction manual for your Power Meter for details regarding command settings.
- ✓ All reasonable care has been taken in the production of this manual, but if you find any points which are unclear or in error, please contact your supplier or the International Sales and Marketing Department at HIOKI headquarters.
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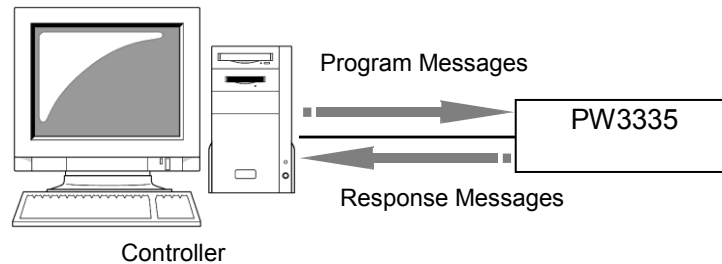
# 1 Introduction

This manual is for Power Meter models PW3335(-01, -02, -03,-04).

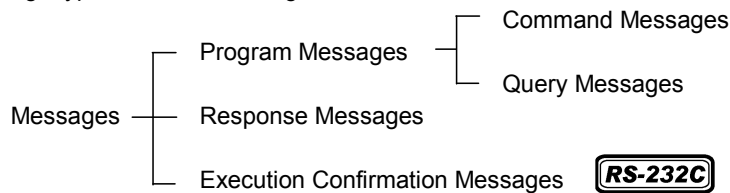
Messages are provided in the interface to control the Power Meter.

There are two types of messages: program messages that are sent from the controller (such as a computer) to the Power Meter and response messages that are sent from the Power Meter to the controller.

There are also execution confirmation messages for synchronization with the controller in the RS-232C interface.



Message types are further categorized as follows.



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

When connecting via LAN, connect to TCP/IP port 3300.

**LAN**

## NOTE

During communication the Power Meter will enter the Remote state and the **REMOTE Indicator** on the unit will turn ON.

When this occurs, all operation keys except for **SHIFT(EXIT/LOCAL)** will be disabled.

However, if the Power Meter is in the Local Lock Out state via GP-IB (GP-IB command [LLO:Local Lock Out -> P11](#)), the **SHIFT(EXIT/LOCAL) Key** will also be disabled. If this occurs, execute the GTL (Go To Local) interface function or turn the Power Meter OFF and ON again to return to the Local state.

If the Power Meter enters the Remote state when on the settings screen, it will automatically change to the measurement display.

## 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 voltage range.

**:VOLTAGE:RANGE 300**

↑
↑
↑  
 Header portion      Space      Data portion

#### (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 range

**:VOLTAGE:RANGE?**

↑
↑  
 Header portion      Question mark

See: "Headers (p. 2)", "Separators (p. 3)", "Data Formats (p.4)"

### ■ Response Messages

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

Header ON                      **:VOLTAGE:RANGE 300**  
Header OFF                    **300**  
                                      (The current voltage range is 300 V.)

At power-on, Header ON is selected.

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

### ■ 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.

|                 |                   |
|-----------------|-------------------|
| <b>DISPLAY?</b> | OK ( long form )  |
| <b>DISP?</b>    | OK ( short form ) |
| <b>DISPL?</b>   | Error             |
| <b>DIS?</b>     | 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.

**:ESE0**

- **Headers for Compound Commands**

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

- **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 query the instrument about the results of operations, measured values, and the current states of instrument settings.

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

**:HOLD?**

**:VOLTage:RANGe?**

Characters within square brackets [ ] may be omitted.

**:MEASure[:NORMAL]:VALue?**



Either form is valid

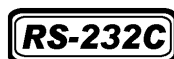
**:MEASure:VALue?**

## ■ Message Terminators

The instrument recognizes the following message terminators (delimiters):



- LF
- CR+LF
- EOI
- LF with an EOI



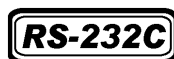
- LF
- CR+LF

Depending on the instrument's interface settings, the following can be selected as the terminator for response messages.

For information on settings, see "Terminator Setting" (p. 111).



- LF with an EOI
- CR+ LF with an EOI (default)



- LF
- CR+LF (default)

## ■ Separators

(1) **Message Unit Separator**

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

**:VOLTage:RANGe 300;AVERaging 10**

- 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).

**: VOLTage: RANGe 300**

(3) **Data Separator**

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

**:MEASure? U I**

## ■ 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 portion contains **<1/0/ON/OFF>**, the operation will be the same as when 0 is OFF and 1 is ON.

**:HEADER** OFF

### (2) Decimal Numeric Data

Three formats are used for numeric data: 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 or truncated.

- 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.

**:AVERAGING** 10



The instrument does not completely support IEEE 488.2. Use referenced data whenever possible. Also be careful not to overflow the input buffer or output queue with a single command.

## Compound Command Header Omission

When several commands having a common header are combined to form a compound command (for example, **:VOLTage:AUTO** and **:VOLTage:RANGe**), if they are written together in sequence, the common portion (here, **:VOLTage:**) can be omitted after its initial occurrence.

This common portion 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 portion.

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

Full expression

**:VOLTage:AUTO OFF;;:VOLTage:RANGe 300**

Compacted expression

**:VOLTage:AUTO OFF;RANGe 300**



The current path allows you to abbreviate the next command.

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
- Device clear
- Query error



The output queue capacity of the instrument is 4,096 bytes. If response messages overflow the buffer, a query error is generated and the output queue is cleared.

### ■ Input Buffer

The input buffer capacity of the instrument is 1,024 bytes.

If 1,024 bytes are allowed to accumulate in this buffer so that it becomes full, the GP-IB interface bus enters the waiting state until space is cleared in the buffer.

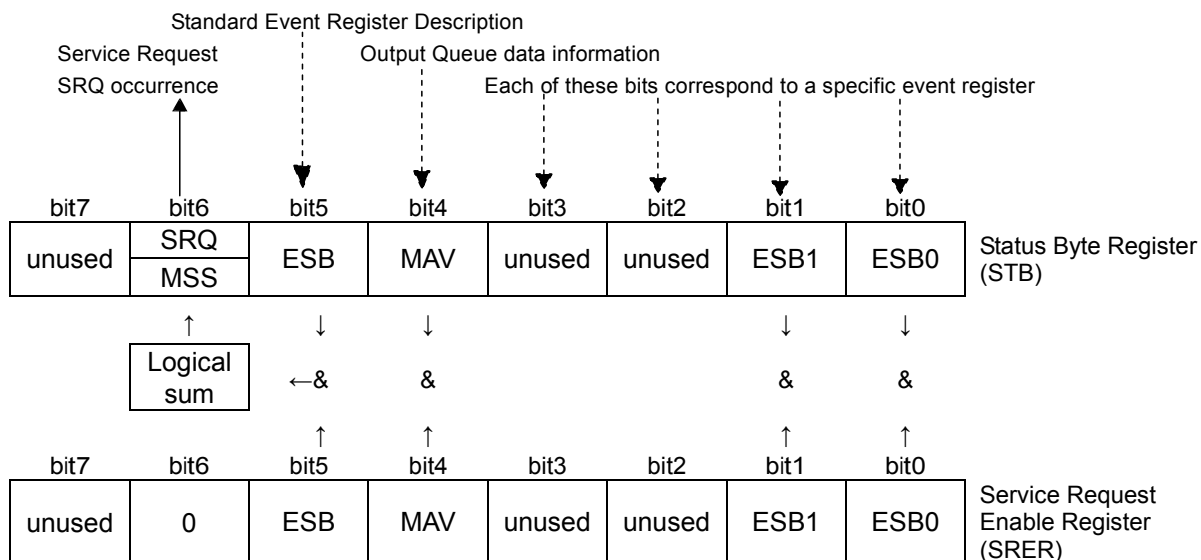
The RS-232C and LAN interfaces will not accept data beyond 1,024 bytes.

Note: Ensure that the length of a single line never exceeds 1,024 bytes.

## Status Byte Register

The instrument uses the status model defined by the IEEE 488.2 standard for items related to serial polling via the service request function.

Events are what trigger service requests.



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, which generates an SRQ (Service Request) message and dispatches a service request.

SRQs (Service Requests) can be used only with the GP-IB interface.

However, SRER setting (**\*SRE?**) and STB read (**\*STB?**) queries can be used even with the RS-232C and LAN interfaces.

## ■ Status Byte Register (STB)

During serial polling, the contents of the 8-bit Status Byte Register are sent from the instrument to the controller. When any Status Byte Register bit enabled by the Service Request Enable Register has switched from 0 to 1, the MSS bit becomes 1. Consequently, the SRQ bit is set to 1, and a service request is dispatched.

The SRQ bit is always synchronous with service requests, and is read and simultaneously cleared during serial polling. 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 |      | unused                                                                                                    |
| Bit 6 | SRQ  | Set to 1 when a service request is dispatched.                                                            |
|       | MSS  | This is the logical sum of the other bits of the Status Byte Register.                                    |
| Bit 5 | ESB  | Standard Event Status (logical sum) bit<br>This is the logical sum of the Standard Event Status Register. |
| Bit 4 | MAV  | Message available<br>Indicates that a message is present in the output queue.                             |
| Bit 3 |      | unused                                                                                                    |
| Bit 2 |      | unused                                                                                                    |
| Bit 1 | ESB1 | Event Summary (logical sum) bit 1<br>This is the logical sum of Event Status Register 1.                  |
| Bit 0 | ESB0 | Event Summary (logical sum) bit 0<br>This is the logical sum of Event Status Register 0.                  |

## ■ Service Request Enable Register (SRER)

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.

See: "Standard Event Status Enable Register (SESER)" (p. 9)

The Standard Event Status Register is cleared in the following situations:

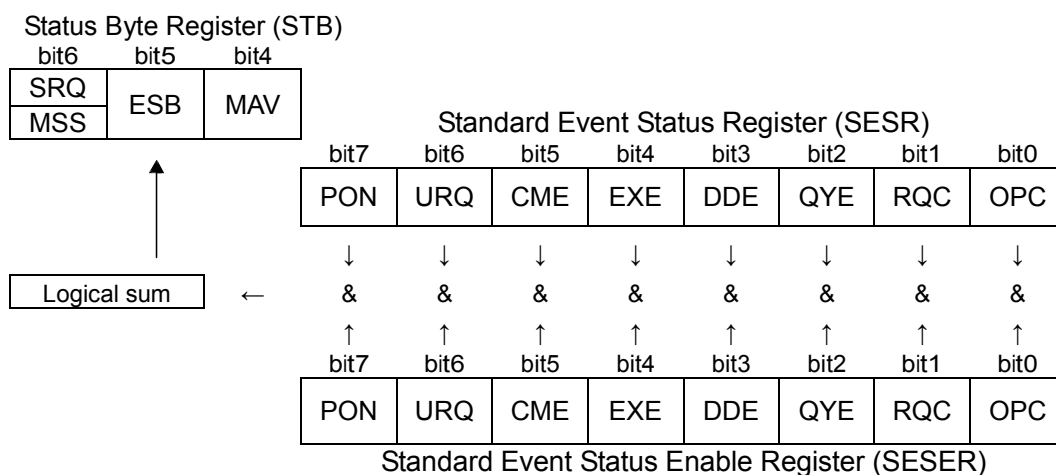
- When a **\*CLS** command is executed
- When an event register query (**\*ESR?**) is executed
- When the instrument is powered on

|       |                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|-------|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Bit 7 | PON             | <b>Power-On Flag</b><br>Set to 1 when the power is turned on, or upon recovery from an outage.                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Bit 6 | URQ             | <b>User Request</b><br>unused                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Bit 5 | CME             | <b>Command error (The command to the message terminator is ignored.)</b><br>This bit is set to 1 when a received command contains a syntactic or semantic error: <ul style="list-style-type: none"> <li>• Program header error</li> <li>• Incorrect number of data parameters</li> <li>• Invalid parameter format</li> <li>• Received a command not supported by the instrument</li> </ul>                                                                                                                                                         |
| Bit 4 | EXE             | <b>Execution Error</b><br>This bit is set to 1 when a received command cannot be executed for some reason. <ul style="list-style-type: none"> <li>• The specified data value is outside of the set range</li> <li>• The specified data cannot be set (data format discrepancy)</li> <li>• Execution is prevented by some other operation being performed</li> </ul>                                                                                                                                                                                |
| Bit 3 | DDE             | <b>Device-dependent Error</b><br>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. <ul style="list-style-type: none"> <li>• An internal error occurred and execution cannot be performed (error displayed)</li> <li>• A command was received that cannot be executed during a restricted operation (integration, hold, etc.)</li> <li>• When "o.r", "S.Err" or "-----" occurs and the error data is read by a <a href="#">*MEASure?</a> query.</li> </ul> |
| Bit 2 | QYE             | <b>Query Error (the output queue is cleared)</b><br>This bit is set to 1 when a query error is detected by the output queue control. <ul style="list-style-type: none"> <li>• When an attempt is made to read the output queue when the output queue is empty (GP-IB only)</li> <li>• When the data overflows the output queue</li> <li>• When the next command is received while there is data in the output queue</li> <li>• When there is a query after a <a href="#">*IDN?</a> on the same line.</li> </ul>                                    |
| Bit 1 | RQC<br>(unused) | <b>Request Control</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Bit 0 | OPC             | <b>Operation Complete</b><br>This bit is set to 1 in response to an <a href="#">*OPC</a> command. <ul style="list-style-type: none"> <li>• It indicates the completion of operations of all messages up to the <b>*OPC</b> command</li> </ul>                                                                                                                                                                                                                                                                                                      |

## ■ 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)



## ■ Device-specific Event Status Registers (ESR0, and ESR1)

This instrument provides four 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, the following happens:

- For Event Status Register 0, bit 0 (ESB0) of the Status Byte Register (STB) is set to 1.
- For Event Status Register 1, bit 1 (ESB1) of the Status Byte Register (STB) is set to 1.

Event Status Registers 0 through 1 are cleared in the following situations:

- When a **\*CLS** command is executed
- When an Event Status Register query (:**ESR0?**, or :**ESR1?**) is executed
- When the instrument is powered on

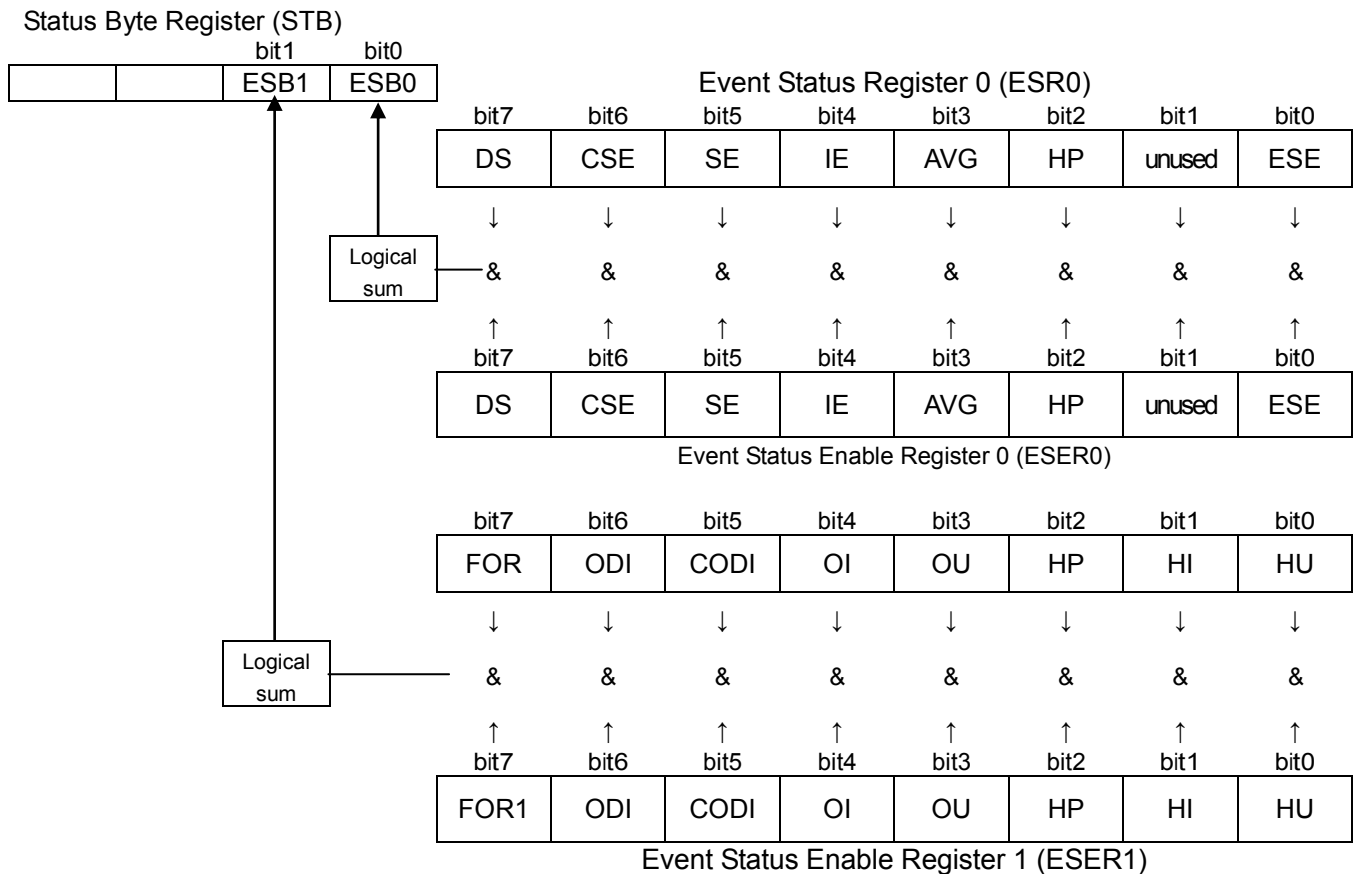
### Event Status Register 0 (ESR0)

|       |                           |                                                                                                                       |
|-------|---------------------------|-----------------------------------------------------------------------------------------------------------------------|
| Bit 7 | <b>DataSet</b>            | Data updated.                                                                                                         |
| Bit 6 | <b>Change Setting Err</b> | Data became invalid due to a hardware-related setting change. (For example, immediately after the range was changed.) |
| Bit 5 | <b>SyncErr</b>            | A synchronization error occurred on ch1, ch2, or ch3.                                                                 |
| Bit 4 | <b>IntegrateEnd</b>       | Integration has completed.                                                                                            |
| Bit 3 | <b>AVeraGe update</b>     | Averaged data updated.                                                                                                |
| Bit 2 | <b>Current Protection</b> | Instrument protection mode activated.                                                                                 |
| Bit 1 | ---                       | Unused.                                                                                                               |
| Bit 0 | <b>Ext.Sync Error</b>     | Failed external synchronization for the data update.                                                                  |

### Event Status Register 1 (ESR1)

|       |                                  |                                                                                       |
|-------|----------------------------------|---------------------------------------------------------------------------------------|
| Bit 7 | <b>Frequency Out of Range</b>    | The frequency(voltage or current) is invalid.                                         |
| Bit 6 | <b>Over DataIntegrate</b>        | A peak overflow of voltage or current occurred in the active power integration value. |
| Bit 5 | <b>CurrentOver DataIntegrate</b> | A peak overflow of current occurred in the current integration value.                 |
| Bit 4 | <b>Over-I</b>                    | A peak overflow occurred in the current input.                                        |
| Bit 3 | <b>Over-U</b>                    | A peak overflow occurred in the voltage input.                                        |
| Bit 2 | <b>High-P</b>                    | The active power is over range.                                                       |
| Bit 1 | <b>High-I</b>                    | The current is over range.                                                            |
| Bit 0 | <b>High-U</b>                    | The voltage is over range.                                                            |

Event Status Register 0 to 1 (ESR0 to ESR1) and  
Event Status Enable Register 0 to 1 (ESER0 to ESER1)



## ■ Register Reading and Writing

| Register                              | Read          | Write        |
|---------------------------------------|---------------|--------------|
| Status Byte Register                  | <b>*STB?</b>  | -            |
| Service Request Enable Register       | <b>*SRE?</b>  | <b>*SRE</b>  |
| Standard Event Status Register        | <b>*ESR?</b>  | -            |
| Standard Event Status Enable Register | <b>*ESE?</b>  | <b>*ESE</b>  |
| Event Status Register 0               | <b>:ESR0?</b> | -            |
| Event Status Enable Register 0        | <b>:ESE0?</b> | <b>:ESE0</b> |
| Event Status Register 1               | <b>:ESR1?</b> | -            |
| Event Status Enable Register 1        | <b>:ESE1?</b> | <b>:ESE1</b> |

## ■ GP-IB Commands

The following commands can be used through interface functions.

| Command    | Description                                                                         |
|------------|-------------------------------------------------------------------------------------|
| <b>GTL</b> | <b>Go To Local</b> Changes the instrument from the Remote state to the Local state. |
| <b>LLO</b> | <b>Local Lock Out</b> Locks all keys on the instrument, including the Local Key.    |
| <b>DCL</b> | <b>Device CLear</b> Clears the input buffer and output queue.                       |
| <b>SDC</b> | <b>Selected Device Clear</b> Clears the input buffer and output queue.              |
| <b>GET</b> | <b>Group Execute Trigger</b> Updates the displayed value while it is being held.    |

## Initialization Items

| Item                                    | Initialization Method | At Power-on | System Reset | *RST Command | Device Clear (GP-IB only) | *CLS Command | Factory Default |
|-----------------------------------------|-----------------------|-------------|--------------|--------------|---------------------------|--------------|-----------------|
| GP-IB address                           |                       | -           | -            | -            | -                         | -            | 1               |
| RS-232C setting (baud rate)             |                       | -           | -            | -            | -                         | -            | 38400           |
| LAN setting                             |                       | -           | -            | -            | -                         | -            | *4              |
| Device-specific functions (range, etc.) |                       | -           | •            | •            | -                         | -            | *4              |
| Output Queue                            |                       | •           | •            | -            | •                         | -            | •               |
| Input Buffer                            |                       | •           | •            | -            | •                         | -            | •               |
| Status Byte Register                    |                       | •           | •            | -            | -*1                       | •*2          | •               |
| Event registers                         |                       | •*3         | •            | -            | -                         | •            | •               |
| Enable register                         |                       | •           | •            | -            | -                         | -            | 0               |
| Current path                            |                       | •           | •            | -            | •                         | -            | •               |
| Headers on/off                          |                       | •           | •            | •            | -                         | -            | ON              |
| Output items                            |                       | •           | •            | •            |                           |              | *5,             |
| Response message terminator             |                       | •           | •            | -            | -                         | -            | CR+LF           |
| Response message separator              |                       | •           | •            | •            | -                         | -            | ;               |

\*1. Only the MAV bit (bit 4) is cleared.

\*2. All bits except the MAV bit are cleared.

\*3. Except the PON bit (bit 7).

\*4. Refer to the user's manual for the instrument.

\*5. See below.

### Output Item Initialization

| Measurement Item                           |                      |
|--------------------------------------------|----------------------|
| Voltage (U)                                | ○                    |
| Current (I)                                | ○                    |
| Active power (P)                           | ○                    |
| Apparent power (S)                         | ○                    |
| Reactive power (Q)                         | ○                    |
| Power factor (PF)                          | ○                    |
| Phase angle (DEG)                          | ○                    |
| Voltage frequency (FREQU)                  | ○                    |
| Current frequency (FREQI)                  | ○                    |
|                                            |                      |
| Harmonic wave voltage effective value (HU) | ○ (first-order only) |
| Harmonic wave current effective value (HI) | ○ (first-order only) |
| Harmonic wave power effective value (HP)   | ○ (first-order only) |
|                                            |                      |

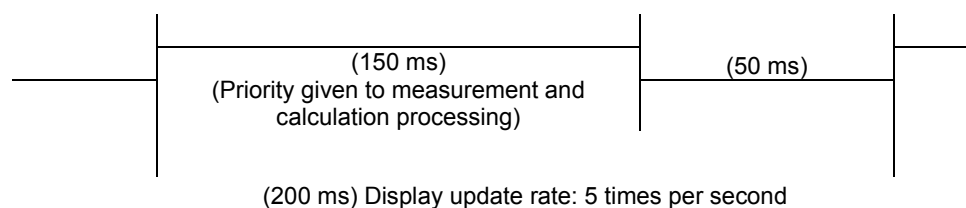
Output for all items other than those listed above is OFF by default.

## Command Execution Time

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

However, the command execution time for commands with data is the time described according to the data format specified in the <data portion>, and for query commands it is the time when the header is ON.

- The instrument performs measurements, calculations, and updates the display repeatedly in 200 ms cycles. Measurements and calculations are given priority over command processing, and require a maximum of 150 ms. Therefore, a maximum delay of 150 ms may be encountered from the time a command is received until analysis begins.



- Updating the display may be delayed if the analysis processing is not completed in time, even if the internal processing time is met.
- All commands are sequential.
- When communicating with a controller, the time required to transfer the data must be added.  
The amount of time required for the data transfer depends on the controller (communications).  
The RS-232C transfer time for a starting bit, data length of 8, no parity bit, and a stop bit (10 bits total) with a baud rate setting of N bps is calculated as follows:  
Transfer Time T [1 character/second] = Baud Rate N [bps] / 10 [bits]  
The measurement value is 11 characters so the time required to transfer one piece of data would be 11/T.  
(Example) 9600 bps:  $11 / (9600 / 10) = 11$  ms (approximately)
- Wait a few moments after making any changes via setting commands to allow the measurements to stabilize.

| Command                   | Execution time (excluding communication time and delays to the start of analysis) |
|---------------------------|-----------------------------------------------------------------------------------|
| <b>*WAI</b>               | 200ms or less                                                                     |
| <b>The other commands</b> | 10 ms or less                                                                     |

## 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
- Query Error**  
When the response message exceeds 4,000 bytes  
When there is a query after an **\*IDN?** query
- Execution Error**  
When invalid character or numeric data is present
- Device-dependent Error**  
When an error occurs during self-testing  
When a restricted operation (such as changing the range) is attempted during an integration operation (when the INTEGRATOR indicator is lit or flashing)  
When a restricted operation (such as changing the range) is attempted during the Hold state  
When the **\*TRG** command is executed in any state other than the Hold state

Note:

A command error will always occur if a message is spelled incorrectly or if any data is present after a query.

When an error occurs with a query, no response message will be generated for that query.

## 2 Message List

The information in angled brackets < > represents the data format.

When the GP-IB interface is used, you can send an SRQ interrupt to the controller by setting the Event Status Register and \*SRE.

### Standard Commands

| Message      | Data Formats<br>(Response data for queries)                                                     | Description                                                                         | Reference<br>Page |
|--------------|-------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------|
| <b>*CLS</b>  | _____                                                                                           | Clears the event registers and the Status Byte Register.                            | 35                |
| <b>*ESE</b>  |                                                                                                 | Sets/Queries the Standard Event                                                     |                   |
| <b>*ESE?</b> | 0 to 255                                                                                        | Status Enable Register.                                                             | 35                |
| <b>*ESR?</b> | 0 to 255                                                                                        | Queries the Standard Event Status Register.                                         | 35                |
| <b>*IDN?</b> | <Manufacturer name>,<br><Model name>,<br><Model type>,<br><Software version><br><Serial number> | Queries the Device ID.                                                              | 33                |
| <b>*OPC</b>  | _____                                                                                           | Sets bit 0 of the Standard Event Status Register to 1 after an operation completes. | 34                |
| <b>*OPC?</b> | 1                                                                                               | Queries execution completion.                                                       | 34                |
| <b>*OPT?</b> | _____                                                                                           | Queries the device options.                                                         | 33                |
| <b>*RST</b>  | _____                                                                                           | Initializes the device.                                                             | 33                |
| <b>*SRE</b>  |                                                                                                 | Sets/Queries the Service Request Enable                                             |                   |
| <b>*SRE?</b> | 0 to 127                                                                                        | Register.                                                                           | 36                |
| <b>*STB?</b> | 0 to 127                                                                                        | Queries the Status Byte Register.                                                   | 36                |
| <b>*TRG</b>  | _____                                                                                           | Updates the display once.                                                           | 36                |
| <b>*TST?</b> | 0 to 4                                                                                          | Initiates a self-test and queries the result.                                       | 34                |
| <b>*WAI</b>  | _____                                                                                           | Waits until the next display update completes.                                      | 34                |

### Device-specific Commands (Event Registers)

| Message       | Data Formats<br>(Response data for queries) | Description                                  | Reference<br>Page |
|---------------|---------------------------------------------|----------------------------------------------|-------------------|
| <b>:ESE0</b>  |                                             | Sets/Queries Event Status Enable Register 0. |                   |
| <b>:ESE0?</b> | 0 to 255                                    |                                              | 37                |
| <b>:ESR0?</b> | (0 to 255)                                  | Queries Event Status Register 0.             | 37                |
| <b>:ESE1</b>  |                                             | Sets/Queries Event Status Enable Register 1. |                   |
| <b>:ESE1?</b> | 0 to 255                                    |                                              | 37                |
| <b>:ESR1?</b> | (0 to 255)                                  | Queries Event Status Register 1.             | 37                |

## Device-specific Commands (Measurement Settings)

| Message                                         | Data Formats<br>(Response data for queries) | Description                                                                 | Reference<br>Page |
|-------------------------------------------------|---------------------------------------------|-----------------------------------------------------------------------------|-------------------|
| :AVERaging<br>:AVERaging?                       | 1/2/5/10/25/50/100                          | Sets/Queries the number of times to perform averaging.                      | 38                |
| :INTEGrate?                                     |                                             | Queries the integration set time and the integration state.                 | 39                |
| :INTEGrate:STATe<br>:INTEGrate:STATe?           | START/STOP/RESET                            | Sets/Queries the integration state.                                         | 39                |
| :INTEGrate:TIME<br>:INTEGrate:TIME?             | <Hour(NR1)>, <Minutes(NR1)>                 | Sets/Queries the integration time.                                          | 40                |
| :INTEGrate:AUTO<br>:INTEGrate:AUTO?             | OFF/ON                                      | Sets/Queries the auto-rage integration.                                     | 40                |
| :HARMonic:ORDer:UPPer<br>:HARMonic:ORDer:UPPer? | <Order (2 to 50)>                           | Sets/Queries the upper limit order for harmonic wave analysis.              | 40                |
| :HOLD<br>:HOLD?                                 | OFF/ON/MAX/MIN/RESET                        | Sets/Queries the holds or releases the display value.                       | 41                |
| :ZEROadjust                                     |                                             | Performs a zero adjustment.                                                 | 41                |
| :ZEROadjust                                     | <Zero adjustment execution state>           | Queries the zero adjustment execution state.                                | 41                |
| :DEMAg<br>:DEMAg?                               | <Zero adjustment execution state>           | Performs a zero adjustment.<br>Queries the zero adjustment execution state. | 41                |
| :SYNC:CONTRol<br>:SYNC:CONTRol?                 | <Synchronization control setting>           | Sets/Queries the synchronization control function.                          | 42                |

## Device-specific Commands (Voltage Range)

| Message                                           | Data Formats<br>(Response data for queries) | Description                                                            | Reference<br>Page |
|---------------------------------------------------|---------------------------------------------|------------------------------------------------------------------------|-------------------|
| :VOLTage?                                         | (<AUTO>, <Voltage Range>)                   | Queries the voltage range setting item (ch1 only).                     | 42                |
| :VOLTage:AUTO<br>:VOLTage:AUTO?                   | ON/OFF                                      | Sets (all channels) or queries (ch1 only) the voltage automatic range. | 42                |
| :VOLTage:RANGe<br>:VOLTage:RANGe?                 | <Voltage Range (NR1)>                       | Sets (all channels) or queries (ch1 only) the voltage range.           | 43                |
| :VOLTage:SELEct:ALL?                              | ON/OFF                                      | Sets whether to select all voltage ranges.                             | 45                |
| :VOLTage:SELEct:U6V<br>:VOLTage:SELEct:U6V?       | ON/OFF                                      | Sets/Queries whether to select the 6 V voltage range.                  | 45                |
| :VOLTage:SELEct:U15V<br>:VOLTage:SELEct:U15V?     | ON/OFF                                      | Sets/Queries whether to select the 15 V voltage range.                 | 45                |
| :VOLTage:SELEct:U30V<br>:VOLTage:SELEct:U30V?     | ON/OFF                                      | Sets/Queries whether to select the 30 V voltage range.                 | 45                |
| :VOLTage:SELEct:U60V<br>:VOLTage:SELEct:U60V?     | ON/OFF                                      | Sets/Queries whether to select the 60 V voltage range.                 | 45                |
| :VOLTage:SELEct:U150V<br>:VOLTage:SELEct:U150V?   | ON/OFF                                      | Sets/Queries whether to select the 150 V voltage range.                | 45                |
| :VOLTage:SELEct:U300V<br>:VOLTage:SELEct:U300V?   | ON/OFF                                      | Sets/Queries whether to select the 300 V voltage range.                | 45                |
| :VOLTage:SELEct:U600V<br>:VOLTage:SELEct:U600V?   | ON/OFF                                      | Sets/Queries whether to select the 600 V voltage range.                | 45                |
| :VOLTage:SELEct:U1000V<br>:VOLTage:SELEct:U1000V? | ON/OFF                                      | Sets/Queries whether to select the 1,000 V voltage range.              | 45                |
| :VOLTage:SELEct<br>:VOLTage:SELEct?               | <Voltage range selection (NR1)>             | Sets/Queries whether to select the voltage range (3332-compatible).    | 45                |

## Device-specific Commands (Current Range)

| Message                 | Data Formats<br>(Response data for queries) | Description                                                                   | Reference<br>Page |
|-------------------------|---------------------------------------------|-------------------------------------------------------------------------------|-------------------|
| :CURRent?               | (<AUTO>, <Current Range>, ...)              | Queries the current range setting item (ch1 only).                            | 46                |
| :CURRent:AUTO           | ON/OFF                                      | Sets (all channels) or queries (ch1 only) the current automatic range.        | 46                |
| :CURRent:AUTO?          |                                             |                                                                               |                   |
| :CURRent:RANGe          | <Current Range (NR1)>                       | Sets (all channels) or queries (ch1 only) the current range.                  | 47                |
| :CURRent:RANGe?         |                                             |                                                                               |                   |
| :CURRent:SElect:ALL     | ON/OFF                                      | Sets whether to select all current ranges.                                    | 47                |
| :CURRent:SElect:I1mA    | ON/OFF                                      | Sets/Queries whether to select the 1 mA current range (*1).                   | 48                |
| :CURRent:SElect:I1mA?   |                                             |                                                                               |                   |
| :CURRent:SElect:I2mA    | ON/OFF                                      | Sets/Queries whether to select the 2 mA current range (*1).                   | 48                |
| :CURRent:SElect:I2mA?   |                                             |                                                                               |                   |
| :CURRent:SElect:I5mA    | ON/OFF                                      | Sets/Queries whether to select the 5 mA current range (*1).                   | 48                |
| :CURRent:SElect:I5mA?   |                                             |                                                                               |                   |
| :CURRent:SElect:I10mA   | ON/OFF                                      | Sets/Queries whether to select the 10 mA current range (*1).                  | 48                |
| :CURRent:SElect:I10mA?  |                                             |                                                                               |                   |
| :CURRent:SElect:I20mA   | ON/OFF                                      | Sets/Queries whether to select the 20 mA current range (*1).                  | 48                |
| :CURRent:SElect:I20mA?  |                                             |                                                                               |                   |
| :CURRent:SElect:I50mA   | ON/OFF                                      | Sets/Queries whether to select the 50 mA current range (*1).                  | 48                |
| :CURRent:SElect:I50mA?  |                                             |                                                                               |                   |
| :CURRent:SElect:I100mA  | ON/OFF                                      | Sets/Queries whether to select the 100 mA current range (*1).                 | 48                |
| :CURRent:SElect:I200mA  | ON/OFF                                      | Sets/Queries whether to select the 200 mA current range (*1).                 | 48                |
| :CURRent:SElect:I200mA? |                                             |                                                                               |                   |
| :CURRent:SElect:I500mA  | ON/OFF                                      | Sets/Queries whether to select the 500 mA current range (*1).                 | 48                |
| :CURRent:SElect:I500mA? |                                             |                                                                               |                   |
| :CURRent:SElect:I1A     | ON/OFF                                      | Sets/Queries whether to select the 1 A current range (*1).                    | 48                |
| :CURRent:SElect:I1A?    |                                             |                                                                               |                   |
| :CURRent:SElect:I2A     | ON/OFF                                      | Sets/Queries whether to select the 2 A current range (*1).                    | 48                |
| :CURRent:SElect:I2A?    |                                             |                                                                               |                   |
| :CURRent:SElect:I5A     | ON/OFF                                      | Sets/Queries whether to select the 5 A current range (*1).                    | 48                |
| :CURRent:SElect:I5A?    |                                             |                                                                               |                   |
| :CURRent:SElect:I10A    | ON/OFF                                      | Sets/Queries whether to select the 10 A current range (*1).                   | 48                |
| :CURRent:SElect:I10A?   |                                             |                                                                               |                   |
| :CURRent:SElect:I20A?   | ON/OFF                                      | Sets/Queries whether to select the 20 A current range (*1).                   | 48                |
| :CURRent:SElect         | ON/OFF                                      | Sets/queries whether to select the current range (3332-compatible).           | 49                |
| :CURRent:SElect?        |                                             |                                                                               |                   |
| :CURRent:EXTRange       | <Clamp Current Range>                       | Sets (all channels) or queries (ch1 only) the current range (current sensor). | 50                |
| :CURRent:EXTRange?      |                                             |                                                                               |                   |
| :CURRent:SElect:C1A     | ON/OFF                                      | Sets or queries whether to select the 1 A current sensor range.               | 48                |
| :CURRent:SElect:C1A?    |                                             |                                                                               |                   |
| :CURRent:SElect:C2A     | ON/OFF                                      | Sets or queries whether to select the 2 A current sensor range.               | 48                |
| :CURRent:SElect:C2A?    |                                             |                                                                               |                   |
| :CURRent:SElect:C5A?    | ON/OFF                                      | Sets or queries whether to select the 5 A current sensor range.               | 48                |
| :CURRent:TYPE           | <Current Sensor Type>                       | Sets (all channels) or queries (ch1 only) the current sensor type.            | 49                |
| :CURRent:TYPE?          |                                             |                                                                               |                   |

\*1: There is no abbreviated format available for the current range portion of the command (the "m" cannot be omitted).

## Device-specific Commands (Frequency Range [Zero-crossing Filter])

The frequency range and zero-crossing filter settings are linked.

| Message           | Data Formats<br>(Response data for queries) | Description                                                 | Reference<br>Page |
|-------------------|---------------------------------------------|-------------------------------------------------------------|-------------------|
| :FREquency?       | <Frequency Range (NR3)>                     | Queries the frequency range (zero-crossing filter).         | 51                |
| :FREquency:RANGe  | <Frequency Range (NR3)>                     | Sets or queries the frequency range (zero-crossing filter). | 51                |
| :FREquency:RANGe? | <Frequency Range (NR3)>                     |                                                             |                   |

## Device-specific Commands (Synchronization Source)

| Message                      | Data Formats<br>(Response data for queries) | Description                                                            | Reference<br>Page |
|------------------------------|---------------------------------------------|------------------------------------------------------------------------|-------------------|
| :SOURce                      | <Synchronization Source>                    | Sets (all channels) or queries (ch1 only) the synchronization source.  | 52                |
| :SOURce?                     |                                             |                                                                        |                   |
| :SOURce:TIMEOut              | 0.1/1/10                                    | Sets (all channels) or queries (ch1 only) the synchronization timeout. | 52                |
| :SOURce:TIMEOut?             |                                             |                                                                        |                   |
| :SOURce:FILTer:LEVel:ALL     | 1 ~ 15                                      | Sets all synchronization source detection levels.                      | 52                |
| :SOURce:FILTer:LEVel:U6V     | 1 ~ 15                                      | Sets/Queries the voltage synchronization source detection level.       | 53                |
| :SOURce:FILTer:LEVel:U6V?    |                                             |                                                                        |                   |
| :SOURce:FILTer:LEVel:U15V    | 1 ~ 15                                      | Sets/Queries the voltage synchronization source detection level.       | 53                |
| :SOURce:FILTer:LEVel:U15V?   |                                             |                                                                        |                   |
| :SOURce:FILTer:LEVel:U30V    | 1 ~ 15                                      | Sets/Queries the voltage synchronization source detection level.       | 53                |
| :SOURce:FILTer:LEVel:U30V?   |                                             |                                                                        |                   |
| :SOURce:FILTer:LEVel:U60V    | 1 ~ 15                                      | Sets/Queries the voltage synchronization source detection level.       | 53                |
| :SOURce:FILTer:LEVel:U60V?   |                                             |                                                                        |                   |
| :SOURce:FILTer:LEVel:U150V   | 1 ~ 15                                      | Sets/Queries the voltage synchronization source detection level.       | 53                |
| :SOURce:FILTer:LEVel:U150V?  |                                             |                                                                        |                   |
| :SOURce:FILTer:LEVel:U300V   | 1 ~ 15                                      | Sets/Queries the voltage synchronization source detection level.       | 53                |
| :SOURce:FILTer:LEVel:U300V?  |                                             |                                                                        |                   |
| :SOURce:FILTer:LEVel:U600V   | 1 ~ 15                                      | Sets/Queries the voltage synchronization source detection level.       | 53                |
| :SOURce:FILTer:LEVel:U600V?  |                                             |                                                                        |                   |
| :SOURce:FILTer:LEVel:U1000V  | 1 ~ 15                                      | Sets/Queries the voltage synchronization source detection level.       | 53                |
| :SOURce:FILTer:LEVel:U1000V? |                                             |                                                                        |                   |
| :SOURce:FILTer:LEVel:1mA     | 1 ~ 15                                      | Sets/Queries the current synchronization source detection level (*1).  | 53                |
| :SOURce:FILTer:LEVel:1mA?    |                                             |                                                                        |                   |
| :SOURce:FILTer:LEVel:12mA    | 1 ~ 15                                      | Sets/Queries the current synchronization source detection level (*1).  | 53                |
| :SOURce:FILTer:LEVel:12mA?   |                                             |                                                                        |                   |
| :SOURce:FILTer:LEVel:15mA    | 1 ~ 15                                      | Sets/Queries the current synchronization source detection level (*1).  | 53                |
| :SOURce:FILTer:LEVel:15mA?   |                                             |                                                                        |                   |
| :SOURce:FILTer:LEVel:110mA   | 1 ~ 15                                      | Sets/Queries the current synchronization source detection level (*1).  | 53                |
| :SOURce:FILTer:LEVel:110mA?  |                                             |                                                                        |                   |
| :SOURce:FILTer:LEVel:120mA   | 1 ~ 15                                      | Sets/Queries the current synchronization source detection level (*1).  | 53                |
| :SOURce:FILTer:LEVel:120mA?  |                                             |                                                                        |                   |
| :SOURce:FILTer:LEVel:150mA   | 1 ~ 15                                      | Sets/Queries the current synchronization source detection level (*1).  | 53                |
| :SOURce:FILTer:LEVel:150mA?  |                                             |                                                                        |                   |
| :SOURce:FILTer:LEVel:1100mA  | 1 ~ 15                                      | Sets/Queries the current synchronization source detection level (*1).  | 53                |
| :SOURce:FILTer:LEVel:1100mA? |                                             |                                                                        |                   |
| :SOURce:FILTer:LEVel:1200mA  | 1 ~ 15                                      | Sets/Queries the current synchronization source detection level (*1).  | 53                |
| :SOURce:FILTer:LEVel:1200mA? |                                             |                                                                        |                   |
| :SOURce:FILTer:LEVel:1500mA  | 1 ~ 15                                      | Sets/Queries the current synchronization source detection level (*1).  | 53                |
| :SOURce:FILTer:LEVel:1500mA? |                                             |                                                                        |                   |
| :SOURce:FILTer:LEVel:11A     | 1 ~ 15                                      | Sets/Queries the current synchronization source detection level.       | 53                |
| :SOURce:FILTer:LEVel:11A?    |                                             |                                                                        |                   |
| :SOURce:FILTer:LEVel:12A     | 1 ~ 15                                      | Sets/Queries the current synchronization source detection level.       | 53                |
| :SOURce:FILTer:LEVel:12A?    |                                             |                                                                        |                   |

|                            |        |                                                                                       |    |
|----------------------------|--------|---------------------------------------------------------------------------------------|----|
| :SOURce:FILTer:LEVel:15A?  |        | source detection level.                                                               |    |
| :SOURce:FILTer:LEVel:110A  | 1 ~ 15 | Sets or queries the current synchronization source detection level.                   | 53 |
| :SOURce:FILTer:LEVel:110A? |        |                                                                                       |    |
| :SOURce:FILTer:LEVel:120A  | 1 ~ 15 | Sets or queries the current synchronization source detection level.                   | 53 |
| :SOURce:FILTer:LEVel:120A? |        |                                                                                       |    |
| :SOURce:FILTer:LEVel:C1A   | 1 ~ 15 | Sets or queries the current (external sensor) synchronization source detection level. | 54 |
| :SOURce:FILTer:LEVel:C1A?  |        |                                                                                       |    |
| :SOURce:FILTer:LEVel:C2A   | 1 ~ 15 | Sets or queries the current (external sensor) synchronization source detection level. | 54 |
| :SOURce:FILTer:LEVel:C2A?  |        |                                                                                       |    |
| :SOURce:FILTer:LEVel:C5A   | 1 ~ 15 | Sets or queries the current (external sensor) synchronization source detection level. | 54 |
| :SOURce:FILTer:LEVel:C5A?  |        |                                                                                       |    |

\*1: There is no abbreviated format available for the current range portion of the command (the “m” in “1 mA” and similar text cannot be omitted).

