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Introduction

This manual explains the settings and commands used for remotely controlling the PLZ-5W series (PLZ205W, PLZ405W, PLZ1205W) using the communication interface.

- RS232C
- USB
- LAN

How to read this manual

This manual is in HTML format that can be viewed with a WWW (World Wide Web) browser.

Related manuals

For the safety precautions, installation, operation, and specifications of the PLZ-5W, read the accompanying PLZ-5W 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.

Who should read this manual?

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

Familiarize yourself with the [syntax of the SCPI commandss](#) that are used with the PLZ-5W before you use them.

Structure of the manual

This manual consists of the following sections.

- Introduction
- Setup
- Overview of commands
- Commands¹
- Appendix
- Tutorial

¹ The list of commands is available also as a [PDF](#) file.

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Firmware version of the product to which this manual applies

This manual applies to products with the following firmware version:
Ver.1.0x

Measuring instrument interface standards

The PLZ-5W complies with 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
- TCP/IP-IEEE488.2 Instrument Interface Specification VXI-11.3
- IVI-6.1 IVI High-Speed LAN Instrument Protocol (HiSLIP) Rev 1.0
- LXI 1.4 Core Specification 2011

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Overview of commands

About Commands

The information that is transferred between the controller (the PC) and the PLZ-5W is referred to as "messages".
The PLZ-5W uses the SCPI language for these messages.
The messages that the PC sends to the PLZ-5W are commands. The messages that the PLZ-5W sends to the PC are responses.

Command hierarchy

SCPI is an ASCII-based command language that was designed for test and measuring equipment. The command structure is composed of the common roots and nodes that are the building blocks of the SCPI subsystem. A command consists of a program header, parameters, and punctuation marks.
The following table uses the SOURce subsystem as an example to explain the hierarchy.

Program header	Parameter	Node level
SOUR:		Root node
VOLT		2nd level
:PROT		3rd level
:STAT	<bool>	4th level
PROG		2nd level
:SEL		3rd level
:REN	<string>	4th level

A colon (:) separates a higher node from a lower node.

Command Syntax

In this manual, SCPI commands are expressed in the following format.

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

Basic Notation

- You can use long form and short form.
Long form: SCPI commands are written with all the characters.
Short form: SCPI commands are written by omitting the lowercase characters.
- No distinction is made between uppercase and lowercase.
CURRENT, Current, and current are all acceptable as long form notations.
CURR, Curr, and curr are all acceptable as short form notations.
- A space separates a program header and its parameters.
- Multiple parameters are separated by commas.
- Multiple commands are separated by semicolons.

```
VOLTage:PROTection:STATe ON;LOWer 10V
```

Input of the following two commands is equivalent to input of the above command.

```
VOLTage:PROTection:STATe ON  
VOLTage:PROTection:LOWer 10V
```

By using colons and semicolons, you can concatenate commands of different subsystems.

```
TRIGger:ACQuire:SOURce BUS;:INITiate:ACQuire
```

- The maximum length of a command that you can transmit on a single line is 128 bytes.

Special symbols

The special symbols that are used in SCPI commands are explained below.

- Characters and numbers enclosed between { } and delimited by "|" indicate that one of the delimited items is to be selected.
Do not include the { and } symbols in the actual program.
- <> denotes a parameter.
Do not include <> in the actual program.
- [] denotes optional data.
The data enclosed in square brackets ([]) can be omitted. If omitted, the default value is applied.
Do not include the [and] symbols in the actual program.

Query

You can query the PLZ-5W settings and status.
To make a query, append a question mark to the end of the program header section. If the query has parameters, insert a space after the question mark, and then write the parameters.

```
CURRent? MIN
```

Response

This is the response to a query. Responses are messages sent to the host PC from the PLZ-5W. They inform the PC about the status and measured values of the PLZ-5W.

NOTE

If you want to send two queries on separate lines, send the second query after you have received the response to the first one.

Program terminator

All commands must be terminated with a valid terminator.

	RS232C	USB	LAN	
			VXI-11, HiSLIP	SCPI-RAW
reception	LF	LF or EOM	LF or END	LF
transmission	LF	LF+EOM	LF+END	LF

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

NOTE

CR (ASCII 0x0D) is not a terminator.

Common commands

There are commands that are common to the IEEE-488.2 and SCPI standards for functions such as resetting devices and performing self-diagnoses. These common commands start with an asterisk ("*"). These commands may have one or multiple parameters.

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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.

SOURCE subsystem

SCPI command		Response	*RST	Description	R/W
Program header	Parameter				
ARB:APPL				Applies the I-V characteristics map and reflects it in the output.	W
ARB:CLE				Returns the I-V characteristics map to its default setting.	W
ARB:COUN	numeric	NR1	Yes	Sets the number of data points of the I-V characteristics map.	R/W
ARB:DATA	numeric	NRf	Yes	Sets the I-V characteristics map in block data format.	R/W
ARB:MAP	numeric	NR3	Yes	Sets the voltage and current values for the specified parts of the I-V characteristics map.	R/W
ARB:MAP:LIST?		NR3		Queries the entire contents of the I-V characteristics map.	R
COND	numeric	NR3	Yes	Sets the conductance in CR mode.	R/W
COND:EXT:FCON	bool	bool	Yes	Enables/disables external control of CR mode. (CURR:EXT:FCON alias)	R/W
COND:PULS:LEV	numeric	NR3	Yes	Sets the switching conductance.	R/W
COND:PULS:FREQ	numeric	NR3	Yes	Sets the switching frequency. (CURR:PULS:FREQ alias)	R/W
COND:PULS:DCYC	numeric	NR3	Yes	Sets the switching duty cycle. (CURR:PULS:DCYC alias)	R/W
COND:RANG	LOW MED HIGH	char	Yes	Sets the CR mode range. (CURR:RANG alias)	R/W
COND:RESP	NORM FAST	char	Yes	Sets the response speed in CR mode.	R/W
CURR	numeric	NR3	Yes	Sets the current in CC mode.	R/W
CURR:EXT:ACON	bool	bool	Yes	Enables/disables external superimposed input in CC mode.	R/W
CURR:EXT:FCON	bool	bool	Yes	Enables/disables external control in CC mode.	R/W
CURR:PROT	numeric	NR3	Yes	Sets the current value for overcurrent protection (OCP).	R/W
CURR:PROT:STAT	bool	bool	Yes	Sets whether to turn the load off when overcurrent protection (OCP) is activated.	R/W
CURR:PULS:LEV	numeric	NR3	Yes	Sets the switching current.	R/W
CURR:PULS:FREQ	numeric	NR3	Yes	Sets the switching frequency.	R/W
CURR:PULS:DCYC	numeric	NR3	Yes	Sets the switching duty cycle.	R/W
CURR:RANG	LOW MED HIGH	char	Yes	Set the range of CC mode.	R/W
CURR:SLEW	numeric	NR3	Yes	Sets the slew rate value.	R/W
CURR:SST	numeric	NR3	Yes	Sets the current's soft start time.	R/W
FUNC	CC CR CV CP ARB	char	Yes	Sets the operation mode.	R/W
FUNC:CVOP	bool	bool	Yes	Enables or disables +CV mode.	R/W
POW	numeric	NR3	Yes	Sets the power of CP mode.	R/W
POW:EXT:FCON	bool	bool	Yes	Enables/disables external control in CP mode. (CURR:EXT:FCON alias)	R/W
POW:PROT	numeric	NR3	Yes	Sets the power of overpower protection (OPP).	R/W
POW:PROT:STAT	bool	bool	Yes	Sets whether to turn the load off when overpower protection (OPP) is activated.	R/W
POW:RANG	LOW MED HIGH	char	Yes	Sets the CP mode range. (CURR:RANG alias)	R/W

SCPI command		Response	*RST	Description	R/W
Program header	Parameter				
PROG	string	string	Yes	Selects or deselects a programs.	R/W
PROG:CRE	string			Creates a new program of the specified name.	W
PROG:CURRE:PROT	numeric	NR3		Sets the current value for overcurrent protection (OCP) in the selected program.	R/W
PROG:CURRE:PROT:STAT	bool	bool		Sets the operation when overcurrent protection (OCP) is activated in the selected program.	R/W
PROG:CVOP:LEV	numeric	NR3		Sets the voltage at +CV (addition of CV mode) application in the selected program.	R/W
PROG:DEL	string			Deletes the program of the specified name.	W
PROG:LIST?		string		Retrieves the list of registered programs.	R
PROG:LOOP	numeric	NR1		Sets the number of times that the selected program will repeat.	R/W
	INF	char			
PROG:POW:PROT	numeric	NR3		Sets the power of overpower protection (OPP) in the selected program.	R/W
PROG:POW:PROT:STAT	bool	bool		Sets the operation to be performed when overpower protection (OPP) is activated in the selected program.	R/W
PROG:REN	string			Changes the name of the selected program.	W
PROG:SAVE				Saves the selected program.	W
PROG:STEP<n>:DWEL	numeric	NR3		Sets the step execution time at the specified step of the selected program.	R/W
PROG:STEP<n>:INP	bool	bool		Sets whether to turn the load on at the specified step of the selected program.	R/W
PROG:STEP<n>:LEV	numeric	NR3		Sets the load at the specified step of the selected program.	R/W
PROG:STEP<n>:OUTP	bool	bool		Sets whether to turn the load on at the specified step of the selected program.	R/W
PROG:STEP<n>:SLEW	numeric	NR3		Sets the slew rate at the specified step of the selected program.	R/W
PROG:STEP<n>:TRIG:GEN	char	char		Sets whether to perform trigger output at the specified step of the selected program.	R/W
PROG:STEP<n>:TRIG:WAIT	char	char		Sets trigger wait at the specified step of the selected program.	R/W
PROG:STEPS:COUN	numeric	NR1		Sets the number of steps to be registered to the selected program.	R/W
PROG:VOLT:PROT:LOW	numeric	NR3		Sets the voltage of underpower protection (UVP) in the selected program.	R/W
PROG:VOLT:PROT:STAT	bool	bool		Enables/disables undervoltage protection (UVP) in the selected program.	R/W
VOLT	numeric	NR3	Yes	Sets the voltage of CV mode.	R/W
VOLT:EXT:FCON	bool	bool		Enables/disables external control in CV mode.	R/W
VOLT:PROT:LOW	numeric	NR3	Yes	Sets the voltage of underpower protection (UVP).	R/W
VOLT:PROT:STAT	bool	bool	Yes	Enables/disables undervoltage protection (UVP).	R/W
VOLT:RANG	LOW HIGH	char	Yes	Sets the range of CV mode.	R/W
VOLT:RESP	NORM FAST	char	Yes	Sets the response speed in CV mode.	R/W

INPut/OUTPut subsystem

SCPI command		Response	*RST	Description	R/W
Program header	Parameter				
INP OUTP	bool[,numeric]	bool	Yes	Sets load on/off. Only when load is set to on, specify the duration to keep the load turned on.	R/W
INP:EXT:LOG OUTP:EXT:LOG	POS NEG	char	Yes	Sets the signal logic for external control input.	R/W
INP:MSYN OUTP:MSYN	bool			Synchronizes the load on/off operation on synchronized PLZ-5Ws.	W
INP:MSYN:ACC OUTP:MSYN:ACC	bool	bool	Yes	Sets whether to accept load on/off sync signal (IMP:MSYN) input from other synchronized devices.	R/W
INP:PON:STAT OUTP:PON:STAT	RST RCL0 AUTO	char		Sets the panel setting state at power-on.	R/W
INP:PROT:CLE OUTP:PROT:CLE				Clears the protection mode.	W
INP:PROT:WDOG OUTP:PROT:WDOG	bool	bool		Sets the watchdog protection function on/off.	R/W
INP:PROT:WDOG:DEL OUTP:PROT:WDOG:DEL	numeric	NR3		Sets the delay time of the watchdog protection function.	R/W
INP:SHOR OUTP:SHOR	bool	bool	Yes	Sets short function execution/release.	R/W

FETCh/READ/MEASure subsystem

SCPI command		Response	*RST	Description	R/W
Program header	Parameter				
FETC? READ? MEAS?		NR3		Queries the measured value at a single point.	R
FETC:CAP? READ:CAP? MEAS:CAP?		NR3		Queries the capacity (Ah) at a single point.	R
FETC:CURR? READ:CURR? MEAS:CURR?		NR3		Queries the current (A) at a single point.	R
FETC:ENER? READ:ENER? MEAS:ENER?		NR3		Queries the power (Wh) at a single point.	R
FETC:ETIM? READ:ETIM? MEAS:ETIM?		NR3		Queries the elapsed time (s) at a single point.	R
FETC:POW? READ:POW? MEAS:POW?		NR3		Queries the power (W) at a single point.	R
FETC:VOLT? READ:VOLT? MEAS:VOLT?		NR3		Queries the voltage (V) at a single point.	R

TRIGger subsystem

SCPI command		Response	*RST	Description	R/W
Program header	Parameter				
ABOR				Stops all the trigger functions.	W
ABOR:ACQ				Stops the measurement trigger function.	W
ABOR:TRAN				Stops the sequence trigger function.	W
ABOR:PULS				Stops the switching function (PULSe).	W
INIT:ACQ				Switches to measurement trigger wait state.	W
INIT:TRAN:PROG				Switches to the sequence trigger wait state in the program selected by PROG.	W
INIT:PULS				Executes the switching function (PULSe).	W
TRIG:ACQ:COUN	numeric	NR1	Yes	Sets the number of times measurement values are to be recorded.	R/W
	INF	char			
TRIG:ACQ:DEL	numeric	NR3	Yes	Sets the delay time for applying measurement triggers.	R/W
TRIG:ACQ:MSYN				Starts measurement simultaneously on synchronized PLZ-5Ws.	W
TRIG:ACQ:SOUR	char	char	Yes	Sets the measurement trigger source.	R/W
TRIG:ACQ:INT:STAT	bool	bool	Yes	Sets whether to measure at intervals when TRIG:ACQ:COUN is 2 or higher.	R/W
TRIG:ACQ:INT:TIME	numeric	NR3	Yes	Sets the measurement interval time when TRIG:ACQ:INT:STAT is set to ON.	R/W
TRIG:TRAN:DEL	numeric	NR3	Yes	Sets the delay time for applying sequence triggers.	R/W
TRIG:TRAN:EXEC?		char		Queries the execution state of the sequence trigger function and the switching function.	R
TRIG:TRAN:MSYN				Starts a sequence simultaneously on synchronized PLZ-5Ws.	W
TRIG:TRAN:RES				Pauses a sequence that is being executed.	W
TRIG:TRAN:SOUR	char	char	Yes	Sets the sequence trigger source.	R/W
TRIG:TRAN:SUSP				Resumes a sequence that has been paused.	W

DATA subsystem

SCPI command		Response	*RST	Description	R/W
Program header	Parameter				
DATA:BSIZ	numeric	NR1	Yes	Sets the buffer size of the data logger function.	R/W
DATA:FORM	char	char	Yes	Sets the response format to be used when referencing data in the data logger.	R/W
DATA:INT:GATE	NONE LOAD_ON PROG_RUN	char	Yes	Sets the integration operation time.	R/W
DATA:INT:GATE:ARES	bool	bool	Yes	Sets whether past integration is reset at the start of the integration operation.	R/W
DATA:INT:RES				Resets all the integrated data (capacity, energy, elapse time).	W
DATA:INT:STAR				Manually starts the integration operation.	W
DATA:INT:STOP				Manually stops the integration operation.	W
DATA:POIN?		NR1		Queries the number of measurement points registered in the data logger.	R
DATA:R?		NR3		Queries the measurement data registered in the data logger from oldest to youngest.	R

SYSTem subsystem

SCPI command		Response	*RST	Description	R/W
Program header	Parameter				
SYST:BEEP	bool	NR1		Collectively sets the beep sounds on/off.	R/W
SYST:BEEP:KEY	bool	bool		Sets whether a beep sound is generated in case of invalid operation.	R/W
SYST:BEEP:PROT	bool	bool		Sets whether a beep sound is generated when a protection is activated.	R/W
SYST:BEEP:SCPI	bool	bool		Sets whether a beep sound is generated in case of SCPI error.	R/W
SYST:COMM:RLST	LOC REM RWL	char		Sets the PWX to remote mode or local mode.	R/W
SYST:CONF:DIGITAL2:DIR	INP OUTP	char		Sets I/O direction of DIGITAL2 signal.	R/W
SYST:CONF:MSYN:IND?	bool	NR1		Queries whether mutual synchronization connection is enabled or disabled.	R
SYST:CONF:RSEN	bool	bool		Sets remote sensing function on/off.	R/W
SYST:DATE	NR1	NR1		Sets the date.	R/W
SYST:ERR?		string		Reads error information.	R
SYST:ERR:COUN?		NR1		Queries the number of unread errors.	R
SYST:KLOC	bool	bool		Panel control lock.	R/W
SYST:KLOC:LEV	1 2 3	NR1		Sets the lock level of panel operation.	R/W
SYST:PASS	string			Enables a password-protected command.	W
SYST:PASS:CDIS	string			Disables a password-protected command.	W
SYST:PASS:NEW	string			Sets the password.	W
SYST:PASS:STAT?		NR1		Queries whether a password-protected command is valid or invalid.	R
SYST:SEC:IMM				Deletes the user data according to the NISPOM requirements and restores the factory default settings.	W
SYST:SSAV	bool	bool		Sets screen saver on/off.	R/W
SYST:SSAV:DEL	numeric	NR3		Sets the time until the screen saver starts.	R/W
SYST:TIME	NR1	NR1		Sets the time.	R/W
SYST:TIME:ADJ				Automatically adjusts the system clock.	W
SYST:TZON	string	string		Sets the time zone of the system clock.	R/W
SYST:TZON:CAT?		string		Queries all the time zone IDs that can be used.	R
SYST:VERS?		NRf		Queries the SCPI specification version that the PLZ-5W complies with.	R

STATus subsystem

SCPI command		Response	*RST	Description	R/W
Program header	Parameter				
STAT:OPER?		NR1		OPERation status register: event	R
STAT:OPER:COND?		NR1		OPERation status register: register condition	R
STAT:OPER:ENAB	NR1	NR1		OPERation status register: enable	R/W
STAT:OPER:PTR	NR1	NR1		OPERation status register: positive transition	R/W
STAT:OPER:NTR	NR1	NR1		OPERation status register: negative transition	R/W
STAT:QUES?		NR1		QUEStionable status register: event	R
STAT:QUES:COND?		NR1		QUEStionable status register: register condition	R
STAT:QUES:ENAB	NR1	NR1		QUEStionable status register: enable	R/W
STAT:QUES:PTR	NR1	NR1		QUEStionable status register: positive transition	R/W
STAT:QUES:NTR	NR1	NR1		QUEStionable status register: negative transition	R/W
STAT:PRES				Resets the status register.	W

Other subsystems

SCPI command		Response	*RST	Description	R/W
Program header	Parameter				
DISP:ETIM	bool	bool	Yes	Sets whether to display the elapsed time on the display.	R/W
DISP:CAP	bool	bool	Yes	Sets whether to display the current capacity on the display.	R/W
DISP:ENER	bool	bool	Yes	Sets whether to display the power capacity on the display.	R/W
HCOP:SDUM:DATA?		NRf		Retrieves the display screen capture.	R
MEM:REC	1 2 3			Recalls preset memory.	W
MEM:SAVE	1 2 3			Saves to preset memory.	W
SENS:APER	numeric	NR3	Yes	Sets the measurement time.	R/W

IEEE 488.2 common commands

IEEE488.2 Common com- mand	Parameter	Description	R/W
*CLS		Clears all the event registers.	W
*ESE	NR1	Sets the event status enable register bits.	R/W
*ESR?		Queries the event status register.	R
*IDN?		Queries the manufacturer information.	R
*OPC		Generates an operation completion message in the event status register when the commands that are in standby have been processed.	R/W
*OPT?		Queries the optional interfaces that are installed in the PLZ-5W.	R
*PSC	bool	Sets whether to initialize *ESE and *SRE when the POWER switch is turned on.	R/W
*RCL	NR1	Recalls panel settings from the specified memory number.	
*RST		Resets the PLZ-5W.	W
*SAV	NR1	Saves the present settings to memory.	
*SRE	NR1	Sets the service request enable register bits.	R/W
*STB?		Reads the status byte and master summary status bits.	R
*TRG		Trigger command.	W
*TST?		Executes a self test.	R
*WAI		Prevents execution of subsequent commands or queries until all operations that are in standby have completed.	W

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Setup

Installing the VISA library

About the VISA Library

VISA (Virtual Instrument Software Architecture) was developed by the IVI Foundation. It is the standard specification for measurement instrument connection software.

To use the VISA library (VISA COM) with the I/O library, the VISA library (NI-VISA, Agilent VISA, or KI-VISA) must be installed on the controller (a Windows PC).

To use the LAN interface to control the PLZ-5W, middleware that supports the VXI-11 protocol or HiSLIP protocol must be installed on the controller. The middleware is installed automatically by the VISA library.

You must install one of the following to use VISA libraries (driver software that is implemented according to the VISA specifications).

- NI-VISA by National Instruments Corporation (Ver. 5.1.1 or later)
- Keysight VISA by Keysight Technologies (formerly, Agilent Technologies) (Keysight IO Libraries Suite 16.0 or later)
- KI-VISA Ver. 5.0.4 or later

NOTE

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

Installing KI-VISA

NOTE

Do not install multiple VISA libraries on the same PC. Doing so may cause errors. If NI-VISA or Agilent VISA is already installed on your PC, you do not need to install KI-VISA.

KI-VISA is a KIKUSUI version of the I/O library.

You can download the most recent version of this library from the Kikusui Electronics Corporation website (<http://www.kikusui.co.jp/download/>).

1. Put the included CD-ROM into the CD-ROM drive.

2. Move to the VISA folder using 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.

NOTE

kivisa_5_5_x(x64).exe contains two software packages, KI-VISA (x64) and KI-VISA (WOW64). When KI-VISA (x64) has been successfully installed, the installation of KI-VISA (WOW64) begins. Be sure to confirm that the installation of KI-VISA (WOW64) has finished successfully.

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Setup

Setting Up the Interface

The RS232C, USB, and LAN interface are installed as standard on the PLZ-5W.

- [RS232C](#)
- [USB](#)
- [LAN](#)
- [Accessing and operating the PLZ-5W from a Web browser \(LAN interface\)](#)

NOTE

There is no need to switch interfaces. All interfaces can be used simultaneously.

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Overview of commands

Parameter

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

The program data expression format that the PLZ-5W series uses is shown below.

Non-numeric parameters

String data (String)

String data is used when a series of ASCII characters (20H to 7EH) are requested.

Enclose strings in single (' ') or double quotation (" ") marks. The opening and closing quotation marks must match (you cannot mix single and double quotation marks).

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

If you want to include a quotation mark as part of the string, enter consecutive quotation marks (with no characters between them).

Character data (Character)

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

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

Boolean data (Boolean)

Boolean data is used to express a condition of 1 or 0, or ON or OFF. Responses are returned as 1 or 0.

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

Numeric parameters

NR1

Represents an integer value.

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

NR2

Represents a real number in floating-point format.

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

NR3

Represents a real number in scientific notation.

Details are given in the "IEEE 488.2 Standard Digital Interface for Programmable Instrumentation." If 380 is returned in the response data, it is returned as +3.80000E+02. Five decimal places are used.

NRf

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

Numeric

Numeric parameter for values such as the decimal point, optional prefixes, and measurement units.

Numbers are expressed the same as NRf.

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

You can also use units such as V, A, and W in numeric parameters.

If a value that cannot be set is entered, an error occurs.

Special form numeric parameters

The special form numeric parameters MINimum and MAXimum can be used as substitutes for the actual maximum and minimum values when the parameter is numeric.

