

SCOPIX III

Portable Oscilloscopes

OX 7042	2-channel	40 MHz
OX 7062	2-channel	60 MHz
OX 7102	2-channel	100 MHz
OX 7104	4-channel	100 MHz
OX 7202	2-channel	200 MHz
OX 7204	4-channel	200 MHz

Remote programming



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Remote programming

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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:

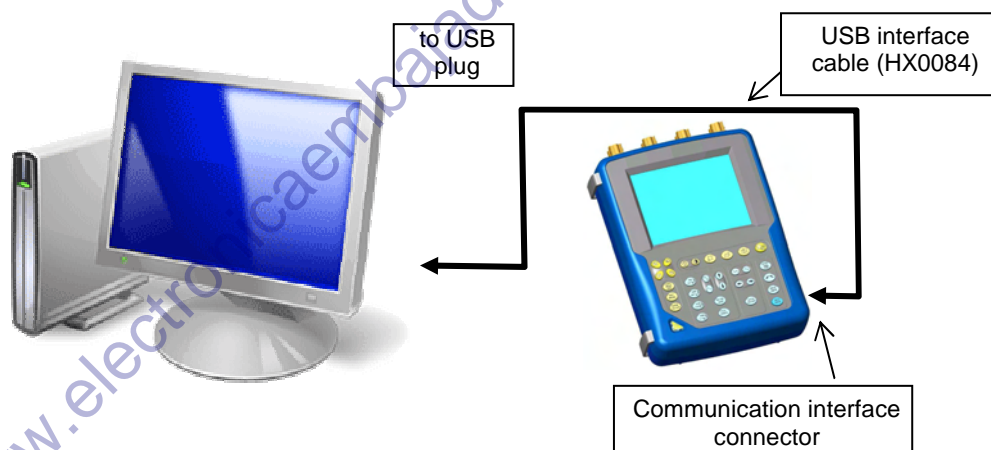
- Configure the instrument
- Perform measurements campaign
- Transfer files

Connection of the instrument

The oscilloscope can be remotely programmed using a computer or PC. The dialogue between the instrument and the PC can be realized via the USB connection, RS232 or Ethernet.

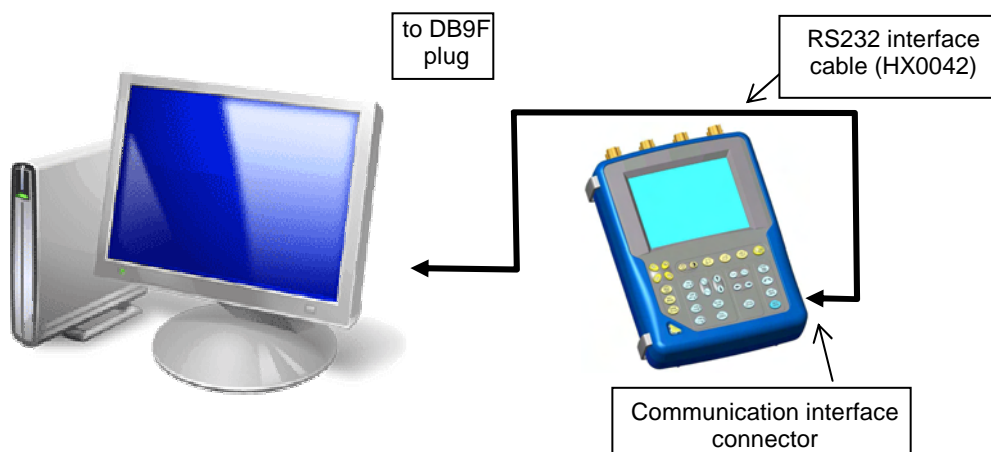
Connexion through « USB »

- Connect the **HX0084** cable between a PC USB port and the SCOPIX communication connector.
- Configure the PC virtual COM port with the following parameters :
460800 bauds, 8 bits, no parity, hardware protocole.



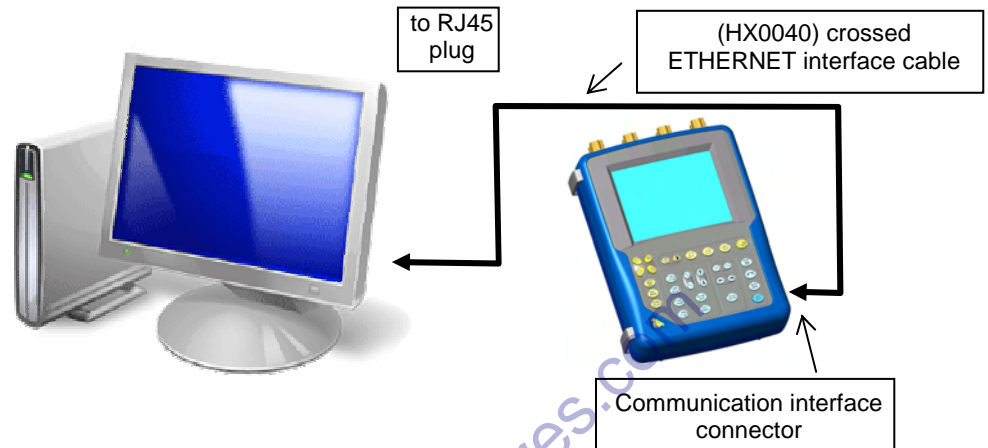
Connection through « RS232 »

