

PW6001

HIOKI

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Communication Command Instruction Manual

POWER ANALYZER



- ✓ This manual explains the communication commands for Model PW6001 Power Analyzer.
- ✓ Please refer to the instruction manual for Model PW6001 for details regarding command settings.
- ✓ Although all reasonable care has been taken in the production of this manual, should you find any points which are unclear or in error, please contact your local distributor or the HIOKI International Sales Department at os-com@hioki.co.jp.
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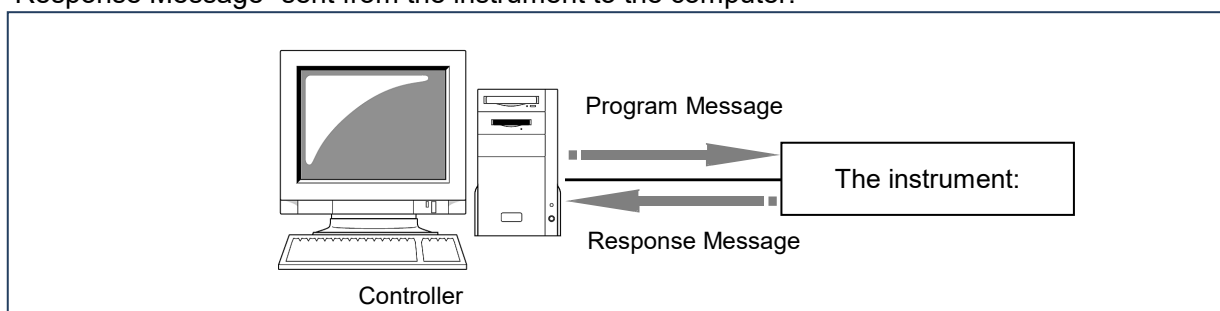
1 Communications

1.1 Communication Method

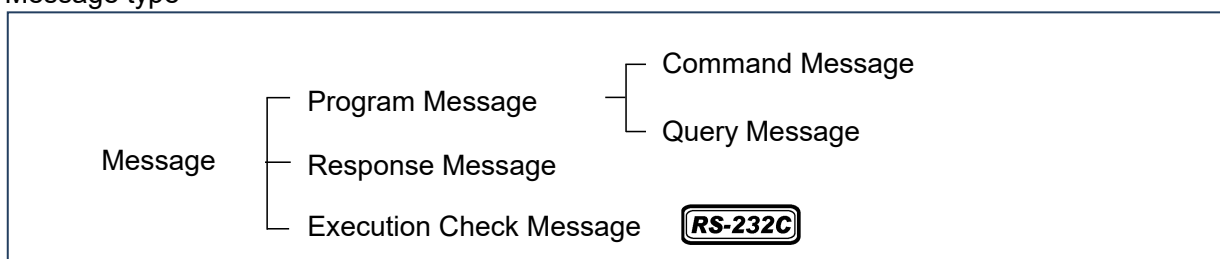
In this manual, PW6001 is represented as The Instrument.

You can control the instrument by sending messages from a computer to the instrument via interfaces.

The messages include "Program Message" sent from a controller to the instrument and "Response Message" sent from the instrument to the computer.



Message type



Message type	Detail
Command Message	Controls setting and reset for the instrument.
Query Message	This message is used to query operation result, measurement result and setting of the instrument.
Response Message	This message is sent from the instrument to controller. This message is created when a query message is received and the syntax is checked.
Execution Check Message	This message is used to synchronize with controller.

Collective term of Command Message and Query Message is "Command".

To make a LAN connection, connect it to **TCP/IP port No. 0023**. **LAN**

Reference

- Enter commands having data in a specified data format.
- During communications, it enters in remote mode, **[REMOTE/LOCAL]** key of the instrument will light.
- Operational keys other than **[REMOTE/LOCAL]** key will be disabled.
- However, if the instrument is in local lockout mode [1.5.6 GP-IB Commands LLO:Local Lock Out] by GP-IB, pressing **[REMOTE/LOCAL]** key will be ignored. In this case, executing a GTL (Go To Local) command of interface function or turning on the power of the instrument once again will return the mode to local.

1.2 Message Format

1.2.1 Command Message

This message is used to control setting and reset for the instrument.

Example: Voltage range setting message

:VOLTAGE1:RANGE 300

↑ ↑ ↑
Header Space Data

1.2.2 Query Message

This message is used to query operation result, measurement result and setting of the instrument.

Example: Voltage range query message

:VOLTAGE1:RANGE?

↑ ↑
Header Question mark

1.2.3 Response Message

This message is sent from the instrument to controller. When a query message is received, its syntax is checked and a response message is generated. Response message allows selecting presence of a header with a **:HEADer** command.

Query Message		:VOLTAGE1:RANGE?	What is the voltage range for CH1?
Response Message	HEADER: ON	:VOLTAGE1:RANGE 300	Voltage range for CH1 is 300V.
	HEADER: OFF	300	

Reference

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

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

HEADer?	OK	Symbols in this manual
HEADER?	OK	Long form
HEAD?	OK	Short form
HEADE?	Error	
HEA?	Error	

1.2.5 Command Program Header

Commands always require a header and there are three types of commands: Simple, Compound, and Standard.

Command type	Example	Detail
Simple command type	:HEADer ON	Header consisting of a word
Compound command type	:VOLTage1:RANGe 300	Headers consisting of multiple simple command type headers separated by colons ":".
Standard command type	*RST	Headers starting with an asterisk "*" indicating that it is a standard command defined by IEEE 488.2.

1.2.6 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.

Command type	Example	Detail
Simple command type	:HEADer?	Header consisting of a word
Compound command type	:VOLTage1:RANGe?	Headers consisting of multiple simple command type headers separated by colons ":".
Standard command type	*IDN?	Headers starting with an asterisk "*" indicating that it is a standard command defined by IEEE 488.2.

1.2.7 Message Terminators

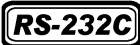
Message terminators show an end of one message transfer.

The instrument recognizes the following message as terminators (delimiters):

Interface	Message terminator
  	CR+LF

All terminators for all Command Messages are the message above.

Terminators for response message in text format are as follows:

Interface	Message terminator
  	CR+LF

Terminator for response message in binary format varies for each. For example, the format of the

message responding to Query Message for transferring file is binary and the terminator of that is "0x02".

1.2.8 Separators

Separator type	Detail
Message unit separator	Compound messages can be written in one line by separating them with semicolons ";". 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.

:VOLTage1:RANGe 300;*IDN?

Header/Separator	In a message consisting of both a header and data, the header is separated from the data by a space (blank).
------------------	--

:VOLTage1:RANGe 300

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

:CLOCK 2014,12,19,12,00,00

1.2.9 Data

The instrument uses "character data" and "decimal numeric data" as the data depending on the command.

Data	Detail		
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.		
	:HEAD ON		
Decimal numeric data	Three formats are used for numeric data: NR1, NR2 and NR3 (NRf format). 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.		
	The instrument accepts NRf format. The format of response data is specified for each command, and the data is sent in that format.		
	NR1	Integer data	Examples: +12, -23, 34
	NR2	Small number data	Examples: +1.23, -23.45, 3.456
	NR3	Floating-point exponential representation data	Examples: +1.0E-2, -2.3E+4

Reference

- 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.

1.2.10 Compound Command Header Omission

When several commands having a common header are combined to form a compound command, if they are written together in sequence, the common portion can be omitted after its initial occurrence. This common portion is called the "current path" and subsequent commands are analyzed presuming that "the current path is omitted" until it is cleared.

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

	Example
Full expression	:VOLTage1:AUTO OFF;:VOLTage1:RANGe 300
Compacted expression	:VOLTage1:AUTO OFF;RANGe 300

The portion underlined becomes a current path allowing you to abbreviate the next command.

The current path is cleared when a message terminator is detected, when reset by key input, by a colon ":" at the start of a command, and when the power is turned on.

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 standard and compound command type headers. However, to avoid confusion with abbreviated forms and operating mistakes, we recommend always placing a colon ":" at the start of a command.

1.3 Output Queue and Input Buffer

1.3.1 Output Queue

Output queue is used to stack response messages in the instrument.

Response messages are stored in the output queue and cleared after read by the controller. The output queue is also cleared in the following circumstances:

Interface	
	Power on Device clear (DCL, SDC) Query error
 	Power on

The output queue capacity of the instrument is 2,000 bytes. If response messages overflow the queue, a query error is generated and the output buffer is cleared.

1.3.2 Input Buffer

Input buffer is used to store received data in the instrument.

The input buffer capacity is 2,000 bytes. The instrument will not accept data beyond 2,000 bytes.

Reference

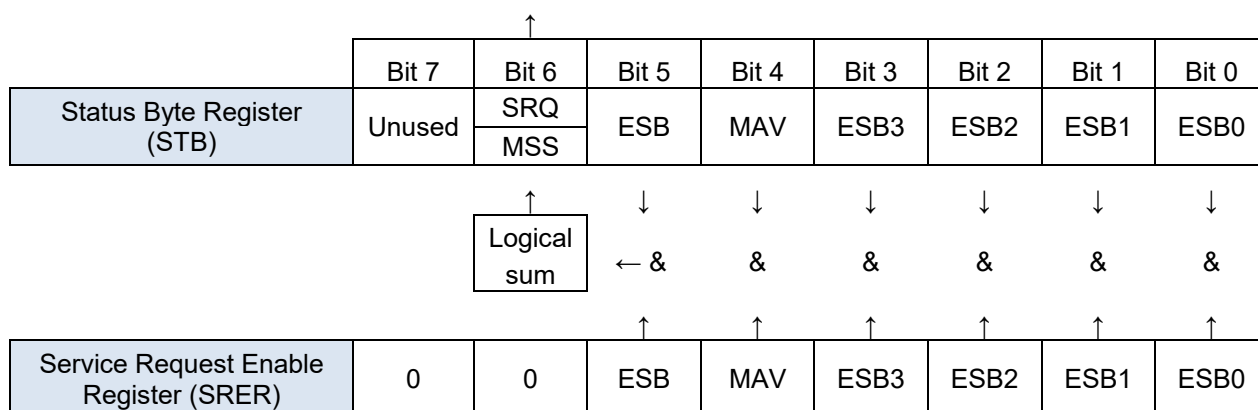
- Ensure that the length of a single line never exceeds 2,000 bytes.

1.4 Status Byte Register

1.4.1 Outline of Service Request Generation

Status Byte Register (STB) is an 8-bit register in which information for event register and output queue is set. Service Request Enable Register (SRER) allows effective setting for necessary bits of the STB. When any Status Byte Register bit enabled by the Service Request Enable Register has switched from "0" to "1", the MSS bit becomes "1". Consequently, the SRQ bit is set to "1", and a service request is dispatched.

Service Request SRQ Generation



Interface	
	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.
 	Reading STB allows learning the status of the instrument. No MAV bit will be set.

Reference

- 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.

1.4.2 Status Byte Register (STB)

Status Byte Register is an 8-bit register used to output from the instrument to the controller for serial polling. 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.

Note: Serial polling: All the devices on the GP-IB bus is polled to identify the device that requested a service.

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 summery bit This is the logical sum of the Standard Event Status Register (SESR).
Bit 4	MAV	Message available Indicates that a message is present in the output queue.
Bit 3	ESB3	Device-specific event summery bit 3 This is the logical sum of Device-specific Event Status Register 3 (ESR3).
Bit 2	ESB2	Device-specific event summery bit 2 This is the logical sum of Device-specific Event Status Register 2 (ESR2).
Bit 1	ESB1	Device-specific event summery bit 1 This is the logical sum of Device-specific Event Status Register 1 (ESR1).
Bit 0	ESB0	Device-specific event summery bit 0 This is the logical sum of Device-specific Event Status Register 0 (ESR0).

1.4.3 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.

1.5 Event Registers

1.5.1 Standard Event Status Register (SESR)

The Standard Event Status Register (SESR) is an 8-bit register.

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

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

- When the instrument is powered on.
- System reset
- When a ***CLS** command is executed.
- ***ESR?** is queried (Query for Standard Event Status Register (SESR)).

Reference

- Beeps when a communication error occurs if beep is enabled for this instrument.

1.5.2 Standard Event Status Enable Register (SESER)

Setting any bit of the Standard Event Status Enable Register (SESER) to "1" enables access to the corresponding bit of the Standard Event Status Register (SESR).

Logical sum of SESR and SESER

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
SESR	PON	URQ	CME	EXE	DDE	QYE	RQC	OPC
Logical sum	&	&	&	&	&	&	&	&
SESER	PON	URQ	CME	EXE	DDE	QYE	RQC	OPC

When any SESR bit enabled by SESER has switched from "0" to "1", ESB bit of the Status Byte Register becomes "1".

	Bit 5							
Status Byte Register (STB)			ESB					

1.5.3 Device-specific Event Status Registers (ESR0, ESR1, ESR2 and ESR3)

The instrument provides four Device-specific Event Status Registers (ESR0 through ESR3) for controlling events. These registers are an 8-bit register.

Device-specific Event Status Register 0 (ESR0)		
Bit 7	DS	Data update
Bit 6	UCU	Calculation unavailable (Measured data is invalid as immediately after range change).
Bit 5	ZP	Power calculation (synchronized source) with forced zero-cross
Bit 4	ZI	Current frequency with forced zero-cross
Bit 3	ZU	Voltage frequency with forced zero-cross
Bit 2	DP	Power calculation (synchronized source) without data update
Bit 1	DI	Current frequency without data update
Bit 0	DU	Voltage frequency without data update

Device-specific Event Status Register 1 (ESR1)		
Bit 7	-	Unused
Bit 6	-	Unused
Bit 5	PU6	CH6 voltage peak exceeded
Bit 4	PU5	CH5 Voltage peak exceeded
Bit 3	PU4	CH4 voltage peak exceeded
Bit 2	PU3	CH3 voltage peak exceeded
Bit 1	PU2	CH2 voltage peak exceeded
Bit 0	PU1	CH1 voltage peak exceeded

Device-specific Event Status Register 2 (ESR2)		
Bit 7	-	Unused
Bit 6	-	Unused
Bit 5	PI6	CH6 current peak exceeded
Bit 4	PI5	CH5 current peak exceeded
Bit 3	PI4	CH4 current peak exceeded
Bit 2	PI3	CH3 current peak exceeded
Bit 1	PI2	CH2 current peak exceeded
Bit 0	PI1	CH1 current peak exceeded

Device-specific Event Status Register 3 (ESR3)		
Bit 7	-	Unused
Bit 6	-	Unused
Bit 5	-	Unused
Bit 4	-	Unused
Bit 3	-	Unused
Bit 2	-	Unused
Bit 1	RB	CHB range exceeded
Bit 0	RA	CHA range exceeded

The Event Status Registers 0 through 3 are cleared in the following situations:

- When the instrument is powered on.
- System reset
- When a ***CLS** command is executed.
- Any of **:ESR0?**, **:ESR1?**, **:ESR2?** or **:ESR3?** queries is executed.

(Queries from Device-specific Event Status Registers 0 through 3)

1.5.4 Device-specific Event Status Enable Registers (SESER0, SESER1, SESER2 and SESER3)

Setting any bit of the Device-specific Event Status Enable Registers (ESER0 through 3) to "1" enables access to the corresponding bit of the Device-specific Event Status Registers (ESR0 through 3). (Similar policy to ones for SESER.)

Example: Logical sum of ESR0 and ESER0

ESR0	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Logical sum	&	&	&	&	&	&	&	&
ESER0	Enable setting	Enable setting	Enable setting	Enable setting	Enable setting	Enable setting	Enable setting	Enable setting

When any ESE* bit enabled by ESER* has switched from "0" to "1", ESB* bit of the Status Byte Register becomes "1". (*: 0 through 3)

- ESR0: ESB0 bit (bit 0) of the Status Byte Register is "1".
- ESR1: ESB1 bit (bit 1) of the Status Byte Register is "1".
- ESR2: ESB2 bit (bit 2) of the Status Byte Register is "1".
- ESR3: ESB3 bit (bit 3) of the Status Byte Register is "1".

Status Byte Register (STB)					Bit 3	Bit 2	Bit 1	Bit 0
					ESB3	ESB2	ESB1	ESB0

1.5.5 Queries and Settings for Registers

Register	Abbreviation	Query	Setting
Status Byte Register	STB	*STB?	-
Service Request Enable Register	SRER	*SRE?	*SRE
Standard Event Status Register	SESR	*ESR?	-
Standard Event Status Enable Register	SESER	*ESE?	*ESE
Device-specific Event Status Register 0	ESR0	:ESR0?	-
Device-specific Event Status Enable Register 0	ESER0	:ESE0?	:ESE0
Device-specific Event Status Register 1	ESR1	:ESR1?	-
Device-specific Event Status Enable Register 1	ESER1	:ESE1?	:ESE1
Device-specific Event Status Register 2	ESR2	:ESR2?	-
Device-specific Event Status Enable Register 2	ESER2	:ESE2?	:ESE2
Device-specific Event Status Register 3	ESR3	:ESR3?	-
Device-specific Event Status Enable Register 3	ESER3	:ESE3?	:ESE3

1.5.6 GP-IB Commands

The following commands can be used through interface functions.

Command	Abbreviation meaning	Detail
GTL	Go To Local	Changes the instrument from the Remote state to the Local state.
LLO	Local Lock Out	Locks all keys on the instrument, including the [REMOTE/LOCAL] Key.
DCL	Device CLea r	Clears the input buffer and output queue.
SDC	S electe d D evice C lea r	Clears the input buffer and output queue.
GET	G roup E xecute T ri g ger	Updates the displayed value while it is being held.

1.6 Initialization Items

✓: Factory initialization, △: Partial initialization, —: No initialization

Item	Factory initialization	Power on	System reset	*RST command	*CLS command	Device clear
GP-IB address	1	—	—	—	—	—
RS-232C setting	38400	—	—	—	—	—
LAN setting	Note 1	—	—	—	—	—
Language setting	Note 1	—	—	—	—	—
Instrument setting other than the above	Note 1	—	✓	✓	—	—
Output queue	Clear	✓	—	—	—	✓
Input buffer	Clear	✓	—	—	—	✓
Status Byte Register	0	✓	—	—	△ Note 3	△ Note 4
Standard Event Status Register	0	△ Note 2	—	—	✓	—
Device-specific Event Status Register	0	✓	—	—	✓	—
Enable Register	0	✓	—	—	—	—
Current path	Clear	✓	—	—	—	✓
Presence of header	OFF	✓	—	—	—	—
Response message separator	Semicolon	✓	—	—	—	—
Saved data item	0	—	✓	✓	—	—
Communication output data item	0	✓	—	—	—	—

Reference

Note 1: Refer to the Instruction Manual for the instrument.

Note 2: All the bits other than Power-On Flag (bit 7: PON) is cleared.

Note 3: All the bits other than Message Available (bit 4: MAV) is cleared.

Note 4: Only Message Available (bit 4: MAV) is cleared. (As output queue is cleared.)

2 Command List

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:UDF[number]:CONStant?	125
:UDF[number]:FUNCTion <Formula 1>, <Formula 2>, <Formula 3>, <Formula 4>	125
:UDF[number]:FUNCTion?	125
:UDF[number]:ITEM <Item 1>, <Item 2>, <Item 3>, <Item 4>	126
:UDF[number]:ITEM?	126
:UDF[number]:OPERator <Operator 1>, <Operator 2>, <Operator 3>	126
:UDF[number]:OPERator?	126
:UDF[number]:UNIT <Unit>	127
:UDF[number]:UNIT?	127
:UDF[number]:UPPer <Upper limit>	127
:UDF[number]:UPPer?	127
:VOLTage[CH]:AUTO <ON/OFF>	127
:VOLTage[CH]:AUTO?	127
:VOLTage[CH]:MEAN <ON/OFF>	128
:VOLTage[CH]:MEAN?	128
:VOLTage[CH]:RANGe <Voltage range>	128
:VOLTage[CH]:RANGe?	128
:WAVE:MODE <PEAK/DECI>	128
:WAVE:MODE?	128
:WAVE:SHOT <Recording length>	129
:WAVE:SHOT?	129
:WAVE:STATe?	129
:WAVE:VALId?	129
:WIRing[CH] <Connection data>	130
:WIRing[CH]?	130
:ZEROsp <Level>	130

:ZEROsp?	130
----------------	-----

3 Command Reference

3.1 Standard Commands

Clearing Event Status Register and Status Byte Register (Except Output Queue)

Syntax Command ***CLS**

Detail Clears Standard Event Status Register (SESR) and Device-specific Event Status Registers (ESR0 through ESR3). The Status Byte Register (STB) bits corresponding to the registers in the left are also cleared.

Reference

- The output queue, enable registers, and bit 4 of the status byte register (MAV) are not affected.

Setting and Querying Standard Event Status Enable Register (SESER)

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

Query ***ESE?**

Response <0 to 255 (NR1)>

128	64	32	16	8	4	2	1
bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
PON	URQ	CME	EXE	DDE	QYE	RQC	OPC

Detail Command Sets a mask pattern for SESER.

Query *Returns the content of SESER set with an ESE command as a value.

Example Command ***ESE 36**

Sets SESER bits 5 and 2.

Query ***ESE?**

Response (HEADER ON) ***ESE 36**
(HEADER OFF) **36**

Reference

- The initial value (at power-on) is 0.
- URQ (bit 6) and RQC (bit 1) are not used by the instrument. Therefore, these events will not be triggered even if a value of 1 is specified.

Querying and Clearing Standard Event Status Register (SESR)

Syntax Query ***ESR?**

Response <0 to 255 (NR1)>

128	64	32	16	8	4	2	1
bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
PON	URQ	CME	EXE	DDE	QYE	RQC	OPC

Detail Query Returns the content of SESER as a value and clears it.

Example Query ***ESR?**

Response **32**

Reference

- The response message has no header.

Querying Instrument's ID (Identification Code)

Syntax	Query	*IDN?
	Response	<HIOKI>, <Model name>, <Serial No.>, <Software version>
Detail	Returns <HIOKI>, <Model name>, <Serial No.> and <Software version>.	
Example	Query	*IDN?
	Response	HIOKI,PW6001-16,012345678,V1.00
Reference	- 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.	

Setting OPC bit of SESR after All Operations Completed

Syntax	Query	*OPC
Detail	After the command before *OPC command from the commands sent is completed, OPC bit (bit 0) of Standard Event Status Register (SESR) is set.	
Example	:MEAS?;*OPC Sets the OPC bit of the SESR after the :MEAS? query finishes processing.	
Reference		

Setting "1" to Output Queue after All Operations Running Completed

Syntax	Query	*OPC?
	Response	1
Detail	After the command before *OPC command from the commands sent is completed, "1" is stored in the output queue.	
Example	:EXT:ZERO;*OPC? "1" is stored in the output queue after the zero compensation of the motor is executed.	
Reference	The response message has no header.	

Querying Instrument's Options

Syntax	Query	*OPT?
	Response	<CH1 sensor>, <CH2 sensor>, <CH3 sensor>, <CH4 sensor>, <CH5 sensor>, <CH6 sensor>
Detail	Queries the options available on the instrument.	
Example	Query	*OPT?
	Response	ACDC50,ACDC200,Probe2,Probe2 CH1 uses AC/DC sensor(50A), CH2 uses AC/DC sensor(200A), and CH3 and CH4 use Probe2. No response message will be output for CH5 or CH6 when only four input channels are used.
Reference	- The response message has no header. - If the sensor is Probe2, "Probe2", not the rating is returned. "*OPT?" 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.	

Initializing Instrument

Syntax Command ***RST**

Detail Executes system reset to return to the instrument's factory setting.

Reference • Language and communication settings are not initialized.

Setting and Querying Service Request Status Enable Register (SRER)

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

Query ***SRE?**

Response <0 to 255 (NR1)>

128	64	32	16	8	4	2	1
bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
0	0	ESB	MAV	ESB3	ESB2	ESB1	ESB0

Detail Command Sets a mask pattern for SRER as a value.

Query *Returns the content of SRER set with an SRE command as a value.

Example Command ***SRE 33**

Sets SRER bits 5 and 0.

Query ***SRE?**

Response (HEADER ON) ***SRE 33**
(HEADER OFF) **33**

Reference • The data is initialized to zero at power-on.
• Unused bits (bit 7, 6) always return zero.

Querying Status Byte Register

Syntax Query ***STB?**

Response <0 to 127 (NR1)>

128	64	32	16	8	4	2	1
bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
-	MSS	ESB	MAV	ESB3	ESB2	ESB1	ESB0

Detail Query Returns the STB setting as a numerical value.

Example Query ***STB?**

Response **16**

Reference • The response message has no header.
• 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.

Sampling Request

Syntax Command ***TRG**

Detail Command Perform a one-time measurement in the hold state or the peak hold state.

Example Command **:HOLD ON;*TRG;:MEAS? Urms1**

Reference • Send two *WAI commands after *TRG when you update measured values in the hold state. Example: MEAS? Urms1;*TRG;*WAI;*WAI;:MEAS? Urms1

Executing Self-test and Querying Result

Syntax	Query	*TST?	
	Response	PASS	Normal
		FAIL	Error
Detail	Query	Performs the instrument self-test and returns the result as a string.	
Example	Query	*TST?	
	Response	PASS	
Reference		• The response message has no header.	

Executing the next command once measurement data update processing is complete.

Syntax	Command	*WAI
Detail	Command	No commands after *WAI are run until the next measurement data update completes.
Example	Command	*WAI::MEAS? Urms1;*WAI::MEAS? Urms1
		Queries measured data for every measurement data update.
Reference		• When combining the *WAI and MEAS? commands, input the *WAI command before querying measurement data. Set the number of measurement parameters such that the corresponding number of response characters can be received within the measurement data update rate time. • When the data update rate is 10 ms or 50 ms, the measurement data update rate will be 50 ms. • When the data update rate is 200 ms, the measurement data update rate will be 200 ms.

3.2 Device-specific Commands

Setting and Querying Full-scale D/A Integration

Syntax	Command	:AOUT:INTEGrate <Scale Data>
	Query	:AOUT:INTEGrate?
	Response	Scale data 1/10 , 1/2 , 1 , 5 , 10 , 50 , 100 , 500 , 1000 , 5000 , 10000
Detail	Command	Sets full-scale D/A output integration coefficient.
	Query	Returns full-scale D/A output integration coefficient setting.
Example	Command	:AOUT:INTEG 1
	Query	:AOUT:INTEG?
	Response	(HEADER ON) :AOUT:INTEGRATE 1
		(HEADER OFF) 1
Reference		

Setting and Querying D/A Output Items

Syntax	Command	:AOUT:ITEM <Item 1>,..., <Item 20>
	Query	:AOUT:ITEM?
	Response	<Item 1> , <Item 2> ,..., <Item 19> , <Item 20> Item 1 to Item 20 See "4.1 Parameters for Normal Measurement Items".
Detail	Command	Sets D/A output (analog output) item. One through below 20 output items must be set. Output item for a D/A channel not specified will not be changed.
	Query	Returns setting for D/A output (analog output) item in a string.
Example	Command	:AOUT:ITEM Urms1,Irms1,P1,Q1,S1,PF1
		Sets D/A outputs for voltage CH1 RMS, current CH1 RMS, active power CH1, reactive power CH1, apparent power CH1 and power factor CH1, starting with channel 1.
	Query	:AOUT:ITEM?
	Response	(HEADER ON) :AOUT:ITEM Urms1,Irms1,P1,Q1,S1,PF1,OFF,OFF,OFF,OFF,OFF,OFF,OFF,OFF, OFF,OFF,OFF,OFF,OFF,OFF (HEADER OFF) Urms1,Irms1,P1,Q1,S1,PF1,OFF,OFF,OFF,OFF,OFF,OFF,OFF,OFF, OFF,OFF,OFF,OFF,OFF,OFF
Reference		

Setting and Querying D/A Output Waveform

Syntax	Command	:AOUT:MONitor <ON/OFF>
	Query	:AOUT:MONitor?
	Response	ON Waveform output ON OFF Waveform output OFF
Detail	Command	Sets waveform output.
	Query	Returns waveform output setting in a string.
Example	Command	:AOUT:MON ON
	Query	:AOUT:MON?
	Response	(HEADER ON) :AOUT:MONITOR ON
		(HEADER OFF) ON
Reference		

Setting and Querying Full-scale D/A Output Waveform	
Syntax	Command : AOUT:MONitor:SCALe <1/2> Query : AOUT:MONitor:SCALe ? Response 1 ± 1 V f.s. 2 ± 2 V f.s.
Detail	Command Sets full-scale D/A waveform output. Query Returns setting for full-scale D/A waveform output as a numeric value.
Example	Command : AOUT:MON:SCAL 1 Query : AOUT:MON:SCAL? Response (HEADER ON) : AOUT:MONITOR:SCALE 1 (HEADER OFF) 1
Reference	
Setting and Querying Auto-range Extent	
Syntax	Command : AUTOrange <WIDE/NARROW> Query : AUTOrange ? Response WIDE Expands auto-range extent. NARROW Narrows auto-range extent.
Detail	Command Sets whether to expand or narrow the auto-range extent. Query Returns auto-range extent in a string.
Example	Command : AUTO WIDE Query : AUTO? Response (HEADER ON) : AUTORANGE WIDE (HEADER OFF) WIDE
Reference	
Setting and Querying Average	
Syntax	Command : AVERaging:MODE <OFF/ADD/FAST/MID/SLOW> Query : AVERaging:MODE? Response OFF N/A ADD Simple average FAST Exponential mean (EXP FAST) MID Exponential mean (EXP MID) SLOW Exponential mean (EXP SLOW)
Detail	Command Sets the average. Query Returns setting for average in a string.
Example	Command : AVE:MODE FAST Query : AVE:MODE? Response (HEADER ON) : AVERAGING:MODE FAST (HEADER OFF) FAST
Reference	When setting for average is changed, averaging restarts.