## Device-specific Commands (VT/CT Ratio)

| Message    | Data Formats<br>(Response data for queries) | Description                   | Reference<br>Page |
|------------|---------------------------------------------|-------------------------------|-------------------|
| :SCALE?    | (<VT Ratio>, <CT Ratio>)                    | Queries the VT and CT ratios. | 55                |
| :SCALE:VT  | <VT Ratio (NRf)>                            | Sets or queries the VT ratio. | 55                |
| :SCALE:VT? |                                             |                               |                   |
| :SCALE:CT  | <CT Ratio (NRf)>                            | Sets or queries the CT ratio. | 55                |
| :SCALE:CT? |                                             |                               |                   |

## Device-specific Commands (D/A Output)

| Message                                | Data Formats<br>(Response data for queries) | Description                                                                                                   | Reference<br>Page |
|----------------------------------------|---------------------------------------------|---------------------------------------------------------------------------------------------------------------|-------------------|
| :AOUT?                                 |                                             | Queries (D/A1 output items only)<br>D/A output items.                                                         | 56                |
| :AOUT:ITEM:DA1<br>:AOUT:ITEM:DA1?      | <Output Item>                               | Sets/Queries the D/A1 terminal output item.                                                                   | 56                |
| :AOUT:ITEM:DA2<br>:AOUT:ITEM:DA2?      | <Output Item>                               | Sets/Queries the D/A2 terminal output item.                                                                   | 56                |
| :AOUT:ITEM:DA3<br>:AOUT:ITEM:DA3?      | <Output Item>                               | Sets/Queries the D/A3 terminal output item.                                                                   | 56                |
| :AOUT:ITEM:DA4<br>:AOUT:ITEM:DA4?      | <Output Item>                               | Sets/Queries the D/A4 terminal output item.                                                                   | 56                |
| :AOUT:ITEM:DA5<br>:AOUT:ITEM:DA5?      | <Output Item>                               | Sets/Queries the D/A5 terminal output item.                                                                   | 56                |
| :AOUT:ITEM:DA6<br>:AOUT:ITEM:DA6?      | <Output Item>                               | Sets/Queries the D/A6 terminal output item.                                                                   | 56                |
| :AOUT:ITEM:DA7<br>:AOUT:ITEM:DA7?      | <Output Item>                               | Sets/Queries the D/A7 terminal output item.                                                                   | 56                |
| :AOUT:IRANge:DA1<br>:AOUT: IRANge:DA1? | <Integrated value current<br>range (NR2)>   | Sets/Queries the current range selected output<br>item when outputting the D/A1 terminal<br>integrated value. | 57                |
| :AOUT:IRANge:DA2<br>:AOUT: IRANge:DA2? | <Integrated value current<br>range (NR2)>   | Sets/Queries the current range selected output<br>item when outputting the D/A2 terminal<br>integrated value. | 57                |
| :AOUT:IRANge:DA3<br>:AOUT: IRANge:DA3? | <Integrated value current<br>range (NR2)>   | Sets/Queries the current range selected output<br>item when outputting the D/A3 terminal<br>integrated value. | 57                |
| :AOUT:IRANge:DA4<br>:AOUT: IRANge:DA4? | <Integrated value current<br>range (NR2)>   | Sets/Queries the current range selected output<br>item when outputting the D/A4 terminal<br>integrated value. | 57                |
| :AOUT:IRANge:DA5<br>:AOUT: IRANge:DA5? | <Integrated value current<br>range (NR2)>   | Sets/Queries the current range selected output<br>item when outputting the D/A5 terminal<br>integrated value. | 57                |
| :AOUT:IRANge:DA6<br>:AOUT: IRANge:DA6? | <Integrated value current<br>range (NR2)>   | Sets/Queries the current range selected output<br>item when outputting the D/A6 terminal<br>integrated value. | 57                |
| :AOUT:IRANge:DA7<br>:AOUT: IRANge:DA7? | <Integrated value current<br>range (NR2)>   | Sets/Queries the current range selected output<br>item when outputting the D/A7 terminal<br>integrated value. | 57                |

## Device-specific Commands (Instrument Display Settings)

| Message ([ ]: Can be omitted)                             | Data Formats<br>(Response data for queries)             | Description                                                               | Reference<br>Page |
|-----------------------------------------------------------|---------------------------------------------------------|---------------------------------------------------------------------------|-------------------|
| :DISPlay[:NORMAl]<br>:DISPlay[:NORMAl]?                   | (<Display a>, <Display b>,<br><Display c>, <Display d>) | Sets/Queries instrument display items (a) through (d).                    | 62                |
| :DISPlay:NORMAl:A<br>:DISPlay:NORMAl:A?                   | <Display a>                                             | Sets/Queries instrument display item (a).                                 | 62                |
| :DISPlay:NORMAl:B<br>:DISPlay:NORMAl:B?                   | <Display b>                                             | Sets/Queries instrument display item (b).                                 | 62                |
| :DISPlay:NORMAl:C<br>:DISPlay:NORMAl:C?                   | <Display c>                                             | Sets/Queries instrument display item (c).                                 | 62                |
| :DISPlay:NORMAl:D<br>:DISPlay:NORMAl:D?                   | <Display d>                                             | Sets/Queries instrument display item (d).                                 | 62                |
| :DISPlay:MODE<br>:DISPlay:MODE?                           | <Display Specification>                                 | Sets/Queries the instrument display mode (normal/harmonic wave).          | 66                |
| :DISPlay:HARMonic:ORDer<br>:DISPlay:HARMonic:ORDer?       | <Harmonic Wave Order<br>0 to 50>                        | Sets/Queries the display order for harmonic wave order common display.    | 66                |
| :DISPlay:HARMonic:B:ITEM<br>:DISPlay:HARMonic:B:ITEM?     | <Harmonic Wave<br>Display Item>                         | Sets/Queries the display item (b) for harmonic wave order common display. | 66                |
| :DISPlay:HARMonic:C:ITEM<br>:DISPlay:HARMonic:C:ITEM?     | <Harmonic Wave<br>Display Item>                         | Sets/Queries the display item (c) for harmonic wave order common display. | 66                |
| :DISPlay:HARMonic:D:ITEM<br>:DISPlay:HARMonic:D:ITEM?     | <Harmonic Wave<br>Display Item>                         | Sets/Queries the display item (d) for harmonic wave order common display. | 66                |
| :DISPlay:HORDerSel:A:ORDer<br>:DISPlay:HORDerSel:A:ORDer? | <Harmonic Wave Order<br>0 to 50>                        | Display order (a) for harmonic wave order individual display.             | 67                |
| :DISPlay:HORDerSel:A:ITEM<br>:DISPlay:HORDerSel:A:ITEM?   | <Harmonic Wave<br>Display Item>                         | Display item (a) for harmonic wave order individual display.              | 67                |
| :DISPlay:HORDerSel:B:ORDer<br>:DISPlay:HORDerSel:B:ORDer? | <Harmonic Wave Order<br>0 to 50>                        | Display order (b) for harmonic wave order individual display.             | 67                |
| :DISPlay:HORDerSel:B:ITEM<br>:DISPlay:HORDerSel:B:ITEM?   | <Harmonic Wave<br>Display Item>                         | Display item (b) for harmonic wave order individual display.              | 67                |
| :DISPlay:HORDerSel:C:ORDer<br>:DISPlay:HORDerSel:C:ORDer? | <Harmonic Wave Order<br>0 to 50>                        | Display order (c) for harmonic wave order individual display.             | 67                |
| :DISPlay:HORDerSel:C:ITEM<br>:DISPlay:HORDerSel:C:ITEM?   | <Harmonic Wave<br>Display Item>                         | Display item (c) for harmonic wave order individual display.              | 67                |
| :DISPlay:HORDerSel:D:ORDer<br>:DISPlay:HORDerSel:D:ORDer? | <Harmonic Wave Order<br>0 to 50>                        | Display order (d) for harmonic wave order individual display.             | 67                |
| :DISPlay:HORDerSel:D:ITEM<br>:DISPlay:HORDerSel:D:ITEM?   | <Harmonic Wave<br>Display Item>                         | Display item (d) for harmonic wave order individual display.              | 67                |

## Device-specific Commands (Measurement Value Output)

Note: :MEASure[:NORMAL]:ITEM:U:CH1(?) → Setting Command:MEASure[:NORMAL]:ITEM:U:CH1  
Query :MEASure[:NORMAL]:ITEM:U:CH1?

| Message ([: ]: Can be omitted)                                                   | Data Formats<br>(Response data<br>for queries) | Description                                                                        | Reference<br>Page |
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| :MEASure[:POWER]?<br>:MEASure[:NORMAl]:VALue?                                    | <Measurement Item 1> ...<br>Maximum 180        | Queries measurement data.                                                          | 68                |
| :MEASure:ITEM:ALLClear                                                           |                                                | Turns OFF all output items (including harmonic wave).                              | 75                |
| :MEASure[:NORMAl]:ITEM?                                                          |                                                | Queries output items.                                                              | 75                |
| :DATAout:ITEM(?)                                                                 | (<Output Item 1>,<br><Output Item 2>)          | “:MEASure?” query output specification (3332-compatible)                           | 76                |
| :MEASure[:NORMAL]:ITEM:STATus:INST(?)<br>:MEASure[:NORMAL]:ITEM:STATus:MAXmin(?) | <Output Item 0/1>                              | “:MEASure?” query Set/Query the measurement status output.                         | 77                |
| :MEASure[:NORMAL]:ITEM:U:ALL<br>:MEASure[:NORMAL]:ITEM:U:CH1(?)                  | <Output Item<br>(Rectification Method)>        | “:MEASure?” query Sets/Queries the voltage (instantaneous value) data output.      | 78                |
| :MEASure[:NORMAL]:ITEM:U_MAX:ALL<br>:MEASure[:NORMAL]:ITEM:U_MAX:CH1(?)          | <Output Item<br>(Rectification Method)>        | “:MEASure?” query Sets/Queries the voltage (maximum value) data output.            | 78                |
| :MEASure[:NORMAL]:ITEM:U_MIN:ALL<br>:MEASure[:NORMAL]:ITEM:U_MIN:CH1(?)          | <Output Item<br>(Rectification Method)>        | “:MEASure?” query Sets/Queries the voltage (minimum value) data output.            | 78                |
| :MEASure[:NORMAL]:ITEM:I:ALL<br>:MEASure[:NORMAL]:ITEM:I:CH1(?)                  | <Output Item<br>(Rectification Method)>        | “:MEASure?” query Sets/Queries the current (instantaneous value) data output.      | 78                |
| :MEASure[:NORMAL]:ITEM:I_MAX:ALL<br>:MEASure[:NORMAL]:ITEM:I_MAX:CH1(?)          | <Output Item<br>(Rectification Method)>        | “:MEASure?” query Sets/Queries the current (maximum value) data output.            | 78                |
| :MEASure[:NORMAL]:ITEM:I_MIN:ALL<br>:MEASure[:NORMAL]:ITEM:I_MIN:CH1(?)          | <Output Item<br>(Rectification Method)>        | “:MEASure?” query Sets/Queries the current (minimum value) data output.            | 78                |
| :MEASure[:NORMAL]:ITEM:P:ALL<br>:MEASure[:NORMAL]:ITEM:P:CH1(?)                  | <Output Item<br>(Rectification Method)>        | “:MEASure?” query Sets/Queries the active power (instantaneous value) data output. | 79                |
| :MEASure[:NORMAL]:ITEM:P_MAX:ALL<br>:MEASure[:NORMAL]:ITEM:P_MAX:CH1(?)          | <Output Item<br>(Rectification Method)>        | “:MEASure?” query Sets/Queries the active power (maximum value) data output.       | 79                |
| :MEASure[:NORMAL]:ITEM:P_MIN:ALL<br>:MEASure[:NORMAL]:ITEM:P_MIN:CH1(?)          | <Output Item<br>(Rectification Method)>        | “:MEASure?” query Sets/Queries the active power (minimum value) data output.       | 79                |

| Message ([ ]: Can be omitted)                                                   | Data Formats<br>(Response data<br>for queries) | Description                                                                                      | Reference<br>Page |
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| :MEASure[:NORMAL]:ITEM:S:ALL<br>:MEASure[:NORMAL]:ITEM:S:CH1(?)                 | <Output Item<br>(Rectification Method)>        | “:MEASure?” query<br>Sets/Queries the apparent<br>power (instantaneous<br>value) data output.    | 79                |
| :MEASure[:NORMAL]:ITEM:S_MAX:ALL<br>:MEASure[:NORMAL]:ITEM:S_MAX:CH1(?)         | <Output Item<br>(Rectification Method)>        | “:MEASure?” query<br>Sets/Queries the apparent<br>power (maximum value)<br>data output.          | 79                |
| :MEASure[:NORMAL]:ITEM:S_MIN:ALL<br>:MEASure[:NORMAL]:ITEM:S_MIN:CH1(?)         | <Output Item<br>(Rectification Method)>        | “:MEASure?” query<br>Sets/Queries the apparent<br>power (minimum value)<br>data output.          | 79                |
| :MEASure[:NORMAL]:ITEM:Q:ALL<br>:MEASure[:NORMAL]:ITEM:Q:CH1(?)                 | <Output Item<br>(Rectification Method)>        | “:MEASure?” query<br>Sets/Queries the reactive<br>power (instantaneous<br>value) data output.    | 80                |
| :MEASure[:NORMAL]:ITEM:Q_MAX:ALL<br>:MEASure[:NORMAL]:ITEM:Q_MAX:CH1(?)         | <Output Item<br>(Rectification Method)>        | “:MEASure?” query<br>Sets/Queries the reactive<br>power (maximum value)<br>data output.          | 80                |
| :MEASure[:NORMAL]:ITEM:Q_MIN:ALL<br>:MEASure[:NORMAL]:ITEM:Q_MIN:CH1(?)         | <Output Item<br>(Rectification Method)>        | “:MEASure?” query<br>Sets/Queries the reactive<br>power (minimum value)<br>output data.          | 80                |
| :MEASure[:NORMAL]:ITEM:PF:ALL<br>:MEASure[:NORMAL]:ITEM:PF:CH1(?)               | <Output Item<br>(Rectification Method)>        | “:MEASure?” query<br>Sets/Queries the power<br>factor (instantaneous<br>value) data output.      | 80                |
| :MEASure[:NORMAL]:ITEM:PF_MAX:ALL<br>:MEASure[:NORMAL]:ITEM:PF_MAX:CH1(?)       | <Output Item<br>(Rectification Method)>        | “:MEASure?” query<br>Sets/Queries the power<br>factor (maximum value)<br>data output.            | 80                |
| :MEASure[:NORMAL]:ITEM:PF_MIN:ALL<br>:MEASure[:NORMAL]:ITEM:PF_MIN:CH1(?)       | <Output Item<br>(Rectification Method)>        | “:MEASure?” query<br>Sets/Queries the power<br>factor (minimum value)<br>data output.            | 80                |
| :MEASure[:NORMAL]:ITEM:DEG:ALL<br>:MEASure[:NORMAL]:ITEM:DEG:CH1(?)             | <Output Item<br>(Rectification Method)>        | “:MEASure?” query<br>Sets/Queries the phase<br>angle (instantaneous<br>value) data output.       | 81                |
| :MEASure[:NORMAL]:ITEM:DEG_MAX:ALL<br>:MEASure[:NORMAL]:ITEM:DEG_MAX:CH1(?)     | <Output Item<br>(Rectification Method)>        | “:MEASure?” query<br>Sets/Queries the phase<br>angle (maximum value)<br>data output.             | 81                |
| :MEASure[:NORMAL]:ITEM:DEG_MIN:ALL<br>:MEASure[:NORMAL]:ITEM:DEG_MIN:CH1(?)     | <Output Item<br>(Rectification Method)>        | “:MEASure?” query<br>Sets/Queries the phase<br>angle (minimum value)<br>data output.             | 81                |
| :MEASure[:NORMAL]:ITEM:FREQU:ALL<br>:MEASure[:NORMAL]:ITEM:FREQU:CH1(?)         | <Output Setting 0/1>                           | “:MEASure?” query<br>Sets/Queries the voltage<br>frequency (instantaneous<br>value) data output. | 81                |
| :MEASure[:NORMAL]:ITEM:FREQU_MAX:ALL<br>:MEASure[:NORMAL]:ITEM:FREQU_MAX:CH1(?) | <Output Setting 0/1>                           | “:MEASure?” query<br>Sets/Queries the voltage<br>frequency (maximum<br>value) data output.       | 81                |

| Message ([ ]: Can be omitted)                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Data Formats<br>(Response data<br>for queries) | Description                                                                                      | Reference<br>Page |
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| :MEASure[:NORMAL]:ITEM:FREQU_MIN:ALL<br>:MEASure[:NORMAL]:ITEM:FREQU_MIN:CH1(?)                                                                                                                                                                                                                                                                                                                                                                                                     | <Output Setting 0/1>                           | “:MEASure?” query<br>Sets/Queries the voltage<br>frequency (minimum value)<br>data output.       | 81                |
| :MEASure[:NORMAL]:ITEM:FREQI:ALL<br>:MEASure[:NORMAL]:ITEM:FREQI:CH1(?)                                                                                                                                                                                                                                                                                                                                                                                                             | <Output Setting 0/1>                           | “:MEASure?” query<br>Sets/Queries the current<br>frequency (instantaneous<br>value) data output. | 82                |
| :MEASure[:NORMAL]:ITEM:FREQI_MAX:ALL<br>:MEASure[:NORMAL]:ITEM:FREQI_MAX:CH1(?)                                                                                                                                                                                                                                                                                                                                                                                                     | <Output Setting 0/1>                           | “:MEASure?” query<br>Sets/Queries the current<br>frequency (maximum<br>value) data output.       | 82                |
| :MEASure[:NORMAL]:ITEM:FREQI_MIN:ALL<br>:MEASure[:NORMAL]:ITEM:FREQI_MIN:CH1(?)                                                                                                                                                                                                                                                                                                                                                                                                     | <Output Setting 0/1>                           | “:MEASure?” query<br>Sets/Queries the current<br>frequency (minimum value)<br>data output.       | 82                |
| :MEASure[:NORMAL]:ITEM:TIME(?)<br><br>(Data by current range during auto-range integration)<br>:MEASure[:NORMAL]:ITEM:TIME:I200mA(?)<br>:MEASure[:NORMAL]:ITEM:TIME:I500mA(?)<br>:MEASure[:NORMAL]:ITEM:TIME:I1A(?)<br>:MEASure[:NORMAL]:ITEM:TIME:I2A(?)<br>:MEASure[:NORMAL]:ITEM:TIME:I5A(?)<br>:MEASure[:NORMAL]:ITEM:TIME:I10A(?)<br>:MEASure[:NORMAL]:ITEM:TIME:I20A(?)<br>:MEASure[:NORMAL]:ITEM:TIME:BACKup(?)                                                              | <Output Setting 0/1>                           | “:MEASure?” query<br>Sets/Queries<br>the integration time<br>data output.                        | 82                |
| :MEASure[:NORMAL]:ITEM:IH:ALL<br>:MEASure[:NORMAL]:ITEM:IH:CH1(?)<br><br>(Data by current range during auto-range integration)<br>:MEASure[:NORMAL]:ITEM:IH:CH1:I200mA(?)<br>:MEASure[:NORMAL]:ITEM:IH:CH1:I500mA(?)<br>:MEASure[:NORMAL]:ITEM:IH:CH1:I1A(?)<br>:MEASure[:NORMAL]:ITEM:IH:CH1:I2A(?)<br>:MEASure[:NORMAL]:ITEM:IH:CH1:I5A(?)<br>:MEASure[:NORMAL]:ITEM:IH:CH1:I10A(?)<br>:MEASure[:NORMAL]:ITEM:IH:CH1:I20A(?)<br>:MEASure[:NORMAL]:ITEM:IH:CH1:BACKup(?)           | <Output Item<br>(Rectification Method)>        | “:MEASure?” query<br>Sets/Queries<br>the integration current (total<br>sum) data output.         | 83                |
| :MEASure[:NORMAL]:ITEM:PIH:ALL<br>:MEASure[:NORMAL]:ITEM:PIH:CH1(?)<br><br>(Data by current range during auto-range integration)<br>:MEASure[:NORMAL]:ITEM:PIH:CH1:I200mA(?)<br>:MEASure[:NORMAL]:ITEM:PIH:CH1:I500mA(?)<br>:MEASure[:NORMAL]:ITEM:PIH:CH1:I1A(?)<br>:MEASure[:NORMAL]:ITEM:PIH:CH1:I2A(?)<br>:MEASure[:NORMAL]:ITEM:PIH:CH1:I5A(?)<br>:MEASure[:NORMAL]:ITEM:PIH:CH1:I10A(?)<br>:MEASure[:NORMAL]:ITEM:PIH:CH1:I20A(?)<br>:MEASure[:NORMAL]:ITEM:PIH:CH1:BACKup(?) | <Output Item<br>(Rectification Method)>        | “:MEASure?” query<br>Sets/Queries the positive<br>integration current data<br>output.            | 84                |

| Message ([ ]: Can be omitted)                                                                                                                                                                                                                                                                                                                                                                            | Data Formats<br>(Response data<br>for queries) | Description                                                                                                   | Reference<br>Page |
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| :MEASure[:NORMAL]:ITEM:MIH:ALL<br>:MEASure[:NORMAL]:ITEM:MIH:CH1(?)                                                                                                                                                                                                                                                                                                                                      |                                                |                                                                                                               |                   |
| (Data by current range during auto-range integration)<br>:MEASure[:NORMAL]:ITEM:MIH:CH1:I200mA(?)<br>:MEASure[:NORMAL]:ITEM:MIH:CH1:I500mA(?)<br>:MEASure[:NORMAL]:ITEM:MIH:CH1:I1A(?)<br>:MEASure[:NORMAL]:ITEM:MIH:CH1:I2A(?)<br>:MEASure[:NORMAL]:ITEM:MIH:CH1:I5A(?)<br>:MEASure[:NORMAL]:ITEM:MIH:CH1:I10A(?)<br>:MEASure[:NORMAL]:ITEM:MIH:CH1:I20A(?)<br>:MEASure[:NORMAL]:ITEM:MIH:CH1:BACKup(?) | <Output Item<br>(Rectification Method)>        | “:MEASure?” query<br>Sets/Queries the negative<br>integration current data<br>output.                         | 85                |
| :MEASure[:NORMAL]:ITEM:WP:ALL<br>:MEASure[:NORMAL]:ITEM:WP:CH1(?)                                                                                                                                                                                                                                                                                                                                        |                                                |                                                                                                               |                   |
| (Data by current range during auto-range integration)<br>:MEASure[:NORMAL]:ITEM:WP:CH1:I200mA(?)<br>:MEASure[:NORMAL]:ITEM:WP:CH1:I500mA(?)<br>:MEASure[:NORMAL]:ITEM:WP:CH1:I1A(?)<br>:MEASure[:NORMAL]:ITEM:WP:CH1:I2A(?)<br>:MEASure[:NORMAL]:ITEM:WP:CH1:I5A(?)<br>:MEASure[:NORMAL]:ITEM:WP:CH1:I10A(?)<br>:MEASure[:NORMAL]:ITEM:WP:CH1:I20A(?)<br>:MEASure[:NORMAL]:ITEM:WP:CH1:BACKup(?)         | <Output Item<br>(Rectification Method)>        | “:MEASure?” query<br>Sets/Queries<br>the integration active power<br>(total sum) data output.                 | 86                |
| :MEASure[:NORMAL]:ITEM:PWP:ALL<br>:MEASure[:NORMAL]:ITEM:PWP:CH1(?)                                                                                                                                                                                                                                                                                                                                      |                                                |                                                                                                               |                   |
| (Data by current range during auto-range integration)<br>:MEASure[:NORMAL]:ITEM:PWP:CH1:I200mA(?)<br>:MEASure[:NORMAL]:ITEM:PWP:CH1:I500mA(?)<br>:MEASure[:NORMAL]:ITEM:PWP:CH1:I1A(?)<br>:MEASure[:NORMAL]:ITEM:PWP:CH1:I2A(?)<br>:MEASure[:NORMAL]:ITEM:PWP:CH1:I5A(?)<br>:MEASure[:NORMAL]:ITEM:PWP:CH1:I10A(?)<br>:MEASure[:NORMAL]:ITEM:PWP:CH1:I20A(?)<br>:MEASure[:NORMAL]:ITEM:PWP:CH1:BACKup(?) | <Output Item<br>(Rectification Method)>        | “:MEASure?” query<br>Sets/Queries<br>the integration active power<br>(positive) data output.                  | 87                |
| :MEASure[:NORMAL]:ITEM:MWP:ALL<br>:MEASure[:NORMAL]:ITEM:MWP:CH1(?)                                                                                                                                                                                                                                                                                                                                      |                                                |                                                                                                               |                   |
| (Data by current range during auto-range integration)<br>:MEASure[:NORMAL]:ITEM:MWP:CH1:I200mA(?)<br>:MEASure[:NORMAL]:ITEM:MWP:CH1:I500mA(?)<br>:MEASure[:NORMAL]:ITEM:MWP:CH1:I1A(?)<br>:MEASure[:NORMAL]:ITEM:MWP:CH1:I2A(?)<br>:MEASure[:NORMAL]:ITEM:MWP:CH1:I5A(?)<br>:MEASure[:NORMAL]:ITEM:MWP:CH1:I10A(?)<br>:MEASure[:NORMAL]:ITEM:MWP:CH1:I20A(?)<br>:MEASure[:NORMAL]:ITEM:MWP:CH1:BACKup(?) | <Output Item<br>(Rectification Method)>        | “:MEASure?” query<br>Sets/Queries<br>the integration active power<br>(negative) data output.                  | 88                |
| :MEASure[:NORMAL]:ITEM:UPK:ALL<br>:MEASure[:NORMAL]:ITEM:UPK:CH1(?)                                                                                                                                                                                                                                                                                                                                      | <Output Setting 0/1>                           | “:MEASure?” query<br>Sets/Queries the voltage<br>waveform peak value<br>(instantaneous value) data<br>output. | 89                |

| Message ( [ ] : Can be omitted)                                               | Data Formats<br>(Response data<br>for queries) | Description                                                                                             | Reference<br>Page |
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| :MEASure[:NORMAL]:ITEM:UPK_MAX:ALL<br>:MEASure[:NORMAL]:ITEM:UPK_MAX:CH1(?)   | <Output Setting 0/1>                           | “:MEASure?” query<br>Sets/Queries the voltage<br>waveform peak value<br>(maximum value) data<br>output. | 89                |
| :MEASure[:NORMAL]:ITEM:UPK_MIN:ALL<br>:MEASure[:NORMAL]:ITEM:UPK_MIN:CH1(?)   | <Output Setting 0/1>                           | “:MEASure?” query<br>Sets/Queries the voltage<br>waveform peak value<br>(minimum value) data<br>output. | 89                |
| :MEASure[:NORMAL]:ITEM:IPK:ALL<br>:MEASure[:NORMAL]:ITEM:IPK:CH1(?)           | <Output Setting 0/1>                           | “:MEASure?” query<br>Sets/Queries the current<br>waveform peak<br>(instantaneous value) data<br>output. | 89                |
| :MEASure[:NORMAL]:ITEM:IPK_MAX:ALL<br>:MEASure[:NORMAL]:ITEM:IPK_MAX:CH1(?)   | <Output Setting 0/1>                           | “:MEASure?” query<br>Sets/Queries the current<br>waveform peak value<br>(maximum value) data<br>output. | 89                |
| :MEASure[:NORMAL]:ITEM:IPK_MIN:ALL<br>:MEASure[:NORMAL]:ITEM:IPK_MIN:CH1(?)   | <Output Setting 0/1>                           | “:MEASure?” query<br>Sets/Queries the current<br>waveform peak value<br>(minimum value) data<br>output. | 89                |
| :MEASure[:NORMAL]:ITEM:MCR:ALL<br>:MEASure[:NORMAL]:ITEM:MCR:CH1(?)           | <Output Setting>                               | “:MEASure?” query<br>Sets/Queries the Maximum<br>Current Ratio<br>(instantaneous value) data<br>output. | 90                |
| :MEASure[:NORMAL]:ITEM:MCR_MAX:ALL<br>:MEASure[:NORMAL]:ITEM:MCR_MAX:CH1(?)   | <Output Setting>                               | “:MEASure?” query<br>Sets/Queries the Maximum<br>Current Ratio<br>(maximum value) data<br>output.       | 90                |
| :MEASure[:NORMAL]:ITEM:MCR_MIN:ALL<br>:MEASure[:NORMAL]:ITEM:MCR_MIN:CH1(?)   | <Output Setting>                               | “:MEASure?” query<br>Sets/Queries the Maximum<br>Current Ratio<br>(minimum value) data<br>output.       | 90                |
| :MEASure[:NORMAL]:ITEM:UCFactor:ALL<br>:MEASure[:NORMAL]:ITEM:UCFactor:CH1(?) | <Output Setting 0/1>                           | “:MEASure?” query<br>Sets/Queries the voltage<br>crest factor (instantaneous<br>value) data output.     | 90                |
| :MEASure[:NORMAL]:ITEM:UCF_MAX:ALL<br>:MEASure[:NORMAL]:ITEM:UCF_MAX:CH1(?)   | <Output Setting 0/1>                           | “:MEASure?” query<br>Sets/Queries the voltage<br>crest factor (maximum<br>value) data output.           | 90                |
| :MEASure[:NORMAL]:ITEM:UCF_MIN:ALL<br>:MEASure[:NORMAL]:ITEM:UCF_MIN:CH1(?)   | <Output Setting 0/1>                           | “:MEASure?” query<br>Sets/Queries the voltage<br>crest factor (minimum<br>value) data output.           | 90                |
| :MEASure[:NORMAL]:ITEM:ICFactor:ALL<br>:MEASure[:NORMAL]:ITEM:ICFactor:CH1(?) | <Output Setting 0/1>                           | “:MEASure?” query<br>Sets/Queries the current<br>crest factor (instantaneous<br>value) data output.     | 91                |

| Message ( [ ] : Can be omitted)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Data Formats<br>(Response data<br>for queries) | Description                                                                                          | Reference<br>Page |
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| :MEASure[:NORMAL]:ITEM:ICF_MAX:ALL<br>:MEASure[:NORMAL]:ITEM:ICF_MAX:CH1(?)                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <Output Setting 0/1>                           | “:MEASure?” query<br>Sets/Queries the current<br>crest factor (maximum<br>value) data output.        | 91                |
| :MEASure[:NORMAL]:ITEM:ICF_MIN:ALL<br>:MEASure[:NORMAL]:ITEM:ICF_MIN:CH1(?)                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <Output Setting 0/1>                           | “:MEASure?” query<br>Sets/Queries the current<br>crest factor (minimum<br>value) data output.        | 91                |
| :MEASure[:NORMAL]:ITEM:ITAVerage:ALL<br>:MEASure[:NORMAL]:ITEM:ITAVerage:CH1(?)<br><br>(Data by current range during auto-range integration)<br>:MEASure[:NORMAL]:ITEM:ITAVerage:CH1:I200mA(?)<br>:MEASure[:NORMAL]:ITEM:ITAVerage:CH1:I500mA(?)<br>:MEASure[:NORMAL]:ITEM:ITAVerage:CH1:I1A(?)<br>:MEASure[:NORMAL]:ITEM:ITAVerage:CH1:I2A(?)<br>:MEASure[:NORMAL]:ITEM:ITAVerage:CH1:I5A(?)<br>:MEASure[:NORMAL]:ITEM:ITAVerage:CH1:I10A(?)<br>:MEASure[:NORMAL]:ITEM:ITAVerage:CH1:I20A(?)<br>:MEASure[:NORMAL]:ITEM:ITAVerage:CH1:BACKup(?) | <Output Item<br>(Rectification Method)>        | “:MEASure?” query<br>Sets/Queries<br>the time average current<br>data output.                        | 92                |
| :MEASure[:NORMAL]:ITEM:PTAVerage:ALL<br>:MEASure[:NORMAL]:ITEM:PTAVerage:CH1(?)<br><br>(Data by current range during auto-range integration)<br>:MEASure[:NORMAL]:ITEM:PTAVerage:CH1:I200mA(?)<br>:MEASure[:NORMAL]:ITEM:PTAVerage:CH1:I500mA(?)<br>:MEASure[:NORMAL]:ITEM:PTAVerage:CH1:I1A(?)<br>:MEASure[:NORMAL]:ITEM:PTAVerage:CH1:I2A(?)<br>:MEASure[:NORMAL]:ITEM:PTAVerage:CH1:I5A(?)<br>:MEASure[:NORMAL]:ITEM:PTAVerage:CH1:I10A(?)<br>:MEASure[:NORMAL]:ITEM:PTAVerage:CH1:I20A(?)<br>:MEASure[:NORMAL]:ITEM:PTAVerage:CH1:BACKup(?) | <Output Item<br>(Rectification Method)>        | “:MEASure?” query<br>Sets/Queries<br>the time average active<br>power data output.                   | 93                |
| :MEASure[:NORMAL]:ITEM:URF:ALL<br>:MEASure[:NORMAL]:ITEM:URF:CH1(?)                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | <Output Setting 0/1>                           | “:MEASure?” query<br>Sets/Queries the voltage<br>ripple factor (instantaneous<br>value) data output. | 93                |
| :MEASure[:NORMAL]:ITEM:URF_MAX:ALL<br>:MEASure[:NORMAL]:ITEM:URF_MAX:CH1(?)                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <Output Setting 0/1>                           | “:MEASure?” query<br>Sets/Queries the voltage<br>ripple factor (maximum<br>value) data output.       | 93                |
| :MEASure[:NORMAL]:ITEM:URF_MIN:ALL<br>:MEASure[:NORMAL]:ITEM:URF_MIN:CH1(?)                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <Output Setting 0/1>                           | “:MEASure?” query<br>Sets/Queries the voltage<br>ripple factor (minimum<br>value) data output.       | 93                |
| :MEASure[:NORMAL]:ITEM:IRF:ALL<br>:MEASure[:NORMAL]:ITEM:IRF:CH1(?)                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | <Output Setting 0/1>                           | “:MEASure?” query<br>Sets/Queries the current<br>ripple factor (instantaneous<br>value) data output. | 94                |
| :MEASure[:NORMAL]:ITEM:IRF_MAX:ALL<br>:MEASure[:NORMAL]:ITEM:IRF_MAX:CH1(?)                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <Output Setting 0/1>                           | “:MEASure?” query<br>Sets/Queries the current<br>ripple factor (maximum<br>value) data output.       | 94                |
| :MEASure[:NORMAL]:ITEM:IRF_MIN:ALL<br>:MEASure[:NORMAL]:ITEM:IRF_MIN:CH1(?)                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <Output Setting 0/1>                           | “:MEASure?” query<br>Sets/Queries the current<br>ripple factor (minimum                              | 94                |

| Message ([ ]: Can be omitted)                                                 | Data Formats<br>(Response data<br>for queries) | Description                                                                                                                        | Reference<br>Page |
|-------------------------------------------------------------------------------|------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| :MEASure[:NORMal]:ITEM:UTHD:ALL<br>:MEASure[:NORMal]:ITEM:UTHD:CH1(?)         | <Output Setting 0/1>                           | “:MEASure?” query<br>Sets/Queries the total<br>harmonic wave voltage<br>distortion factor<br>(instantaneous value) data<br>output. | 94                |
| :MEASure[:NORMal]:ITEM:UTHD_MAX:ALL<br>:MEASure[:NORMal]:ITEM:UTHD_MAX:CH1(?) | <Output Setting 0/1>                           | “:MEASure?” query<br>Sets/Queries the total<br>harmonic wave voltage<br>distortion factor (maximum<br>value) data output.          | 94                |
| :MEASure[:NORMal]:ITEM:UTHD_MIN:ALL<br>:MEASure[:NORMal]:ITEM:UTHD_MIN:CH1(?) | <Output Setting 0/1>                           | “:MEASure?” query<br>Sets/Queries the total<br>harmonic wave voltage<br>distortion factor data<br>output.                          | 94                |
| :MEASure[:NORMal]:ITEM:ITHD:ALL<br>:MEASure[:NORMal]:ITEM:ITHD:CH1(?)         | <Output Setting 0/1>                           | “:MEASure?” query<br>Sets/Queries the total<br>harmonic wave current<br>distortion factor<br>(instantaneous value) data<br>output. | 95                |
| :MEASure[:NORMal]:ITEM:ITHD_MAX:ALL<br>:MEASure[:NORMal]:ITEM:ITHD_MAX:CH1(?) | <Output Setting 0/1>                           | “:MEASure?” query<br>Sets/Queries the total<br>harmonic wave current<br>distortion factor (maximum<br>value) data output.          | 95                |
| :MEASure[:NORMal]:ITEM:ITHD_MIN:ALL<br>:MEASure[:NORMal]:ITEM:ITHD_MIN:CH1(?) | <Output Setting 0/1>                           | “:MEASure?” query<br>Sets/Queries the total<br>harmonic wave current<br>distortion factor (minimum<br>value) data output.          | 95                |

## Device-specific Commands (Measurement Value Output Settings [Harmonic Wave])

Note: :MEASure:HARMonic:ITEM:U:CH1(?) → Setting Command :MEASure:HARMonic:ITEM:U:CH1  
Query :MEASure:HARMonic:ITEM:U:CH1?

| Message ([ ]: Can be omitted)                                                    | Data Formats<br>(Response data for queries)                                                                           | Description                                                                                                                                          | Reference<br>Page |
|----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| :MEASure:HARMonic[:VALue]?                                                       |                                                                                                                       | Harmonic wave measurement data output.                                                                                                               | 96                |
| :MEASure:HARMonic:ITEM:ALLClear                                                  |                                                                                                                       | “:MEASure:HARMonic?”<br>Turns OFF all query output.                                                                                                  | 98                |
| :MEASure:HARMonic:ITEM:LIST(?)                                                   | (<Output Item 1>,<br><Output Item 2>,<br><Output Item 3>,<br><Output Item 4>,<br><Output Item 5>,<br><Output Item 6>) | “:MEASure:HARMonic?” query.<br>Sets/Queries output items.                                                                                            | 99                |
| :MEASure:HARMonic:ITEM:ORDer(?)                                                  | (<Lower Limit Order>,<br><Upper Limit Order>,<br><ODD/EVEN/ALL>)                                                      | Sets/Queries the output order<br>of “:MEASure:HARMonic?”<br>queries.                                                                                 | 100               |
| :MEASure:HARMonic:ITEM:STATus:INST(?)<br>:MEASure:HARMonic:ITEM:STATus:MAXmin(?) | <Output Setting 0/1>                                                                                                  | “:MEASure:HARMonic?” query<br>Sets/Querys the measurement<br>status output                                                                           | 100               |
| :MEASure:HARMonic:ITEM:U:ALL<br>:MEASure:HARMonic:ITEM:U:CH1(?)                  | <Output Setting 0/1>                                                                                                  | “:MEASure:HARMonic?”<br>Sets/Queries the output of the<br>harmonic wave voltage<br>effective value output for the<br>above query.                    | 101               |
| :MEASure:HARMonic:ITEM:U_MAX:ALL<br>:MEASure:HARMonic:ITEM:U_MAX:CH1(?)          | <Output Setting 0/1>                                                                                                  | “:MEASure:HARMonic?”<br>Sets/Queries the output of the<br>harmonic wave voltage<br>effective value (maximum<br>value) output for the above<br>query. | 101               |
| :MEASure:HARMonic:ITEM:U_MIN:ALL<br>:MEASure:HARMonic:ITEM:U_MIN:CH1(?)          | <Output Setting 0/1>                                                                                                  | “:MEASure:HARMonic?”<br>Sets/Queries the output of the<br>harmonic wave voltage<br>effective value (minimum<br>value) output for the above<br>query. | 101               |
| :MEASure:HARMonic:ITEM:I:ALL<br>:MEASure:HARMonic:ITEM:I:CH1(?)                  | <Output Setting 0/1>                                                                                                  | “:MEASure:HARMonic?”<br>Sets/Queries the output of the<br>harmonic wave current<br>effective value output for the<br>above query.                    | 101               |
| :MEASure:HARMonic:ITEM:I_MAX:ALL<br>:MEASure:HARMonic:ITEM:I_MAX:CH1(?)          | <Output Setting 0/1>                                                                                                  | “:MEASure:HARMonic?”<br>Sets/Queries the output of the<br>harmonic wave current<br>effective value (maximum<br>value) output for the above<br>query. | 101               |

| Message ([ ]: Can be omitted)                                                 | Data Formats<br>(Response data for queries) | Description                                                                                                                              | Reference<br>Page |
|-------------------------------------------------------------------------------|---------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| :MEASure:HARMonic:ITEM:I_MIN:ALL<br>:MEASure:HARMonic:ITEM:I_MIN:CH1(?)       | <Output Setting 0/1>                        | “:MEASure:HARMonic?”<br>Sets/Queries the output of the harmonic wave current effective value (minimum value) output for the above query. | 101               |
| :MEASure:HARMonic:ITEM:P:ALL<br>:MEASure:HARMonic:ITEM:P:CH1(?)               | <Output Setting 0/1>                        | “:MEASure:HARMonic?”<br>Sets/Queries the harmonic wave active power output for the above query.                                          | 102               |
| :MEASure:HARMonic:ITEM:P_MAX:ALL<br>:MEASure:HARMonic:ITEM:P_MAX:CH1(?)       | <Output Setting 0/1>                        | “:MEASure:HARMonic?”<br>Sets/Queries the harmonic wave active power (maximum value) output for the above query.                          | 102               |
| :MEASure:HARMonic:ITEM:P_MIN:ALL<br>:MEASure:HARMonic:ITEM:P_MIN:CH1(?)       | <Output Setting 0/1>                        | “:MEASure:HARMonic?”<br>Sets/Queries the harmonic wave active power (minimum value) output for the above query.                          | 102               |
| :MEASure:HARMonic:ITEM:UCON:ALL<br>:MEASure:HARMonic:ITEM:UCON:CH1(?)         | <Output Setting 0/1>                        | “:MEASure:HARMonic?”<br>Sets/Queries the harmonic wave voltage content for the above query.                                              | 102               |
| :MEASure:HARMonic:ITEM:UCON_MAX:ALL<br>:MEASure:HARMonic:ITEM:UCON_MAX:CH1(?) | <Output Setting 0/1>                        | “:MEASure:HARMonic?”<br>Sets/Queries the harmonic wave voltage content (maximum value) for the above query.                              | 102               |
| :MEASure:HARMonic:ITEM:UCON_MIN:ALL<br>:MEASure:HARMonic:ITEM:UCON_MIN:CH1(?) | <Output Setting 0/1>                        | “:MEASure:HARMonic?”<br>Sets/Queries the harmonic wave voltage content (minimum value) for the above query.                              | 102               |
| :MEASure:HARMonic:ITEM:ICON:ALL<br>:MEASure:HARMonic:ITEM:ICON:CH1(?)         | <Output Setting 0/1>                        | “:MEASure:HARMonic?”<br>Sets/Queries the harmonic wave current content for the above query.                                              | 103               |
| :MEASure:HARMonic:ITEM:ICON_MAX:ALL<br>:MEASure:HARMonic:ITEM:ICON_MAX:CH1(?) | <Output Setting 0/1>                        | “:MEASure:HARMonic?”<br>Sets/Queries the harmonic wave current content (maximum value) for the above query.                              | 103               |
| :MEASure:HARMonic:ITEM:ICON_MIN:ALL<br>:MEASure:HARMonic:ITEM:ICON_MIN:CH1(?) | <Output Setting 0/1>                        | “:MEASure:HARMonic?”<br>Sets/Queries the harmonic wave current content (minimum value) for the above query.                              | 103               |
| :MEASure:HARMonic:ITEM:PCON:ALL<br>:MEASure:HARMonic:ITEM:PCON:CH1(?)         | <Output Setting 0/1>                        | “:MEASure:HARMonic?”<br>Sets/Queries the harmonic wave active power content for the above query.                                         | 103               |
| :MEASure:HARMonic:ITEM:PCON_MAX:ALL<br>:MEASure:HARMonic:ITEM:PCON_MAX:CH1(?) | <Output Setting 0/1>                        | “:MEASure:HARMonic?”<br>Sets/Queries the harmonic wave active power content (maximum value) for the above query.                         | 103               |

| Message ([ ]: Can be omitted)                                                     | Data Formats<br>(Response data for queries) | Description                                                                                                                           | Reference<br>Page |
|-----------------------------------------------------------------------------------|---------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| :MEASure:HARMonic:ITEM:PCON_MIN:ALL<br>:MEASure:HARMonic:ITEM:PCON_MIN:CH1(?)     | <Output Setting 0/1>                        | “:MEASure:HARMonic?”<br>Sets/Queries the harmonic<br>wave active power content<br>(minimum value) for the above<br>query.             | 103               |
| :MEASure:HARMonic:ITEM:UPHase:ALL<br>:MEASure:HARMonic:ITEM:UPHase:CH1(?)         | <Output Setting 0/1>                        | “:MEASure:HARMonic?”<br>Sets/Queries the harmonic<br>wave voltage phase angle for<br>the above query.                                 | 104               |
| :MEASure:HARMonic:ITEM:UPHase_MAX:ALL<br>:MEASure:HARMonic:ITEM:UPHase_MAX:CH1(?) | <Output Setting 0/1>                        | “:MEASure:HARMonic?”<br>Sets/Queries the harmonic<br>wave voltage phase angle<br>(maximum value) for the above<br>query.              | 104               |
| :MEASure:HARMonic:ITEM:UPHase_MIN:ALL<br>:MEASure:HARMonic:ITEM:UPHase_MIN:CH1(?) | <Output Setting 0/1>                        | “:MEASure:HARMonic?”<br>Sets/Queries the harmonic<br>wave voltage phase angle<br>(minimum value) for the above<br>query.              | 104               |
| :MEASure:HARMonic:ITEM:IPHase:ALL<br>:MEASure:HARMonic:ITEM:IPHase:CH1(?)         | <Output Setting 0/1>                        | “:MEASure:HARMonic?”<br>Sets/Queries the harmonic<br>wave current phase angle for<br>the above query.                                 | 104               |
| :MEASure:HARMonic:ITEM:IPHase_MAX:ALL<br>:MEASure:HARMonic:ITEM:IPHase_MAX:CH1(?) | <Output Setting 0/1>                        | “:MEASure:HARMonic?”<br>Sets/Queries the harmonic<br>wave current phase angle<br>(maximum value) for the above<br>query.              | 104               |
| :MEASure:HARMonic:ITEM:IPHase_MIN:ALL<br>:MEASure:HARMonic:ITEM:IPHase_MIN:CH1(?) | <Output Setting 0/1>                        | “:MEASure:HARMonic?”<br>Sets/Queries the harmonic<br>wave current phase angle<br>(minimum value) for the<br>above query.              | 104               |
| :MEASure:HARMonic:ITEM:PPHase:ALL<br>:MEASure:HARMonic:ITEM:PPHase:CH1(?)         | <Output Setting 0/1>                        | “:MEASure:HARMonic?”<br>Sets/Queries the harmonic<br>wave voltage current phase<br>difference for the above query.                    | 105               |
| :MEASure:HARMonic:ITEM:PPHase_MAX:ALL<br>:MEASure:HARMonic:ITEM:PPHase_MAX:CH1(?) | <Output Setting 0/1>                        | “:MEASure:HARMonic?”<br>Sets/Queries the harmonic<br>wave voltage current phase<br>difference (maximum value)<br>for the above query. | 105               |
| :MEASure:HARMonic:ITEM:PPHase_MIN:ALL<br>:MEASure:HARMonic:ITEM:PPHase_MIN:CH1(?) | <Output Setting 0/1>                        | “:MEASure:HARMonic?”<br>Sets/Queries the harmonic<br>wave voltage current phase<br>difference (minimum value)<br>for the above query. | 105               |

## Device-specific Commands (Communications)

| Message ([ ]: Can be omitted) | Data Formats<br>(Response data for queries)                                           | Description                                      | Reference<br>Page |
|-------------------------------|---------------------------------------------------------------------------------------|--------------------------------------------------|-------------------|
| :RS232c?                      |                                                                                       | Queries the RS232-C setting items.               | 106               |
| :RS232c:BAUD                  |                                                                                       |                                                  |                   |
| :RS232c:BAUD?                 | <RS Baud Rate>                                                                        | Sets/Queries the RS232-C baud rate.              | 106               |
| :RS232c:ANSWer                |                                                                                       |                                                  |                   |
| :RS232c:ANSWer?               | ON/OFF                                                                                | Sets/Queries the execution confirmation message. | 107               |
| :RS232c:ERRor?                |                                                                                       | Sets/Queries RS232-C communications errors.      | 107               |
| :RS232c:BTINit                |                                                                                       |                                                  |                   |
| :RS232c:BTINit?               | OK/BUSY/ERROR/NONE                                                                    |                                                  | 108               |
| :RS232c:CONNect               |                                                                                       |                                                  |                   |
| :RS232c:CONNect?              | PC/BT                                                                                 |                                                  | 108               |
| :IP:ADDRess                   | (<Address 1 (NR1)>,<br><Address 2 (NR1)>,<br><Address 3 (NR1)>,<br><Address 4 (NR1)>) | Sets/Queries the LAN IP address.                 | 109               |
| :IP:ADDRess?                  |                                                                                       |                                                  |                   |
| :IP:DEFAultgateway            | (<Address 1 (NR1)>,<br><Address 2 (NR1)>,<br><Address 3 (NR1)>,<br><Address 4 (NR1)>) | Sets/Queries the LAN default gateway.            | 109               |
| :IP:DEFAultgateway?           |                                                                                       |                                                  |                   |
| :IP:SUBNetmask                | (<Address 1 (NR1)>,<br><Address 2 (NR1)>,<br><Address 3 (NR1)>,<br><Address 4 (NR1)>) | Sets/Queries the LAN subnet mask.                | 109               |
| :IP:SUBNetmask?               |                                                                                       |                                                  |                   |
| :GPIB?                        |                                                                                       | Queries the GP-IB setting items.                 | 110               |
| :GPIB:ADDRess                 |                                                                                       |                                                  |                   |
| :GPIB:ADDRess?                | <Address (NR1)>                                                                       | Sets/Queries the GP-IB address.                  | 110               |
| :HEADer                       |                                                                                       |                                                  |                   |
| :HEADer?                      | ON/OFF                                                                                | Sets/Queries the header.                         | 110               |
| :LOCAL                        | 0/1 (NR1)                                                                             | Changes to the Local (manual operation) state.   | 110               |
| :TRANsmi:t:SEParator          |                                                                                       |                                                  |                   |
| :TRANsmi:t:SEParator?         | 0/1 (NR1)                                                                             | Sets/Queries the message unit separator.         | 111               |
| :TRANsmi:t:TERMinator         |                                                                                       |                                                  |                   |
| :TRANsmi:t:TERMinator?        | 0/1 (NR1)                                                                             | Sets/Queries the message unit terminator.        | 111               |

## Device-specific Commands (Dummy commands for maintaining compatibility with other models (333x, PW3336, PW3337, etc.))

| Message     | Data Formats<br>(Response data for queries) | Description                                                               | Reference<br>Page |
|-------------|---------------------------------------------|---------------------------------------------------------------------------|-------------------|
| :WIRing     |                                             |                                                                           |                   |
| :Wiring?    | TYPE1 to TYPE7                              | Sets/Queries the wire connection setting.                                 |                   |
| :MODE       |                                             |                                                                           |                   |
| :MODE?      | 1/2 (for 3331 interchangeability)           | Queries will always return "TYPE1"                                        |                   |
| :RECTifier  |                                             |                                                                           |                   |
| :RECTifier? | ACDC,ACDC_UMEAN,DC,AC,FN<br>D,1,2,3         | Sets/Queries the rectifier. Queries will always return "ALL."             |                   |
| :RESPonse   |                                             |                                                                           |                   |
| :RESPonse?  | FAST/SLOW/AUTO<br>(For 3331 compatibility)  | Sets/Queries the display update speed. Queries will always return "AUTO." |                   |

## 3 Message Reference

### Message Reference Interpretation

**< >:** Indicates the contents (character or numeric parameters) of the data portion 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. This description is normally when HEADER ON is set.

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

Syntax

Command

Query

Response

Command

Query

Description

\*ESE <0 ~ 255 (NR1)>

\*ESE?

<0 ~ 255 (NR1)>

The SESER mask is set to the numerical value 0 to 255. The initial value (at power-on) is 0.

The contents of the SESER, as set by the \*ESE command, are returned as an NR1 value (0 to 255).

1286432168421

bit 7bit 6bit 5bit 4bit 3bit 2bit 1bit 0

PON

URQ

CME

EXE

DDE

QYE

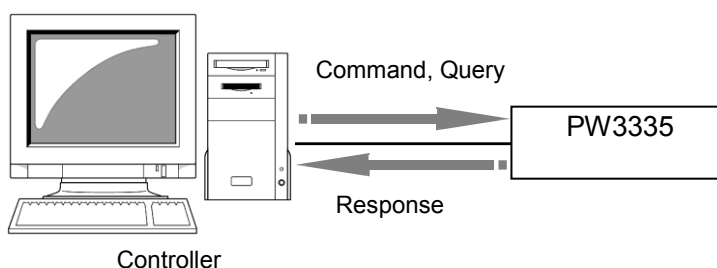
RQC

OPC

Example

\*ESE 36

(Sets bits 5 and 2 of SESER)



## Standard Commands

### (1) System Data Command

#### Query Device ID (Identification Code)

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

<Manufacturer name> "HIOKI"  
 <Model name> "PW3335" Fixed  
 No. of channels: 1

| <Model type> | RS-232c | GP-IB | D/A output | Current Sensor Input |
|--------------|---------|-------|------------|----------------------|
| 00           | ●       | -     | -          | -                    |
| 01           | -       | ●     | -          | -                    |
| 02           | ●       | -     | ●          | -                    |
| 03           | ●       | -     | -          | ●                    |
| 04           | ●       | ●     | ●          | ●                    |

**Example** Query **\*IDN?**  
 Response **HIOKI,PW3335,04,V1.00,ser123456789**

The Device ID is HIOKI PW3335-04 (RS-232c,GP-IB, with D/A output,current sensor input), software version 1.00, 123456789.

- Note**
- The response message has no header.
  - "\*\*IDN?" must be the last query message in a program message.
  - Therefore, if any other query is detected after this query on the same line, a query error will occur and no response message will be output.

#### Query Device Options

**Syntax** Query **\*OPT?**  
 Response <IF type>, <D/A output capability>,< External current input sensor presence>

<IF type> RS/GPIB/RS\_GPIB/NONE  
 <D/A output capability> DA\_OUT/NONE  
 < External current input sensor presence> CURR\_SENSOR/NONE

**Description** Queries the options available on the instrument.

**Example** Query **\*OPT?**  
 Response **GPIB,DA\_OUT,CURR\_SENSOR**  
 Instrument is equipped with a GP-IB interface, D/A output, and an external current sensor.

- Note**
- The response message has no header.

### (2) Internal Operation Command

#### Initialize Device

**Syntax** Command **\*RST**  
**Description** Command Resets the instrument to its initial state.

- Note**
- Refer to the user's manual for the instrument (in the System Reset section) for information about the initial settings.
  - The communications state is not initialized.
  - This command can be executed even when a system error has occurred.