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



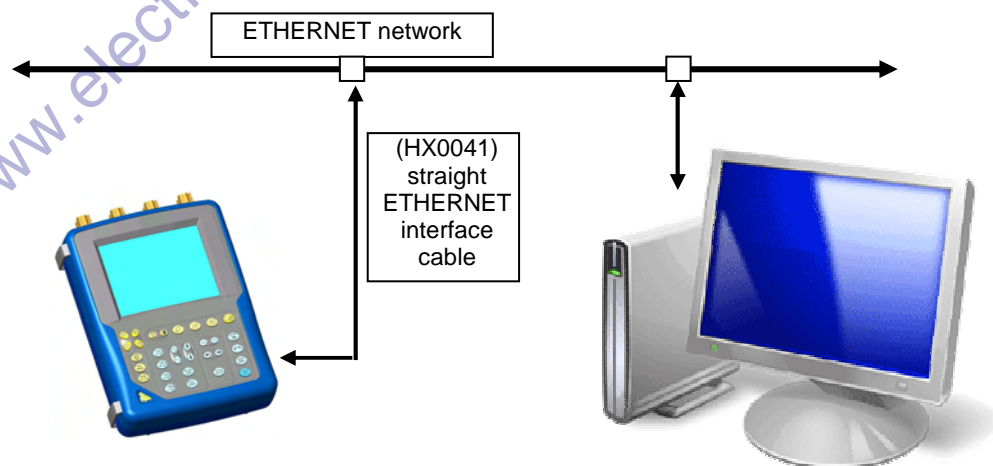
**Connection through
« ETHERNET »**

- 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.

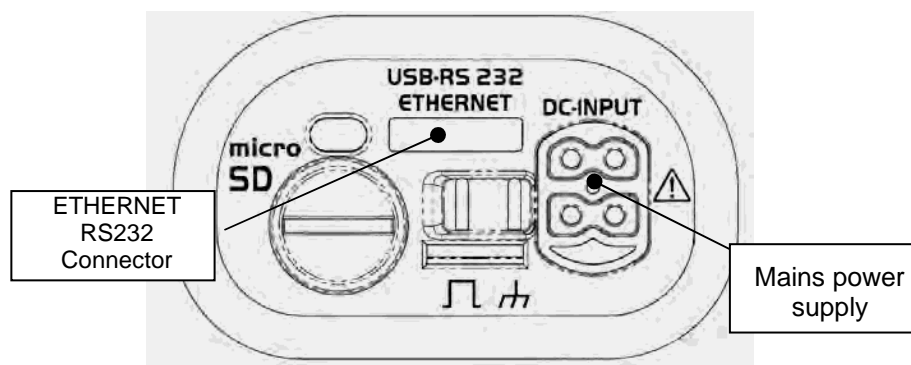


Straight cable

- 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 :

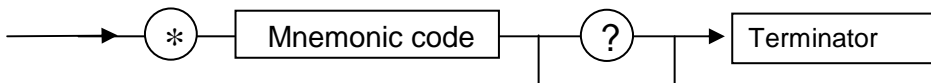
DISP:TRAC:STAT1 1;STAT2 1<NL>

same as :

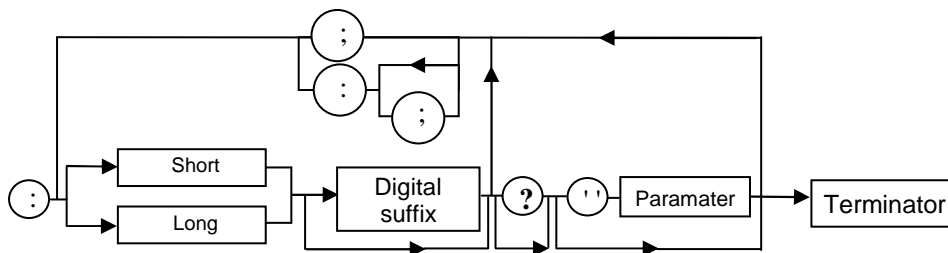
DISP:TRAC:STAT1 1;; DISP:TRAC:STAT2 1<NL>

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 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 separates 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 There are several values :

NRf (flexible Numeric Representation).
In the case of physical quantity, these numbers can be or not by a multiple and its unit.

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

✎ *Example* : 1 micro second can be written either 1 μ s 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 >**.

There are several data :

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

« Oscilloscope » Mode

Vertical

Display

`DISPlay[:WINDow]` (Command/Query)
`:TRACe:STATe{[1]|2|3|4}` The **DISP:TRAC:STAT{[1]|2|3|4} <1|0|ON|OFF>** command 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]|2|3|4}[:DC]:RANGe` **VOLT{[1]|2|3|4}:RANG:PTP <sensitivity|MAX|MIN|UP|DOWN>**
`:PTPeak` sets the full screen vertical sensitivity of the selected channel.

<sensitivity> is a value in **NRf** format, it may be followed or not by a multiple and the unit.

By default the value is expressed in volt.

To the question **VOLT{[1]|2|3|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 x 10 mV/div.

