

Communication Command Instruction Manual

PW3390

Power Analyzer

- ✓ This instruction manual handles only parts related to commands.
 - ✓ For communication settings, please refer to the instruction manual for the main unit
 - ✓ Care has been taken to ensure the accuracy of the contents in this instruction manual, however, please approach HIOKI's Sales Planning Division or your nearest HIOKI dealer should you have any queries or found any mistakes.
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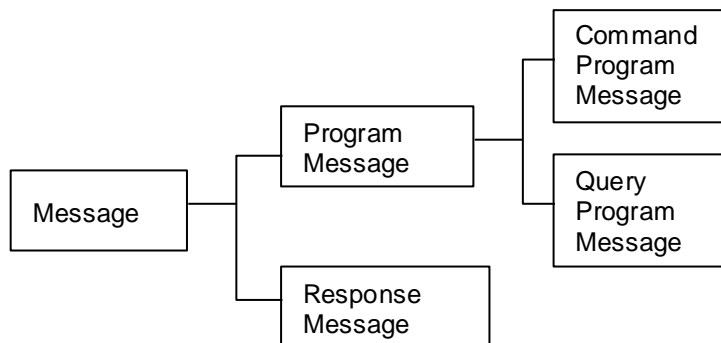
1. Communication Command Overview

The PW3390 Power Analyzer can communicate with PC via LAN(TCP/IP) or RS-232C, so that users can control the functions, and acquire measurement data and recorded data through text commands and queries.

The port number of TCP/IP is fixed to 3390.

Commands/Messages

Data sent and received from the communication device are called messages and are classified as follows.



Program Message	Message sent from the controller to the instrument.
Response Message	Message sent from the instrument to the controller. This message is created at the time when a query program message is received and syntax checked.
Command Program Message	Command to control settings and resetting of the instrument.
Query Program Message	Order to interrogate instrument on operation results, measurement results, and setting status.

Command/Program message, and Query Program Message are collectively known as commands.

Command Syntax

Commands are accepted in uppercase, lowercase or a mixture of both types of letters. 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 uppercase letters, extended to the long form in lower case letters.

The response message from the main device is returned as long form in uppercase letters.

Example

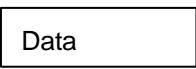
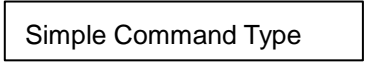

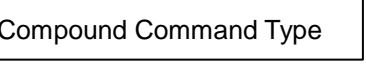
Description as shown in this manual (Command Name)	Short Form	Long Form
DISPlay	DISP	DISPLAY

A mixture of uppercase and lowercase letters such as DiSpLay is accepted, but DISPLA, DISPL and DIS are considered as errors.

Command Program Header

A header shows what kind of function that command has.

A command always requires a header and comes in three types, "Simple Command Type", "Compound Command Type", and "Standard Command Type".

Types of Commands	Description Explanation
Simple Command Type	<p>A sequence of letters</p> <p>[Example] <u>:HEADer</u> <u>ON</u> </p> <p></p>
Compound Command Type	<p>Multiple simple command type headers separated by colons ":"</p> <p>[Example] <u>:VOLTage1:RANGe</u> <u>600</u> </p> <p></p>
Standard Command Type	<p>Begins with an asterisk "*", indicating that it is a standard command defined by IEEE 488.2.</p> <p>[Example] <u>*RST</u></p>

Query Program Header

These commands are used to interrogate the instrument about the results of operations and settings. A query is formed by appending a question mark "?" after a program header

Types of Commands	Description
Simple Command Type	A sequence of letters [Example] <u>:HEADer?</u> Simple Command Type
Compound Command Type	Multiple simple command type headers separated by colons ":" [Example] <u>:VOLTage1:RANGe?</u> Compound Command Type
Standard Command Type	Begins with an asterisk "*", indicating that it is a standard command defined by IEEE 488.2. [Example] <u>*IDN?</u>

Response Message

The response message to a query, like the program message, consists of the header and data and is in principle outputted in the same format as the program message in response to the query. The header can be omitted.

[Example]

Query Program Message	:VOLTage1:RANGe?	
Response Message	:VOLTAGE1:RANGE 300 300	(When header is ON) (When header is OFF)

Terminator and Separator

(1) Message Terminator

The message terminator means the division of one message forwarding.

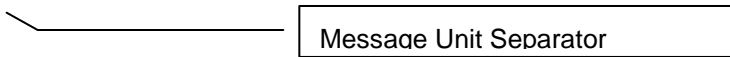
However, there is no message in the terminator.

Main instrument/Communication Software Setting	ANSI Word code (hexadecimal)	Meaning	English Name
CR+LF	0Dh 0Ah	Recovery + Change line	Carriage Return + Line Feed

(2) Message Unit Separator

The semicolon ";" is a message unit separator and is used to write multiple messages in one line.

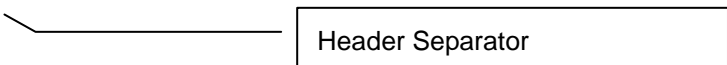
[Example] :VOLTage1:RANGe 600;:CURRent:RANGe 50



(3) Header Separator

In a message containing header and data, a space (header separator) is used to separate the header from the data.

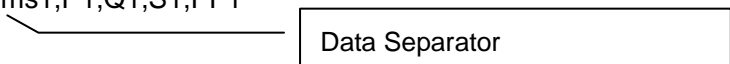
[Example] :VOLTage1:RANGe 600



(4) Data Separator

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

[Example] :AOUT:ITEM Urms1,Irms1,P1,Q1,S1,PF1



Multiple-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. This common portion is called the "current path", and until it is cleared, the interpretation of subsequent commands presumes that they share the same common portion.

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

```
Full Expression      :VOLTage1:RANGe 600;:VOLTage1:MEAN OFF
Compacted Expression :VOLTage1:RANGe 600;MEAN OFF
```

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

Standard command messages can be executed regardless of the current path. They have no effect upon the current path.

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

Note

- Beeps when a communication error occurs if beep is enabled for this instrument.
- Avoid inserting or removing storage media while using commands that refer to files and media.

2. Command Reference (Standard Command)

Clear Standard Event Status Register (SESR) (except Output Queue)

Syntax Command *CLS

Example Clear Event Register. (SESR)

Note · No effect on Output Cue.

Read Standard Event Status Register (SESR)

Syntax Query *ESR?

Example Return SESR Contents as NR1 numerical values 0-255.

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

PON: Power-On Flag. Set to 1 when the power is turned on, or upon recovery from an outage.

URQ:User Request. Unused.

CME:Command error. (The command to the message terminator is ignored.)

This bit is set to 1 when a received command contains a syntactic or semantic error:

- Program header error
- Incorrect number of data parameters
- Invalid parameter format

EXE: Execution Error

This bit is set to 1 when a received command cannot be executed for some reason.

- The specified data value is outside of the set range
- The specified setting data cannot be set (Invalid data format)
- Cannot be executed when another function is in operation (during hold, integration, etc.)

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.

- Execution is impossible due to an internal instrument fault

QYE:Query Error (the output queue is cleared)

This bit is set to "1" when an abnormality occurs in processing an output queue.

- When the data overflows the output queue

RQC: Controller privilege request. Unused

OPC: Operation Complete. Unused

Example Response *ESR 32 (when HEADER is ON)
32 (when HEADER is OFF)

Query Device ID (Recognition Code)

Syntax Query *IDN?

Example Query Instrument ID.

Response "Maker's name", "Model name", "Serial number", "Software version"

Description Response HIOKI,PW3390-03,081225345,V1.00
 InstrumentID is HIOKI,PW3390-03,081225345, and software version is 1.00.

Note "**IDN?" is the last query message inside the program message.
 Therefore, any subsequent query (in the same line) that is detected will lead to a query error and no response message will be outputted.

Set 1 for Output Queue When Finished All Pending Operations

Syntax Query *OPC?

Description When the command (of transferred commands) prior to the *OPC command has finished processing, "1" is stored in the output queue.

Response *OPC 1 (when HEADER is ON)
 1 (when HEADER is OFF)

Example :DEMAG;*OPC?
 :After DEMAG command has finished processing, 1 is stored in the output queue.

Query Instrument Options

Syntax Query *OPT?

Description Queries the types of options available in the instrument.

Response CH1 sensor, CH2 sensor, CH3 sensor, CH4 sensor

Example ACDC500, ACDC500, ACDC500, ACDC500

Note "*OPT?" is the last query message inside the program message.
Therefore, any subsequent query (in the same line) that is detected will lead to a query error and no response message will be outputted.

Initialize Instrument

Syntax Command *RST

Description Initializes all instrument settings besides language and communication setting and returns them to factory default.

Example *RST

Request a Sampling

Syntax Command *TRG

Description Performs one measurement when the display values or peak values are held.

Example :HOLD ON;*TRG;:MEAS?

Execute Next Command after Command Has Finished Processing

Syntax Command *WAI

Description Commands after *WAI will not be executed until the next update has finished.
The time required for updating is usually 50 ms.

Example :MEAS?;*WAI;;MEAS?
Data will be retrieved each time the display is updated.

Note Display data will not change even when a command is executed when peak values are held.

3. Command Reference (Device-Specific Commands)

Set and Query Frequency Full Scale

Syntax

Command	:AOUT:FREQuency (Frequency Data)
Query	:AOUT:FREQuency?
Response	Frequency Data :100Hz/500Hz/1kHz/5kHz

Description

Command	Sets the maximum frequency of D/A output's Frequency Full Scale and the motor.
Query	Sets the maximum frequency of D/A output's Frequency Full Scale and returns it as words.

Example

Command	:AOUT:FREQ 100Hz Set the Frequency Full Scale of D/A output as 100Hz.
Query	:AOUT:FREQ?
Response	:AOUT:FREQUENCY 100Hz (when HEADER is ON) 100Hz (when HEADER is OFF)

Note The settings for the D/A output's Frequency Full Scale and the motor measured maximum frequency are the same.

Set and Query Coefficient of Integrated Full Scale

Syntax

Command	:AOUT:INTEGrate <Magnification data>
Query	:AOUT:INTEGrate?
Response	Magnification Data :1/10,1/2,1,5,10,50,100,500,1000,5000,10000

Description

Command	Sets the integration full scale coefficient of D/A Output.
Query	Sets the integration full scale coefficient of D/A output and returns it as words.

Example

Command	:AOUT:INTEG 1 Set the coefficient of the D/A integration full scale as 1.
Query	:AOUT:INTEG?
Response	:AOUT:INTEGRATE 1 (when HEADER is ON) 1 (when HEADER is OFF)

Set and Query D/A Output Items

Syntax Command :AOUT:ITEM "Item 1", "Item 2",.....,"Item 16"
 Query :AOUT:ITEM?
 Response "Item 1", "Item 2", "Item 3",.....,"Item 15", "Item 16"
 "Item 1 – 16" = Basic measured item parameters (Refer to [4. Fundamental Measurement Item Parameters](#))

Description Command Sets the D/A output item. Output items can be specified from 1 to 16. Output items in the unspecified D/A channels will not be changed.
 Query Sets the D/A output items and return them as words.

Example Command :AOUT:ITEM Urms1,Irms1,P1,Q1,S1,PF1
 Set the D/A outputs from Channel 1 in sequence as Voltage CH1 RMs, Current CH1 RMS, Effective Current CH1, Ineffective Current CH1, Apparent Power CH1, and Power Factor Ch1.
 Query :AOUT:ITEM?
 Response :AOUT:ITEM
 Urms1,Irms1,P1,Q1,S1,PF1,OFF,OFF,OFF,OFF,OFF,OFF
 ,OFF,OFF,OFF,OFF (when HEADER is ON)
 Urms1,Irms1,P1,Q1,S1,PF1,OFF,OFF,OFF,OFF,OFF,OFF,OFF,OFF,OFF
 ,OFF (when HEADER is OFF) (when HEADER is OFF)

Select and Query Waveform Output

Syntax Command :AOUT:MONitor <ON/OFF>
 Query :AOUT:MONitor?
 Response ON : Waveform output ON
 OFF : Waveform output OFF

Description Command Sets the Waveform output ON/OFF.
 Query Returns the setting of the waveform output as ON or OFF.