### Execute Self-test and Query Result

|                    |                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                            |
|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | Query                                                                                                                                                                                                                                                                                                                                                                   | <b>*TST?</b>                                                                                                                                                               |
|                    | Response                                                                                                                                                                                                                                                                                                                                                                | <b>&lt;0 ~ 4 (NR1)&gt;</b><br>0:No error<br>1:ROM error<br>2:RAM error<br>3:FPGA error<br>4:Backup data error                                                              |
| <b>Description</b> | Perform the instrument self-test and return the result as a numerical value 0 to 4.<br>Returns zero when no error occurs.                                                                                                                                                                                                                                               |                                                                                                                                                                            |
| <b>Example</b>     | Query                                                                                                                                                                                                                                                                                                                                                                   | <b>*TST?</b>                                                                                                                                                               |
|                    | Response                                                                                                                                                                                                                                                                                                                                                                | <b>2</b><br>A RAM error was detected.<br>The instrument may not be able to perform measurements correctly.<br>Stop use immediately and send the instrument in for repairs. |
| <b>Note</b>        | <ul style="list-style-type: none"> <li>• The response message has no header.</li> <li>• A device-dependent error will occur if this command is executed during integration (when the INTEGRATOR indicator is lit) or when in the Hold state (when the HOLD indicator is lit).</li> <li>• This command can be executed even when a system error has occurred.</li> </ul> |                                                                                                                                                                            |

### (3) Synchronization Commands

#### Set OPC Bit of SESR when Finished with All Pending Operations

|                    |                                                                                                                              |             |
|--------------------|------------------------------------------------------------------------------------------------------------------------------|-------------|
| <b>Syntax</b>      | Command                                                                                                                      | <b>*OPC</b> |
| <b>Description</b> | Sets OPC bit 0 of the Standard Event Status Register (SESR) when all commands prior to <b>*OPC</b> have finished processing. |             |
| <b>Example</b>     | <b>:MEAS?;*OPC</b>                                                                                                           |             |
|                    | Sets the OPC bit of the SESR after the :MEAS? query finishes processing.                                                     |             |

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

|                    |                                                                                          |                                                              |
|--------------------|------------------------------------------------------------------------------------------|--------------------------------------------------------------|
| <b>Syntax</b>      | Query                                                                                    | <b>*OPC?</b>                                                 |
|                    | Response                                                                                 | <b>1</b>                                                     |
| <b>Description</b> | Responds with ASCII "1" when all commands prior to <b>*OPC</b> have finished processing. |                                                              |
| <b>Example</b>     | <b>:MEAS?;*OPC?</b>                                                                      |                                                              |
|                    | "1" is stored in the output queue after the data for the :MEAS? query is generated.      |                                                              |
|                    | Response                                                                                 | (When HEADER ON) <b>*OPC 1</b><br>(When HEADER OFF) <b>1</b> |
| <b>Note</b>        | <ul style="list-style-type: none"> <li>• The response message has no header.</li> </ul>  |                                                              |

#### Wait until display update finishes before executing the next command.

|                    |                                                                                                                                                                                                                                                                                                                                                                          |             |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| <b>Syntax</b>      | Command                                                                                                                                                                                                                                                                                                                                                                  | <b>*WAI</b> |
| <b>Description</b> | No commands after <b>*WAI</b> are run until the next display update completes.<br>(200ms max)                                                                                                                                                                                                                                                                            |             |
| <b>Example</b>     | <b>:MEAS?;*WAI;;MEAS?</b><br>Data is loaded after each display update.                                                                                                                                                                                                                                                                                                   |             |
| <b>Note</b>        | <ul style="list-style-type: none"> <li>• The displayed data will not be updated even if this command is executed, while the display is held, the maximum/minimum values are being held, and the averaged values are displayed.</li> <li>• The display data will not be updated even during a range switch ("-----" display) even if this command is executed.</li> </ul> |             |

## (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. (**SESR, ESR0, ESR1, RS232c:ERRor**)

**Note**

- The output queue, enable registers, and bit 4 of the status byte register (MAV) are not affected.
- This command can be executed even when a system error has occurred.

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

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

**Description** Command The SESER mask is set to the numerical value 0 to 255. The initial value (at power-on) is 0. Although NRf numerical values are accepted, values to the right of the decimal are truncated. URQ (bit 6) and RQC (bit 1) is not used by the instrument. Therefore, these events will not be triggered even if a value of 1 is specified.

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** Command **\*ESE 36**  
 (Sets bits 5 and 2 of SESER)  
 Query **\*ESE?**  
 Response (When HEADER ON) **\*ESE 36**  
 (When HEADER OFF) **36**

**Read and Clear Standard Event Status Register (SESR)**

**Syntax** Query **\*ESR?**  
 Response **<0~255 (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   | URQ   | CME   | EXE   | DDE   | QYE   | RQC   | OPC   |

**Example** **\*ESR?**  
**32**

Bit 5 of the SESR has been set to 1. → A CME (Command Error) has occurred.

**Note**

- This command can be executed even when a system error has occurred.

## Write and Read Service Request Enable Register (SRER)

**Syntax** Command **\*SRE <0~255 (NR1)>**  
 Query **\*SRE?**  
 Response **<0~255 (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 truncated. Bit 6 and unused bits (bit 7) are ignored.

Query The data is initialized to zero at power-on. 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 (bit 7,3,2) 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 |
| unused | 0     | ESB   | MAV   | unused | unused | ESB1  | ESB0  |

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

Query **\*SRE?**  
 Response (When HEADER ON) **\*SRE 33**  
 (When HEADER OFF) **33**  
 SRER bits 0 and 5 have been set to 1.

## Read Status Byte Register

**Syntax** Query **\*STB?**  
 Response **<0~255 (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 |
| unused | MSS   | ESB   | MAV   | unused | unused | ESB1  | ESB0  |

**Example** Query **\*STB?**  
 Response (When HEADER ON) **16**  
 (When HEADER OFF) **16**

STB bit 4 has been set to 1.

- Note**
- The value of bit 6 is the value of the MSS bit.
  - The MSS bit will not be cleared even if the service requests have been cleared through serial polling.
  - This command can be executed even when a system error has occurred.

## Request a Sample

**Syntax** Command **\*TRG**

**Description** Updates the measurement display once when the instrument is in the Hold state.

**Example** **:HOLD ON;\*TRG;;MEAS?**

- Note**
- A device-dependent error occurs if this command is executed in any other state than the Hold state.
  - While the averaged value is displayed, the displayed averaged value is updated by executing this command.

## Device-specific Commands

### (1) Event Status Register

#### Set and Query Device-specific Event Status Enable Register ESER0

**Syntax** Command :ESE0 <0~255 (NR1)>  
 Query :ESE0?  
 Response <0~255 (NR1)>

**Description** Command Sets the mask pattern in Event Status Enable Register 0 (ESER0) for the Event Status Register. Although NRf numerical values are accepted, values to the right of the decimal are truncated.

|       |       |       |       |       |       |       |       |
|-------|-------|-------|-------|-------|-------|-------|-------|
| 128   | 64    | 32    | 16    | 8     | 4     | 2     | 1     |
| bit 7 | bit 6 | bit 5 | bit 4 | bit 3 | bit 2 | bit 1 | bit 0 |
| DS    | CSE   | SE    | IE    | AVG   | HP    | ODI   | ESE   |

**Example** Command :ESE0 4  
 Set ESER0 bit 2 to 1.  
 Query :ESE0?  
 Response (When HEADER ON) :ESE0 4  
 (When HEADER OFF) 4

**Note** The data is initialized to zero at power-on.

#### Set and Query Device-specific Event Status Enable Register ESER1

**Syntax** Command :ESE1 <0~255 (NR1)>  
 Query :ESE1?  
 Response <0~255 (NR1)>

**Description** Command Sets the mask pattern in Event Status Enable Register 1 (ESER1) for the Event Status Register. Although NRf numerical values are accepted, values to the right of the decimal are truncated to the nearest integer.

|       |       |       |       |       |       |       |       |
|-------|-------|-------|-------|-------|-------|-------|-------|
| 128   | 64    | 32    | 16    | 8     | 4     | 2     | 1     |
| bit 7 | bit 6 | bit 5 | bit 4 | bit 3 | bit 2 | bit 1 | bit 0 |
| FOR   | ODI   | CODI  | IO    | OU    | HP    | HI    | HU    |

**Example** Command :ESE1 24  
 Set ESER1 bits 3 and 4 to 1.  
 Query :ESE1?  
 Response (When HEADER ON) :ESE1 24  
 (When HEADER OFF) 24

**Note** The data is initialized to zero at power-on.

#### Set and Query Device-specific Event Status Enable Registers ESER0 to ESER3

**Syntax** Query :ESR0?  
 :ESR1?  
 Response <0~255 (NR1)>

**Description** Command Returns the contents of the Event Status Register in NR1 format.

**Note**

- When ESR0? is executed, the content of ESR0 is cleared.
- When ESR1? is executed, the content of ESR1 is cleared.

## (2) Measurement Settings

### Setting and Querying the Number of Times to Perform Averaging

|               |          |                                                                    |
|---------------|----------|--------------------------------------------------------------------|
| <b>Syntax</b> | Command  | <b>:AVERaging</b> <Number of times to perform averaging (NR1)>     |
|               | Query    | <b>:AVERaging?</b>                                                 |
|               | Response | <Number of times to perform averaging (NR1)><br>1/2/5/10/25/50/100 |

**Description** Sets or queries the number of times to perform averaging. Although NRf numerical values are accepted, values to the right of the decimal are truncated.

|                |          |                                                                      |
|----------------|----------|----------------------------------------------------------------------|
| <b>Example</b> | Command  | <b>:AVER 10</b>                                                      |
|                |          | Set the number of times to perform averaging to 10.                  |
|                | Query    | <b>:AVER?</b>                                                        |
|                | Response | (When HEADER ON) <b>:AVERAGING 10</b><br>(When HEADER OFF) <b>10</b> |

**Note**

- When the number of times to perform averaging is changed, averaging restarts.
- You cannot change this setting while the display is held or when the maximum/minimum values are being held.

## Querying the Integration Set Time and Status

|                    |          |                                                                                                                                                                                                                           |
|--------------------|----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | Query    | <b>:INTEGrate?</b>                                                                                                                                                                                                        |
|                    | Response | <0000 to 9999 (NR1)>,<00 to 59 (NR1)>;<Integration status>                                                                                                                                                                |
| <b>Description</b> |          | Returns the integration set time (hours, minutes) and the status of integration calculations as a numerical value and string, respectively. See “:INTEGrate:TIME?”, “:INTEGrate:STATE?” for details on the return values. |
| <b>Example</b>     | Query    | <b>:INTEG?</b>                                                                                                                                                                                                            |
|                    | Response | (When HEADER ON) <b>:INTEGRATE:TIME 0100,00,STATE START</b><br>(When HEADER OFF) <b>0100,00;START</b>                                                                                                                     |
| <b>Note</b>        |          | • You can use the :TRANsmit:SEParator command to change the message unit separator from a semicolon “;” to a comma “,”.                                                                                                   |

## Set and Query the Integration Status

|                    |          |                                                                                                                                                                                                                                                                                                          |
|--------------------|----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | Command  | <b>:INTEGrate:STATE &lt;Integration status&gt;</b>                                                                                                                                                                                                                                                       |
|                    | Query    | <b>:INTEGrate:STATE?</b>                                                                                                                                                                                                                                                                                 |
|                    | Response | <Integration status>                                                                                                                                                                                                                                                                                     |
| <b>Description</b> | Query    | START/STOP/RESET                                                                                                                                                                                                                                                                                         |
|                    | Response | Indicates the integration operation.                                                                                                                                                                                                                                                                     |
| <b>Example</b>     | Command  | <b>:INTEG:STAT START</b>                                                                                                                                                                                                                                                                                 |
|                    |          | Starts the integration operation.                                                                                                                                                                                                                                                                        |
|                    | Query    | <b>:INTEG:STAT?</b>                                                                                                                                                                                                                                                                                      |
|                    | Response | (When HEADER ON) <b>:INTEGRATE:STATE START</b><br>(When HEADER OFF) <b>START</b>                                                                                                                                                                                                                         |
| <b>Note</b>        |          | <ul style="list-style-type: none"> <li>Depending on the integration state, a device-dependent error may occur (see the table below).</li> <li>A device-dependent error will occur if the integration value reaches <math>\pm 9999999M</math> or if the integration time reaches 10,000 hours.</li> </ul> |

|         |       | Instrument Status                                      |                                                     |                                        |                                                           |                                        |
|---------|-------|--------------------------------------------------------|-----------------------------------------------------|----------------------------------------|-----------------------------------------------------------|----------------------------------------|
|         |       | RUN Indicator<br>EXT Indicator<br>OFF<br>(Reset state) | Key input (command)<br>EXT Indicator OFF            |                                        | Integration from an External Terminal<br>EXT Indicator ON |                                        |
|         |       |                                                        | RUN Indicator<br>ON<br>(Integration in<br>progress) | RUN Indicator<br>Flashing<br>(Stopped) | RUN indicator<br>ON<br>(Integration in<br>progress)       | RUN indicator<br>Flashing<br>(Stopped) |
| Command | START | ○                                                      | ×                                                   | ○                                      | ×                                                         | ×                                      |
|         | STOP  | ×                                                      | ○                                                   | ×                                      | ×                                                         | ×                                      |
|         | RESET | ○                                                      | ×                                                   | ○                                      | ×                                                         | ○                                      |

○: The command is executed.

×: A device-dependent error occurs.

### Set and Query the Integration Time

|                    |          |                                                                                                                                                                                                                                                                                                                                                                                                           |
|--------------------|----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | Command  | <b>:INTEGrate:TIME &lt;0000 to 9999 (NR1)&gt;,&lt;00to 59 (NR1)&gt;</b>                                                                                                                                                                                                                                                                                                                                   |
|                    | Query    | <b>:INTEGrate:TIME?</b>                                                                                                                                                                                                                                                                                                                                                                                   |
|                    | Response | <b>&lt;0000 to 9999(NR1)&gt;,&lt;00 to 59(NR1)&gt;</b>                                                                                                                                                                                                                                                                                                                                                    |
| <b>Description</b> |          | <p>Sets or queries the hours and minutes for the integration time.</p> <p>The setting range is 1 minute to 9,999 hours and 59 minutes. The unit is 1 minute.</p> <p>If the integration time is set to 0 hours and 0 minutes, integration is performed for 10,000 hours (approximately 417 days).</p> <p>Although NRf numerical values are accepted, values to the right of the decimal are truncated.</p> |
| <b>Example</b>     | Command  | <b>:INTEG:TIME 100,20</b>                                                                                                                                                                                                                                                                                                                                                                                 |
|                    | Query    | <b>:INTEG:TIME?</b>                                                                                                                                                                                                                                                                                                                                                                                       |
|                    | Response | (When HEADER ON) <b>:INTEGRATE:TIME 0100,20</b><br>(When HEADER OFF) <b>0100,20</b>                                                                                                                                                                                                                                                                                                                       |
| <b>Note</b>        |          | • You cannot change this setting during integration, while the display is held, or when the maximum/minimum values are being held.                                                                                                                                                                                                                                                                        |

### Set and Query Auto-range Integration

|                    |          |                                                                                                                                    |
|--------------------|----------|------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | Command  | <b>:INTEGrate:AUTO &lt;OFF/ON&gt;</b>                                                                                              |
|                    | Query    | <b>:INTEGrate:AUTO?</b>                                                                                                            |
|                    | Response | <b>&lt;OFF/ON&gt;</b>                                                                                                              |
| <b>Description</b> |          | Sets auto-range integration.                                                                                                       |
| <b>Example</b>     | Command  | <b>:INTEG:AUTO ON</b>                                                                                                              |
|                    | Query    | <b>:INTEG:AUTO?</b>                                                                                                                |
|                    | Response | (When HEADER ON) <b>:INTEGRATE:AUTO ON</b><br>(When HEADER OFF) <b>ON</b>                                                          |
| <b>Note</b>        |          | • You cannot change this setting during integration, while the display is held, or when the maximum/minimum values are being held. |

### Set and Query the Harmonic Wave Analysis Order Upper Limit

|                    |          |                                                                                                                                                                                   |
|--------------------|----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | Command  | <b>:HARMOinic:ORDer:UPPer &lt;2 to 50 (NR1)&gt;</b>                                                                                                                               |
|                    | Query    | <b>:HARMOinic:ORDer:UPPer?</b>                                                                                                                                                    |
|                    | Response | <b>&lt;2 to 50 (NR1)&gt;</b>                                                                                                                                                      |
| <b>Description</b> |          | <p>Sets or queries the upper limit for the harmonic wave analysis order.</p> <p>Although NRf numerical values are accepted, values to the right of the decimal are truncated.</p> |
| <b>Example</b>     | Command  | <b>:HARM:ORD:UPP 50</b>                                                                                                                                                           |
|                    | Query    | <b>:HARM:ORD:UPP?</b>                                                                                                                                                             |
|                    | Response | (When HEADER ON) <b>:HARMONIC:ORDER:UPPER 50</b><br>(When HEADER OFF) <b>50</b>                                                                                                   |
| <b>Note</b>        |          | • You cannot change this setting during integration, while the display is held, or when the maximum/minimum values are being held.                                                |

## Set and Query the Display Hold Status

|                    |             |                                                                                                                                                                                                                                                                                                                              |
|--------------------|-------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | Command     | <b>:HOLD &lt;ON/OFF/MAX/MIN/RESET&gt;</b>                                                                                                                                                                                                                                                                                    |
|                    | Query       | <b>:HOLD?</b>                                                                                                                                                                                                                                                                                                                |
|                    | Response    | <b>&lt;ON/OFF/MAX/MIN/RESET&gt;</b><br>ON Keeps the current display value (display hold state).<br>OFF Releases the currently held display value.<br>MAX Displays the maximum value (maximum value hold).<br>MIN Displays the minimum value (minimum value hold).<br>RESET Resets the maximum, minimum, and averaged values. |
| <b>Description</b> | Command     | Specifies the type of hold to perform on the display value or resets the maximum and minimum values.<br>Although NRf numerical values are accepted, values to the right of the decimal are truncated.                                                                                                                        |
|                    | Query       | Returns the current display value hold setting.                                                                                                                                                                                                                                                                              |
| <b>Example</b>     | Command     | <b>:HOLD ON</b><br>Holds the current display value.                                                                                                                                                                                                                                                                          |
|                    | Query       | <b>:HOLD?</b>                                                                                                                                                                                                                                                                                                                |
|                    | Response    | (When HEADER ON) <b>:HOLD ON</b><br>(When HEADER OFF) <b>ON</b>                                                                                                                                                                                                                                                              |
|                    | <b>Note</b> | • Auto-range operation may cease to function if the hold state is triggered and canceled at a short period of around 200 ms.                                                                                                                                                                                                 |

## Execute and Query Zero Adjustment (Degaussing)

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                       |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | Command                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <b>:ZEROadjust</b><br><b>:DEMAg</b>                                                                                                                   |
|                    | Query                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | <b>:ZEROadjust?</b><br><b>:DEMAg?</b>                                                                                                                 |
|                    | Response                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <b>&lt;OK/BUSY/ERROR&gt;</b><br>OK Operation completed successfully.<br>BUSY Currently performing a zero adjustment.<br>ERROR Zero adjustment failed. |
| <b>Description</b> | Command                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Performs a zero adjustment.                                                                                                                           |
|                    | Query                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Returns the zero adjustment execution results or current status.                                                                                      |
| <b>Example</b>     | Command                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <b>:ZERO</b>                                                                                                                                          |
|                    | Query                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | <b>:ZERO?</b>                                                                                                                                         |
|                    | Response                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | (When HEADER ON) <b>:ZEROADJUST OK</b><br>(When HEADER OFF) <b>OK</b>                                                                                 |
| <b>Note</b>        | <ul style="list-style-type: none"> <li>• Some time is required to perform a zero adjustment (approximately 30 seconds). During this time, some commands may result in an execution error. Use this command in such a way that the next command is sent only after the zero adjustment (degaussing) is complete. For example, "<b>:ZERO;*WAI</b>".</li> <li>• If a zero adjustment has not been performed since the instrument was powered on, <b>:ZEROadjust?</b> will return "OK".</li> <li>• Although this instrument does not provide degauss operation, DEMAG(?) will trigger the same operation as <b>:ZEROadjust</b>.</li> <li>• You cannot change this setting during integration, while the display is held, or when the maximum/minimum values are being held.</li> </ul> |                                                                                                                                                       |

### Set and Query the Multiple Instrument Synchronization Control Function

|                            |                                                                                                                                                                       |                                                                                                                                                                                  |
|----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>              | Command                                                                                                                                                               | <b>:SYNC:CONTRol &lt;OFF/IN/OUT&gt;</b>                                                                                                                                          |
|                            | Query                                                                                                                                                                 | <b>:SYNC:CONTRol?</b>                                                                                                                                                            |
|                            | Response                                                                                                                                                              | <b>&lt;OFF/IN/OUT&gt;</b><br>OFF Turns OFF the synchronization control function.<br>IN Sets the instrument as the slave device.<br>OUT Sets the instrument as the master device. |
| <b>Description Example</b> | Command                                                                                                                                                               | Sets or queries the I/O settings for multiple device synchronization control.                                                                                                    |
|                            | Command                                                                                                                                                               | <b>:SYNC:CONT OUT</b>                                                                                                                                                            |
|                            | Query                                                                                                                                                                 | <b>:SYNC:CONT?</b>                                                                                                                                                               |
|                            | Response                                                                                                                                                              | (When HEADER ON) <b>:SYNC:CONTROL OUT</b><br>(When HEADER OFF) <b>OUT</b>                                                                                                        |
| <b>Note</b>                | <ul style="list-style-type: none"> <li>Reset the integration value for both the master and slaves before starting synchronized measurement of integration.</li> </ul> |                                                                                                                                                                                  |

### (3) Voltage Range

#### Query the Voltage Range and Auto Range

|                            |                                                                                                                                                                                                                                                                                                                      |                                                                                                    |
|----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|
| <b>Syntax</b>              | Query                                                                                                                                                                                                                                                                                                                | <b>:VOLTage?</b>                                                                                   |
|                            | Response                                                                                                                                                                                                                                                                                                             | <b>&lt;Voltage range (NR1)&gt;;&lt;Auto range ON/OFF&gt;;&lt; Select (NR1)&gt;</b>                 |
| <b>Description Example</b> | Query                                                                                                                                                                                                                                                                                                                | Queries the voltage range setting.                                                                 |
|                            | Query                                                                                                                                                                                                                                                                                                                | <b>:VOLT?</b>                                                                                      |
|                            | Response                                                                                                                                                                                                                                                                                                             | (When HEADER ON) <b>:VOLTAGE:RANGE 15;AUTO ON;SELECT 63</b><br>(When HEADER OFF) <b>15; ON; 63</b> |
| <b>Note</b>                | <ul style="list-style-type: none"> <li>You can use the <b>:TRANsmit:SEParator</b> command to change the message unit separator from a semicolon ";" to a comma ",".</li> <li>Instead of <b>: VOLTage?</b>, you can also use <b>: VOLTage1?</b>.<br/> (Both of these commands perform the same operation.)</li> </ul> |                                                                                                    |

#### Set and Query the Voltage Auto Range

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                 |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | Command                                                                                                                                                                                                                                                                                                                                                                                                                                       | <b>:VOLTage:AUTO &lt;ON/OFF&gt;</b>                                                                                             |
|                    | Query                                                                                                                                                                                                                                                                                                                                                                                                                                         | <b>:VOLTage:AUTO?</b>                                                                                                           |
|                    | Response                                                                                                                                                                                                                                                                                                                                                                                                                                      | <b>&lt;ON/OFF&gt;</b><br>ON Measures the voltage in an automatic range.<br>OFF Turns off the voltage automatic range operation. |
| <b>Description</b> | Command                                                                                                                                                                                                                                                                                                                                                                                                                                       | Turns ON or OFF the voltage auto range.                                                                                         |
|                    | Query                                                                                                                                                                                                                                                                                                                                                                                                                                         | Returns the voltage auto range setting.                                                                                         |
| <b>Example</b>     | Command                                                                                                                                                                                                                                                                                                                                                                                                                                       | <b>:VOLT:AUTO ON</b>                                                                                                            |
|                    | Query                                                                                                                                                                                                                                                                                                                                                                                                                                         | <b>:VOLT:AUTO?</b>                                                                                                              |
|                    | Response                                                                                                                                                                                                                                                                                                                                                                                                                                      | (When HEADER ON) <b>:VOLTAGE:AUTO ON</b><br>(When HEADER OFF) <b>ON</b>                                                         |
| <b>Note</b>        | <ul style="list-style-type: none"> <li>If you set the voltage range via a command such as <b>:VOLTage:RANGE</b>, the auto range operation will be turned OFF for the specified channel.</li> <li>You cannot change this setting during integration, while the display is held.</li> <li>Instead of <b>: VOLTage:AUTO(?)</b>, you can also use <b>: VOLTage1:AUTO(?)</b>.<br/> (Both of these commands perform the same operation.)</li> </ul> |                                                                                                                                 |

## Set and Query the Voltage Range Setting

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                               |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | Command                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | <b>:VOLTage:RANGe &lt;Voltage Range (NR1)&gt;</b>                                                             |
|                    | Query                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | <b>:VOLTage:RANGe?</b>                                                                                        |
|                    | Response                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | <b>&lt;Voltage range (NR1)&gt;</b><br><b>&lt;Voltage range (NR1)&gt; = 6/15/30/60/150/300/600/1000</b>        |
| <b>Description</b> | Command                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Sets the voltage range setting. (The unit is in volts [V].)<br>The numerical value is accepted in NRf format. |
|                    | Query                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Returns the voltage range setting in NR1 format.                                                              |
| <b>Example</b>     | Command                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | <b>:VOLT:RANG 15</b>                                                                                          |
|                    | Query                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | <b>:VOLT:RANG?</b>                                                                                            |
|                    | Response                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | (When HEADER ON) <b>:VOLTAGE:RANGE 15</b><br>(When HEADER OFF) <b>15</b>                                      |
| <b>Note</b>        | <ul style="list-style-type: none"> <li>Do not append a unit to the voltage range.</li> <li>After you change the range, wait a few moments until the internal circuitry stabilizes before you read any measurement values.</li> <li>If a negative value is specified, the absolute value will be used.</li> <li>If the number of times to perform averaging is set to any value other than 1 and the range is changed, averaging is restarted.</li> <li>If any value other than &lt;Voltage range (NR1)&gt; is specified, the set value will be set to the range that can be measured.<br/>However, if the specified value exceeds the full scale of the range, the next highest range will be set instead.</li> <li>If a range is specified, the auto range operation is turned OFF. Additionally, range select will be turned on.</li> <li>You cannot change this setting during integration, while the display is held.</li> <li>Instead of <b>: VOLTage: RANGe (?)</b>, you can also use <b>: VOLTage1: RANGe (?)</b>.<br/>(Both of these commands perform the same operation.)</li> </ul> |                                                                                                               |

## Set Whether to Select All Voltage Ranges

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                    |
|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | Query                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <b>:VOLTage:SElect:ALL &lt;ON/OFF&gt;</b>                                                          |
| <b>Description</b> | Sets whether to select all voltage ranges.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                    |
| <b>Example</b>     | Query                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <b>:VOLT:SEL:ALL ON?</b>                                                                           |
|                    | Response                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | (When HEADER ON) <b>:VOLTAGE:RANGE 15;AUTO ON;SELECT 63</b><br>(When HEADER OFF) <b>15; ON; 63</b> |
| <b>Note</b>        | <ul style="list-style-type: none"> <li>The 1,000 V range is always on, regardless of the value of this setting.</li> <li>Specifying a voltage range with the <b>“:VOLTage:RANGe”</b> command will cause range select for the specified range to be turned on.</li> </ul> <p>You can use the <b>:TRANsmit:SEParator</b> command to change the message unit separator from a semicolon “;” to a comma “,”.</p> <ul style="list-style-type: none"> <li>You cannot change this setting during integration, while the display is held, or when the maximum/minimum values are being held.</li> </ul> |                                                                                                    |

## Set and Query Voltage Range Select

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                  |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | Command                                                                                                                                                                                                                                                                                                                                                                                                             | <b>:VOLTage:SElect:U6V &lt;ON/OFF&gt;</b><br><b>:VOLTage:SElect:U15V &lt;ON/OFF&gt;</b><br><b>:VOLTage:SElect:U30V &lt;ON/OFF&gt;</b><br><b>:VOLTage:SElect:U60V &lt;ON/OFF&gt;</b><br><b>:VOLTage:SElect:U150V &lt;ON/OFF&gt;</b><br><b>:VOLTage:SElect:U300V &lt;ON/OFF&gt;</b><br><b>:VOLTage:SElect:U600V &lt;ON/OFF&gt;</b> |
|                    | Query                                                                                                                                                                                                                                                                                                                                                                                                               | <b>:VOLTage:SElect:U6V?</b><br><b>:VOLTage:SElect:U15V?</b><br><b>:VOLTage:SElect:U30V?</b><br><b>:VOLTage:SElect:U60V?</b><br><b>:VOLTage:SElect:U150V?</b><br><b>:VOLTage:SElect:U300V?</b><br><b>:VOLTage:SElect:U600V?</b><br><b>:VOLTage:SElect:U1000V?</b>                                                                 |
|                    | Response                                                                                                                                                                                                                                                                                                                                                                                                            | <b>&lt;ON/OFF&gt;</b><br>ON Performs measurement using the voltage range in question during range key operation, auto-range operation, and auto-range integration.<br>OFF Disables use of the voltage range in question during range key operation, auto-range operation, and auto-range integration.                            |
| <b>Description</b> | Command                                                                                                                                                                                                                                                                                                                                                                                                             | Toggles use of the voltage range in question during auto-range operation and auto-range integration.                                                                                                                                                                                                                             |
|                    | Query                                                                                                                                                                                                                                                                                                                                                                                                               | Returns whether the voltage range in question is used during auto-range operation and auto-range integration.                                                                                                                                                                                                                    |
| <b>Example</b>     | Command                                                                                                                                                                                                                                                                                                                                                                                                             | <b>:VOLT:SEL:U30V ON</b>                                                                                                                                                                                                                                                                                                         |
|                    | Query                                                                                                                                                                                                                                                                                                                                                                                                               | <b>:VOLT:SEL:U30V?</b>                                                                                                                                                                                                                                                                                                           |
|                    | Response                                                                                                                                                                                                                                                                                                                                                                                                            | (When HEADER ON) <b>:VOLTAGE:SELECT:U30V ON</b><br>(When HEADER OFF) <b>ON</b>                                                                                                                                                                                                                                                   |
| <b>Note</b>        | <ul style="list-style-type: none"> <li>Specifying a voltage range with the “:VOLTage:RANGe” command will cause range select for the specified range to be turned on.</li> <li>You cannot change this setting during integration, while the display is held, or when the maximum/minimum values are being held.</li> <li>Since use of the 1,000 V range is always enabled, queries will always return ON.</li> </ul> |                                                                                                                                                                                                                                                                                                                                  |

## Set and Query Voltage Range Select

**Syntax** Command **:VOLTage:SElect <data(NR1)>**

Query **:VOLTage:SElect?**

Response **<data>**  
 128      64      32      16      8      4      2      1  
**<data(NR1)>**

| bit7 | bit6  | bit5 | bit4 | bit3 | bit2 | bit1 | bit0 |
|------|-------|------|------|------|------|------|------|
| -    | 1000V | 600V | 300V | 150V | 60V  | 30V  | 15V  |

### Description

Sets and queries voltage range use settings range key operation, auto-range operation, and auto-range integration as a value from 0 to 127. Although NRf numerical values are accepted, values to the right of the decimal are truncated.

**Example** Command **:VOLT:SEL 124**

Configures the setting so that the 15 V and 30 V ranges are skipped.

Query **:VOLT:SEL?**

Response (When HEADER ON) **:VOLTAGE:SELECT 124**  
 (When HEADER OFF) **124**

- Note**
- This command is provided to ensure compatibility with control programs for existing models (3332). To take maximum advantage of the PW3335's functionality, it is recommended to use commands such as :VOLTage:SElect:6V.
  - This query cannot be used to query the 6 V range use setting.
  - If this command is used to set whether to select voltage ranges, the 6 V range use setting will be set to OFF.
  - This command cannot be used to set the 1,000 V range (which is always ON).
  - Specifying a voltage range with the ":VOLTage:RANGe" command will cause range select for the specified range to be turned on.
  - You cannot change this setting during integration, while the display is held, or when the maximum/minimum values are being held.

## (4) Current Range

**Batch Query of Current Range Settings**

|                    |          |                                                                                                                                                                                                                                                                                                                                                                                                                    |
|--------------------|----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | Query    | <b>:CURRent?</b>                                                                                                                                                                                                                                                                                                                                                                                                   |
|                    | Response | <Current range (NR2)>;<Auto range ON/OFF>;<Current sensor type>;<Current sensor range>;<Select (NR1)>; <Select (NR1)>                                                                                                                                                                                                                                                                                              |
| <b>Description</b> |          | Queries the current range setting.                                                                                                                                                                                                                                                                                                                                                                                 |
|                    |          |                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Example</b>     | Query    | <b>:CURR?</b>                                                                                                                                                                                                                                                                                                                                                                                                      |
|                    | Response | (When HEADER ON) <b>:CURRENT:RANGE 0.2;AUTO OFF; TYPE TYPE2;EXTRANGE C50;SELECT 255,32</b><br>(When HEADER OFF) <b>0.2; OFF; TYPE2; C50</b>                                                                                                                                                                                                                                                                        |
| <b>Note</b>        |          | <ul style="list-style-type: none"> <li>You can use the <b>:TRANsmit:SEParator</b> command to change the message unit separator from a semicolon ";" to a comma ",".</li> <li>See the sections on <b>:CURRent:RANGe</b>, <b>AUTO</b>, <b>TYPE</b>, <b>EXTRange</b>, <b>SElect</b> for details on the responses for this query.</li> <li>Instead of <b>:CURRent?</b>, you can also use <b>:CURRent1?</b>.</li> </ul> |
|                    |          | (Both of these commands perform the same operation.)                                                                                                                                                                                                                                                                                                                                                               |

**Query the Current Auto Range Setting**

|                    |          |                                                                                                                                                                                                                                                                                           |
|--------------------|----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | Command  | <b>:CURRent:AUTO &lt;ON/OFF&gt;</b>                                                                                                                                                                                                                                                       |
|                    | Query    | <b>:CURRent:AUTO?</b>                                                                                                                                                                                                                                                                     |
|                    | Response | <b>&lt;ON/OFF&gt;</b><br>ON Measures the current in an automatic range.<br>OFF Turns off the current automatic range operation.                                                                                                                                                           |
| <b>Description</b> | Command  | Turns ON or OFF the current auto range.                                                                                                                                                                                                                                                   |
|                    | Query    | Returns the current auto range setting.                                                                                                                                                                                                                                                   |
| <b>Example</b>     | Command  | <b>:CURR:AUTO ON</b>                                                                                                                                                                                                                                                                      |
|                    | Query    | <b>:CURR:AUTO?</b>                                                                                                                                                                                                                                                                        |
|                    | Response | (When HEADER ON) <b>:CURRENT:AUTO ON</b><br>(When HEADER OFF) <b>ON</b>                                                                                                                                                                                                                   |
| <b>Note</b>        |          | <ul style="list-style-type: none"> <li>If you set the current range via a command such as <b>:CURRent:RANGe</b>, the auto range operation will be turned OFF for the specified channel.</li> <li>You cannot change this setting during integration, while the display is held.</li> </ul> |
|                    |          | <ul style="list-style-type: none"> <li>Instead of <b>:CURRent:AUTO(?)</b>, you can also use <b>:CURRent1:AUTO(?)</b>.</li> </ul> (Both of these commands perform the same operation.)                                                                                                     |

## Set and Query the Current Range Setting

|                    |          |                                                                                                                  |
|--------------------|----------|------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | Command  | <b>:CURRent:RANGe &lt;Current range (NR2)&gt;</b>                                                                |
|                    | Query    | <b>:CURRent:RANGe?</b>                                                                                           |
|                    | Response | <Current range (NR2)><br><Current range (NR2)> =<br>0.001/0.002/0.005/0.01/0.02/0.05/0.1/0.2/0.5/1/2/5/10/20     |
| <b>Description</b> | Command  | Sets the current range setting. (The unit used for current is amperes [A].)<br>NRf numerical values are accepted |
|                    | Query    | Returns the current range setting in NR1 format.                                                                 |
| <b>Example</b>     | Command  | <b>:CURR:RANG 0.2</b>                                                                                            |
|                    | Query    | <b>:CURR:RANG?</b>                                                                                               |
|                    | Response | (When HEADER ON) <b>:CURRENT:RANGE 0.2</b><br>(When HEADER OFF) <b>0.2</b>                                       |

- Note**
- Do not append a unit to the current range.
  - After you change the range, wait a few moments until the internal circuitry stabilizes before you read any measurement values.
  - If a range is specified, the auto range operation is turned OFF. Range select will be turned ON.
  - If the number of times to perform averaging is set to any value other than 1 and the range is changed, averaging is restarted.
  - If any value other than <Current range (NR2)> is specified, the set value will be set to the range that can be measured. However, if the specified value exceeds the full scale of the range, the next highest range will be set instead.
  - If a negative value is specified, the absolute value will be used.
  - You cannot change this setting during integration, while the display is held.
  - If you are using a current sensor, use the **:CURRent:EXTRange(?)** command.
  - **:CURRent:RANGe(?)** performs the same operation.

## Set Whether to Select All Auto-range Current Ranges

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |         |                                                                                                                                       |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|---------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Command | <b>:CURRent:SElect:ALL ON/OFF</b>                                                                                                     |
| <b>Description</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Command | Sets whether to enable use of all current ranges and external current sensors during auto-range operation and auto-range integration. |
| <b>Example</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Command | <b>:CURR:SEL:ALL ON</b>                                                                                                               |
| <b>Note</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |         |                                                                                                                                       |
| <ul style="list-style-type: none"> <li>• Use of the 100 mA and 20 A ranges as well as the external current sensor C5A range is always enabled, regardless of the value of this setting.</li> <li>• Specifying a current range with the <b>:CURRent:RANGe</b> command will cause range select for the specified range to be turned on.</li> <li>• You cannot change this setting during integration, while the display is held, or when the maximum/minimum values are being held.</li> </ul> |         |                                                                                                                                       |

## Set and Query Auto-range Current Range Select

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | Command                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | :CURRent:SElect:I1mA ON/OFF<br>:CURRent:SElect:I2mA ON/OFF<br>:CURRent:SElect:I5mA ON/OFF<br>:CURRent:SElect:I10mA ON/OFF<br>:CURRent:SElect:I20mA ON/OFF<br>:CURRent:SElect:I50mA ON/OFF<br>:CURRent:SElect:I200mA ON/OFF<br>:CURRent:SElect:I500mA ON/OFF<br>:CURRent:SElect:I1A ON/OFF<br>:CURRent:SElect:I2A ON/OFF<br>:CURRent:SElect:I5A ON/OFF<br>:CURRent:SElect:I10A ON/OFF<br>:CURRent:SElect:C1A ON/OFF<br>:CURRent:SElect:C2A ON/OFF |
|                    | Query                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | :CURRent:SElect:I1mA?<br>:CURRent:SElect:I2mA?<br>:CURRent:SElect:I5mA?<br>:CURRent:SElect:I10mA?<br>:CURRent:SElect:I20mA?<br>:CURRent:SElect:I50mA?<br>:CURRent:SElect:I100mA?<br>:CURRent:SElect:I200mA?<br>:CURRent:SElect:I500mA?<br>:CURRent:SElect:I1A?<br>:CURRent:SElect:I2A?<br>:CURRent:SElect:I5A?<br>:CURRent:SElect:I10A?<br>:CURRent:SElect:I20A?<br>:CURRent:SElect:C1A?<br>:CURRent:SElect:C2A?<br>:CURRent:SElect:C5A?         |
|                    | Response                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | <ON/OFF><br>ON Performs measurement using the current range in question during range key operation, auto-range operation, and auto-range integration.<br>OFF Disables use of the current range in question during range key operation, auto-range operation, and auto-range integration.                                                                                                                                                         |
| <b>Description</b> | Command                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Toggles use of the current range in question during range key operation, auto-range operation, and auto-range integration.                                                                                                                                                                                                                                                                                                                       |
|                    | Query                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Returns whether the current range in question is used during range key operation, auto-range operation, and auto-range integration.                                                                                                                                                                                                                                                                                                              |
| <b>Example</b>     | Command                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | :CURR:SEL:I5A ON                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|                    | Query                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | :CURR:SEL:I5A?                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|                    | Response                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | (When HEADER ON) :CURRENT:SELECT:I5A ON<br>(When HEADER OFF) ON                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Note</b>        | <ul style="list-style-type: none"> <li>• Specifying a current range with the :CURRent:RANGe or :CURRent:EXTRange command will cause range select for the specified range to be turned on.</li> <li>• You cannot change this setting during integration, while the display is held, or when the maximum/minimum values are being held.</li> <li>• Since use of the 100 mA and 20 A ranges as well as the external current sensor 5 A range is always enabled, queries will always return "ON."</li> </ul> |                                                                                                                                                                                                                                                                                                                                                                                                                                                  |

There is no abbreviated format available for the current range portion of the command.

(the “m” in “1 mA” an similar text cannot be omitted).

### Set and Query Current Range Select

|                    |          |                                                               |       |      |      |      |      |      |
|--------------------|----------|---------------------------------------------------------------|-------|------|------|------|------|------|
| <b>Syntax</b>      | Command  | <b>:CURRent:SElect &lt;data1(NR1)&gt;, &lt;data2(NR1)&gt;</b> |       |      |      |      |      |      |
|                    | Query    | <b>:CURRent:SElect?</b>                                       |       |      |      |      |      |      |
| <b>Description</b> | Response | <data1>,<data2>                                               |       |      |      |      |      |      |
|                    |          | 128                                                           | 64    | 32   | 16   | 8    | 4    | 2    |
|                    |          | <data1(NR1)>                                                  |       |      |      |      |      |      |
|                    |          | bit7                                                          | bit6  | bit5 | bit4 | bit3 | bit2 | bit1 |
|                    |          | 200mA                                                         | 100mA | 50mA | 20mA | 10mA | 5mA  | 2mA  |
| <b>Example</b>     |          | <data2(NR1)>                                                  |       |      |      |      |      |      |
|                    |          | Bit7                                                          | bit6  | bit5 | bit4 | bit3 | bit2 | bit1 |
|                    |          | -                                                             | -     | 20A  | 10A  | 5A   | 2A   | 1A   |
|                    | Command  | <b>:CURR:SEL 252,63</b>                                       |       |      |      |      |      |      |
|                    | Query    | <b>:CURR:SEL?</b>                                             |       |      |      |      |      |      |
| <b>Note</b>        | Response | (When HEADER ON) <b>:CURRENT:SELECT 253, 63</b>               |       |      |      |      |      |      |
|                    |          | (When HEADER OFF) <b>253, 63</b>                              |       |      |      |      |      |      |

Sets and queries current range use settings during range key operation, auto-range operation, and auto-range integration as a value from 0 to 255 (data 1) or from 0 to 63.

Although NRf numerical values are accepted, values to the right of the decimal are truncated.

Configures the setting so that the 1 mA and 2 mA ranges are skipped.

(When HEADER ON) **:CURRENT:SELECT 253, 63**

(When HEADER OFF) **253, 63**

- This command is provided to ensure compatibility with control programs for existing models (3332).
- To take maximum advantage of the PW3335's functionality, it is recommended to use commands such as :CURRent:SElect:10A.
- This command/query cannot be used to set or query external current sensor range use settings.
- This command cannot be used to set the 100 mA or 20 A ranges (which are always on).
- Specifying a current range with the :CURRent:RANGe command will cause range select for the specified range to be turned on.
- You cannot change this setting during integration, while the display is held, or when the maximum/minimum values are being held.