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

<offset> is a value in **NRf** format, it may be followed or not by a multiple and the unit.

By default the value is expressed in volt.

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

Response format: <measured value><NL>

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

INPut{[1]|2|3|4}:COUPling (Command/Query)

The **INP{[1]|2|3|4}:COUP <AC|DC|GROund>** command selects the coupling of the selected channel.

To the question **INP{[1]|2|3|4}:COUP?**, the instrument returns the coupling of the selected channel.

[SENSe]:BANDwidth
{[1]|2|3|4}[:RESolution] (Command/Query)

The **BAND{[1]|2|3|4} <Bandwidth>** command limits the channel bandwidth to the value of the parameter [5 kHz ; 1,5 MHz ; 20 MHz ; 0 (no bandwidth limit)].

To the question **BAND{[1]|2|3|4}?**, the instrument returns the value of the filter cut-off frequency [5 kHz ; 1,5 MHz ; 20 MHz ; 0 (no bandwidth limit)].

[SENSe]:BANDwidth
{[1]|2|3|4}[:RESolution]
:AUTO (Command/Query)

The command **BAND{[1]|2|3|4}:AUTO <1|0|ON|OFF>** validates or devalidates the application of the bandwidth limit on the selected channel.

To the question **BAND{[1]|2|3|4}:AUTO?**, the instrument returns the activation status of the bandwidth limit on the selected channel.

Function Definition

CALCulate:MATH
{[1] |2|3|4}[:EXPRession]
[:DEFine] (Command/Query)

The **CALC:MATH{[1]|2|3|4} <(function)>** command 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{[1]|2|3|4}?**, the instrument returns the mathematical function of the selected signal.

CALCulate:MATH{[1]
|2|3|4}[:EXPRession]:
DELete (Command)

The **CALC:MATH{[1]|2|3|4}:DEL** command deletes the mathematical function of the selected signal.

MMEMory:STORe:MACRo (Command)

The **MMEM:STOR:MACR <INT{1|2|3|4}>,<"file">,<LOCAL|FTP>** command saves the mathematical function of the selected signal in the file system, in a ".fct" file :

- LOCAL (internal memory or SDCard),
- or distant (FTP).

<"file"> consists in a name of 20 letters maximum, followed by a period and the FCT extension.

MMEMory:LOAD:MACRo (Command)

The **MMEM:STOR:MACR** <INT{1|2|3|4}>,<"file">,<LOCAL|FTP> command loads a mathematical function, from the file system, in a ".fct" file :

- LOCAL (internal memory or SDCard),
- or distant (FTP).

<"file"> consists in a name of 20 letters maximum, followed by a period and the FCT extension.

MMEMory:SOUrce? (Query)

To the question **MMEMory:SOUrce?** the instrument returns the type of active disk.

The query returns « SDCard » if a memory SDCard is present and it responds.

Otherwise, if there is no memory card, the issue is "RAM".

Finally, if there is an SDCard and it does not respond (so no disk is active), the question returns a SCPI error.

Response format : <disk name><NL>

Disk name = « RAM » when no SDCard is present
« SDCard » if SDCard is present.

Vertical Scale

DISPlay[:WINDow] (Command/Query)

:TRACe:Y[:SCALe]
:PDIVision{[1]|2|3|4}

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 **DISP:TRAC:Y:LAB**{[1]|2|3|4} <"label"> command determines the unit of the selected signal.

The unit is selected 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.

Trigger

Standard SCPI enables the use of various trigger modes thanks to the key word SEQUENCE.

The instrument has several trigger modes which are:

- Sequence 1 : Trigger on edge (EDGE)
- Sequence 2 : Trigger on pulse width (PULSE)
- Sequence 3 : Delayed trigger (DELAY)
- Sequence 4 : Delayed trigger by event counting (EVENT)
- Sequence 5 : Trigger on video signals such as television type (TV)
- Sequence 6 : Standard triggering of Recorder mode.
- Sequence 7: The "Fault Capture" triggering of the Recorder mode.
- Sequence 8 : Trigger on threshold of automatic measurement of the Oscilloscope mode.

TRIGGER[:SEQUENCE
{[1]|2|3|4|5|6|7}]:DEFINE?

(Command/Interrogation)

Returns the description of the indicated sequence :

SEQUENCE1: EDGE
SEQUENCE2: PULSE
SEQUENCE3: DELAY
SEQUENCE4: EVENT
SEQUENCE5: TV
SEQUENCE6: RECORDER
SEQUENCE7: CAPTURE
SEQUENCE8 : THRESHOLD

Trigger main source

- TRIGger[:SEQuence
{[1]|2|3|4|5}]:SOURce (Command/Query)
The **TRIG:SOUR <INTERNAL{1|2|3|4}>** command determines the main trigger source of the instrument.
INTERNAL{1|2|3|4} corresponds to the 1, 2, 3, 4 channel of the instrument.
To the question **TRIG:SOUR?**, the instrument returns the main trigger source used in.
- TRIGger[:SEQuence
{[1]|2|3|4|5}]:COUPling (Command/Query)
The **TRIG:COUP <AC|DC>** command 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|3|4|5}]
:FILTer:HPASs[:STATe] (Command/Query)
The **TRIG:FILT:HPAS <1|0|ON|OFF>** command 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|3|4|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 **TRIG:VID:FIEL:FORM:LPFR <525|625>** command 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 **TRIG:VID:LINE:SEL <line>** command 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)