Setting and Querying Number of Averaging Times	
Syntax	Command : AVERaging:TIMEs <Number of averaging times> Query : AVERaging:TIMEs? Response Number of averaging times 5 / 10 / 20 / 50 / 100
Detail	Command Sets number of averaging times for simple average. Query Returns number of averaging times for simple average in a numeric value.
Example	Command : AVE:TIME 10 Query : AVE:TIME? Response (HEADER ON) : AVERAGING:TIMES 10 (HEADER OFF) 10
Reference	
Setting and Querying Beep	
Syntax	Command : BEEPPer <ON/OFF> Query : BEEPPer? Response ON Beep ON OFF Beep OFF
Detail	Command Sets beep. Query Returns setting for beep in a string.
Example	Command : BEEP ON Query : BEEP? Response (HEADER ON) : BEEPER ON (HEADER OFF) ON
Reference	
Setting and Querying Pin for Efficiency and Loss Formulas	
Syntax	Command : CALCulate[number]:PIN <Item 1>, <Item 2>, <Item 3>, <Item 4> Query : CALCulate[number]:PIN? Response <Item 1>, <Item 2>, <Item 3>, <Item 4> Item 1 to Item 4 OFF / P1 / P2 / P3 / P4 / P5 / P6 / P12 / P34 / P45 / P56 / P123 / P456 / Pfd1 / Pfd2 / Pfd3 / Pfd4 / Pfd5 / Pfd6 / Pfd12 / Pfd34 / Pfd45 / Pfd56 / Pfd123 / Pfd456 / Pm1 / Pm2 / P1slv / P2slv / P3slv / P4slv / P5slv / P6slv / P12slv / P34slv / P45slv / P56slv / P123slv / P456slv / Pfd1slv / Pfd2slv / Pfd3slv / Pfd4slv / Pfd5slv / Pfd6slv / Pfd12slv / Pfd34slv / Pfd45slv / Pfd56slv / Pfd123slv / Pfd456slv / Pm1slv / Pm2slv
Detail	Command Sets Pin items for efficiency and loss formulas. Any of efficiency and loss formulas 1 to 4 must be specified to [number]. Query Returns Pin items for efficiency and loss formulas in a string.
Example	Command : CALC1:PIN P1,P34,P12,OFF Sets P1 for Pin1, P34 for Pin2 and P12 for Pin3 and OFF for Pin4 in efficiency and loss formula 1. Query : CALC1:PIN? Response (HEADER ON) : CALCULATE1:PIN P1,P34,P12,OFF (HEADER OFF) P1,P34,P12,OFF
Reference	If number of items is less than 4, items that have not been set will not be changed.

Setting and Querying Pout for Efficiency and Loss Formulas

Syntax	Command	:CALCulate[number]:POUT <Item 1>, <Item 2>, <Item 3>, <Item 4>
	Query	:CALCulate[number]:POUT?
	Response	<Item 1>, <Item 2>, <Item 3>, <Item 4>
	Item 1 to Item 4	OFF / P1 / P2 / P3 / P4 / P5 / P6 / P12 / P34 / P45 / P56 / P123 / P456 / Pfnd1 / Pfnd2 / Pfnd3 / Pfnd4 / Pfnd5 / Pfnd6 / Pfnd12 / Pfnd34 / Pfnd45 / Pfnd56 / Pfnd123 / Pfnd456 / Pm1 / Pm2 / P1slv / P2slv / P3slv / P4slv / P5slv / P6slv / P12slv / P34slv / P45slv / P56slv / P123slv / P456slv / Pfnd1slv / Pfnd2slv / Pfnd3slv / Pfnd4slv / Pfnd5slv / Pfnd6slv / Pfnd12slv / Pfnd34slv / Pfnd45slv / Pfnd56slv / Pfnd123slv / Pfnd456slv / Pm1slv / Pm2slv
Detail	Command	Sets Pout items for efficiency and loss formulas. Any of efficiency and loss formulas 1 to 4 must be specified to [number].
	Query	Returns Pout items for efficiency and loss formulas in a string.
Example	Command	:CALC1:POUT P12,Pm1,Pm1,OFF
		Sets P12 for Pout1, Pm1 for Pout2 and Pm1 for Put3 and OFF for Pout4 in efficiency and loss formula 1.
	Query	:CALC1:POUT?
	Response	(HEADER ON) :CALCULATE1:POUT P12,Pm1,Pm1,OFF (HEADER OFF) P12,Pm1,Pm1,OFF
Reference		If number of items is less than 4, items that have not been set will not be changed.

Setting and Querying Clock

Syntax	Command	:CLOCK <Year (NR1)>, <Month (NR1)>, <Date (NR1)>, <Hour (NR1)>, <Minute (NR1)>, <Second (NR1)>
	Query	:CLOCK?
	Response	<Year>, <Month>, <Date>, <Hour>, <Minute>, <Second>
	Year	2010 to 2077, (10 to 77)
	Month	1 to 12
	Date	1 to 31
	Hour	0 to 23
	Minute	0 to 59
	Second	0 to 59
Detail	Command	Sets time for the clock in the instrument.
	Query	Returns time of the clock in the instrument as an NR1 value.
Example	Command	:CLOC 2014,12,19,12,00,00
		Sets 12:00:00 on December 19, 2014.
	Query	:CLOC?
	Response	(HEADER ON) :CLOCK 2014,12,19,12,00,30 (HEADER OFF) 2014,12,19,12,00,30
Reference		As the instrument identifies the number of days from the month and whether the year is a leap year, specifying an impossible date results in an execution error.

File: Setting and Querying Comment Save for Screen Hardcopy

Syntax	Command	:COPY:COMMeNt <OFF/TEXT/BMP>
	Query	:COPY:COMMeNt?
	Response OFF	Comment save OFF
	TEXT	Text comment
	BMP	Handwritten image comment
Detail	Command	Sets comment save for screen hardcopy.
	Query	Returns comment save setting for screen hardcopy in a string.
Example	Command	:COPY:COMM TEXT
	Query	:COPY:COMM?
	Response (HEADER ON)	:COPY:COMMENT TEXT
	(HEADER OFF)	TEXT
Reference		

File: Setting and Querying Destination Folder Name for Saving Screen Hardcopy

Syntax	Command	:COPY:FOLDername <Folder name>
	Query	:COPY:FOLDername?
	Response	<Folder name>
Detail	Command	Sets destination folder name for saving screen hardcopy.
	Query	Returns destination folder name for saving screen hardcopy in a string.
Example	Command	:COPY:FOLD H6001
	Query	:COPY:FOLD?
	Response (HEADER ON)	:COPY:FOLDERNAME H6001
	(HEADER OFF)	H6001
Reference		• The folder name is a string consisting of up to 8 characters. • Characters available: ASCII characters H'20 through H'7E ("*/:<>?¥ are not included). • If "NO_FOLDER" is specified for the folder name, the destination folder becomes the root.

File: Setting and Querying Setting Information Save for Screen Hardcopy

Syntax	Command	:COPY:INFormation <ON/OFF>
	Query	:COPY:INFormation?
	Response ON	Setting information save ON
	OFF	Setting information save OFF
Detail	Command	Sets setting information save for screen hardcopy.
	Query	Returns setting information save setting for screen hardcopy in a string.
Example	Command	:COPY:INF ON
	Query	:COPY:INF?
	Response (HEADER ON)	:COPY:INFORMATION ON
	(HEADER OFF)	ON
Reference		

Setting and Querying Current Auto-range

Syntax	Command	:CURRent[CH]:AUTO <ON/OFF>
	Query	:CURRent[CH]:AUTO?
	Response ON	Measures current in auto-range mode.
	OFF	Measures current in manual-range mode.
Detail	Command	Sets current auto-range. [CH]: 1 to 6.
	Query	Returns current auto-range setting in a string.
Example	Command	:CURR1:AUTO ON
	Query	:CURR1:AUTO?
	Response	(HEADER ON) :CURRENT1:AUTO ON (HEADER OFF) ON
Reference	• If a range is set with a CURRent[CH]:RANGe command, the auto-range for specified channel becomes OFF. • Depending on the combination of lines to be measured, current auto-range settings for other channels combined will be changed.	

Setting and Querying Phase Correction Formulas for Current Sensors

Syntax	Command	:CURRent[CH]:CORRect <ON/OFF>
	Query	:CURRent[CH]:CORRect?
	Response ON	Turns ON phase correction formulas for current sensors
	OFF	Turns OFF phase correction formulas for current sensors
Detail	Command	Sets phase correction formulas for current sensors. [CH]: 1 to 6.
	Query	Returns setting for phase correction formulas for current sensors in a string.
Example	Command	:CURR1:CORR ON
	Query	:CURR1:CORR?
	Response	(HEADER ON) :CURRENT1:CORRECT ON (HEADER OFF) ON
Reference		

Setting and Querying Phase Correction Angle for Current Sensors

Syntax	Command	:CURRent[CH]:DEGRee <Phase correction angle>
	Query	:CURRent[CH]:DEGRee?
	Response	Phase correction angle (°) -90.00 to +90.00
Detail	Command	Sets phase correction angle for current sensors. [CH]: 1 to 6.
	Query	Returns setting for phase correction angle for current sensors in a string.
Example	Command	:CURR1:DEGR 90.00
	Query	:CURR1:DEGR?
	Response	(HEADER ON) :CURRENT1:DEGREE +90.00 (HEADER OFF) +90.00
Reference		

Setting and Querying Phase Correction Frequency for Current Sensors

Syntax Command :**CURRent**[CH]:**FREQuency** <Correction frequency (kHz)>
Query :**CURRent**[CH]:**FREQuency**?
Response Correction frequency (kHz) 000.1 to 999.9

Detail Command Sets phase correction frequency for current sensors. [CH]: 1 to 6.
Query Returns setting for phase correction frequency for current sensors in a string.

Example Command :**CURR1:FREQ 200.0**
Query :**CURR1:FREQ?**
Response (HEADER ON) :**CURRENT1:FREQUENCY 200.0**
(HEADER OFF) 200.0

Reference

Setting and Querying Current Sensor Terminals

Syntax Command :**CURRent**[CH]:**INPut** <Probe1/Probe2>
Query :**CURRent**[CH]:**INPut**?
Response Probe1 Probe 1
Probe2 Probe 2

Detail Command Sets type of current sensor terminal. [CH]: 1 to 6.
Query Returns setting for current sensor terminal in a string.

Example Command :**CURR1:INP Probe1**
Query :**CURR1:INP?**
Response (HEADER ON) :**CURRENT1:INPUT Probe1**
(HEADER OFF) Probe1

Reference

Setting and Querying Current Rectification Method

Syntax Command :**CURRent**[CH]:**MEAN** <ON/OFF>
Query :**CURRent**[CH]:**MEAN**?
Response ON Sets current rectification method to MEAN.
OFF Sets current rectification method to RMS.

Detail Command Sets current rectification method. [CH]: 1 to 6.
Query Returns setting for current rectification method in a string.

Example Command :**CURR1:MEAN OFF**
Query :**CURR1:MEAN?**
Response (HEADER ON) :**CURRENT1:MEAN OFF**
(HEADER OFF) OFF

Reference

- Setting for current rectification method for other channel combined will be changed depending on the pair of measurement lines.

Setting and Querying Current Range

Syntax	Command	:CURRent[CH]:RANGe <Current rage (NR2)>
	Query	:CURRent[CH]:RANGe?
Response	0.04 / 0.08 / 0.20 / 0.40 / 0.80 / 2	(2 A sensor)
	0.40 / 0.80 / 2 / 4 / 8 / 20	(20 A sensor)
	4 / 8 / 20 / 40 / 80 / 200	(200 A sensor)
	40 / 80 / 200 / 400 / 800 / 2000	(2000 A sensor)
	0.10 / 0.20 / 0.50 / 1 / 2 / 5	(5 A sensor)
	1 / 2 / 5 / 10 / 20 / 50	(50 A sensor)
	10 / 20 / 50 / 100 / 200 / 500	(500 A sensor)
	100 / 200 / 500 / 1000 / 2000 / 5000	(5000 A sensor)
	20 / 40 / 100 / 200 / 400 / 1000	(CT6865)
	1000 / 2000 / 5000 / 10000 / 20000 / 50000	(0.1 mV/A sensor)
	100 / 200 / 500 / 1000 / 2000 / 5000	(1 mV/A sensor)
	10 / 20 / 50 / 100 / 200 / 500	(10 mV/A sensor, 3274, 3275)
	1 / 2 / 5 / 10 / 20 / 50	(100 mV/A sensor, 3273, 3276)
	0.10 / 0.20 / 0.50 / 1 / 2 / 5	(1 V/A sensor, CT6700, CT6701)

Detail	Command	Sets a current range. The unit is [A]. [CH]: 1 to 6.
	Query	Returns current range setting in an NR2 numeric value.

Example	Command	:CURR1:RANG 0.04
	Query	:CURR1:RANG?
	Response	(HEADER ON) :CURRENT1:RANGE 0.04 (HEADER OFF) 0.04

Reference	- The range allowed depends on the current sensor type. - Numeric values are accepted in NRf format but the values to the right of the decimal are rounded. - Do not set a unit for current range. - After you change the range, wait a few moments until the internal circuitry stabilizes before you read any measured values. - If a range is specified, the auto-range specified is turned OFF. - Depending on the combination of lines to be measured (1P3W or higher), current auto-range settings for other channels combined will be changed.	

Setting and Querying Current Sensor Plobe2 Rating

Syntax	Command	:CURRent[CH]:RATE <Rating>
	Query	:CURRent[CH]:RATE?
	Response	Rating 100uV/A,1mV/A,10mV/A,100mV/A,1V/A,3273,3274,3275,3276,CT6700,CT6701

Detail	Command	Sets a current sensor Plobe2 rating. [CH]: 1 to 6.
	Query	Returns current sensor Plobe2 rating in a string.

Example	Command	:CURR1:RATE CT6700
	Query	:CURR1:RATE?
	Response	(HEADER ON) :CURRENT1:RATE CT6700 (HEADER OFF) CT6700

Reference

Save item: Initialized Save Data Items

Syntax Command :**DATAout:ITEM:ALLClear**

Detail Command Initializes save data items.

All the save data items associated with ":DATAout:ITEM:" will be turned OFF.

Example Command :**DATA:ITEM:ALLC**

Reference

Save item: Initialized Save Data Items (Slave)

Syntax Command :**DATAout:SLAVE:ALLClear**

Detail Command Initializes save data items (slave).

All the save data items associated with ":DATAout:SLAVE:" will be turned OFF.

Example Command :**DATA:SLAV:ALLC**

Reference

Save Item: Setting and Querying Efficiency and Loss Formulas

Syntax Command :**DATAout:ITEM:EFFiciency <EFF>,<LOSS>**

Query :**DATAout:ITEM:EFFiciency?**

Response <EFF>,<LOSS>

	128	64	32	16	8	4	2	1
	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
EFF (η)	-	-	-	-	EFF4	EFF3	EFF2	EFF1
LOSS	-	-	-	-	LOSS4	LOSS3	LOSS2	LOSS1

Detail Command Sets save items of calculated efficiency (EFF) and loss (LOSS) values in values from 0 to 255.

Query Returns the setting for save item of calculated efficiency and loss values in numerical values.

Example Command :**DATA:ITEM:EFF 3,8**

Sets all calculated efficiency values 1 and 2 (EFF1 and EFF2) and calculated loss value 4 (LOSS4) to ON.

Query :**DATA:ITEM:EFF?**

Response (HEADER ON) :**DATAOUT:ITEM:EFFICIENCY 3,8**

(HEADER OFF) 3,8

Reference

Save Item: Setting and Querying Calculated Efficiency and Loss (Slave)

Syntax Command :**DATAout:SLAVe:EFFiciency** <EFF>,<LOSS>
 Query :**DATAout:SLAVe:EFFiciency?**
 Response <EFF>,<LOSS>

	128	64	32	16	8	4	2	1
	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
EFF (η)	-	-	-	-	EFF4	EFF3	EFF2	EFF1
LOSS	-	-	-	-	LOSS4	LOSS3	LOSS2	LOSS1

Detail Command Sets save items of calculated efficiency (EFF) and loss (LOSS) values (slave) in values from 0 to 255.
 Query Returns the setting for save item of calculated efficiency and loss values (slave) in numerical values.

Example Command :**DATA:SLAV:EFF 12,5**
 Sets all calculated efficiency values 3 and 4 (EFF3 and EFF4) and calculated loss values 1 and 3 (LOSS1 and LOSS3) to ON.
 Query :**DATA:SLAV:EFF?**
 Response (HEADER ON) :**DATAOUT:ITEM:EFFICIENCY 12,5**
 (HEADER OFF) 12,5

Reference

Save item: Initialized Save Data Items for Harmonics

Syntax Command :**DATAout:ITEM:HARMonic:ALLClear**

Detail Command Initializes save data items for harmonics.
 All the save data items for harmonics will be turned OFF.

Example Command :**DATA:ITEM:HARM:ALLC**

Reference

Save Item: Setting and Querying Harmonics Data

Syntax Command **:DATAout:ITEM:HARMonic:LIST** <Level U>, <Level I>, <Level P>, <Level Psum>, <Content percentage U>, <Content percentage I>, <Content percentage P>, <Content percentage Psum>, <Phase angle U>, <Phase angle I>, <Phase angle P>, <Phase angle Psum>

Query **:DATAout:ITEM:HARMonic:LIST?**

Response <Level U>, <Level I>, <Level P>, <Level Psum>, <Content percentage U>, <Content percentage I>, <Content percentage P>, <Content percentage Psum>, <Phase angle U>, <Phase angle I>, <Phase angle P>, <Phase angle Psum>

Harmonics
List

	128	64	32	16	8	4	2	1
	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
Level U	-	-	HU6	HU5	HU4	HU3	HU2	HU1
Level I	-	-	HI6	HI5	HI4	HI3	HI2	HI1
Level P	-	-	HP6	HP5	HP4	HP3	HP2	HP1
Level Psum	-	-	HP456	HP123	HP56	HP45	HP34	HP12
Content percentage U	-	-	HU6	HU5	HU4	HU3	HU2	HU1
Content percentage I	-	-	HI6	HI5	HI4	HI3	HI2	HI1
Content percentage P	-	-	HP6	HP5	HP4	HP3	HP2	HP1
Content percentage Psum	-	-	HP456	HP123	HP56	HP45	HP34	HP12
Phase angle U	-	-	HU6	HU5	HU4	HU3	HU2	HU1
Phase angle I	-	-	HI6	HI5	HI4	HI3	HI2	HI1
Phase angle P	-	-	HP6	HP5	HP4	HP3	HP2	HP1
Phase angle Psum	-	-	HP456	HP123	HP56	HP45	HP34	HP12

Detail

Command Sets save items of harmonics value in a value from 0 to 255.

You must specify a harmonics list (level, content percentage, phase angle) here.

You must set items by using ON/OFF for the bits above and specifying values with numeric data from 0 to 255.

Query Returns harmonics list settings for save items of harmonics values in values from 0 to 255.

Example

Command **:DATA:ITEM:HARM:LIST 1,1,1,0,1,1,1,0,1,1,1,0**

Sets HU1, HI1 and HP1 for the level, HU1, HI1 and HP1 for the content percentage and HU1, HI1 and HP1 for the phase angle.

Query **:DATA:ITEM:HARM:LIST?**

Response (HEADER ON) **:DATAOUT:ITEM:HARMONIC:LIST 1,1,1,0,1,1,1,0,1,1,1,0**
(HEADER OFF) **1,1,1,0,1,1,1,0,1,1,1,0**

Reference

- Use ":DATAout:ITEM:HARMonic:ORDer" command to set the order to be saved.

Save Item: Setting and Querying Output Order for Harmonics Data

Syntax	Command	:DATAout:ITEM:HARMonic:ORDer <Lower limit order(NR1)>, <Upper limit order(NR1)>, <ODD/EVEN/ALL>
	Query	:DATAout:ITEM:HARMonic:ORDer?
Response		<Lower limit order>, <Upper limit order>, <ODD/EVEN/ALL>
	Lower limit order	0 to 100
	Upper limit order	0 to 100
	ODD	Odd order only
	EVEN	Even order only
	ALL	All orders

Detail	Command	Sets upper and lower limit orders and even, odd and all orders for save items of harmonics data.
	Query	Returns order settings for items of harmonics data in a numeric value and a string.

Example	Command	:DATA:ITEM:HARM:ORD 1,15,ODD
		Sets odd orders from 1 to 15 as outputs.
	Query	:DATA:ITEM:HARM:ORD?
	Response	(HEADER ON) :DATAOUT:ITEM:HARMONIC:ORDER 1,15,ODD (HEADER OFF) 1,15,ODD

Reference	Use this command as a combination with ":DATAout:ITEM:HARMonic:LIST" command.
------------------	---

Save Item: Setting and Querying Current Data

Syntax	Command	:DATAout:ITEM:I <RMS>,<MN>,<AC>,<DC>,<FND>,<PK+>,<PK->,<THD>,<RF>,<DEG>
	Query	:DATAout:ITEM:I?
Response		<RMS>,<MN>,<AC>,<DC>,<FND>,<PK+>,<PK->,<THD>,<RF>,<DEG>

	128	64	32	16	8	4	2	1
	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
RMS	-	-	lrms6	lrms5	lrms4	lrms3	lrms2	lrms1
MN	-	-	lmn6	lmn5	lmn4	lmn3	lmn2	lmn1
AC	-	-	lac6	lac5	lac4	lac3	lac2	lac1
DC	-	-	ldc6	ldc5	ldc4	ldc3	ldc2	ldc1
FND	-	-	lfnd6	lfnd5	lfnd4	lfnd3	lfnd2	lfnd1
PK+	-	-	Plpk6	Plpk5	Plpk4	Plpk3	Plpk2	Plpk1
PK-	-	-	Mlpk6	Mlpk5	Mlpk4	Mlpk3	Mlpk2	Mlpk1
THD	-	-	lthd6	lthd5	lthd4	lthd3	lthd2	lthd1
RF	-	-	lrf6	lrf5	lrf4	lrf3	lrf2	lrf1
DEG (φ)	-	-	ldeg6	ldeg5	ldeg4	ldeg3	ldeg2	ldeg1

Detail	Command	Sets save items of current data in a value from 0 to 255.
	Query	Returns setting for save item of current data in a value from 0 to 255.

Example	Command	:DATA:ITEM:I 3,3,3,0,0,3,3,0,0,0
		You must set RMS, MN, AC, PK+ and PK- to all ON for the channels 1 and 2.
	Query	:DATA:ITEM:I?
	Response	(HEADER ON) :DATAOUT:ITEM:I 3,3,3,0,0,3,3,0,0,0 (HEADER OFF) 3,3,3,0,0,3,3,0,0,0

Reference

Save Item: Setting and Querying Current Data (Slave)

Syntax Command :**DATAout:SLAVE:I**
<RMS>,<MN>,<AC>,<DC>,<FND>,<PK+>,<PK->,<THD>,<RF>,<DEG>
 Query :**DATAout:SLAVE:I?**
 Response <RMS>,<MN>,<AC>,<DC>,<FND>,<PK+>,<PK->,<THD>,<RF>,<DEG>

	128	64	32	16	8	4	2	1
	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
RMS	-	-	lrms6	lrms5	lrms4	lrms3	lrms2	lrms1
MN	-	-	lmn6	lmn5	lmn4	lmn3	lmn2	lmn1
AC	-	-	lac6	lac5	lac4	lac3	lac2	lac1
DC	-	-	ldc6	ldc5	ldc4	ldc3	ldc2	ldc1
FND	-	-	lfnd6	lfnd5	lfnd4	lfnd3	lfnd2	lfnd1
PK+	-	-	Plpk6	Plpk5	Plpk4	Plpk3	Plpk2	Plpk1
PK-	-	-	MIpk6	MIpk5	MIpk4	MIpk3	MIpk2	MIpk1
THD	-	-	lthd6	lthd5	lthd4	lthd3	lthd2	lthd1
RF	-	-	lrf6	lrf5	lrf4	lrf3	lrf2	lrf1
DEG (φ)	-	-	ldeg6	ldeg5	ldeg4	ldeg3	ldeg2	ldeg1

Detail Command Sets save items of current data (slave) in a value from 0 to 255.
 Query Returns setting for save item of current data (slave) in a value from 0 to 255.

Example Command :**DATA:SLAV:I 3,3,3,0,0,3,3,0,0,0**
 You must set RMS, MN, AC, PK+ and PK- for the channels 1 and 2.
 Query :**DATA:SLAV:I?**
 Response (HEADER ON) :**DATAOUT:SLAVE:I 3,3,3,0,0,3,3,0,0,0**
 (HEADER OFF) 3,3,3,0,0,3,3,0,0,0

Reference

Save Item: Setting and Querying Total Current Data

Syntax Command :**DATAout:ITEM:ISUM <RMS>,<MN>,<UNB>**
 Query :**DATAout:ITEM:ISUM?**
 Response <RMS>,<MN>,<UNB>

	128	64	32	16	8	4	2	1
	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
RMS	-	-	lrms456	lrms123	lrms56	lrms45	lrms34	lrms12
MN	-	-	lmn456	lmn123	lmn56	lmn45	lmn34	lmn12
UNB	-	-	lunb456	lunb123	-	-	-	-

Detail Command Sets save items of total current data in a value from 0 to 255.
 Query Returns setting for save item of total current data in a value from 0 to 255.

Example Command :**DATA:ITEM:ISUM 1,1,16**
 Sets lrms12, lmn12 and lunb123.
 Query :**DATA:ITEM:ISUM?**
 Response (HEADER ON) :**DATAOUT:ITEM:ISUM 1,1,16**
 (HEADER OFF) 1,1,16

Reference • This reference is the same with the one for ":DATAout:ITEM:I".

Save Item: Setting and Querying Total Current Data (Slave)

Syntax Command :**DATAout:SLAVE:ISUM <RMS>,<MN>,<UNB>**
 Query :**DATAout:SLAVE:ISUM?**
 Response <RMS>,<MN>,<UNB>

	128	64	32	16	8	4	2	1
	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
RMS	-	-	lrms456	lrms123	lrms56	lrms45	lrms34	lrms12
MN	-	-	lmn456	lmn123	lmn56	lmn45	lmn34	lmn12
UNB	-	-	lunb456	lunb123	-	-	-	-

Detail Command Sets save items of total current data (slave) in a value from 0 to 255.
 Query Returns setting for save item of total current data (slave) in a value from 0 to 255.

Example Command :**DATA:SLAV:ISUM 1,1,16**
 Sets lrms12, lmn12 and lunb123.
 Query :**DATA:SLAV:ISUM?**
 Response (HEADER ON) :**DATAOUT:SLAVE:ISUM 1,1,16**
 (HEADER OFF) **1,1,16**

Reference • This reference is the same with the one for ":DATAout:SLAVE:I".

Save Item: Setting and Querying Integration Data

Syntax Command :**DATAout:ITEM:INTEGrate <PIH>, <MIH>, <IH>, <PWP>, <MWP>, <WP>, <PWP_SUM>, <MWP_SUM>, <WP_SUM>, <Elapsed time>**
 Query :**DATAout:ITEM:INTEGrate?**
 Response <PIH>, <MIH>, <IH>, <PWP>, <MWP>, <WP>, <PWP_SUM>, <MWP_SUM>, <WP_SUM>, <Elapsed time>

	128	64	32	16	8	4	2	1
	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
PIH	-	-	PIH6	PIH5	PIH4	PIH3	PIH2	PIH1
MIH	-	-	MIH6	MIH5	MIH4	MIH3	MIH2	MIH1
IH	-	-	IH6	IH5	IH4	IH3	IH2	IH1
PWP	-	-	PWP6	PWP5	PWP4	PWP3	PWP2	PWP1
MWP	-	-	MWP6	MWP5	MWP4	MWP3	MWP2	MWP1
WP	-	-	WP6	WP5	WP4	WP3	WP2	WP1
PWP_SUM	-	-	PWP456	PWP123	PWP56	PWP45	PWP34	PWP12
MWP_SUM	-	-	MWP456	MWP123	MWP56	MWP45	MWP34	MWP12
WP_SUM	-	-	WP456	WP123	WP56	WP45	WP34	WP12
Elapsed time	-	-	-	-	-	-	ms unit	Time

Detail Command Sets save items of integration data in a value from 0 to 255.
 Hour, minute and second are saved if elapsed time is set to ON and elapsed time in ms unit is saved if ms unit is set to ON.
 Query Returns setting for save item of integration data in a value from 0 to 255.