### Set and Query External Current Sensor Input

|                    |          |                                                                                                                                   |  |  |  |  |  |  |
|--------------------|----------|-----------------------------------------------------------------------------------------------------------------------------------|--|--|--|--|--|--|
| <b>Syntax</b>      | Command  | <b>:CURRent:TYPE &lt;External Current Sensor Type&gt;</b>                                                                         |  |  |  |  |  |  |
|                    | Query    | <b>:CURRent:TYPE?</b>                                                                                                             |  |  |  |  |  |  |
|                    | Response | <External current sensor type>                                                                                                    |  |  |  |  |  |  |
| <b>Description</b> |          | <External current sensor type> = OFF/TYPE1/TYPE2                                                                                  |  |  |  |  |  |  |
|                    | Command  | Sets the external current sensor type.                                                                                            |  |  |  |  |  |  |
|                    | Query    | Returns the current sensor range setting as a string.                                                                             |  |  |  |  |  |  |
| <b>Example</b>     | Command  | <b>:CURR:TYPE TYPE1</b>                                                                                                           |  |  |  |  |  |  |
|                    | Query    | <b>:CURR:TYPE?</b>                                                                                                                |  |  |  |  |  |  |
|                    | Response | (When HEADER ON) <b>:CURRENT:TYPE TYPE1</b>                                                                                       |  |  |  |  |  |  |
| <b>Note</b>        |          | (When HEADER OFF) <b>TYPE1</b>                                                                                                    |  |  |  |  |  |  |
|                    |          | After you change this setting, wait a few moments until the internal circuitry stabilizes before you read any measurement values. |  |  |  |  |  |  |
|                    |          | If the number of times to perform averaging is set to any value other than 1 and the range is changed, averaging is restarted.    |  |  |  |  |  |  |
|                    |          | You cannot change this setting during integration, while the display is held, or when the maximum/minimum values are being held.  |  |  |  |  |  |  |
|                    |          | If the instrument does not have external current sensor input, a hardware error will result.                                      |  |  |  |  |  |  |

### Set and Query the Current Range (When Using an External Current Sensor)

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                       |
|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | Command                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | <b>:CURRent:EXTRange &lt;External Current Sensor Range&gt;</b>                                                                                                                        |
|                    | Query                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | <b>:CURRent:EXTRange?</b>                                                                                                                                                             |
|                    | Response                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | <External current sensor range><br><External current sensor range> = C1/C2/C5                                                                                                         |
| <b>Description</b> | Command                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Sets the external current range.<br>Unlike other commands such as :CURRent:RANGe, an error will occur if any value other than the above <External current sensor range> is specified. |
|                    | Query                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Returns the external current sensor range setting as a string.                                                                                                                        |
| <b>Example</b>     | Command                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | <b>:CURR:EXTR C5</b>                                                                                                                                                                  |
|                    | Query                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | <b>:CURR:EXTR?</b>                                                                                                                                                                    |
|                    | Response                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | (When HEADER ON) <b>:CURRENT:EXTRANGE C5</b><br>(When HEADER OFF) <b>C5</b>                                                                                                           |
| <b>Note</b>        | <ul style="list-style-type: none"> <li>• After you the change the range, wait a few moments until the internal circuitry stabilizes before you read any measurement values.</li> <li>• If a range is specified, the auto range operation is turned OFF.</li> <li>• If the number of times to perform averaging is set to any value other than 1 and the range is changed, averaging is restarted.</li> <li>• An error will occur if any value other than the above &lt;External current sensor range&gt; is specified.</li> <li>• You cannot change this setting during integration, while the display is held, or when the maximum/minimum values are being held.</li> </ul> |                                                                                                                                                                                       |

## (5) Frequency Range (Zero-crossing Filter)

**Query the Frequency Range**

|                    |                                                                                                                                                                                                                                                            |                                                                                          |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | Query                                                                                                                                                                                                                                                      | <b>:FREQuency?</b>                                                                       |
|                    | Response                                                                                                                                                                                                                                                   | <Frequency range (NR3)>                                                                  |
| <b>Description</b> | Queries the frequency range setting.                                                                                                                                                                                                                       |                                                                                          |
|                    |                                                                                                                                                                                                                                                            |                                                                                          |
| <b>Example</b>     | Query                                                                                                                                                                                                                                                      | <b>:FREQuency?</b>                                                                       |
|                    | Response                                                                                                                                                                                                                                                   | (When HEADER ON) <b>:FREQUENCY:RANGE +500.0E+0</b><br>(When HEADER OFF) <b>+500.0E+0</b> |
| <b>Note</b>        | <ul style="list-style-type: none"> <li>The frequency range and zero-crossing filter settings are linked.</li> <li>Instead of <b>:FREQuency?</b>, you can also use <b>:FREQuency1?</b>.<br/>(Both of these commands perform the same operation.)</li> </ul> |                                                                                          |

**Set and Query the Frequency Range**

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                           |
|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | Command                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | <b>:FREQuency:RANGe</b> <Frequency range (NR3)>                                                           |
|                    | Query                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | <b>:FREQuency:RANGe?</b>                                                                                  |
|                    | Response                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | <Frequency range (NR3)><br><Frequency range (NR3)> =<br>+100.0E+0,+500.0E+0,+5.0E+3,+100.0E+3             |
| <b>Description</b> | Command                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Sets the frequency range. (The unit used for frequency is hertz [Hz].) NRf numerical values are accepted. |
|                    | Query                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Returns the frequency range setting in NR3 format.                                                        |
| <b>Example</b>     | Command                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | <b>:FREQ:RANG 500E+0</b>                                                                                  |
|                    | Query                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | <b>:FREQ:RANG?</b>                                                                                        |
|                    | Response                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | (When HEADER ON) <b>:FREQUENCY:RANGE +500.0E+0</b><br>(When HEADER OFF) <b>+500.0E+0</b>                  |
| <b>Note</b>        | <ul style="list-style-type: none"> <li>Do not append a unit to the frequency range.</li> <li>After you change the range, wait a few moments until the internal circuitry stabilizes before you read any measurement values.</li> <li>The same setting is applied to all channels which are a part of a wiring type.</li> <li>If the number of times to perform averaging is set to any value other than 1 and the range is changed, averaging is restarted.</li> <li>If any value other than &lt;Frequency range (NR3)&gt; is specified, the set value will be set to the range that can be measured.<br/>However, if the specified value exceeds the full scale of the range, the next highest range will be set instead.</li> <li>An execution error will occur if any value that exceeds the maximum range (100 kHz) or any negative value is specified.</li> <li>You cannot change this setting during integration, while the display is held, or when the maximum/minimum values are being held.</li> <li>Instead of <b>:FREQuency:RANGe(?)</b>, you can also use <b>:FREQuency1:RANGe(?)</b>.<br/>(Both of these commands perform the same operation.)</li> </ul> |                                                                                                           |

## (6) Synchronization Source

**Set and Query the Synchronization Source**

|                    |          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|--------------------|----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | Command  | <b>:SOURce &lt;Synchronization source&gt;</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|                    | Query    | <b>:SOURce?</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|                    | Response | <b>&lt;Synchronization source&gt;</b><br><b>&lt;Synchronization source&gt; = U / I / DC</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Description</b> |          | Sets or queries the synchronization source setting.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Example</b>     | Command  | <b>:SOUR U</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|                    | Query    | <b>:SOUR?</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|                    | Response | (When HEADER ON) <b>:SOURCE U</b><br>(When HEADER OFF) <b>U</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Note</b>        |          | <ul style="list-style-type: none"> <li>• After you change this setting, wait a few moments until the internal circuitry stabilizes before you read any measurement values.</li> <li>• The same setting is applied to all channels which are a part of a wiring type.</li> <li>• If the number of times to perform averaging is set to any value other than 1 and this setting is changed, averaging is restarted.</li> <li>• You cannot change this setting during integration, while the display is held, or when the maximum/minimum values are being held.</li> <li>• Instead of <b>:SOURce?</b>, you can also use <b>:SOURce1?</b>.</li> <li>(Both of these commands perform the same operation.)</li> </ul> |

**Set and Query the Synchronization Timeout**

|                    |          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|--------------------|----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | Command  | <b>:SOURce:TIMEOut &lt;Timeout value (NR2)&gt;</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|                    | Query    | <b>:SOURce:TIMEOut?</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|                    | Response | <b>&lt;Timeout value (NR2)&gt;</b><br><b>&lt;Timeout value&gt; = 0.1/1/10</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Description</b> |          | Sets or queries the synchronization timeout.<br>(The unit used is seconds [sec].)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Example</b>     | Command  | <b>:SOUR:TIMEO 1</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|                    | Query    | <b>:SOUR:TIMEO?</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|                    | Response | (When HEADER ON) <b>:SOURCE:TIMEOUT 1.0</b><br>(When HEADER OFF) <b>1.0</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Note</b>        |          | <ul style="list-style-type: none"> <li>• Do not append a unit to this setting.</li> <li>• After you change this setting, wait a few moments until the internal circuitry stabilizes before you read any measurement values.</li> <li>• If the number of times to perform averaging is set to any value other than 1 and this setting is changed, averaging is restarted.</li> <li>• You cannot change this setting during integration, while the display is held, or when the maximum/minimum values are being held.</li> <li>• Instead of <b>:SOURce:TIMEOut(?)</b>, you can also use <b>:SOURce1:TIMEOut(?)</b>.</li> <li>(Both of these commands perform the same operation.)</li> </ul> |

**Set All Zero-cross Threshold Levels**

|                    |         |                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|--------------------|---------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | Command | <b>:SOURce:FILTer:LEVel:ALL &lt;1~15(NR1)&gt;</b>                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Description</b> |         | Command Sets the zero-cross threshold level for all voltage and current ranges.                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Example</b>     | Command | <b>:SOUR:FILT:LEV:ALL 1</b>                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Note</b>        |         | <ul style="list-style-type: none"> <li>• Changing this setting when the number of times to perform averaging is set to a value other than 1 will cause averaging processing to be restarted.</li> <li>• Although NRf numerical values are accepted, values to the right of the decimal are truncated.</li> <li>• You cannot change this setting during integration, while the display is held, or when the maximum/minimum values are being held.</li> </ul> |

### Set and Query Zero-cross Threshold Values (Voltage Ranges)

|                    |                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | Command                                                                                                                                                                                                                                                                                                                                             | <b>:SOURce:FILTer:LEVel:U6V &lt;1~15 (NR1)&gt;</b><br><b>:SOURce:FILTer:LEVel:U15V &lt;1~15 (NR1)&gt;</b><br><b>:SOURce:FILTer:LEVel:U30V &lt;1~15 (NR1)&gt;</b><br><b>:SOURce:FILTer:LEVel:U60V &lt;1~15 (NR1)&gt;</b><br><b>:SOURce:FILTer:LEVel:U150V &lt;1~15 (NR1)&gt;</b><br><b>:SOURce:FILTer:LEVel:U300V &lt;1~15 (NR1)&gt;</b><br><b>:SOURce:FILTer:LEVel:U600V &lt;1~15 (NR1)&gt;</b><br><b>:SOURce:FILTer:LEVel:U1000V &lt;1~15 (NR1)&gt;</b> |
|                    | Query                                                                                                                                                                                                                                                                                                                                               | <b>:SOURce:FILTer:LEVel:U6V?</b><br><b>:SOURce:FILTer:LEVel:U15V?</b><br><b>:SOURce:FILTer:LEVel:U30V?</b><br><b>:SOURce:FILTer:LEVel:U60V?</b><br><b>:SOURce:FILTer:LEVel:U150V?</b><br><b>:SOURce:FILTer:LEVel:U300V?</b><br><b>:SOURce:FILTer:LEVel:U600V?</b><br><b>:SOURce:FILTer:LEVel:U1000V?</b>                                                                                                                                                 |
| <b>Description</b> | Response                                                                                                                                                                                                                                                                                                                                            | <b>&lt;1~15(NR1)&gt;</b>                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|                    | Command                                                                                                                                                                                                                                                                                                                                             | Sets zero-cross threshold values.<br>Although NRf numerical values are accepted, values to the right of the decimal are truncated.                                                                                                                                                                                                                                                                                                                       |
| <b>Example</b>     | Query                                                                                                                                                                                                                                                                                                                                               | Queries zero-cross threshold values.                                                                                                                                                                                                                                                                                                                                                                                                                     |
|                    | Command                                                                                                                                                                                                                                                                                                                                             | <b>:SOUR:FILT:LEV:U6V 1</b>                                                                                                                                                                                                                                                                                                                                                                                                                              |
|                    | Query                                                                                                                                                                                                                                                                                                                                               | <b>:SOUR:FILT:LEV:U6V?</b>                                                                                                                                                                                                                                                                                                                                                                                                                               |
|                    | Response                                                                                                                                                                                                                                                                                                                                            | (When HEADER ON) <b>:SOURCE:FILTER:LEVEL:U6V 1</b><br>(When HEADER OFF) <b>1</b>                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Note</b>        | <ul style="list-style-type: none"> <li>• Changing this setting when the number of times to perform averaging is set to a value other than 1 will cause averaging processing to be restarted.</li> <li>• You cannot change this setting during integration, while the display is held, or when the maximum/minimum values are being held.</li> </ul> |                                                                                                                                                                                                                                                                                                                                                                                                                                                          |

### Set and Query Zero-cross Threshold Values (Current Ranges)

|               |         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|---------------|---------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b> | Command | <b>:SOURce:FILTer:LEVel:I1mA &lt;1~15 (NR1)&gt;</b><br><b>:SOURce:FILTer:LEVel:I2mA &lt;1~15 (NR1)&gt;</b><br><b>:SOURce:FILTer:LEVel:I5mA &lt;1~15 (NR1)&gt;</b><br><b>:SOURce:FILTer:LEVel:I10mA &lt;1~15 (NR1)&gt;</b><br><b>:SOURce:FILTer:LEVel:I20mA &lt;1~15 (NR1)&gt;</b><br><b>:SOURce:FILTer:LEVel:I50mA &lt;1~15 (NR1)&gt;</b><br><b>:SOURce:FILTer:LEVel:I100mA &lt;1~15 (NR1)&gt;</b><br><b>:SOURce:FILTer:LEVel:I200mA &lt;1~15 (NR1)&gt;</b><br><b>:SOURce:FILTer:LEVel:I500mA &lt;1~15 (NR1)&gt;</b><br><b>:SOURce:FILTer:LEVel:I1A &lt;1~15 (NR1)&gt;</b><br><b>:SOURce:FILTer:LEVel:I2A &lt;1~15 (NR1)&gt;</b><br><b>:SOURce:FILTer:LEVel:I5A &lt;1~15 (NR1)&gt;</b><br><b>:SOURce:FILTer:LEVel:I10A &lt;1~15 (NR1)&gt;</b><br><b>:SOURce:FILTer:LEVel:I20A &lt;1~15 (NR1)&gt;</b> |
|               | Query   | <b>:SOURce:FILTer:LEVel:I1mA?</b><br><b>:SOURce:FILTer:LEVel:I2mA?</b><br><b>:SOURce:FILTer:LEVel:I5mA?</b><br><b>:SOURce:FILTer:LEVel:I10mA?</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |

|                    |                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                    |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|
|                    |                                                                                                                                                                                                                                                                                                                                                     | <b>:SOURce:FILTer:LEVel:I50mA?</b>                                                                                                 |
|                    |                                                                                                                                                                                                                                                                                                                                                     | <b>:SOURce:FILTer:LEVel:I100mA?</b>                                                                                                |
|                    |                                                                                                                                                                                                                                                                                                                                                     | <b>:SOURce:FILTer:LEVel:I200mA?</b>                                                                                                |
|                    |                                                                                                                                                                                                                                                                                                                                                     | <b>:SOURce:FILTer:LEVel:I500mA?</b>                                                                                                |
|                    |                                                                                                                                                                                                                                                                                                                                                     | <b>:SOURce:FILTer:LEVel:I1A?</b>                                                                                                   |
|                    |                                                                                                                                                                                                                                                                                                                                                     | <b>:SOURce:FILTer:LEVel:I2A?</b>                                                                                                   |
|                    |                                                                                                                                                                                                                                                                                                                                                     | <b>:SOURce:FILTer:LEVel:I5A?</b>                                                                                                   |
|                    |                                                                                                                                                                                                                                                                                                                                                     | <b>:SOURce:FILTer:LEVel:I10A?</b>                                                                                                  |
|                    |                                                                                                                                                                                                                                                                                                                                                     | <b>:SOURce:FILTer:LEVel:I20A?</b>                                                                                                  |
|                    | Response                                                                                                                                                                                                                                                                                                                                            | <1~15(NR1)>                                                                                                                        |
| <b>Description</b> | Command                                                                                                                                                                                                                                                                                                                                             | Sets zero-cross threshold values.<br>Although NRf numerical values are accepted, values to the right of the decimal are truncated. |
|                    | Query                                                                                                                                                                                                                                                                                                                                               | Queries zero-cross threshold values.                                                                                               |
| <b>Example</b>     | Command                                                                                                                                                                                                                                                                                                                                             | <b>:SOUR:FILT:LEV:I1A 1</b>                                                                                                        |
|                    | Query                                                                                                                                                                                                                                                                                                                                               | <b>:SOUR:FILT:LEV:I1A?</b>                                                                                                         |
|                    | Response                                                                                                                                                                                                                                                                                                                                            | (When HEADER ON) <b>:SOURCE:FILTER:LEVEL:I1A 1</b><br>(When HEADER OFF) <b>1</b>                                                   |
| <b>Note</b>        | <ul style="list-style-type: none"> <li>• Changing this setting when the number of times to perform averaging is set to a value other than 1 will cause averaging processing to be restarted.</li> <li>• You cannot change this setting during integration, while the display is held, or when the maximum/minimum values are being held.</li> </ul> |                                                                                                                                    |

#### Set and Query Zero-cross Threshold Values (external current sensor)

|                    |                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                    |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | Command                                                                                                                                                                                                                                                                                                                                             | <b>:SOURce:FILTer:LEVel:C1A &lt;1~15 (NR1)&gt;</b>                                                                                 |
|                    |                                                                                                                                                                                                                                                                                                                                                     | <b>:SOURce:FILTer:LEVel:C2A &lt;1~15 (NR1)&gt;</b>                                                                                 |
|                    |                                                                                                                                                                                                                                                                                                                                                     | <b>:SOURce:FILTer:LEVel:C5A &lt;1~15 (NR1)&gt;</b>                                                                                 |
|                    | Query                                                                                                                                                                                                                                                                                                                                               | <b>:SOURce:FILTer:LEVel:C1A?</b>                                                                                                   |
|                    |                                                                                                                                                                                                                                                                                                                                                     | <b>:SOURce:FILTer:LEVel:C2A?</b>                                                                                                   |
|                    |                                                                                                                                                                                                                                                                                                                                                     | <b>:SOURce:FILTer:LEVel:C5A?</b>                                                                                                   |
|                    | Response                                                                                                                                                                                                                                                                                                                                            | <1~15(NR1)>                                                                                                                        |
| <b>Description</b> | Command                                                                                                                                                                                                                                                                                                                                             | Sets zero-cross threshold values.<br>Although NRf numerical values are accepted, values to the right of the decimal are truncated. |
|                    | Query                                                                                                                                                                                                                                                                                                                                               | Queries zero-cross threshold values.                                                                                               |
| <b>Example</b>     | Command                                                                                                                                                                                                                                                                                                                                             | <b>:SOUR:FILT:LEV:C1A 1</b>                                                                                                        |
|                    | Query                                                                                                                                                                                                                                                                                                                                               | <b>:SOUR:FILT:LEV:C1A?</b>                                                                                                         |
|                    | Response                                                                                                                                                                                                                                                                                                                                            | (When HEADER ON) <b>:SOURCE:FILTER:LEVEL:C1A 1</b><br>(When HEADER OFF) <b>1</b>                                                   |
| <b>Note</b>        | <ul style="list-style-type: none"> <li>• Changing this setting when the number of times to perform averaging is set to a value other than 1 will cause averaging processing to be restarted.</li> <li>• You cannot change this setting during integration, while the display is held, or when the maximum/minimum values are being held.</li> </ul> |                                                                                                                                    |

## (7) VT Ratio/CT Ratio

**Query the VT Ratio and CT Ratio**

|                    |          |                                                        |
|--------------------|----------|--------------------------------------------------------|
| <b>Syntax</b>      | Query    | <b>:SCALE?</b>                                         |
|                    | Response | <VT ratio (NR2)>,<CT ratio(NR2)>                       |
| <b>Description</b> |          | Queries the VT (PT) ratio and CT ratio setting values. |
| <b>Example</b>     | Query    | <b>:SCALE?</b>                                         |
|                    | Response | (When HEADER ON) <b>:SCALE:VT 2.0;CT 3.000</b>         |
|                    |          | (When HEADER OFF) <b>2.0;3.000</b>                     |

**Set and Query the VT Ratio Setting**

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                           |
|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------|
| <b>Syntax</b>      | Command                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <b>:SCALE:VT &lt;VT ratio (NR2)&gt;</b>                                   |
|                    | Query                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | <b>:SCALE:VT?</b>                                                         |
|                    | Response                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <VT ratio (NR2)>                                                          |
| <b>Description</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | <VT ratio (NR2)> = 0.001 to 1000                                          |
|                    | Command                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Sets the VT (PT) ratio.<br>NRf numerical values are accepted.             |
|                    | Query                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Returns the VT ratio setting in NR2 format.                               |
| <b>Example</b>     | Command                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <b>:SCAL:VT 1.2</b>                                                       |
|                    | Query                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | <b>:SCAL:VT?</b>                                                          |
|                    | Response                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | (When HEADER ON) <b>:SCALE:VT 1.200</b><br>(When HEADER OFF) <b>1.200</b> |
| <b>Note</b>        | <ul style="list-style-type: none"> <li>• If the number of times to perform averaging is set to any value other than 1 and the ratio is changed, averaging is restarted.</li> <li>• Changing the setting will cause the maximum and minimum values to be reset.</li> <li>• You cannot change this setting during integration, while the display is held, or when the maximum/minimum values are being held.</li> <li>• Instead of <b>:SCALE:VT(?)</b>, you can also use <b>:SCALE:PT(?)</b>. (Both of these commands perform the same operation.)</li> </ul> |                                                                           |

**Set and Query the CT Ratio Setting**

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                           |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------|
| <b>Syntax</b>      | Command                                                                                                                                                                                                                                                                                                                                                                                                               | <b>:SCALE:CT &lt;CT ratio (NR2)&gt;</b>                                   |
|                    | Query                                                                                                                                                                                                                                                                                                                                                                                                                 | <b>:SCALE:CT?</b>                                                         |
|                    | Response                                                                                                                                                                                                                                                                                                                                                                                                              | <CT ratio (NR2)>                                                          |
| <b>Description</b> |                                                                                                                                                                                                                                                                                                                                                                                                                       | <CT ratio (NR2)> = 0.001 to 1000                                          |
|                    | Command                                                                                                                                                                                                                                                                                                                                                                                                               | Sets the CT ratio.<br>NRf numerical values are accepted.                  |
|                    | Query                                                                                                                                                                                                                                                                                                                                                                                                                 | Returns the CT ratio setting in NR2 format.                               |
| <b>Example</b>     | Command                                                                                                                                                                                                                                                                                                                                                                                                               | <b>:SCAL:CT 2.1</b>                                                       |
|                    | Query                                                                                                                                                                                                                                                                                                                                                                                                                 | <b>:SCAL:CT?</b>                                                          |
|                    | Response                                                                                                                                                                                                                                                                                                                                                                                                              | (When HEADER ON) <b>:SCALE:CT 2.100</b><br>(When HEADER OFF) <b>2.100</b> |
| <b>Note</b>        | <ul style="list-style-type: none"> <li>• If the number of times to perform averaging is set to any value other than 1 and the range is changed, averaging is restarted.</li> <li>• Changing the setting will cause the maximum and minimum values to be reset.</li> <li>• You cannot change this setting during integration, while the display is held, or when the maximum/minimum values are being held.</li> </ul> |                                                                           |

## (8) D/A output

**Set and Query D/A Output (D/A1) Settings**

|                    |          |                                                                                                                                               |                                  |
|--------------------|----------|-----------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|
| <b>Syntax</b>      | Command  | Output Terminal D/A1                                                                                                                          | <b>:AOUT &lt;Output item&gt;</b> |
|                    | Query    | Output Terminal D/A1                                                                                                                          | <b>:AOUT?</b>                    |
|                    | Response | <Output item><br>See <a href="#">List of Measurement Item Specifications</a> for details about the<br><Output item> field.                    |                                  |
| <b>Description</b> | Command  | D/A1 Output Item                                                                                                                              |                                  |
|                    | Query    | Returns the D/A1 output item. (Same as :AOUT:ITEM:DA1.)                                                                                       |                                  |
| <b>Example</b>     | Command  | <b>:AOUT S</b>                                                                                                                                |                                  |
|                    | Query    | <b>:AOUT?</b>                                                                                                                                 |                                  |
|                    | Response | (When HEADER ON) <b>:AOUT:ITEM:DA1 S</b><br>(When HEADER OFF) <b>S</b>                                                                        |                                  |
| <b>Note</b>        |          | You can use the AOUT:ITEM(?) command to query and set DA1 through DA7.<br>• A device error will occur on units that do not have a D/A output. |                                  |

**Set and Query the D/A Output Terminal (D/A1 to D/A7) Output Items**

|                                                                                |                                                                                             |                      |                   |                   |
|--------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|----------------------|-------------------|-------------------|
| Syntax                                                                         | Command                                                                                     | Output Terminal D/A1 | :AOUT:ITEM:DA1    | <D/A output item> |
|                                                                                |                                                                                             | Output Terminal D/A2 | :AOUT:ITEM:DA2    | <D/A output item> |
|                                                                                |                                                                                             | Output Terminal D/A3 | :AOUT:ITEM:DA3    | <D/A output item> |
|                                                                                |                                                                                             | Output Terminal D/A4 | :AOUT:ITEM:DA4    | <D/A output item> |
|                                                                                |                                                                                             | Output Terminal D/A5 | :AOUT:ITEM:DA5    | <D/A output item> |
|                                                                                |                                                                                             | Output Terminal D/A6 | :AOUT:ITEM:DA6    | <D/A output item> |
|                                                                                |                                                                                             | Output Terminal D/A7 | :AOUT:ITEM:DA7    | <D/A output item> |
|                                                                                | Query                                                                                       | Output Terminal D/A1 | :AOUT:ITEM:DA1?   |                   |
|                                                                                |                                                                                             | Output Terminal D/A2 | :AOUT:ITEM:DA2?   |                   |
|                                                                                |                                                                                             | Output Terminal D/A3 | :AOUT:ITEM:DA3?   |                   |
|                                                                                |                                                                                             | Output Terminal D/A4 | :AOUT:ITEM:DA4?   |                   |
|                                                                                |                                                                                             | Output Terminal D/A5 | :AOUT:ITEM:DA5?   |                   |
|                                                                                |                                                                                             | Output Terminal D/A6 | :AOUT:ITEM:DA6?   |                   |
|                                                                                |                                                                                             | Output Terminal D/A7 | :AOUT:ITEM:DA7?   |                   |
|                                                                                | Response                                                                                    | <D/A output item>    |                   |                   |
| Description                                                                    | See the <a href="#">D/A output item specification list</a> for details.                     |                      |                   |                   |
|                                                                                | Sets or queries the output (rectification method) of the D/A output terminals (DA1 to DA7). |                      |                   |                   |
|                                                                                |                                                                                             |                      |                   |                   |
| Example                                                                        | Command                                                                                     | :AOUT:ITEM:DA1 WP    |                   |                   |
|                                                                                | Query                                                                                       | :AOUT:ITEM:DA1?      |                   |                   |
|                                                                                | Response                                                                                    | (When HEADER ON)     | :AOUT:ITEM:DA1 WP |                   |
|                                                                                |                                                                                             | (When HEADER OFF)    | WP                |                   |
| <b>Note</b> •A device error will occur on units that do not have a D/A output. |                                                                                             |                      |                   |                   |

## Set and Query Current Range Select during D/A Output Terminal (D/A 1 to 7) Integrated Value Output

|               |         |                      |                                                         |
|---------------|---------|----------------------|---------------------------------------------------------|
| <b>Syntax</b> | Command | Output Terminal D/A1 | :AOUT:IRANge:DA1 <integrated value current range (NR2)> |
|               |         | Output Terminal D/A2 | :AOUT:IRANge:DA2 <integrated value current range (NR2)> |
|               |         | Output Terminal D/A3 | :AOUT:IRANge:DA3 <integrated value current range (NR2)> |
|               |         | Output Terminal D/A4 | :AOUT:IRANge:DA4 <integrated value current range (NR2)> |
|               |         | Output Terminal D/A5 | :AOUT:IRANge:DA5 <integrated value current range (NR2)> |
|               |         | Output Terminal D/A6 | :AOUT:IRANge:DA6 <integrated value current range (NR2)> |
|               |         | Output Terminal D/A7 | :AOUT:IRANge:DA7 <integrated value current range (NR2)> |
| Query         |         | Output Terminal D/A1 | :AOUT:IRANge:DA1?                                       |
|               |         | Output Terminal D/A2 | :AOUT:IRANge:DA2?                                       |
|               |         | Output Terminal D/A3 | :AOUT:IRANge:DA3?                                       |
|               |         | Output Terminal D/A4 | :AOUT:IRANge:DA4?                                       |
|               |         | Output Terminal D/A5 | :AOUT:IRANge:DA5?                                       |
|               |         | Output Terminal D/A6 | :AOUT:IRANge:DA6?                                       |
|               |         | Output Terminal D/A7 | :AOUT:IRANge:DA7?                                       |
| Response      |         |                      | < integrated value current range (NR2)>                 |
|               |         |                      | 0                                                       |
|               |         |                      | 0.2 / 0.5 / 1 / 2 / 5 / 10 / 20                         |
|               |         |                      | BACKUP                                                  |

### Description

Integrated values exist for each current range when auto-range integration is performed. This command sets or queries the current range for which to output data when outputting integrated values. (Unit: ampere [A])  
NRf numerical values are accepted.

When the value 0 is selected, integrated values for all ranges are added, and the resulting total value is output.

### Example

|          |                                                                     |
|----------|---------------------------------------------------------------------|
| Command  | Returns the current range setting as an NR2-format value or string. |
| Query    | :AOUT:IRANge:DA1?                                                   |
| Response | (When HEADER ON) :AOUT:IRANge:DA1 0.2<br>(When HEADER OFF) 0.2      |

**Note** • A device error will occur on units that do not have a D/A output.

- When auto-range integration is off, changing the setting results in an execution error. For DA output, the total value will be output regardless of the setting.
- Specifying a value other than <integrated value current range (NR2)> will cause the setting to be changed to “range that can measure the specified value.” However, the next range up will be selected if the range’s full-scale value is exceeded.
- If a negative value is specified, the absolute value will be used.

**D/A output item specification list**  
(For :AOUT:ITEM:DA1~7)

| Description              |                     |                                          | Parameter List<br>(Values in parentheses can also be used.) |               |        |          |           |
|--------------------------|---------------------|------------------------------------------|-------------------------------------------------------------|---------------|--------|----------|-----------|
| Output items             | Speed               | Full-scale or<br>output range<br>(5Vfs.) | Rectification Method                                        |               |        |          |           |
|                          |                     |                                          | ACDC                                                        | ACDC<br>UMEAN | DC     | AC       | FND       |
| Voltage (U)              | Level               | 2Vf.s.                                   | U<br>(V,V1,U1)                                              | UMN           | UDC    | UAC      | UFND      |
|                          |                     | 5Vf.s.                                   | U_5V                                                        | UMN_5V        | UDC_5V | UAC_5V   | UFND_5V   |
|                          | High-speed<br>level | 2Vf.s.                                   | U_F                                                         |               |        |          |           |
|                          |                     | 5Vf.s.                                   | U_F5V                                                       |               |        |          |           |
|                          | Wave<br>form        | 1Vf.s.                                   | U_WV                                                        |               |        |          |           |
| Current (I)              | Level               | 2Vf.s.                                   | I<br>(AA1,I1)                                               | (IMN)         | IDC    | IAC      | IFND      |
|                          |                     | 5Vf.s.                                   | I_5V                                                        | (IMN_5)       | IDC_5V | IAC_5V   | IFND_5V   |
|                          | High-speed<br>level | 2Vf.s.                                   | I_F                                                         |               |        |          |           |
|                          |                     | 5Vf.s.                                   | I_F5V                                                       |               |        |          |           |
|                          | Wave<br>form        | 1Vf.s.                                   | I_WV                                                        |               |        |          |           |
| Active power<br>(P)      | Level               | 2Vf.s.                                   | P<br>(W,W1,P1)                                              | PMN           | PDC    | PAC      | PFND      |
|                          |                     | 5Vf.s.                                   | P_5V                                                        | PMN_5V        | PDC_5V | PAC_5V   | PFND_5V   |
|                          | High-speed<br>level | 2Vf.s.                                   | P_F                                                         |               |        |          |           |
|                          |                     | 5Vf.s.                                   | P_F5V                                                       |               |        |          |           |
|                          | Wave<br>form        | 1Vf.s.                                   | P_WV                                                        |               |        |          |           |
| Apparent power<br>(S)    | Level               | 2Vf.s.                                   | S<br>(VA,VA1,S1)                                            | SMN           |        | SAC      | SFND      |
|                          |                     | 5Vf.s.                                   | S_5V                                                        | SMN_5V        |        | SAC_5V   | SFND_5V   |
| Inactive power<br>(Q)    | Level               | 2Vf.s.                                   | Q<br>(VAR,VAR1,Q1)                                          | QMN           |        | QAC      | QFND      |
|                          |                     | 5Vf.s.                                   | Q_5V                                                        | QMN_5V        |        | QAC_5V   | QFND_5V   |
| Power factor (λ)         | Level               | 2Vf.s.                                   | PF<br>(PF1)                                                 | PFMN          |        | PFAC     | PFFND     |
|                          |                     | 5Vf.s.                                   | PF_5V                                                       | PFMN_5V       |        | PFAC_5V  | PFFND_5V  |
| Phase angle (φ)          | Level               | 2Vf.s.                                   |                                                             |               |        | DEGAC    | DEGFND    |
|                          |                     | 5Vf.s.                                   |                                                             |               |        | DEGAC_5V | DEGFND_5V |
| Voltage<br>frequency (f) | Level               | 0.5Hz                                    | FREQU_05                                                    |               |        |          |           |
|                          |                     | 5Hz                                      | FREQU_5                                                     |               |        |          |           |
|                          |                     | 50Hz                                     | FREQU_50<br>or<br>FREQU                                     |               |        |          |           |
|                          |                     | 500Hz                                    | FREQU_500                                                   |               |        |          |           |
|                          |                     | 5kHz                                     | FREQU_5K                                                    |               |        |          |           |
|                          |                     | 50kHz                                    | FREQU_50K                                                   |               |        |          |           |
|                          |                     | 500kHz                                   | FREQU_500K                                                  |               |        |          |           |
| Current<br>frequency (f) | Level               | 0.5Hz                                    | FREQU_05                                                    |               |        |          |           |
|                          |                     | 5Hz                                      | FREQU_5                                                     |               |        |          |           |
|                          |                     | 50Hz                                     | FREQU_50<br>or                                              |               |        |          |           |

| Description                                                          |       |                                       | Parameter List<br>(Values in parentheses can also be used.) |                           |                         |    |     |
|----------------------------------------------------------------------|-------|---------------------------------------|-------------------------------------------------------------|---------------------------|-------------------------|----|-----|
| Output items                                                         | Speed | Full-scale or output range<br>(5Vfs.) | Rectification Method                                        |                           |                         |    |     |
|                                                                      |       |                                       | ACDC                                                        | ACDC<br>U <sub>MEAN</sub> | DC                      | AC | FND |
|                                                                      |       |                                       | FREQI                                                       |                           |                         |    |     |
|                                                                      |       | 500Hz                                 | FREQI_500                                                   |                           |                         |    |     |
|                                                                      |       | 5kHz                                  | FREQI_5K                                                    |                           |                         |    |     |
|                                                                      |       | 50kHz                                 | FREQI_50K                                                   |                           |                         |    |     |
|                                                                      |       | 500kHz                                | FREQI_500K                                                  |                           |                         |    |     |
|                                                                      |       |                                       |                                                             |                           |                         |    |     |
| Positive current integration<br>(See Note 1.)                        | Level | 5mAh                                  |                                                             |                           | PIHDC_0005              |    |     |
|                                                                      |       | 50mAh                                 |                                                             |                           | PIHDC_005               |    |     |
|                                                                      |       | 500mAh                                |                                                             |                           | PIHDC_05                |    |     |
|                                                                      |       | 5Ah                                   |                                                             |                           | PIHDC_5                 |    |     |
|                                                                      |       | 50Ah                                  |                                                             |                           | PIHDC_50<br>or<br>PIHDC |    |     |
|                                                                      |       | 500Ah                                 |                                                             |                           | PIHDC_500               |    |     |
|                                                                      |       | 5kAh                                  |                                                             |                           | PIHDC_5K                |    |     |
|                                                                      |       | 50kAh                                 |                                                             |                           | PIHDC_50K               |    |     |
|                                                                      |       | 500kAh                                |                                                             |                           | PIHDC_500K              |    |     |
|                                                                      |       | 5MAh                                  |                                                             |                           | PIHDC_5M                |    |     |
|                                                                      |       | 50MAh                                 |                                                             |                           | PIHDC_50M               |    |     |
|                                                                      |       | 500MAh                                |                                                             |                           | PIHDC_500M              |    |     |
|                                                                      |       | 5000MAh                               |                                                             |                           | PIHDC_5000M             |    |     |
|                                                                      |       |                                       |                                                             |                           |                         |    |     |
|                                                                      |       |                                       |                                                             |                           |                         |    |     |
| Negative current integration<br>(See Note 1.)                        | Level | 5mAh                                  |                                                             |                           | MIHDC_0005              |    |     |
|                                                                      |       | 50mAh                                 |                                                             |                           | MIHDC_005               |    |     |
|                                                                      |       | 500mAh                                |                                                             |                           | MIHDC_05                |    |     |
|                                                                      |       | 5Ah                                   |                                                             |                           | MIHDC_5                 |    |     |
|                                                                      |       | 50Ah                                  |                                                             |                           | MIHDC_50<br>or<br>MIHDC |    |     |
|                                                                      |       | 500Ah                                 |                                                             |                           | MIHDC_500               |    |     |
|                                                                      |       | 5kAh                                  |                                                             |                           | MIHDC_5K                |    |     |
|                                                                      |       | 50kAh                                 |                                                             |                           | MIHDC_50K               |    |     |
|                                                                      |       | 500kAh                                |                                                             |                           | MIHDC_500K              |    |     |
|                                                                      |       | 5MAh                                  |                                                             |                           | MIHDC_5M                |    |     |
|                                                                      |       | 50MAh                                 |                                                             |                           | MIHDC_50M               |    |     |
|                                                                      |       | 500MAh                                |                                                             |                           | MIHDC_500M              |    |     |
|                                                                      |       | 5000MAh                               |                                                             |                           | MIHDC_5000M             |    |     |
|                                                                      |       |                                       |                                                             |                           |                         |    |     |
|                                                                      |       |                                       |                                                             |                           |                         |    |     |
| Current integration<br>(total sum)<br>(See Note 1.)<br>(See Note 2.) | Level | 5mAh                                  | IH_0005                                                     | IHMN_0005                 | IHDC_0005               |    |     |
|                                                                      |       | 50mAh                                 | IH_005                                                      | IHMN_005                  | IHDC_005                |    |     |
|                                                                      |       | 500mAh                                | IH_05                                                       | IHMN_05                   | IHDC_05                 |    |     |
|                                                                      |       | 5Ah                                   | IH_5                                                        | IHMN_5                    | IHDC_5                  |    |     |
|                                                                      |       | 50Ah                                  | IH_50<br>or<br>IH<br>(AH,AH1,<br>IH1)                       | IHMN_50<br>or<br>IHMN     | IHDC_50<br>or<br>IHDC   |    |     |
|                                                                      |       | 500Ah                                 | IH_500                                                      | IHMN_500                  | IHDC_500                |    |     |
|                                                                      |       | 5kAh                                  | IH_5K                                                       | IHMN_5K                   | IHDC_5K                 |    |     |
|                                                                      |       | 50kAh                                 | IH_50K                                                      | IHMN_50K                  | IHDC_50K                |    |     |
|                                                                      |       | 500kAh                                | IH_500K                                                     | IHMN_500K                 | IHDC_500K               |    |     |
|                                                                      |       | 5MAh                                  | IH_5M                                                       | IHMN_5M                   | IHDC_5M                 |    |     |
|                                                                      |       | 50MAh                                 | IH_50M                                                      | IHMN_50M                  | IHDC_50M                |    |     |
|                                                                      |       | 500MAh                                | IH_500M                                                     | IHMN_500M                 | IHDC_500M               |    |     |
|                                                                      |       |                                       |                                                             |                           |                         |    |     |
|                                                                      |       |                                       |                                                             |                           |                         |    |     |
|                                                                      |       |                                       |                                                             |                           |                         |    |     |

| Description                                                    |       |                                          | Parameter List<br>(Values in parentheses can also be used.) |                          |                          |    |     |
|----------------------------------------------------------------|-------|------------------------------------------|-------------------------------------------------------------|--------------------------|--------------------------|----|-----|
| Output items                                                   | Speed | Full-scale or<br>output range<br>(5Vfs.) | Rectification Method                                        |                          |                          |    |     |
|                                                                |       |                                          | ACDC                                                        | ACDC<br>UMEAN            | DC                       | AC | FND |
| Positive Active<br>power<br>integration<br>(See Note 1.)       | Level | 5000MAh                                  | IH_5000M                                                    | IHMN_5000M               | IHDC_5000M               |    |     |
|                                                                |       | 5mWh                                     | PWP_0005                                                    | PWPMN_0005               | PWPDC_0005               |    |     |
|                                                                |       | 50mWh                                    | PWP_005                                                     | PWPMN_005                | PWPDC_005                |    |     |
|                                                                |       | 500mWh                                   | PWP_05                                                      | PWPMN_05                 | PWPDC_05                 |    |     |
|                                                                |       | 5Wh                                      | PWP_5                                                       | PWPMN_5                  | PWPDC_5                  |    |     |
|                                                                |       | 50Wh                                     | PWP_50                                                      | PWPMN_50                 | PWPDC_50                 |    |     |
|                                                                |       | 500Wh                                    | PWP_500<br>Or<br>PWP<br>(PWH,<br>PWH1,<br>PWP1)             | PWPMN_500<br>Or<br>PWPMN | PWPDC_500<br>Or<br>PWPDC |    |     |
|                                                                |       | 5kWh                                     | PWP_5K                                                      | PWPMN_5K                 | PWPDC_5K                 |    |     |
|                                                                |       | 50kWh                                    | PWP_50K                                                     | PWPMN_50K                | PWPDC_50K                |    |     |
|                                                                |       | 500kWh                                   | PWP_500K                                                    | PWPMN_500K               | PWPDC_500K               |    |     |
|                                                                |       | 5MWh                                     | PWP_5M                                                      | PWPMN_5M                 | PWPDC_5M                 |    |     |
|                                                                |       | 50MWh                                    | PWP_50M                                                     | PWPMN_50M                | PWPDC_50M                |    |     |
|                                                                |       | 500MWh                                   | PWP_500M                                                    | PWPMN_500M               | PWPDC_500M               |    |     |
|                                                                |       | 5000MW                                   | PWP_5000M                                                   | PWPMN_5000M              | PWPDC_5000M              |    |     |
| Negative active<br>power<br>integration<br>(See Note 1.)       | Level | 5mWh                                     | MWP_0005                                                    | MWPMN_0005               | MWPDC_0005               |    |     |
|                                                                |       | 50mWh                                    | MWP_005                                                     | MWPMN_005                | MWPDC_005                |    |     |
|                                                                |       | 500mWh                                   | MWP_05                                                      | MWPMN_05                 | MWPDC_05                 |    |     |
|                                                                |       | 5Wh                                      | MWP_5                                                       | MWPMN_5                  | MWPDC_5                  |    |     |
|                                                                |       | 50Wh                                     | MWP_50                                                      | MWPMN_50                 | MWPDC_50                 |    |     |
|                                                                |       | 500Wh                                    | MWP_500<br>Or<br>MWP<br>(MWH,<br>MWH1,<br>MWP1)             | MWPMN_500<br>Or<br>MWPMN | MWPDC_500<br>Or<br>MWPDC |    |     |
|                                                                |       | 5kWh                                     | MWP_5K                                                      | MWPMN_5K                 | MWPDC_5K                 |    |     |
|                                                                |       | 50kWh                                    | MWP_50K                                                     | MWPMN_50K                | MWPDC_50K                |    |     |
|                                                                |       | 500kWh                                   | MWP_500K                                                    | MWPMN_500K               | MWPDC_500K               |    |     |
|                                                                |       | 5MWh                                     | MWP_5M                                                      | MWPMN_5M                 | MWPDC_5M                 |    |     |
|                                                                |       | 50MWh                                    | MWP_50M                                                     | MWPMN_50M                | MWPDC_50M                |    |     |
|                                                                |       | 500MWh                                   | MWP_500M                                                    | MWPMN_500M               | MWPDC_500M               |    |     |
|                                                                |       | 5000MW                                   | MWP_5000M                                                   | MWPMN_5000M              | MWPDC_5000M              |    |     |
| Active power<br>(total sum of<br>integration)<br>(See Note 1.) | Level | 5mWh                                     | WP_0005                                                     | WPMN_0005                | WPDC_0005                |    |     |
|                                                                |       | 50mWh                                    | WP_005                                                      | WPMN_005                 | WPDC_005                 |    |     |
|                                                                |       | 500mWh                                   | WP_05                                                       | WPMN_05                  | WPDC_05                  |    |     |
|                                                                |       | 5Wh                                      | WP_5                                                        | WPMN_5                   | WPDC_5                   |    |     |
|                                                                |       | 50Wh                                     | WP_50                                                       | WPMN_50                  | WPDC_50                  |    |     |
|                                                                |       | 500Wh                                    | WP_500<br>Or<br>WP<br>(WH,<br>WH1,<br>WP1)                  | WPMN_500<br>Or<br>WPMN   | WPDC_500<br>Or<br>PWPDC  |    |     |
|                                                                |       | 5kWh                                     | WP_5K                                                       | WPMN_5K                  | WPDC_5K                  |    |     |
|                                                                |       |                                          |                                                             |                          |                          |    |     |

| Description                                                           |       |                                           | Parameter List<br>(Values in parentheses can also be used.) |               |            |    |     |
|-----------------------------------------------------------------------|-------|-------------------------------------------|-------------------------------------------------------------|---------------|------------|----|-----|
| Output items                                                          | Speed | Full-scale or<br>output range<br>(5Vf.s.) | Rectification Method                                        |               |            |    |     |
|                                                                       |       |                                           | ACDC                                                        | ACDC<br>UMEAN | DC         | AC | FND |
|                                                                       |       | 500kWh                                    | WP_500K                                                     | WPMN_500K     | WPDC_500K  |    |     |
|                                                                       |       | 5MWh                                      | WP_5M                                                       | WPMN_5M       | WPDC_5M    |    |     |
|                                                                       |       | 50MWh                                     | WP_50M                                                      | WPMN_50M      | WPDC_50M   |    |     |
|                                                                       |       | 500MWh                                    | WP_500M                                                     | WPMN_500M     | WPDC_500M  |    |     |
|                                                                       |       | 5000MW                                    | WP_5000M                                                    | WPMN_5000M    | WPDC_5000M |    |     |
| Maximun<br>Current Ratio<br>(MCR)                                     | Level | 2Vf.s.                                    | MCR                                                         |               |            |    |     |
|                                                                       |       | 5Vf.s.                                    | MCR_5V                                                      |               |            |    |     |
| Voltage<br>crest factor<br>(Ucf)                                      | Level | 2Vf.s.                                    | UCF                                                         |               |            |    |     |
|                                                                       |       | 5Vf.s.                                    | UCF_5V                                                      |               |            |    |     |
| Current<br>crest factor<br>(Icf)                                      | Level | 2Vf.s.                                    | ICF                                                         |               |            |    |     |
|                                                                       |       | 5Vf.s.                                    | ICF_5V                                                      |               |            |    |     |
| Time average<br>current<br>(T.AV I)<br>(See Note 1.)<br>(See Note 2.) | Level | 2Vf.s.                                    | ITAV                                                        | ITAVMN        | ITAVDC     |    |     |
|                                                                       |       | 5Vf.s.                                    | ITAV_5V                                                     | ITAVMN_5V     | ITAVDC_5V  |    |     |
| Time average<br>power<br>(T.AV P) (See<br>Note 1.)                    | Level | 2Vf.s.                                    | PTAV                                                        | PTAVMN        | PTAVDC     |    |     |
|                                                                       |       | 5Vf.s.                                    | PTAV_5V                                                     | PTAVMN_5V     | PTAVDC_5V  |    |     |
| Voltage<br>ripple factor<br>(Urf)                                     | Level | 2Vf.s.                                    | URF                                                         |               |            |    |     |
|                                                                       |       | 5Vf.s.                                    | URF_5V                                                      |               |            |    |     |
| Current ripple<br>factor<br>(Irf)                                     | Level | 2Vf.s.                                    | IRF                                                         |               |            |    |     |
|                                                                       |       | 5Vf.s.                                    | IRF_5V                                                      |               |            |    |     |
| Voltage<br>total distortion<br>factor<br>(Uthd)                       | Level | 2Vf.s.                                    | UTHD                                                        |               |            |    |     |
|                                                                       |       | 5Vf.s.                                    | UTHD_5V                                                     |               |            |    |     |
| Current<br>total distortion<br>factor<br>(Ithd)                       | Level | 2Vf.s.                                    | ITHD                                                        |               |            |    |     |
|                                                                       |       | 5Vf.s.                                    | ITHD_5V                                                     |               |            |    |     |

Note 1: Outputs the measured value for the current range specified with :AOUT:IRANGE:DAX.

Note 2: During auto-range integration mode operation, ACDC and ACDC UMEAN result in invalid data, triggering 0 V output.

## (9) Instrument Display Settings

**Set and Query Instrument Display Items (Normal Measurement Items)**

|                    |          |                      |                                                                                                                                                                                                             |
|--------------------|----------|----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>      | Command  | Display Area: a to d | <b>:DISPlay[:NORMal]</b> <Display a>,<Display b>,<Display c>,<Display d>                                                                                                                                    |
|                    |          | Display Area: a      | <b>:DISPlay:NORMal:A</b> <Display a>                                                                                                                                                                        |
|                    |          | Display Area: b      | <b>:DISPlay:NORMal:B</b> <Display b>                                                                                                                                                                        |
|                    |          | Display Area: c      | <b>:DISPlay:NORMal:C</b> <Display c>                                                                                                                                                                        |
|                    |          | Display Area: d      | <b>:DISPlay:NORMal:D</b> <Display d>                                                                                                                                                                        |
| Query              |          | Display Area: a to d | <b>:DISPlay[:NORMal]?</b>                                                                                                                                                                                   |
|                    |          | Display Area: a      | <b>:DISPlay:NORMal:A?</b>                                                                                                                                                                                   |
|                    |          | Display Area: b      | <b>:DISPlay:NORMal:B?</b>                                                                                                                                                                                   |
|                    |          | Display Area: c      | <b>:DISPlay:NORMal:C?</b>                                                                                                                                                                                   |
|                    |          | Display Area: d      | <b>:DISPlay:NORMal:D?</b>                                                                                                                                                                                   |
| Response           |          |                      | <Display a>,<Display b>,<Display c>,<Display d>                                                                                                                                                             |
|                    |          |                      | See <a href="#">List of Measurement Item Specifications</a> for details about the <Display items a to d> fields.                                                                                            |
| <b>Description</b> | Command  |                      | Sets or queries the items to display in the instrument display areas "a" to "d".                                                                                                                            |
| <b>Example</b>     | Command  |                      | <b>:DISP U,I,P,TIME</b>                                                                                                                                                                                     |
|                    |          |                      | The instrument display area settings are as follows:<br>Display Area "a": Voltage (acdc)<br>Display Area "b": Current (acdc)<br>Display Area "c": Active power (acdc)<br>Display Area "d": Integration time |
|                    | Query    |                      | <b>:DISP?</b>                                                                                                                                                                                               |
|                    | Response |                      | (When HEADER ON) <b>:DISPLAY U,I,P,TIME</b><br>(When HEADER OFF) <b>U,I,P,TIME</b>                                                                                                                          |

**Note** • The value displayed (instantaneous value, maximum value, or minimum value) depends on the HOLD state.

The HOLD states and the subsequent output values are as follows:

| HOLD State         | Displayed Content   |
|--------------------|---------------------|
| OFF                | Instantaneous value |
| ON                 | HOLD value          |
| Maximum value hold | Maximum value       |
| Minimum value hold | Minimum value       |

- If this command is issued while in harmonic wave display mode, use the :DISPlay:MODE command to change to normal display mode.
- The above-mentioned "instantaneous value" corresponds to the averaged value while the value is being averaged.