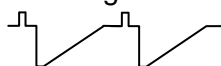
:VIDeo:SSIGnal[:POLarity]

The **TRIG:VID:SSIG <POSitive|NEGative>** command 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|3|4|5]:SLOPe

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|3|4}] :HYSTerisis[:STATe] (Command/Query)
The **TRIG:HYST <hysteresis>** command sets the amplitude of the hysteresis which rejects 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 which rejects the noise associated to the trigger main source.
- TRIGger[:SEQuence {[1]|2|3|4|5|8}]:LEVel (Command/Query)
Used in the Seq. 1 to 5, the **TRIG:LEV <level|MAX|MIN|UP|DOWN>** command sets the trigger level of the main source.
- Used in Seq. 8, the **TRIG:SEQ8:LEV <level|MAX|MIN|UP|DOWN>** command sets the trigger threshold of the 'Measure Thresholds' mode which has been activated in the 'Trig' menu.
- <level>** is a value in format **NRf**, it may be followed or not by a multiple and by the unit.
- By default, the value is expressed in volt.
- To the question **TRIG:LEV?**, the instrument returns the trigger level of the main source in SEQuence1.
- Response format: <measured value><NL>
value in format <NR3> expressed in volt.
- TRIGger:SEQuence8 :AUXLEVel (Command/Query)
The **TRIG:SEQ8:AUXLEV <level|MAX|MIN|UP|DOWN>** command sets the auxiliary measurement threshold used in the 'Measure Thresholds' of the 'TRIG' menu.
- <level>** is a value in format **NRf**, it may be followed or not by a multiple and by the unit.
- By default, the value is expressed in volt.
- To the question **TRIG:SEQ8:LEV?**, the instrument returns the trigger level of the main source in SEQuence1.
- Response format: <measured value><NL>
value in format <NR3> expressed in volt.

TRIGger[:SEQuence

[2]]:TYPe

(Command/Query)

The **TRIG:TYP <INFerior|SUPerior|INT|OUT>** command determines the trigger type on pulse width :

trigger on pulses of durations which are inferior (**INF**) or superior (**SUP**) to the specified duration, or which are situated inside (**INT**) or outside (**OUT**) of the specified temporal range, with :

- **INF** : triggers on a pulse if its duration is less than **t1**
- **SUP** : triggers on a pulse if its duration is more than **t1**
- **INT** : triggers on a pulse if its duration is between **t1** and **t1 + d**
- **OUT** : triggers on a pulse if its duration is situated over **t1** and **t1 + d**

To the question **TRIG:TYP?**, the instrument returns the trigger type on pulse width.

Response format: <INF|SUP|INT|OUT ><NL>

TRIGger:SEQuence{2|3}
:DELay

(Command/Query)

TRIG:SEQ{2|3}:DEL <time|MAX|MIN|UP|DOWN>

- in sequence 2 (Pulse) sets T1, the pulse time in following cases :
« t > T1 »,
« t > T1 and t < T2 »,
« t < T1 or t > T2 »
- in sequence 3 (trig-after-delay): sets the trigger delay on main source

<time> is a value in format <NRf>, it may be then followed or not by a multiple and by the unit.

By default the value is expressed in second.

To the question **TRIG:SEQ{2|3}:DEL?**, the instrument returns the trigger delay of the main source or the T1 pulse time according to the selected sequence.

Response format: <measured value><NL>

value in format <NR3> expressed in second.

TRIGger:SEQuence2:
DELDpulse

(Command/Query)

The command **TRIG:SEQ2:DELD <time|MAX|MIN|UP|DOWN>**

sets **T2**, the pulse time in following cases: « t < T2 »,
« t > T1 and t < T2 »,
« t < T1 or t > T2 »

<time> is a value in format <NRf>, it may be then followed or not by a multiple and by the unit.

By default the value is expressed in second.

To the question **TRIG:SEQ2:DELD?**, the instrument returns the T2 pulse time.

Response format: <measured value><NL>

value in format <NR3> expressed in second.

- TRIGger[:SEQuence
[1]|3|4|5]:HOLDoff (Command/Query)
The **TRIG:HOLD <time|MAX|MIN|UP|DOWN>** command sets the inhibition time of the trigger (Holdoff).
<time> is a value in format <NRf>, it may be followed or not by a multiple and by the unit.
By default the value is expressed in second.
To the question **TRIG:HOLD?**, the instrument returns the trigger Holdoff time.
Response format: <measured value><NL>
value in format <NR3> expressed in second.
- TRIGger[:SEQuence[4]] (Command/Query)
:ECOunt
The **TRIG:ECO <count|MAX|MIN|UP|DOWN>** command sets the number of events used in the trigger mode delayed by count.
<count> is a value in format NR1 from 3 to 16384.
To the question **TRIG:ECO?**, the instrument returns the number of events to be counted before the trigger.
- TRIGger[:SEQuence{8}] (Command/Query)
:THReshold:MEASure
The command **TRIG:THR:MEAS <NO|MIN|MAX|PTPeak|LOW|HIGH|AMPLitude|ROVERshoot|FOVERshoot|RTIME|FTIME|PWIDth|NWIDth|FREQuency|PERiod|PDUTycycle|COUNT>** selects the type of measurement of the "Measure Thresholds" function. The channel analyzed is the channel used as trigger source.
Select **TRIG:THR:MEAS NO** to deactivate the trigger on threshold.
To the question **TRIG:THR:MEAS?**, the instrument returns the measurement used by the trigger on threshold.

