

6003A

Three Phase Power Calibrator

Remote Programmers Manual

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Introduction

The 6003A Three Phase Power Calibrator (The Product) can operate under the remote control of an instrument controller, computer or terminal, as well as under the direct control from the front panel.

Warning

To prevent possible electrical shock, fire, or personal injury, do not make or touch connections to the output binding posts while the Product is connected to the GPIB or USB. The Product is capable of supplying lethal voltages.

Make sure you read and understand the *6003A Safety Information*.

Remote Control

The Product is equipped with a USB interface and IEEE-488 bus. System connectors are located at the rear panel. For the remote control to work properly, interface parameters must be set in the system menu. For USB, the virtual COM port communication speed must be set on the PC. For IEEE-488 bus, an address range from 0 to 30 is allowed. The Product can be only controlled by one interface at a time. Select one of the interfaces (USB/IEEE488) with the Interface menu. See Figure 1.

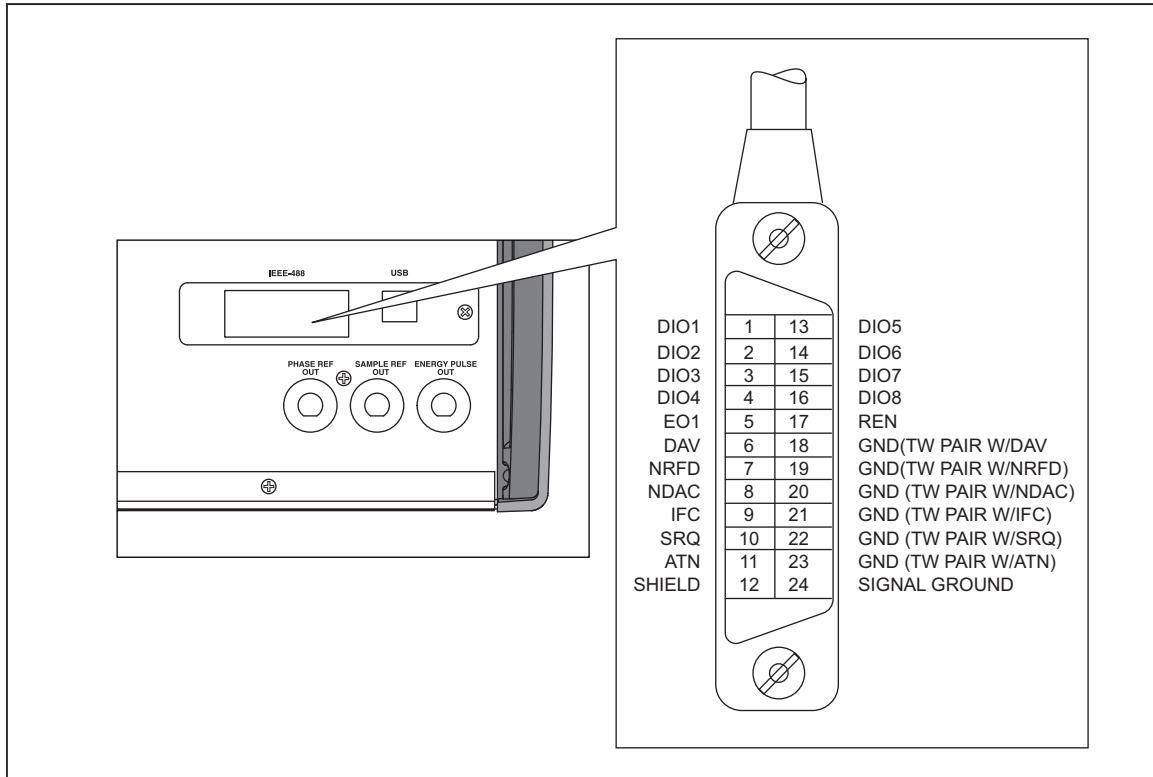


Figure 1. GPIB Connector

hoa113.eps

IEEE-488 Bus Properties

The Product performs the functions listed below based on IEEE488 bus commands:

SH1, AH1, T5, L3, RL1, DC1, SR1

The Product also recognizes these general commands:

DCL	Device Clear	reset the Product
SDC	Selected Device Clear	reset the Product
EOI	End or Identify Message Terminator	close the message
GTL	Go To Local	close remote control mode
LLO	Local Lock Out	local control locked
SPD	Serial Poll Disable	close serial message status
SPE	Serial Poll Enable	release serial message status

USB Interface

The Product can be controlled with a USB (Universal Serial Bus) interface.

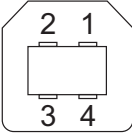
This equipment is required:

- The Product
- Personal Computer (PC) (or other controlling device) with a USB interface (USB type-A connector)
- Standard USB A-B cable

The USB interface must be selected from the product system menu to be in operation (SETUP->Interface->Active interface). The USB interface is seen as a virtual COM port so the baud rate must be set on the Product.

The Product is equipped with a USB type B connector. Table 1 explains the pins on the USB connector.

Table 1. USB Connector

		
hoa114.eps		
Pin	Label	Description
1	+5V	Power supply
2	DATA-	Data signal -
3	DATA+	Data signal +
4	GND	Ground

The subsequent settings should be set on your PC for proper operation:

Baudrate	Set to the same as the Product
Data bits	8
Stop bits	1
Parity	None

The proper COM port must also be selected. After the Product is connected to the PC, a virtual COM port should appear in the System Control panel of the Microsoft Windows Operating System. This COM port is labeled "USB Serial Port (COMxx)".

Note

It is not possible to send or receive data over USB when the Product is not in remote mode. Use the command SYST:REM or SYST:RWL.

Use the IEEE-488 Port for Remote Control

The Product is fully programmable for use on the IEEE Standard 488.1 interface bus (IEEE-488 bus). The interface also complies with supplemental standard IEEE-488.2. Devices connected to the bus in a system are designated as talkers, listeners, talker/listeners, or controllers. Under the remote control of an instrument controller, the Product operates exclusively as a talker/listener on the IEEE-488 bus.

For more detailed information, refer to the standard specification in the publications ANSI/ IEEE Std. 488.1 - 1987 and IEEE Std. 488.2 - 1988.

The Product conforms to the Standard Specification IEEE 488.1 - 1987: "IEEE Standard Digital Interface for Programmable Instrumentation", and to IEEE 488.2 - 1988: "Codes, Formats, Protocols and Common Commands".

In IEEE 488.2 terminology, the Product is a device containing a system interface. It can be connected to a system with its system bus and set into programmed communication with other bus-connected devices under the direction of a system controller.

Programming Options

The Product can be programmed with the IEEE Interface, to:

- Change its operating state (Function, Output, etc.)
- Transmit its own status data over the bus
- Request service from the system controller

Bus Addresses

When an IEEE-488 system comprises several instruments, a unique address is assigned to each to enable the controller to communicate with them individually.

The Product has one primary address that can be set to an exclusive value within the range from 0 to 30 inclusive. It cannot be made to respond to any address outside this range. Secondary addressing is not available. The application program adds data to the active address to define talk or listen.

Default Bus Address:

The default setting is 02.

The IEEE-488 address can be changed on the Product in the Product Menu. See Chapter 3 of the Operators Manual for details.

IEEE 488 and SCPI Standard Defined Features

See Figure 2 for an overview of the status registers.

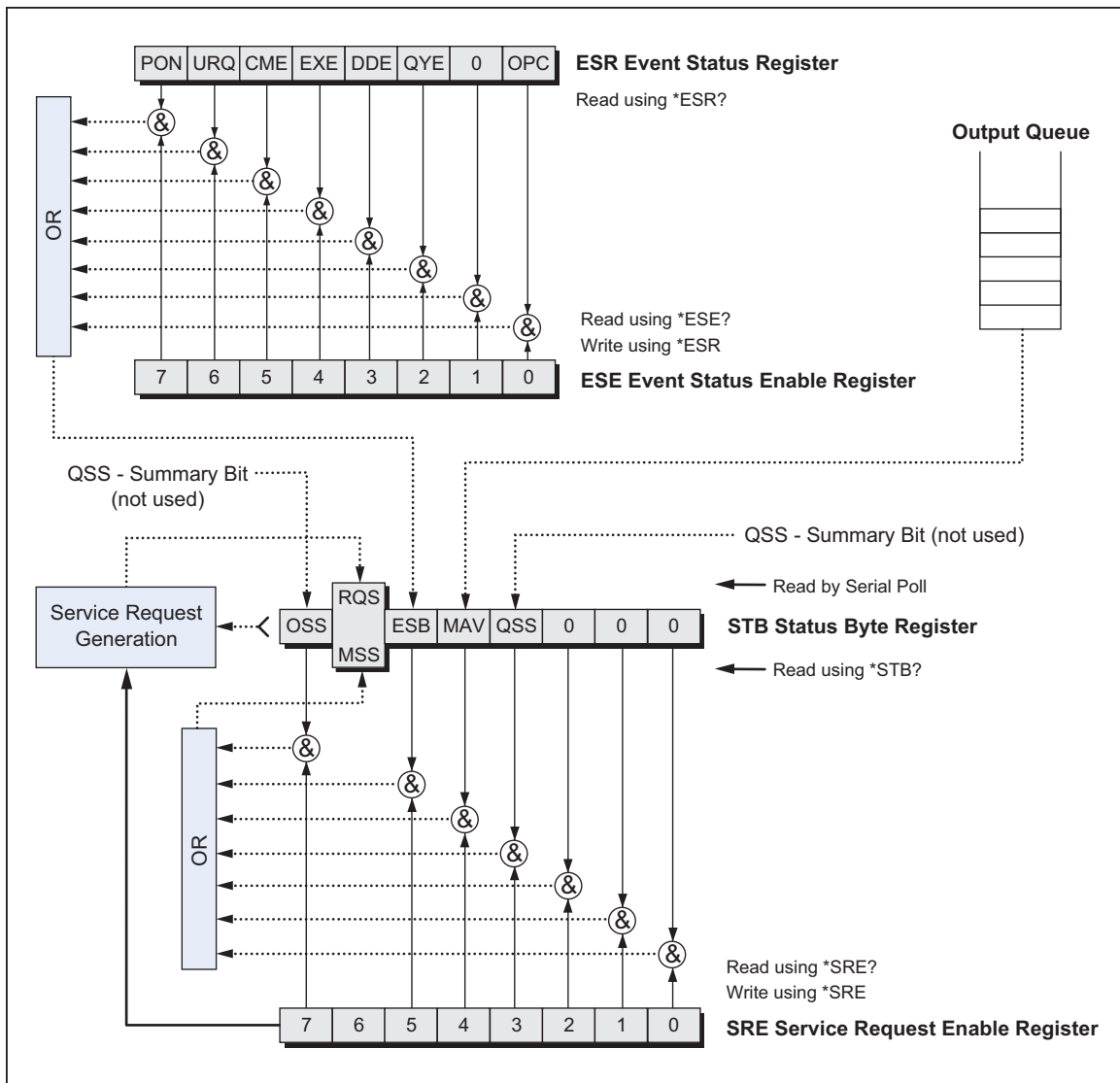


Figure 2. Status Register Overview

hoa008.eps

Standard Status Data Structures

The Product meets standard protocol according to the IEEE488.2 standard. The protocol can be used to check error and status behavior of the Product. It enables single-wire transmitting of SRQ command. The conditions on which SRQ signal (local control request) is sent can be set with parameters *STB?, *SRE?, *SRE, *ESR?, *ESE?, *ESE a *CLS.

Status data structure contains these registers:

- STB – Status Byte Register
- SRE – Service Request Enable Register
- ESR – Event Status Register
- ESE – Event Status Enable Register
- Output Queue

STB (Status Byte Register)

STB is the main register where information from other status registers and from the output queue is collected. The value of the STB register is reset after switching on the Product or after sending the *CLS command. This command resets the STB register except bit MAV, which remains set if the output queue is not empty. The STB register value can be read with a serial message or through the general query *STB?.

Bit configuration of STB:

OSS	Operation Summary Status, bit 7. SCPI-defined. The OSS bit is set to 1 when the data in the OSR (Operation Status Register) contains one or more enabled bits which are true.
RQS	Request Service, bit 6. The bit is read as a part of status byte only when serial message is sent.
MSS	Master Summary Status, bit 6. The MSS bit is set to 1 whenever bits ESB or MAV are 1 and enabled (1) in the SRE. This bit can be read with the *STB? command. This value is derived from the STB and SRE status.
ESB	Event Summary Bit, bit 5. This value is derived from the STB and SRE status. The ESB bit is set to 1 when one or more enabled ESR bits are set to 1.
MAV	Message Available, bit 4. The MAV bit is set to 1 whenever data is available in the IEEE488 Output Queue (the response on query is ready).
QSS	Questionable Summary Status, bit 3. SCPI-defined. The QSS bit is set to 1 when the data in the QSR (Questionable Status Register) contains one or more enabled bits which are true.

SRE Service Request Enable Register

The Service Request Enable Register suppresses or allows the STB bits. A “0” value of a SRE bit means, that the bit does not influence the value of the MSS bit. The value of any unmask STB bit results in setting of the MSS bit to the level “1”. The SRE bit 6 is not influenced and its value is “0”. The SRE register value can be set with the command *SRE followed by mask register value (0 – 191). The register can be read with the command *SRE?. The register automatically resets after switching the Product on. The register is not reset by the command *CLS.

ESR Event Status Register

Every bit of the Event Status Register corresponds to one event. This bit is set when the event is changed and it also remains set when the event passed. The ESR is cleared when the power is turned on (except bit PON which is set), and every time it is read via command *ESR? Or cleared with *CLS.