The following example sets the overcurrent protection value to the minimum value.

```
SOURce:CURRent MINimum
```

You can query the minimum and maximum values for most parameters.

```
SOURce:CURRent? MAX
SOURce:CURRent? MIN
```

Measurement units

The default measurement units are listed below. Commands are accepted even if measurement units are not specified.

V (voltage)	A (current)	W (power)	SIE (conductance)
S (second)	HZ (frequency)	PCT (%)	

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 contain lowercase characters. The IEEE standard uses uppercase characters. SCPI commands are not case sensitive.
- Commands are accepted whether or not measurement units are specified.
- To enter "μ" in the data, use "U" instead.

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Overview of commands

Default State

When the PLZ-5W is switched to the following default states, there are settings whose values are changed.

- *RST command transmission
- *RCL command transmission
- Power on
- Factory default ([SYST:SEC:IMM](#) transmission)

The following tables list the values of the settings that change after they have changed.

SOURce subsystem

Setting item	Value				Unit
	*RST	*RCL	Power on	Factory default	
ARB:COUN	3	Depends on the settings in memory	Depends on PON setting	3	--
COND	0.0	Depends on the settings in memory	Depends on PON setting	0.0	SIE
COND:EXT:FCON	OFF	Depends on the settings in memory	Depends on PON setting	OFF	--
COND:PULS:LEV	0.0	Depends on the settings in memory	Depends on PON setting	0.0	SIE
COND:PULS:FREQ	1.0	Depends on the settings in memory	Depends on PON setting	1.0	HZ
COND:PULS:DCYC	50	Depends on the settings in memory	Depends on PON setting	50	PCT
COND:RANG	HIGH	Depends on the settings in memory	Depends on PON setting	HIGH	--
COND:RESP	NORM	Depends on the settings in memory	Depends on PON setting	NORM	--
CURR	0.0	Depends on the settings in memory	Depends on PON setting	0.0	A
CURR:EXT:FCON	OFF	Depends on the settings in memory	Depends on PON setting	OFF	--
CURR:EXT:ACON	OFF	Depends on the settings in memory	Depends on PON setting	OFF	--
CURR:PULS:LEV	0.0	Depends on the settings in memory	Depends on PON setting	0.0	A
CURR:PULS:DCYC	50	Depends on the settings in memory	Depends on PON setting	50	PCT
CURR:PULS:FREQ	1.0	Depends on the settings in memory	Depends on PON setting	1.0	Hz
CURR:RANG	HIGH	Depends on the settings in memory	Depends on PON setting	HIGH	--
CURR:PROT	MAX	Depends on the settings in memory	Depends on PON setting	MAX	A
CURR:PROT:STAT	OFF	Depends on the settings in memory	Depends on PON setting	OFF	--
CURR:SLEW	MIN	Depends on the settings	Depends on PON	MIN	A/μs

		in memory	setting		
CURR:SST	MIN	Depends on the settings in memory	Depends on PON setting	MIN	S
FUNC	CC	Depends on the settings in memory	Depends on PON setting	CC	--
FUNC:CVOP	OFF	Depends on the settings in memory	Depends on PON setting	OFF	--
POW	0.0	Depends on the settings in memory	Depends on PON setting	0.0	V
POW:EXT:FCON	OFF	Depends on the settings in memory	Depends on PON setting	OFF	--
POW:RANG	HIGH	Depends on the settings in memory	Depends on PON setting	HIGH	--
POW:PROT	MAX	Depends on the settings in memory	Depends on PON setting	MAX	W
POW:PROT:STAT	OFF	Depends on the settings in memory	Depends on PON setting	OFF	--
PROG	""(No selection)				--
VOLT	0.0	Depends on the settings in memory	Depends on PON setting	0.0	V
VOLT:EXT:FCON	OFF	Depends on the settings in memory	Depends on PON setting	OFF	--
VOLT:RANG	HIGH	Depends on the settings in memory	Depends on PON setting	HIGH	--
VOLT:PROT:LOW	0.0	Depends on the settings in memory	Depends on PON setting	0.0	V
VOLT:PROT:STAT	OFF	Depends on the settings in memory	Depends on PON setting	OFF	--
VOLT:RESP	NORM	Depends on the settings in memory	Depends on PON setting	NORM	--

OUTPut/INPut subsystem

Setting item	Value				Unit
	*RST	*RCL	Power on	Factory default	
INP OUTP	OFF	Depends on the settings in memory	Depends on PON setting	OFF	--
INP:EXT:LOG OUTP:EXT:LOG	POS	Depends on the settings in memory	Depends on PON setting	POS	--
INP:MSYN:ACC OUTP:MSYN:ACC	OFF	Depends on the settings in memory	Depends on PON setting	OFF	--
INP:PON:STAT OUTP:PON:STAT	No change		Value at previous POWER off	AUTO	--
INP:PROT:WDOG OUTP:PROT:WDOG	No change		Value at previous POWER off	OFF	--
INP:PROT:WDOG:DEL OUTP:PROT:WDOG:DEL	No change		Value at previous POWER off	60	S
INP:SHOR OUTP:SHOR	OFF	Depends on the settings in memory	Depends on PON setting	OFF	--

TRIG subsystem

Setting item	Value				Unit
	*RST	*RCL	Power on	Factory default	
TRIG:ACQ:COUN	1	Depends on the settings in memory	Depends on PON setting	1	--
TRIG:ACQ:DEL	0	Depends on the settings in memory	Depends on PON setting	0	S

		in memory	setting		
TRIG:ACQ:SOUR	IMM	Depends on the settings in memory	Depends on PON setting	IMM	--
TRIG:ACQ:INT:STAT	OFF	Depends on the settings in memory	Depends on PON setting	OFF	--
TRIG:ACQ:INT:TIME	0.1	Depends on the settings in memory	Depends on PON setting	0.1	S
TRIG:TRAN:DEL	0.0	Depends on the settings in memory	Depends on PON setting	0.0	S
TRIG:TRAN:SOUR	IMM	Depends on the settings in memory	Depends on PON setting	IMM	--

DATA subsystem

Setting item	Value				Unit
	*RST	*RCL	Power on	Factory default	
DATA:BSIZ	1024	Depends on the settings in memory	Depends on PON setting	1024	--
DATA:FORM	CURR,VOL,POW	Depends on the settings in memory	Depends on PON setting	CURR,VOL,POW	--
DATA:INT:GATE	LOAD ON	Depends on the settings in memory	Depends on PON setting	LOAD ON	--
DATA:INT:GATE:ARES	ON	Depends on the settings in memory	Depends on PON setting	ON	--

SYSTem subsystem

Setting item	Value				Unit
	*RST	*RCL	Power on	Factory default	
SYST:BEEP	No change		Value at previous POWER off	ON	--
SYST:BEEP:KEY	No change		Value at previous POWER off	ON	--
SYST:BEEP:PROT	No change		Value at previous POWER off	ON	--
SYST:BEEP:SCPI	No change		Value at previous POWER off	ON	--
SYST:COMM:RLST	No change		LOCAL		--
SYST:CONF:DIGITAL2:DIR	No change		Value at previous POWER off	INP	--
SYST:CONF:RSEN	No change		Value at previous POWER off	OFF	--
SYST:KLOC	No change		Value at previous POWER off	OFF	--
SYST:KLOC:LEV	No change		Value at previous POWER off	3	--
SYST:PASS:NEW	No change		Value at previous POWER off	""	--
SYST:SSAV	No change		Value at previous POWER off	OFF	--
SYST:SSAV:DEL	No change		Value at previous POWER off	60	S
SYST:TZON	No change		No change	UTC	--

STATus subsystem

Setting item	Value				Unit
	*RST	*RCL	Power on	Factory default	
STAT:OPER:ENAB	No change		0		--
STAT:OPER:PTR	No change		32767		--
STAT:OPER:NTR	No change		0		--
STAT:QUES:ENAB	No change		0		--
STAT:QUES:PTR	No change		32767		--
STAT:QUES:NTR	No change		0		--

Other subsystems

Setting item	Value				Unit
	*RST	*RCL	Power on	Factory default	
DISP:ETIM	OFF	Depends on the settings in memory	Depends on PON setting	OFF	--
DISP:CAP	OFF	Depends on the settings in memory	Depends on PON setting	OFF	--
DISP:ENER	OFF	Depends on the settings in memory	Depends on PON setting	OFF	--
SENS:APER	0.1	Depends on the settings in memory	Depends on PON setting	0.1	S

IEEE 488.2 common command

Setting item	Value				Unit
	*RST	*RCL	Power on	Factory default	
*ESE	No change		Depends on PSC setting	0	--
*PSC	No change		Value at previous POWER off	ON	--
*SRE	No change		Depends on PSC setting	0	--

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Commands (Function/Subsystem)

IEEE 488.2 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 manufacturer information
*OPC	Generates an operation completion message in the event status register when the commands that are in standby have been processed
*OPT?	Queries the optional interfaces that are installed in the PLZ-5W
*PSC	Sets whether to initialize *ESE and *SRE when the POWER switch is turned on
*RCL	Recalls panel settings from the specified memory number
*RST	Resets the PLZ-5W
*SAV	Saves the present 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 execution of subsequent commands or queries until all operations that are in standby have completed

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Command (function search)

Load condition settings

Operation mode

FUNC	Sets the operation mode
FUNC:CVOP	Enables/disables +CV mode

Range

COND:RANG	Sets the conductance range
CURR:RANG	Sets the current range
POW:RANG	Sets the power range
VOLT:RANG	Sets the voltage range

Setting values

COND	Sets the conductance
CURR	Sets the current
POW	Sets the power
VOLT	Sets the voltage

Slew rate

CURR:SLEW	Sets the slew rate
---------------------------	--------------------

Soft start

CURR:SST	Sets the soft start time
--------------------------	--------------------------

Short function

INP:SHOR	Sets the short function
OUTP:SHOR	

Response speed

COND:RESP	Sets the response speed in CR mode
VOLT:RESP	Sets the response speed in CV mode

Switching

COND:PULS:LEV	Sets the switching conductance
CURR:PULS:LEV	Sets the switching current
COND:PULS:FREQ	Sets the switching frequency
CURR:PULS:FREQ	
COND:PULS:DCYC	Sets the switching duty cycle
CURR:PULS:DCYC	

Remote sensing

SYST:CONF:RSEN	Enables/disables remote sensing
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Command (function search)

Setting the Protection Function and Clearing the Alarm

Overcurrent protection (OCP)

[CURR:PROT](#) Sets the current in OCP

[CURR:PROT:STAT](#) Sets the operation of the PLZ-5W when OCP is activated

Overpower protection (OPP)

[POW:PROT](#) Sets the power in OPP

[POW:PROT:STAT](#) Sets the operation of the PLZ-5W when OPP is activated

Undervoltage protection (UVP)

[VOLT:PROT:LOW](#) Sets the voltage of UVP

[VOLT:PROT:STAT](#) Enables/disables UVP

Watchdog protection (WDP)

[INP:WDPPROT:WDOG](#)
[OUTP:PROT:WDOG](#) Enables/disables WDP

[INP:PROT:WDOG:DEL](#)
[OUTP:PROT:WDOG:DEL](#) Sets the delay time of WDP

Overcurrent protection (OCP) during program operation

[PROG:CURR:PROT](#) Sets the current value of OCP for program operation

[PROG:CURR:PROT:STAT](#) Sets how the PLZ-5W operates when OCP is activated during program operation

Overpower protection (OPP) during program operation

[PROG:POW:PROT](#) Sets the power value of OPP for program operation

[PROG:POW:PROT:STAT](#) Sets how the PLZ-5W operates when OPP is activated during program operation

Undervoltage protection (UVP) for program operation

[PROG:VOLT:PROT:LOW](#) Sets the voltage value of UVP for program operation

[PROG:VOLT:PROT:STAT](#) Enables or disables UVP for program operation

Clears alarms

[INP:PROT:CLE](#)
[OUTP:PROT:CLE](#) Clears alarms

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INPut OUTPut

Sets the load on/off. Only when load is set to on, the duration to keep the load turned on can be specified.

Command

```
INPut[:STATe] {ON|OFF|1|0}[, {<numeric>|MINimum|MAXimum}]  
OUTPut[:STATe] {ON|OFF|1|0}[, {<numeric>|MINimum|MAXimum}]  
INPut[:STATe]?  
OUTPut[:STATe]?
```

Parameter 1 {ON|OFF|1|0}

Value	ON(1)	Load on
	OFF(0)	Load off
*RST transmission	OFF(0)	

Parameter 2 {<numeric>|MINimum|MAXimum}

If parameter 1 is set to ON (1), specify the duration to keep the load turned on. When the duration passes, the load turns off. When omitted, the load does not turn off based on the elapsed time.

Value	0 to 3599999
Unit	S

Response

Returns the load on/off state in boolean format in response to the INP? or OUTP? query.

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Command (function search)

Measurement Function

Starting a measurement

[INIT:ACQ](#) Switches to measurement trigger wait state

Querying measured values

DATA:R?, FETC?, READ?, and MEAS? are used to query the measurement results. Each command is different in the following ways.

- DATA:R? queries measured values in chronological order. The queried measurement values are deleted from the data logger.
- FETC? does not wait for the measurement to finish. It queries the most recent measured value when the command is received. If there is no measured value, the measured value is queried after waiting for the completion of a single measurement. If [TRIG:ACQ:SOUR](#) is set to BUS, an error is returned.
- READ? starts a new measurement and queries the measured value after waiting for the completion of a single measurement. If [TRIG:ACQ:SOUR](#) is set to IMM, measurement starts immediately. If set to BUS, an error is returned. If set to any other value, measurement starts after a trigger is applied.
- MEAS? starts a new measurement after resetting (equivalent to [*RST](#)) the settings listed in ["Setting Measurement Conditions."](#) and queries a single measured value.

[DATA:R?](#) Queries measured values in chronological order

[FETC?](#)
[READ?](#) Queries the measured value at a single point
[MEAS?](#)

[FETCh:CAP?](#)
[READ:CAP?](#) Queries the capacity (Ah) at a single point
[MEAS:CAP?](#)

[FETC:CURR?](#)
[READ:CURR?](#) Queries the current (A) at a single point
[MEAS:CURR?](#)

[FETC:ENER?](#)
[READ:ENER?](#) Queries the power (Wh) at a single point
[MEAS:ENER?](#)

[FETC:ETIM?](#)
[READ:ETIM?](#) Queries the elapsed time (s) at a single point
[MEAS:ETIM?](#)

[FETC:POW?](#)
[READ:POW?](#) Queries the power (W) at a single point
[MEAS:POW?](#)

[FETC:VOLT?](#)
[READ:VOLT?](#) Queries the voltage (V) at a single point
[MEAS:VOLT?](#)

Setting Measuring Conditions

[TRIG:ACQ:COUN](#) Sets the number of times measurement values are to be recorded

[TRIG:ACQ:DEL](#) Sets the delay time for applying measurement triggers

[TRIG:ACQ:INT:STAT](#) Sets whether to measure at intervals when [TRIG:ACQ:COUN](#) is 2 or higher

	TRIG:ACQ:INT:TIME	Sets the measurement interval time when TRIG:ACQ:INT:STAT is set to ON
	TRIG:ACQ:SOUR	Sets the measurement trigger source
	SENS:APER	Sets the measurement time
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Command (function search)

Trigger Function

The PLZ-5W has 2 independent triggers (TRANsient, ACQuire). →[Overview of Trigger Function](#)

Trigger Function (ACQuire)

Starts measurement at trigger application.

INIT:ACQuire	Switches to measurement trigger wait state
TRIG:ACQ:COUN	Sets the number of times measurement values are to be recorded
TRIG:ACQ:DEL	Sets the delay time for applying measurement triggers
TRIG:ACQ:SOUR	Sets the measurement trigger source
TRIG:ACQ:TNT:STAT	Sets whether to measure at intervals
TRIG:ACQ:TNT:TIME	Sets the measurement interval time
TRIG:ACQ:MSYN	Starts measurement simultaneously on synchronized PLZ-5Ws
ABOR:ACQ	Stops the measurement trigger function

Trigger Function (TRANsient)

Starts sequence at trigger application.

INIT:TRAN:PROG	Switches to the sequence trigger wait state in the program selected by PROG
TRIG:TRAN:DEL	Sets the delay time for applying sequence triggers
TRIG:TRAN:SUSP	Pauses a sequence that is being executed
TRIG:TRAN:RES	Resumes a sequence that has been paused
TRIG:TRAN:EXEC?	Queries the execution state of the sequence trigger function and the switching function
TRIG:TRAN:SOUR	Sets the sequence start trigger source
TRIG:TRAN:MSYN	Starts a sequence simultaneously on synchronized PLZ-5Ws
ABOR:TRAN	Stops the sequence trigger function

Trigger functions (common to ACQuire, TRANsient)

*TRG	Sends a software trigger
ABOR	Stops all the trigger functions

Related information

[Overview of Trigger Function](#)
[Taking measurements](#)

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Command (function search)

Synchronized Operation

Synchronized operation is possible among multiple synchronized PLZ-5Ws. For details on how to establish synchronized connections, see the user's manual contained in the accompanying CD-ROM.

Synchronizing load on/off

[INP:MSYN:ACC](#) Sets whether to accept load on/off sync signal (IMP:MSYN) input from other synchronized devices

[INP:MSYN](#) Turns the load on or off simultaneously on synchronized PLZ-5Ws

Synchronizing measurements

[TRIG:ACQ:SOUR](#) Measurement trigger source. To synchronize, specify MSYNc.

[INIT:ACQ](#) Switches to measurement trigger wait state

[TRIG:ACQ:MSYN](#) Starts measurement simultaneously on synchronized PLZ-5Ws

Synchronizing the start of sequences

[TRIG:TRAN:SOUR](#) Sequence trigger source. To synchronize, specify MSYNc.

[INIT:TRAN:PROG](#) Switches to the sequence trigger wait state in the program selected by [PROG](#)

[TRIG:TRAN:MSYN](#) Starts a sequence simultaneously on synchronized PLZ-5Ws

Synchronizing the resuming of sequences

[PROG:STEP<n>:TRIG:WAIT](#) Sets trigger wait at the specified step of the program selected by [PROG](#) and sets the trigger source. To synchronize, set the trigger source to MSYNc.

[TRIG:TRAN:MSYN](#) If synchronized PLZ-5Ws are in a MSYNc trigger wait state in a program step, sending this command to any of the PLZ-5Ws starts the step simultaneously on the synchronized PLZ-5Ws.

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Command (function search)

ABC Preset Memories

MEM:REC	Recalls settings from ABC preset memories
MEM:SAVE	Saves the settings to ABC preset memories

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Command (function search)

Sequence operations

[-> Tutorial](#)

Program configuration

PROG	Selects or deselects a program
PROG:CRE	Creates a new program of the specified name
PROG:CURRE:PROT	Sets the current value for overcurrent protection (OCP) in the selected program
PROG:CURRE:PROT:STAT	Sets the operation when overcurrent protection (OCP) is activated in the selected program
PROG:CVOP:LEV	Sets the voltage at +CV (addition of CV mode) application in the selected program
PROG:DEL	Deletes the program of the specified name
PROG:LIST?	Queries the list of registered programs
PROG:LOOP	Sets the number of times that the selected program will repeat
PROG:POW:PROT	Sets the power of overpower protection (OPP) in the selected program
PROG:POW:PROT:STAT	Sets the operation to be performed when overpower protection (OPP) is activated in the selected program
PROG:REN	Changes the name of the selected program
PROG:SAVE	Saves the selected program
PROG:VOLT:PROT:LOW	Sets the voltage of underpower protection (UVP) in the selected program
PROG:VOLT:PROT:STAT	Enables/disables undervoltage protection (UVP) in the selected program

Step configuration

PROG:STEP<n>:DWEL	Sets the step execution time at the specified step of the selected program
PROG:STEP<n>:INP	Sets load on/off at the specified step of the selected program
PROG:STEP<n>:LEV	Sets the load at the specified step of the selected program
PROG:STEP<n>:OUTP	Sets load on/off at the specified step of the selected program
PROG:STEP<n>:SLEW	Sets the slew rate at the specified step of the selected program
PROG:STEP<n>:TRAN	Sets the setting transition method at the specified step of the selected program
PROG:STEP<n>:TRIG:GEN	Sets whether to perform trigger output at the specified step of the selected program
PROG:STEP<n>:TRIG:WAIT	Sets trigger wait at the specified step of the selected program
PROG:STEPS:COUN	Sets the number of steps to be registered to the selected program

Sequence execution

INIT:TRAN:PROG	Switches to the sequence trigger wait state in the program selected by
--------------------------------	--

	PROG	
	TRIG:ACQ:SOUR	Sets the measurement trigger source
	TRIG:TRAN:SOUR	Sets the source of the trigger to be sent to TRANSient
	ABOR	Aborts the trigger function
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Command (function search)

System Settings

SYST:BEEP	Collectively sets the beep sounds on/off
SYST:BEEP:KEY	Sets whether a beep sound is generated in case of invalid operation
SYST:BEEP:PROT	Sets whether a beep sound is generated when a protection is activated
SYST:BEEP:SCPI	Sets whether a beep sound is generated in case of SCPI error
SYST:COMM:RLST	Sets the PLZ-5W to remote mode or local mode
SYST:CONF:DIGITAL2:DIR	Sets I/O direction of DIGITAL2 signal
SYST:CONF:MSYN:IND?	Queries whether mutual synchronization connection is enabled or disabled
SYST:CONF:RSEN	Sets remote sensing function on/off
SYST:DATE	Sets the date
SYST:ERR?	Reads error information
SYST:ERR:COUN?	Queries the number of unread errors
SYST:KLOC	Panel control lock
SYST:KLOC:LEV	Sets the lock level of panel operation
SYST:PASS	Makes protected command executable
SYST:PASS:CDIS	Makes protected command non-executable
SYST:PASS:STAT?	Checks whether a protected command is executable
SYST:SEC:IMM	Deletes the user data according to the NISPOM requirements and restores the factory default settings
SYST:SSAV	Sets screen saver on/off
SYST:SSAV:DEL	Sets the time until the screen saver starts
SYST:TIME	Sets the time
SYST:TIME:ADJ	Automatically adjusts the system clock
SYST:TZON	Sets the time zone of the system clock
SYST:TZON:CAT?	Queries all the time zone IDs that can be used
SYST:VERS?	Queries the SCPI specification version that the PLZ-5W complies with

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Command (function search)

Register

[Status byte register](#)

[Event status register](#)

[OPERation status register](#)

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

[QUESTionable status register](#)

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

Preset status

STAT:PRES	Resets the status register
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HCOP:SDUM:DATA?

Retrieves the display screen capture.

Command

HCOPy:SDUMp:DATA?

Response

Returns the screen capture in block data format (#6NNNNNN<block_data>) in response to the HCOP:SDUM:DATA? query.

#6NNNNNN	Indicates the <block_data> length as a 6-digit decimal integer.
<block_data>	Block data of screen capture. The length is approximately 25 KBytes to 30 KBytes.

