Introduction

The PCR-M series Communication Interface Manual explains the settings and commands for remotely controlling the PCR series using the communication interface.

- ･RS232C interface (standard equipped)
- ･GPIB interface (optional)
- ･USB interface (optional)

When the PCR-M series is operating under remote control, the REMOTE LED on the display on the front panel lights. To switch from remote mode to local mode (panel operation) from the panel, press LOCAL.

Reading environment

This manual is in HTML format and PDF format. The manual can be viewed by the following environment.

OS： Windows 7 or later

Browser: Microsoft Internet Explorer 9.0 or later

PDF Reader: Adobe Reader 9.2 or later

Related manuals

For the safety precautions, installation, operation, and specifications of the PCR, read the accompanying PCR-M series User's Manual.

Intended readers

This manual is written for readers with sufficient basic knowledge of how to control instruments using a personal computer.

Familiarize yourself with the syntax of the SCPI commands that are used with the product before you use them.

Structure of the manual

This manual consists of the following sections.

- ･ Overview
- ･ Setup
- ･ Overview of messages
- ･ Command (list*1)
- ･ Appendix
- ･ Tutorial

*1. The list of command is provided in a PDF file.

Trademarks

Firmware version of the product to which this manual applies

This manual applies to products with the following firmware version:

Ver.1.3x

Instrument Interface Standards

The PCR conforms to the following standards.

•IEEE Std 488.2-1992 IEEE Standard Codes, Formats, Protocols, and Common Commands For Use With IEEE Std 488.1-1987

•IEEE Std 488.1-1987 IEEE Standard Digital Interface for Programmable Instrumentation

•Standard Commands for Programmable Instruments (SCPI) version 1999.0

•Universal Serial Bus Specification Rev 2.0

•Universal Serial Bus Test and Measurement Class Specification (USBTMC) Rev 1.0

•Universal Serial Bus Test and Measurement Class, Subclass USB488 Specification (USBTMC-USB488) Rev 1.0

•TCP/IP Instrument Protocol Specification VXI-11

•IVI-6.1 IVI High-Speed LAN Instrument Protocol (HiSLIP) Rev 1.0

•LXI Standard 1.3

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Overview of Command

The information that is exchanged between the controller (computer) and the device (PCR-M series) is called a message.

The PCR uses the SCPI language for the messages.

There are two types of messages, commands that are sent from the computer to the PCR and responses that are sent from the PCR to the computer.

Command Hierarchy

SCPI commands are ASCII-based commands designed for test and measurement devices. The command hierarchy is structured around the common root or node, which is the construction block of the SCPI subsystem. A command consists of a program header, parameters, and punctuation.

The hierarchy is explained using the SOURce subsystem as an example.

Program header	Parameter	Hierarchy of node
SOUR:		Root node
FREQ		Second level
:LIM		Third level
:UPP	<numeric>	Fourth level
:LOW	<bool>	Fourth level
VOLT		Second level
:RANGE		Third level
:UPP	<numeric>	Fourth level
:AUTO	<bool>	Fourth level

A higher node is separated from a lower node using a colon (:).

Command Syntax

This manual denotes SCPI commands using the following format.

```
MEASure[:SCALar]:CURRent:DC? {<numeric>|MINimum|MAXimum}
```

SCPI commands can be issued using the short form. The short form of a SCPI command is the section of the command written in uppercase.

SCPI commands can be sent in the long form or short form. Since SCPI commands are not case-sensitive, CURR, Curr, and curr are all accepted as the short form of CURRent. In the long form, CURRENT, Current, and current are all acceptable.

- A space is required between the program header section and the parameter section.
- Multiple parameters, when available, are concatenated using commas.
- Commands are concatenated using semicolons (compound command).

```
TRIGger:SEQuence2:SOURce PHASe;PHASe 270
```

In the second command, TRIGger:SEQuence2 is omitted. This is because the path is set to TRIGger:SEQuence2 by the first command TRIGger:SEQuence2:SOURce PHASe.

This compound command is the same as entering the following commands.

```
TRIGger:SEQuence2:SOURce PHASe
```

```
TRIGger:SEQuence2:PHASe 270
```

An error occurs if a node that is not defined in the current path is designated.

Commands of different subsystems can be concatenated using a colon and a semicolon together.

```
SOURce:CURRent MINimum;:MEASure:CURRent:AC?
```

This compound command contains two root nodes, SOURce and MEASure.

When the second or subsequent command starts with a colon, the path specified by the previous command is cleared.

- The maximum number of characters that can be transmitted in a single line is 128.

Special symbols

Special symbols used in this manual to describe SCPI commands are defined below.

·Characters and numbers delimited by "|" in {} braces indicate that one of the items is to be selected.

Do not include the {} braces in the actual program.

·The characters <> indicate program data.

Do not write <> in the actual program.

·Brackets [] indicate option data.

When option data is not sent with the program, the default value is applied.
Do not write [] in the actual program.

Queries

The device settings or status can be queried.

To make a query, add a question mark at the end of the program header section.

If a query has parameters, enter a space after the question mark followed by the parameters.

```
CURRent? MIN
```

Response

A response returned as an answer to a query. It is a message that is always sent from the device to the computer. The status of the device or measured values are transmitted to the computer.

NOTE

When transmitting two queries in separate lines, read the response to the first query before transmitting the second line.

Program Terminator

All commands must be terminated using a valid terminator.

	RS232C	GPIB	USB
during reception	LF	LF or EOI	LF or EOM
during transmission	CR + LF	LF + EOI	LF + EOM

When a command string is terminated, the path is reset to the root level.

NOTE

CR (ASCII 0x0D) is not a terminator.

Common commands

The IEEE-488.2 and SCPI standards contain a set of common commands for reset, self-test, and other functions. These common commands always start with an asterisk. The commands may have one or multiple parameters.

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Installing the VISA Library

VISA (Virtual Instrument Software Architecture) is a specification for standard software that is used to connect instruments. VISA was defined by the IVI Foundation.

A VISA library is required to use the software application. The VISA library (NI-VISA, Agilent VISA, or KI-VISA) must be installed on the controller (Windows).

One of the VISA libraries (driver software implemented in compliance with the VISA specifications) below is necessary.

- NI-VISA by National Instruments (Ver. 5.1.1 or later)
- Agilent VISA by Agilent Technologies (Agilent IO Libraries Suite16.0 or later)
- KI-VISA Ver. 5.0.4 or later

NOTE

If your VISA library is an older version than that specified, you may not be able to use it depending on the interface.

Installing KI-VISA

NOTE

Do not install multiple VISA libraries on the same PC. Doing so may cause errors.
KI-VISA is not required if NI-VISA or Agilent VISA is already installed.

KI-VISA is Kikusui's original VISA library that supports the VXIplug&play VISA specifications.

The newest version can be downloaded from the Kikusui website (http://www.kikusui.co.jp/en/download/).

1. Load the accompanying CD-ROM into the CD-ROM drive.
2. Move to the VISA folder using the menu program of the CD-ROM or Explorer.
3. Double-click Kivisa_x_x_x.exe.
   The value for x varies depending on the revision of the VISA library stored on the CD-ROM.
4. Proceed with the installation according to the instructions on the screen.

Interface Setup

The PCR is equipped with RS232C interface as standard. If option interface boards are installed, you can use the GPIB, and USB interfaces.

expanded function

By installing optional interface boards in the PCR-M series, you can expand its functions.

AC+DC mode, which enables you to superimposed an AC voltage with DC and generate the output, becomes selectable.

EXT-AC mode and EXT-DC mode, which enable you to control the output with an external analog signal, become selectable. (This is only available with the EX04-PCR-M analog interface board.)

The number of entries that you can store in memory increases from 3 to 10.

Setup

In the factory default settings, the remote control interface is set to the RS232C interface. The GPIB, RS232C, and USB interfaces cannot be used simultaneously.

- RS232C
- GPIB
- USB

Parameters

The parameter format of SCPI is derived from the program parameter format defined in IEEE 488.2.

The representation system of the program data that is used on the PCR is indicated below.

Non-numeric parameters

Character string data (String)

Used when a series of ASCII characters are requested.

Be sure to enclose a string in single or double quotation marks. The start and end quotation marks must match.

```
DISPlay:AMMeter "AVG"
```

If you wish to use a quotation mark as a part of the string, enter two quotation marks consecutively (with no characters in between).

Character data (Character)

Character data is used when only a limited number of values are available for the program setting. Responses are returned in the short form.

```
TRIGger:SOURce {BUS|IMMediate}
```

Boolean data （Boolean）

Boolean data expresses a 1 or 0 condition or an ON or OFF condition. Responses are returned as 1 or 0.

```
OUTPut {ON|OFF|1|0}
```

Numeric parameters

NR1

Represents an integer.

Details are given in the IEEE 488.2 Standard Digital Interface for Programmable Instrumentation.

NR2

Represents a real number (floating point).

Details are given in the IEEE 488.2 Standard Digital Interface for Programmable Instrumentation.

NR3

Represents a real number (exponential).

Details are given in the IEEE 488.2 Standard Digital Interface for Programmable Instrumentation.

The value +3.80000E+02 is returned for the response data 380. The number of digits to the right of the decimal is 5.

NRf

NRf is a generic term that includes NR1, NR2, and NR3.

Numeric

A numeric parameter such as a decimal point, optional prefix, or measurement unit.

The syntax as a numeric representation is the same as NRf.

MINimum and MAXimum are available as substitutes for declaring certain values.

Units such as V, A, and W can also be used in a numeric parameter.

If a value that cannot be assigned is entered, the device rounds the value to the closest possible value.

```
SOURce:FREQuency 1100
```

PCR-M: The range of values for frequency is 40 to 500. Thus, 500 is set even if 1100 is specified.

PCR-LE/PCR-LE2: The range of values for frequency is 1 to 999.9. Thus, 999.9 is set even if 1100 is specified.

Special form numeric parameters

The special form numeric parameters MINimum, MAXimum and DEFault can be used as substitutes for limit values when the parameter is numeric.

In the example below, the current limit is set to the minimum value.

```
SOURce:CURRent MINimum
```

Queries can be used to inquire the minimum and maximum values for most parameters.

```
SOURce:CURRent? MAX
```

```
SOURce:CURRent? MIN
```

Measurement units

Below are the default measurement units. Commands are accepted even if measurement units are not specified.

·V（voltage） ·A（current） ·W (wattage) ·VA (apparent power)
·VAR (reactive power) ·DEG (degrees) ·HZ (frequency)

The following optional prefixes are supported. If you use optional prefixes, specify the measurement unit.

·M （milli） ·K （kilo） ·U （micro）

NOTE

· The unit symbols in the International System of Units (SI) contain lowercase characters. The IEEE standard uses uppercase characters. SCPI commands are not case-sensitive.

· Commands are accepted even if a measurement unit is not specified.

· To enter "μ" in the data, use "U" instead.

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Default Settings

Conditions after sending a *RST, fctory shipment, and at power-on

The following table shows how the PCR-M is set when the *RST command is executed, at the time of factory shipment, and when the power is turned on.

Setup item	Setting				Unit
	*RST	*RCL	Factory default	At power-on	
OUTP:COUP	AC	Depends on the settings in the memory	AC	Setting immediately before turning the POWER switch off	--
VOLT:RANG	135		135		--
VOLT:RANGE:AUTO	0/OFF		0/OFF		--
VOLT	0		0		V
VOLT:OFFS	0		0		V
FREQ	60		60		HZ
OUTP	0/OFF	No change	0/OFF	0/OFF	--
CURR	PCR500M:5.25 PCR1000M:10.5 PCR2000M:21.0 PCR4000M:42.0	Depends on the settings in the memory	PCR500M:5.25 PCR1000M:10.5 PCR2000M:21.0 PCR4000M:42.0	Setting immediately before turning the POWER switch off	A
CURR:OFFS	PCR500M:4.2 PCR1000M:8.4 PCR2000M:16.8 PCR4000M:33.6		PCR500M:4.2 PCR1000M:8.4 PCR2000M:16.8 PCR4000M:33.6		A
CURR:PROT:STAT	1/ON		1/ON		--
FREQ:LIM	500		500		HZ
FREQ:LIM:LOW	40		40		HZ
VOLT:LIM	275.0		275.0		V
VOLT:LIM:LOW	0		0		V
VOLT:OFFS:LIM	388.0		388.0		V
VOLT:OFFS:LIM:LOW	0		0		V
TRIG:SOUR	BUS	BUS	BUS	BUS	--
FREQ:MODE	FIX	FIX	FIX	FIX	--
VOLT:MODE					--
VOLT:OFFS:MODE					--
FREQ:TRIG	60	Depends on the settings in the memory	60	Setting immediately before turning the POWER switch off	HZ
VOLT:TRIG	0		0		V
VOLT:OFFS:TRIG	0		0		V
TRIG:SEQ2:SOUR TRIG:SYNC:SOUR	No change	No change	IMM		--
TRIG:SEQ2:PHAS TRIG:SYNC:PHAS	No change	No change	0		DEG
TRIG:SEQ3:SOUR TRIG:ACQ:SOUR	IMM	IMM	IMM	IMM	--
INIT:CONT:SEQ1 INIT:CONT:SEQ3 INIT:CONT:NAME TRAN INIT:CONT:NAME	0/OFF	0/OFF	0/OFF	0/OFF	--

ACQ					
DISP:AMM	RMS	Depends on the settings in the memory	RMS	Setting immediately before turning the POWER switch off	--
SYST:KLOC	No change	No change	0/OFF		--
SYST:CONF:BACK			1/ON	1/ON	--
SYST:CONF:TRAC			0/OFF	Setting immediately before turning the POWER switch off	--
SENS:AVER			0/OFF		--
SENS:HOLD			SHOR		--

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Command (Function/ Subsystem)

IEEE488.2 Common Commands

*CLS	Clears all the event registers
*ESE	Sets the event status enable register bits
*ESR	Queries the event status register
*IDN	Queries the identification string (manufacturer information)
*OPC	Causes the device to generate the operation complete message in the event status register when all pending selected device operations have been finished
*OPT	Queries the hardware interface board that is installed
*PSC	Initializes *ESE and *SRE
*RCL	Recalls the contents saved to memory
*RST	Performs a device reset; configures the PCR to a known condition independent from the usage history of the device
*SAV	Saves the current settings to memory
*SRE	Sets the service request enable register bits
*STB	Reads the status byte and master summary status bits
*TRG	Trigger command
*TST	Executes a self-test
*WAI	Prevents the device from executing subsequent commands or queries until the No Operation Pending flag becomes true

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Command (Function)

Output Settings

Setting the Output

OUTP:COUP	Sets the output mode

Output on/off

OUTP	Output on/off

Setting the voltage

VOLT:RANG	Sets the voltage range
VOLT:RANG:AUTO	Sets the auto voltage range function
VOLT	Sets the AC voltage
VOLT:OFFS	Sets the DC voltage

Setting the frequency

FREQ	Sets the frequency

Command (Function)

Protection and Clearing Alarms

Setting frequency limits

FREQ:LIM	Sets the frequency upper limit
FREQ:LIM:LOW	Sets the frequency lower limit

Setting current limits

CURR	Sets the AC current upper limit
CURR:OFFS	Sets the DC current upper limit
CURR:PROT:STAT	Action that is performed when the current limit is exceeded

Setting voltage limits

VOLT:LIM	Sets the AC voltage upper limit
VOLT:LIM:LOW	Sets the AC voltage lower limit
VOLT:OFFS:LIM	Sets the DC voltage upper limit
VOLT:OFFS:LIM:LOW	Sets the DC voltage lower limit

Clearing alarms

OUTP:PROT:CLE	Clears alarms

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Command (Function)

Triggered Control of Output

The second level nodes are SEQuence[1] and TRANsient. Regardless of which node you use, the PCR operates in the same way when it receives the commands.

-> Tutorial

VOLT:TRIG	Sets the AC voltage that will be set when a trigger is received
VOLT:MODE	Sets the trigger function control of the AC voltage setting
VOLT:OFFS:TRIG	Sets the DC voltage that will be set when a trigger is received
VOLT:OFFS:MODE	Sets the trigger function control of the DC voltage setting
FREQ:TRIG	Sets the frequency that will be set when a trigger is received
FREQ:MODE	Sets the trigger function control of the frequency setting
TRIG:SOUR	Sets the trigger source of the sequence 1 group
INIT	Starts the trigger function of the sequence 1 group
INIT:NAME	Starts the trigger function of the specified sequence group
TRIG	Sequence 1 group software trigger
INIT:CONT:SEQ1	Sets the auto continue mode of the sequence 1 group
INIT:CONT:NAME	Sets the auto continue mode of the specified sequence group
ABOR	Aborts the trigger function

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Command (Function)

Output On/Off Phase Control

The PCR-M only has output on phase control. It does not have output off phase control.

The second level nodes are SEQuence2 and SYNChronize. Regardless of which node you use, the PCR operates in the same way when it receives the commands.

The PCR-M's sequence 2 group phase is controlled by the output being turned on, not by software triggers. To stop phase control, send the TRIG:SEQ2:SOUR IMM or TRIG:SYNC:SOUR IMM command.

-> Tutorial

TRIG:SEQ2:SOUR TRIG:SYNC:SOUR	Sets the output on phase control
TRIG:SEQ2:PHAS TRIG:SYNC:PHAS	Sets the phase angle of output on phase control
ABOR	Aborts the trigger function

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Command (Function)

Measured Value Queries

The second level nodes are SEQuence3 and ACQuire. Regardless of which node you use, the PCR operates in the same way when it receives the commands.

If you use the root node MEASure, the measurement is performed, and then the measured value is queried. If you use FETC, the measured value is queried without a measurement being performed.

-> Tutorial

TRIG:SEQ3:SOUR TRIG:ACQ:SOUR	Sets the trigger source of the sequence 3 group
INIT:SEQ3	Starts the trigger function of the sequence 3 group
INIT:NAME	Starts the trigger function of the specified sequence group
TRIG:SEQ3 TRIG:ACQ	Sequence 3 group software trigger
INIT:CONT:SEQ3 INIT:CONT:NAME	Sets the auto continue mode
SENS:AVER	Sets the averaging period of measured values
ABOR	Aborts the trigger function
MEAS:CURR:DC FETC:CURR:DC	Queries the DC current
MEAS:CURR:AC FETC:CURR:AC	Queries the AC current
MEAS:CURR:AMP:MAX FETC:CURR:AMP:MAX	Queries the peak current
SENS:HOLD	Sets the hold time of the peak current
MEAS:CURR:AMP:MAX:HOLD FETC:CURR:AMP:MAX:HOLD	Queries the peak current (the held value)
SENS:CURR:PEAK:CLE	Clears the held measured peak current
MEAS:FREQ FETC:FREQ	Queries the frequency
MEAS:POW:AC FETC:POW:AC	Queries the AC power (the actual power)
MEAS:POW:AC:APP FETC:POW:AC:APP	Queries the AC power (the apparent power)
MEAS:POW:AC:REAC FETC:POW:AC:REAC	Queries the AC power (the reactive power)
MEAS:POW:AC:PFAC FETC:POW:AC:PFAC	Queries the power factor of the AC power
MEAS:POW:DC FETC:POW:DC	Queries the DC power
MEAS:VOLT:DC FETC:VOLT:DC	Queries the DC voltage
MEAS:VOLT:AC FETC:VOLT:AC	Queries the AC voltage

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Command (Function)

System Configuration

SYST:ERR	Reads error information
SYST:CONF:BACK	Configures the auto save function of the panel settings and the configuration settings
SYST:CONF:TRAC	Sets the communication error display
SYST:KLOC	Locks panel controls
SYST:LOC	Switches the PCR to local mode
SYST:OPT	Queries the optional interface
DISP:AMM	Sets the measured value display
SYST:REM	Switches the PCR to remote mode; locks panel controls (except the local key)
SYST:RWL	Switches the PCR to remote mode; locks panel controls
SYST:VERS	Queries the SCPI specification version that the PCR complies with

Command (Function)

Registers

Status byte register

Event status register

OPERations status register

STAT:OPER	Event
STAT:OPER:COND	Register status
STAT:OPER:ENAB	Enable
STAT:OPER:NTR	Negative transition
STAT:OPER:PTR	Positive transition

QUEStionable status register

STAT:QUES	Event
STAT:QUES:COND	Register status
STAT:QUES:ENAB	Enable
STAT:QUES:NTR	Negative transition
STAT:QUES:PTR	Positive transition

Preset status

STAT:PRES	Resets the enable register

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ABOR

Aborts operations such as setting, change, and measurement in all sequence groups.

The trigger status immediately after the power is turned on is the same as the trigger status when the ABOR command is received. If the ABOR command is sent when the measurement is already started, the measured data of the sequence 3 group remains invalid.

If the ABOR command is sent when the sequence 3 group is not initiated and the measured data that is held is valid, the measured data is not discarded.

A specific sequence group cannot be specified with the ABOR command. It is always interpreted as ALL.

Command

```
ABORt
```

C

DISP:AMM (PCR-M series only)

Sets the measured value displayed on the lower numeric display.