Trigger Auxiliary Source

ARM[:SEQuence{[3][4]}] (Command/Query)
:COUPling

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

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

ARM[:SEQuence{[3][4]}] (Command/Query)
:LEVel

The **ARM:LEV <level|MAX|MIN|UP|DOWN>** command sets the trigger level of the auxiliary source.

<level> is a value in format **<NRf>**, it may be followed or not by a multiple and by the unit.

By default, the value is expressed in volt.



To the question **ARM:LEV?**, the instrument returns the trigger level of the auxiliary source.

Response format: <measured value><NL>

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

ARM[:SEQuence{[3][4]}] (Command/Query)
:SLOPe

The **ARM:SLOP <POSitive|NEGative>** command determines the trigger front of the auxiliary source.

- **POSitive:** rising front 
- **NEGative:** falling front 

To the question **ARM: SLOP?**, the instrument returns the polarity of the trigger front of the auxiliary source.

ARM[:SEQuence{[3][4]}] (Command/Query)
:SOURce

The **ARM:SOUR <INTernal{1|2|3|4}>** command determines the auxiliary trigger source of the instrument.

INTernal{1|2|3|4} corresponds to the channel 1, 2, 3, 4 of the instrument.

To the question **ARM:SOUR?**, the instrument returns the used trigger auxiliary source.

ARM[:SEQuence{[3][4]}] (Command/Query)
:HYSTeresis

The **ARM:HYST <hysteresis>** command sets the amplitude of the hysteresis which rejects the noise associated to the trigger auxiliary source.

<hysteresis> is a value in format NR1 with following values :

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

To the question **ARM:HYST?**, the instrument returns the amplitude of the hysteresis used for the noise rejection associated to the trigger auxiliary source.

ARM[:SEQuence{[3][4]}]
:FILTer:HPASs[:STATe] (Command/Query)

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

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

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

ARM[:SEQuence{[3][4]}]
:FILTer:LPASs[:STATe] (Command/Query)

The **ARM:FILT:LPAS <1|0|ON|OFF>** command validates or devalidates the high frequencies reject associated to the trigger auxiliary 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 **ARM:FILT:LPAS?**, the instrument returns the activation status of the high frequencies reject associated to the trigger auxiliary source.

Trigger mode / automatic mode

TRIGger[:SEQuence
{[1][2][3][4][5]}]
:ATRIGger[:STATe] (Command/Query)

The **TRIG:ATRIG <1|0|ON|OFF>** command 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)

INIT:NAME <EDGE|PULse|DELay|EVENT|TV|RECOOrder|CAPTuRe> runs an acquisition in single mode.

In the CAPTuRe (Recorder) mode, the capture of 10 faults is launched.

Horizontal

Min/Max Acquisition

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

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

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

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

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

The **AVER <1|0|ON|OFF>** command 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

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)
:FREQUency[:STATe]

The **CALC:TRAN:FREQ <1|0|ON|OFF>** command 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 **DISP:TRAC:Y:SPAC <LOGarithmic|LINEar>** command 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[:SCALe]
:PDIVision

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

<scale> is a value in format **NRf**, it may be followed or not by a multiple and by the unit.

By default, the value is expressed in second.

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

<time> is a signed value in format **<NRf>** ; it may be followed or not by a multiple and by the unit.

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 **DISP:TRAC:MODE** <NORMAl|ENVELOpe> command 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 **DISP:TRAC:FORM** <A|XY> command 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 **DISP:TRAC:XY:XDEF** <INT{1|2|3|4}> command 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 **DISP:TRAC:XY:YDEF** <INT{1|2|3|4}> command 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 (Command/Query)
:REFerence

The **DISP:CURS:REF** <INT{1|2|3|4}> command 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:PDUTycycle? (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>.

MEASure:SUM? (Query)

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

Response format: <measured value><NL>

value in format <NR3>.

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 degree.

Manual measurement

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

The **DISP:CURS:STAT <1|0|ON|OFF>** command 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 **DISP:CURS:TIME{[1]|2|3}:POS <position|MAX|MIN>** command sets the horizontal position of the selected manual cursor.

<position> is a value in format **NRf**, it may be followed or not by a multiple and the unit.

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] (Command/Query)
:CURSor:PHASe:STATe

The **DISP:CURS:PHAS:STAT <1|0|ON|OFF>** command 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 degree.

Unattached cursors

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

The **DISP:CURS:AUTO:STAT <1|0|ON|OFF>** command 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 **MMEM:STOR:TRAC <INT{1|2|3|4}|REF{1|2|3|4}>**,
<"file.TRC"|"file.TXT">,<LOCAL|SDCARD|FTP>] command generates a ".TRC" or ".TXT" file from the signal or the indicated reference memory, in the selected file system.

If the file system is not specified, the default file system is used (see command **MMEM:MSIS**).