Example Command :AOUT:MON ON
 Set the Monitor output as ON.
 Query :AOUT:MON?
 Response :AOUT:MONITOR ON (when HEADER is ON)
 ON (when HEADER is OFF)

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.

Description

Command	Sets full-scale of D/A waveform output.
Query	Returns setting for full-scale of D/A waveform output as a numeric value.

Example

Command	:AOUT:MON:SCAL 1
Query	:AOUT:MON:SCAL?
Response	:AOUT:MONITOR:SCALE 1 (when HEADER is ON)
	1 (when HEADER is OFF)

Select and Query Auto Range Limit

Syntax

Command	:AUTOrange <WIDE/NARROW>
Query	:AUTOrange?
Response	<WIDE/NARROW>
WIDE	: Widen the auto range limit.
NARROW	: Narrow the auto range limit.

Description

Command	Selects to widen or narrow the auto range limit.
Query	Returns the auto range limit as words.

Example

Command	:AUTO WIDE
	Widen the auto range limit.
Query	:AUTO?
Response	:AUTORANGE WIDE (when HEADER is ON)
	WIDE (when HEADER is OFF)

Select and Query Beep Sound

Syntax

Command	:BEEPer <ON/OFF>
Query	:BEEPer?
Response	<ON/OFF>

Description

Command	Set the beep sound ON/OFF.
Query	Returns the On/OFF beep sound setting as ON or OFF.

Example

Command	:BEEP ON	Set the beep sound ON.
Query	:BEEP?	
Response	:BEEPER ON (when HEADER is ON)	ON (when HEADER is OFF)

Set and Query Efficiency, Pin of Loss Calculation Formula

Syntax

Command	:CALCulate[number]:PIN <P1/P2/P3/P4/P12/P34/P123/Pm>
Query	:CALCulate[number]:PIN?
	[number] ···· 1,2,3
Response	"P1/P2/P3/P4/P12/P34/P123/Pm"

Description

Command	Sets Efficiency, Pin of Loss Calculation Formula.
Query	Returns the settings of efficiency, Pin of Loss Calculation Formula as words.

Example

Command	:CALC1:PIN P1	Set the Pin of the Calculation formula 1 as P1.
Query	:CALC1:PIN?	
Response	:CALCULATE1:PIN P1 (when HEADER is ON)	P1 (when HEADER is OFF)

Note When P12/P34/P123 cannot be selected because of wiring settings, they cannot be specified. Pm cannot be specified except when it can be selected during the implementation of the motor analysis function.

Set and Query Efficiency, Pout of Loss Calculation Formula

- Syntax**
- | | |
|----------|---|
| Command | :CALCulate[number]:POUT <P1/P2/P3/P4/P12/P34/P123/Pm> |
| Query | :CALCulate[number]:POUT?
[number] ···· 1,2,3 |
| Response | "P1/P2/P3/P4/P12/P34/P123/Pm" |
- Description**
- | | |
|---------|--|
| Command | Sets the items for Efficiency, Pout of Loss Calculation Formula. |
| Query | Returns the setting items for Pout of Loss Calculation Formula as words. |
- Example**
- | | |
|----------|---|
| Command | :CALC1:POUT Pm
Set the Pout item of Calculation Formula 1 as Pm. |
| Query | :CALC1:POUT? |
| Response | :CALCULATE1:POUT Pm (when HEADER is ON)
Pm (when HEADER is OFF) |
- Note** When P12/P34/P123 cannot be selected because of wiring settings, they cannot be specified. Pm cannot be specified except when it can be selected during the implementation of the motor analysis function.

Set and Query Automatic Saving

- Syntax**
- | | |
|----------|--|
| Command | :CARD:AUTO:SAVE <ON/OFF> |
| Query | :CARD:AUTO:SAVE? |
| Response | <ON/OFF>
ON: Automatic Save on
OFF: Automatic Save off |
- Description**
- | | |
|---------|---|
| Command | Sets the automatic saving to the CF Card On or OFF |
| Query | Returns the setting for the automatic saving to the CF Card as On or OFF. |
- Example**
- | | |
|----------|---|
| Command | :CARD:AUTO:SAVE ON
Set the automatic saving to the CF Card ON. |
| Query | :CARD:AUTO:SAVE? |
| Response | :CARD:AUTO:SAVE ON (when HEADER is ON)
ON (when HEADER is OFF) |

Query Existence of CF Card

Syntax

Query	:CARD:EXIST?
Response	<Y/N> Y:CF Card Exist N:CF Card Doesn't exist

Description Query Returns the existence of the CF Card in the instrument with Y or N.

Example

Query	:CARD:EXIS?
Response	:CARD:EXIST Y (when HEADER is ON) Y (when HEADER is OFF)

Acquire File Name in CF Card

Syntax

Query	:CARD:FILENAME? "Specified Folder Name" "Specified Folder Name"
Response	Acquire the file name under the specified folder name. When omitted, acquire the file name under the root folder. "File name", "Byte count", "File name", "Byte count" ... The order of "File name", "Byte count" will continue for as long as there are files. When there are no more files, the words "NO_FILE" will be returned.

Description Query Acquires the file name under the folder specified from the CF card.

Example

Query	:CARD:FILE? PW3390
Response	Acquire and return the file name under the PW3390 folder from the CF card. :CARD:FILENAME H3390001.BMP,44862,M3390000.CSV,578 (when HEADER is ON) 3390001.BMP,44682,M3390000.CSV,578 (when HEADER is OFF)

Note Up to 90 files displayed from the start of the screen can be acquired.
When more than 90 files exist in the same folder, subsequent file names cannot be acquired.

Acquire Folder Name in CF Card

Syntax Query :CARD:FOLDername?
 Response "Folder name", "Folder name", "Folder name"...

Folder names will continue for as long as there are folders.
When there are no more folders, the words "NO_FOLDER" will be returned.

Description Query Acquires the folder name under the root of the CF card.

Example Query :CARD:FOLD?
 Response :CARD:FOLDERNAME PW3390 (when HEADER is ON)
 PW3390 (when HEADER is OFF)

Note Up to 215 folders displayed from the start of the screen can be acquired.
 When more than 215 folders exist in the root, subsequent folder names cannot be acquired.

Querying File Size in CF Card

Syntax Query :CARD:SIZE? <Specified File Name>,<Specified Folder Name>
 Response <File size (Bytes)>

Description Query Returns the size of the specified file.

Example Query :CARD:SIZE? H3390000.BMP,PW3390
 Response :CARD:SIZE 35124 (when HEADER is ON)
 35124 (when HEADER is OFF))

Note File name can be specified with a maximum of 40 characters.
 If folder name is omitted, a file name will be used from under the root folder.
 During execution of file operation, it can take some time to get a response.

Set and Query Time

Syntax

Command	:CLOCK "Year Data", "Month Data", "Day Data", "Hour Data", "Minute Data", "Second Data"
Query	:CLOCK?
Response	"Year Data", "Month Data", "Day Data", "Hour Data", "Minute Data", "Second Data"

Year Data: 2000 - 2079 (can be set 00 – 79)
Month Data: 01- 12
Day Data: 01 - 31
Hour Data: 00 - 23
Minute Data: 00 - 59
Second Data: 0

Description

Command	Sets the time of the clock in the main instrument.
Query	Returns the time setting of the main instrument as NRI numerical values.

Example

Command	:CLOC 17,12,25,12,30,0 Set as 2017 December 25 th 12:30:0
Query	:CLOC?
Response	:CLOCK 2017,12,25,12,30,45 (when HEADER is ON) 2017,12,25,12,30,45 (when HEADER is OFF)

Note The instrument can interpret days of the month as well as leap years, so specifying an improbable date will lead to an error.
Always set 0 for the second data.

Set and Query Current Auto Range

Syntax

Command	:CURRent[CH]:AUTO <ON/OFF>
Query	:CURRent[CH]:AUTO? [CH] ···· 1,2,3,4
Response	ON: Measure current with auto range. OFF: Measure current with manual range.

Description

Command	Set the current auto range ON/OFF.
Query	Returns the current auto range setting with ON or OFF.

Example

Command	:CURR1:AUTO ON Set the auto range of the Current Channel 1 to ON.
Query	:CURR1:AUTO?
Response	:CURRENT1:AUTO ON (when HEADER is ON) ON (when HEADER is OFF)

Note When the range is set with the :CURRent[CH]:RANGeCommand, the auto range of the specified channel will be OFF.
By combining measurement lines (for above IP3W), the auto ranges of other channels which are combined are also set.

Setting and Querying Phase Correction Formulas for Current Sensors

Syntax

Command	:CURRent[CH]:CORRect <ON/OFF>
Query	:CURRent[CH]:CORRect? [CH] ···· 1,2,3,4
Response	ON:Turns ON phase correction formulas for current sensors OFF:Turns OFF phase correction formulas for current sensors

Description

Command	Sets phase correction formulas for current sensors. [CH]: 1 to 4.
Query	Returns setting for phase correction formulas for current sensors in a string.

Example

Command	:CURR1:CORR ON
Query	:CURR1:CORR?
Response	:CURRENT1:CORRECT ON (when HEADER is ON) ON (when HEADER is OFF)

Set and Query Phase Correction Angle for Current Sensors

Syntax Command :CURRent[CH]:DEGRee <Phase correction angle>
 Query :CURRent[CH]:DEGRee?
 [CH] ···· 1,2,3,4
 Response Phase correction angle (°)
 -90.00 to +90.00

Description Command Sets phase correction angle for current sensors. [CH]: 1 to 4.
 Query Returns setting for phase correction angle for current sensors in a string.

Example Command :CURR1:DEGR 90.00
 Query :CURR1:DEGR?
 Response :CURRENT1:DEGREE +90.00 (when HEADER is ON)
 +90.00 (when HEADER is OFF)

Set and Query Phase Correction Frequency for Current Sensors

Syntax Command :CURRent[CH]:FREQUency <Correction frequency (kHz)>
 Query :CURRent[CH]:FREQUency?
 [CH] ···· 1,2,3,4
 Response Correction frequency (kHz)
 000.001 to 999.999

Description Command Sets phase correction frequency for current sensors. [CH]: 1 to 4.
 Query Returns setting for phase correction frequency for current sensors in a string.

Example Command :CURR1:FREQ 200.000
 Query :CURR1:FREQ?
 Response :CURRENT1:FREQUENCY 200.000 (when HEADER is ON)
 200.000 (when HEADER is OFF)

Select and Query Current Rectifier Type

- Syntax**
- | | |
|----------|--|
| Command | :CURRent[CH]:MEAN <ON/OFF> |
| Query | :CURRent[CH]:MEAN?
[CH] ···· 1,2,3,4 |
| Response | ON: Set the current rectifier type to MEAN.
OFF: Set the current rectifier type to RMS. |
- Description**
- | | |
|---------|--|
| Command | Select the RMS/MEAN of the current rectifier type. |
| Query | Returns the selection of the RMS/MEAN of the rectifier type as ON (MEAN) or OFF (RMS). |
- Example**
- | | |
|----------|---|
| Command | :CURR1:MEAN OFF
Select the current rectifier type of Current Channel 1 as RMS. |
| Query | :CURR1:MEAN? |
| Response | :CURRENT1:MEAN OFF (when HEADER is ON)
OFF (WHEN HEADER IS OFF) |
- Note** By combining measurement lines (for above IP3W), the current rectifier types of other channels which are combined are also set.

Set and Query Current Range

Syntax

Command	:CURRent[CH]:RANGe <Current Range(NR2)>
Query	:CURRent[CH]:RANGe? [CH] ···· 1,2,3,4
Response	0.1/0.2/0.4/0.5/0.8/1/2/4/5/8/10/20/40/50/80/ 100/200/400/500/800/1000/2000/4000/8000/20000

Description

Command	Specifies the current range suitable for the sensor. (Unit is [A])
Query	Queries the current range setting. Returns the current range as a numerical value in NR2 format.

Example

Command	:CURR1:RANG 1.0 Set the current Channel 1 to 1A range.
Query	:CURR1:RANG?
Response	:CURRENT1:RANGE 1.0 (WHEN HEADER IS ON) 1.0 (WHEN HEADER IS OFF)

Note

- Do not add a unit to the measurement range.
- Wait until the internal circuit has stabilized after changing a range before reading measurements.
- When the range is specified, the auto range of the specified channel will be OFF.
- By combining measurement lines (for above IP3W), the settings for the current ranges of other channels which are combined are also changed.