Command

```
DISPlay:AMMeter "{RMS|AVG|PEAK|WATTage}"

DISPlay:AMMeter?
```

Parameter

Value	"RMS"	Current (default)
	"AVG"	Moving average of the current
	"PEAK"	Peak current
	"WATT"	Wattage

For the setting that is applied when *RST is sent, see this table

Response

Response

Returns the lower meter display value in string format in response to DISP:AMM?.

F

I

M

O

S

T

V

*

Command (Subsystem)

SOURce subsystem

CURR	Sets the AC current upper limit
CURR:OFFS	Sets the DC current upper limit
CURR:PROT:STAT	Action that is performed when the current limit is exceeded
FREQ	Sets the frequency
FREQ:LIM	Sets the frequency upper limit
FREQ:LIM:LOW	Sets the frequency lower limit
FREQ:MODE	Sets the trigger function control of the frequency setting
FREQ:TRIG	Sets the frequency that will be set when a trigger is received
VOLT	Sets the AC voltage
VOLT:LIM	Sets the AC voltage upper limit
VOLT:LIM:LOW	Sets the AC voltage lower limit
VOLT:MODE	Sets the trigger function control of the AC voltage setting
VOLT:OFFS	Sets the DC voltage
VOLT:OFFS:LIM	Sets the DC voltage upper limit
VOLT:OFFS:LIM:LOW	Sets the DC voltage lower limit
VOLT:OFFS:MODE	Sets the trigger function control of the DC voltage setting
VOLT:OFFS:TRIG	Sets the DC voltage that will be set when a trigger is received
VOLT:RANG	Sets the voltage range
VOLT:RANG:AUTO	Sets the auto voltage range function
VOLT:TRIG	Sets the AC voltage that will be set when a trigger is received

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Command (Subsystem)

OUTPut subsystem

OUTP	Turns output on and off
OUTP:COUP	Sets the output mode
OUTP:PROT:CLE	Clears alarms

Command (Subsystem)

MEASure and FETCh subsystem

MEAS:CURR:DC FETC:CURR:DC	Queries the DC current
MEAS:CURR:AC FETC:CURR:AC	Queries the AC current
MEAS:CURR:AMPL:MAX FETC:CURR:AMPL:MAX	Queries the peak current
MEAS:CURR:AMPL:MAX:HOLD FETC:CURR:AMPL:MAX:HOLD	Queries the peak current (the held value)
MEAS:FREQ FETC:FREQ	Queries the frequency
MEAS:POW:DC FETC:POW:DC	Queries the DC power
MEAS:POW:AC FETC:POW:AC	Queries the AC power
MEAS:POW:AC:APP FETC:POW:AC:APP	Queries the AC power (the apparent power)
MEAS:POW:AC:REAC FETC:POW:AC:REAC	Queries the AC power (the reactive power)
MEAS:POW:AC:PFAC FETC:POW:AC:PFAC	Queries the power factor of the AC power
MEAS:VOLT:DC FETC:VOLT:DC	Queries the DC voltage
MEAS:VOLT:AC FETC:VOLT:AC	Queries the AC voltage

Command (Subsystem)

TRIGger subsystem

ABOR	Aborts the trigger function
INIT	Starts the trigger function of the sequence 1 group
INIT:CONT:NAME	Sets the auto continue mode of the specified sequence group
INIT:CONT:SEQ1	Sets the auto continue mode of the sequence 1 group
INIT:CONT:SEQ3	Sets the auto continue mode of the sequence 3 group
INIT:NAME	Starts the trigger function of the specified sequence group
INIT:SEQ3	Starts the trigger function of the sequence 3 group
TRIG	Sequence 1 group software trigger
TRIG:ACQ	Sequence 3 group software trigger
TRIG:ACQ:SOUR	Sets the trigger source of the sequence 3 group
TRIG:SEQ2:PHAS	Sets the phase angle of output on phase control
TRIG:SEQ2:SOUR	Sets the output on phase control
TRIG:SEQ3	Sequence 3 group software trigger
TRIG:SEQ3:SOUR	Sets the trigger source of the sequence 3 group
TRIG:SOUR	Sets the trigger source of the sequence 1 group
TRIG:SYNC:SOUR	Sets the output on phase control
TRIG:SYNC:PHAS	Sets the phase angle of output on phase control

Command (Subsystem)

SYSTem subsystem

SYST:CONF:BACK	Configures the auto save function of the panel settings and the configuration settings
SYST:CONF:TRAC	Sets the communication error display
SYST:ERR	Reads error information
SYST:KLOC	Locks panel controls
SYST:LOC	Switches the PCR to local mode
SYST:OPT	Queries the optional interface
SYST:REM	Switches the PCR to remote mode; locks panel controls (except the local key)
SYST:RWL	Switches the PCR to remote mode; locks panel controls
SYST:VERS	Queries the SCPI specification version that the PCR complies with

Command (Subsystem)

STATus subsystem

STATus:OPERation	OPERation status register: Event
STATus:OPERation:CONDition	OPERation status register: Register status
STATus:OPERation:ENABle	OPERation status register: Enable
STATus:OPERation:PTRansition	OPERation status register: Negative transition
STATus:OPERation:NTRansition	OPERation status register: Positive transition
STATus:QUESionable	QUEStionable status register: Event
STATus:QUESionable:CONDition	QUEStionable status register: Register status
STATus:QUESionable:ENABle	QUEStionable status register: Enable
STATus:QUESionable:PTRansition	QUEStionable status register: Negative transition
STATus:QUESionable:NTRansition	QUEStionable status register: Positive transition
STATus:PRESet	Resets the enable register

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Command (Subsystem)

SENSe subsystem

SENS:HOLD	Sets the hold time of the peak current
SENS:CURR:PEAK:CLE	Clears the held measured peak current
SENS:AVER	Sets the averaging period of measured values

DISPlay subsystem

DISP:AMM	Sets the measured value display

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List of Messages

SCPI command: Command name in the short form.

*RST: “Yes” for commands that are affected by *RST.

R/W: “R” for query commands and “W” for set commands.

M/LE: “M” for PCR-M commands and “LE” for PCR-LE/PCR-LE2 commands.

SOURce subsystem

SCPI command		Response	*RST	Description	R/W	M/LE
Program header	Parameter					
[SOUR:]						
CURR[:LEV][:IMM][:AMP]	numeric	NR3	Yes	AC current upper limit	R/W	M/LE
CURR:OFFS[:IMM]	numeric	NR3	Yes	DC current upper limit	R/W	M/LE
CURR:PEAK[:UPP][:IMM]	numeric	NR3	Yes	Sets the peak limit of the positive electric potential	R/W	LE
CURR:PEAK:LOW[:IMM]	numeric	NR3	Yes	Sets the peak limit of the negative electric potential	R/W	LE
CURR:PROT:OCP2:TIME	numeric	NR3	Yes	Sets the time that must elapse after the internal semiconductor protection is activated before an alarm is generated	R/W	LE
CURR:PROT:STATe	bool	NR1	Yes	Action that is performed when the current limit is exceeded	R/W	M/LE
CURR:PROT:TRIP:TIME	numeric	NR3	Yes	Time until the protection function trips when the current limit is exceeded	R/W	LE
FREQ[:CC|IMM]	numeric	NR3	Yes	Frequency	R/W	M/LE
FREQ:LIM[:UPP]	numeric	NR3	Yes	Frequency upper limit	R/W	M/LE
FREQ:LIM:LOW	numeric	NR3	Yes	Frequency lower limit	R/W	M/LE
FREQ:MODE	FIX|STEP	char	Yes	Trigger function control of the frequency setting	R/W	M/LE
FREQ:SYNC[:STAT]	bool	NR1	Yes	Turns the synchronization function on and off	R/W	LE
FREQ:SYNC:PHASE:DEL	numeric	NR3	Yes	Synchronization delay phase angle	R/W	LE
FREQ:TRIG	numeric	NR3	Yes	Frequency that will be set when a trigger is received	R/W	M/LE
FUNC:SOUR	INT|EXT|SUM	char	Yes	Sets signal source	R/W	LE
VOLT[:LEV][:IMM][:AMPL]	numeric	NR3	Yes	AC voltage	R/W	M/LE
VOLT:EXT:SOUR	NONE|VOLT	char	Yes	Sets the signal source	R/W	LE
VOLT:LIM[:UPP]	numeric	NR3	Yes	AC voltage upper limit	R/W	M/LE
VOLT:LINE	numeric	NR3	Yes	AC Line voltage	R/W	LE[1]
VOLT[:LEV]:LIM:LOW	numeric	NR3	Yes	AC voltage lower limit	R/W	M/LE
VOLT:MODE	FIX|STEP	char	Yes	Trigger function control of the AC voltage setting	R/W	M/LE
VOLT:OFFS[:IMM]	numeric	NR3	Yes	DC voltage	R/W	M/LE
VOLT:OFFS:LIM[:UPP]	numeric	NR3	Yes	DC voltage upper limit	R/W	M/LE
VOLT:OFFS:LIM:LOW	numeric	NR3	Yes	DC voltage lower limit	R/W	M/LE
VOLT:OFFS:LINE	numeric	NR3	Yes	DC line voltage	R/W	LE[2]
VOLT:OFFS:MODE	FIX|STEP	char	Yes	Trigger function control of the DC voltage setting	R/W	M/LE
VOLT:OFFS:PROT:LEV[:UPP]	numeric	NR3	Yes	OVP value in DC mode and AC+DC mode	R/W	LE
VOLT:OFFS:PROT:LEV:LOW	numeric	NR3	Yes	UVP value in DC mode and AC+DC mode	R/W	LE
VOLT:OFFS:TRIG	numeric	NR3	Yes	DC voltage that will be set when a trigger is received	R/W	M/LE
VOLT:PROT:LEV[:UPP]	numeric	NR3	Yes	OVP value in AC mode	R/W	LE
VOLT:PROT:LEV:LOW	numeric	NR3	Yes	UVP value in AC mode	R/W	LE
VOLT:RANG[:UPP]	numeric	NR3	Yes	Voltage range	R/W	M/LE
VOLT:RANG:AUTO	bool	NR1	Yes	Auto voltage range function	R/W	M
VOLT[:LEV]:TRIG[:AMPL]	numeric	NR3	Yes	AC voltage that will be set when a trigger is received	R/W	M/LE
VOLT:VCC[:LEV]	numeric	NR3	Yes	Internal Vcc voltage	R/W	LE
VOLT:VCC:MODE	AUTO|MAN	char	Yes	Vcc operating condition	R/W	LE
WAVE:BANK[:SEL]	NR1	NR1	Yes	Number of the waveform bank to execute	R/W	LE
WAVE:BANK:MODE	FIX|STEP	char	Yes	Trigger function control of the number of the waveform bank	R/W	LE
WAVE:BANK:TRIG	numeric	NR3	Yes	The number of the waveform bank that will be set when a trigger is received	R/W	LE
WAVE:BANK:TYPE?	NR1	char	Yes	Type of waveform to output	R	LE
WAVE:EDIT:PCL	NR1			Sets the crest factor of the special waveform	R/W	LE
	numeric	NR3				
WAVE:EDIT:SIN	NR1			Sets the special waveform to the sine wave	W	LE
WAVE[0]:EDIT:USER:DATA:POIN	NR1			Sets a user-defined waveform	R/W	LE
	NR1					
	NR1	NR1				

1 Single-phase three-wire output or three-phase output only
2 Single-phase three-wire output only

OUTPut subsystem

SCPI command		Response	*RST	Description	R/W	M/LE
Program header	Parameter					
OUTP						
[:STAT]	bool	NR1	Yes	Output on/off	R/W	M/LE
:COUP	AC|DC|ACDC|EAC|EDC	char	Yes	Output mode	R/W	M/LE
:EXT:LOG	DIS|LOW|HIGH	char		Sets the logic of the output on/off	R/W	LE
:IMP[:STAT]	bool	NR1	Yes	Output impedance control	R/W	LE
:IMP:LEV	numeric	NR3	Yes	Sets the output impedance in terms of resistance	R/W	LE
:IMP:RAT	numeric	NR3	Yes	Sets the output impedance in terms of percentage	R/W	LE
:SST[:STAT]	bool	NR1	Yes	Soft start control	R/W	LE
:SST:TIME[:RISE]	numeric	NR1	Yes	Rise time	R/W	LE
:PHAS:ON[:STAT]	bool	NR1	Yes	Turns output on phase control on and off	R/W	LE
:PHAS:ON:LEV	numeric	NR3	Yes	Output on phase angle	R/W	LE
:PHAS:OFF[:STAT]	bool	NR1	Yes	Turns output off phase control on and off	R/W	LE
:PHAS:OFF:LEV	numeric	NR3	Yes	Output off phase angle	R/W	LE
:PROT:CLE				Alarm clearing	W	M/LE

MEASure/ FETCh subsystem

SCPI command		Response	*RST	Description	R/W	M/LE
Program header	Parameter					
MEAS[:SCAL]:|FETC[:SCAL]:						
CURR:DC				Queries the DC current	R	M/LE
CURR:AC				Queries the AC current	R	M/LE
CURR:AMPL:MAX				Queries the current peak	R	M/LE
CURR:AMPL:MAX:HOLD				Queries the current peak (the held value)	R	M/LE
CURR:CRES				Queries the current crest factor	R	LE
CURR:HARM				Queries the harmonic current	R	LE
CURR:HARM:RAT				Queries the harmonic current (the percentage)	R	LE
FREQ				Queries the frequency	R	M/LE
LVOL				Queries the DC line voltage	R	LE[1]
LVOL:AC				Queries the AC line voltage	R	LE[2]
LVOL:AMPL:MAX				Queries the AC voltage peak	R	LE[2]
POW:DC				Queries the DC power	R	M/LE
POW:AC				Queries the AC power (the actual power)	R	M/LE
POW:AC:APP				Queries the AC power (the apparent power)	R	M/LE
POW:AC:REAC				Queries the AC power (the reactive power)	R	M/LE
POW:AC:REAC:TOT				Queries the AC power (the overall reactive power)	R	M/LE
POW:AC:PFAC				Queries the power factor of the AC power	R	M/LE
POW:AC:PFAC:TOT				Queries the total power factor of the AC power	R	M/LE
VOLT:DC				Queries the DC voltage	R	M/LE
VOLT:AC				Queries the AC voltage	R	M/LE
VOLT:AMPL:MAX				Queries the voltage peak	R	LE

1 Single-phase three-wire output only
2 Single-phase three-wire output or three-phase output only

TRIGger subsystem

SCPI command		Response	*RST	Description	R/W	M/LE
Program header	Parameter					
ABOR				Aborts the trigger function	W	M/LE
INIT						
[:IMM][:SEQ[1]]				Starts the trigger function of sequence 1	W	M/LE
:CONT:NAME	TRAN|ACQ		Yes	Sets the auto continue mode of the specified sequence	R/W	M
	bool	NR1				
:CONT:SEQ1	bool	NR1	Yes	Auto continue mode of sequence 1	R/W	M
:CONT:SEQ3	bool	NR1	Yes	Auto continue mode of sequence 3	R/W	M
[:IMM]:NAME	TRAN|ACQ|SIM|PROG	char		Starts the trigger function of the specified sequence	R/W	M/LE
[:IMM]:SEQ3				Starts the trigger function of sequence 3	R/W	M/LE
[:IMM]:SEQ4				Starts the trigger function of sequence 4	R/W	LE
[:IMM]:SEQ5				Starts the trigger function of sequence 5	R/W	LE
TRIG						
[:SEQ[1]][:IMM]				Sequence 1 software trigger	W	M/LE
[:TRAN][:IMM]						
[:SEQ[1]]:SOUR	IMM|BUS	char	Yes	Sequence 1 trigger source	R/W	LE
[:TRAN]:SOUR						
:SEQ2:SOUR	IMM|PHAS	char	Yes	Output on phase control	R/W	M
:SYNC:SOUR						
:SEQ2:PHAS[:ON]	numeric	NR3	Yes	Phase angle of output on phase control	R/W	M
:SEQ3[:IMM]				Sequence 3 software trigger	W	M/LE
:ACQ[:IMM]						
:SEQ3:SOUR	IMM|BUS	char	Yes	Sequence 3 trigger source	R/W	M/LE
:ACQ:SOUR						
:SEQ4[:IMM]				Sequence 4 software trigger	R/W	LE
:SIM[:IMM]						
:SEQ4:SOUR	IMM|BUS	char	Yes	Sequence 4 trigger source	R/W	LE
:SIM:SOUR						
:SEQ5[:IMM]				Sequence 5 software trigger	W	LE
:PROG[:IMM]						
:SEQ5:SOUR	IMM|BUS	char	Yes	Sequence 5 trigger source	R/W	LE
:PROG:SOUR						
:SIM:SOUR						

PROGram subsystem

SCPI command		Response	*RST	Description	R/W	M/LE
Program header	Parameter					
PROG						
:EDIT	NR1			Edits a sequence step	R/W	LE
	bool	NR1				
	numeric	NR3				
	bool	NR1				
	numeric	NR3				
	bool	NR1				
	numeric	NR3				
	numeric	NR3				
	NR1	NR1				
	bool	NR1				
	bool	NR1				
	bool	NR1				
	bool	NR1				
:EDIT:JUMP	NR1			Edits the jump settings of a sequence step	R/W	LE
	bool	NR1				
	NR1	NR1				
	NR1	NR1				
:EDIT:OIMP:RAT	NR1	NR1		Edits the output impedance settings of a sequence step	R/W	LE
	numeric	NR3				
:EDIT:PHAS:STAR	NR1	NR1		Edits the starting phase angle settings of a sequence step	R/W	LE
	bool	NR1				
	[numeric]	NR3				
:EDIT:PHAS:STOP	NR1	NR1		Edits the ending phase angle settings of a sequence step	R/W	LE
	bool	NR1				
	[numeric]	NR3				
:EDIT:PHASE:UOFFS	NR1	NR1		Edits the U-phase offset settings of a sequence step	R/W	LE[1]
	bool	NR1				
	[numeric]	NR3				
:EDIT:PHASE:UV	NR1	NR1		Edits the U-V phase defference settings of a sequence step	R/W	LE[1]
	bool	NR1				
	[numeric]	NR3				
:EDIT:PHAS:UW	NR1	NR1		Edits the U-W phase defference settings of a sequence step	R/W	LE[2]
	bool	NR1				
	[numeric]	NR3				
:EDIT:PHAS:RAMP	NR1	NR1		Sets the phase change	R/W	LE[1]
	char	char				
	[char]	char				
	[char]	char				
:EDIT:VOLT	NR1	NR1		Edits the AC voltage of each phase	R/W	LE[1]
	[numeric]	NR3				
:EDIT:VOLT:OFFS	NR1	NR1		Edits the DC voltage of each phase	R/W	LE[1]
	[numeric]	NR3				
:LOOP	numeric	NR3		Number of sequence repetitions	R/W	LE
CLE	numeric	NR3		Sets all the steps in the sequence to their default values	R/W	LE
:STEP:STAR	numeric	NR3		Sequence starting step number	R/W	LE
:STEP:END	char	NR1		Sequence ending step number	R/W	LE
:EXEC		char,NR3,NR1,NR1		Queries the execution state of the sequence	R	LE
:STAT	STOP|RUN|PAUS|CONT			Changes the execution state of the sequence	W	LE
:EXT:LOG	DIS|LOW|HIGH	char		Sets the logic of the sequence start/stop	R/W	LE

1 Single-phase three-wire output or three-phase output only
2 Three-phase output only

SIMulation subsystem

SCPI command		Response	*RST	Description	R/W	M/LE
Program header	Parameter					
SIMulation:						
T1:PHAS:STAT	bool	BR1	Yes	Sets the voltage regulation start setting	R/W	LE
T1:TIME[:LEV]	numeric	NR3	Yes	Voltage regulation starting time	R/W	LE
T1:PHAS[:LEV]	numeric	NR3	Yes	Voltage regulation starting phase	R/W	LE
T2:TIME[:LEV]	numeric	NR3	Yes	Slope time 1	R/W	LE
T3:TIME[:LEV]	numeric	NR3	Yes	Voltage regulation time	R/W	LE
T3:VOLT[:LEV]	numeric	NR3	Yes	Regulated voltage	R/W	LE
T4:TIME[:LEV]	numeric	NR3	Yes	Slope time 2	R/W	LE
T5:CYCL:STAT	bool	NR1	Yes	Sets the duration that the voltage remains at the initial level	R/W	LE
T5:TIME[:LEV]	numeric	NR3	Yes	Return time		LE
T5:CYCL[:LEV]	numeric	NR3	Yes	Return cycles	R/W	LE
POL	NORM|INV	char	Yes	Voltage regulation polarity	R/W	LE
REP:COUN	numeric	NR3	Yes	Number of repetitions	R/W	LE
STAT	STOP|RUN			Executes and stops power line abnormality simulations	W	LE
EXEC		char,NR1		Queries the execution status of power line abnormality simulations	R	LE