Bit configuration of Event Status Register:

PON	Power On, bit 7. This event bit indicates that an off-to-on transition has occurred in the device’s power supply.
URQ	User Request, bit 6. Bit is not used and it is always “0”.
CME	Command Error, bit 5. This event bit indicates that an incorrectly formed command or query has been detected by the Product.
EXE	Execution Error, bit 4. This event bit indicates that the received command cannot be executed, owing to the device state or the command parameter being out of limits.
DDE	Device Dependent Error, bit 3. This event bit indicates that an error has occurred which is not a Command Error, a Query Error, nor an Execution Error. A device-specific Error is any executed device operation that did not properly complete due to a condition, such as overload.
QYE	Query Error, bit 2. The bit is set if the Product is addressed as talker and the output queue is empty or if the control unit did not pick up a response before sending the next query.
OPC	Operation Complete, bit 0. This event bit is generated in response to the *OPC command. It indicates that the device has completed all selected pending operations.

ESE Event Status Enable Register

The Event Status Enable Register allows one or more events in the Event Status Register to be reflected in the ESB summary-message bit. This register is defined for 8 bits, each corresponding to the bits in the Event Status Register. The Event Status Enable Register is read with the common query *ESE?. Data is returned as a binary-weighted value. The Event Status Enable Register is written to by the common command, *ESE. Sending the *ESE common command, followed by a zero, clears the ESE. The Event Status Enable Register is cleared upon power-on.

It suppresses or allows bits in the ESR register. Value “0” of a bit of the ESE register suppresses influence of the appropriate bit of the ESR register on value of sum bit of ESB status register. Setting of any unmask bit of an ESR register results in setting of the ESB status register. The ESE register value can be modified by command *ESE followed by the value of the mask register (integer in range 0 –255). Reading of the register can be performed with command *ESE?. The register is automatically reset after switching on. The register is not reset with the *CLS command.

Operation Status Register

Not used in the Product.

Questionable Status Register

Not used in the Product.

Output Queue

The Output Queue stores response messages until they are read from the control unit. If there is one sign (minimum) in the output queue, the MAV register (message available) is set. The Output Queue is cleared upon power-on and after reading all signs from the output queue.

Error Queue

The Error Queue stores error messages. They are placed in a “first in, first out” queue. The queue is read destructively with the query command “SYSTem:ERRor?” to obtain a code number and error message. The query “SYSTem:ERRor?” can be used to read errors in the queue until it is empty, when the message “0, No Error” will be returned.

Command Syntax

The commands described in this manual can be issued through all interfaces (USB/IEEE488).

All commands listed are explained in two columns:

- KEYWORD
- PARAMETERS

The KEYWORD column includes the name of the command. Each command includes one or more keywords. If a keyword is in brackets ([]), it is not mandatory. Non-mandatory commands are used only to achieve compatibility with the SCPI language standard.

Capital letters designate the abbreviated form of the commands. The extended form is written in lowercase.

Command parameters are in brackets (<>). Each parameter is separated with a comma. Parameters in brackets ([]) are not mandatory. Line (|) means “or” and is used to separate several alternative parameters.

A semicolon ‘;’ is used to separate more commands written on one line. For example: SAF:LR 100.5;:OUTP ON

Note

For USB only, each command must end in <cr> or <lf>. Both codes <crlf> can be used at the same time. The Product does all commands written on one line of the program after it receives <cr>, <lf> or <crlf> code. Without this code, the program line is ignored.

Description of Abbreviations:

<DNPD>	Decimal Numeric Program Data. This format is used to express a decimal number with or without the exponent.
<CPD>	Character Program Data. Usually, this represents a group of alternative character parameters. For example {ON OFF 0 1}.
<SPD>	String Program Data. A string value consisting of items from more parts. It is used to set date/time.
?	A flag indicating a request for the value of the parameter specified by the command. No other parameter, other than the question mark, can be used.
(?)	A flag indicating a request for the parameter specified by the command. This command permits a value to be set as well as requested.
<cr>	Carriage return. ASCII code 13. This code executes the program line.
<lf>	Line feed. ASCII code 10. This code executes the program line.

Commands

INPut Subsystem

This subsystem enables you to change parameters of Product inputs.

Keyword	Parameters
INPut	
FILTer (?)	<CPD> { OFF ON 0 1 }
:PULLup (?)	<CPD> { OFF 150 1K }

OUTPut Subsystem

This subsystem lets you activate or deactivate the Product output.

Keyword	Parameters
OUTPut	
[:STATe](?)	<CPD> { ON OFF }
:LOWVoltage(?)	<CPD> { FLOat GROund }
:LOWCurrent (?)	<CPD> { FLOat GROund }
[:PHASe]:UNIT(?)	<CPD> { DEG COS }
:CURCoil(?)	<CPD> { OFF X25 X50 }
:SYNChronization(?)	<CPD> { INT LINE IN2 }
:LOCKed?	<CPD> { 0 1 }
:ENERgy	
:UNIT(?)	<CPD> { WS WH }
:MVOLtage (?)	<CPD> { OFF ON 0 1 }
:REFerence	
:UNIT(?)	<CPD> { W VA VAR }
:PULLup(?)	<CPD> { 0 1 }
:CONStant (?)	<DNPD>
:MHARmonics	
:UNIT(?)	<CPD> { PRMS PFUN }
:VFC (?)	<CPD> { OFF ON 0 1 }
:EQUivalence	
:FACTor(?)	<DNPD>
:CONFIguration (?)	<CPD> { 1 12 123 }

OUTP[:STAT](?) <CPD> { ON | OFF }

This command activates or deactivates output terminals.

- ON - activates the output
- OFF - deactivates the output

If a query is sent, the Product returns ON if the output is active or OFF if it is inactive

Example:

OUTP ON - activates the output

OUTP? - Product returns ON or OFF

OUTP:LOWV(?) <CPD> { FLO | GRO }

This command connects or disconnects the Lo terminals of all voltage outputs to/from GND terminal.

- FLOat ungrounds voltage outputs
- GROund grounds voltage outputs

If a query is sent, the Product returns GRO when the output is grounded or FLO when floating.

Example:

OUTP:LOWV GRO

OUTP:LOWV? - Product returns FLO or GRO

OUTP:LOWC(?) <CPD> { FLO | GRO }

This command connects or disconnects the Lo terminals of all current outputs to/from GND terminal.

- FLOat ungrounds current outputs
- GROund grounds current outputs

If a query is sent, the Product returns GRO when the output is grounded or FLO when floating.

Example:

OUTP:LOWC GRO

OUTP:LOWC? - Product returns FLO or GRO

OUTP[:PHAS]:UNIT(?) <CPD> { DEG | COS }

This command sets the method used to specify the phase shift between the output voltage and current.

- DEG activates a mode where all entries are done with the angle, “°” in the range of 0.0 – 360.0 °
- COS activates a mode where all entries are done with the power factor in the range of 1.000 to –1.000, LAG or LEAD (LAG = 0-180 °, LEAD = 180-360 °)

The unit of measurement remains valid even after the Product is switched off and back on.

If a query is sent, the Product returns the set unit of measurement { DEG | COS }.

Example:

OUTP:UNIT DEG - sets the angle as the unit of phase shift

OUTP:UNIT? - the Product returns DEG

OUTP:CURC(?) <CPD> { OFF | X25 | X50 }

This command activates or deactivates the use of 25 or 50-turns current coil.

- OFF - deactivates the current coil
- X25 - activates the 25 turns current coil
- X50 - activates the 50 turns current coil

If a query is sent, the Product returns X50 if the 50-turn coil is activated, X25 if the 25-turn coil is activated, or OFF if the current coil is deactivated.

Example:

OUTP:CURC X50 - activates 50-tuen current coil

OUTP:CURC? - Product returns OFF, X50 or X25

OUTP:SYNC(?) <CPD> { INT | LINE | IN2 }

This command sets the output frequency synchronization.

- INT - internal synchronization
- LINE - synchronization to power supply frequency
- IN2 - synchronization to external signal (input IN2)

If a query is sent, the Product returns INT, LINE or IN2 according to selected synchronization mode.

Example:

OUTP:SYNC INT - selects frequency synchronization to internal reference

OUTP:SYNC? - Product returns INT, LINE or IN2

OUTP:SYNC:LOCK? <CPD> { 0 | 1 }

This query returns the actual state of frequency synchronization.

- 0 - output frequency is not locked (it is not possible to activate the output terminals)
- 1 - output frequency is locked to reference signal

Example:

OUTP:SYNC:LOCK? - Product returns 1 or 0

OUTP:ENER:UNIT(?) <CPD> { WS | WH }

This command sets the unit used for energy.

- WS - energy is displayed in Ws, VAs, VARs
- WH - energy is displayed in Wh, VAh, VARh

Energy unit remains valid even after the Product is switched off and back on.

If a query is sent, the Product returns set energy unit { WS | WH }.

Example:

OUTP:ENER:UNIT WH - sets energy unit Wh

OUTP: ENER:UNIT? - the Product returns WH

OUTP:ENER:MVOL(?) <CPD> { OFF | ON | 0 | 1 }

This command activates or deactivates Maintain Voltage Signal function.

- OFF or 0 - function is not active
- ON or 1 - function is active

State of the function remains valid even after the Product is switched off and back on.

If a query is sent, the Product returns state of the function { 0 | 1 }.

Example:

OUTP:ENER:MVOL ON - activates Maintain Voltage Signal function

OUTP: ENER:MVOL? - the Product returns 1

OUTP:REF:PULL (?) <CPD> { 0 | 1 }

This command connects the internal pull-up resistor (150 Ω) to the Energy pulse output.

- 0 - disconnects pull-up resistor
- 1 - connects pull-up resistor

If a query is sent, the Product returns 0 or 1.

Example:

OUTP:REF:PULL 1 - connects pull-up resistor

OUTP:REF:PULL? - Product returns 0 or 1

OUTP:REF:CONS(?) <DNPD>

This command sets the number of pulses per the selected unit (pulses generated on Energy pulse output on the rear panel BNC).

<DNPD>

Parameter represents the value of the number of pulses per selected unit.

If a query is sent, the Product returns the set value using standard exponential format.

Example:

400.0 i/kWh is returned as 4.000000e+002.

Example:

Number of pulses 1000 i/kVArh:

OUT:REF:CONS 1000.0

OUT:REF:UNIT VAR

OUTP:REF:UNIT(?) <CPD> { W | VA | VAR }

This command defines the unit of the constant for pulses generated on Energy pulse output.

<CPD>

If a query is sent, the Product returns selected unit.

Example:

OUTP:REF:UNIT VAR - sets energy pulse output unit VAR

OUTP: REF:UNIT? - the Product returns VAR

OUTP:MHAR:UNIT(?) <CPD> { PRMS | PFUN }

This command defines how higher harmonic components are evaluated.

<CPD>

- PRMS – % of RMS value
- PFUN – % of Fundamental harmonic value

If a query is sent, the Product returns selected unit.

Example:

OUTP:MHAR:UNIT PRMS - harmonics are expressed as “% of RMS”

OUTP: MHAR:UNIT? - the Product returns PRMS

OUTP:VFC(?) <CPD> { OFF | ON | 0 | 1 }

This command activates or deactivates the voltage from the current function.

- OFF or 0 - function is not active
- ON or 1 - function is active

State of the function remains valid even after the Product is switched off and back on.

If a query is sent, the Product returns state of the function { 0 | 1 }.

Example:

OUTP:VFC ON - activates Voltage from current function

OUTP:VFC? - the Product returns 1

OUTP:EQU:FACT(?) <DNPD>

This command sets the ratio between the simulated current value and the voltage output.

<DNPD>

Parameter represents the ratio expressed in V/A.

If a query is sent, the Product returns set value with standard exponential format.

Example:

10 V/A is returned as 1.000000e+001.

Example:

Ratio 10 V/A:

OUTP:EQU:FACT 10

OUTP:CONF (?) <CPD> { 1 | 12 | 123 }

This command defines how many outputs are used in basic power and energy ac modes (Pac and Eac).

- 1 - channels U1, I1 only are active
- 12 - channels U1, U2, I1, I2 are active
- 123 - all channels are active

If a query is sent, the Product returns active channels.

Example:

OUTP:CONF 123 - activates all channels

OUTP: CONF? - the Product returns 123

MEASure a CONFigure subsystem

This subsystem controls the internal multimeter.

Keyword**Parameters**

MEASure?

CONFigure(?) <CPD> { VOLTage | CURRent | FREQuency }

MEAS?

This query returns a value measured by the multimeter.

The Product returns the set value of power with the standard exponential format.

Example:

5.456 V is returned as 5.456000e+000.

Example:

MEAS? The Product returns the measured value

CONF(?) <CPD> { VOLT | CURR | FREQ }

This command sets the function of the internal multimeter.

If a query is sent, the Product returns VOLT, CURR or FREQ according to selected multimeter function.

Example:

CONF VOLT - sets the multimeter to function voltage dc.

SOURce subsystem

This subsystem controls the individual functions of the Product.

