

PW6001

HIOKI

PW6001-01 PW6001-11
PW6001-02 PW6001-12
PW6001-03 PW6001-13
PW6001-04 PW6001-14
PW6001-05 PW6001-15
PW6001-06 PW6001-16

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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Contents

1 Communications	1
1.1 Communication Method.....	1
1.2 Message Format	2
1.3 Output Queue and Input Buffer	6
1.4 Status Byte Register.....	7
1.5 Event Registers	9
1.6 Initialization Items	14
2 Command List.....	15
2.1 Table of Contents	15
2.2 Command List	21
3 Command Reference.....	32
3.1 Standard Commands.....	32
3.2 Device-specific Commands	36
4 Parameters for Normal Measurement Items	131
4.1 Parameters for Normal Measurement Items	131
4.2 List and Order of Direct Specification Items for :MEASure?	134
4.3 List and Order of Direct Specification Items for :MEASure:HARMonic?.....	137
4.4 List and Order of Output Item for :MEASure:NOISepeak?	138
5 Trouble Shooting	139
6 Device Documents Requirements.....	141
6.1 Device Documents Requirements	141
6.2 Queries to which multiple response messages are returned.....	143
6.3 Paired interacting commands	144

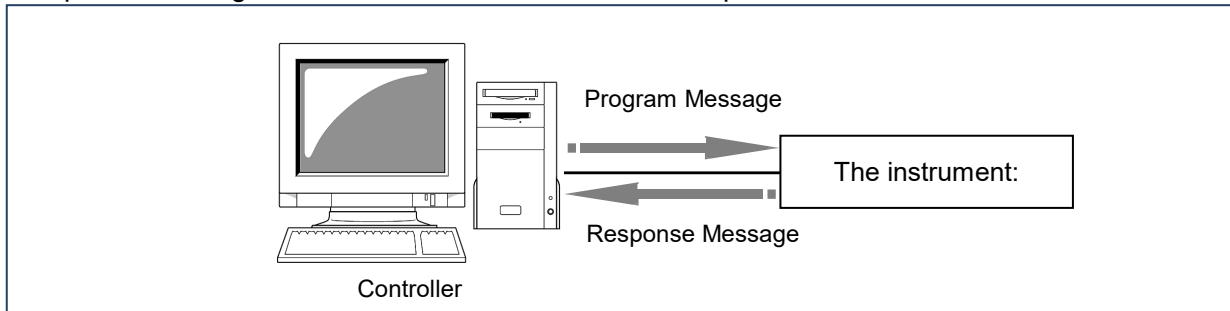
1 Communications

1.1 Communication Method

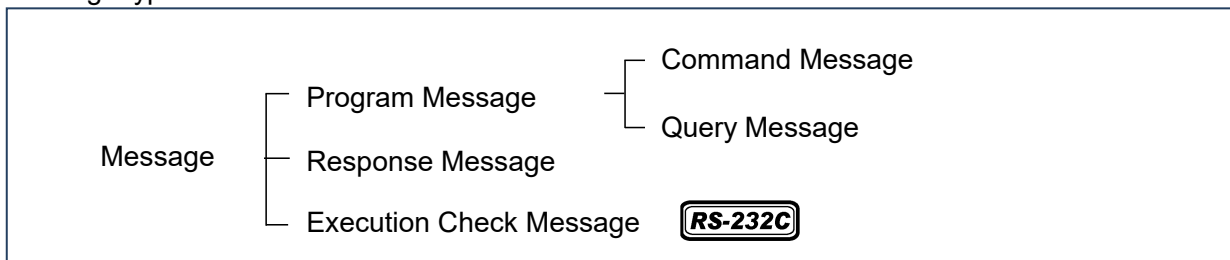
In this manual, PW6001 is represented as The Instrument.

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**. 

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	<u>:VOLTage1:AUTO OFF</u>;:VOLTage1:RANGe 300
Compacted expression	<u>:VOLTage1:AUTO OFF</u>;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.


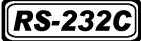

A colon ":" is not required at the start of standard and compound command type headers. However, to avoid confusion with abbreviated forms and operating mistakes, we recommend always placing a colon ":" at the start of a command.

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.

1.4.2 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: <ul style="list-style-type: none"> • 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. <ul style="list-style-type: none"> • 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. <ul style="list-style-type: none"> • 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. <ul style="list-style-type: none"> • 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 Clear	Clears the input buffer and output queue.
SDC	Selected Device Clear	Clears the input buffer and output queue.
GET	Group Execute Trigger	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

2.1 Table of Contents

Clearing Event Status Register and Status Byte Register (Except Output Queue)	32
Setting and Querying Standard Event Status Enable Register (SESER).....	32
Querying and Clearing Standard Event Status Register (SESR)	32
Querying Instrument's ID (Identification Code)	33
Setting OPC bit of SESR after All Operations Completed	33
Setting "1" to Output Queue after All Operations Running Completed.....	33
Querying Instrument's Options	33
Initializing Instrument	34
Setting and Querying Service Request Status Enable Register (SRER).....	34
Querying Status Byte Register	34
Sampling Request	34
Executing Self-test and Querying Result.....	35
Executing the next command once measurement data update processing is complete.	35
Setting and Querying Full-scale D/A Integration	36
Setting and Querying D/A Output Items	36
Setting and Querying D/A Output Waveform	36
Setting and Querying Full-scale D/A Output Waveform	37
Setting and Querying Auto-range Extent.....	37
Setting and Querying Average.....	37
Setting and Querying Number of Averaging Times	38
Setting and Querying Beep.....	38
Setting and Querying Pin for Efficiency and Loss Formulas.....	38
Setting and Querying Pout for Efficiency and Loss Formulas	39
Setting and Querying Clock.....	39
File: Setting and Querying Comment Save for Screen Hardcopy	40
File: Setting and Querying Destination Folder Name for Saving Screen Hardcopy.....	40
File: Setting and Querying Setting Information Save for Screen Hardcopy	40
Setting and Querying Current Auto-range.....	41
Setting and Querying Phase Correction Formulas for Current Sensors.....	41
Setting and Querying Phase Correction Angle for Current Sensors	41
Setting and Querying Phase Correction Frequency for Current Sensors.....	42
Setting and Querying Current Sensor Terminals	42
Setting and Querying Current Rectification Method.....	42
Setting and Querying Current Range	43
Setting and Querying Current Sensor Plobe2 Rating	43
Save item: Initialized Save Data Items.....	44
Save item: Initialized Save Data Items (Slave)	44