Other subsystems

SCPI command		Response	*RST	Description	R/W	M/LE
Program header	Parameter					
MEM:						
SAV	NRf			Saves settings to memory	W	LE
PREV	NRf	NR1,NR3,NR3,NR3,NR1		Views the settings in memory	R	LE
RCL	NRf			Recalls settings from memory	W	LE
SENSe:						
HOLD	SHOR|LONG	char		Peak current hold time	R/W	M
CURR:ADJ:ZERO				Starts zero calibration	W	LE
CURR:HOLD	numeric	NR3	Yes	Peak current hold time	R/W	LE
CURR:PEAK:CLE				Clears the peak hold	W	M/LE
AVER[:STAT]	bool	NR1	Yes	Averaging period of measured values	R/W	M/LE
DISPlay:						
CONT	numeric	NR3	Yes	Adjusts the screen brightness	R/W	LE
AMM	“RMS|AVG|PEAK|WATT”	NR3	Yes	Measured value display	R/W	M
LVOL	bool	NR1	Yes	Selects voltage(phase voltage/ line voltage) display	R/W	LE[1]
PHAS	NRf	NR1	Yes	Selects display of phase	R/W	LE[1]
MMOD:CURR	RMS|PEAK|WATTage|VA|PF|AVG	char	Yes	Measured current and power displays	R/W	LE
MMOD:VOLT	RMS|PEAK|AVG	char	Yes	Measured voltage display	R/W	LE

1 Single-phase three-wire output or three-phase output only

STATus subsystem

SCPI command		Response	Description	R/W	M/LE
Program header	Parameter				
STAT					
:OPER					
[:EVEN]		NR1	Event[1]	R	1
:COND		NR1	Register status[1]	R	1
:ENAB	NRf	NR1	Enable[1]	R/W	1
:PTR	NRf	NR1	Positive transition[1]	R/W	1
:NTR	NRf	NR1	Negative transition[1]	R/W	1
:INST[2]					
[:EVEN]		NR1	Event[3]	R	LE
:COND		NR1	Register status[3]	R	LE
:ENAB	NRf	NR1	Enable[3]	R/W	LE
:PTR	NRf	NR1	Positive transition[3]	R/W	LE
:NTR	NRf	NR1	Negative transition[3]	R/W	LE
:ISUM{1|2|3}					
[:EVEN]		NR1	Event[4]	R	LE
:COND		NR1	Register status[4]	R	LE
:ENAB	NRf	NR1	Enable[4]	R/W	LE
:PTR	NRf	NR1	Positive transition[4]	R/W	LE
:NTR	NRf	NR1	Negative transition[4]	R/W	LE
:PRES			Resets the enable register	W	1
:QUES					
[:EVEN]		NR1	Event[5]	R	1
:COND		NR1	Register status[5]	R	1
:ENAB	NRf	NR1	Enable[5]	R/W	1
:PTR	NRf	NR1	Positive transition[5]	R/W	1
:NTR	NRf	NR1	Negative transition[5]	R/W	1
:INST[2]					
[:EVEN]		NR1	Event[6]	R	LE
:COND		NR1	Register status[6]	R	LE
:ENAB	NRf	NR1	Enable[6]	R/W	LE
:PTR	NRf	NR1	Positive transition[6]	R/W	LE
:NTR	NRf	NR1	Negative transition[6]	R/W	LE
:ISUM{1|2|3}					
[:EVEN]		NR1	Event[7]	R	LE
:COND		NR1	Register status[7]	R	LE
:ENAB	NRf	NR1	Enable[7]	R/W	LE
:PTR	NRf	NR1	Positive transition[7]	R/W	LE
:NTR	NRf	NR1	Negative transition[7]	R/W	LE

1 OPERation status register
2 Single-phase three-wire output or three-phase output only
3 OPERation:INSTrument sub register
4 OPERation:INSTrument:ISUMmary sub register
5 QUEStionable status register
6 OPERation:INSTrument sub register
7 OPERation:INSTrument:ISUMmary{1|2|3} sub register

SYSTem subsystem

SCPI command		Response	*RST	Description	R/W	M/LE
Program header	Parameter					
SYST						
:CONF						
:BACK	bool	NR1		Auto save function of the panel settings and the configuration settings	R/W	M
:DATE	NR1	NR1		Date	R/W	LE
	NR1	NR1				
	NR1	NR1				
:EXT:ACL	DIS|LOW|HIGH	char		Sets the logic of the alarm clear	R/W	LE
:EXT:EST:FREQ:LOW	numeric	NR3	Yes	Sets the estimated minimum frequency	R/W	LE
:EXT:OOR:MODE	TOT:EACH	char		Sets the phase to monitor	R/W	LE
:EXT:SHUT:CONT	DIS|LOW|HIGH	char		Sets the logic of the shut down	R/W	LE
:EXT:SINP:POL	NORM|INV	char	Yes	Sets the polarity	R/W	LE
:PHAS:UV	numeric	NR1		U-V phase difference	R/W	LE[1]
:PHAS:UW	numeric	NR1		U-W phase difference	R/W	LE[2]
:PHAS:UOFF:INIT				Clears the U phase offset setting	W	LE[1]
:POW:EXP[:MAX]	numeric	NR3	Yes	Anticipated maximum power	R/W	LE
:RESP[:VOLT]	SLOW|MED|FAST	char	Yes	Response	R/W	LE
:SENS:MODE	OFF|SENS1|SENS2|RADJ	char	Yes	Compensation function	R/W	LE
:STAT:OUTP:POL	POS|NEG	char	Yes	Status signal output polarity	R/W	LE
:TIME	NR1	NR1		Time	R/W	LE
	NR1	NR1				
	NR1	NR1				
:TPH:MODE	bool	NR1	Yes	Output mode (Single-phase three-wire, Double-phase)	R/W	LE[3]
:TRIG:INP:POL	POS|NEG	char	Yes	Trigger signal input polarity	R/W	LE
:TRIG:OUTP:POL	POS|NEG	char	Yes	Trigger signal output polarity	R/W	LE
:TRAC	bool	NR1		Communication error display	R/W	M/LE
:WIR	P1|P1W3|P3	char		Output mode (Single-phase, Single-phase three-wire, Three-phase)		LE[4]
:WIR:CAT		char		Queries the output mode that the PCR-LE2 can change		LE[4]
:ERR[:NEXT]		string		Reads error information	R	M/LE
:KLOC	bool	NR1		Locks panel controls	R/W	M/LE
:LOC				Switches the PCR to local mode	W	M/LE
:OPT		char		Queries options	R	M/LE
:REM				Sets the PCR to remote mode; locks all panel controls, except the LOCAL key	W	M/LE
:RWL				Sets the PCR to remote mode; locks panel controls	W	M/LE
:SLE:EXEC				Activates sleep mode immediately	R/W	LE
:SLE[:STAT]	bool	NR1	Yes	Turns the sleep function on and off	R/W	LE
:SLE:TIME	numeric	NR3	Yes	The time that must elapse before the PCR-LE series enters sleep mode	R/W	LE
:VERS				Queries SCPI specification version that the PCR series complies with	R	M/LE

1 Single-phase three-wire output or three-phase output only
2 Three-phase output only
3 PCR-LE only
4 PCR-LE2 only

IEEE 488.2 common commands

IEEE 488.2 common command	Parameter	Description	R/W	M/LE
*CLS		Clears all the event registers	W	M/LE
*ESE	NR1	Sets the event status enable register bits	R/W	M/LE
*ESR		Queries the event status register	R	M/LE
*IDN		Queries the identification string (manufacturer information)	R	M/LE
*OPC		Causes the PCR series to generate the operation complete message in the event status register when all of its pending operations have finished	R/W	M/LE
*OPT		Queries the optional interface boards that are installed in the PCR series	R	M/LE
*PSC	bool	Sets whether the *ESE and *SRE settings will be cleared	R/W	M/LE
*RCL	NR1	Recalls the settings that have been stored to memory		M
*RST		Resets the PCR series; configures the PCR series to a known condition independent from the usage history of the device	W	M/LE
*SAV	NR1	Saves the current settings to memory		M
*SRE	NR1	Sets the service request enable register bits	R/W	M/LE
*STB		Reads the status byte and master summary status bits	R	M/LE
*TRG		Trigger command	W	M/LE
*TST		Executes a self test	R	M/LE
*WAI		Prevents the PCR series from executing subsequent commands and queries until the flag indicating that there are no operations standing by becomes true	W	M/LE

Registers

Architecture

IEEE488.2 and SCPI registers are used for the status reports.

In each SCPI status register, there are the following sub registers: CONDition register, EVENt register, ENABle register, PTRansition filter, and NTRansition filter.

CONDition register

The transition of the CONDition register is automatic and reflects the condition of the PCR in real-time. Reading this register does not affect the contents.

EVENt register

The EVENt register bits are automatically set according to the changes in the CONDition register. The rule varies depending on the positive and negative transition filters (PTRansition and NTRansition). The EVENt register is reset when it is read.

ENABle register

The ENABle register enables the reports to the summary bit or status bit of the event bit.

Transition filter

The PTRansition (positive transition) filter is used to report events when the condition changes from false to true.

The NTRansition (negative transition) filter is used to report events when the condition changes from true to false.

If both the positive filter and the negative filter are set to true, events can be reported each time the status changes.

If both filters are cleared, event reporting is disabled.

Registers

Register Structure

[-199,-100] | [-299,-200]
[-399,-300] | [-499,-400]
[-899,-800] | [100 and higher]

A List of Errors

Command errors

An error in the range [-199, -100] indicates that an IEEE 488.2 syntax error has been detected by the instrument's parser. The occurrence of any error in this class shall cause the Command Error (bit 5) in the event status register to be set.

Error code		Error message description
-100	Command error	This is the generic syntax error.
-101	Invalid character	A syntactic element contains a character that is invalid for that type.
-102	Syntax error	An unrecognized command or data type was encountered.
-103	Invalid separator	The parser was expecting a separator and encountered an illegal character.
-104	Data type error	The parser recognized a data element different than one allowed.
-105	GET not allowed	A Group Execute Trigger was received within a program message.
-108	Parameter not allowed	More parameters were received than expected for the header.
-109	Missing parameter	Fewer parameters were received than required for the header.
-110	Command header error	An error was detected in the header.
-113	Undefined header	The header is undefined for this device.
-120	Numeric data error	This error is generated when parsing a data element that appears to be numeric, including the nondecimal numeric types.
-130	Suffix error	This error is generated when parsing a suffix.
-131	Invalid suffix	The suffix does not follow the syntax or the suffix is inappropriate for this device.
-134	Suffix too long	The suffix contained more than 12 characters.
-138	Suffix not allowed	A suffix was encountered after a numeric element which does not allow suffixes.
-140	Character data error	This error is generated when parsing a character data element.
-141	Invalid character data	Either the character data element contains an invalid character or the particular element received is not valid for the header.
-144	Character data too Long	The character data element contains more than twelve characters.
-148	Character data not allowed	A legal character data element was encountered where prohibited by the device.
-150	String data error	This error is generated when parsing a string data element.
-160	Block data error	This error is generated when parsing a block data element.
-170	Expression error	This error is generated when parsing an expression data element.

-180	Macro error	This error is generated when defining a macro or executing a macro.

>top

Execution errors

An error in the range [-299, -200] indicates that an error has been detected by the instrument's execution control block. The occurrence of any error in this class shall cause the Execution Error (bit 4) in the event status register to be set.

Error code		Error message description
-200	Execution error (generic)	This is the generic syntax error for devices that cannot detect more specific errors.
-203	Command protected	Indicates that a legal password-protected program command or query could not be executed because the command was disabled.
-210	Trigger error	Trigger error.
-211	Trigger ignored	Indicates that a GET, *TRG, or triggering signal was received and recognized by the device but was ignored because of device timing considerations.
-213	Init ignored	Indicates that a request for a measurement initiation was ignored as another measurement was already in progress.
-214	Trigger deadlock	Indicates that the trigger source for the initiation of a measurement is set to GET and a subsequent measurement query was received.
-220	Parameter error	Indicates that a program data element related error occurred.
-221	Settings conflict	Indicates that a legal program data element was parsed but could not be executed due to the current device state.
-222	Data out of range	Indicates that a legal program data element was parsed but could not be executed because the interpreted value was outside the legal range as defined by the device.
-223	Too much data	Indicates that a legal program data element of block, expression, or string type was received that contained more data than the device could handle due to memory or related device-specific requirements.
-224	Illegal parameter value	Used where an exact value, from a list of possible values, was expected.
-230	Data corrupt or stale	Possibly invalid data; new reading started but not completed since last access.
-241	Hardware missing	Indicates that a legal program command or query could not be executed because of missing device hardware.

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Device-specific errors

The occurrence of any error in this class shall cause the Device Dependent Error (bit 3) in the event status register to be set.

Error code		Error message description
-360	Communication error	Communication error when the flow control is turned off. This error applies when the RS232C interface is used.
-362	Framing error in program message	Framing error. This error applies when the RS232C interface is used.
-363	Input buffer overrun	Buffer overrun error. This error applies when the RS232C interface is used.
-364	Time out error	Time out error. This error applies when the RS232C interface is used.

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Query errors

An error in the range [-499, -400] indicates that the output queue control of the instrument has detected a problem with the message exchange protocol described in IEEE 488.2, chapter 6. The occurrence of any error in this class shall cause the Query Error (bit 2) in the event status register to be set.

Error code		Error message description
-400	Query error (generic)	This is the generic query error for devices that cannot detect more specific errors.
-410	Query INTERRUPTED	Received a new command before the response was read.
-420	Query UNTERMINATED	The controller attempted to read the response after the device received an unsupported query or has not received a query. The -100 "COMMAND ERROR" error and this error are stored in the error queue. The controller will time out.
-430	Query DEADLOCKED	The error queue, input buffer, and output buffer are full when sending large binary data as a response, and the transmission timing is off.
-440	Query UNTERMINATED after indefinite response	Received a separate query in semicolon-delimited format after a query that returns a response in an indefinite form. (Example: A command such as the following. *IDN?;SYST:ERR?)

>top

Operation complete event errors

An error in the range [-899, -800] is used when the PCR wishes to report an IEEE488.2 operation complete event. This event occurs when the instrument's synchronization protocol, having been enabled by an *OPC command, completes all selected pending operations.

The occurrence of any event error in this class shall cause the Operation Complete (bit 0) in the event status register to be set.

Error code		Error message description
-800	Operation complete	The instrument has completed all selected pending operations in accordance with the IEEE 488.2, 12.5.2 synchronization protocol.

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Device-dependent errors

The occurrence of any error in this class shall cause the Device Dependent Error (bit 3) in the event status register to be set.

Errors that have a number of +900 or greater are generated as a result of the self test that is run when the *TST? query is received.

Error code		Error message description
100	Advanced features are not available	The option board is not installed.
101	Operation denied while in LOCal state	Operation is denied because the PCR-M/PCR-LE/PCR-LE2 is in local mode.
102	Operation denied while in OUTPut ON state	Operation is denied because the OUTPUT is on.
103	Operation denied while in PROTection state	Operation is denied because a protection function is activated.
104	Operation denied due to invalid OUTPut:COUPling mode	Operation is denied because the output mode is invalid.
105	Operation denied (OUTPut OFF)	Operation is denied because the OUTPUT is off.
106	Operation denied (TRIP DISable)	Operation is denied because the action to perform when the current limit is exceeded is set to "not to turn the output off (DISABLE)."

107	Operation denied (RISE TIME/SIM/SEQ)	Operation is denied because soft start, power line abnormality simulation, or sequence is in progress.
108	Operation denied (WIRing METHod)	Operation is denied because the wiring method (single-phase, two-wire; single-phase, three-wire; or three-phase) is invalid.
109	Operation denied (EXT.OUTPUT OFF)	Operation is denied because the output has been turned off through external control.
110	Operation denied (EXT.SEQ.STOP)	Operation is denied because a sequence is being executed or stopped through external control.
111	Operation denied (V-PROG)	Operation is denied because the AC voltage output is being controlled with an external signal.
112	Operation denied (SOURCE)	Operation is denied because the command is in conflict with the signal source setting.
199	Operation denied (BUSY)	The operation is denied because the PCR-LE/PCR-LE2 is busy.
201	Operation denied (FREQ)	The sequence cannot be executed because there is a step whose frequency is outside its limits.
202	Operation denied (VOLT)	The power line abnormality simulation, or the sequence cannot be executed because there is a step whose voltage is outside the voltage range or limits.
203	Operation denied (PHASE CHANG)	The sequence cannot be executed because there is a step whose trigger wait setting and sudden phase change setting are both turned on.
301	Settings conflict (COMPENSATION)	Setting conflict: Cannot be set because the command is in conflict with the compensation setting.
302	Settings conflict (CV RESPONSE)	Setting conflict: Cannot be set because the command is in conflict with the response setting.
303	Settings conflict (RISE TIME)	Setting conflict: Cannot be set because the soft start output is in progress or the command is in conflict with the soft start setting.
304	Settings conflict (SYNCRO)	Setting conflict: Cannot be set because the synchronization function is in use.
305	Settings conflict (TRIP)	Setting conflict: Cannot be set because the command is in conflict with the action that is performed when any of the current limits is exceeded.
306	Settings conflict (UNBALANCE PHASE)	Setting conflict: Cannot be set because the phase difference is unbalanced.
308	Settings Conflict (OUTPUT IMPEDANCE)	Setting conflict: Cannot be set because an output impedance is set.
309	Settings conflict (WAVE BANK)	Setting conflict: Cannot be set because a waveform other than waveform bank No. 0 is in use.
909	Selftest error (DSP SIO)	Self-test error: Detected an error in the internal communication.
910	Selftest error (DSP DETect)	Self-test error: Detected an input voltage outside the ratings at power-on.
911	Selftest error (DSP VCC)	Self-test error: Detected a voltage error.
912	Selftest error (DSP Input)	Self-test error: Detected an input voltage outside the ratings.
913	Selftest error (DSP CMD)	Self-test error: Detected an invalid internal communication command.
915	Selftest error (CAL)	Self-test error: Detected an error in the calibration data.

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Processing Time of Commands

The command processing time is the time until the next command is accepted.
The processing times indicated here are typical values.
They are not warranted.
The processing times vary depending on the settings and the measurement conditions.
It does not include the response time of the hardware.

PCR-M series

Command	GPIB processing time*1 (ms)	USB processing time (ms)	RS232C processing time*2 (ms)	Description
OUTP ON	9	11	7	Turn the output ON
OUTP OFF	19	23	18	Turn the output OFF
VOLT	16	18	13	Sets the voltage
MEAS:VOLT:AC?	333	333	333	Queries the measured voltage output
FREQ	15	17	13	Sets the frequency
MEAS:CURR:AC?	333	333	333	Queries the measured voltage output
*RCL	233	230	230	Recalls the contents
*SAV	13	14	11	Saves the curtent settings
*CLS	5	6	4	Clears the status data
*RST	233	230	230	Performs a device reset.

*1 : Using GPIB-USB-B by National Instruments.
*2 : Data rate setting: 19200 bps, Flow control: X-Flow

FAQ

The measured value is not shown on the panel display (shows "----").

Is auto continue mode on? Auto continue mode is off by default on the PCR-M.

Is the trigger source set to IMM (default)?

```
:INITiate:CONTinuous:SEQuence3 ON

:TRIGger:SEQuence3:SOURce IMM
```

The display of the PCR-M series with firmware version 1.20 or later operates as a monitor. It displays the present value that is being delivered to the load.

The display of the PCR-M series with firmware version 1.19 or earlier displays the value that was measured using the INIT or MEASure command. Therefore, the PCR-M display shows "----," which signifies that there is no data, in the following cases. When the front panel control switches from local to remote.

->View details

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The measured value is not shown on the panel display (shows ".b.y.t").

If a concatenated command or a command that takes a long time to process is received, the PCR-M series may not be able to allocate the necessary internal memory.

When you send a command that takes a long time to process, wait approximately 250 ms before sending the next command.

->Processing time of main commands

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Measurement does not start or the settings are not changed even when a trigger is sent.

Is the sequence in the WTG (Waiting for Trigger) state?

To start the measurement using a trigger, set the trigger source to BUS and send the INIT command to set the sequence in the WTG state.

Sequence 3 example

```
:TRIGger:SEQuence3:SOURce BUS

:INITiate:SEQuence3
```

If a trigger is sent in the WTG state, measurement starts.

:TRIGger:SEQuence3

->View details

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Would like to know the time needed to complete the measurement.

The PCR-M requires at most 330 ms to complete a measurement after starting the measurement operation.

If an *OPC? query is sent along with the INIT command, an ASCII character "1" is set in the output queue when all of the measurement operations are completed.

Sequence 3 example

```
INITiate:SEQuence3;*OPC?
```

Because the measurement is complete when this response is retrieved, the measured data can be retrieved using the FETC? query.

For sequence 1, change INIT:SEQ3 to :INIT.

->View details

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An error occurs when attempting to execute the "Easy Controller for PCR-M".

Has your computer installed the "VISA Library"?

One of the "VISA Libraries" is required in your computer to execute for the "Easy Controller for PCR-M".

