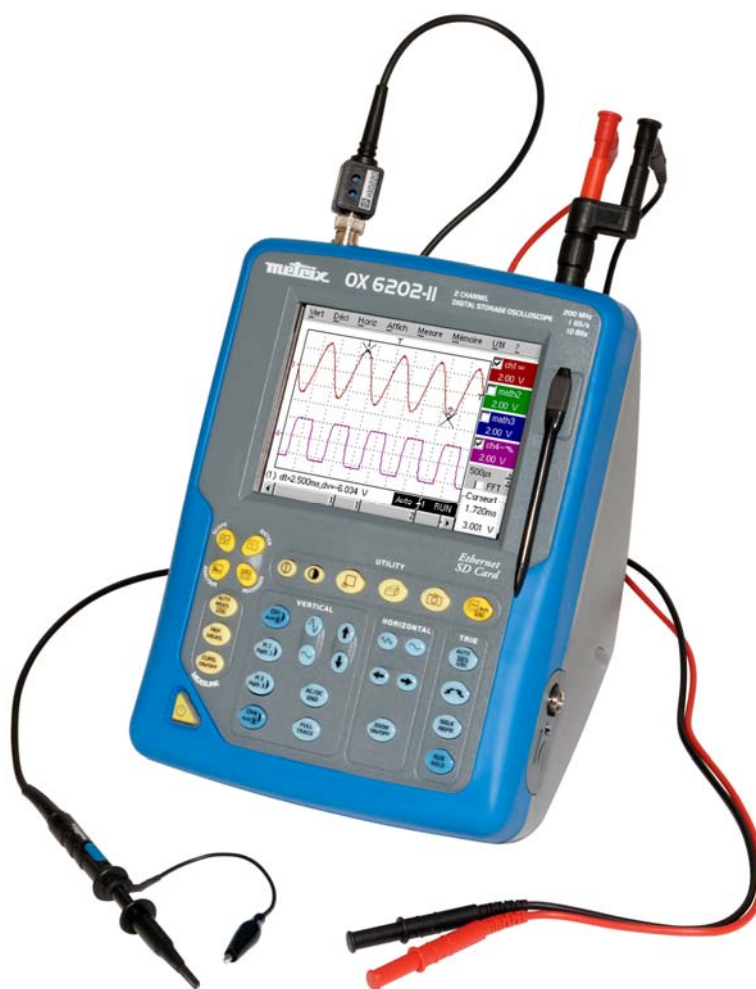


Bench-Top Oscilloscopes

60MHz 2-channel **OX 6062-II**

200MHz 2-channel **OX 6202-II**

[Remote programming manual](#)



Pôle Test et Mesure de CHAUVIN-ARNOUX
Parc des Glaisins
6, avenue du Pré de Challes
F - 74940 ANNECY-LE-VIEUX

Tél. +33 (0)4.50.64.22.22 - Fax +33 (0)4.50.64.22.00

Contents	page
Introduction.....	4
Presentation	4
Connection of the instrument.....	4
Connection through « RS232 ».....	4
Connection through « ETHERNET »	4
Straight cable.....	5
Interface.....	5
Programming convention.....	5
Command syntax.....	6
Common commands	6
Specific commands	6
Key words.....	6
Separators.....	6
Parameters.....	6
(' ').....	6
Parameter format	7
Recall	7
Terminator	8
Response	8
Commands specific to the instrument	9
Vertical.....	9
Display.....	9
Sensitivity / Coupling.....	9
Function Definition.....	10
Vertical Scale	10
Trigger	11
Trigger main source	12
Trigger mode / automatic mode	15
Single mode	15
Horizontal	15
Min/Max Acquisition	15
Average	15
FFT	16
Time base.....	16
Display	17
Display mode.....	17
Oscilloscope / XY	17
Definition of the XY mode.....	17
Measure.....	18
Reference.....	18
Measurement query	18
Phase measurement	20
Manual measurement.....	21
Phase manual measurement	22
Unattached cursors	22
Memory	22
Trace	22
Utilities	26
I/O port configuration.....	27
Hardcopy	27
Configuration	28
RUN/STOP.....	29
Autoset	30
Help	30
Multimeter	31

Vertical	31
Measurement	32
Error.....	33
* Command error: (-199 to -100)	33
* Execution errors: (-299 to -200)	34
* Specific instrument errors: (-399 to -300)	34
* Query errors: (-499 to -400)	34
Introduction	35
Events and status management	35
Registers	35
Status registers	36
Service request mask register	36
Event register	36
Event mask register	37
IEEE 488.2 Common commands	41
SCPI Commands	42
 Commands SCPI	 42

Introduction

Presentation

The programming instructions comply with standard IEEE488.2, protocol SCPI. They provide the user with the possibility of checking the instrument remotely from simple standard controls.

Communication between a controller and a generator enables users to:

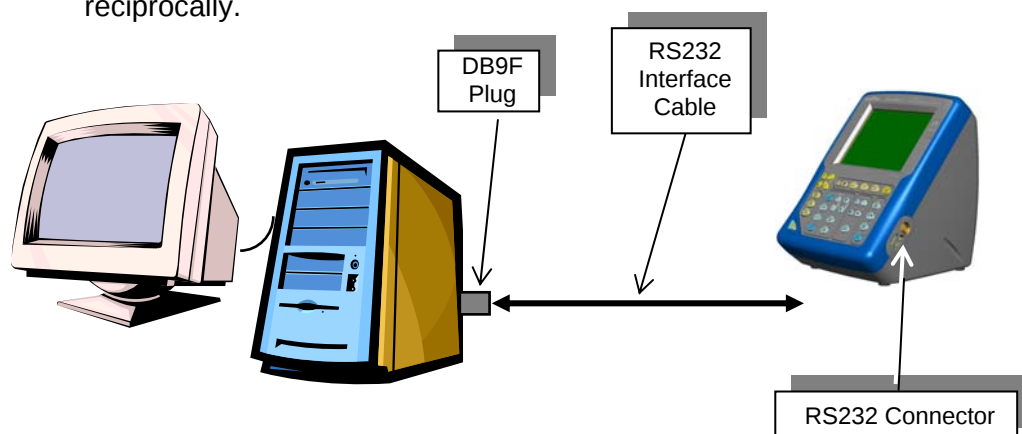
- Configure the instrument
- Perform measurements campaign
- Transfer files

Connection of the instrument

The oscilloscope can be remotely programmed using a computer or PC with the programming kit. The dialog between the instrument and the PC can be realized through the RS232 link, or through an ETHERNET link.

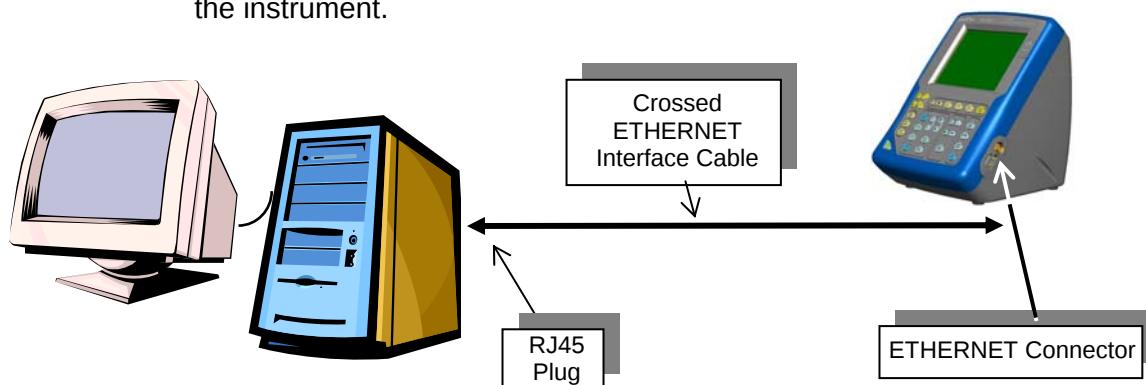
Connection through « RS232 »

- Connect connector DB9F on one of the "COM" RS232C inputs of the PC.
- Configure the PC port to be in adequacy with the instrument or reciprocally.



Connection through « ETHERNET »

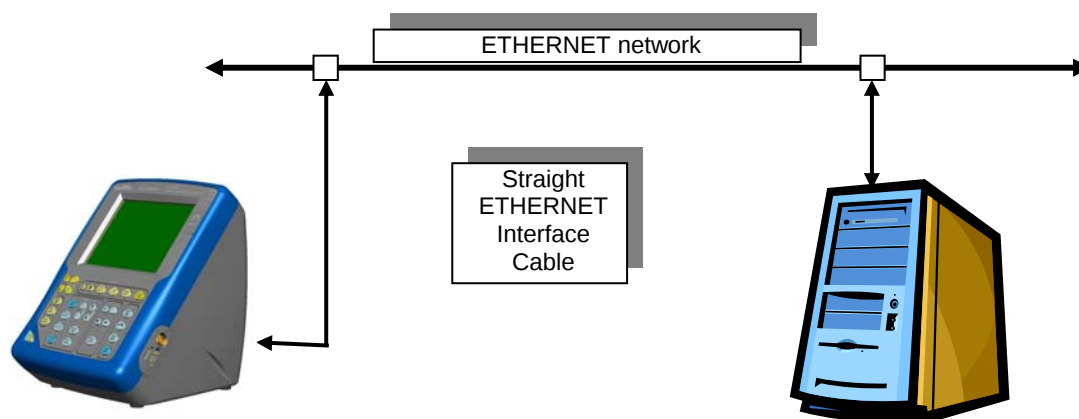
- Crossed cable**
- Connect the ETHERNET interface crossed cable directly to the PC.
 - Connect a terminal (TELNET Port : 23) to the IP address defined on the instrument.