Keyword	Parameters
[SOURce]	
:MODE?	{ PAC PDC PACI PDCI PACE PHAR PIH PDIP PDCE EAC EDC EACI EDCI VAC VDC CAC CDC CACI CDCI }
:PAC	
:POWer(?)	<DNPd>
[:POWer]	
:UNIT(?)	<CPD> { W VA VAR }
:VOLTagE(?)	<DNPd>
:CURRent(?)	<DNPd>
[:CURRent]	
:PHASe(?)	<DNPd>
:POLarity(?)	<CPD> { LEAD LAG }
:FREQuency(?)	<DNPd >
:PDC	
:POWer(?)	<DNPd>
:VOLTagE(?)	<DNPd>
:CURRent(?)	<DNPd>
:PACI	
:POWer(?)	<DNPd>
[:POWer]	
:UNIT(?)	<CPD> { W VA VAR }
:VOLTagE(?)	<DNPd>
:CURRent(?)	<DNPd>
[:CURRent]	
:PHASe(?)	<DNPd>
:POLarity(?)	<CPD> { LEAD LAG }
:FREQuency(?)	<DNPd >
:PDCI	
:POWer(?)	<DNPd>
:VOLTagE(?)	<DNPd>
:CURRent(?)	<DNPd>
:PACE	
:POWer?	
[:POWer]	
:UNIT(?)	<CPD> { W VA VAR }
:VOLTagE<n>(?)	<DNPd>
:PHASe(?)	<DNPd>
:ENABle (?)	<CPD> { ON OFF }
:CURRent<n>(?)	<DNPd>
:PHASe(?)	<DNPd>
:ENABle (?)	<CPD> { ON OFF }
:FREQuency(?)	<DNPd >
:PDCE	
:POWer?	
:VOLTagE<n>(?)	<DNPd>
:ENABle (?)	<CPD> { ON OFF }

```

:CURRent<n>(?)      <DNPd>
                    :ENABle (?)  <CPD> { ON | OFF }

:PHAR
:POWer?            <DNPd>, <DNPd>
:VOLTagE<n>(?)    <DNPd>
                    :PHASe(?)   <DNPd>
                    :ENABle (?)  <CPD> { ON | OFF }
                    :HARMonic<y>(?) <DNPd>
                    :PHASe(?)   <DNPd>
                    :MODulation(?)<DNPd>
                    :SHAPEe(?)   <CPD> { SIN | RECT | OFF }
                    :DUTY(?)    <DNPd>

:CURRent<n>(?)    <DNPd>
                    :PHASe(?)   <DNPd>
                    :ENABle(?)   <CPD> { ON | OFF }
                    :HARMonic<y>(?) <DNPd>
                    :PHASe(?)   <DNPd>
                    :MODulation(?) <DNPd>
                    :SHAPEe(?)   <CPD> { SIN | RECT | OFF }
                    :DUTY(?)    <DNPd>
                    :FREQuency(?) <DNPd >
                    :MODulation(?) <DNPd >

:PIH
:VOLTagE<n>(?)    <DNPd>
                    :PHASe(?)   <DNPd>
                    :ENABle(?)   <CPD> { ON | OFF }
                    :IHARmonic(?) <DNPd>

:CURRent<n>(?)    <DNPd>
                    :PHASe(?)   <DNPd>
                    :ENABle(?)   <CPD> { ON | OFF }
                    :IHARmonic(?) <DNPd>

:FREQuency(?)    <DNPd >
                    :IHARmonic(?) <DNPd >

:PDIP
:VOLTagE<n>(?)    <DNPd>
                    :PHASe(?)   <DNPd>
                    :ENABle(?)   <CPD> { ON | OFF }
                    :CHANge (?)  <DNPd>

:CURRent<n>(?)    <DNPd>
                    :PHASe(?)   <DNPd>
                    :ENABle(?)   <CPD> { ON | OFF }
                    :CHANge (?)  <DNPd>

:FREQuency(?)    <DNPd >
:TIME(?)         <DNPd >, <DNPd >, <DNPd >, <DNPd >
>, <DNPd >
:TRIGger
                    :INPut(?)    <CPD> { OFF | IN2 }
                    :SYNChronization(?) <CPD> { OFF | ON }
                    :REPetition (?) <CPD> { ONE | REPeat }

```

```

:EAC
:ENERgy?
:DEVIation?
:POWEr?
[:POWEr]
    :UNIT(?) <CPD> { W | VA | VAR }
:VOLTage(?) <DNPd>
:CURRent(?) <DNPd>
[:CURRent]
    :PHASe(?) <DNPd>
    :POLarity(?) <CPD> { LEAD | LAG }
:CONStant(?) <DNPd>
:TIME(?) <DNPd>
:FREQuency(?) <DNPd >
:CONTRol(?) <CPD> { PACK | CNT1 | TIM1 | FR1 }
:TEST
    :TIME(?) <DNPd>
    :COUNT(?) <DNPd>
    :FREQ? <DNPd>
:WUP
    :TIME(?) <DNPd>
    :COUNT(?) <DNPd>

:EDC
:ENERgy?
:DEVIation?
:POWEr?
:VOLTage(?) <DNPd>
:CURRent(?) <DNPd>
:CONStant(?) <DNPd>
:TIME(?) <DNPd>
:CONTRol(?) <CPD> { PACK | CNT1 | TIM1 | FR1 }
:TEST
    :TIME(?) <DNPd>
    :COUNT(?) <DNPd>
    :FREQ? <DNPd>
:WUP
    :TIME(?) <DNPd>
    :COUNT(?) <DNPd>

:EACI
:ENERgy?
:DEVIation?
:POWEr?
:VOLTage(?) <DNPd>
:CURRent(?) <DNPd>
[:CURRent]
    :PHASe(?) <DNPd>
:FREQuency(?) <DNPd >
:CONStant(?) <DNPd>
:TIME(?) <DNPd>
:CONTRol(?) <CPD> { PACK | CNT1 | TIM1 | FR1 }
:TEST
    :TIME(?) <DNPd>
    :COUNT(?) <DNPd>

```

```

:WUP :FREQ? <DNPd>
      :TIME(?) <DNPd>
      :COUNT(?) <DNPd>

:EDCI
:ENERgy?
:DEViation?
:POWer?
:VOLTage(?) <DNPd>
:CURRent(?) <DNPd>
:CONStant(?) <DNPd>
:TIME(?) <DNPd>
:CONTRol(?) <CPD> { PACK | CNT1 | TIM1 | FR1 }
:TEST
      :TIME(?) <DNPd>
      :COUNT(?) <DNPd>
      :FREQ? <DNPd>

:WUP
      :TIME(?) <DNPd>
      :COUNT(?) <DNPd>

:VAC
:VOLTage(?) <DNPd>
:FREQUency(?) <DNPd >

:VDC
:VOLTage(?) <DNPd>

:CAC
:CURRent(?) <DNPd>
:FREQUency(?) <DNPd >

:CDC
:CURRent(?) <DNPd>

:CACI
:CURRent(?) <DNPd>
:FREQUency(?) <DNPd >

:CDCI
:CURRent(?) <DNPd>

```


[SOUR]:MODE?

This command returns the selected mode of the Product { PAC | PDC | PACI | PDCI | PACE | PDCE | PHAR | PIH | PDIP | EAC | EDC | EACI | EDCI | VAC | VDC | CAC | CDC | CACI | CDCI }.

- PAC – Power AC mode
- PDC – Power DC mode
- PACI – Power AC high current mode
- PDCI – Power DC high current mode
- PACE – Power AC extended mode
- PDCE – Power DC extended mode
- PHAR – Power harmonic mode
- PIH – Power interharmonic mode
- PDIP – Power Dip/Swell mode
- EAC – Energy AC mode
- EDC – Energy DC mode
- EACI – Energy AC high current mode
- EDCI – Energy DC high current mode
- VAC – Voltage AC mode
- VDC – Voltage DC mode
- CAC – Current AC mode
- CDC – Current DC mode
- CACI – Current AC high current mode
- CDCI – Current DC high current mode

Example:

MODE?

[SOUR]:PAC:POW(?) <DNPD>

This command sets the power value in Power AC mode.

<DNPD>

Parameter represents the value of the power expressed in actual units (W, VA, VAR).

If a query is sent, the Product returns the set value of the power using standard exponential format.

Example:

100.60 W is returned as 1.006000e+002.

Example:

AC power 1000 W:

PAC:POW 1000

Note

This command switches the Product into Power AC mode.

[SOUR]:PAC[:POW]:UNIT(?) <CPD> { W | VA | VAR }

This command selects the units for power in the Power AC mode.

If a query is sent, the Product returns actual units in Power AC mode.

Example:

Select unit W for Power AC mode:

PAC:UNIT W

Note

This command switches the Product into Power AC mode.

[SOUR]:PAC:VOLT(?) <DNPD>

This command sets the output voltage value.

<DNPD>

Parameter represents the value of the output voltage expressed in V.

If a query is sent, the Product returns the value of the output voltage using standard exponential format.

Example:

110.12 V is returned as 1.101200e+002.

Example:

Voltage 230.5V:

PAC:VOLT 230.5

Note

This command switches the Product into Power AC mode.

[SOUR]:PAC:CURRE(?) <DNPD>

This command sets the output current value in Power AC mode.

<DNPD>

Parameter represents the value of the output current expressed in A.

If a query is sent, the Product returns the value of the output current using standard exponential format.

Example:

11.012 A is returned as 1.101200e+001.

Example:

Current 23.05A:

PAC:CURRE 23.05

Note

This command switches the Product into Power AC mode.

[SOUR]:PAC[:CURRE]:PHAS(?) <DNPD>

This command sets the phase angle between voltage and current.

<DNPD>

Represents the phase angle between the output voltage and current in degrees (PHAS:UNIT=DEG), or specified as a value of the power factor (PHAS:UNIT=COS).

If a query is sent, the Product returns the set value of the phase shift between the output voltage and current using standard exponential format.

Example:

156.3 ° is returned as 1.563000e+002.

Example:

PAC:PHAS 250.2 - sets 250.2 ° phase shift between the output voltage and current

(PHAS:UNIT=DEG) PAC:PHAS? - the Product returns 2.502000e+002

Example:

PAC:PHAS 0.554 - sets power factor 0.554

(PHAS:UNIT=COS) PAC:PHAS? - the Product returns 5.540000e-001,LAG

Note

This command switches the Product into Power AC mode.

[SOUR]:PAC[:CURR]:POLarity(?) <CPD> { LEAD | LAG }

This command sets the polarity of the phase angle between voltage and current. Command is valid only for PHAS:UNIT=DEG.

<CPD>

Represents the polarity of the phase angle between the output voltage and the current.

If a query is sent, the Product returns the polarity of the phase angle between the output voltage and current.

Example:

PAC:POL LEAD sets the phase angle polarity to Lead

Note

This command switches the Product into Power AC mode.

[SOUR]:PAC:FREQ(?) <DNPD>

This command sets the frequency in Power AC mode.

<DNPD>

Parameter represents the value of the frequency expressed in Hz.

If a query is sent, the Product returns the value of the frequency using standard exponential format.

Example:

50 Hz is returned as 5.000000e+001.

Example:

Frequency 60 Hz:

PAC:FREQ 60

Note

This command switches the Product into Power AC mode.

[SOUR]:PDC:POW(?) <DNPD>

This command sets the power value in Power DC mode.

<DNPD>

Parameter represents the value of the power expressed in W.

If a query is sent, the Product returns the set value of the power using standard exponential format.

Example:

100.60 W is returned as 1.006000e+002.

Example:

DC power 1000 W:
PDC:POW 1000

Note

This command switches the Product into Power DC mode.

[SOUR]:PDC:VOLT(?) <DNPD>

This command sets the output voltage value in Power DC mode.

<DNPD>

Parameter represents the value of the output voltage expressed in V.

If a query is sent, the Product returns the value of the output voltage using standard exponential format.

Example:

110.12 V is returned as 1.101200e+002.

Example:

Voltage 230.5 V:
PDC:VOLT 230.5

Note

This command switches the Product into Power DC mode.

[SOUR]:PDC:CURRE(?) <DNPD>

This command sets the output current value in Power DC mode.

<DNPD>

Parameter represents the value of the output current expressed in A.

If a query is sent, the Product returns the value of the output current using standard exponential format.

Example:

11.012 A is returned as 1.101200e+001.

Example:

Current 23.05 A:

PDC:CURRE 23.05

Note

This command switches the Product into Power DC mode.

[SOUR]:PACI:POW(?) <DNPD>

This command sets the power value in Power AC high-current mode.

<DNPD>

Parameter represents the value of the power expressed in actual units (W, VA, VAr).

If a query is sent, the Product returns the set value of the power using standard exponential format.

Example:

100.60 W is returned as 1.006000e+002.

Example:

AC power 1000 W:

PACI:POW 1000

Note

This command switches the Product into Power AC high-current mode.

[SOUR]:PACI[:POW]:UNIT(?) <CPD> { W | VA | VAR }

This command selects units for power in the Power AC high-current mode.
If a query is sent, the Product returns actual units in Power AC high-current mode.

Example:

Select unit W for Power AC high current mode:
PACI:UNIT W

Note

Command switches the Product into Power AC high-current mode.

[SOUR]:PACI:VOLT(?) <DNPD>

This command sets the output voltage value.

<DNPD>

This parameter represents the value of the output voltage expressed in V.
If a query is sent, the Product returns the value of the output voltage using standard exponential format.

Example:

110.12 V is returned as 1.101200e+002.

Example:

Voltage 230.5 V:
PAC:VOLT 230.5

Note

Command switches the Product into Power AC high-current mode.

[SOUR]:PACI:CURR(?) <DNPD>

This command sets the output current value in Power AC high-current mode.

<DNPD>

Parameter represents the value of the output current expressed in A.

If a query is sent, the Product returns the value of the output current using standard exponential format.

Example:

11.012 A is returned as 1.101200e+001.

Example:

Current 23.05A:
PACI:CURR 23.05

Note

This command switches the Product into Power AC high-current mode.

[SOUR]:PACI[:CURR]:PHAS(?) <DNPD>

This command sets the phase angle between voltage and current.

<DNPD>

Represents the phase angle between the output voltage and current in degrees (PHAS:UNIT=DEG), or specified as a value of the power factor (PHAS:UNIT=COS).

If a query is sent, the Product returns the set value of the phase shift between the output voltage and current using standard exponential format.

Example:

156.3 ° is returned as 1.563000e+002.

Example:

PACI:PHAS 250.2 - sets 250.2° phase shift between the output voltage and current

(PHAS:UNIT=DEG) PACI:PHAS? - the Product returns 2.502000e+002

Example:

PACI:PHAS 0.554 – sets power factor 0.554 (PHAS:UNIT=COS)

PACI:PHAS? - the Product returns 5.540000e-001,LAG

Note

This command switches the Product into Power AC high-current mode.

[SOUR]:PACI[:CURR]:POLarity(?) <CPD> { LEAD | LAG }

This command sets the polarity of the phase angle between voltage and current. Command is valid only for PHAS:UNIT=DEG.