Save Item: Setting and Querying Efficiency and Loss Formulas.....	44
Save Item: Setting and Querying Calculated Efficiency and Loss (Slave).....	45
Save item: Initialized Save Data Items for Harmonics.....	45
Save Item: Setting and Querying Harmonics Data.....	46
Save Item: Setting and Querying Output Order for Harmonics Data.....	47
Save Item: Setting and Querying Current Data.....	47
Save Item: Setting and Querying Current Data (Slave).....	48
Save Item: Setting and Querying Total Current Data.....	48
Save Item: Setting and Querying Total Current Data (Slave).....	49
Save Item: Setting and Querying Integration Data.....	49
Save Item: Setting and Querying Integration Data (Slave).....	50
Save Item: Setting and Querying Normal Measured Values of Channels.....	51
Save Item: Setting and Querying Normal Measured Values of Channels (Slave).....	52
Save Item: Setting and Querying Power Data.....	53
Save Item: Setting and Querying Power Data (Slave).....	54
Save Item: Setting and Querying Total Power Data.....	55
Save Item: Setting and Querying Total Power Data (Slave).....	56
Save Item: Setting and Querying Normal Measured Values for SUM.....	57
Save Item: Setting and Querying Normal Measured Values for SUM (Slave).....	58
Save Item: Setting and Querying Voltage Data.....	59
Save Item: Setting and Querying Voltage Data (Slave).....	60
Save Item: Setting and Querying Total Voltage Data.....	60
Save Item: Setting and Querying Total Voltage Data (Slave).....	61
Save Item: Setting and Querying User-defined Formulas.....	61
Save Item: Setting and Querying Motor.....	62
Save Item: Setting and Querying Motor (Slave).....	62
Setting and Querying ON/OFF for Δ -Y Calculation (CH1, 2, 3).....	63
Setting and Querying ON/OFF for Δ -Y Calculation (CH4, 5, 6).....	63
Executing and Querying Zero Adjustment.....	63
Setting and Querying Display Items of CUSTOM/WAVE+VALUE Screens.....	64
Key Operations of The Instrument.....	65
Switching Display.....	66
Switch Number of Parameters on CUSTOM Screen.....	66
Select and Query Start Up Screen.....	66
Setting and Querying Device-specific Event Status Enable Registers (SESER0).....	67
Setting and Querying Device-specific Event Status Enable Register (ESER1).....	68
Setting and Querying Device-specific Event Status Enable Register (ESER2).....	69
Setting and Querying Device-specific Event Status Enable Register (ESER3).....	70
Querying Device-specific Event Status Registers (ESR0 through 3).....	70
Querying Options.....	71

Motor analysis option: Setting and Querying Lower Limit Frequency for Motor	71
Motor analysis option: Setting and Querying Upper Limit Frequency for Motor	71
Motor analysis option: Setting and Querying Operation Mode	72
Motor analysis option: Setting and Querying in Single Operation Mode	72
Motor analysis option: Setting and Querying RPM Scaling	72
Motor analysis option: Executing Zero Compensation.....	73
Motor analysis option: Setting and Querying Input Frequency Range	73
Motor analysis option: Setting and Querying Motor Pole Number.....	73
Motor analysis option: Setting and Querying Pulse Number	74
Motor analysis option: Setting and Querying Torque Scaling.....	74
Motor analysis option: Setting and Querying Input Frequency Source for Slip Calculation.....	74
Motor analysis option: Setting and Querying Synchronization Source.....	75
Motor analysis option: Setting and Querying Unit.....	75
Motor analysis option: Setting and Querying Analog Lowpass Filter for Channel A.....	76
Motor analysis option: Setting and Querying Input for Channel A.....	76
Motor analysis option: Setting and Querying Pulse Filter for Channel A.....	76
Motor analysis option: Setting and Querying Range for Channel A	77
Motor analysis option: Setting and Querying Analog Lowpass Filter for Channel B.....	77
Motor analysis option: Setting and Querying Input for Channel B.....	77
Motor analysis option: Setting and Querying Pulse Filter for Channel B.....	78
Motor analysis option: Setting and Querying Range for Channel B	78
Motor analysis option: Setting and Querying Pulse Filter for Channel C.....	78
Motor analysis option: Setting and Querying Pulse Filter for Channel D.....	79
FFT: Setting and Querying Measurement Channel for Noise Analysis.....	79
FFT: Setting and Querying Noise Lower Frequency Limit	79
FFT: Setting and Querying Noise Analysis Points	80
FFT: Setting and Querying Starting Point for Noise Analysis	80
FFT: Setting and Querying Sampling Speed for Noise Analysis	80
FFT: Setting and Querying Window Functions for Noise Analysis.....	80
FFT: Setting and Querying Vertical Scale of Displayed Noise Analysis Results	82
File: Setting and Querying Auto Save for USB Flash Drive	82
File: Acquire File Data in USB Flash Drive in a lump	82
File: Querying Availability of USB Flash Drive	83
File: Querying File Name	83
File: Querying Folder Name	83
File: Acquire File Data in USB Flash Drive	84
File: Setting and Querying Delimiter for CSV File.....	84
File: Querying File Size.....	84
Frequency: Setting and Querying Frequency (HPF) for Zero-cross Filter.....	85
Frequency: Setting and Querying Lower Measurement Frequency Limit	85