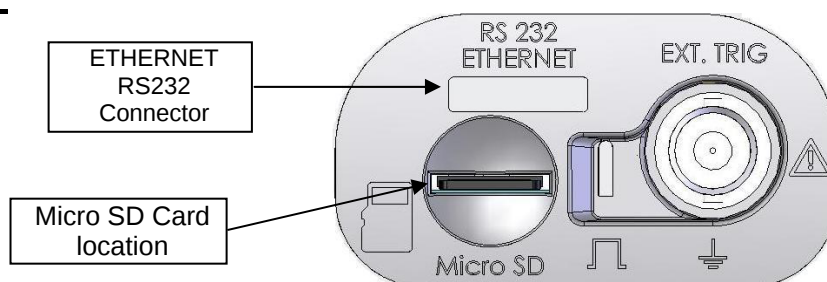
Introduction (cont'd)

Straight cable

- Connect the oscilloscope to the network of the PC through a Hub with the straight ETHERNET interface cable.
- Connect a terminal (TELNET Port : 23), to the IP address defined on the oscilloscope.



Interface



Programming convention

Tree structure

- The Command SCPI structure is a tree structure
- Each command must be ended by a <NL> or <;> terminator character.
- The command used after the <;> character must be in the same directory as the precedent command, otherwise it must be preceded by the <:> character and its full name.

Example

DISP:TRAC:STAT1 1<NL>

DISP:TRAC:STAT2 1<NL>

same as :

DISP:TRAC:STAT1 1<NL> ; STAT2 1<NL>

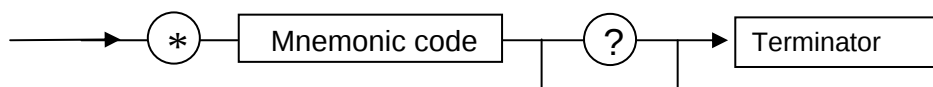
same as :

DISP:TRAC:STAT1 1 ;: DISP :TRAC :STAT2 1<NL>

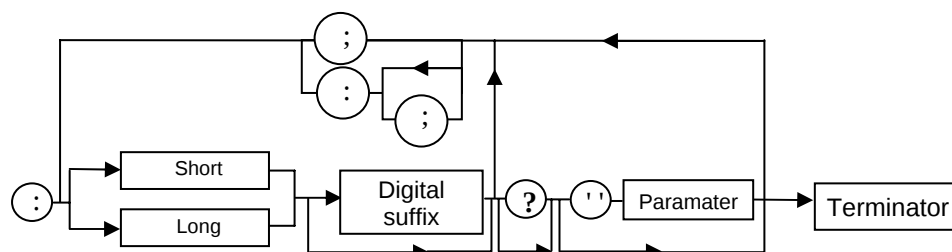
Introduction (cont'd)

Command syntax

Common commands



Specific commands



Key words

The brackets ([]) are used to frame a keyword which is optional during programming; i.e. the instrument will execute the command whether the keyword is optional or not. Uppercase and lowercase are used to differentiate the short form of the keyword (uppercase letters) and the long form (whole word).

The instrument accepts the uppercase or lowercase letters without distinction.



DISP:TRAC:STAT 1 is equivalent to **DISPLAY:WINDOW:TRACE:STATE 1**

Separators

' : '	descends in the next directory or returns under the root, if preceded by a ' ; '.
' ; '	separates two commands in the same directory
' '	(space) separates the keyword from the following parameter.
' , '	separates a parameter from the following

Parameters

(' ')	The parameters, if any, are separated from the keyword by a space (' '). A command can accept parameters of a defined type, a literal expression or a combination of both.
< >	The defined-types are marked by the opposite characters.
[]	The brackets ([]) mean that the parameters are optional.
{ }	The accolades define the list of parameters allowed.
	The vertical bar () may be read as an "or", it is used to separate the various possible parameters.

Introduction (cont'd)

Parameter format

The parameters can be key words, numeric values, character chains or numeric expressions.

Key words

These parameters have two forms of call, as for the instructions : the shortened form (in capital letter) and the whole form (shortened form plus complement into small letter).

Thus, for certain commands, the parameters are the following :

- **ON, OFF** corresponding to the boolean values (1,0)
- **EDGE, PULse, DELay, EVENT** or **TV** for the trigger modes

Numeric values

They have several possible formats :

NRf

(flexible Numeric Representation).

In the case of physical quantity, these numbers can be followed of a sub-multiple or a multiple of its unit.

Recall

The interpreter does not make any difference between capital and small letters.

 *Example* : 1 micro second can be written either 1μs or 0.000001, 1e-6s, 1E-3mS ...

This parameter can also be replaced by the following key words :

- **MAXimum, MINimum** to get extreme values of the parameter
- **UP, DOWN** to get the value following or preceding the current status of the parameter

Units

V	Volt (Voltage)
S	Second (Time)
PCT	Percent (Percentage)
Hz	Hertz (Frequency)
MHz	Mega-Hertz (Frequency)
F	Farad (Capacitance)
OHM	Ohm (Resistance)
DEG	Degree Celsius

Multiples and sub-multiples

MA	Mega: 10 ⁺⁶
K	Kilo: 10 ⁺³
M	Milli: 10 ⁻³
U	Micro: 10 ⁻⁶
N	Nano: 10 ⁻⁹
P	Pico: 10 ⁻¹²

NR1 The parameter is a signed whole number.

 *Example* : 10

NR2 The parameter is a signed real without exponent.

 *Example* : 10.1

NR3 The parameter is a signed real expressed with a mantisse and a signed exponent.

 *Example* : 10.1e-3

Introduction (cont'd)

Chains of Characters

They are continuations of letters and figures framed by quotation marks " ".

Terminator

<NL>

<NL> is a general term for a terminator.

NL is the character CR (code ASCII 13 or 0x0D).

A line of command should not exceed 80 characters; it ends with a terminator.

Response

The response can be made up of several elements separated between them by a comma ', '. The last element is followed by the terminator < NL >.

The data are of several natures :

Key words

They are the same ones as those used in parameter, but here, only the shortened form is returned.

Numeric Values

They have three possible formats : NR1, NR2 et NR3.

Chains of characters

There is no difference compared to the parameters. If the chain contains a key word, it is returned in shortened form.

Detailed Description of Commands

Commands specific to the instrument

Vertical

Display

DISPlay[:WINDow] (Command/Query)
:TRACe:STATe{[1]|2|3|4}
 The command **DISP:TRAC:STAT{[1]|2|3|4} <1|0|ON|OFF>** validates or devalidates the selected signal.

To the question **DISP:TRAC:STAT{[1]|2|3|4}?**, the instrument returns the validation status of the selected signal.

Sensitivity / Coupling

[SENSe]:VOLTage (Command)
{[1]|4}[:DC]:RANGe
:PTPeak
 The command **VOLT{[1]|4}:RANG:PTP <sensitivity|MAX|MIN|UP|DOWN>** sets the full screen vertical sensitivity of the selected channel.

<sensitivity> is a value in **NRf** format, it may be followed by a submultiple and by the unit (V).

By default the value is expressed in Volts.

To the question **VOLT{[1]|4}: RANG:PTP?**, the instrument returns the full screen vertical sensitivity of the selected channel.

Response format: <measured value><NL>

value in format **<NR3>** expressed in volt.

If 10mV/div is the sensitivity displayed in the channel parameters, then the **<sensitivity>** parameter = $8 \times 10 \text{ mV/div}$.

INPut{[1]|4}:COUPling (Command/Query)
 The command **INP{[1]|4}:COUP <AC|DC|GROund>** selects the coupling of the selected channel.

To the question **INP{[1]|4}:COUP?**, the instrument returns the coupling of the selected channel.

[SENSe]:BANDwidth{[1]|4} (Command/Query)
[:RESolution]
 The command **BAND{[1]|4} <Bandwidth>** limits the bandwidth of the channel to the value of the parameter « Bandwidth » [5 kHz, 1,5 MHz, 20 MHz, 0 (no bandwidth limit)].

To the question **BAND{[1]|4}?**, the instrument returns the value of the frequency of the filter cut [5 kHz, 1,5 MHz, 20 MHz, 0 (no bandwidth limit)].

[SENSe]:BANDwidth {**[1]**|**4**}:RESolution :AUTO (Command/Query)

The command **BAND{**[1]**|**4**}:AUTO <**1**|**0**|ON|OFF>** validates or devalidates the application of the bandwidth limit on the selected channel.

To the question **BAND{**[1]**|**4**}:AUTO?**, the instrument returns the activation status of the bandwidth limit on the selected channel.

Function Definition

CALCulate:MATH {**2**|**3**}:EXPRession [:DEFine] (Command/Query)

The command **CALC:MATH{**2**|**3**} <(function)>** defines and activates the mathematical function of the selected signal.

<function> is the definition of the mathematical function.

(ch1 – ch2) subtracts the channel 1 from channel 2.

To the question **CALC:MATH{**2**|**3**}?**, the instrument returns the mathematical function of the selected signal.

CALCulate:MATH{**2**|**3**}:EXPRession: DELeTe (Command)

The command **CALC:MATH{**2**|**3**}:DEL** deletes the mathematical function of the selected signal.

MMEMemory:STORe:MACRo (Command)

The **MMEM:STOR:MACR <INT{**2**|**3**>,<"file">** command saves the mathematical function of the chosen signal, in the internal memory, in an ".fct" file.

<"file"> consists of a name of 15 letters maximum, followed by a period and the FCT extension.

MMEMemory:LOAD:MACRo (Command)

The **MMEM:STOR:MACR <INT{**2**|**3**>,<"file">** command loads a mathematical function, from an ".fct" file of the internal memory, onto the chosen signal.

<"file"> consists of a name of 15 letters maximum, followed by a period and the FCT extension.

Vertical Scale

DISPlay[:WINDow] :TRACe:Y[:SCAThe] :PDIVision{**[1]**|**2**|**3**|**4**} (Command/Query)

The command **DISP:TRAC:Y:PDIV{**[1]**|**2**|**3**|**4**} <scale|MAX|MIN>** sets the value of the probe coefficient for the selected signal.

<scale> is a value at **NRf** format.

To the question **DISP:TRAC:Y:PDIV{**[1]**|**2**|**3**|**4**}?**, the instrument returns the value of the probe coefficient for the selected signal.