## Normal Measurement Display Items List

(For :DISPlay[:NORMal])

| Description                     |                      | Parameter List                                                                 | :DISPlay<br>:NORMal<br>Compatibility |
|---------------------------------|----------------------|--------------------------------------------------------------------------------|--------------------------------------|
| Output items                    | Rectification Method |                                                                                |                                      |
| Voltage (U)                     | ACDC                 | U (U1/V can also be used.)                                                     | a,b,c,d                              |
|                                 | ACDC<br>UMEAN        | UMN (UMN1 can also be used.)                                                   | a,b,c,d                              |
|                                 | DC                   | UDC (UDC1 can also be used.)                                                   | a,b,c,d                              |
|                                 | AC                   | UAC (UAC1 can also be used.)                                                   | a,b,c,d                              |
|                                 | FND                  | UFND (UFND1 can also be used.)                                                 | a,b,c,d                              |
| Current (I)                     | ACDC                 | I (I1/A can also be used.)                                                     | a,b,c,d                              |
|                                 | DC                   | IDC (IDC1 can also be used.)                                                   | a,b,c,d                              |
|                                 | AC                   | IAC (IAC1 can also be used.)                                                   | a,b,c,d                              |
|                                 | FND                  | IFND (IFND1 can also be used.)                                                 | a,b,c,d                              |
| Active power (P)                | ACDC                 | P (P1/W can also be used.)                                                     | a,b,c,d                              |
|                                 | ACDC<br>UMEAN        | PMN (PMN1 can also be used.)                                                   | a,b,c,d                              |
|                                 | DC                   | PDC (PDC1 can also be used.)                                                   | a,b,c,d                              |
|                                 | AC                   | PAC (PAC1 can also be used.)                                                   | a,b,c,d                              |
|                                 | FND                  | PFND (PFND1 can also be used.)                                                 | a,b,c,d                              |
| Apparent power (S)              | ACDC                 | S (S1/VA can also be used.)                                                    | a,b,c,d                              |
|                                 | ACDC<br>UMEAN        | SMN (SMN1 can also be used.)                                                   | a,b,c,d                              |
|                                 | AC                   | SAC (SAC1 can also be used.)                                                   | a,b,c,d                              |
|                                 | FND                  | SFND (SFND1 can also be used.)                                                 | a,b,c,d                              |
| Inactive power (Q)              | ACDC                 | Q (Q1/VAR can also be used.)                                                   | a,b,c,d                              |
|                                 | ACDC<br>UMEAN        | QMN (QMN1 can also be used.)                                                   | a,b,c,d                              |
|                                 | AC                   | QAC (QAC1 can also be used.)                                                   | a,b,c,d                              |
|                                 | FND                  | QFND (QFND1 can also be used.)                                                 | a,b,c,d                              |
| Power factor ( $\lambda$ )      | ACDC                 | PF (PF1 can also be used.)                                                     | a,b,c,d                              |
|                                 | ACDC<br>UMEAN        | PFMN (PFMN1 can also be used.)                                                 | a,b,c,d                              |
|                                 | AC                   | PFAC (PFAC1 can also be used.)                                                 | a,b,c,d                              |
|                                 | FND                  | PFFND (PFFND1 can also be used.)                                               | a,b,c,d                              |
| Phase angle ( $\varphi$ )       | AC                   | DEGAC (DEGAC1 can also be used.)                                               | a,b,c,d                              |
|                                 | FND                  | DEGFND (DEGFND1 can also be used.)                                             | a,b,c,d                              |
| Voltage frequency (f)           | -                    | FREQU (FREQU1 can also be used.)                                               | a,b                                  |
| Current frequency (f)           | -                    | FREQI (FREQI1 can also be used.)                                               | a,b                                  |
| Positive current integration    | DC                   | PIHDC (PIHDC1 can also be used.)<br>PIHDC_TOTAL                                | a,b                                  |
|                                 |                      | During Auto-range integration operation: Data by current range<br>PIHDC_IRANGE | a,b: See Note 1.                     |
| Negative current integration    | DC                   | MIHDC (MIHDC1 can also be used.)<br>MIHDC_TOTAL                                | a,b                                  |
|                                 |                      | During Auto-range integration operation: Data by current range<br>MIHDC_IRANGE | a,b: See Note 1.                     |
| Current integration (total sum) | ACDC                 | IH (IH1/AH can also be used.)<br>IH_TOTAL                                      | a,b,c,d                              |
|                                 | ACDC<br>UMEAN        | IHMN (IHMN1 can also be used.)<br>IHMN_TOTAL                                   | a,b,c,d                              |
|                                 | DC                   | IHDC (IHDC1 can also be used.)<br>IHDC_TOTAL                                   | a,b,c,d                              |
|                                 |                      | During Auto-range integration operation: Data by current range<br>IHDC_IRANGE  | a,b,c,d: See Note 1.                 |

| Description                                   |                          | Parameter List                                                                    | :DISPlay<br>:NORMal<br>Compatibility |
|-----------------------------------------------|--------------------------|-----------------------------------------------------------------------------------|--------------------------------------|
| Output items                                  | Rectificati<br>on Method |                                                                                   |                                      |
| Positive Active power<br>integration          | ACDC                     | PWP (PWP1/PWH/PINTEG can also be used.)<br>PWP_TOTAL                              | a,b                                  |
|                                               |                          | During Auto-range integration operation: Data<br>by current range<br>PWP_IRANGE   | a,b: See<br>Note 1.                  |
|                                               | ACDC<br>UMEAN            | PWPMN (PWPMN1 can also be used.)<br>PWPMN_TOTAL                                   | a,b                                  |
|                                               |                          | During Auto-range integration operation: Data<br>by current range<br>PWPMN_IRANGE | a,b: See<br>Note 1.                  |
|                                               | DC                       | PWPDC (PWPDC1 can also be used.)<br>PWPDC_TOTAL                                   | a,b                                  |
|                                               |                          | During Auto-range integration operation: Data<br>by current range<br>PWPDC_IRANGE | a,b: See<br>Note 1.                  |
| Negative active<br>power integration          | ACDC                     | MWP (MWP1/MWH/MINTEG can also be used.)<br>MWP_TOTAL                              | a,b                                  |
|                                               |                          | During Auto-range integration operation: Data<br>by current range<br>MWP_IRANGE   | a,b: See<br>Note 1.                  |
|                                               | ACDC<br>UMEAN            | MWPMN (MWPMN1 can also be used.)<br>MWPMN_TOTAL                                   | a,b                                  |
|                                               |                          | During Auto-range integration operation: Data<br>by current range<br>MWPMN_IRANGE | a,b: See<br>Note 1.                  |
|                                               | DC                       | MWPDC (MWPDC1 can also be used.)<br>MWPDC_TOTAL                                   | a,b                                  |
|                                               |                          | During Auto-range integration operation: Data<br>by current range<br>MWPDC_IRANGE | a,b: See<br>Note 1.                  |
| Active power<br>(total sum of<br>integration) | ACDC                     | WP (WP1/WH/INTEG can also be used.)<br>WP_TOTAL                                   | a,b,c,d                              |
|                                               |                          | During Auto-range integration operation: Data<br>by current range<br>WP_IRANGE    | a,b,c,d: See<br>Note 1.              |
|                                               | ACDC<br>UMEAN            | WPMN (WPMN1 can also be used.)<br>WPMN_TOTAL                                      | a,b,c,d                              |
|                                               |                          | During Auto-range integration operation: Data<br>by current range<br>WPMN_IRANGE  | a,b,c,d: See<br>Note 1.              |
|                                               | DC                       | WPDC (WPDC1 can also be used.)<br>WPDC_TOTAL                                      | a,b,c,d                              |
|                                               |                          | During Auto-range integration operation: Data<br>by current range<br>WPDC_IRANGE  | a,b,c,d: See<br>Note 1.              |
| Integration time                              | -                        | TIME<br>TIME_TOTAL                                                                | a,b,c,d                              |
|                                               |                          | During Auto-range integration operation: Data<br>by current range<br>TIME_IRANGE  | a,b,c,d: See<br>Note 1.              |
| Voltage waveform<br>peak value (Upk)          | -                        | UPK (UPK1 can also be used.)                                                      | a,b                                  |
| Current waveform<br>peak value (IpK)          | -                        | IPK (IPK1 can also be used.)                                                      | a,b                                  |
| Max Current Ratio(MCR)                        | -                        | MCR                                                                               | c,d                                  |
| Voltage crest factor<br>(Ucf)                 | -                        | UCF (UCF1 can also be used.)                                                      | c,d                                  |
| Current crest factor                          | -                        | ICF (ICF1 can also be used.)                                                      | c,d                                  |

| Description                                  |                          | Parameter List                                                                     | :DISPlay<br>:NORMal<br>Compatibility |
|----------------------------------------------|--------------------------|------------------------------------------------------------------------------------|--------------------------------------|
| Output items                                 | Rectificati<br>on Method |                                                                                    |                                      |
| Time average current<br>(T.AV I)             | ACDC                     | ITAV (ITAV1 can also be used.)<br>ITAV_TOTAL                                       | a,b,c,d                              |
|                                              | ACDC<br>UMEAN            | ITAVMN (ITAVMN1 can also be used.)<br>ITAVMN_TOTAL                                 | a,b,c,d                              |
|                                              | DC                       | ITAVDC (ITAVDC1 can also be used.)<br>ITAVDC_TOTAL                                 | a,b,c,d                              |
|                                              |                          | During Auto-range integration operation: Data<br>by current range<br>ITAVDC_IRANGE | a,b,c,d: See<br>Note 1.              |
| Time average power<br>(T.AV P)               | ACDC                     | PTAV (PTAV1 can also be used.)<br>PTAV_TOTAL                                       | a,b,c,d                              |
|                                              |                          | During Auto-range integration operation: Data<br>by current range<br>ITAV_IRANGE   | a,b,c,d: See<br>Note 1.              |
|                                              | ACDC<br>UMEAN            | PTAVMN (PTAVMN1 can also be used.)<br>PTAVMN_TOTAL                                 | a,b,c,d                              |
|                                              |                          | During Auto-range integration operation: Data<br>by current range<br>PTAVMN_IRANGE | a,b,c,d: See<br>Note 1.              |
|                                              | DC                       | PTAVDC (PTAVDC1 can also be used.)<br>PTAVDC_TOTAL                                 | a,b,c,d                              |
|                                              |                          | During Auto-range integration operation: Data<br>by current range<br>PTAVDC_IRANGE | a,b,c,d: See<br>Note 1.              |
| Voltage ripple factor<br>(Urf)               | -                        | URF (URF1 can also be used.)                                                       | c,d                                  |
| Current ripple factor<br>(Irf)               | -                        | IRF (IRF1 can also be used.)                                                       | c,d                                  |
| Voltage<br>total distortion factor<br>(Uthd) | -                        | UTHD (UTHD1 can also be used.)                                                     | c,d                                  |
| Current<br>total distortion factor<br>(Ithd) | -                        | ITHD (ITHD1 can also be used.)                                                     | c,d                                  |

\*Note 1: Valid data is displayed only when using auto-range integration.

### Toggle and Query the Normal Measurement and Harmonic Wave Measurement Display Modes

|                |                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|----------------|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>  | Command            | <b>:DISPlay:MODE &lt;NORM/HRMS/HCON/HOSRMS/HOSCON&gt;</b>                                                                                                                                                                                                                                                                                                                                                                                                                                |
|                | Query              | <b>:DISPlay:MODE?</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|                | Response           | <b>&lt;NORM/HRMS/HCON/HOSRMS/HOSCON&gt;</b><br>NORM: Normal measurement values<br>HRMS: Harmonic wave level display, all orders<br>(a: order, b/c/d: harmonic wave measurement)<br>HCON: Harmonic wave content display, all orders<br>(a: order, b/c/d: harmonic wave measurement)<br>HOSRMS: Harmonic wave level display, individual orders<br>(a/b/c/d: harmonic wave measurement)<br>HOSCON: Harmonic wave content display, individual orders<br>(a/b/c/d: harmonic wave measurement) |
|                | <b>Description</b> | Toggles or queries the content of the display area (normal measurement or harmonic wave measurement).                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Example</b> | Command            | <b>:DISP:MODE NORM</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|                | Query              | <b>:DISP:MODE?</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|                | Response           | (When HEADER ON) <b>:DISPLAY:MODE NORM</b><br>(When HEADER OFF) <b>NORM</b>                                                                                                                                                                                                                                                                                                                                                                                                              |

### Set and Query the Displayed Order for Harmonic Wave Common Order Display Mode

|               |                    |                                                                                                                                                                                                                                                                      |
|---------------|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b> | Command            | <b>:DISPlay:HARMonic:ORDer &lt;0 to 50 (NR1)&gt;</b>                                                                                                                                                                                                                 |
|               | Query              | <b>:DISPlay:HARMonic:ORDer?</b>                                                                                                                                                                                                                                      |
|               | Response           | <b>&lt;0 to 50 (NR1)&gt;</b>                                                                                                                                                                                                                                         |
|               | <b>Description</b> | Sets or queries the order for harmonic wave common order display mode. Although NRf numerical values are accepted, values to the right of the decimal are dropped.                                                                                                   |
|               | <b>Example</b>     | Command: <b>:DISP:HARM:ORD 21</b><br>Query: <b>:DISP:HARM:ORD?</b><br>Response: (When HEADER ON) <b>:DISPLAY:HARMONIC:ORDER 21</b><br>(When HEADER OFF) <b>21</b>                                                                                                    |
|               | <b>Note</b>        | • If the display is in any other mode other than harmonic wave (all orders) display mode, the display will not be immediately affected by this command.<br>The setting will be applied when the display mode is changed via a command such as <b>:DISPlay:MODE</b> . |

### Set and Query the Display Items for Harmonic Wave Common Order Display Mode

|               |                    |                                                                                                                                                                                                                                                                |
|---------------|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b> | Command            | Display Area: b <b>:DISPlay:HARMonic:B:ITEM &lt;Harmonic wave display item&gt;</b><br>Display Area: c <b>:DISPlay:HARMonic:C:ITEM &lt;Harmonic wave display item&gt;</b><br>Display Area: d <b>:DISPlay:HARMonic:D:ITEM &lt;Harmonic wave display item&gt;</b> |
|               | Query              | Display Area: b <b>:DISPlay:HARMonic:B:ITEM?</b><br>Display Area: c <b>:DISPlay:HARMonic:C:ITEM?</b><br>Display Area: d <b>:DISPlay:HARMonic:D:ITEM?</b>                                                                                                       |
|               | Response           | <b>&lt;Harmonic wave display item&gt;</b><br>Harmonic wave voltage HU (HU1 can also be used.)<br>Harmonic wave current HI (HI1 can also be used.)<br>the harmonic wave active power output HP (HP1 can also be used.)                                          |
|               | <b>Description</b> | Sets or queries the display items for harmonic wave common order display mode.                                                                                                                                                                                 |
|               | <b>Example</b>     | Command: <b>:DISP:HARM:B:ITEM HU</b><br>Query: <b>:DISP:HARM:B:ITEM?</b><br>Response: (When HEADER ON) <b>:DISPLAY:HARMONIC:B:ITEM HU</b><br>(When HEADER OFF) <b>HU</b>                                                                                       |
|               | <b>Note</b>        | • If the display is in any other mode other than harmonic wave (all orders) display mode, the display will not be immediately affected by this command.<br>Change the display mode via a command such as <b>:DISPlay:MODE</b> .                                |

### Set and Query the Displayed Order for Harmonic Wave Individual Order Display Mode

|                    |          |                                                                                                                                                                                                                                                                                            |                                      |                              |
|--------------------|----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|------------------------------|
| <b>Syntax</b>      | Command  | Display Area: a                                                                                                                                                                                                                                                                            | <b>:DISPlay:HORDerSel:A:ORDer</b>    | <b>&lt;0 to 50 (NR1)&gt;</b> |
|                    |          | Display Area: b                                                                                                                                                                                                                                                                            | <b>:DISPlay:HORDerSel:B:ORDer</b>    | <b>&lt;0 to 50 (NR1)&gt;</b> |
|                    |          | Display Area: c                                                                                                                                                                                                                                                                            | <b>:DISPlay:HORDerSel:C:ORDer</b>    | <b>&lt;0 to 50 (NR1)&gt;</b> |
|                    |          | Display Area: d                                                                                                                                                                                                                                                                            | <b>:DISPlay:HORDerSel:D:ORDer</b>    | <b>&lt;0 to 50 (NR1)&gt;</b> |
|                    | Query    | Display Area: a                                                                                                                                                                                                                                                                            | <b>:DISPlay:HORDerSel:A:ORDer?</b>   |                              |
|                    |          | Display Area: b                                                                                                                                                                                                                                                                            | <b>:DISPlay:HORDerSel:B:ORDer?</b>   |                              |
|                    |          | Display Area: c                                                                                                                                                                                                                                                                            | <b>:DISPlay:HORDerSel:C:ORDer?</b>   |                              |
|                    |          | Display Area: d                                                                                                                                                                                                                                                                            | <b>:DISPlay:HORDerSel:D:ORDer?</b>   |                              |
| <b>Description</b> | Response |                                                                                                                                                                                                                                                                                            | <b>&lt;0 to 50 (NR1)&gt;</b>         |                              |
|                    |          | Sets or queries the displayed order for harmonic wave individual order display mode.                                                                                                                                                                                                       |                                      |                              |
| <b>Example</b>     | Command  | <b>:DISP:HORDS:A:ORD 39</b>                                                                                                                                                                                                                                                                |                                      |                              |
|                    | Query    | <b>:DISP:HORDS:A:ORD?</b>                                                                                                                                                                                                                                                                  |                                      |                              |
|                    | Response | (When HEADER ON)                                                                                                                                                                                                                                                                           | <b>:DISPlay:HORDERSEL:A:ORDER 39</b> |                              |
| <b>Note</b>        |          | (When HEADER OFF)                                                                                                                                                                                                                                                                          | <b>39</b>                            |                              |
|                    |          | <ul style="list-style-type: none"> <li>If the display is in any other mode other than harmonic wave (individual order) display mode, the display will not be immediately affected by this command.</li> <li>Change the display mode via a command such as <b>:DISPlay:MODE</b>.</li> </ul> |                                      |                              |

### Set and Query the Display Items for Harmonic Wave Individual Order Display Mode

|                    |          |                                                                                                                                                                                                                                                                                            |                                           |                                           |
|--------------------|----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------|-------------------------------------------|
| <b>Syntax</b>      | Command  | Display Area: a                                                                                                                                                                                                                                                                            | <b>:DISPlay:HORDerSel:A:ITEM</b>          | <b>&lt;Harmonic wave display item&gt;</b> |
|                    |          | Display Area: b                                                                                                                                                                                                                                                                            | <b>:DISPlay:HORDerSel:B:ITEM</b>          | <b>&lt;Harmonic wave display item&gt;</b> |
|                    |          | Display Area: c                                                                                                                                                                                                                                                                            | <b>:DISPlay:HORDerSel:C:ITEM</b>          | <b>&lt;Harmonic wave display item&gt;</b> |
|                    |          | Display Area: d                                                                                                                                                                                                                                                                            | <b>:DISPlay:HORDerSel:D:ITEM</b>          | <b>&lt;Harmonic wave display item&gt;</b> |
|                    | Query    | Display Area: a                                                                                                                                                                                                                                                                            | <b>:DISPlay:HORDerSel:A:ITEM?</b>         |                                           |
|                    |          | Display Area: b                                                                                                                                                                                                                                                                            | <b>:DISPlay:HORDerSel:B:ITEM?</b>         |                                           |
|                    |          | Display Area: c                                                                                                                                                                                                                                                                            | <b>:DISPlay:HORDerSel:C:ITEM?</b>         |                                           |
|                    |          | Display Area: d                                                                                                                                                                                                                                                                            | <b>:DISPlay:HORDerSel:D:ITEM?</b>         |                                           |
| <b>Description</b> | Response |                                                                                                                                                                                                                                                                                            | <b>&lt;Harmonic wave display item&gt;</b> |                                           |
|                    |          | See the <a href="#">:DISPlay:HARMonic:B:ITEM</a> section for details.                                                                                                                                                                                                                      |                                           |                                           |
| <b>Example</b>     | Command  | Sets or queries the display items for harmonic wave individual order display mode.                                                                                                                                                                                                         |                                           |                                           |
|                    |          | <b>:DISP:HORDS:A:ITEM HI1</b>                                                                                                                                                                                                                                                              |                                           |                                           |
|                    |          | <b>:DISP:HORDS:A:ITEM?</b>                                                                                                                                                                                                                                                                 |                                           |                                           |
| <b>Note</b>        | Response | (When HEADER ON)                                                                                                                                                                                                                                                                           | <b>:DISPlay:HORDERSEL:A:ITEM HI1</b>      |                                           |
|                    |          | (When HEADER OFF)                                                                                                                                                                                                                                                                          | <b>HI1</b>                                |                                           |
| <b>Note</b>        |          | <ul style="list-style-type: none"> <li>If the display is in any other mode other than harmonic wave (individual order) display mode, the display will not be immediately affected by this command.</li> <li>Change the display mode via a command such as <b>:DISPlay:MODE</b>.</li> </ul> |                                           |                                           |

## (10) Measurement Value Output

**Query Measurement Data (Normal Measurement Items)**

Syntax Query

**:MEASure[:POWER]? (<Output item 1>...)****:MEASure[:NORMal]:VALue? (<Output item 1>...)****Up to a maximum of 180 items**

Response

&lt;Output item 1&gt;&lt;Measurement value 1&gt;,&lt;Output item 2&gt;&lt;Measurement value 2&gt;....

See the **List of Output Item Specifications** for details about the <Measurement item> field.

Output Format

| Header Portion                                                                                                             | Data Formats                                                                                                                                                                    |
|----------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Measurement Values<br>U,I,P,S,Q,PF,DEG,<br>FREQU,FREQI,<br>UPK,IPK,<br>MCR,UCF,ICF,<br>ITAV,PTAV,<br>URF,IRF,<br>UTHD,ITHD | NR3 numerical value data (always 10 characters)<br>$\pm$ ddddddE $\pm$ e<br>(dddddd: 6-character numerical value data, including decimal point,<br>e: coefficient 0, 3, or 6)   |
| Integration Values<br>IH,PIH,MIH,<br>WP,PWP,MWP                                                                            | NR3 numerical value data (always 11 characters)<br>$\pm$ dddddddE $\pm$ e<br>(ddddddd: 7-character numerical value data, including decimal point,<br>e: coefficient 0, 3, or 6) |
| Time Values<br>TIME                                                                                                        | NR1 numerical value data (always 11 characters)<br>hhhhh,mm,ss (hours, minutes, seconds)                                                                                        |

Error Data

| Headers                                        | Measurement Values<br>U,I,P,S,Q,PF,DEG,<br>FREQU,FREQI,<br>UPK,IPK,<br>MCR,UCF,ICF,<br>ITAV,PTAV,URF,IRF,<br>UTHD,ITHD | Integration Values<br>IH,PIH,MIH,<br>WP,PWP,MWP |
|------------------------------------------------|------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------|
| Error                                          |                                                                                                                        |                                                 |
| Over range<br>(Instrument display: "o.r")      | $\pm 999.99\text{E}+9$                                                                                                 | None                                            |
| Scaling error<br>(Instrument display: "S.Err") | $\pm 888.88\text{E}+9$                                                                                                 | $\pm 8888.88\text{E}+9$                         |
| No data                                        | $\pm 777.77\text{E}+9$                                                                                                 | $\pm 7777.77\text{E}+9$                         |

Description Query

Returns the measurement value as a numerical value.

The output items can be specified directly as parameters to **:MEASure?**, or specified in advance via a **:MEASure:ITEM** command.If only **:MEASure[:POWER]?** is specified without an output item, the outputs specified in advance via a **:MEASure:ITEM?** command are output.If specified directly, the items are output in the order they were specified. You can specify the output items listed in the [List of Directly Specified :MEASure Query Items](#) below.If you specified the output items in advance via **:MEASure:ITEM?** commands, the items will be output in the order that they appear in the [List of Directly Specified :MEASure Query Items](#).

Example Query

**:MEAS? U,I,P**

Outputs the voltage, current, and active power values.

Response

(When HEADER ON) 11 1450.00E+01,1.1020.00E+01,0.102.000E+02

1.888.610.7664



www.calcert.com

sales@calcert.com

(When HEADER OFF) **+150.00E+0;+020.00E+0;+03.000E+3**

- Note**
- When all output items are set to OFF (immediately after executing **:MEASure:ITEM:ALLClear**), the measurement values for the items shown in display areas (a) through (d) will be output.
  - You can use the **:TRANsmit:SEParator** command to change the message unit separator from a semicolon ";" to a comma ",".
  - If the display is blank (such as when the range has been changed), the response message will be "no data" ( $\pm 777.77E+9$ ) until the measurement data is displayed.
  - We recommend only using this function with a fixed range.
  - If **:MEASure[:POWER]?** is called with no specified output items immediately after powering on the instrument, U, I, P, S, Q, PF, DEG, FREQU, and FREQL will be output for channels 1 through 3 and SUM.
  - The output items specified via **:MEASure:ITEM** commands will not be reset even if a system reset is performed. These items are reset only when the instrument is powered on.
  - Up to 180 items will be output for each **:MEASure?** Query. If output was specified with a **:MEASure:ITEM** command, up to 180 items will be output in the order indicated in the List of Directly Specified **:MEASure?** Query Items. Since more than 180 items cannot be output, exercise care to ensure that the number of output items is 180 or less.

### List of Directly Specified :MEASure? Query Items

| Measurement Item | Rectification Method | Type                | Parameter List                         | Substitute parameter (can be used with the same definition) |
|------------------|----------------------|---------------------|----------------------------------------|-------------------------------------------------------------|
| Status           |                      | Instantaneous value | STATUS (Details <a href="#">P.77</a> ) |                                                             |
|                  |                      | Total               | STATUS_MAXMIN                          |                                                             |
| Voltage          | AC+DC                | Instantaneous value | U                                      | U1,V                                                        |
|                  |                      | Maximum value       | U_MAX                                  | U1_MAX                                                      |
|                  |                      | Minimum value       | U_MIN                                  | U1_MIN                                                      |
|                  | AC+DC UMEAN          | Instantaneous value | UMN                                    | UMN1                                                        |
|                  |                      | Maximum value       | UMN_MAX                                | UMN1_MAX                                                    |
|                  |                      | Minimum value       | UMN_MIN                                | UMN1_MIN                                                    |
|                  | AC                   | Instantaneous value | UAC                                    | UAC1                                                        |
|                  |                      | Maximum value       | UAC_MAX                                | UAC1_MAX                                                    |
|                  |                      | Minimum value       | UAC_MIN                                | UAC1_MIN                                                    |
|                  | DC                   | Instantaneous value | UDC                                    | UDC1                                                        |
|                  |                      | Maximum value       | UDC_MAX                                | UDC1_MAX                                                    |
|                  |                      | Minimum value       | UDC_MIN                                | UDC1_MIN                                                    |
|                  | FND                  | Instantaneous value | UFND                                   | UFND1                                                       |
|                  |                      | Maximum value       | UFND_MAX                               | UFND1_MAX                                                   |
|                  |                      | Minimum value       | UFND_MIN                               | UFND1_MIN                                                   |
| Current          | AC+DC                | Instantaneous value | I                                      | I1,A                                                        |
|                  |                      | Maximum value       | I_MAX                                  | I1_MAX                                                      |
|                  |                      | Minimum value       | I_MIN                                  | I1_MIN                                                      |
|                  | MEAN                 | Instantaneous value | IMN                                    | IMN1                                                        |
|                  |                      | Maximum value       | IMN_MAX                                | IMN1_MAX                                                    |
|                  |                      | Minimum value       | IMN_MIN                                | IMN1_MIN                                                    |
|                  | AC                   | Instantaneous value | IAC                                    | IAC1                                                        |
|                  |                      | Maximum value       | IAC_MAX                                | IAC1_MAX                                                    |
|                  |                      | Minimum value       | IAC_MIN                                | IAC1_MIN                                                    |
|                  | DC                   | Instantaneous value | IDC                                    | IDC1                                                        |
|                  |                      | Maximum value       | IDC_MAX                                | IDC1_MAX                                                    |
|                  |                      | Minimum value       | IDC_MIN                                | IDC1_MIN                                                    |
|                  | FND                  | Instantaneous value | IFND                                   | IFND1                                                       |
|                  |                      | Maximum value       | IFND_MAX                               | IFND1_MAX                                                   |
|                  |                      | Minimum value       | IFND_MIN                               | IFND1_MIN                                                   |
| Active power     | AC+DC                | Instantaneous value | P                                      | P1, W                                                       |
|                  |                      | Maximum value       | P_MAX                                  | P1_MAX                                                      |

| Measurement Item | Rectification Method | Type                | Parameter List | Substitute parameter (can be used with the same definition) |
|------------------|----------------------|---------------------|----------------|-------------------------------------------------------------|
|                  | MEAN                 | Instantaneous value | PMN            | PMN1                                                        |
|                  |                      | Maximum value       | PMN_MAX        | PMN1_MAX                                                    |
|                  |                      | Minimum value       | PMN_MIN        | PMN1_MIN                                                    |
|                  | AC                   | Instantaneous value | PAC            | PAC1                                                        |
|                  |                      | Maximum value       | PAC_MAX        | PAC1_MAX                                                    |
|                  |                      | Minimum value       | PAC_MIN        | PAC1_MIN                                                    |
|                  | DC                   | Instantaneous value | PDC            | PDC1                                                        |
|                  |                      | Maximum value       | PDC_MAX        | PDC1_MAX                                                    |
|                  |                      | Minimum value       | PDC_MIN        | PDC1_MIN                                                    |
|                  | FND                  | Instantaneous value | PFND           | PFND1                                                       |
|                  |                      | Maximum value       | PFND_MAX       | PFND1_MAX                                                   |
|                  |                      | Minimum value       | PFND_MIN       | PFND1_MIN                                                   |
| Apparent power   | AC+DC                | Instantaneous value | S              | S1, VA                                                      |
|                  |                      | Maximum value       | S_MAX          | S1_MAX                                                      |
|                  |                      | Minimum value       | S_MIN          | S1_MIN                                                      |
|                  | AC+DC UMEAN          | Instantaneous value | SMN            | SMN1                                                        |
|                  |                      | Maximum value       | SMN_MAX        | SMN1_MAX                                                    |
|                  |                      | Minimum value       | SMN_MIN        | SMN1_MIN                                                    |
|                  | AC                   | Instantaneous value | SAC            | SAC1                                                        |
|                  |                      | Maximum value       | SAC_MAX        | SAC1_MAX                                                    |
|                  |                      | Minimum value       | SAC_MIN        | SAC1_MIN                                                    |
|                  | FND                  | Instantaneous value | SFND           | SFND1                                                       |
|                  |                      | Maximum value       | SFND_MAX       | SFND1_MAX                                                   |
|                  |                      | Minimum value       | SFND_MIN       | SFND1_MIN                                                   |
| Reactive power   | AC+DC                | Instantaneous value | Q              | Q1, VAR                                                     |
|                  |                      | Maximum value       | Q_MAX          | Q1_MAX                                                      |
|                  |                      | Minimum value       | Q_MIN          | Q1_MIN                                                      |
|                  | AC+DC UMEAN          | Instantaneous value | QMN            | QMN1                                                        |
|                  |                      | Maximum value       | QMN_MAX        | QMN1_MAX                                                    |
|                  |                      | Minimum value       | QMN_MIN        | QMN1_MIN                                                    |
|                  | AC                   | Instantaneous value | QAC            | QAC1                                                        |
|                  |                      | Maximum value       | QAC_MAX        | QAC1_MAX                                                    |
|                  |                      | Minimum value       | QAC_MIN        | QAC1_MIN                                                    |
|                  | FND                  | Instantaneous value | QFND           | QFND1                                                       |
|                  |                      | Maximum value       | QFND_MAX       | QFND1_MAX                                                   |
|                  |                      | Minimum value       | QFND_MIN       | QFND1_MIN                                                   |
| Power factor     | AC+DC                | Instantaneous value | PF             | PF1                                                         |
|                  |                      | Maximum value       | PF_MAX         | PF1_MAX                                                     |
|                  |                      | Minimum value       | PF_MIN         | PF1_MIN                                                     |
|                  | AC+DC UMEAN          | Instantaneous value | PFMN           | PFMN1                                                       |
|                  |                      | Maximum value       | PFMN_MAX       | PFMN1_MAX                                                   |
|                  |                      | Minimum value       | PFMN_MIN       | PFMN1_MIN                                                   |
|                  | AC                   | Instantaneous value | PFAC           | PFAC1                                                       |
|                  |                      | Maximum value       | PFAC_MAX       | PFAC1_MAX                                                   |
|                  |                      | Minimum value       | PFAC_MIN       | PFAC1_MIN                                                   |
|                  | FND                  | Instantaneous value | PFFND          | PFFND1                                                      |
|                  |                      | Maximum value       | PFFND_MAX      | PFFND1_MAX                                                  |
|                  |                      | Minimum value       | PFFND_MIN      | PFFND1_MIN                                                  |
| Phase angle      | AC                   | Instantaneous value | DEGAC          | DEGAC1                                                      |
|                  |                      | Maximum value       | DEGAC_MAX      | DEGAC1_MAX                                                  |
|                  |                      | Minimum value       | DEGAC_MIN      | DEGAC1_MIN                                                  |
|                  | FND                  | Instantaneous value | DEGFND         | DEGFND1                                                     |
|                  |                      | Maximum value       | DEGFND_MAX     | DEGFND1_MAX                                                 |
|                  |                      | Minimum value       | DEGFND_MIN     | DEGFND1_MIN                                                 |

| Measurement Item            | Rectification Method | Type                | Parameter List                                                                                                                                                                     | Substitute parameter (can be used with the same definition) |
|-----------------------------|----------------------|---------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------|
| frequency                   |                      | Maximum value       | FREQU_MAX                                                                                                                                                                          | FREQU1_MAX                                                  |
|                             |                      | Minimum value       | FREQU_MIN                                                                                                                                                                          | FREQU1_MIN                                                  |
| Current frequency           | -                    | Instantaneous value | FREQI                                                                                                                                                                              | FREQI1                                                      |
|                             |                      | Maximum value       | FREQI_MAX                                                                                                                                                                          | FREQI1_MAX                                                  |
|                             |                      | Minimum value       | FREQI_MIN                                                                                                                                                                          | FREQI1_MIN                                                  |
| Voltage waveform peak value | -                    | Instantaneous value | UPK                                                                                                                                                                                | UPK1                                                        |
|                             |                      | Maximum value       | UPK_MAX                                                                                                                                                                            | UPK1_MAX                                                    |
|                             |                      | Minimum value       | UPK_MIN                                                                                                                                                                            | UPK1_MIN                                                    |
| Current waveform peak value | -                    | Instantaneous value | IPK                                                                                                                                                                                | IPK1, IP                                                    |
|                             |                      | Maximum value       | IPK_MAX                                                                                                                                                                            | IPK1_MAX                                                    |
|                             |                      | Minimum value       | IPK_MIN                                                                                                                                                                            | IPK1_MIN                                                    |
| Maximum Current Ratio       | -                    | Instantaneous value | MCR                                                                                                                                                                                |                                                             |
|                             |                      | Maximum value       | MCR_MAX                                                                                                                                                                            |                                                             |
|                             |                      | Minimum value       | MCR_MIN                                                                                                                                                                            |                                                             |
| Voltage crest factor        | -                    | Instantaneous value | UCF                                                                                                                                                                                | UCF1                                                        |
|                             |                      | Maximum value       | UCF_MAX                                                                                                                                                                            | UCF1_MAX                                                    |
|                             |                      | Minimum value       | UCF_MIN                                                                                                                                                                            | UCF1_MIN                                                    |
| Current crest factor        | -                    | Instantaneous value | ICF                                                                                                                                                                                | ICF1                                                        |
|                             |                      | Maximum value       | ICF_MAX                                                                                                                                                                            | ICF1_MAX                                                    |
|                             |                      | Minimum value       | ICF_MIN                                                                                                                                                                            | ICF1_MIN                                                    |
| Time average current        | AC+DC                | Instantaneous value | ITAV<br>(See Note 3.)                                                                                                                                                              | ITAV1                                                       |
|                             | AC+DC UMEAN          | Instantaneous value | ITAVMN<br>(See Note 3.)                                                                                                                                                            | ITAVMN1                                                     |
|                             | DC                   | Instantaneous value | ITAVDC                                                                                                                                                                             | ITAVDC1                                                     |
|                             |                      |                     | During Auto-range integration operation: Data by current range (See Note 2.)<br>ITAVDC_200mA, ITAVDC_500mA, ITAVDC_1A, ITAVDC_2A, ITAVDC_5A, ITAVDC_10A, ITAVDC_20A, ITAVDC_BACKUP |                                                             |
| Time average active power   | AC+DC                | Instantaneous value | PTAV                                                                                                                                                                               | PTAV1                                                       |
|                             |                      |                     | During Auto-range integration operation: Data by current range (See Note 2.)<br>PTAV_200mA, PTAV_500mA, PTAV_1A, PTAV_2A, PTAV_5A, PTAV_10A, PTAV_20A, PTAV_BACKUP                 |                                                             |
|                             | AC+DC UMEAN          | Instantaneous value | PTAVMN                                                                                                                                                                             | PTAVMN1                                                     |
|                             |                      |                     | During Auto-range integration operation: Data by current range (See Note 2.)<br>PTAVMN_200mA, PTAVMN_500mA, PTAVMN_1A, PTAVMN_2A, PTAVMN_5A, PTAVMN_10A, PTAVMN_20A, PTAVMN_BACKUP |                                                             |
|                             | DC                   | Instantaneous value | PTAVDC                                                                                                                                                                             | PTAVDC1                                                     |
|                             |                      |                     | During Auto-range integration operation: Data by current range (See Note 2.)<br>PTAVDC_200mA, PTAVDC_500mA, PTAVDC_1A, PTAVDC_2A, PTAVDC_5A, PTAVDC_10A, PTAVDC_20A, PTAVDC_BACKUP |                                                             |

| Measurement Item                              | Rectification Method | Type                | Parameter List                                                                                                                                                             | Substitute parameter (can be used with the same definition) |
|-----------------------------------------------|----------------------|---------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------|
| ripple factor                                 |                      | Maximum value       | URF_MAX                                                                                                                                                                    | URF1_MAX                                                    |
|                                               |                      | Minimum value       | URF_MIN                                                                                                                                                                    | URF1_MIN                                                    |
| Current ripple factor                         | -                    | Instantaneous value | IRF                                                                                                                                                                        | IRF1                                                        |
|                                               |                      | Maximum value       | IRF_MAX                                                                                                                                                                    | IRF1_MAX                                                    |
|                                               |                      | Minimum value       | IRF_MIN                                                                                                                                                                    | IRF1_MIN                                                    |
| Total harmonic wave voltage distortion factor | -                    | Instantaneous value | UTHD                                                                                                                                                                       | UTHD1                                                       |
|                                               |                      | Maximum value       | UTHD_MAX                                                                                                                                                                   | UTHD1_MAX                                                   |
|                                               |                      | Minimum value       | UTHD_MIN                                                                                                                                                                   | UTHD1_MIN                                                   |
| Total harmonic wave current distortion factor | -                    | Instantaneous value | ITHD                                                                                                                                                                       | ITHD1                                                       |
|                                               |                      | Maximum value       | ITHD_MAX                                                                                                                                                                   | ITHD1_MAX                                                   |
|                                               |                      | Minimum value       | ITHD_MIN                                                                                                                                                                   | ITHD1_MIN                                                   |
| Positive power integration                    | AC+DC                | Instantaneous value | PWP                                                                                                                                                                        | PWP1, PWH                                                   |
|                                               |                      |                     | During Auto-range integration operation: Data by current range (See Note 2.)<br>PWP_200mA, PWP_500mA, PWP_1A, PWP_2A, PWP_5A, PWP_10A, PWP_20A, PWP_BACKUP                 |                                                             |
| Negative power integration                    | AC+DC                | Instantaneous value | MWP                                                                                                                                                                        | MWP1, MWH                                                   |
|                                               |                      |                     | During Auto-range integration operation: Data by current range (See Note 2.)<br>MWP_200mA, MWP_500mA, MWP_1A, MWP_2A, MWP_5A, MWP_10A, MWP_20A, MWP_BACKUP                 |                                                             |
| Active power integration (total sum)          | AC+DC                | Instantaneous value | WP                                                                                                                                                                         | WP1, WH                                                     |
|                                               |                      |                     | During Auto-range integration operation: Data by current range (See Note 2.)<br>WP_200mA, WP_500mA, WP_1A, WP_2A, WP_5A, WP_10A, WP_20A, WP_BACKUP                         |                                                             |
| Positive power integration                    | AC+DC UMEAN          | Instantaneous value | PWPMN                                                                                                                                                                      | PWPMN                                                       |
|                                               |                      |                     | During Auto-range integration operation: Data by current range (See Note 2.)<br>PWPMN_200mA, PWPMN_500mA, PWPMN_1A, PWPMN_2A, PWPMN_5A, PWPMN_10A, PWPMN_20A, PWPMN_BACKUP |                                                             |
| Negative power integration                    | AC+DC UMEAN          | Instantaneous value | MWPMN                                                                                                                                                                      | MWPMN1                                                      |
|                                               |                      |                     | During Auto-range integration operation: Data by current range (See Note 2.)<br>MWPMN_200mA, MWPMN_500mA, MWPMN_1A, MWPMN_2A, MWPMN_5A, MWPMN_10A, MWPMN_20A, MWPMN_BACKUP |                                                             |
| Active power                                  | AC+DC                | Instantaneous value | WPMN                                                                                                                                                                       | WPMN1                                                       |

| Measurement Item                     | Rectification Method | Type                | Parameter List                                                                                                                                                             | Substitute parameter (can be used with the same definition) |
|--------------------------------------|----------------------|---------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------|
| integration (total sum)              | UMEAN                |                     | During Auto-range integration operation: Data by current range (See Note 2.)<br>WPMN_200mA, WPMN_500mA, WPMN_1A, WPMN_2A, WPMN_5A, WPMN_10A, WPMN_20A, WPMN_BACKUP         |                                                             |
| Positive power integration           | DC                   | Instantaneous value | PWPDC                                                                                                                                                                      | PWPDC1                                                      |
|                                      |                      |                     | During Auto-range integration operation: Data by current range (See Note 2.)<br>PWPDC_200mA, PWPDC_500mA, PWPDC_1A, PWPDC_2A, PWPDC_5A, PWPDC_10A, PWPDC_20A, PWPDC_BACKUP |                                                             |
| Negative power integration           | DC                   | Instantaneous value | MWPDC                                                                                                                                                                      | MWPDC1                                                      |
|                                      |                      |                     | During Auto-range integration operation: Data by current range (See Note 2.)<br>MWPDC_200mA, MWPDC_500mA, MWPDC_1A, MWPDC_2A, MWPDC_5A, MWPDC_10A, MWPDC_20A, MWPDC_BACKUP |                                                             |
| Active power integration (total sum) | DC                   | Instantaneous value | WPDC                                                                                                                                                                       | WPDC1                                                       |
|                                      |                      |                     | During Auto-range integration operation: Data by current range (See Note 2.)<br>WPDC_200mA, WPDC_500mA, WPDC_1A, WPDC_2A, WPDC_5A, WPDC_10A, WPDC_20A, WPDC_BACKUP         |                                                             |
| Current integration (total sum)      | AC+DC                | Instantaneous value | IH<br>(See Note 3.)                                                                                                                                                        | IH1, AH                                                     |
|                                      | AC+DC UMEAN          | Instantaneous value | IHMN<br>(See Note 3.)                                                                                                                                                      | IHMN1                                                       |
| Positive current integration         | DC                   | Instantaneous value | PIHDC                                                                                                                                                                      | PIHDC1                                                      |
|                                      |                      |                     | During Auto-range integration operation: Data by current range (See Note 2.)<br>PIHDC_200mA, PIHDC_500mA, PIHDC_1A, PIHDC_2A, PIHDC_5A, PIHDC_10A, PIHDC_20A, PIHDC_BACKUP |                                                             |
| Negative current integration         | DC                   | Instantaneous value | MIHDC                                                                                                                                                                      | MIHDC1                                                      |
|                                      |                      |                     | During Auto-range integration operation: Data by current range (See Note 2.)<br>MIHDC_200mA, MIHDC_500mA, MIHDC_1A, MIHDC_2A, MIHDC_5A, MIHDC_10A, MIHDC_20A, MIHDC_BACKUP |                                                             |
| Current integration                  | DC                   | Instantaneous value | IHDC                                                                                                                                                                       | IHDC1                                                       |

| Measurement Item | Rectification Method | Type                | Parameter List                                                                                                                                                     | Substitute parameter (can be used with the same definition) |
|------------------|----------------------|---------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------|
| (total sum)      |                      |                     | During Auto-range integration operation: Data by current range (See Note 2.)<br>IHDC_200mA, IHDC_500mA, IHDC_1A, IHDC_2A, IHDC_5A, IHDC_10A, IHDC_20A, IHDC_BACKUP |                                                             |
| Integration time | -                    | Instantaneous value | TIME                                                                                                                                                               |                                                             |
|                  |                      |                     | During Auto-range integration operation: Data by current range (See Note 2.)<br>TIME_200mA, TIME_500mA, TIME_1A, TIME_2A, TIME_5A, TIME_10A, TIME_20A, TIME_BACKUP |                                                             |

List of Directly Specified :MEASure? Query Items

Note: **U**→, **V**, **I**→**A**, **P**→**W**, **S**→**VA**, **Q**→**VAR**, **IH**→**AH**, **PWP**→**PWH**, **MWP**→**MWH**, **WH**→**WP**, and **WH**→**INTEG** are all valid substitutions.

For example, :MEAS? U and :MEAS? V produce the same response. However, U is always returned as the header.

Note 2: Valid only when Auto-range integration is on.

Note 3: Valid only when Auto-range integration is off.

### Perform and Query a Reset of :MEASure? and :MEASure:HARMonics? Output Items

|                    |                                                                                                                                                                                                                                                                                                                                               |                               |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|
| <b>Syntax</b>      | Command                                                                                                                                                                                                                                                                                                                                       | <b>:MEASure:ITEM:ALLClear</b> |
| <b>Description</b> | Clears all outputs set for :MEASure? and :MEASure:HARMonic? via :MEASure:ITEM commands.                                                                                                                                                                                                                                                       |                               |
| <b>Example</b>     | Command                                                                                                                                                                                                                                                                                                                                       | <b>:MEAS:ITEM:ALLC</b>        |
| <b>Note</b>        | <ul style="list-style-type: none"> <li>• This command turns all output settings OFF.</li> <li>• The output settings immediately after the instrument is powered on are as follows:<br/>Normal Measurement Items<br/>U, I, P, S, Q, PF, DEGAC, FREQU, and FREQL.<br/>Harmonic Wave<br/>First order effective values HU, HI, and HP.</li> </ul> |                               |

### Query:MEASure? Output Items

|                    |                                                                                                                                                                                                    |                                                                                      |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| <b>Syntax</b>      | Query                                                                                                                                                                                              | <b>:MEASure[:NORMal]:ITEM?</b>                                                       |
| <b>Description</b> | Clears all outputs set for :MEASure? and :MEASure:HARMonic?<br>Returns the output settings for when :MEASure? is executed without any direct specifications.                                       |                                                                                      |
| <b>Example</b>     | Query                                                                                                                                                                                              | <b>:MEAS:ITEM?</b>                                                                   |
|                    | Response                                                                                                                                                                                           | (When HEADER ON) <b>:MEASURE:NORMAL:ITEM U,I,P</b><br>(When HEADER OFF) <b>U,I,P</b> |
| <b>Note</b>        | <ul style="list-style-type: none"> <li>• If all output items are turned OFF, this command returns the measurement items displayed on the instrument (in display areas (a) through (d)).</li> </ul> |                                                                                      |

## Set and Query:MEASure? Output Items

**Syntax** Command **:DATAout:ITEM <data1 (NR1)>,<data2 (NR1)>**

Query **:DATAout:ITEM?**

Response **<data1>,<data2>**

|               |      |      |      |      |      |      |      |
|---------------|------|------|------|------|------|------|------|
| 128           | 64   | 32   | 16   | 8    | 4    | 2    | 1    |
| <data1 (NR1)> |      |      |      |      |      |      |      |
| bit7          | bit6 | bit5 | bit4 | bit3 | bit2 | bit1 | bit0 |
| FREQU         | DEG  | PF   | Q    | S    | P    | I    | U    |
| <data2 (NR1)> |      |      |      |      |      |      |      |
| bit7          | bit6 | bit5 | bit4 | bit3 | bit2 | bit1 | bit0 |
|               |      | IPK  | IH   | TIME | MWP  | PWP  | WP   |

### Description

Sets or queries the measurement items for the :MEASure? query as a numerical value between 0 and 255. Although NRf numerical values are accepted, values to the right of the decimal are dropped.

### Example

Command **:DATA:ITEM 7,0**  
(This enables the output of the voltage, current, and active power.)

Query **:DATA:ITEM?**

Response (When HEADER ON) **:DATAOUT:ITEM 7,0**  
(When HEADER OFF) **7,0**

- Note**
- This command is provided for compatibility with control programs for the existing model 3332. This command can be used only to set or query AC/DC rectification measurement values. In order to fully utilize the capabilities of the PW3335, we recommend using the [MEASure:ITEM](#) commands.

**Set and Query :MEASure? Output Items****(Measurement status data: instantaneous value, maximum value, minimum value)**

**Syntax** Instantaneous value :MEASure[:NORMal]:ITEM:STATus:INST(?) <Output item>  
 Maximum/Minimum value :MEASure[:NORMal]:ITEM:STATus:MAXmin(?) <Output item>

**Response**

&lt;Output item (NR1)&gt;

| 128  | 64   | 32   | 16   | 8    | 4    | 2    | 1      |
|------|------|------|------|------|------|------|--------|
| bit7 | bit6 | bit5 | bit4 | bit3 | bit2 | bit1 | bit0   |
|      |      |      |      |      |      |      | STATUS |

**Description**

Sets the measurement data status (instantaneous value, maximum value, minimum value) output items as numerical values between 0 and 1.

Although NRf numerical values are accepted, values to the right of the decimal are dropped.

If no items are specified directly via a :MEASure? query, output is based on the specification of this command.

INST indicates the status for the instantaneous value at the time when the data is acquired.

MAXmin indicates the total from the time the maximum and minimum values were last reset.

The Status data indicates the status of the warning indicators on the instrument when the measurement data was saved. The Status data is represented by a 32-bit hexadecimal value. The content of each of these 32 bits is as follows:

| bit31 | bit30 | bit29 | bit28 | bit27 | bit26 | bit25 | bit24 |
|-------|-------|-------|-------|-------|-------|-------|-------|
| -     | -     | -     | HM    | -     | -     | -     | RP    |
| bit23 | bit22 | bit21 | bit20 | bit19 | bit18 | bit17 | bit16 |
| -     | -     | -     | CP    | -     | -     | -     | SY    |
| bit15 | bit14 | bit13 | bit12 | bit11 | bit10 | bit9  | bit8  |
| -     | -     | -     | RI    | -     | -     | -     | RU    |
| bit7  | bit6  | bit5  | bit4  | bit3  | bit2  | bit1  | bit0  |
| -     | -     | -     | PI    | -     | -     | -     | PU    |

HM: Harmonic wave measurement synchronization error

RP: Active power range exceeded

CP: Instrument protection mode activated

SY: Synchronization error

RI: Current range exceeded

RU: Voltage range exceeded

Plx: Current peak exceeded

PUx: Voltage peak exceeded

**Example****Command****:MEAS:ITEM:STAT:INST 1**

Specifies to turn ON measurement status output.

**Query****:MEAS:ITEM:STAT:INST?****Response**

(When HEADER ON)

**:MEASURE:NORMAL:ITEM:STAT:INST 1**

(When HEADER OFF)

**1**

### Set and Query :MEASure? Output Items (Instantaneous, Maximum, and Minimum Values for Voltage Data)

|               |                     |                                                   |
|---------------|---------------------|---------------------------------------------------|
| <b>Syntax</b> | Instantaneous value | :MEASure[:NORMal]:ITEM:U:ALL <Output item>        |
|               |                     | :MEASure[:NORMal]:ITEM:U:CH1(?) <Output item>     |
|               | Maximum value       | :MEASure[:NORMal]:ITEM:U_MAX:ALL <Output item>    |
|               |                     | :MEASure[:NORMal]:ITEM:U_MAX:CH1(?) <Output item> |
|               | Minimum value       | :MEASure[:NORMal]:ITEM:U_MIN:ALL <Output item>    |
|               |                     | :MEASure[:NORMal]:ITEM:U_MIN:CH1(?) <Output item> |
|               | Response            | <Output item (NR1)>                               |

|      |      |      |      |      |      |      |      |
|------|------|------|------|------|------|------|------|
| 128  | 64   | 32   | 16   | 8    | 4    | 2    | 1    |
| bit7 | bit6 | bit5 | bit4 | bit3 | bit2 | bit1 | bit0 |
|      |      |      | FND  | DC   | AC   | MN   | ACDC |

#### Description

Sets the voltage data (instantaneous value, maximum value, minimum value) output items as numerical values between 0 and 31.

For example, specify 1 to output the AC+DC rectification or 2 to output the AC+DC Umn rectification measurement value.

You can also output all rectification methods together at once. For example, you can specify 3 to output both the AC+DC rectification and AC+DC Umn rectification measurement values at the same time.

Although NRf numerical values are accepted, values to the right of the decimal are dropped.