Frequency:Setting and Querying Frequency Measurement Source.....	85
Frequency:Setting and Querying Upper Measurement Frequency Limit	86
Communications: Setting and Querying GP-IB Address	86
Setting and Querying Grouping for Harmonics Measurement.....	86
Setting and Querying Mode for Harmonics Measurement.....	87
Setting and Querying Maximum Analysis Order for Harmonics Measurement.....	87
Setting and Querying THD Calculation for Harmonics Measurement	87
Setting and Querying Header Availability for Response Message	88
Setting and Querying Hold State	88
Setting and Querying Integration Mode.....	88
Executing Reset for Integrated Data	89
Executing Integration (Time Control) Start.....	89
Querying Integration (Time Control).....	89
Executing Integration (Time Control) Stop	89
Time Control: Setting and Querying Interval Time	90
LAN: Setting and Querying IP Address	90
LAN: Setting and Querying Default Gateway	90
LAN: Setting and Querying DHCP.....	91
LAN: Setting and Querying Subnet Mask.....	91
Querying Key Lock.....	91
Setting and Querying Instrument Language.....	92
Setting and Querying Lowpass Filter (LPF)	92
Setting and Querying Formula for Three-phase Power	92
Communication Output Item: Querying Measurement Data.....	93
Communication Output Item: Querying Measurement Data (Interval: 10 ms)	94
Communication Output Item: Querying Measured Harmonics Data	95
Communication Output Item: Querying Measurement Data in Inner Memory	96
Communication Output Item: Setting and Querying First Index of Ouput in Inner Memory.....	97
Communication Output Item: Querying Number of Index saved in Inner Memory.....	97
Communication Output Item: Setting and Querying Output Times of Index in Inner Memory.....	98
Communication Output Item: Initializing Communication Output Data Items	98
Communication Output Item: Setting and Querying Calculated Efficiency and Loss	98
Communication Output Item: Initializing Communication Output Data Items for Harmonics.....	99
Communication Output Item: Setting and Querying Harmonics Data	100
Communication Output Item: Setting and Querying Output Order for Harmonics Data.....	101
Communication Output Item: Setting and Querying Current Data.....	101
Communication Output Item: Setting and Querying Total Current Data	102
Communication Output Item: Setting and Querying Integration Data	103
Communication Output Item: Setting and Querying Normal Measured Values of Channels	104
Communication Output Item: Setting and Querying Power Data	105

Communication Output Item: Setting and Querying Total Power Data	106
Communication Output Item: Setting and Querying Normal Measured Values for SUM.....	107
Communication Output Item: Setting and Querying Voltage Data	108
Communication Output Item: Setting and Querying Total Voltage Data	108
Communication Output Item: Setting and Querying User-defined Formulas	109
Communication Output Item: Setting and Querying Motor	109
Querying Measured Noise Data	110
Querying Measured Current Noise Data	110
Querying Measured Voltage Noise Data.....	111
Querying Measured Noise Data for Motor CHA.....	111
Querying Measured Noise Data for Motor CHB.....	112
Setting and Querying Connection Mode	112
Executing and Clearing Phase Zero Adjustment	113
Setting and Querying Phase Zero Adjustment Degree.....	113
Setting and Querying Data Update Rate.....	113
Communication: Setting and Querying Availability of Execution Check Message.....	114
Communication: Setting and Querying RS232C Communication Speed	114
Communication: Setting and Querying Destination of RS232C Connection.....	114
File: Setting and Querying Folder Name for Auto Save Destination	115
File: Setting and Querying Folder Name for Manual Save Destination.....	115
File: Setting and Querying Comment Save for Manual Save	115
File: Setting and Querying File format for Waveforms.....	116
Setting and Querying CT Ratio.....	116
Setting and Querying VT Ratio.....	116
Setting and Querying Synchronization Source	117
Time Control: Setting and Querying Real-time Control.....	117
Time Control: Setting and Querying Start Time for Real-time Control	118
Time Control: Setting and Querying Stop Time for Real-time Control	118
Querying Synchronous Control State.....	119
Setting and Querying Master/Slave for Synchronization Control.....	119
Time Control: Setting and Querying Timer Control.....	119
Time Control: Setting and Querying Time for Timer	120
Communication: Setting and Querying Numeric Character Data Format	120
Communication: Setting and Querying Separator per Response Message.....	121
Setting and Querying Auto Trigger.....	121
Setting and Querying Trigger Detection Method.....	121
Setting and Querying Inequality Sign of Event Trigger.....	122
Setting and Querying Logical Operators of Event Trigger	122
Setting and Querying Trigger Source of Event Trigger.....	122
Setting and Querying Threshold Value of Event Trigger	123

Setting and Querying Trigger Level.....	123
Trigger: Setting and Querying Pre-trigger	123
Setting and Querying Trigger Slope	124
Setting and Querying Trigger Source.....	124
Setting and Querying Constants for User-defined Formulas.....	125
Setting and Querying Basic Formulas for User-defined Formulas	125
Setting and Querying Items for User-defined Formulas.....	126
Setting and Querying Operators for User-defined Formulas	126
Setting and Querying Unit for User-defined Formulas	127
Setting and Querying Upper Limit for User-defined Formulas.....	127
Setting and Querying Voltage Auto Range	127
Setting and Querying Voltage Rectification Method	128
Setting and Querying Voltage Range.....	128
Setting and Querying Storage Mode for Waveforms	128
Setting and Querying Waveform Recording Length	129
Querying Waveform Acquisition State	129
Querying Waveform Data State of Valid or Invalid	129
Setting and Querying Connections.....	130
Setting and Querying Zero Suppression	130

2.2 Command List

*CLS	32
*ESE <0 to 255 (NR1)>	32
*ESE?	32
*ESR?	32
*IDN?	33
*OPC	33
*OPC?	33
*OPT?	33
*RST	34
*SRE <0 to 255 (NR1)>	34
*SRE?	34
*STB?	34
*TRG	34
*TST?	35
*WAI	35
:AOUT:INTEGrate <Scale Data>	36
:AOUT:INTEGrate?	36
:AOUT:ITEM <Item 1>,, <Item 20>	36
:AOUT:ITEM?	36
:AOUT:MONitor <ON/OFF>	36
:AOUT:MONitor?	36
:AOUT:MONitor:SCALe <1/2>	37
:AOUT:MONitor:SCALe?	37
:AUTOrange <WIDE/NARROW>	37
:AUTOrange?	37
:AVERaging:MODE <OFF/ADD/FAST/MID/SLOW>	37
:AVERaging:MODE?	37
:AVERaging:TIMEs <Number of averaging times>	38
:AVERaging:TIMEs?	38
:BEEPer <ON/OFF>	38
:BEEPer?	38
:CALCulate[number]:PIN <Item 1>, <Item 2>, <Item 3>, <Item4>	38
:CALCulate[number]:PIN?	38
:CALCulate[number]:POUT <Item 1>, <Item 2>, <Item 3>, <Item 4>	39
:CALCulate[number]:POUT?	39
:CLOCK <Year (NR1)>, <Month (NR1)>, <Date (NR1)>, <Hour (NR1)>, <Minute (NR1)>, <Second (NR1)>	39
:CLOCK?	39
:COPY:COMMeNt <OFF/TEXT/BMP>	40