If the error still appears even when the "VISA Library" is installed in your computer, please try to re-install the "VISA Library".。

As for the detailed installation of either library for such "NI-VISA" or "Agilent VISA", please refer to the instruction manual respectively.

For the installation of "KI-VISA"

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Tutorial

Programming AC Output

AC Voltage and Frequency

Setting the AC voltage and frequency

The AC output voltage and frequency are controlled with the VOLTage and FREQuency commands. Prior to programming the output, it is recommended that the appropriate output mode and voltage range be selected.

The following is an example using the PCR-M.

```
:OUTPut:COUPling AC 'Sets the output mode to AC mode
:VOLTage:RANGe 135 'Sets the voltage range to the 135V range
:VOLTage 110 'Sets the AC voltage to 110 V
:FREQuency 55 'Sets the frequency to 55 Hz
:OUTPut ON    'Turns the output on
```

Setting the AC voltage limit and frequency limit

The maximum allowable value for VOLTage varies depending on the VOLTage:RANGe setting.

The minimum and maximum allowable values for VOLTage and FREQuency commands may vary depending on the VOLTage:LIMit and FREQuency:LIMit settings. The VOLTage and FREQuency settings must be specified within the upper and lower limits.

The voltage limit and frequency limit settings are safety interlock functions that prevent unexpected miss-operation or miss-programming. They are not output limiting functions.

```
:VOLTage:RANGe 135 'Sets the voltage range to the 135V range
:VOLTage:LIMit MAX 'Sets the voltage upper limit to 275 V
:VOLTage:LIMit:LOWer MIN 'Sets the voltage lower limit to 0 V
:VOLTage 110 'Sets the AC voltage to 110 V
:FREQuency:LIMit MAX 'Sets the frequency upper limit to 500 Hz
:FREQuency:LIMit:LOWer MIN 'Sets the frequency lower limit to 40 Hz
:FREQuency 55 'Sets the frequency to 55 Hz
```

Above example expands the upper/lower limits to the widest span allowing the VOLTage and FREQuency to be set to any value within the given range.

When the VOLTage:RANGe is set to 135 V, VOLTage setting cannot exceed 137.5 V.

Query

To query the maximum and minimum allowed values for the VOLTage and FREQuency commands, use the query with the MINimum and/or MAXimum parameters.

```
:VOLTage? MINimum
:VOLTage? MAXimum
:FREQuency? MINimum
:FREQuency? MAXimum
```

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Tutorial

Programming DC Output

DC Voltage

Setting the DC voltage

The DC output voltage is controlled with the VOLTage:OFFSet command. Prior to programming the output, it is recommended that the appropriate output mode and voltage range be selected.

The following is an example using the PCR-M.

```
:OUTPut:COUPling DC 'Sets the output mode to DC mode
:VOLTage:RANGe 135 'Sets the voltage range to the 135V range
:VOLTage:OFFSet 40 'Sets the DC voltage to 40 V
:OUTPut ON    'Turns the output on
```

Once the power supply output is enabled (turned on), output mode and voltage range settings cannot be changed. On the other hand, the VOLTage:OFFSet setting can always be changed while the output is on.

Setting the DC voltage limit

The maximum allowable value for VOLTage:OFFSet also varies depending on the VOLTage:RANGe setting. The minimum and maximum allowable values for VOLTage:OFFSet command may vary depending on the VOLTage:OFFSet:LIMit settings.

```
:VOLTage:RANGe 135 'Sets the voltage range to the 135V range
:VOLTage:OFFSet:LIMit MAX 'Sets the voltage upper limit to 388 V
:VOLTage:OFFSet:LIMit:LOWer MIN 'Sets the voltage lower limit to -388 V
:VOLTage:OFFSet 40 'Sets the DC voltage to 40 V
```

Above example expands the upper/lower limits to the widest span allowing the VOLTage:OFFSet to be set to any value within the given range.

When the VOLTage:RANGe is set to 135 V, VOLTage:OFFSet setting cannot exceed +/-194.0 V. The VOLTage:RANGe specifies the voltage range using the AC voltage expression. The allowable DC voltage range for the 135 V range is +/-194.0 V, and that for the 270 V range is +/-388.0 V.

By *RST default, the :VOLTage:OFFSet:LIMit:LOWer setting is not set to its MINimum. It is set to 0 for operational safety.

Query

To query the maximum and minimum allowed values for the VOLTage:OFFSet command, use the query with the MINimum and/or MAXimum parameters.

```
:VOLTage:OFFSet? MINimum
:VOLTage:OFFSet? MAXimum
```

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Tutorial

Triggering Output Change (SEQuence1:TRANsient)

PCR-M/PCR-LE/PCR-LE2 has five different trigger subsystems -TRANsient, SYNChronize, ACQuire, SIMulation, and PROGram. These features are mapped to SEQuence1 to SEQuence5 respectively, as the SCPI specification generally categorizes each trigger subsystem as a numbered Trigger Sequence.

The TRANsient (SEQuence1) group is a trigger subsystem that changes the output voltage and frequency settings.

State

The three states are available in the sequence operation. -> See for details

Output Change Control

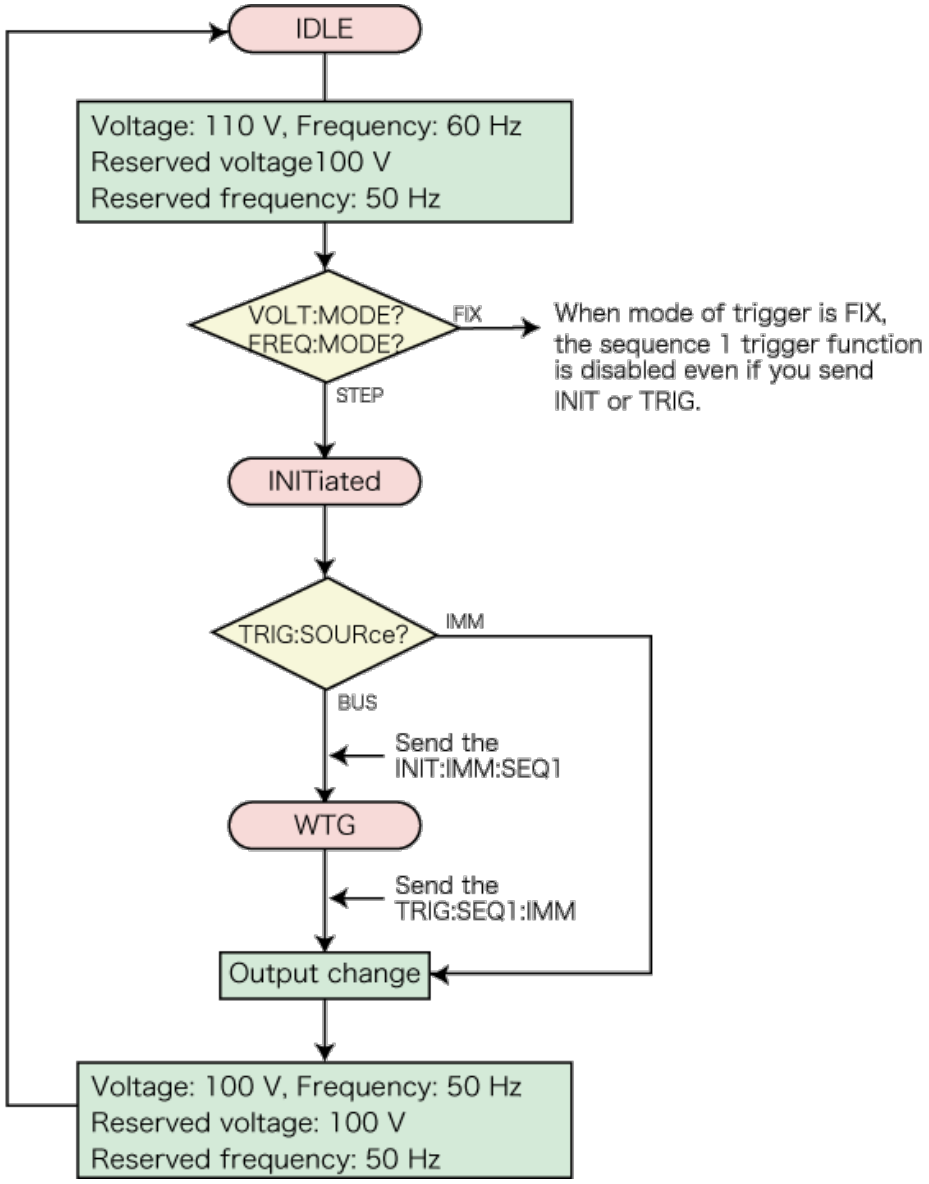
Using TRIGger:SEQuence1 (or TRIGger:TRANsient) subsystem allows you to synchronize the output changes with a given trigger. This is convenient if you want to synchronize output changes with other instrument actions such as external DC power supply or electronic loads.

To reserve triggered settings, use the VOLTage:TRIGgered and FREQuency:TRIGgered commands. Keep in mind that the MODE settings for each output item must be set to STEP prior to using triggers.

```
:VOLTage 110 'Sets the voltage to 110 V
:FREQuency 60 'Sets the frequency to 60 Hz
:VOLTage:MODE STEP 'Sets the voltage trigger mode to STEP
:FREQuency:MODE STEP 'Sets the frequency trigger mode to STEP
:VOLTage:TRIGgered 100 'Sets the voltage that will be set when a trigger is
received to 100 V
:FREQuency:TRIGgered 50 'Sets the frequency that will be set when a trigger
is received to 50 Hz
:TRIGger:SEQuence1:SOURce BUS 'Sets the trigger source to BUS
:INITiate 'Initiates sequence 1 (starts the trigger function)
:TRIGger 'Applies a software trigger to sequence 1
```

If you repeatedly change the output, a trigger error (-210) may occur. By using the *OPC command, you can prevent this error. ->see for detail

```
:TRIGger;*OPC    'Apply a trigger and wait until the output change is
complete.
```



The TRIGger:SEQuence1:SOURce command sets the trigger source to BUS or IMMediate.

When the Trigger Source is set to IMMediate, the change is executed immediately causing the voltage and/or frequency to change to a new setting. When the Trigger Source is set to BUS, the trigger subsystem goes to the WTG (Waiting For Trigger) state. When a software trigger is applied with the TRIGger:SEQuence1:IMMediate or *TRG command, the change is executed.

When the operation is completed, the trigger subsystem returns to the IDLE state again. When an ABORt or an equivalent command is sent without executing the trigger, the change is cancelled, and then the trigger subsystem returns to the IDLE state.

Setting items that are programmable in the sequence 1 group are VOLTage, VOLTage:OFFSet, and FREQuency. CURRent limit settings are not associated with the trigger subsystem.

By *RST and *RCL default, VOLTage:MODE, FREQuency:MODE, and VOLTage:OFFSet:MODE are all reset to FIXed. This means that the sequence 1 trigger function is disabled. The MODE settings must be explicitly set to STEP for each output item.

The TRIGger:SEQuence1:IMMediate command applies a software trigger to the sequence 1 group

You can also use the *TRG command or the IEEE488.1 get (Group Execute Trigger) command for the same purpose. This command applies a software trigger to all the sequence groups, so if there are other sequence groups that are in the INITiated state, their sequences will also be executed at the same time.

On the PCR-M, you do not have to send an initiate command for every trigger. You can configure sequences so that they continue automatically.

```
INITiate:CONTinuous:SEQuence1 ON
```

Operation using a software trigger

When ABOR is sent, INIT:SEQ1 is cancelled. The VOLT:TRIG setting does not change.

Table below shows the responses when the voltage is set to 20 V (VOLT 20) and when the target value to which the voltage is to change using a trigger is set to 10 V (VOLT:TRIG 10).

	Response	
	VOLT?	VOLT:TRIG?
Immediately after the setting	20 V	10 V
After a trigger is sent	10 V	10 V
After *RST is sent	0 V	0 V
ABOR is sent before sending a trigger	20 V	20 V(cancel)
Voltage change VOLT 30 is sent before sending a trigger	30 V	30 V(cancel)

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Tutorial

Output-on Phase Control (SEQuence 2: SYNChronize, PCR-M only)

On the PCR-LE, use the output subsystem commands to control the output ON/OFF phase. Do not use sequences.

PCR-M/PCR-LE has five different trigger subsystems -TRANsient, SYNChronize, ACQuire, SIMulation, and PROGram. These features are mapped to SEQuence1 to SEQuence5 respectively, as the SCPI specification generally categorizes each trigger subsystem as a numbered Trigger Sequence.

The SEQuence2 (SYNChronize) group is the output ON phase control trigger subsystem.

Using TRIGger:SEQuence2 (or TRIGger:SYNChronize) subsystem allows you to synchronize the output ON/OFF changes with a specific AC output phase angle.

```
TRIGger:SEQuence2:SOURce PHASe 'Configures the PCR so that the phase will
be controlled when the output is turned on
TRIGger:SEQuence2:PHASe 270    'Sets the phase angle at 270 deg
OUTPut ON    'Turns the output on
```

When the power supply output is changed from OFF to ON state, the changing action is synchronized to the specified phase angle.

To disable the output-on phase control, set the trigger source to IMMediate.

```
TRIGger:SEQuence2:SOURce IMMediate
```

The output-on phase control is applied only when the output is changed from OFF to ON. It is not applied when the output changes from ON to OFF or when other settings such as the AC voltage setting, DC voltage setting, and frequency setting change.

The output-on phase control is not a function that synchronizes the output frequency to the input commercial AC line.

The sequence 2 group does not have INITiate commands. It is always initiated and cannot be aborted.

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Tutorial

Measurement (SEQuence3: ACQuire)

PCR-M/PCR-LE/PCR-LE2 has five different trigger subsystems -TRANsient, SYNChronize, ACQuire, SIMulation, and PROGram. These features are mapped to SEQuence1 to SEQuence5 respectively, as the SCPI specification generally categorizes each trigger subsystem as a numbered Trigger Sequence.

The SEQuence3 (ACQuire) group is the measurement trigger subsystem. This subsystem is used to measure values such as voltage, current, and power.

There are easy measurements and advanced measurements.

Easy Measurement

The PCR-M/ PCR-LE/PCR-LE2 has the capability to return voltage, current, and power measurement values. The easiest way is use the MEASure commands.

The MEASure commands immediately start a new measurement. This is the easiest way to make measurements, however simultaneity for multi-item measurements are lost, because each MEASure command starts a new measurement. To avoid this, consider the advanced measurement approach that is described later in this manual, allowing separate control for measurement initiation and data query.

Voltage/Current Measurement

In AC mode, use the AC measurement queries.

```
:MEASure:VOLTage:AC?     'Queries AC voltage in volts-rms
:MEASure:CURRent:AC?     'Queries AC current in amps-rms
```

In DC mode, use the DC measurement queries.

```
:MEASure:VOLTage:DC?     'Queries DC voltage in volts
:MEASure:CURRent:DC?     'Queries DC current in amps
```

The current measurement function also has the following additional items:

```
:MEASure:CURRent:AMPLitude:MAXimum?     'Queries peak current in amps
:MEASure:CURRent:AMPLitude:MAXimum:HOLD? 'Queries peak current (the held
value)
:MEASure:CURRent:CREStfactor? 'Queries crest factor
```

The MEASure:CURRent:AMPLitude:MAXimum:HOLD command queries the maximum peak current since the PCR-M/ PCR-LE/PCR-LE2 was turned on or since it was explicitly cleared. To clear the peak current (held value), use the SENSe:CURRent:PEAK:CLEar command.

```
:SENSe:CURRent:PEAK:CLEar
```

By *RST and *RCL default, the peak current (held value) is not cleared.

Available measurement items vary depending on the selected output mode. For example, DC measurement cannot be performed while AC mode is selected.

Peak current measurement and peak hold measurement can be performed in either AC or DC output mode.

Normally, it takes approximately 330 ms on the PCR-M and approximately 110 ms on the PCR-LE/PCR-LE2 to complete a single measurement. This means that sending MEASure queries multiple times requires long data acquisition time. If you want to acquire multiple items, it is recommended that you use the advanced approach described later.

The PCR-M/ PCR-LE/PCR-LE2 supports READ commands that also initiate a new measurement and data query, however, READ and MEASure operate exactly the same, as they are aliases.

Power Measurement

In AC mode, use the AC measurement queries.

```
:MEASure:POWer:AC?     'Queries AC real power in watts
:MEASure:POWer:AC:APParent?     'Queries AC apparent power in volt-amps
:MEASure:POWer:AC:REACtive?     'Queries AC reactive power in volt-amps-
reactive
:MEASure:POWer:AC:PFACtor?     'Queries AC power factor
```

In DC mode, use the DC measurement queries.

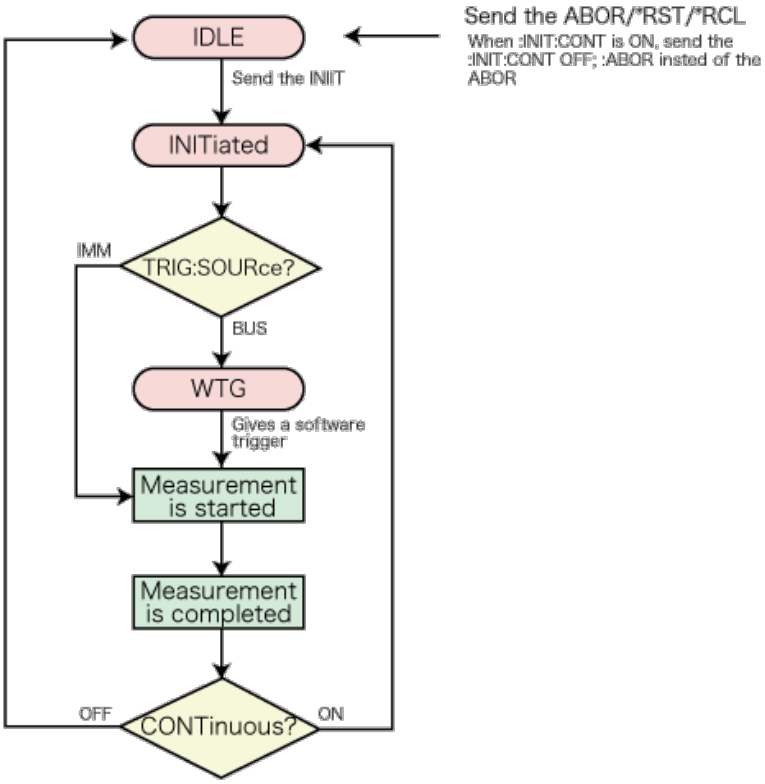
```
:MEASure:POWer:DC?      'Queries DC power in watts
```

Advanced Measurement

In advanced measurement, you can separate and control the starting of measurement and the referencing of data.

State

The three states are available in the sequence operation. -> See for details



Voltage/Current/Power Measurement

To start a new measurement, set the trigger source to IMMediate and use the INITiate command.

```
:TRIGger:SEQuence3:SOURce IMMediate    'Selects trigger source to IMMediate
:INITiate:SEQuence3 'Initiates sequence 3
```

If you want the sequence 3 group to start the measurement on a software trigger, change the trigger source to BUS.

```
:TRIGger:SEQuence3:SOURce BUS    'Selects trigger source to BUS
:INITiate:SEQuence3 'Initiates sequence 3
:TRIGger:SEQuence3 'Applies a software trigger to sequence 3
```

When the measurement is completed, measurement data can be queried with the FETCh query commands.

```
:FETCh:VOLTage:AC?    'Queries AC voltage in volts, without new measure
:FETCh:CURRent:AC?    'Queries AC current in amps, without new measure
:FETCh:POWer:AC?    'Queries AC real power in watts, without new measure
:FETCh:POWer:AC:APParent?    'Queries AC apparent power in volt-amps,
without new measure
```

If you send a FETCh command before the measurement is complete, correct measurement data will not be obtained. By using the *OPC command, you can obtain correct measurement data. ->See for detail

```
:INITiate:SEQuence3;*OPC    'Initiate sequence 3 and wait for the
measurement to complete.
```

The TRIGger:SEQuence3:SOURce command sets the trigger source to BUS or IMMediate. The INITiate:SEQuence3 command makes the trigger subsystem leave the IDLE state and go the initiated state.

When the Trigger Source is set to IMMediate, the action is executed immediately causing a new measurement to start. When the Trigger Source is set to BUS, the trigger subsystem

goes to the WTG (Waiting For Trigger) state. When a software trigger is applied with the TRIGger:SEQuence3:IMMediate or *TRG command, the measurement action is executed. When the operation is completed, the trigger subsystem returns to the IDLE state again. When an ABORt or an equivalent command is sent without executing the trigger, the measurement action is cancelled, and then the trigger subsystem returns to the IDLE state.

The ABORt command and IEEE488.1 sdc/dcl commands simply abort the measurement task that is in progress. It does not have a feature to invalidate any measurement data that has been acquired. On the other hand, the *RST and *RCL commands not only abort the measurement task, but also invalidate the acquired measurement data. This means that the "*RST;:FETC:VOLT:AC?" command line will generate an error, because no measurement data can be fetched and there is no new measurement is scheduled.