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Command (Sub-system search)

SOURce subsystem

ARB:APPL	Applies the I-V characteristics map and reflects it in the output
ARB:CLE	Returns the I-V characteristics map to its default setting
ARB:COUN	Sets the number of data points of the I-V characteristics map
ARB:DATA	Sets the entire I-V characteristics map in block data format
ARB:MAP	Sets the voltage and current values for the specified parts of the I-V characteristics map
ARB:MAP:LIST?	Queries the entire contents of the I-V characteristics map
COND	Sets the conductance in CR mode
COND:EXT:FCON	Enables/disables external control in CR mode (CURR:EXT:FCON alias)
COND:PULS:LEV	Sets the switching conductance
COND:PULS:FREQ	Sets the switching frequency (CURR:PULS:FREQ alias)
COND:PULS:DCYC	Sets the switching duty cycle (CURR:PULS:DCYC alias)
COND:RANG	Sets the CR mode range (CURR:RANG alias)
COND:RESP	Sets the response speed in CR mode
CURR	Sets the current in CC mode
CURR:EXT:ACON	Enables/disables external superimposed input in CC mode
CURR:EXT:FCON	Enables/disables external control in CC mode
CURR:PROT	Sets the current value for overcurrent protection (OCP)
CURR:PROT:STAT	Sets the operation to be performed when overcurrent protection (OCP) is activated
CURR:PULS:LEV	Sets the switching current
CURR:PULS:FREQ	Sets the switching frequency
CURR:PULS:DCYC	Sets the switching duty cycle
CURR:RANG	Set the range of CC mode
CURR:SLEW	Sets the slew rate value
CURR:SST	Sets the current's soft start time
FUNC	Sets the operation mode
FUNC:CVOP	Enables or disables the +CV function
POW	Sets the power of CP mode
POW:EXT:FCON	Enables/disables external control in CP mode (CURR:EXT:FCON alias)
POW:PROT	Sets the power of overpower protection (OPP)
POW:PROT:STAT	Sets the operation to be performed when overpower protection (OPP) is activated
POW:RANG	Sets the CP mode range (CURR:RANG alias)
PROG	Selects or deselects a program
PROG:CRE	Creates a new program of the specified name
PROG:CURR:PROT	Sets the current value for overcurrent protection (OCP) in the selected program
PROG:CURR:PROT:STAT	Sets the operation when overcurrent protection (OCP) is activated in the selected program
PROG:CVOP:LEV	Sets the voltage at +CV (addition of CV mode) application

	in the selected program
<u>PROG:DEL</u>	Deletes the program of the specified name
<u>PROG:LIST?</u>	Retrieves the list of registered programs
<u>PROG:LOOP</u>	Sets the number of times that the selected program will repeat
<u>PROG:POW:PROT</u>	Sets the power of overpower protection (OPP) in the selected program
<u>PROG:POW:PROT:STAT</u>	Sets the operation to be performed when overpower protection (OPP) is activated in the selected program
<u>PROG:REN</u>	Changes the name of the selected program
<u>PROG:SAVE</u>	Saves the selected program
<u>PROG:STEP<n>:DWEL</u>	Sets the step execution time at the specified step of the selected program
<u>PROG:STEP<n>:INP</u>	Sets whether to turn the load on at the specified step of the selected program
<u>PROG:STEP<n>:LEV</u>	Sets the load at the specified step of the selected program
<u>PROG:STEP<n>:OUTP</u>	Sets whether to turn the load on at the specified step of the selected program
<u>PROG:STEP<n>:SLEW</u>	Sets the slew rate at the specified step of the selected program
<u>PROG:STEP<n>:TRAN</u>	Sets the setting transition method at the specified step of the selected program
<u>PROG:STEP<n>:TRIG:GEN</u>	Sets whether to perform trigger output at the specified step of the selected program
<u>PROG:STEP<n>:TRIG:WAIT</u>	Sets trigger wait at the specified step of the selected program
<u>PROG:STEPS:COUN</u>	Sets the number of steps to be registered to the selected program
<u>PROG:VOLT:PROT:LOW</u>	Sets the voltage of underpower protection (UVP) in the selected program
<u>PROG:VOLT:PROT:STAT</u>	Enables/disables undervoltage protection (UVP) in the selected program
<u>VOLT</u>	Sets the voltage of CV mode
<u>VOLT:EXT:FCON</u>	Enables/disables external control in CV mode
<u>VOLT:PROT:LOW</u>	Sets the voltage of undervoltage protection (UVP)
<u>VOLT:PROT:STAT</u>	Enables/disables undervoltage protection (UVP)
<u>VOLT:RANG</u>	Sets the range of CV mode
<u>VOLT:RESP</u>	Sets the response speed in CV mode

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Command (Sub-system search)

OUTPut/INPut subsystem

INP OUTP	Sets load on/off. Only when load is set to on, the duration to keep the load turned on can be specified.
INP:EXT:LOG OUTP:EXT:LOG	Sets the signal logic for external control input
INP:MSYN OUTP:MSYN	Synchronizes the load on/off operation on synchronized PLZ-5Ws
INP:MSYN:ACC OUTP:MSYN:ACC	Sets whether to accept load on/off sync signal (IMP:MSYN) input from other synchronized devices
INP:PON:STAT OUTP:PON:STAT	Sets the panel setting state at power-on
INP:PROT:CLE OUTP:PROT:CLE	Clears the protection mode
INP:PROT:WDOG OUTP:PROT:WDOG	Enables/disables the watchdog protection function
INP:PROT:WDOG:DEL OUTP:PROT:WDOG:DEL	Sets the delay time of the watchdog protection function
INP:SHOR OUTP:SHOR	Sets the short function on/off

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Command (Sub-system search)

FETCh, READ and MEASure subsystem

The FETCh, READ, and MEASure subsystems all query measurement value, but with the following differences.

- FETC? does not wait for the measurement to finish. It queries the most recent measured value when the command is received. If there is no measured value, the measured value is queried after waiting for the completion of a single measurement. If [TRIG:ACQ:SOUR](#) is set to BUS, an error is returned.
- READ? starts a new measurement and queries the measured value after waiting for the completion of a single measurement. If [TRIG:ACQ:SOUR](#) is set to IMM, measurement starts immediately. If set to BUS, an error is returned. If set to any other value, measurement starts after a trigger is applied.
- MEAS? starts a new measurement after resetting (equivalent to [*RST](#)) the settings listed in ["Setting Measurement Conditions,"](#) and queries a single measured value.

[FETCh?](#)

Queries the measured value at a single point

[READ?](#)

[MEAS?](#)

[FETCh:CAP?](#)

[READ:CAP?](#)

[MEAS:CAP?](#)

Queries the capacity (Ah) at a single point

[FETC:CURR?](#)

[READ:CURR?](#)

[MEAS:CURR?](#)

Queries the current (A) at a single point

[FETC:ENER?](#)

[READ:ENER?](#)

[MEAS:ENER?](#)

Queries the power (Wh) at a single point

[FETC:ETIM?](#)

[READ:ETIM?](#)

[MEAS:ETIM?](#)

Queries the elapsed time (s) at a single point

[FETC:POW?](#)

[READ:POW?](#)

[MEAS:POW?](#)

Queries the power (W) at a single point

[FETC:VOLT?](#)

[READ:VOLT?](#)

[MEAS:VOLT?](#)

Queries the voltage (V) at a single point

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Command (Sub-system search)

TRIGger subsystem

ABOR	Stops all the trigger functions
ABOR:ACQ	Stops the measurement trigger function
ABOR:TRAN	Stops the sequence trigger function
ABOR:PULS	Stops the switching function (PULSe)
INIT:ACQ	Switches to measurement trigger wait state
INIT:TRAN:PROG	Switches to the sequence trigger wait state in the program selected by PROG
INIT:PULS	Executes the switching function (PULSe)
TRIG:ACQ:COUN	Sets the number of times measurement values are to be recorded
TRIG:ACQ:DEL	Sets the delay time for applying measurement triggers
TRIG:ACQ:MSYN	Starts measurement simultaneously on synchronized PLZ-5Ws
TRIG:ACQ:SOUR	Sets the measurement trigger source
TRIG:ACQ:INT:STAT	Sets whether to measure at intervals when TRIG:ACQ:COUN is 2 or higher
TRIG:ACQ:INT:TIME	Sets the measurement interval time when TRIG:ACQ:INT:STAT is set to ON
TRIG:TRAN:DEL	Sets the delay time for applying sequence triggers
TRIG:TRAN:EXEC?	Queries the execution state of the sequence trigger function and the switching function
TRIG:TRAN:MSYN	Starts a sequence simultaneously on synchronized PLZ-5Ws
TRIG:TRAN:RES	Resumes a sequence that has been paused
TRIG:TRAN:SOUR	Sets the sequence start trigger source
TRIG:TRAN:SUSP	Pauses a sequence that is being executed

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Command (Sub-system search)

DATA subsystem

DATA:BSIZ	Sets the buffer size of the data logger function
DATA:FORM	Sets the response format to be used when referencing data in the data logger
DATA:INT:GATE	Sets the integration operation time
DATA:INT:GATE:AREs	Sets whether past integration is reset at the start of the integration operation
DATA:INT:RES	Resets all the integrated data (capacity, energy, elapsed time)
DATA:INT:STAR	Manually starts the integration operation
DATA:INT:STOP	Manually stops the integration operation
DATA:POIN?	Queries the number of measurement points registered in the data logger
DATA:R?	Queries the measurement value registered in the data logger from oldest to youngest

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Command (Sub-system search)

SYSTem subsystem

SYST:BEEP	Collectively sets the beep sounds on/off
SYST:BEEP:KEY	Sets whether a beep sound is generated in case of invalid operation
SYST:BEEP:PROT	Sets whether a beep sound is generated when a protection is activated
SYST:BEEP:SCPI	Sets whether a beep sound is generated in case of SCPI error
SYST:COMM:RLST	Sets the PLZ-5W to remote mode or local mode
SYST:CONF:DIGITAL2:DIR	Sets I/O direction of DIGITAL2 signal
SYST:CONF:MSYN:IND?	Queries whether mutual synchronization connection is enabled or disabled
SYST:CONF:RSEN	Sets remote sensing function on/off
SYST:DATE	Sets the date
SYST:ERR?	Reads error information
SYST:ERR:COUN?	Queries the number of unread errors
SYST:KLOC	Panel control lock
SYST:KLOC:LEV	Sets the lock level of panel operation
SYST:PASS	Enables a password-protected command and enables the execution of SYST:SEC:IMM .
SYST:PASS:CDIS	Disable the password-protected command and disables the execution of SYST:SEC:IMM .
SYST:PASS:NEW	Sets the password
SYST:PASS:STAT?	Queries whether a password-protected command is valid or invalid.
SYST:SEC:IMM	Deletes the user data according to the NISPOM requirements and restores the factory default settings
SYST:SSAV	Sets screen saver on/off
SYST:SSAV:DEL	Sets the time until the screen saver starts
SYST:TIME	Sets the time
SYST:TIME:ADJ	Automatically adjusts the system clock
SYST:TZON	Sets the time zone of the system clock
SYST:TZON:CAT?	Queries all the time zone IDs that can be used
SYST:VERS?	Queries the SCPI specification version that the PLZ-5W complies with

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Command (Sub-system search)

■ STATus subsystem

STAT:OPER?	OPERation status register: event
STAT:OPER:COND?	OPERation status register: register condition
STAT:OPER:ENAB	OPERation status register: enable
STAT:OPER:PTR	OPERation status register: positive transition
STAT:OPER:NTR	OPERation status register: negative transition
STAT:QUES?	QUESTionable status register: event
STAT:QUES:COND?	QUESTionable status register: register condition
STAT:QUES:ENAB	QUESTionable status register: enable
STAT:QUES:PTR	QUESTionable status register: positive transition
STAT:QUES:NTR	QUESTionable status register: negative transition
STAT:PRES	Resets the status register

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Command (Sub-system search)

DISPlay subsystem

DISP:ETIM	Sets whether to display the elapsed time on the display
DISP:CAP	Sets whether to display the current capacity on the display.
DISP:ENER	Sets whether to display the power capacity on the display.

HCOPy subsystem

HCOP:SDUM:DATA?	Retrieves the display screen capture
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MEMory subsystem

MEM:REC	Recalls preset memory
MEM:SAVE	Saves to preset memory

SENSE subsystem

SENS:APER	Sets the measurement time
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Architecture

IEEE 488.2 and SCPI registers are used for status reports.

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

CONDition register

Transitions of the CONDition register are automatic and reflect the condition of the PLZ-5W in real time. Reading this register does not affect its contents.

EVENT register

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

ENABle register

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

Transition filters

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

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

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

If both filters are cleared, event reporting is disabled.

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Appendix

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 causes the Command Error bit (bit 5) in the event status register to be set.

Error code		Error message description
-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.
-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.
-112	Program mnemonic too long	The number of characters in the header exceeds 12 characters.
-113	Undefined header	The header is undefined for this device.
-114	Header suffix out of range	The header is invalid because the header suffix is out of range.
-115	Unexpected number of parameters	The number of parameters does not match the requested number of parameters.
-120	Numeric data error	This error is generated when parsing a data element that appears to be numeric, including the nondecimal numeric types.
-128	Numeric data not allowed	A value is invalid.
-131	Invalid suffix	The suffix does not follow the syntax or the suffix is inappropriate for this device.
-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.
-150	String data error	This error is generated when parsing a string data element.
-151	Invalid string data	A character string is invalid. For example, the END message comes before the end quote.
-158	String data not allowed	The character string is valid, but is not allowed by the parser.
-161	Invalid block data	The block data is invalid.

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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 causes the Execution Error bit (bit 4) in the event status register to be set.

Error code		Error message description
-203	Command protected	Indicates that a legal password-protected program command or query could not be executed because the command was disabled.
-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.
-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 causes the Device Dependent Error bit (bit 3) in the event status register to be set.

Error code		Error message description
-310	System error	This is a system error.
-311	Memory error	This is a memory error.
-313	Calibration memory lost	The calibration data has been lost.
-314	Save/recall memory lost	The data that was saved with the *SAV command has been lost.
-315	Configuration memory lost	The system settings data has been lost.
-330	Self-test error	An error occurred during the self-test.
-350	Queue overflow	A specific code entered into the queue in lieu of the code that caused the error. This code indicates that there is no room in the queue and an error occurred but was not recorded.
-363	Input buffer overrun	Buffer overrun 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 causes the Query Error bit (bit 2) in the event status register to be set.

Error code		Error message description
-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.

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Device-specific errors

The occurrence of any error in this class causes the Device Dependent Error bit (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
101	Setting conflicts due to PROTECTION state	Cannot be set because a protection function is activated.
102	Setting conflicts while INPUT is ON	Cannot be set because the load is on.
103	Setting conflicts while INPUT:SHORT is ON	Cannot be set because the short function is in operation.
104	Setting conflicts while PROGRAM is running	Cannot be set because a program is running.
105	Setting conflicts while PULSE is running	Cannot be set because switching operation is in progress.
106	Setting conflicts due to invalid FUNCTION:MODE	Cannot be set because an invalid mode is set.
107	Setting conflicts while in CVOPTION is OFF	Cannot be set because the +CV function is disabled.
108	Wrong password given	The password is not correct.
109	Illegal password format	The password is illegal.
110	Mutual-sync is not established	Mutual-sync is not established.
121	ARBITRARY map index out of range	The number of data points of the arbitrary I-V characteristics map is out of range.
122	ARBITRARY map voltage out of range	The voltage of the arbitrary I-V characteristics map is out of range.
123	ARBITRARY map current out of range	The current of the arbitrary I-V characteristics map is out of range.
124	ARBITRARY map data conflict	The arbitrary I-V characteristics map is invalid.
125	Too less ARBITRARY map data	The number of data of the arbitrary I-V characteristics map is too low.
126	Too many ARBITRARY map data	The number of data of the arbitrary I-V characteristics map is too large.
201	Illegal buffer size due to not in 2 ^N	The buffer size is not 2 ^N .
202	Same item is specified more than once	The same item is specified multiple times.
203	NONE is invalid in multiple item settings	NONE is invalid if multiple items are set.
204	IMMEDIATE is invalid in multiple item settings	IMMEDIATE is invalid if multiple items are set.
205	BUS is invalid in multiple item settings	Connections for parallel operation are illegal.

301	Illegal PROGram name	The program name is illegal.
302	PROGram name already exists	The program name is already used.
303	PROGram not found	The program could not be found.
304	PROGram not selected	No program is selected.
305	Selected PROGram cannot be deleted	The selected program cannot be deleted.
306	Recursive PROGram specified	A recursive program has been specified.
307	STEP number out of range	The number of steps is too large.
308	Execution error due to non-existing PROGram specified	An execution error occurred because you specified a non-existing program.
309	Execution error due to value range conflict	An execution error occurred due to a value range conflict.
310	TRANSient not operating	The TRANSient function is not operating.
311	TRANSient not suspending	The TRANSient function is not paused.
313	PROGram cannot be created during selection	Programs cannot be created when a program is being selected.

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■ Command processing time

A certain amount of time is required before the commands shown in the following table are received by the PLZ-5W.
The processing times shown here are typical values, not guaranteed values.
The processing times vary depending on the settings and the measurement conditions. The values shown below include hardware response times.

Command	Processing time (ms)		
	RS232C1	USB	LAN
INP/OUTP	30	5	5
CURR	30	5	5
INIT:TRAN:PROG	30	5	5
MEAS? ²	180	130	130

1: Baud rate setting: 115200 bps
2: When [SENS:APER](#) is 0.1 second.

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Sample of ARB:DATA

This is a sample program that sets [ARB:DATA](#) on [Visual Basic 2013](#).

A programming example in which the voltage-current pairs are (0V, 0A), (1V, 0.1A), (157.5V, 0.1A) are provided below. The first voltage and current are fixed to "0V, 0A," and the last voltage is fixed to "157.5V." If you specify any other values, an error is returned.

Setting ARB:DATA

```
Private Sub CommandArbSet_Click(ByVal sender As System.Object,
ByVal e As System.EventArgs) Handles CommandArbSet.Click
    ' Data to set in the ARB table
    Dim Dbl_Volt() As Double = {0, 1, 157.5}
    Dim Dbl_Curr() As Double = {0, 0.1, 0.1}

    ' Convert the unit to the μ order
    Dim Int_Data(5) As Integer
    Dim Int_a As Integer = 0
    For Int_b As Integer = 0 To 2
        Int_Data(Int_a) = CInt(Dbl_Volt(Int_b) * 1000000)
        Int_a = Int_a + 1
        Int_Data(Int_a) = CInt(Dbl_Curr(Int_b) * 1000000)
        Int_a = Int_a + 1
    Next

    Dim Byte_Data(41) As Byte
    Dim Byte_Comm() As Byte =
System.Text.Encoding.ASCII.GetBytes("ARB:DATA #40024") ' Convert
the command and LENGTH parts to byte type
    Dim Int_Count As Integer = 0

    For Int_Count = 0 To 14
        Byte_Data(Int_Count) = Byte_Comm(Int_Count) ' Insert at the
head of the byte array to be sent
    Next

    Dim Byte_VoltCurr(4) As Byte
    For Int_m As Integer = 0 To 5
        Byte_VoltCurr = BitConverter.GetBytes(Int_Data(Int_m)) '
Convert the data that you want to set in the ARB table into byte type
one at a time
        For Int_n As Integer = 0 To 3
            Byte_Data(Int_Count) = Byte_VoltCurr(Int_n) ' Fill the
converted data in order into the byte array to be sent
            Int_Count = Int_Count + 1
        Next
    Next

    Byte_Data(Int_Count + 1) = CByte(&HA) ' Insert a line feed at the
end of the byte array

    msg.Write(Byte_Data, 41) 'Write in the PLZ-5W
    msg.WriteString("ARB:APPL" & vbCrLf) ' Apply the ARB data
End Sub
```

Querying ARB:DATA

```

Dim rm As IResourceManager3 = New ResourceManager()
Dim msg As IMessage
Dim seri As ISerial
Private Sub ARB_DATA_Click(ByVal sender As System.Object, ByVal e
As System.EventArgs) Handles Button2.Click
    RichText.Clear()
    Initialize the RichTextBox that is to display the ARB table values
    msg.WriteString("ARB:COUN?" & vbCrLf) ' Determine
the number data pairs in the ARB table
    Dim Int_ArbCoun As Integer = CInt(msg.ReadString(32))
    Dim Int_ByteLength As Integer = Int_ArbCoun * 8 + 7 ' Calculate
the total number of bytes to receive

    msg.TerminationCharacterEnabled = False ' Disable
the terminator
    seri.EndIn = SerialEndConst.ASRL_END_NONE ' Set this
also to use 232C
    msg.WriteString("ARB:DATA?" & vbCrLf) ' Write a
query command in the PLZ-5W
    Dim Byte_ArbRead() As Byte = msg.Read(Int_ByteLength) ' Read the
response from the PLZ-5W

    Dim Int_Volt(Int_ArbCoun) As Integer ' Calculate the number of
data values from and prepare a box
    Dim Int_Curr(Int_ArbCoun) As Integer
    Dim Dbl_Volt(Int_ArbCoun) As Double
    Dim Dbl_Curr(Int_ArbCoun) As Double
    Dim Int_Count As Integer = 6
    For Int_a = 0 To Int_ArbCoun - 1
        Int_Volt(Int_a) = BitConverter.ToInt32(Byte_ArbRead,
Int_Count) ' Convert in order from the top the byte type data into
integers
        Dbl_Volt(Int_a) = Int_Volt(Int_a) / 1000000 ' Convert the unit
from  $\mu$ V order to V order
        Int_Count = Int_Count + 4
        Int_Curr(Int_a) = BitConverter.ToInt32(Byte_ArbRead,
Int_Count) ' Convert from the top the byte type data into integers
        Dbl_Curr(Int_a) = Int_Curr(Int_a) / 1000000 ' Convert the unit
from  $\mu$ V order to V order
        Int_Count = Int_Count + 4
        RichText.Text = RichText.Text & CStr(Dbl_Volt(Int_a)) & " , "
& CStr(Dbl_Curr(Int_a)) & vbCrLf ' Write the ARB data as voltage-
current pairs
    Next

    msg.TerminationCharacterEnabled = True ' Enable the
terminator
    seri.EndIn = SerialEndConst.ASRL_END_TERMCHAR ' Reset to default
End Sub

```

The program execution result is as follows.

The screenshot shows a Windows application window titled "Form1". Inside the window, there are three buttons stacked vertically: "CommandIdn", "CommandCurr", and "CommandProg". Below these, there are two more buttons: "ARB:DATA" and "ARB:DATA?". To the right of these buttons is a text area that displays the output of the program execution. The output consists of three lines of text: "0,0", "1,0.1", and "157.5,0.1".

Related information

[Using Visual Basic 2013](#)



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Basic Settings

Using the following load conditions as an example, this section explains how to write commands starting from basic configuration up to turning the load on.

Load conditions

Operation mode:	CC mode
Current range:	H range
Current value:	30 A
Slew rate:	3 A/μs
Switching:	Switching level 10 A Switching frequency 10 Hz Duty cycle 50 %
Overcurrent protection (OCP):	Activated at 40 A Load is turned off when activated

Command examples

```
:FUNCTION CC      'Set the operation mode to CC mode
:CURRENT:RANGE HIGH  'Set the current range to H range
:CURRENT 30      'Set the current to 30 A
:CURRENT:SLEWrate 3  'Set the slew rate to 3 A/μs
:CURRENT:PULSE:LEVEL 20  'Set the switching level to 20 A
:CURRENT:PULSE:FREQUENCY 10  'Set the switching frequency to 10 Hz
:CURRENT:PULSE:DCYCLE 50  'Set the duty cycle to 50 %
:CURRENT:PROTECTION 40  'Set OCP to 40 A
:CURRENT:PROTECTION:STATE ON  'Turn off the load when OCP is activated
:INPUT ON      'Load on
```

Checking the current's minimum/maximum values

The current's minimum/maximum setting values depend on the set current range. You can query the present minimum/maximum setting value by sending a query to which the MINimum or MAXimum parameter is added, as shown below.

```
:CURRENT? MINimum
:CURRENT? MAXimum
```

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Taking measurements

This tutorial explains how to take measurements and query the results.

Taking a measurement and querying the result

In the following command example, after the load is turned on, INIT:ACQ is entered to immediately take a measurement, and then the measurement is queried.

```
1 :TRIGger:ACQuire:SOURce IMM 'Set the measurement trigger source to IMMEDIATE.
2 :INPut ON 'Turn the load on.
3 :INITiate:ACQuire 'Start measurement.
4 :FETCh? 'Query the measured value.
```

In the line 3, the PLZ-5W switches to measurement trigger wait state, but since the trigger source is set to IMMEDIATE in line 1, measurement starts immediately.