:COPY:COMMeNt?	40
:COPY:FOLDeRname <Folder name>	40
:COPY:FOLDeRname?	40
:COPY:INFORmation <ON/OFF>	40
:COPY:INFORmation?	40
:CURRent[CH]:AUTO <ON/OFF>	41
:CURRent[CH]:AUTO?	41
:CURRent[CH]:CORReCt <ON/OFF>	41
:CURRent[CH]:CORReCt?	41
:CURRent[CH]:DEGRee <Phase correction angle>	41
:CURRent[CH]:DEGRee?	41
:CURRent[CH]:FREQUency <Correction frequency (kHz)>	42
:CURRent[CH]:FREQUency?	42
:CURRent[CH]:INPUt <Probe1/Probe2>	42
:CURRent[CH]:INPUt?	42
:CURRent[CH]:MEAN <ON/OFF>	42
:CURRent[CH]:MEAN?	42
:CURRent[CH]:RANGe <Current rage (NR2)>	43
:CURRent[CH]:RANGe?	43
:CURRent[CH]:RATE <Rating>	43
:CURRent[CH]:RATE?	43
:DATAout:ITEM:ALLClear	44
:DATAout:SLAVe:ALLClear	44
:DATAout:ITEM:EFFiciency <EFF>,<LOSS>	44
:DATAout:ITEM:EFFiciency?	44
:DATAout:SLAVe:EFFiciency <EFF>,<LOSS>	45
:DATAout:SLAVe:EFFiciency?	45
:DATAout:ITEM:HARMonic:ALLClear	45
: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>	46
:DATAout:ITEM:HARMonic:LIST?	46
:DATAout:ITEM:HARMonic:ORDeR <Lower limit order(NR1)>, <Upper limit order(NR1)>, <ODD/EVEN/ALL>	47
:DATAout:ITEM:HARMonic:ORDeR?	47
:DATAout:ITEM:I <RMS>,<MN>,<AC>,<DC>,<FND>,<PK+>,<PK->,<THD>,<RF>,<DEG>	47
:DATAout:ITEM:I?	47
:DATAout:SLAVe:I <RMS>,<MN>,<AC>,<DC>,<FND>,<PK+>,<PK->,<THD>,<RF>,<DEG>	48
:DATAout:SLAVe:I?	48
:DATAout:ITEM:ISUM <RMS>,<MN>,<UNB>	48

:DATAout:ITEM:ISUM?	48
:DATAout:SLAVE:ISUM <RMS>,<MN>,<UNB>.....	49
:DATAout:SLAVE:ISUM?	49
:DATAout:ITEM:INTEGrate <PIH>, <MIH>, <IH>, <PWP>, <MWP>, <WP>, <PWP_SUM>, <MWP_SUM>, <WP_SUM>, <Elapsed time>.....	49
:DATAout:ITEM:INTEGrate?	49
:DATAout:SLAVE:INTEGrate <PIH>, <MIH>, <IH>, <PWP>, <MWP>, <WP>, <PWP_SUM>, <MWP_SUM>, <WP_SUM>, <Elapsed time>.....	50
:DATAout:SLAVE:INTEGrate?.....	50
:DATAout:ITEM:NORMAl <U>,<I>,<P>,<S>,<Q>,<PF>,<DEG>,<FREQ>	51
:DATAout:ITEM:NORMAl?	51
:DATAout:SLAVE:NORMAl <U>,<I>,<P>,<S>,<Q>,<PF>,<DEG>,<FREQ>.....	52
:DATAout:SLAVE:NORMAl?	52
:DATAout:ITEM:P <P>,<Pfnd>,<S>,<Sfnd>,<Q>,<Qfnd>,<PF>,<PFfnd>,<DEG>.....	53
:DATAout:ITEM:P?	53
:DATAout:SLAVE:P <P>,<Pfnd>,<S>,<Sfnd>,<Q>,<Qfnd>,<PF>,<PFfnd>,<DEG>	54
:DATAout:SLAVE:P?	54
:DATAout:ITEM:PSUM <P>,<Pfnd>,<S>,<Sfnd>,<Q>,<Qfnd>,<PF>,<PFfnd>,<DEG>.....	55
:DATAout:ITEM:PSUM?	55
:DATAout:SLAVE:PSUM <P>,<Pfnd>,<S>,<Sfnd>,<Q>,<Qfnd>,<PF>,<PFfnd>,<DEG>	56
:DATAout:SLAVE:PSUM?	56
:DATAout:ITEM:SUM <U>,<I>,<P>,<S>,<Q>,<PF>,<DEG>	57
:DATAout:ITEM:SUM?.....	57
:DATAout:SLAVE:SUM <U>,<I>,<P>,<S>,<Q>,<PF>,<DEG>	58
:DATAout:SLAVE:SUM?	58
:DATAout:ITEM:U <RMS>,<MN>,<AC>,<DC>,<FND>,<PK+>,<PK->,<THD>,<RF>,<DEG>	59
:DATAout:ITEM:U?	59
:DATAout:SLAVE:U <RMS>,<MN>,<AC>,<DC>,<FND>,<PK+>,<PK->,<THD>,<RF>,<DEG>	60
:DATAout:SLAVE:U?	60
:DATAout:ITEM:USUM <RMS>,<MN>,<UNB>.....	60
:DATAout:ITEM:USUM?	60
:DATAout:SLAVE:USUM <RMS>,<MN>,<UNB>	61
:DATAout:SLAVE:USUM?	61
:DATAout:ITEM:UDF <User definitions 1 to 8>, <User definitions 9 to 16>	61
:DATAout:ITEM:UDF?	61
:DATAout:ITEM:EXTErnalin <Torque>, <RPM>, <Motor power>, <Slip>, <Independent input>	62
:DATAout:ITEM:EXTErnalin?.....	62
:DATAout:SLAVE:EXTErnalin <Torque>, <RPM>, <Motor power>, <Slip>, <Independent input> .	62
:DATAout:SLAVE:EXTErnalin?	62
:DELTay123 <ON/OFF>	63