The only difference between MEASure and FETCh commands is that the MEASure command starts a new measurement while the FETCh command does not. Availability for measurement items varies depending on the output mode, but it is exactly the same for MEASure and FETCh.

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Tutorial

Waiting for Operation Complete

The *OPC command has a capability to wait for an operation to complete. Operation complete means that there is no pending operation that is still in progress. It takes approximately 330 ms on the PCR-M and approximately 110 ms on the PCR-LE/PCR-LE2 for a measurement to be completed. The PCR is not in the operation complete state while a measurement is ongoing. When the measurement completes, if there are no other operations waiting to be completed, the PCR enters the operation complete state.

When the *OPC command is sent, the PCR-M/ PCR-LE/PCR-LE2 enters the Operation Complete Command Active State (OCAS). When the measurement is completed and there is no other operation pending, the PCR-M/ PCR-LE/PCR-LE2 returns to Operation Complete Command Idle State (OCIS) and sets the OPC bit (bit 0) to TRUE (1) in the Standard Event Status Register. This information can be confirmed with the *ESR? query command by checking the OPC bit (bit 0).

The following example makes a new measurement and sends the *OPC. When the measurement is completed, an SRQ (Service Request) is generated, as the Standard Event Status Enable Register and the Service Request Enable Register are unmasked so that an SRQ can be signaled by the Operation Complete event. When using the RS232 interface, the SRQ feature cannot be used.

```
*ESE 1;*SRE 32;*CLS;:INITiate:IMMediate:SEQuence3;*OPC
```

<Wait for the SRQ to be generated.>

Using the *OPC? query command instead of the *OPC command makes the PCR-M/ PCR-LE/PCR-LE2 enter the Operation Complete Query Active State (OQAS). When the measurement is completed and there is no other operation pending, the PCR-M/ PCR-LE/PCR-LE20 returns to the Operation Complete Query Idle State (OQIS) and sets the response data to "1" (in NR1 format) in the output queue.

```
INITiate:IMMediate:SEQuence3;*OPC?
```

<Read the response>

At power-on or after the IEEE488 sdc/dcl, *RST command is sent, the PCR-M/ PCR-LE/PCR-LE2 is in the OCIS and OQIS state

Tutorial

Status Monitoring

The PCR has two mandatory SCPI standard registers, STATus:OPERation and STATus:QUEStionable, in addition to the IEEE488.2 standard registers.

Register basics

All SCPI registers have standard event/filter architecture, employing CONDition, EVENt, ENABle, and optionally PTRansition and NTRansition. CONDition and EVENt are read-only registers working as status indicators, and ENABle, PTRansition and NTRansition are read-write registers working as event and summary filters.

STATus:OPERation

The STATus:OPERation register records events or signals that occur during normal operation.

For example, to check if the PCR is being regulated in CV state, check the CV bit (bit 8) on the STATus:OPERation register.

```
:STATus:OPERation?     'Check whether the CV bit is set
```

STATus:QUEStionable

The STATus:OPERation register records events or signals that occur during normal operation.

For example, to check if the PCR is being regulated in CV state, check the CV bit (bit 8) on the STATus:OPERation register.

```
:STATus:QUEStionable?     'Check whether the CV bit is set
```

Status Monitoring

STATus:OPERation

The OPERation Status register is used to record events and notifications that occur during normal operations.

To check whether CV output is being performed, check the CV bit (bit 8) of the OPERation:INSTrument:ISUMmary{1|2|3} subregister.

{1|2|3}の1はU相、2はV相、3はW相です。

```
:STAT:OPER:INST:ISUM2? 'Check whether the CV bit of V phase is set.
```

STATus:QUEStionable

The QUEStionable Status register is used to record events and notifications that occur during abnormal operations.

To check whether the overvoltage protection function has been activated, check the OV bit (bit 0) of the STATus:QUEStionable register.

```
:STAT:QUES? 'Check whether the OV bit is set.
```

Even if bit 0 is true, you can not tell on which phase the overvoltage protection function has been activated. To check which phase is operating abnormally, check the STATus:QUEStionable:INSTrument subregister.

```
:STAT:QUES:INST? 'Check which phase is operating abnormally.
```

All phases whose corresponding bits are true are operating abnormally. You can determine how the specified phase is operating abnormally by checking the STATus:QUEStionable:INStrument:ISUMmary{1|2|3} subregister of the phase.

{1|2|3}の1はU相、2はV相、3はW相です。

```
:STAT:OPER:INST:ISUM2? 'Check whether the OV bit of V phase is set.
```

PON （Power ON） bit

The PON bit (bit 7) in the event status register is set whenever the PCR is turned on. The most common use for the PON bit is to generate an SRQ at power-on to keep track of unexpected loss of power or power line failure. To do this, follow the steps shown below.

1. Set *PSC (Power-on Status Clear) to 0 (or OFF).
   Enable the backup function of the event status enable register and service request enable register (*PSC 0).
2. Set the PON bit (bit 7) of the event status enable register.
   Permit the transmission of a power-on event to the upper layer (*ESE 128).
3. Set the ESB bit (bit 5) of the status byte enable register.
   Permit the generation of an SRQ caused by a standard event (*SRE 32).

```
*PSC 0;*ESE 128;*SRE 32
```

When using the RS232C interface, the PON bit cannot be assigned to the service request, because SRQs are not generated.

Though the SRQ feature itself is provided by communication protocol on the USB interface or LAN (VXI-11/ HiSLIP) interface, a Connection Lost error in the VISA I/O session occurs immediately before the power-on event. It may be difficult to handle PON events when using the USB interface.

>top

Tutorial

Error Checking

Error/event queue

The SCPI specifications define a standard error reporting scheme, Error/Event Queue. This is a FIFO (First In First Out) queue, which records errors and events. The maximum number of errors/events that the PCR can record is 255. Each error/event can be read with the SYSTem:ERRor query.

```
:SYSTem:ERRor?
```

The response to this query contains a numeric part (error/event number) and a textual description, such as:

```
-222,"Data out of range"
```

The error/event queue is empty when the *CLS common command is sent, when the last item in the queue is read, and when the PCR is turned on. When the error/event queue is empty, the query returns the following:

```
0,"No error"
```

Displaying communication errors

The PCR has a debug trace function.

The oldest item among the errors and events (if they are present) can be displayed on the PCR. This function is convenient when you debug your remote applications.

While an error/event item is displayed on the panel, the normal voltmeter and ammeter are disabled.

If the error/event queue is empty, the debug trace function does not display any errors. Sending the *CLS command clears the communication error display.

If in local mode, the debug trace function is temporarily disabled.

The communication error display can be enabled or disabled with the SYSTem:ERRor:TRACe command.

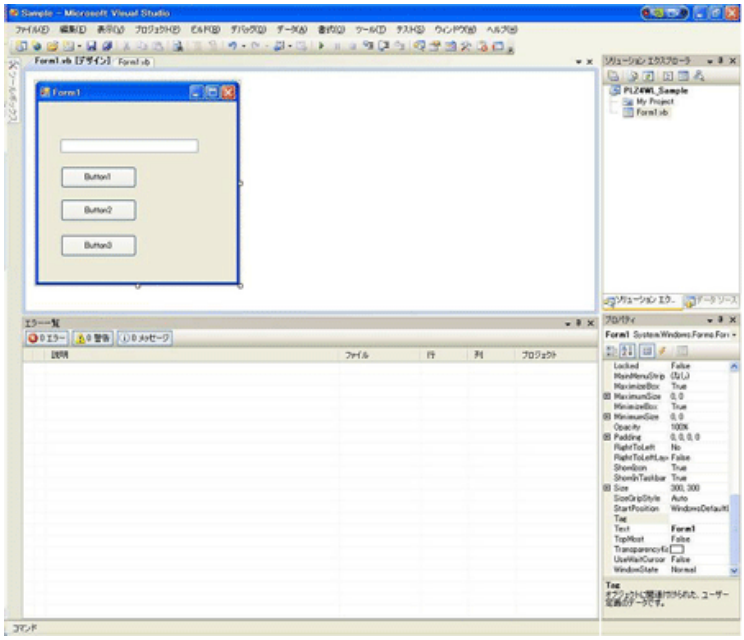
```
SYSTem:CONFigure:TRACe {ON|OFF}
```

>top

Tutorial

Visual Basic 2008

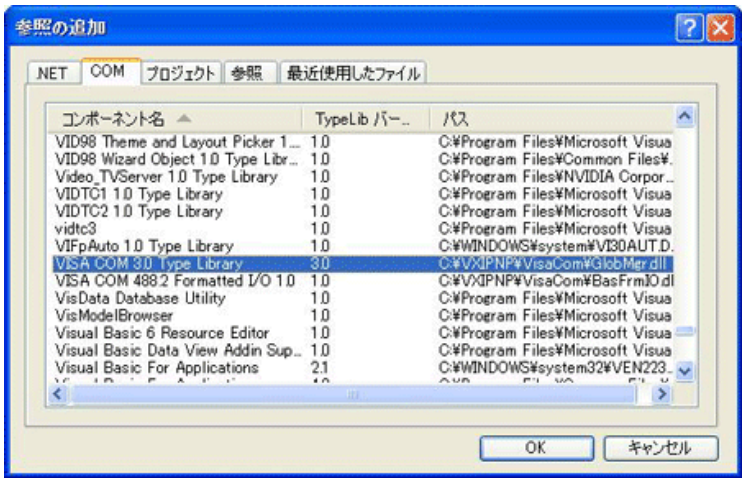
Communicate with the PCR-M/ PCR-LE/PCR-LE2 series using VISA through GPIB, RS232C, USB, or LAN.Visual Basic 2008.



Setting the "Project"

First, set the communication driver (VISA library) for the "Project."

Click "Project" on the menu bar, then select "Add Reference" to refer to "VISA COM 3.0 Type Library."



Communication through GPIB, RS232C, USB, or LAN

After setting the communication driver, you can communicate with the PCR through GPIB, RS232C, USB, or LAN.

The following describes the communication procedure using VISA.

Open the VISA

To communicate with an GPIB, RS232C, USB, or LAN device using VISA, you have to first open VISA. When you open VISA, specify the I/O resource.

Example : To open VISA by using USB

```
Set rm = CreateObject("VISA.GlobalRM")
Set msg = rm.Open("USB::0x0B3E::0x1024::00000001::INSTR", NO_LOCK, 0, "")
```

"USB::0x0B3E::0x1024::00000001::INSTR" is the I/O resource.

The I/O resource is specified by the following constructions. The part indicated with [ ] can be omitted. Enter the appropriate values in the parts specified in oblique characters.

GPIB		GPIB[*board*]::*PrimaryAddress*[::*SecondaryAddress*][::INSTR] Example: The primary address 3 of the measuring instrument connected to GPIB0. GPIB0::3::INSTR
Serial (RS232C)		ASRL[*board*][::INSTR] Example : The measuring instrument connected to the serial port COM1. ASRL1::INSTR
USB		USB[*board*]::*VendorID*::*ProductID*::*SerialNumber*[::*InterfaceNumber*][::INSTR] Example: The USBTMC measuring instrument having vendor ID (VID) 2878, Product ID (PID) 4133 and serial number "00000001." USB0::0x0B3E::0x1024::00000001::INSTR
LAN*1	VXI-11	TCPIP[*board*]::*hostname*[::inst*0*][::INSTR] Example :The measuring instrument whose IP address (hostname) is 169.254.7.8. TCPIP::169.254.7.8::INSTR You can also set the LAN device name using the host name.
	HiSLIP	TCPIP[*board*]::*hostname*::hislip0[::INSTR] Example :The measuring instrument whose IP address (hostname) is 169.254.7.8. TCPIP::169.254.7.8::hislip0::INSTR You can also set the LAN device name using the host name.
	SCPI-RAW	TCPIP[*board*]::*hostname*::*portno*::SOCKET Example :The measuring instrument whose IP address (hostname) is 169.254.7.8. (The "portno" setting of the PCR is normally 5025.) TCPIP::169.254.7.8::5025::SOCKET You can also set the LAN device name using the host name.

*1: The hostname must be a valid mDNS hostname (a Bonjour hostname that ends in ".local") or a DNS hostname that is managed by an external DNS server (a full-qualified domain name—FQDN). If you are using an mDNS hostname, Apple Bonjour (alternatively, iTunes or Safari) must be installed on your PC.

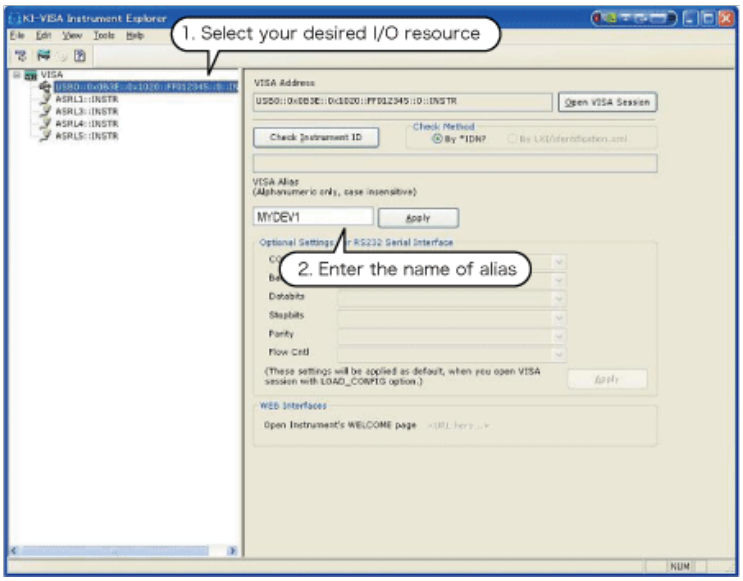
For VISA, the alias can be used for the I/O resource.

When using the alias for the I/O resource, even if the alias name is hard-coded directly in the application, the alias name can be easily converted to the appropriate I/O resource name.

Example : When using the alias (MYDEV1) for the I/O resource.

```
Set msg = rm.Open("MYDEV1", NO_LOCK, 0, "")
```

When the alias is used, the actual I/O resource is specified by an external configuration table. When using USB (example for KI-VISA):



If you are using a VISA implementation other than KI-VISA, please refer to the applicable VISA manual.

Controlling the devices

Next, use "Read" and "Write" commands to control devices. You must include line-feed codes in the command character strings.

Example:

```
msg.WriteString ("VOLT 110" & vbLF)       'Set the AC voltage to 110 V
msg.WriteString ("FREQ 60" & vbLF)     'Set the frequency to 60.0 Hz
msg.WriteString ("OUTP 1" & vbLF)              'Turn the output on
```

Closing the VISA

Close the VISA at the end.

You only need to include one "open" VISA command and one "close" VISA command in the program.

```
msg.Close
```

Sample program

```
Imports Ivi.Visa.Interop

Public Class Form1

  Dim rm As ResourceManager
  Dim msg As IMessage

  Private Sub Form1_Load(ByVal sender As System.Object, ByVal e As System.EventArgs) Handles MyBase.Load
    rm = CreateObject("VISA.GlobalRM")
    msg = rm.Open("GPIB0::1::INSTR", AccessMode.NO_LOCK, 0, "")     'Example: How to write GPIB
    'msg = rm.Open("MYDEV1", AccessMode.NO_LOCK, 0, "")  'Example: Using an alias
    'msg = rm.Open("USB0::0x0B3E::0x1024::00000001::INSTR", AccessMode.NO_LOCK, 0, "")  'Example: USB
    'msg = rm.Open("TCPIP::169.254.178.141::INSTR", AccessMode.NO_LOCK, 0, "")  'Example: LAN
    msg.TerminationCharacterEnabled = True
  End Sub

  'Query the instrument identity
  Private Sub cmdIdn_Click(ByVal sender As System.Object, ByVal e As System.EventArgs) Handles cmdIdn.Click
    msg.WriteString("*IDN?" & vbLF)
    TextBox1.Text = msg.ReadString(256)
  End Sub

  'Set the voltage and frequency
  Private Sub cmdCurr_Click(ByVal sender As System.Object, ByVal e As System.EventArgs) Handles cmdCurr.Click
    msg.WriteString("OUTP 0" & vbLF)
    msg.WriteString("VOLT 110" & vbLF)
    msg.WriteString("FREQ 60" & vbLF)
    msg.WriteString("OUTP 1" & vbLF)
  End Sub

  'Querys measurement DC voltage
  Private Sub cmdMeas_Click(ByVal sender As System.Object, ByVal e As System.EventArgs) Handles cmdMeas.Click
    msg.WriteString("MEAS:VOLT:DC?" & vbLF)
    TextBox1.Text = msg.ReadString(256)
  End Sub

  Private Sub Form1_Disposed(ByVal sender As Object, ByVal e As System.EventArgs) Handles Me.Disposed
    msg.Close()
  End Sub

END CLASS
```

>top

Interface Setup

Interface Setup for PCR-M series

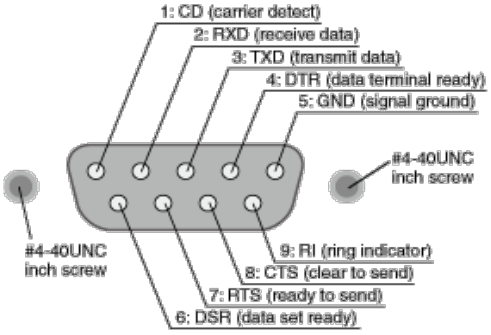
RS232C (standard equipped)

RS232C connection

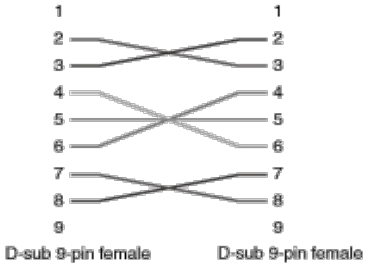
Turn off the POWER switch on the PCR-M and the computer.

Use a D-sub 9-pin female-to-female AT type crossover cable for the RS232C cable. Figure shows the connector pin assignments.

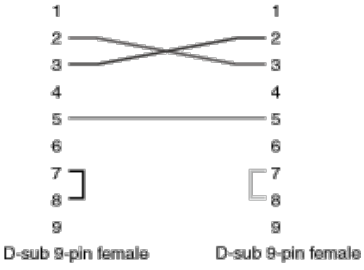
The KPM1000 does not use hardware handshaking (Crossover cable example2).



Facing the PCR front panel



Cross cable example1



Cross cable example2

9-pin AT type connector

RS232C configuration

1. Press CONFIG until the interface is set to "IntF."
2. Turn the rotary knob to set RS232C to "232."
3. Press CONFIG to set the baud rate to "bAUd."
4. Turn the rotary knob to set the baud rate.
   You can set the baud rate to 1.2, 2.4, 4.8, 9.6, or 19.2 (the unit is kBPS).
5. Press CONFIG to set the flow control to "F.CTL" (Xon/Xoff).
6. Turn the rotary knob to select "ON" or "OFF."
7. Wait at least 5 seconds, and then turn the POWER switch off and on.
   The settings are applied.

Protocol

The following table shows the settings that correspond to the RS232C protocol.
Underlined values are factory default settings.

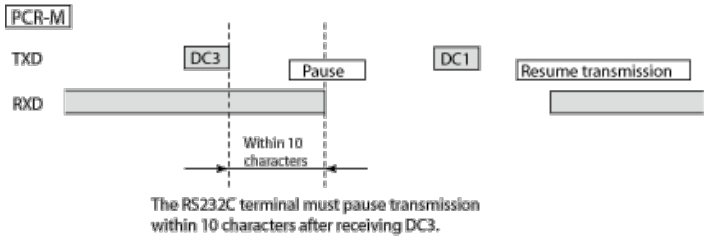
Item	Setting
Baudrate	1 200 bps/ 2 400 bps/ 4 800 bps/ 9 600 bps/ 19 200 bps
Data	Fixed to 8 bit
Stop:	Fixed to 1 bit
Parity	Fixed to none
Flow	XFLOW/ NONE

RS232C communication

Use flow control for RS232C communication. DC (device control) codes are used as control codes.

Transmission/reception may not work correctly through unilateral transmission.

Code	Function	ASCII code
DC1 (Xon)	Request to send	11H
DC3 (Xoff)	Transmission stop request	13H



Break signal

The break signal functions as a substitute for the IEEE488.1 dcl / sdc (Device Clear, Selected Device Clear) message.

NOTE

The RS232C interface should be shifted remotely by the command. Use the "SYSTem:REMote" SCPI command to set the RS232C interface to the remote state. Be sure to include this command at the start of the program when you are performing remote programming.

>top

Interface Setup

Interface Setup for PCR-M series

GPIB （optional）

This interface is valid only when the optional GPIB interface board is installed. This product does not use the dip switches that are installed in the IB21.

GPIB connection

Use a standard IEEE488 cable to connect the PCR-M to the computer.

GPIB configuration

1. Press CONFIG until the interface is set to "IntF."
2. Turn the rotary knob to set GPIB to "488."
3. Press CONFIG to set the GPIB display to "GPIb."
   Turn the rotary knob to select the GPIB address (1 to 30).
4. Wait at least 5 seconds, and then turn the POWER switch off and on.
   The settings are applied.