Taking several measurements and querying the results

In the following command example, after the load is turned on, INIT:ACQ is entered to immediately take three measurements, and then the measurement is queried.

```
1 :TRIGger:ACQuire:SOURce IMM 'Set the measurement trigger source to IMMEDIATE.
2 :TRIGger:ACQuire:COUNt 3 'Set the measurement count to 3.
3 :INPut ON 'Turn the load on.
4 :INITiate:ACQuire 'Start measurement.
5 :DATA:R? 'Query the measured value.
```

In the line 4, the PLZ-5W switches to measurement trigger wait state, but since the trigger source is set to IMMEDIATE in line 1, measurement starts immediately. Since the measurement count is set to 3 in line 2, measurement is taken three times. When several measurements are taken, use DATA:R? (line 5) to query the measured values.

For the differences in the methods of querying measured values, see ["Querying measured values"](#).

Starting a measurement with a trigger and querying the results

You can use a trigger to take measurements by setting the measurement trigger source (TRIG:ACQ:SOUR) to anything other than IMMEDIATE. Here, an example of starting a measurement with a DIGITAL2 input after the load is turned on and querying the measured values is explained.

```
1 :TRIGger:ACQuire:SOURce DIGITAL2 'Set the trigger source to DIGITAL2.
2 :INPut ON 'Turn the load on.
3 :INITiate:ACQuire 'Switch to measurement trigger wait state (start a measurement with DIGITAL2 input).
4 :FETCh? 'Query the measured value.
```

The PLZ-5W switches to measurement trigger wait state in line 3. Because the trigger source was set to DIGITAL2 in line 1, when a signal is received through pin 13 of the EXT CONT connector when the PLZ-5W is in the trigger wait state, measurement starts.

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Overview of Trigger Function

The PLZ-5W allows you to control the start timing of measurement and sequences using triggers. In the trigger wait state, a measurement or a sequence can be started when an event selected beforehand (trigger source) matches an event either inside or outside the PLZ-5W (trigger).

Trigger systems

There are two trigger systems.

TRANSient	A sequence or step starts using trigger detection as the starting point.
ACQuire	Measurement starts using trigger detection as the starting point.

Trigger source

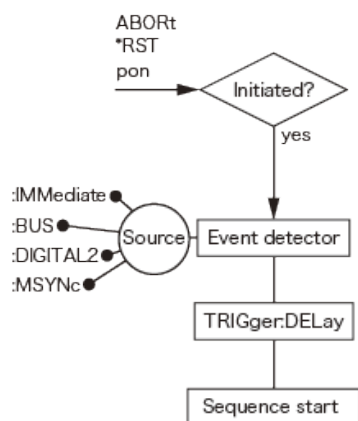
The following trigger sources are supported.

IMMediate	Execution starts at the internal timing of the PLZ-5W without waiting for trigger application. The delay until the start of execution is reduced to a minimum.
BUS	Execution starts at the software trigger (*TRG) application timing. Software triggers are applied to both the TRANSient and ACQuire trigger systems.
DIGITAL2	Execution starts at the timing at which a signal is input to pin 13 of the EXT CONT connector. (when SYST:CONF:DIGITAL2:DIR is set to INPut)
TALink (ACQuire only)	If PROG:STEP<n>:TRIG:GEN is set to TALink, measured values are recorded during the step execution of the sequence.
MSYNc	Measurement or sequence starts when a signal is received from external equipment synchronized to the PLZ-5W or when a TRIG:ACQ:MSYN or TRIG:TRAN:MSYN synchronization command packet is received from a PC or the like.
TRIGIN (ステップ実行のみ)	The next step is executed when a signal is input to pin 9 of the EXT CONT connector.

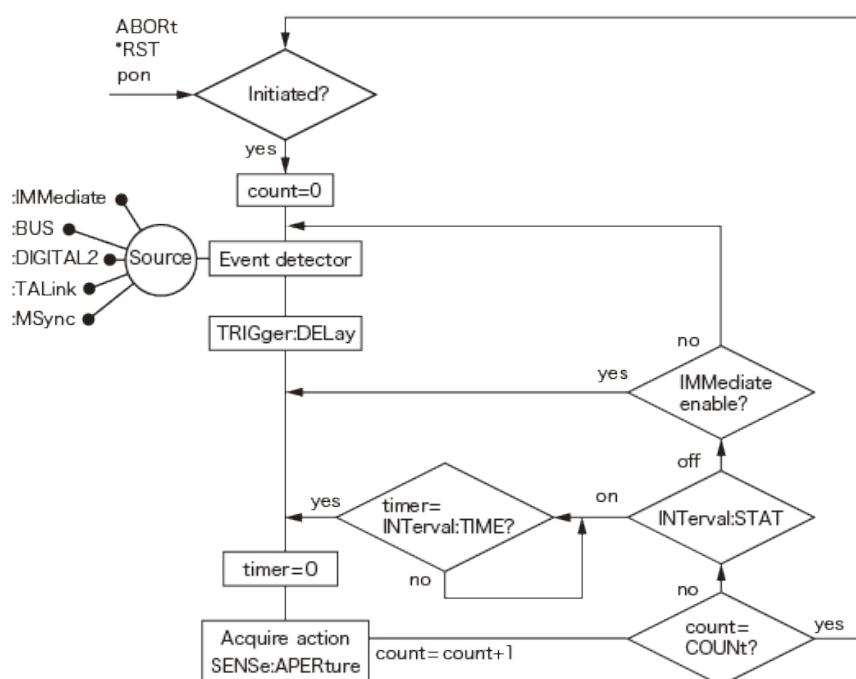
Trigger processing procedure

The general trigger processing procedure is illustrated in the following figures. You can set the sequence trigger source with [TRIG:TRAN:SOUR](#). You can set the measurement trigger source with [TRIG:ACQ:SOUR](#).

■ Sequence trigger system



■ Measurement trigger system



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Sequence operations

A sequence consists of programs and steps. A program is a collection of steps. Steps are executed in order one at a time, starting from step 1. Upon completion of the last step of a program, execution of that program has been completed once. The value at the end of the sequence will be the value of the last step.

You can create up to 30 programs in the PLZ-5W. You can use a combined total of 10000 steps for all the programs. For an overview of the sequence functions, see the user's manual contained in the accompanying CD-ROM.

In this example, we will create a sequence that works under the following conditions in constant current (CC) mode.

Operating condition

Operation mode: CC

Program1

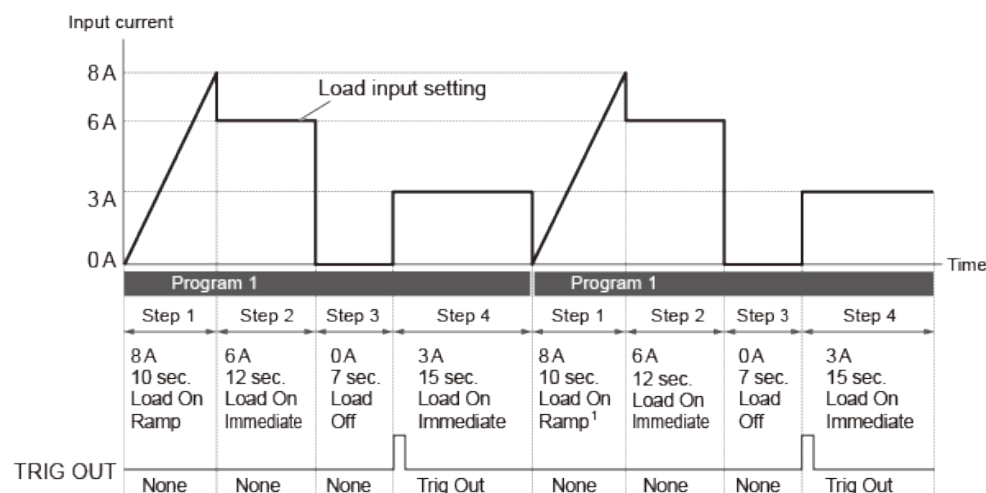
Program name: PROGRAM1, Number of loops: 2

Run	Load setting value	Execution time	Load	Transition method	Trigger output
Step 1	8 A	10 seconds	On	Ramp	None
Step 2	6 A	12 seconds	On	Immediate	None
Step 3	0 A	7 seconds	Off	-	None
Step 4	3 A	15 seconds	On	Immediate	Trig Out

Explanation

Program 1 executes steps 1 to 4 and ends the first execution. Program1 is then executed one more time, and this completes this sequence.

Representing this sequence in graph form looks as follows.



1: If Load of step 1 is set to Ramp and the program is repeated, the start current of step 1 will always be 0A.

Example of commands used to create a sequence

```

:FUNC CC           'Set the operation mode to CC mode
:PROG:CRE "/PROGRAM1" 'Newly create PROGRAM1
:PROG "/PROGRAM1"   'Select PROGRAM1
:PROG:LOOP 2        'Set the number of loops of PROGRAM1 to 2

```

:PROG:STEPS:COUN	4	'Set the number of steps of PROGRAM1 to 4
:PROG:STEP1:LEV	8A	'Set the setting value of Step 1 to 8A
:PROG:STEP1:DWEL	10S	'Set the execution time of Step 1 to 10 seconds
:PROG:STEP1:INP	ON	'Set Step 1 to load on
:PROG:STEP1:TRAN	RAMP	'Set Step 1 to Ramp transition
:PROG:STEP2:LEV	6A	'Set the setting value of Step 2 to 6A
:PROG:STEP2:DWEL	12S	'Set the execution time of Step 2 to 12 seconds
:PROG:STEP2:INP	ON	'Set Step 2 to load on
:PROG:STEP2:TRAN	IMM	'Set Step 2 to Immediate transition
:PROG:STEP3:DWEL	7S	'Set the execution time of Step 3 to 7 seconds
:PROG:STEP3:INP	OFF	'Set Step 3 to load off
:PROG:STEP4:LEV	3A	'Set the setting value of Step 4 to 3A
:PROG:STEP4:DWEL	15S	'Set the execution time of Step 4 to 15 seconds
:PROG:STEP4:INP	ON	'Set Step 4 to load on
:PROG:STEP4:TRAN	IMM	'Set Step 4 to Immediate transition
:PROG:STEP4:TRIG:GEN	TRIGOUT	'Trigger output to TRIGOUT pin at Step 4

Executing and stopping a sequence

Send the following commands to execute a sequence immediately.

```
:TRIG:TRAN:SOUR IMM 'Set the trigger source to IMM.
:PROG "/PROGRAM1" 'Select PROGRAM1
:INIT:TRAN:PROG 'Start PROGRAM1
```

To stop a sequence that is being executed, send the following command.

```
:ABOR
```

Executing a sequence using triggers

You can use triggers to synchronize sequence operation.

For example, if you are using a software trigger to execute PROGRAM1, set the trigger source to BUS.

```
:TRIG:TRAN:SOUR BUS 'Set the trigger source to BUS.
:PROG "/PROGRAM1" 'Select PROGRAM1
:INIT:TRAN:PROG 'Enter wait state for sequence execution trigger
*TRG 'Sends a software trigger and starts the sequence
```

[:INIT:TRAN:PROG](#) pulls the TRIGger subsystem out of the IDLE state and places it in the trigger feature start (initiated) state.

At that time, if [:TRIG:TRAN:SOUR](#) is IMM, the sequence is immediately executed by the selected program.

If [:TRIG:TRAN:SOUR](#) is other than IMM, the state is the trigger wait (WTG) state, and when the source signal set with [:TRIG:TRAN:SOUR](#) is sent, the sequence is executed by the selected program.

When the sequence completes or is stopped, the TRIGger subsystem enters the IDLE state again.

Related information

[Overview of Trigger Function](#)

[Trigger Function Command List](#)

[Sequence Function Command List](#)

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■ Waiting for Operation Complete

When the [*OPC](#) command is transmitted, the PLZ-5W sets the OPC bit (bit 0) of the event status register to TRUE (1) when the processing of all commands in standby has been completed. This information can be determined by checking the OPC bit (bit 0) of the [*ESR?](#) query.

Example: Starting a new measurement and transmitting the *OPC command

When the [Event Status Enable Register](#) is set to 1 and the [Service Request Enable Register](#) is set to 32, an SRQ (Service Request) is generated upon measurement completion. The SRQ function cannot be used if you are using the RS232 and SCPI-ROW interfaces.

```
*ESE 1;*SRE 32;*CLS;:INIT:ACO;*OPC
<A service request is generated upon completion of measurement>
```

When the *OPC? request is used instead of the *OPC command, the PLZ-5W sets response data "1" (in NR1 format) in the output queue upon completion of measurement if there are no other operations waiting to be completed.

```
:INIT:ACO;*OPC?
<Read response upon measurement completion>
```

When IEEE488 sdc/dcl, [*RST](#), or [*RCL](#) is transmitted when the power is turned on, the PLZ-5W sets the OPC bit (bit 0) to TRUE (1), and the response data in the output queue to "1" (in NR1 format).

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Status Monitoring

The PLZ-5W 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 a [standard architecture](#) that uses events/filters. CONDition, EVENT, and ENABLE and optionally PTRansition and NTRansition can be used. CONDition and EVENT are read-only registers working as status indicators. ENABLE, PTRansition and NTRansition are read-write registers working as event and summary filters.

STATus:OPERation

The [OPERation Status register](#) is used to record events and notifications that occur during normal operations.

For example, to check whether CV output is being performed, check the CV bit (bit 0) of the STATus:OPERation register.

`:STATus:OPERation?`

`Checks whether the CV bit 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.

`:STATus:QUEStionable?`

`Checks whether the CV bit is set.`

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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 PLZ-5W can record is 16. 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 becomes empty when the *CLS common command is sent, when the last item in the queue is read, and when the PLZ-5W is turned on. When the error/event queue is empty, the query returns the following:

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

Displaying communication errors

When an SCPI error occurs, the error is shown on the display when SYSTEM and then Error are pressed on the front panel. This is convenient for debugging remote control.

Related information

[Command errors](#)

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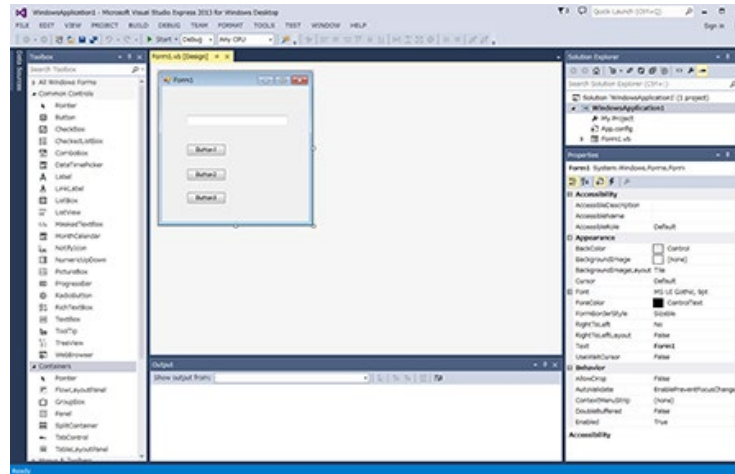
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Visual Basic 2013

How to use Visual Basic 2013 and the VISA library to communicate with the PLZ-5W Series through its RS232C, USB, and LAN interfaces is explained below.

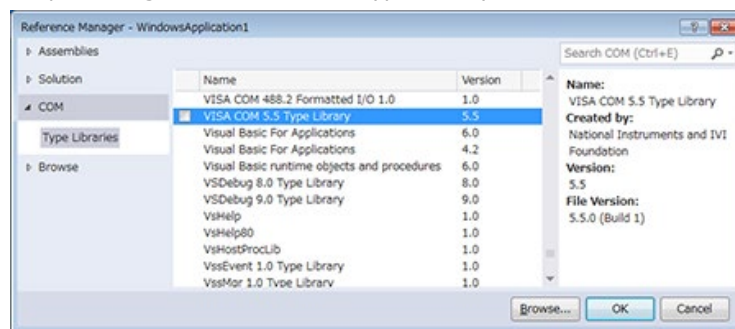


Setting the "Project"

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

From Solution Explorer, select a project, right-click to show the shortcut menu, select Properties, References, and then Add, and then select the VISA COM you want to use.

Example: Using the VISA COM5.5 Type Library



Communication through RS232C, USB, or LAN

After setting the communication driver, you can communicate with the PLZ-5W through RS232C, USB, or LAN.

The following describes the communication procedure using VISA.

Open the VISA

To communicate with an 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

```
Dim rm As IResourceManager3 = New ResourceManager()
Dim msg As IMessage
msg = rm.Open("USB0::0x0B3E::0x1042::AB012345::INSTR", AccessMode.NO_LOCK, 0, "")
```

"USB0::0x0B3E::0x1042::AB012345::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.

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[:inst0][: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 PLZ-5W 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.

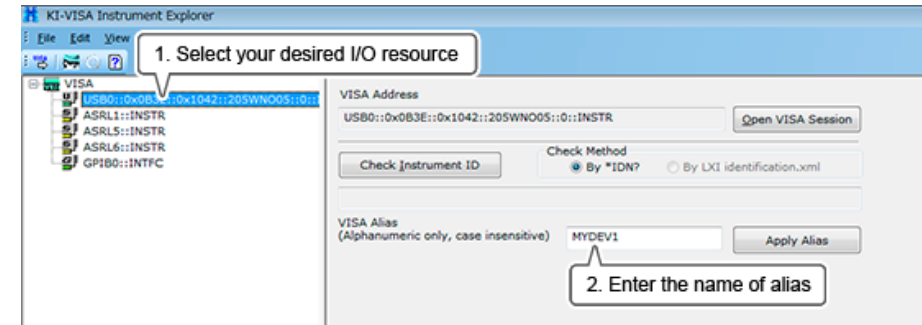
For VISA, the alias can be used for the I/O resource.

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.

```
msg = rm.Open("MYDEV1", AccessMode.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 version of VISA other than KI-VISA, see the manual of your VISA version.

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("CURRent 0.3" & vbCrLf) 'Set the current to 0.3A
msg.WriteString("CURRent:PULSe:FREquency 10" & vbCrLf) 'Set the switching
frequency to 10 Hz
msg.WriteString("INPut ON" & vbCrLf) 'Load 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( "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
```

```
    'Queries the measured 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
```

Related information

A KIKUSUI version of the I/O library (KI-VISA) is available. You can download KI-VISA from the Kikusui Electronics Corporation website (<http://www.kikusui.co.jp/en/download/>). [>top](#)

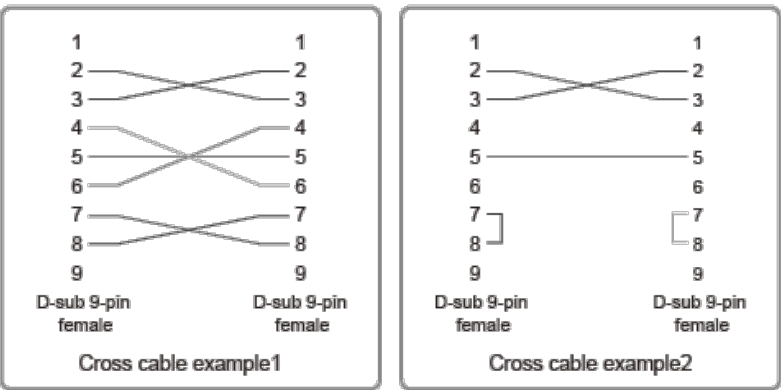
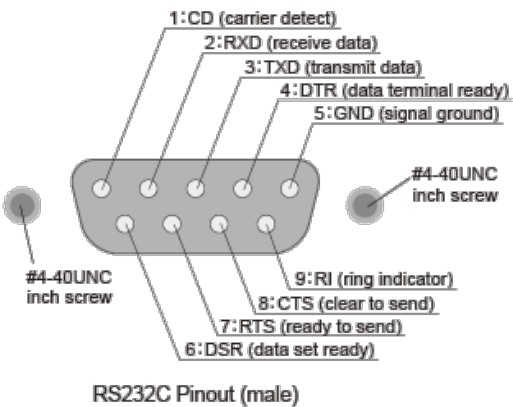
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Setting Up the RS232C Interface

Connector pinout

For the RS232C cable, use a D-sub, 9-pin, female-to-female AT cross cable. The figure below shows the port pinout.



If you are not using flow control, you do not have to connect all the pins. (See the second crossover cable wiring example below.)

9-pin AT connector (Flow control cannot be performed using the cable described in the second crossover cable wiring example.)

Connection Procedure

Turn off the POWER switches of the PLZ-5W and computer.
Using an RS232C cable, connect the PLZ-5W to the PC.

Setting Procedure

- Press SYSTEM and then Configure Interface on the front panel.**
If the Interface screen does not appear, press Configure Interface again.
- Configure the protocol (the baud rate, data length, stop bits, and flow control) by selecting the respective Bitrate, Data Bits, Stop Bits, and Flow Ctlol items under RS232C Adjustment.**
For the settings, see the table under Protocol below.

3. Turn the **POWER** switch of the **PLZ-5W** off and on again to enable the settings.

Protocol

The RS232C protocol is shown in the following table. The underlined values are the factory default settings.

Item	Value
Bitrate	9600 bps/ <u>19200 bps</u> / 38400 bps/ 57600 bps/ 115200 bps
Data Bits	8 bits (fixed)
Stop Bits	1 bit (fixed)
Flow Ctrol	<u>NONE</u> / CTS-RTS

Break signal

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

NOTE

If you are going to use remote control, we recommend that you set the PLZ-5W in remote mode (set [SYST:COMM:RLST](#) to REMote or RWLock). When operating in remote mode, REMOTE appears on the front panel display.

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Setting Up the USB Interface

To use the USB interface to control the PLZ-5W, a driver that supports the USB T&M class (USBTMC) must be installed on the controller. The USBTMC driver is installed automatically by the VISA library.

Connection Procedure

Turn off the POWER switches of the PLZ-5W and computer.

Using a USB cable, connect the PLZ-5W to the PC and then turn on the PLZ-5W.

Service request

The PLZ-5W is equipped with service request and serial polling functions.

USB feature

Complies with USB specification 2.0

Complies with the USBTMC-USB488 device class specifications

Baud rate: 480Mbps max. (High Speed)

Message terminator: LF or EOM during reception, LF + EOM during transmission

VID (vendor ID)

0x0B3E

PID (product ID)

0x1042 (for all models)

NOTE

If you are going to use remote control, we recommend that you set the PLZ-5W in remote mode (set [SYST:COMM:RLST](#) to REMote or RWLock). When operating in remote mode, REMOTE appears on the front panel display.

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Setting Up the LAN Interface

Either the VXI-11, HiSLIP, or SCPI-RAW protocol can be used to control the PLZ-5W via the LAN interface. For VXI-11 and HiSLIP, the middleware is installed automatically by the VISA library. For SCPI-RAW, no middleware is required.

The LAN interface board has a [Web browser interface](#). You can configure the LAN interface settings from your PC's Web browser.

For information on topics such as connecting to your corporate LAN, your IP address, your host name, and security, contact your network administrator.

If you are using a host name (a Bonjour host name), you have to install Apple Bonjour.

Connection Procedure

Use a standard LAN cable (category 5 and straight) to connect the PLZ-5W to a network hub or router.

Setting Procedure

1. Press SYSTEM and then Configure Interface on the front panel.

If the Interface screen does not appear, press Configure Interface again.

2. Press Modify and make the necessary LAN settings for "IP Address", "DNS Server", "WINS Server", and "Hostname & Services".

Normally, use the PLZ-5W with "Method" under "IP Address" set to "Automatic" (factory default setting). If this settings have been changed, execute [Resetting the LAN Interface Settings](#) to restore the factory default settings.

You can check the IP address by pressing SYSTEM and then Information on the front panel.

WARNING

Possible damage to the equipment and electric shock. The LAN interface can be accessed from anywhere on the network that the PLZ-5W is connected to. If necessary, set a password for the Web browser interface.
->[Setting Procedure](#)

NOTE

If you are going to use remote control, we recommend that you set the PLZ-5W in remote mode (set [SYST:COMM:RLST](#) to REMote or RWLock). When operating in remote mode, REMOTE appears on the front panel display.