Set and Query Current Sensor for CT9920

Syntax Command :CURRent[CH]:TYPE <Current sensor>
 Query :CURRent[CH]:TYPE?
 [CH] ···· 1,2,3,4
 Response 100uV/A,1mV/A,10mV/A,100mV/A,
 CT7642,CT7742,CT7044,CT7045,CT7046

Description Command Specifies current sensor for CT9920.
 Query Queries the current sensor setting. Returns the current sensor as a character string.

Example Command :CURR1:TYPE CT7642
 Set the current sensor 1 to CT7642.
 Query :CURR1:TYPE?
 Response :CURRENT1:TYPE CT7642 (WHEN HEADER IS ON)
 CT7642 (WHEN HEADER IS OFF)

Note • By combining measurement lines (for above IP3W), the current sensor of other channels which are combined are also changed.

Initialize Data of Saved Items

Syntax Command :DATAout:ITEM:ALLClear

Description Command Initializes the saved data items.
 Returns the saved data items to factory defaults.

Example Command :DATA:ITEM:ALLC
 Initialize the saved data items.

Set and Query Efficiency, Saved Items of Loss Calculation Value

Syntax Command :DATAout:ITEM:EFFiciency <0 to 255>
 Query :DATAout:ITEM:EFFiciency?
 Response

	128	64	32	16	8	4	2	1
bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0	
-	LOSS3	LOSS2	LOSS1	-	EFF3	EFF2	EFF1	

Description Command Sets the efficiency, saved items of loss calculation values between 0 and 255.
 Query Returns the setting of efficiency, saved items of loss calculation values with values of 0 – 255.

Example Command :DATA:ITEM:EFF 17
 Set “1” of efficiency calculation value, and “1” of loss calculation value to ON.
 Query :DATA:ITEM:EFF?
 Response :DATAOUT:ITEM:EFF 17 (WHEN HEADER IS ON)
 17 (WHEN HEADER IS OFF)

Set and Query Saved Items of Motor Input

Syntax Command :DATAout:ITEM:EXTernalin <0 to 255>
 Query :DATAout:ITEM:EXTernalin?
 Response

	128	64	32	16	8	4	2	1
bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0	
-	-	-	-	SLIP	PM	EXTB	EXTA	

Description Command Sets motor saved items between 0 and 255.
 Query Returns setting of motor saved items with values of 0 – 255.

Example Command :DATA:ITEM:EXT 7
 Set the EXTA, EXTB, PM of motor analysis function calculation value to ON.
 Query :DATA:ITEM:EXT?
 Response :DATAOUT:ITEM:EXTERNALIN 7 (WHEN HEADER IS ON)
 7 (WHEN HEADER IS OFF)

Initialize Harmonic Saved Data Items

Syntax Command :DATAout:ITEM:HARMonic:ALLClear

Description Command Initializes harmonic saved data items.
All harmonic saved data items become OFF (factory defaults).

Example Command :DATA:ITEM:HARM:ALLC
Initialize harmonic saved data items.

Set and Query Noise Peak Value Saving

Syntax	Command	:DATAout:ITEM:NOISepk <ON/OFF>
	Query	:DATAout:ITEM:NOISepk?
	Response	ON : Output noise peak value
		OFF : Do not output noise peak value
Description	Command	Sets noise peak value saving.
	Query	Returns noise peak value save setting with ON or OFF.
Example	Command	:DATA:ITEM:NOIS ON Set the noise peak value saving to ON.
	Query	:DATA:ITEM:NOIS?
	Response	:DATAOUT:ITEM:NOISEPEAK ON (WHEN HEADER IS ON) ON (WHEN HEADER IS OFF)

Select and Query ON/OFF of Δ -Y Calculation

Syntax	Command	:DELTay <ON/OFF>
	Query	:DELTay?
	Response	ON : Process Δ -Y calculation. OFF : Do not process Δ -Y calculation.
Description	Command	Sets Δ -Y calculation ON/OFF.
	Query	Returns ON/OFF setting for Δ -Y calculation with ON or OFF.
Example	Command	:DELT OFF Set Δ -Y calculation OFF.
	Query	:DELT?
	Response	:DELTAY OFF (WHEN HEADER IS ON) OFF (WHEN HEADER IS OFF)

Execute and Query Zero Adjust

Syntax

Command	:DEMAg
Query	DEMAg?
Response	<OK/BUSY/ERROR>
	OK :Normal completion
	BUSY :Degaussing
	ERROR :Zero adjust failed

Description

Command	Executes zero adjust.
Query	Returns result of zero adjust as character string.

Example

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

Note The execution of :DEMAgCommand takes more than 30 seconds and in the interval, an execution error Command appears.

Combine with a *OPC? such as ":DEMAG;*OPC?" and after the *OPC? Response is returned, send the next Command. A *OPC? Response indicates that the DEMAG has finished.

If DEMAGCommand has never been executed after the main instrument is turned on, OK will be returned on :DEMAg.

Key Operations of The Instrument

Syntax Command :DISPlay:KEY <Key name>

Description Command Execute same operation as the key operations from the main instrument.

<Key name>

- MEAS : MEAS key
- SYSTEM : SYSTEM key
- FILE : FILE key
- F1 - F6 : F1 - F6 key
- PAGEL : Page left key
- PAGER : Page right key
- ESC : ESC key
- ENTER : ENTER key
- UP : Up key
- DOWN : Down key
- LEFT : Left key
- RIGHT : Right key

Example Command :DISP:KEY MEAS
Execute same operation as when MEAS key is pressed.

Switching Display

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

VECTOR	CH	WAVE	SELECT	EFF
XY	MOTOR			
WIRING	SENSOR	INPUT	CALC	TIME
INTERFACE	SYSTEM	MOTORSET	DA	
CF	USB			

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

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

Setting and Querying Display Items of Select Screens

Syntax

Command	:DISPlay:SElect[number] <Item name>,...,<Item name>
Query	:DISPlay:SElect[number]?
Response	<Item name>,...,<Item name>

Item name:Basic measured item parameters
(Refer to [4. Fundamental Measurement Item Parameters](#))

Description

Command	Sets items for Select screen. Specify any of 4/8/16/32 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 Select screen in a string. Specify any of 4/8/16/32 for [number].

Example

Command	:DISP:SEL4 Urms1,Umn1,Urms2,Umn2
Query	:DISP:SEL4?
Response	:DISPLAY:SELECT4 Urms1,Umn1,Urms2,Umn2 (WHEN HEADER IS ON) Urms1,Umn1,Urms2,Umn2 (WHEN HEADER IS OFF)

Select and Query Display Screen Color

Syntax

Command	:DISPlay:SET:COLor <COLOR1/COLOR2/COLOR3/COLOR4/COLOR5>
Query	:DISPlay:SET:COLor?
Response	<COLOR1/COLOR2/COLOR3/COLOR4/COLOR5>

Description

Command	Sets the display screen color.
Query	Returns the display screen color setting as character string.

Example

Command	:DISP:SET:COL COLOR1
Query	:DISP:SET:COL?
Response	:DISPLAY:SET:COLOR COLOR1 (WHEN HEADER IS ON) COLOR1 (WHEN HEADER IS OFF)

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 confirmation screen
Description	Command	Sets the start up screen.
	Query	Returns the start up screen setting as character string.
Example	Command	:DISP:SET:STAR BACKUP
		Set the screen to start up with the last shut down screen.
	Query	:DISP:SET:STAR?
	Response	:DISPLAY:SET:STARTING BACKUP (WHEN HEADER IS ON) BACKUP (WHEN HEADER IS OFF)

Select and Query Motor Analysis Function Channel A Input

Syntax	Command	:EXternalinA:FREQUENCY <ON/OFF>
	Query	:EXternalinA:FREQUENCY?
	Response	ON : Frequency input OFF : Input Analog DC input
Description	Command	Sets the motor analysis function of Channel A input.
	Query	Returns the setting of motor analysis function of Channel A input as ON or Off.
Example	Command	:EXTA:FREQ ON
		Set the Channel A input as frequency.
	Query	:EXTA:FREQ?
	Response	:EXTERNALINA:FREQUENCY ON (WHEN HEADER IS ON) ON (WHEN HEADER IS OFF)
Note	When the Channel A input is set to Analog DC, and Channel A's unit is "Hz", the unit changes to "V". When the Channel A input is set to frequency and Channel A's unit is "V", the unit changes to "Hz".	

Set and Query Motor Analysis Function Channel A Input Frequency Range

Syntax

Command	:EXternalinA:FREQuency:RANGe <fc>,<fd>
Query	:EXternalinA:FREQuency:RANGe?
Response	fc :3000 to 98000 (3kHz to 98kHz)
	fd :1000 to 48000 (1kHz to 48kHz)

Description

Command	Sets the fc and fd of the Channel A input frequency.
Query	Returns the setting for fc and fd of Channel A input frequency as numerical values.

Example

Command	:EXTA:FREQ:RANG 10000,1000 Set fc as 10kHz and fd as 1kHz.
Query	:EXTA:FREQ:RANG?
Response	:EXTERNALINA:FREQUENCY:RANGE 10000,1000 (WHEN HEADER IS ON) 10000, 1000 (WHEN HEADER IS OFF)

Note

Key only appears in the setting when it is $fc + fd < 100\text{kHz}$ and $fc - fd > 1\text{kHz}$.
Always set fc, fd in multiples of 1000.
This command is only effective under the :EXternalinA:FREQuency ON.

Set and Query Motor Analysis Function Channel A Rating Torque

Syntax Command :EXternalinA:FREQuency:TORQue <Rating Torque>
 Query :EXternalinA:FREQuency:TORQue?
 Response Rating Torque :001 to 999

Description Command Sets the rating torque value of Channel A.
 Query Returns the setting for Channel A's rating torque value as a 3-digit numerical value.

Example Command :EXTA:FREQ:TORQ 10
 Set the rating torque for Channel A to 10.
 Query :EXTA:FREQ:TORQ?
 Response :EXTERNALINA:FREQUENCY:TORQUE 010 (WHEN HEADER IS ON)
 010 (WHEN HEADER IS OFF)

Note The value set here can be used in combination with the unit set under :EXternalinA:UNIT.
 This command is only effective under the :EXternalinA:FREQuency ON.

Select and Query Low-pass Filter of Motor Analysis Function

Syntax Command :EXternalinA:LPF <ON/OFF>
 Query :EXternalinA:LPF?
 Response ON : Low pulse filter ON
 OFF : Low pulse filter OFF

Description Command Sets the ON/OFF for the low pulse filter of the motor analysis function.
 Query Returns the setting for the low pulse filter as ON or OFF.

Example Command :EXTA:LPF OFF
 Set the low pulse filter to OFF.
 Query :EXTA:LPF?
 Response :EXTERNALINA:LPF OFF (WHEN HEADER IS ON)
 OFF (WHEN HEADER IS OFF)

Note This setting is effective for both Channel A and Channel B.
 This command is only effective under the :EXternalinA:FREQuency OFF.

Execute and Clear Motor Analysis Function's Phase Zero Adjust

Syntax Command :EXternalinA:PHASe:ZEROadjust <SET/CLEAR>
 SET : Phase zero adjust execution
 CLEAR : Phase zero adjust value clear

Description Command Executes the phase zero adjust of the motor analysis function, or clear the phase zero adjust value.
 Same operation as the SHIFT+0ADJ from the main instrument, or the SHIFT+DATA RESET key.

Example Command :EXTA:PHAS:ZERO SET
 Execute the phase zero adjust.

Set and Query Motor Analysis Function Channel A Range

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

Description Command Sets the voltage range of Channel A.
 Query Returns the range setting of Channel A as a numerical value.

Example Command :EXTA:RANG 10
 Set Channel A to 10v range.
 Query :EXTA:RANG?
 Response :EXTERNALINA:RANGE 10 (WHEN HEADER IS ON)
 10 (WHEN HEADER IS OFF)

Note This command is only effective under the :EXternalinA:FREQuency OFF.