:DELTay123?	63
:DELTay456 <ON/OFF>	63
:DELTay456?	63
:DEMAg	63
:DEMAg?	63
:DISPlay:CUSTom[number] <Item name>, ..., <Item name>	64
:DISPlay:CUSTom[number]?	64
:DISPlay:KEY <Key name>	65
:DISPlay:PAGE <Screen type>	66
:DISPlay:PAGE?	66
:DISPlay:PAGE:CUSTom <4 / 8 / 16 / 32>	66
:DISPlay:PAGE:CUSTom?	66
:DISPlay:SET:STARting <BACKUP/WIRING>	66
:DISPlay:SET:STARting?	66
:ESE0 <0 to 255 (NR1)>	67
:ESE0?	67
:ESE1 <0 to 63 (NR1)>	68
:ESE1?	68
:ESR2 <0 to 63 (NR1)>	69
:ESE2?	69
:ESE3 <0 to 3 (NR1)>	70
:ESE3?	70
:ESR0?	70
:ESR1?	70
:ESR2?	70
:ESR3?	70
:EXTernalin:EXISt?	71
:EXTernalin:FREQUency:LOWer <Frequency data>	71
:EXTernalin:FREQUency:LOWer?	71
:EXTernalin:FREQUency:UPPER <Frequency data>	71
:EXTernalin:FREQUency:UPPER?	71
:EXTernalin:MODE <SINGLE/DUAL/IND>	72
:EXTernalin:MODE?	72
:EXTernalin:PATTern <TSSZ/TSSO/TSOZ/TSOO>	72
:EXTernalin:PATTern?	72
:EXTernalin:SCALe:SPEEd <RPM Scaling>	72
:EXTernalin:SCALe:SPEEd?	72
:EXTernalin:ZEROadjust	73
:EXTernalin[MOTOR]:FREQUency:RANGe <Center frequency>, <Frequency range>	73
:EXTernalin[MOTOR]:FREQUency:RANGe?	73

:EXTErnalin[MOTOR]:PULSe:MOTorpoles <Pole number>	73
:EXTErnalin[MOTOR]:PULSe:MOTorpoles?	73
:EXTErnalin[MOTOR]:PULSe:NUMBer <Pulse number>	74
:EXTErnalin[MOTOR]:PULSe:NUMBer?	74
:EXTErnalin[MOTOR]:SCALe:TORQue <Torque Scaling>	74
:EXTErnalin[MOTOR]:SCALe:TORQue?	74
:EXTErnalin[MOTOR]:SLIP <Frequency measurement channels 1 to 6>	74
:EXTErnalin[MOTOR]:SLIP?	74
:EXTErnalin[MOTOR]:SOURce <Synchronization source>	75
:EXTErnalin[MOTOR]:SOURce?	75
:EXTErnalin[MOTOR]:UNIT <Unit data>	75
:EXTErnalin[MOTOR]:UNIT?	75
:EXTErnalinA:ANALog:LPF <ON/OFF>	76
:EXTErnalinA:ANALog:LPF?	76
:EXTErnalinA:FREQuency <ON/OFF>	76
:EXTErnalinA:FREQuency?	76
:EXTErnalinA:PULSe:LPF <OFF/WEAK/STRONG>	76
:EXTErnalinA:PULSe:LPF?	76
:EXTErnalinA:RANGe <Range value>	77
:EXTErnalinA:RANGe?	77
:EXTErnalinB:ANALog:LPF <ON/OFF>	77
:EXTErnalinB:ANALog:LPF?	77
:EXTErnalinB:FREQuency <ON/OFF>	77
:EXTErnalinB:FREQuency?	77
:EXTErnalinB:PULSe:LPF <OFF/WEAK/STRONG>	78
:EXTErnalinB:PULSe:LPF?	78
:EXTErnalinB:RANGe <Range value>	78
:EXTErnalinB:RANGe?	78
:EXTErnalinC:PULSe:LPF <OFF/WEAK/STRONG>	78
:EXTErnalinC:PULSe:LPF?	78
:EXTErnalinD:PULSe:LPF <OFF/WEAK/STRONG>	79
:EXTErnalinD:PULSe:LPF?	79
:FFT:ITEM <Measurement channel>	79
:FFT:ITEM?	79
:FFT:LOWerfreq < Frequency >	79
:FFT:LOWerfreq?	79
:FFT:POINt <Points>	80
:FFT:POINt?	80
:FFT:STARt < Starting Point >	80
:FFT:STARt?	80

:FFT:SAMPLing <Sampling>	80
:FFT:SAMPLing?.....	80
:FFT:WINDow <0/1/2>.....	80
:FFT:WINDow?	80
:FFT:VSCALE <0/1>.....	82
:FFT:VSCALE?.....	82
:FILE:AUTO:SAVE <ON/OFF>.....	82
:FILE:AUTO:SAVE?.....	82
:FILE:DOWNload? <File name>,<Specified folder name>.....	82
:FILE:EXIST?	83
:FILE:FILEName? <Specified folder name>	83
:FILE:FOLDername? <Specified folder name>.....	83
:FILE:PICKout? <File name>,<Start position>,<Stop position>,<Specified folder name>.....	84
:FILE:SEParator <CSV/SSV>.....	84
:FILE:SEParator?.....	84
:FILE:SIZE? <Specified File Name>,<Specified Folder Name>.....	84
:FREQuency[CH]:HPF <ON/OFF>.....	85
:FREQuency[CH]:HPF?.....	85
:FREQuency[CH]:LOWer <Frequency data>.....	85
:FREQuency[CH]:LOWer?	85
:FREQuency[CH]:SOURce <U/I>.....	85
:FREQuency[CH]:SOURce?.....	85
:FREQuency[CH]:UPPer <Frequency data>.....	86
:FREQuency[CH]:UPPer?	86
:GPIB:ADDRess <Address>.....	86
:GPIB:ADDRess?.....	86
:HARMonic:GROUp <OFF/TYPE1/TYPE2>	86
:HARMonic:GROUp?.....	86
:HARMonic:MODE <IEC/WIDE>.....	87
:HARMonic:MODE?.....	87
:HARMonic:ORDer <Maximum analysis order>.....	87
:HARMonic:ORDer?	87
:HARMonic:THD <F/R>	87
:HARMonic:THD?	87
:HEADer <ON/OFF>	88
:HEADer?.....	88
:HOLD <OFF/ON/PEAK>	88
:HOLD?	88
:INTEGrate:MODE[CH] <DC/RMS>.....	88
:INTEGrate:MODE[CH]?.....	88