<"file"> consists in a name of 20 letters maximum, followed by a period and the **TRC** extension.

MMEMory:LOAD:TRACe (Command)

The **MEM:LOAD:TRAC <TRACE{1|2|3|4}>,<"file.TRC">[,<LOCAL|SDCARD|FTP>]** command reads a trace defined in a ".TRC" file and affects it to the indicated signal.

If the file system is not specified, the default file system is used (see command **MMEM:MSIS**).

<"file"> consists in a name of 20 letters maximum, followed by a period and the **TRC** extension.

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? <INT{1|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 **FORMat:DINTerchange** and **FORMat[:DATA]** commands.

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 **FORM:DINT <1|0|ON|OFF>** command 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.

Response format: DIF format:

(DIF	(VERsion <year.version>)
DIMension=X	(TYPE IMPLicit SCALe <sample interval> SIZE <sample no> U N I T s "S")
DIMension=Y	(TYPE EXPLicit SCALe <ADC step> SIZE 262144 OFFSet 393216 U N I T s "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 volt 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 in whole numbers, unsigned with a length of 32 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

B1001010,#B1000110,#B1000111,# B1001100

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

Configuration

- MMEMory:STORe:STATe** (Command)
- The **MMEM:STOR:STAT** <"file">[,<LOCAL|SDCARD|FTP>] command generates a ".CFG" file from the instrument configuration, in the selected file system.
- If the file system is not specified, the default file system is used (see command **MMEM:MSIS**).
- <"file"> consists in a name of 20 letters maximum, followed by a period and the CFG extension.
- MMEMory:LOAD:STATe** (Command)
- The **MMEM:LOAD:STAT** <"file">[,<LOCAL|SDCARD|FTP>] command reads an instrument configuration from a ".cfg" file.
- If the file system is not specified, the default file system is used (see command **MMEM:MSIS**).
- <"file"> consists in a name of 20 letters maximum, followed by a period and the CFG extension.
- 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?** [,<LOCAL|SDCARD|FTP>] the device returns the list of files present in the local memory.
- If the file system is not specified, the default file system is used (see command **MMEM:MSIS**).
- Response format: <file number>, 0[,<file list>] <file number> is in **NR1** format. <file list> = <"file">,<type>,<size>
- <"file"> consists in a name of 20 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">[,<LOCAL|SDCARD|FTP>] command deletes a file.

If the file system is not specified, the default file system is used (see command **MMEM:MSIS**).

MMEMory:DATA (Command/Query)

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

<"file"> consists in a name of 20 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>

I/O port configuration**SYSTem:COMMunicate
:SOCKet:ADDRess** (Command/Query)

The **SYST:COMM:SOCK:ADDR** "<IPaddress>" command 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 instrument, any connection calling upon the ETHERNET connection will stop. A restarting of the instrument 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.

SYSTem:COMMunicate (Command/Query)

:SOCKet:FTPSeRver
:ADDReSS

**SYST:COMM:SOCK:FTPS:ADDR "<IPaddress>" "username",
"password"** sets up access to an FTP server.

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

"username" and "password" are chains of characters.

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

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

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Hardcopy

HCOPy:DESTination (Command/Query)

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 local memory (active disk). The name of the file contains 20 letters without extension. The extension is automatically 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)

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

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

HCOPy:SDUMp[:IMMediate] (Command)

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

HCOPy:SDUMp:UNDO (Command)

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

Configuration

DEVice:MODE (Command/Query)

The **DEV:MOD <SCOPE|ANALYSer|RECOder|MULTimeter>** command 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 **SYST:DATE <NR1>,<NR1>,<NR1>** command 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 **SYST:TIME <NR1>,<NR1>,<NR1>** command 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 **SYST:LANG <ENGLISH|FRENch|GERman|SPANish|ITALian>** command selects the language of the instrument.

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

SYSTem:KLOCK (Command/Query)

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

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

RUN/STOP

NITiate:CONTInuous:NAME (Command)

INIT:CONT:NAME <EDGE|PULse|DELay|EVENT|TV|RECORDER|CAPture>,<1|0|ON|OFF> starts or stops the acquisition in repetitive mode in the indicated trigger mode.

In the CAPTURE mode, the capture of faults in (Recorder) files is used.

ABORt (Command)

The **ABOR** command 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|3|4|6|7}
:RUN:STATe

The **TRIG:RUN:STAT <1|0|ON|OFF>** command 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 **AUTOS:EXE** command 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 » Mode

Vertical

INPut{[1]|2|3|4}:DMM
:COUPling (Command/Query)

The **INP{[1]|2|3|4}:DMM:COUP <AC|DC|GROund>** command affects the coupling of the selected channel.

To the question **INP{[1]|2|3|4}:DMM:COUP?** the instrument returns the current coupling of the selected channel.

INPUT:DMM
:BANDwidth:AUTO (Command/Query)

The **INP{[1]|2|3|4}:DMM:AUTO <1|0|ON|OFF>** command limits the bandwidth of the channel to 5 kHz.

To the question **INP{[1]|2|3|4}:DMM:AUTO?** the instrument shows if the bandwidth limit is active.