Example Command :**DATA:ITEM:INTEG 0,0,0,1,1,1,0,0,0,1**
 Sets all the integrated power to ON and integrated elapsed time to ON for the channel 1.
 Query :**DATA:ITEM:INTEG?**
 Response (HEADER ON) :**DATAOUT:ITEM:INTEGRATE 0,0,0,1,1,1,0,0,0,1**
 (HEADER OFF) **0,0,0,1,1,1,0,0,0,1**

Reference • In order to output ms unit for elapsed time, a bit must be set for the time.

Save Item: Setting and Querying Integration Data (Slave)

Syntax Command :DATAout:SLAVE:INTEGrate <PIH>, <MIH>, <IH>, <PWP>, <MWP>, <WP>, <PWP_SUM>, <MWP_SUM>, <WP_SUM>, <Elapsed time>

Query :DATAout:SLAVE:INTEGrate?

Response <PIH>, <MIH>, <IH>, <PWP>, <MWP>, <WP>, <PWP_SUM>, <MWP_SUM>, <WP_SUM>, <Elapsed time>

	128	64	32	16	8	4	2	1
	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
PIH	-	-	PIH6	PIH5	PIH4	PIH3	PIH2	PIH1
MIH	-	-	MIH6	MIH5	MIH4	MIH3	MIH2	MIH1
IH	-	-	IH6	IH5	IH4	IH3	IH2	IH1
PWP	-	-	PWP6	PWP5	PWP4	PWP3	PWP2	PWP1
MWP	-	-	MWP6	MWP5	MWP4	MWP3	MWP2	MWP1
WP	-	-	WP6	WP5	WP4	WP3	WP2	WP1
PWP_SUM	-	-	PWP456	PWP123	PWP56	PWP45	PWP34	PWP12
MWP_SUM	-	-	MWP456	MWP123	MWP56	MWP45	MWP34	MWP12
WP_SUM	-	-	WP456	WP123	WP56	WP45	WP34	WP12
Elapsed time	-	-	-	-	-	-	ms unit	Time

Detail Command Sets save items of integration data (slave) in a value from 0 to 255.

Query Returns setting for save item of integration data (slave) in a value from 0 to 255.

Example Command :DATA:SLAV:INTEG 0,0,0,1,1,1,0,0,0,0

Sets all the integrated power to ON for the channel 1.

Query :DATA:SLAV:INTEG?

Response (HEADER ON) :DATAOUT:SLAVE:INTEGRATE 0,0,0,1,1,1,0,0,0,0

(HEADER OFF) 0,0,0,1,1,1,0,0,0,0

Reference • :DATAout:ITEM:INTEGrate command is enabled for elapsed time.

Save Item: Setting and Querying Normal Measured Values of Channels

Syntax Command :**DATAout:ITEM:NORMAL** <U>,<I>,<P>,<S>,<Q>,<PF>,<DEG>,<FREQ>
 Query :**DATAout:ITEM:NORMAL?**
 Response <U>,<I>,<P>,<S>,<Q>,<PF>,<DEG>,<FREQ>

	128	64	32	16	8	4	2	1
	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
U	-	-	U6	U5	U4	U3	U2	U1
I	-	-	I6	I5	I4	I3	I2	I1
P	-	-	P6	P5	P4	P3	P2	P1
S	-	-	S6	S5	S4	S3	S2	S1
Q	-	-	Q6	Q5	Q4	Q3	Q2	Q1
PF (λ)	-	-	PF6	PF5	PF4	PF3	PF2	PF1
DEG (φ)	-	-	DEG6	DEG5	DEG4	DEG3	DEG2	DEG1
FREQ	-	-	FREQ6	FREQ5	FREQ4	FREQ3	FREQ2	FREQ1

Detail Command Sets save items of normal measured values of channels in values from 0 to 255.

Query Returns settings for save items of normal measured values of channels in values from 0 to 255.

Example Command :**DATA:ITEM:NORM 1,1,1,0,0,1,0,0**

Sets voltage, current, active power and power factor of the channel 1 to ON.

Query :**DATA:ITEM:NORM?**

Response (HEADER ON) :**DATAOUT:ITEM:NORMAL 1,1,1,0,0,1,0,0**
 (HEADER OFF) 1,1,1,0,0,1,0,0

Reference

- All the U items (:DATAout:ITEM:U) of the specified channel is set to ON if this command is used to set U to ON, and all the U items is set OFF if U is set to OFF. The same applies to I data.
- P and P_{nd} of the channel specified by :DATAout:ITEM:P are set to either ON or OFF for P data. The same applies to S, Q and PF data.
- In order to specify detailed save items for U, I, P, S, Q and PF data, use :DATAout:ITEM:U, :DATAout:ITEM:I and :DATAout:ITEM:P commands after this command is issued.
- If any of items is set to ON of the channels on a query, the channel becomes ON.

Save Item: Setting and Querying Normal Measured Values of Channels (Slave)

Syntax Command **:DATAout:SLAVe:NORMal <U>,<I>,<P>,<S>,<Q>,<PF>,<DEG>,<FREQ>**
 Query **:DATAout:SLAVe:NORMal?**
 Response <U>,<I>,<P>,<S>,<Q>,<PF>,<DEG>,<FREQ>

	128	64	32	16	8	4	2	1
	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
U	-	-	U6	U5	U4	U3	U2	U1
I	-	-	I6	I5	I4	I3	I2	I1
P	-	-	P6	P5	P4	P3	P2	P1
S	-	-	S6	S5	S4	S3	S2	S1
Q	-	-	Q6	Q5	Q4	Q3	Q2	Q1
PF (λ)	-	-	PF6	PF5	PF4	PF3	PF2	PF1
DEG (φ)	-	-	DEG6	DEG5	DEG4	DEG3	DEG2	DEG1
FREQ	-	-	FREQ6	FREQ5	FREQ4	FREQ3	FREQ2	FREQ1

Detail Command Sets save items of normal measured values of channels (slave) in values from 0 to 255.
 Query Returns settings for save items of normal measured values of channels (slave) in values from 0 to 255.

Example Command **:DATA:SLAV:NORM 1,1,1,0,0,1,0,0**
 Sets voltage, current, active power and power factor of the channel 1 to ON.
 Query **:DATA:SLAV:NORM?**
 Response (HEADER ON) **:DATAOUT:SLAVE:NORMAL 1,1,1,0,0,1,0,0**
 (HEADER OFF) **1,1,1,0,0,1,0,0**

Reference

- All the U items (:DATAout:SLAVe:U) of the specified channel is set to ON if this command is used to set U to ON, and all the U items is set OFF if U is set to OFF. The same applies to I data.
- P and P_{nd} of the channel specified by :DATAout:SLAVe:P are set to either ON or OFF for P data. The same applies to S, Q and PF data.
- In order to specify detailed save items for U, I, P, S, Q and PF data, use :DATAout:SLAVe:U, :DATAout:SLAVe:I and :DATAout:SLAVe:P commands after this command is issued.
- If any of items is set to ON of the channels on a query, the channel becomes ON.

Save Item: Setting and Querying Power Data

Syntax Command :**DATAout:ITEM:P**
<P>,<Pfnd>,<S>,<Sfnd>,<Q>,<Qfnd>,<PF>,<PFnd>,<DEG>
 Query :**DATAout:ITEM:P?**
 Response <P>,<Pfnd>,<S>,<Sfnd>,<Q>,<Qfnd>,<PF>,<PFnd>,<DEG>

	128	64	32	16	8	4	2	1
	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
P	-	-	P6	P5	P4	P3	P2	P1
Pfnd	-	-	Pfnd6	Pfnd5	Pfnd4	Pfnd3	Pfnd2	Pfnd1
S	-	-	S6	S5	S4	S3	S2	S1
Sfnd	-	-	Sfnd6	Sfnd5	Sfnd4	Sfnd3	Sfnd2	Sfnd1
Q	-	-	Q6	Q5	Q4	Q3	Q2	Q1
Qfnd	-	-	Qfnd6	Qfnd5	Qfnd4	Qfnd3	Qfnd2	Qfnd1
PF (λ)	-	-	PF6	PF5	PF4	PF3	PF2	PF1
PFnd	-	-	PFnd6	PFnd5	PFnd4	PFnd3	PFnd2	PFnd1
DEG (φ)	-	-	DEG6	DEG5	DEG4	DEG3	DEG2	DEG1

Detail Command Sets save items of power data in a value from 0 to 255.
 Query Returns setting for save item of power data in a value from 0 to 255.

Example Command :**DATA:ITEM:P 1,0,1,0,1,0,1,0,1**
 You must set P, S, Q, PF and DEG to all ON for the channels 1.
 Query :**DATA:ITEM:P?**
 Response (HEADER ON) :**DATAOUT:ITEM:P 1,0,1,0,1,0,1,0,1**
 (HEADER OFF) **1,0,1,0,1,0,1,0,1**

Reference

Save Item: Setting and Querying Power Data (Slave)

Syntax Command :**DATAout:SLAVE:P**
<P>,<Pfnd>,<S>,<Sfnd>,<Q>,<Qfnd>,<PF>,<PFfnd>,<DEG>
 Query :**DATAout:SLAVE:P?**
 Response <P>,<Pfnd>,<S>,<Sfnd>,<Q>,<Qfnd>,<PF>,<PFfnd>,<DEG>

	128	64	32	16	8	4	2	1
	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
P	-	-	P6	P5	P4	P3	P2	P1
Pfnd	-	-	Pfnd6	Pfnd5	Pfnd4	Pfnd3	Pfnd2	Pfnd1
S	-	-	S6	S5	S4	S3	S2	S1
Sfnd	-	-	Sfnd6	Sfnd5	Sfnd4	Sfnd3	Sfnd2	Sfnd1
Q	-	-	Q6	Q5	Q4	Q3	Q2	Q1
Qfnd	-	-	Qfnd6	Qfnd5	Qfnd4	Qfnd3	Qfnd2	Qfnd1
PF (λ)	-	-	PF6	PF5	PF4	PF3	PF2	PF1
PFfnd	-	-	PFfnd6	PFfnd5	PFfnd4	PFfnd3	PFfnd2	PFfnd1
DEG (φ)	-	-	DEG6	DEG5	DEG4	DEG3	DEG2	DEG1

Detail Command Sets save items of power data (slave) in a value from 0 to 255.
 Query Returns setting for save item of power data (slave) in a value from 0 to 255.

Example Command :**DATA:SLAV:P 1,0,1,0,1,0,1,0,1**
 You must set P, S, Q, PF and DEG to all ON for the channels 1.
 Query :**DATA:SLAV:P?**
 Response (HEADER ON) :**DATAOUT:SLAVE:P 1,0,1,0,1,0,1,0,1**
 (HEADER OFF) 1,0,1,0,1,0,1,0,1

Reference

Save Item: Setting and Querying Total Power Data

Syntax Command :**DATAout:ITEM:PSUM**
<P>,<Pfnd>,<S>,<Sfnd>,<Q>,<Qfnd>,<PF>,<PFfnd>,<DEG>
 Query :**DATAout:ITEM:PSUM?**
 Response <P>,<Pfnd>,<S>,<Sfnd>,<Q>,<Qfnd>,<PF>,<PFfnd>,<DEG>

	128	64	32	16	8	4	2	1
	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
P	-	-	P456	P123	P56	P45	P34	P12
Pfnd	-	-	Pfnd456	Pfnd123	Pfnd56	Pfnd45	Pfnd34	Pfnd12
S	-	-	S456	S123	S56	S45	S34	S12
Sfnd	-	-	Sfnd456	Sfnd123	Sfnd56	Sfnd45	Sfnd34	Sfnd12
Q	-	-	Q456	Q123	Q56	Q45	Q34	Q12
Qfnd	-	-	Qfnd456	Qfnd123	Qfnd56	Qfnd45	Qfnd34	Qfnd12
PF (λ)	-	-	PF456	PF123	PF56	PF45	PF34	PF12
PFfnd	-	-	PFfnd456	PFfnd123	PFfnd56	PFfnd45	PFfnd34	PFfnd12
DEG (φ)	-	-	DEG456	DEG123	DEG56	DEG45	DEG34	DEG12

Detail Command Sets save items of total power data in a value from 0 to 255.

Query Returns setting for save item of total power data in a value from 0 to 255.

Example Command :**DATA:ITEM:PSUM 1,0,1,0,1,0,1,0,1**

You must set P, S, Q, PF and DEG to all ON for the channels 1.

Query :**DATA:ITEM:PSUM?**

Response (HEADER ON) :**DATAOUT:ITEM:PSUM 1,0,1,0,1,0,1,0,1**

(HEADER OFF) 1,0,1,0,1,0,1,0,1

Reference

Save Item: Setting and Querying Total Power Data (Slave)

Syntax Command :**DATAout:SLAVE:PSUM**
<P>,<Pfnd>,<S>,<Sfnd>,<Q>,<Qfnd>,<PF>,<PFfnd>,<DEG>
 Query :**DATAout:SLAVE:PSUM?**
 Response <P>,<Pfnd>,<S>,<Sfnd>,<Q>,<Qfnd>,<PF>,<PFfnd>,<DEG>

	128	64	32	16	8	4	2	1
	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
P	-	-	P456	P123	P56	P45	P34	P12
Pfnd	-	-	Pfnd456	Pfnd123	Pfnd56	Pfnd45	Pfnd34	Pfnd12
S	-	-	S456	S123	S56	S45	S34	S12
Sfnd	-	-	Sfnd456	Sfnd123	Sfnd56	Sfnd45	Sfnd34	Sfnd12
Q	-	-	Q456	Q123	Q56	Q45	Q34	Q12
Qfnd	-	-	Qfnd456	Qfnd123	Qfnd56	Qfnd45	Qfnd34	Qfnd12
PF (λ)	-	-	PF456	PF123	PF56	PF45	PF34	PF12
PFfnd	-	-	PFfnd456	PFfnd123	PFfnd56	PFfnd45	PFfnd34	PFfnd12
DEG (φ)	-	-	DEG456	DEG123	DEG56	DEG45	DEG34	DEG12

Detail Command Sets save items of total power data (slave) in a value from 0 to 255.
 Query Returns setting for save item of total power data (slave) in a value from 0 to 255.

Example Command :**DATA:SLAV:PSUM 1,0,1,0,1,0,1,0,1**
 You must set P, S, Q, PF and DEG to all ON for the channels 1.
 Query :**DATA:SLAV:PSUM?**
 Response (HEADER ON) :**DATAOUT:SLAVE:PSUM 1,0,1,0,1,0,1,0,1**
 (HEADER OFF) 1,0,1,0,1,0,1,0,1

Reference

Save Item: Setting and Querying Normal Measured Values for SUM

Syntax Command :DATAout:ITEM:SUM <U>,<I>,<P>,<S>,<Q>,<PF>,<DEG>
 Query :DATAout:ITEM:SUM?
 Response <U>,<I>,<P>,<S>,<Q>,<PF>,<DEG>

	128	64	32	16	8	4	2	1
	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
U	-	-	U456	U123	U56	U45	U34	U12
I	-	-	I456	I123	I56	I45	I34	I12
P	-	-	P456	P123	P56	P45	P34	P12
S	-	-	S456	S123	S56	S45	S34	S12
Q	-	-	Q456	Q123	Q56	Q45	Q34	Q12
PF (λ)	-	-	PF456	PF123	PF56	PF45	PF34	PF12
DEG (φ)	-	-	DEG456	DEG123	DEG56	DEG45	DEG34	DEG12

Detail Command Sets save items of normal measured values for SUM in values from 0 to 255.
 Query Returns settings for save items of normal measured values for SUM in values from 0 to 255.

Example Command :DATA:ITEM:SUM 1,0,1,0,1,0,1
 Sets U, P, Q and DEG of the SUM12 to ON.
 Query :DATA:ITEM:SUM?
 Response (HEADER ON) :DATAOUT:ITEM:SUM 1,0,1,0,1,0,1
 (HEADER OFF) 1,0,1,0,1,0,1

Reference

- All the U items (:DATAout:ITEM:U) of the specified channel is set to ON if this command is used to set U to ON, and all the U items is set OFF if U is set to OFF. The same applies to I data.
- P and P_{nd} of the channel specified by :DATAout:ITEM:PSUM are set to either ON or OFF for P data. The same applies to S, Q and PF data.
- In order to specify detailed save items for U, I, P, S, Q and PF data, use :DATAout:ITEM:USUM, :DATAout:ITEM:ISUM and :DATAout:ITEM:PSUM commands after this command is issued.
- If any of items is set to ON of the channels on a query, the channel becomes ON.

Save Item: Setting and Querying Normal Measured Values for SUM (Slave)

Syntax Command :DATAout:SLAVE:SUM <U>,<I>,<P>,<S>,<Q>,<PF>,<DEG>
 Query :DATAout:SLAVE:SUM?
 Response <U>,<I>,<P>,<S>,<Q>,<PF>,<DEG>

	128	64	32	16	8	4	2	1
	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
U	-	-	U456	U123	U56	U45	U34	U12
I	-	-	I456	I123	I56	I45	I34	I12
P	-	-	P456	P123	P56	P45	P34	P12
S	-	-	S456	S123	S56	S45	S34	S12
Q	-	-	Q456	Q123	Q56	Q45	Q34	Q12
PF (λ)	-	-	PF456	PF123	PF56	PF45	PF34	PF12
DEG (φ)	-	-	DEG456	DEG123	DEG56	DEG45	DEG34	DEG12

Detail Command Sets save items of normal measured values for SUM (slave) in values from 0 to 255.
 Query Returns settings for save items of normal measured values for SUM (slave) in values from 0 to 255.

Example Command :DATA:SLAV:SUM 1,0,1,0,1,0,1
 Sets U, P, Q and DEG of the SUM12 to ON.
 Query :DATA:SLAV:SUM?
 Response (HEADER ON) :DATAOUT:SLAVE:SUM 1,0,1,0,1,0,1
 (HEADER OFF) 1,0,1,0,1,0,1

Reference

- All the U items (:DATAout:SLAVE:U) of the specified channel is set to ON if this command is used to set U to ON, and all the U items is set OFF if U is set to OFF. The same applies to I data.
- P and Pfnd of the channel specified by :DATAout:SLAVE:PSUM are set to either ON or OFF for P data. The same applies to S, Q and PF data.
- In order to specify detailed save items for U, I, P, S, Q and PF data, use :DATAout:SLAVE:USUM, :DATAout:SLAVE:ISUM and :DATAout:SLAVE:PSUM commands after this command is issued.
- If any of items is set to ON of the channels on a query, the channel becomes ON.

Save Item: Setting and Querying Voltage Data

Syntax Command :**DATAout:ITEM:U**
<RMS>,<MN>,<AC>,<DC>,<FND>,<PK+>,<PK->,<THD>,<RF>,<DEG>
 Query :**DATAout:ITEM:U?**
 Response <RMS>,<MN>,<AC>,<DC>,<FND>,<PK+>,<PK->,<THD>,<RF>,<DEG>

	128	64	32	16	8	4	2	1
	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
RMS	-	-	Urms6	Urms5	Urms4	Urms3	Urms2	Urms1
MN	-	-	Umn6	Umn5	Umn4	Umn3	Umn2	Umn1
AC	-	-	Uac6	Uac5	Uac4	Uac3	Uac2	Uac1
DC	-	-	Udc6	Udc5	Udc4	Udc3	Udc2	Udc1
FND	-	-	Ufnd6	Ufnd5	Ufnd4	Ufnd3	Ufnd2	Ufnd1
PK+	-	-	PUpk6	PUpk5	PUpk4	PUpk3	PUpk2	PUpk1
PK-	-	-	MUpk6	MUpk5	MUpk4	MUpk3	MUpk2	MUpk1
THD	-	-	Uthd6	Uthd5	Uthd4	Uthd3	Uthd2	Uthd1
RF	-	-	Urf6	Urf5	Urf4	Urf3	Urf2	Urf1
DEG (φ)	-	-	Udeg6	Udeg5	Udeg4	Udeg3	Udeg2	Udeg1

Detail Command Sets save items of voltage data in a value from 0 to 255.

Query Returns setting for save item of voltage data in a value from 0 to 255.

Example Command :**DATA:ITEM:U 3,3,3,0,0,3,3,0,0,0**

You must set RMS, MN, AC, PK+ and PK- to all ON for the channels 1 and 2.

Query :**DATA:ITEM:U?**

Response (HEADER ON) :**DATAOUT:ITEM:U 3,3,3,0,0,3,3,0,0,0**

(HEADER OFF) **3,3,3,0,0,3,3,0,0,0**

Reference

Save Item: Setting and Querying Voltage Data (Slave)

Syntax Command :**DATAout:SLAVE:U**
<RMS>,<MN>,<AC>,<DC>,<FND>,<PK+>,<PK->,<THD>,<RF>,<DEG>
 Query :**DATAout:SLAVE:U?**
 Response <RMS>,<MN>,<AC>,<DC>,<FND>,<PK+>,<PK->,<THD>,<RF>,<DEG>

	128	64	32	16	8	4	2	1
	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
RMS	-	-	Urms6	Urms5	Urms4	Urms3	Urms2	Urms1
MN	-	-	Umn6	Umn5	Umn4	Umn3	Umn2	Umn1
AC	-	-	Uac6	Uac5	Uac4	Uac3	Uac2	Uac1
DC	-	-	Udc6	Udc5	Udc4	Udc3	Udc2	Udc1
FND	-	-	Ufnd6	Ufnd5	Ufnd4	Ufnd3	Ufnd2	Ufnd1
PK+	-	-	PUpk6	PUpk5	PUpk4	PUpk3	PUpk2	PUpk1
PK-	-	-	MUpk6	MUpk5	MUpk4	MUpk3	MUpk2	MUpk1
THD	-	-	Uthd6	Uthd5	Uthd4	Uthd3	Uthd2	Uthd1
RF	-	-	Urf6	Urf5	Urf4	Urf3	Urf2	Urf1
DEG (φ)	-	-	Udeg6	Udeg5	Udeg4	Udeg3	Udeg2	Udeg1

Detail Command Sets save items of voltage data (slave) in a value from 0 to 255.
 Query Returns setting for save item of voltage data (slave) in a value from 0 to 255.

Example Command :**DATA:SLAV:U 3,3,3,0,0,3,3,0,0,0**
 You must set RMS, MN, AC, PK+ and PK- to all ON for the channels 1 and 2.
 Query :**DATA:SLAV:U?**
 Response (HEADER ON) :**DATAOUT:SLAVE:U 3,3,3,0,0,3,3,0,0,0**
 (HEADER OFF) **3,3,3,0,0,3,3,0,0,0**

Reference

Save Item: Setting and Querying Total Voltage Data

Syntax Command :**DATAout:ITEM:USUM <RMS>,<MN>,<UNB>**
 Query :**DATAout:ITEM:USUM?**
 Response <RMS>,<MN>,<UNB>

	128	64	32	16	8	4	2	1
	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
RMS	-	-	Urms456	Urms123	Urms56	Urms45	Urms34	Urms12
MN	-	-	Umn456	Umn123	Umn56	Umn45	Umn34	Umn12
UNB	-	-	Uunb456	Uunb123	-	-	-	-

Detail Command Sets save items of total voltage data in a value from 0 to 255.
 Query Returns setting for save item of total voltage data in a value from 0 to 255.

Example Command :**DATA:ITEM:USUM 1,1,16**
 Sets Urms12, Umn12 and Uunb123 to ON.
 Query :**DATA:ITEM:USUM?**
 Response (HEADER ON) :**DATAOUT:ITEM:USUM 1,1,16**
 (HEADER OFF) **1,1,16**

Reference • This reference is the same with the one for ":DATAout:ITEM:U".

Save Item: Setting and Querying Total Voltage Data (Slave)

Syntax Command **:DATAout:SLAVE:USUM <RMS>,<MN>,<UNB>**
Query **:DATAout:SLAVE:USUM?**
Response <RMS>,<MN>,<UNB>

	128	64	32	16	8	4	2	1
	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
RMS	-	-	Urms456	Urms123	Urms56	Urms45	Urms34	Urms12
MN	-	-	Umn456	Umn123	Umn56	Umn45	Umn34	Umn12
UNB	-	-	Uunb456	Uunb123	-	-	-	-

Detail Command Sets save items of total voltage data (slave) in a value from 0 to 255.
Query Returns setting for save item of total voltage data (slave) in a value from 0 to 255.

Example Command **:DATA:SLAV:USUM 1,1,16**
Sets Urms12, Umn12 and Uunb123 to ON.
Query **:DATA:SLAV:USUM?**
Response (HEADER ON) **:DATAOUT:SLAVE:USUM 1,1,16**
(HEADER OFF) **1,1,16**

Reference • This reference is the same with the one for ":DATAout:SLAVE:U".

Save Item: Setting and Querying User-defined Formulas

Syntax Command **:DATAout:ITEM:UDF <User definitions 1 to 8>, <User definitions 9 to 16>**
Query **:DATAout:ITEM:UDF?**
Response <User definitions 1 to 8>, <User definitions 9 to 16>

	128	64	32	16	8	4	2	1
	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
1 to 8	UDF8	UDF7	UDF6	UDF5	UDF4	UDF3	UDF2	UDF1
9 to 16	UDF16	UDF15	UDF14	UDF13	UDF12	UDF11	UDF10	UDF9

Detail Command Sets save items of user-defined formulas in a value from 0 to 255.
Query Returns setting for save item of user-defined formulas in a value from 0 to 255.

Example Command **:DATA:ITEM:UDF 7,0**
Sets UDF1, UDF2 and UDF3 to ON.
Query **:DATA:ITEM:UDF?**
Response (HEADER ON) **:DATAOUT:ITEM:UDF 7,0**
(HEADER OFF) **7,0**

Reference

Save Item: Setting and Querying Motor

Syntax Command :DATAout:ITEM:EXternalin <Torque>, <RPM>, <Motor power>, <Slip>, <Independent input>

Query :DATAout:ITEM:EXternalin?

Response <Torque>, <RPM>, <Motor power>, <Slip>, <Independent input>

	128	64	32	16	8	4	2	1
	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
Torque	-	-	-	-	-	-	Tq2	Tq1
RPM	-	-	-	-	-	-	Spd2	Spd1
Motor power	-	-	-	-	-	-	Pm2	Pm1
Slip	-	-	-	-	-	-	Slip2	Slip1
Independent input	-	-	-	-	CHD	CHC	CHB	CHA

Detail Command Sets save items of motor in a value from 0 to 255.

Query Returns setting for save item of motor in a value from 0 to 255.

Example Command :DATA:ITEM:EXT 3,3,0,0,0

Sets Tq1, Tq2, Spd1 and Spd2 to ON.

Query :DATA:ITEM:EXT?

Response (HEADER ON) :DATAOUT:ITEM:EXTERNALIN 3,3,0,0,0
(HEADER OFF) 3,3,0,0,0

Reference

Save Item: Setting and Querying Motor (Slave)

Syntax Command :DATAout:SLAVE:EXternalin <Torque>, <RPM>, <Motor power>, <Slip>, <Independent input>

Query :DATAout:SLAVE:EXternalin?

Response <Torque>, <RPM>, <Motor power>, <Slip>, <Independent input>

	128	64	32	16	8	4	2	1
	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
Torque	-	-	-	-	-	-	Tq2	Tq1
RPM	-	-	-	-	-	-	Spd2	Spd1
Motor power	-	-	-	-	-	-	Pm2	Pm1
Slip	-	-	-	-	-	-	Slip2	Slip1
Independent input	-	-	-	-	CHD	CHC	CHB	CHA

Detail Command Sets save items of motor (slave) in a value from 0 to 255.

Query Returns setting for save item of motor (slave) in a value from 0 to 255.

Example Command :DATA:SLAV:EXT 3,3,0,0,0

Sets Tq1, Tq2, Spd1 and Spd2 to ON.

Query :DATA:SLAV:EXT?

Response (HEADER ON) :DATAOUT:SLAVE:EXTERNALIN 3,3,0,0,0
(HEADER OFF) 3,3,0,0,0

Reference

Setting and Querying ON/OFF for Δ -Y Calculation (CH1, 2, 3)

Syntax Command :DELTay123 <ON/OFF>
Query :DELTay123?
Response ON Execute Δ - Y calculation.
OFF Does not execute Δ - Y calculations.

Detail Command Sets for Δ - Y calculation (CH1, 2, 3).
Query Returns setting for Δ - Y calculation (CH1, 2, 3) in a string.

Example Command :DELT123 OFF
Query :DELT123?
Response (HEADER ON) :DELTAY123 OFF
(HEADER OFF) OFF

Reference

Setting and Querying ON/OFF for Δ -Y Calculation (CH4, 5, 6)

Syntax Command :DELTay456 <ON/OFF>
Query :DELTay456?
Response ON Execute Δ - Y calculation.
OFF Does not execute Δ - Y calculations.