:INTEGrate:RESet	89
:INTEGrate:START	89
:INTEGrate:STATe?	89
:INTEGrate:STOP	89
:INTERval <Time data>	90
:INTERval?	90
:IP:ADDRes <Address 1>, <Address 2>, <Address 3>, <Address 4>	90
:IP:ADDRes?	90
:IP:DEFaultgateway <Address 1>, <Address 2>, <Address 3>, <Address 4>	90
:IP:DEFaultgateway?	90
:IP:DHCP <ON/OFF>	91
:IP:DHCP?	91
:IP:SUBNetmask <Address 1>, <Address 2>, <Address 3>, <Address 4>	91
:IP:SUBNetmask?	91
:KEYLock?	91
:LANGuage <Language>	92
:LANGuage?	92
:LPF[CH] <Frequency data>	92
:LPF[CH]?	92
:MATH <1/2/3>	92
:MATH?	92
:MEASure? <Item 1>, <Item 2>,, <Item 63>, <Item 64>	93
:MEASure:10MS? <Item 1>, <Item 2>,, <Item 63>, <Item 64>	94
:MEASure:HARMonic? <Item 1>, <Item 2>,, <Item 63>, <Item 64>	95
:MEASure:INNER? <Item 1>, <Item 2>,, <Item 63>, <Item 64>	96
:MEASure:INNER:INDEX <Index number>	97
:MEASure:INNER:INDEX?	97
:MEASure:INNER:NUMBER?	97
:MEASure:INNER:TIME <output times of index>	98
:MEASure:INNER:TIME?	98
:MEASure:ITEM:ALLClear	98
:MEASure:ITEM:EFFiciency <EFF>, <LOSS>	98
:MEASure:ITEM:EFFiciency?	98
:MEASure:ITEM:HARMonic:ALLClear	99
: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>	100
:MEASure:ITEM:HARMonic:LIST?	100
:MEASure:ITEM:HARMonic:ORDer <Lower limit order>, <Upper limit order>, <ODD/EVEN/ALL>	101

:MEASure:ITEM:HARMonic:ORDer?	101
:MEASure:ITEM:I <RMS>,<MN>,<AC>,<DC>,<FND>,<PK+>,<PK->,<THD>,<RF>,<DEG>	101
:MEASure:ITEM:I?	101
:MEASure:ITEM:ISUM <RMS>,<MN>,<UNB>	102
:MEASure:ITEM:ISUM?	102
:MEASure:ITEM:INTEGrate <PIH>,<MIH>,<IH>,<PWP>,<MWP>,<WP>,<PWP_SUM>,<MWP_SUM>,<WP_SUM>,<Elapsed time>	103
:MEASure:ITEM:INTEGrate?	103
:MEASure:ITEM:NORMAl <U>,<I>,<P>,<S>,<Q>,<PF>,<DEG>,<FREQ>	104
:MEASure:ITEM:NORMAl?	104
:MEASure:ITEM:P <P>,<Pfd>,<S>,<Sfd>,<Q>,<Qfd>,<PF>,<PFfd>,<DEG>	105
:MEASure:ITEM:P?	105
:MEASure:ITEM:PSUM <P>,<Pfd>,<S>,<Sfd>,<Q>,<Qfd>,<PF>,<PFfd>,<DEG>	106
:MEASure:ITEM:PSUM?	106
:MEASure:ITEM:SUM <U>,<I>,<P>,<S>,<Q>,<PF>,<DEG>	107
:MEASure:ITEM:SUM?	107
:MEASure:ITEM:U <RMS>,<MN>,<AC>,<DC>,<FND>,<PK+>,<PK->,<THD>,<RF>,<DEG>	108
:MEASure:ITEM:U?	108
:MEASure:ITEM:USUM <RMS>,<MN>,<UNB>	108
:MEASure:ITEM:USUM?	108
:MEASure:ITEM:UDF <User definitions 1 to 8>,<User definitions 9 to 16>	109
:MEASure:ITEM:UDF?	109
:MEASure:ITEM:EXTErnalIn <Torque>,<RPM>,<Motor power>,<Slip>,<Independent input>	109
:MEASure:ITEM:EXTErnalIn?	109
:MEASure:NOISepeak?	110
:MEASure:NOISepeak:I?	110
:MEASure:NOISepeak:U?	111
:MEASure:NOISepeak:CHA?	111
:MEASure:NOISepeak:CHB?	112
:MODE <Connection mode>	112
:MODE?	112
:PHASe:ZEROadjust <CH number>,<SET/CLEAR>	113
:PHASe[CH]:ZEROadjust <Phase Zero Adjustment Degree>	113
:PHASe[CH]:ZEROadjust?	113
:RATE <Update rate>	113
:RATE?	113
:RS232c:ANSWer <ON/OFF>	114
:RS232c:ANSWer?	114
:RS232c:BAUD <Baud rate>	114
:RS232c:BAUD?	114