GPIB function

Function	Subset	Description
Source handshaking	SH1	Full capability
Acceptor handshaking	AH1	Full capability
Talker	T6	Function available
Listener	L4	Function available
Service request	SR1	Full capability
Remote local	RL1	Full capability
Parallel polling	PP0	No capability
Device clear	DC1	Full capability
Device trigger	DT1	Full capability
Controller	C0	No capability
Electrical interface	E1	Open collector driver

Service request

Service request and serial polling functions are implemented.

>top

Interface Setup

Interface Setup for PCR-M series

USB （optional）

This interface is valid only when the optional USB interface board is installed.

A device driver supporting USB T&M Class (USBTMC) is required to control the PCR through the USB interface. The USBTMC driver is automatically installed by the VISA library.

USB connection

Use a standard USB cable to connect the PCR to the computer.

USB configuration

1. Press CONFIG until the interface is set to "IntF."
2. Turn the rotary knob to set USB to "USb."
3. Wait at least 5 seconds, and then turn the POWER switch off and on.
   The settings are applied.

Service request

The PCR is equipped with service request and serial polling functions.

USB function

Complies with USB Specification 2.0

Complies with USBTMC Specification 1.0 and USBTMC-USB488 Specification 1.0

Data rate: 12 Mbps maximum (full speed)

VID （Vender ID）

0x0B3E

PID （Product ID）

PCR500M: 0x1009

PCR1000M: 0x100A

PCR2000M: 0x100B

PCR4000M 0x1043

>top

OUTP:COUP

Sets the output mode.

This command is not valid when the output is on (OUTP ON).

Command

```
OUTPut:COUPling {AC|DC|ACDC|EAC|EDC}

OUTPut:COUPling?
```

Parameter

Value	AC	AC mode (default)
	DC	DC mode
	ACDC	AC+DC mode This mode is available on the PCR-LE/PCR-LE2 at all times. It is available on the PCR-M when the appropriate optional interface board is installed.
	EAC	EXT-AC PCR-M (when the analog interface board is installed) only
	EDC	EXT-DC PCR-M (when the analog interface board is installed) only

For the setting that is applied when *RST is sent, see this table

Response

Response

Returns the output mode in char format in response to OUTP:COUP?.

VOLT:RANG

Sets the voltage range.

If the voltage range is switched, the VOLT:TRIG and VOLT:OFFS:TRIG settings are cleared, and ABOR is applied to all SEQuence groups. Command

This command is not valid when the output is on (OUTP ON).

Command

```
[SOURce:]VOLTage:RANGe[:UPPer] {<numeric>|MINimum|MAXimum}

[SOURce:]VOLTage:RANGe[:UPPer]? [{MINimum|MAXimum}]
```

Parameter

Value	135	135V range (default)
	270	270V range

For the setting that is applied when *RST is sent, see this table

Response

Response

Returns the voltage range setting in NR3 format in response to VOLT:RANG?.

VOLT:RANG:AUTO (PCR-M series only)

Sets AUTO function of the voltage range.

If the AUTO function is switched, the VOLT:TRIG and VOLT:OFFS:TRIG settings are cleared, and ABOR is applied to all SEQuence groups.

Command

```
[SOURce:]VOLTage:RANGe:AUTO {ON|OFF|1|0}

[SOURce:]VOLTage:RANGe:AUTO?
```

Parameter

Value	ON(1)	Enable the AUTO function
	OFF(0)	Disable the AUTO function (default)

For the setting that is applied when *RST is sent, see this table

Response

Response

Returns the voltage range setting in NR1 format in response to VOLT:RANG:AUTO?.

VOLT

Sets the AC voltage.

This command is valid in AC mode and AC+DC mode (when the parameter to OUTP:COUP is AC or ACDC).

Command

```
[SOURce:]VOLTage[0][:LEVel][:IMMediate][:AMPLitude]
  {<numeric>|MINimum|MAXimum}

[SOURce:]VOLTage[0][:LEVel][:IMMediate][:AMPLitude]? [{MINimum|MAXimum}]
```

Parameter

Value AC mode, 135V range: 0 to 137.5
AC mode, 270V range: 0 to 275.0
AC+DC mode, 135V range: This can only be set when the AC and DC voltages are within the settable ranges defined by the voltage limits and the AC+DC waveform peak is between -194 V and 194 V.
AC+DC mode, 270V range: This can only be set when the AC and DC voltages are within the settable ranges defined by the voltage limits and the AC+DC waveform peak is between -388 V and 388 V.

A SCPI error (-222, "Data out of range") occurs if outside the range.
The default value is 0.

Unit V

For the setting that is applied when *RST is sent, see this table

Response

Response

Returns the AC voltage setting in NR3 format in response to VOLT?.

In case of the single-phase three-wire output, VOLT? returns a comma-separated list of the AC voltage setting <NR3> for U and V phases.

VOLT:OFFS

Sets the DC voltage.

This command is valid in DC mode and AC+DC mode (OUTP:COUP DC|ACDC).

Command

```
[SOURce:]VOLTage[0]:OFFSet[:IMMediate] {<numeric>|MINimum|MAXimum}

[SOURce:]VOLTage[0]:OFFSet[:IMMediate]? [{MINimum|MAXimum}]
```

Parameter

Value DC mode, 135V range: -194.0 to 194.0
DC mode, 270V range: -388.0 to 388.0
AC+DC mode, 135V range: This can only be set when the AC and DC voltages are within the settable ranges defined by the voltage limits and the AC+DC waveform peak is between -194 V and 194 V.
AC+DC mode, 270V range: This can only be set when the AC and DC voltages are within the settable ranges defined by the voltage limits and the AC+DC waveform peak is between -388 V and 388 V.

A SCPI error (-222, "Data out of range") occurs if outside the range.
The default value is 0.

Unit V

For the setting that is applied when *RST is sent, see this table

Response

Response

Returns the DC voltage setting in NR3 format in response to VOLT:OFFS?.

FREQ

Set the AC output frequency.
This is valid in AC mode and AC+DC mode (OUTP:COUP AC|ACDC).

Command

```
[SOURce:]FREQuency[:CC|IMMediate] {<numeric>|MINimum|MAXimum}

[SOURce:]FREQuency[:CC|IMMediate]? [{MINimum|MAXimum}]
```

Parameter
Value 40 to 500 (60 by default)
Unit HZ

For the setting that is applied when *RST is sent, see this table

Response

Response

Returns the AC output frequency in NR3 format in response to FREQ?.

OUTP

Turns the output on and off.

Command

```
OUTPut[:STATe] {ON|OFF|1|0}

OUTPut[:STATe]?
```

Parameter

Value	ON(1)	Output on
	OFF(0)	Output off (default)

For the setting that is applied when *RST is sent, see this table

Response

Response

Returns whether the output is on in NR1 format in response to OUTP?.

CURR

Sets the AC current upper limit.

This command is valid in AC mode and AC+DC mode (OUTP:COUP AC|ACDC).

Command

```
[SOURce:]CURRent[:LEVel][:IMMediate][:AMPLitude]
  {<numeric>|MINimum|MAXimum}

[SOURce:]CURRent[:LEVel][:IMMediate][:AMPLitude]? [{MINimum|MAXimum}]
```

Parameter

Value	PCR500M: 0.1 to 5.25 (5.25 by default)) PCR1000M: 0.2 to 10.5 (10.5 by default) PCR2000M: 0.4 to 21.0 (21.0 by default) PCR4000M: 0.8 to 42.0 (42.0 by default)
Unit	A

For the setting that is applied when *RST is sent, see this table

Response

Returns the AC current upper limit in NR3 format in response to CURR?.

CURR:OFFS

Sets the DC current upper limit.

This is valid in DC mode (OUTP:COUP DC).

Command

```
[SOURce:]CURRent:OFFSet[:IMMediate] {<numeric>|MINimum|MAXimum}

[SOURce:]CURRent:OFFSet[:IMMediate]? [{MINimum|MAXimum}]
```

Parameter

Value	PCR500M: 0.1 to 4.2 (4.2 by defaul) PCR1000M: 0.2 to 8.4 (8.4 by default) PCR2000M: 0.4 to 16.8 (16.8 by default) PCR4000M: 0.8 to 33.6 (33.6 by default)
Unit	A

For the setting that is applied when *RST is sent, see this table

Response

Response

Returns the DC current upper limit in NR3 format in response to CURR:OFFS?.

CURR:PROT:STAT

Sets the PCR acts when the current limit is exceeded.

You cannot set the time (it is fixed to 3 seconds).

Command

```
[SOURce:]CURRent:PROTection:STATe {ON|OFF|1|0}

[SOURce:]CURRent:PROTection:STATe?
```

Parameter

Value	ON(1)	TRIP (when an overload occurs for longer than the specified time, the output is turned off, and an alarm is generated; default).
	OFF(0)	CC (when an overload occurs, the output is lowered so that the current limit is not exceeded).

For the setting that is applied when *RST is sent, see this table

Response

Response

Returns the PCR acts when the current limit is exceeded in NR1 format in response to CURR:PROT:STAT?.

FREQ:LIM

Sets the upper limit value of frequency.
This is valid in AC mode and AC+DC mode (OUTP:COUP AC|ACDC).

Command

```
[SOURce:]FREQuency:LIMit[:UPPer] {<numeric>|MINimum|MAXimum}

[SOURce:]FREQuency:LIMit[:UPPer]? [{MINimum|MAXimum}]
```

Parameter
Value 40 to 500 (500 by default)
Unit HZ

For the setting that is applied when *RST is sent, see this table

Response

Response

Returns the upper limit value of frequency in NR3 format in response to FREQ:LIM?.

FREQ:LIM:LOW

Sets the lower limit value of frequency.
This is valid in AC mode and AC+DC mode (OUTP:COUP AC|ACDC).

Command

```
[SOURce:]FREQuency:LIMit:LOWer {<numeric>|MINimum|MAXimum}

[SOURce:]FREQuency:LIMit:LOWer? [{MINimum|MAXimum}]
```

Parameter
Value 40 to 500 (40 by default)
Unit HZ

For the setting that is applied when *RST is sent, see this table

Response

Response

Returns the lower limit value of frequency in NR3 format in response to FREQ:LIM:LOW?.

VOLT:LIM

Sets the upper limit value of DC voltage.

This command is valid in AC mode and AC+DC mode (OUTP:COUP AC|ACDC).

Command

```
[SOURce:]VOLTage:LIMit[:UPPer] {<numeric>|MINimum|MAXimum}

[SOURce:]VOLTage:LIMit[:UPPer]? [{MINimum|MAXimum}]
```

Parameter

Value 0 to 275.0 (275.0 by default)
A SCPI error (-222, "Data out of range") occurs if outside the range.

Unit V

For the setting that is applied when *RST is sent, see this table

Response

Response

Returns the upper limit setting of DC voltage in NR3 format in response to VOLT:LIM?.

VOLT:LIM:LOW

Sets the lower limit value of DC voltage.

This command is valid in AC mode and AC+DC mode (OUTP:COUP AC|ACDC).

Command

```
[SOURce:]VOLTage[:LEVel]:LIMit:LOWer {<numeric>|MINimum|MAXimum}

[SOURce:]VOLTage[:LEVel]:LIMit:LOWer? [{MINimum|MAXimum}]
```

Parameter

Value 135V range: 0 to 137.5 （0 by default）
270Vrange: 0 to 275.0 （0 by default）
A SCPI error (-222, "Data out of range") occurs if outside the range.

Unit V

For the setting that is applied when *RST is sent, see this table

Response

Response

Returns the lower limit setting of DC voltage in NR1 format in response to VOLT:OFFS:LIM:LOW?.

VOLT:OFFS:LIM

Sets the upper limit value of DC voltage.

This command is valid in DC mode and AC+DC mode (OUTP:COUP DC|ACDC).

If the EX05-PCR-LE is in use (PCR-LE/PCR-LE2 optional) and the signal source is set to external signal source (FUNC:SOUR EXT), this command is invalid.

During single-phase, three-wire output (PCR-LE optional), set the voltage using phase voltage of the U phase.

Command

```
[SOURce:]VOLTage:OFFSet:LIMit[:UPPer] {<numeric>|MINimum|MAXimum}

[SOURce:]VOLTage:OFFSet:LIMit[:UPPer]? [{MINimum|MAXimum}]
```

Parameter

Value	PCR-M: DC mode, 135V range: -194.0 to 388.0 (388.0 by default) DC mode, 270V range: -388.0 to 388.0 (388.0 by default) PCR-LE/PCR-LE2: -431.0 to 431.0 (431.0 by default) A SCPI error (-222, "Data out of range") occurs if outside the range.
Unit	V

For the setting that is applied when *RST is sent, see this table

Response

Response

Returns the upper limit setting of DC voltage in NR3 format in response to VOLT:OFFS:LIM?.

VOLT:OFFS:LIM:LOW

Sets the lower limit value of DC voltage.

This command is valid in DC mode and AC+DC mode (OUTP:COUP DC|ACDC).

If the EX05-PCR-LE is in use (PCR-LE/PCR-LE2 optional) and the signal source is set to external signal source (FUNC:SOUR EXT), this command is invalid.

During single-phase, three-wire output (PCR-LE optional), set the voltage using phase voltage of the U phase.

Command

```
[SOURce:]VOLTage:OFFSet:LIMit:LOWer {<numeric>|MINimum|MAXimum}

[SOURce:]VOLTage:OFFSet:LIMit:LOWer? [{MINimum|MAXimum}]
```

Parameter

Value PCR-M:
DC mode, 135V range: -388.0 to 194.0 (0 by default)
DC mode, 270V range: -388.0 to 388.0 (0 by default)

PCR-LE/PCR-LE2: -431.0 to 431.0 (-431.0 by default)

A SCPI error (-222, "Data out of range") occurs if outside the range.

Unit V

For the setting that is applied when *RST is sent, see this table

Response

Response

Returns the lower limit setting of DC voltage in NR1 format in response to VOLT:OFFS:LIM:LOW?.

TRIG:SOUR

Sets the condition (trigger source) for actually changing the setting after a sequence group 1 receives INIT/ INIT:NAME.

Command

```
TRIGger[:SEQuence[1]]:SOURce {IMMediate|BUS}

TRIGger[:SEQuence[1]]:SOURce?

TRIGger[:TRANsient]:SOURce {IMMediate|BUS}

TRIGger[:TRANsient]:SOURce?
```

Parameter

Value	IMM	The setting is changed immediately.
	BUS	The setting is changed when a software trigger is received (use the *TRG, TRIG, or IEEE488.1 get (Group Execute Trigger) command to change the setting; default).

For the setting that is applied when *RST is sent, see this table

Response

Response

Returns the trigger source of the sequence 1 group in CHAR format in response to TRIG:SOUR?.

FREQ:MODE

Sets the trigger function control of the frequency setting when INIT/INIT:NAME TRAN and a software trigger are sent.

Command

```
[SOURce:]FREQuency:MODE {FIXed|STEP}

[SOURce:]FREQuency:MODE?
```

Parameter

Value	FIXed	Disables the trigger function (default)
	STEP	Enables the trigger function

For the setting that is applied when *RST is sent, see this table

Response

Response

Returns the trigger function control setting of the frequency setting in char format in response to FREQ:MODE?.

VOLT:MODE

Sets the trigger function control of the DC voltage setting when INIT/INIT:NAME TRAN and a software trigger are sent.

Command

```
[SOURce:]VOLTage:MODE {FIXed|STEP}

[SOURce:]VOLTage:MODE?
```

Parameter

Value	FIXed	Disables the trigger function (default)
	STEP	Enables the trigger function

For the setting that is applied when *RST is sent, see this table

Response

Response

Returns the trigger function control of the DC voltage setting in NR1 format in response to VOLT:MODE?.

VOLT:OFFS:MODE

Sets the trigger function control of the DC voltage setting when INIT/INIT:NAME TRAN and a software trigger are sent.

Command

```
[SOURce:]VOLTage:OFFSet:MODE {FIXed|STEP}

[SOURce:]VOLTage:OFFSet:MODE?
```

Parameter

Value	FIXed	Disables the trigger function (default)
	STEP	Enables the trigger function

For the setting that is applied when *RST is sent, see this table

Response

Response

Returns the trigger function control of the DC voltage setting in NR1 format in response to VOLT:OFFS:MODE?.

FREQ:TRIG

Sets the target frequency when INIT/INIT:NAME TRAN and a software trigger are sent.

Command

```
[SOURce:]FREQuency:TRIGgered {<numeric>|MINimum|MAXimum}

[SOURce:]FREQuency:TRIGgered? [{MINimum|MAXimum}]
```

Parameter

Value 40 to 500 (60 by default))
Unit HZ

For the setting that is applied when *RST is sent, see this table

Response

Response

Returns the target value to which the frequency is to change using a trigger in NR3 format in response to FREQ:TRIG?.

VOLT:TRIG

Sets the AC voltage that is applied when INIT/INIT:NAME TRAN and a software trigger are sent.

This command is valid in AC mode and AC+DC mode (OUTP:COUP AC|ACDC).

Command

```
[SOURce:]VOLTage[:LEVel]:TRIGgered[:AMPLitude] {<numeric>|MINimum|MAXimum}

[SOURce:]VOLTage[:LEVel]:TRIGgered[:AMPLitude]? [{MINimum|MAXimum}]
```

Parameter

Value
AC mode, 135V range: 0 to 137.5
AC mode, 270V range: 0 to 275.0
AC+DC mode, 135V range: This can only be set when the AC and DC voltages are within the settable ranges defined by the voltage limits and the AC+DC waveform peak is between -194 V and 194 V.
AC+DC mode, 270V range: This can only be set when the AC and DC voltages are within the settable ranges defined by the voltage limits and the AC+DC waveform peak is between -388 V and 388 V.

A SCPI error (-222, "Data out of range") occurs if outside the range.
The default value is 0.

Unit
V

For the setting that is applied when *RST is sent, see this table

Response

Response

Returns the target value to which the AC voltage is to change using a trigger in NR3 format in response to VOLT:TRIG?.

VOLT:OFFS:TRIG

Sets the target DC voltage when INIT/INIT:NAME TRAN and a software trigger are sent.
This command is valid in DC mode and AC+DC mode (OUTP:COUP DC|ACDC).

Command

```
[SOURce:]VOLTage[0]:OFFSet:TRIGgered {<numeric>|MINimum|MAXimum}

[SOURce:]VOLTage[0]:OFFSet:TRIGgered? [{MINimum|MAXimum}]
```

Parameter

Value	DC mode, 135V range: -194.0 to 194.0 DC mode, 270V range: -388.0 to 388.0 AC+DC mode, 135V range: This can only be set when the AC and DC voltages are within the settable ranges defined by the voltage limits and the AC+DC waveform peak is between -194 V and 194 V. AC+DC mode, 270V range: This can only be set when the AC and DC voltages are within the settable ranges defined by the voltage limits and the AC+DC waveform peak is between -388 V and 388 V. A SCPI error (-222, "Data out of range") occurs if outside the range. The default value is 0.
Unit	V

For the setting that is applied when *RST is sent, see this table

Response

Response

Returns the target value to which the DC voltage is to change using a trigger in NR3 format in response toVOLT:OFFS:TRIG?.

TRIG:SEQ2:SOUR/ TRIG:SYNC:SOUR (PCR-M series only)

Sets the OUTPUT on phase control when OUTP ON is sent.

Command

```
TRIGger:SEQuence2:SOURce {IMMediate|PHASe}

TRIGger:SEQuence2:SOURce?

TRIGger:SYNChronize:SOURce {IMMediate|PHASe}

TRIGger:SYNChronize:SOURce?
```

Parameter

Value	IMM	Disables OUTPUT on phase control (default)
	PHAS	Enables OUTPUT on phase control

For the setting that is applied when *RST is sent, see this table

Response

Response

Returns the OUTPUT on phase control when OUTP ON is sent in CHAR format in response to TRIG:SYNC:SOUR?.

TRIG:SEQ2:PHAS/ TRIG:SYNC:PHAS (PCR-M series only)

Sets the phase angle of the OUTPUT on phase control.

Command

```
TRIGger:SEQuence2:PHASe[:ON] {<numeric>|MINimum|MAXimum}

TRIGger:SEQuence2:PHASe[:ON]? [{MINimum|MAXimum}]
```

Parameter
Value 0 to 359
Unit DEG

For the setting that is applied when *RST is sent, see this table

Response

Response

Returns the phase angle of the OUTPUT on phase control in NR3 format in response to SENS:AVER?.TRIG:SEQ2:PHAS?.

TRIG:SEQ3:SOUR/ TRIG:ACQ:SOUR

Sets the condition (trigger source) for actually starting the measurement after the sequence 3 group receives INIT:SEQ3/INIT:NAME ACQ.