Detail Command Sets for Δ - Y calculation (CH4, 5, 6).
Query Returns setting for Δ - Y calculation (CH4, 5, 6) in a string.

Example Command :DELT456 OFF
Query :DELT456?
Response (HEADER ON) :DELTAY456 OFF
(HEADER OFF) OFF

Reference

Executing and Querying Zero Adjustment

Syntax Command :DEMAg
Query :DEMAg?
Response OK Normal complete
BUSY Demagnetization being executed
YET Not executed yet before start
ERROR Zero adjustment failure

Detail Command Executes zero adjustment.
Query Returns the result of zero adjustment in a string.

Example Command :DEMA
Query :DEMA?
Response (HEADER ON) :DEMAG OK
(HEADER OFF) OK

Reference

- It takes 30 seconds or more for executing :DEMAg command and some of commands may become an execution error during the execution.
- Make a combination with *OPC? such as ":DEMAG;*OPC?" so as to send the next command after an response to the *OPC? is returned.* The response to the OPC? shows that DEMAG has been completed.

Setting and Querying Display Items of CUSTOM/WAVE+VALUE Screens

Syntax	Command	:DISPlay:CUSTom[number] <Item name>,...,<Item name>
	Query	:DISPlay:CUSTom[number]?
	Response	<Item name>,...,<Item name>
	Item name	Selects from "4.1 Parameters for Normal Measurement Items".
Detail	Command	Sets items for CUSTOM screen. Specify any of 4/8/16/32 for the [number].
		Sets items for WAVE+VALUE screen. Specify "12" for the [number].
		Maximum number of <Item name> is the figure shown in the number.
		Items after <Item name> omitted will not be changed.
	Query	Returns items for CUSTOM screen in a string. Specify any of 4/8/16/32 for [number].
		Return items for WAVE+VALUE screen in a string. Specify "12" for the [number].
Example	Command	:DISP:CUST4 Urms1,Umn1,Urms2,Umn2
	Query	:DISP:CUST4?
	Response (HEADER ON)	:DISPLAY:CUSTOM4 Urms1,Umn1,Urms2,Umn2
	(HEADER OFF)	Urms1,Umn1,Urms2,Umn2
Reference		

Key Operations of The Instrument

Syntax Command :DISPlay:KEY <Key name>

Detail Command Executes the same operations with the ones by the instrument.

<Key name>

RUN	Waveform storage RUN/STOP
SINGLE	Single trigger
MANUAL	Manual trigger
KNOBR	Press right knob
KNOBL	Press left knob
PHOLD	Peak hold
START	Integration START/STOP
DRESET	Data reset
HOLD	Hold key
IRA	Current auto-range
IRM	Current range -
IRP	Current range +
URA	Voltage auto-range
URM	Voltage range -
URP	Voltage range +
COPY	Screen hardcopy
SAVE	Data save
0ADJ	Zero adjustment
CHR	Right channel key
CHL	Left channel key
FILE	FILE Key
SYSTEM	SYSTEM key
INPUT	INPUT key
MEAS	MEAS key

Example Command :DISP:KEY MEAS

Behaves the same with the ones for MEAS key.

Reference

Switching Display

Syntax Command **:DISPlay:PAGE <Screen type>**
Query **:DISPlay:PAGE?**
Response <Screen>

BASIC	VECTOR1	WIRING	CONFIG	FILE
CUSTOM	VECTOR2	CH	TIME	
WAVE	LIST	COMMON	DATA	
WAVEVALUE	BAR	EFF	COM	
WAVEZOOM	DA	MOTOR	OUTPUT	
WAVEFFT	XY			

Detail Command Switches the screen.
Query Returns current screen name in a string.

Example Command **:DISP:PAGE WAVE**
Query **:DISP:PAGE?**
Response (HEADER ON) **:DISPLAY:PAGE WAVE**
(HEADER OFF) **WAVE**

Reference

Switch Number of Parameters on CUSTOM Screen.

Syntax Command **:DISPlay:PAGE:CUSTom <4 / 8 / 16 / 32>**
Query **:DISPlay:PAGE:CUSTom?**
Response Number of parameters 4 / 8 / 16 / 32

Detail Command Switch the number of parameters on CUSTOM Screen.
Query Returns the number of paramters on CUSTOM Screen in a string.

Example Command **:DISP:PAGE:CUST 4**
Query **:DISP:PAGE:CUST?**
Response (HEADER ON) **:DISPLAY:PAGE:CUSTOM 4**
(HEADER OFF) **4**

Reference

Select and Query Start Up Screen

Syntax Command **:DISPlay:SET:STARting <BACKUP/WIRING>**
Query **:DISPlay:SET:STARting?**
Response <BACKUP> Last shut down screen
<WIRING> Wiring screen

Detail Command Sets the start up screen.
Query Returns the start up screen setting as character string.

Example Command **:DISP:SET:STAR BACKUP**
Query **:DISP:SET:STAR?**
Response (HEADER ON) **:DISPLAY:SET:STARTING BACKUP**
(HEADER OFF) **BACKUP**

Reference

Setting and Querying Device-specific Event Status Enable Registers (ESER0)

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

128	64	32	16	8	4	2	1
bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
DS	UCU	ZP	ZI	ZU	DP	DI	DU

Bit 7	DS	Data update
Bit 6	UCU	Calculation unavailable (Measured data is invalid as immediately after range change).
Bit 5	ZP	Power calculation (synchronized source) with forced zero-cross
Bit 4	ZI	Current frequency with forced zero-cross
Bit 3	ZU	Voltage frequency with forced zero-cross
Bit 2	DP	Power calculation (synchronized source) without data update
Bit 1	DI	Current frequency without data update
Bit 0	DU	Voltage frequency without data update

Detail Command Sets enable setting of Device-specific Event Status Register 0 (ESR0) to ESER0.
 Query Returns the content of ESER0 set with a :ESE0 command in a value.

Example Command :**ESE0 56**
 Sets bits 5, 4 and 3 to ESER0.
 Query :**ESE0?**
 Response (HEADER ON) :**ESE0 56**
 (HEADER OFF) 56

Reference • Power-on initializes the data to zero.

Setting and Querying Device-specific Event Status Enable Register (ESER1)

Syntax Command :ESE1 <0 to 63 (NR1)>

Query :ESE1?

Response <0 to 63 (NR1)>

128	64	32	16	8	4	2	1
bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
-	-	PU6	PU5	PU4	PU3	PU2	PU1

Bit 7	-	Unused
Bit 6	-	Unused
Bit 5	PU6	CH6 voltage peak exceeded
Bit 4	PU5	CH5 Voltage peak exceeded
Bit 3	PU4	CH4 voltage peak exceeded
Bit 2	PU3	CH3 voltage peak exceeded
Bit 1	PU2	CH2 voltage peak exceeded
Bit 0	PU1	CH1 voltage peak exceeded

Detail Command Sets enable setting of Device-specific Event Status Register 1 (ESR1) to ESER1.
Query Returns the content of ESER1 set with a :ESE1 command in a value.

Example Command :ESE1 63
Sets bits 5, 4, 3, 2, 1 and 0 to ESER1.
Query :ESE1?
Response (HEADER ON) :ESE1 63
(HEADER OFF) 63

Reference • Power-on initializes the data to zero.

Setting and Querying Device-specific Event Status Enable Register (ESER2)

Syntax Command :ESR2 <0 to 63 (NR1)>

Query :ESE2?

Response <0 to 63 (NR1)>

128	64	32	16	8	4	2	1
bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
-	-	PI6	PI5	PI4	PI3	PI2	PI1

Bit 7	-	Unused
Bit 6	-	Unused
Bit 5	PI6	CH6 current peak exceeded
Bit 4	PI5	CH5 current peak exceeded
Bit 3	PI4	CH4 current peak exceeded
Bit 2	PI3	CH3 current peak exceeded
Bit 1	PI2	CH2 current peak exceeded
Bit 0	PI1	CH1 current peak exceeded

Detail Command Sets enable setting of Device-specific Event Status Register 2 (ESR2) to ESER2.
Query Returns the content of ESER2 set with a :ESE2 command in a value.

Example Command :ESE2 63
Sets bits 5, 4, 3, 2, 1 and 0 to ESER2.
Query :ESE2?
Response (HEADER ON) :ESE2 63
(HEADER OFF) 63

Reference • Power-on initializes the data to zero.

Setting and Querying Device-specific Event Status Enable Register (ESER3)

Syntax Command :ESE3 <0 to 3 (NR1)>
 Query :ESE3?
 Response <0 to 3 (NR1)>

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

Bit 7	-	Unused
Bit 6	-	Unused
Bit 5	-	Unused
Bit 4	-	Unused
Bit 3	-	Unused
Bit 2	-	Unused
Bit 1	RB	CHB range exceeded
Bit 0	RA	CHA range exceeded

Detail Command Sets enable setting of Device-specific Event Status Register 3 (ESR3) to ESER3.
 Query Returns the content of ESER3 set with a :ESE3 command in a value.

Example Command :ESE3 3
 Sets bits 1 and 0 to ESER3.
 Query :ESE3?
 Response (HEADER ON) :ESE3 3
 (HEADER OFF) 3

Reference • Power-on initializes the data to zero.

Querying Device-specific Event Status Registers (ESR0 through 3)

Syntax Query :ESR0?
 :ESR1?
 :ESR2?
 :ESR3?
 Response 0 to 255 <NR1>

Detail Query Returns the content of Device-specific Event Status Register in a value.

Example Query :ESR3?
 Response (HEADER ON) :ESR3 3
 (HEADER OFF) 3

Reference • When ESR0? is executed, the content of ESR0 is cleared.
 • When ESR1? is executed, the content of ESR1 is cleared.
 • When ESR2? is executed, the content of ESR2 is cleared.
 • When ESR3? is executed, the content of ESR3 is cleared.

Querying Options		
Syntax	Query	:EXTernalin:EXIS?
	Response Y	Option available
	N	Option unavailable
Detail	Query	Returns availability of options in a string.
Example	Query	:EXT:EXIS?
	Response (HEADER ON)	:EXTERNALIN:EXIST Y
	(HEADER OFF)	Y
Reference		

Motor analysis option: Setting and Querying Lower Limit Frequency for Motor		
Syntax	Command	:EXTernalin:FREquency:LOWer <Frequency data>
	Query	:EXTernalin:FREquency:LOWer?
	Response	Frequency data 100mHz / 1Hz / 10Hz / 100Hz
Detail	Command	Sets a lower limit frequency for the motor.
	Query	Returns a lower limit frequency for the motor in a string.
Example	Command	:EXT:FREQ:LOW 100Hz
	Query	:EXT:FREQ:LOW?
	Response (HEADER ON)	:EXTERNALIN:FREQUENCY:LOWER 100Hz
	(HEADER OFF)	100Hz
Reference		

Motor analysis option: Setting and Querying Upper Limit Frequency for Motor		
Syntax	Command	:EXTernalin:FREquency:UPPer <Frequency data>
	Query	:EXTernalin:FREquency:UPPer?
	Response	Frequency data 100Hz / 500Hz / 1kHz / 5kHz / 10kHz / 50kHz / 100kHz / 500kHz / 2MHz
Detail	Command	Sets an upper limit frequency for the motor.
	Query	Returns an upper limit frequency for the motor in a string.
Example	Command	:EXT:FREQ:UPP 1kHz
	Query	:EXT:FREQ:UPP?
	Response (HEADER ON)	:EXTERNALIN:FREQUENCY:UPPER 1kHz
	(HEADER OFF)	1kHz
Reference		

Motor analysis option: Setting and Querying Operation Mode

Syntax Command :**EXTernalin:MODE** <SINGLE/DUAL/IND>
Query :**EXTernalin:MODE?**
Response SINGLE Single
DUAL Dual
IND Independent input

Detail Command Sets operation mode for motor options.
Query Returns operation mode for motor options in a string.

Example Command :**EXT:MODE DUAL**
Query :**EXT:MODE?**
Response (HEADER ON) :EXTERNALIN:MODE DUAL
(HEADER OFF) DUAL

Reference

Motor analysis option: Setting and Querying in Single Operation Mode

Syntax Command :**EXTernalin:PATtern** <TSSZ/TSSO/TSOZ/TSOO>
Query :**EXTernalin:PATtern?**
Response

	CHA	CHB	CHC	CHD
TSSZ	Torque	Speed	Direction	Origin
TSSO	Torque	Speed	Direction	OFF
TSOZ	Torque	Speed	OFF	Origin
TSOO	Torque	Speed	OFF	OFF

Detail Command Sets a pattern for measurement items of CHA, CHB, CHC and CHD.
Query Returns a pattern for measurement items of CHA, CHB, CHC and CHD in a string.

Example Command :**EXT:PATT TSSO**
Query :**EXT:PATT?**
Response (HEADER ON) :EXTERNALIN:PATTERN TSSO
(HEADER OFF) TSSO

Reference • The setting is valid only if the operation mode is in single.

Motor analysis option: Setting and Querying RPM Scaling

Syntax Command :**EXTernalin:SCALE:SPEED** <RPM Scaling>
Query :**EXTernalin:SCALE:SPEED?**
Response RPM Scaling 0.00001 to 99999.9

Detail Command Sets a RPM scaling.
Query Returns a RPM scaling in a numeric value.

Example Command :**EXT:SCAL:SPEE 3000**
Query :**EXT:SCAL:SPEE?**
Response (HEADER ON) :EXTERNALIN:SCALE:SPEED 3000.00
(HEADER OFF) 3000.00

Reference • The setting is valid only if the operation mode is in single and CHB is set to an analog input.

Motor analysis option: Executing Zero Compensation	
Syntax	Command : EXTernalin:ZEROadjust
Detail	Command Executes zero compensation of the motor option.
Example	Command : EXT:ZERO
Reference	

Motor analysis option: Setting and Querying Input Frequency Range	
Syntax	Command : EXTernalin[MOTOR]:FREQUENCY:RANGe <Center frequency>,<Frequency range> Query : EXTernalin[MOTOR]:FREQUENCY:RANGe? Response <Center frequency>, <Frequency range> Center frequency 2000 to 499000 (2 kHz to 499 kHz) Frequency range 1000 to 249500 (1 kHz to 249.5 kHz)
Detail	Command Sets a center frequency and a frequency range for input frequency range. Set [MOTOR] to "1" when the operation mode is single and "1" or "2" for dual. Query Returns a center frequency and a frequency range for input frequency range in a numeric value.
Example	Command : EXT1:FREQ:RANG 5000,1000 Query : EXT1:FREQ:RANG? Response (HEADER ON) : EXTERNALIN1:FREQUENCY:RANGE 5000,1000 (HEADER OFF) 5000,1000
Reference	You must set (Center frequency + Frequency range) $\leq$ 500 kHz and (Center frequency - Frequency range) $\geq$ 1 kHz.

Motor analysis option: Setting and Querying Motor Pole Number	
Syntax	Command : EXTernalin[MOTOR]:PULSe:MOTorpoles <Pole number> Query : EXTernalin[MOTOR]:PULSe:MOTorpoles? Response Pole number Any even value from 02 to 98
Detail	Command Sets a pole number of the motor. Set [MOTOR] to "1" when the operation mode is single and "1" or "2" for dual. Query Returns a pole number of the motor in a numeric number.
Example	Command : EXT1:PULS:MOT 8 Query : EXT1:PULS:MOT? Response (HEADER ON) : EXTERNALIN1:PULSE:MOTORPOLES 08 (HEADER OFF) 08
Reference	If an odd number is set, an even number less than the value is set.

Motor analysis option: Setting and Querying Pulse Number	
Syntax	Command :EXTeRnalin[MOTOR]:PULSe:NUMBER <Pulse number>
	Query :EXTeRnalin[MOTOR]:PULSe:NUMBER?
	Response Pulse number 00001 to 60000
Detail	Command Set a pulse number. Set [MOTOR] to "1" when the operation mode is single and "1" or "2" for dual.
	Query Returns a pulse number in a numeric number.
Example	Command :EXT1:PULS:NUMB 360
	Query :EXT1:PULS:NUMB?
	Response (HEADER ON) :EXTERNALIN1:PULSE:NUMBER 00360
	(HEADER OFF) 00360
Reference	

Motor analysis option: Setting and Querying Torque Scaling	
Syntax	Command :EXTeRnalin[MOTOR]:SCALE:TORQue <Torque Scaling>
	Query :EXTeRnalin[MOTOR]:SCALE:TORQue?
	Response Torque Scaling 0.01 to 9999.99
Detail	Command Sets a torque scaling. Set [MOTOR] to "1" when the operation mode is single and "1" or "2" for dual.
	Query Returns a torque scaling setting in a numeric value.
Example	Command :EXT1:SCAL:TORQ 10
	Query :EXT1:SCAL:TORQ?
	Response (HEADER ON) :EXTERNALIN1:SCALE:TORQUE 0010.00
	(HEADER OFF) 0010.00
Reference	

Motor analysis option: Setting and Querying Input Frequency Source for Slip Calculation	
Syntax	Command :EXTeRnalin[MOTOR]:SLIP <Frequency measurement channels 1 to 6>
	Query :EXTeRnalin[MOTOR]:SLIP?
	Response Frequency measurement channels 1 to 6 f1 / f2 / f3 / f4 / f5 / f6
Detail	Command Sets an input frequency source for slip calculation. Set [MOTOR] to "1" when the operation mode is single and "1" or "2" for dual.
	Query Returns an input frequency source for slip calculation in a string.
Example	Command :EXT1:SLIP f1
	Query :EXT1:SLIP?
	Response (HEADER ON) :EXTERNALIN1:SLIP f1
	(HEADER OFF) f1
Reference	

Motor analysis option: Setting and Querying Synchronization Source	
Syntax	Command : EX Ternalin[MOTOR]: SOUR ce <Synchronization source> Query : EX Ternalin[MOTOR]: SOUR ce? Response Synchronization U1 / U2 / U3 / U4 / U5 / U6 / I1 / I2 / I3 / I4 / I5 / I6 / DC / Ext1 / Ext2 / source Zph / CHC / CHD
Detail	Command Sets a synchronization source for the motor. Set [MOTOR] to "1" when the operation mode is single and "1" or "2" for dual. Query Returns a synchronization source setting for the motor in a string.
Example	Command : EXT1:SOUR U1 Query : EXT1:SOUR? Response (HEADER ON) :EXTERNALIN1:SOURCE U1 (HEADER OFF) U1
Reference	• In order to set Ext1 or Ext2 as a synchronization source, the RPM input for the motor analysis option must be set to pulse input setting and the pulse number must be set to 1/2 multiplies of the setting for motor pole. • Ext2 can be set only if you set for 2 motor measurements (i.e., operating mode is set to dual). • In order to set Zph as a synchronization source, operation mode for the motor analysis option is must be set to single and measurement parameter for CH D must to be set to Origin. • In order to set CHC or CHD as a synchronization source, operation mode for the motor option must be set to individual.

Motor analysis option: Setting and Querying Unit	
Syntax	Command : EX Ternalin[MOTOR]: UNIT <Unit data> Query : EX Ternalin[MOTOR]: UNIT ? Response Unit data mNm / Nm / kNm
Detail	Command Sets a unit. Set [MOTOR] to "1" when the operation mode is single and "1" or "2" for dual. Query Returns a unit setting in a string.
Example	Command : EXT1:UNIT Nm Query : EXT1:UNIT? Response (HEADER ON) :EXTERNALIN1:UNIT Nm (HEADER OFF) Nm
Reference	

Motor analysis option: Setting and Querying Analog Lowpass Filter for Channel A

Syntax	Command	:EXTErnalinA:ANALog:LPF <ON/OFF>
	Query	:EXTErnalinA:ANALog:LPF?
	Response	ON Analog lowpass filter ON OFF Analog lowpass filter OFF
Detail	Command	Sets an analog lowpass filter for channel A.
	Query	Returns an analog lowpass filter setting for channel A in a string.
Example	Command	:EXTA:ANAL:LPF OFF
	Query	:EXTA:ANAL:LPF?
	Response	(HEADER ON) :EXTERNALINA:ANALOG:LPF OFF
		(HEADER OFF) OFF
Reference		

Motor analysis option: Setting and Querying Input for Channel A

Syntax	Command	:EXTErnalinA:FREQuency <ON/OFF>
	Query	:EXTErnalinA:FREQuency?
	Response	ON Frequency input OFF Analog DC input
Detail	Command	Sets an input for channel A.
	Query	Returns an input setting for channel A in a string.
Example	Command	:EXTA:FREQ ON
	Query	:EXTA:FREQ?
	Response	(HEADER ON) :EXTERNALINA:FREQUENCY ON
		(HEADER OFF) ON
Reference		

Motor analysis option: Setting and Querying Pulse Filter for Channel A

Syntax	Command	:EXTErnalinA:PULSe:LPF <OFF/WEAK/STRONG>
	Query	:EXTErnalinA:PULSe:LPF?
	Response	OFF Filter OFF WEAK Filter weak STRONG Filter strong
Detail	Command	Sets a pulse filter for channel A of the motor.
	Query	Returns a pulse filter setting for channel A of the motor in a string.
Example	Command	:EXTA:PULS:LPF OFF
	Query	:EXTA:PULS:LPF?
	Response	(HEADER ON) :EXTERNALINA:PULSE:LPF OFF
		(HEADER OFF) OFF
Reference		

Motor analysis option: Setting and Querying Range for Channel A	
Syntax	Command : EX Ternalin A : R ANGE <Range value> Query : EX Ternalin A : R ANGE? Response Range value 1 / 5 / 10
Detail	Command Sets a voltage range for channel A. Query Returns a voltage range setting for channel A in a string.
Example	Command : EXTA:RANG 10 Query : EXTA:RANG? Response (HEADER ON) :EXTERNALINA:RANGE 10 (HEADER OFF) 10
Reference	
Motor analysis option: Setting and Querying Analog Lowpass Filter for Channel B	
Syntax	Command : EX Ternalin B : AN ALog: LP F <ON/OFF> Query : EX Ternalin B : AN ALog: LP F? Response ON Analog lowpass filter ON OFF Analog lowpass filter OFF
Detail	Command Sets an analog lowpass filter for channel B. Query Returns an analog lowpass filter setting for channel B in a string.
Example	Command : EXTB:ANAL:LPF OFF Query : EXTB:ANAL:LPF? Response (HEADER ON) :EXTERNALINB:ANALOG:LPF OFF (HEADER OFF) OFF
Reference	
Motor analysis option: Setting and Querying Input for Channel B	
Syntax	Command : EX Ternalin B : F REQuency <ON/OFF> Query : EX Ternalin B : F REQuency? Response ON Pulse input OFF Analog DC input
Detail	Command Sets an input for channel B. Query Returns an input setting for channel B in a string.
Example	Command : EXTB:FREQ ON Query : EXTB:FREQ? Response (HEADER ON) :EXTERNALINB:FREQUENCY ON (HEADER OFF) ON
Reference	

Motor analysis option: Setting and Querying Pulse Filter for Channel B

Syntax Command :**EXTernalinB:PULSe:LPF** <OFF/WEAK/STRONG>
Query :**EXTernalinB:PULSe:LPF?**
Response OFF Filter OFF
WEAK Filter weak
STRONG Filter strong

Detail Command Sets a pulse filter for channel B of the motor.
Query Returns a pulse filter setting for channel B of the motor in a string.

Example Command :**EXTB:PULS:LPF OFF**
Query :**EXTB:PULS:LPF?**
Response (HEADER ON) :EXTERNALINB:PULSE:LPF OFF
(HEADER OFF) OFF

Reference

Motor analysis option: Setting and Querying Range for Channel B

Syntax Command :**EXTernalinB:RANGe** <Range value>
Query :**EXTernalinB:RANGe?**
Response Range value 1 / 5 / 10

Detail Command Sets a voltage range for channel B.
Query Returns a voltage range setting for channel B in a string.

Example Command :**EXTB:RANG 10**
Query :**EXTB:RANG?**
Response (HEADER ON) :EXTERNALINB:RANGE 10
(HEADER OFF) 10

Reference

Motor analysis option: Setting and Querying Pulse Filter for Channel C

Syntax Command :**EXTernalinC:PULSe:LPF** <OFF/WEAK/STRONG>
Query :**EXTernalinC:PULSe:LPF?**
Response OFF Filter OFF
WEAK Filter weak
STRONG Filter strong

Detail Command Sets a pulse filter for channel C of the motor.
Query Returns a pulse filter setting for channel C of the motor in a string.

Example Command :**EXTC:PULS:LPF OFF**
Query :**EXTC:PULS:LPF?**
Response (HEADER ON) :EXTERNALINC:PULSE:LPF OFF
(HEADER OFF) OFF

Reference

Motor analysis option: Setting and Querying Pulse Filter for Channel D

Syntax Command **:EXTernalinD:PULSe:LPF <OFF/WEAK/STRONG>**
Query **:EXTernalinD:PULSe:LPF?**
Response OFF Filter OFF
WEAK Filter weak
STRONG Filter strong

Detail Command Sets a pulse filter for channel D of the motor.
Query Returns a pulse filter setting for channel D of the motor in a string.

Example Command **:EXTD:PULS:LPF OFF**
Query **:EXTD:PULS:LPF?**
Response (HEADER ON) :EXTERNALIND:PULSE:LPF OFF
(HEADER OFF) OFF

Reference

FFT: Setting and Querying Measurement Channel for Noise Analysis

Syntax Command **:FFT:ITEM <Measurement channel>**
Query **:FFT:ITEM?**
Response Measurement channel CH1 / CH2 / CH3 / CH4 / CH5 / CH6 / MOTOR

Detail Command Sets a measurement channel used for noise analysis.
Query Returns setting for a measurement channel used for noise analysis in a string.

Example Command **:FFT:ITEM CH1**
Query **:FFT:ITEM?**
Response (HEADER ON) :FFT:ITEM CH1
(HEADER OFF) CH1

Reference

FFT: Setting and Querying Noise Lower Frequency Limit

Syntax Command **:FFT:LOWerfreq < Frequency >**
Query **:FFT:LOWerfreq?**
Response Frequency 0 to 2000(kHz)

Detail Command Sets noise lower frequency limit.
Query Returns the noise lower frequency limit setting as a numeric value.

Example Command **:FFT:LOW 50**
Query **:FFT:LOW?**
Response (HEADER ON) :FFT:LOWERFREQ 50
(HEADER OFF) 50

Reference

FFT: Setting and Querying Noise Analysis Points

Syntax	Command	:FFT:POINTt <Points>
	Query	:FFT:POINT?
	Response	Number of points 1000 / 5000 / 10000 / 50000
Detail	Command	Sets number of points used for noise analysis.
	Query	Returns setting for number of points used for noise analysis in a numeric value.
Example	Command	:FFT:POIN 1000
	Query	:FFT:POIN?
	Response	(HEADER ON) :FFT:POIN
		(HEADER OFF) 1000
Reference		

FFT: Setting and Querying Starting Point for Noise Analysis

Syntax	Command	:FFT:STARt < Starting Point >
	Query	:FFT:STARt?
	Response	Starting Point 0 to 499
Detail	Command	Sets the starting point used for noise analysis.
	Query	Returns the setting of starting point used for noise analysis as a numeric value.
Example	Command	:FFT:STAR 100
	Query	:FFT:STAR?
	Response	(HEADER ON) :FFT:START 100
		(HEADER OFF) 100
Reference	The starting point used for noise corresponds to the dot of the wave display area of the instrument.	
	The starting point "0" is the leftside and 499 is the rightside of the wave display area.	

FFT: Setting and Querying Sampling Speed for Noise Analysis

Syntax	Command	:FFT:SAMPing <Sampling>
	Query	:FFT:SAMPing?
	Response	Sampling 10kHz/25kHz/50kHz/100kHz/250kHz/500kHz/1MHz/2.5MHz/5MHz
Detail	Command	Sets a sampling speed used for noise analysis.
	Query	Returns setting for sampling speed used for noise analysis in a string.
Example	Command	:FFT:SAMP 10kHz
	Query	:FFT:SAMP?
	Response	(HEADER ON) :FFT:SAMPLING 10kHz
		(HEADER OFF) 10kHz
Reference		

FFT: Setting and Querying Window Functions for Noise Analysis

Syntax	Command	:FFT:WINDow <0/1/2>
	Query	:FFT:WINDow?
	Response	0 Rectangular 1 Hanning 2 Flat top

Detail	Command	Sets a window function used for noise analysis.
	Query	Returns setting for window function used for noise analysis in a numeric value.
Example	Command	:FFT:WIND 0
	Query	:FFT:WIND?
	Response	(HEADER ON) :FFT:WINDOW 0 (HEADER OFF) 0
Reference		

FFT: Setting and Querying Vertical Scale of Displayed Noise Analysis Results

Syntax	Command	:FFT:VSCAlE <0/1>
	Query	:FFT:VSCAlE?
	Response	0 %f.s. of range 1 rms value
Detail	Command	Sets a vertical scale of displayed noise analysis results.
	Query	Returns setting for vertical scale of displayed noise analysis results in a numeric value.
Example	Command	:FFT:VSCAlE 0
	Query	:FFT:VSCAlE?
	Response	(HEADER ON) :FFT:VSCALE 0
		(HEADER OFF) 0
Reference		

File: Setting and Querying Auto Save for USB Flash Drive

Syntax	Command	:FILE:AUTO:SAVE <ON/OFF>
	Query	:FILE:AUTO:SAVE?
	Response	ON Auto save ON OFF Auto save OFF
Detail	Command	Sets auto save setting for USB flash drive.
	Query	Returns auto save setting for USB flash drive in s string.
Example	Command	:FILE:AUTO:SAVE ON
	Query	:FILE:AUTO:SAVE?
	Response	(HEADER ON) :FILE:AUTO:SAVE ON
		(HEADER OFF) ON
Reference		

File: Acquire File Data in USB Flash Drive in a lump

Syntax	Query	:FILE:DOWNload? <File name>,<Specified folder name>
	File name	File name to be forwarded
	Specified folder name	Search for file name under the specified folder. When omitted, search for the file name under the root.
	Response	File data
Detail	Query	Reads the specified file name under the folder from the USB memory and forward data.
Example	Query	:FILE:DOWN? 07010000.CSV,PW6001
	Response	Date,Time,Status,.....
Reference		
• Even when the header is set as ON, headers will not attach to Response data. • This command is valid only when a communication interface is LAN or RS-232C. • Number of characters used for the specified file name or folder name is up to 40.		