Set and Query Motor Analysis Function Channel A Scaling

Syntax

Command	:EXternalinA:SCALE <Scaling value>
Query	:EXternalinA:SCALE?
Response	Scaling Value :0000.01 to 9999.99

Description

Command	Sets the scaling value for Channel A.
Query	Returns the scaling setting for Channel A as numerical values.

Example

Command	:EXTA:SCAL 2.0
	Set the scaling value for Channel A to 2.0.
Query	:EXTA:SCAL?
Response	:EXTERNALINA:SCALE 0002.00 (WHEN HEADER IS ON) 0002.00 (WHEN HEADER IS OFF)

Note This command is only effective under the :EXternalinA:FREQUENCY OFF.

Set and Query Input Frequency Source for Motor Analysis Function's Slip Calculation

Syntax

Command	:EXternalinA:SLIP <f1/f2/f3/f4>
Query	:EXternalinA:SLIP?
Response	<f1/f2/f3/f4> :Frequency measurement channels 1 - 4

Description

Command	Set the frequency source for slip calculation.
Query	Return the setting for frequency source for slip calculation as a character string.

Example

Command	:EXTA:SLIP f1
	Set the frequency source for slip calculation to F1.
Query	:EXTA:SLIP?
Response	:EXTERNALINA:SLIP f1 (WHEN HEADER IS ON) f1 (WHEN HEADER IS OFF)

Set and Query Motor Analysis Function's Motor Synchronized Sources

Syntax Command :EXternalinA:SOURce < Synchronized Sources >
 Query :EXternalinA:SOURce?
 Response < Synchronized Sources >
 :U1/U2/U3/U4/I1/I2/I3/I4/Ext/DC50ms/DC100ms

Description Command Sets the motor synchronized sources.
 Query Returns the motor synchronized Sources as character strings.

Example Command :EXTA:SOUR U1
 Set the motor synchronized Sources to U1.
 Query :EXTA:SOUR?
 Response :EXTERNALINA:SOURCE U1 (WHEN HEADER IS ON)
 U1 (WHEN HEADER IS OFF)

Note Ext can only be set with key and when CHB is set as the pulse.

Select and Query Motor Analysis Function Channel A Unit

Syntax Command :EXternalinA:UNIT <Unit data>
 Query :EXternalinA:UNIT?
 Response <Unit data> :V/Hz/mNm/Nm/kNm

Description Command Sets the unit for Channel A.
 Query Returns the unit setting for Channel A as a character string.

Example Command :EXTA:UNIT V
 Set the Channel A unit to V.
 Query :EXTA:UNIT?
 Response :EXTERNALINA:UNIT V (WHEN HEADER IS ON)
 V (WHEN HEADER IS OFF)

Note During Analog DC setting, when Channel A sets to “Hz”, Channel A input setting changes to frequency, and during frequency setting, when Channel A sets to “V”, Channel A input setting changes to Analog DC.

Execute Zero Adjust of Motor Analysis Function

Syntax Command :EXternalinA:ZEROadjust

Description Command Executes the zero adjust for motor analysis function.

Example Command :EXTA:ZERO
Execute zero adjust.

Set and Query Motor Analysis Function Channel B Range

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

Description Command Sets the voltage range of Channel B.
Query Returns the range setting of Channel B as a numerical value.

Example Command :EXTB:RANG 5
Set Channel B to 5v range.
Query :EXTB:RANG?
Response :EXTERNALINB:RANGE 5 (WHEN HEADER IS ON)
5 (WHEN HEADER IS OFF)

Note This command is only effective under the :EXternalinB:PULSE OFF.

Set and Query Pulse ON/OFF of Motor Analysis Function Channel B Input

Syntax

Command	:EXternalinB:PULSe <ON/OFF>
Query	:EXternalinB:PULSe?
Response	ON : Pulse input
	OFF : Analog DC input

Description

Command	Sets the pulse/analog DC of Channel B input.
Query	Returns the settings of Channel B input as ON or OFF.

Example

Command	:EXTB:PULS OFF
	Set Channel B input to analog DC.
Query	:EXTB:PULS?
Response	:EXTERNALINB:PULSE OFF (WHEN HEADER IS ON)
	OFF (WHEN HEADER IS OFF)

Set and Query Motor Analysis Function Channel Z Input

Syntax

Command	:EXternalinB:PULSe:CHZ <OFF/ON/BPHASE>
Query	:EXternalinB:PULSe:CHZ?
Response	OFF : Invalidate Channel Z
	ON : Z-phase
	BPHASE: B-phase

Description

Command	Sets the Channel Z input.
Query	Returns the setting for Channel Z input as a character string.

Example

Command	:EXTB:PULS:CHZ OFF
	Set the Channel Z input to OFF.
Query	:EXTB:PULS:CHZ?
Response	:EXTERNALINB:PULSE:CHZ OFF (WHEN HEADER IS ON)
	OFF (WHEN HEADER IS OFF)

Note This command is only effective under the :EXternalinB:PULSE ON.
When ON is set with the command, the instrument displays the selection name "Z-phase".

Set and Query Motor Analysis Function Channel B Measured Maximum Frequency

- Syntax**
- Command :EXternalinB:PULSe:FREQuency <100Hz/500Hz/1kHz/5kHz>
 Query :EXternalinB:PULSe:FREQuency?
 Response <100Hz/500Hz/1kHz/5kHz> :Set frequency
- Description**
- Command Sets the maximum frequency for Channel B during pulse input.
 Query Returns the setting for maximum frequency for Channel B pulse input as a character string.
- Example**
- Command :EXTB:PULS:FREQ 500Hz
 Set the maximum frequency for Channel B during pulse input to 500Hz.
 Query :EXTB:PULS:FREQ?
 Response :EXTERNALINB:PULSE:FREQUENCY 500Hz (WHEN HEADER IS ON)
 500Hz (WHEN HEADER IS OFF)
- Note** The setting for this command is common with that of ":AOUT:FREQuency" Command.

Set and Query Motor Analysis Function Motor Pole Value

- Syntax**
- Command :EXternalinB:PULSe:MOTorpoles <Pole value>
 Query :EXternalinB:PULSe:MOTorpoles?
 Response Pole value data :even numbers in 02 - 98
- Description**
- Command Sets the pole value.
 Query Returns the setting for the pole value.
- Example**
- Command :EXTB:PULS:MOT 8
 Set the motor pole value to 8.
 Query :EXTB:PULS:MOT?
 Response :EXTERNALINB:PULSE:MOTORPOLES 8 (WHEN HEADER IS ON)
 08 (WHEN HEADER IS OFF)
- Note** When an odd number is selected, an even number smaller than the selected number will be set.

Set and Query Pulse Values of Motor Analysis Function Channel B

Syntax

Command	:EXTeRnalinB:PULSe:NUMBer <Pulse>
Query	:EXTeRnalinB:PULSe:NUMBer?
Response	Pulse :00001 to 60000

Description

Command	Sets the pulse for Channel B.
Query	Returns the pulse setting for Channel B as a numerical value.

Example

Command	:EXTB:PULS:NUMB 360 Set the pulse to 360.
Query	:EXTB:PULS:NUMB?
Response	:EXTERNALINB:PULSE:NUMBER 00360 (WHEN HEADER IS ON) 00360 (WHEN HEADER IS OFF)

Note Only 1/2 multiples of the motor pole values can be set.

Set and Query Motor Analysis Function Channel B Scaling

Syntax

Command	:EXTeRnalinB:SCALe <Scaling Value>
Query	:EXTeRnalinB:SCALe?
Response	Scaling Value :0000.01 to 9999.99

Description

Command	Sets the scaling value for Channel B.
Query	Returns the scaling setting for Channel B as numerical values.

Example

Command	:EXTB:SCAL 2.0 Set the scaling value for Channel B to 2.0.
Query	:EXTB:SCAL?
Response	:EXTERNALINB:SCALE 0002.00 (WHEN HEADER IS ON) 0002.00 (WHEN HEADER IS OFF)

Note This command is only effective under the :EXTeRnalinB:PULSe OFF.

Select and Query Motor Analysis Function Channel B Units

Syntax

Command	:EXternalinB:UNIT <Unit data>
Query	:EXternalinB:UNIT?
Response	<Unit data> : V/Hz/rpm

Description

Command	Sets the unit for Channel B.
Query	Returns the unit setting for Channel B as a character string.

Example

Command	:EXTB:UNIT V Set the Channel B unit to V.
Query	:EXTB:UNIT?
Response	:EXTERNALINB:UNIT V (WHEN HEADER IS ON) V (WHEN HEADER IS OFF)

Note During the pulse setting, when Channel B sets to “V”, Channel B input setting changes to Analog DC.

Select and Query Noise Analysis Measurement Channel

Syntax

Command	:FFT:ITEM <CH1/CH2/CH3/CH4>
Query	:FFT:ITEM?
Response	<CH1/CH2/CH3/CH4> : Measurement channel character string

Description

Command	Sets noise analysis measurement channel
Query	Returns setting for noise analysis measurement channel as a character string.

Example

Command	FFT:ITEM CH1 Set noise analysis measurement channel to Channel 1.
Query	FFT:ITEM?
Response	FFT:ITEM CH1 (WHEN HEADER IS ON) CH1 (WHEN HEADER IS OFF)

Set and Query Noise Lower Limit Frequency

Syntax

Command	:FFT:LOWerfreq <frequency data>
Query	:FFT:LOWerfreq?
Response	<frequency data> : <OFF/1kHz/2kHz/3kHz/4kHz/5kHz/6kHz/7kHz/8kHz/9kHz/10kHz>

Description

Command	Sets noise lower limit frequency.
Query	Returns the noise lower limit frequency setting as a character string data.

Example

Command	FFT:LOW 10kHz Set the noise lower limit frequency to 10kHz.
Query	:FFT:LOW?
Response	:FFT:LOWERFREQ 10kHz (WHEN HEADER IS ON) 10kHz (WHEN HEADER IS OFF)

Note Specify OFF when set to 0kHz.
The key upper limit may be restricted depending on the sampling speed setting.

Select and Query Noise Analysis Point Values

Syntax

Command	:FFT:POINt <Point value>
Query	:FFT:POINt?
Response	<Point value> : <1000/5000/10000/50000>

Description

Command	Sets the noise analysis point value.
Query	Returns the setting for the noise analysis point value as a numerical value.

Example

Command	:FFT:POIN 1000 Set the noise analysis point value to 1000.
Query	:FFT:POIN?
Response	:FFT:POINT 1000 (WHEN HEADER IS ON) 1000 (WHEN HEADER IS OFF)

Select and Query Noise Analysis Sampling Speed

Syntax

Command	:FFT:SAMPing <Sampling>
Query	:FFT : SAMPing?
Response	<Sampling> : <10kS/25kS/50kS/100kS/250kS/500kS>

Description

Command	Sets the noise analysis sampling speed.
Query	Returns the noise analysis sampling speed as a character string.

Example

Command	:FFT:SAMP 10kS	Set the noise analysis sampling speed to 10kS/s.
Query	:FFT:SAMP?	
Response	:FFT:SAMPLING 10kS (WHEN HEADER IS ON)	10kS (WHEN HEADER IS OFF)

Note Depending on the noise analysis sampling speed to be set, the noise lower limit frequency may change automatically.

Set and Query Noise Analysis Window Function

Syntax

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

Description

Command	Sets the noise analysis window function.
Query	Returns the noise analysis window function setting as a numerical value.