Service request

The PLZ-5W is equipped with service request and serial polling functions.

LAN feature

Depending on the operations that you perform through the [Web browser interface](#), the PLZ-5W may need to connect to the Internet.

Complies with LXI 1.4 Core Specification 2011

Complies with the VXI-11, HiSLIP, SCPI-RAW, and SCPI-Telnet protocols

Baud rate: 100Mbps maximum (auto negotiation)

AUTO MDIX support

From your Web browser, you can:

- Operating environment

Internet Explorer 8.0 or later, Mozilla Firefox 3.6 or later, Google Chrome 5.0 or later, Safari 5.1 or later,

- Functions that can be used

Measuring instrument information, network information, display of VISA resource information, checking the connected PLZ-5W, remote control from browser, changing network settings, system status information, license information, password setting

Resetting the LAN interface

When the LAN interface is reset, the Interface items other than "Desired Hostname", "Desired Description", "NTP Server Hostname", and "Auto Clock Adjustment" are restored to the factory default settings. This operation does not affect the other settings.

You can use this if you forget the security password or IP address.

1. Press SYSTEM and then Configure Interface on the front panel.

If the Interface screen does not appear, press Configure Interface again.

2. Press LAN Reset and then ENTER.

The LAN interface setting is reset. If the PLZ-5W is in remote mode, reset will change the PLZ-5W back into local mode (panel operation).

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Accessing and operating the PLZ-5W from a Web browser (LAN)

Access method

You can configure the LAN interface settings from a Web browser.

You can access the Web browser in the following manners.

- Enter the URL consisting of the IP address of the PLZ-5W prefixed with http:// in the address bar of the browser.

You can check the IP address on the Information screen (press SYSTEM and then Information).

Example: When the IP address is 169.254.7.8
http://169.254.7.8

- If you using a VISA library, click on the web link from the search results of the application supplied by the VISA vendor.

The PLZ-5W has a function for searching the VXI-11 measurement instrument with the application supplied by the vendor (National Instruments NI-MAX, Agilent Connection Expert, Kikusui KI-VISA Instrument Explorer, or the like).

The following Web browsers are supported.

Internet Explorer 8.0 or later

Mozilla Firefox 3.6 or later

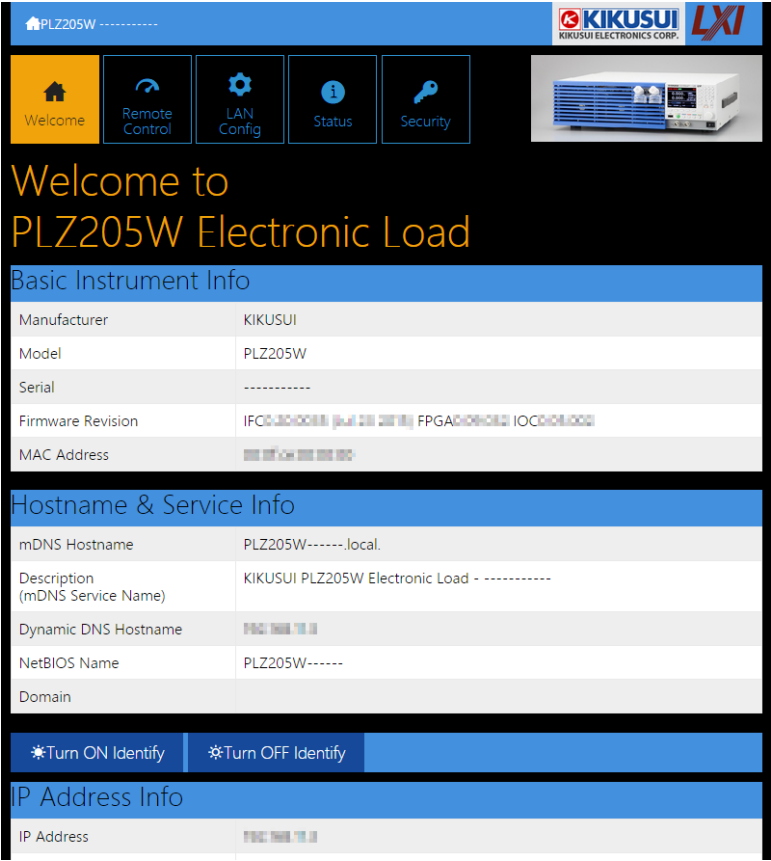
Google Chrome 5.0 or later

Safari 5.1 or later

Welcome page

This is the first page that is displayed when you access the Web browser.

There, you can display the measuring instrument information, network information, and VISA resources (I/O resources) information, and also check the connected PLZ-5W. Click the top menu to go to another page.



Buttons

Turn ON Identify button: "LXI Web Identify" is displayed on the display of the connected PLZ-5W.
Turn OFF Identify button: The displayed "LXI Web Identify" stops being displayed.

Remote Control page

You can remotely control the PLZ-5W from a browser. The various buttons have the same functions as those on the front panel of the PLZ-5W.

WARNING

Should network communication issues occur, the instrument settings shown in this Browser Web Control page may not represent the actual state of the instrument. This may result in unexpected hazardous voltages on the output that could result in personal injury, death or damage to a device under test.
Before touching the output or connecting a device under test always verify the state of the instrument.



LAN Configuration page

You can display and change the network settings.
To change a setting, click "Modify Now" and enter the setting value.

IP Address Assignment	
Assignment Method	Automatic
IP Address	192.168.0.100
Subnet Mask	255.255.0.0
Default Gateway	192.168.0.1

DNS Server Assignment	
Assignment Method	Automatic
Primary DNS Server	0.0.0.0
Secondary DNS Server	0.0.0.0

WINS Server Assignment	
Assignment Method	Automatic
Primary WINS Server	0.0.0.0
Secondary WINS Server	0.0.0.0

Buttons

Modify Now: Goes to the network setting item editing screen. The following 4 buttons are displayed.

Undo: Returns the edited contents to the state before editing.

Apply: Applies the edited contents.

Reset: Resets the network settings.

Default: Returns the network settings to the factory default settings.

IP Address Assignment

You can set the IP address. You can choose between automatic assignment and assignment of a fixed address.

In the case of automatic assignment of IP address, we recommend using the DHCP server function using a router as far as possible.

If the DHCP server function is not used, it takes about 60 seconds until determination that address assignment with DHCP has failed. Then, an address between 169.254.0.0 to 169.254.255.255 is assigned by link local address (Auto-IP).

DNS Server Assignment

Sets the address of the DNS server.

WINS Server Assignment

Sets the address of the WINS server.

Hostname & Services

You can set the host name and so on. If you set the host name, you can use it in place of the IP address to access the LAN interface. Normally, we recommend that you select "Enable Dynamic DNS", "Enable mDNS", and "NetBIOS Over TCP/IP".

If you leave the Hostname and Description boxes empty and click "Apply," the host name will be created from the model name and serial number.

Auto Clock Adjustment

You can set auto clock adjustment. Enter the NTP server address to be used for clock adjustment and select the "Enable Auto Adjustment" check box to enable auto clock adjustment when the PLZ-5W is turned on.

To use auto clock adjustment, the PLZ-5W must be connected to the Internet when it is turned on.

If a link local address was set for the IP address, auto clock adjustment does not function.

Reset and factory default settings

Pressing Reset and Default changes the network settings change as follows. The items with an X mark are returned to their default values.

Reset	Default	Item	Default value
X	X	IP Address Assignment	Automatic
X	X	DNS Server Assignment	0.0.0.0
X	X	WINS Server Assignment	0.0.0.0
	X	Desired Hostname	<Model name> - <Last 5 digits of serial number>
	X	Desired Description	KIKUSUI <Model name> Electronic Load - <Serial number>
X	X	Enable Dynamic DNS	Yes
X	X	Enable mDNS	Yes
X	X	Enable NetBIOS Over TCP/IP	Yes
	X	NTP Server Hostname	ntp.nict.jp
	X	Auto Clock Adjustment	Yes

System Status page

Displays the system information and license information.

The screenshot displays the 'System Status' page of the Kikusui LXI interface. At the top, there's a navigation bar with icons for Welcome, Remote Control, LAN Config, Status (highlighted), and Security. Below the navigation bar, the 'System Status' title is followed by 'System Status Info'. This section contains a table with the following data:

Max Ratings	210W / 42A / 158V	
System Time	Thu 08 Sep 2016 12:19:48 JST	
CAL Date	Fri Aug 21 2016	
Installed Options		

Below this is the 'OSS Licensing Info' section, which contains a table detailing the licenses for various components:

Linux Kernels	Instrument firmware uses GNU/Linux and BusyBox	Under GNU GPLv2 License
Firmware Libraries	Instrument firmware uses Qt5	Under GNU LGPL License 2.1
WEB Core Libraries	Web contents are powered by jQuery 1.9	Under MIT License
WEB GUI Libraries	Web contents are styled with Metro UI CSS 2.0	Under MIT License
Web Server	Embedded web server uses lighttpd 1.4	Under revised BSD License
Web Server Script Engine	Embedded web server is powered by PHP 5	Under PHP License

System Status Info

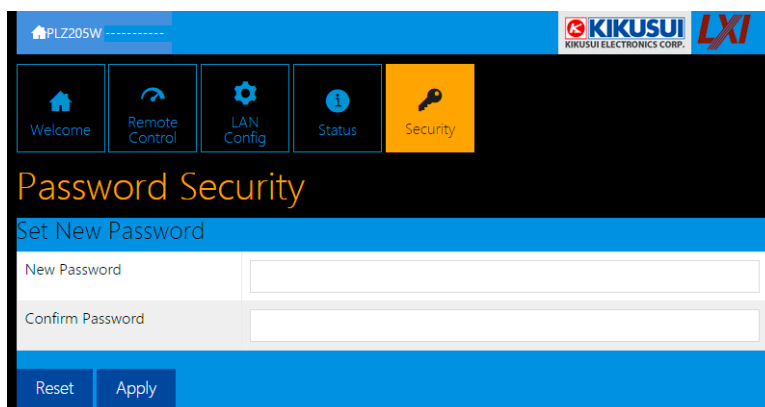
Displays the system information.

OSS Licensing Info

Displays the license information of the open-source software.

Password Security page

You can set and change the password for the Web browser interface here.



The screenshot shows the 'Set New Password' page of the Kikusui LXI web interface. The page has a blue header with the Kikusui LXI logo and a navigation bar with icons for Welcome, Remote Control, LAN Config, Status, and Security. The main content area is titled 'Password Security' and 'Set New Password'. It contains two input fields: 'New Password' and 'Confirm Password'. Below the fields are 'Reset' and 'Apply' buttons.

When a password has been set, that password is required in order to use the following functions.

- Remote control from Remote Control page
- Editing of LAN Configuration page
- Changing/deleting the password

Set New Password

Enter the password.

You can use alphanumeric characters, hyphens, and underscores for the password. 15 characters maximum.

Changing/deleting the password

After the password has been set, the screen for changing the password appears when you enter the password.

To change the password, enter the present password in "Current Password", enter the new password in "New Password" and "Confirm Password", and then click "Apply".

To disable password protection, enter the present password in "Current Password", leave "New Password" and "Confirm Password" blank, and click "Apply".

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SYST:SEC:IMM

Deletes all the user data other than the calibration data and present time according to NISPOM requirements, and returns the PLZ-5W to its factory default settings.
To use this command, you have to enable password protection with [SYST:PASS](#).

Command

SYSTem:SECurity:IMMediate

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ARB:COUN

Sets the number of data points of the I-V characteristics map.
To reflect this setting in the output, send [ARB:APPL](#).

Command

```
[SOURce:]ARBItrary[:LEVel][:IMMediate]:COUNT <numeric>  
[SOURce:]ARBItrary[:LEVel][:IMMediate]:COUNT?
```

Parameter

Value	3 to 100
*RST transmission	3

Example

```
ARB:COUN 10
```

Response

Returns the number of data points of the I-V characteristics map in response to ARB:COUN?.

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INP:PON:STAT OUTP:PON:STAT

Sets the condition panel setting state when the POWER switch is turned on.

Command

```
INPut:PON:STATe {RST|RCL0|AUTO}  
OUTPut:PON:STATe {RST|RCL0|AUTO}  
  
INPut:PON:STATe?  
OUTPut:PON:STATe?
```

Parameter

Value	RST	Start in *RST command transmission state
	RCL0	Start with memory number 0 setting
	AUTO	Start with the same settings as when the power was switched off the previous time (but always load off)
Factory default	AUTO	

Response

Returns the panel setting state when the POWER switch is turned on, in character format in response to the INP:PON:STAT? or OUTP:PON:STAT? query.

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COND

Sets the conductance in CR mode.

Command

```
[SOURCE:]CONDUCTance[:LEVEL][:IMMEDIATE][:AMPLITUDE]
{<numeric>|MINimum|MAXimum}

[SOURCE:]CONDUCTance[:LEVEL][:IMMEDIATE][:AMPLITUDE]? [{MINimum|MAXimum}]
```

Parameter (Unit: SIE)

	PLZ205W	PLZ405W	PLZ1205W
H range	42.000 to 0.000	84.000 to 0.000	252.000 to 0.000
Resolution	1m	2m	5m
M range	4.2000 to 0.0000	8.4000 to 0.0000	25.2000 to 0.0000
Resolution	0.1m	0.2m	0.5m
L range	0.42000 to 0.00000	0.84000 to 0.00000	2.52000 to 0.00000
Resolution	0.01m	0.02m	0.05m

*RST transmission 0

Response

Returns the conductance setting value in NR3 format in response to the COND? query.

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COND:EXT:FCON

Enables/disables external control of CR mode.

Command

```
[SOURce:]CONDuatcnce[:LEVel]:EXTeRnal:FCONtrol {ON|OFF|1|0}
[SOURce:]CONDuatcnce[:LEVel]:EXTeRnal:FCONtrol?
```

Parameter

	ON(1) Enabled
Value	OFF(0) Disabled
*RST transmission	OFF(0)

Response

Returns external control enable/disable of CR mode in boolean format in response to the COND:EXT:FCON? query.

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COND:PULS:LEV

Sets the switching conductance.

During switching operation, two settings are executed repetitively.

The [CONDuctance](#) setting value is used as the setting for the first value of the set of two values, and this setting value is applied for the second value of the set of two values.

Command

```
[SOURCE:]CONDuctance[:LEVel]:PULSe:LEVel {<numeric>|MINimum|MAXimum}
[SOURCE:]CONDuctance[:LEVel]:PULSe:LEVel? [{MINimum|MAXimum}]
```

Parameter (Unit: SIE)

	PLZ205W	PLZ405W	PLZ1205W
H range	42.000 to 0.000	84.000 to 0.000	252.000 to 0.000
Resolution	1m	2m	5m
M range	4.2000 to 0.0000	8.4000 to 0.0000	25.2000 to 0.0000
Resolution	0.1m	0.2m	0.5m
L range	0.42000 to 0.00000	0.84000 to 0.00000	2.52000 to 0.00000
Resolution	0.01m	0.02m	0.05m

***RST transmission** 0.0

Response

Returns the switching conductance in NR3 format in response to the COND:PULS:LEV? query.

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COND:PULS:FREQ

Sets the switching frequency.
This frequency is used in common for CURRent and CONDuctance switching.

Command

```
[SOURce:]CONDuctance[:LEVel]:PULSe:FREQuency {<numeric>|MINimum|MAXimum}
[SOURce:]CONDuctance[:LEVel]:PULSe:FREQuency? [{MINimum|MAXimum}]
```

Parameter

Value	1.0 to 100.0k
Unit	HZ
*RST transmission	1.0

Response

Returns the switching frequency in NR3 format in response to the COND:PULS:FREQ? query.

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COND:PULS:DCYC

Sets the switching duty cycle.
This frequency is used in common for CURRent and CONDuctance switching.

Command

```
[SOURce:]CONDuctance[:LEVel]:PULSe:DCYClE {<numeric>|MINimum|MAXimum}  
[SOURce:]CONDuctance[:LEVel]:PULSe:DCYClE? [{MINimum|MAXimum}]
```

Parameter

Value	1 to 99
Unit	PCT
*RST transmission	50

Response

Returns the switching duty cycle in NR3 format in response to the COND:PULS:DCYC? query.

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COND:RANG

Set the range of CR mode.

Command

[SOURce:] CONDuctance:RANGE {LOW|MEDium|HIGH}

[SOURce:] CONDuctance:RANGE?

Parameter

	LOW	L range
Value	MEDium	M range
	HIGH	H range
*RST transmission	HIGH	

Response

Returns the range setting value of CR mode in character format in response to the COND:RANG? query.

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COND:RESP

Sets the response speed in CR mode.

Command

[SOURce:] CONDUCTance:RESPonse {NORMal|FAST}

[SOURce:] CONDUCTance:RESPonse?

Parameter

Value	NORMal Normal	
	FAST	Fast
*RST transmission	NORMal	

Response

Returns the response speed in CR mode in character format in response to the COND:RESP? query.

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CURR

Sets the current in CC mode.

Command

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

Parameter (Unit: A)

	PLZ205W	PLZ405W	PLZ1205W
H range	0.000 to 42.000	0.000 to 84.000	0.0000 to 252.000
Resolution	1m	2m	5m
M range	0.0000 to 4.2000	0.0000 to 8.4000	0.0000 to 25.2000
Resolution	0.1m	0.2m	0.5m
L range	0.00000 to 0.42000	0.00000 to 0.84000	0.00000 to 2.52000
Resolution	0.01m	0.02m	0.05m

*RST transmission 0.0

Response

Returns the current in CC mode in NR3 format in response to the CURR? query.

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CURR:EXT:FCON

Enables/disables external control of CC mode.

Command

```
[SOURce:]CURRent[:LEVel]:EXTernal:FCONtrol {ON|OFF|1|0}  
[SOURce:]CURRent[:LEVel]:EXTernal:FCONtrol?
```

Parameter

	ON(1) Enabled
Value	OFF(0) Disabled
*RST transmission	OFF(0)

Response

Returns external control enable/disable of CC mode in boolean format in response to the CURR:EXT:FCON? query.

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CURR:EXT:ACON

Enables/disables external superimposed input in CC mode.

Command

[SOURce:]CURRent[:LEVel]:EXTernal:ACONtrol {ON|OFF|1|0}

[SOURce:]CURRent[:LEVel]:EXTernal:ACONtrol?

Parameter

Value	ON(1) Enabled
	OFF(0) Disabled
*RST transmission	OFF(0)

Response

Returns external superimposed input enable/disable in CC mode in boolean format in response to the CURR:EXT:ACON? query.

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[Visual Basic 2013](#)**CURR:PULS:LEV**

Sets the switching current.

During switching operation, two settings are executed repetitively.

The [CURRent](#) setting value is applied as the setting for the first value of the set of two values, and this setting value here is applied for the second value of the set of two values.

Command

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

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

Parameter (Unit: A)

	PLZ205W	PLZ405W	PLZ1205W
H range	0.000 to 42.000	0.000 to 84.000	0.0000 to 252.000
Resolution	1m	2m	5m
M range	0.0000 to 4.2000	0.0000 to 8.4000	0.0000 to 25.2000
Resolution	0.1m	0.2m	0.5m
L range	0.00000 to 0.42000	0.00000 to 0.84000	0.00000 to 2.52000
Resolution	0.01m	0.02m	0.05m

***RST transmission** 0.0

Response

Returns the switching current in NR3 format in response to the CURR:PULS:LEV? query.

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CURR:PULS:DCYC

Sets the switching duty cycle.
This frequency is used in common for CURRent and CONDuctance switching.

Command

```
[SOURce:]CURRent[:LEVel]:PULSe:DCYClE {<numeric>|MINimum|MAXimum}  
[SOURce:]CURRent[:LEVel]:PULSe:DCYClE? [{MINimum|MAXimum}]
```

Parameter

Value	1 to 99
Unit	PCT
*RST transmission	50

Response

Returns the switching duty cycle in NR3 format in response to the CURR:PULS:DCYC? query.

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CURR:PULS:FREQ

Sets the switching frequency.
This frequency is used in common for CURRent and CONDuctance switching.

Command

```
[SOURce:]CURRent[:LEVel]:PULSe:FREQuency {<numeric>|MINimum|MAXimum}  
[SOURce:]CURRent[:LEVel]:PULSe:FREQuency? [{MINimum|MAXimum}]
```

Parameter

Value	1.0 to 100.0k
Unit	HZ
*RST transmission	1.0

Response

Returns the switching frequency in NR3 format in response to the CURR:PULS:FREQ? query.

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CURR:RANG

Set the range of CC mode.

Command

```
[SOURce:]CURRent:RANGe {LOW|MEDium|HIGH}  
[SOURce:]CURRent:RANGe?
```

Parameter

	LOW	L range
Value	MEDium	M range
	HIGH	H range
*RST transmission	HIGH	

Response

Returns the range setting value of CC mode in character format in response to the CURR:RANG? query.

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CURR:PROT

Sets the current value for overcurrent protection (OCP).

Command

```
[SOURce:]CURRent:PROTection[:LEVel][:UPPer] {<numeric>|MINimum|MAXimum}
[SOURce:]CURRent:PROTection[:LEVel][:UPPer]? [{MINimum|MAXimum}]
```

Parameter

	PLZ205W	PLZ405W	PLZ1205W
Setting range	0.0A to 44.0A	0.0A to 88.0A	0.0A to 264.0A
Resolution	10mA	10mA	10mA

During [*RST](#) transmission, all MAXimum

Response

Returns the current value for overcurrent protection (OCP) in NR3 format in response to the CURR:PROT? query.

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CURR:PROT:STAT

Sets the operation when overcurrent protection (OCP) is activated.

Command

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

Parameter

Value	ON(1)	Load off (Trip)
	OFF(0)	Limit output (Limit)
*RST transmission	OFF(0)	

Response

Returns the operation when OCP is activated in boolean format in response to CURR:PROT:STAT? query.

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CURR:SLEW

Set the slew rate value.

Command

[SOURce:]CURRent:SLEWrate {<numeric>|MINimum|MAXimum}

[SOURce:]CURRent:SLEWrate? [{MINimum|MAXimum}]

Parameter (Unit: A/μs)

	PLZ205W	PLZ405W	PLZ1205W
H range	0.01 to 10	0.02 to 20	0.06 to 60
Resolution	0.01	0.02	0.06
M range	0.001 to 1	0.002 to 2	0.006 to 6
Resolution	0.001	0.002	0.006
L range	0.1m to 100m	0.2m to 200m	0.6m to 600m
Resolution	0.1m	0.2m	0.6m

During ***RST** transmission, all MINimum

Response

Returns the slew rate in NR3 format in response to the CURR:SLEW? query.

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CURR:SST

Sets the soft start time.

Command

```
[SOURce:]CURRent:SStArt {<numeric>|MINimum|MAXimum}
[SOURce:]CURRent:SStArtw? [{MINimum|MAXimum}]
```

Parameter

Value	0, 100μ, 200μ, 500μ, 1m, 2m, 5m, 10m, 20m
Unit	S
*RST transmission	MINimum

Response

Returns the soft start time in NR3 format in response to the CURR:SST? query.

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FUNC

Set the operation mode.

Command

[SOURce:] FUNCtion[:MODE] {CC|CR|CV|CP|ARB}

[SOURce:] FUNCtion[:MODE] ?

Parameter

Value	CC	CC mode
	CR	CR mode
	CV	CV mode
	CP	CP mode
	ARB	ARB mode
*RST transmission		CC

Response

Returns the setting of the operation mode in character format in response to the FUNC? query.

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FUNC:CVOP

Enables/disables +CV mode (addition of CV mode to CC mode or CR mode).