File: Querying Availability of USB Flash Drive

Syntax	Query	:FILE:EXIST?
	Response Y	USB flash drive available
	N	USB flash drive unavailable
Detail	Query	Returns availability of USB flash drive in a string.
Example	Query	:FILE:EXIS?
	Response (HEADER ON)	:FILE:EXIST Y
	(HEADER OFF)	Y
Reference		

File: Querying File Name

Syntax	Query	:FILE:FILENAME? <Specified folder name>
	Response	<File name>, <Bytes>, <File name>, <Bytes>, ...,
Detail	Query	Obtains a file name in the folder specified. It continues for the number of files in the order of <File name>, <Bytes>.
Example	Query	:FILE:FILE? PW6001¥TEST1
	Response (HEADER ON)	:FILE:FILENAME SETTING.SET,3824
	(HEADER OFF)	SETTING.SET,3824
Reference		• If there is no file, a string "NO_FILE" will be returned. • If folder name is omitted, a file name will be obtained under the root folder. • Number of characters used for the specified folder name is up to 25. • Number of files obtainable is up to 90. • If there are more than 90 files in the same folder, no latter file name can be obtained. • If the file name contains any two-byte character, file name cannot be obtained. • During execution of file operation, it can take some time to get a response.

File: Querying Folder Name

Syntax	Query	:FILE:FOLDername? <Specified folder name>
	Response	<Folder name>, <Folder name>, <Folder name>, <Folder name>, ...,
Detail	Query	Obtains a folder name in the folder specified. The folder name listing continues for the number of folders.
Example	Query	:FILE:FOLD? PW6001
	Response (HEADER ON)	:FILE:FOLDERNAME TEST1
	(HEADER OFF)	TEST1
Reference		• If there is no folder, a string "NO_FOLDER" will be returned. • Number of characters used for the specified folder name is up to 25. • Number of folders obtainable is up to 215. • If there are more than 215 folders in the root, no latter folder name can be obtained. • If the folder name contains any two-byte character, folder name cannot be obtained. • During execution of file operation, it can take some time to get a response.

File: Acquire File Data in USB Flash Drive	
Syntax	Query :FILE:PICKout? <File name>,<Start position>,<Stop position>,<Specified folder name> File name File name to be forwarded Start position Specify the acquired start position in the file with byte count. Stop position Specify the acquired stop position in the file with byte count. Specified folder name Search for file name under the specified folder. When omitted, search for the file name under the root. Response STX(02) File data ETX(03)
Detail	Query Reads the specified file name under the folder from the USB memory from the start position to the stop position, attach STX (02) to the start and ETX (03) to the end of the data to be forwarded, and forward data.
Example	Query :FILE:PICK? 07010000.CSV,1,100,PW6001 Response STX(02)Date,Time,Status,.....ETX(03)
Reference	• Even when the header is set as ON, headers will not attach to Response data. • Specify "1" if the beginning of the file is made the start position. • STX/ETX is not a ASCII Code but (02)/(03) of the Binary Data. • This command is valid only when a communication interface is LAN or RS-232C. • Number of characters used for the specified file name or folder name is up to 40.

File: Setting and Querying Delimiter for CSV File	
Syntax	Command :FILE:SEParator <CSV/SSV> Query :FILE:SEParator? Response CSV Comma-delimited ",", period-decimal"." SSV Semicolon-delimited";", comma-decimal", "
Detail	Command Sets a delimiter for CSV file. Query Returns a delimiter for CSV file in a string.
Example	Command :FILE:SEP SSV Query :FILE:SEP? Response (HEADER ON) :FILE:SEPARATOR SSV (HEADER OFF) SSV
Reference	

File: Querying File Size	
Syntax	Query :FILE:SIZE? <Specified File Name>,<Specified Folder Name> Response <File size (Bytes)>
Detail	Query Obtains the size of the specified file.
Example	Query :FILE:SIZE? H6001000.BMP,PW6001 Response (HEADER ON) :FILE:SIZE 55628 (HEADER OFF) 55628
Reference	• File name can be specified with a maximum of 40 characters. • If folder name is omitted, a file name will be obtained under the root folder. • During execution of file operation, it can take some time to get a response.

Frequency: Setting and Querying Frequency (HPF) for Zero-cross Filter	
Syntax	Command :FREQuency[CH]:HPF <ON/OFF> Query :FREQuency[CH]:HPF? Response ON HPF ON OFF HPF OFF
Detail	Command Sets a frequency (HPF) for zero-cross filter. [CH]: 1 to 6. Query Returns a frequency (HPF) for zero-cross filter in a string.
Example	Command :FREQ1:HPF ON Query :FREQ1:HPF? Response (HEADER ON) :FREQUENCY1:HPF ON (HEADER OFF) ON
Reference	The OFF setting is valid only when the frequency lower limit is less than 1 Hz.

Frequency: Setting and Querying Lower Measurement Frequency Limit	
Syntax	Command :FREQuency[CH]:LOWer <Frequency data> Query :FREQuency[CH]:LOWer? Response Frequency data 100mHz / 1Hz / 10Hz / 100Hz / 1kHz / 10kHz / 100kHz
Detail	Command Set a lower measurement frequency limit. [CH]: 1 to 6. Query Returns setting for a lower measurement frequency limit.
Example	Command :FREQ1:LOW 10Hz Query :FREQ1:LOW? Response (HEADER ON) :FREQUENCY1:LOWER 10Hz (HEADER OFF) 10Hz
Reference	

Frequency: Setting and Querying Frequency Measurement Source	
Syntax	Command :FREQuency[CH]:SOURce <U/I> Query :FREQuency[CH]:SOURce? Response U Frequency source is voltage. I Frequency source is current.
Detail	Command Sets a frequency measurement source for the specified channel. [CH]: 1 to 6. Query Returns setting for frequency measurement source for the specified channel in a string.
Example	Command :FREQ1:SOUR U Query :FREQ1:SOUR? Response (HEADER ON) :FREQUENCY1:SOURCE U (HEADER OFF) U
Reference	

Frequency:Setting and Querying Upper Measurement Frequency Limit		
Syntax	Command	:FREQUENCY[CH]:UPPER <Frequency data>
	Query	:FREQUENCY[CH]:UPPER?
	Response	Frequency data 100Hz / 500Hz / 1kHz / 5kHz / 10kHz / 50kHz / 100kHz / 500kHz / 2MHz
Detail	Command	Set an upper measurement frequency limit. [CH]: 1 to 6.
	Query	Returns setting for an upper measurement frequency limit in a string.
Example	Command	:FREQ1:UPP 1kHz
	Query	:FREQ1:UPP?
	Response	(HEADER ON) :FREQUENCY1:UPPER 1kHz
		(HEADER OFF) 1kHz
Reference		

Communications: Setting and Querying GP-IB Address		
Syntax	Command	:GPIB:ADDRess <Address>
	Query	:GPIB:ADDRess?
	Response	Address 01 to 30
Detail	Command	Sets a GP-IB address.
	Query	Returns setting a GP-IB address in a numeric value.
Example	Command	:GPIB:ADDR 3
	Query	:GPIB:ADDR?
	Response	(HEADER ON) :GPIB:ADDRESS 03
		(HEADER OFF) 03
Reference		The address will be changed after the command is sent. Pay attention to any transmission with GP-IB.

Setting and Querying Grouping for Harmonics Measurement		
Syntax	Command	:HARMonic:GROUp <OFF/TYPE1/TYPE2>
	Query	:HARMonic:GROUp?
	Response	OFF Grouping OFF
		TYPE1 Grouping TYPE1
		TYPE2 Grouping TYPE2
Detail	Command	Sets a grouping for harmonics measurement.
	Query	Returns setting for a grouping for harmonics measurement in a string.
Example	Command	:HARM:GROU TYPE1
	Query	:HARM:GROU?
	Response	(HEADER ON) :HARMONIC:GROUP TYPE1
		(HEADER OFF) TYPE1
Reference		

Setting and Querying Mode for Harmonics Measurement	
Syntax	Command :HARMonic:MODE <IEC/WIDE>
	Query :HARMonic:MODE?
	Response IEC IEC standard mode WIDE Wideband mode
Detail	Command Sets a mode for harmonics measurement.
	Query Returns mode setting for harmonics measurement in a string.
Example	Command :HARM:MODE IEC
	Query :HARM:MODE?
	Response (HEADER ON) :HARMONIC:MODE IEC
	(HEADER OFF) IEC
Reference	

Setting and Querying Maximum Analysis Order for Harmonics Measurement	
Syntax	Command :HARMonic:ORDer <Maximum analysis order>
	Query :HARMonic:ORDer?
	Response Maximum analysis order 2 to 100
Detail	Command Sets a maximum analysis order for harmonics measurement.
	Query Returns setting for maximum analysis order for harmonics measurement in a numeric value.
Example	Command :HARM:ORD 13
	Query :HARM:ORD?
	Response (HEADER ON) :HARMONIC:ORDER 13
	(HEADER OFF) 13
Reference	

Setting and Querying THD Calculation for Harmonics Measurement	
Syntax	Command :HARMonic:THD <F/R>
	Query :HARMonic:THD?
	Response F THD-F (Reference fundamental wave) R THD-R (Total reference harmonics)
Detail	Command Sets a THD calculation for harmonics measurement.
	Query Returns THD calculation setting for harmonics measurement in a string.
Example	Command :HARM:THD F
	Query :HARM:THD?
	Response (HEADER ON) :HARMONIC:THD F
	(HEADER OFF) F
Reference	

Setting and Querying Header Availability for Response Message

Syntax	Command	:HEADer <ON/OFF>	
	Query	:HEADer?	
	Response	ON	Attaches a header to a response message.
		OFF	Does not attach a header to a response message.
Detail	Command	Sets header availability for a response message.	
	Query	Returns header availability setting for a response message in a string.	
Example	Command	:HEAD ON	
	Query	:HEAD?	
	Response	(HEADER ON)	:HEADER ON
		(HEADER OFF)	ON
Reference		The setting is initialized to OFF at power-on.	

Setting and Querying Hold State

Syntax	Command	:HOLD <OFF/ON/PEAK>	
	Query	:HOLD?	
	Response	OFF	Hold OFF
		ON	Hold ON
		PEAK	Peak hold ON
Detail	Command	Sets hold state.	
	Query	Returns hold state in a string.	
Example	Command	:HOLD ON	
	Query	:HOLD?	
	Response	(HEADER ON)	:HOLD ON
		(HEADER OFF)	ON
Reference		Use *TRG command in the hold state or the peak hold state to update the data.	

Setting and Querying Integration Mode

Syntax	Command	:INTEGrate:MODE[CH] <DC/RMS>	
	Query	:INTEGrate:MODE[CH]?	
	Response	DC	Integrated DC mode
		RMS	Integrated RMS mode
Detail	Command	Sets integration mode. [CH]: 1 to 6.	
	Query	Returns integration mode setting in a string.	
Example	Command	:INTEG:MODE1 DC	
	Query	:INTEG:MODE1?	
	Response	(HEADER ON)	:INTEGRATE:MODE1 DC
		(HEADER OFF)	DC
Reference		Integration DC mode can be set only in 1P2W connection.	

Executing Reset for Integrated Data

Syntax	Command :INTEGrate:RESet
Detail	Command Resets integrated data.
Example	Command :INTEG:RES
Reference	• This action is the same with the one by the DATA RESET key of the instrument. • This command is valid only when integration state is in STOP.

Executing Integration (Time Control) Start

Syntax	Command :INTEGrate:STARt
Detail	Command Starts integration (time control).
Example	Command :INTEG:STAR
Reference	

Querying Integration (Time Control)

Syntax	Query :INTEGrate:STATe?
	RESET Integration is in reset
	STOP Integration is in stop
	WAIT Integration is in standby
	RUN Integration is in process
	OTHER States other than the above
	0ADJ Zero adjustment is in process
Detail	Query Returns integration state of the instrument in a string.
Example	Query :INTEG:STAT?
	Response (HEADER ON) :INTEGRATE:STATE RUN
	(HEADER OFF) RUN
Reference	

Executing Integration (Time Control) Stop

Syntax	Command :INTEGrate:STOP
Detail	Command Stops integration (time control).
Example	Command :INTEG:STOP
Reference	• This command is valid only when integration state is in RUN/WAIT.

Time Control: Setting and Querying Interval Time

Syntax	Command	:INTERval <Time data>
	Query	:INTERval?
	Response	Time data OFF / 10ms / 50ms / 200ms / 500ms / 1s / 5s / 10s / 15s / 30s / 1min / 5min / 10min / 15min / 30min / 60min
Detail	Command	Sets an interval time.
	Query	Returns interval time setting in a string.
Example	Command	:INTER 1min
	Query	:INTER?
	Response	(HEADER ON) :INTERVAL 1min
		(HEADER OFF) 1min
Reference		Any setting less than the data update rate is not allowed.

LAN: Setting and Querying IP Address

Syntax	Command	:IP:ADDRess <Address 1>, <Address 2>, <Address 3>, <Address 4>
	Query	:IP:ADDRess?
	Response	Address 1 000 to 255
		Address 2 000 to 255
Detail	Command	Sets an IP address.
	Query	Returns IP address setting in a numeric value.
Example	Command	:IP:ADDR 192,168,1,1
	Query	:IP:ADDR?
	Response	(HEADER ON) :IP:ADDRESS 192,168,001,001
		(HEADER OFF) 192,168,001,001
Reference		- The address will be changed after command transmission. Pay attention to any transmission with LAN. - Setting is not allowed when DHCP is in ON.

LAN: Setting and Querying Default Gateway

Syntax	Command	:IP:DEFaultgateway <Address 1>, <Address 2>, <Address 3>, <Address 4>
	Query	:IP:DEFaultgateway?
	Response	Address 1 000 to 255
		Address 2 000 to 255
Detail	Command	Sets the default gateway.
	Query	Returns setting for default gateway in a numeric value.
Example	Command	:IP:DEF 192,168,1,250
	Query	:IP:DEF?
	Response	(HEADER ON) :IP:DEFAULTGATEWAY 192,168,001,250
		(HEADER OFF) 192,168,001,250
Reference		- The default gateway will be changed after command transmission. Pay attention to any transmission with LAN. - Setting is not allowed when DHCP is in ON.

LAN: Setting and Querying DHCP

Syntax	Command	:IP:DHCP <ON/OFF>	
	Query	:IP:DHCP?	
	Response	ON	DHCP ON
		OFF	DHCP OFF
Detail	Command	Sets DHCP.	
	Query	Returns DHCP setting in a string.	
Example	Command	:IP:DHCP ON	
	Query	:IP:DHCP?	
	Response	(HEADER ON)	:IP:DHCP ON
		(HEADER OFF)	ON
Reference			

LAN: Setting and Querying Subnet Mask

Syntax	Command	:IP:SUBNetmask <Address 1>, <Address 2>, <Address 3>, <Address 4>	
	Query	:IP:SUBNetmask?	
	Response	Address 1	000 to 255
		Address 2	000 to 255
		Address 3	000 to 255
		Address 4	000 to 255
Detail	Command	Sets subnet mask.	
	Query	Returns subnet mask setting in a numeric value.	
Example	Command	:IP:SUBN 255,255,255,0	
	Query	:IP:SUBN?	
	Response	(HEADER ON)	:IP:SUBNETMASK 255,255,255,000
		(HEADER OFF)	255,255,255,000
Reference		• The subnet mask will be changed after command transmission. Pay attention to any transmission with LAN.	
		• Setting is not allowed when DHCP is in ON.	

Querying Key Lock

Syntax	Query	:KEYLock?	
	Response	ON	Key lock is on.
		OFF	Key lock is off.
Detail	Query	Returns key lock setting in a string.	
	Query	:KEYL?	
Example	Response	(HEADER ON)	:KEYLOCK ON
		(HEADER OFF)	ON
Reference			

Setting and Querying Instrument Language

Syntax	Command	:LANGuage <Language>
	Query	:LANGuage?
	Response	Language JAPANESE / ENGLISH / CHINESE
Detail	Command	Sets a language used for the instrument.
	Query	Returns language setting used for the instrument.
Example	Command	:LANG ENGLISH
	Query	:LANG?
	Response	(HEADER ON) :LANGUAGE ENGLISH
		(HEADER OFF) ENGLISH
Reference		

Setting and Querying Lowpass Filter (LPF)

Syntax	Command	:LPF[CH] <Frequency data>
	Query	:LPF[CH]?
	Response	Frequency data OFF / 500Hz / 1kHz / 5kHz / 10kHz / 50kHz / 100kHz / 500kHz
Detail	Command	Sets a cutoff frequency for lowpass filter (LPF). [CH]: 1 to 6.
	Query	Returns cutoff frequency setting for lowpass filter (LPF) in a string.
Example	Command	:LPF1 500Hz
	Query	:LPF1?
	Response	(HEADER ON) :LPF1 500Hz
		(HEADER OFF) 500Hz
Reference		Depending on the combination of lines to be measured, lowpass filter (LPF) settings for other channels combined will be changed.

Setting and Querying Formula for Three-phase Power

Syntax	Command	:MATH <1/2/3>
	Query	:MATH?
	Response 1	TYPE1: Compatible with 3193 and 3390 TYPE1
	2	TYPE2: Compatible with 3192 and 3193 TYPE2
Detail		3 TYPE3: Sign of power factor for TYPE1 is used as a sign for active power.
	Command	Sets formulas for apparent power, reactive power and power factor of three-phase power.
	Query	Returns formula settings for apparent power, reactive power and power factor of three-phase power in a numeric value.
Example	Command	:MATH 1
	Query	:MATH?
	Response	(HEADER ON) :MATH 1
		(HEADER OFF) 1
Reference		

Communication Output Item: Querying Measurement Data

Syntax Query :MEASure? <Item 1>, <Item 2>, ,<Item 63>, <Item 64>

Response <Item 1>, <Item 2>....., <Item 63>, <Item 64>

Items 1 to 64 Any from "4.2 List and Order of Direct Specification Items for :MEASure?"

Detail

Query Item specification mode (with argument)

Any of <Item> is described, the mode becomes this mode.

Creates measurement data specified by the <Item>. Number of maximum items is 64.

Any order of sorting <Item> is allowed and the data is created in the order as specified.

No item specification mode (without argument)

No <Item> is described, the mode becomes this mode.

Creates measurement data for the item specified by :MEASure:ITEM system command.

The order for this measurement data is fixed. (See direct specification item list and order table.)

Status data is always attached to the top of the data.

Data Format for Measured Values

General measured value	±*****E±** Mantissa in 7 digits and exponent in 2 digits including decimal point
Integrated value	±*****E±** Mantissa in 7 digits and exponent in 2 digits including decimal point
Time	Elapsed time *****,**,** (hour, minute, second) Elapsed time (ms) ***
Error	Excessive input +99999.9E+99

Example Command :MEAS? Urms1,P1,DEG1

RMS voltage, active power and phase angle of the channel 1 is queried in item specification mode.

Response (HEADER ON) Urms1 151.63E+00,P1 5.74E+00,DEG1 83.80E+00

(HEADER OFF) 151.63E+00, 5.74E+00,83.80E+00

Reference

- Any of <Item> can be specified from "Parameters for Normal Measurement Items" and selecting any item other than listed will become a command error.
- Some items cannot be selected for connection and integration mode settings. If items that cannot be selected are specified, meaningless numbers will be output in case of <Item specification mode>. They are not be output in case of <No item specification mode>.
- ":TRANsmit:COLumn" command controls whether "+" at the top and leading "0" of the mantissa are omitted. If nothing is specified, "+" at the top and leading "0" of the mantissa will be omitted.

Communication Output Item: Querying Measurement Data (Interval: 10 ms)		
Syntax	Query	:MEASure:10MS? <Item 1>, <Item 2>, ,<Item 63>, <Item 64>
	Response	Measurement data for 5 times of <Item 1>, <Item 2>, ,<Item 63>, <Item 64> Items 1 to 64 Any from "4.2 List and Order of Direct Specification Items for :MEASure?" Responds 5 times of measurement data per 10 ms in a single result.
Detail	Query	As any of the followings are equivalent to ":Measure?" command, see the command. Item specification mode (with argument) No item specification mode (without argument) Data format for measured values
	Example	
Example	Command	:MEAS:10MS? Urms1,Urms2 RMS voltages for channels 1 and 2 are queried in item specification mode.
	Response	(HEADER ON) Urms1 151.63E+00,Urms2 152.25E+00, Urms1 151.62E+00,Urms2 152.26E+00, Urms1 151.66E+00,Urms2 152.28E+00, Urms1 151.70E+00,Urms2 152.24E+00, Urms1 151.69E+00,Urms2 152.19E+00 (HEADER OFF) 151.63E+00,152.25E+00,151.62E+00,152.26E+00,151.66E+00,152.28E+00,151.70E+00,152.24E+00,151.69E+00,152.19E+00
Reference	This reference is equivalent to the one for ":Measure?".	

Communication Output Item: Querying Measured Harmonics Data

Syntax Query :MEASure:HARMonic? <Item 1>, <Item 2>, ,<Item 63>, <Item 64>

Response <Item 1>, <Item 2>....., <Item 63>, <Item 64>

Items 1 to 64 Any from "4.3 List and Order of Direct Specification Items for :MEASure:HARMonic?"

Detail

Query Item specification mode (with argument)

Any of <Item> is described, the mode becomes this mode.

Creates measurement data specified by the <Item>. Number of maximum items is 64.

Any order of sorting <Item> is allowed and the data is created in the order as specified.

No item specification mode (without argument)

No <Item> is described, the mode becomes this mode.

Creates measurement data for the item specified by :MEASure:ITEM:HARMonic system command.

The order for this measurement data is fixed. (See direct specification item list and order table.)

Status data is always attached to the top of the data.

Data format for measured values

General measured value	±*****E±** Mantissa in 7 digits and exponent in 2 digits including decimal point
Error	Excessive input +99999.9E+99

Example

Command :MEAS:HARM?
HU1L001,HU1D001,HP1L001,HU1L003,HU1D003,HP1L003

This command queries first and third-order harmonic RMS voltage, harmonic wave voltage content ratio and harmonic wave active power for channel 1 in the item specification mode.

(HEADER ON) HU1L001 90.45E+00,HU1D001 100.00E+00,HP1L001
0.0043E+03,HU1L003 0.20E+00,HU1D003 0.22E+00,HP1L003
-0.0000E+03

(HEADER OFF) 90.45E+00,100.00E+00,0.0043E+03,0.20E+00,0.22E+00,-0.0000E+03

Reference

- Any of <Item> can be specified from "Parameters for Normal Measurement Items" and selecting any item other than listed will become a command error.
- Some items cannot be selected for connection and integration mode settings. If items that cannot be selected are specified, meaningless numbers will be output in case of <Item specification mode>. They are not be output in case of <No item specification mode>.
- ":TRANsmit:COLumn" command controls whether "+" at the top and leading "0" of the mantissa are omitted. If nothing is specified, "+" at the top and leading "0" of the mantissa will be omitted.

Items 1 to 64	Any from "4.2 List and Order of Direct Specification Items for :MEASure?"
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General measured value	±*****E±** Mantissa in 7 digits and exponent in 2 digits including decimal point
Integrated value	±*****E±** Mantissa in 7 digits and exponent in 2 digits including decimal point
Time	Elapsed time *****, **, ** (hour, minute, second) Elapsed time (ms) ***
Error	Excessive input +99999.9E+99

	Date	2016/02/01,Time	10:00:00,Urms1	151.63E+00,Urms2
	152.25E+00,Date	2016/02/01,Time	10:00:01,Urms1	
	151.62E+00,Urms2	152.26E+00,Date	2016/02/01,Time	
Response (HEADER ON)	10:00:02,Urms1	151.66E+00,Urms2	152.28E+00,Date	
	2016/02/01,Time	10:00:03,Urms1	151.70E+00,Urms2	
	152.24E+00,Date	2016/02/01,Time	10:00:04,Urms1	
	151.69E+00,Urms2	152.19E+00		
	2016/02/01,10:00:00,151.63E+00,152.25E+00,2016/02/01,10:00:01,15			
(HEADER OFF)	1.62E+00,152.26E+00,2016/02/01,10:00:02,151.66E+00,152.28E+00,			
	2016/02/01,10:00:03,151.70E+00,152.24E+00,2016/02/01,10:00:04,15			
	1.69E+00,152.19E+00			

Reference	- Any of <Item> can be specified from "Parameters for Normal Measurement Items" and selecting any item other than listed will become a command error. - Some items cannot be selected for connection and integration mode settings. If items that cannot be selected are specified, meaningless numbers will be output in case of <Item specification mode>. They are not be output in case of <No item specification mode>. - During recording and auto save is ON, it becomes an execution error. ":TRANsmit:COLumn" command controls whether "+" at the top and leading "0" of the mantissa are omitted. If nothing is specified, "+" at the top and leading "0" of the mantissa will be omitted.
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Communication Output Item: Setting and Querying First Index of Ouput in Inner Memory

Syntax	Command :MEASure:INNER:INDEX <Index number> Query :MEASure:INNER:INDEX? Response Index number of output
Detail	Command Sets first index of output in inner memory. This index is common with :MEASure:INNER? command and file. When outputs from leading data, sets "1". When sets under 1, it sets 1 automatically. When sets index over saved number, it sets last index automatically. When the interval is 10ms, outputs 5 data per 1 index. Query Returns index set by this command. Not returns index updated by :MEASure:INNER? command and file output.
Example	Command :MEAS:INNER:INDEX 1 Query :MEAS:INNER:INDEX? Response (HEADER ON) :MEASURE:INNER:INDEX 1 (HEADER OFF) 1
Reference	During recording and auto save is ON, it becomes an execution error.

Communication Output Item: Querying Number of Index saved in Inner Memory

Syntax	Query :MEASure:INNER:NUMBer? Response Number of index.
Detail	Query Returns number of index saved in Inner memory in values.
Example	Query :MEAS:INNER:NUMB? Response (HEADER ON) :MEASURE:INNER:NUMBER 5 (HEADER OFF) 5
Reference	

Communication Output Item: Setting and Querying Output Times of Index in Inner Memory

Syntax Command :MEASure:INNER:TIME <output times of index>
 Query :MEASure:INNER:TIME?
 Response Output times of index in inner memory.

Detail Command Sets output times of index in inner memory at the time to get the value of inner memory. Specify -1 when output all. When the interval is 10ms, outputs 5 data per 1 index.
 Query Returns output times of index in inner memory at the time to get the value of inner memory in values.

Example Command :MEAS:INNER:TIME 3
 Query :MEAS:INNER:TIME?
 Response (HEADER ON) :MEASURE:INNER:TIME 3
 (HEADER OFF) 3

Reference • During recording and auto save is ON, it becomes an execution error.

Communication Output Item: Initializing Communication Output Data Items

Syntax Command :MEASure:ITEM:ALLClear

Detail Command Initializes communication output data Items.

Example Command :MEAS:ITEM:ALLC

Reference • All the communication output data Items associated with ":MEASure:ITEM:" turns OFF.

Communication Output Item: Setting and Querying Calculated Efficiency and Loss

Syntax Command :MEASure:ITEM:EFFiciency <EFF>,<LOSS>
 Query :MEASure:ITEM:EFFiciency?
 Response <EFF>,<LOSS>

	128	64	32	16	8	4	2	1
	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
EFF (η)	-	-	-	-	EFF4	EFF3	EFF2	EFF1
LOSS	-	-	-	-	LOSS4	LOSS3	LOSS2	LOSS1

Detail Command Sets communication output items of calculated efficiency (EFF) and loss (LOSS) values in values from 0 to 255.
 Query Returns the setting for communication output item of calculated efficiency and loss values in numerical values.