<CPD>

Represents the polarity of the phase angle between the output voltage and current.

If a query is sent, the Product returns the polarity of the phase angle between the output voltage and current.

Example:

PACI:POL LEAD sets the phase angle polarity to Lead

Note

This command switches the Product into Power AC high-current mode.

[SOUR]:PACI:FREQ(?) <DNPD>

This command sets the frequency in Power AC high-current mode.

<DNPD>

Parameter represents the value of the frequency expressed in Hz.

If a query is sent, the Product returns the value of the frequency using standard exponential format.

Example:

50 Hz is returned as 5.000000e+001.

Example:

Frequency 60 Hz:

PACI:FREQ 60

Note

This command switches the Product into Power AC high-current mode.

[SOUR]:PDCI:POW(?) <DNPD>

This command sets the power value in Power DC high-current mode.

<DNPD>

Parameter represents the value of the power expressed in W.

If a query is sent, the Product returns the set value of the power using standard exponential format.

Example:

100.60 W is returned as 1.006000e+002.

Example:

DC power 1000W:

PDCI:POW 1000

Note

This command switches the Product into Power DC high-current mode.

[SOUR]:PDCI:VOLT(?) <DNPD>

This command sets the output voltage value in Power DC high-current mode.

<DNPD>

Parameter represents the value of the output voltage expressed in V.

If a query is sent, the Product returns the value of the output voltage using standard exponential format.

Example:

110.12 V is returned as 1.101200e+002.

Example:

Voltage 230.5V:

PDCI:VOLT 230.5

Note

This command switches the Product into Power DC high-current mode.

[SOUR]:PDCI:CURR(?) <DNPD>

This command sets the output current value in Power DC high-current mode.

<DNPD>

Parameter represents the value of the output current expressed in A.

If a query is sent, the Product returns the value of the output current using standard exponential format.

Example:

11.012 A is returned as 1.101200e+001.

Example:

Current 23.05A:

PDCI:CURR 23.05

Note

This command switches the Product into Power DC high-current mode.

[SOUR]:PACE:POW?

This query returns the set value of the power using standard exponential format.

Example:

100.60 W is returned as 1.006000e+002.

Note

Query switches the Product into Power AC extended mode.

[SOUR]:PACE[:POW]:UNIT(?) <CPD> { W | VA | VAR }

This command selects units for power in the Power AC extended mode.

If a query is sent, the Product returns actual units in Power AC extended mode.

Example:

Select unit W for Power AC extended mode:

PACE:UNIT W

Note

This command switches the Product into Power AC extended mode.

[SOUR]:PACE:VOLT<n>(?) <DNPD>

This command sets the output voltage value in channel <n>

<DNPD>

Parameter represents the value of the output voltage expressed in V.

<n>

Parameter represents the output channel (1, 2 or 3).

If a query is sent, the Product returns the value of the output voltage using standard exponential format.

Example:

110.12 V is returned as 1.101200e+002.

Example:

Voltage 230.5V in channel 1:

PACE:VOLT1 230.5

Note

This command switches the Product into Power AC extended mode.

[SOUR]:PACE:VOLT<n>:PHAS(?) <DNPD>

This command sets the phase angle between the voltage output in channel <n> and the internal reference phase.

<DNPD>

Represents the phase angle in degrees.

If a query is sent, the Product returns the set value of the phase angle using standard exponential format.

Example:

156.3 ° is returned as 1.563000e+002.

Example:

PACE:VOLT1:PHAS 0

PACE:VOLT2:PHAS 120

PACE:VOLT3:PHAS 240

Note

This command switches the Product into Power AC extended mode.

[SOUR]:PACE:VOLT<n>:ENAB(?) <CPD> { ON | OFF }

This command enables (disables) the voltage output in channel <n>. Disabled outputs are OFF during OUTP ON.

- ON - enables the output
- OFF - disables the output

If a query is sent, the Product returns ON if the output is enabled or OFF if it is disabled.

Example:

PACE:VOLT1:ENAB ON

Note

This command switches the Product into Power AC extended mode.

[SOUR]:PACE:CURRE<n>(?) <DNPD>

This command sets the output current value in channel <n>

<DNPD>

Parameter represents the value of the output current expressed in A.

<n>

Parameter represents the output channel (1, 2 or 3).

If a query is sent, the Product returns the value of the output current using standard exponential format.

Example:

11.012 V is returned as 1.101200e+001.

Example:

Current 23.05A in channel 1:

PACE:CURRE1 23.05

Note

This command switches the Product into Power AC extended mode.

[SOUR]:PACE:CURRE<n>:PHAS(?) <DNPD>

This command sets the phase angle between the current output in channel <n> and the internal reference phase.

<DNPD>

Represents the phase angle in degrees.

If a query is sent, the Product returns the set value of the phase angle using standard exponential format.

Example:

156.3 ° is returned as 1.563000e+002.

Example:

PACE:CURRE1:PHAS 0

PACE: CURRE 2:PHAS 120

PACE: CURRE 3:PHAS 240

Note

This command switches the Product into Power AC extended mode.

[SOUR]:PACE:CURR<n>:ENAB(?) <CPD> { ON | OFF }

This command enables (disables) the current output in channel <n>. Disabled outputs are OFF during OUTF ON.

- ON - enables the output
- OFF - disables the output

If a query is sent, the Product returns ON if the output is enabled or OFF if it is disabled.

Example:

```
PACE:CURR1:ENAB ON
```

Note

This command switches the Product into Power AC extended mode.

[SOUR]:PACE:FREQ(?) <DNPD>

This command sets the frequency in Power AC extended mode.

<DNPD>

Parameter represents the value of the frequency expressed in Hz.

If a query is sent, the Product returns the value of the frequency using standard exponential format.

Example:

50 Hz is returned as 5.000000e+001.

Example:

Frequency 60 Hz:

```
PACE:FREQ 60
```

Note

This command switches the Product into Power AC extended mode.

[SOUR]:PDCE:POW?

This command sets the power value in Power DC extended mode.

This query returns the set value of the power using standard exponential format.

Example:

100.60 W is returned as 1.006000e+002.

Note

Query switches the Product into Power DC extended mode.

[SOUR]:PDCE:VOLT<n>(?) <DNPD>

This command sets the output voltage value in channel <n>

<DNPD>

Parameter represents the value of the output voltage expressed in V.

<n>

Parameter represents the output channel (1, 2 or 3).

If a query is sent, the Product returns the value of the output voltage using standard exponential format.

Example:

110.12 V is returned as 1.101200e+002.

Example:

Voltage 230.5V in channel 1:

PDCE:VOLT1 230.5

Note

This command switches the Product into Power DC extended mode.

[SOUR]:PDCE:VOLT<n>:ENAB(?) <CPD> { ON | OFF }

This command enables (disables) the voltage output in channel <n>. Disabled outputs are OFF during OUTF ON.

- ON - enables the output
- OFF - disables the output

If a query is sent, the Product returns ON if the output is enabled or OFF if it is disabled.

Example:

PDCE:VOLT1:ENAB ON

Note

This command switches the Product into Power DC extended mode.

[SOUR]:PDCE:CURR<n>(?) <DNPD>

This command sets the output current value in channel <n>

<DNPD>

Parameter represents the value of the output current expressed in A.

<n>

Parameter represents the output channel (1, 2 or 3).

If a query is sent, the Product returns the value of the output current using standard exponential format.

Example:

11.012 V is returned as 1.101200e+001.

Example:

Current 23.05A in channel 1:

PDCE:CURR1 23.05

Note

This command switches the Product into Power DC extended mode.

[SOUR]:PDCE:CURR<n>:ENAB(?) <CPD> { ON | OFF }

This command enables (disables) the current output in channel <n>. Disabled outputs are OFF during OUTF ON.

- ON - enables the output
- OFF - disables the output

If a query is sent, the Product returns ON if the output is enabled or OFF if it is disabled.

Example:

PDCE:CURR1:ENAB ON

Note

This command switches the Product into Power DC extended mode.

[SOUR]:PHAR:POW?

This query returns active and reactive power values using standard exponential format.

Example:

100.60 W, 1.1 VAR is returned as 1.006000e+002, 1.100000e+000.

Note

Query switches the Product into Power Harmonic mode.

[SOUR]:PHAR:VOLT<n>(?) <DNPD>

This command sets the output voltage value in channel <n>

<DNPD>

Parameter represents the value of the output voltage expressed in V.

<n>

Parameter represents the output channel (1, 2 or 3).

If a query is sent, the Product returns the value of the output voltage using standard exponential format.

Example:

110.12 V is returned as 1.101200e+002.

Example:

Voltage 230.5V in channel 1:

PHAR:VOLT1 230.5

Note

This command switches the Product into Power Harmonic mode.

[SOUR]:PHAR:VOLT<n>:PHAS(?) <DNPD>

This command sets the phase angle between the voltage output in channel <n> and the internal reference phase.

<DNPD>

Represents the phase angle in degrees.

If a query is sent, the Product returns the set value of the phase angle using standard exponential format.

Example:

156.3 ° is returned as 1.563000e+002.

Example:

PHAR:VOLT1:PHAS 0

PHAR:VOLT2:PHAS 120

PHAR:VOLT3:PHAS 240

Note

This command switches the Product into Power Harmonic mode.

[SOUR]:PHAR:VOLT<n>:ENAB(?) <CPD> { ON | OFF }

This command enables (disables) the voltage output in channel <n>. Disabled outputs are OFF during OUTP ON.

- ON - enables the output
- OFF - disables the output

If a query is sent, the Product returns ON if the output is enabled or OFF if it is disabled.

Example:

```
PHAR:VOLT1:ENAB ON
```

Note

This command switches the Product into Power Harmonic mode.

[SOUR]:PHAR:VOLT<n>:HARM<y> (?) <DNPD>

This command sets the level of <y> harmonic in output voltage in channel <n>
<DNPD>

Parameter represents the level of <y> harmonic expressed in %.

<n>

Parameter represents the output channel (1, 2 or 3).

<y>

Parameter represents the harmonic order (1 to 50). Number 1 is for query only.

If a query is sent, the Product returns the level of the harmonic order using standard exponential format.

Example:

```
10 % is returned as 1.000000e+001.
```

Example:

```
Set harmonic order 2 to 5.3 % in voltage channel 1:
```

```
PHAR:VOLT1:HARM2 5.3
```

Note

This command switches the Product into Power Harmonic mode.

[SOUR]:PHAR:VOLT<n>:HARM<y>:PHAS(?) <DNPD>

This command sets the phase shift of <y> harmonic component in channel <n>
<DNPD>

Parameter represents the phase shift of <y> harmonic component expressed in °.
<n>

Parameter represents the output channel (1, 2 or 3).

<y>

Parameter represents the harmonic order (2 to 50). Order 1 has zero phase shift and cannot be changed.

If a query is sent, the Product returns the phase shift of harmonic component using standard exponential format.

Example:

10 ° is returned as 1.000000e+001.

Example:

Set phase shift of harmonic component 2 to 5.3 ° in voltage channel 1:
PHAR:VOLT1:HARM2:PHAS 5.3

Note

This command switches the Product into Power Harmonic mode.

[SOUR]:PHAR:VOLT<n>:MOD(?) <DNPD>

This command sets the modulation level for voltage output in channel <n>.
<DNPD>

Represents the modulation level in %.

If a query is sent, the Product returns the modulation level using standard exponential format.

Example:

12.45° is returned as 1.145000e+001.

Example:

PHAR:VOLT1:MOD 12.45

Note

This command switches the Product into Power Harmonic mode.

[SOUR]:PHAR:VOLT<n>:MOD:SHAP(?) <CPD> { SIN | RECT | OFF }

This command sets the type of modulation for voltage output in channel <n>.

<CPD>

- SIN - modulation using sinusoidal wave shape
- RECT - modulation using rectangular wave shape
- OFF - disables modulation

If a query is sent, the Product returns SIN, RECT or OFF.

Example:

```
PHAR:VOLT1:MOD:SHAP SIN
```

Note

This command switches the Product into Power Harmonic mode.

[SOUR]:PHAR:VOLT<n>:MOD:DUTY(?) <DNPD>

This command sets the duty cycle of rectangular modulation for voltage output in channel <n>.

<DNPD>

Represents the duty cycle in %.

If a query is sent, the Product returns the duty cycle using standard exponential format.

Example:

```
50% is returned as 5.000000e+001.
```

Example:

```
PHAR:VOLT1:MOD:DUTY 50
```

Note

This command switches the Product into Power Harmonic mode.

[SOUR]:PHAR:CURRE<n>(?) <DNPD>

This command sets the output current value in channel <n>

<DNPD>

Parameter represents the value of the output current expressed in A.

<n>

Parameter represents the output channel (1, 2 or 3).

If a query is sent, the Product returns the value of the output current using standard exponential format.

Example:

11.012 A is returned as 1.101200e+001.

Example:

Voltage 23.05A in channel 1:

PHAR:CURRE1 23.05

Note

This command switches the Product into Power Harmonic mode.

[SOUR]:PHAR:CURRE<n>:PHAS(?) <DNPD>

This command sets the phase angle between current output in channel <n> and the internal reference phase.

<DNPD>

Represents the phase angle in degrees.

If a query is sent, the Product returns the set value of the phase angle using standard exponential format.

Example:

156.3 ° is returned as 1.563000e+002.

Example:

PHAR:CURRE1:PHAS 0

PHAR:CURRE2:PHAS 120

PHAR:CURRE3:PHAS 240

Note

This command switches the Product into Power Harmonic mode.

[SOUR]:PHAR:CURREN:ENAB(?) <CPD> { ON | OFF }

This command enables (disables) the current output in channel <n>. Disabled outputs are OFF during OUTF ON.

- ON - enables the output
- OFF - disables the output

If a query is sent, the Product returns ON if the output is enabled or OFF if it is disabled.

Example:

```
PHAR:CURREN1:ENAB ON
```

Note

This command switches the Product into Power Harmonic mode.