If no items are specified directly via a :MEASure? query, the measurement values are output based on the specification of this command.

|                |          |                                               |
|----------------|----------|-----------------------------------------------|
| <b>Example</b> | Command  | :MEAS:ITEM:U:CH1 1                            |
|                | Query    | :MEAS:ITEM:U:CH1?                             |
|                | Response | (When HEADER ON) :MEASURE:NORMAL:ITEM:U:CH1 1 |
|                |          | (When HEADER OFF) 1                           |

### Set and Query :MEASure? Output Items (Instantaneous, Maximum, and Minimum Values for Current Data)

|               |                     |                                                   |
|---------------|---------------------|---------------------------------------------------|
| <b>Syntax</b> | Instantaneous value | :MEASure[:NORMal]:ITEM:I:ALL <Output item>        |
|               |                     | :MEASure[:NORMal]:ITEM:I:CH1(?) <Output item>     |
|               | Maximum value       | :MEASure[:NORMal]:ITEM:I_MAX:ALL <Output item>    |
|               |                     | :MEASure[:NORMal]:ITEM:I_MAX:CH1(?) <Output item> |
|               | Minimum value       | :MEASure[:NORMal]:ITEM:I_MIN:ALL <Output item>    |
|               |                     | :MEASure[:NORMal]:ITEM:I_MIN:CH1(?) <Output item> |
|               | Response            | <Output item (NR1)>                               |

|      |      |      |      |      |      |      |      |
|------|------|------|------|------|------|------|------|
| 128  | 64   | 32   | 16   | 8    | 4    | 2    | 1    |
| bit7 | bit6 | bit5 | bit4 | bit3 | bit2 | bit1 | bit0 |
|      |      |      | FND  | DC   | AC   | MN   | ACDC |

#### Description

Sets the current data (instantaneous value, maximum value, minimum value) output items as numerical values between 0 and 31.

For example, specify 1 to output the AC+DC rectification or 2 to output the AC+DC Umn rectification measurement value.

You can also output all rectification methods together at once. For example, you can specify 3 to output both the AC+DC rectification and AC+DC Umn rectification measurement values at the same time.

Although NRf numerical values are accepted, values to the right of the decimal are dropped.

If no items are specified directly via a :MEASure? query, the measurement values are output based on the specification of this command.

|                |          |                                               |
|----------------|----------|-----------------------------------------------|
| <b>Example</b> | Command  | :MEAS:ITEM:I:CH1 1                            |
|                | Query    | :MEAS:ITEM:I:CH1?                             |
|                | Response | (When HEADER ON) :MEASURE:NORMAL:ITEM:I:CH1 1 |
|                |          | (When HEADER OFF) 1                           |

### Set and Query :MEASure? Output Items (Instantaneous, Maximum, and Minimum Values for Active Power Data)

|             |                                                                                                                                                                                                        |                                                   |      |      |      |      |      |      |      |
|-------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|------|------|------|------|------|------|------|
| Syntax      | Instantaneous value                                                                                                                                                                                    | :MEASure[:NORMal]:ITEM:P:ALL <Output item>        |      |      |      |      |      |      |      |
|             |                                                                                                                                                                                                        | :MEASure[:NORMal]:ITEM:P:CH1(?) <Output item>     |      |      |      |      |      |      |      |
|             | Maximum value                                                                                                                                                                                          | :MEASure[:NORMal]:ITEM:P_MAX:ALL <Output item>    |      |      |      |      |      |      |      |
|             |                                                                                                                                                                                                        | :MEASure[:NORMal]:ITEM:P_MAX:CH1(?) <Output item> |      |      |      |      |      |      |      |
|             | Minimum value                                                                                                                                                                                          | :MEASure[:NORMal]:ITEM:P_MIN:ALL <Output item>    |      |      |      |      |      |      |      |
|             | Response                                                                                                                                                                                               | :MEASure[:NORMal]:ITEM:P_MIN:CH1(?) <Output item> |      |      |      |      |      |      |      |
|             |                                                                                                                                                                                                        | <Output item (NR1)>                               |      |      |      |      |      |      |      |
|             |                                                                                                                                                                                                        | 128                                               | 64   | 32   | 16   | 8    | 4    | 2    | 1    |
|             |                                                                                                                                                                                                        | bit7                                              | bit6 | bit5 | bit4 | bit3 | bit2 | bit1 | bit0 |
|             |                                                                                                                                                                                                        |                                                   |      |      | FND  | DC   | AC   | MN   | ACDC |
| Description | Sets the active power data (instantaneous value, maximum value, minimum value) output items as numerical values between 0 and 31.                                                                      |                                                   |      |      |      |      |      |      |      |
|             | For example, specify 1 to output the AC+DC rectification or 2 to output the AC+DC Umn rectification measurement value.                                                                                 |                                                   |      |      |      |      |      |      |      |
|             | You can also output all rectification methods together at once. For example, you can specify 3 to output both the AC+DC rectification and AC+DC Umn rectification measurement values at the same time. |                                                   |      |      |      |      |      |      |      |
|             | Although NRf numerical values are accepted, values to the right of the decimal are dropped.                                                                                                            |                                                   |      |      |      |      |      |      |      |
|             | If no items are specified directly via a :MEASure? query, the measurement values are output based on the specification of this command.                                                                |                                                   |      |      |      |      |      |      |      |
| Example     | Command                                                                                                                                                                                                | :MEAS:ITEM:P:CH1 1                                |      |      |      |      |      |      |      |
|             | Query                                                                                                                                                                                                  | :MEAS:ITEM:P:CH1?                                 |      |      |      |      |      |      |      |
|             | Response                                                                                                                                                                                               | (When HEADER ON) :MEASURE:NORMAL:ITEM:P:CH1 1     |      |      |      |      |      |      |      |
|             |                                                                                                                                                                                                        | (When HEADER OFF) 1                               |      |      |      |      |      |      |      |

### Set and Query :MEASure? Output Items (Instantaneous, Maximum, and Minimum Values for Apparent Power Data)

|             |                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |      |      |      |      |      |      |      |      |  |  |  |     |  |    |    |      |
|-------------|---------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|------|------|------|------|------|------|------|--|--|--|-----|--|----|----|------|
| Syntax      | Instantaneous value | :MEASure[:NORMal]:ITEM:S:ALL <Output item>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |      |      |      |      |      |      |      |      |  |  |  |     |  |    |    |      |
|             |                     | :MEASure[:NORMal]:ITEM:S:CH1(?) <Output item>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |      |      |      |      |      |      |      |      |  |  |  |     |  |    |    |      |
|             | Maximum value       | :MEASure[:NORMal]:ITEM:S_MAX:ALL <Output item>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |      |      |      |      |      |      |      |      |  |  |  |     |  |    |    |      |
|             |                     | :MEASure[:NORMal]:ITEM:S_MAX:CH1(?) <Output item>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |      |      |      |      |      |      |      |      |  |  |  |     |  |    |    |      |
|             | Minimum value       | :MEASure[:NORMal]:ITEM:S_MIN:ALL <Output item>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |      |      |      |      |      |      |      |      |  |  |  |     |  |    |    |      |
|             | Minimum value       | :MEASure[:NORMal]:ITEM:S_MIN:CH1(?) <Output item>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |      |      |      |      |      |      |      |      |  |  |  |     |  |    |    |      |
|             | Response            | <Output item (NR1)>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |      |      |      |      |      |      |      |      |  |  |  |     |  |    |    |      |
| Description |                     | <div> <div>1286432168421</div> <table> <tr> <td>bit7</td><td>bit6</td><td>bit5</td><td>bit4</td><td>bit3</td><td>bit2</td><td>bit1</td><td>bit0</td></tr> <tr> <td></td><td></td><td></td><td>FND</td><td></td><td>AC</td><td>MN</td><td>ACDC</td></tr> </table> </div> <p>Sets the apparent power data (instantaneous value, maximum value, minimum value) output items as numerical values between 0 and 23.</p> <p>For example, specify 1 to output the AC+DC rectification or 2 to output the AC+DC Umn rectification measurement value.</p> <p>You can also output all rectification methods together at once. For example, you can specify 3 to output both the AC+DC rectification and AC+DC Umn rectification measurement values at the same time.</p> <p>Although NRf numerical values are accepted, values to the right of the decimal are dropped.</p> <p>If no items are specified directly via a :MEASure? query, the measurement values are output based on the specification of this command.</p> | bit7 | bit6 | bit5 | bit4 | bit3 | bit2 | bit1 | bit0 |  |  |  | FND |  | AC | MN | ACDC |
| bit7        | bit6                | bit5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | bit4 | bit3 | bit2 | bit1 | bit0 |      |      |      |  |  |  |     |  |    |    |      |
|             |                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | FND  |      | AC   | MN   | ACDC |      |      |      |  |  |  |     |  |    |    |      |
| Example     | Command             | :MEAS:ITEM:S:CH1 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |      |      |      |      |      |      |      |      |  |  |  |     |  |    |    |      |
| Example     | Query               | :MEAS:ITEM:S:CH1?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |      |      |      |      |      |      |      |      |  |  |  |     |  |    |    |      |
| Example     | Response            | (When HEADER ON) :MEASURE:NORMAL:ITEM:S:CH1 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |      |      |      |      |      |      |      |      |  |  |  |     |  |    |    |      |
| Example     | Response            | (When HEADER OFF) 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |      |      |      |      |      |      |      |      |  |  |  |     |  |    |    |      |

### Set and Query :MEASure? Output Items (Instantaneous, Maximum, and Minimum Values for Inactive Power Data)

|               |                     |                                                                                                     |
|---------------|---------------------|-----------------------------------------------------------------------------------------------------|
| <b>Syntax</b> | Instantaneous value | :MEASure[:NORMal]:ITEM:Q:ALL <Output item><br>:MEASure[:NORMal]:ITEM:Q:CH1(?) <Output item>         |
|               | Maximum value       | :MEASure[:NORMal]:ITEM:Q_MAX:ALL <Output item><br>:MEASure[:NORMal]:ITEM:Q_MAX:CH1(?) <Output item> |
|               | Minimum value       | :MEASure[:NORMal]:ITEM:Q_MIN:ALL <Output item><br>:MEASure[:NORMal]:ITEM:Q_MIN:CH1(?) <Output item> |
|               | Response            | <Output item (NR1)>                                                                                 |

|      |      |      |      |      |      |      |      |
|------|------|------|------|------|------|------|------|
| 128  | 64   | 32   | 16   | 8    | 4    | 2    | 1    |
| bit7 | bit6 | bit5 | bit4 | bit3 | bit2 | bit1 | bit0 |
|      |      |      | FND  |      | AC   | MN   | ACDC |

#### Description

Sets the inactive power data (instantaneous value, maximum value, minimum value) output items as numerical values between 0 and 23.

For example, specify 1 to output the AC+DC rectification or 2 to output the AC+DC Umn rectification measurement value.

You can also output all rectification methods together at once. For example, you can specify 3 to output both the AC+DC rectification and AC+DC Umn rectification measurement values at the same time.

Although NRf numerical values are accepted, values to the right of the decimal are dropped.

If no items are specified directly via a :MEASure? query, the measurement values are output based on the specification of this command.

#### Example Command

:MEAS:ITEM:Q:CH1 1

Specifies to output the instantaneous value of the AC/DC rectified inactive power.

#### Query

:MEAS:ITEM:Q:CH1?

#### Response

(When HEADER ON) :MEASURE:NORMAL:ITEM:Q:CH1 1

(When HEADER OFF) 1

### Set and Query :MEASure? Output Items (Instantaneous, Maximum, and Minimum Values for Power Factor Data)

|               |                     |                                                                                                       |
|---------------|---------------------|-------------------------------------------------------------------------------------------------------|
| <b>Syntax</b> | Instantaneous value | :MEASure[:NORMal]:ITEM:PF:ALL <Output item><br>:MEASure[:NORMal]:ITEM:PF:CH1(?) <Output item>         |
|               | Maximum value       | :MEASure[:NORMal]:ITEM:PF_MAX:ALL <Output item><br>:MEASure[:NORMal]:ITEM:PF_MAX:CH1(?) <Output item> |
|               | Minimum value       | :MEASure[:NORMal]:ITEM:PF_MIN:ALL <Output item><br>:MEASure[:NORMal]:ITEM:PF_MIN:CH1(?) <Output item> |
|               | Response            | <Output item (NR1)>                                                                                   |

|      |      |      |      |      |      |      |      |
|------|------|------|------|------|------|------|------|
| 128  | 64   | 32   | 16   | 8    | 4    | 2    | 1    |
| bit7 | bit6 | bit5 | bit4 | bit3 | bit2 | bit1 | bit0 |
|      |      |      | FND  |      | AC   | MN   | ACDC |

#### Description

Sets the power factor data (instantaneous value, maximum value, minimum value) output items as numerical values between 0 and 23.

For example, specify 1 to output the AC+DC rectification or 2 to output the AC+DC Umn rectification measurement value.

You can also output all rectification methods together at once. For example, you can specify 3 to output both the AC+DC rectification and AC+DC Umn rectification measurement values at the same time.

Although NRf numerical values are accepted, values to the right of the decimal are dropped.

If no items are specified directly via a :MEASure? query, the measurement values are output based on the specification of this command.

#### Example Command

:MEAS:ITEM:PF:CH1 1

Specifies to output the instantaneous value of the AC/DC rectified power factor.

#### Query

:MEAS:ITEM:PF:CH1?

#### Response

(When HEADER ON) :MEASURE:NORMAL:ITEM:PF:CH1 1

(When HEADER OFF) 1

### Set and Query :MEASure? Output Items (Instantaneous, Maximum, and Minimum Values for Phase Angle Data)

|               |                     |                                                                      |
|---------------|---------------------|----------------------------------------------------------------------|
| <b>Syntax</b> | Instantaneous value | :MEASure[:NORMal]:ITEM:DEG:ALL <Output item><br><Output item>        |
|               | Maximum value       | :MEASure[:NORMal]:ITEM:DEG:CH1(?) <Output item><br><Output item>     |
|               | Minimum value       | :MEASure[:NORMal]:ITEM:DEG_MAX:ALL <Output item><br><Output item>    |
|               | Response            | :MEASure[:NORMal]:ITEM:DEG_MAX:CH1(?) <Output item><br><Output item> |
|               |                     | :MEASure[:NORMal]:ITEM:DEG_MIN:ALL <Output item><br><Output item>    |
|               |                     | :MEASure[:NORMal]:ITEM:DEG_MIN:CH1(?) <Output item><br><Output item> |

|      |      |      |      |      |      |      |      |
|------|------|------|------|------|------|------|------|
| 128  | 64   | 32   | 16   | 8    | 4    | 2    | 1    |
| bit7 | bit6 | bit5 | bit4 | bit3 | bit2 | bit1 | bit0 |
|      |      |      | FND  |      | AC   | MN   | ACDC |

#### Description

Sets the phase angle data (instantaneous value, maximum value, minimum value) output items as numerical values between 0 and 20.

For example, specify 4 to output the AC rectification or 16 to output the FND rectification measurement value.

You can also output all rectification methods together at once. For example, you can specify 20 to output both the AC rectification and FND rectification measurement values at the same time.

Although NRf numerical values are accepted, values to the right of the decimal are dropped.

If no items are specified directly via a :MEASure? query, the measurement values are output based on the specification of this command.

#### Example

|          |                                                                        |
|----------|------------------------------------------------------------------------|
| Command  | :MEAS:ITEM:DEG:CH1 4                                                   |
| Query    | :MEAS:ITEM:DEG:CH1?                                                    |
| Response | (When HEADER ON) :MEASURE:NORMAL:ITEM:DEG:CH1 4<br>(When HEADER OFF) 4 |

### Set and Query :MEASure? Output Items (Instantaneous, Maximum, and Minimum Values for Voltage Frequency Data)

|               |                     |                                                                        |
|---------------|---------------------|------------------------------------------------------------------------|
| <b>Syntax</b> | Instantaneous value | :MEASure[:NORMal]:ITEM:FREQU:ALL <Output item><br><Output item>        |
|               | Maximum value       | :MEASure[:NORMal]:ITEM:FREQU:CH1(?) <Output item><br><Output item>     |
|               | Minimum value       | :MEASure[:NORMal]:ITEM:FREQU_MAX:ALL <Output item><br><Output item>    |
|               | Response            | :MEASure[:NORMal]:ITEM:FREQU_MAX:CH1(?) <Output item><br><Output item> |
|               |                     | :MEASure[:NORMal]:ITEM:FREQU_MIN:ALL <Output item><br><Output item>    |
|               |                     | :MEASure[:NORMal]:ITEM:FREQU_MIN:CH1(?) <Output item><br><Output item> |

|      |      |      |      |      |      |      |       |
|------|------|------|------|------|------|------|-------|
| 128  | 64   | 32   | 16   | 8    | 4    | 2    | 1     |
| bit7 | bit6 | bit5 | bit4 | bit3 | bit2 | bit1 | bit0  |
|      |      |      |      |      |      |      | FREQU |

#### Description

Sets the voltage frequency data (instantaneous value, maximum value, minimum value) output items as numerical values between 0 and 1.

Although NRf numerical values are accepted, values to the right of the decimal are dropped.

If no items are specified directly via a :MEASure? query, the measurement values are output based on the specification of this command.

#### Example

|          |                                                                          |
|----------|--------------------------------------------------------------------------|
| Command  | :MEAS:ITEM:FREQU:CH1 1                                                   |
| Query    | :MEAS:ITEM:FREQU:CH1?                                                    |
| Response | (When HEADER ON) :MEASURE:NORMAL:ITEM:FREQU:CH1 1<br>(When HEADER OFF) 1 |

### Set and Query :MEASure? Output Items (Instantaneous, Maximum, and Minimum Values for Current Frequency Data)

|             |                     |                                                                                                                                                                                                                                                                                                                                                                                                |      |      |      |      |       |   |   |   |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |
|-------------|---------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|------|------|------|-------|---|---|---|------|------|------|------|------|------|------|------|--|--|--|--|--|--|--|
| Syntax      | Instantaneous value | :MEASure[:NORMal]:ITEM:FREQI:ALL <Output item><br>:MEASure[:NORMal]:ITEM:FREQI:CH1(?) <Output item>                                                                                                                                                                                                                                                                                            |      |      |      |      |       |   |   |   |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |
|             | Maximum value       | :MEASure[:NORMal]:ITEM:FREQI_MAX:ALL <Output item><br>:MEASure[:NORMal]:ITEM:FREQI_MAX:CH1(?) <Output item>                                                                                                                                                                                                                                                                                    |      |      |      |      |       |   |   |   |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |
|             | Minimum value       | :MEASure[:NORMal]:ITEM:FREQI_MIN:ALL <Output item><br>:MEASure[:NORMal]:ITEM:FREQI_MIN:CH1(?) <Output item>                                                                                                                                                                                                                                                                                    |      |      |      |      |       |   |   |   |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |
|             | Response            | <Output item (NR1)>                                                                                                                                                                                                                                                                                                                                                                            |      |      |      |      |       |   |   |   |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |
|             |                     | <table><tr><td>128</td><td>64</td><td>32</td><td>16</td><td>8</td><td>4</td><td>2</td><td>1</td></tr><tr><td>bit7</td><td>bit6</td><td>bit5</td><td>bit4</td><td>bit3</td><td>bit2</td><td>bit1</td><td>bit0</td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>FREQI</td></tr></table>                                                                           | 128  | 64   | 32   | 16   | 8     | 4 | 2 | 1 | bit7 | bit6 | bit5 | bit4 | bit3 | bit2 | bit1 | bit0 |  |  |  |  |  |  |  |
| 128         | 64                  | 32                                                                                                                                                                                                                                                                                                                                                                                             | 16   | 8    | 4    | 2    | 1     |   |   |   |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |
| bit7        | bit6                | bit5                                                                                                                                                                                                                                                                                                                                                                                           | bit4 | bit3 | bit2 | bit1 | bit0  |   |   |   |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |
|             |                     |                                                                                                                                                                                                                                                                                                                                                                                                |      |      |      |      | FREQI |   |   |   |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |
| Description |                     | <p>Sets the current frequency data (instantaneous value, maximum value, minimum value) output items as numerical values between 0 and 1.</p> <p>Although NRf numerical values are accepted, values to the right of the decimal are dropped.</p> <p>If no items are specified directly via a :MEASure? query, the measurement values are output based on the specification of this command.</p> |      |      |      |      |       |   |   |   |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |
| Example     | Command             | :MEAS:ITEM:FREQI:CH1 1                                                                                                                                                                                                                                                                                                                                                                         |      |      |      |      |       |   |   |   |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |
|             | Query               | :MEAS:ITEM:FREQI:CH1?                                                                                                                                                                                                                                                                                                                                                                          |      |      |      |      |       |   |   |   |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |
|             | Response            | (When HEADER ON) :MEASURE:NORMAL:ITEM:FREQI:CH1 1<br>(When HEADER OFF) 1                                                                                                                                                                                                                                                                                                                       |      |      |      |      |       |   |   |   |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |

### Set and Query:MEASure? Output Items (Integration Time)

|                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |      |      |      |      |      |      |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |      |
|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|--|--|--|--|--|--|--|------|
| Syntax          | :MEASure[:NORMal]:ITEM:TIME(?) <Output item>                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |      |      |      |      |      |      |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |      |
|                 | Data by current range during auto-range integration<br>:MEASure[:NORMal]:ITEM:TIME:I200mA(?) < Output item ><br>:MEASure[:NORMal]:ITEM:TIME:I500mA(?) < Output item ><br>:MEASure[:NORMal]:ITEM:TIME:I1A(?) < Output item ><br>:MEASure[:NORMal]:ITEM:TIME:I2A(?) < Output item ><br>:MEASure[:NORMal]:ITEM:TIME:I5A(?) < Output item ><br>:MEASure[:NORMal]:ITEM:TIME:I10A(?) < Output item ><br>:MEASure[:NORMal]:ITEM:TIME:I20A(?) < Output item ><br>:MEASure[:NORMal]:ITEM:TIME:BACKup(?) < Output item> |      |      |      |      |      |      |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |      |
| Response        | <Output item (NR1)><br>128      64      32      16      8      4      2      1<br><table border="1"> <tr> <td>bit7</td><td>bit6</td><td>bit5</td><td>bit4</td><td>bit3</td><td>bit2</td><td>bit1</td><td>bit0</td></tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>TIME</td></tr> </table>                                                                                                                                                                                       |      |      |      |      |      |      | bit7 | bit6 | bit5 | bit4 | bit3 | bit2 | bit1 | bit0 |  |  |  |  |  |  |  | TIME |
| bit7            | bit6                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | bit5 | bit4 | bit3 | bit2 | bit1 | bit0 |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |      |
|                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |      |      |      |      |      | TIME |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |      |
| Description     | Sets the integration time data output to a numerical value between 0 and 1.<br>Although NRf numerical values are accepted, values to the right of the decimal are dropped.<br>If no items are specified directly via a :MEASure? query, the measurement values are output based on the specification of this command.                                                                                                                                                                                         |      |      |      |      |      |      |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |      |
| Example Command | :MEAS:ITEM:TIME 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |      |
| Query           | :MEAS:ITEM:TIME?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |      |      |      |      |      |      |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |      |
| Response        | (When HEADER ON) :MEASURE:NORMAL:ITEM:TIME 1<br>(When HEADER OFF) 1                                                                                                                                                                                                                                                                                                                                                                                                                                           |      |      |      |      |      |      |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |      |

## Set and Query:MEASure? Output Items (Current Integration [Total Sum])

**Syntax** :MEASure[:NORMal]:ITEM:IH:ALL <Output item>  
:MEASure[:NORMal]:ITEM:IH:CH1(?) <Output item>

Data by current range during auto-range integration

:MEASure[:NORMal]:ITEM:IH:CH1:I200mA(?) <Output item>  
:MEASure[:NORMal]:ITEM:IH:CH1:I500mA(?) <Output item>  
:MEASure[:NORMal]:ITEM:IH:CH1:I1A(?) <Output item>  
:MEASure[:NORMal]:ITEM:IH:CH1:I2A(?) <Output item>  
:MEASure[:NORMal]:ITEM:IH:CH1:I5A(?) <Output item>  
:MEASure[:NORMal]:ITEM:IH:CH1:I10A(?) <Output item>  
:MEASure[:NORMal]:ITEM:IH:CH1:I20A(?) <Output item>  
:MEASure[:NORMal]:ITEM:IH:CH1:BACKup(?) <Output item>

**Response** <Output item (NR1)>

| 128  | 64   | 32   | 16   | 8    | 4    | 2    | 1    |
|------|------|------|------|------|------|------|------|
| bit7 | bit6 | bit5 | bit4 | bit3 | bit2 | bit1 | bit0 |
|      |      |      |      | DC   |      | MN   | ACDC |

### Description

Sets the current integration (total sum) data output items to a numerical value between 0 and 11.

For example, specify 1 to output the AC+DC rectification or 2 to output the AC+DC Umn rectification measurement value.

You can also output all rectification methods together at once. For example, you can specify 3 to output both the AC+DC rectification and AC+DC Umn rectification measurement values at the same time.

Although NRf numerical values are accepted, values to the right of the decimal are dropped.

If no items are specified directly via a :MEASure? query, the measurement values are output based on the specification of this command.

### Example Command

:MEAS:ITEM:IH:CH1 1

Specifies to output the instantaneous value of the AC/DC rectified current integration (total sum).

**Query** :MEAS:ITEM:IH:CH1?

**Response** (When HEADER ON) :MEASURE:NORMAL:ITEM:IH:CH1 1  
(When HEADER OFF) 1

**Note** •If auto-range integration is ON, the output of the MN and ACDC will be invalid data.

## Set and Query:MEASure? Output Items (Positive Current Integration)

### Syntax

:MEASure[:NORMal]:ITEM:PIH:ALL <Output item>

:MEASure[:NORMal]:ITEM:PIH:CH1(?) <Output item>

Data by current range during auto-range integration

:MEASure[:NORMal]:ITEM:PIH:CH1:I200mA(?) <Output item>

:MEASure[:NORMal]:ITEM:PIH:CH1:I500mA(?) <Output item>

:MEASure[:NORMal]:ITEM:PIH:CH1:I1A(?) <Output item>

:MEASure[:NORMal]:ITEM:PIH:CH1:I2A(?) <Output item>

:MEASure[:NORMal]:ITEM:PIH:CH1:I5A(?) <Output item>

:MEASure[:NORMal]:ITEM:PIH:CH1:I10A(?) <Output item>

:MEASure[:NORMal]:ITEM:PIH:CH1:I20A(?) <Output item>

:MEASure[:NORMal]:ITEM:PIH:CH1:BACKup(?) <Output item>

### Response

<Output item (NR1)>

| 128  | 64   | 32   | 16   | 8    | 4    | 2    | 1    |
|------|------|------|------|------|------|------|------|
| bit7 | bit6 | bit5 | bit4 | bit3 | bit2 | bit1 | bit0 |
|      |      |      |      | DC   |      |      |      |

### Description

Sets the positive current integration data output items to a numerical value between 0 and 8.

For example, specify 8 to output the DC rectification measurement value.

Although NRf numerical values are accepted, values to the right of the decimal are dropped.

If no items are specified directly via a :MEASure? query, the measurement values are output based on the specification of this command.

### Example Command

:MEAS:ITEM:PIH:CH1 8

Specifies to output the instantaneous value of the DC rectified positive current integration.

### Query

:MEAS:ITEM:PIH:CH1?

### Response

(When HEADER ON) :MEASURE:NORMAL:ITEM:PIH:CH1 8

(When HEADER OFF) 8

Set and Query:MEASure? Output Items (Negative Current Integration)

Syntax

:MEASure[:NORMal]:ITEM:MIH:ALL <Output item>

:MEASure[:NORMal]:ITEM:MIH:CH1(?) <Output item>

Data by current range during auto-range integration

:MEASure[:NORMal]:ITEM:MIH:CH1:I200mA(?) <Output item>

:MEASure[:NORMal]:ITEM:MIH:CH1:I500mA(?) <Output item>

:MEASure[:NORMal]:ITEM:MIH:CH1:I1A(?) <Output item>

:MEASure[:NORMal]:ITEM:MIH:CH1:I2A(?) <Output item>

:MEASure[:NORMal]:ITEM:MIH:CH1:I5A(?) <Output item>

:MEASure[:NORMal]:ITEM:MIH:CH1:I10A(?) <Output item>

:MEASure[:NORMal]:ITEM:MIH:CH1:I20A(?) <Output item>

:MEASure[:NORMal]:ITEM:MIH:CH1:BACKup(?) <Output item>

Response

<Output item (NR1)>

1286432168421

|      |      |      |      |      |      |      |      |
|------|------|------|------|------|------|------|------|
| bit7 | bit6 | bit5 | bit4 | bit3 | bit2 | bit1 | bit0 |
|      |      |      |      | DC   |      |      |      |

Description

Sets the negative current integration data output items to a numerical value between 0 and 8.

For example, specify 8 to output the DC rectification measurement value.

Although NRf numerical values are accepted, values to the right of the decimal are dropped.

If no items are specified directly via a :MEASure? query, the measurement values are output based on the specification of this command.

Example

Command

:MEAS:ITEM:MIH:CH1 8

Specifies to output the instantaneous value of the DC rectified negative current integration.

Query

:MEAS:ITEM:MIH:CH1?

Response

(When HEADER ON)

:MEASURE:NORMAL:ITEM:MIH:CH1 8

(When HEADER OFF)

8

## Set and Query:MEASure? Output Items (Active Power Integration [Total Sum])

### Syntax

:MEASure[:NORMal]:ITEM:WP:ALL <Output item>  
:MEASure[:NORMal]:ITEM:WP:CH1(?) <Output item>

Data by current range during auto-range integration

:MEASure[:NORMal]:ITEM:WP:CH1:I200mA(?) <Output item>  
:MEASure[:NORMal]:ITEM:WP:CH1:I500mA(?) <Output item>  
:MEASure[:NORMal]:ITEM:WP:CH1:I1A(?) <Output item>  
:MEASure[:NORMal]:ITEM:WP:CH1:I2A(?) <Output item>  
:MEASure[:NORMal]:ITEM:WP:CH1:I5A(?) <Output item>  
:MEASure[:NORMal]:ITEM:WP:CH1:I10A(?) <Output item>  
:MEASure[:NORMal]:ITEM:WP:CH1:I20A(?) <Output item>  
:MEASure[:NORMal]:ITEM:WP:CH1:BACKup(?) <Output item>

### Response

<Output item (NR1)>

| 128  | 64   | 32   | 16   | 8    | 4    | 2    | 1    |
|------|------|------|------|------|------|------|------|
| bit7 | bit6 | bit5 | bit4 | bit3 | bit2 | bit1 | bit0 |
|      |      |      |      | DC   |      | MN   | ACDC |

### Description

Sets the active power integration (total sum) data output items to a numerical value between 0 and 11.

For example, specify 1 to output the AC+DC rectification or 2 to output the AC+DC Umn rectification measurement value.

You can also output all rectification methods together at once. For example, you can specify 3 to output both the AC+DC rectification and AC+DC Umn rectification measurement values at the same time.

Although NRf numerical values are accepted, values to the right of the decimal are dropped.

If no items are specified directly via a :MEASure? query, the measurement values are output based on the specification of this command.

### Example Command

:MEAS:ITEM:WP:CH1 1

Specifies to output the instantaneous value of the AC/DC rectified active power integration (total sum).

### Query

:MEAS:ITEM:WP:CH1?

### Response

(When HEADER ON) :MEASURE:NORMAL:ITEM:WP:CH1 1  
(When HEADER OFF) 1

## Set and Query:MEASure? Output Items (Positive Active Power Integration)

Syntax

:MEASure[:NORMal]:ITEM:PWP:ALL <Output item>  
:MEASure[:NORMal]:ITEM:PWP:CH1(?) <Output item>

Data by current range during auto-range integration

:MEASure[:NORMal]:ITEM:PWP:CH1:I200mA(?) <Output item>  
:MEASure[:NORMal]:ITEM:PWP:CH1:I500mA(?) <Output item>  
:MEASure[:NORMal]:ITEM:PWP:CH1:I1A(?) <Output item>  
:MEASure[:NORMal]:ITEM:PWP:CH1:I2A(?) <Output item>  
:MEASure[:NORMal]:ITEM:PWP:CH1:I5A(?) <Output item>  
:MEASure[:NORMal]:ITEM:PWP:CH1:I10A(?) <Output item>  
:MEASure[:NORMal]:ITEM:PWP:CH1:I20A(?) <Output item>  
:MEASure[:NORMal]:ITEM:PWP:CH1:BACKup(?) <Output item>

Response

<Output item (NR1)>

| 128  | 64   | 32   | 16   | 8    | 4    | 2    | 1    |
|------|------|------|------|------|------|------|------|
| bit7 | bit6 | bit5 | bit4 | bit3 | bit2 | bit1 | bit0 |
|      |      |      |      | DC   |      | MN   | ACDC |

Description

Sets the positive active power integration data output items to a numerical value between 0 and 11.

For example, specify 1 to output the AC+DC rectification or 2 to output the AC+DC Umn rectification measurement value.

You can also output all rectification methods together at once. For example, you can specify 3 to output both the AC+DC rectification and AC+DC Umn rectification measurement values at the same time.

Although NRf numerical values are accepted, values to the right of the decimal are dropped.

If no items are specified directly via a :MEASure? query, the measurement values are output based on the specification of this command.

Example Command

:MEAS:ITEM:PWP:CH1 1

Specifies to output the instantaneous value of the AC/DC rectified positive active power integration.

Query

:MEAS:ITEM:PWP:CH1?

Response

(When HEADER ON) :MEASURE:NORMAL:ITEM:PWP:CH1 1  
(When HEADER OFF) 1

## Set and Query:MEASure? Output Items (Negative Active Power Integration)

### Syntax

:MEASure[:NORMal]:ITEM:MWP:ALL <Output item>  
:MEASure[:NORMal]:ITEM:MWP:CH1(?) <Output item>

Data by current range during auto-range integration

:MEASure[:NORMal]:ITEM:MWP:CH1:I200mA(?) <Output item>  
:MEASure[:NORMal]:ITEM:MWP:CH1:I500mA(?) <Output item>  
:MEASure[:NORMal]:ITEM:MWP:CH1:I1A(?) <Output item>  
:MEASure[:NORMal]:ITEM:MWP:CH1:I2A(?) <Output item>  
:MEASure[:NORMal]:ITEM:MWP:CH1:I5A(?) <Output item>  
:MEASure[:NORMal]:ITEM:MWP:CH1:I10A(?) <Output item>  
:MEASure[:NORMal]:ITEM:MWP:CH1:I20A(?) <Output item>  
:MEASure[:NORMal]:ITEM:MWP:CH1:BACKup(?) <Output item>

### Response

<Output item (NR1)>

| 128  | 64   | 32   | 16   | 8    | 4    | 2    | 1    |
|------|------|------|------|------|------|------|------|
| bit7 | bit6 | bit5 | bit4 | bit3 | bit2 | bit1 | bit0 |
|      |      |      |      | DC   |      | MN   | ACDC |

### Description

Sets the negative active power integration data output items to a numerical value between 0 and 11.

For example, specify 1 to output the AC+DC rectification or 2 to output the AC+DC Umn rectification measurement value.

You can also output all rectification methods together at once. For example, you can specify 3 to output both the AC+DC rectification and AC+DC Umn rectification measurement values at the same time.

Although NRf numerical values are accepted, values to the right of the decimal are dropped.

If no items are specified directly via a :MEASure? query, the measurement values are output based on the specification of this command.

### Example Command

:MEAS:ITEM:MWP:CH1 1

Specifies to output the instantaneous value of the AC/DC rectified negative active power integration.

### Query

:MEAS:ITEM:MWP:CH1?

### Response

(When HEADER ON) :MEASURE:NORMAL:ITEM:MWP:CH1 1  
(When HEADER OFF) 1

### Set and Query :MEASure? Output Items (Instantaneous, Maximum, and Minimum Values for the Voltage Waveform Peak)

|                                                                                                                                                                                                                                                                                                                    |                     |                                                                                                                                                                                                                                                                                                                                                                                                          |      |      |      |      |      |   |   |   |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |     |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|------|------|------|------|---|---|---|------|------|------|------|------|------|------|------|--|--|--|--|--|--|--|-----|
| Syntax                                                                                                                                                                                                                                                                                                             | Instantaneous value | :MEASure[:NORMal]:ITEM:UPK:ALL <Output item>                                                                                                                                                                                                                                                                                                                                                             |      |      |      |      |      |   |   |   |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |     |
|                                                                                                                                                                                                                                                                                                                    |                     | :MEASure[:NORMal]:ITEM:UPK:CH1(?) <Output item>                                                                                                                                                                                                                                                                                                                                                          |      |      |      |      |      |   |   |   |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |     |
|                                                                                                                                                                                                                                                                                                                    | Maximum value       | :MEASure[:NORMal]:ITEM:UPK_MAX:ALL <Output item>                                                                                                                                                                                                                                                                                                                                                         |      |      |      |      |      |   |   |   |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |     |
|                                                                                                                                                                                                                                                                                                                    |                     | :MEASure[:NORMal]:ITEM:UPK_MAX:CH1(?) <Output item>                                                                                                                                                                                                                                                                                                                                                      |      |      |      |      |      |   |   |   |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |     |
|                                                                                                                                                                                                                                                                                                                    | Minimum value       | :MEASure[:NORMal]:ITEM:UPK_MIN:ALL <Output item>                                                                                                                                                                                                                                                                                                                                                         |      |      |      |      |      |   |   |   |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |     |
|                                                                                                                                                                                                                                                                                                                    |                     | :MEASure[:NORMal]:ITEM:UPK_MIN:CH1(?) <Output item>                                                                                                                                                                                                                                                                                                                                                      |      |      |      |      |      |   |   |   |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |     |
| Response                                                                                                                                                                                                                                                                                                           |                     | <Output item (NR1)>                                                                                                                                                                                                                                                                                                                                                                                      |      |      |      |      |      |   |   |   |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |     |
| <table><tr><td>128</td><td>64</td><td>32</td><td>16</td><td>8</td><td>4</td><td>2</td><td>1</td></tr><tr><td>bit7</td><td>bit6</td><td>bit5</td><td>bit4</td><td>bit3</td><td>bit2</td><td>bit1</td><td>bit0</td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>UPK</td></tr></table> |                     |                                                                                                                                                                                                                                                                                                                                                                                                          | 128  | 64   | 32   | 16   | 8    | 4 | 2 | 1 | bit7 | bit6 | bit5 | bit4 | bit3 | bit2 | bit1 | bit0 |  |  |  |  |  |  |  | UPK |
| 128                                                                                                                                                                                                                                                                                                                | 64                  | 32                                                                                                                                                                                                                                                                                                                                                                                                       | 16   | 8    | 4    | 2    | 1    |   |   |   |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |     |
| bit7                                                                                                                                                                                                                                                                                                               | bit6                | bit5                                                                                                                                                                                                                                                                                                                                                                                                     | bit4 | bit3 | bit2 | bit1 | bit0 |   |   |   |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |     |
|                                                                                                                                                                                                                                                                                                                    |                     |                                                                                                                                                                                                                                                                                                                                                                                                          |      |      |      |      | UPK  |   |   |   |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |     |
| Description                                                                                                                                                                                                                                                                                                        |                     | <p>Sets the voltage waveform peak value data (instantaneous value, maximum value, minimum value) output items as numerical values between 0 and 1.</p> <p>Although NRf numerical values are accepted, values to the right of the decimal are dropped.</p> <p>If no items are specified directly via a :MEASure? query, the measurement values are output based on the specification of this command.</p> |      |      |      |      |      |   |   |   |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |     |
| Example                                                                                                                                                                                                                                                                                                            | Command             | :MEAS:ITEM:UPK:CH1 1                                                                                                                                                                                                                                                                                                                                                                                     |      |      |      |      |      |   |   |   |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |     |
|                                                                                                                                                                                                                                                                                                                    |                     | Specifies to output the instantaneous value of the AC/DC rectified voltage waveform peak value.                                                                                                                                                                                                                                                                                                          |      |      |      |      |      |   |   |   |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |     |
|                                                                                                                                                                                                                                                                                                                    | Query               | :MEAS:ITEM:UPK:CH1?                                                                                                                                                                                                                                                                                                                                                                                      |      |      |      |      |      |   |   |   |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |     |
|                                                                                                                                                                                                                                                                                                                    | Response            | (When HEADER ON) :MEASURE:NORMAL:ITEM:UPK:CH1 1                                                                                                                                                                                                                                                                                                                                                          |      |      |      |      |      |   |   |   |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |     |
|                                                                                                                                                                                                                                                                                                                    |                     | (When HEADER OFF) 1                                                                                                                                                                                                                                                                                                                                                                                      |      |      |      |      |      |   |   |   |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |     |

### Set and Query :MEASure? Output Items (Instantaneous, Maximum, and Minimum Values for the Current Waveform Peak)

|             |                     |                                                                                                                                                                                                                                                                                                                                                                                                   |      |      |      |      |      |   |   |   |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |     |
|-------------|---------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|------|------|------|------|---|---|---|------|------|------|------|------|------|------|------|--|--|--|--|--|--|--|-----|
| Syntax      | Instantaneous value | :MEASure[:NORMal]:ITEM:IPK:ALL <Output item>                                                                                                                                                                                                                                                                                                                                                      |      |      |      |      |      |   |   |   |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |     |
|             |                     | :MEASure[:NORMal]:ITEM:IPK:CH1(?) <Output item>                                                                                                                                                                                                                                                                                                                                                   |      |      |      |      |      |   |   |   |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |     |
|             | Maximum value       | :MEASure[:NORMal]:ITEM:IPK_MAX:ALL <Output item>                                                                                                                                                                                                                                                                                                                                                  |      |      |      |      |      |   |   |   |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |     |
|             |                     | :MEASure[:NORMal]:ITEM:IPK_MAX:CH1(?) <Output item>                                                                                                                                                                                                                                                                                                                                               |      |      |      |      |      |   |   |   |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |     |
|             | Minimum value       | :MEASure[:NORMal]:ITEM:IPK_MIN:ALL <Output item>                                                                                                                                                                                                                                                                                                                                                  |      |      |      |      |      |   |   |   |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |     |
|             |                     | :MEASure[:NORMal]:ITEM:IPK_MIN:CH1(?) <Output item>                                                                                                                                                                                                                                                                                                                                               |      |      |      |      |      |   |   |   |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |     |
| Response    |                     | <Output item (NR1)>                                                                                                                                                                                                                                                                                                                                                                               |      |      |      |      |      |   |   |   |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |     |
|             |                     | <table><tr><td>128</td><td>64</td><td>32</td><td>16</td><td>8</td><td>4</td><td>2</td><td>1</td></tr><tr><td>bit7</td><td>bit6</td><td>bit5</td><td>bit4</td><td>bit3</td><td>bit2</td><td>bit1</td><td>bit0</td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>IPK</td></tr></table>                                                                                | 128  | 64   | 32   | 16   | 8    | 4 | 2 | 1 | bit7 | bit6 | bit5 | bit4 | bit3 | bit2 | bit1 | bit0 |  |  |  |  |  |  |  | IPK |
| 128         | 64                  | 32                                                                                                                                                                                                                                                                                                                                                                                                | 16   | 8    | 4    | 2    | 1    |   |   |   |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |     |
| bit7        | bit6                | bit5                                                                                                                                                                                                                                                                                                                                                                                              | bit4 | bit3 | bit2 | bit1 | bit0 |   |   |   |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |     |
|             |                     |                                                                                                                                                                                                                                                                                                                                                                                                   |      |      |      |      | IPK  |   |   |   |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |     |
| Description |                     | <p>Sets the current waveform peak value data (instantaneous value, maximum value, minimum value) output items as numerical values between 0 and 1. Although NRf numerical values are accepted, values to the right of the decimal are dropped.</p> <p>If no items are specified directly via a :MEASure? query, the measurement values are output based on the specification of this command.</p> |      |      |      |      |      |   |   |   |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |     |
| Example     | Command             | :MEAS:ITEM:IPK:CH1 1                                                                                                                                                                                                                                                                                                                                                                              |      |      |      |      |      |   |   |   |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |     |
|             |                     | Specifies to output the instantaneous value of the AC/DC rectified current waveform peak value.                                                                                                                                                                                                                                                                                                   |      |      |      |      |      |   |   |   |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |     |
|             | Query               | :MEAS:ITEM:IPK:CH1?                                                                                                                                                                                                                                                                                                                                                                               |      |      |      |      |      |   |   |   |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |     |
|             | Response            | (When HEADER ON) :MEASURE:NORMAL:ITEM:IPK:CH1 1                                                                                                                                                                                                                                                                                                                                                   |      |      |      |      |      |   |   |   |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |     |
|             |                     | (When HEADER OFF) 1                                                                                                                                                                                                                                                                                                                                                                               |      |      |      |      |      |   |   |   |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |     |

### Set and Query :MEASure? Output Items (Instantaneous, Maximum, and Minimum Values for Maximum Current Ratio Data)

|             |                     |                                                                                                                                                                                                                                                                                                                                                                                             |      |      |      |      |      |   |   |   |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |     |
|-------------|---------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|------|------|------|------|---|---|---|------|------|------|------|------|------|------|------|--|--|--|--|--|--|--|-----|
| Syntax      | Instantaneous value | :MEASure[:NORMal]:ITEM:MCR:ALL <Output item>                                                                                                                                                                                                                                                                                                                                                |      |      |      |      |      |   |   |   |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |     |
|             |                     | :MEASure[:NORMal]:ITEM:MCR:CH1(?) <Output item>                                                                                                                                                                                                                                                                                                                                             |      |      |      |      |      |   |   |   |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |     |
|             | Maximum value       | :MEASure[:NORMal]:ITEM:MCR_MAX:ALL <Output item>                                                                                                                                                                                                                                                                                                                                            |      |      |      |      |      |   |   |   |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |     |
|             |                     | :MEASure[:NORMal]:ITEM:MCR_MAX:CH1(?) <Output item>                                                                                                                                                                                                                                                                                                                                         |      |      |      |      |      |   |   |   |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |     |
|             | Minimum Value       | :MEASure[:NORMal]:ITEM:MCR_MIN:ALL <Output item>                                                                                                                                                                                                                                                                                                                                            |      |      |      |      |      |   |   |   |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |     |
|             |                     | :MEASure[:NORMal]:ITEM:MCR_MIN:CH1(?) <Output item>                                                                                                                                                                                                                                                                                                                                         |      |      |      |      |      |   |   |   |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |     |
|             | Response            | <Output item (NR1)>                                                                                                                                                                                                                                                                                                                                                                         |      |      |      |      |      |   |   |   |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |     |
|             |                     | <table><tr><td>128</td><td>64</td><td>32</td><td>16</td><td>8</td><td>4</td><td>2</td><td>1</td></tr><tr><td>bit7</td><td>bit6</td><td>bit5</td><td>bit4</td><td>bit3</td><td>bit2</td><td>bit1</td><td>bit0</td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>MCR</td></tr></table>                                                                          | 128  | 64   | 32   | 16   | 8    | 4 | 2 | 1 | bit7 | bit6 | bit5 | bit4 | bit3 | bit2 | bit1 | bit0 |  |  |  |  |  |  |  | MCR |
| 128         | 64                  | 32                                                                                                                                                                                                                                                                                                                                                                                          | 16   | 8    | 4    | 2    | 1    |   |   |   |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |     |
| bit7        | bit6                | bit5                                                                                                                                                                                                                                                                                                                                                                                        | bit4 | bit3 | bit2 | bit1 | bit0 |   |   |   |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |     |
|             |                     |                                                                                                                                                                                                                                                                                                                                                                                             |      |      |      |      | MCR  |   |   |   |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |     |
| Description |                     | <p>Sets the Maximum Current Ratio data (instantaneous value, maximum value, minimum value) output items as numerical values between 0 and 1. Although NRf numerical values are accepted, values to the right of the decimal are dropped.</p> <p>If no items are specified directly via a :MEASure? query, the measurement values are output based on the specification of this command.</p> |      |      |      |      |      |   |   |   |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |     |
| Example     | Command             | :MEAS:ITEM:MCR:CH1 1                                                                                                                                                                                                                                                                                                                                                                        |      |      |      |      |      |   |   |   |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |     |
|             | Query               | :MEAS:ITEM:MCR:CH1?                                                                                                                                                                                                                                                                                                                                                                         |      |      |      |      |      |   |   |   |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |     |
|             | Response            | (When HEADER ON) :MEASURE:NORMAL:ITEM:MCR:CH1 1<br>(When HEADER OFF) 1                                                                                                                                                                                                                                                                                                                      |      |      |      |      |      |   |   |   |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |     |

### Set and Query :MEASure? Output Items (Instantaneous, Maximum, and Minimum Values for Voltage Crest Factor Data)

|                    |                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                    |      |      |      |      |      |   |   |   |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |     |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|------|------|------|------|---|---|---|------|------|------|------|------|------|------|------|--|--|--|--|--|--|--|-----|
| <b>Syntax</b>      | Instantaneous value                                                                                                                                                                                                                                                                                                                                                                               | :MEASure[:NORMal]:ITEM:UCFactor:ALL <Output item>                                                                                                                                                                                                                                                                  |      |      |      |      |      |   |   |   |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |     |
|                    |                                                                                                                                                                                                                                                                                                                                                                                                   | :MEASure[:NORMal]:ITEM:UCFactor:CH1(?) <Output item>                                                                                                                                                                                                                                                               |      |      |      |      |      |   |   |   |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |     |
|                    | Maximum value                                                                                                                                                                                                                                                                                                                                                                                     | :MEASure[:NORMal]:ITEM:UCF_MAX:ALL <Output item>                                                                                                                                                                                                                                                                   |      |      |      |      |      |   |   |   |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |     |
|                    |                                                                                                                                                                                                                                                                                                                                                                                                   | :MEASure[:NORMal]:ITEM:UCF_MAX:CH1(?) <Output item>                                                                                                                                                                                                                                                                |      |      |      |      |      |   |   |   |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |     |
|                    | Minimum value                                                                                                                                                                                                                                                                                                                                                                                     | :MEASure[:NORMal]:ITEM:UCF_MIN:ALL <Output item>                                                                                                                                                                                                                                                                   |      |      |      |      |      |   |   |   |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |     |
|                    |                                                                                                                                                                                                                                                                                                                                                                                                   | :MEASure[:NORMal]:ITEM:UCF_MIN:CH1(?) <Output item>                                                                                                                                                                                                                                                                |      |      |      |      |      |   |   |   |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |     |
|                    | Response                                                                                                                                                                                                                                                                                                                                                                                          | <Output item (NR1)>                                                                                                                                                                                                                                                                                                |      |      |      |      |      |   |   |   |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |     |
|                    |                                                                                                                                                                                                                                                                                                                                                                                                   | <table><tr><td>128</td><td>64</td><td>32</td><td>16</td><td>8</td><td>4</td><td>2</td><td>1</td></tr><tr><td>bit7</td><td>bit6</td><td>bit5</td><td>bit4</td><td>bit3</td><td>bit2</td><td>bit1</td><td>bit0</td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>UCF</td></tr></table> | 128  | 64   | 32   | 16   | 8    | 4 | 2 | 1 | bit7 | bit6 | bit5 | bit4 | bit3 | bit2 | bit1 | bit0 |  |  |  |  |  |  |  | UCF |
| 128                | 64                                                                                                                                                                                                                                                                                                                                                                                                | 32                                                                                                                                                                                                                                                                                                                 | 16   | 8    | 4    | 2    | 1    |   |   |   |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |     |
| bit7               | bit6                                                                                                                                                                                                                                                                                                                                                                                              | bit5                                                                                                                                                                                                                                                                                                               | bit4 | bit3 | bit2 | bit1 | bit0 |   |   |   |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |     |
|                    |                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                    |      |      |      |      | UCF  |   |   |   |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |     |
| <b>Description</b> | <p>Sets the voltage crest factor data (instantaneous value, maximum value, minimum value) output items as numerical values between 0 and 1.</p> <p>Although NRf numerical values are accepted, values to the right of the decimal are dropped.</p> <p>If no items are specified directly via a :MEASure? query, the measurement values are output based on the specification of this command.</p> |                                                                                                                                                                                                                                                                                                                    |      |      |      |      |      |   |   |   |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |     |
| <b>Example</b>     | Command                                                                                                                                                                                                                                                                                                                                                                                           | :MEAS:ITEM:UCF:CH1 1                                                                                                                                                                                                                                                                                               |      |      |      |      |      |   |   |   |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |     |
|                    | Query                                                                                                                                                                                                                                                                                                                                                                                             | :MEAS:ITEM:UCF:CH1?                                                                                                                                                                                                                                                                                                |      |      |      |      |      |   |   |   |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |     |
|                    | Response                                                                                                                                                                                                                                                                                                                                                                                          | (When HEADER ON) :MEASURE:NORMAL:ITEM:UCFACTOR:CH1 1<br>(When HEADER OFF) 1                                                                                                                                                                                                                                        |      |      |      |      |      |   |   |   |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |     |

## Set and Query :MEASure? Output Items (Instantaneous, Maximum, and Minimum Values for Current Crest Factor Data)

**Syntax**

|                     |                                                      |
|---------------------|------------------------------------------------------|
| Instantaneous value | :MEASure[:NORMal]:ITEM:ICFactor:ALL <Output item>    |
|                     | :MEASure[:NORMal]:ITEM:ICFactor:CH1(?) <Output item> |
| Maximum value       | :MEASure[:NORMal]:ITEM:ICF_MAX:ALL <Output item>     |
|                     | :MEASure[:NORMal]:ITEM:ICF_MAX:CH1(?) <Output item>  |
| Minimum value       | :MEASure[:NORMal]:ITEM:ICF_MIN:ALL <Output item>     |
|                     | :MEASure[:NORMal]:ITEM:ICF_MIN:CH1(?) <Output item>  |
| Response            | <Output item (NR1)>                                  |

|      |      |      |      |      |      |      |      |
|------|------|------|------|------|------|------|------|
| 128  | 64   | 32   | 16   | 8    | 4    | 2    | 1    |
| bit7 | bit6 | bit5 | bit4 | bit3 | bit2 | bit1 | bit0 |
|      |      |      |      |      |      |      | ICF  |

### Description

Sets the current crest factor data (instantaneous value, maximum value, minimum value) output items as numerical values between 0 and 1.