DISPlay[:WINDow] (Command/Query)
:TRACe:Y:LABel{[1]|2|3|4}
The command **DISP:TRAC:Y:LAB{[1]|2|3|4} <"label">** determines the unit of the selected signal.

The unit is chosen among the upper-case letters of the alphabet (A to Z), and is composed of a name up to 3 letters.

To the question **DISP:TRAC:Y:LAB{[1]|2|3|4}?**, the instrument returns the unit of the selected signal.

[SENSe]:VOLTage (Command/Query)
{[1]|2|3|4}[:DC]
:RANGe:OFFSet
The command **VOLT{[1]|2|3|4}:RANG:OFFS<offset|MAX|MIN|UP|DOWN>** sets the vertical offset of the selected signal.

<offset> is a value in format **NRf**, it can be then followed by a submultiple and by the unit (v).

By default this value is expressed in Volts.

To the question **VOLT{[1]|2|3|4}:RANG:OFFS?**, the instrument returns the vertical offset of the selected signal.

Response format: <measured value><NL>

Value in the **<NR3>** format expressed in Volts.

Trigger

The apparatus has several trigger modes which are:

- Sequence 1 : Trigger on edge (EDGE)
- Sequence 2 : Trigger on pulse width (PULse)
- Sequence 5 : Trigger on video signals such as television type (TV)

Standard SCPI allows the use of these various trigger modes thanks to the key word SEQuence. The index of this key word makes it possible to identify these modes. To simplify the programming, only two sequences are defined :

Example : in mode PULse, the trigger source of the instrument is programmed in entering the command **TRIG:SEQ2:SOUR INT1**, or **TRIG:SEQ1:SOUR INT1**, or **TRIG:SEQ:SOUR INT1** or **TRIG:SOUR INT1**.

TRIGger[:SEQuence
{[1]|2|5}]:DEFine? (Command/Interrogation)
Returns the description of the indicated sequence :
SEQuence1: EDGE
SEQuence2: PULse
SEQuence5: TV

Trigger main source

TRIGger[:SEQuence
{[1]|2|5}]:SOURce

(Command/Query)

The command

TRIG:SOUR <INTernal{1|4|EXTernal|EXTernal5|LINE}> determines the main trigger source of the instrument.

INTernal{1|4} corresponds to the 1, 4, External and Mains channel of the instrument.

To the question **TRIG:SOUR?**, the instrument returns the main trigger source used in.

TRIGger[:SEQuence
{[1]|2|5}]:COUPling

(Command/Query)

The command **TRIG:COUP <AC|DC>** determines the coupling associated to the main trigger source.

To the question **TRIG:COUP?**, the instrument returns the coupling associated to the main trigger source.

TRIGger[:SEQuence
{[1]|2|5}]
:FILTer:HPASs[:STATe]

(Command/Query)

The command **TRIG:FILT:HPAS <1|0|ON|OFF>** validates or devalidates the reject of the low frequencies associated to the main trigger source.

- **1|ON**: activates the reject of the low frequencies (LF Reject coupling)
- **0|OFF**: deactivates the reject of the low frequencies; the DC coupling is then activated.

To the question **TRIG:FILT:HPAS?**, the instrument returns the activation status of the low frequencies reject associated to the trigger source.

TRIGger[:SEQuence
{[1]|2|5}]
:FILTer:LPASs[:STATe]

(Command/Query)

To the question **TRIG:FILT:LPAS?**, the instrument returns the activation status the reject of the high frequencies associated to the trigger source.

- **1|ON**: activates the high frequencies reject (HF Reject coupling)
- **0|OFF**: deactivates the high frequencies reject; the DC coupling is then activated.

To the question **TRIG:FILT:LPAS?**, the instrument returns the activation status the reject of the high frequencies associated to the trigger source.

TRIGger[:SEQuence[5]]
:VIDeo:FIELd:FORMat
:LPFRame

(Command/Query)

The command **TRIG:VID:FIEL:FORM:LPFR <525|625>** selects the standard of the TV frame, on which the trigger is to be realised : 525 or 625 lines.

To the question **TRIG:VID:FIEL:FORM:LPFR?**, the instrument returns the current video frame standard.

TRIGger[:SEQuence[5]] (Command/Query)

:VIDeo:LINE:Select

The command **TRIG:VID:LINE:SEL <line>** selects the line on which it is to be triggered.

<line>: is a value at NR1 format between 1 and the max number of lines of the standard selected with the previous command (525 or 625 lines).

To the question **TRIG:VID:LINE:SEL?**, the instrument returns the number of current line on which it is to be triggered.

TRIGger[:SEQuence[5]] (Command/Query)

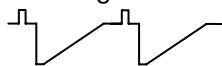
:VIDeo:SSIGnal[:POLarity]

The command **TRIG:VID:SSIG <POSitive|NEGative>** determines the polarity of the video signal.

- **POSitive**: gives following video signal



- **NEGative**: gives following video signal



At the command **TRIG:VID:SSIG?**, the instrument returns the polarity of the video signal.

TRIGger[:SEQuence

{[1]|2|5]:SLOPe

(Command/Query)

The command **TRIG:SEQ{[1]|2|3|4|5}:SLOP <POSitive|NEGative>** determines :

- in **SEQuence2** : determines the polarity of the pulse

⇒ **POSitive**: positive pulse 

⇒ **NEGative**: negative pulse 

To the question **TRIG:SEQ{[1]|2}:SLOP?**, the instrument returns the polarity trigger front or pulse according to the selected **SEQuence**.

- In the other sequences: used to measure the triggering edge of the main source:

⇒ **POSitive**: rising front 

⇒ **NEGative**: falling front 

TRIGger[:SEQuence

{[1]|2}:HYSTeresis

(Command/Query)

The command **TRIG:HYST <hysteresis>** sets the amplitude of the hysteresis used to reject the noise associated to the trigger main source.

<hysteresis> is a value at NR1 format taking following values :

- **0**: no noise reject, hysteresis is about 0.5 div.
- **3**: activated noise reject, hysteresis is about 3 div.

To the question **TRIG:HYST?**, the instrument returns the amplitude of the hysteresis used to reject the noise associated to the trigger main source.

TRIGger[:SEQuence {{1}}2[5]] :LEVel	(Command/Query) The command TRIG:LEV <level MAX MIN UP DOWN> sets the trigger level of the main source. <level> is a value in format NRf, it may be followed by a submultiple and by the unit (V). By default the value is expressed in Volts. To the question TRIG:LEV?, the instrument returns the trigger level of the main source . <u>Response format:</u> <measured value><NL> value in format <NR3> expressed in volt.
TRIGger:SEQuence2 :DELaY	(Command/Query) The command TRIG:SEQ2:DEL <time MAX MIN UP DOWN> sets the pulse time. <time> is a value in format <NRf>, it may be followed by a submultiple and by the unit (s). By default the value is expressed in second. To the question TRIG:SEQ2:DEL?, the instrument returns the trigger delay of the main source or the pulse time according to the selected SEQuence. <u>Response format:</u> <measured value><NL> value in format <NR3> expressed in second.
TRIGger[:SEQuence[2]] :TYPE	(Command/Query) The command TRIG:TYP <EQUate SUPerior INFerior> selects the type of trigger on the pulse width to be used by the trigger. • SUPerior: trigger for pulses of superior duration • INFerior: trigger for pulses of inferior duration To the question TRIG:TYP?, the instrument returns the type of trigger on the current pulse width.
TRIGger[:SEQuence [1]]5:HOLDoff	(Command/Query) The command TRIG:HOLD <time MAX MIN UP DOWN> sets the inhibition time of the trigger (Holdoff). <time> is a value in format <NRf>, it may be followed by a submultiple and by the unit (s). By default the value is expressed in second. To the question TRIG:HOLD?, the instrument returns the trigger Holdoff time. <u>Response format:</u> <measured value><NL> value in format <NR3> expressed in second.

Trigger mode / automatic mode

TRIGger[:SEQuence] (Command/Query)

{[1]|2|5}]
:ATRIGger[:STATe]

The command **TRIG:ATRIG <1|0|ON|OFF>**, validates or devalidates the automatic trigger mode.

- **ON|1** activates the automatic trigger mode.
- **OFF|0** activates the trigger mode.

To the question **TRIG:ATRIG?**, the instrument returns the activation status of the automatic trigger mode.

Single mode

INITiate[:IMMediate]:NAME (Command)

The command **INIT:NAME <EDGE|PULse|EVENT|TV>** runs an acquisition in single mode.

Horizontal

Min/Max Acquisition

[SENSe]:AVERage:TYPE (Command/Query)

The command **AVER:TYPE <NORMal|ENVELOpe>** validates or devalidates the mode of min/max acquisition.

- **NORMal** devalidates the mode of min/max acquisition.
- **ENVELOpe** validates the mode of min/max acquisition.

To the question **AVER:TYPE?**, the instrument returns the activation status of the mode of min/max acquisition.

Average

[SENSe]:AVERage:COUNt (Command/Query)

The command **AVER:COUN <number of acquisitions|MAX|MIN| UP| DOWN>** determines the number of acquisition bursts necessary to obtain a displayed trace by averaging.

<number of acquisitions> is a value in format **NR1**, from values **2, 4, 16 to 64**.

To the question **AVER:COUN?**, the instrument returns the the number of acquisition bursts necessary to obtain a displayed trace by averaging.

[SENSe]:AVERage[:STATe] (Command/Query)

The command **AVER <1|0|ON|OFF>** validates or devalidates the 'REPETITIVE SIGNAL' function.

- **1|ON**: signal repetitive validated
- **0|OFF**: signal repetitive not validated

To the question **AVER?**, the instrument returns the activation status of averaging.

The averaging is only active when the option 'repetitive signal' is validated.

FFT

CALCulate:TRANSform (Command/Query)

:FREQuency:WINDow

The command **CALC:TRAN:FREQ:WIND<RECTangular|HAMMING|HANNing|BLACKman>** selects the window used for the FFT calculation.

To the question **CALC:TRAN:FREQ:WIND?**, the instrument returns the type of window used for the FFT calculation.