[SENSe]:RANGe
{[1]|2|3|4}:AUTO (Command/Query)

The **RANG{[1]|2|3|4}:AUTO <1|0|ON|OFF>** command 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 **RANG:CAPA <range|MAX|MIN|UP|DOWN>** command selects the range of measurement to be used in capacitance mode.

<range> is a value in format **NRf**, it may be followed or not by a multiple and by the unit.

By default, the value is expressed in Farad.

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

Response format: <range><NL>

value in format <NR3>

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

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

<range> is a value in format **NRf**, it may be followed or not by a multiple and by the unit.

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

To the question **RANG:OHM?** the instrument returns the value of the measurement range of the ohmmeter.

Response format: <range><NL>
value in format <NR3>

[SENSe]:RANGe
{[1]|2|3|4}:VOLT (Command/Query)

The **RANG{[1]|2|3|4}:VOLT <range|MAX|MIN|UP|DOWN>** command 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 or not by a multiple and by the unit.

By default, it is expressed in volt.

To the question **RANG{[1]|2|3|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 <NR3>

Recording time

[SENSe]:SWEep:TIME[?] (Command/Query)

The **SWE:TIME <time|MAX|MIN|UP|DOWN>** command sets the recording time.

<time> is a value in **NRf** format and may be followed or not by a multiple of the unit.

By default, it is expressed in second.

To the question **SWE:TIME?** the instrument returns the recording time.

Response format: <time><NL>
value in the <NR3>

Measurement

MEASure:DMM? (Query)

To the question **MEAS:DMM? <INT1|2|3|4>** the instrument returns the value of the main measurement for the selected channel.

[SENSe]:FUNCTion (Command/Query)

FUNC <VOLTage|RESistance|CONTInuity|CAPAcitor|DIODE|PT100|POWER|POWER3> selects the measurement function on channel 1.

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

« Recorder » Mode

Trigger

ARM:SEquence {6 7} :SOURce	(Command/Query) The ARM:Seq{6 7}:SOUR <AINTernal TIMER> command validates the immediate (AINT) or (TIMER) deferred triggering. To the question ARM:Seq{6 7}:SOUR? , the device returns AINT or TIM.
TRIGger[:SEquence{[6] 7}]:LEVel{[1] 2 3 4}	(Command/Query) The TRIG:LEV{[1] 2 3 4} <threshold MAX MIN UP DOWN> command adjusts the main triggering level on the channel indicated, in RECORDER mode. <threshold> is a value in <NRf> format, it can therefore be followed or not by a sub-multiple and the unit. By default, the value is expressed in volt. To the question TRIG:LEV{[1] 2 3 4}? , the device returns the auxiliary triggering level on the channel indicated. <u>Response format:</u> <value measured><NL> value in <NR3> format, expressed in volt.
TRIGger[:SEquence{[6] 7}]:AUXLEVel{[1] 2 3 4}	(Command/Query) The TRIG:AUXLEV{[1] 2 3 4} <threshold MAX MIN UP DOWN> command adjusts the auxiliary triggering level on the channel indicated, in RECORDER mode. <threshold> is a value in <NRf> format, it can therefore be followed or not by a multiple and the unit. By default, the value is expressed in volt. To the question TRIG:AUXLEV{[1] 2 3 4}? , the device returns the auxiliary triggering level on the channel indicated. <u>Response format:</u> <value measured><NL> value in <NR3> format, expressed in volt.
TRIGger:SEquence{6 7} :DELay{[1] 2 3 4}	(Command/Query) TRIG:SEQ{6 7}:DEL{[1] 2 3 4} <time MAX MIN UP DOWN> In the RECORDER mode, setting of the default time generating a trigger. <time> is a value in <NRf> format, it can therefore be followed or not by a multiple and the unit. By default, the value is expressed in second. To the question TRIG:SEQ{6 7}:DEL{[1] 2 3 4}? , the instrument returns the event time triggering on the selected value. <u>Response format:</u> <value measured><NL> value in <NR3> format, expressed in second.

ARM[:SEQuence{[6][7]}
:DATE

(Command/Query)

The **ARM:DATE** <year>,<month>,<day> command adjusts the date of the deferred start-up.

<year>,<month>,<day> are values in <NR1> format

To the question **ARM:DATE?**, the device returns the date of the deferred start-up.

ARM[:SEQuence{[6][7]}
:TIME

(Command/Query)

The **ARM:TIME** <hour>,<minute>,<second> command adjusts the time of the deferred start-up.

<hour>,<minute>,<sec> are values in <NR1> format

To the question **ARM:TIME?**, the device returns the date of the deferred start-up.

TRIGger[:SEQuence{[6][7]}
:SLOPe{[1][2][3][4]}

(Command/Query)

TRIG:SLOP{[1][2][3][4]} <NO|POSitive|NEGative|EITher|WINDow> enables the selection of the trigger type on the indicated channel.

To the question **TRIG :SLOP**{[1][2][3][4]}?, the instrument returns the present trigger type.

Recording time

[SENSe]:SWEep:TIME[?]

(Command/Query)

The **SWE:TIME** <time|MAX|MIN|UP|DOWN> command sets the recording time.

<TIME> is a value in **NRf** format and may be followed or not by a multiple and the unit .

By default, it is expressed in second.

To the question **SWE:TIME?** the instrument returns the recording time.