Example

Command	:FFT:WIND 0	Set the noise analysis window function to rectangular.
Query	:FFT:WIND?	
Response	:FFT:WINDOW 0 (WHEN HEADER IS ON)	0 (WHEN HEADER IS OFF)

Set and Query Zero Cross Filter

Syntax	Command	:FILTer <STRONG/WEAK/OFF>	
	Query	:FILTer?	
	Response	STRONG	:Filter strong
		WEAK	:Filter weak
	OFF	:Filter OFF	
Description	Command	Sets the zero cross filter.	
	Query	Returns the zero cross filter setting as a character string.	
Example	Command	:FILT STRONG	
		Set the zero cross filter to strong.	
	Query	:FILT?	
	Response	:FILTER STRONG (WHEN HEADER IS ON) STRONG (WHEN HEADER IS OFF)	

Set and Query Measurement Lower Limit Frequency

Syntax	Command	:FREQUENCY:LOWer <frequency data>
	Query	:FREQUENCY:LOWer?
	Response	<frequency data> :0.5Hz/1Hz/2Hz/5Hz/10Hz/20Hz
Description	Command	Sets the measurement lower limit frequency.
	Query	Returns the measurement lower limit frequency setting with a character string.
Example	Command	:FREQ:LOW 10Hz
		Set the measurement lower limit frequency to 10Hz.
	Query	:FREQ:LOW?
	Response	:FREQUENCY:LOWER 10Hz (WHEN HEADER IS ON) 10Hz (WHEN HEADER IS OFF)

Select and Query Frequency Measurement Source

Syntax	Command	:FREQUency:SOURce[CH] <U/I>
	Query	:FREQUency:SOIURce[CH]? [CH] ···· 1,2,3,4
	Response	U : frequency source is voltage I : frequency source is current
Description	Command	Sets the specified channel's frequency measurement source.
	Query	Returns the specified channel's frequency measurement source setting as a character string.
Example	Command	:FREQ:SOUR1 U Select voltage as the frequency measurement source for Channel 1.
	Query	:FREQ:SOUR1?
	Response	:FREQUENCY:SOURCE1 U (WHEN HEADER IS ON) U (WHEN HEADER IS OFF)

Select and Query Harmonic Synchronized Source

Syntax	Command	:HARMonic:SOURce <Synchronized source>
	Query	:HARMonic:SOURce?
	Response	<synchronized source> :U1/U2/U3/U4/I1/I2/I3/I4/DC50ms/DC100ms/Ext
Description	Command	Sets the harmonic synchronized source.
	Query	Returns the harmonic synchronized source setting as a character string.
Example	Command	:HARM:SOUR U1 Set the harmonic synchronized source setting to U1.
	Query	:HARM:SOUR?
	Response	:HARMONIC:SOURCE U1 (WHEN HEADER IS ON) U1 (WHEN HEADER IS OFF)
Note	Only the key of Ext can be set when the motor analysis function is implemented and CHB is set as pulse.	

Set and Query THD Calculation Formula

Syntax

Command	:	HARMonic:THD	<F/R>
Query	:	HARMonic:THD?	
Response	F	:	THD-F(Fundamental wave standard)
	R	:	THD-R(Harmonic total value standard)

Description

Command	Sets the THD calculation formula.
Query	Returns the THD calculation formula as a character string.

Example

Command	:	HARM:THD F
	Set the THD calculation formula setting to THD-F.	
Query	:	HARM:THD?
Response	:	HARMONIC:THD F (WHEN HEADER IS ON)
	F (WHEN HEADER IS OFF)	

Set and Query Header for Response Message

Syntax

Command	:	HEADer	<ON/OFF>
Query	:	HEADer?	
Response	ON	:	Attach header to the Response message.
	OFF	:	Do not attach header to the Response message.

Description

Command	Sets header for the Response message.
Query	Returns setting for Response message header as ON or OFF.

Example

Command	:	HEAD ON
	Attach header to Response message.	
Query	:	HEAD?
Response	:	HEADER ON (WHEN HEADER IS ON)
	OFF (WHEN HEADER IS OFF)	

Note When the instrument is turned on, the setting will always return to OFF.

Set and Query Hold Status

Syntax

Command	:HOLD <OFF/ON/PEAK>
Query	:HOLD?
Response	OFF :Hold OFF
	ON :Hold ON
	PEAK :Peak Hold ON

Description

Command	Sets the hold status.
Query	Return the hold status as a character string.

Example

Command	:HOLD ON
	Set to hold status.
Query	:HOLD?
Response	:HOLD ON (WHEN HEADER IS ON)
	ON (WHEN HEADER IS OFF)

Note Use *TRG Command to update data during hold or peak hold status.

Set and Query Integration Mode

Syntax

Command	:INTEGrate:MODE[CH] <DC/RMS>
Query	:INTEGrate:MODE[CH]? [CH] ···· 1,2,3,4
Response	DC : Integration DC mode RMS : Integration RMS mode

Description

Command	Sets the integration mode.
Query	Returns the integration mode setting as DC or RMS.

Example

Command	:INTEG:MODE1 DC Set the integration mode of Channel 1 to DC.
Query	:INTEG:MODE1?
Response	:INTEGRATE:MODE1 DC (WHEN HEADER IS ON) DC (WHEN HEADER IS OFF)

Note By combining measurement lines (for above IP3W), the settings for integration modes of other channels which are combined are also changed.
To get the DC mode, the current sensor used for the IP2W wiring must be the AC/DC type.

Execute Integration Data Reset

Syntax

Command	:INTEGrate:RESet
---------	------------------

Description

Command	Resets integration data. Same operation as DATA RESET key of the main instrument.
---------	---

Example

Command	:INTEG:RES Reset the integration data.
---------	---

Note This command is only available when the integration is in STOP status.
After sending the STOP command, transmit it with an interval of 250 ms (1 sec when auto save ON).

Execute Integration (Time) Start

Syntax Command :INTEGrate:STARt

Description Command Starts integration (time).

Example Command :INTEG:STAR
Start integration (time).

Query Integration (Time)

Syntax Query :INTEGrate:STATe?
Response RESET : Integration reset status
STOP : Integration stopped status
WAIT : Integration waiting status
RUN : Integration running status

Description Query Returns the integration status of the main instrument as a character string.

Example Query :INTEG:STAT?
Start integration (time).
Response :INTEGRATE:STATE RUN (WHEN HEADER IS ON)
RUN (WHEN HEADER IS OFF)

Execute Integration (Time) Stop

Syntax Command :INTEGrate:STOP

Description Command Stops integration (time).

Example Command :INTEG:STOP
Stop integration (time).

Note This command is only available when integration is in RUN/WAIT status.

Set and Query Interval Time

Syntax

Command	:INTERval <Time data>
Query	:ITERval?
Response	OFF/50ms/100ms/200ms/500ms/1s/5s/10s/15s /30s/1min/5min/10min/15min/30min/60min

Description

Command	Sets the interval time.
Query	Returns the interval time setting as a character string.

Example

Command	:INTER 1min Set the interval time to 1 minute.
Query	:INTER?
Response	:INTERVAL 1min (WHEN HEADER IS ON) 1min (WHEN HEADER IS OFF)

Set and Query 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

Description

Command	Sets IPAddress.
Query	Returns IPAddress setting as a numerical value.

Example

Command	:IP:ADDR 192,168,1,1 Set IPAddress to 192.168.1.1.
Query	:IP:ADDR?
Response	:IP:ADDRESS 192.168.1.1 (WHEN HEADER IS ON) 192.168.1.1 (WHEN HEADER IS OFF)

Note The address will be changed after the command has been sent. Please be careful when sending from LAN.

Set and Query 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

Description

Command	Sets the default gateway.
Query	Returns the setting for default gateway as a numerical value.

Example

Command	:IP:DEF 192,168,1,250
	Set the default gateway to 192,168,1,250.
Query	:IP:DEF?
Response	:IP:DEFAULTGATEWAY 192,168,001,250 (WHEN HEADER IS ON)
	192,168,001,250 (WHEN HEADER IS OFF)

Set and Query 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

Description

Command	Sets the subnet mask.
Query	Returns the subnet mask setting as a numerical value.

Example

Command	:IP:SUBN 255,255,255,0
	Set the subnet mask to 255,255,255,0.
Query	:IP:SUBN?
Response	:IP:SUBNETMASK 255,255,255,000 (WHEN HEADER IS ON)
	255,255,255,000 (WHEN HEADER IS OFF)

Set and Query Key Lock

Syntax	Command	:KEYLock <ON/OFF>
	Query	:KEYLock?
	Response	ON : Turn key lock on.
		OFF : Turn key lock off.
Description	Command	Sets the key lock ON/OFF.
	Query	Returns the key lock setting as ON or OFF.
Example	Command	:KEYL ON Set the key lock ON.
	Query	:KEYL?
	Response	:KEYLOCK ON (WHEN HEADER IS ON) ON (WHEN HEADER IS OFF)

Set and Query Main Instrument Display Language

Syntax	Command	:LANGuage <Language>
	Query	:LANGuage?
	Response	<Language> :JAPANESE/ENGLISH/CHINESE
Description	Command	Sets the display language for the main instrument.
	Query	Returns the display language setting for the main instrument as a character string.
Example	Command	:LANG ENGLISH Set the display language of the main instrument to English.
	Query	:LANG?
	Response	:LANGUAGE ENGLISH (WHEN HEADER IS ON) ENGLISH (WHEN HEADER IS OFF)

Select and Query Low Pulse Filter (LPF)

Syntax

Command	:LPF[CH] <OFF/500Hz/5kHz/100kHz>
Query	:LPF[CH]? [CH] ···· 1,2,3,4
Response	<OFF/500Hz/5kHz/100kHz>

Description

Command	Sets the cutoff frequency for the low pulse filter (LPF).
Query	Returns the setting for the cut off frequency for the low pulse filter as a character string.

Example

Command	:LPF1 500Hz Set the cutoff frequency for the low pulse filter of Channel 1 to 500Hz.
Query	:LPF1?
Response	:LPF1 500Hz (WHEN HEADER IS ON) 500Hz (WHEN HEADER IS OFF)

Note By combining measurement lines (for above IP3W), the settings for the low pulse filters (LPF) of other channels which are combined are also changed.

Query Measurement Data

Syntax Query :MEASure? <Item 1>, <Item 2>, ,<Item 63>,<Item 64>
 Response <Item 1>, <Item 2>, ,<Item 63>,<Item 64>
 <Item 1 to 64> : Fundamental measurement item arbitrary within
 the parameter.
 (Refer to [4. Fundamental Measurement Item Parameters](#))

Description Query **Item Specified Mode (with parameters)**
 <Item> Describing any part will change it to this mode.
 <Item> Create measurement data specified by this. A maximum of 64 items
 is possible.
 <Item> Can be arbitrarily specified within the fundamental measurement item
 parameter, but anything else that is specified will return a command error.
 <Item> Order is arbitrary. Creates the data in the order specified.
 Item No Specified Mode (with no parameters)
 <Item> If not part is specified, the mode will change to this.
 Create measurement data of item specified under a type
 of :MEASure:ITEM Command.
 The measurement data order is fixed. (Refer to the output item and order
 table)
 Status data is always attached to the beginning of the data.

Example Query :MEAS? Urms1, P1, DEG1 (Example of Item specified mode)
 Query the voltage RMS, effective power value, and power phase angle of
 Channel 1.
 Response Urms1 151.63E+00,P1 5.74E+00,DEG1 83.80E+00 (WHEN HEADER
 IS ON)
 151.78E+00,5.58E+00,84.00E+00 (WHEN HEADER IS OFF)

Measurement data format

General Measurement value	6 digits including digits after the decimal point Index 2 digits
Integration Value	7 digits including digits after the decimal point Index 2 digits
Time	Year/Month/Date Hour/Minute/Second Elapsed time Elapsed Time (ms)
Error	Input over +9999, 9E + 99

Note Controls whether to omit the + at the beginning of the fraction and the preceding 0, under the :TRANsmi:t:COLumnCommand.
 If nothing is specified, the beginning of the fraction and the preceding 0 will be omitted (:TRANsmi:t:COLumn 0)

Query Harmonic Measurement Data

Syntax Query :MEASure:HARMonic?

Description Query Creates measurement data of item specified under a type of :MEASure:ITEM Command.
 The measurement data order is fixed. (Refer to the output item and order table)
 Statusdata is always attached to the beginning of the data.