Command

```
TRIGger:SEQuence3:SOURce {IMMediate|BUS}

TRIGger:SEQuence3:SOURce?

TRIGger:ACQuire:SOURce {IMMediate|BUS}

TRIGger:ACQuire:SOURce?
```

Parameter

Value	IMM	Start the measurement immediately (default)
	BUS	Wait for a software trigger (*TRG, TRIG:SEQ3, TRIG:ACQ, or IEEE488.1 get (Group Execute Trigger)) to start the measurement

For the setting that is applied when *RST is sent, see this table

Response

Response

Returns the trigger source of the sequence 3 group in CHAR format in response to TRIG:SEQ3:SOUR? / TRIG:ACQ:SOUR?.

INIT:CONT:SEQ1 (PCR-M series only)

Sets the sequence operation auto continue mode of the sequence 1 group.

When the sequence operation auto continue mode is turned on

If the trigger source parameter is set to IMM, the change or measurement starts immediately. When the operation is complete, a new change or measurement automatically starts.

If the parameter is set to BUS, the change or measurement starts after receiving a software trigger. When the operation is complete, the PCR-M/ PCR-LE waits for the next trigger.

When the sequence operation auto continue mode is turned off

The change or measurement currently in progress continues unless ABOR is sent. The operation does not automatically continue to the new change or measurement.

Command

```
INITiate:CONTinuous:SEQuence1 {ON|OFF|1|0}

INITiate:CONTinuous:SEQuence1?
```

Parameter

Value	ON(1)	Auto continue mode on
	OFF(0)	Auto continue mode off (default)

For the setting that is applied when *RST is sent, see this table

Response

Response

Returns the sequence operation auto continue mode setting in NR1 format in response to INIT:CONT:SEQ1?

INIT:CONT:SEQ3 (PCR-M series only)

Sets the sequence operation auto continue mode of the sequence 3 group.

When the sequence operation auto continue mode is turned on

If the trigger source parameter is set to IMM, the change or measurement starts immediately. When the operation is complete, a new change or measurement automatically starts.

If the parameter is set to BUS, the change or measurement starts after receiving a software trigger. When the operation is complete, the PCR-M/ PCR-LE waits for the next trigger.

When the sequence operation auto continue mode is turned off

The change or measurement currently in progress continues unless ABOR is sent. The operation does not automatically continue to the new change or measurement.

Command

```
INITiate:CONTinuous:SEQuence3 {ON|OFF|1|0}

INITiate:CONTinuous:SEQuence3?
```

Parameter

Value	ON(1)	Auto continue mode on
	OFF(0)	Auto continue mode off (default)

For the setting that is applied when *RST is sent, see this table

Response

Response

Returns the sequence operation auto continue mode setting in NR1 format in response to INIT:CONT:SEQ3?

INIT:CONT:NAM (PCR-M series only)

Sets the sequence operation auto continue mode of the specified sequence group.

When the sequence operation auto continue mode is turned on

If the trigger source parameter is set to IMM, the change or measurement starts immediately. When the operation is complete, a new change or measurement automatically starts.

If the parameter is set to BUS, the change or measurement starts after receiving a software trigger. When the operation is complete, the PCR-M/ PCR-LE waits for the next trigger.

When the sequence operation auto continue mode is turned off

The change or measurement currently in progress continues unless ABOR is sent. The operation does not automatically continue to the new change or measurement.

Command

```
INITiate:CONTinuous:NAME {TRANsient|ACQuire},{ON|OFF|1|0}

INITiate:CONTinuous:NAME?
```

Parameter {TRANsient|ACQuire}

Value	TRAN	SEQuence1
	ACQ	SEQuence3

Parameter {ON|OFF|1|0}

Value	ON(1)	Auto continue mode on
	OFF(0)	Auto continue mode off (default)

For the setting that is applied when *RST is sent, see this table

Response

Response

Returns the sequence operation auto continue mode setting using a string and NR1 foratm in response to INIT:CONT:NAME? {TRAN|ACQ}.

SYST:KLOC

Sets/Releases the panel operation lock.

Command

```
SYSTem:KLOCk {ON|OFF|1|0}

SYSTem:KLOCk?
```

Parameter

Value	ON(1)	Lock the panel operation
	OFF(0)	Release the panel operation lock

Response

Returns the panel operation lock setting in NR1 format in response to SYST:KLOC?.

SYST:CONF:BACK (PCR-M series only)

Sets the auto save function of panel settings and configuration settings.

Command

```
SYSTem:CONFigure:BACKup {ON|OFF|1|0}

SYSTem:CONFigure:BACKup?
```

Parameter

Value	ON(1)	Auto save function on (default) Saves the settings every approximately 5 seconds.
	OFF(0)	Auto save function off

Response

Returns the on/off setting of the auto save function in NR1 format in response to SYST:CONF:BACK?.

SYST:CONF:TRAC

Sets whether to display communication errors by performing a debug trace. If the debug trace function is turned on, error codes (example: Err-100) are shown on the PCR-M/ PCR-LE display.

Command

```
SYSTem:CONFigure:TRACe {ON|OFF|1|0}

SYSTem:CONFigure:TRACe?
```

Parameter

Value	ON(1)	Display communication errors
	OFF(0)	Not display communication errors (default)

Response

Returns whether to display communication errors in NR1 format in response to SYST:CONF:TRAC?.

SENS:AVER

Sets the averaging period of the measured values (excluding the peak current).

Command

```
SENSe:AVERage[:STATe] {ON|OFF|1|0}

SENSe:AVERage[:STATe]?
```

Parameter

Value	ON(1)	Displays the moving average over approximately 3 seconds
	OFF(0)	Update every approximately 0.3 seconds (default)

For the setting that is applied when *RST is sent, see this table

Response

Response

Returns the averaging period of the measured values in NR1 format in response to SENS:AVER?.

SENS:HOLD (PCR-M series only)

Sets the hold time of the peak current.

Command

```
SENSe:HOLD {SHORt|LONG}

SENSe:HOLD?
```

Parameter

Value	SHORt	Update every approximately 0.3 seconds (default)
	LONG	Hold the peak value for approximately 5 seconds

Response

Returns the hold time of the peak current in CHAR format in response to SENS:HOLD?.

*CLS

Clears all event registers including the status byte, event status, and error queue.
Clears the operation complete standby that was created by the *OPC or *OPC? command.

Command

```
*CLS
```

*ESE

Sets the event status enable register that is counted by the event summary bit (ESB) of the status byte.

Command

```
*ESE <NRf>

*ESE?
```

Parameter
Value : 0 to 255

(Example) When *ESE 16 is transmitted, bit 4 of the event status enable register is set. Each time the execution error bit (bit 4) of the event status register is set, the summary bit (ESB) of the status byte is set.

Response

Returns the value of the event status enable register in NR1 format in response to *ESE?.

*ESR

Queries the event status register. Registers that are read are cleared.

Command

```
*ESR?
```

Response

Returns the value of the event status register in NR1 format in response to *ESR? and clears the register.

*IDN

Queries the model name, serial number, and firmware version of the PCR.

Command

```
*IDN?
```

Response

The response to *IDN? is indicated below.

(Example) For a PCR1000LE with serial number AB123456 and firmware version 1.00, this returns:

```
KIKUSUI,PCR1000LE,AB123456,1.00
```

*OPC

Sets the OPC bit (bit 0) of the event status register when all the commands in standby have been completed.

See section 12.5.3 in IEEE 488.2-1992.

Command

```
*OPC

*OPC?
```

Response

Returns 1 in response to *OPC? when all the commands in standby have been completed.

*OPT/ SYST:OPT

Queries the optional interface board that is installed in the PCR.

並列運転時には、マスタ機に装着されているオプションインターフェースボードを問い合わせます。

単相3線出力時または三相出力時には、U相に装着されているオプションインターフェースボードを問い合わせます。

Command

```
*OPT?

SYST:OPT?
```

Response

Returns the optional interface board that is installed in the PCR in comma-separated string format in response to OPT?/SYST:OPT?. Returns 0 in response to *OPT?/SYST:OPT? if there is no option installed.

"MP-3P05"	3P05-PCR-LE	Three-phase output driver
"MP-2P05"	2P05-PCR-LE	Single-phase, three-wire output driver
"PD05"	PD05-PCR-LE	Parallel operation driver
"EX05"	EX05-PCR-LE	Analog signal interface
"EX06"	EX06-PCR-LE	Analog signal interface
"USB"	US05-PCR-LE	USB interface board
"GPIB"	IB05-PCR-LE	GPIB interface board
"LAN"	LN05-PCR-LE	LAN interface board

*PSC

Sets whether to clear the event status enable register and the service request enable register when the POWER switch is turned on (power-on status).

Command

```
*PSC <NRf>

*PSC?
```

Parameter

Value 0 The *ESE and *SRE settings are not cleared when the POWER switch is turned on.
1 The *ESE and *SRE settings are cleared when the POWER switch is turned on.

(Example) To enable the power-on SRQ function

```
*PSC 0;*SRE 32;*ESE 128
```

Response

Returns the power-on status setting in response to *PSC?.

*RCL (PCR-M series only)

Aborts the measurement operation and reads the contents stored in memory.

For the commands that are affected, see this table.

When recalling a memory with the output turned on, a SCPI error (-102,"Operation denied while in OUTPut ON state") occurs if the output mode or voltage range switches.

Command

```
*RCL <NR1>
```

Parameter

Value	1	Memory A
	2	Memory B
	3	Memory C
	4 to 10	Memoru No. (When the optional board is installed)

A SCPI error (-222, "Data out of range") occurs if outside the range.

*RST

Aborts the measurement operation and initializes the PCR to its factory default condition.
For the commands that are affected, see this table

Command

```
*RST
```

*SAV (PCR-M series only)

Stores the current PCR settings to memory. The items that are stored are the same as those that are recalled with the *RCL command.

Command

```
*SAV <NR1>
```

Parameter

Value	1	Memory A
	2	Memory B
	3	Memory C
	4 to 10	Memoru No. (When the optional board is installed)

A SCPI error (-222, "Data out of range") occurs if outside the range.

*SRE

Sets the service request enable register.

The service request enable register is used to select the summary messages in the status byte register that will be able to perform service requests.

To clear the service request enable register, send *SRE 0. If the register is cleared, service requests cannot be generated by status information.

Command

```
*SRE <NRf>

*SRE?
```

Parameter
Value 0 to 255

(Example) Sending *SRE 8 sets bit 3 of the service request enable register. Each time the summary bit (bit 3) of the QUEStionable status register in the status byte is set, a service request message is generated.

Response

Returns the value of the service request enable register in NR1 format in response to *SRE?.

*STB

Queries the contents of the status byte register and the MSS (master summary status) message.

The response is the same as serial polling only with the exception that the MSS message appears in place of the RQS message in bit 6.

Command

```
*STB?
```

Response

Returns the value of the status byte register and the MSS message (bit 6) in NR1 format in response to *STB?.

*TRG

Trigger command.。

This is a substitute command for the IEEE488.1 get (Group Execute Trigger) command.

If the PCR is not in a condition to accept triggers, an SCPI error (-211,"Trigger ignored") occurs.

See section 10.37 in IEEE 488.2-1992.

Command

```
*TRG
```

*TST

Executes a self-test. Use SYST:ERR? to query the errors that occurred. See section 10.38 in IEEE 488.2-1992.

Command

```
*TST?
```

Response

Returns 0 if there are no errors in response to *TST?. Returns the error code, if there are errors.

*WAI

Prevents the PCR from executing subsequent commands until all operations in standby are complete.

Command

```
*WAI
```

OUTP:PROT:CLE

Clears alarms.

Command

```
OUTPut:PROTection:CLEar
```

INIT

Starts the sequence group 1 trigger function.

If trigger source is set to IMM, the change starts immediately. If set to BUS, the change starts after waiting for a software trigger.

Command

```
INITiate[:IMMediate][:SEQuence[1]]
```

INIT:NAME

Starts the trigger function of the specified sequence group.

If the trigger source is set to IMM, the settings are changed immediately, or the measurement, power line abnormality simulation, or sequence starts immediately. If the trigger source is set to BUS, the PCR waits for a software trigger, and then the settings are changed, or the measurement, power line abnormality simulation, or sequence starts.

Command

```
INITiate[:IMMediate]:NAME {TRANsient|ACQuire|SIMulation|PROGram}
```

Parameter

Value	TRAN	Starts the output change (sequence 1) trigger function
	ACQ	Starts the measurement (sequence 3) trigger function
	SIM	Starts the power line abnormality simulation trigger function (sequence 4; PCR-LE only) This is not valid when the action that is performed when the current limit is exceeded is set to CC (CURR:PROT:STAT OFF).
	PROG	Starts the sequence operation trigger function (sequence 5; PCR-LE only) This is not valid when the action that is performed when the current limit is exceeded is set to CC (CURR:PROT:STAT OFF).

TRIG

Executes a software trigger for a sequence group 1.

Command

```
TRIGger[:SEQuence[1]][:IMMediate]
```

```
TRIGger[:TRANsient][:IMMediate]
```

INIT:SEQ3

Clears the present valid measurement data and starts a new measurement.

If the trigger source parameter is IMM, the measurement starts immediately. If set to BUS, the measurement starts after waiting for a software trigger.

Command

```
INITiate[:IMMediate]:SEQuence3
```

TRIG:SEQ3/ TRIG:ACQ

Executes a software trigger for a sequence group 3.

Command

```
TRIGger:SEQuence3[:IMMediate]
```

```
TRIGger:ACQuire[:IMMediate]
```

MEAS:CURR:DC/ FETC:CURR:DC

MEAS:CURR:DC? starts a new measurement and then queries the DC current.

FETC:CURR:DC? queries the DC current without starting a new measurement.

The valid modes (parameters to the OUTP:COUP command) are DC, ACDC, and EDC (PCR-M only).

Command

```
MEASure[0][:SCALar]:CURRent:DC?
```

```
FETCh[0][:SCALar]:CURRent:DC?
```

Response

Returns the DC current in NR3 format in response to MEAS:CURR:DC? or FETC:CURR:DC?.

In case of the single-phase three-wire output, MEAS:CURR:DC? or FETC:CURR:DC? returns a comma-separated list of the DC current <NR3> for U and V phases.

Unit : A

MEAS:CURR:AC/ FETC:CURR:AC

MEAS:CURR:AC? starts a new measurement and then queries the AC current.

FETC:CURR:AC? queries the AC current without starting a new measurement.

The valid modes (parameters to the OUTP:COUP command) are AC, ACDC, EAC (PCR-M only), and EDC (PCR-M only).

Command

```
MEASure[0][:SCALar]:CURRent:AC?
```

```
FETCh[0][:SCALar]:CURRent:AC?
```

Response

Returns the AC current in NR3 format in response to MEAS:CURR:AC? or FETC:CURR:AC?.

In case of the single-phase three-wire output, MEAS:CURR:AC? or FETC:CURR:AC? returns a comma-separated list of the AC current <NR3> for U and V phases.

In case of the three-phase output, MEAS:CURR:AC? or FETC:CURR:AC? returns a comma-separated list of the AC current <NR3> for U, V, and W phases.

Unit：A

MEAS:CURR:AMPL:MAX/ FETC:CURR:AMPL:MAX

MEAS:CURR:AMPL:MAX? starts a new measurement and then queries the peak current.

FETC:CURR:AMPL:MAX? queries the peak current without starting a new measurement.

All modes (parameters to the OUTP:COUP command) are valid.

Command

```
MEASure[0][:SCALar]:CURRent:AMPLitude:MAXimum?
FETCh[0][:SCALar]:CURRent:AMPLitude:MAXimum?
```

Response

Returns the peak current in NR3 format in response to MEAS:CURR:AMPL:MAX? or FETC:CURR:AMPL:MAX?.

In case of the single-phase three-wire output, MEAS:CURR:AMPL:MAX? or FETC:CURR:AMPL:MAX? returns a comma-separated list of the peak current <NR3> for U and V phases.

In case of the three-phase output, MEAS:CURR:AMPL:MAX? or FETC:CURR:AMPL:MAX? returns a comma-separated list of the peak current <NR3> for U, V, and W phases.

Unit : A

MEAS:CURR:AMPL:MAX:HOLD/ FETC:CURR:AMPL:MAX:HOLD

MEAS:CURR:AMPL:MAX:HOLD? starts a new measurement and then queries the peak current (the held value).

FETC:CURR:AMPL:MAX:HOLD? queries the peak current (the held value) without starting a new measurement.

You can use SENS:CURR:PEAK:CLE to clear the held peak value.

All modes (parameters to the OUTP:COUP command) are valid.

Command

```
MEASure[0][:SCALar]:CURRent:AMPLitude:MAXimum:HOLD?
```

```
FETCh[0][:SCALar]:CURRent:AMPLitude:MAXimumv:HOLD?
```

Response

Returns the peak current (the held value) in NR3 format in response to MEAS:CURR:AMPL:MAX:HOLD? or FETC:CURR:AMPL:MAX:HOLD?.

In case of the single-phase three-wire output, MEAS:CURR:AMPL:MAX:HOLD? or FETC:CURR:AMPL:MAX:HOLD? returns a comma-separated list of the peak current (the held value) <NR3> for U and V phases.

In case of the three-phase output, MEAS:CURR:AMPL:MAX:HOLD? or FETC:CURR:AMPL:MAX:HOLD? returns a comma-separated list of the peak current (the held value) <NR3> for U, V, and W phases.

Unit : A

SENS:CURR:PEAK:CLE

Clears the peak hold of the current measurement.

Command

```
SENSe:CURRent:PEAK:CLEar
```

MEAS:FREQ/ FETC:FREQ

MEAS:FREQ? starts a new measurement and then queries the frequency.

FETC:FREQ? queries the frequency without starting a new measurement.

All modes (parameters to the OUTP:COUP command) are valid.

Command

```
MEASure[:SCALar]:FREQuency?
```

```
FETCh[:SCALar]:FREQuency?
```

Response

Returns the frequency in NR3 format (returns 0 in DC mode) in response to MEAS:FREQ? or FETC:FREQ?.

Unit：HZ

MEAS:POW:AC/ FETC:POW:AC

MEAS:POW:AC? starts a new measurement and then queries the AC power.

FETC:POW:AC? queries the AC power without starting a new measurement.

The valid modes (parameters to the OUTP:COUP command) are AC, ACDC, EAC (PCR-M only), and EDC (PCR-M only).

Command

```
MEASure[0][:SCALar]:POWer:AC[:REAL]?
```

```
FETCh[0][:SCALar]:POWer:AC[:REAL]?
```

Response

Returns the AC power in NR3 format in response to MEAS:POW:AC? or FETC:POW:AC?.

In case of the single-phase three-wire output, MEAS:POW:AC? or FETC:POW:AC? returns a comma-separated list of the AC power <NR3> for U and V phases.

In case of the three-phase output, MEAS:POW:AC? or FETC:POW:AC? returns a comma-separated list of the AC power <NR3> for U, V, and W phases.

Unit : W

MEAS:POW:AC:APP/ FETC:POW:AC:APP

MEAS:POW:AC:APP? starts a new measurement and then queries the AC power (the apparent power).

FETC:POW:AC:APP? queries the AC power (the apparent power) without starting a new measurement.

The valid modes (parameters to the OUTP:COUP command) are AC, ACDC, EAC (PCR-M only), and EDC (PCR-M only).

Command

```
MEASure[0][:SCALar]:POWer:AC:APParent?
```

```
FETCh[0][:SCALar]:POWer:AC:APParent?
```

Response

Returns the AC power (the apparent power) in NR3 format in response to MEAS:POW:AC:APP? or FETC:POW:AC:APP?.

In case of the single-phase three-wire output, MEAS:POW:AC:APP? or FETC:POW:AC:APP? returns a comma-separated list of the AC power (the apparent power) <NR3> for U and V phases.

In case of the three-phase output, MEAS:POW:AC:APP? or FETC:POW:AC:APP? returns a comma-separated list of the AC power (the apparent power) <NR3> for U, V, and W phases.

Unit : VA

MEAS:POW:AC:REAC/ FETC:POW:AC:REAC

MEAS:POW:AC:REAC? starts a new measurement and then queries the AC power (the reactive power).

FETC:POW:AC:REAC? queries the AC power (the reactive power) without starting a new measurement.

The valid modes (parameters to the OUTP:COUP command) are AC, ACDC, EAC (PCR-M only), and EDC (PCR-M only).

Command

```
MEASure[0][:SCALar]:POWer:AC:REACtive?
```

```
FETCh[0][:SCALar]:POWer:AC:REACtive?
```

Response

Returns the AC power (the reactive power) in NR3 format in response to MEAS:POW:AC:REAC? or FETC:POW:AC:REAC?.

In case of the single-phase three-wire output, MEAS:POW:AC:REAC? or FETC:POW:AC:REAC? returns a comma-separated list of the AC power (the reactive power) <NR3> for U and V phases.

In case of the three-phase output, MEAS:POW:AC:REAC? or FETC:POW:AC:REAC? returns a comma-separated list of the AC power (the reactive power) <NR3> for U, V, and W phases.

Unit：VAR

MEAS:POW:AC:PFAC/ FETC:POW:AC:PFAC

MEAS:POW:AC:PFAC? starts a new measurement and then queries the AC power factor.