Command

```
[SOURce:]FUNCtion[:MODE]:CVOPtion[:STATE] {ON|OFF|1|0}
[SOURce:]FUNCtion[:MODE]:CVOPtion[:STATE]?
```

Parameter

Value	ON(1) Enabled
	OFF(0) Disabled
*RST transmission	OFF(0)

Response

Returns +CV mode enable/disable in boolean format in response to the FUNC:CVOP? query.

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POW

Sets the power in CP mode.

Command

[SOURce:]POWer[:LEVel][:IMMediate][:AMPlitude] {<numeric>|MINimum|MAXimum}

[SOURce:]POWer[:LEVel][:IMMediate][:AMPlitude]? [{MINimum|MAXimum}]

Parameter (Unit: W)

	PLZ205W	PLZ405W	PLZ1205W
H range	0.00 to 210.00	0.00 to 420.00	0.00 to 1260.00
Resolution	0.005	0.01	0.05
M range	0.00 to 21.000	0.00 to 42.000	0.00 to 126.000
Resolution	0.0005	0.001	0.005
L range	0.00 to 2.1000	0.00 to 4.2000	0.00 to 12.6000
Resolution	0.00005	0.0001	0.0005

***RST transmission** 0.0

Response

Returns the power in CP mode in NR3 format in response to the POW? query.

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POW:EXT:FCON

Enables/disables external control of CP mode.

Command

[SOURce:]POWer[:LEVel]:EXTeRnal:FCOnTrol {ON|OFF|1|0}

[SOURce:]POWer[:LEVel]:EXTeRnal:FCOnTrol?

Parameter

Value	ON(1) Enabled
	OFF(0) Disabled
*RST transmission	OFF(0)

Response

Returns external control enable/disable of CP mode in boolean format in response to the POW:EXT:FCON? query.

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POW:RANG

Set the range of CP mode.

Command

```
[SOURce:] POWER:RANGE {LOW|MEDium|HIGH}  
[SOURce:] POWER:RANGe?
```

Parameter

	LOW	L range
Value	MEDium	M range
	HIGH	H range
*RST transmission	HIGH	

Response

Returns the range setting value of CP mode in character format in response to the POW:RANG? query.

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POW:PROT

Sets the power of overpower protection (OPP)

Command

```
[SOURce:]POWer:PROTection[:LEVel][:UPPer] {<numeric>|MINimum|MAXimum}

[SOURce:]POWer:PROTection[:LEVel][:UPPer]? [{MINimum|MAXimum}]
```

Parameter

	PLZ205W	PLZ405W	PLZ1205W
Setting range	0W to 220W	0W to 440W	0W to 1320W
Resolution	0.1W	0.1W	0.1W

During [*RST](#) transmission, all MAXimum

Response

Returns the power of OPP in NR3 format in response to the POW:PROT? query.

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POW:PROT:STAT

Sets the operation when overpower protection (OPP) is activated.

Command

```
[SOURce:]POWer:PROTection:StAte {ON|OFF|1|0}
[SOURce:]POWer:PROTection:StAte?
```

Parameter

	ON(1)	Load off (Trip)
Value	OFF(0)	Limit output (Limit)
*RST transmission	OFF(0)	

Response

Returns the operation when OPP is activated in boolean format in response to the POW:PROT:STAT? query.

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PROG

Selects or deselects a program.

Command

```
[SOURce:]PROGrama[:SELeCted] "/<program name>"
```

Parameter <program name>

Value	Program name	Entering a name of an available program selects that program. Enter a slash at the beginning of the program name. To clear the program selection, enter "".
-------	--------------	---

Example

```
PROG "/My test program"    'Select My test program.  
PROG ""    'Clear the program selection.
```

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VOLT

Sets the voltage in CV mode.

Command

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

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

Parameter (Unit: V)

	PLZ205W	PLZ405W	PLZ1205W
H range	0.000 to 157.500		
Resolution	5m		
L range	0.000 to 15.7500		
Resolution	0.5m		

*RST transmission 0.0

Response

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

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VOLT:EXT:FCON

Enables/disables external control of CV mode.

Command

[SOURce:]VOLTage[:LEVel]:EXTeRnal:FCONtrol {ON|OFF|1|0}

[SOURce:]VOLTage[:LEVel]:EXTeRnal:FCONtrol?

Parameter

Value	ON(1) Enabled
	OFF(0) Disabled
*RST transmission	OFF(0)

Response

Returns external control enable/disable of CV mode in boolean format in response to the VOLT:EXT:FCON? query.

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VOLT:RANG

Sets the range of CV mode.

Command

```
[SOURce:]VOLTage:RANGe {LOW|HIGH}
[SOURce:]VOLTage:RANGe?
```

Parameter

	LOW	L range
Value	HIGH	H range
*RST transmission	HIGH	

Response

Returns the range setting value of CV mode in character format in response to the VOLT:RANG? query.

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VOLT:PROT:LOW

Sets the voltage of undervoltage protection (UVP).

Command

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

Parameter

Value	0.00 to 150.00
Resolution	0.01
Unit	V
*RST transmission	0.00

Response

Returns the UVP voltage value in NR3 format in response to the VOLT:PROT:LOW? query.

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VOLT:PROT:STAT

Enables/disables undervoltage protection (UVP).
When enabled, the PLZ-5W turns the load off during UVP operation. You can set the UVP voltage value with [VOLT:PROT:LOW](#).

Command

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

Parameter

Value	ON(1) Enabled
	OFF(0) Disabled
*RST transmission	OFF(0)

Response

Returns UVP enable/disable in boolean format in response to the VOLT:PROT:STAT? query.

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VOLT:RESP

Sets the response speed in CV mode.

Command

```
[SOURce:]VOLTage:RESPonse {NORMal|FAST}  
[SOURce:]VOLTage:RESPonse?
```

Parameter

Value	NORMal Normal	
	FAST	Fast
*RST transmission	NORMal	

Response

Returns the response speed in CV mode in character format in response to the VOLT:RESP? query.

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INP:EXT:LOG OUTP:EXT:LOG

Sets the signal logic for external control input.

Command

```
INPut[:STATe]:EXTeRnal:LOGic {POSitive|NEGative}  
  
OUTPut[:STATe]:EXTeRnal:LOGic {POSitive|NEGative}  
  
INPut[:STATe]:EXTeRnal:LOGic?  
  
OUTPut[:STATe]:EXTeRnal:LOGic?
```

Parameter

Value	POSitive	Positive
	NEGative	Negative
*RST transmission	POSitive	

Response

Returns the signal logic for external control input in character format in response to the INP:EXT:LOG? or OUTP:EXT:LOG?query.

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INP:MSYN:ACC OUTP:MSYN:ACC

Sets whether to accept INPut (OUTPut) synchronization instruction packets sent on the mutual synchronization connection line.

Command

```
INPut:MSYNc:ACcEpt[:STATe] {ON|OFF|1|0}  
OUTPut:MSYNc:ACcEpt[:STATe] {ON|OFF|1|0}  
INPut:MSYNc:ACcEpt[:STATe]?  
OUTPut:MSYNc:ACcEpt[:STATe]?
```

Parameter

Value	ON(1) Accept
	OFF(0) Not accept
*RST transmission	OFF(0)

Response

Returns whether to accept INPut (OUTPut) synchronization instruction packets in boolean format in response to the INP:MSYN:ACC? or OUTP:MSYN:ACC? query.

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INPut:PROT:WDOG

OUTPut:PROT:WDOG

Enables/disables the watchdog protection function.

Command

INPut:PROTection:WDOG[:STATe] {ON|OFF|1|0}

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

INPut:PROTection:WDOG[:STATe]?

OUTPut:PROTection:WDOG[:STATe]?

Parameter

Value	ON(1) Enabled
	OFF(0) Disabled
Factory default	OFF(0)

Response

Returns watchdog protection function enable/disable in boolean format in response to the INPut:PROT:WDOG? or OUTPut:PROT:WDOG? query.

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INPut:PROT:WDOG:DEL
OUTPut:PROT:WDOG:DEL

Sets the delay time of the watchdog protection function.

Command

```
INPut:PROTEction:WDOG:DElay <numeric>  
  
OUTPut:PROTEction:WDOG:DElay <numeric>  
  
INPut:PROTEction:WDOG:DElay?  
  
OUTPut:PROTEction:WDOG:DElay?
```

Parameter

Value	1 to 3600 (1 second unit)
Unit	S
Factory default	60

Response

Returns the delay time of the watchdog protection function in NR3 format in response to the INPut:PROT:WDOG:DEL? or OUTPut:PROT:WDOG:DEL? query.

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INP:SHOR OUTP:SHOR

Sets the short function on/off.

Command

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

Parameter

Value	ON(1)	On
	OFF(0)	Off
*RST transmission	OFF(0)	

Response

Returns short function on/off in boolean format in response to the INP:SHOR? or OUTP:SHOR? query.

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TRIG:ACQ:COUN

Sets the number of times measurement values are to be recorded.

Command

```
TRIGger:ACQuire:COUNt <numeric>  
  
TRIGger:ACQuire:COUNt?
```

Parameter

Value	Number of measurement values to be recorded	1 to 65536
*RST transmission	1	

Response

Returns the number of measurement values to be recorded in NR1 format in response to TRIG:ACQ:COUN?.

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TRIG:ACQ:DEL

Sets the delay time for applying measurement triggers.
The delay time is applied to each trigger application.

Command

```
TRIGger:ACQuire:DELay {<numeric>|MINimum|MAXimum}  
TRIGger:ACQuire:DELay? [{MINimum|MAXimum}]
```

Parameter

Value	0 to 100.0
Unit	S
*RST transmission	0

Response

Returns the delay time for applying measurement triggers in NR3 format in response to TRIG:ACQ:DEL?.

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TRIG:ACQ:SOUR

Sets the trigger source for clearing sequence start trigger wait states.

Command

```
TRIGger:ACQuire:SOURce <character>
TRIGger:ACQuire:SOURce?
```

Parameter <character>

You can select from the available choices below.

Value	IMMediate	Executes the measurement values when the Initiate key on the PLZ-5W front panel is pressed or when INIT:ACQ is received from a PC or the like.
	BUS	Records the measurement values at the timing of software trigger (*TRG) application. The trigger is applied to both trigger systems: (1) sequence and step (TRANsient) and (2) measure (ACQuire).
	DIGITAL2	Executes the measurement values at the timing at which a signal is input to pin 13 of the EXT CONT connector of the PLZ-5W (when SYST:CONF:DIGITAL2:DIR is set to INPut).
	TALink	If PROG:STEP<n>:TRIG:GEN is set to TALink, measured values are recorded during the step execution of the sequence.
	MSYNc	Executes the step when TRIG:ACQ:MSYN is received from a PC or the like.
*RST transmission		
	IMMediate	

Example

```
TRIG:ACQ:SOUR DIGITAL2
```

Response

Returns the source of the trigger of the ACQuire subsystem in character format in response to the TRIG:ACQ:SOUR? query.

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TRIG:ACQ:INT:STAT

Sets whether to measure at intervals when the trigger count ([TRIG:ACQ:COUN](#)) is 2 or higher.

Command

```
TRIGger:ACQuire:INTerval:STATe {ON|OFF|1|0}  
TRIGger:ACQuire:INTerval:STATe?
```

Parameter

Value	ON(1)	Intervals are inserted between measurements.
	OFF(0)	Intervals are not inserted between measurements.
*RST transmission OFF(0)		

Response

Returns whether intervals are inserted between measurements in boolean format in response to TRIG:ACQ:INT:STAT?.

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TRIG:ACQ:INT:TIME

Sets the measurement interval time when [TRIG:ACQ:INT:STAT](#) is set to ON.

Command

TRIGger:ACQuire:INTerval:TIME {<numeric>|MINimum|MAXimum}

TRIGger:ACQuire:INTerval:TIME? [{MINimum|MAXimum}]

Parameter

Value	200 μ to 3600.0
Unit	S
*RST transmission	0.1

Response

Returns the measurement interval time in NR3 format in response to the TRIG:ACQ:INT:TIME? query.

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TRIG:TRAN:DEL

Sets the delay time for applying sequence triggers.

Command

```
TRIGger:TRANsient:DELay {<numeric>|MINimum|MAXimum}  
  
TRIGger:TRANsient:DELay? [{MINimum|MAXimum}]
```

Parameter

Value	0~100.0
Unit	S
*RST transmission	0.0

Response

Returns the delay time for trigger application of TRANSient in NR3 format in response to the TRIG:TRAN:DEL? query.

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TRIG:TRAN:SOUR

Sets the trigger source for clearing sequence start trigger wait states.

Command

```
TRIGger:TRANsient:SOURce <character>
TRIGger:TRANsient:SOURce?
```

Parameter <character>

You can select from the available choices below.

Value	IMMediate	Starts the sequence when the Initiate key on the PLZ-5W front panel is pressed or when INIT:TRAN:PROG is received from a PC or the like.
	BUS	Starts execution at the timing of software trigger application by the 4882/SCPI command
	DIGITAL2	Starts execution at the timing at which a signal is input to pin 13 of the EXT CONT connector of the PLZ-5W (when SYST:CONF:DIGITAL2:DIR is set to INPut).
	MSYNc	Starts the sequence when an MSync key on the front panel of the synchronized PLZ-5Ws is pressed. Starts the sequence when TRIG:TRAN:MSYN is received from a PC or the like.
*RST transmission		
IMMediate		

Example

```
TRIG:TRAN:SOUR DIGITAL2
```

Response

Returns the source of the trigger to be applied for TRANSient in character format in response to the TRIG:TRAN:SOUR? query.

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DATA:BSIZ

Sets the buffer size (maximum number of measurement points) of the data logger function.
If the number of measurement points exceeds the buffer size, measured values are cleared in order from the oldest value. Changing the buffer size deletes all the data that has already been registered.

Command

```
DATA:BSIZe <numeric>  
  
DATA:BSIZe?
```

Parameter

Value	1024, 2048, 4096, 8192, 16384, 32768, 65536
*RST transmission	1024

Response

Returns the buffer size of the data logger function in NR1 format in response to the DATA:BSIZ? query.

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DATA:FORM

Sets the response format (type of measured data and order) to be used when referencing data in the data logger.

Command

```
DATA:FORMat <item>[,<item>,<item>,<item>,<item>,<item>]
DATA:FORMat?
```

Parameter <item>

You can specify between 1 and 6 items.

Value ¹	CURRent	Sets the response format to current value (A)
	VOLTage	Sets the response format to voltage value (V)
	POWER	Sets the response format to power value (W)
	ETIMe	Sets the response format to elapsed time (s)
	CAPacity	Sets the response format to current capacity value (Ah)
	ENERgy	Sets the response format to power capacity value (Wh)
*RST transmission	CURR,VOL,POW	

1: You cannot specify the same setting value 2 or more times.

Example

If DATA:FORM VOLT,CURR,ETIM is specified and DATA:R? is used to query measured data, the response is expressed in the following order: voltage, current, elapsed time.

Response

Returns the response format in character format in response to the DATA:FORM? query.

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DATA:INT:GATE

Sets the integration time.

Command

DATA:INTEgral:GATE {NONE|LOAD_ON|PROG_RUN}

DATA:INTEgral:GATE?

Parameter

Value	NONE	Manual integration start/stop only.
	LOAD_ON	Starts integration at load on. Stops integration at load off.
	PROG_RUN	Starts integration at sequence start. Stops integration at sequence completion.
*RST transmission	LOAD ON	

Response

Returns the integration operation time in character format in response to the DATA:INT:GATE? query.

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DATA:INT:GATE:ARES

Sets whether past integration is reset at the start of the integration operation.

Command

```
DATA:INTEgral:GATE:ARESet {ON|OFF|1|0}  
  
DATA:INTEgral:GATE:ARESet?
```

Parameter

Value	ON(1) Reset
	OFF(0) Don't reset (accumulation of past integrated values)
*RST transmission	ON(1)

Response

Returns whether past integration is reset at the start of the integration operation in boolean format in response to the DATA:INT:GATE:ARES? query.

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SYST:BEEP

Collectively turns on or off the beep sounds that are generated in the following situations.

- Invalid operation
- Protection activation
- SCPI error

Command

```
SYSTem:BEEPer[:ALL][:STATe] {ON|OFF|1|0}  
  
SYSTem:BEEPer[:ALL][:STATe]?
```

Parameter

Value	ON(1)	On
	OFF(0)	Off
Factory default	ON(1)	

Response

Returns 1 if any of the beep sounds that are generated when an invalid operation is carried out, when a protection is activated, or when an SCPI error occurs is set to on, in response to the SYST:BEEP? query.

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SYST:BEEP:KEY

Sets the beep sound on/off in case of invalid operation

Command

```
SYSTem:BEEPer:KEY[:STATe] {ON|OFF|1|0}  
  
SYSTem:BEEPer:KEY[:STATe] ?
```

Parameter

Value	ON(1)	On
	OFF(0)	Off
Factory default	ON(1)	

Response

Returns the beep sound on/off setting in boolean format in response to the SYST:BEEP:KEY? query.

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SYST:BEEP:PROT

Sets the beep sound on/off in case of protection activation.

Command

```
SYSTem:BEEPer:PROTection[:STATe] {ON|OFF|1|0}  
SYSTem:BEEPer:PROTection[:STATe]?
```

Parameter

	ON(1)	On
Value	OFF(0)	Off
Factory default	ON(1)	

Response

Returns the beep sound on/off setting in case of protection activation in boolean format in response to the SYST:BEEP:PROT? query.

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SYST:BEEP:SCPI

Sets the beep sound on/off in case of SCPI error.

Command

```
SYSTem:BEEPer:SCPI[:STATe] {ON|OFF|1|0}  
  
SYSTem:BEEPer:SCPI[:STATe]?
```

Parameter

	ON(1)	On
Value	OFF(0)	Off
Factory default	ON(1)	

Response

Returns the beep sound on/off setting in case of SCPI error in NR1 format in response to the SYST:BEEP:SCPI? query.

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SYST:COMM:RLST

Sets the operation of the PLZ-5W to local/remote (lock all panel controls except ESCAPE)/remote (lock all panel controls).

When set to REMote, pressing the front panel ESCAPE key causes the PLZ-5W to return to LOCal. When set to REMote or RWLock, "REMOTE" appears on the front panel display.

Command

```
SYSTem:COMMunicate:RLState {LOCal|REMote|RWLock}  
SYSTem:COMMunicate:RLState?
```

Parameter

Value	LOCal	Switches the PLZ-5W to local mode. This is a substitute command for IEEE488.1 ren FALSE (Remote Disable).
	REMote	Switches the PLZ-5W to remote mode, locking all panel controls except the ESCAPE key. This is a substitute command for IEEE 488.1 ren (Remote Enable). This is also the substitute command for address specification.
	RWLock	Switches the PLZ-5W to remote mode, locking all panel controls. This is a substitute command for IEEE 488.1 llo (Local Lock Out).
Power on	LOCal	

Response

Returns the operation status of the PLZ-5W in character format in response to the SYST:COMM:RLST? query.

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SYST:CONF:DIGITAL2:DIR

Sets the I/O direction of the DIGITAL2 signal.

Command

```
SYSTem:CONFigure:DIGITAL2:DIRection {INPut|OUTPut}  
  
SYSTem:CONFigure:DIGITAL2:DIRection?
```

Parameter

	INPut	Input
Value	OUTPut	Output
Factory default	INPut	

Response

Returns the I/O direction of the DIGITAL2 signal as character data in response to the SYST:CONF:DIGITAL2:DIR? query.

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SYST:CONF:RSEN

Sets remote sensing function on/off.

Command

```
SYSTem:CONFigure:RSENsing[:STATe] {ON|OFF|1|0}  
SYSTem:CONFigure:RSENsing[:STATe] ?
```

Parameter

Value	ON(1)	On
	OFF(0)	Off
Factory default	OFF(0)	

Response

Returns whether remote sensing is on or off in boolean format in response to the SYST:CONF:RSEN? query.

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SYST:KLOC

Sets or releases panel control lock.

Command

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

SYSTem:KLOCk?

Parameter

Value	ON(1) Lock
	OFF(0) Release lock
Factory default	OFF(0)

Response

Returns the present panel control lock setting in response to the SYST:KLOC? query.

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SYST:KLOC:LEV

Sets the panel control lock level (1 to 3).

Command

```
SYSTem:KLOCk:LEVel {1|2|3}
SYSTem:KLOCk:LEVel?
```

Parameter

Value	
1	Locks all operations except the following - Release key lock - Load on/off - Used to recall setup memory. - Preset memory recall
2	Locks all operations except the following - Release key lock - Load on/off
3	Locks all operations except key lock release
Factory default	3

Response

Returns the panel control lock level in NR1 format in response to the SYST:KLOC:LEV? query.

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SYST:PASS:NEW

Set the password.

Command

SYSTem:PASSword:NEW <"existing password">,<"new password">

Parameter <"existing password">

Value	Enter the present password. Because no password is set by default, enter <" ">.
-------	---

Parameter <"new password">

Value	Enter an arbitrary password under the following conditions. Characters that can be used: alphanumeric characters (A-Z, a-z, 0-9), underscore, hyphen Number of characters: 4 to 15
-------	--

Example

SYST:PASS:NEW "existing_password","new_password"

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SYST:SSAV

Sets the screen saver on/off.
You can also set the time until the screen saver starts with [SYST:SSAV:DEL](#).

Command

```
SYSTem:SSAVer[:STATe] {ON|OFF|1|0}  
SYSTem:SSAVer[:STATe]?
```

Parameter

Value	ON(1)	On
	OFF(0)	Off
Factory default	OFF(0)	

Response

Returns screen saver on/off in boolean format in response to the SYST:SSAV? query.

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SYST:SSAV:DEL

Sets the time until the screen saver starts, when the screen saver has been set to on.

Command

```
SYSTem:SSAVer:DELay {<numeric>|MINimum|MAXimum}  
SYSTem:SSAVer:DELay? [{MINimum|MAXimum}]
```

Parameter

Value	60 to 59940
Unit	S ¹
Factory default	60

1: You can perform input in second units, but the value is actually rounded to the nearest minute.

Response

Returns the time until the screen saver starts in NR3 format with SYST:SSAV:DEL?.

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[Visual Basic 2013](#)**SYST:TZON**

Sets the time zone of the system clock.

Uses the format (Time-zone ID) defined in Linux for the setting. Normally, you can specify "<region name>/<city name>", but you can also use the format specifying the time difference with UTC (Coordinated Universal Time), or even UTC itself.

Command

```
SYSTem:TZONe <"string">
```

```
SYSTem:TZONe?
```

Parameter

Value	Time zone ID
Factory default	UTC

Example

```
SYST:TZON "Asia/Tokyo"
```

Response

Returns the time zone as a character string in response to the SYST:TZON? query.

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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
Power on	0

Response

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

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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
Power on	32767

Response

Returns the positive transition filter of the OPERATION status register in NR1 format.

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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
Power on	0

Response

Returns the negative transition filter of the OPERATION status register in NR1 format.

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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
Power on	0

Response

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

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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
Power on	32767

Response

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

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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
Power on	0

Response

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

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DISP:ETIM

Sets whether to display the elapsed time on the display.

Command

```
DISPlay[:WINDow]:ETIMe[:STATe] {ON|OFF|1|0}  
  
DISPlay[:WINDow]:ETIMe[:STATe] ?
```

Parameter

	ON(1)	Display
Value	OFF(0)	Nothing is displayed.
Factory default	OFF(0)	

Response

Returns whether to display the elapsed time on the display in boolean format in response to the DISP:ETIM? query.

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DISP:CAP

Sets whether to display the current capacity (Ah) on the display.

Command

```
DISPlay[:WINDow]:CAPacity[:STATe] {ON|OFF|1|0}
DISPlay[:WINDow]:CAPacity[:STATe] ?
```

Parameter

	ON(1) Display
Value	OFF(0) Nothing is displayed.
Factory default	OFF(0)

Response

Returns whether to display the current capacity on the display in boolean format in response to the DISP:CAP? query.

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DISP:ENER

Sets whether to display the power capacity (Wh) on the display.