Example Query :MEAS:HARM?
 Query the harmonic measurement data.
 Response Status F0000000,HU1L001 90.45E+00,HU1D001 100.00E+00
 ,HP1L001 0.0043E+03,HU1L003 0.20E+00,HU1D003 0.22E+00
 ,HP1L003 -0.0000E+03 (WHEN HEADER IS ON)
 F0000000,90.45E+00,100.00E+00,0.0043E+03,0.20E+00,0.22E+00
 ,-0.0000E+03 (WHEN HEADER IS OFF)

Measurement data format

General measurement data	6 digits including digits after the decimal point Index 2 digits
Error	Input over +9999, 9E + 99

Note Controls whether to omit the + at the beginning of the fraction and the preceding 0, under the :TRANsmit:COLumnCommand.
 If nothing is specified, the beginning of the fraction and the preceding 0 will be omitted (:TRANsmit:COLumn 0)

Query Noise Measurement Value Data

Syntax	Query	:MEASure:NOISepeak?
Description	Query	Returns the voltage of the noise measurement value, the frequencies of the top 10 pole current values and numerical values. The measurement data order is fixed. (Refer to the output item and order table) First, ten voltage followed by 10 current values will be outputted from the top in the order of frequency and numerical value.
Example	Query	:MEAS:NOIS?
		Query the noise measurement's voltage and current.
	Response	UNf01 1.1396E+03,UN01 0.26E+00, ... ,INf10 1.9500E+03,IN10 0.005E+00 (WHEN HEADER IS ON) 1.1396E+03,0.26E+00, ... ,1.9500E+03,0.005E+00 (WHEN HEADER IS OFF)

Query Voltage Noise Measurement Value Data

Syntax	Query	:MEASure:NOISepeak:U?
Description	Query	Returns the frequencies of the top 10 pole voltage values and numerical values. The measurement data order is fixed. (Refer to the output item and order table) The top 10 voltage values will be outputted from the top in the order of frequency and numerical value (20 data).
Example	Query	:MEAS:NOIS:U?
		Query the noise measurement value.
	Response	UNf01 1.1396E+03,UN01 0.26E+00, ... ,UNf10 1.9792E+03,UN10 0.02E+00 (WHEN HEADER IS ON) 1.1396E+03,0.26E+00, ... ,1.9792E+03,0.02E+00 (WHEN HEADER IS OFF)

Query Current Noise Measurement Value Data

Syntax Query :MEASure:NOISepEak:I?

Description Query Returns the frequencies of the top 10 pole current values and numerical values.
The measurement data order is fixed. (Refer to the output item and order table)
The top 10 current values will be outputted from the top in the order of frequency and numerical value (20 data).

Example Query :MEAS:NOIS:I?
Query the noise measurement value of the current.
Response INf01 1.0500E+03,IN01 0.018E+00, ... ,INf10 1.9500E+03,IN10 0.005E+00
(WHEN HEADER IS ON)
1.0500E+03,0.018E+00, ... ,1.9500E+03,0.005E+00 (WHEN HEADER IS OFF)

Note Controls whether to omit the + at the beginning of the fraction and the preceding 0, under the :TRANsmit:COLumnCommand.
If nothing is specified, the beginning of the fraction and the preceding 0 will be omitted (:TRANsmit:COLumn 0)

Initialize Communication Output Item Data

Syntax Command :MEASure:ITEM:ALLClear

Description Command Initializes the communication output data item.
All communication output data item related to ":MEASure:ITEM:" will be OFF.

Example Command :MEAS:ITEM:ALLC
Initialize the communication output data item.

Set and Query Efficiency, Loss Calculation Value Communication Output Items

Syntax Command :MEASure:ITEM:EFFiciency <0 to 255>

Query :MEASure:ITEM:EFFiciency?

Response

	128	64	32	16	8	4	2	1
bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0	
-	LOSS3	LOSS2	LOSS1	-	EFFI3	EFFI2	EFFI1	

Description Command Sets the efficiency, communication output data items of loss calculation values between 0 and 255.

Query Returns the setting of efficiency, communication output data items of loss calculation values with values of 0 – 255.

Example Command :MEAS:ITEM:EFF 17

Set the “1” of the efficiency calculation and the “1” of the loss calculation to ON.

Query :MEAS:ITEM:EFF?

Response :MEASURE:ITEM:EFF 17 (WHEN HEADER IS ON)
17 (WHEN HEADER IS OFF)

Set and Query Communication Output Items of Motor Input

Syntax Command :MEASure:ITEM:EXternalin <0 to 255>
 Query :MEASure:ITEM:EXternalin?
 Response

128	64	32	16	8	4	2	1
bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
-	-	-	-	SLIP	PM	EXTB	EXTA

Description Command Sets the communication output item of the motor input as 0 – 255.
 Query Returns the setting for the communication output item of the motor input as 0 – 255.

Example Command :MEAS:ITEM:EXT 7
 Set the EXTA, EXTB, PM of the motor analysis function calculation value to ON.
 Query :MEAS:ITEM:EXT?
 Response :MEASURE:ITEM:EXTERNALIN 7 (WHEN HEADER IS ON)
 7 (WHEN HEADER IS OFF)

Initialize Harmonic Communication Output Data Items

Syntax Command :MEASure:ITEM:HARMonic:ALLClear

Description Command Initializes the Harmonic communication output data item.
 All Harmonic communication output data item set to OFF.

Example Command :MEAS:ITEM:HARM:ALLC
 Initialize the Harmonic communication output data item.

Set and Query Output Order of Harmonic Data Communication Output
--

Syntax Command :MEASure:ITEM:HARMonic:ORDer <Lower limit order>, <Upper limit order>, <ODD/EVEN/ALL>

Query :MEASure:ITEM:HARMonic:ORDer?

Response Lower limit order (NR1) :0 to 100

Upper limit order (NR1) :0 to100

ODD : Odd-number order only

EVEN : Even-number order only

ALL : All orders

Description Command Sets the default send item of the response data in the default mode as a response to ":MEASure:HARMonic?" as 0 – 255.

Use in a combination with ":MEASure:ITEM:HARMonic:LIST"Command.

Query Returns the setting for the default send item of the response data in the default mode as a response to ":MEASure:HARMonic?" as numerical values or character strings.

Example Command :MEAS:ITEM:HARM:ORD 1,15,ODD

Set the odd-number order from 1 – 15 to the default output.

Query :MEAS:ITEM:HARM:ORD?

Response :MEASURE:HARMONIC:ORDER 1,15,ODD (WHEN HEADER IS ON)
1,15,ODD (WHEN HEADER IS OFF)

Query Existence of USB Memory

Syntax Query :MEMory:EXISt?
 Response Y :USB Memory
 N :No USB Memory

Description Query Returns the existence of the USB in the main instrument as Y or N.

Example Query :MEM:EXIS?
 Response :MEMORY:EXIST Y (WHEN HEADER IS ON)
 Y (WHEN HEADER IS OFF)

Acquire File Name in USB Memory

Syntax Query :MEMory:FILEname? <Specified Folder Name>
 < Specified Folder Name >
 Acquires file name under the specified folder name.
 When omitted, the file name under the root folder will be acquired.
 Response <File name>, <byte count>, <file name>,<byte count>,,,,,
 Continue in the <File name>, <byte count> order for as long as there are files.
 When there are no more folders, the words "NO_FILES" will be returned.

Description Query Acquires the file name under the folder specified from the USB memory.

Example Query :MEM:FILE? PW3390
 Acquire and return the file name under the PW3390 folder from the USB memory.
 Response :MEMORY:FILENAME H3390001.BMP,44862,M3390000.CSV,578
 (WHEN HEADER IS ON)
 H3390001.BMP,44682,M3390000.CSV,578 (WHEN HEADER IS OFF)

Note Up to 90 files displayed from the start of the screen can be acquired.
 When more than 90 files exist in the same folder, subsequent file names cannot be acquired.

Acquire Folder Name in USB Memory

Syntax Query :MEMory:FOLDername?
 Response <Folder name>,<Folder name>,<Folder name>,,,,,
 Folder names will continue for as long as there are folders.
 When there are no more folders, the words "NO_FOLDER" will be
 returned.

Description Query Acquires the folder name under the root of the USB memory.

Example Query :MEM:FOLD?
 Response :MEMORY:FOLDERNAME PW3390 (WHEN HEADER IS ON)
 PW3390 (WHEN HEADER IS OFF)

Note Up to 215 folders displayed from the start of the screen can be acquired.
 When more than 215 folders exist in the root, subsequent folder names cannot be acquired.

Acquire File Data in USB Memory

Syntax Query :MEMory:PICKout? <File name>,<Start position (NR1)>,
 <Stop position (NR1)>,<Specified folder name>
 Response <Folder name>,<Start position>,<Stop position>,<Specified folder name>
 File name :File name to be forwarded
 Start position (NRI) :Specify the acquired start position in the file with
 byte count
 Stop position (NRI) :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.

Description 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 :MEM:PICK? 02030100.CSV,1,1000,PW3390
 Return the 1-100 byte data of the 02030100.CSV file under
 the PW3390 folder from USB Memory.
 Response STX(02)HIOKI PW3390 ETX(03)

Note 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.
 It automatically shifts to the measurement screen.

Querying File Size in USB Memory

Syntax Query :MEMory:SIZE? <Specified File Name>,<Specified Folder Name>
 Response <File size (Bytes)>

Description Query Returns the size of the specified file.

Example Query :MEM:SIZE? H3390000.BMP,PW3390
 Response :MEMORY:SIZE 35124 (when HEADER is ON)
 35124 (when HEADER is OFF))

Note File name can be specified with a maximum of 40 characters.
 If folder name is omitted, a file name will be used from under the root folder.
 During execution of file operation, it can take some time to get a response.

Select and Query Wiring Mode

Syntax

Command	:MODE <TYPE1/TYPE2/TYPE3/TYPE4/TYPE5/TYPE6/TYPE7/TYPE8>
Query	:MODE?
Response	TYPE1: 1P2W, 1P2W, 1P2W, 1P2W TYPE2: 1P3W, 1P2W, 1P2W TYPE3: 3P3W, 1P2W, 1P2W TYPE4: 1P3W, 1P3W TYPE5: 3P3W2M, 1P3W TYPE6: 3P3W2M, 3P3W2M TYPE7: 3P3W3M, 1P2W TYPE8: 3P4W, 1P2W

Description

Command	Selects wiring mode, and set according to the wiring of the various channels.
Query	Returns wiring mode as character string.

Example

Command	:MODE TYPE1 Set the wiring modes of all channels to IP2W.
Query	:MODE?
Response	:MODE TYPE1 (WHEN HEADER IS ON) TYPE1 (WHEN HEADER IS OFF)

Note The wiring mode setting affects many settings. Try to set it as early as possible. To set a wiring mode for a combination of multiple channels, the current sensors of the channels to be combined must be the same.

Setting and Querying Formula for Three-phase Power

Syntax	Command	:OPERation <TYPE1/TYPE2>
	Query	:OPERation?
	Response	TYPE1: 3P3W3M standard calculation method TYPE2: Calculation method to improve the mutual compatibility with 3V3A wiring of other power meter
Description	Command	Sets formulas of three-phase power.
	Query	Returns formula settings of three-phase power as character string.
Example	Command	:OPER TYPE1 Set the formulas of three-phase power to TYPE1.
	Query	:OPER?
	Response	:OPERATION TYPE1 (WHEN HEADER IS ON) TYPE1 (WHEN HEADER IS OFF)

Set and Query Execution Confirmation Message

Syntax	Command	:RS232c:ANSWer <ON/OFF>
	Query	:RS232c:ANSWer?
	Response	ON: Execution Confirmation Message OFF: No Execution Confirmation Message
Description	Command	Sets the existence of execution confirmation message. When there is a message, response will return even when the command is being sent, and an execution confirmation message will be attached at the end of the query's response during query. The execution confirmation message has a 3-digit "nnn" format and shows an error at the nnth Command. "000" is shown when there is an error.
	Query	Returns the setting for the execution confirmation message as ON or OFF.
Example	Command	:RS232:ANSW ON Set the execution confirmation message to ON.
	Query	:RS232:ANSW?
	Response	:RS232C:ANSWER ON;000 (WHEN HEADER IS ON) ON,000 (WHEN HEADER IS OFF)
Note	The command name is RS232C, but is the same operation as when communicating with LAN or USB.	