CALCulate:TRANSform (Command/Query)

The command **CALC:TRAN:FREQ <1|0|ON|OFF>** activates the FFT calculation.

To the question **CALC:TRAN:FREQ?**, the instrument returns the activation status of the FFT calculation.

DISPlay[:WINDow]:TRACe (Command/Query)

:Y:SPACing

The command **DISP:TRAC:Y:SPAC <LOGarithmic|LINEar>** specifies the type of scale applied to the Y-axis.

To the question **DISP:TRAC:Y:SPAC?**, the instrument returns the type of scale applied to the Y-axis.

Time base

DISPlay[:WINDow] (Command/Query)

:TRACe:X[:SCAThe]

:PDIVision

The command **DISP:TRAC:X:PDIV <scale|MAX|MIN|UP|DOWN >** sets the value of the time base.

<scale> is a value in format **NRf**, it may be followed by a submultiple and by the unit (s).

By default the value is expressed in second (s).

Example: to get a time base of 1 μ s, following values can be entered: **1E-3ms** or **1E-6** or **0.000001s** or **0.000001** or else **1us**.

To the question **DISP:TRAC:X:PDIV?**, the instrument returns the value of the time base.

Response format: <measured value><NL>
value in format **<NR3>** expressed in second.

[SENSE]SWEep:OFFSet (Command/Query)
:TIME

The command **SWE:OFFS:TIME** <time|MAX|MIN|UP|DOWN> settles the horizontal offset of the trace (run-after-delay or postrig).

<time> is a signed value in format <NRf> ; it may be followed by a submultiple and by the unit (s). By default, it is expressed in second.

To the question **SWE:OFFS:TIME?**, the instrument returns the current run-after-delay.

Response format: <measured value><NL>
value in format <NR3> expressed in second.

Display

Display mode

DISPlay[:WINDow]:TRACe: (Command/Query)
MODE

The command **DISP:TRAC:MODE** <NORMal|ENVELOpe> selects the display mode.

- **NORMal** validates the Vector display mode.
- **ENVELOpe** validates the Envelope display mode.

To the question **DISP:TRAC:MODE?**, the instrument returns the active display mode.

Oscilloscope / XY

DISPlay[:WINDow]:TRACe: (Command/Query)
FORMat

The command **DISP:TRAC:FORM** <A|XY> selects the display mode of the instrument.

- **A** validates the Oscilloscope display mode : $Y = f(t)$
- **XY** validates the XY display mode : $Y = f(x)$

To the question **DISP:TRAC:FORM?**, the instrument returns the active display mode.

Definition of the XY mode

DISPlay[:WINDow]:TRACe: (Command/Query)
XY:XDEFine

The command **DISP:TRAC:XY:XDEF** <INT{1|2|3|4}> selects the signal positioned on the X-basis.

To the question **DISP:TRAC:XY:XDEF?**, the instrument returns the signal used on the X-basis.

DISPlay[:WINDow]:TRACe: (Command/Query)
XY:YDEFine

The command **DISP:TRAC:XY:YDEF** <INT{1|2|3|4}> selects the signal positioned on the Y-basis.

To the question **DISP:TRAC:XY:YDEF?**, the instrument returns the signal used on the Y-basis.

Measure

Reference

DISPlay[:WINDow]:CURSor
:REFerence (Command/Query)

The command **DISP:CURS:REF <INT{1|2|3|4}>** selects the reference for the automatic and manual measurements.

To the question **DISP:CURS:REF?**, the instrument returns the signal used as reference.

Measurement query

MEASure:MINimum? (Query)

To the question **MEAS:MIN? <INT{1|2|3|4}>** the instrument returns the value minimum of the selected signal.

Response format: <measured value><NL>

value in format <NR3> expressed in volt.

MEASure:MAXimum? (Query)

To the question **MEAS:MAX? <INT{1|2|3|4}>** the instrument returns the maximum value of the selected signal.

Response format: <measured value><NL>

value in format <NR3> expressed in volt.

MEASure:PTPeak? (Query)

To the question **MEAS:PTP? <INT{1|2|3|4}>** the instrument returns the peak-to-peak value of the selected signal.

Response format: <measured value><NL>

value in format <NR3> expressed in volt.

MEASure:LOW? (Query)

To the question **MEAS:LOW? <INT{1|2|3|4}>** the instrument returns the low level value of the selected signal.

Response format: <measured value><NL>

value in format <NR3> expressed in volt.

MEASure:HIGh? (Query)

To the question **MEAS:HIGh? <INT{1|2|3|4}>** the instrument returns the value of the high level level of the selected signal.

Response format: <measured value><NL>

value in format <NR3> expressed in volt.

MEASure:AMPLitude? (Query)

To the question **MEAS:AMPLitude? <INT{1|2|3|4}>** the instrument returns the amplitude of the selected signal.

MEASure:AC? (Query)

To the question **MEAS:AC? <INT{1|2|3|4}>** the instrument returns the RMS voltage of the selected signal.

MEASure:VOLT[:DC]? (Query)

To the question **MEAS:VOLT? <INT{1|2|3|4}>** the instrument returns the average value of the selected signal.

Response format: <measured value><NL>
value in format <NR3> expressed in volt.

MEASure:RISE:OVERshoot? (Query)

To the question **MEAS:RISE:OVER? <INT{1|2|3|4}>** the instrument returns the positive overshoot of the selected signal.

Response format: <measured value><NL>
value in format <NR2> expressed in percent.

MEASure:FALL:OVERshoot? (Query)

To the question **MEAS:FALL:OVER? <INT{1|2|3|4}>** the instrument returns the negative overshoot of the selected signal.

Response format: <measured value><NL>
value in format <NR2> expressed in percent.

MEASure:RISE:TIME? (Query)

or
MEASure:RTIME?

To the question **MEAS:RISE:TIME? <INT{1|2|3|4}>** the instrument returns the rise time of the selected signal.

Response format: <measured value><NL>
value in format <NR3> expressed in second.

MEASure:FALL:TIME? (Query)

or
MEASure:FTIME?

To the question **MEAS:FALL:TIME? <INT{1|2|3|4}>** the instrument returns the fall time of the selected signal.

Response format: <measured value><NL>
value in format <NR3> expressed in second.

MEASure:PWIDth? (Query)

To the question **MEAS:PWID? <INT{1|2|3|4}>** the instrument returns the positive pulse width of the selected signal.

Response format: <measured value><NL>
value in format <NR3> expressed in second.

MEASure:NWIDth? (Query)

To the question **MEAS:NWID? <INT{1|2|3|4}>** the instrument returns the negative pulse width of the selected signal.

Response format: <measured value><NL>
value in format <NR3> expressed in second.

MEASure:PERiod? (Query)

To the question **MEAS:PERiod? <INT{1|2|3|4}>** the instrument returns the period of the selected signal.

Response format: <measured value><NL>
value in format <NR3> expressed in second.

MEASure:FREQuency? (Query)

To the question **MEAS:FREQ? <INT{1|2|3|4}>** the instrument returns the frequency of the selected signal.

Response format: <measured value><NL>
value in format <NR3> expressed in hertz.

MEASure:PDUTcycle? (Query)

To the question **MEAS:PDUT? <INT{1|2|3|4}>** the instrument returns the duty cycle of the selected signal.

Response format: <measured value><NL>
value in format <NR2> expressed in percent.

MEASure:PULse:COUNt? (Query)

To the question **MEAS:PUL:COUN? <INT{1|2|3|4}>** the instrument returns the pulse count on screen of the selected signal.

Response format: <measured value><NL>
value in format <NR2>.

Phase measurement

MEASure:PHASe? (Query)

To the question **MEAS:PHAS? <INT{1|2|3|4}>,<INT{1|2|3|4}>** the instrument returns the phase of the first selected signal to the second.

Response format: <measured value><NL>
value in format <NR2> expressed in degrees.

Manual measurement

DISPlay[:WINDow]:CURSor
:STATe (Command/Query)

The command **DISP:CURS:STAT <1|0|ON|OFF>** activates or inhibits the manual measurements.

- **1|ON**: activates the manual measurements
- **0|OFF**: inhibits the manual measurements

To the question **DISP:CURS:STAT?**, the instrument returns the activation status of the manual measurements.

DISPlay[:WINDow]:CURSor
:TIME{[1]|2|3}:POSition (Command/Query)

The command **DISP:CURS:TIME{[1]|2|3}:POS<position|MAX|MIN>** sets the horizontal position of the selected manual cursor.

<position> is a value in format **NRf**, it may be followed by a submultiple and the unit (s).

By default the value is expressed in second.

This command acts on the manual cursors represented on the screen by the X-symbol accompanied by an index (1, 2 or ϕ).

To the question **DISP:CURS:TIME{[1]|2|3}:POS?**, the instrument returns the horizontal position of the selected manual cursor.

Response format: <measured value><NL>

value in format **<NR3>** expressed in second.

DISPlay[:WINDow]:CURSor
:VOLT{[1]|2|3}:POSition (Query)

To the question **DISP:CURS:VOLT{[1]|2|3}:POS?**, the instrument returns the horizontal position of the selected manual cursor.

This command acts on the manual cursors represented on the screen by the X-symbol accompanied by an index (1, 2 or ϕ).

Response format: <measured value><NL>

value in format **<NR3>** expressed in volt.

MEASure:CURSor:DTIME? (Query)

To the question **MEAS:CURS:DTIME?**, the instrument returns the time delay between cursors 1 and 2.

Response format: <measured value><NL>

value in format **<NR3>** expressed in second.

MEASure:CURSor:DVOLT? (Query)

To the question **MEAS:CURS:DVOLT?**, the instrument returns the difference between cursors 1 and 2.

Response format: <measured value><NL>

value in format <**NR3**> expressed in volt.

Phase manual measurement

DISPlay[:WINDow]: CURSor:PHASe:STATE (Command/Query)

The command **DISP:CURS:PHAS:STAT <1|0|ON|OFF>** activates or inhibits the phase manual measurement.

To the question **DISP:CURS:PHAS:STAT?**, the instrument returns the activation status of the phase manual measurement.