[SOUR]:PHAR:CURREN:HARM<y>(?) <DNPD>

This command sets the level of <y> harmonic in output current in channel <n> <DNPD>

Parameter represents the level of <y> harmonic expressed in %.

<n>

Parameter represents the output channel (1, 2 or 3).

<y>

Parameter represents the harmonic order (1 to 50). Number 1 is for query only.

If a query is sent, the Product returns the level of the harmonic order using standard exponential format.

Example:

```
10 % is returned as 1.000000e+001.
```

Example:

```
Set harmonic order 2 to 5.3 % in voltage channel 1:
```

```
PHAR:CURREN1:HARM2 5.3
```

Note

This command switches the Product into Power Harmonic mode.

[SOUR]:PHAR:CURRE<n>:HARM<y>:PHAS(?) <DNPD>

This command sets the phase shift of <y> harmonic component in channel <n>
<DNPD>

Parameter represents the phase shift of <y> harmonic component expressed in °.
<n>

Parameter represents the output channel (1, 2 or 3).

<y>

Parameter represents the harmonic order (2 to 50). Order 1 has zero phase shift and cannot be changed.

If a query is sent, the Product returns the phase shift of harmonic component using standard exponential format.

Example:

10 ° is returned as 1.000000e+001.

Example:

Set phase shift of harmonic component 2 to 5.3 ° in current channel 1:

PHAR:CURRE1:HARM2:PHAS 5.3

Note

This command switches the Product into Power Harmonic mode.

[SOUR]:PHAR:CURRE<n>:MOD(?) <DNPD>

This command sets the modulation level for current output in channel <n>.
<DNPD>

Parameter represents the modulation level in %.

If a query is sent, the Product returns the modulation level using standard exponential format.

Example:

12.45 ° is returned as 1.145000e+001.

Example:

PHAR:CURRE1:MOD 12.45

Note

This command switches the Product into Power Harmonic mode.

[SOUR]:PHAR:CURRE<n>:MOD:SHAP(?) <CPD> { SIN | RECT | OFF }

This command sets the type of modulation for current output in channel <n>.

<CPD>

- SIN - modulation using sinusoidal wave shape
- RECT - modulation using rectangular wave shape
- OFF - disables modulation

If a query is sent, the Product returns SIN, RECT or OFF.

Example:

```
PHAR:CURRE1:MOD:SHAP SIN
```

Note

This command switches the Product into Power Harmonic mode.

[SOUR]:PHAR:CURRE<n>:MOD:DUTY(?) <DNPD>

This command sets the duty cycle of rectangular modulation for current output in channel <n>.

<DNPD>

Represents the duty cycle in %.

If a query is sent, the Product returns the duty cycle using standard exponential format.

Example:

```
50% is returned as 5.000000e+001.
```

Example:

```
PHAR:CURRE1:MOD:DUTY 50
```

Note

This command switches the Product into Power Harmonic mode.

[SOUR]:PHAR:FREQ(?) <DNPD>

This command sets the frequency in Power Harmonic mode.

<DNPD>

Parameter represents the value of the frequency expressed in Hz.

If a query is sent, the Product returns the value of the frequency using standard exponential format.

Example:

50 Hz is returned as 5.000000e+001.

Example:

Frequency 60 Hz:

PHAR:FREQ 60

Note

This command switches the Product into Power Harmonic mode.

[SOUR]:PHAR:FREQ:MOD(?) <DNPD>

This command sets the modulation frequency in Power Harmonic mode.

<DNPD>

Parameter represents the value of the modulation frequency expressed in Hz.

If a query is sent, the Product returns the value of the modulation frequency using standard exponential format.

Example:

5 Hz is returned as 5.000000e+000.

Example:

Modulation frequency 5.3 Hz:

PHAR:FREQ:MOD 5.3

Note

This command switches the Product into Power Harmonic mode.

[SOUR]:PIH

This command switches the Product into Power Interharmonic mode.

Example:

PIH

[SOUR]:PIH:VOLT<n>(?) <DNPD>

This command sets the output voltage value in channel <n>

<DNPD>

Parameter represents the value of the output voltage expressed in V.

<n>

Parameter represents the output channel (1, 2 or 3).

If a query is sent, the Product returns the value of the output voltage using standard exponential format.

Example:

110.12 V is returned as 1.101200e+002.

Example:

Voltage 230.5 V in channel 1:

PIH:VOLT1 230.5

Note

This command switches the Product into Power Interharmonic mode.

[SOUR]:PIH:VOLT<n>:PHAS(?) <DNPD>

This command sets the phase angle between the voltage output in channel <n> and the internal reference phase.

<DNPD>

Represents the phase angle in degrees.

If a query is sent, the Product returns the set value of the phase angle using standard exponential format.

Example:

156.3 ° is returned as 1.563000e+002.

Example:

PIH:VOLT1:PHAS 0

PIH:VOLT2:PHAS 120

PIH:VOLT3:PHAS 240

Note

This command switches the Product into Power Interharmonic mode.

[SOUR]:PIH:VOLT<n>:ENAB(?) <CPD> { ON | OFF }

This command enables (disables) the voltage output in channel <n>. Disabled outputs are OFF during OUTF ON.

- ON - enables the output
- OFF - disables the output

If a query is sent, the Product returns ON if the output is enabled or OFF if it is disabled.

Example:

```
PIH:VOLT1:ENAB ON
```

Note

This command switches the Product into Power Interharmonic mode.

[SOUR]:PIH:VOLT<n>:IHAR(?) <DNPD>

This command sets the level of interharmonic component for voltage output in channel <n>.

<DNPD>

Represents the voltage in V.

If a query is sent, the Product returns the value of the output voltage using standard exponential format.

Example:

```
110.12 V is returned as 1.101200e+002.
```

Example:

```
Interharmonic component 23.05 V in channel 1:
```

```
PIH:VOLT1:IHAR 23.05
```

Note

This command switches the Product into Power Interharmonic mode.

[SOUR]:PIH:CURRE<n>(?) <DNPD>

This command sets the output current value in channel <n>

<DNPD>

Parameter represents the value of the output current expressed in A.

<n>

Parameter represents the output channel (1, 2 or 3).

If a query is sent, the Product returns the value of the output voltage using standard exponential format.

Example:

11.012 V is returned as 1.101200e+001.

Example:

Voltage 23.05 V in channel 1:

PIH:CURRE1 23.05

Note

This command switches the Product into Power Interharmonic mode.

[SOUR]:PIH:CURRE<n>:PHAS(?) <DNPD>

This command sets the phase angle between current output in channel <n> and the internal reference phase.

<DNPD>

Represents the phase angle in degrees.

If a query is sent, the Product returns the set value of the phase angle using standard exponential format.

Example:

156.3 ° is returned as 1.563000e+002.

Example:

PIH:CURRE1:PHAS 0

PIH:CURRE1:PHAS 120

PIH:CURRE1:PHAS 240

Note

This command switches the Product into Power Interharmonic mode.

[SOUR]:PIH:CURR<n>:ENAB(?) <CPD> { ON | OFF }

This command enables (disables) the current output in channel <n>. Disabled outputs are OFF during OUTF ON.

- ON - enables the output
- OFF - disables the output

If a query is sent, the Product returns ON if the output is enabled or OFF if it is disabled.

Example:

```
PIH:CURR1:ENAB ON
```

Note

This command switches the Product into Power Interharmonic mode.

[SOUR]:PIH:CURR<n>:IHAR(?) <DNPD>

This command sets the level of interharmonic component for the current output in channel <n>.

<DNPD>

Represents the current in A.

If a query is sent, the Product returns the value of the output voltage using standard exponential format.

Example:

```
11.012 V is returned as 1.101200e+001.
```

Example:

```
Interharmonic component 2.305A in channel 1:
```

```
PIH:CURR1:IHAR 2.305
```

Note

This command switches the Product into Power Interharmonic mode.

[SOUR]:PIH:FREQ(?) <DNPD>

This command sets the frequency in Power Interharmonic mode.

<DNPD>

Parameter represents the value of the frequency expressed in Hz.

If a query is sent, the Product returns the value of the frequency using standard exponential format.

Example:

50 Hz is returned as 5.000000e+001.

Example:

Frequency 60 Hz:

PIH:FREQ 60

Note

This command switches the Product into Power Interharmonic mode.

[SOUR]:PIH:FREQ:IHAR(?) <DNPD>

This command sets the modulation frequency in Power Interharmonic mode.

<DNPD>

Parameter represents the value of the modulation frequency expressed in Hz.

If a query is sent, the Product returns the value of the modulation frequency using standard exponential format.

Example:

5 Hz is returned as 5.000000e+000.

Example:

Interharmonic frequency 72.5 Hz:

PIH:FREQ:IHAR 72.5

Note

This command switches the Product into Power Interharmonic mode.

[SOUR]:PDIP

This command switches the Product into Power Dip/Swell mode.

Example:

PDIP

[SOUR]:PDIP:VOLT<n>(?) <DNPD>

This command sets the output voltage value in channel <n>

<DNPD>

Parameter represents the value of the output voltage expressed in V.

<n>

Parameter represents the output channel (1, 2 or 3).

If a query is sent, the Product returns the value of the output voltage using standard exponential format.

Example:

110.12 V is returned as 1.101200e+002.

Example:

Voltage 230.5 V in channel 1:

PDIP:VOLT1 230.5

Note

This command switches the Product into Power Dip/Swell mode.

[SOUR]:PDIP:VOLT<n>:PHAS(?) <DNPD>

This command sets the phase angle between the voltage output in channel <n> and the internal reference phase.

<DNPD>

Represents the phase angle in degrees.

If a query is sent, the Product returns the set value of the phase angle using standard exponential format.

Example:

156.3 ° is returned as 1.563000e+002.

Example:

PDIP:VOLT1:PHAS 0

PDIP:VOLT2:PHAS 120

PDIP:VOLT3:PHAS 240

Note

This command switches the Product into Power Dip/Swell mode.

[SOUR]:PDIP:VOLT<n>:ENAB(?) <CPD> { ON | OFF }

This command enables (disables) the voltage output in channel <n>. Disabled outputs are OFF during OUPP ON.

- ON - enables the output
- OFF - disables the output

If a query is sent, the Product returns ON if the output is enabled or OFF if it is disabled.

Example:

```
PDIP:VOLT1:ENAB ON
```

Note

This command switches the Product into Power Dip/Swell mode.

[SOUR]:PDIP:VOLT<n>:CHAN(?) <DNPD>

This command sets the level of change (Dip/Swell - t3 period) for voltage output in channel <n>.

<DNPD>

Represents the voltage in V.

If a query is sent, the Product returns the value of the output voltage using standard exponential format.

Example:

```
110.12 V is returned as 1.101200e+002.
```

Example:

```
Dip/Swell change 23.05 V in channel 1:
```

```
PDIP:VOLT1:CHAN 23.05
```

Note

This command switches the Product into Power Dip/Swell mode.

[SOUR]:PDIP:CURR<n>(?) <DNPD>

This command sets the output current value in channel <n>

<DNPD>

Parameter represents the value of the output current expressed in A.

<n>

Parameter represents the output channel (1, 2 or 3).

If a query is sent, the Product returns the value of the output current using standard exponential format.

Example:

11.012 A is returned as 1.101200e+001.

Example:

Current 23.05 A in channel 1:

PDIP:CURR1 23.05

Note

This command switches the Product into Power Dip/Swell mode.

[SOUR]:PDIP:CURR<n>:PHAS(?) <DNPD>

This command sets the phase angle between current output in channel <n> and the internal reference phase.

<DNPD>

Represents the phase angle in degrees.

If a query is sent, the Product returns the set value of the phase angle using standard exponential format.

Example:

156.3 ° is returned as 1.563000e+002.

Example:

PDIP:CURR1:PHAS 0

PDIP:CURR2:PHAS 120

PDIP:CURR3:PHAS 240

Note

This command switches the Product into Power Dip/Swell mode.

[SOUR]:PDIP:CURREN<n>:ENAB(?) <CPD> { ON | OFF }

This command enables (disables) the current output in channel <n>. Disabled outputs are OFF during OUTF ON.

- ON - enables the output
- OFF - disables the output

If a query is sent, the Product returns ON if the output is enabled or OFF if it is disabled.

Example:

```
PDIP:CURREN1:ENAB ON
```

Note

This command switches the Product into Power Dip/Swell mode.

[SOUR]:PDIP:CURREN<n>:CHAN(?) <DNPD>

This command sets the level of change (Dip/Swell - t3 period) for current output in channel <n>.

<DNPD>

Represents the current in A.

If a query is sent, the Product returns the value of the output current using standard exponential format.

Example:

```
11.012 A is returned as 1.101200e+001.
```

Example:

```
Dip/Swell change 2.305 A in channel 1:
```

```
PDIP:CURREN1:CHAN 2.305
```

Note

This command switches the Product into Power Dip/Swell mode.

[SOUR]:PDIP:FREQ(?) <DNPD>

This command sets the frequency in Power Dip/Swell mode.

<DNPD>

Parameter represents the value of the frequency expressed in Hz.

If a query is sent, the Product returns the value of the frequency using standard exponential format.

Example:

50 Hz is returned as 5.000000e+001.

Example:

Frequency 60 Hz:

PDIP:FREQ 60

Note

This command switches the Product into Power Dip/Swell mode.

[SOUR]:PDIP:TIME(?) <DNPD>,<DNPD>,<DNPD>,<DNPD>,<DNPD>

This command sets the time periods t1, t2, t3, t4 and t5 in Power Dip/Swell mode.

<DNPD>,<DNPD>,<DNPD>,<DNPD>,<DNPD>

Parameters represent the value of times (t1, t2, t3, t4 and t5) expressed in s.

If a query is sent, the Product returns time values using standard exponential format.

Example:

50 s is returned as 5.000000e+001.