Select and Query RS232C Communication Speed

Syntax	Command	:RS232c:BAUD <9600bps/19200bps/38400bps>
	Query	:RS232c:BAUD?
	Response	<9600bps/19200bps/38400bps>
Description	Command	Sets the RS232C communication speed.
	Query	Returns the setting for the RS232C communication speed as a character string.
Example	Command	:RS232:BAUD 19200bps
		Set the RS232C communication speed to 19200bps.
	Query	:RS232:BAUD?
	Response	:RS232C:BAUD 19200 (WHEN HEADER IS ON) 19200 (WHEN HEADER IS OFF)

Set and Query Automatic Saving Folder Name

Syntax	Command	:SAVE:AUTO:FOLDername <Folder name>
	Query	:SAVE:AUTO:FOLDername?
	Response	The folder name is a character string of up to 8 characters. Characters that can be used are ASCII characters H'20 – H'7E (except for " */:<>?¥ ."). When "NO_FOLDER" is specified in the folder name, the root will become the folder to be saved to.
Description	Command	Set the folder name of the automatic saving measurement file.
	Query	Returns the setting for the folder name of the automatic saving measurement file as a character string.
Example	Command	:SAVE:AUTO:FOLD AUTO3390
		Set the folder name of the automatic saving measurement file to "AUTO3390".
	Query	:SAVE:AUTO:FOLD?
	Response	:SAVE:AUTO:FOLDERNAME AUTO3390 (WHEN HEADER IS ON) AUTO3390 (WHEN HEADER IS OFF)

Set and Query Manual Saving Folder Name

Syntax

Command :SAVE:FOLDername <Folder name>
 Query :SAVE:FOLDername?
 Response The folder name is a character string of up to 8 characters.
 Characters that can be used are ASCII characters H'20 – H'7E (except for " */:<>?¥|.").
 When "NO_FOLDER" is specified in the folder name, the root will become the folder to be saved to.

Description

Command Sets the folder name of the manual saving measurement file.
 Query Returns the setting for the folder name of the manual automatic saving measurement file as a character string.

Example

Command :SAVE:FOLD DATA3390
 Set the folder name of the manual saving measurement file to "AUTO3390".
 Query :SAVE:FOLD?
 Response :SAVE:FOLDERNAME DATA3390 (WHEN HEADER IS ON)
 DATA3390 (WHEN HEADER IS OFF)

Select and Query Manual Saving Media Location

Syntax

Command :SAVE:MEDIA <MEMORY/CARD>
 Query :SAVE:MEDIA?
 Response MEMORY :USB Memory
 CARD :CF Card

Description

Command Sets the manual saving media location
 Query Returns the setting for the manual saving media location as a Character string.

Example

Command :SAVE:MEDI CARD
 Set the manual saving media to the CF card.
 Query :SAVE:MEDI?
 Response :SAVE:MEDIA CARD (WHEN HEADER IS ON)
 CARD (WHEN HEADER IS OFF)

Setting and Querying Delimiter for CSV File

Syntax	Command	:SAVE:SEParator <CSV/SSV>
	Query	:SAVE:SEParator?
	Response	CSV: Comma-delimited “,”, period-decimal”.” SSV: Semicolon-delimited”;”, comma-decimal”,”
Description	Command	Sets a type of delimiter for CSV file.
	Query	Returns a type of delimiter for CSV file.
Example	Command	:SAVE:SEP SSV
	Query	:SAVE:SEP?
	Response	:SAVE:SEPARATOR SSV (WHEN HEADER IS ON) SSV (WHEN HEADER IS OFF)

Set and Query CT Ratio

Syntax	Command	:SCALE[CH]:CT <CTRatio>
	Query	:SCALE[CH]:CT? [CH] ···· 1,2,3,4
	Response	CT Ratio:0000.01 to 9999.99
Description	Command	Sets the CT ratio of the specified channel.
	Query	Returns the setting for the CT ratio of the specified channel in numerical value.
Example	Command	:SCAL1:CT 2.0 Set the CT ratio of Channel 1 to 2.0.
	Query	:SCAL1:CT?
	Response	:SCALE1:CT 0002.00 (WHEN HEADER IS ON) 0002.00 (WHEN HEADER IS OFF)

Note The setting for CT Ratio OFF is 1.0. The Query Response for OFF is 0001.00. Settings for the other channels in the measurement line combination will also be changed. Specify the first channel in the combination channels.

Set and Query VT Ratio

Syntax

Command	:SCALE[CH]:VT <VT Ratio>
Query	:SCALE[CH]:VT?
	[CH] ···· 1,2,3,4
Response	VT Ratio :0000.01 to 9999.99

Description

Command	Sets the VT ratio of the specified channel.
Query	Returns the setting for the VT ratio of the specified channel in numerical value.

Example

Command	:SCALE1:VT 10.0
	Set the CT ratio of Channel 1 to 10.0.
Query	:SCALE1:VT?
Response	:SCALE1:VT 0010.00 (WHEN HEADER IS ON)
	0010.00 (WHEN HEADER IS OFF)

Note The setting for VT Ratio OFF is 1.0. The Query Response for OFF is 0001.00. Settings for the other channels in the measurement line combination will also be changed. Specify the first channel in the combination channels.

Set and Query Synchronized Source

Syntax

Command	:SOURCE[CH] <synchronized source>
Query	:SOURCE[CH]?
	[CH] ···· 1,2,3,4
Response	<synchronized source> :U1/U2/U3/U4/I1/I2/I3/I4/Ext/DC50ms/DC100ms

Description

Command	Sets the synchronized source of the specified channel.
Query	Returns the setting for the synchronized source of the specified channel as a character string.

Example

Command	:SOUR1 U1
	Set the synchronized source of Channel 1 to U1.
Query	:SOUR1?
Response	:SOURCE1 U1 (WHEN HEADER IS ON)
	U1 (WHEN HEADER IS OFF)

Note Settings for the other channels in the measurement line combination will also be changed. Only the key of Ext can be set when the motor analysis function is implemented and chB is set as pulse.

Select and Query Actual Time ON/OFF

Syntax

Command	:STIMe:CONTRol <ON/OFF>
Query	:STIMe:CONTRol?
Response	ON : Actual Time ON
	OFF : Actual Time OFF

Description

Command	Sets the actual time ON/OFF.
Query	Returns the setting for actual time as ON or OFF.

Example

Command	:STIM:CONT ON
	Set the actual time to ON.
Query	:STIM:CONT?
Response	:STIME:CONTROL ON (WHEN HEADER IS ON)
	ON (WHEN HEADER IS OFF)

Set and Query Actual Time Start Time

- Syntax**
- | | |
|----------|---|
| Command | :STIME:STARtime <Year>,<Month>,<Date>,<Hour>,<Minute> |
| Query | :STIME:STARtime? |
| Response | Year data:2000 to 2079 (can be set 00 - 79) |
| | Month data:01 to 12 |
| | Date data:01 to 31 |
| | Hour data:00 to 23 |
| | Minute data:00 to 59 |
- Description**
- | | |
|---------|--|
| Command | Sets the actual time start time. |
| Query | Returns the time setting of the actual start time as numerical values of year, month, date, hour and minute. |
- Example**
- | | |
|----------|--|
| Command | :STIM:STAR 08,12,25,12,00 |
| | Set the actual time start time as 2017 Dec 25 th 12:0 |
| Query | :STIM:STAR? |
| Response | :STIME:STARTTIME 2017,12,25,12,00 (WHEN HEADER IS ON) |
| | 2017,12,25,12,00 (WHEN HEADER IS OFF) |
- Note**
- The instrument can interpret days of the month as well as leap years, so specifying an improbable date will lead to an error.
- When a time after the stop time is set, the stop time will be set one minute after the start time.

Set and Query Actual Time Stop Time

- Syntax**
- | | |
|----------|---|
| Command | :STIME:STOPtime <Year>,<Month>,<Date>,<Hour>,<Minute> |
| Query | :STIME:STOPtime? |
| Response | Year data:2000 to 2079 (can be set 00 - 79) |
| | Month data:01 to 12 |
| | Date data:01 to 31 |
| | Hour data:00 to 23 |
| | Minute data:00 to 59 |
- Description**
- | | |
|---------|---|
| Command | Sets the actual time stop time. |
| Query | Returns the time setting of the actual stop time as numerical values of year, month, date, hour and minute. |
- Example**
- | | |
|----------|---|
| Command | :STIM:STOP 08,12,25,12,00 |
| | Set the actual time stop time as 2017 Dec 25 th 12:0 |
| Query | :STIM:STOP? |
| Response | :STIME:STOPTIME 2017,12,30,8,30 (WHEN HEADER IS ON) |
| | 2017,12,30,8,30 (WHEN HEADER IS OFF) |
- Note** The instrument can interpret days of the month as well as leap years, so specifying an improbable date will lead to an error.
- When a time before the start time is set, an execution error will occur.

Select and Query Master/Slave of Synchronized Control Master

Syntax	Command	:SYNC:CONTRol <MASTER/SLAVE>
	Query	:SYNC:CONTRol?
	Response	MASTER : Master SLAVE : Slave
Description	Command	Sets the master and slave of synchronized control.
	Query	Returns the settings of master and slave of synchronized controls MASTER or SLAVE.
Example	Command	:SYNC:CONT MASTER Set the master of synchronized control.
	Query	:SYNC:CONT?
	Response	:SYNC:CONTROL MASTER (WHEN HEADER IS ON) MASTER (WHEN HEADER IS OFF)

Set and Query Synchronized Event Items

Syntax	Command	:SYNC:EVENTitem <HOLD/SAVE/COPY>
	Query	:SYNC:EVENTitem?
	Response	HOLD : Hold SAVE : Manual Save COPY : Screen Copy
Description	Command	Set the synchronized events during the synchronized control.
	Query	Returns the synchronized events during the synchronized control as character strings.
Example	Command	:SYNC:EVEN HOLD Set the synchronized event as hold.
	Query	:SYNC:EVEN?
	Response	:SYNC:EVENTITEM HOLD (WHEN HEADER IS ON) HOLD (WHEN HEADER IS OFF)

Set and Query Numerical Data Format

Syntax

Command :TRANsmit:COLumn <0/1>
 Query :TRANsmit:COLumn?
 Response 0 : Omit the + at the beginning of the fraction of the response measurement value data and the preceding 0
 1 : Fixed number of characters in the fraction of the response measurement value data
 (the + at the beginning of the fraction and the preceding 0 will not be omitted)

Description

Command Sets the response data value data format of
 ":MEASure?", ":MEASure:HARMonic?", and " :MEASure:NOISepeak?".
 Query Returns the setting for the response data's value data format as 0 or 1.

Example

Command :TRAN:COL 1
 Set not to omit the fraction.
 Query :TRAN:COL?
 Response :TRANSMIT:COLMUN 1 (WHEN HEADER IS ON)
 1 (WHEN HEADER IS OFF)

Note Response example of ":MEASure?"Command (WHEN HEADER IS OFF)

• **When TRANsmit:COLumn 0**

Query :MEAS? U1_RMS,I1_RMS
 Response 78.01E+00,5.0120E+00

• **When TRANsmit:COLumn 1**

Query :MEAS? U1_RMS,I1_RMS
 Response +078.01E+00,+5.0120E+00

Set and Query Response Message Unit Separator

Syntax

Command	:TRANsmit:SEParator <0/1>
Query	:TRANsmit:SEParator?
Response	0: Semicolon ';' 1 : Colon ','

Description

Command	Sets the message unit separator when the header is OFF.
Query	Returns the setting for the message unit separator when the header is OFF as a numerical value.

Example

Command	TRAN:SEP 1
	Set the message unit separator when the header is OFF as a comma (,).
Query	TRAN:SEP?
Response	:TRANSMIT:SEPARATOR 1 (WHEN HEADER IS ON) 1 (WHEN HEADER IS OFF)

Note The response message unit separator can only be changed when the header is OFF. The measurement value Response data of the "MEASure?" type is independent of this setting and is separated by a ','.

Set and Query Voltage Auto Range

Syntax

Command	:VOLTage [CH]:AUTO <ON/OFF>
Query	:VOLTage [CH]:AUTO? [CH] ···· 1,2,3,4
Response	ON : Measures voltage by auto range. OFF : Measures voltage by manual range.

Description

Command	Sets the voltage auto range ON/OFF.
Query	Returns the setting for the voltage auto range as ON or OFF.

Example

Command	:VOLT1:AUTO ON Set the auto range for voltage Channel 1 to ON.
Query	:VOLT1:AUTO?
Response	:VOLTAGE1:AUTO ON (WHEN HEADER IS ON) ON (WHEN HEADER IS OFF)

Note When the range is set using the :VOLTage [CH]:RANGeCommand, the auto range of the specified channel will be OFF.
By combining measurement lines (for above IP3W), the settings for the voltage auto ranges of other channels which are combined are also changed.