MEASure:MANual:PHASe? (Query)

To the question **MEAS: MAN:PHAS?**, the instrument returns the phase of ϕ -cursor in relation to cursors 1 and 2. The difference between the cursor 1 and 2 represents 360°. The cursor 1 equal to 0° and the cursor 2, 360°.

Response format: <measured value><NL>

value in format <**NR2**> expressed in degrees.

Unattached cursors

DISPlay[:WINDow]:CURS :AUTO:STATE (Command/Query)

The command **DISP:CURS:AUTO:STAT <1|0|ON|OFF>** activates or inhibits the unattached cursors.

- **ON|1** the cursors 1 and 2 move along the reference signal.
- **OFF|0** the moving of cursors 1 and 2 is free.

To the question **DISP:CURS:AUTO:STAT?**, the instrument returns the activation status of unattached cursor mode.

Memory

Trace

MMEMory:STORe:TRACe (Command)

The command **MMEM:STOR:TRAC <INT{1|2|3|4} | REF{1|2|3|4}>, <"file.TRC" | "file.TXT">** saves the signal or the selected reference memory, in a ".trc" or ".txt" file of the internal memory

MMEMory:LOAD:TRACe (Command)

The **MMEM:LOAD:TRAC<TRACE{1|2|3|4}>, <"file.TRC">** command loads a trace from a ".trc" file of the internal memory.

TRACe:CATalog (Query)

To the question **TRAC:CAT?**, the device returns the list of active signals.

TRAC:CAT?

reply <NL> when no signal is active.

reply INT1 <NL> when only signal 1 is active.

reply INT1,INT3<NL> when signals 1 and 3 are active.

TRACe:LIMit (Command/Query)

The **TRAC:LIM <abscissa1>,<abscissa2>,<step>** command sets the left and right limits and the step of the data to be transferred.

<abscissa1>,<abscissa2>,<step> are parameters using format **NR1**.

Their default value is 0, 2499 and 1.

To the question **TRAC:LIM?**, the device returns the left and right limits and the step of the data to be transferred.

TRACe[:DATA] (Query)

To the question **TRAC? <INT1|2|3|4>**, the device transfers the selected trace to the computer.

Response format: <block><NL>

<block> is a data block, the format of which is set by the commands **FORMat:DINTerchange** and **FORMat[:DATA]**.

It contains the value of the 2500 samples encoded on 4 bytes, as follows (bit 31 = MSB):

31	24	19	0
Validity	-	samples coded on 20 bits	

The validity byte contains 3 data bits:

31	30	29	28	27	26	25	24
I	O	E	-	-	-	-	-

with :

I : Invalidity, the sample is invalid if equal to 1

A : Age, used in slow mode, this sample is validated

E : Extrapolated, the sample is the result of an extrapolation if equal to 1.

FORMat:DINTerchange (Command/Query)

The command **FORM:DINT <1|0|ON|OFF>** activates or inhibits the trace transfer in DIF format.

- **ON|1** activates the trace transfer in DIF format.
- **OFF|0** the trace transfer data is raw.

To the question **FORM:DINT?**, the device returns the activation status of the DIF format.

<u>Response format:</u>	DIF format:
(DIF	(VERSION <year.version>)
DIMension=X	(TYPE IMPLicit
	SCALE <sample interval>
	SIZE <sample no>
	U N ITs "S")
DIMension=Y	(TYPE EXPLicit
	SCALE <ADC step> SIZE 262144
	OFFSet 393216
	U N ITs "V")
	DATA(CURVe (<data block>)))<NL>

<year.version> is a number in <NR2> format giving the year of the SCPI standard used and the software version.

: 1999.1 means that SCPI version 1999 is used. This is the first software version of the remote control management programme.

<sample interval > is a number in <NR3> format.
It represents the time difference between two samples.

<sample no> is a number in <NR1> format.
It represents the number of samples to be transferred.

It can vary from 1 to 2500.

<ADC step> is a number in <NR3> format.

It represents the difference in Volts between two consecutive values of the analogue digital converter.

<data block> is a block containing the samples. This data comprises only the values resulting from the analogue digital converter. This block is in the format specified by the **FORMat[:DATA]** command.

FORMat[:DATA]

(Command/Query)

The **FORM <INTEger|ASCii|HEXadecimal|BINary>** command selects the data format of the trace transfer.

- **INTEger:** The data transmitted consists of whole numbers, unsigned with a length of 8 bits, preceded by the heading **#an**. **n** represents the number of data items to transmit. **a** gives the number of figures making up **n**.

The transmission for 4 data items (74, 70, 71, 76) is **#14JFGL**

- **ASCii:** The data is transferred using ASCII characters according to <NR1> numbering from 0 to 255. Each number is separated by a comma.

The transmission for 4 data items (74, 70, 71, 76) is **74,70,71,76**

- **HEXadecimal:** The data is transferred using ASCII characters according to a numbering in base 16 on 8 bits. Each number is preceded by **#H** and separated by a comma.

The transmission for 4 data items (74, 70, 71, 76) is **#H4A,#H46,#H47,#H4C**

- **BINary:** The data is transferred using ASCII characters according to a numbering in base 2 on 8 bits. Each number is preceded by **#B** and separated by a comma.

The transmission for 4 data items (74, 70, 71, 76) is **# B 1001010,#B 1000110,#B 1000111,# B 1001100**

To the question **FORM?**, the device returns the format selected for the trace transfer.

Configuration

MMEMemory:STORe:STATe

(Command)

The **MMEM:STOR:STAT <"file">** command saves the configuration, in internal memory, in a ".cfg" file.

MMEMemory:LOAD:STATe

(Command)

The **MMEM:LOAD:STAT <"file">** command loads the configuration from a ".cfg" file of the internal memory.

SYSTem:SET

(Command/Query)

The **SYST:SET <block>** command transfers the configuration from the computer to the device.

<block> is a finite data number preceded by the heading **#an** with **n**, the data number and **a**, a figure indicating the number of figures making up **n**.

To the question **SYST:SET?**, the device transfers the current configuration to the computer.

Response format: **<block> <NL>**

Utilities

MMEMory:CATalog?

(Query)

To the question **MMEM:CAT?**, the device returns the list of files present in the internal memory.

Response format: <file number>, 0[, <file list>] <file number> is in **NR1** format. <file list> = <"file">,<type>,<size>

<"file"> consists of a name of 15 letters maximum, followed by a period and the 3-letter extension.

<size> is in **NR1** format

<type> is STAT for a config file.

- TRAC for a trace file
- ASC for a text file
- BIN for any other file

MMEMory:DELeTe

(Command)

The **MMEM:DEL <"file">** command is used to delete a file from the internal memory. <"file"> consists of a name of 15 letters maximum, followed by a period and the 3-letter extension.

MMEMory:DATA

(Command/Query)

The **MMEM:DATA <"file">,<block>** command is used to transfer a file from the PC to the device.

<"file"> consists of a name of 15 letters maximum, followed by a period and the 3-letter extension. If the file already exists, it will be overwritten by the new file.

The text files (".txt") cannot be imported from the PC to the device.

<block> is all of the data in the file preceded by the heading **#an**. **n** being the data number and **a**, a figure indicating the number of figures making up **n**.

To the question **MMEM:DATA? <"file">**, the device transfers the file named to the PC.

Response format: <block> <NL>

MMEMory:SOUrce?

(Query)

The **MMEMory:SOUrce?** Query command returns the type of the active disk.

The response is « SDCard » if a memory card is present and if it responds properly.

If there is no memory card, the response is « RAM »

If a defect memory card is present (and therefore there is no active disk), the response is an SCPI error.

Response message: <name of disk><NL>

Name of disk = « RAM » if no memory card is present.

« SDCard » if a functional SD-Card is present.

I/O port configuration

SYSTem:COMMunicate (Command/Query)

:SOCKet:ADDRess

The command **SYST:COMM:SOCK:ADDR "<IPaddress>"** defines the IP address of the instrument.

<IPaddress> is a chain of characters as: ip1.ip2.ip3.ip4, each of the ipX values must be included between 0 & 255.

To the question **SYST:COMM:SOCK:ADDR?** the instrument returns the value of the current IP address.

Response format: <ip1.ip2.ip3.ip4><NL>

Warning

- Following to the change of IP address of the apparatus, any connection calling upon the ETHERNET connection will stop. A restarting of the apparatus is necessary to take into account this new address and to establish a new connection.
- If the instrument is programmed through the ETHERNET link, the connection with the PC will stop following to the change of IP address. To be able to continue, it is necessary to start again the oscilloscope and to define its new address on the PC.

Hardcopy

HCOPy:DESTination (Command/Query)

The command

HCOP:DEST<"SERial"|"CENTronics"|"NETwork"|"file"> selects the connection port of the peripheral.

- **SERial** : for the serial link
- **CENTronics** : for the Centronics link
- **NETwork** : for the network link
- **<file>** : to write in a file in the internal memory. The name of the file contains 15 letters without extension. The extension is auto-matically set as a function of the language (cf. HCOP:DEV:LANG).

To the question **HCOP:DEST?**, the instrument returns the connection port of the peripheral.

HCOPy:DEVIce:LANGUage *(Command/Query)*

The command

HCOP:DEV:LANG<IBM|EPSON|CANON|PCL|DPU|POSTscript|BMP|GIF> selects the print language.

- **IBM**: IBM Proprinter language
extension of the printing file will be **.PRN**.
- **EPSON**: Epson Stylus language
extension of the printing file will be **.PRN**.
- **CANON**: Canon language
extension of the printing file will be **.PRN**.
- **PCL**: HP Laserjet language
extension of the printing file will be **.PCL**.
- **DPU**: Seiko DPU 411 language
extension of the printing file will be **.PRN**.
- **POSTscript**: Postscript language
extension of the printing file will be **.EPS**.
- **BMP**: bitmap BMP language
extension of the printing file will be **.BMP**.
- **GIF**: GIF language
extension of the printing file will be **.GIF**.

To the question **HCOP:DEV:LANG?**, the instrument returns the configured language of printing.