:RS232c:CONNect <RS/BT/EXT>.....	114
:RS232c:CONNect?.....	114
:SAVE:AUTO:FOLDername <Folder name>	115
:SAVE:AUTO:FOLDername?	115
:SAVE:FOLDername <Folder name>.....	115
:SAVE:FOLDername?	115
:SAVE:COMMeNt <ON/OFF>	115
:SAVE:COMMeNt?.....	115
:SAVE:WAVE:FORMat <CSV/BIN>.....	116
:SAVE:WAVE:FORMat?	116
:SCALE[CH]:CT <CT ratio>	116
:SCALE[CH]:CT?.....	116
:SCALE[CH]:VT <VT ratio>	116
:SCALE[CH]:VT?	116
:SOURce[CH] <Synchronization source>	117
:SOURce[CH]?.....	117
:STIME:CONTRol <ON/OFF>	117
:STIME:CONTRol?	117
:STIME:STARTime <Year>, <Month>, <Date>, <Hour>, <Minute>	118
:STIME:STARTime?.....	118
:STIME:STOPtime <Year>, <Month>, <Date>, <Hour>, <Minute>	118
:STIME:STOPtime?	118
:SYNC:STATus?	119
:SYNC:CONTRol <OFF/MASTERWAVE/MASTERMEAS/SLAVEWAVE/SLAVEMEAS>	119
:SYNC:CONTRol?.....	119
:TIMER:CONTRol <ON/OFF>	119
:TIMER:CONTRol?	119
:TIMER:TIME <Hour>, <Minute>, <Second>.....	120
:TIMER:TIME?.....	120
:TRANsmit:COLumn <0/1>.....	120
:TRANsmit:COLumn?	120
:TRANsmit:SEParator <0/1>	121
:TRANsmit:SEParator?	121
:TRIGger:AUTO <ON/OFF>	121
:TRIGger:AUTO?	121
:TRIGger:DETEct <LEVEL/EVENT>	121
:TRIGger:DETEct?.....	121
:TRIGger:EVENT[number]:INEQuality <LT/GT>	122
:TRIGger:EVENT[number]:INEQuality?	122
:TRIGger:EVENT[number]:OPERator <OPERATOR 1>, <OPERATOR 2>, <OPERATOR 3>.....	122

:TRIGger:EVENT[number]:OPERator?	122
:TRIGger:EVENT[number]:SOURse <D/A Output Measurement Parameter Number>	122
:TRIGger:EVENT[number]:SOURse?	122
:TRIGger:EVENT[number]:THREshold <Threshold Value>	123
:TRIGger:EVENT[number]:THREshold?	123
:TRIGger:LEVEl <Trigger level>	123
:TRIGger:LEVEl?	123
:TRIGger:PRETrig <Pre-trigger data>	123
:TRIGger:PRETrig?	123
:TRIGger:SLOPe <RISING/FALLING>	124
:TRIGger:SLOPe?	124
:TRIGger:SOURce <Trigger source>	124
:TRIGger:SOURce?	124
:UDF[number]:CONStant <Constant 1>, <Constant 2>, <Constant 3>, <Constant 4>	125
: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	<ul style="list-style-type: none">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	<ul style="list-style-type: none">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	<ul style="list-style-type: none">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 $\pm 1V$ f.s.
2 $\pm 2V$ 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 :**AVE**raging:**TIME**s <Number of averaging times>
Query :**AVE**raging:**TIME**s?
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 :**BEEP**er <ON/OFF>
Query :**BEEP**er?
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 :**CALC**ulate[number]:**PIN** <Item 1>, <Item 2>, <Item 3>, <Item 4>
Query :**CALC**ulate[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 / 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 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	<ul style="list-style-type: none">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	<ul style="list-style-type: none">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	<ul style="list-style-type: none">• 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-	-	-	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 (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 Pfd 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
PFfnd	-	-	PFfnd6	PFfnd5	PFfnd4	PFfnd3	PFfnd2	PFfnd1
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>,<PFnd>,<DEG>
 Query :**DATAout:SLAVE: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 (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>,<PFnd>,<DEG>
 Query :**DATAout: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 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>,<PFnd>,<DEG>
 Query :**DATAout:SLAVe: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
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 Pfd 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 Pfd 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:EXISt?**
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	:EXTERNALIN[MOTOR]:SOURCE <Synchronization source>
	Query	:EXTERNALIN[MOTOR]:SOURCE?
	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 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		<ul style="list-style-type: none">• 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	:EXTERNALIN[MOTOR]:UNIT <Unit data>
	Query	:EXTERNALIN[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 **:EXTErnAlinA:RANGe <Range value>**
Query **:EXTErnAlinA:RANGe?**
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 **:EXTErnAlinB:ANALog:LPF <ON/OFF>**
Query **:EXTErnAlinB:ANALog:LPF?**
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 **:EXTErnAlinB:FREQUency <ON/OFF>**
Query **:EXTErnAlinB:FREQUency?**
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:POINT <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
	Response (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		<ul style="list-style-type: none">• 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		<ul style="list-style-type: none">• 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		<ul style="list-style-type: none">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		<ul style="list-style-type: none">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		<ul style="list-style-type: none">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		<ul style="list-style-type: none">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 Address 3 000 to 255 Address 4 000 to 255
	Detail	Command
	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		<ul style="list-style-type: none">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 Address 3 000 to 255 Address 4 000 to 255
	Detail	Command
	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		<ul style="list-style-type: none">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.

Example Query **:KEYL?**
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
3 TYPE3: Sign of power factor for TYPE1 is used as a sign for active power.

Detail 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	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.
 Response (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.

Communication Output Item: Querying Measurement Data in Inner Memory

Syntax Query :MEASure:INNER? <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 Creates measurement data saved in inner memory. Creates from the index of the current inner memory. When Sends this command multiple times, creates from the index after the last output because proceeds the index by count of the output.
 Send :MEASure:INNER:INDEX command to change the index.
 Be careful when output to file because the index is common with file.
 Date and time data are always attached to the top of the data.

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 saving item of the instrument. 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:INNER? Urms1,Urms2

RMS voltage of the channel 1 and 2 is queried in item specification mode.

Response (HEADER ON) 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 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
 (HEADER OFF) 2016/02/01,10:00:00,151.63E+00,152.25E+00,2016/02/01,10:00:01,151.62E+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+00,2016/02/01,10:00:04,151.69E+00,152.19E+00

Reference	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none">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.

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 Pfn 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:NOISepcak?	
	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>,<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>	
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 (HEADER OFF) ... ,1.08000E+03,0.171E+00,1.00000E+03,0.00028E+00, ... ,3.39900E+03,0.00009E+00
Reference		<ul style="list-style-type: none"> • 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:NOISepcak:I?	
	Response	<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>	
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		<ul style="list-style-type: none"> • 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		<ul style="list-style-type: none"> • 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		<ul style="list-style-type: none"> • 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?	
	Response	<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>	
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		<ul style="list-style-type: none"> 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?	
	Response	<TYPE1 to TYPE7>	
	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		<ul style="list-style-type: none"> 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	: SOUR ce[CH] <Synchronization source>
	Query	: SOUR ce[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	: SOUR 1 U1
	Query	: SOUR 1?
	Response	(HEADER ON) :SOURCE1 U1 (HEADER OFF) U1
Reference		<ul style="list-style-type: none">• 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 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.