Example:

period t1 100 ms

period t2 20 ms

period t3 30 s

period t4 200 ms

period t5 0 s

PDIP:TIME 0.1, 0.02, 30, 0.2, 0

Note

This command switches the Product into Power Dip/Swell mode.

[SOUR]:PDIP:TRIG:INP(?) <CPD> { OFF | IN2 }

This command enables (disables) external trigger for Dip/Swell mode.

- OFF - disables external trigger for Dip/Swell function
- IN2 - enables external trigger for Dip/Swell function (TTL falling edge applied to input IN2)

If a query is sent, the Product returns IN2 if external trigger is enabled or OFF if it is disabled.

Example:

```
PDIP:TRIG:INP IN2
```

Note

This command switches the Product into Power Dip/Swell mode.

[SOUR]:PDIP:TRIG:SYNC(?) <CPD> { OFF | ON }

This command enables (disables) synchronization of Dip/Swell shape.

- OFF - Dip/Swell shape starts immediately after trigger
- ON - start of Dip/Swell shape is synchronized with phase 0 °

If a query is sent, the Product returns ON if synchronization is enabled or OFF if it is disabled.

Example:

```
PDIP:TRIG:SYNC ON
```

Note

This command switches the Product into Power Dip/Swell mode.

[SOUR]:PDIP:TRIG:REP(?) <CPD> { ONE | REP }

This sets automatic repetition of generated Dip/Swell shape.

- ONE - trigger starts generation of one Dip/Swell shape
- REP - trigger starts repeated generation of Dip/Swell shapes

If a query is sent, the Product returns ONE if repetition is disabled or REP if it is enabled.

Example:

```
PDIP:TRIG:REP ONE
```

Note

This command switches the Product into Power Dip/Swell mode.

[SOUR]:EAC:ENER?

This query returns the set value of energy using standard exponential format.

Example:

100.60 Ws is returned as 1.006000e+002.

Note

Query switches the Product into Energy AC mode.

[SOUR]:EAC:DEV?

This query returns the deviation between the tested energy meter and the Product. Calculation of the deviation is based on the pulses generated by the energy meter.

Example:

0.612 % is returned as 6.120000e-001.

Note

Query switches the Product into Energy AC mode.

[SOUR]:EAC:POW?

This query returns the set value of the power using standard exponential format.

Example:

100.60 W is returned as 1.006000e+002.

Note

Query switches the Product into Energy AC mode.

[SOUR]:EAC[:POW]:UNIT(?) <CPD> { W | VA | VAR }

This command selects units for power in the Energy AC mode.

If a query is sent, the Product returns actual units in Energy AC mode.

Example:

Select unit W for Energy AC mode:

EAC:UNIT W

Note

This command switches the Product into Energy AC mode.

[SOUR]:EAC:VOLT(?) <DNPD>

This command sets the output voltage value.

<DNPD>

Parameter represents the value of the output voltage expressed in V.

If a query is sent, the Product returns the value of the output voltage using standard exponential format.

Example:

110.12 V is returned as 1.101200e+002.

Example:

Voltage 230.5 V:

EAC:VOLT 230.5

Note

This command switches the Product into Energy AC mode.

[SOUR]:EAC:CURR(?) <DNPD>

This command sets the output current value in Energy AC mode.

<DNPD>

Parameter represents the value of the output current expressed in A.

If a query is sent, the Product returns the value of the output current using standard exponential format.

Example:

11.012 A is returned as 1.101200e+001.

Example:

Current 23.05 A:

EAC:CURR 23.05

Note

This command switches the Product into Energy AC mode.

[SOUR]:EAC[:CURR]:PHAS(?) <DNPD>

This command sets the phase angle between voltage and current.

<DNPD>

Represents the phase angle between the output voltage and current in degrees (PHAS:UNIT=DEG), or specified as a value of the power factor (PHAS:UNIT=COS).

If a query is sent, the Product returns the set value of the phase shift between the output voltage and current using standard exponential format.

Example:

156.3 ° is returned as 1.563000e+002.

Example:

EAC:PHAS 250.2 - sets 250.2 ° phase shift between the output voltage and current

(PHAS:UNIT=DEG) EAC:PHAS? - the Product returns 2.502000e+002

Example:

EAC:PHAS 0.554 - sets power factor 0.554

(PHAS:UNIT=COS) EAC:PHAS? - the Product returns 5.540000e-001,LAG

Note

This command switches the Product into Energy AC mode.

[SOUR]:EAC[:CURR]:POLarity(?) <CPD> { LEAD | LAG }

This command sets the polarity of the phase angle between voltage and current. Command is valid only for PHAS:UNIT=DEG.

<CPD>

Represents the polarity of the phase angle between the output voltage and current.

If a query is sent, the Product returns the polarity of the phase angle between the output voltage and current.

Example:

EAC:POL LEAD sets the phase angle polarity to Lead

Note

This command switches the Product into Energy AC mode.

[SOUR]:EAC:FREQ(?) <DNPD>

This command sets the frequency in Energy AC mode.

<DNPD>

Parameter represents the value of the frequency expressed in Hz.

If a query is sent, the Product returns the value of the frequency using standard exponential format. Example: 50 Hz is returned as 5.000000e+001.

Example:

Frequency 60 Hz:

EAC:FREQ 60

Note

This command switches the Product into Energy AC mode.

[SOUR]:EAC:TIME(?) <DNPD>

This command sets the time in Energy AC "Packet" control mode.

<DNPD>

Parameter represents the value of time expressed in s.

If a query is sent, the Product returns the value of time using standard exponential format.

Example:

120 s is returned as 1.200000e+002.

Example:

Time 60 s:

EAC:TIME 60

Note

This command switches the Product into Energy AC mode.

[SOUR]:EAC:CONS(?) <DNPD>

This command sets the number of pulses per selected the unit (pulses generated by energy meter).

<DNPD>

Parameter represents the number of pulses per selected unit.

If a query is sent, the Product returns the set value using standard exponential format.

Example:

400.0 i/kWh is returned as 4.000000e+002.

Example:

Number of pulses 1000 i/kVArh:

EAC:CONS 1000.0

EAC:UNIT VAR

Note

This command switches the Product into Energy AC mode.

[SOUR]:EAC:CONT(?) <CPD> { PACK | CNT1 | TIM1 | FR1 }

This command selects the energy counting control mode.

<CPD>

Represents the control mode of energy counting.

- PACK - Packet mode energy counting is controlled by the time to deliver a specific "Packet" of energy
- CNT1 - energy counting mode is controlled by the number of pulses on input 1
- TIM1 - energy timer mode is controlled by time duration
- FR1 - free run mode that measures the frequency on input 1

If a query is sent, the Product returns the selected control mode.

Example:

EAC:CONT PACK selects the Packet control mode which is controlled by time

Note

This command switches the Product into Energy AC mode.

[SOUR]:EAC:TEST:TIME (?) <DNPD>

This command sets test timer in Energy AC mode.

<DNPD>

Parameter represents test time when pulses are counted.

If a query is sent, the Product returns the test time using standard exponential format.

Example:

20 is returned as 2.000000e+001.

Example:

EAC:TEST:TIME 10

Note

This command switches the Product into Energy AC mode.

[SOUR]:EAC:TEST:COUN(?) <DNPD>

This command sets the test pulse counter in Energy AC mode.

<DNPD>

Parameter represents the number of test pulses to be counted.

If a query is sent, the Product returns the number of pulse counts using standard exponential format.

Example:

20 is returned as 2.000000e+001.

Example:

EAC:TEST:COUN 10

Note

This command switches the Product into Energy AC mode.

[SOUR]:EAC:TEST:FREQ? <DNPD>

This query returns the actual frequency generated by the tested energy meter.

<DNPD>

Parameter represents the measured frequency.

The Product returns the frequency using standard exponential format.

Example:

20 is returned as 2.000000e+001.

Example:

EAC:TEST:FREQ?

Note

This command switches the Product into Energy AC mode.

[SOUR]:EAC:WUP:TIME (?) <DNPD>

This command sets the warm-up timer in Energy AC mode.

<DNPD>

Parameter represents the warm-up time when pulses are counted.

If a query is sent, the Product returns the warm-up time using standard exponential format.

Example:

20 is returned as 2.000000e+001.

Example:

EAC:WUP:TIME 10

Note

This command switches the Product into Energy AC mode.

[SOUR]:EAC:WUP:COUN(?) <DNPD>

This command sets the warm-up pulse counter in Energy AC mode.

<DNPD>

Parameter represents the number of warm-up pulses to be counted.

If a query is sent, the Product returns the number of pulse counts using standard exponential format.

Example:

20 is returned as 2.000000e+001.

Example:

EAC:TEST:COUN 10

Note

This command switches the Product into Energy AC mode.

[SOUR]:EDC:ENER?

This query returns the set value of energy using standard exponential format.

Example:

100.60 Ws is returned as 1.006000e+002.

Note

Query switches the Product into Energy DC mode.

[SOUR]:EDC:DEV?

This query returns the deviation between the tested energy meter and the Product. Calculation of the deviation is based on the pulses generated by the energy meter.

Example:

0.612 % is returned as 6.120000e-001.

Note

Query switches the Product into Energy DC mode.

[SOUR]:EDC:POW?

This query returns the set value of the power using standard exponential format.

Example:

100.60 W is returned as 1.006000e+002.

Note

Query switches the Product into Energy DC mode.

[SOUR]:EDC:VOLT(?) <DNPD>

This command sets the output voltage value Energy DC mode.

<DNPD>

Parameter represents the value of the output voltage expressed in V.

If a query is sent, the Product returns the value of the output voltage using standard exponential format.

Example:

110.12 V is returned as 1.101200e+002.

Example:

Voltage 230.5V:

EDC:VOLT 230.5

Note

This command switches the Product into Energy DC mode.

[SOUR]:EDC:CURRE(?) <DNPD>

This command sets the output current value in Energy DC mode.

<DNPD>

Parameter represents the value of the output current expressed in A.

If a query is sent, the Product returns the value of the output current using standard exponential format.

Example:

11.012 A is returned as 1.101200e+001.

Example:

Current 23.05A:

EDC:CURRE 23.05

Note

This command switches the Product into Energy DC mode.

[SOUR]:EDC:TIME(?) <DNPD>

This command sets the time in Energy DC "Packet" control mode.

<DNPD>

Parameter represents the value of time expressed in s.

If a query is sent, the Product returns the value of time using standard exponential format.

Example:

120 s is returned as 1.200000e+002.

Example:

Time 60s:

EDC:TIME 60

Note

This command switches the Product into Energy DC mode.

[SOUR]:EDC:CONS(?) <DNPD>

This command sets the number of pulses per kWh (pulses generated by energy meter).

<DNPD>

Parameter represents the value of the number of pulses per kWh.

If a query is sent, the Product returns the set value using standard exponential format.

Example:

400.0 i/kWh is returned as 4.000000e+002.

Example:

Number of pulses 1000 i/kWh:
EDC:CONS 1000.0

Note

This command switches the Product into Energy DC mode.

[SOUR]:EDC:CONT(?) <CPD> { PACK | CNT1 | TIM1 | FR1 }

This command selects the energy counting control in Energy DC mode.

<CPD>

Represents the control mode of energy counting.

- PACK - Packet mode energy counting is controlled by the time to deliver a specific "Packet" of energy
- CNT1 - energy counting mode is controlled by pulses on input 1
- TIM1 - energy timer mode is controlled by time duration
- FR1 - f free run mode that measures the frequency on input 1

If a query is sent, the Product returns the selected control mode.

Example:

EDC:CONT PACK selects the Packet control mode which is controlled by time

Note

This command switches the Product into Energy DC mode.

[SOUR]:EDC:TEST:TIME (?) <DNPD>

This command sets the test timer in Energy DC mode.

<DNPD>

Parameter represents test time when pulses are counted.

If a query is sent, the Product returns the test time using standard exponential format.

Example:

20 is returned as 2.000000e+001.

Example:

EDC:TEST:TIME 10

Note

This command switches the Product into Energy DC mode.

[SOUR]:EDC:TEST:COUN(?) <DNPD>

This command sets the test pulse counter in Energy DC mode.

<DNPD>

Parameter represents the number of test pulses to be counted.

If a query is sent, the Product returns the number of pulse counts using standard exponential format.

Example:

20 is returned as 2.000000e+001.

Example:

EDC:TEST:COUN 10

Note

This command switches the Product into Energy DC mode.

[SOUR]:EDC:TEST:FREQ? <DNPD>

This query returns the actual frequency generated by the tested energy meter.

<DNPD>

Parameter represents the measured frequency.

The Product returns the frequency using standard exponential format.

Example:

20 is returned as 2.000000e+001.

Example:

EDC:TEST:FREQ?

Note

This command switches the Product into Energy DC mode.

[SOUR]:EDC:WUP:TIME (?) <DNPD>

This command sets the warm-up timer in Energy DC mode.

<DNPD>

Parameter represents the warm-up time when the pulses are counted.

If a query is sent, the Product returns the warm-up time using standard exponential format.

Example:

20 is returned as 2.000000e+001.

Example:

EDC:TEST:TIME 10

Note

This command switches the Product into Energy DC mode.

[SOUR]:EDC:WUP:COUN(?) <DNPD>

This command sets the warm-up pulse counter in Energy DC mode.

<DNPD>

Parameter represents the number of warm-up pulses to be counted.

If a query is sent, the Product returns the number of pulse counts using standard exponential format.

Example:

20 is returned as 2.000000e+001.

Example:

EDC:TEST:COUN 10

Note

This command switches the Product into Energy DC mode.

[SOUR]:EACI:ENER?

This query returns the set value of energy using standard exponential format.

Example:

100.60 Ws is returned as 1.006000e+002.

Note

Query switches the Product into Energy AC high-current mode.

[SOUR]:EACI:DEV?

This query returns the deviation between the tested energy meter and the Product. Calculation of the deviation is based on the pulses generated by the energy meter.

Example:

0.612 % is returned as 6.120000e-001.