Command

```
DISPlay[:WINDow]:ENERgy[:STATe] {ON|OFF|1|0}  
  
DISPlay[:WINDow]:ENERgy[:STATe]?
```

Parameter

Value	ON(1)	Display
	OFF(0)	Nothing is displayed.
Factory default	OFF(0)	

Response

Returns whether to display the power capacity on the display in boolean format in response to the DISP:ENER? query.

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SENS:APER

Sets the measurement time.

Performs numerous measurements within the measurement time when a measurement is executed, and returns their average value. The measurement time affects the query result generation time.

Command

```
SENSe:APERture {<numeric>|MINimum|MAXimum}
SENSe:APERture? [{MINimum|MAXimum}]
```

Parameter

Value	200μ to 1
Unit	S
*RST transmission	0.1

Response

Returns the measurement time in NR3 format in response to the SENS:APER? query.

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***RST**

Aborts measurement and resets the PLZ-5W.
→[Affected Commands](#)

Command

*RST

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***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
Factory default	0

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 the *ESE? query.

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*PSC

Sets whether the [event status enable register](#) and [service request enable register](#) are cleared when the POWER switch is turned on (power-on status).

Command

```
*PSC <NRf>
*PSC?
```

Parameter

Value	ON(1)	Clear
	OFF(0)	Don't clear
Factory default	ON(1)	

Example: To enable the power-on SRQ feature:

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

Response

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

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***SRE**

Sets the service request enable register.

The service request enable register can be used to select which summary messages in the [status byte register](#) will perform service requests.

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

Command

*SRE <NRf>

*SRE?

Parameter

Value	0 to 255
Factory default	0

Example: Sending *SRE8 sets bit 3 of the service request enable register. Each time the summary bit of the QUEStionable status register (bit 3) 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 the *SRE? query.

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***CLS**

Clears all the 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.

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*CLS

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***ESR?**

Queries the [event status register](#). The event status register is cleared when read.

Command

*ESR?

Response

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

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***IDN?**

Queries the model name and firmware version of the PLZ-5W.

Command

*IDN?

Response

Returns the following information in response to the *IDN? query.

Example: For model PLZ1205W, serial number AB123456 and firmware version IFC01.00.0001、FPGA01.00.002、IOC01.00.002.

KIKUSUI,PLZ1205W,AB123456,IFC01.00.0001,FPGA01.00.002,IOC01.00.002

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***OPC**

Sets the OPC bit (bit 0) of the [event status register](#) when the commands that are in standby have been processed.
See IEEE 488.2-1992 section 12.5.3.

Command

- *OPC
- *OPC?

Response

Returns "1" when the processing of all commands in standby is complete in response to the *OPC? query.

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***OPT?**

Queries the optional interface boards that are installed in the PLZ-5W.

Command

*OPT?

Response

Returns "0" if no options are installed in response to the *OPT? query.

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***RCL**

Aborts measurement and loads the settings that have been saved to memory.
There are [affected commands](#) when this command is sent.

Command

*RCL <NR1>

Parameter

Value¹ 0 to 19 Settings saved in each memory number

1: An SCPI error (-222, "Data out of range") occurs if the specified value is out of range.

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***SAV**

Saves the present settings of the PLZ-5W to memory. The settings that can be saved are the same as the [*settings recalled by RCL](#).

Command

*SAV <NR1>

Parameter

Value	Memory number 0~19
--------------	--------------------

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***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.

Commands

*STB?

Response

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

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***TRG**

Trigger command.

This is a substitute command for IEEE 488.1 get (Group Execute Trigger).

See IEEE 488.2-1992 section 10.37.

Triggers are accepted when all the following conditions are met.

- [TRIG:ACQ:SOUR](#) or [TRIG:TRAN:SOUR](#) or both is set to BUS.
- The trigger function whose trigger source is set to BUS has been initialized with INIT ([INIT:ACQ](#), [INIT:TRAN:PROG](#)).

If the PLZ-5W is in a state in which it does not accept triggers, an SCPI error (-211, "Trigger ignored") occurs.

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***TST?**

Executes a self-test. You can check which error occurred with SYST:ERR? command. See IEEE 488.2-1992 section 10.38.

Command

*TST?

Response

If there is no problem, returns 0 in response to the *TST? query. Returns an error code if there is a problem.

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***WAI**

Prevents the PLZ-5W from executing subsequent commands until all operations that are in standby have completed.

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PROG:CURR:PROT

Sets the current value for overcurrent protection (OCP) in the program selected by [PROG](#).

Command

```
[SOURCE:] PROGRAM[:SElected]:CURRENT:PROTection[:LEVel][:UPPer] <numeric>
[SOURCE:] PROGRAM[:SElected]:CURRENT:PROTection[:LEVel][:UPPer]?
```

Parameter <numeric>

Value	Current
Unit	A
Factory default	Rated current

Response

Returns the current value for overcurrent protection (OCP) in the selected program in NR3 format in response to the PROG:CURR:PROT? query.

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PROG:CURR:PROT:STAT

Sets the operation to be performed when overcurrent protection (OCP) is activated in the program selected by [PROG](#).

Command

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

Parameter

Value	ON(1) Load off (Trip)
	OFF(0) Limit output (Limit)
Factory default	OFF(0)

Response

Returns the operation to be performed when OCP in the selected program is activated in boolean format in response to the PROG:CURR:PROT:STAT? query.

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PROG:POW:PROT

Sets the power value for overpower protection (OPP) in the program selected by [PROG](#).

Command

```
[SOURce:]PROGram[:SELeCted]:POWer:PROTection[:LEVel][:UPPer] <numeric>
[SOURce:]PROGram[:SELeCted]:POWer:PROTection[:LEVel][:UPPer]?
```

Parameter <numeric>

Value	電力値
Unit	W
Factory default	定格電力値

Response

Returns the power value for the OPP in the selected program in NR3 format in response to the PROG:POW:PROT? query.

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PROG:POW:PROT:STAT

Sets the operation to be performed when overpower protection (OPP) is activated in the program selected by [PROG](#).

Command

```
[SOURce:]PROGram[:SElected]:POWer:PROTection:STATe {ON|OFF|1|0}
[SOURce:]PROGram[:SElected]:POWer:PROTection:STATe?
```

Parameter

Value	ON(1) Load off (Trip)
	OFF(0) Limit output (Limit)
Factory default	OFF(0)

Response

Returns the operation to be performed when OPP in the selected program is activated in boolean format in response to the PROG:POW:PROT:STAT? query.

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PROG:VOLT:PROT:LOW

Sets the voltage for undervoltage protection (UVP) in the program selected by [PROG](#).

Command

```
[SOURCE:]PROGRAM[:SELETED]:VOLTage:PROTection[:LEVel]:LOWer <numeric>  
[SOURCE:]PROGRAM[:SELETED]:VOLTage:PROTection[:LEVel]:LOWer
```

Parameter <numeric>

Value	0.00 to 150.00
Resolution	0.01
Unit	V
Factory default	0.00

Response

Returns the voltage for the UVP in the selected program in NR3 format in response to the PROG:VOLT:PROT:LOW? query.

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PROG:VOLT:PROT:STAT

Enables or disables the undervoltage protection (UVP) in the program selected by [PROG](#). When enabled, the PLZ-5W turns the load off during UVP operation. You can set the UVP voltage value with [PROG:VOLT:PROT:LOW](#).

Command

```
[SOURCE:]PROGrama[:SElected]:VOLTage:PROTection:STATe {ON|OFF|1|0}
[SOURCE:]PROGrama[:SElected]:VOLTage:PROTection:STATe?
```

Parameter

Value	ON(1)	Enabled
	OFF(0)	Disabled
Factory default	OFF(0)	

Response

Returns the whether the UVP in the selected program is enabled in boolean format in response to the PROG:VOLT:PROT:STAT? query.

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INP:PROT:CLE OUTP:PROT:CLE

Clears the protection mode.

Command

```
INPut:PROTEction:CLEar  
OUTPut:PROTEction:CLEar
```

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INIT:ACQ

Switches to measurement trigger wait state.

If [TRIG:ACQ:SOUR](#) is set to IMM, measurement is immediately started. If it is set to other than IMM, measurement is started with the respective conditions. Executing this command deletes all the measurement records in the data logger.

Command

```
INITiate[:IMMediate]:ACquire
```

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DATA:R?

Queries the measurement value registered in the data logger from oldest to youngest. The queried data is deleted from the data logger records.

Command

DATA:R? [<numeric>]

Parameter

Value	Specifies the number of data points to be queried in NRf format (1 or more). By default, all the data is queried.
-------	---

Response

Returns the measured values registered in the data logger in comma-separated NR3 format in response to the DATA:R? query.

The type of measured values and the order depends on the [DATA:FORM](#) setting.

The maximum number of data points that can be queried at one time varies as follows depending on the number of items specified by [DATA:FORM](#).

Number of items specified by DATA:FORM	Maximum number of points that can be queried
6	512
5	640
4	768
3	1024
2	1872
1	3072

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[Visual Basic 2013](#)**FETC
READ
MEAS**

Queries the measurement results Each command is different in the following ways.

- FETC? does not wait for the measurement to finish. It queries the most recent measured value when the command is received. If there is no measured value, the measured value is queried after waiting for the completion of a single measurement. If [TRIG:ACQ:SOUR](#) is set to BUS, an error is returned.
- READ? starts a new measurement and queries the measured value after waiting for the completion of a single measurement. If [TRIG:ACQ:SOUR](#) is set to IMM, measurement starts immediately. If set to BUS, an error is returned. If set to any other value, measurement starts after a trigger is applied.
- MEAS? starts a new measurement after resetting (equivalent to [*RST](#)) the settings listed in "[Setting Measurement Conditions.](#)" and queries a single measured value.

The displayed content and display order depends on the [DATA:FORM](#) setting.

CommandFETCh?
READ?
MEASure?**Response**

Returns the measurement value in NR3 format in response to the FETC?, READ?, or MEAS? query.

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FETC:CAP? READ:CAP? MEAS:CAP?

Queries the measured current capacity (Ah) Each command is different in the following ways.

- FETC? does not wait for the measurement to finish. It queries the most recent measured value when the command is received. If there is no measured value, the measured value is queried after waiting for the completion of a single measurement. If [TRIG:ACQ:SOUR](#) is set to BUS, an error is returned.
- READ? starts a new measurement and queries the measured value after waiting for the completion of a single measurement. If [TRIG:ACQ:SOUR](#) is set to IMM, measurement starts immediately. If set to BUS, an error is returned. If set to any other value, measurement starts after a trigger is applied.
- MEAS? starts a new measurement after resetting (equivalent to [*RST](#)) the settings listed in ["Setting Measurement Conditions."](#) and queries a single measured value.

Command

```
FETCh:CAPacity?
READ:CAPacity?
MEASure:CAPacity?
```

Response

Returns the current capacity (Ah) in NR3 format in response to the FETC:CAP?, READ:CAP?, or MEAS:CAP? query.

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FETC:CURR? READ:CURR? MEAS:CURR?

Queries the measured current (A) Each command is different in the following ways.

- FETC? does not wait for the measurement to finish. It queries the most recent measured value when the command is received. If there is no measured value, the measured value is queried after waiting for the completion of a single measurement. If [TRIG:ACQ:SOUR](#) is set to BUS, an error is returned.
- READ? starts a new measurement and queries the measured value after waiting for the completion of a single measurement. If [TRIG:ACQ:SOUR](#) is set to IMM, measurement starts immediately. If set to BUS, an error is returned. If set to any other value, measurement starts after a trigger is applied.
- MEAS? starts a new measurement after resetting (equivalent to [*RST](#)) the settings listed in ["Setting Measurement Conditions."](#) and queries a single measured value.

Command

```
FETCh:CURRent[:DC]?
READ:CURRent[:DC]?
MEASure:CURRent[:DC]?

```

Response

Returns the current (A) in NR3 format in response to the FETC:CURR?, READ:CURR?, or MEAS:CURR? query.

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FETC:ENER? READ:ENER? MEAS:ENER?

Queries the measured power capacity (Wh) Each command is different in the following ways.

- FETC? does not wait for the measurement to finish. It queries the most recent measured value when the command is received. If there is no measured value, the measured value is queried after waiting for the completion of a single measurement. If [TRIG:ACQ:SOUR](#) is set to BUS, an error is returned.
- READ? starts a new measurement and queries the measured value after waiting for the completion of a single measurement. If [TRIG:ACQ:SOUR](#) is set to IMM, measurement starts immediately. If set to BUS, an error is returned. If set to any other value, measurement starts after a trigger is applied.
- MEAS? starts a new measurement after resetting (equivalent to [*RST](#)) the settings listed in ["Setting Measurement Conditions."](#) and queries a single measured value.

Command

FETCh:ENERgy?

READ:ENERgy?

MEASure:ENERgy?

Response

Returns the power capacity (Wh) in response to the FETC:ENER?, READ:ENER? or MEAS:ENER? query.

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FETC:ETIM? READ:ETIM? MEAS:ETIM?

Queries the measured elapsed time (s) Each command is different in the following ways.

- FETC? does not wait for the measurement to finish. It queries the most recent measured value when the command is received. If there is no measured value, the measured value is queried after waiting for the completion of a single measurement. If [TRIG:ACQ:SOUR](#) is set to BUS, an error is returned.
- READ? starts a new measurement and queries the measured value after waiting for the completion of a single measurement. If [TRIG:ACQ:SOUR](#) is set to IMM, measurement starts immediately. If set to BUS, an error is returned. If set to any other value, measurement starts after a trigger is applied.
- MEAS? starts a new measurement after resetting (equivalent to [*RST](#)) the settings listed in "[Setting Measurement Conditions.](#)" and queries a single measured value.

Command

```
FETCh:ETIMe?
READ:ETIMe?
MEASure:ETIMe?
```

Response

Returns the elapsed time (s) in NR3 format in response to the FETC:ETIM?, READ:ETIM? or MEAS:ETIM? query.

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FETC:POW? READ:POW? MEAS:POW?

Queries the measured power (W) Each command is different in the following ways.

- FETC? does not wait for the measurement to finish. It queries the most recent measured value when the command is received. If there is no measured value, the measured value is queried after waiting for the completion of a single measurement. If [TRIG:ACQ:SOUR](#) is set to BUS, an error is returned.
- READ? starts a new measurement and queries the measured value after waiting for the completion of a single measurement. If [TRIG:ACQ:SOUR](#) is set to IMM, measurement starts immediately. If set to BUS, an error is returned. If set to any other value, measurement starts after a trigger is applied.
- MEAS? starts a new measurement after resetting (equivalent to [*RST](#)) the settings listed in "[Setting Measurement Conditions.](#)" and queries a single measured value.

Command

```
FETCh:POWer[:DC]?
READ:POWer[:DC]?
MEASure:POWer[:DC]?
```

Response

Returns the power (W) in NR3 format in response to the FETC:POW?, READ:POW? or MEAS:POW? query.

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FETC:VOLT? READ:VOLT? MEAS:VOLT?

Queries the measured voltage (V) Each command is different in the following ways.

- FETC? does not wait for the measurement to finish. It queries the most recent measured value when the command is received. If there is no measured value, the measured value is queried after waiting for the completion of a single measurement. If [TRIG:ACQ:SOUR](#) is set to BUS, an error is returned.
- READ? starts a new measurement and queries the measured value after waiting for the completion of a single measurement. If [TRIG:ACQ:SOUR](#) is set to IMM, measurement starts immediately. If set to BUS, an error is returned. If set to any other value, measurement starts after a trigger is applied.
- MEAS? starts a new measurement after resetting (equivalent to [*RST](#)) the settings listed in "[Setting Measurement Conditions.](#)" and queries a single measured value.

Command

```
FETCh:VOLTage[:DC]?  
READ:VOLTage[:DC]?  
MEASure:VOLTage[:DC]?
```

Response

Returns the voltage (V) in NR3 format in response to the FETC:VOLT?, READ:VOLT? or MEAS:VOLT? query.

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TRIG:ACQ:MSYN

Sending this command to any of the synchronized PLZ-5Ws starts measurements simultaneously on the synchronized PLZ-5Ws.

[TRIG:ACQ:SOUR](#) must be set to MSYNc on PLZ-5Ws that you want to synchronize.

Command

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


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ABOR:ACQ

Stops the measurement trigger function.
Even if there are unexecuted triggers, measurement stops when this command is executed.

Command

ABORt:ACQuire

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INIT:TRAN:PROG

Switches to the sequence start trigger wait state in the program selected by [PROG](#).
If [TRIG:TRAN:SOUR](#) is set to IMM, the sequence is immediately started. If it is set to other than IMM, the sequence is started with the respective conditions.

Command

```
INITiate[:IMMediate]:TRANsient:PROGram
```

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TRIG:TRAN:SUSP

Pauses the running sequence trigger function.
This function forcibly pauses the execution time ([PROG:STEP:DWEL](#)) of the currently running program step.

Command

TRIGger:TRANsient:SUSPend

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TRIG:TRAN:RES

Resumes the paused sequence from the point at which it was paused.

Command

TRIGger:TRANsient:RESume

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TRIG:TRAN:EXEC?

Queries the execution state of the sequence trigger function and the switching function.

Command

TRIGger:TRANsient:EXECution[:STATe]?

Response

Returns <IDLE|WTG|RUN|SUSP|PULS>, <Step_NR1>, <Loop_NR1> in response to the TRIG:TRAN:EXEC? query.

Response	Description
<IDLE WTG RUN SUSP PULS>	IDLE: Sequence waiting and the switching function is off WTG: Waiting for triggers SUSP: Sequence is paused RUN: Delay time or step in execution PULS: During switching operation
<Step_NR1>	Number of steps of program
<Loop_NR1>	Number of loops of program

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TRIG:TRAN:MSYN

If synchronized PLZ-5Ws are in a sequence start trigger wait state or step start trigger wait state, sending this command to any of the PLZ-5Ws starts the sequence or step simultaneously.

The trigger source ([TRIG:TRAN:SOUR](#) or [PROG:STEP<n>:TRIG:WAIT](#)) must be set to MSYNc on PLZ-5Ws that you want to synchronize.

Command

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

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ABOR:TRAN

Stops the sequence trigger function.

Command

ABORt:TRANsient

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ABOR

Stops all the trigger functions.

Command

ABORt [:ALL]

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INP:MSYN
OUTP:MSYN

Sending this command to any of the synchronized PLZ-5Ws turns the load on or off simultaneously on the synchronized PLZ-5Ws.
The load-on or load-off sync signal can be selected.
[INP:MSYN:ACC](#) must be set to ON (1) on PLZ-5Ws that you want to synchronize.

Command

```
INPut:MSYNc[:IMMediate] {ON|OFF|1|0}  
OUTPut:MSYNc[:IMMediate] {ON|OFF|1|0}
```

Parameter

Value	ON(1)	Sends a load-on sync signal
	OFF(0)	Sends a load-off sync signal

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Visual Basic 2013**PROG:STEP<n>:TRIG:WAIT**Sets trigger wait at the specified step of the program selected by [PROG](#).**Command**`[SOURce:]PROGram[:SELEcted]:STEP<n>:TRIGger:WAIT <character>[,<character>,<character>]``[SOURce:]PROGram[:SELEcted]:STEP<n>:TRIGger:WAIT?`**Parameter <n>****Value** Specifies the step number**Example** STEP1**Parameter <character>**

If IMMEDIATE or BUS is set, it cannot be specified at the same time as other setting values.

You can specify up to 3 items in the case of TRIGIN, DIGITAL2 and MSYNc.

Value	IMMEDIATE	Execution the step at the internal timing of the PLZ-5W without waiting for trigger application
	BUS	Executes the step at the timing of software trigger (*TRG) application. The trigger is applied to both trigger systems: (1) sequence and step (TRANSient) and (2) measure (ACQuire).
	TRIGIN	Executes the step at the timing at which a signal is input to pin 9 of the EXT CONT connector of the PLZ-5W
	DIGITAL2	Executes the step at the timing at which a signal is input to pin 13 of the EXT CONT connector of the PLZ-5W (when SYST:CONF:DIGITAL2:DIR is set to INPut)
	MSYNc	A step is executed when a signal (ACQuire command) is received from external equipment synchronized to the PLZ-5W or when a TRIG:ACQ:MSYN synchronization command packet is received from a PC or the like.

Example`PROG:STEP1:TRIG:WAIT DIGITAL2,MSYNc`**Response**Returns the trigger wait setting state at the specified step in character format in response to the `PROG:STEP<n>:TRIG:WAIT?` query.

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MEM:REC

Recalls settings from preset memories

Command

MEMory:RECall {1|2|3}

Parameter

	1	Recalls from preset memory A
Value	2	Recalls from preset memory B
	3	Recalls from preset memory C

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MEM:SAVE

Saves the settings to ABC preset memories.

Command

MEMory:SAVE {1|2|3}

Parameter

	1	Save to preset memory A
Value	2	Save to preset memory B
	3	Save to preset memory C

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PROG:CRE

Creates a new program of the specified name.
The program is created on a file on the file system. Because the location where the program is created depends on the present [operation mode](#), even if a program of the same name is created for example in CC mode and CP mode, the resulting programs will be treated as different programs.
Programs cannot be created when a program is being selected. If this happens, enter [PROG ""](#) to clear the program selection.

Command

[SOURce:]PROG:CREate "<program name>"

Parameter <program name>

Value	Program name	Up to 255 alphanumeric characters (A-Z, a-z, 0-9), other symbols (., { } [] & \$ # ^ % = - + _), and spaces can be set. Distinction is made between uppercase and lowercase.
		Enter a slash at the beginning of the program name.

Example

PROG:CRE "/My test program"

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PROG:CVOP:LEV

Sets the +CV (addition of CV mode) voltage in the program selected by [PROG](#).

Command

```
[SOURce:]PROGram[:SELeCted]:CVOPtion:LEVel <numeric>  
[SOURce:]PROGram[:SELeCted]:CVOPtion:LEVel?
```

Parameter <numeric>

Value	電圧値
Unit	V
Factory default	0

Response

Returns the +CV voltage in the selected program in NR3 format in response to the PROG:CVOP:LEV? query.

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PROG:DEL

Deletes the program of the specified name.
Programs cannot be deleted when a program is being selected. If this happens, enter [PROG ""](#) to clear the program selection.

Command

[SOURce:]PROG:DELeTe "<program name>"

Parameter <program name>

Value	Program name	Enters the program name. Enter a slash at the beginning of the program name.
-------	--------------	--

Example

PROG:DEL "/My test program"

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PROG:LIST?

Queries the list of all the registered programs

Command

[SOURce:] PROGram:LIST?

Response

Returns all the registered program names as a comma-delimited character string enclosed in quotation marks (") in response to the PROG:LIST? query. If no program has been registered, returns an empty string ("").

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PROG:LOOP

Sets the number of times that the program selected by [PROG](#) will repeat.

Command

```
[SOURce:] PROGram[:SElected]:LOOP {<numeric>|INFinite}  
[SOURce:] PROGram[:SElected]:LOOP?
```

Parameter

	1 to 100000	Repeat count
Value	INFinite	Infinite

Response

Returns the number of program repetitions in NR1 format in response to the PROG:LOOP? query.
Returns 0 when no program has been selected by [PROG](#).

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PROG:REN

Changes the name of the program selected by [PROG](#).

Command

[SOURCE:] PROGRAM[:SELECTED]:REName "<name>"

Parameter

Value	Program name after change	Up to 255 alphanumeric characters (A-Z, a-z, 0-9), other symbols (_-[](){}), and spaces can be set.
-------	---------------------------	---

Parameter

PROG:REN "Your test program"

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PROG:SAVE

Saves the program selected by [PROG](#).

Command

[SOURce:] PROGram[:SElected]:SAVE

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PROG:STEP<n>:DWEL

Sets the step execution time at the specified step of the program selected by [PROG](#).

Command

[SOURce:] PROGram[:SElected]:STEP<n>:DWELl <numeric>

[SOURce:] PROGram[:SElected]:STEP<n>:DWELl?