Time Control: Setting and Querying Real-time Control

Syntax	Command	: STIME:CONT rol <ON/OFF>
	Query	: STIME:CONT rol?
	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
<hr/>		
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.
<hr/>		
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
<hr/>		
Reference		<ul style="list-style-type: none">• 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
<hr/>		
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.
<hr/>		
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
<hr/>		
Reference		<ul style="list-style-type: none">• 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.

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	<ul style="list-style-type: none">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	<ul style="list-style-type: none">In case of :TRANsmit:COLumn 0 Query :MEAS? Urms1,Irms1 Response 78.01E+00,5.0120E+00In case of :TRANsmit:COLumn 1 Query :MEAS? Urms1,Irms1 Response +0078.01E+00,+05.0120E+00The 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	<ul style="list-style-type: none">• 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:EVEN2:INEQ LT
	Query	:TRIG:EVEN2: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:EVEN2:OPER AND,OR,OFF
	Query	:TRIG:EVEN2: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 Measurement Parameter Number>
	Query	:TRIGger:EVENT[number]:SOURse?
	Response	D/A Output Measurement Parameter Number 13 to 20
Detail	Command	Sets trigger source of event trigger with D/A output measurement parameter number. [number]: 1 to 4.
	Query	Returns trigger source of event trigger in a D/A output measurement parameter number.
Example	Command	:TRIG:EVEN2:SOUR 15
	Query	:TRIG:EVEN2: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?**
Response Threshold Value ± 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 Sets threshold value of event trigger. [number]: 1 to 4.
Query Returns threshold value in a string.

Example Command **:TRIG:EVEN2:THRE 0.01**
Query **:TRIG:EVEN2: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 U1FILT / U2FILT / U3FILT / U4FILT / U5FILT /
after zero-crossing filter 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		<ul style="list-style-type: none"> 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>																															
		<table border="0"> <tr><td>NONE</td><td>No conversion</td></tr> <tr><td>NEG</td><td>Reversed sign</td></tr> <tr><td>SIN</td><td>Sine</td></tr> <tr><td>COS</td><td>Cosine</td></tr> <tr><td>TAN</td><td>Tangent</td></tr> <tr><td>SQRT</td><td>Square root</td></tr> <tr><td>ABS</td><td>Absolute value</td></tr> <tr><td>LOG10</td><td>Common logarithm</td></tr> <tr><td>LOG</td><td>Logarithm</td></tr> <tr><td>EXP</td><td>Exponent</td></tr> <tr><td>ASIN</td><td>Arc sine</td></tr> <tr><td>ACOS</td><td>Arc cosine</td></tr> <tr><td>ATAN</td><td>Arc tangent</td></tr> <tr><td>SINH</td><td>Hyperbolic sine</td></tr> <tr><td>COSH</td><td>Hyperbolic cosine</td></tr> <tr><td>TANH</td><td>Hyperbolic tangent</td></tr> </table>	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
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		<ul style="list-style-type: none"> 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,Irms1,OFF,OFF Query :UDF1:ITEM? Response (HEADER ON) :UDF1:ITEM Urms1,Irms1,OFF,OFF (HEADER OFF) Urms1,Irms1,OFF,OFF
Reference	<ul style="list-style-type: none">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	<ul style="list-style-type: none">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		<ul style="list-style-type: none">• 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		<ul style="list-style-type: none">• 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		<ul style="list-style-type: none">• 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	<ul style="list-style-type: none">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	<ul style="list-style-type: none">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	<ul style="list-style-type: none">• 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		Instrument's notation	Parameter list
Status		-	Status
Zero-order	Harmonic voltage RMS value	U _k	HU1L000/HU2L000/HU3L000/HU4L000/HU5L000/HU6L000
	Harmonic current RMS value	I _k	HI1L000/HI2L000/HI3L000/HI4L000/HI5L000/HI6L000
	Harmonic active power	P _k	HP1L000/HP2L000/HP3L000/HP4L000/HP5L000/HP6L000/ HP12L000/HP34L000/HP45L000/HP56L000/HP123L000/HP456L000
	Harmonic voltage content percentage	HDU _k	HU1D000/HU2D000/HU3D000/HU4D000/HU5D000/HU6D000
	Harmonic current content percentage	HDI _k	HI1D000/HI2D000/HI3D000/HI4D000/HI5D000/HI6D000
	Harmonic power content percentage	HDP _k	HP1D000/HP2D000/HP3D000/HP4D000/HP5D000/HP6D000/ HP12D000/HP34D000/HP45D000/HP56D000/HP123D000/HP456D000
	Harmonic voltage phase angle	θ _{U_k}	HU1P000/HU2P000/HU3P000/HU4P000/HU5P000/HU6P000
	Harmonic current phase angle	θ _{I_k}	HI1P000/HI2P000/HI3P000/HI4P000/HI5P000/HI6P000
	Harmonic voltage/current phase angle	θ _k	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	U _k	HU1L100/HU2L100/HU3L100/HU4L100/HU5L100/HU6L100
	Harmonic current RMS value	I _k	HI1L100/HI2L100/HI3L100/HI4L100/HI5L100/HI6L100
	Harmonic active power	P _k	HP1L100/HP2L100/HP3L100/HP4L100/HP5L100/HP6L100/ HP12L100/HP34L100/HP45L100/HP56L100/HP123L100/HP456L100
	Harmonic voltage content percentage	HDU _k	HU1D100/HU2D100/HU3D100/HU4D100/HU5D100/HU6D100
	Harmonic current content percentage	HDI _k	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/II2P100/II3P100/II4P100/II5P100/II6P100
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 Current	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? Are all the used cables the correct types?	See "9 Connect with Computer, Instruction Manual".
	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?
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. Did an error occur?	Execute a *ESR? query to obtain Standard Event Status Register and check the error.
	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	<ul style="list-style-type: none"> ■ 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	<ul style="list-style-type: none"> ■ 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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