Note

Query switches the Product into Energy AC high-current mode.

[SOUR]:EACI:POW?

This query returns the set value of the power using standard exponential format.

Example:

100.60 W is returned as 1.006000e+002.

Note

Query switches the Product into Energy AC high-current mode.

[SOUR]:EACI[:POW]:UNIT(?) <CPD> { W | VA | VAR }

This command selects units for power in the Energy AC high-current mode.

If a query is sent, the Product returns actual units in Energy AC high-current mode.

Example:

Select unit W for Energy AC high current mode:
EACI:UNIT W

Note

This command switches the Product into Energy AC high-current mode.

[SOUR]:EACI:VOLT(?) <DNPD>

This command sets the output voltage value.

<DNPD>

Parameter represents the value of the output voltage expressed in V.

If a query is sent, the Product returns the value of the output voltage using standard exponential format.

Example:

110.12 V is returned as 1.101200e+002.

Example:

Voltage 230.5V:

EACI:VOLT 230.5

Note

This command switches the Product into Energy AC high-current mode.

[SOUR]:EACI:CURR(?) <DNPD>

This command sets the output current value in Energy AC high-current mode.

<DNPD>

Parameter represents the value of the output current expressed in A.

If a query is sent, the Product returns the value of the output current using standard exponential format.

Example:

11.012 A is returned as 1.101200e+001.

Example:

Current 23.05A:

EACI:CURR 23.05

Note

This command switches the Product into Energy AC high-current mode.

[SOUR]:EACI[:CURR]:PHAS(?) <DNPD>

This command sets the phase angle between voltage and current.

<DNPD>

Represents the phase angle between the output voltage and current in degrees (PHAS:UNIT=DEG), or specified as a value of the power factor (PHAS:UNIT=COS).

If a query is sent, the Product returns the set value of the phase shift between the output voltage and current using standard exponential format.

Example:

156.3 ° is returned as 1.563000e+002.

Example:

EACI:PHAS 250.2 - sets 250.2° phase shift between the output voltage and current

(PHAS:UNIT=DEG) EACI:PHAS? - the Product returns 2.502000e+002

Example:

EACI:PHAS 0.554 - sets power factor 0.554

(PHAS:UNIT=COS) EACI:PHAS? - the Product returns 5.540000e-001,LAG

Note

This command switches the Product into Energy AC high-current mode.

[SOUR]:EACI[:CURR]:POLarity(?) <CPD> { LEAD | LAG }

This command sets the polarity of the phase angle between voltage and current. Command is valid only for PHAS:UNIT=DEG.

<CPD>

Represents the polarity of the phase angle between the output voltage and current.

If a query is sent, the Product returns the polarity of the phase angle between the output voltage and current.

Example:

EACI:POL LEAD sets the phase angle polarity to Lead

Note

This command switches the Product into Energy AC high-current mode.

[SOUR]:EACI:FREQ(?) <DNPD>

This command sets the frequency in Energy AC high-current mode.

<DNPD>

Parameter represents the value of frequency expressed in Hz.

If a query is sent, the Product returns the value of the frequency using standard exponential format.

Example:

50 Hz is returned as 5.000000e+001.

Example:

Frequency 60Hz:

EACI:FREQ 60

Note

This command switches the Product into Energy AC high-current mode.

[SOUR]:EACI:TIME(?) <DNPD>

This command sets the time in Energy AC high-current “Packet” control mode.

<DNPD>

Parameter represents the value of time expressed in s.

If a query is sent, the Product returns the value of time using standard exponential format.

Example:

120 s is returned as 1.200000e+002.

Example:

Time 60 s:

EACI:TIME 60

Note

This command switches the Product into Energy AC high-current mode.

[SOUR]:EACI:CONS(?) <DNPD>

This command sets the number of pulses per selected unit (pulses generated by energy meter).

<DNPD>

Parameter represents the value of the number of pulses per selected unit.

If a query is sent, the Product returns the set value using standard exponential format.

Example:

400.0 i/kWh is returned as 4.000000e+002.

Example:

Number of pulses 1000 i/kVArh:

EACI:CONS 1000.0

EACI:UNIT VAR

Note

This command switches the Product into Energy AC high-current mode.

[SOUR]:EACI:CONT(?) <CPD> { PACK | CNT1 | TIM1 | FR1 }

This command selects the energy counting control mode.

<CPD>

Represents the control mode of energy counting.

- PACK - Packet mode energy counting is controlled by the time to deliver a specific "Packet" of energy
- CNT1 - energy counting mode is controlled by pulses on input 1
- TIM1 - energy timer mode is controlled by time duration
- FR1 - free run mode measures the frequency on input 1

If a query is sent, the Product returns the selected control mode.

Example:

EACI:CONT PACK selects the Packet control mode which is controlled by time.

Note

This command switches the Product into Energy AC high-current mode.

[SOUR]:EACI:TEST:TIME (?) <DNPD>

This command sets the test timer in Energy AC high-current mode.

<DNPD>

Parameter represents test time when pulses are counted.

If a query is sent, the Product returns the test time using standard exponential format.

Example:

20 is returned as 2.000000e+001.

Example:

EACI:TEST:TIME 10

Note

This command switches the Product into Energy AC high-current mode.

[SOUR]:EACI:TEST:COUN(?) <DNPD>

This command sets the test pulse counter in Energy AC high-current mode.

<DNPD>

Parameter represents the number of test pulses to be counted.

If a query is sent, the Product returns the number of pulse counts using standard exponential format.

Example:

20 is returned as 2.000000e+001.

Example:

EACI:TEST:COUN 10

Note

This command switches the Product into Energy AC high-current mode.

[SOUR]:EACI:TEST:FREQ? <DNPD>

This query returns the actual frequency generated by the tested energy meter.

<DNPD>

Parameter represents the measured frequency.

Product returns the frequency using standard exponential format.

Example:

20 is returned as 2.000000e+001.

Example:

EACI:TEST:FREQ?

Note

This command switches the Product into Energy AC high-current mode.

[SOUR]:EACI:WUP:TIME (?) <DNPD>

This command sets the warm-up timer in Energy AC high-current mode.

<DNPD>

Parameter represents the warm-up time when the pulses are counted.

If a query is sent, the Product returns the warm-up time using standard exponential format.

Example:

20 is returned as 2.000000e+001.

Example:

EACI:TEST:TIME 10

Note

This command switches the Product into Energy AC high-current mode.

[SOUR]:EACI:WUP:COUN(?) <DNPD>

This command sets the warm-up pulse counter in Energy AC high-current mode.

<DNPD>

Parameter represents the number of warm-up pulses to be counted.

If a query is sent, the Product returns the number of pulse counts using standard exponential format.

Example:

20 is returned as 2.000000e+001.

Example:

EACI:TEST:COUN 10

Note

This command switches the Product into Energy AC high-current mode.

[SOUR]:EDCI:ENER?

This query returns the set value of energy using standard exponential format.

Example:

100.60 Ws is returned as 1.006000e+002.

Note

Query switches the Product into Energy DC high-current mode.

[SOUR]:EDCI:DEV?

This query returns the deviation between the tested energy meter and the Product. Calculation of the deviation is based on the pulses generated by the energy meter.

Example:

0.612 % is returned as 6.120000e-001.

Note

Query switches the Product into Energy DC high-current mode.

[SOUR]:EDCI:POW?

This query returns the set value of the power using standard exponential format.

Example:

100.60 W is returned as 1.006000e+002.

Note

Query switches the Product into Energy DC high-current mode.

[SOUR]:EDCI:VOLT(?) <DNPD>

This command sets the output voltage value.

<DNPD>

Parameter represents the value of the output voltage expressed in V.

If a query is sent, the Product returns the value of the output voltage using standard exponential format.

Example:

110.12 V is returned as 1.101200e+002.

Example:

Voltage 230.5 V:

EDCI:VOLT 230.5

Note

This command switches the Product into Energy DC high-current mode.

[SOUR]:EDCI:CURR(?) <DNPD>

This command sets the output current value in Energy DC high-current mode.

<DNPD>

Parameter represents the value of the output current expressed in A.

If a query is sent, the Product returns the value of the output current using standard exponential format.

Example:

11.012 A is returned as 1.101200e+001.

Example:

Current 23.05 A:

EDCI:CURR 23.05

Note

This command switches the Product into Energy DC high-current mode.

[SOUR]:EDCI:TIME(?) <DNPD>

This command sets the time in Energy DC high current “Packet” control mode.

<DNPD>

Parameter represents the value of time expressed in s.

If a query is sent, the Product returns the value of time using standard exponential format.

Example:

120 s is returned as 1.200000e+002.

Example:

Time 60 s:

EDCI:TIME 60

Note

This command switches the Product into Energy DC high-current mode.

[SOUR]:EDCI:CONS(?) <DNPD>

This command sets the number of pulses per kWh (pulses generated by energy meter).

<DNPD>

Parameter represents the value of the number of pulses per kWh.

If a query is sent, the Product returns the set value using standard exponential format.

Example:

400.0 i/kWh is returned as 4.000000e+002.

Example:

Number of pulses 1000 i/kWh:

EDCI:CONS 1000.0

Note

This command switches the Product into Energy DC high-current mode.

[SOUR]:EDCI:CONT(?) <CPD> { PACK | CNT1 | TIM1 | FR1 }

This command selects the energy counting control mode.

<CPD>

Represents the control mode of energy counting.

- PACK - Packet mode energy counting is controlled by the time to deliver a specific "Packet" of energy
- CNT1 - energy counting mode is controlled by pulses on input 1
- TIM1 - energy timer mode is controlled by time duration
- FR1 - free run mode measures the frequency on input 1

If a query is sent, the Product returns the selected control mode.

Example:

EDCI:CONT PACK selects the Packet control mode which is controlled by time

Note

This command switches the Product into Energy DC high-current mode.

[SOUR]:EDCI:TEST:TIME (?) <DNPD>

This command sets the test timer in Energy DC high-current mode.

<DNPD>

Parameter represents test time when pulses are counted.

If a query is sent, the Product returns the test time using standard exponential format.

Example:

20 is returned as 2.000000e+001.

Example:

EDCI:TEST:TIME 10

Note

This command switches the Product into Energy DC high-current mode.

[SOUR]:EDCI:TEST:COUN(?) <DNPD>

This command sets the test pulse counter in Energy DC high-current mode.

<DNPD>

Parameter represents the number of test pulses to be counted.

If a query is sent, the Product returns the number of pulse counts using standard exponential format.

Example:

20 is returned as 2.000000e+001.

Example:

EDCI:TEST:COUN 10

Note

This command switches the Product into Energy DC high-current mode.

[SOUR]:EDCI:TEST:FREQ? <DNPD>

This query returns the actual frequency generated by the tested energy meter.

<DNPD>

Parameter represents the measured frequency.

Product returns the frequency using standard exponential format.

Example:

20 is returned as 2.000000e+001.

Example:

EDCI:TEST:FREQ?

Note

This command switches the Product into Energy DC high-current mode.

[SOUR]:EDCI:WUP:TIME (?) <DNPD>

This command sets the warm-up timer in Energy DC high-current mode.

<DNPD>

Parameter represents the warm-up time when the pulses are counted.

If a query is sent, the Product returns the warm-up time using standard exponential format.

Example:

20 is returned as 2.000000e+001.

Example:

EDCI:TEST:TIME 10

Note

This command switches the Product into Energy DC high-current mode.

[SOUR]:EDCI:WUP:COUN(?) <DNPD>

This command sets the warm-up pulse counter in Energy DC high-current mode.

<DNPD>

Parameter represents the number of warm-up pulses to be counted.

If a query is sent, the Product returns the number of pulse counts using standard exponential format.

Example:

20 is returned as 2.000000e+001.

Example:

EDCI:TEST:COUN 10

Note

This command switches the Product into Energy DC high-current mode.

[SOUR]:VAC:VOLT(?) <DNPD>

This command sets the output voltage value in Voltage AC mode.

<DNPD>

Parameter represents the value of the output voltage expressed in V.

If a query is sent, the Product returns the value of the output voltage using standard exponential format.

Example:

110.12 V is returned as 1.101200e+002.

Example:

Voltage 230.5 V:

VAC:VOLT 230.5

Note

This command switches the Product into Voltage AC mode.

[SOUR]:VAC:FREQ(?) <DNPD>

This command sets the frequency in Voltage AC mode.

<DNPD>

Parameter represents the value of frequency expressed in Hz.

If a query is sent, the Product returns the value of the frequency using standard exponential format.

Example:

50 Hz is returned as 5.000000e+001.

Example:

Frequency 60 Hz:

VAC:FREQ 60

Note

This command switches the Product into Voltage AC mode.

[SOUR]:VDC:VOLT(?) <DNPD>

This command sets the output voltage value in Voltage DC mode.

<DNPD>

Parameter represents the value of the output voltage expressed in V.

If a query is sent, the Product returns the value of the output voltage using standard exponential format.

Example:

110.12 V is returned as 1.101200e+002.

Example:

Voltage 230.5 V:

VDC:VOLT 230.5

Note

This command switches the Product into Voltage DC mode.

[SOUR]:CAC:CURR(?) <DNPD>

This command sets the output current value in Current AC mode.

<DNPD>

Parameter represents the value of the output current expressed in A.

If a query is sent, the Product returns the value of the output current using standard exponential format.

Example:

11.012 A is returned as 1.101200e+001.

Example:

Current 23.05 A:

CAC:CURR 23.05

Note

This command switches the Product into Current AC mode.

[SOUR]:CAC:FREQ(?) <DNPD>

This command sets the frequency in Current AC mode.

<DNPD>

Parameter represents the value of frequency expressed in Hz.

If a query is sent, the Product returns the value of the frequency using standard exponential format.

Example:

50 Hz is returned as 5.000000e+001.

Example:

Frequency 60 Hz:

CAC:FREQ 60

Note

This command switches the Product into Current AC mode.