Example Command :MEAS:ITEM:EFF 3,8
 Sets all calculated efficiency values 1 and 2 (EFF1 and EFF2) and calculated loss value 4 (LOSS4) to ON.
 Query :MEAS:ITEM:EFF?
 Response (HEADER ON) :MEASURE:ITEM:EFFICIENCY 3,8
 (HEADER OFF) 3,8

Reference

Communication Output Item: Initializing Communication Output Data Items for Harmonics

Syntax	Command : MEASure:ITEM:HARMonic:ALLClear
Detail	Command Initializes communication output data items for harmonics.
Example	Command : MEAS:ITEM:HARM:ALLC
Reference	• All the communication output data items for harmonics will be turned OFF.

Communication Output Item: Setting and Querying Harmonics Data

Syntax Command **:MEASure:ITEM:HARMonic:LIST** <Level U>, <Level I>, <Level P>, <Level Psum>, <Content percentage U>, <Content percentage I>, <Content percentage P>, <Content percentage Psum>, <Phase angle U>, <Phase angle I>, <Phase angle P>, <Phase angle Psum>

Query **:MEASure:ITEM:HARMonic:LIST?**

Response <Level U>, <Level I>, <Level P>, <Level Psum>, <Content percentage U>, <Content percentage I>, <Content percentage P>, <Content percentage Psum>, <Phase angle U>, <Phase angle I>, <Phase angle P>, <Phase angle Psum>

Harmonics
List

	128	64	32	16	8	4	2	1
	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
Level U	-	-	HU6	HU5	HU4	HU3	HU2	HU1
Level I	-	-	HI6	HI5	HI4	HI3	HI2	HI1
Level P	-	-	HP6	HP5	HP4	HP3	HP2	HP1
Level Psum	-	-	HP456	HP123	HP56	HP45	HP34	HP12
Content percentage U	-	-	HU6	HU5	HU4	HU3	HU2	HU1
Content percentage I	-	-	HI6	HI5	HI4	HI3	HI2	HI1
Content percentage P	-	-	HP6	HP5	HP4	HP3	HP2	HP1
Content percentage Psum	-	-	HP456	HP123	HP56	HP45	HP34	HP12
Phase angle U	-	-	HU6	HU5	HU4	HU3	HU2	HU1
Phase angle I	-	-	HI6	HI5	HI4	HI3	HI2	HI1
Phase angle P	-	-	HP6	HP5	HP4	HP3	HP2	HP1
Phase angle Psum	-	-	HP456	HP123	HP56	HP45	HP34	HP12

Detail

Command Returns transmission items of data responded by ":MEASure:HARMonic?" in a numeric value from 0 to 255.

You must specify a harmonics list (level, content percentage, phase angle) here.

You must set items by using ON/OFF for the bits above and specifying values with numeric data from 0 to 255.

Query Returns transmission item settings of data responded by ":MEASure:HARMonic?" in a numeric value from 0 to 255.

Example

Command **:MEAS:ITEM:HARM:LIST 1,1,1,0,1,1,1,0,1,1,1,0**

Sets HU1, HI1 and HP1 for the level, HU1, HI1 and HP1 for the content percentage and HU1, HI1 and HP1 for the phase angle.

Query **:MEAS:ITEM:HARM:LIST?**

Response (HEADER ON) **:MEASURE:ITEM:HARMONIC:LIST 1,1,1,0,1,1,1,0,1,1,1,0**

(HEADER OFF) **1,1,1,0,1,1,1,0,1,1,1,0**

Reference

- Use ":MEASure:ITEM:HARMonic:ORDer" command to set the order for communication output.

Communication Output Item: Setting and Querying Output Order for Harmonics Data

Syntax	Command	:MEASure:ITEM:HARMonic:ORDer <Lower limit order>, <Upper limit order>, <ODD/EVEN/ALL>
	Query	:MEASure:ITEM:HARMonic:ORDer?
	Response	<Lower limit order>, <Upper limit order>, <ODD/EVEN/ALL>
	Lower limit order (NR1)	0 to 100
	Upper limit order (NR1)	0 to 100
	ODD	Odd order only
	EVEN	Even order only
	ALL	All orders

Detail	Command	Sets transmission items of data responded by ":MEASure:HARMonic?".
	Query	Returns transmission item settings of data responded by ":MEASure:HARMonic?" in a numeric value and a string.

Example	Command	:MEAS:ITEM:HARM:ORD 1,15,ODD
		Sets odd orders from 1 to 15 as outputs.
	Query	:MEAS:ITEM:HARM:ORD?
	Response	(HEADER ON) :MEASURE:ITEM:HARMONIC:ORDER 1,15,ODD (HEADER OFF) 1,15,ODD

Reference	Use this command as a combination with ":MEASure:ITEM:HARMonic:LIST" command.
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Communication Output Item: Setting and Querying Current Data

Syntax	Command	:MEASure:ITEM:I <RMS>,<MN>,<AC>,<DC>,<FND>,<PK+>,<PK->,<THD>,<RF>,<DEG>
	Query	:MEASure:ITEM:I?
	Response	<RMS>,<MN>,<AC>,<DC>,<FND>,<PK+>,<PK->,<THD>,<RF>,<DEG>

	128	64	32	16	8	4	2	1
	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
RMS	-	-	lrms6	lrms5	lrms4	lrms3	lrms2	lrms1
MN	-	-	lmn6	lmn5	lmn4	lmn3	lmn2	lmn1
AC	-	-	lac6	lac5	lac4	lac3	lac2	lac1
DC	-	-	ldc6	ldc5	ldc4	ldc3	ldc2	ldc1
FND	-	-	lfnd6	lfnd5	lfnd4	lfnd3	lfnd2	lfnd1
PK+	-	-	Plpk6	Plpk5	Plpk4	Plpk3	Plpk2	Plpk1
PK-	-	-	Mlpk6	Mlpk5	Mlpk4	Mlpk3	Mlpk2	Mlpk1
THD	-	-	lthd6	lthd5	lthd4	lthd3	lthd2	lthd1
RF	-	-	lrf6	lrf5	lrf4	lrf3	lrf2	lrf1
DEG (φ)	-	-	ldeg6	ldeg5	ldeg4	ldeg3	ldeg2	ldeg1

Detail	Command	Sets communication output items of current data in a value from 0 to 255.
	Query	Returns setting for communication output item of current data in a value from 0 to 255.

Example	Command	:MEAS:ITEM:I 3,3,3,0,0,3,3,0,0,0
		You must set RMS, MN, AC, PK+ and PK- to all ON for the channels 1 and 2.
	Query	:MEAS:ITEM:I?
	Response	(HEADER ON) :MEASURE:ITEM:I 3,3,3,0,0,3,3,0,0,0 (HEADER OFF) 3,3,3,0,0,3,3,0,0,0

Reference

Communication Output Item: Setting and Querying Total Current Data

Syntax Command :MEASure:ITEM:ISUM <RMS>,<MN>,<UNB>
 Query :MEASure:ITEM:ISUM?
 Response <RMS>,<MN>,<UNB>

	128	64	32	16	8	4	2	1
	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
RMS	-	-	lrms456	lrms123	lrms56	lrms45	lrms34	lrms12
MN	-	-	lmn456	lmn123	lmn56	lmn45	lmn34	lmn12
UNB	-	-	lunb456	lunb123	-	-	-	-

Detail Command Sets communication output items of total current data in a value from 0 to 255.
 Query Returns setting for communication output item of total current data in a value from 0 to 255.

Example Command :MEAS:ITEM:ISUM 1,1,16
 Sets lrms12, lmn12 and lunb123.
 Query :MEAS:ITEM:ISUM?
 Response (HEADER ON) :MEASURE:ITEM:ISUM 1,1,16
 (HEADER OFF) 1,1,16

Reference • This reference is the same with the one for ":MEASure:ITEM:I".

Communication Output Item: Setting and Querying Integration Data

Syntax Command :MEASure:ITEM:INTEGrate <PIH>, <MIH>, <IH>, <PWP>, <MWP>, <WP>, <PWP_SUM>, <MWP_SUM>, <WP_SUM>, <Elapsed time>

Query :MEASure:ITEM:INTEGrate?

Response <PIH>, <MIH>, <IH>, <PWP>, <MWP>, <WP>, <PWP_SUM>, <MWP_SUM>, <WP_SUM>, <Elapsed time>

	128	64	32	16	8	4	2	1
	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
PIH	-	-	PIH6	PIH5	PIH4	PIH3	PIH2	PIH1
MIH	-	-	MIH6	MIH5	MIH4	MIH3	MIH2	MIH1
IH	-	-	IH6	IH5	IH4	IH3	IH2	IH1
PWP	-	-	PWP6	PWP5	PWP4	PWP3	PWP2	PWP1
MWP	-	-	MWP6	MWP5	MWP4	MWP3	MWP2	MWP1
WP	-	-	WP6	WP5	WP4	WP3	WP2	WP1
PWP_SUM	-	-	PWP456	PWP123	PWP56	PWP45	PWP34	PWP12
MWP_SUM	-	-	MWP456	MWP123	MWP56	MWP45	MWP34	MWP12
WP_SUM	-	-	WP456	WP123	WP56	WP45	WP34	WP12
Elapsed time	-	-	-	-	-	-	ms unit	Hours

Detail

Command Sets communication output items of integration data in a value from 0 to 255.
Hour, minute and second are saved if elapsed time is set to ON and elapsed time in ms unit is saved if ms unit is set to ON.

Query Returns setting for communication output item of integration data in a value from 0 to 255.

Example

Command :MEAS:ITEM:INTEG 0,0,0,1,1,1,0,0,0,1

Sets all the integrated power to ON and integrated elapsed time to ON for the channel 1.

Query :MEAS:ITEM:INTEG?

Response (HEADER ON) :MEASURE:ITEM:INTEGRATE 0,0,0,1,1,1,0,0,0,1

(HEADER OFF) 0,0,0,1,1,1,0,0,0,1

Reference

- In order to output ms unit for elapsed time, a bit must be set for the time.

Communication Output Item: Setting and Querying Normal Measured Values of Channels

Syntax Command :MEASure:ITEM:NORMAL <U>,<I>,<P>,<S>,<Q>,<PF>,<DEG>,<FREQ>
 Query :MEASure:ITEM:NORMAL?
 Response <U>,<I>,<P>,<S>,<Q>,<PF>,<DEG>,<FREQ>

	128	64	32	16	8	4	2	1
	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
U	-	-	U6	U5	U4	U3	U2	U1
I	-	-	I6	I5	I4	I3	I2	I1
P	-	-	P6	P5	P4	P3	P2	P1
S	-	-	S6	S5	S4	S3	S2	S1
Q	-	-	Q6	Q5	Q4	Q3	Q2	Q1
PF (λ)	-	-	PF6	PF5	PF4	PF3	PF2	PF1
DEG (φ)	-	-	DEG6	DEG5	DEG4	DEG3	DEG2	DEG1
FREQ	-	-	FREQ6	FREQ5	FREQ4	FREQ3	FREQ2	FREQ1

Detail

Command Sets communication output items of normal measured values of channels in values from 0 to 255.
 Query Returns settings for communication output items of normal measured values of channels in values from 0 to 255.

Example

Command :MEAS:ITEM:NORM 1,1,1,0,0,1,0,0
 Sets voltage, current, active power and power factor of the channel 1 to ON.
 Query :MEAS:ITEM:NORM?
 Response (HEADER ON) :MEASURE:ITEM:NORMAL 1,1,1,0,0,1,0,0
 (HEADER OFF) 1,1,1,0,0,1,0,0

Reference

- All the U items (:MEASure:ITEM:U) of the specified channel is set to ON if this command is used to set U to ON, and all the U items is set OFF if U is set to OFF. The same applies to I data.
- P and P_{nd} of the channel specified by :MEASure:ITEM:P are set to either ON or OFF for P data. The same applies to S, Q and PF data.
- In order to specify detailed save items for U, I, P, S, Q and PF data, use :MEASure:ITEM:U, :MEASure:ITEM:I and :MEASure:ITEM:P commands after this command is issued.
- If any of items is set to ON of the channels on a query, the channel becomes ON.

Communication Output Item: Setting and Querying Power Data

Syntax Command :MEASure:ITEM:P
 <P>,<Pfnd>,<S>,<Sfnd>,<Q>,<Qfnd>,<PF>,<PFfnd>,<DEG>
 Query :MEASure:ITEM:P?
 Response <P>,<Pfnd>,<S>,<Sfnd>,<Q>,<Qfnd>,<PF>,<PFfnd>,<DEG>

	128	64	32	16	8	4	2	1
	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
P	-	-	P6	P5	P4	P3	P2	P1
Pfnd	-	-	Pfnd6	Pfnd5	Pfnd4	Pfnd3	Pfnd2	Pfnd1
S	-	-	S6	S5	S4	S3	S2	S1
Sfnd	-	-	Sfnd6	Sfnd5	Sfnd4	Sfnd3	Sfnd2	Sfnd1
Q	-	-	Q6	Q5	Q4	Q3	Q2	Q1
Qfnd	-	-	Qfnd6	Qfnd5	Qfnd4	Qfnd3	Qfnd2	Qfnd1
PF (λ)	-	-	PF6	PF5	PF4	PF3	PF2	PF1
PFfnd	-	-	PFfnd6	PFfnd5	PFfnd4	PFfnd3	PFfnd2	PFfnd1
DEG (φ)	-	-	DEG6	DEG5	DEG4	DEG3	DEG2	DEG1

Detail Command Sets communication output items of power data in a value from 0 to 255.
 Query Returns setting for communication output item of power data in a value from 0 to 255.

Example Command :MEAS:ITEM:P 1,0,1,0,1,0,1,0,1
 You must set P, S, Q, PF and DEG to all ON for the channels 1.
 Query :MEAS:ITEM:P?
 Response (HEADER ON) :MEASURE:ITEM:P 1,0,1,0,1,0,1,0,1
 (HEADER OFF) 1,0,1,0,1,0,1,0,1

Reference

Communication Output Item: Setting and Querying Total Power Data

Syntax Command :MEASure:ITEM:PSUM
 <P>,<Pfnd>,<S>,<Sfnd>,<Q>,<Qfnd>,<PF>,<PFnd>,<DEG>
 Query :MEASure:ITEM:PSUM?
 Response <P>,<Pfnd>,<S>,<Sfnd>,<Q>,<Qfnd>,<PF>,<PFnd>,<DEG>

	128	64	32	16	8	4	2	1
	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
P	-	-	P456	P123	P56	P45	P34	P12
Pfnd	-	-	Pfnd456	Pfnd123	Pfnd56	Pfnd45	Pfnd34	Pfnd12
S	-	-	S456	S123	S56	S45	S34	S12
Sfnd	-	-	Sfnd456	Sfnd123	Sfnd56	Sfnd45	Sfnd34	Sfnd12
Q	-	-	Q456	Q123	Q56	Q45	Q34	Q12
Qfnd	-	-	Qfnd456	Qfnd123	Qfnd56	Qfnd45	Qfnd34	Qfnd12
PF (λ)	-	-	PF456	PF123	PF56	PF45	PF34	PF12
PFnd	-	-	PFnd456	PFnd123	PFnd56	PFnd45	PFnd34	PFnd12
DEG (φ)	-	-	DEG456	DEG123	DEG56	DEG45	DEG34	DEG12

Detail Command Sets communication output items of total power data in a value from 0 to 255.
 Query Returns setting for communication output item of total power data in a value from 0 to 255.

Example Command :MEAS:ITEM:PSUM 1,0,1,0,1,0,1,0,1
 You must set P, S, Q, PF and DEG to all ON for the channels 1.
 Query :MEAS:ITEM:PSUM?
 Response (HEADER ON) :MEASURE:ITEM:PSUM 1,0,1,0,1,0,1,0,1
 (HEADER OFF) 1,0,1,0,1,0,1,0,1

Reference

Communication Output Item: Setting and Querying Normal Measured Values for SUM

Syntax Command :MEASure:ITEM:SUM <U>,<I>,<P>,<S>,<Q>,<PF>,<DEG>
 Query :MEASure:ITEM:SUM?
 Response <U>,<I>,<P>,<S>,<Q>,<PF>,<DEG>

	128	64	32	16	8	4	2	1
	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
U	-	-	U456	U123	U56	U45	U34	U12
I	-	-	I456	I123	I56	I45	I34	I12
P	-	-	P456	P123	P56	P45	P34	P12
S	-	-	S456	S123	S56	S45	S34	S12
Q	-	-	Q456	Q123	Q56	Q45	Q34	Q12
PF (λ)	-	-	PF456	PF123	PF56	PF45	PF34	PF12
DEG (φ)	-	-	DEG456	DEG123	DEG56	DEG45	DEG34	DEG12

Detail

Command Sets communication output items of normal measured values for SUM in values from 0 to 255.
 Query Returns settings for communication output items of normal measured values for SUM in values from 0 to 255.

Example

Command :MEAS:ITEM:SUM 1,0,1,0,1,0,1
 Sets U, P, Q and DEG of the SUM12 to ON.
 Query :MEAS:ITEM:SUM?
 Response (HEADER ON) :MEASURE:ITEM:SUM 1,0,1,0,1,0,1
 (HEADER OFF) 1,0,1,0,1,0,1

Reference

- All the U items (:MEASure:ITEM:USUM) of the specified channel is set to ON if this command is used to set U to ON, and all the U items is set OFF if U is set to OFF. The same applies to I data.
- P and P_{nd} of the channel specified by :MEASure:ITEM:PSUM are set to either ON or OFF for P data. The same applies to S, Q and PF data.
- In order to specify detailed save items for U, I, P, S, Q and PF data, use :MEASure:ITEM:USUM, :MEASure:ITEM:ISUM and :MEASure:ITEM:PSUM commands after this command is issued.
- If any of items is set to ON of the channels on a query, the channel becomes ON.

Communication Output Item: Setting and Querying Voltage Data

Syntax Command :**MEASure:ITEM:U**
<RMS>,<MN>,<AC>,<DC>,<FND>,<PK+>,<PK->,<THD>,<RF>,<DEG>
 Query :**MEASure:ITEM:U?**
 Response <RMS>,<MN>,<AC>,<DC>,<FND>,<PK+>,<PK->,<THD>,<RF>,<DEG>

	128	64	32	16	8	4	2	1
	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
RMS	-	-	Urms6	Urms5	Urms4	Urms3	Urms2	Urms1
MN	-	-	Umn6	Umn5	Umn4	Umn3	Umn2	Umn1
AC	-	-	Uac6	Uac5	Uac4	Uac3	Uac2	Uac1
DC	-	-	Udc6	Udc5	Udc4	Udc3	Udc2	Udc1
FND	-	-	Ufnd6	Ufnd5	Ufnd4	Ufnd3	Ufnd2	Ufnd1
PK+	-	-	PUpk6	PUpk5	PUpk4	PUpk3	PUpk2	PUpk1
PK-	-	-	MUpk6	MUpk5	MUpk4	MUpk3	MUpk2	MUpk1
THD	-	-	Uthd6	Uthd5	Uthd4	Uthd3	Uthd2	Uthd1
RF	-	-	Urf6	Urf5	Urf4	Urf3	Urf2	Urf1
DEG (φ)	-	-	Udeg6	Udeg5	Udeg4	Udeg3	Udeg2	Udeg1

Detail Command Sets communication output items of voltage data in a value from 0 to 255.
 Query Returns setting for communication output item of voltage data in a value from 0 to 255.

Example Command :**MEAS:ITEM:U 3,3,3,0,0,3,3,0,0,0**
 You must set RMS, MN, AC, PK+ and PK- to all ON for the channels 1 and 2.
 Query :**MEAS:ITEM:U?**
 Response (HEADER ON) :**MEASURE:ITEM:U 3,3,3,0,0,3,3,0,0,0**
 (HEADER OFF) **3,3,3,0,0,3,3,0,0,0**

Reference

Communication Output Item: Setting and Querying Total Voltage Data

Syntax Command :**MEASure:ITEM:USUM <RMS>,<MN>,<UNB>**
 Query :**MEASure:ITEM:USUM?**
 Response <RMS>,<MN>,<UNB>

	128	64	32	16	8	4	2	1
	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
RMS	-	-	Urms456	Urms123	Urms56	Urms45	Urms34	Urms12
MN	-	-	Umn456	Umn123	Umn56	Umn45	Umn34	Umn12
UNB	-	-	Uunb456	Uunb123	-	-	-	-

Detail Command Sets communication output items of total voltage data in a value from 0 to 255.
 Query Returns setting for communication output item of total voltage data in a value from 0 to 255.

Example Command :**MEAS:ITEM:USUM 1,1,16**
 Sets Urms12, Umn12 and Uunb123 to ON.
 Query :**MEAS:ITEM:USUM?**
 Response (HEADER ON) :**MEASURE:ITEM:USUM 1,1,16**
 (HEADER OFF) **1,1,16**

Reference • This reference is the same with the one for ":MEASure:ITEM:U".

Communication Output Item: Setting and Querying User-defined Formulas

Syntax

Command **:MEASure:ITEM:UDF** <User definitions 1 to 8>, <User definitions 9 to 16>

Query **:MEASure:ITEM:UDF?**

Response <User definitions 1 to 8>, <User definitions 9 to 16>

	128	64	32	16	8	4	2	1
	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
1 to 8	UDF8	UDF7	UDF6	UDF5	UDF4	UDF3	UDF2	UDF1
9 to 16	UDF16	UDF15	UDF14	UDF13	UDF12	UDF11	UDF10	UDF9

Detail

Command Sets communication output items of user-defined formulas in a value from 0 to 255.

Query Returns setting for communication output item of user-defined formulas in a value from 0 to 255.

Example

Command **:MEAS:ITEM:UDF 7,0**

Sets UDF1, UDF2 and UDF3 to ON.

Query **:MEAS:ITEM:UDF?**

Response (HEADER ON) **:MEASURE:ITEM:UDF 7,0**

(HEADER OFF) **7,0**

Reference

Communication Output Item: Setting and Querying Motor

Syntax

Command **:MEASure:ITEM:EXternalin** <Torque>, <RPM>, <Motor power>, <Slip>, <Independent input>

Query **:MEASure:ITEM:EXternalin?**

Response <Torque>, <RPM>, <Motor power>, <Slip>, <Independent input>

	128	64	32	16	8	4	2	1
	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
Torque	-	-	-	-	-	-	Tq2	Tq1
RPM	-	-	-	-	-	-	Spd2	Spd1
Motor power	-	-	-	-	-	-	Pm2	Pm1
Slip	-	-	-	-	-	-	Slip2	Slip1
Independent input	-	-	-	-	CHD	CHC	CHB	CHA

Detail

Command Sets communication output items of motor in a value from 0 to 255.

Query Returns setting for communication output item of motor in a value from 0 to 255.

Example

Command **:MEAS:ITEM:EXT 3,3,0,0,0**

Sets Tq1, Tq2, Spd1 and Spd2 to ON.

Query **:MEAS:ITEM:EXT?**

Response (HEADER ON) **:MEASURE:ITEM:EXTERNALIN 3,3,0,0,0**

(HEADER OFF) **3,3,0,0,0**

Reference

Querying Measured Noise Data		
Syntax	Query	:MEASure:NOISep^{peak}? <Frequency of voltage maximum value 1>,<Numerical value of voltage maximum value 1>, ...<Frequency of voltage maximum value 10>,<Numerical value of voltage maximum value 10>,<Frequency of current maximum value 1>,<Numerical value of current maximum value 1>,...<Frequency of current maximum value 10>,<Numerical value of current maximum value 10>
	Response	
Detail	Query	Returns frequencies and values of top 10 voltage and current values from measured noise data. Data format for measured values
	General measured value	±*****E±** Mantissa in 7 digits and exponent in 2 digits including decimal point
	Error	Excessive input, FFT not analyzed +99999.9E+99
Example	Query	:MEAS:NOIS?
	Response	(HEADER ON) UNf01 1.02000E+03,UN01 0.608E+00, ... ,UNf10 1.08000E+03,UN10 0.171E+00,INf01 1.00000E+03,IN01 0.00028E+00, ... ,INf10 3.39900E+03,IN10 0.00009E+00 1.02000E+03,0.608E+00, (HEADER OFF) ... ,1.08000E+03,0.171E+00,1.00000E+03,0.00028E+00, ... ,3.39900E+03,0.00009E+00
Reference		- The order for this measurement data is fixed. - In the order of frequency and numeric values, top 10 voltage values are output and then top 10 current values are output. (Total 40 data) - When a measurement channel used for noise analysis is set as motor, motor CHA (Analog DC) data are output instead of voltage and motor CHB (Analog DC) data are output instead of current. - In order to update noise data, screen of the instrument must be set to "WAVE+FFT".

Querying Measured Current Noise Data		
Syntax	Query	:MEASure:NOISep^{peak}:I? <Frequency of current maximum value 1>,<Numerical value of current maximum value 1>,...<Frequency of current maximum value 10>,<Numerical value of current maximum value 10>
	Response	
Detail	Query	Returns frequencies and values of top 10 current values from measured noise data. Data format for measured values
	General measured value	±*****E±** Mantissa in 7 digits and exponent in 2 digits including decimal point
	Error	Excessive input, FFT not analyzed +99999.9E+99
Example	Query	:MEAS:NOIS:I?
	Response	(HEADER ON) INf01 1.00000E+03,IN01 0.00028E+00, ... ,INf10 3.39900E+03,IN10 0.00009E+00 (HEADER OFF) 1.00000E+03,0.00028E+00, ... ,3.39900E+03,0.00009E+00
Reference		- The order for this measurement data is fixed. - Top 10 values are output in the order of frequencies and numeric values. (Total 20 data) - When a measurement channel used for noise analysis is set as motor, it becomes an execution error. - In order to update noise data, screen of the instrument must be set to "WAVE+FFT".

Querying Measured Voltage Noise Data		
Syntax	Query	:MEASure:NOISepcak:U?
	Response	<Frequency of voltage maximum value 1>,<Numerical value of voltage maximum value 1>, ...<Frequency of voltage maximum value 10>,<Numerical value of voltage maximum value 10>
Detail	Query	Returns frequencies and values of top 10 voltage values from measured noise data.
		Data format for measured values
	General measured value	±*****E±** Mantissa in 7 digits and exponent in 2 digits including decimal point
	Error	Excessive input, FFT not analyzed +99999.9E+99
Example	Query	:MEAS:NOIS:U?
	Response (HEADER ON)	UNf01 1.02000E+03,UN01 0.608E+00, ... ,UNf10 1.08000E+03,UN10 0.171E+00
	(HEADER OFF)	1.02000E+03,0.608E+00, ... ,1.08000E+03,0.171E+00
Reference		- The order for this measurement data is fixed. - Top 10 values are output in the order of frequencies and numeric values. (Total 20 data) - When a measurement channel used for noise analysis is set as motor, it becomes an execution error. - In order to update noise data, screen of the instrument must be set to "WAVE+FFT".

Querying Measured Noise Data for Motor CHA		
Syntax	Query	:MEASure:NOISepcak:CHA?
	Response	<Frequency of motor CHA maximum value 1>,<Numerical value of motor CHA maximum value 1>,...<Frequency of motor CHA maximum value 10>,<Numerical value of motor CHA maximum value 10>
Detail	Query	Returns top 10 frequencies and values from measured noise data for motor CHA (analog DC).
		Data format for measured values
	General measured value	±*****E±** Mantissa in 7 digits and exponent in 2 digits including decimal point
	Error	Excessive input, FFT not analyzed +99999.9E+99
Example	Query	:MEAS:NOIS:CHA?
	Response (HEADER ON)	ANf01 2.09400E+03,AN01 0.00008E+00, ... ,ANf10 1.48800E+03,AN10 0.00001E+00
	(HEADER OFF)	2.09400E+03,0.00008E+00, ... ,1.48800E+03,0.00001E+00
Reference		- The order for this measurement data is fixed. - Top 10 values are output in the order of frequencies and numeric values. (Total 20 data) - When a measurement channel used for noise analysis is set as except for motor, it becomes an execution error. - In order to update noise data, screen of the instrument must be set to "WAVE+FFT".

Querying Measured Noise Data for Motor CHB		
Syntax	Query	:MEASure:NOISepeak:CHB? <Frequency of motor CHB maximum value 1>,<Numerical value of motor CHB maximum value 1>,...<Frequency of motor CHB maximum value 10>,<Numerical value of motor CHB maximum value 10>
	Response	
Detail	Query	Returns top 10 frequencies and values from measured noise data for motor CHB (analog DC). Data format for measured values
	General measured value	±*****E±** Mantissa in 7 digits and exponent in 2 digits including decimal point
	Error	Excessive input, FFT not analyzed +99999.9E+99
Example	Query	:MEAS:NOIS:CHB?
	Response (HEADER ON)	BNf01 2.14800E+03,BN01 0.0009E-03, ... ,BNf10 2.38100E+03,BN10 0.0001E-03
	(HEADER OFF)	2.14800E+03,0.0009E-03, ... ,2.38100E+03,0.0001E-03
Reference	- The order for this measurement data is fixed. - Top 10 values are output in the order of frequencies and numeric values. (Total 20 data) - When a measurement channel used for noise analysis is set as except for motor, it becomes an execution error. - In order to update noise data, screen of the instrument must be set to "WAVE+FFT".	