HCOPy:DEVIce:COLor *(Command/Query)*

The command **HCOP:DEV:COL** <0, 1> sets the color printing.

To the question **HCOP:DEV:COL?**, the instrument returns the configured colors of printing.

HCOPy:SDUMp[:IMMediate] *(Command)*

The command **HCOP:SDUM** starts a hard copy.

HCOPy:SDUMp:UNDO *(Command)*

The command **HCOP:SDUM:UNDO** stops or cancels a hard copy.

Configuration

DEVIce:MODE *(Command/Query)*

The command **DEV:MOD** <SCOPE|MULTimeter> selects the principal mode of the instrument.

To the question **DEV:MOD?**, the instrument returns the mode in which it has been configured.

SYSTem:DATE (Command/Query)

The command **SYST:DATE <NR1>,<NR1>,<NR1>**, sets the date of the instrument.

The possible values are:

0	to	9999	for the year range (1 st range).
1	to	12	for the month range (2 nd range).
1	to	31	for the day range (3 rd range).

To the question **SYST:DATE?**, the instrument returns the date.

Response format: < YYYY,MM,DD ><NL>

with **Y** = year, **M** = month, **D** = day.

SYSTem:TIME (Command/Query)

The command **SYST:TIME <NR1>,<NR1>,<NR1>**, sets the time of the instrument.

The possible values are:

0	to	23	for the hour range (1 st range).
0	to	59	for the minute range (2 nd range).
0	to	59	for the second range (3 rd range).

To the question **SYST:TIME?**, the instrument returns the hour.

Response format: < HH,MM,SS ><NL>

avec **H** = hour, **M** = minute, **S** = second.

SYSTem:LANGUage (Command/Query)

The command

SYST:LANG <ENGLISH|FRENch|GERman|SPANish|ITALian>
selects the language of the instrument.

To the question **SYST:LANG?**, the instrument returns the selected language.

SYSTem:KLOCK (Command/Query)

The command **SYST:KLOCK <0|1|ON|OFF>** locks the front face.

To the question **SYST:KLOCK?**, the instrument returns the lock status of the front face.

RUN/STOP**INITiate:CONTInuous:NAME** (Command)

The command **INIT:CONT:NAME <EDGE|PULse>,<1|0|ON|OFF>** starts or stops the acquisition in repetitive mode in the indicated trigger mode.

ABORt (Command)

The command **ABOR** aborts the acquisition in progress.

- If the instrument is set in the **single** mode, the acquisition is stopped. The instrument stays in the starting status.
- If the instrument is in **continuous** mode, the acquisition in progress is stopped and the following starts.

Note: if no acquisition is running, this command has no effect.

TRIGger[:SEQuence (Command/Query)

{[1][2]} :RUN:STATe

The command **TRIG:RUN:STAT <1|0|ON|OFF>** starts or stops the acquisition.

- **ON|1** acquisition starts.
- **OFF|0** acquisition is stopped.

To the question **TRIG:RUN:STAT?**, the instrument returns the trigger status.

Autoset**AUTOSet:EXEcute** (Command)

The command **AUTOS:EXE** starts an autoset on each active channel.

Help**HELP[?]** (Query)

To the question **HELP? [« directory entry »]** the instrument answers helping in the SCPI commands available.

« **directory entry** » is a key word (short or long form) of first level in the tree of the command. No distinction is made between small and capital letters.

In absence of parameter, the list of the key words accepted by the function is given. When a key word is introduced, the list and the syntax of all the commands starting with this word is returned by the function.

Multimeter

Vertical

INPut{[1]|4}:DMM
:COUPling (Command/Query)

The command **INP{[1]|4}:DMM:COUP <AC|DC|GROund>** affects the coupling of the selected channel.

To the question **INP{[1]|4}:DMM:COUP?** the instrument returns the current coupling of the selected channel.

[SENSe]:RANGe{[1]|4}
:AUTO (Command/Query)

The command **RANG{[1]|4}:AUTO <1|0|ON|OFF>** authorizes or prohibits the autoranging of the selected channel.

- **ON|1** activates the autoranging.
- **OFF|0** deactivates this function.

To the question **RANG{[1]|2|3|4}:AUTO?** the instrument returns the autoranging status for the selected channel.

[SENSe]:RANGe[1]:CAPA (Command/Query)

The command **RANG:CAPA <range|MAX|MIN|UP|DOWN>** selects the range of measurement to be used in capacitance mode.

<range> is a value in format **NRf**, it may be followed by a sub-multiple (p, n, u) and by the unit (F).

By default, the value is expressed in Farad (F).

To the question **RANG:CAPA?** the instrument returns the range value of the capacitance.

Response format: <range><NL>

value in format **<NR2>** followed by sub-multiples (p, n, u) and by the unit (F).

[SENSe]:RANGe[1]:OHM (Command/Query)

The command **RANG:OHM <range|MAX|MIN|UP|DOWN>** selects the measurement range to be used in ohm-meter mode.

<range> is a value in format **NRf**, it may be followed by a sub-multiple (k, ma) and by the unit (Ohm).

By default, it is expressed in Ω (Ohm).

To the question **RANG:OHM?** the instrument returns the value of the measurement range of the ohm-meter.

Response format: <range><NL>

value in format **<NR2>** followed by the sub-multiples (k, M) and by the unit (Ohm).

[SENSe]:RANGe{[1]|2} (Command/Query)
:VOLT

The command **RANG{[1]|4}:VOLT <range|MAX|MIN|UP|DOWN>** selects the measurement range to be used in voltmeter mode for the selected channel.

<range> is a value in **NRf** format, it may be followed by a multiple (k) or sub-multiple (m, u) and by the unit (V).

By default, it is expressed in Volt (V).

To the question **RANG{[1]|4}:VOLT?** the instrument returns the value of the measurement range of the voltmeter for the selected channel.

Response format: <range><NL>

value in format **<NR2>** followed by the sub-multiple (m) and by the unit (V).

Measurement

MEASure:DMM? (Query)

To the question **MEAS:DMM? <INT1|4>** the instrument returns the value of the main measurement for the selected channel.

[SENSe]:FUNCtion (Command/Query)

The command **FUNC <VOLTage|RESistance|CONTInuity|CAPAcitor|DIODE|PT100 >** selects the measurement function on channel 1.

To the question **FUNC?**, the instrument returns the function de measurement on channel 1.

Error

SYSTem:ERRor[:NEXT]? (Query)

To the question **SYST:ERR?**, the instrument returns the number of error positioned at the top of the queue. The queue has a stack of 20 numbers and is managed as follows : first in, first out.

As the SYST:ERR? questions arrive, the instrument returns the number of errors in order of arrival, until the queue is empty. Every more SYST:ERR? question involves a negative answer: character "0" (ASCII 48code). If the queue is full, the case at the top of the queue takes the value -350 (saturated queue).

The queue is empty:

- when the instrument is getting started.
- at the receipt of a *CLS.
- at the reading of the last error.

Response format: <error><NL>

with error = negative or 0, no error.

* Command error: (-199 to -100)

They indicate that a syntax error has been detected by the syntax analyzer and causes event register bit 5, called CME, CoMmand Error to be set to 1.

-101 :	Invalid character
-103 :	Invalid separator
-104 :	Data type error
-108 :	Parameter not allowed
-109 :	Missing parameter
-111 :	Header separator error
-112 :	Program mnemonic too long
-113 :	Undefined header
-114 :	Header suffix out of range
-121 :	Invalid character in number
-128 :	Numeric data not allowed
-131 :	Invalid suffix
-138 :	Suffix not allowed
-141 :	Invalid character data
-148 :	Character data not allowed
-151 :	Invalid string data
-154 :	String data too long
-171 :	Invalid expression

*** Execution errors:
(-299 to -200)**

They indicate that an error has been detected at the moment of command execution and causes event register bit 4, called EXE, Execution Error, to be set to 1.

-200	:	Execution error
-213	:	Init ignored
-221	:	Sandtings conflict
-222	:	Data out of range
-232	:	Invalid format
-256	:	File name not found
-257	:	File name error

*** Specific instrument
errors:
(-399 to -300)**

They indicate that an abnormal error has been detected during execution of a task, and causes event register bit 3, called DDE, Device Dependent Error to be set to 1.

-300	:	Device-specific error
-321	:	Out of memory
-350	:	Queue overflow
-360	:	Communication error

*** Query errors:
(-499 to -400)**

They indicate that an abnormal error has been detected during execution of a task, and cause event register bit 2, called QYE, QuerY Error, to be set to 1.