Although NRf numerical values are accepted, values to the right of the decimal are dropped.

If no items are specified directly via a :MEASure? query, the measurement values are output based on the specification of this command.

### Example

|          |                                                                          |
|----------|--------------------------------------------------------------------------|
| Command  | :MEAS:ITEM:ICF:CH1 1                                                     |
|          | Specifies to output the instantaneous value of the current crest factor. |
| Query    | :MEAS:ITEM:ICF:CH1?                                                      |
| Response | (When HEADER ON) :MEASURE:NORMAL:ITEM:ICFACTOR:CH1 1                     |
|          | (When HEADER OFF) 1                                                      |

## Set and Query:MEASure? Output Items (Time Average Current)

### Syntax

:MEASure[:NORMal]:ITEM:ITAVerage:ALL <Output item>  
:MEASure[:NORMal]:ITEM:ITAVerage:CH1(?) <Output item>

Data by current range during auto-range integration

:MEASure[:NORMal]:ITEM:ITAVerage:CH1:I200mA(?) <Output item>  
:MEASure[:NORMal]:ITEM:ITAVerage:CH1:I500mA(?) <Output item>  
:MEASure[:NORMal]:ITEM:ITAVerage:CH1:I1A(?) <Output item>  
:MEASure[:NORMal]:ITEM:ITAVerage:CH1:I2A(?) <Output item>  
:MEASure[:NORMal]:ITEM:ITAVerage:CH1:I5A(?) <Output item>  
:MEASure[:NORMal]:ITEM:ITAVerage:CH1:I10A(?) <Output item>  
:MEASure[:NORMal]:ITEM:ITAVerage:CH1:I20A(?) <Output item>  
:MEASure[:NORMal]:ITEM:ITAVerage:CH1:BACKup(?) <Output item>

### Response

<Output item (NR1)>

| 128  | 64   | 32   | 16   | 8    | 4    | 2    | 1    |
|------|------|------|------|------|------|------|------|
| bit7 | bit6 | bit5 | bit4 | bit3 | bit2 | bit1 | bit0 |
|      |      |      |      | DC   |      | MN   | ACDC |

### Description

Sets the time average current data output items to a numerical value between 0 and 11.

For example, specify 1 to output the AC+DC rectification or 2 to output the AC+DC Umn rectification measurement value.

You can also output all rectification methods together at once. For example, you can specify 3 to output both the AC+DC rectification and AC+DC Umn rectification measurement values at the same time.

Although NRf numerical values are accepted, values to the right of the decimal are dropped.

If no items are specified directly via a :MEASure? query, the measurement values are output based on the specification of this command.

### Example

#### Command

:MEAS:ITEM:ITAV:CH1 1

#### Query

:MEAS:ITEM:ITAV:CH1?

#### Response

(When HEADER ON) :MEASURE:NORMAL:ITEM:ITAVERAGE:CH1 1  
(When HEADER OFF) 1

### Note

• If auto-range integration is ON, the output of the MN and ACDC will be invalid data.

### Set and Query:MEASure? Output Items (Time Average Active Power)

Syntax

:MEASure[:NORMal]:ITEM:PTAVerage:ALL <Output item>

:MEASure[:NORMal]:ITEM:PTAVerage:CH1(?) <Output item>

Data by current range during auto-range integration

:MEASure[:NORMal]:ITEM:PTAVerage:CH1:I200mA(?) <Output item>

:MEASure[:NORMal]:ITEM:PTAVerage:CH1:I500mA(?) <Output item>

:MEASure[:NORMal]:ITEM:PTAVerage:CH1:I1A(?) <Output item>

:MEASure[:NORMal]:ITEM:PTAVerage:CH1:I2A(?) <Output item>

:MEASure[:NORMal]:ITEM:PTAVerage:CH1:I5A(?) <Output item>

:MEASure[:NORMal]:ITEM:PTAVerage:CH1:I10A(?) <Output item>

:MEASure[:NORMal]:ITEM:PTAVerage:CH1:I20A(?) <Output item>

:MEASure[:NORMal]:ITEM:PTAVerage:CH1:BACKup(?) <Output item>

Response

<Output item (NR1)>

1286432168421

bit7bit6bit5bit4bit3bit2bit1bit0

DC

MN

ACDC

Description

Sets the time average active power data output items to a numerical value between 0 and 11.

For example, specify 1 to output the AC+DC rectification or 2 to output the AC+DC Umn rectification measurement value.

You can also output all rectification methods together at once. For example, you can specify 3 to output both the AC+DC rectification and AC+DC Umn rectification measurement values at the same time.

Although NRf numerical values are accepted, values to the right of the decimal are dropped.

If no items are specified directly via a :MEASure? query, the measurement values are output based on the specification of this command.

Example

Command

:MEAS:ITEM:PTAV:CH1 1

Query

:MEAS:ITEM:PTAV:CH1?

Response

(When HEADER ON) :MEASURE:NORMAL:ITEM:PTAVERAGE:CH1 1

(When HEADER OFF) 1

Specifies to output the AC/DC rectified time average active power data.

### Set and Query :MEASure? Output Items (Instantaneous, Maximum, and Minimum Values for the Voltage Ripple Factor)

|             |                     |                                                                                                                                                                                                                                                                                                                                                                                                    |      |      |      |      |      |   |   |   |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |
|-------------|---------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|------|------|------|------|---|---|---|------|------|------|------|------|------|------|------|--|--|--|--|--|--|--|
| Syntax      | Instantaneous value | :MEASure[:NORMal]:ITEM:URF:ALL <Output item><br>:MEASure[:NORMal]:ITEM:URF:CH1(?) <Output item>                                                                                                                                                                                                                                                                                                    |      |      |      |      |      |   |   |   |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |
|             | Maximum value       | :MEASure[:NORMal]:ITEM:URF_MAX:ALL <Output item><br>:MEASure[:NORMal]:ITEM:URF_MAX:CH1(?) <Output item>                                                                                                                                                                                                                                                                                            |      |      |      |      |      |   |   |   |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |
|             | Minimum value       | :MEASure[:NORMal]:ITEM:URF_MIN:ALL <Output item><br>:MEASure[:NORMal]:ITEM:URF_MIN:CH1(?) <Output item>                                                                                                                                                                                                                                                                                            |      |      |      |      |      |   |   |   |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |
|             | Response            | <Output item (NR1)>                                                                                                                                                                                                                                                                                                                                                                                |      |      |      |      |      |   |   |   |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |
|             |                     | <table><tr><td>128</td><td>64</td><td>32</td><td>16</td><td>8</td><td>4</td><td>2</td><td>1</td></tr><tr><td>bit7</td><td>bit6</td><td>bit5</td><td>bit4</td><td>bit3</td><td>bit2</td><td>bit1</td><td>bit0</td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>URF</td></tr></table>                                                                                 | 128  | 64   | 32   | 16   | 8    | 4 | 2 | 1 | bit7 | bit6 | bit5 | bit4 | bit3 | bit2 | bit1 | bit0 |  |  |  |  |  |  |  |
| 128         | 64                  | 32                                                                                                                                                                                                                                                                                                                                                                                                 | 16   | 8    | 4    | 2    | 1    |   |   |   |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |
| bit7        | bit6                | bit5                                                                                                                                                                                                                                                                                                                                                                                               | bit4 | bit3 | bit2 | bit1 | bit0 |   |   |   |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |
|             |                     |                                                                                                                                                                                                                                                                                                                                                                                                    |      |      |      |      | URF  |   |   |   |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |
| Description |                     | <p>Sets the voltage ripple factor data (instantaneous value, maximum value, minimum value) output items as numerical values between 0 and 1.</p> <p>Although NRf numerical values are accepted, values to the right of the decimal are dropped.</p> <p>If no items are specified directly via a :MEASure? query, the measurement values are output based on the specification of this command.</p> |      |      |      |      |      |   |   |   |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |
| Example     | Command             | :MEAS:ITEM:URF:CH1 1                                                                                                                                                                                                                                                                                                                                                                               |      |      |      |      |      |   |   |   |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |
|             | Query               | :MEAS:ITEM:URF:CH1?                                                                                                                                                                                                                                                                                                                                                                                |      |      |      |      |      |   |   |   |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |
|             | Response            | (When HEADER ON) :MEASURE:NORMAL:ITEM:URF:CH1 1<br>(When HEADER OFF) 1                                                                                                                                                                                                                                                                                                                             |      |      |      |      |      |   |   |   |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |

### Set and Query :MEASure? Output Items (Instantaneous, Maximum, and Minimum Values for the Current Ripple Factor)

|          |                     |                                                     |
|----------|---------------------|-----------------------------------------------------|
| Syntax   | Instantaneous value | :MEASure[:NORMal]:ITEM:IRF:ALL <Output item>        |
|          |                     | :MEASure[:NORMal]:ITEM:IRF:CH1(?) <Output item>     |
|          | Maximum value       | :MEASure[:NORMal]:ITEM:IRF_MAX:ALL <Output item>    |
|          |                     | :MEASure[:NORMal]:ITEM:IRF_MAX:CH1(?) <Output item> |
|          | Minimum value       | :MEASure[:NORMal]:ITEM:IRF_MIN:ALL <Output item>    |
|          |                     | :MEASure[:NORMal]:ITEM:IRF_MIN:CH1(?) <Output item> |
| Response |                     | <Output item (NR1)>                                 |

|      |      |      |      |      |      |      |      |
|------|------|------|------|------|------|------|------|
| 128  | 64   | 32   | 16   | 8    | 4    | 2    | 1    |
| bit7 | bit6 | bit5 | bit4 | bit3 | bit2 | bit1 | bit0 |
|      |      |      |      |      |      |      | IRF  |

#### Description

Sets the current ripple factor data (instantaneous value, maximum value, minimum value) output items as numerical values between 0 and 1. Although NRf numerical values are accepted, values to the right of the decimal are dropped.

If no items are specified directly via a :MEASure? query, the measurement values are output based on the specification of this command.

#### Example

|          |                                                                        |
|----------|------------------------------------------------------------------------|
| Command  | :MEAS:ITEM:IRF:CH1 1                                                   |
| Query    | :MEAS:ITEM:IRF:CH1?                                                    |
| Response | (When HEADER ON) :MEASURE:NORMAL:ITEM:IRF:CH1 1<br>(When HEADER OFF) 1 |

### Set and Query :MEASure? Output Items (Instantaneous, Maximum, and Minimum Values for Total Harmonic Wave Voltage Distortion Factor Data)

|          |                     |                                                      |
|----------|---------------------|------------------------------------------------------|
| Syntax   | Instantaneous value | :MEASure[:NORMal]:ITEM:UTHD:ALL <Output item>        |
|          |                     | :MEASure[:NORMal]:ITEM:UTHD:CH1(?) <Output item>     |
|          | Maximum value       | :MEASure[:NORMal]:ITEM:UTHD_MAX:ALL <Output item>    |
|          |                     | :MEASure[:NORMal]:ITEM:UTHD_MAX:CH1(?) <Output item> |
|          | Minimum value       | :MEASure[:NORMal]:ITEM:UTHD_MIN:ALL <Output item>    |
|          |                     | :MEASure[:NORMal]:ITEM:UTHD_MIN:CH1(?) <Output item> |
| Response |                     | <Output item (NR1)>                                  |

|      |      |      |      |      |      |      |      |
|------|------|------|------|------|------|------|------|
| 128  | 64   | 32   | 16   | 8    | 4    | 2    | 1    |
| bit7 | bit6 | bit5 | bit4 | bit3 | bit2 | bit1 | bit0 |
|      |      |      |      |      |      |      | UTHD |

#### Description

Sets the total harmonic wave voltage distortion factor data (instantaneous value, maximum value, minimum value) output items as numerical values between 0 and 1.

Although NRf numerical values are accepted, values to the right of the decimal are dropped.

If no items are specified directly via a :MEASure? query, the measurement values are output based on the specification of this command.

#### Example

|          |                                                                         |
|----------|-------------------------------------------------------------------------|
| Command  | :MEAS:ITEM:UTHD:CH1 1                                                   |
| Query    | :MEAS:ITEM:UTHD:CH1?                                                    |
| Response | (When HEADER ON) :MEASURE:NORMAL:ITEM:UTHD:CH1 1<br>(When HEADER OFF) 1 |

### Set and Query :MEASure? Output Items (Instantaneous, Maximum, and Minimum Values for Total Harmonic Wave Current Distortion Factor Data)

|        |                     |                                                                                                           |
|--------|---------------------|-----------------------------------------------------------------------------------------------------------|
| Syntax | Instantaneous value | :MEASure[:NORMal]:ITEM:ITHD:ALL <Output item><br>:MEASure[:NORMal]:ITEM:ITHD:CH1(?) <Output item>         |
|        | Maximum value       | :MEASure[:NORMal]:ITEM:ITHD_MAX:ALL <Output item><br>:MEASure[:NORMal]:ITEM:ITHD_MAX:CH1(?) <Output item> |
|        | Minimum value       | :MEASure[:NORMal]:ITEM:ITHD_MIN:ALL <Output item><br>:MEASure[:NORMal]:ITEM:ITHD_MIN:CH1(?) <Output item> |
|        | Response            | <Output item (NR1)>                                                                                       |

|      |      |      |      |      |      |      |      |
|------|------|------|------|------|------|------|------|
| 128  | 64   | 32   | 16   | 8    | 4    | 2    | 1    |
| bit7 | bit6 | bit5 | bit4 | bit3 | bit2 | bit1 | bit0 |
|      |      |      |      |      |      |      | ITHD |

#### Description

Sets the total harmonic wave current distortion factor data (instantaneous value, maximum value, minimum value) output items as numerical values between 0 and 1. Although NRf numerical values are accepted, values to the right of the decimal are dropped.

If no items are specified directly via a :MEASure? query, the measurement values are output based on the specification of this command.

|         |          |                                                                                                                            |
|---------|----------|----------------------------------------------------------------------------------------------------------------------------|
| Example | Command  | :MEAS:ITEM:ITHD:CH1 1<br>Specifies to output the instantaneous value of the total harmonic wave current distortion factor. |
|         | Query    | :MEAS:ITEM:ITHD:CH1?                                                                                                       |
|         | Response | (When HEADER ON) :MEASURE:NORMAL:ITEM:ITHD:CH1 1<br>(When HEADER OFF) 1                                                    |

## Query Harmonic Wave Measurement Data (Normal Measurement Items)

|             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                            |
|-------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Syntax      | Query                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | <b>:MEASure:HARMonic[:VALue]?</b>                                                                                                                                                                                                                                                                                                          |
|             | Response                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | <Output item 1><Measurement value 1>,<Output item 2><Measurement value 2>.... (Maximum of 180 items)<br>See the <a href="#">List of Harmonic Wave Measurement Item Specifications</a> for details about the <Output item> field.                                                                                                           |
| Description | Query                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Outputs the items specified via <b>:MEASure:HARMonic:ITEM</b> commands. Unlike the <b>:MEASure?</b> query, only the items specified via <b>:MEASure:HARMonic:ITEM</b> commands are output. The measurement data is output in the order that the items are listed in the <a href="#">List of Harmonic Wave Output Item Specifications</a> . |
|             | Example                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                            |
| Example     | Query                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | <b>:MEAS:HARM?</b>                                                                                                                                                                                                                                                                                                                         |
|             | Response                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | (When HEADER ON) <b>Status 00000000,</b><br><b>HU1L001 +09.803E+0;HI1L001 +12.933E+0;</b><br><b>HP1L001 -085.72E+0</b><br>(When HEADER OFF) <b>00000000;+09.803E+0;+12.933E+0;-085.72E+0</b>                                                                                                                                               |
| Note        | <ul style="list-style-type: none"> <li>You can use the <b>:TRANsmit:SEParator</b> command to change the message unit separator from a semicolon ";" to a comma ",".</li> <li>If the display is blank (such as when the range has been changed), the response message will be "no data" (<math>\pm 777.77E+9</math>) until the measurement data is displayed. We recommend only using this function with a fixed range.</li> <li>If <b>:MEASure:HARMonic?</b> is called immediately after the instrument is powered on, the first-order effective values of HU, HI, and HP are output.</li> <li>The output items specified via <b>:MEASure:HARMonic:ITEM</b> commands will not be reset even if a system reset is performed. These items are reset only when the instrument is powered on.</li> <li>Up to 180 items will be output for each <b>:MEASure:HARMonic[:VALue]?</b> query. If output was specified with a <b>:MEASure:HARMonic?</b> command, up to 180 items will be output in the order indicated in the Output Items and Their Sequence. Since more than 180 items cannot be output, exercise care to adjust with <b>:MEASure:HARMonic:ITEM</b> so that the number of output items is 180 or less.</li> <li>If the harmonic upper limit order (<b>:HARMonic:ORDer:UPPer</b>) is set to a value of less than 50, data for orders above the limit will be 0. (The instrument will display "----.")</li> </ul> |                                                                                                                                                                                                                                                                                                                                            |

## :MEASure:HARMonic? Output Items and their Sequence

| Harmonic Wave Measurement Items        |                                  |                      |
|----------------------------------------|----------------------------------|----------------------|
| Status                                 | Instantaneous value              | Status               |
|                                        | Total                            | Status_MaxMin        |
| Effective Value<br>(Level)             | Voltage 0-order                  | HU1L000              |
|                                        | Voltage 0-order (maximum value)  | HU1MAXL000           |
|                                        | Voltage 0-order (minimum value)  | HU1MINL000           |
|                                        | Current 0-order                  | HI1L000              |
|                                        | Current 0-order (maximum value)  | HI1MAXL000           |
|                                        | Current 0-order (minimum value)  | HI1LMIN000           |
|                                        | Power 0-order                    | HP1L000              |
|                                        | Power 0-order (maximum value)    | HP1MAXL000           |
|                                        | Power 0-order (minimum value)    | HP1MINL000           |
| Content Ratio                          | Voltage 0-order                  | HU1D000              |
|                                        | Voltage 0-order (maximum value)  | HU1MAXD000           |
|                                        | Voltage 0-order (minimum value)  | HU1MIND000           |
|                                        | Current 0-order                  | HI1D000              |
|                                        | Current 0-order (maximum value)  | HI1MAXD000           |
|                                        | Current 0-order (minimum value)  | HI1MIND000           |
|                                        | Power 0-order                    | HP1D000              |
|                                        | Power 0-order (maximum value)    | HP1MAXD000           |
|                                        | Power 0-order (minimum value)    | HP1MIND000           |
| Voltage Phase<br>Difference            | Voltage 0-order                  | HU1P000              |
|                                        | Voltage 0-order (maximum value)  | HU1MAXP000           |
|                                        | Voltage 0-order (minimum value)  | HU1MINP000           |
| Current Phase<br>Difference            | Current 0-order                  | HI1P000              |
|                                        | Current 0-order (maximum value)  | HI1MAXP000           |
|                                        | Current 0-order (minimum value)  | HI1MINP000           |
| Voltage Current<br>Phase<br>Difference | Power 0-order                    | HP1P000              |
|                                        | Power 0-order (maximum value)    | HP1MAXP000           |
|                                        | Power 0-order (minimum value)    | HP1MINP000           |
| ...                                    | n-order                          | Last three digits: n |
| ...                                    | ...                              | ...                  |
| Effective Value<br>(Level)             | Voltage 50-order                 | HU1L050              |
|                                        | Voltage 50-order (maximum value) | HU1MAXL050           |
|                                        | Voltage 50-order (minimum value) | HU1MINL050           |
|                                        | Current 50-order                 | HI1L050              |
|                                        | Current 50-order (maximum value) | HI1MAXL050           |
|                                        | Current 50-order (minimum value) | HI1LMIN050           |
|                                        | Power 50-order                   | HP1L050              |
|                                        | Power 50-order (maximum value)   | HP1MAXL050           |
|                                        | Power 50-order (minimum value)   | HP1MINL050           |
| Content Ratio                          | Voltage 50-order                 | HU1D050              |
|                                        | Voltage 50-order (maximum value) | HU1MAXD050           |
|                                        | Voltage 50-order (minimum value) | HU1MIND050           |
|                                        | Current 50-order                 | HI1D050              |
|                                        | Current 50-order (maximum value) | HI1MAXD050           |
|                                        | Current 50-order (minimum value) | HI1MIND050           |
|                                        | Power 50-order                   | HP1D050              |
|                                        | Power 50-order (maximum value)   | HP1MAXD050           |
|                                        | Power 50-order (minimum value)   | HP1MIND050           |

|                                        |                                     |            |
|----------------------------------------|-------------------------------------|------------|
| Voltage Phase<br>Difference            | Voltage 50-order                    | HU1P050    |
|                                        | Voltage 50-order<br>(maximum value) | HU1MAXP050 |
|                                        | Voltage 50-order (minimum value)    | HU1MINP050 |
| Current Phase<br>Difference            | Current 50-order                    | HI1P050    |
|                                        | Current 50-order<br>(maximum value) | HI1MAXP050 |
|                                        | Current 50-order (minimum value)    | HI1MINP050 |
| Voltage Current<br>Phase<br>Difference | Power 50-order                      | HP1P050    |
|                                        | Power 50-order (maximum value)      | HP1MAXP050 |
|                                        | Power 50-order (minimum value)      | HP1MINP050 |

### Perform and Query a Reset of :MEASure:HARMonic? Output Items

|                    |                                                                                                                                                                                                                                                              |                                        |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|
| <b>Syntax</b>      | Command                                                                                                                                                                                                                                                      | <b>:MEASure:HARMonic:ITEM:ALLClear</b> |
| <b>Description</b> | Clears all outputs set for :MEASure:HARMonic?<br>via :MEASure:HARMonic:ITEM commands.                                                                                                                                                                        |                                        |
| <b>Example</b>     | Command                                                                                                                                                                                                                                                      | <b>:MEAS:HARM:ITEM:ALLC</b>            |
| <b>Note</b>        | <ul style="list-style-type: none"> <li>This command turns all output settings OFF.</li> <li>The output settings immediately after the instrument is powered on are as follows:<br/>harmonic wave<br/>First order effective values HU, HI, and HP.</li> </ul> |                                        |

## Set and Query:MEASure:HARMonic? Output Items

|          |         |                                                                                                                     |      |      |       |      |      |      |       |
|----------|---------|---------------------------------------------------------------------------------------------------------------------|------|------|-------|------|------|------|-------|
| Syntax   | Command | :MEASure:HARMonic:ITEM :LIST<br><data1 (NR1)>,<data2 (NR1)>,<data3 (NR1)>,<data4 (NR1)>,<data5 (NR1)>,<data6 (NR1)> |      |      |       |      |      |      |       |
| Query    |         | :MEASure:HARMonic:ITEM:LIST?                                                                                        |      |      |       |      |      |      |       |
| Response |         | <data1>,<data2>,<data3>,<data4>,<data5>,<data6>                                                                     |      |      |       |      |      |      |       |
|          |         | 128                                                                                                                 | 64   | 32   | 16    | 8    | 4    | 2    | 1     |
|          |         | <data1 (NR1)> Effective Value HU,HI                                                                                 |      |      |       |      |      |      |       |
|          |         | bit7                                                                                                                | bit6 | bit5 | bit4  | bit3 | bit2 | bit1 | bit0  |
|          |         |                                                                                                                     |      |      | HI    |      |      |      | HU    |
|          |         | <data2 (NR1)> Effective Value HP                                                                                    |      |      |       |      |      |      |       |
|          |         | bit7                                                                                                                | bit6 | bit5 | bit4  | bit3 | bit2 | bit1 | bit0  |
|          |         |                                                                                                                     |      |      |       |      |      |      | HP    |
|          |         | <data3 (NR1)> Content Ratio HUCON,HICON                                                                             |      |      |       |      |      |      |       |
|          |         | bit7                                                                                                                | bit6 | bit5 | bit4  | bit3 | bit2 | bit1 | bit0  |
|          |         |                                                                                                                     |      |      | HICON |      |      |      | HUCON |
|          |         | <data4 (NR1)> Content Ratio P                                                                                       |      |      |       |      |      |      |       |
|          |         | bit7                                                                                                                | bit6 | bit5 | bit4  | bit3 | bit2 | bit1 | bit0  |
|          |         |                                                                                                                     |      |      |       |      |      |      | HPCON |
|          |         | <data5 (NR1)> Phase Angle HUPHase,HIPHase                                                                           |      |      |       |      |      |      |       |
|          |         | bit7                                                                                                                | bit6 | bit5 | bit4  | bit3 | bit2 | bit1 | bit0  |
|          |         |                                                                                                                     |      |      | HIPHA |      |      |      | HUPHA |
|          |         | <data6 (NR1)> Phase Difference HPPHase                                                                              |      |      |       |      |      |      |       |
|          |         | bit7                                                                                                                | bit6 | bit5 | bit4  | bit3 | bit2 | bit1 | bit0  |
|          |         |                                                                                                                     |      |      |       |      |      |      | HPPHA |

**Description** Sets or queries the measurement items for the :MEASure:HARMonic? query as a numerical value between 0 and 17.

Although NRf numerical values are accepted, values to the right of the decimal are dropped.

**Example** Command :MEAS:HARM:ITEM:LIST 17,1,0,0,0,0  
(This enables the output of the harmonic wave voltage, current, and active power effective values.)

Query :MEAS:HARM:ITEM:LIST?

Response (When HEADER ON) :MEASURE:HARMONIC:ITEM:LIST 17,1,0,0,0,0  
(When HEADER OFF) 17,1,0,0,0,0

- Note**
- This command is used along with the :MEASure:HARMonic:ITEM:ORDER command to specify the harmonic wave output order.
  - If you need to output the maximum and minimum values in addition to the instantaneous value for an output item, use the provided commands such as :MEASure:HARMonic:ITEM:HU\_MAX to specify that.
  - Harmonic wave phase angle data cannot be displayed on the instrument. This data can only be obtained through communications commands.

## Set and Query:MEASure:HARMonic? Output Items (Order)

**Syntax** Command **:MEASure:HARMonic:ITEM:ORDER**  
**<Lower Limit Order (NR1)>,<Upper Limit Order (NR1)>,<ODD/EVEN/ALL>**

Query **:MEASure:HARMonic:ITEM:ORDER?**

Response **<Lower Limit Order (NR1)>,<Upper Limit Order (NR1)>,<ODD/EVEN/ALL>**  
 Lower limit order (NR1): 0 to 50  
 Upper limit order (NR1): 0 to 50  
 (the lower limit must be less than or equal to the upper limit)

ODD: Odd orders only  
 EVEN: Even orders only  
 ALL: All orders

### Description

Sets or queries the measurement items(Order) for the :MEASure:HARMonic? query. The numerical value is accepted in NRf format, but any data after the decimal point is truncated.

### Example

Command **:MEAS:HARM:ITEM:ORD 1,15,ODD**  
 Sets the output to an odd order between 1 and 15.

Query **:MEAS:HARM:ITEM:ORD?**

Response (When HEADER ON) **:MEASURE:HARMONIC:ORDER 1,15,ODD**  
 (When HEADER OFF) **1,15,ODD**

**Note** • This command is used along with the :MEASure:HARMonic:ITEM:LIST or :MEASure:HARMonic:ITEM:xxx commands to specify the harmonic wave output items.

## Set and Query :MEASure:HARMonic? Output Items (Measurement status data: instantaneous value, maximum value, minimum value)

**Syntax** Instantaneous value **:MEASure:HARMonic:ITEM:STATus:INST(?) <Output item>**

Maximum/Minimum value **:MEASure:HARMonic:ITEM:STATus:MAXmin(?) <Output item>**

Response **<Output item (NR1)>**

| 128  | 64   | 32   | 16   | 8    | 4    | 2    | 1      |
|------|------|------|------|------|------|------|--------|
| bit7 | bit6 | bit5 | bit4 | bit3 | bit2 | bit1 | bit0   |
|      |      |      |      |      |      |      | STATUS |

### Description

Sets the measurement data status (instantaneous value, maximum value, minimum value) output items as numerical values between 0 and 1.

Although NRf numerical values are accepted, values to the right of the decimal are dropped.

INST indicates the status for the instantaneous value at the time when the data is acquired.

MAXmin indicates the total from the time the maximum and minimum values were last reset.

For information about Status data, refer to :MEASure:ITEM:STATUS (page 77) for details.

### Example

Command **:MEAS:HARM:ITEM:STAT:INST 1**  
 Specifies to turn ON measurement status output.

Query **:MEAS:HARM:ITEM:STAT:INST?**

Response (When HEADER ON) **:MEASURE:HARMONIC:ITEM:STAT:INST 1**  
 (When HEADER OFF) **1**

### Set and Query :MEASure:HARMonic? Output Items (Instantaneous, Maximum, and Minimum Values for the Harmonic Wave Voltage Effective Value)

|        |                     |                                                   |
|--------|---------------------|---------------------------------------------------|
| Syntax | Instantaneous value | :MEASure:HARMonic:ITEM:U:ALL <Output item>        |
|        |                     | :MEASure:HARMonic:ITEM:U:CH1(?) <Output item>     |
|        | Maximum value       | :MEASure:HARMonic:ITEM:U_MAX:ALL <Output item>    |
|        |                     | :MEASure:HARMonic:ITEM:U_MAX:CH1(?) <Output item> |
|        | Minimum value       | :MEASure:HARMonic:ITEM:U_MIN:ALL <Output item>    |
|        |                     | :MEASure:HARMonic:ITEM:U_MIN:CH1(?) <Output item> |
|        | Response            | <Output item (NR1)>                               |

| 128  | 64   | 32   | 16   | 8    | 4    | 2    | 1    |
|------|------|------|------|------|------|------|------|
| bit7 | bit6 | bit5 | bit4 | bit3 | bit2 | bit1 | bit0 |
|      |      |      |      |      |      |      | HU   |

#### Description

Sets the harmonic wave voltage effective value data output items returned by :MEASure:HARMonic? (instantaneous value, maximum value, minimum value) as numerical values between 0 and 1.

The order output is the order specified via MEASure:HARMonic:ITEM:ORDER.

Although NRf numerical values are accepted, values to the right of the decimal are dropped.

#### Example

|          |                                                                                           |
|----------|-------------------------------------------------------------------------------------------|
| Command  | :MEAS:HARM:ITEM:U:CH1 1                                                                   |
|          | Specifies to output the instantaneous value of the harmonic wave voltage effective value. |
| Query    | :MEAS:HARM:ITEM:U:CH1?                                                                    |
| Response | (When HEADER ON) :MEASURE:HARMONIC:ITEM:U:CH1 1                                           |
|          | (When HEADER OFF) 1                                                                       |

#### Note

- This command is used along with the :MEASure:HARMonic:ITEM:ORDER command to specify the harmonic wave output order.
- If the specification is the same as that for the :MEASure:HARMonic:ITEM:LIST command, the command issued afterwards takes precedence.

### Set and Query :MEASure:HARMonic? Output Items (Instantaneous, Maximum, and Minimum Values for the Harmonic Wave Current Effective Value)

|        |                     |                                                   |
|--------|---------------------|---------------------------------------------------|
| Syntax | Instantaneous value | :MEASure:HARMonic:ITEM:I:ALL <Output item>        |
|        |                     | :MEASure:HARMonic:ITEM:I:CH1(?) <Output item>     |
|        | Maximum value       | :MEASure:HARMonic:ITEM:I_MAX:ALL <Output item>    |
|        |                     | :MEASure:HARMonic:ITEM:I_MAX:CH1(?) <Output item> |
|        | Minimum value       | :MEASure:HARMonic:ITEM:I_MIN:ALL <Output item>    |
|        |                     | :MEASure:HARMonic:ITEM:I_MIN:CH1(?) <Output item> |
|        | Response            | <Output item (NR1)>                               |

| 128  | 64   | 32   | 16   | 8    | 4    | 2    | 1    |
|------|------|------|------|------|------|------|------|
| bit7 | bit6 | bit5 | bit4 | bit3 | bit2 | bit1 | bit0 |
|      |      |      |      |      |      |      | HI   |

#### Description

Sets the harmonic wave current effective value data output items returned by :MEASure:HARMonic? (instantaneous value, maximum value, minimum value) as numerical values between 0 and 1.

The order output is the order specified via MEASure:HARMonic:ITEM:ORDER.

Although NRf numerical values are accepted, values to the right of the decimal are dropped.

#### Example

|          |                                                                                           |
|----------|-------------------------------------------------------------------------------------------|
| Command  | :MEAS:HARM:ITEM:I:CH1 1                                                                   |
|          | Specifies to output the instantaneous value of the harmonic wave current effective value. |
| Query    | :MEAS:HARM:ITEM:I:CH1?                                                                    |
| Response | (When HEADER ON) :MEASURE:HARMONIC:ITEM:I:CH1 1                                           |
|          | (When HEADER OFF) 1                                                                       |

#### Note

- This command is used along with the :MEASure:HARMonic:ITEM:ORDER command to specify the harmonic wave output order.
- If the specification is the same as that for the :MEASure:HARMonic:ITEM:LIST command, the command issued afterwards takes precedence.

### Set and Query :MEASure:HARMonic? Output Items (Instantaneous, Maximum, and Minimum Values for the Harmonic Wave Active Power Effective Value)

|        |                     |                                                   |
|--------|---------------------|---------------------------------------------------|
| Syntax | Instantaneous value | :MEASure:HARMonic:ITEM:P:ALL <Output item>        |
|        |                     | :MEASure:HARMonic:ITEM:P:CH1(?) <Output item>     |
|        | Maximum value       | :MEASure:HARMonic:ITEM:P_MAX:ALL <Output item>    |
|        |                     | :MEASure:HARMonic:ITEM:P_MAX:CH1(?) <Output item> |
|        | Minimum value       | :MEASure:HARMonic:ITEM:P_MIN:ALL <Output item>    |
|        |                     | :MEASure:HARMonic:ITEM:P_MIN:CH1(?) <Output item> |
|        | Response            | <Output item (NR1)>                               |

|      |      |      |      |      |      |      |      |
|------|------|------|------|------|------|------|------|
| 128  | 64   | 32   | 16   | 8    | 4    | 2    | 1    |
| bit7 | bit6 | bit5 | bit4 | bit3 | bit2 | bit1 | bit0 |
|      |      |      |      |      |      |      | HP   |

#### Description

Sets the harmonic wave active power effective value data output items returned by :MEASure:HARMonic? (instantaneous value, maximum value, minimum value) as numerical values between 0 and 1.

The order output is the order specified via MEASure:HARMonic:ITEM:ORDER.

Although NRf numerical values are accepted, values to the right of the decimal are dropped.

**Example** Command :MEAS:HARM:ITEM:P:CH1 1

Specifies to output the instantaneous value of the harmonic wave active power effective value.

Query :MEAS:HARM:ITEM:P:CH1?

Response (When HEADER ON) :MEASURE:HARMONIC:ITEM:P:CH1 1

(When HEADER OFF) 1

- Note**
- This command is used along with the :MEASure:HARMonic:ITEM:ORDER command to specify the harmonic wave output order.
  - If the specification is the same as that for the :MEASure:HARMonic:ITEM:LIST command, the command issued afterwards takes precedence.

### Set and Query :MEASure:HARMonic? Output Items (Instantaneous, Maximum, and Minimum Values for the Harmonic Wave Voltage Content Ratio)

|        |                     |                                                      |
|--------|---------------------|------------------------------------------------------|
| Syntax | Instantaneous value | :MEASure:HARMonic:ITEM:UCON:ALL <Output item>        |
|        |                     | :MEASure:HARMonic:ITEM:UCON:CH1(?) <Output item>     |
|        | Maximum value       | :MEASure:HARMonic:ITEM:UCON_MAX:ALL <Output item>    |
|        |                     | :MEASure:HARMonic:ITEM:UCON_MAX:CH1(?) <Output item> |
|        | Minimum value       | :MEASure:HARMonic:ITEM:UCON_MIN:ALL <Output item>    |
|        |                     | :MEASure:HARMonic:ITEM:UCON_MIN:CH1(?) <Output item> |
|        | Response            | <Output item (NR1)>                                  |

|      |      |      |      |      |      |      |       |
|------|------|------|------|------|------|------|-------|
| 128  | 64   | 32   | 16   | 8    | 4    | 2    | 1     |
| bit7 | bit6 | bit5 | bit4 | bit3 | bit2 | bit1 | bit0  |
|      |      |      |      |      |      |      | HUCON |

#### Description

Sets the harmonic wave voltage content ratio data output items returned by :MEASure:HARMonic? (instantaneous value, maximum value, minimum value) as numerical values between 0 and 1.

The order output is the order specified via MEASure:HARMonic:ITEM:ORDER.

Although NRf numerical values are accepted, values to the right of the decimal are dropped.

**Example** Command :MEAS:HARM:ITEM:UCON:CH1 1

Specifies to output the instantaneous value of the harmonic wave voltage content ratio.

Query :MEAS:HARM:ITEM:UCON:CH1?

Response (When HEADER ON) :MEASURE:HARMONIC:ITEM:UCON:CH1 1

(When HEADER OFF) 1

- Note**
- This command is used along with the :MEASure:HARMonic:ITEM:ORDER command to specify the harmonic wave output order.
  - If the specification is the same as that for the :MEASure:HARMonic:ITEM:LIST command, the command issued afterwards takes precedence.

### Set and Query :MEASure:HARMonic? Output Items (Instantaneous, Maximum, and Minimum Values for the Harmonic Wave Current Content Ratio)

Syntax

Instantaneous value

Maximum value

Minimum value

Response

:MEASure:HARMonic:ITEM:ICON:ALL <Output item>

:MEASure:HARMonic:ITEM:ICON:CH1(?) <Output item>

:MEASure:HARMonic:ITEM:ICON\_MAX:ALL <Output item>

:MEASure:HARMonic:ITEM:ICON\_MAX:CH1(?) <Output item>

:MEASure:HARMonic:ITEM:ICON\_MIN:ALL <Output item>

:MEASure:HARMonic:ITEM:ICON\_MIN:CH1(?) <Output item>

<Output item (NR1)>

1286432168421

bit7bit6bit5bit4bit3bit2bit1bit0

HICON

Description

Sets the harmonic wave current content ratio data output items returned by :MEASure:HARMonic? (instantaneous value, maximum value, minimum value) as numerical values between 0 and 1.

The order output is the order specified via MEASure:HARMonic:ITEM:ORDER.

Although NRf numerical values are accepted, values to the right of the decimal are dropped.

Example

Command

Query

Response

:MEAS:HARM:ITEM:ICON:CH1 1

:MEAS:HARM:ITEM:ICON:CH1?

(When HEADER ON) :MEASURE:HARMONIC:ITEM:ICON:CH1 1

(When HEADER OFF) 1

Note

This command is used along with the :MEASure:HARMonic:ITEM:ORDER command to specify the harmonic wave output order.

If the specification is the same as that for the :MEASure:HARMonic:ITEM:LIST command, the command issued afterwards takes precedence.

### Set and Query :MEASure:HARMonic? Output Items (Instantaneous, Maximum, and Minimum Values for the Harmonic Wave Active Power Content Ratio)

Syntax

Instantaneous value

Maximum value

Minimum value

Response

:MEASure:HARMonic:ITEM:PCON:ALL <Output item>

:MEASure:HARMonic:ITEM:PCON:CH1(?) <Output item>

:MEASure:HARMonic:ITEM:PCON\_MAX:ALL <Output item>

:MEASure:HARMonic:ITEM:PCON\_MAX:CH1(?) <Output item>

:MEASure:HARMonic:ITEM:PCON\_MIN:ALL <Output item>

:MEASure:HARMonic:ITEM:PCON\_MIN:CH1(?) <Output item>

<Output item (NR1)>

128

64

32

16

8

4

2

1

bit7

bit6

bit5

bit4

bit3

bit2

bit1

bit0

HPCON

Description

Sets the harmonic wave active power content ratio data output items returned by :MEASure:HARMonic? (instantaneous value, maximum value, minimum value) as numerical values between 0 and 1.

The order output is the order specified via MEASure:HARMonic:ITEM:ORDER.

Although NRf numerical values are accepted, values to the right of the decimal are dropped.

Example

Command

Query

Response

:MEAS:HARM:ITEM:PCON:CH1 1

:MEAS:HARM:ITEM:PCON:CH1?

(When HEADER ON)

(When HEADER OFF)

Specifies to output the instantaneous value of the harmonic wave active power content ratio.

:MEASURE:HARMONIC:ITEM:PCON:CH1 1

1

Note

This command is used along with the :MEASure:HARMonic:ITEM:ORDER command to specify the harmonic wave output order.

If the specification is the same as that for the :MEASure:HARMonic:ITEM:LIST command, the command issued afterwards takes precedence.

### Set and Query :MEASure:HARMonic? Output Items (Instantaneous, Maximum, and Minimum Values for the Harmonic Wave Voltage Phase Angle)

Syntax

Instantaneous value

Maximum value

Minimum value

Response

:MEASure:HARMonic:ITEM:UPHase:ALL <Output item>

:MEASure:HARMonic:ITEM:UPHase:CH1(?) <Output item>

:MEASure:HARMonic:ITEM:UPHase\_MAX:ALL <Output item>

:MEASure:HARMonic:ITEM:UPHase\_MAX:CH1(?) <Output item>

:MEASure:HARMonic:ITEM:UPHase\_MIN:ALL <Output item>

:MEASure:HARMonic:ITEM:UPHase\_MIN:CH1(?) <Output item>

<Output item (NR1)>

128

64

32

16

8

4

2

1

bit7

bit6

bit5

bit4

bit3

bit2

bit1

bit0

HUPHase

Description

Sets the harmonic wave voltage phase angle data output items returned by :MEASure:HARMonic? (instantaneous value, maximum value, minimum value) as numerical values between 0 and 1.

The order output is the order specified via MEASure:HARMonic:ITEM:ORDER.

Although NRf numerical values are accepted, values to the right of the decimal are dropped.

Example

Command

Query

Response

:MEAS:HARM:ITEM:UPHA:CH1 1

:MEAS:HARM:ITEM:UPHA:CH1?

(When HEADER ON)

(When HEADER OFF)

:MEASURE:HARMONIC:ITEM:UPHA:CH1 1

1

Note

This command is used along with the :MEASure:HARMonic:ITEM:ORDER command to specify the harmonic wave output order.

If the specification is the same as that for the :MEASure:HARMonic:ITEM:LIST command, the command issued afterwards takes precedence.

Harmonic wave phase angle data cannot be displayed on the instrument. This data can only be obtained through communications commands.

### Set and Query :MEASure:HARMonic? Output Items (Instantaneous, Maximum, and Minimum Values for the Harmonic Wave Current Phase Angle)

|             |                     |                                                                                                                                                                                                                                                                                                                                                                                                               |      |      |      |      |         |   |   |   |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |         |
|-------------|---------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|------|------|------|---------|---|---|---|------|------|------|------|------|------|------|------|--|--|--|--|--|--|--|---------|
| Syntax      | Instantaneous value | :MEASure:HARMonic:ITEM:IPHase:ALL <Output item><br>:MEASure:HARMonic:ITEM:IPHase:CH1(?) <Output item>                                                                                                                                                                                                                                                                                                         |      |      |      |      |         |   |   |   |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |         |
|             | Maximum value       | :MEASure:HARMonic:ITEM:IPHase_MAX:ALL <Output item><br>:MEASure:HARMonic:ITEM:IPHase_MAX:CH1(?) <Output item>                                                                                                                                                                                                                                                                                                 |      |      |      |      |         |   |   |   |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |         |
|             | Minimum value       | :MEASure:HARMonic:ITEM:IPHase_MIN:ALL <Output item><br>:MEASure:HARMonic:ITEM:IPHase_MIN:CH1(?) <Output item>                                                                                                                                                                                                                                                                                                 |      |      |      |      |         |   |   |   |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |         |
|             | Response            | <Output item (NR1)><br><table><tr><td>128</td><td>64</td><td>32</td><td>16</td><td>8</td><td>4</td><td>2</td><td>1</td></tr><tr><td>bit7</td><td>bit6</td><td>bit5</td><td>bit4</td><td>bit3</td><td>bit2</td><td>bit1</td><td>bit0</td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>HIPHase</td></tr></table>                                                                 | 128  | 64   | 32   | 16   | 8       | 4 | 2 | 1 | bit7 | bit6 | bit5 | bit4 | bit3 | bit2 | bit1 | bit0 |  |  |  |  |  |  |  | HIPHase |
| 128         | 64                  | 32                                                                                                                                                                                                                                                                                                                                                                                                            | 16   | 8    | 4    | 2    | 1       |   |   |   |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |         |
| bit7        | bit6                | bit5                                                                                                                                                                                                                                                                                                                                                                                                          | bit4 | bit3 | bit2 | bit1 | bit0    |   |   |   |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |         |
|             |                     |                                                                                                                                                                                                                                                                                                                                                                                                               |      |      |      |      | HIPHase |   |   |   |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |         |
| Description |                     | <p>Sets the harmonic wave current phase angle data output items returned by :MEASure:HARMonic? (instantaneous value, maximum value, minimum value) as numerical values between 0 and 1.</p> <p>The order output is the order specified via MEASure:HARMonic:ITEM:ORDER. Although NRf numerical values are accepted, values to the right of the decimal are dropped.</p>                                       |      |      |      |      |         |   |   |   |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |         |
| Example     | Command             | :MEAS:HARM:ITEM:IPHA:CH1 1<br>Specifies to output the instantaneous value of the harmonic wave current phase angle.                                                                                                                                                                                                                                                                                           |      |      |      |      |         |   |   |   |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |         |
|             | Query               | :MEAS:HARM:ITEM:IPHA:CH1?                                                                                                                                                                                                                                                                                                                                                                                     |      |      |      |      |         |   |   |   |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |         |
|             | Response            | (When HEADER ON) :MEASURE:HARMONIC:ITEM:IPHASE:CH1 1<br>(When HEADER OFF) 1                                                                                                                                                                                                                                                                                                                                   |      |      |      |      |         |   |   |   |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |         |
| Note        |                     | <ul style="list-style-type: none"><li>This command is used along with the :MEASure:HARMonic:ITEM:ORDER command to specify the harmonic wave output order.</li><li>If the specification is the same as that for the :MEASure:HARMonic:ITEM:LIST command, the command issued afterwards takes precedence.</li><li>Harmonic wave phase angle data cannot be displayed on the instrument. This data can</li></ul> |      |      |      |      |         |   |   |   |      |      |      |      |      |      |      |      |  |  |  |  |  |  |  |         |

**Set and Query :MEASure:HARMonic? Output Items (Instantaneous, Maximum, and Minimum Values for the Harmonic Voltage Current Phase difference)**

Syntax

Instantaneous value

Maximum value

Minimum value

Response

:MEASure:HARMonic:ITEM:PPHase:ALL <Output item>

:MEASure:HARMonic:ITEM:PPHase:CH1(?) <Output item>

:MEASure:HARMonic:ITEM:PPHase\_MAX:ALL <Output item>

:MEASure:HARMonic:ITEM:PPHase\_MAX:CH1(?) <Output item>

:MEASure:HARMonic:ITEM:PPHase\_MIN:ALL <Output item>

:MEASure:HARMonic:ITEM:PPHase\_MIN:CH1(?) <Output item>

<Output item (NR1)>

128

64

32

16

8

4

2

1

bit7

bit6

bit5

bit4

bit3

bit2

bit1

bit0

HPCON

Description

Sets the harmonic wave active power phase angle data output items returned by :MEASure:HARMonic? (instantaneous value, maximum value, minimum value) as numerical values between 0 and 1.