Setting and Querying Connection Mode		
Syntax	Command	:MODE <Connection mode>
	Query	:MODE? <TYPE1 to TYPE7>
Response	TYPE1	1P2W, 1P2W, 1P2W, 1P2W, 1P2W, 1P2W
	TYPE2	1P3W/3P3W2M, 1P2W, 1P2W, 1P2W, 1P2W
	TYPE3	1P3W/3P3W2M, 1P2W, 1P3W/3P3W2M, 1P2W
	TYPE4	1P3W/3P3W2M, 1P3W/3P3W2M, 1P3W/3P3W2M
	TYPE5	3P3W3M/3V3A/3P4W, 1P2W, 1P2W, 1P2W
	TYPE6	3P3W3M/3V3A/3P4W, 1P3W/3P3W2M, 1P2W
	TYPE7	3P3W3M/3V3A/3P4W, 3P3W3M/3V3A/3P4W
Detail	Command	Sets connection mode.
	Query	Returns connection mode setting in a string.
Example	Command	:MODE TYPE1
	Query	:MODE?
	Response (HEADER ON)	:MODE TYPE1 (HEADER OFF) TYPE1
Reference	- Connection mode setting influences many of settings. Set this mode in early setting process. - After this command, use ":WIRing[CH] <Connection data>" to set detailed connection. - In order to set a mode combined with more than one channel, their current sensors used for the combination must be the same.	

Executing and Clearing Phase Zero Adjustment

Syntax Command :PHASe:ZEROadjust <CH number>,<SET/CLEAR>
CH number CH1/CH2/CH3/CH4/CH5/CH6
SET/CLEAR Phase zero adjustment execute and Phase zero compensation value clear

Detail Command Executes phase zero adjustment or clears phase zero compensation value.

Example Command :PHAS:ZERO CH1,SET

Reference

- This action is the same with the Adjust/Reset of VECTOR1.
- These operations are valid only if the setting for [Synchronization Source] is set to [Ext1] or [Ext2].
- Specify the first channel of the connection.

Setting and Querying Phase Zero Adjustment Degree

Syntax Command :PHASe[CH]:ZEROadjust <Phase Zero Adjustment Degree>
Query :PHASe[CH]:ZEROadjust?
Response Phase Zero Adjustment Degree[°] -180.000 to +180.000

Detail Command Executes phase zero adjustment or clears phase zero compensation value. [CH]: 1 to 6.
Query Returns the setting of phase zero adjustment degree as numerical value.

Example Command :PHAS1:ZERO 90.000

Query :PHAS1:ZERO?

Response (HEADER ON) :PHASE1:ZEROADJUST +90.000
(HEADER OFF) +90.000

Reference

Setting and Querying Data Update Rate

Syntax Command :RATE <Update rate>
Query :RATE?
Response Update rate 10ms / 50ms / 200ms

Detail Command Sets a data update rate.
Query Returns data update rate setting in a string.

Example Command :RATE 10ms

Query :RATE?

Response (HEADER ON) :RATE 10ms
(HEADER OFF) 10ms

Reference

Communication: Setting and Querying Availability of Execution Check Message

Syntax	Command	:RS232c:ANSWer <ON/OFF>
	Query	:RS232c:ANSWer?
	Response ON	Execution check message enabled
	OFF	Execution check message disabled
Detail	Command	Sets execution check message. If set to enabled, a response will be returned on command transmission and an execution check message will be attached after the response to a query. Format of execution check message is in 3 digits "nnn" showing that an error occurred at the nnn commands. If there is no error, it becomes "000".
	Query	Returns setting for execution check message in a string.
Example	Command	:RS232:ANSW ON
	Query	:RS232:ANSW?
	Response (HEADER ON)	:RS232C:ANSWER ON;000
	(HEADER OFF)	ON;000
Reference	• The command name is RS232C but the operation is the same with the one for LAN.	

Communication: Setting and Querying RS232C Communication Speed

Syntax	Command	:RS232c:BAUD <Baud rate>
	Query	:RS232c:BAUD?
	Response Baud rate	9600bps / 19200bps / 38400bps / 57600bps / 115200bps / 230400bps
Detail	Command	Sets RS232C communication speed.
	Query	Returns RS232C communication speed setting in a string.
Example	Command	:RS232:BAUD 38400bps
	Query	:RS232:BAUD?
	Response (HEADER ON)	:RS232C:BAUD 38400bps
	(HEADER OFF)	38400bps
Reference	•	

Communication: Setting and Querying Destination of RS232C Connection

Syntax	Command	:RS232c:CONNect <RS/BT/EXT>
	Query	:RS232c:CONNect?
	Response RS	RS-232C
	BT	Bluetooth
	EXT	External control line
Detail	Command	Sets destination of RS232C connection.
	Query	Returns setting for destination of RS232C connection in a string.
Example	Command	:RS232:CONN RS
	Query	:RS232:CONN?
	Response (HEADER ON)	:RS232C:CONNECT RS
	(HEADER OFF)	RS
Reference		

File: Setting and Querying Folder Name for Auto Save Destination

Syntax	Command	:SAVE:AUTO:FOLDername <Folder name>
	Query	:SAVE:AUTO:FOLDername?
	Response	<Folder name>
Detail	Command	Sets a folder name for auto save destination.
	Query	Returns a folder name for auto save destination in a string.
Example	Command	:SAVE:AUTO:FOLD AUTO6001
	Query	:SAVE:AUTO:FOLD?
	Response	(HEADER ON) :SAVE:AUTO:FOLDERNAME AUTO6001 (HEADER OFF) AUTO6001
Reference		• The folder name is a string consisting of up to 8 characters.
		• Characters available: ASCII characters H'20 through H'7E ("*/:<>?¥ are not included).
		• If "NO_FOLDER" is specified for the folder name, the destination folder becomes the root.

File: Setting and Querying Folder Name for Manual Save Destination

Syntax	Command	:SAVE:FOLDername <Folder name>
	Query	:SAVE:FOLDername?
	Response	<Folder name>
Detail	Command	Sets a folder name for manual save destination.
	Query	Returns a folder name for manual save destination in a string.
Example	Command	:SAVE:FOLD DATA6001
	Query	:SAVE:FOLD?
	Response	(HEADER ON) :SAVE:FOLDERNAME DATA6001 (HEADER OFF) DATA6001
Reference		• The folder name is a string consisting of up to 8 characters.
		• Characters available: ASCII characters H'20 through H'7E ("*/:<>?¥ are not included).
		• If "NO_FOLDER" is specified for the folder name, the destination folder becomes the root.

File: Setting and Querying Comment Save for Manual Save

Syntax	Command	:SAVE:COMMeNt <ON/OFF>
	Query	:SAVE:COMMeNt?
	Response	ON Comment save ON OFF Comment save OFF
Detail	Command	Sets Comment save for manual save.
	Query	Returns comment save setting for manual save in a string.
Example	Command	:SAVE:COMM ON
	Query	:SAVE:COMM?
	Response	(HEADER ON) :SAVE:COMMENT ON (HEADER OFF) ON
Reference		

File: Setting and Querying File format for Waveforms

Syntax	Command	:SAVE:WAVE:FORMat <CSV/BIN>	
	Query	:SAVE:WAVE:FORMat?	
	Response	CSV	CSV format
		BIN	Binary format
Detail	Command	Sets file format for waveform saving.	
	Query	Returns setting for file format for waveform saving.	
Example	Command	:SAVE:WAVE:FORM CSV	
	Query	:SAVE:WAVE:FORM?	
	Response	(HEADER ON)	:SAVE:WAVE:FORMAT CSV
		(HEADER OFF)	CSV
Reference			

Setting and Querying CT Ratio

Syntax	Command	: SCALE[CH]:CT <CT ratio>
	Query	: SCALE[CH]:CT ?
	Response	CT ratio 0.00001 to 9999.99
Detail	Command	Sets a CT ratio for a specified channel. [CH]: 1 to 6.
	Query	Returns CT ratio setting for specified channel in a numeric value.
Example	Command	: SCAL1:CT 2.0
	Query	: SCAL1:CT ?
	Response	(HEADER ON) :SCALE1:CT 2.00000
		(HEADER OFF) 2.00000
Reference	• The OFF setting for CT ratio is 1.0. The query response to OFF is 1.00000. • Setting for other channel combined with measurement line will be changed. • VT x CT must not exceed 1.0E+06.	

Setting and Querying VT Ratio

Syntax	Command	: SCALE[CH]:VT <VT ratio>
	Query	: SCALE[CH]:VT ?
	Response	VT ratio 0.00001 to 9999.99
Detail	Command	Sets a VT ratio for a specified channel. [CH]: 1 to 6.
	Query	Returns VT ratio setting for specified channel in a numeric value.
Example	Command	: SCAL1:VT 10.0
	Query	: SCAL1:VT ?
	Response	(HEADER ON) :SCALE1:VT 10.0000
		(HEADER OFF) 10.0000
Reference	• The OFF setting for VT ratio is 1.0. The query response to OFF is 1.00000. • Setting for other channel combined with measurement line will be changed. • VTx CT must not exceed 1.0E+06.	

Setting and Querying Synchronization Source

Syntax	Command	: SOURce [CH] < Synchronization source >
	Query	: SOURce [CH]?
	Response	Synchronization source U1 / U2 / U3 / U4 / U5 / U6 / I1 / I2 / I3 / I4 / I5 / I6 / DC / Ext1 / Ext2 / Zph / CHC / CHD
Detail	Command	Sets a synchronization source for the specified channel. [CH]: 1 to 6.
	Query	Returns setting for synchronization source for the specified channel in a string.
Example	Command	: SOUR1 U1
	Query	: SOUR1?
	Response	(HEADER ON) : SOURCE1 U1 (HEADER OFF) U1
Reference	- Setting for other channel combined with measurement line will be changed. - In order to set Ext1 or Ext2 as a synchronization source, motor analysis option must be implemented, the RPM input for the option must be set to pulse input setting and the pulse number must be set to 1/2 multiplies of the setting for motor pole. - Ext2 can be set only if you set for 2 motor measurements (i.e., operating mode is set to dual). - In order to set Zph as a synchronization source, operation mode for the motor analysis option is must be set to single and measurement parameter for CH D must be set to Origin. - In order to set CHC or CHD as a synchronization source, operation mode for the motor option must be set to individual.	

Time Control: Setting and Querying Real-time Control

Syntax	Command	: STIME:CONTRol < ON/OFF >
	Query	: STIME:CONTRol?
	Response	ON Real-time control ON OFF Real-time control OFF
Detail	Command	Sets real-time control.
	Query	Returns setting for real-time control in a string.
Example	Command	: STIM:CONT ON
	Query	: STIM:CONT?
	Response	(HEADER ON) : STIME:CONTROL ON (HEADER OFF) ON
Reference		

Time Control: Setting and Querying Start Time for Real-time Control

Syntax	Command	:STIME:STARttime <Year>, <Month>, <Date>, <Hour>, <Minute>
	Query	:STIME:STARttime?
Response	Year	2010 to 2077 (10 to 77 can be used for setting)
	Month	01 to 12
	Month	01 to 31
	Hour	00 to 23
	Minute	00 to 59
Detail	Command	Sets a start time for real-time control.
	Query	Returns start time for real-time control in numeric values consisting of year, month, date, hour and minute.
Example	Command	:STIM:STAR 2015,02,13,12,00
		Sets a start time for real-time control to: year: 2015, month: 02, date: 13, hour: 12 and minute: 00.
	Query	:STIM:STAR?
	Response	(HEADER ON) :STIME:STARTTIME 2015,02,13,12,00 (HEADER OFF) 2015,02,13,12,00
Reference		- As the instrument identifies the number of days from the month and whether the year is a leap year, specifying an impossible date results in an execution error. - If the setting is made after the stop time, the stop time will be set 1 minute after the start time.

Time Control: Setting and Querying Stop Time for Real-time Control

Syntax	Command	:STIME:STOptime <Year>, <Month>, <Date>, <Hour>, <Minute>
	Query	:STIME:STOptime?
Response	Year	2010 to 2077 (10 to 77 can be used for setting)
	Month	01 to 12
	Month	01 to 31
	Hour	00 to 23
	Minute	00 to 59
Detail	Command	Sets a stop time for real-time control.
	Query	Returns stop time for real-time control in numeric values consisting of year, month, date, hour and minute.
Example	Command	:STIM:STOP 2015,02,13,14,59
		Sets a stop time for real-time control to: year: 2015, month: 2, date: 13, hour: 14 and minute: 59.
	Query	:STIM:STOP?
	Response	(HEADER ON) :STIME:STOPTIME 2015,02,13,14,59 (HEADER OFF) 2015,02,13,14,59
Reference		- As the instrument identifies the number of days from the month and whether the year is a leap year, specifying an impossible date results in an execution error. - If a stop time is set to a value before start time, it becomes an execution error.

Querying Synchronous Control State		
Syntax	Query	:SYNC:STATus?
	Response Y	Synchronized state or synchronization control OFF
	N	Asynchronous state with synchronous control ON
Detail	Query	Returns synchronous control state in a string.
Example	Query	:SYNC:STAT?
	Response (HEADER ON)	:SYNC:STATUS Y
	(HEADER OFF)	Y
Reference		

Setting and Querying Master/Slave for Synchronization Control		
Syntax	Command	:SYNC:CONTRol <OFF/MASTERWAVE/MASTERMEAS/SLAVEWAVE/SLAVEMEAS>
	Query	:SYNC:CONTRol?
	Response OFF	OFF
	MASTERWAVE	Master waveform transfer
	MASTERMEAS	Master numeric value transfer
	SLAVEWAVE	Slave waveform transfer
	SLAVEMEAS	Slave numeric value transfer
Detail	Command	Sets master/slave for synchronization control.
	Query	Returns master/slave setting for synchronization control in a string.
Example	Command	:SYNC:CONT MASTERWAVE
	Query	:SYNC:CONT?
	Response (HEADER ON)	:SYNC:CONTROL MASTERWAVE
	(HEADER OFF)	MASTERWAVE
Reference		

Time Control: Setting and Querying Timer Control		
Syntax	Command	:TIMEr:CONTRol <ON/OFF>
	Query	:TIMEr:CONTRol?
	Response ON	Timer control ON
	OFF	Timer control OFF
Detail	Command	Sets timer control.
	Query	Returns setting for timer control in a string.
Example	Command	:TIME:CONT ON
	Query	:TIME:CONT?
	Response (HEADER ON)	:TIMER:CONTROL ON
	(HEADER OFF)	ON
Reference		

Time Control: Setting and Querying Time for Timer

Syntax	Command	:TIMER:TIME <Hour>, <Minute>, <Second>	
	Query	:TIMER:TIME?	
	Response	Hour	0000 to 9999
		Minute	00 to 59
		Second	00 to 59
Detail	Command	Sets time for timer.	
	Query	Returns time setting for timer in a numeric value.	
Example	Command	:TIME:TIME 1,0,0	
		Sets 1 hour for the time of the timer.	
	Query	:TIME:TIME?	
	Response	(HEADER ON)	:TIMER:TIME 0001,00,00
		(HEADER OFF)	0001,00,00
Reference		Range of setting allowed for time of the time is from 10 seconds to 9999 hours, 59 minutes and 59 seconds.	

Communication: Setting and Querying Numeric Character Data Format

Syntax	Command	:TRANsmit:COLumn <0/1>	
	Query	:TRANsmit:COLumn?	
	Response	0	"+" at the top and leading "0" of the mantissa for measured response data will be omitted.
		1	Number of mantissa characters of measured response data is constant. ("+" at the top and leading "0" of the mantissa are not omitted.)
Detail	Command	Sets numeric value data format for response data of ":MEASure?", ":MEASure:HARMonic?" and ":MEASure:NOISepeak?".	
	Query	Returns numeric value data format setting for response data in a numeric value.	
Example	Command	:TRAN:COL 1	
	Query	:TRAN:COL?	
	Response	(HEADER ON)	:TRANSMIT:COLUMN 1
		(HEADER OFF)	1
Reference		In case of :TRANsmit:COLumn 0	
	Query	:MEAS? Urms1,Irms1	
	Response	78.01E+00,5.0120E+00	
		In case of :TRANsmit:COLumn 1	
	Query	:MEAS? Urms1,Irms1	
	Response	+0078.01E+00,+05.0120E+00	
		The setting is initialized to a zero (0) at power-on.	

Communication: Setting and Querying Separator per Response Message	
Syntax	Command :TRANsmit:SEParator <0/1> Query :TRANsmit:SEParator? Response 0 Semicolon ';' ;' 1 Comma ',' ;'
Detail	Command Sets a separator per response message when header is OFF. Query Returns setting for separator per response message when header is OFF in a numeric value.
Example	Command :TRAN:SEP 1 Query :TRAN:SEP? Response (HEADER ON) :TRANSMIT:SEPARATOR 1 (HEADER OFF) 1
Reference	- Setting for separator per response message is valid only when header is OFF. - Measured response data of "MEASure?" system is delimited by ',' independent of this setting. - The setting is initialized to a semicolon (0) at power-on.

Setting and Querying Auto Trigger	
Syntax	Command :TRIGger:AUTO <ON/OFF> Query :TRIGger:AUTO? Response ON Auto Trigger ON OFF Auto Trigger OFF
Detail	Command Sets auto trigger. Query Returns setting for auto trigger in a string.
Example	Command :TRIG:AUTO ON Query :TRIG:AUTO? Response (HEADER ON) :TRIGGER:AUTO ON (HEADER OFF) ON
Reference	

Setting and Querying Trigger Detection Method	
Syntax	Command :TRIGger:DETEct <LEVEL/EVENT> Query :TRIGger:DETEct? Response LEVEL Level Trigger ON EVENT Event Trigger ON
Detail	Command Sets trigger detection method. Query Returns setting for trigger detection method in a string.
Example	Command :TRIG:DETE LEVEL Query :TRIG:DETE? Response (HEADER ON) :TRIGGER:DETECT LEVEL (HEADER OFF) LEVEL
Reference	

Setting and Querying Inequality Sign of Event Trigger	
Syntax	Command :TRIGger:EVENT[number]:INEQuality <LT/GT>
	Query :TRIGger:EVENT[number]:INEQuality?
	Response LT Inequality Sign "<". That means "less than". GT Inequality Sign ">". That means "greater than".
Detail	Command Sets inequality sign of event trigger. [number]: 1 to 4.
	Query Returns inequality sign of event trigger in a string.
Example	Command :TRIG:EVENT2:INEQ LT
	Query :TRIG:EVENT2:INEQ?
	Response (HEADER ON) :TRIGGER:EVENT2:LT
	(HEADER OFF) LT
Reference	

Setting and Querying Logical Operators of Event Trigger	
Syntax	Command :TRIGger:EVENT[number]:OPERator <OPERATOR 1>,<OPERATOR 2>,<OPERATOR 3>
	Query :TRIGger:EVENT[number]:OPERator?
	Response <OPERATOR 1>,<OPERATOR 2>,<OPERATOR 3>
	AND Logical Product OR Logical Sum OFF No Effect
Detail	Command Sets logical operators of event trigger. [number]: 1 to 4.
	Query Returns logical operators of event trigger in a string.
Example	Command :TRIG:EVENT2:OPER AND,OR,OFF
	Query :TRIG:EVENT2:OPER?
	Response (HEADER ON) :TRIGGER:EVENT:OPER AND,OR,OFF
	(HEADER OFF) AND,OR,OFF
Reference	

Setting and Querying Trigger Source of Event Trigger	
Syntax	Command :TRIGger:EVENT[number]:SOURse <D/A Output Mesurement Parameter Number>
	Query :TRIGger:EVENT[number]:SOURse?
	Response D/A Output Mesurement Parameter Number 13 to 20
Detail	Command Sets trigger source of event trigger with D/A output mesurement parameter number. [number]: 1 to 4.
	Query Returns trigger source of event trigger in a D/A output mesurement parameter number.
Example	Command :TRIG:EVENT2:SOUR 15
	Query :TRIG:EVENT2:SOUR?
	Response (HEADER ON) :TRIGGER:EVENT:SOURCE 15
	(HEADER OFF) 15
Reference	

Setting and Querying Threshold Value of Event Trigger	
Syntax	Command :TRIGger:EVENT[number]:THREshold <Threshold Value>
	Query :TRIGger:EVENT[number]:THREshold?
	±0.00001(a unit character) to ±999999(a unit character): Signed significant number of 6 digits and a unit character. Any one of n, u, m, k, M, G, and T can be specified as the unit character.
	Response Threshold Value
Detail	Command Sets threshold value of event trigger. [number]: 1 to 4. Query Returns threshold value in a string.
Example	Command :TRIG:EVENT2:THRE 0.01
	Query :TRIG:EVENT2:THRE?
	Response (HEADER ON) :TRIGGER:EVENT:THRESHOLD 0.01 (HEADER OFF) 0.01
Reference	

Setting and Querying Trigger Level	
Syntax	Command :TRIGger:LEVEL <Trigger level>
	Query :TRIGger:LEVEL?
	Response Trigger level -300.0 to 300.0
Detail	Command Sets a trigger level. This setting allows 0.1% step. Query Returns setting for trigger level in a numeric value.
Example	Command :TRIG:LEVE 50
	Query :TRIG:LEVE?
	Response (HEADER ON) :TRIGGER:LEVEL 50.0 (HEADER OFF) 50.0
Reference	

Trigger: Setting and Querying Pre-trigger	
Syntax	Command :TRIGger:PRETrig <Pre-trigger data>
	Query :TRIGger:PRETrig?
	Response Pre-trigger data 0 / 10 / 20 / 30 / 40 / 50 / 60 / 70 / 80 / 90 / 100
Detail	Command Sets pre-trigger. The setting is made for recording length with 10[%] step. Query Return setting for pre-trigger in a numeric value.
Example	Command :TRIG:PRET 10
	Query :TRIG:PRET?
	Response (HEADER ON) :TRIGGER:PRETRIG 10 (HEADER OFF) 10
Reference	

Setting and Querying Trigger Slope

Syntax Command **:TRIGger:SLOPe <RISING/FALLING>**
Query **:TRIGger:SLOPe?**
Response RISING Rising edge
FALLING Falling edge

Detail Command Sets a trigger slope.
Query Returns setting for trigger slope in a string.

Example Command **:TRIG:SLOP RISING**
Query **:TRIG:SLOP?**
Response (HEADER ON) **:TRIGGER:SLOPE RISING**
(HEADER OFF) **RISING**

Reference

Setting and Querying Trigger Source

Syntax Command **:TRIGger:SOURce <Trigger source>**
Query **:TRIGger:SOURce?**
Response <Trigger source>
Voltage and current waveforms U1 / U2 / U3 / U4 / U5 / U6 / I1 / I2 / I3 / I4 / I5 / I6
Voltage and current waveforms after zero-crossing filter U1FILT / U2FILT / U3FILT / U4FILT / U5FILT / U6FILT / I1FILT / I2FILT / I3FILT / I4FILT / I5FILT / I6FILT /
Motor waveform TQ1 / SPD1 / TQ2 / EXT1 / EXT2
CHA / CHB / CHC / CHD

Detail Command Sets a trigger source.
Query Returns setting for trigger source in a string.

Example Command **:TRIG:SOUR U1**
Query **:TRIG:SOUR?**
Response (HEADER ON) **:TRIGGER:SOURCE U1**
(HEADER OFF) **U1**

Reference

Setting and Querying Constants for User-defined Formulas	
Syntax	Command :UDF[number]:CONSTant <Constant 1>, <Constant 2>, <Constant 3>, <Constant 4>
	Query :UDF[number]:CONSTant?
	Response <Constant 1>, <Constant 2>, <Constant 3>, <Constant 4>
	Constants 1 to 4 ±0.00001(a unit character) to ±999999(a unit character): Signed significant number of 6 digits and a unit character. Any one of n, u, m, k, M, G, and T can be specified as the unit character.
Detail	Command Set a constant used for user-defined formula. [number]: 1 to 16.
	Query Returns a constant used for user-defined formula in a numeric value.
Example	Command :UDF1:CONS 0.01,1,100,1000
	Query :UDF1:CONS?
	Response (HEADER ON) :UDF1:CONSTANT +0.01000,+1.00000,+100.000G,+1000.00 (HEADER OFF) +0.01000,+1.00000,+100.000G,+1000.00
Reference	• If the number of arguments is less than 4, remaining items will not be changed. • When specifying 'm' as the unit character, enclose the entire argument with "". Example:UDF1:CONS "1m,2M,3,4"

Setting and Querying Basic Formulas for User-defined Formulas	
Syntax	Command :UDF[number]:FUNCTION <Formula 1>, <Formula 2>, <Formula 3>, <Formula 4>
	Query :UDF[number]:FUNCTION?
	Response <Formula 1>, <Formula 2>, <Formula 3>, <Formula 4>
	NONE No conversion NEG Reversed sign SIN Sine COS Cosine TAN Tangent SQRT Square root ABS Absolute value LOG10 Common logarithm LOG Logarithm EXP Exponent ASIN Arc sine ACOS Arc cosine ATAN Arc tangent SINH Hyperbolic sine COSH Hyperbolic cosine TANH Hyperbolic tangent
Detail	Command Sets a basic formula for user-defined formula. [number]: 1 to 16.
	Query Returns setting for basic formula for user-defined formula in a string.
Example	Command :UDF1:FUNC SIN,COS,TAN,SQRT
	Query :UDF1:FUNC?
	Response (HEADER ON) :UDF1:FUNCTION SIN,COS,TAN,SQRT (HEADER OFF) SIN,COS,TAN,SQRT
Reference	• If the number of arguments is less than 4, remaining items will not be changed.

Setting and Querying Items for User-defined Formulas

Syntax	Command	:UDF[number]:ITEM <Item 1>, <Item 2>, <Item 3>, <Item 4>
	Query	:UDF[number]:ITEM?
	Response	<Item 1>, <Item 2>, <Item 3>, <Item 4> Items 1 to 4 See "4.1 Parameters for Normal Measurement Items".
Detail	Command	Sets items for user-defined formula. [number]: 1 to 16. When specifying constant input CONST.
	Query	Returns items for user-defined formula in a string. Returns CONST when a constant is specified.
Example	Command	:UDF1:ITEM Urms1,lrms1,OFF,OFF
	Query	:UDF1:ITEM?
	Response	(HEADER ON) :UDF1:ITEM Urms1,lrms1,OFF,OFF (HEADER OFF) Urms1,lrms1,OFF,OFF
Reference		If the number of arguments is less than 4, remaining items will not be changed.

Setting and Querying Operators for User-defined Formulas

Syntax	Command	:UDF[number]:OPERator <Operator 1>, <Operator 2>, <Operator 3>
	Query	:UDF[number]:OPERator?
	Response	<Operator 1>, <Operator 2>, <Operator 3> NONE No conversion PLUS Addition MINUS Subtraction MULTI Multiplication DIV Division
Detail	Command	Sets operator for user-defined formula. [number]: 1 to 16.
	Query	Returns operators for user-defined formula in a string.
Example	Command	:UDF1:OPER PLUS,MINUS,NONE
	Query	:UDF1:OPER?
	Response	(HEADER ON) :UDF1:OPERATOR PLUS,MINUS,NONE (HEADER OFF) PLUS,MINUS,NONE
Reference		If the number of arguments is less than 3, remaining items will not be changed.

Setting and Querying Unit for User-defined Formulas

Syntax	Command	:UDF[number]:UNIT <Unit>
	Query	:UDF[number]:UNIT?
	Response	Unit Up to 6 alphanumeric characters
Detail	Command	Set a unit for user-defined formula. [number]: 1 to 16.
	Query	Returns unit for user-defined formula in a string.
Example	Command	:UDF1:UNIT K
	Query	:UDF1:UNIT?
	Response	(HEADER ON) :UDF1:UNIT K (HEADER OFF) K
Reference		- Sets without the unit when unit is specified as "NO_UNIT". - If you need to include lower-case characters, use "" around it. Example :UDF1:UNIT "Mpa" ;, ?, and space cannot be set.

Setting and Querying Upper Limit for User-defined Formulas

Syntax	Command	:UDF[number]:UPPer <Upper limit>
	Query	:UDF[number]:UPPer?
	Response	Upper limit 0.00001(a unit character) to 999999(a unit character): Signed significant number of 6 digits and a unit character. Any one of n, u, m, k, M, G, and T can be specified as the unit character. Allowable range is 1.000u - 100.0T.
Detail	Command	Sets an upper limit for user-defined formula. [number]: 1 to 16.
	Query	Returns upper limit for user-defined formula in a numeric value.
Example	Command	:UDF1:UPP 100G
	Query	:UDF1:UPP?
	Response	(HEADER ON) :UDF1:UPPER +100.000G (HEADER OFF) +100.000G
Reference		- When specifying 'm' as the unit character, enclose the entire argument with "". - Example :UDF1:UPP "100m"

Setting and Querying Voltage Auto Range

Syntax	Command	:VOLTage[CH]:AUTO <ON/OFF>
	Query	:VOLTage[CH]:AUTO?
	Response	ON Voltages are measured in auto range mode. OFF Voltages are measured in manual range mode.
Detail	Command	Sets for voltage auto range. [CH]: 1 to 6.
	Query	Returns setting for voltage auto range in a string.
Example	Command	:VOLT1:AUTO ON
	Query	:VOLT1:AUTO?
	Response	(HEADER ON) :VOLTAGE1:AUTO ON (HEADER OFF) ON
Reference		- If a range is set with a VOLTage[CH]:RANGe command, the auto-range for specified channel becomes OFF. - Depending on the combination of lines to be measured, voltage auto-range settings for other channels combined will be changed.