-400	:	Query error
------	---	-------------

IEEE 488.2 common commands

Introduction

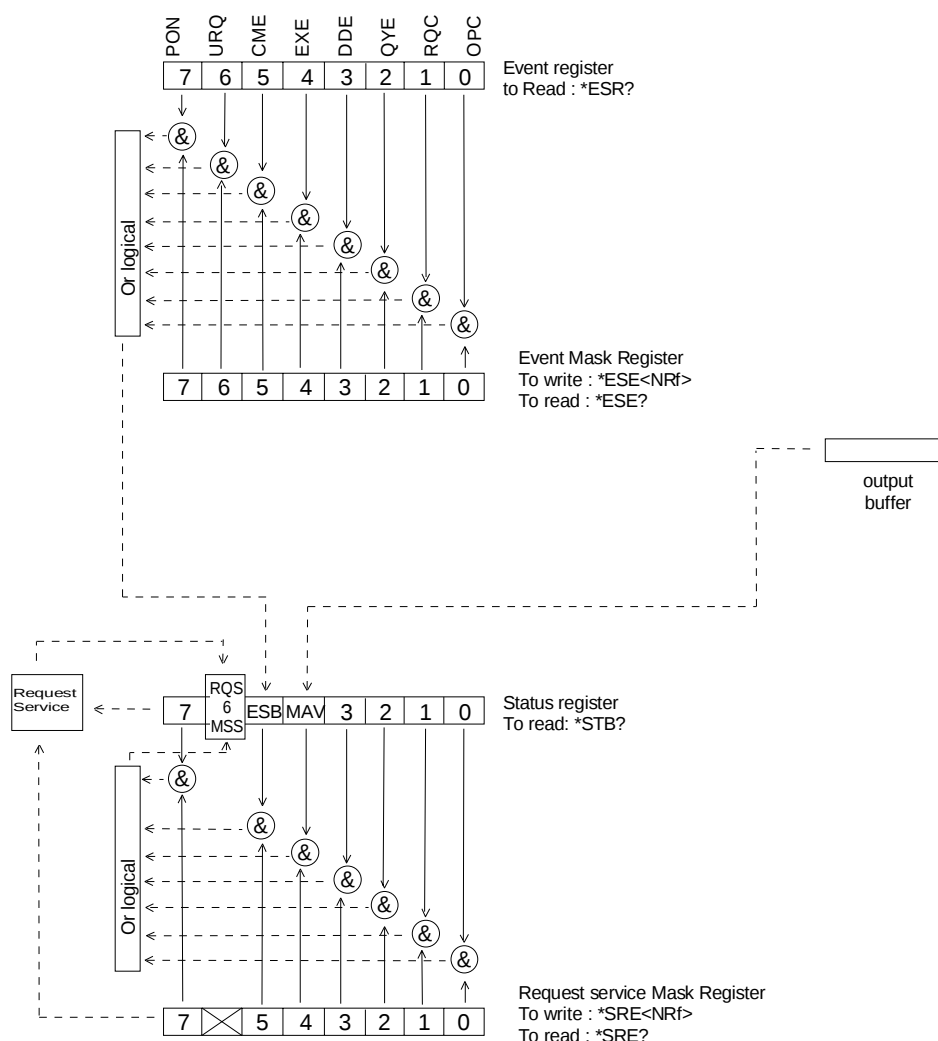
The common commands are defined by the IEEE 488.2 standard. They are operational on all instruments which are specified IEEE 488.2. They command basic functions such as:

- identification,
- reset,
- configuration reading,
- reading of event and status register,
- reset of event and status register.

If a command containing one or several directories has been received, and if a common command has been stacked up, then the instrument stays in this directory and execute normally the commands.

Events and status management

Registers

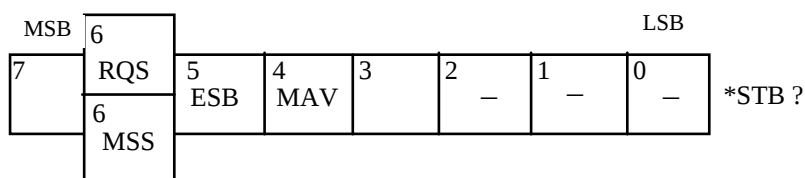


Status registers

Reading only → *STB? common command.

In this case, the (MSS) 6 Bit is returned and remain in the status it was before reading [see §. *STB (Status Byte)]

The *CLS common command is reset to zero.

Detailed description**RQS Request Service (6 bit)**

Indicates if the instrument requests a service. The type of COMM used on the instrument does not generate a request, but the byte is accessible in reading. It is reset to 0 after reading and can switch to zero only if the event register is reset to zero (by reading or *CLS).

MSS Master Summary Status (6 bit)

Indicates if the instrument has a reason to request a service. This information is accessible only in reading the status register. (*STB? command) and stays as it is after the reading.

ESB Event Satus Bit (5 bit)

Indicates if at least one of the conditions of the event register is satisfied and not masked.

MAV Message Available (4 bit)

Indicates if at least one response is in the output spooler.

Service request mask register

Reading and writing → *SRE command.

MSB				LSB				
7	6	5	4	3	2	1	0	*SRE<NRF>
		ESB	MAV					*SRE?

Event register

Reading → *ESR command. Its reading resets to zero.

Detailed description

MSB				LSB				
7	6	5	4	3	2	1	0	
PON	URQ	CME	EXE	DDE	QYE	RQC	OPC	*ESR?

PON	Power On (7 bit) Not used
URQ	User request (6 bit) Not used
CME	Command Error (5 bit) A command error has been detected.
EXE	Execution Error (4 bit) An error execution has been detected.
DDE	Device Dependant Error 3 (bit) An error specific to the instrument has been detected.
QYE	Query Error (2 bit) A query error has been detected.
RQC	Request Control (1bit) Always at zero.
OPC	Operation Complete (0 bit) All operations running are ended.

Event mask register

Reading and writing → *ESE command.

MSB				LSB				
7	6	5	4	3	2	1	0	*ESE<NRF>
PON	URQ	CME	EXE	DDE	QYE	RQC	OPC	*ESE?

IEEE 488.2 Commands

***CLS** (Command)
(Clear Status)

The common command ***CLS** reset the status and event register.

***ESE** (Command/Query)
(Event Status Enable)

The ***ESE <mask>** common command positions the status of the event mask.

<mask> is a value in format **<NR1>**, from 0 to 255.

A **1** authorises the corresponding bit of the event register to generate an event, while a **0** masks it.

To the question ***ESE?**, the instrument returns the current content of the event mask register.

Response format: <value><NL>

value in format **<NR1>** from 0 to 255.

Event mask register :

MSB				LSB			
7	6	5	4	3	2	1	0
PON	URQ	CME	EXE	DDE	QYE	RQC	OPC

***ESR?** (Query)
(Event Status Register)

To the question ***ESR?**, the instrument returns the content of the event register.

Once the register has been read, the content value is reset to zero.

Response format: <value><NL>

value in format **<NR1>** from 0 to 255.

Event register

MSB				LSB			
7	6	5	4	3	2	1	0
PON	URQ	CME	EXE	DDE	QYE	RQC	OPC

***IDN?** (Query)
(Identification Number) To the question ***IDN?**, the instrument returns the type of instrument and the software version.

Response format:

<instrument>,<firmware version>/<hardware version><NL>
<instrument> Instrument reference
<firmware version> Software version
<hardware version> PCB version

***OPC** (Command/Query)
(Operation Complete) The command ***OPC** authorises the setting to 1 of the OPC bit in the event register as soon as the current operation is completed.
To the question ***OPC?**, the instrument returns the character ASCII "1" as soon as the current operation is terminated.

***RST** (Command)
(Reset) The command ***RST** reconfigures the instrument with the factory settings.

***SRE** (Command/Query)
(Service Request Enable) The command ***SRE <mask>** positions the service request mask register.

<mask> is a value in format <NR1>, from 0 to 255.

A value of bit at 1 enables the same-rank bit of the status register to request a service (bit of the status register contains 1). A bit value at 0 neutralizes it.

To the question ***SRE?**, the instrument returns the value of the service demand mask register.

Response format: <value><NL>

value in format <NR1> from 0 to 255.

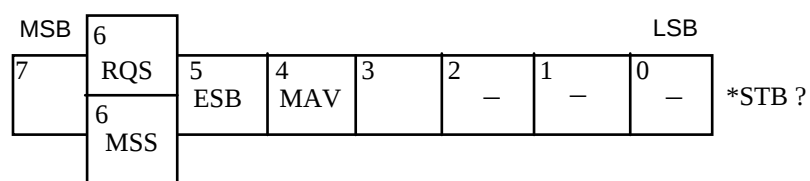
Service demand mask register :

MSB				LSB			
7	6	5	4	3	2	1	0
0	0	ESB	MAV	0	0	0	0

***STB?** (Query)
 (Status Byte) To the question ***STB?** the instrument returns the content of its status register (Status Byte Register).

The bit 6 returned indicates the MSS value (Master Summary Status) (at 1 if the instrument has a reason for requesting a service).
 Contrary to RQS, it is not reset to zero after reading the status register (RQS is accessible only by a series recognition, and falls to 0 at its end).

Status register



***TRG** (Command)

The command ***TRG** starts an acquisition in the current mode "single" or "continuous".

***TST?** (Query)

(Test) To the question ***TST?**, the instrument returns the status of the autotest procedure.

Response format: <0|1><NL>

- responds 0 when the autotest is successful.
- responds 1 when a problem has been detected.

***WAI** (Command)

(Wait) The command ***WAI** prevents the instrument from performing further commands as long as the current command has not been terminated. This enables to synchronize the instrument with the application program in progress on the controller.

Tree structure**IEEE 488.2
Common commands**

Command	Function
*CLS	Reset the status and event registers
*ESE	Write event mask
*ESE?	Read event mask
*ESR?	Read event register
*IDN?	Read identifier
*OPC	Validate bit OPC
*OPC?	Wait till end of execution
*RST	Reset
*SRE	Write service request mask
*SRE?	Read service request mask
*STB?	Read status register
*TRG	Starts an acquisition in the current mode
*TST?	Returns the status of the autoset procedure
*WAI	Command synchronization