[SOUR]:CDC:CURR(?) <DNPD>

This command sets the output voltage value in Current DC mode.

<DNPD>

Parameter represents the value of the output current expressed in A.

If a query is sent, the Product returns the value of the output voltage using standard exponential format.

Example:

11.012 A is returned as 1.101200e+001.

Example:

Current 23.05 A:

CDC:CURR 23.05

Note

This command switches the Product into Current DC mode.

[SOUR]:CACI:CURRE(?) <DNPD>

This command sets the output current value in Current AC high-current mode.

<DNPD>

Parameter represents the value of the output current expressed in A.

If a query is sent, the Product returns the value of the output current using standard exponential format.

Example:

11.012 A is returned as 1.101200e+001.

Example:

Current 23.05 A:

CACI:CURRE 23.05

Note

This command switches the Product into Current AC high-current mode.

[SOUR]:CACI:FREQ(?) <DNPD>

This command sets the frequency in Current AC high-current mode.

<DNPD>

Parameter represents the value of frequency expressed in Hz.

If a query is sent, the Product returns the value of the frequency using standard exponential format.

Example:

50 Hz is returned as 5.000000e+001.

Example:

Frequency 60 Hz:

CACI:FREQ 60

Note

This command switches the Product into Current AC high-current mode.

[SOUR]:CDCI:CURRE(?) <DNPD>

This command sets the output voltage value in Current DC high-current mode.

<DNPD>

Parameter represents the value of the output current expressed in A.

If a query is sent, the Product returns the value of the output voltage using standard exponential format.

Example:

11.012 A is returned as 1.101200e+001.

Example:

Current 23.05 A:

CDCI:CURRE 23.05

Note

This command switches the Product into Current DC high-current mode.

SYSTem subsystem

This subsystem lets you control various functions from the MENU.

SYSTem

:DATE(?)

<DNPD>,<DNPD>,<DNPD>

:TIME(?)

<DNPD>,<DNPD>,<DNPD>

:ERRor?

:REMote

:RWLock

:LOCal

SYST:DATE(?) <DNPD>,<DNPD>,<DNPD>

This command sets the system date of the Product.

<DNPD>,<DNPD>,<DNPD>

Represents date in format YYYY, MM, DD.

If a query is sent, the Product returns the current value of system date in format YYYY,MM,DD.

where YYYY = year (2000..2099)

MM = month (01..12)

DD = day (01..31)

SYST:TIME(?) <DNPD>,<DNPD>,<DNPD>

This command sets the time of the Product.

<DNPD>,<DNPD>,<DNPD>

Represents time in format HH,MM,SS.

If a query is sent, the Product returns the current value of system time in format HH,MM,SS.

where HH = hour (00..23)

MM = minute (00..59)

SS = second (00..59)

SYST:ERR?

Query the multimeter error queue. Detected errors are placed in the queue. This query returns the first error from the queue. The queue is a "first in, first out" type. The error is deleted after reading it.

The response is in the form of "String Program Data", and consists of two elements: a code number and error message.

If all errors are read, the Product returns message 0,"No Error".

In case of overflow in the error queue, the last error in the queue is -350,"Queue overflow". The earliest errors remain in the queue, and the most recent error is discarded.

Example:

SYST:ERR?

SYST:REM

This command places the Product in the remote mode for USB operation. All keys on the front panel, except the LOCAL key, are disabled.

Note

It is not possible to send or receive data over USB when the Product is not in remote mode.

SYST:RWL

This command places the Product in the remote mode for USB operation. All keys on the front panel, including the LOCAL key, are disabled.

SYST:LOC

This command returns the Product in the local mode. This command is for USB interfaces.

STATus subsystem

This subsystem is used to enable bits in the Operation and Questionable Event registers. The Operation and Questionable: Event, Enable and Condition registers can be interrogated to determine their state.

STATus

```

:OPERational
  :EVENT?
  :ENABLE(?)      <DNPD>
  :CONDition?
:QUESTionable
  :EVENT?
  :ENABLE(?)      <DNPD>
  :CONDition?
:PRESet

```

STAT:OPER:EVEN?

This query returns the content of Operational Data Event register. It is a decimal value which corresponds to the binary-weighted sum of all bits set in the register. Register is cleared after this query.

Example:

```
STAT:OPER:EVEN?
```

STAT:OPER:ENAB? <DNPD>

This command enables bits in the Operational Data Enable register. Selected bits are summarized at bit 7 (OSS) of the IEEE488.2 Status Byte register.

<DNPD>

Parameter represents required value of Operational Data Enable register.

If a query is sent, the Product returns the value of the register as a decimal number.

Example:

64 is returned as 64.

Example:

Set bit 1 in the Operational Data Enable register (other bits are 0):

STAT:OPER:ENAB 2

STAT:OPER:COND?

This query returns the content of the Operational Condition register. It is a decimal value which corresponds to the binary-weighted sum of all bits in the register. The register is not cleared after this query. The response to the query therefore represents an instantaneous “snapshot” of the register state, at the time that the query was accepted.

Example:

STAT:OPER:COND?

STAT:QUES:EVEN?

This query returns the content of the Questionable Data Event register. It is a decimal value which corresponds to the binary-weighted sum of all bits set in the register. The register is cleared after this query.

Example:

STAT:QUES:EVEN?

STAT:QUES:ENAB? <DNPD>

This command enables bits in the Questionable Data Enable register. Selected bits are summarized at bit 3 (QSS) of the IEEE488.2 Status Byte register.

<DNPD>

Parameter represents required value of the Questionable Data Enable register.

If a query is sent, the Product returns the value of the register as a decimal number.

Example:

64 is returned as 64.

Example:

Set bit 1 in the Questionable Data Enable register (other bits are 0):

STAT:QUES:ENAB 2

STAT:QUES:COND?

This query returns the content of the Questionable Condition register. It is a decimal value which corresponds to the binary-weighted sum of all bits in the register. Register is not cleared after this query. The response to the query therefore represents an instantaneous “snapshot” of the register state, at the time that the query was accepted.

Example:

STAT:QUES:COND?

STAT:PRES

This command clears all bits in the Operation Data Enable register and in the Questionable Data Enable register.

Example:

STAT:PRES

IEEE488.2 Common Commands

I/D (instrument identification)

***IDN?**

This command returns the identification of the manufacturer, model, serial number and firmware revision.

Operation complete

***OPC**

This command sets the OPC bit in the ESR (Event Status Register) when all pending operations are complete.

Operation complete?

***OPC?**

This command returns “1” to the output queue after all pending operations are complete.

Option identification?

***OPT?**

This command returns the Product hardware configuration.

The reply is formatted as follows:

1,a2,a3,a4,a5,0,0

Where:

1 ... indicates that the main unit (channel #1) is fitted – always true
a2 ... indicates that additional unit (channel #2) is fitted
a3 ... indicates that additional unit (channel #3) is fitted
0 ... position reserved for future use.

a2 = 0 ... unit channel #2 is not fitted

a2 = 1 ... unit channel #2 is fitted

a3 = 0 ... unit channel #3 is not fitted

a3 = 1 ... unit channel #3 is fitted

a4 = 0 ... Energy option is not fitted

a4 = 1 ... Energy option is fitted

a5 = 0 ... Power Quality option is not fitted

a5 = 1 ... Power Quality option is fitted

Wait-to-Continue command

***WAI**

Prevents the Product from executing any further commands or queries until all previous remote commands have been executed.

Reset

***RST**

This command resets the Product to its initial status.

Test operation

***TST?**

This command launches an internal self-test. Return the self-test result ("0" for pass or "1" for fail).

Status byte reading

***STB?**

This query returns a number in range 0 to 255 with information about content of register STB, which carries the MSS bit status.

Service Request Enable

***SRE <value>**

This command sets the condition of the Service Request Enable register. Since bit 6 is not used, the maximum value is 191.

Service Request Enable reading

***SRE?**

This query returns the Service Request Enable Register number.

Event Status Register reading***ESR?**

This query returns the contents of the Event Status Register and clears the register.

Event Status Enable setting***ESE <value>**

This command programs the Event Status Enable register bits. Parameter “value” is number in range 0 – 255.

Event Status Enable reading***ESE?**

This query returns the Event Status Enable register.

Clear status***CLS**

This command clears the Event Status Register and the Status Byte Register except the MAV bit and output queue. The output line is not reset.

Remote Program Examples

Examples Summary

- Example 1 Create a 3 Φ sine wave power signal.
- Example 2 Create a 3 Φ Timer mode energy test
- Example 3 Create an ac voltage signal with multiple harmonic distortion and phase shifts.
- Example 4 Create an ac voltage signal with Flicker.

Example 1

Configure the Product to output a three phase sinusoidal signal of 60 Hz, 115 V, 1 A RMS from all channels, and 120 ° of phase shift between each channel.

This example switches the Product to Power AC extended mode.

Reset all parameters to a known state.	*RST
Setup the voltage value in channel 1.	PACE:VOLT1 115
Setup the voltage phase on this channel.	PACE:VOLT1:PHAS 0
Enable voltage output on this channel.	PACE:VOLT1:ENAB ON
Setup the voltage value in channel 2.	PACE:VOLT2 115
Setup the voltage phase on this channel.	PACE:VOLT2:PHAS 120
Enable voltage output on this channel.	PACE:VOLT2:ENAB ON
Setup the voltage value in channel 3.	PACE:VOLT3 115
Setup the voltage phase on this channel.	PACE:VOLT3:PHAS 240
Enable voltage output on this channel.	PACE:VOLT3:ENAB ON
Setup the current value in channel 1.	PACE:CURR1 1
Setup the current phase on this channel.	PACE:CURR1:PHAS 0
Enable current output on this channel.	PACE:CURR1:ENAB ON
Setup the current value in channel 2.	PACE:CURR2 1
Setup the current phase on this channel.	PACE:CURR2:PHAS 120
Enable current output on this channel.	PACE:CURR2:ENAB ON
Setup the current value in channel 3.	PACE:CURR3 1
Setup the current phase on this channel.	PACE:CURR3:PHAS 240
Enable current output on this channel.	PACE:CURR3:ENAB ON
Setup the frequency.	PACE:FREQ 60
Set output to on (or Operate).	OUTP:STAT ON

Example 2

Configure the Product to test a three phase energy meter at 120 V, 5 A RMS at Power Factor = 0.5 using a 5 second warmup and 15 second test. Product Voltage remains ON after test. Note the energy meter constant will likely need to be changed to match the UUT.

This example switches the Product to Energy AC mode.

Reset all parameters to a known state.	*RST
Activate all channels.	OUTP:CONF 123
Setup the voltage value.	EAC:VOLT 120
Setup the current value.	EAC:CURR 5
Use power factor units.	OUTP:UNIT COS
Setup the power factor value.	EAC:PHAS 0.5
Setup the energy counting control mode.	EAC:CONT TIM1
Setup the warm-up time.	EAC:WUP:TIME 5
Setup the test time.	EAC:TEST:TIME 15
Set maintain voltage signal to on.	OUTP:ENER:MVOL ON
Set output to on (or Operate).	OUTP:STAT ON

Example 3

This example shows how to setup a fundamental and the 3rd and 5th harmonics for the Voltage function.

The fundamental is set to 110 V, 60 Hz, the 3rd harmonic to 10 % of fundamental with 0 ° phase angle, and the 5th harmonic to 5 % of fundamental with a 90 ° phase angle.

This example switches the Product to Power Harmonic mode.

Reset all parameters to a known state.	*RST
Setup the fundamental value in channel 1.	PHAR:VOLT1 110
Enable voltage output on this channel.	PHAR:VOLT1:ENAB ON
Setup the % of fundamental harmonic value.	OUTP:MHAR:UNIT PFUN
Setup the 3rd harmonic level.	PHAR:VOLT1:HARM3 10
Setup the 3rd harmonic phase.	PHAR:VOLT1:HARM3:PHAS 0
Setup the 5rd harmonic level.	PHAR:VOLT1:HARM5 5
Setup the 5rd harmonic phase.	PHAR:VOLT1:HARM5:PHAS 90
Setup the frequency.	PHAR:FREQ 60
Set output to on (or Operate).	OUTP:STAT ON

Example 4

This example creates a 3 Φ Flicker voltage output at 120V, 60 Hz by setting the modulation to 20 %, using a 3 Hz rectangular modulating wave. The three current channels are set to 0.5 A sine wave.

This example switches the Product to Power Harmonic mode.

Reset all parameters to a known state.	*RST
Setup the voltage value in channel 1.	PHAR:VOLT1 120
Set type of modulation on this channel.	PHAR:VOLT1:MOD:SHAP RECT
Setup the modulation level on this channel.	PHAR:VOLT1:MOD 20
Enable voltage output on this channel.	PHAR:VOLT1:ENAB ON
Setup the voltage value in channel 2.	PHAR:VOLT2 120
Set type of modulation on this channel.	PHAR:VOLT2:MOD:SHAP RECT
Setup the modulation level on this channel.	PHAR:VOLT2:MOD 20
Enable voltage output on this channel.	PHAR:VOLT2:ENAB ON
Setup the voltage value in channel 3.	PHAR:VOLT3 120
Set type of modulation on this channel.	PHAR:VOLT3:MOD:SHAP RECT
Setup the modulation level on this channel.	PHAR:VOLT3:MOD 20
Enable voltage output on this channel.	PHAR:VOLT3:ENAB ON
Setup the current value in channel 1.	PHAR:CURR1 0.5
Enable current output on this channel.	PHAR:CURR1:ENAB ON
Setup the current value in channel 2.	PHAR:CURR2 0.5
Enable current output on this channel.	PHAR:CURR2:ENAB ON
Setup the current value in channel 3.	PHAR:CURR3 0.5
Enable current output on this channel.	PHAR:CURR3:ENAB ON
Setup the frequency.	PHAR:FREQ 60
Setup the modulating wave.	PHAR:FREQ:MOD 3
Set output to on (or Operate).	OUTP:STAT ON