Setting and Querying Voltage Rectification Method

Syntax	Command	:VOLTage[CH]:MEAN <ON/OFF>
	Query	:VOLTage[CH]:MEAN?
	Response ON	Sets voltage rectification method to MEAN.
	OFF	Sets voltage rectification method to RMS.
Detail	Command	Sets a voltage rectification method. [CH]: 1 to 6.
	Query	Returns voltage rectification method in a string.
Example	Command	:VOLT1:MEAN OFF
	Query	:VOLT1:MEAN?
	Response	(HEADER ON) :VOLTAGE1:MEAN OFF (HEADER OFF) OFF
Reference	Setting for voltage rectification method for other channel combined will be changed depending on the pair of measurement lines.	

Setting and Querying Voltage Range

Syntax	Command	:VOLTage[CH]:RANGe <Voltage range>
	Query	:VOLTage[CH]:RANGe?
	Response	Voltage range 6 / 15 / 30 / 60 / 150 / 300 / 600 / 1500
Detail	Command	Changes a voltage range. [CH]: 1 to 6.
	Query	Returns a voltage range. [CH]: 1 to 6.
Example	Command	:VOLT1:RANG 300
	Query	:VOLT1:RANG?
	Response	(HEADER ON) :VOLTAGE1:RANGE 300 (HEADER OFF) 300
Reference	- Do not include any unit for the measurement range. - After you change the range, wait a few moments until the internal circuitry stabilizes before you read any measured values. - If a range is specified, the auto-range specified is turned OFF. - Depending on the combination of lines to be measured, voltage range settings for other channels combined will be changed.	

Setting and Querying Storage Mode for Waveforms

Syntax	Command	:WAVE:MODE <PEAK/DECI>
	Query	:WAVE:MODE?
	Response PEAK	Peak-Peak compression
	DECI	Decimation in frequency
Detail	Command	Sets a storage mode for waveform recording.
	Query	Returns setting for storage mode for waveform recording in a string.
Example	Command	:WAVE:MODE PEAK
	Query	:WAVE:MODE?
	Response	(HEADER ON) :WAVE:MODE PEAK (HEADER OFF) PEAK
Reference		

Setting and Querying Waveform Recording Length

Syntax	Command	:WAVE:SHOT <Recording length>
	Query	:WAVE:SHOT?
	Response	Recording length 1k / 5k / 10k / 50k / 100k / 500k / 1M
Detail	Command	Sets a recording length for a waveform. The unit is word.
	Query	Returns setting for waveform recording length in a string.
Example	Command	:WAVE:SHOT 100k
	Query	:WAVE:SHOT?
	Response	(HEADER ON) :WAVE:SHOT 100k
		(HEADER OFF) 100k
Reference		

Querying Waveform Acquisition State

Syntax	Query	:WAVE:STATe?
	Response	STOP Stop
		WAIT_AUTO Waiting for auto trigger
		WAIT_SINGLE Waiting for single trigger
		PRE_TRG Pre-trigger in progress
		STORAGE Storage in progress
		PROCESSING Compression in progress
		ABORT Abort in progress
Detail	Query	Returns waveform acquisition state as a character string.
Example	Query	:WAVE:STAT?
	Response	(HEADER ON) :WAVE:STATE STOP
		(HEADER OFF) STOP
Reference		

Querying Waveform Data State of Valid or Invalid

Syntax	Query	:WAVE:VALid?
	Response	TRUE Waveform data is valid.
		FALSE Waveform data is invalid.
Detail	Query	Returns waveform data state of valid or invalid as a character string.
Example	Query	:WAVE:VAL?
	Response	(HEADER ON) :WAVE:VALID TRUE
		(HEADER OFF) TRUE
Reference		

Setting and Querying Connections

Syntax	Command	:WIRing[CH] <Connection data>
	Query	:WIRing[CH]?
	Response	Connection data 1P2W / 1P3W / 3P3W2M / 3P3W3M / 3V3A / 3P4W
Detail	Command	Sets a connection per channel. [CH]: 1 to 6.
	Query	Returns connection setting per channel in a string. [CH]: 1 to 6.
Example	Command	:WIR1 1P2W
	Query	:WIR1?
	Response	(HEADER ON) :WIRING1 1P2W (HEADER OFF) 1P2W
Reference		• Use this command or query after a connection mode is set with ":MODE <Connection mode>" • If no change is available depending on the combination of connection data of a channel, it becomes a command execution error.

Setting and Querying Zero Suppression

Syntax	Command	:ZEROSP <Level>
	Query	:ZEROSP?
	Response	Level OFF / 0.1% / 0.5%
Detail	Command	Sets zero suppression mode.
	Query	Returns setting for zero suppression in a string.
Example	Command	:ZERO 0.1%
		Sets the zero suppression level to 0.1%f.s.
	Query	:ZERO?
	Response	(HEADER ON) :ZEROSP 0.1% (HEADER OFF) 0.1%
Reference		

4 Parameters for Normal Measurement Items

4.1 Parameters for Normal Measurement Items

Measurement item	Instru- ment's notation	Parameter list
Voltage RMS value	Urms	Urms1/Urms2/Urms3/Urms4/Urms5/Urms6/ Urms12/Urms34/Urms45/Urms56/Urms123/Urms456
Voltage average value rectification RMS equivalent	Umn	Umn1/Umn2/Umn3/Umn4/Umn5/Umn6/ Umn12/Umn34/Umn45/Umn56/Umn123/Umn456
Voltage AC component	Uac	Uac1/Uac2/Uac3/Uac4/Uac5/Uac6
Voltage simple average	Udc	Udc1/Udc2/Udc3/Udc4/Udc5/Udc6
Voltage fundamental wave component	Ufnd	Ufnd1/Ufnd2/Ufnd3/Ufnd4/Ufnd5/Ufnd6/
Voltage waveform peak +	Upk+	PUpk1/PUpk2/PUpk3/PUpk4/PUpk5/PUpk6
Voltage waveform peak -	Upk-	MUpk1/MUpk2/MUpk3/MUpk4/MUpk5/MUpk6
Total voltage harmonic distortion	Uthd	Uthd1/Uthd2/Uthd3/Uthd4/Uthd5/Uthd6
Voltage ripple factor	Urf	Urf1/Urf2/Urf3/Urf4/Urf5/Urf6
Voltage unbalance rate	Uunb	Uunb123/Uunb456
Current RMS value	Irms	Irms1/Irms2/Irms3/Irms4/Irms5/Irms6/ Irms12/Irms34/Irms45/Irms56/Irms123/Irms456
Current average value rectification RMS equivalent	Imn	Imn1/Imn2/Imn3/Imn4/Imn5/Imn6/ Imn12/Imn34/Imn45/Imn56/Imn123/Imn456
Current AC component	Iac	Iac1/Iac2/Iac3/Iac4/Iac5/Iac6
Current simple average	Idc	Idc1/Idc2/Idc3/Idc4/Idc5/Idc6
Current fundamental wave component	Ifnd	Ifnd1/Ifnd2/Ifnd3/Ifnd4/Ifnd5/Ifnd6/
Current waveform peak +	Ipk+	PIpk1/PIpk2/PIpk3/PIpk4/PIpk5/PIpk6
Current waveform peak -	Ipk-	MIpk1/MIpk2/MIpk3/MIpk4/MIpk5/MIpk6
Total current harmonic distortion	Ithd	Ithd1/Ithd2/Ithd3/Ithd4/Ithd5/Ithd6
Current ripple factor	Irf	Irf1/Irf2/Irf3/Irf4/Irf5/Irf6
Current unbalance rate	Iunb	Iunb123/Iunb456
Active power	P	P1/P2/P3/P4/P5/P6/P12/P34/P45/P56/P123/P456
Fundamental wave active power	Pfnd	Pfnd1/Pfnd2/Pfnd3/Pfnd4/Pfnd5/Pfnd6/ Pfnd12/Pfnd34/Pfnd45/Pfnd56/Pfnd123/Pfnd456
Apparent power	S	S1/S2/S3/S4/S5/S6/S12/S34/S45/S56/S123/S456
Fundamental wave apparent power	Sfnd	Sfnd1/Sfnd2/Sfnd3/Sfnd4/Sfnd5/Sfnd6/ Sfnd12/Sfnd34/Sfnd45/Sfnd56/Sfnd123/Sfnd456

Measurement item	Instru- ment's notation	Parameter list
Reactive power	Q	Q1/Q2/Q3/Q4/Q5/Q6/Q12/Q34/Q45/Q56/Q123/Q456
Fundamental wave reactive power	Qfnd	Qfnd1/Qfnd2/Qfnd3/Qfnd4/Qfnd5/Qfnd6/ Qfnd12/Qfnd34/Qfnd45/Qfnd56/Qfnd123/Qfnd456
Power factor	λ	PF1/PF2/PF3/PF4/PF5/PF6/PF12/PF34/PF45/PF56/PF123/ PF456
Fundamental wave power power	λ fnd	PFfnd1/PFfnd2/PFfnd3/PFfnd4/PFfnd5/PFfnd6/ PFfnd12/PFfnd34/PFfnd45/PFfnd56/PFfnd123/PFfnd456
Voltage phase angle	θ_U	Udeg1/Udeg2/Udeg3/Udeg4/Udeg5/Udeg6
Current phase angle	θ_I	Ideg1/Ideg2/Ideg3/Ideg4/Ideg5/Ideg6
Power phase angle	φ	DEG1/DEG2/DEG3/DEG4/DEG5/DEG6/ DEG12/DEG34/DEG45/DEG56/DEG123/DEG456
Frequency	f	FREQ1/FREQ2/FREQ3/FREQ4/FREQ5/FREQ6
Positive integration current	Ih+	PIH1/PIH2/PIH3/PIH4/PIH5/PIH6
Negative integration current	Ih-	MIH1/MIH2/MIH3/MIH4/MIH5/MIH6
Positive and negative integration current sum	Ih	IH1/IH2/IH3/IH4/IH5/IH6
Positive integration power sum	WP+	PWP1/PWP2/PWP3/PWP4/PWP5/PWP6 PWP12/PWP34/PWP45/PWP56/PWP123/PWP456
Negative integration power	WP-	MWP1/MWP2/MWP3/MWP4/MWP5/MWP6 MWP12/MWP34/MWP45/MWP56/MWP123/MWP456
Positive and negative integration power sum	WP	WP1/WP2/WP3/WP4/WP5/WP6 WP12/WP34/WP45/WP56/WP123/WP456
Efficiency	η	Eff1/Eff2/Eff3/Eff4
Loss	Loss	Loss1/Loss2/Loss3/Loss4
Torque	Tq	Tq1/Tq2
RPM	Spd	Spd1/Spd2
Motor power	Pm	Pm1/Pm2
Slip	Slip	Slip1/Slip2
Free input in independent input mode	CH	CHA/CHB/CHC/CHD
User Dified Function	UDF	UDF1/UDF2/UDF3/UDF4/UDF5/UDF6/UDF7/UDF8/UDF9/ UDF10/UDF11/UDF12/UDF13/UDF14/UDF15/UDF16
:AOUT:ITEM :DISPlay:CUSTom[number] :UDF[number]:ITEM	-	OFF

To specify slave normal measurement items for :AOUT:ITEM, :DISPlay:CUSTom[number] commands,

and :UDF[number]:ITEM commands, add [slv] at the end of the parameters given in the list above. Example:

Urms1slv

To specify slave normal measurement items for :MEASure? command, add [slv] at the top of the parameters given in the list above. Example: SlvUrms1

UDF items of slave cannot be specified.

4.2 List and Order of Direct Specification Items for :MEASure?

Measurement item	Parameter list	
Status	Status/Status1/Status2/Status3/Status4/Status5/Status6/ StatusM1/StatusM2/StatusMInd	
Elapsed time	Etime	Order when elapsed time is set to ON for communication output item of integration data (:MEASure:ITEM:INTEGrate).
Elapsed time in ms	Etime(ms)	
Parameters for normal measurement items	This items shows the output in the item name and order same with the parameters for normal measurement items. See 4.1 Parameters for Normal Measurement Items for details.	

4.2.1 Statuses

Status shows the status for saved measurement data in a 32 bits-hexadecimal value.

The status is a logical sum of Status1 through Status6 and StatusM1 and StatusM2 and StatusMInd. For example, if bit 11 (ZU) of Status2 is set to ON and bit 17 (ZM) of StatusM1 is set to ON, both bits 11 and 17 of Status are set to ON.

4.2.2 Channel Statuses (Status1, Status2, Status3, Status4, Status5, Status6)

Statuses for channels are Status1 through Status6. (e.g The status of channel 3 is Status3.)

Assignment of the 32 bits is as follows:

bit31	bit30	bit29	bit28	bit27	bit26	bit25	bit24
—	—	—	—	—	—	—	—
bit23	bit22	bit21	bit20	bit19	bit18	bit17	bit16
—	—	—	—	—	—	—	—
bit15	bit14	bit13	bit12	bit11	bit10	bit9	bit8
—	UCU	ZP	ZI	ZU	DP	DI	DU
bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
—	—	—	—	RI	RU	PI	PU

Bit	Abbreviation	Detail
Bit 14	UCU	Calculation unavailable (measured data is immediately after change resulting in invalid)
Bit 13	ZP	Power calculation (synchronized source) with forced zero-cross
Bit 12	ZI	Current frequency with forced zero-cross
Bit 11	ZU	Voltage frequency with forced zero-cross
Bit 10	DP	Power calculation (synchronized source) without data update
Bit 9	DI	Current frequency without data update
Bit 8	DU	Voltage frequency without data update
Bit 3	RI	Current range exceeded
Bit 2	RU	Voltage range exceeded
Bit 1	PI	Current peak exceeded
Bit 0	PU	Voltage peak exceeded

4.2.3 Motor statuses for channels A and B (StatusM1, StatusM2)

Motor statuses for channels A and B are StatusM1 and StatusM2.

Assignment of the 32 bits is as follows:

bit31	bit30	bit29	bit28	bit27	bit26	bit25	bit24
—	—	—	—	—	—	—	—
bit23	bit22	bit21	bit20	bit19	bit18	bit17	bit16
—	—	UCUB	ZMB	RMB	UCUA	ZMA	RMA
bit15	bit14	bit13	bit12	bit11	bit10	bit9	bit8
—	—	—	—	—	—	—	—
bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
—	—	—	—	—	—	—	—

Bit	Abbreviation	Detail
Bit 21	UCUB	CHB calculation unavailable (measured data is immediately after change resulting in invalid)
Bit 20	ZMB	CHB motor synchronization source with forced zero-cross
Bit 19	RMB	CHB range exceeded when input is set to analog
Bit 18	UCUA	CHA calculation unavailable (measured data is immediately after change resulting in invalid)
Bit 17	ZMA	CHA motor synchronization source with forced zero-cross
Bit 16	RMA	CHA range exceeded when input is set to analog

4.2.4 Motor analysis status in independent input mode (StatusMInd)

Motor analysis status in independent input mode is StatusMInd.

Assignment of the 32 bits is as follows:

bit31	bit30	bit29	bit28	bit27	bit26	bit25	bit24
—	UCU	ZD	ZC	ZB	ZA	RB	RA
bit23	bit22	bit21	bit20	bit19	bit18	bit17	bit16
—	—	—	—	—	—	—	—
bit15	bit14	bit13	bit12	bit11	bit10	bit9	bit8
—	—	—	—	—	—	—	—
bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
—	—	—	—	—	—	—	—

Bit	Abbreviation	Detail
Bit 30	UCU	Calculation unavailable (measured data is immediately after change resulting in invalid)
Bit 29	ZD	CHD with forced zero-cross
Bit 28	ZC	CHC with forced zero-cross
Bit 27	ZB	CHB with forced zero-cross
Bit 26	ZA	CHA with forced zero-cross
Bit 25	RB	CHB range exceeded
Bit 24	RA	CHA range exceeded

4.3 List and Order of Direct Specification Items for :MEASure:HARMonic?

Measurement item		Instru ment's notatio n	Parameter list
Status		-	Status
Zero- order	Harmonic voltage RMS value	Uk	HU1L000/HU2L000/HU3L000/HU4L000/HU5L000/HU6L000
	Harmonic current RMS value	Ik	HI1L000/HI2L000/HI3L000/HI4L000/HI5L000/HI6L000
	Harmonic active power	Pk	HP1L000/HP2L000/HP3L000/HP4L000/HP5L000/HP6L000/ HP12L000/HP34L000/HP45L000/HP56L000/HP123L000/HP456L000
	Harmonic voltage content percentage	HDUk	HU1D000/HU2D000/HU3D000/HU4D000/HU5D000/HU6D000
	Harmonic current content percentage	HDIk	HI1D000/HI2D000/HI3D000/HI4D000/HI5D000/HI6D000
	Harmonic power content percentage	HDPk	HP1D000/HP2D000/HP3D000/HP4D000/HP5D000/HP6D000/ HP12D000/HP34D000/HP45D000/HP56D000/HP123D000/HP456D000
	Harmonic voltage phase angle	θUk	HU1P000/HU2P000/HU3P000/HU4P000/HU5P000/HU6P000
	Harmonic current phase angle	θIk	HI1P000/HI2P000/HI3P000/HI4P000/HI5P000/HI6P000
	Harmonic voltage/current phase angle	θk	HP1P000/HP2P000/HP3P000/HP4P000/HP5P000/HP6P000/ HP12P000/HP34P000/HP45P000/HP56P000/HP123P000/HP456P000
n-th	(omitted)	-	The suffix in 3 digits shows the order "n".
100-t h	Harmonic voltage RMS value	Uk	HU1L100/HU2L100/HU3L100/HU4L100/HU5L100/HU6L100
	Harmonic current RMS value	Ik	HI1L100/HI2L100/HI3L100/HI4L100/HI5L100/HI6L100
	Harmonic active power	Pk	HP1L100/HP2L100/HP3L100/HP4L100/HP5L100/HP6L100/ HP12L100/HP34L100/HP45L100/HP56L100/HP123L100/HP456L100
	Harmonic voltage content percentage	HDUk	HU1D100/HU2D100/HU3D100/HU4D100/HU5D100/HU6D100
	Harmonic current content percentage	HDIk	HI1D100/HI2D100/HI3D100/HI4D100/HI5D100/HI6D100

Harmonic power content percentage	HDPk	HP1D100/HP2D100/HP3D100/HP4D100/HP5D100/HP6D100/ HP12D100/HP34D100/HP45D100/HP56D100/HP123D100/HP456D100
Harmonic voltage phase angle	θ_{Uk}	HU1P100/HU2P100/HU3P100/HU4P100/HU5P100/HU6P100
Harmonic current phase angle	θ_{Ik}	HI1P100/HI2P100/HI3P100/HI4P100/HI5P100/HI6P100
Harmonic voltage/current phase angle	θ_k	HP1P100/HP2P100/HP3P100/HP4P100/HP5P100/HP6P100/ HP12P100/HP34P100/HP45P100/HP56P100/HP123P100/HP456P100

4.3.1 Statuses

Status shows the status for saved measurement data in a 32 bits-hexadecimal value.

The status of measured harmonics data is one of the Statuses.

Assignment of the 32 bits is as follows: (The numbers 1 through 6 after abbreviation show channel number.)

bit31	bit30	bit29	bit28	bit27	bit26	bit25	bit24
—	—	—	—	—	—	—	—
bit23	bit22	bit21	bit20	bit19	bit18	bit17	bit16
—	—	UCU6	UCU5	UCU4	UCU3	UCU2	UCU1
bit15	bit14	bit13	bit12	bit11	bit10	bit9	bit8
—	—	ZH6	ZH5	ZH4	ZH3	ZH2	ZH1
bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
—	—	RF6	RF5	RF4	RF3	RF2	RF1

Bit	Abbreviation	Detail
16 to 21	UCU	Calculation unavailable (If data measured immediately after frequency fluctuation of a synchronization source is invalid.)
8 to 13	ZH	Harmonics waveform with forced zero-cross
0 to 5	RF	Frequency range exceeded

4.4 List and Order of Output Item for :MEASure:NOISepk?

Measurement item	Parameter list				
Noise Voltage	UNf01	UN01	~	UNf10	UN10
Noise Motor CHA	ANf01	AN01	~	ANf10	AN10
Noise Currennt	INf01	IN01	~	INf10	IN10
Noise Motor CHB	BNf01	BN01	~	BNf10	BN10

5 Trouble Shooting

Problem	Check item or cause	Solution/Reference
No communications.	Is the cable connected properly?	See "9 Connect with Computer, Instruction Manual".
	Are all the used cables the correct types?	
	Are all connected devices powered ON?	Turn ON all the devices.
	RS-232C Is the communication port setting identical to the one for the instrument?	See "9 Connect with Computer, Instruction Manual".
	GP-IB Is the address setting identical to the one for the instrument? Is the address setting identical to the one for other device?	See "9 Connect with Computer, Instruction Manual".
	LAN Is the communication setting identical to the one for the instrument? Is the IP address setting identical to the one for other device? Is the TCP/IP port number correct?	See "9 Connect with Computer, Instruction Manual". The port number is "0023".
Communications are not working properly.	Is the message terminator (delimiter) setting identical to the one for the instrument?	See "1.2.7 Message Terminators".
	Is open/close switching repeated frequently?	Take a more interval before reopening.
	RS-232C Is the communication port setting identical to the one for the instrument?	See "9 Connect with Computer, Instruction Manual".
I sent a command but nothing happens.	Beeps when a communication error occurs if beep is enabled for this instrument.	Execute a *ESR? query to obtain Standard Event Status Register and check the error.
	Did an error occur?	
	RS-232C Did an error occur?	Set RS232c:ANSWER to ON and check the execution check message.
I sent multiple queries but received only one response back.	Did an error occur?	Be sure to check for and read the response after each query is sent. To read all query responses at once, use the message separator and put all the queries on a single line.
	Are you using a *IDN? query?	"*IDN?" is the last query message in a program message. No other latter query commands are executed.
The query response message is not the same as what is displayed on the instrument panel.	Response messages are generated when the query is received by the instrument. Therefore, in some cases the message may not match what is displayed on the panel when the response is read by the controller.	
Any of the instrument's keys is not available after communication.	Is the [REMOTE] key on the instrument panel lit?	Press the [REMOTE] key to cancel remote state.

Problem	Check item or cause	Solution/Reference
	Are you sending the LLO (Local Lock Out) command to the instrument?	Send a GTL command to set the state to local.
Sometimes service requests are not executed. 	Are all the registers: Service Request Enable Register (SRER), Standard Event Status Enable Register (SESER) and Device-specific Event Status Enable Register (ESER*) set correctly?	Clear all the event registers with the *CLS command at the end of your SRQ processing subroutine. If the event bits are not cleared, the service requests will not be executed in the same event.
The program stops running when I try to read data with an INPUT statement.	Are you sending a query?	You must send a query before the INPUT statement.
	Did an error occur in the query sent before the INPUT statement?	Execute a *ESR? query to obtain Standard Event Status Register and check the error.

6 Device Documents Requirements

6.1 Device Documents Requirements

"Information on compliance to standards" based on the IEEE 488.2 standard

	Item	Detail
1	IEEE488.1 Interface Functions	See "Specification" of "9.3 Control and Measurements with GP-IB Interface" of the instrument's Instruction Manual.
2	Operation When the Address Is Set to a Value Outside the Range of 0 to 30	Settings outside the range of 0 to 30 are not allowed.
3	Recognizing When a User Changes the Initial Address Setting	The new address is recognized at the moment when the user changes the address.
4	Device Settings When the Instrument is Powered On	All status information is cleared. All other items are backed up. However, header, message separator and current path settings are reset.
5	Message Exchange Option Notation	■ Input buffer capacity and operation See "1.3.2 Input Buffer". ■ Queries to which multiple response messages are returned See "6.2 Queries to which multiple response messages are returned". ■ Queries that Generate a Response for Syntax Analysis All queries generate a response after syntax analysis. ■ Whether any queries produce responses when read: There are no queries that generate a response when read by the controller. ■ Availability of paired interacting commands Reference: "6.3 Paired interacting commands"
6	List of Functional Requirements for Device-specific Commands and Explanation for Compound Command Program Header Usage	■ List of functional requirements 1.2.1 Command Message 1.2.2 Query Message 1.2.3 Response Message 1.2.4 Command Syntax 1.2.5 Command Program Header 1.2.6 Query Program Header 1.2.7 Message Terminators 1.2.8 Separators 1.2.9 Data 1.2.10 Compound Command Header Omission
7	Block Data Buffer Capacity Limits	Block data is not used.

	Item	Detail
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>)	See "1 Command Reference".
9	Query Response Syntax	See "1 Command Reference".
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 "3.1 Standard Commands".
13	Device Status After a Revised Query Completes Successfully	*CAL? query is not used.
14	*DDT command availability	*DDT command is not used.
15	Macro Commands	Macros are not used.
16	Queries related to identification, explanation of the response to the *IDN? query	See "3.1 Standard Commands".
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. No data storage area is available for users.
18	Resources When the *RDT Command or *RDT? Query Is Used.	The *RDT command and *RDT? query are not used. Explanation for resources is not saved in the device.
19	Situations When the *RST , *LRN? , *RCL and *SAV Commands Are Affected	The *LRN? , *RCL and *SAV commands are not used. *RST command returns the instrument to its initial state. See "3.1 Standard Commands". See "6.2 Factory Settings" of the instrument's Instruction Manual.
20	Scope of the self-testing executed as a result of the *TST? query	See "3.1 Standard Commands".
21	Additional Status Data Structures Used for Reporting the Device Status	See "1.5 Event Registers".
22	Whether commands are overlap or sequential type	All commands are sequential.
23	Standards for Functions Required When Operation Complete Messages Are Generated as Command Responses	As overlap command is not used, standard to complete operation is not available. Supplement: Operation complete messages for sequential commands are generated when analysis of the command is performed.

6.2 Queries to which multiple response messages are returned

*IDN?	:DISPlay:CUSTom[number]?
*OPT?	:EXTErnalin[MOTOR]:FREQuency:RANGe?
:AOUT:ITEM?	:FILE:FILEName?
:CALCulate[number]:PIN?	:FILE:FOLDername?
:CALCulate[number]:POUT?	:IP:ADDReSS?
:CLOCK?	:IP:DEFaultgateway?
:DATAout:ITEM:EFFiciency?	:IP:SUBNetmask?
:DATAout:SLAVE:EFFiciency?	:MEASure?
:DATAout:ITEM:HARMonic:LIST?	:MEASure:HARMonic?
:DATAout:ITEM:HARMonic:ORDER?	:MEASure:ITEM:EFFiciency?
:DATAout:ITEM:I?	:MEASure:ITEM:HARMonic:LIST?
:DATAout:SLAVE:I?	:MEASure:ITEM:HARMonic:ORDER?
:DATAout:ITEM:ISUM?	:MEASure:ITEM:I?
:DATAout:SLAVE:ISUM?	:MEASure:ITEM:ISUM?
:DATAout:ITEM:INTEGrate?	:MEASure:ITEM:INTEGrate?
:DATAout:SLAVE:INTEGrate?	:MEASure:ITEM:NORMAl?
:DATAout:ITEM:NORMAl?	:MEASure:ITEM:P?
:DATAout:SLAVE:NORMAl?	:MEASure:ITEM:PSUM?
:DATAout:ITEM:P?	:MEASure:ITEM:SUM?
:DATAout:SLAVE:P?	:MEASure:ITEM:U?
:DATAout:ITEM:PSUM?	:MEASure:ITEM:USUM?
:DATAout:SLAVE:PSUM?	:MEASure:ITEM:UDF?
:DATAout:ITEM:SUM?	:MEASure:ITEM:EXTErnalin?
:DATAout:SLAVE:SUM?	:MEASure:NOISepeak?
:DATAout:ITEM:U?	:MEASure:NOISepeak:CHA?
:DATAout:SLAVE:U?	:MEASure:NOISepeak:CHB?
:DATAout:ITEM:USUM?	:MEASure:NOISepeak:I?
:DATAout:SLAVE:USUM?	:MEASure:NOISepeak:U?
:DATAout:ITEM:EXTErnalin?	:STIME:STARttime?
:DATAout:SLAVE:EXTErnalin?	:STIME:STARttime?
	:STIME:STOPtime?
	:TIMER:TIME?

6.3 Paired interacting commands

Commands affecting	Commands to be affected
:MODE <Connection mode>	:WIRing[CH]
:IP:DHCP <ON/OFF>	:IP:ADDRes :IP:DEFaultgateway :IP:SUBNetmask
:STIMe:STARttime	:STIMe:STOPtime

HIOKI

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