The order output is the order specified via MEASure:HARMonic:ITEM:ORDER.

Although NRf numerical values are accepted, values to the right of the decimal are dropped.

Example

Command

Query

Response

:MEAS:HARM:ITEM:PPHA:CH1 1

:MEAS:HARM:ITEM:PPHA:CH1?

(When HEADER ON)

(When HEADER OFF)

:MEASURE:HARMONIC:ITEM:PPHASE:CH1 1

1

Note

This command is used along with the :MEASure:HARMonic:ITEM:ORDER command to specify the harmonic wave output order.

If the specification is the same as that for the :MEASure:HARMonic:ITEM:LIST command, the command issued afterwards takes precedence.

Harmonic voltage current phase difference data cannot be displayed on the instrument. This data can only be obtained through communications commands.

## (11) Communications Settings

**Set and Query RS-232C Settings**

|             |          |                                                                                                                                                                                                                                                                                                                                           |
|-------------|----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Syntax      | Query    | <b>:RS232c?</b>                                                                                                                                                                                                                                                                                                                           |
|             | Response | <b>BAUD &lt;9600BPS/38400BPS&gt;;ANSWER &lt;ON/OFF&gt;</b>                                                                                                                                                                                                                                                                                |
| Description |          | BAUD <9600BPS/38400BPS>: RS232C baud rate<br>ANSWER<ON/OFF>: Turns execution confirmation message output ON or OFF.<br>Returns the RS232-C baud rate and execution confirmation message settings as string values.                                                                                                                        |
| Example     | Query    | <b>:RS232C?</b>                                                                                                                                                                                                                                                                                                                           |
|             | Response | (When HEADER ON) <b>:RS232C:BAUD 9600BPS;ANSWER OFF</b><br>(When HEADER OFF) <b>9600BPS; OFF</b>                                                                                                                                                                                                                                          |
| Note        |          | <ul style="list-style-type: none"> <li>• This command can be executed even when a system error has occurred.</li> <li>• You can use the <b>:TRANsmit:SEParator</b> command to change the message unit separator from a semicolon ";" to a comma ",".</li> <li>• This query can be used with the RS, LAN, and GP-IB interfaces.</li> </ul> |

**Set and Query the RS-232C Baud Rate Setting**

|             |          |                                                                                                                                                       |
|-------------|----------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
| Syntax      | Command  | <b>:RS232c:BAUD &lt;9600BPS/38400BPS&gt;</b>                                                                                                          |
|             | Query    | <b>:RS232c:BAUD?</b>                                                                                                                                  |
|             | Response | <b>&lt;9600BPS/38400BPS&gt;</b>                                                                                                                       |
| Description |          | Sets or queries the instrument's RS-232C baud rate setting.                                                                                           |
| Example     | Command  | <b>:RS232:BAUD 9600BPS</b>                                                                                                                            |
|             | Query    | <b>:RS232:BAUD?</b>                                                                                                                                   |
|             | Response | (When HEADER ON) <b>:RS232C:BAUD 9600BPS</b><br>(When HEADER OFF) <b>9600BPS</b>                                                                      |
| Note        |          | <p>This query can be used with the RS, LAN, and GP-IB interfaces.</p> <p>This setting command can only be used with the LAN and GP-IB interfaces.</p> |

## Set and Query the RS-232C Execution Confirmation Message Setting

Syntax Command :RS232c:ANSWer <ON/OFF>  
 Query :RS232c:ANSWer?  
 Response <ON/OFF>

### Description

Sets or queries the RS-232C execution confirmation message output setting (ON or OFF).  
 When set to ON, a response is also received when sending a command. In addition, an execution confirmation message is included after the response to a query.  
 The execution confirmation message is a 3-digit numerical value ("nnn"). "000" is returned when an operation is executed successfully. If an error occurs, the number of the nnnth command where the error occurred will be returned instead of "000".

Example (when HEADER OFF):

| Command                         | Response   | Comments                                         |
|---------------------------------|------------|--------------------------------------------------|
| :RS232C:ANSWER ON               | 000        | Operation completed successfully.                |
| :ABCD                           | 001        | "ABCD" is an error.                              |
| :VOLT:RANGE?;CUR R:RANGE?       | 15;0.1;000 | Operation completed successfully.                |
| :VOLT:RANGE?;CUR R:RANGE? ; ABC | 15;0.1;003 | An error occurred with the third command, "ABC". |

Example Command :RS232:ANSW ON  
 Query :RS232:ANSW?  
 Response (When HEADER ON) :RS232C:ANSWER ON;000  
 (When HEADER OFF) ON;000

- Note**
- This command and query can be executed even when a system error has occurred.
  - When set to ON, operation may become unstable if the controller (the device that sends commands) does not receive an execution confirmation message response.
  - Please have received execution confirmation message also when sending blank line.
  - This command is used to synchronize operation with the controller over RS-232C, but can also be used with the GP-IB and LAN interfaces.
  - However, be sure to always receive sent execution confirmation messages.
- This query and setting command can be used with the RS, LAN, and GP-IB interfaces.

## Query RS-232C Communications Errors

Syntax Query :RS232c:ERRor?  
 Response <Communications error information (NR1)>

|      |      |      |      |      |          |         |      |
|------|------|------|------|------|----------|---------|------|
| 128  | 64   | 32   | 16   | 8    | 4        | 2       | 1    |
| bit7 | bit6 | bit5 | bit4 | bit3 | bit2     | bit1    | bit0 |
|      |      |      |      |      | Over run | Framing |      |

### Description

Returns RS-232C communications error information in NR1 format and clears that information.  
 The communications error information can also be reset to 0 via the \*CLS command.  
 The response message has no header.  
 bit 2: Overrun error (missed data)  
 bit 1: Framing error (erroneous data read)

Example Query :RS232:ERR?  
 Response 4

- Note**
- This command can be executed even when a system error has occurred.
  - This query can be used with the RS, LAN, and GP-IB interfaces.

### Initialize the Bluetooth Adapter for LR8410 and Query Its Result

**Syntax** Command :RS232c:BTINit  
 Query :RS232c:BTINit?  
 Response <OK/BUSY/ERROR/NONE>

| Response | Description                                   |
|----------|-----------------------------------------------|
| OK       | The initialization is successfully completed. |
| BUSY     | The initialization is in progress.            |
| ERROR    | The initialization failed.                    |
| NONE     | No initialization is executed.                |

#### Description

Initializes the Bluetooth Serial Adapter Parani-SD1000, used for LR8410Link, when Model Parani-SD1000 is connected to the RS-232C terminal.

The device name of Model Parani-SD1000 and other configuration are set by the initialization.

The result of the initialization can be obtained by sending the query.

**Example** Command :RS232:BTIN  
 Query :RS232:BTIN?  
 Response (When HEADER ON) :RS232C:BTINIT OK  
 (When HEADER OFF) OK

- Note**
- This command /query can be executed even when a system error has occurred.
  - You cannot change this setting during integration.
  - The Bluetooth adapter that has been initialized beforehand works even if the query response is "NONE" (no initialization is executed). The Bluetooth adapter is required to be initialized just one time with Model PW3335.

### Set and Query RS-232C destination

**Syntax** Command :RS232c:CONNEct  
 Query :RS232c:CONNEct?  
 Response <RS/BT >

| Response | Description          |
|----------|----------------------|
| RS       | RS-232C              |
| BT       | Bluetooth(converter) |

#### Description

Sets and queries the destination connected through the RS-232C terminal.

**Example** Command :RS232:CONN  
 Query :RS232:CONN?  
 Response (When HEADER ON) :RS232C:CONN RS  
 (When HEADER OFF) RS

- Note**
- This command /query can be executed even when a system error has occurred.

### Set and Query the LAN IP Address Execution Confirmation Message Setting

|                        |          |                                                                                                                                                                                                                                                                                                                                                                               |
|------------------------|----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Syntax                 | Command  | <b>:IP:ADDRess</b> <Address 1 (NR1)>,<Address 2 (NR1)>,<Address 3 (NR1)>,<Address 4 (NR1)>                                                                                                                                                                                                                                                                                    |
|                        | Query    | <b>:IP:ADDRess?</b>                                                                                                                                                                                                                                                                                                                                                           |
|                        | Response | <b>&lt;Address 1 (NR1)&gt;,&lt;Address 2 (NR1)&gt;,&lt;Address 3 (NR1)&gt;,&lt;Address 4 (NR1)&gt;</b><br><b>&lt;Address 1 to Address 4 (NR1)&gt; = 0 to 255</b>                                                                                                                                                                                                              |
| Description<br>Example | Command  | Sets or queries the IP address of the instrument.<br><b>:IP:ADDR 192,168,1,1</b>                                                                                                                                                                                                                                                                                              |
|                        | Query    | <b>:IP:ADDR?</b>                                                                                                                                                                                                                                                                                                                                                              |
|                        | Response | (When HEADER ON) <b>:IP:ADDRESS 192,168,1,1</b><br>(When HEADER OFF) <b>192,168,1,1</b>                                                                                                                                                                                                                                                                                       |
| Note                   |          | <ul style="list-style-type: none"> <li>The LAN communications settings will be changed after the command is sent. All established connections before the settings were changed will be disconnected.</li> <li>This query can be used with the RS-232C, LAN, and GP-IB interfaces.</li> <li>This setting command can be used with the RS-232C and GP-IB interfaces.</li> </ul> |

### Set and Query the LAN Default Gateway Address Execution Confirmation Message Setting

|                        |          |                                                                                                                                                                                                                                                                                                                                                                               |
|------------------------|----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Syntax                 | Command  | <b>:IP:DEFaultgateway</b><br><Address 1 (NR1)>,<Address 2 (NR1)>,<Address 3 (NR1)>,<Address 4 (NR1)>                                                                                                                                                                                                                                                                          |
|                        | Query    | <b>:IP:DEFaultgateway?</b>                                                                                                                                                                                                                                                                                                                                                    |
|                        | Response | <b>&lt;Address 1 (NR1)&gt;,&lt;Address 2 (NR1)&gt;,&lt;Address 3 (NR1)&gt;,&lt;Address 4 (NR1)&gt;</b><br><b>&lt;Address 1 to Address 4 (NR1)&gt; = 0 to 255</b>                                                                                                                                                                                                              |
| Description<br>Example | Command  | Sets or queries the default gateway address for the instrument.<br><b>:IP:DEF 192,168,1,250</b>                                                                                                                                                                                                                                                                               |
|                        | Query    | <b>:IP:DEF?</b>                                                                                                                                                                                                                                                                                                                                                               |
|                        | Response | (When HEADER ON) <b>:IP:DEFAULTGATEWAY 192,168,1,250</b><br>(When HEADER OFF) <b>192,168,1,250</b>                                                                                                                                                                                                                                                                            |
| Note                   |          | <ul style="list-style-type: none"> <li>The LAN communications settings will be changed after the command is sent. All established connections before the settings were changed will be disconnected.</li> <li>This query can be used with the RS-232C, LAN, and GP-IB interfaces.</li> <li>This setting command can be used with the RS-232C and GP-IB interfaces.</li> </ul> |

### Set and Query the LAN Subnet Mask Execution Confirmation Message Setting

|                        |          |                                                                                                                                                                                                                                                                                                                                                                               |
|------------------------|----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Syntax                 | Command  | <b>:IP:SUBNetmask</b><br><Address 1 (NR1)>,<Address 2 (NR1)>,<Address 3 (NR1)>,<Address 4 (NR1)>                                                                                                                                                                                                                                                                              |
|                        | Query    | <b>:IP:SUBNetmask?</b>                                                                                                                                                                                                                                                                                                                                                        |
|                        | Response | <b>&lt;Address 1 (NR1)&gt;,&lt;Address 2 (NR1)&gt;,&lt;Address 3 (NR1)&gt;,&lt;Address 4 (NR1)&gt;</b><br><b>&lt;Address 1 to Address 4 (NR1)&gt; = 0 to 255</b>                                                                                                                                                                                                              |
| Description<br>Example | Command  | Sets or queries the subnet mask for the instrument.<br><b>:IP:SUBN 255,255,255,0</b>                                                                                                                                                                                                                                                                                          |
|                        | Query    | <b>:IP:SUBN?</b>                                                                                                                                                                                                                                                                                                                                                              |
|                        | Response | (When HEADER ON) <b>:IP:SUBNETMASK 255,255,255,0</b><br>(When HEADER OFF) <b>255,255,255,0</b>                                                                                                                                                                                                                                                                                |
| Note                   |          | <ul style="list-style-type: none"> <li>The LAN communications settings will be changed after the command is sent. All established connections before the settings were changed will be disconnected.</li> <li>This query can be used with the RS-232C, LAN, and GP-IB interfaces.</li> <li>This setting command can be used with the RS-232C and GP-IB interfaces.</li> </ul> |

### Query GP-IB Settings

|                                                                                                                                                                                                                    |          |                                                                                                            |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                                                                                                                                                                                                      | Query    | <b>:GPIB?</b>                                                                                              |
|                                                                                                                                                                                                                    | Response | <GP-IB address (NR1)><br><GP-IB address (NR1)> = 0 to 30<br>Returns the GP-IB address setting as a string. |
| <b>Description Example</b>                                                                                                                                                                                         | Query    | <b>:GPIB?</b>                                                                                              |
|                                                                                                                                                                                                                    | Response | (When HEADER ON) <b>:GPIB:ADDRESS 5</b><br>(When HEADER OFF) <b>5</b>                                      |
| <b>Note</b> <ul style="list-style-type: none"> <li>• This query can be used with the RS-232C, LAN, and GP-IB interfaces.</li> <li>• If GP-IB is not implemented by the unit, a device error will occur.</li> </ul> |          |                                                                                                            |

### Set and Query the GP-IB Address

|                                                                                                                                                                                                                                                                                                          |          |                                                                       |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|-----------------------------------------------------------------------|
| <b>Syntax</b>                                                                                                                                                                                                                                                                                            | Command  | <b>:GPIB:ADDRess &lt;GP-IB address (NR1)&gt;</b>                      |
|                                                                                                                                                                                                                                                                                                          | Query    | <b>:GPIB:ADDRess?</b>                                                 |
|                                                                                                                                                                                                                                                                                                          | Response | <GP-IB address (NR1)><br><GP-IB address (NR1)> = 0 to 30              |
| <b>Description</b> Sets or queries the GP-IB address of the instrument.                                                                                                                                                                                                                                  |          |                                                                       |
| <b>Example</b>                                                                                                                                                                                                                                                                                           | Command  | <b>:GPIB:ADDR 5</b>                                                   |
|                                                                                                                                                                                                                                                                                                          | Query    | <b>:GPIB:ADDR?</b>                                                    |
|                                                                                                                                                                                                                                                                                                          | Response | (When HEADER ON) <b>:GPIB:ADDRESS 5</b><br>(When HEADER OFF) <b>5</b> |
| <b>Note</b> <ul style="list-style-type: none"> <li>• This query can be used with the RS-232C, LAN, and GP-IB interfaces.</li> <li>• This setting command can only be used with the RS-232C and LAN interfaces.</li> <li>• If GP-IB is not implemented by the unit, a device error will occur.</li> </ul> |          |                                                                       |

### Set and Query Response Message Headers ON/OFF Status

|                                                                                                                                                                                                                 |          |                                                                                                                |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|----------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                                                                                                                                                                                                   | Command  | <b>:HEADer &lt;ON/OFF&gt;</b>                                                                                  |
|                                                                                                                                                                                                                 | Query    | <b>:HEADer?</b>                                                                                                |
|                                                                                                                                                                                                                 | Response | <ON/OFF><br>ON: A header is added to the response message.<br>OFF: No header is added to the response message. |
| <b>Description</b> Sets or queries the ON/OFF status of query response message headers.                                                                                                                         |          |                                                                                                                |
| <b>Example</b>                                                                                                                                                                                                  | Command  | <b>:HEAD ON</b>                                                                                                |
|                                                                                                                                                                                                                 | Query    | <b>:HEAD?</b>                                                                                                  |
|                                                                                                                                                                                                                 | Response | (When HEADER ON) <b>:HEADER ON</b><br>(When HEADER OFF) <b>OFF</b>                                             |
| <b>Note</b> <ul style="list-style-type: none"> <li>• This command and query can be executed even when a system error has occurred.</li> <li>• This command can not be executed during a zero adjust.</li> </ul> |          |                                                                                                                |

### Change to the Local State

|                                                                                                                                                                                                     |         |               |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|---------------|
| <b>Syntax</b>                                                                                                                                                                                       | Command | <b>:LOCAL</b> |
| <b>Description</b> Changes the instrument from the Remote state to the Local state.<br>If the instrument is already in the Local state when this command is received, it will remain in that state. |         |               |
| <b>Example</b>                                                                                                                                                                                      | Command | <b>:LOCAL</b> |
| <b>Note</b> <ul style="list-style-type: none"> <li>• This command and query can be executed even when a system error has occurred.</li> </ul>                                                       |         |               |

## Set and Query the Message Unit Separator

Syntax Command :TRANsmit:SEParator <0/1>  
 Query :TRANsmit:SEParator?  
 Response <0/1>

### Description

0: Semicolon ";" (default setting)  
 1: Comma ","

Sets or queries the message unit separator used in response messages. Although NRf numerical values are accepted, values to the right of the decimal are truncated.

However, if headers are turned ON the actual output will be separated by semicolons, even if the separator has been set to comma.

### Example

|          |                                    |                                                                 |
|----------|------------------------------------|-----------------------------------------------------------------|
| Command  | :TRAN:SEP 0;;HEAD OFF;;MEAS? U1,I1 | (Specify the separator to be a semicolon.)                      |
| Response | 10.038E+00;+12.719E+0              | (Separator is a semicolon.)                                     |
| Command  | :TRAN:SEP 1;;HEAD OFF;;MEAS? U1,I1 | (Specify the separator to be a comma.)                          |
| Response | 10.038E+00,+12.719E+0              | (Separator is a comma.)                                         |
| Command  | :TRAN:SEP 0;;HEAD ON;;MEAS? U1,I1  | (Specify the separator to be a semicolon.)                      |
| Response | U1 10.038E+00;I1 +12.719E+0        | (Separator is a semicolon.)                                     |
| Command  | :TRAN:SEP 1;;HEAD ON;;MEAS? U1,I1  | (Specify the separator to be a comma.)                          |
| Response | U1 10.038E+00,I1 +12.719E+0        | (Separator is a semicolon.)<br>(Because headers are turned ON.) |

Query :TRAN:SEP?  
 Response (When HEADER ON) :TRANSMIT:SEPARATOR 1  
 (When HEADER OFF) 1

- Note**
- Always turn headers OFF (:HEAD OFF) when changing the message unit separator.
  - This command and query can be executed even when a system error has occurred.

## Set and Query the Message Unit Terminator

Syntax Command :TRANsmit:TERMinator <0/1>  
 Query :TRANsmit:TERMinator?  
 Response <0/1>

| I/F | Setting | RS-232c<br>LAN | GP-IB            |
|-----|---------|----------------|------------------|
|     |         |                |                  |
| 0   |         | LF             | LF with an EOI   |
| 1   |         | CR+LF          | LF with a CR+EOI |

### Description

Sets or queries the message unit terminator used in response messages. Although NRf numerical values are accepted, values to the right of the decimal are truncated.

### Example

Command :TRAN:TERM 1  
 Query :TRAN:TERM?  
 Response (When HEADER ON) :TRANSMIT:TERMINATOR 1  
 (When HEADER OFF) 1

- Note**
- This command and query can be executed even when a system error has occurred.

## (12) Status-dependent Commands (Common Commands)

○: Can be executed ×: Cannot be executed

| Command \ Status      | Integration Reset |      | Integration START |      | Integration STOP |      | System Error |
|-----------------------|-------------------|------|-------------------|------|------------------|------|--------------|
|                       | Continuous        | HOLD | Continuous        | HOLD | Continuous       | HOLD |              |
| <a href="#">*CLS</a>  | ○                 | ○    | ○                 | ○    | ○                | ○    | ○            |
| <a href="#">*ESE</a>  | ○                 | ○    | ○                 | ○    | ○                | ○    | ○            |
| <a href="#">*ESE?</a> | ○                 | ○    | ○                 | ○    | ○                | ○    | ○            |
| <a href="#">*ESR?</a> | ○                 | ○    | ○                 | ○    | ○                | ○    | ○            |
| <a href="#">*IDN?</a> | ○                 | ○    | ○                 | ○    | ○                | ○    | ○            |
| <a href="#">*OPC</a>  | ○                 | ○    | ○                 | ○    | ○                | ○    | ○            |
| <a href="#">*OPC?</a> | ○                 | ○    | ○                 | ○    | ○                | ○    | ○            |
| <a href="#">*OPT?</a> | ○                 | ○    | ○                 | ○    | ○                | ○    | ○            |
| <a href="#">*RST</a>  | ○                 | ○    | ○                 | ○    | ○                | ○    | ○            |
| <a href="#">*SRE</a>  | ○                 | ○    | ○                 | ○    | ○                | ○    | ○            |
| <a href="#">*SRE?</a> | ○                 | ○    | ○                 | ○    | ○                | ○    | ○            |
| <a href="#">*STB?</a> | ○                 | ○    | ○                 | ○    | ○                | ○    | ○            |
| <a href="#">*TRG</a>  | ×                 | ○    | ×                 | ○    | ×                | ○    | ×            |
| <a href="#">*TST?</a> | ○                 | ×    | ×                 | ×    | ×                | ×    | ○            |
| <a href="#">*WAI</a>  | ○                 | ○    | ○                 | ○    | ○                | ○    | ×            |

## Status Descriptions

- Integration Reset : Integration calculations are stopped and the integration time and integration value are reset.  
(The INTEGRATOR RUN indicator is OFF.)
- Integration START : Integration calculations are being performed (the INTEGRATOR RUN indicator is ON).
- Integration STOP : Integration calculations are stopped (the INTEGRATOR RUN indicator is flashing).
- Continuous : The display is updated each time sampling is performed (continuous display).
- HOLD : The display is currently held and/or maximum/minimum values are being held.  
(The HOLD, MAX, or MIN indicator is ON.)  
However, \*TRG is only valid when the HOLD indicator is ON.
- System Error : Err. 1 to Err. 4 is currently displayed.

## (13) Status-dependent Commands (Device-specific Commands)

○: Can be executed ×: Cannot be executed

Δ: While the display is held, cannot be executed.

When the maximum/minimum values are being held, can be executed.

| Command \ Status               | Integration Reset |      | Integration START |      | Integration STOP |      | System Error |
|--------------------------------|-------------------|------|-------------------|------|------------------|------|--------------|
|                                | Continu<br>ous    | HOLD | Continu<br>ous    | HOLD | Continu<br>ous   | HOLD |              |
|                                |                   |      |                   |      |                  |      |              |
| <a href="#">AOUT?</a>          | ○                 | ○    | ○                 | ○    | ○                | ○    | ○            |
| AOUT                           |                   |      |                   |      |                  |      |              |
| :ITEM                          |                   |      |                   |      |                  |      |              |
| <a href="#">:DA[n]</a>         | ○                 | ○    | ○                 | ○    | ○                | ○    | ×            |
| <a href="#">:DA[n]?</a>        | ○                 | ○    | ○                 | ○    | ○                | ○    | ○            |
| :IRANge                        |                   |      |                   |      |                  |      |              |
| <a href="#">:DA[n]</a>         | ○                 | ○    | ○                 | ○    | ○                | ○    | ×            |
| <a href="#">:DA[n]?</a>        | ○                 | ○    | ○                 | ○    | ○                | ○    | ○            |
|                                |                   |      |                   |      |                  |      |              |
| <a href="#">AVERaging</a>      | ○                 | ×    | ×                 | ×    | ×                | ×    | ×            |
| <a href="#">AVERaging?</a>     | ○                 | ○    | ○                 | ○    | ○                | ○    | ○            |
|                                |                   |      |                   |      |                  |      |              |
| <a href="#">CURRENT?</a>       | ○                 | ○    | ○                 | ○    | ○                | ○    | ○            |
| CURRENT                        |                   |      |                   |      |                  |      |              |
| <a href="#">:AUTO</a>          | ○                 | Δ    | ×                 | ×    | ○                | Δ    | ×            |
| <a href="#">:AUTO?</a>         | ○                 | ○    | ○                 | ○    | ○                | ○    | ○            |
| <a href="#">:RANGe</a>         | ○                 | Δ    | ×                 | ×    | ○                | Δ    | ×            |
| <a href="#">:RANGe?</a>        | ○                 | ○    | ○                 | ○    | ○                | ○    | ○            |
| <a href="#">:EXTRange</a>      | ○                 | Δ    | ×                 | ×    | ○                | Δ    | ×            |
| <a href="#">:EXTRange?</a>     | ○                 | ○    | ○                 | ○    | ○                | ○    | ○            |
| <a href="#">:TYPe</a>          | ○                 | ×    | ×                 | ×    | ×                | ×    | ×            |
| <a href="#">:TYPe?</a>         | ○                 | ○    | ○                 | ○    | ○                | ○    | ○            |
| <a href="#">:SElect</a>        | ○                 | ×    | ×                 | ×    | ×                | ×    | ×            |
| <a href="#">:SElect?</a>       | ○                 | ○    | ○                 | ○    | ○                | ○    | ○            |
| <a href="#">:ALL</a>           | ○                 | ×    | ×                 | ×    | ×                | ×    | ×            |
| <a href="#">:I[xxx]A</a>       | ○                 | ×    | ×                 | ×    | ×                | ×    | ×            |
| <a href="#">:I[xxx]A?</a>      | ○                 | ○    | ○                 | ○    | ○                | ○    | ○            |
| <a href="#">:C[xxx]A</a>       | ○                 | ×    | ×                 | ×    | ×                | ×    | ×            |
| <a href="#">:C[xxx]A?</a>      | ○                 | ○    | ○                 | ○    | ○                | ○    | ○            |
|                                |                   |      |                   |      |                  |      |              |
| <a href="#">DATAout:ITEM</a>   | ○                 | ○    | ○                 | ○    | ○                | ○    | ○            |
| <a href="#">DATAout:ITEM?</a>  | ○                 | ○    | ○                 | ○    | ○                | ○    | ○            |
|                                |                   |      |                   |      |                  |      |              |
| <a href="#">DEMAg</a>          | ○                 | ×    | ×                 | ×    | ○                | ×    | ×            |
| <a href="#">DEMAg?</a>         | ○                 | ○    | ○                 | ○    | ○                | ○    | ○            |
|                                |                   |      |                   |      |                  |      |              |
| <a href="#">DISPlay?</a>       | ○                 | ○    | ○                 | ○    | ○                | ○    | ○            |
| DISPlay                        |                   |      |                   |      |                  |      |              |
| :HARMonic                      |                   |      |                   |      |                  |      |              |
| <a href="#">:[B,C,D]:ITEM</a>  | ○                 | ○    | ○                 | ○    | ○                | ○    | ×            |
| <a href="#">:[B,C,D]:ITEM?</a> | ○                 | ○    | ○                 | ○    | ○                | ○    | ○            |
| <a href="#">:ORDer</a>         | ○                 | ○    | ○                 | ○    | ○                | ○    | ×            |

| Command \ Status                      | Integration Reset |      | Integration START |      | Integration STOP |      | System Error |
|---------------------------------------|-------------------|------|-------------------|------|------------------|------|--------------|
|                                       | Continu<br>ous    | HOLD | Continu<br>ous    | HOLD | Continu<br>ous   | HOLD |              |
| :HORDERSel                            |                   |      |                   |      |                  |      |              |
| : [A,B,C,D]                           |                   |      |                   |      |                  |      |              |
| <a href="#">:ITEM</a>                 | ○                 | ○    | ○                 | ○    | ○                | ○    | ×            |
| <a href="#">:ITEM?</a>                | ○                 | ○    | ○                 | ○    | ○                | ○    | ○            |
| <a href="#">:ORDER</a>                | ○                 | ○    | ○                 | ○    | ○                | ○    | ×            |
| <a href="#">:ORDER?</a>               | ○                 | ○    | ○                 | ○    | ○                | ○    | ○            |
| <a href="#">:MODE</a>                 | ○                 | ○    | ○                 | ○    | ○                | ○    | ×            |
| <a href="#">:MODE?</a>                | ○                 | ○    | ○                 | ○    | ○                | ○    | ○            |
| <a href="#">:NORMal</a>               | ○                 | ○    | ○                 | ○    | ○                | ○    | ×            |
| <a href="#">: [A,B,C,D]</a>           | ○                 | ○    | ○                 | ○    | ○                | ○    | ×            |
| <a href="#">: [A,B,C,D]?</a>          | ○                 | ○    | ○                 | ○    | ○                | ○    | ○            |
|                                       |                   |      |                   |      |                  |      |              |
| <a href="#">ESE0</a>                  | ○                 | ○    | ○                 | ○    | ○                | ○    | ×            |
| <a href="#">ESE0?</a>                 | ○                 | ○    | ○                 | ○    | ○                | ○    | ○            |
| <a href="#">ESR0?</a>                 | ○                 | ○    | ○                 | ○    | ○                | ○    | ○            |
| <a href="#">ESE1</a>                  | ○                 | ○    | ○                 | ○    | ○                | ○    | ×            |
| <a href="#">ESE1?</a>                 | ○                 | ○    | ○                 | ○    | ○                | ○    | ○            |
| <a href="#">ESR1?</a>                 | ○                 | ○    | ○                 | ○    | ○                | ○    | ○            |
|                                       |                   |      |                   |      |                  |      |              |
| <a href="#">FREQuency?</a>            | ○                 | ○    | ○                 | ○    | ○                | ○    | ○            |
| FREQuency                             |                   |      |                   |      |                  |      |              |
| <a href="#">:RANGe</a>                | ○                 | ×    | ×                 | ×    | ×                | ×    | ×            |
| <a href="#">:RANGe?</a>               | ○                 | ○    | ○                 | ○    | ○                | ○    | ○            |
|                                       |                   |      |                   |      |                  |      |              |
| <a href="#">GPIB?</a>                 | ○                 | ○    | ○                 | ○    | ○                | ○    | ○            |
| GPIB                                  |                   |      |                   |      |                  |      |              |
| <a href="#">:ADDRess</a>              | ○                 | ○    | ○                 | ○    | ○                | ○    | ×            |
| <a href="#">:ADDRess?</a>             | ○                 | ○    | ○                 | ○    | ○                | ○    | ○            |
|                                       |                   |      |                   |      |                  |      |              |
| <a href="#">HARMonic:ORDER:UPPER</a>  | ○                 | ×    | ×                 | ×    | ×                | ×    | ×            |
| <a href="#">HARMonic:ORDER:UPPER?</a> | ○                 | ○    | ○                 | ○    | ○                | ○    | ○            |
|                                       |                   |      |                   |      |                  |      |              |
| <a href="#">HEADer</a>                | ○                 | ○    | ○                 | ○    | ○                | ○    | ○            |
| <a href="#">HEADer?</a>               | ○                 | ○    | ○                 | ○    | ○                | ○    | ○            |
|                                       |                   |      |                   |      |                  |      |              |
| <a href="#">HOLD</a>                  | ○                 | ○    | ○                 | ○    | ○                | ○    | ×            |
| <a href="#">HOLD?</a>                 | ○                 | ○    | ○                 | ○    | ○                | ○    | ○            |
|                                       |                   |      |                   |      |                  |      |              |
| <a href="#">INTEGrate?</a>            | ○                 | ○    | ○                 | ○    | ○                | ○    | ○            |
| INTEGrate                             |                   |      |                   |      |                  |      |              |
| <a href="#">:STATe (*)</a>            |                   |      |                   |      |                  |      |              |
| START                                 | ○                 | ○    | ×                 | ×    | ○                | ○    | ×            |
| STOP                                  | ×                 | ×    | ○                 | ○    | ×                | ×    | ×            |
| RESET                                 | ○                 | ○    | ×                 | ×    | ○                | ○    | ×            |
| <a href="#">:STATe?</a>               | ○                 | ○    | ○                 | ○    | ○                | ○    | ○            |
| <a href="#">:TIME</a>                 | ○                 | ×    | ×                 | ×    | ×                | ×    | ×            |
| <a href="#">:TIME?</a>                | ○                 | ○    | ○                 | ○    | ○                | ○    | ○            |
| <a href="#">:AUTO</a>                 | ○                 | ×    | ×                 | ×    | ×                | ×    | ×            |
| <a href="#">:AUTO?</a>                | ○                 | ○    | ○                 | ○    | ○                | ○    | ○            |

| Command \ Status                                              | Integration Reset |      | Integration START |      | Integration STOP |      | System Error |
|---------------------------------------------------------------|-------------------|------|-------------------|------|------------------|------|--------------|
|                                                               | Continu<br>ous    | HOLD | Continu<br>ous    | HOLD | Continu<br>ous   | HOLD |              |
| (*See also: <a href="#">Detailed Command Specifications</a> ) |                   |      |                   |      |                  |      |              |
| IP                                                            |                   |      |                   |      |                  |      |              |
| :ADDRes                                                       | o                 | o    | o                 | o    | o                | o    | x            |
| :ADDRes?                                                      | o                 | o    | o                 | o    | o                | o    | o            |
| :DEFaultgateway                                               | o                 | o    | o                 | o    | o                | o    | x            |
| :DEFaultgateway?                                              | o                 | o    | o                 | o    | o                | o    | o            |
| :SUBNetmask                                                   | o                 | o    | o                 | o    | o                | o    | x            |
| :SUBNetmask?                                                  | o                 | o    | o                 | o    | o                | o    | o            |
| LOCAL                                                         | o                 | o    | o                 | o    | o                | o    | o            |
| MEASure?                                                      | o                 | o    | o                 | o    | o                | o    | x            |
| MEASure                                                       |                   |      |                   |      |                  |      |              |
| :ITEM:ALLClear                                                | o                 | o    | o                 | o    | o                | o    | o            |
| :NORMal                                                       |                   |      |                   |      |                  |      |              |
| :VALUE?                                                       | o                 | o    | o                 | o    | o                | o    | x            |
| All :ITEM commands and queries                                | o                 | o    | o                 | o    | o                | o    | o            |
| :HARMonic?                                                    | o                 | o    | o                 | o    | o                | o    | x            |
| :HARMonic                                                     |                   |      |                   |      |                  |      |              |
| :ITEM                                                         |                   |      |                   |      |                  |      |              |
| :LIST                                                         | o                 | o    | o                 | o    | o                | o    | o            |
| :LIST?                                                        | o                 | o    | o                 | o    | o                | o    | o            |
| :ORDER                                                        | o                 | o    | o                 | o    | o                | o    | o            |
| :ORDER?                                                       | o                 | o    | o                 | o    | o                | o    | o            |
| All :[U,I,P] commands and queries                             | o                 | o    | o                 | o    | o                | o    | o            |
| :[UCON,ICON,PCON]                                             | o                 | o    | o                 | o    | o                | o    | o            |
| :[UPHase,IPHase,PPHase]                                       | o                 | o    | o                 | o    | o                | o    | o            |
| :RS232c?                                                      | o                 | o    | o                 | o    | o                | o    | o            |
| :RS232c                                                       | o                 | o    | o                 | o    | o                | o    | o            |
| ANSWer                                                        | o                 | o    | o                 | o    | o                | o    | o            |
| ANSWer?                                                       | o                 | o    | o                 | o    | o                | o    | o            |
| BAUD                                                          | o                 | o    | o                 | o    | o                | o    | x            |
| BAUD?                                                         | o                 | o    | o                 | o    | o                | o    | o            |
| ERRor?                                                        | o                 | o    | o                 | o    | o                | o    | o            |
| SCALE[n]?                                                     | o                 | o    | o                 | o    | o                | o    | o            |
| SCALE[n]                                                      |                   |      |                   |      |                  |      |              |
| :CT                                                           | o                 | x    | x                 | x    | x                | x    | x            |
| :CT?                                                          | o                 | o    | o                 | o    | o                | o    | o            |
| :VT                                                           | o                 | x    | x                 | x    | x                | x    | x            |
| :VT?                                                          | o                 | o    | o                 | o    | o                | o    | o            |
| SOURce[n]?                                                    | o                 | o    | o                 | o    | o                | o    | o            |
| SOURce[n]                                                     | o                 | x    | x                 | x    | x                | x    | x            |

| Command \ Status              | Integration Reset |      | Integration START |      | Integration STOP |      | System Error |
|-------------------------------|-------------------|------|-------------------|------|------------------|------|--------------|
|                               | Continu<br>ous    | HOLD | Continu<br>ous    | HOLD | Continu<br>ous   | HOLD |              |
| <a href="#">:TIMEOut</a>      | ○                 | ×    | ×                 | ×    | ×                | ×    | ×            |
| <a href="#">:FILTer</a>       |                   |      |                   |      |                  |      |              |
| <a href="#">:LEVel</a>        |                   |      |                   |      |                  |      |              |
| <a href="#">:ALL</a>          | ○                 | ×    | ×                 | ×    | ×                | ×    | ×            |
| <a href="#">:U[xxx]V</a>      | ○                 | ×    | ×                 | ×    | ×                | ×    | ×            |
| <a href="#">:U[xxx]V?</a>     | ○                 | ○    | ○                 | ○    | ○                | ○    | ○            |
| <a href="#">:I[xxx]A</a>      | ○                 | ×    | ×                 | ×    | ×                | ×    | ×            |
| <a href="#">:I[xxx]A?</a>     | ○                 | ○    | ○                 | ○    | ○                | ○    | ○            |
| <a href="#">:C[xxx]A</a>      | ○                 | ×    | ×                 | ×    | ×                | ×    | ×            |
| <a href="#">:C[xxx]A?</a>     | ○                 | ○    | ○                 | ○    | ○                | ○    | ○            |
|                               |                   |      |                   |      |                  |      |              |
| <a href="#">SYNC:CONTRol</a>  | ○                 | ×    | ×                 | ×    | ×                | ×    | ×            |
| <a href="#">SYNC:CONTRol?</a> | ○                 | ○    | ○                 | ○    | ○                | ○    | ○            |
|                               |                   |      |                   |      |                  |      |              |
| <a href="#">TRANsmit</a>      |                   |      |                   |      |                  |      |              |
| <a href="#">:SEParator</a>    | ○                 | ○    | ○                 | ○    | ○                | ○    | ○            |
| <a href="#">:SEParator?</a>   | ○                 | ○    | ○                 | ○    | ○                | ○    | ○            |
| <a href="#">:TERMinator</a>   | ○                 | ○    | ○                 | ○    | ○                | ○    | ○            |
| <a href="#">:TERMinator?</a>  | ○                 | ○    | ○                 | ○    | ○                | ○    | ○            |
|                               |                   |      |                   |      |                  |      |              |
| <a href="#">VOLTage[n]?</a>   | ○                 | ○    | ○                 | ○    | ○                | ○    | ○            |
| <a href="#">VOLTage[n]</a>    |                   |      |                   |      |                  |      |              |
| <a href="#">:AUTO</a>         | ○                 | Δ    | ×                 | ×    | ×                | ×    | ×            |
| <a href="#">:AUTO?</a>        | ○                 | ○    | ○                 | ○    | ○                | ○    | ○            |
| <a href="#">:RANGe</a>        | ○                 | Δ    | ×                 | ×    | ×                | ×    | ×            |
| <a href="#">:RANGe?</a>       | ○                 | ○    | ○                 | ○    | ○                | ○    | ○            |
| <a href="#">:SElect</a>       | ○                 | Δ    | ×                 | ×    | ×                | ×    | ×            |
| <a href="#">:SElect?</a>      | ○                 | ○    | ○                 | ○    | ○                | ○    | ○            |
| <a href="#">:ALL</a>          | ○                 | ×    | ×                 | ×    | ×                | ×    | ×            |
| <a href="#">:U[xxx]V</a>      | ○                 | ×    | ×                 | ×    | ×                | ×    | ×            |
| <a href="#">:U[xxx]V?</a>     | ○                 | ○    | ○                 | ○    | ○                | ○    | ○            |
|                               |                   |      |                   |      |                  |      |              |
| <a href="#">ZEROadjust</a>    | ○                 | ×    | ×                 | ×    | ○                | ×    | ×            |
| <a href="#">ZEROadjust?</a>   | ○                 | ○    | ○                 | ○    | ○                | ○    | ○            |
|                               |                   |      |                   |      |                  |      |              |
| <a href="#">MODE</a>          | ○                 | ○    | ○                 | ○    | ○                | ○    | ○            |
| <a href="#">MODE?</a>         | ○                 | ○    | ○                 | ○    | ○                | ○    | ○            |
|                               |                   |      |                   |      |                  |      |              |
| <a href="#">RECTifier</a>     | ○                 | ○    | ○                 | ○    | ○                | ○    | ○            |
| <a href="#">RECTifier?</a>    | ○                 | ○    | ○                 | ○    | ○                | ○    | ○            |
|                               |                   |      |                   |      |                  |      |              |
| <a href="#">RESPonse</a>      | ○                 | ○    | ○                 | ○    | ○                | ○    | ○            |
| <a href="#">RESPonse?</a>     | ○                 | ○    | ○                 | ○    | ○                | ○    | ○            |
|                               |                   |      |                   |      |                  |      |              |
| <a href="#">WIRing</a>        | ○                 | ○    | ○                 | ○    | ○                | ○    | ○            |
| <a href="#">WIRing?</a>       | ○                 | ○    | ○                 | ○    | ○                | ○    | ○            |

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**Status Descriptions**

|                   |   |                                                                                                                                          |
|-------------------|---|------------------------------------------------------------------------------------------------------------------------------------------|
| Integration Reset | : | Integration calculations are stopped and the integration time and integration value are reset.<br>(The INTEGRATOR RUN indicator is OFF.) |
| Integration START | : | Integration calculations are being performed (the INTEGRATOR RUN indicator is ON).                                                       |
| Integration STOP  | : | Integration calculations are stopped (the INTEGRATOR RUN indicator is flashing).                                                         |
| Continuous        | : | The display is updated each time sampling is performed (continuous display).                                                             |
| HOLD              | : | The display is currently held and/or maximum/minimum values are being held.<br>(The HOLD, MAX, or MIN indicator is ON.)                  |
| System Error      | : | Err. 1 to Err. 4 is currently displayed.                                                                                                 |

## 4 Operation Problems (Communications)

When communications are not operating properly, check the following causes and try the listed solutions.

- \* Problems and solutions with no specific interface icon (  ) can be applied for all interfaces.

| Problem                                                                                                                                                          | Cause / Solution                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| The RS-232C/LAN/GP-IB interface does not work at all.                                                                                                            | <ul style="list-style-type: none"> <li>• Are all cables properly connected?<br/>(See Chapter 4 in the Instruction Manual for the instrument.)</li> <li>• Are all connected devices powered ON?</li> <li>• Are all the cables used the correct types?<br/>(See Chapter 4 in the Instruction Manual for the instrument.)</li> <li>• Do the set communications conditions (RS baud rate, etc.) on the instrument match up with the controller? </li> <li>• Are the address settings on the instrument the same as the controller's destination address? </li> <li>• Does the instrument have the same IP address setting as another device? </li> <li>• Are the communications settings (IP address, subnet mask, default gateway) all correct? </li> <li>• Are these IP address settings the same as those on another device? </li> <li>• Is the TCP/IP port number correct? </li> </ul> (Connect to TCP/IP port 3300.) |
| Communications are not working properly.                                                                                                                         | <ul style="list-style-type: none"> <li>• Are the instrument and controller RS-232C settings (baud rate, data length, parity, stop bit) the same? </li> <li>• The data length (8 bits), parity (none), and stop bit (1) are fixed values.</li> <li>• Is the controller's <a href="#">message terminator (delimiter) setting</a> the same as the instrument setting?</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| After communications, the keys on the instrument no longer work.                                                                                                 | <ul style="list-style-type: none"> <li>• Press the SHIFT/EXIT/LOCAL keys on the instrument panel to take the instrument out of the Remote state.<br/>Or, send the <a href="#">:LOCAL</a> command.</li> <li>• Are you sending the <a href="#">LLO (Local Lock Out) command</a> (see page 11) to the instrument? </li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| The program stops running when I try to read data with an INPUT statement.    | <ul style="list-style-type: none"> <li>• You must send a query before the INPUT statement.</li> <li>• Did an error occur in the query sent before the INPUT statement?</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| The GP-IB bus stops when I try to read data with an INPUT@(ENTER) statement.  | <ul style="list-style-type: none"> <li>• You must send a query before the INPUT@(ENTER) statement.</li> <li>• Did an error occur in the query sent before the INPUT statement?</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

|                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| I sent a command but nothing happens.                                                    | <ul style="list-style-type: none"> <li>• Use the <a href="#">*ESR?</a> query to check the Standard Event Status Register for items that have caused an error. (See page 35.)</li> <li>• Use the <a href="#">RS232c:ERRor?</a> query to check for any RS-232C communications errors. (See page 107.) <b>RS-232C</b></li> <li>• Set <a href="#">RS232c:ANSWer</a> to ON to enable execution confirmation. (See page 107.)</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| I sent multiple queries but received no responses back.                                  | <ul style="list-style-type: none"> <li>• Did an error occur?</li> <li>• Be sure to check for and read the response after each query is sent.<br/>To read all query responses at once, use the <a href="#">message separator</a> and put all the queries on a single line. (See page 3.)</li> <li>Are you using the <a href="#">*IDN?</a> query? <ul style="list-style-type: none"> <li>• Query commands after an <a href="#">*IDN?</a> query are not executed.</li> </ul> </li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| The query response message is not the same as what is displayed on the instrument panel. | <ul style="list-style-type: none"> <li>• Response messages are generated when the query is received by the instrument.<br/>Therefore, in some cases the message may not match what is displayed on the panel when the response is read by the controller.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Sometimes service requests are not executed. <b>GP-IB</b>                                | <ul style="list-style-type: none"> <li>• Are the <a href="#">Service Request Enable</a> and <a href="#">Event Status Enable</a> registers set correctly? (See page 35.)</li> <li>• Clear all the event registers with the <a href="#">*CLS</a> command at the end of your SRQ processing subroutine.<br/>If the event bits are not cleared, the service requests will not be executed in the same event. (See page 35.)</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| I cannot obtain the averaged data.                                                       | <ul style="list-style-type: none"> <li>• If any measurement-related settings such as the wiring, voltage range, current range, number of times to perform averaging, VT ratio, CT ratio, etc. are changed, averaging is restarted. To obtain the average values, wait until the first averaging process finishes or monitor the AVG flag in <a href="#">ESR0?</a> as shown below.</li> </ul> <ol style="list-style-type: none"> <li>1. After changing these settings, wait until the first set of data is displayed and clear the event flags.<br/>(Example: Changing the current range to 1A)<br/><a href="#">:CURR:RANG 1;*WAI;*CLS</a></li> <li>2. Monitor the AVG flag to see when it changes to 1.<br/>Read Event Status Register 0 with an <a href="#">:ESR0?</a> query.<br/>Repeat until the AVG flag (bit 3) changes to 1.</li> <li>3. Read the data once the AVG flag changes to 1.<br/><a href="#">:MEAS?</a></li> </ol> |

**GP-IB**

## (1) IEEE488.1 Interface Functions

(2) Operation When the Address Is Set to a Value Outside the Range of 0 to 30

### (3) Recognizing When a User Changes the Initial Address Setting

#### (4) Device Settings When the Instrument is Powered On

However, header and response message terminator settings are reset.

- Input Buffer Capacity and Operation

- Queries that Return Multiple Response Message Units

:CURRENT? . . . . . (page 49)

SCAL F? . . . . . (page 55)

MEASure2: ..... (page 68)

```

:MEASure:ITEM? ..... (page 75)
:MEASure:IARMagic? ..... (page 96)

```

RS232C? . . . . . (page 106)

- Queries that Generate a Response When Checking Syntax

All queries generate a response when checking syntax.

- Queries that Generate a Response When Read

There are no queries that generate a response when read by the controller.

- Coupled Commands

There are no such coupled commands.

- Program messages

- Program messages

- Program message terminators

- Program message units

- Program message unit separators

- Command message units

- Query message units

- Command program headers

- Query program headers

- Program data

- Character program data

- Binary numerical value program data

- Compound command program headers

Block data is not used.

- 
- (8) List of Program Data Elements Used in <Expressions> and the Maximum Number of Nested Levels Allowed in Sub-expressions (Including Syntax Restrictions Imposed by the Device on <Expressions>)  
Sub-expressions are not used. The program data elements used in expressions are character program data and binary numerical value program data.  
(Excluding [\\*IDN?](#))
- (9) Query Response Syntax  
See: [Message Reference](#)(page 32)
- (10)Message Transmission Interference Between Devices that Do Not Conform to the Defined Response Message Rules  
Messages cannot be sent between devices.
- (11)Block Data Response Capacity  
There are no block data responses.
- (12)List of Common Commands and Queries Used  
See: [Message List](#)(page 14)
- (13)Device Status After a Revised Query Completes Successfully  
The [\\*CAL?](#) command is not used.
- (14)"\*DDT" Command  
The [\\*DDT?](#) command is not used.
- (15)Macro Commands  
Macros are not used.
- (16)Identification-related Queries and ["\\*IDN?"](#) Query Responses  
See: [Standard Commands](#)(page 33)
- (17)Capacity of the User Data Storage Area Protected When the ["\\*PUD"](#) Command or ["\\*PUD"](#) Query Is Executed  
The [\\*PUD?](#) command and [\\*PUD](#) query are not used.  
There also is no user data storage area.
- (18)Resources When the ["RDT"](#) Command or ["\\*RDT?"](#) Query Is Used  
The [\\*RDT?](#) command and [\\*RDT](#) query are not used.  
There also is no user data storage area.
- (19)Situations When the ["\\*RST"](#), ["\\*LRN?"](#), ["\\*RCL"](#), and ["\\*SAV"](#) Commands Are Affected  
The [\\*LRN?](#), [\\*RCL](#), and [\\*SAV](#) commands are not used.  
The [\\*RST](#) command resets the instrument back to its initial state.  
See: [Standard Commands](#) (page 33) and [Initialization Items](#) (page 12)
- (20)Range of Self-testing Performed by the ["\\*TST?"](#) Query  
See: [Standard Commands](#)(page 33)
- (21)Additional Status Data Structures Used for Reporting the Device Status  
See: [Event Registers](#) (page 8)
- (22)Are Commands Overwrap or Sequential Commands  
All commands are sequential.
- (23)Standards for Functions Required When Operation Complete Messages Are Generated as Command Responses  
Operation complete messages are generated when analysis of the command is performed.