Parameter <n>

Value Specifies the step number

Example STEP1

Parameter <numeric>

Value 0.000025 to 3600000

Unit S

Response

Returns the execution time at the specified step in NR3 format in response to the PROG:STEP<n>:DWEL? query.

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PROG:STEP<n>:INP

Sets load on/off at the specified step of the program selected by [PROG](#).

Command

[SOURce:] PROGram[:SElected]:STEP<n>:INPut {ON|OFF|1|0}

[SOURce:] PROGram[:SElected]:STEP<n>:INPut?

Parameter <n>

Value	Specifies the step number
-------	---------------------------

Example	STEP1
---------	-------

Parameter {ON|OFF|1|0}

Value	ON(1) Load on
	OFF(0) Load off

Response

Returns load on/off at the specified step in boolean format in response to the PROG:STEP<n>:INP? query.

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PROG:STEP<n>:LEV

Sets the load at the specified step of the program selected by [PROG](#).

Command

[SOURce:] PROGram[:SElected]:STEP<n>:LEVel <numeric>

[SOURce:] PROGram[:SElected]:STEP<n>:LEVel?

Parameter <n>

Value Specifies the step number**Example** STEP1

Parameter <numeric>

See the references below according to the present [operation mode](#)

Current (Unit: A)

	PLZ205W	PLZ405W	PLZ1205W
H range	0.000 to 42.000	0.000 to 84.000	0.0000 to 252.000
Resolution	1m	2m	5m
M range	0.0000 to 4.2000	0.0000 to 8.4000	0.0000 to 25.2000
Resolution	0.1m	0.2m	0.5m
L range	0.00000 to 0.42000	0.00000 to 0.84000	0.00000 to 2.52000
Resolution	0.01m	0.02m	0.05m

Conductance (Unit: SIE)

	PLZ205W	PLZ405W	PLZ1205W
H range	42.000 to 0.000	84.000 to 0.000	252.000 to 0.000
Resolution	1m	2m	5m
M range	4.2000 to 0.0000	8.4000 to 0.0000	25.2000 to 0.0000
Resolution	0.1m	0.2m	0.5m
L range	0.42000 to 0.00000	0.84000 to 0.00000	2.52000 to 0.00000
Resolution	0.01m	0.02m	0.05m

Voltage (Unit: V)

	PLZ205W	PLZ405W	PLZ1205W
H range	0.000 to 157.500		
Resolution	5m		
L range	0.000 to 15.7500		
Resolution	0.5m		

Power (Unit: W)

	PLZ205W	PLZ405W	PLZ1205W
H range	0.00 to 210.00	0.00 to 420.00	0.00 to 1260.00
Resolution	0.005	0.01	0.05
M range	0.00 to 21.000	0.00 to 42.000	0.00 to 126.000
Resolution	0.0005	0.001	0.005

L range	0.00 to 2.1000	0.00 to 4.2000	0.00 to 12.6000
Resolution	0.00005	0.0001	0.0005

Response

Returns the load at the specified step in NR3 format in response to the PROG:STEP<n>:LEV? query.

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PROG:STEP<n>:OUTPut

Sets load on/off at the specified step of the program selected by [PROG](#).

Command

[SOURce:] PROGram[:SElected]:STEP<n>:OUTPut {ON|OFF|1|0}

[SOURce:] PROGram[:SElected]:STEP<n>:OUTPut?

Parameter <n>

Value	Specifies the step number
-------	---------------------------

Example	STEP1
---------	-------

Parameter {ON|OFF|1|0}

Value	ON(1) Load on
	OFF(0) Load off

Response

Returns load on/off at the specified step in boolean format in response to the PROG:STEP<n>:OUTPut? query.

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PROG:STEP<n>:SLEW

Sets the slew rate at the specified step of the program selected by [PROG](#).

Command

[SOURce:]PROGram[:SElected]:STEP<n>:SLEWrate <numeric>

[SOURce:]PROGram[:SElected]:STEP<n>:SLEWrate?

Parameter <n>

Value	Specifies the step number
-------	---------------------------

Example	STEP1
---------	-------

Parameter <numeric>

Value	Slew rate
-------	-----------

Unit	A ¹
------	----------------

1. The actual unit is A/μs

Response

Returns the slew rate at the specified step in NR3 format in response to the PROG:STEP<n>:SLEW? query.

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PROG:STEP<n>:TRAN

Sets the setting transition method at the specified step of the program selected by [PROG](#).

Command

```
[SOURce:] PROGram[:SElected]:STEP<n>:TRANSient {IMMediate|RAMP}
[SOURce:] PROGram[:SElected]:STEP<n>:TRANSient?
```

Parameter <n>

Value	Specifies the step number
Example	STEP1

Parameter {IMMediate|RAMP}

Value	IMMediate	Immediate transition from the previous step setting
	RAMP	Ramp transition from the previous step setting

Response

Sets the setting transition method at the specified step of the currently selected program in response to the PROG:STEP<n>:TRAN? query.

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PROG:STEP<n>:TRIG:GEN

Sets whether to perform trigger output at the specified step of the program selected by [PROG](#).

Command

```
[SOURce:]PROGram[:SElected]:STEP<n>:TRIGger:GENerate <character>[,  
<character>,<character>,<character>,<character>]
```

```
[SOURce:]PROGram[:SElected]:STEP<n>:TRIGger:GENerate?
```

Parameter <n>

Value	Specifies the step number
--------------	---------------------------

Example	STEP1
----------------	-------

Parameter <character>

If NONE is set, it cannot be specified at the same time as other setting values.
For all other setting values, up to 5 items can be set.

	NONE	Trigger not generated
	TRIGOUT	Trigger signal output to TRIGOUT pin
	DIGITAL0	Trigger signal output to DIGITAL0 pin
Value	DIGITAL1	Trigger signal output to DIGITAL1 pin
	DIGITAL2	Trigger signal output to DIGITAL2 pin (When I/O is OUTPut)
	TALink	Output TALink triggers. If TRIG:ACQ:SOUR is set to TALink, measured values are recorded during the step execution of the sequence.

Example

```
PROG:STEP1:TRIG:GEN TRIGOUT,DIGITAL2,TAL
```

Response

Returns the trigger output setting at the specified step in character format in response to the PROG:STEP<n>:TRIG:GEN? query.

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PROG:STEPS:COUN

Sets the number of steps to be registered to the program selected by [PROG](#).
If the number of steps is reduced from the current number of steps, the contents of the remaining steps remain unchanged.

Command

```
[SOURce:]PROGram[:SElected]:STEPS:COUNT <numeric>  
[SOURce:]PROGram[:SElected]:STEPS:COUNT?
```

Parameter

Value	Number of steps 1 to 10000
--------------	----------------------------

Response

Returns the number of steps in the program that is currently selected in NR1 format in response to the PROG:STEPS:COUN? query.
Returns 0 when no program has been selected by [PROG](#).

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SYST:CONF:MSYN:IND?

Queries whether mutual synchronization connection is enabled or disabled.

Command

SYSTem:CONFigure:MSYNc:INDex?

Response

Returns whether mutual synchronization connection is enabled or disabled in boolean format in response to the SYST:CONF:MSYN:IND? query.

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SYST:DATE

Sets the date.
Also set the time ([SYST:TIME](#)).

Command

```
SYSTem:DATE <year_NR1>,<month_NR1>,<date_NR1>  
SYSTem:DATE?
```

Parameter

<year_NR1>	Year
<month_NR1>	Month
<date_NR1>	Day
Settable range*1 2016/1/1 to 2037/12/31	

*1: This is the setting range in UTC. The range may differ depending on the combination of the time zone set by [SYST:TZON](#) and [SYST:TIME](#).

Example

```
SYST:DATE 2017,2,17
```

Response

Returns the date as a sequence of values in NR1 format (in the order year, month, day) in response to SYST:DATE?.

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SYST:ERR?

Reads the oldest error information or event information from the error queue.
The error/event queue can hold up to 16 errors. [→Tutorial](#)

Command

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

Response

Returns the oldest error or event from the error/event queue in the following format, in response to the SYST:ERR? query.
Example: If there is no error or event
 This command returns +0, "No error".
Example: If a command has been received that cannot be executed in the present operating state of the PLZ-5W,
 this command returns -221, "Settings conflict".
For details on errors, see the [Command error reference](#).

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SYST:ERR:COUN?

Returns the number of unread errors in the error queue.

Command

SYSTem:ERRor:COUNT?

Response

Returns the number of unread errors in the error queue in NR1 format.

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SYST:PASS

Enables a password-protected command and enables the execution of [SYST:SEC:IMM](#).

Command

SYSTem:PASSword[:CENable] <"password">

Parameter <"password">

Value Enter password set by [SYSTem:PASSword:NEW](#)

Example

SYST:PASS "my_password"

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SYST:PASS:CDIS

Disable the password-protected command and disables the execution of [SYST:SEC:IMM](#).

Command

SYSTem:PASSword:CDISable <"password">

Parameter <"password">

Value Enter password set by [SYST:PASS:NEW](#) command

Example

SYST:PASS:CDIS "my_password"

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SYST:PASS:STAT?

Queries whether a password-protected command is valid or invalid. If valid, [SYST:SEC:IMM](#) is executable.

Command

```
SYSTem:PASSword[:CENable]:STATe?
```

Response

Returns 1 if the command is executable in response to the SYST:PASS:STAT? query.

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SYST:TIME

Sets the time.
Also set the date (using [SYST:DATE](#)).

Command

SYSTem:TIME <hour_NR1>,<min_NR1>,<sec_NR1>

SYSTem:TIME?

Parameter <hour_NR1>

Value 0 to 23 Hour

Parameter <min_NR1>

Value 1 to 59 Minutes

Parameter <sec_NR1>

Value 1 to 59 second

Example

SYST:TIME 23,0,0

Response

Returns the time as a sequence of values in NR1 format (in the order hour, minute, second) in response to SYST:TIME?.

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SYST:TIME:ADJ

Automatically adjusts the system clock using the NTP server on the network.

Command

SYSTem:TIME:ADJust

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SYST:TZON:CAT?

Queries all the time zone IDs that can be used.

Command

SYSTem:TZONe:CATalog?

Response

Returns the time zone IDs that can be used as a comma-delimited character string in response to the SYST:TZON:CAT? query.

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SYST:VERS?

Queries the version of the SCPI specifications that the PLZ-5W complies with.

Command

SYSTem:VERSion?

Response

Returns 1999.0 in response to the SYST:VERS? query.

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Status byte register

The status byte register stores STB and RQS (MSS) messages as defined by the IEEE 488.1 standard. The status byte register can be read by using IEEE 488.1 serial polling or the IEEE 488.2 common command [*STB?](#).

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

*STB? makes the PLZ-5W transmit the contents of the status byte register and the master status summary (MSS) message.

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

Bit	Bit weight	Bit name	Description
0	1	Reserved	Reserved for future use by IEEE 488. 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 PLZ-5W is ready to generate 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 any 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.
8-15		Not Used	Not used

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[Visual Basic 2013](#)**Event status register**

The event status register bits are set when certain events occur during PLZ-5W operation. All the event status register bits are set by the error event queue.

This register is defined by the IEEE 488.2 standard and is controlled by the IEEE 488.2 common commands [*ESE](#), [*ESE?](#), and [*ESR?](#).

You can check the error content with [SYST:ERR?](#).

Bit	Bit weight	Bit name	Description
0	1	Operation Complete(OPC)	Set when an *OPC command is received and all operations in standby have been completed.
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 data or when the output queue is not in the wait state. This indicates that there is no data in the output queue.
3	8	Device Dependent Error(DDE)	Set when there is a device-specific error.
4	16	Execution Error(EXE)	Set when the PLZ-5W evaluates that the program data after the header is outside the formal input range or does not match the specifications of the PLZ-5W. This indicates that a valid SCPI command may not be executed correctly depending on the state of the PLZ-5W.
5	32	Command Error(CME)	Set when an IEEE 488.2 syntax error is detected by the parser, when an unidentifiable header is received, or when a group execution trigger enters the internal IEEE 488.2 SCPI command input buffer.
6	64	User Request	Not used
7	128	Power ON(PON)	Not used
8-15		Reserved	Not used

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OPERation status register

The OPERation status register is a 16-bit register that contains information about the normal operating conditions of the PLZ-5W.

Bit	Bit weight	Bit name	Description
0	1	CV	CV output in progress
1	2	CC	CC output in progress
2	4	CR	CR output in progress
3	8	CP	CP output in progress
4	16	ACQ Busy	ACQuire sequence execution in progress
5	32	ACQ WTG	ACQuire sequence waiting for trigger (TRIG)
6	64	TRAN Busy	TRANsient sequence execution in progress
7	128	TRAN WTG	TRANsient sequence waiting for trigger (TRIG)
8	256	LOAD	Load is currently on
9	512	PS	The sequence is paused.
10	1024	INT	Integration in progress
11	2048	ACQ DAV	Data to be acquired is valid (acquirable)
12	4096	NOT USED	Not used
13	8192	NOT USED	Not used
14	16384	NOT USED	Not used
15	32768	NOT USED	Always zero

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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.

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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.

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[Visual Basic 2013](#)**QUESTionable status register**

The QUESTionable status register is a 16-bit register that stores information related to the PLZ-5W's status and the questionable events that occur during PLZ-5W operation.

The QUESTionable status register bits may indicate that there are problems with the PLZ-5W's measured data.

Bit	Bit weight	Bit name	Description
0	1	OV(Over Voltage Protection)	Overvoltage protection activated
1	2	OC(Over Current Protection)	Overcurrent protection activated
2	4	NOT USED	Not used
3	8	OP(Over Power protection)	Overpower protection activated
4	16	OT(Over Temperature Protection)	Overheat protection activated
5	32	WDOG(Watchdog protection)	Watchdog protection activated
6	64	CL	Current limiting in progress
7	128	PL	Power limiting in progress
8	256	NOT USED	Not used
9	512	UV(Under Voltage Protection)	Undervoltage protection activated
10	1024	EXT	External error occurred
11	2048	REV	Reverse voltage detected
12	4096	FORM	Connection error occurred
13	8192	NOT USED	Not used
14	16384	NOT USED	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.

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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.

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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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ABOR:PULS

Stops the switching function (PULSe).

Command

ABORt : PULSe

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ARB:APPL

Applies the set I-V characteristics map and reflects it in the output.

Command

```
[SOURce:]ARBItrary[:LEVel][:IMMediate]:APPLy
```

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ARB:CLE

Returns the I-V characteristics map to its default setting.

Command

```
[SOURCE:]ARBItary[:LEVel][:IMMediate]:CLEar
```

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ARB:DATA

Sets the entire I-V characteristics map in binary block data format.

The data of the entire I-V characteristics map is set at one time, so you do not need to perform initialization with [ARB:CLE](#) and set the number of points with [ARB:COUN](#) in advance. The ARB:COUN value is changed by the block data setting.

To reflect the setting content in the output, send [ARB:APPL](#).

Command

```
[SOURCE:]ARBItary[:LEVel][:IMMediate]:DATA #<length-width><length><data>
[SOURCE:]ARBItary[:LEVel][:IMMediate]:DATA?
```

Parameter <length-width>

Number of digits of <length>

Parameter <length>

Byte length of <data>

Parameter <data>

Voltage and current data is expressed in a binary 4 byte integer.

A value is expressed with four bytes (eight digits). For each point, a pair of voltage and current is indicated.

Each value is in little-endian format, and the unit is written using μV and μA .

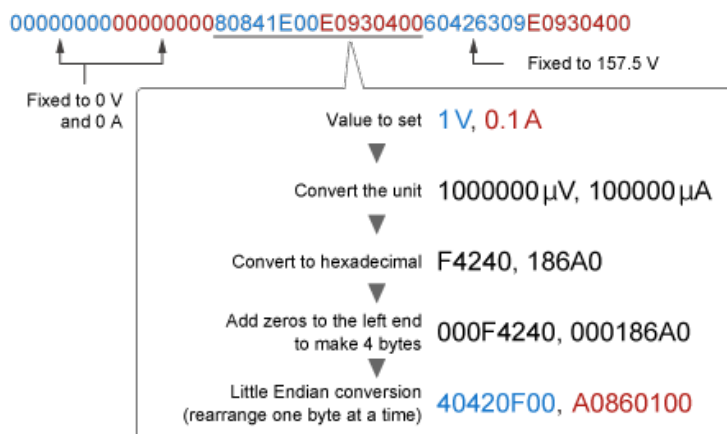
The first voltage and current are fixed to "0V, 0A," and the last voltage is fixed to "157.5V." If you specify any other values, an error is returned.

Example

If you were to set the combination "0V, 0A," "1V, 0.1A," and "157.5V, 0.1A," the byte length of <data> would be 24. Send the following command in binary. During a binary transfer, we do not recommend concatenating other commands. Terminate with LF.

```
ARB:DATA #40024<binary data>0A
```

How to create binary data is explained below.



Response

Returns the I-V characteristics map settings in binary block data format (#<length-width><length><data>) in response to ARB:DATA?.

Example

In the case of the combination "0V, 0A," "1V, 0.1A," and "157.5V, 0.1A," the following response is returned.

```
23343030323400000000000000000080841E00E093040060426309E09304000A
```



The "233430303234" in the beginning, when converted into hexadecimal ASCII character code every two digits, becomes "#40024." This indicates that <length-width> is 4, and <length> is 0024.

Related information

[Sample of ARB:DATA](#)

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ARB:MAP

Sets the voltage and current values for the specified parts (point index) of the I-V characteristics map.

To reflect this setting in the output, send [ARB:APPL](#).

Command

```
[SOURce:]ARBItary[:LEVel][:IMMediate]:MAP <index>,  
{<voltage>|MINimum|MAXimum},{<current>|MINimum|MAXimum}  
  
[SOURce:]ARBItary[:LEVel][:IMMediate]:MAP? <index>
```

Parameter <index>

Specifies the point index of the I-V characteristics map

Value 1 to maximum value of [ARB:COUN](#)

Parameter <voltage>

Specifies the voltage (Unit: V)

	PLZ205W	PLZ405W	PLZ1205W
H range	0.000 to 157.500		
Resolution	5m		
L range	0.000 to 15.7500		
Resolution	0.5m		

Parameter <current>

Specifies the current (Unit: A)

	PLZ205W	PLZ405W	PLZ1205W
H range	0.000 to 42.000	0.000 to 84.000	0.0000 to 252.000
Resolution	1m	2m	5m
M range	0.0000 to 4.2000	0.0000 to 8.4000	0.0000 to 25.2000
Resolution	0.1m	0.2m	0.5m
L range	0.00000 to 0.42000	0.00000 to 0.84000	0.00000 to 2.52000
Resolution	0.01m	0.02m	0.05m

Example

ARB:MAP 1, 5.0V, 1.0A

Response

Returns the voltage and current values for the specified point index in the NR3 format in response to ARB:MAP?.

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ARB:MAP:LIST?

Queries the entire contents of the I-V characteristics map.

Command

```
[SOURce:]ARBItrary[:LEVel][:IMMediate]:MAP:LIST?
```

Response

Returns the voltage and current values of the data points set with [ARB:COUN](#) in comma-delimited NR3 format in response to ARB:MAP:LIST?.

<v1>,<c1>,<v2>,<c2>...

<v1> Voltage of 1st point

<c1> Current of 1st point

<v2> Voltage of 2nd point

<c2> Current of 2nd point

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DATA:INT:RES

Resets the following integrated data.

- Current capacity (Ah)
- Power capacity (Wh)
- Elapsed time (s)

Command

DATA:INTegral:RESet

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DATA:INT:STAR

Manually starts the integration operation. The currently held integrated values are saved. This command is ignored if the integration operation is already started.

Command

DATA:INTegral:STARt

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DATA:INT:STOP

Manually stops the integration operation. The currently held integrated values are saved. This command is ignored if the integration operation is currently stopped.

Command

DATA:INTegral:STOP

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DATA:POIN?

Queries the number of measurement points registered in the data logger.

Command

DATA:POINt?

Response

Returns the number of measurement points registered in the data logger in NR1 format in response to the DATA:POIN? query.

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INIT:PULS

Executes the switching function (PULSe).

The switching function continues to be executed until either [ABOR:PULS](#) or [ABOR](#) is executed. This command cannot be used when a sequence trigger function is in execution.

Command

```
INITiate[:IMMediate]:PULSe
```

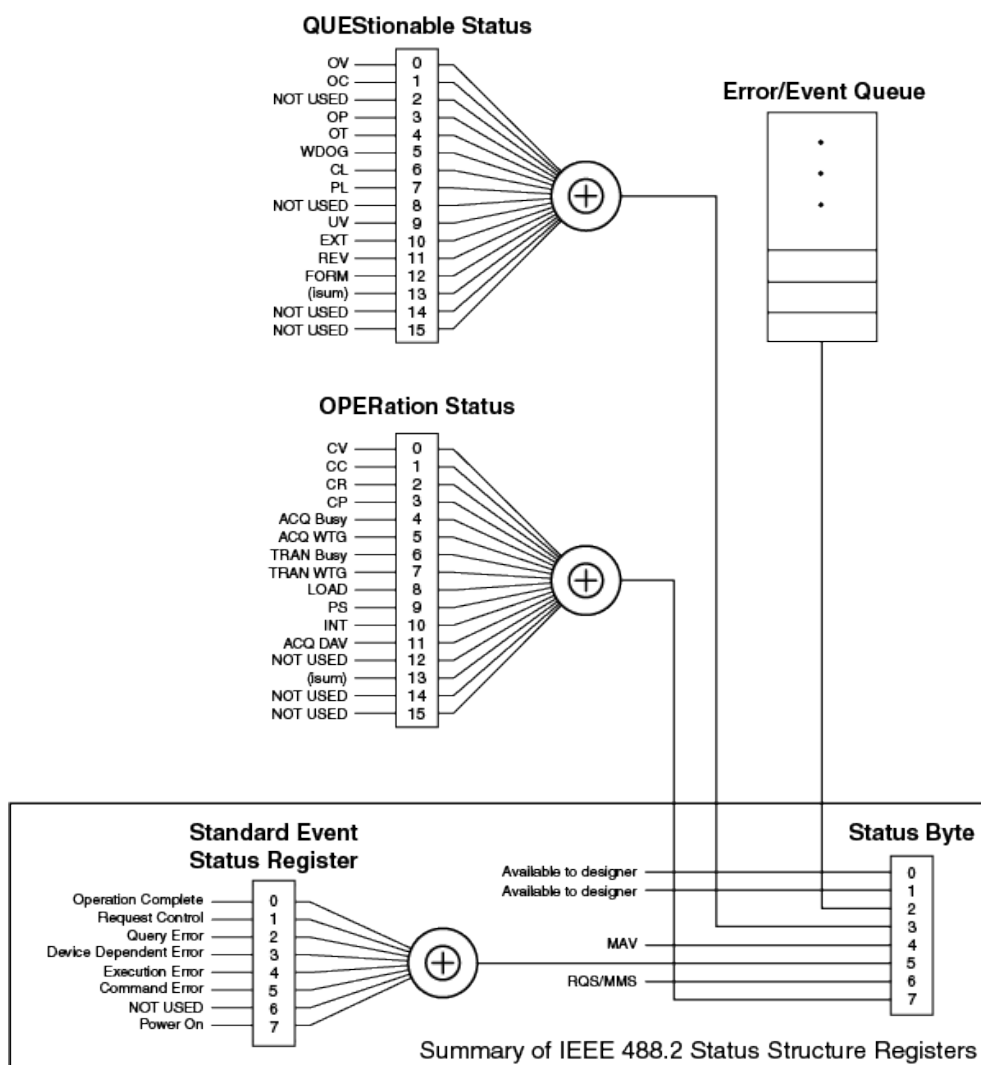
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1999 SCPI Syntax & Style



Partially changed SCPI Standard 1999.0 Volume 1 Fig. 9

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