Select and Query Voltage Rectifier Type

- Syntax**
- | | |
|----------|--|
| Command | :VOLTage [CH]:MEAN <ON/OFF> |
| Query | :VOLTage [CH]:MEAN?
[CH] ···· 1,2,3,4 |
| Response | ON : Sets the voltage rectifier type to MEAN.
OFF : Sets the voltage rectifier type to RMS. |
- Description**
- | | |
|---------|--|
| Command | Selects the RMS/MEAN of the voltage rectifier type. |
| Query | Returns the selection of the RMS/MEAN of the voltage rectifier type as ON (MEAN) or OFF (RMS). |
- Example**
- | | |
|----------|---|
| Command | :VOLT1:MEAN OFF
Select the rectifier type of voltage Channel 1 as RMS. |
| Query | :VOLT1:MEAN? |
| Response | :VOLTAGE1:MEAN OFF (WHEN HEADER IS ON)
OFF (WHEN HEADER IS OFF) |
- Note** By combining measurement lines (for above IP3W), the settings for the voltage rectifier types of other channels which are combined are also changed.

Set and Query Voltage Range

Syntax

Command	:VOLTage[CH]:RANGe <Voltage range>
Query	:VOLTage[CH]:RANGe? [CH] ···· 1,2,3,4
Response	<Voltage range> : 15/30/60/150/300/600/1500

Description

Command	Specifies the voltage range. (Unit is [V])
Query	Queries the voltage range. Returns the voltage range as a numerical value.

Example

Command	:VOLT1:RANG 300 Sets the voltage range of channel 1 as 300V.
Query	:VOLT1:RANG?
Response	:VOLTAGE1:RANGE 300 (WHEN HEADER IS ON) 300 (WHEN HEADER IS OFF)

Note

- Do not add a unit to the measurement range.
- Wait until the internal circuit has stabilized after changing a range before reading measurements.
- When the range is specified, the auto range of the specified channel will be OFF.
- By combining measurement lines (for above IP3W), the settings for the voltage ranges of other channels which are combined are also changed.

Set and Query Zero Suppress

Syntax Command :ZEROSP <OFF/0.1%/0.5%>
 Query :ZEROSP?
 Response <OFF/0.1%/0.5%>

Description Command Sets zero suppress.
 Query Returns setting for zero suppress as a character string.

Example Command :ZERO 0.1%
 Set the zero suppress level o 0.1% f.s.
 Query :ZERO?
 Response :ZEROSP 0.1% (WHEN HEADER IS ON)
 0.1% (WHEN HEADER IS OFF)

4. Fundamental Measurement Item Parameters

Contents	Parameter List
Voltage RMS	Urms1/Urms2/Urms3/Urms4/Urms12/Urms34/Urms123
Rectified Voltage Average	Umn1/Umn2/Umn3/Umn4/Umn12/Umn34/Umn123
Voltage AC Component, Fundamental Wave Phase Angle	Uac1/Uac2/Uac3/Uac4/HU1P/HU2P/HU3P/HU4P
Voltage Simple Average, Fundamental Wave Component	Udc1/Udc2/Udc3/Udc4/Ufnd1/Ufnd2/Ufnd3/Ufnd4
Voltage \pm Peak	PUpk1/PUpk2/PUpk3/PUpk4/MUpk1/MUpk2/MUpk3/MUpk4
Voltage Distortion, Voltage Ripple Rate	Uthd1/Uthd2/Uthd3/Uthd4/Urf1/Urf2/Urf3/Urf4
Current RMS	Irms1/Irms2/Irms3/Irms4/Irms12/Irms34/Irms123
Rectified Current Average	Imn1/Imn2/Imn3/Imn4/Imn12/Imn34/Imn123
Current AC Component, Fundamental Wave Phase Angle	Iac1/Iac2/Iac3/Iac4/HI1P/HI2P/HI3P/HI4P
Current Simple Average, Fundamental Wave Component	Idc1/Idc2/Idc3/Idc4/Ifnd1/Ifnd2/Ifnd3/Ifnd4
Current \pm Peak	PIpk1/PIpk2/PIpk3/PIpk4/MIpk1/MIpk2/MIpk3/MIpk4
Current Distortion, Current Ripple Rate	Ithd1/Ithd2/Ithd3/Ithd4/Irf1/Irf2/Irf3/Irf4
Effective power, Reactive power	P1/P2/P3/P4/P12/P34/P123/Q1/Q2/Q3/Q4/Q12/Q34/Q123
Apparent Power	S1/S2/S3/S4/S12/S34/S123
Power factor	PF1/PF2/PF3/PF4/PF12/PF34/PF123
Power phase angle	DEG1/DEG2/DEG3/DEG4/DEG12/DEG34/DEG123
frequency, unbalance factor	FREQ1/FREQ2/FREQ3/FREQ4/UUNB123/IUNB123
Efficiency, Loss	Eff1/Eff2/Eff3/Loss1/Loss2/Loss3
Integ. current in positive/negative direction	PIH1/PIH2/PIH3/PIH4/MIH1/MIH2/MIH3/MIH4
Sum of integ. current	IH1/IH2/IH3/IH4
Energy in positive direction	PWP1/PWP2/PWP3/PWP4/PWP12/PWP34/PWP123
Energy in negative direction	MWP1/MWP2/MWP3/MWP4/MWP12/MWP34/MWP123
Sum of Energy	WP1/WP2/WP3/WP4/WP12/WP34/WP123
(Only during :AOUT:ITEM)	OFF
Motor	ExtA/ExtB/Pm/Slip (Only during motor analysis function)

Output Items of :MEASure? and the order

Output Item		Output Item and the order				
Status		Status				
Elapsed time		Laptime				
Elapsed time in ms		Laptime(ms)				
Voltage	RMS	Urms1 to Urms4	Urms12	Urms34	Urms123	
	Rectified Average	Urn1 to Urn4	Urn12	Urn34	Urn123	
	AC Component	Uac1 to Uac4				
	Simple Average	Udc1 to Udc4				
	Fundamental Wave Component	Ufnd1 to Ufnd4				
	Waveform peak +	PUpk1 to PUpk4				
	Waveform peak -	MUpk1 to MUpk4				
	THD/Ripple Rate	Uthd1 to Uthd4 / Urf1 to Urf4				
	Unbalance factor	Uunb123				
Current	RMS	Irms1 to Irms4	Irms12	Irms34	Irms123	
	Rectified Average	Imn1 to Imn4	Imn12	Imn34	Imn123	
	AC Component	Iac1 to Iac4				
	Simple Average	Idc1 to Idc4				
	Fundamental Wave Component	Ifnd1 to Ifnd4				
	Waveform peak +	PIpk1 to PIpk4				
	Waveform peak -	MIpk1 to MIpk4				
	THD/Ripple Rate	Ithd1 to Ithd4 / Irf1 to Irf4				
	Unbalance factor	Iunb123				
Effective power		P1 to P4	P12	P34	P123	
Apparent Power		S1 to S4	S12	S34	S123	
Reactive power		Q1 to Q4	Q12	Q34	Q123	
Power factor		PF1 to PF4	PF12	PF34	PF123	
Phase angle		DEG1 to DEG4	DEG12	DEG34	DEG123	
frequency		FREQ1 to FREQ4				
Integra tion	Integ. current in positive direction	PIH1 to PIH4				
	Integ. current in negative direction	MIH1 to MIH4				
	Sum of integ. current	IH1 to IH4				
	Energy in positive direction	PWP1 to PWP4	PWP12	PWP34	PWP123	
	Energy in negative direction	MWP1 to MWP4	MWP12	MWP34	MWP123	
	Sum of Energy	WP1 to WP4	WP12	WP34	WP123	
Efficiency		Eff1 to Eff3				
Loss		Loss1 to Loss3				
Motor		ExtA	ExtB	Pm	Slip	

Output Items of :MEASure:HARMonic? and the order

Harmonic Measurement Items						
Status		Status				
frequency		HFREQ				
Level	Voltage 0th	HU1L000 to HU4L000				
	Current 0th	HI1L000 to HI4L000				
	Power 0th	HP1L000 to HP4L000	HP12L000	HP34L000	HP123L000	
Content	Voltage 0th	HU1D000 to HU4D000				
	Current 0th	HI1D000 to HI4D000				
	Power 0th	HP1D000 to HP4D000	HP12D000	HP34D000	HP123D000	
Phase angle	Voltage 0th	HU1P000 to HU4P000				
	Current 0th	HI1P000 to HI4P000				
	Power 0th	HP1P000 to HP4P000	HP12P000	HP34P000	HP123P000	
•••	n th	Last 3 digits are n				
Level	Voltage 100th	HU1L100 to HU4L100				
	Current 100th	HI1L100 to HI4L100				
	Power 100th	HP1L100 to HP4L100	HP12L100	HP34L100	HP123L100	
Content	Voltage 100th	HU1D100 to HU4D100				
	Current 100th	HI1D100 to HI4D100				
	Power 100th	HP1D100 to HP4D100	HP12D100	HP34D100	HP123D100	
Phase angle	Voltage 100th	HU1P100 to HU4P100				
	Current 100th	HI1P100 to HI4P100				
	Power 100th	HP1P100 to HP4P100	HP12P100	HP34P100	HP123P100	

Noise Measurement Items						
Noise	Voltage	UNf01	UN01	to	UNf10	UN10
	Current	INf01	IN01	to	INf10	IN10

About Status data

The status information shows the measurement status when the measurement data is being saved, and is shown as a hexadecimal of 32bit.

Contents of the individual bits in the 32bit are shown below.

bit 31	bit 30	bit 29	bit 28	bit 27	bit 26	bit 25	bit 24
HM4	HM3	HM2	HM1	MRB	MRA	MPB	MPA
bit 23	bit 22	bit 21	bit 20	bit 19	bit 18	bit 17	bit 16
ULM	UDP	UCU	HUL	UL4	UL3	UL2	UL1
bit 15	bit 14	bit 13	bit 12	bit 11	bit 10	bit 9	bit 8
RI4	RI3	RI2	RI1	RU4	RU3	RU2	RU1
bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
PI4	PI3	PI2	PI1	PU4	PU3	PU2	PU1

HMx : Harmonic parameter invalid (when the Harmonic synchronization is off, etc.)

MRx : Motor analysis function A, B range over

MPx : Motor analysis function A, B peak over

ULM : Motor analysis function A, B synchronization unlock

UDP : Undisplayable (when the measurement data becomes significantly invalid immediately after a range change, etc.)

UCU : Uncalculable (when the measurement data becomes invalid immediately after a range change, etc.)

HUL : Harmonic synchronization unlock

ULx : Respective channels synchronization unlock

Rlx : Respective channels current range over

RUx : Respective channels voltage range over

Plx : Respective channels current peak over

PUx : Respective channels voltage peak over

(x is the channel number)

5. Troubleshooting

Please refer to the following contents for any operation that is not processed properly.

Symptoms	Causes	Solutions
Cannot communicate at all	Is the LAN cable connected correctly?	When using a HUB to connect the main instrument and the computer, use a straight cable. When connecting the main instrument and the computer as 1:1, either attach a cross conversion connector to the straight cable or use a cross cable to connect.
	Is the Interface setting correct?	Confirm the settings for the IP address, subnet mask and default gateway of the main instrument.
	Is the IPAddress the same as other instruments?	Confirm the IPAddress setting of the main and other instruments.
	Is the TCP/IP port number correct?	Specify the correct port number.
Cannot communicate well	Is the message terminator (delimiter) correct?	Insert CR+LF to divide each message that is forwarded.
Command not executed	Is there any error?	Use *ESR? and look at the contents of the standard event status register to confirm the error.
	Can the command be operated?	Many commands for settings cannot be executed during hold or integration operation.
No response at all to the queries sent	Is the response acquired correctly?	Read after sending every query. To read all at once, use a message separator and describe the Query in one line.

- Please visit our website at www.hioki.com for the following:
 - Regional contact information
 - The latest revisions of instruction manuals and manuals in other languages.
 - Declarations of Conformity for instruments that comply with CE mark requirements.
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