SCPI Commands

Directory	Commands + parameters	page
ABORt		30
AUTOSet	:EXEcute	30
CALCulate	:MATH{2 3}[:EXPRession][:DEFine] <(fct)>	10
	:MATH{2 3}[:EXPRession][:DEFine]?	
	:MATH{2 3}[:EXPRession]:DELete	10
	:TRANSform:FREQuency[:STATe] <1 0 ON OFF>	16
	:TRANSform:FREQuency[:STATe]?	
	:TRANSform:FREQuency:WINDow <RECTangular HAMMING HANNing BLACKman>	16
	CALCulate:TRANSform:FREQuency:WINDow?	
DEVICE	MODE <SCOPE MULTimeter> DEVICE:MODE?	
DISPlay	[:WINDow]:CURSor:AUTO:STATe <1 0 ON OFF>	22
	[:WINDow]:CURSor:AUTO:STATe?	
	[:WINDow]:CURSor:PHASe:STATe <1 0 ON OFF>	22
	[:WINDow]:CURSor:PHASe:STATe?	
	[:WINDow]:CURSor:REFerence <INT{1 2 3 4}>	18
	[:WINDow]:CURSor:REFerence?	
	[:WINDow]:CURSor:STATe <1 0 ON OFF>	21
	[:WINDow]:CURSor:STATe?	
	[:WINDow]:CURSor:TIME{[1] 2 3}:POSition <position MAX MIN>	21
	[:WINDow]:CURSor:TIME{[1] 2 3}:POSition?	
	[:WINDow]:CURSor:VOLT{[1] 2 3}:POSition?	21
	[:WINDow]:TRACe:FORMat <A XY>	17
	[:WINDow]:TRACe:FORMat?	
	[:WINDow]:TRACe:MODE <NORMal ENVELOpe>	17
	[:WINDow]:TRACe:MODE?	
	[:WINDow]:TRACe:STATe{[1] 2 3 4} <1 0 ON OFF>	9
	[:WINDow]:TRACe:STATe{[1] 2 3 4}?	
	[:WINDow]:TRACe:X[:SCALE]:PDIVision <scale MAX MIN UP DOWN >	16
	[:WINDow]:TRACe:X[:SCALE]:PDIVision?	
	[:WINDow]:TRACe:XY:XDEFine <INT{1 2 3 4}>	17
	[:WINDow]:TRACe:XY:XDEFine?	
	[:WINDow]:TRACe:XY:YDEFine <INT{1 2 3 4}>	17
	[:WINDow]:TRACe:XY:YDEFine?	
	[:WINDow]:TRACe:Y:LABel{[1] 2 3 4} <"label">	11
	[:WINDow]:TRACe:Y:LABel{[1] 2 3 4}?	
	[:WINDow]:TRACe:Y:SPACing <LOGarithmic LINear>	16
	[:WINDow]:TRACe:Y:SPACing?	
	[:WINDow]:TRACe:Y[:SCALE]:PDIVision{[1] 2 3 4} <scale MAX MIN>	10
	[:WINDow]:TRACe:Y[:SCALE]:PDIVision{[1] 2 3 4}?	
FORMat	:DINTerchange <1 0 ON OFF>	24
	:DINTerchange?	
	[:DATA] <INTeger ASCii HEXadecimal BINary>	25
	[:DATA]?	
HCOPY	:DESTination <"SERial " "CENTronics " "NETwork " "file ">	27
	:DESTination?	
	:DEVIce:COLor <1 0 ON OFF>	28
	:DEVIce:COLor?	
	:DEVIce:LANGuage <IBM EST PCL DPU POSTscript BMP GIF>	28
	:DEVIce:LANGuage?	
	:SDUMp[:IMMediate]	28
	:SDUMp:UNDO	
HELP	[?] <directory-entry> [?]	30
INITiate	:CONTinuous:NAME <EDGE PUL TV>, <ON OFF 1 0>	30
	[:IMMediate]:NAME <EDGE PUL TV>	15
INPut	{[1] 4}:COUPLing <AC DC GROund> {[1] 4}:COUPLing?	9

Directory	Commands + parameters	page
	{{1} 4}:DMM:BANDwidth:AUTO {{1} 4}:DMM:BANDwidth:AUTO, {{1} 4}:DMM:COUPling <AC DC ACDC> {{1} 4}:DMM:COUPling?	31
MEASure	:AC? <INT{1 2 3 4}>	19
	:AMPLitude? <INT{1 2 3 4}>	19
	:CURSor:DTIME?	21
	:CURSor:DVOLT?	22
	:DMM? <INT{1 2 3 4}>	32
	:FALL:OVERshoot? <INT{1 2 3 4}>	19
	:FALL:TIME? <INT{1 2 3 4}>	19
	:FTIME? <INT{1 2 3 4}>	
	:FREQuency? <INT{1 2 3 4}>	20
	:HIGH? <INT{1 2 3 4}>	18
	:LOW? <INT{1 2 3 4}>	18
	:MANual: PHASe?	22
	:MAXimum? <INT{1 2 3 4}>	18
	:MINimum? <INT{1 2 3 4}>	18
	:NWIDth? <INT{1 2 3 4}>	20
	:PDUTYcycle? <INT{1 2 3 4}>	20
	:PERiod? <INT{1 2 3 4}>	20
	:PHASe? <INT{1 2 3 4}>	
	:PTPeak? <INT{1 2 3 4}>	18
	:PULse:COUNT? <INT{1 2 3 4}>	20
	:PWIDth? <INT{1 4}>	19
	:RISE:OVERshoot? <INT{1 2 3 4}>	19
	:RISE:TIME? <INT{1 2 3 4}>	19
	:RTIME? <INT{1 2 3 4}>	
	:SUM?<INT{1 2 3 4}>	20
	:VOLT[:DC]? <INT{1 2 3 4}>	19
MMEMorY	:CATalog?	26
	:DATA <"file">,<block>	26
	:DATA? <"file">	
	:DELeTe <"file">	26
	:LOAD:MACRo <INT{2 3}>,<"file">	10
	:LOAD:STATe <"file.CFG">	25
	:LOAD:TRACe <TRACE{1 2 3 4}>,<"file.TRC">	23
	:SOUrce?	26
	:STORE:MACRo <INT{2 3}>,<"file">	10
	:STORE:STATe <"file.CFG">	25
	:STORE:TRACe <INT{1 2 3 4} REF{1 2 3 4}>,<"file.TRC" "file.TXT">	22
[SENSe]	:AVERage:COUNT <2 4 16 64 MAX MIN UP DOWN>	15
	:AVERage:COUNT?	
	:AVERage[:STATe] <1 0 ON OFF>	15
	:AVERage[:STATe]?	
	:AVERage:TYPE <NORMal ENVelope>	15
	:AVERage:TYPE?	
	:BANDwidth{[1] 4}[:RESolution]<bandwidth>	9
	:BANDwidth{[1] 4}[:RESolution]?	
	:BANDwidth{[1] 4}[:RESolution]:AUTO <1 0 ON OFF>	10
	:BANDwidth{[1] 4}[:RESolution]:AUTO?	
	:FUNctioN[1] <VOLTage RESistance CONTinuity CAPAcitor DIODE PT100>	32
	:FUNctioN[1]?	
	:RANGe{[1] 4}:AUTO <1 0 ON OFF>	31
	:RANGe{[1] 4}:AUTO?	
	:RANGe[1]:CAPA <range MAX MIN UP DOWN >	31
	:RANGe[1]:CAPA?	
	:RANGe[1]:OHM <range MAX MIN UP DOWN >	31
	:RANGe[1]:OHM?	

Directory	Commands + parameters	page
	:RANGe{[1] 4}:VOLT <range MAX MIN UP DOWN > :RANGe{[1] 4}:VOLT?	32
	:SWEep:OFFSet:TIME <time MAX MIN UP DOWN> :SWEep:OFFSet:TIME?	17
	:SWEep:TIME :SWEep:TIME?	32
	:VOLTage{[1] 4}[:DC]:RANGe:OFFSet <offset MAX MIN UP DOWN> :VOLTage{[1] 4}[:DC]: RANGe:OFFSet?	11
	:VOLTage{[1] 4}[:DC]:RANGe:PTPeak <sensibility MAX MIN UP DOWN> :VOLTage{[1] 4}[:DC]:RANGe:PTPeak?	9
SYSTem	:COMMunicate:SOCKeT:ADDReSS <"IP Address "> :COMMunicate:SOCKeT:ADDReSS?	27
	:DATE <yyyy>,<mm>,<dd> :DATE?	29
	:ERRor[: N EXT]?	33
	:KLOCK <1 0 ON OFF> :KLOCK?	29
	:LANGuage <ENGLISH FREnch GERman SPANish ITALian> :LANGuage?	29
	:SET <block> :SET?	25
	:TIME <HH>,<MM>,<SS> :TIME?	29
TRACe	TRACe:CATalog?	23
	[:DATA]? <INT1 2 3 4>	23
	:LIMit <limit1>,<limit2>,<step> :LIMit?	23
TRIGger	[:SEQuence{[1] 2 5}]:ATRIGger[:STATe] <1 0 ON OFF> [:SEQuence{[1] 2 5}]:ATRIGger[:STATe]?	15
	[:SEQuence{[1] 2 5}]:COUPling <AC DC> [:SEQuence{[1] 2 5}]:COUPling?	21
	[:SEQuence{[1] 2 5}]:DEFine?	11
	:SEQuence2:DELay <delay MAX MIN UP DOWN> :SEQuence2:DELay?	14
	[:SEQuence{[1] 2 5}]:FILTer:HPASs[:STATe] <1 0 ON OFF> [:SEQuence{[1] 2 5}]:FILTer:HPASs[:STATe]?	12
	[:SEQuence{[1] 2 5}]:FILTer:LPASs[:STATe] <1 0 ON OFF> [:SEQuence{[1] 2 5}]:FILTer:LPASs[:STATe]?	12
	[:SEQuence{[1] 2}]:HYSTeresis <0 3> [:SEQuence{[1] 2}]:HYSTeresis?	13
	[:SEQuence[1] 5]:HOLDoff <holdoff> [:SEQuence[1] 5]:HOLDoff?	14
	[:SEQuence{[1] 2 5}]:LEVel <level MAX MIN UP DOWN> [:SEQuence{[1] 2 5}]:LEVel?	14
	[:SEQuence{[1] 2 5}]:RUN:STATe <1 0 ON OFF> [:SEQuence{[1] 2 5}]:RUN:STATe?	30
	[:SEQuence{[1] 2 5}]:SLOPe <POSitive NEGative> [:SEQuence{[1] 2 5}]:SLOPe?	13
	[:SEQuence{[1] 2 5}]:SOURce <INTernal{1 4} EXTernal EXTernal5 LINE> [:SEQuence{[1] 2 5}]:SOURce?	12
	[:SEQuence[2]]:TYPE <SUPerior INFERior> [:SEQuence[2]]:TYPE?	14
	[:SEQuence[5]]:VIDeo:FIELD:FORMat:LPFrame <525 625> [:SEQuence[5]]:VIDeo:FIELD:FORMat:LPFrame?	12
	[:SEQuence[5]]:VIDeo:LINE:SElect <line> [:SEQuence[5]]:VIDeo:LINE:SElect?	13
	[:SEQuence[5]]:VIDeo:SSIGnal[:POLarity] <POSitive NEGative> [:SEQuence[5]]:VIDeo:SSIGnal[:POLarity]?	13