FETC:POW:AC:PFAC? queries the AC power factor without starting a new measurement.

The valid modes (parameters to the OUTP:COUP command) are AC, ACDC, EAC (PCR-M only), and EDC (PCR-M only).

Command

```
MEASure[0][:SCALar]:POWer:PFACtor?

FETCh[0][:SCALar]:POWer:PFACtor?
```

Response

Returns the AC power factor in NR3 format in response to MEAS:POW:AC:PFAC? or FETC:POW:AC:PFAC?.

In case of the single-phase three-wire output, MEAS:POW:AC:PFAC? or FETC:POW:AC:PFAC? returns a comma-separated list of the AC power factor <NR3> for U and V phases.

In case of the three-phase output, MEAS:POW:AC:PFAC? or FETC:POW:AC:PFAC? returns a comma-separated list of the AC power factor <NR3> for U, V, and W phases.

MEAS:POW:DC/ FETC:POW:DC

MEAS:POW:DC? starts a new measurement and then queries the DC power.

FETC:POW:DC? queries the DC power without starting a new measurement.

The valid modes (parameters to the OUTP:COUP command) are DC, ACDC, and EDC (PCR-M only).

Command

```
MEASure[0][:SCALar]:POWer:DC?
```

```
FETCh[0][:SCALar]:POWer:DC?
```

Response

Returns the DC power in NR3 format in response to MEAS:POW:DC? or FETC:POW:DC?.

In case of the single-phase three-wire output, MEAS:POW:DC? or FETC:POW:DC? returns a comma-separated list of the DC power <NR3> for U and V phases.

Unit : W

MEAS:VOLT:DC/ FETC:VOLT:DC

MEAS:VOLT:DC? starts a new measurement and then queries the DC voltage.

FETC:VOLT:DC? queries the DC voltage without starting a new measurement.

The valid modes (parameters to the OUTP:COUP command) are DC, ACDC (PCR-M only), and EDC (PCR-M only).

Command

```
MEASure[0][:SCALar]:VOLTage:DC?
```

```
FETCh[0][:SCALar]:VOLTage:DC?
```

Response

Returns the DC voltage in NR3 format in response to MEAS:VOLT:DC? or FETC:VOLT:DC?.

In case of the single-phase three-wire output, MEAS:VOLT:DC? or FETC:VOLT:DC? returns a comma-separated list of the DC voltage <NR3> for U and V phases.

Unit : V

MEAS:VOLT:AC/ FETC:VOLT:AC

MEAS:VOLT:AC? starts a new measurement and then queries the AC voltage.

FETC:VOLT:AC? queries the AC voltage without starting a new measurement.

The valid modes (parameters to the OUTP:COUP command) are AC, ACDC, EAC (PCR-M only), and EDC (PCR-M only).

Command

```
MEASure[0][:SCALar]:VOLTage:AC?
```

```
FETCh[0][:SCALar]:VOLTage:AC?
```

Response

Returns the AC voltage in NR3 format in response to MEAS:VOLT:AC? or FETC:VOLT:AC?.

In case of the single-phase three-wire output, MEAS:VOLT:AC? or FETC:VOLT:AC? returns a comma-separated list of the AC voltage <NR3> for U and V phases.

In case of the three-phase output, MEAS:VOLT:AC? or FETC:VOLT:AC? returns a comma-separated list of theAC voltage <NR3> for U, V, and W phases.

Unit : V

SYST:ERR

Reads the oldest error information or event information from the error queue. The error queue can store up to 255 errors.-> Tutorial

Use the *CLS command to clear the error queue.

Command

```
SYSTem:ERRor[:NEXT]?
```

Response

Returns the oldest error or event information in the error/event queue in response to SYST:ERR? as follows:

(Example) When there are no errors or events

+0"No error"

(Example) When a command that cannot be executed under the current operating conditions has been received

-221,"Settings conflict"

SYST:LOC (RS232C, USB or LAN only)

Sets the PCR-M/ PCR-LE to local mode (Remote Disable; the REMOTE LED turns off). This is a substitute command for the IEEE488.1 ren FALSE (remote disable) command. The Remote Disable state enables both panel operations and commands.

Use SYST:REMor SYST:RWL to switch to remote mode (Remote Enable; the REMOTE LED lights).

Command

```
SYSTem:LOCal
```

SYST:REM (RS232C, USB or LAN only)

Sets the PCR-M/ PCR-LE operation to remote mode. All panel keys except the LOCAL key are locked. This is a substitute command for the IEEE488.1 REN (Remote Enable) command and address designation.

Use the SYST:LOC command to return the PCR-M/ PCR-LE to local mode.

Command

```
SYSTem:REMote
```

SYST:RWL (RS232C, USB or LAN only)

Sets the PCR-M/ PCR-LE operation to remote mode. All panel keys are locked (the LOCAL key is also locked). This is a substitute command for the IEEE488.1 llo (Local Lock Out) command.

Use the SYST:LOC command to return the PCR-M/ PCR-LE to local mode.

Command

```
SYSTem:RWLock
```

SYST:VERS

Queries the version of the SCPI specifications to which the PCR-M/ PCR-LE conforms.

Command

```
SYSTem:VERSion?
```

Response

Returns 1999.0 in response to SYST:VERS?.

Status byte register

The status byte register stores STB and RQS (MSS) messages as defined by the IEEE488.1 standard. The status byte register can be read using IEEE488.1 serial polling or the IEEE488.2 common command *STB?.

When serial polling is carried out, bit 6 responds with the request service (RQS). The status byte value is not changed by serial polling.

*STB? makes the device transmit the contents of the status byte register and the master status summary (MSS) message.

*STB? does not change the status byte, MSS, or RQS.

Bit	Bit weight	Bit name	Description
0	1	Reserved	Reserved for future use by the IEEE488. The bit value is notified as zero.
1	2	Reserved	
2	4	Error/Event Queue	If data exists in the error or event queue, this bit is set to true.
3	8	Questionable Status Register (QUES)	This bit is set to true when a bit is set in the QUEStionable event status register and the corresponding bit in the QUEStionable status enable register is true.
4	16	Message Available (MAV)	This bit is set to true when a request is received from the digital programming interface and the PCR is ready to output the data byte.
5	32	Standard Event Status Bit Summary (ESB)	This bit is set to true when a bit is set in the event status register.
6	64	Request Service (RQS)	This bit is set to true when a bit is set in the service request enable register, and the corresponding bit exists in the status byte. The SRQ line of the GPIB is set.
		Master Status Summary (MSS)	This bit is set to true when a bit in the status byte register is set to 1 and the corresponding bit in the service request enable register is set to 1.
7	128	Operation Status Register (OPER)	This bit is set to true when a bit is set in the OPERation event status register and the corresponding bit in the OPERation status enable register is set.
8 to 15		Not Used	--

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Event status register

The event status register bits are set when certain events occur during PCR operation. All bits of the event status register are set by the error event queue.

The register is defined by the IEEE488.2 standard and is controlled by the IEEE488.2 common commands *ESE, *ESE?, and *ESR?.

See SYST:ERR? for the descriptions of the errors.

Bit	Bit weight	Bit name	Description	Error code
0	1	Operation Complete(OPC)	Set when an *OPC command is received and all operations in standby are complete.	-800 to -899
1	2	Request Control (RQC)	Not used	--
2	4	Query Error(QYE)	Set when an attempt is made to read data from the output queue when there is no output or the error queue is in wait status. Indicates that there is no data in the error queue.	-400 to -499
3	8	Device Dependent Error(DDE)	Set when there is a device-specific error.	-300 to -399, 100 to 999
4	16	Execution Error(EXE)	Set when the PCR evaluates that the program data following the header is outside the formal input range or does not match the performance of the PCR. This indicates that a valid SCPI command may not be executed correctly depending on the conditions of the PCR.	-200 to -299
5	32	Command Error(CME)	Set when an IEEE 488.2 syntax error is detected, when an unidentifiable header is received, or when a group execution trigger enters the internal IEEE 488.2 SCPI command input buffer.	-100 to -199
6	64	Reserved	Not used	--
7	128	Power ON(PON)	Set when the power is turned on.	--
8 to 15		Reserved	Not used	--

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OPERation status register （PCR-M）

The OPERation status register is a 16-bit register that contains conditions that are part of the PCR normal operations.

Bit	Bit weight	Bit name	Description
0	1	NOT USED	--
1	2	NOT USED	--
2	4	NOT USED	--
3	8	NOT USED	--
4	16	MEASuring *1	Indicates whether measurement is in progress on the PCR.
5	32	Waiting for TRIGger *2	Indicates whether the PCR is waiting for a trigger (TRIG)
6	64	NOT USED	--
7	128	NOT USED	--
8	256	CV	CV output
9	512	NOT USED	--
10	1024	NOT USED	--
11	2048	NOT USED	--
12	4096	NOT USED	--
13	8192	NOT USED	--
14	16384	NOT USED	--
15	32768	NOT USED	Always zero

*1. A summary bit of the STAT:OPER:MEAS register. Further detailed information can be obtained by referring to this register.
*2. A summary bit of the STAT:OPER:TRIG register. Further detailed information can be obtained by referring to this register.

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STAT:OPER

Queries the event of the OPERation status register.
A query clears the contents of the register.

Command

```
STATus:OPERation[:EVENt]?
```

Response

Returns the event of the OPERation status register in NR1 format.

STAT:OPER:COND

Queries the condition of the OPERation status register.

A query does not clear the contents of the register.

Command

```
STATus:OPERation:CONDition?
```

Response

Returns the condition of the OPERation status register in NR1 format.

STAT:OPER:ENAB

Sets the enable register of the OPERation status register.

Command

```
STATus:OPERation:ENABle <NR1>

STATus:OPERation:ENABle?
```

Parameter

Value : 0 to 32767

Response

Returns the enable register setting of the OPERation status register in NR1 format.

STAT:OPER:NTR

Sets the negative transition of the OPERation status register.

Command

```
STATus:OPERation:NTRansition <NR1>

STATus:OPERation:NTRansition?
```

Parameter

Value : 0 to 32767

Response

Returns the negative transition of the OPERation status register in NR1 format.

STAT:OPER:PTR

Sets the positive transition of the OPERation status register.

Command

```
STATus:OPERation:PTRansition <NR1>

STATus:OPERation:PTRansition?
```

Parameter

Value : 0 to 32767

Response

Returns the positive transition of the OPERation status register in NR1 format.

QUEStionable status register （PCR-M）

The QUEStionable status register is a 16-bit register that stores information related to the questionable events and status during PCR operation.

These register bits may indicate problems with the measured data of the PCR.

Bit	Bit weight	Bit name	Description
0	1	OV(Over Voltage Protection)	Overvoltage protection has been activated
1	2	OC(Over Current Protection)	Overcurrent protection has been activated
2	4	DSP(DSP error)	Device error has occurred
3	8	UNR(UNRegulated)	Undervoltage protection has been activated
4	16	OT(Over Temperature Protection)	Overtemperature protection has been activated
5	32	Not Used	--
6	64	Not Used	--
7	128	MEM(Memory)	Memory data is invalid
8	256	CAL(CALibration)	Calibration data is invalid
9	512	OP(Over Power protection)	Overpower protection has been activated
10	1024	CL-PEAK(Current Limit on PEAK)	Current limit control has been activated
11	2048	PL(Power Limit)	Overpower overload has been activated
12	4096	CL-RMS(Current Limit on RMS)	Overcurrent (peak) overload has been activated
13	8192	Not Used	--
14	16384	Not Used	--
15	32768	Not Used	Always zero

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STAT:QUES

Queries the event of the QUEStionable status register.
A query clears the contents of the register.

Command

```
STATus:QUEStionable[:EVENt]?
```

Response

Returns the event of the QUEStionable status register in NR1 format.

STAT:QUES:COND

Queries the condition of the QUEStionable status register.

A query does not clear the contents of the register.

Command

```
STATus:QUEStionable:CONDition?
```

Response

Returns the condition of the QUEStionable status register in NR1 format.

STAT:QUES:ENAB

Sets the enable register of the QUEStionable status register.

Command

```
STATus:QUEStionable:ENABle <NR1>

STATus:QUEStionable:ENABle?
```

Parameter

Value : 0 to 32767

Response

Returns the enable register setting of the QUEStionable status register in NR1 format.

STAT:QUES:NTR

Sets the negative transition of the QUEStionable status register.

Command

```
STATus:QUEStionable:NTRansition <NR1>

STATus:QUEStionable:NTRansition?
```

Parameter

Value : 0 to 32767

Response

Returns the negative transition of the QUEStionable status register in NR1 format.

STAT:QUES:PTR

Sets the positive transition of the QUEStionable status register.

Command

```
STATus:QUEStionable:PTRansition <NR1>

STATus:QUEStionable:PTRansition?
```

Parameter

Value : 0 to 32767

Response

Returns the positive transition of the QUEStionable status register in NR1 format.

STAT:PRES

Resets the ENABle, PTRansition, and NTRansition filter registers of all status registers (including sub registers) to their default values.

Default values:

STATus:ENABle = 0x0000

STATus:PTRansition = 0x7FFF

STATus:NTRansition = 0x0000

Command

```
STATus:PRESet
```

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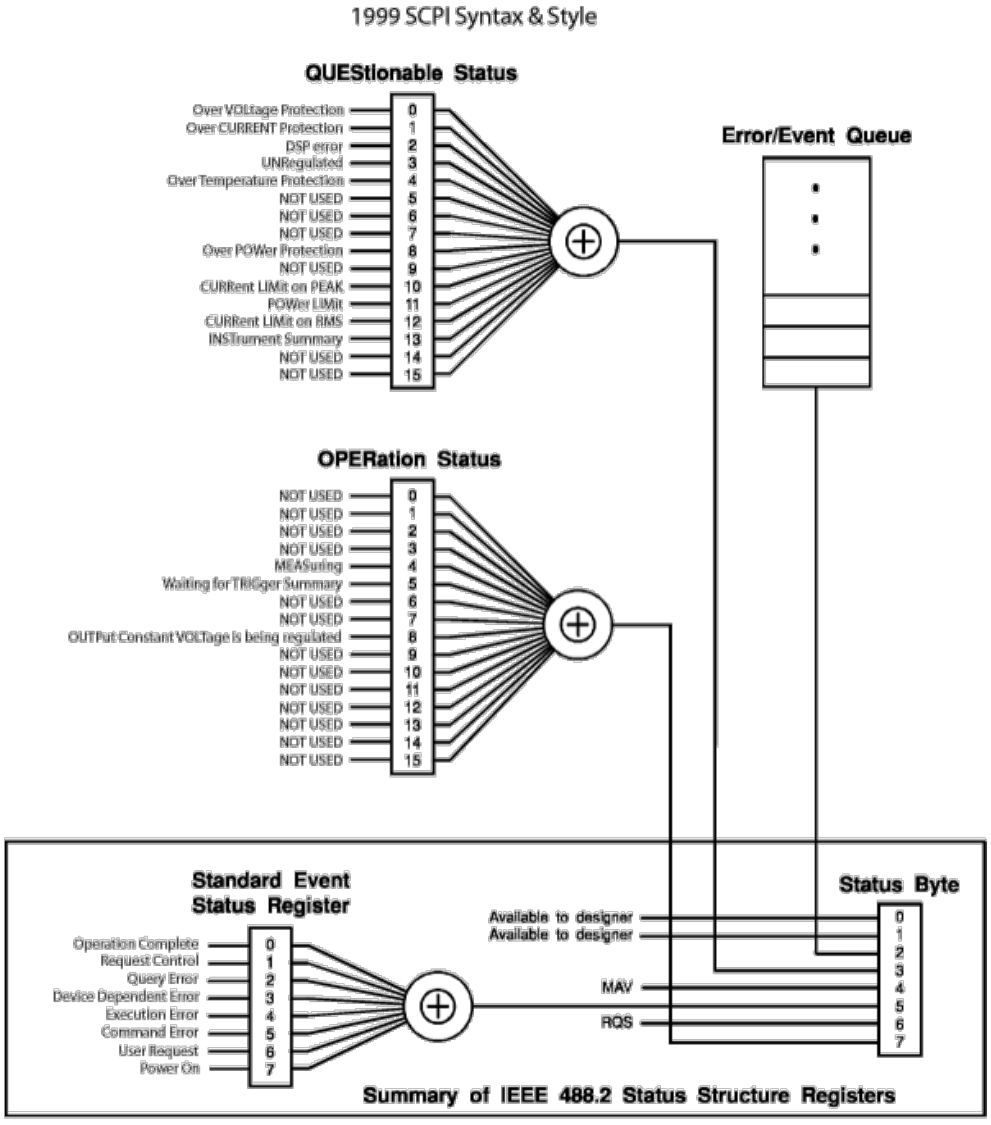
Registers

Register Structure

Status report function（PCR-M）

The SCPI status register structure is shown in the figure below. The character "+" represents the logical sum of the register bits.



The use of Bit 15 is not allowed since some controllers may have difficulty reading a 16 bit unsigned integer. The value of this bit shall always be 0.

Paritally changed SCPI Standard 1999.0 Volume1 fig.9

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Panel display of the PCR-M

The display of the PCR-M series with firmware version 1.20 or later operates as a monitor. It displays the present value that is being delivered to the load.

The display of the PCR-M series with firmware version 1.19 or earlier displays the value that was measured using the INIT or MEASure command. Therefore, the PCR-M display shows "----," which signifies that there is no data, in the following cases.

- When the front panel control switches from local to remote.
- When the PCR-M is in a condition in which valid measurement data cannot be queried.
- When the measurement is not complete.
- When the *RST or *RCL command is sent.

On firmware version 1.19 or earlier, the voltmeter and ammeter on the front panel display are refreshed each time a new measurement is completed. If sequence operation auto continue mode is turned ON, automatic refreshing of the measured data is enabled so that the PCR-M operates as a monitor.

```
:INITiate:CONTinuous:SEQuence3 ON

:TRIGger:SEQuence3:SOURce IMM
```

When continuous operation is enabled, measurement data and the front panel displays are automatically refreshed by the internal trigger loop. In this state, MEASure/READ/FECh query commands work equivalently. This means that sending multiple FETCh queries results in different measurement results, and simultaneity is lost.

When the continuous operation is enabled, the ABORt command is virtually ignored because the trigger subsystem automatically exits the IDLE state even if it is aborted.

The *RST/*RCL command resets the continuous operation to off.

NOTE

The panel display operation is different on a PCR-M with firmware version 1.19 or earlier and on a PCR-M with firmware version 1.20 or later. However, programs created for a PCR-M with firmware version 1.19 or earlier still run on a PCR-M with firmware version 1.20 or later (except for control of panel display at timing of measurement).

State of Sequence

The three states (IDLE state, INITiated state, and WTG tate) are available in the sequence operation.

IDLE state

When the PCR-M/ PCR-LE/PCR-LE2 is turned on, all the trigger subsystems are in the IDLE state. In this state, the trigger subsystems ignore all triggers. Sending one of the following commands at any time also returns the trigger subsystems to the IDLE state.

The sequence does not start in the IDLE state, even when TRG is sent.

:ABORt (":INIT:CONT OFF;:ABOR" on the PCR-M if the auto continue mode is turned on)

*RST

*RCL

IEEE488.1 sdc(Selected Device Clear) or dcl(Device Clear)

INITiated state

If INIT is sent in the IDLE state, the trigger function starts and the PCR-M/ PCR-LE/PCR-LE2 enters the INITiated state.

If the trigger source is set to IMMediate, the settings are changed immediately, or the measurement, power line abnormality simulation, or sequence starts immediately.

If the trigger source is set to BUS, the PCR-M/ PCR-LE/PCR-LE2 enters the WTG (Waiting for Trigger) state.

WTG (Waiting for Trigger) state

If a trigger is received in the WTG state, the settings are changed, or the measurement, power line abnormality simulation, or sequence starts.

Auto continue mode (TRANSIENT and ACQUIRE of PCR-M only)

If auto continue mode is turned on, measured data is automatically refreshed without having to send the INIT command each time. In normal cases, turn auto continue mode off (default).

If you are using the PCR-M series with firmware version 1.19 or earlier, see here.

When the sequence operation auto continue mode is turned on

When the trigger source is set to IMMediate, the settings are changed immediately, or the measurement, power line abnormality simulation, or sequence starts immediately. When the operation completes, the new change is made automatically, or the measurement, power line abnormality simulation, or sequence starts automatically. However, if auto continue mode is on, the MEASure, READ, and FETCh queries operate in the same manner. This means that sending multiple FETCh queries results in different measurement results, and simultaneity is lost.

When the trigger source is set to BUS, the PCR waits for a software trigger before making the change or starting the measurement, power line abnormality simulation, or sequence. When the operation has completed, the PCR waits for the next trigger.

The ABORt command to the measurement function is invalid, because the trigger subsystem automatically exits the IDLE state even if aborted. The *RST/*RCL command resets the continuous operation to off.

When the sequence operation auto continue mode is turned off

The change or measurement currently in progress continues unless ABOR is sent. The operation does not automatically continue to the new change or measurement.