Response format: <time><NL>

value in the <NR3>

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

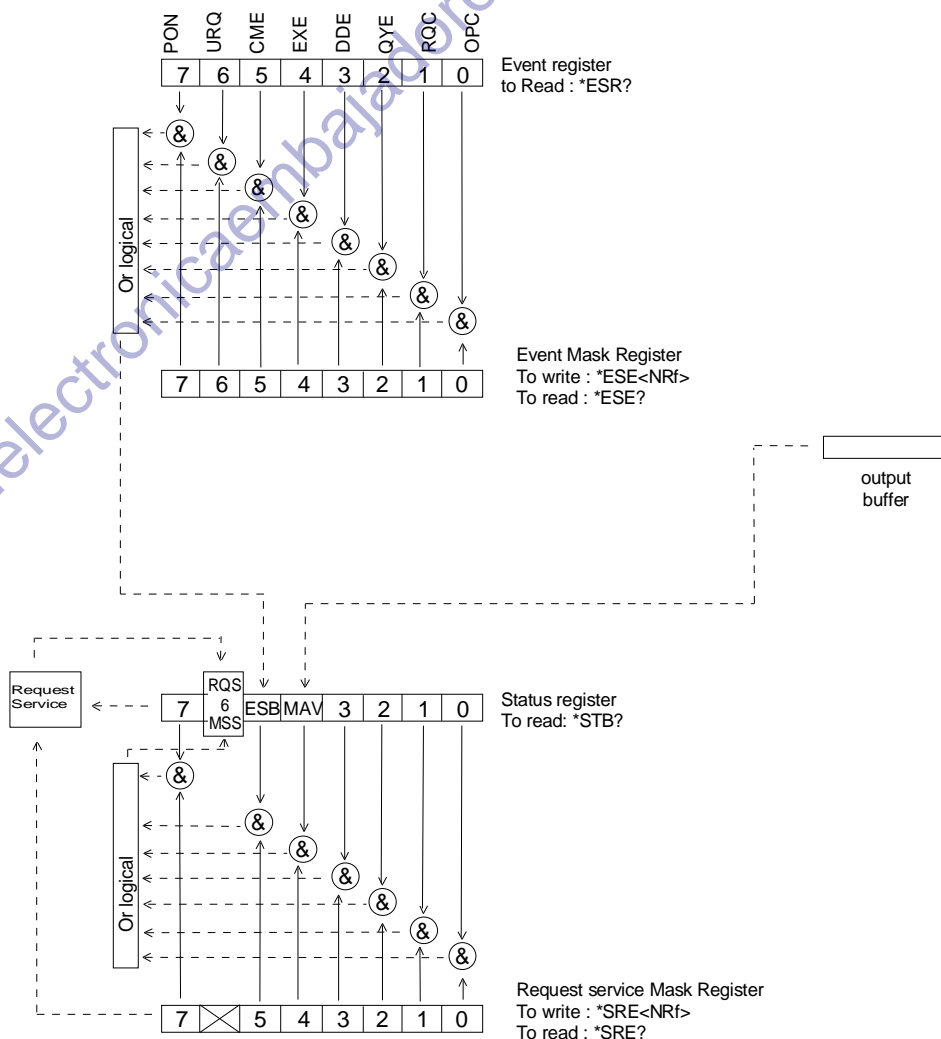
The common commands are defined by the IEEE 488.2 standard. They are operational on all instruments which are specified IEEE 488.2. They command basic functions such as:

- 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



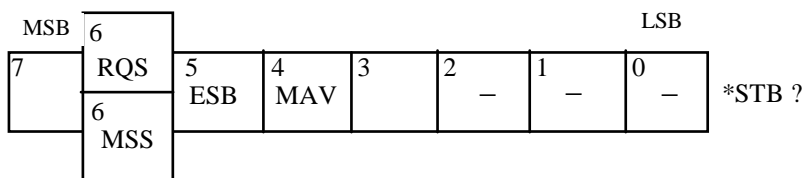
Status registers

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)

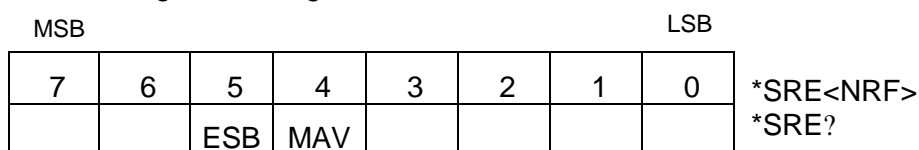
Indicates if at least one of the conditions of the event register is satisfied and not masked.

MAV Message Available (4 bit)

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

Service request mask register

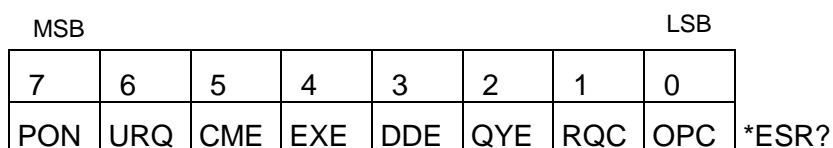
Reading and writing → *SRE command.



Event register

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

Detailed description



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		
PON	URQ	CME	EXE	DDE	QYE	RQC	OPC	*ESE<NRF> *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.

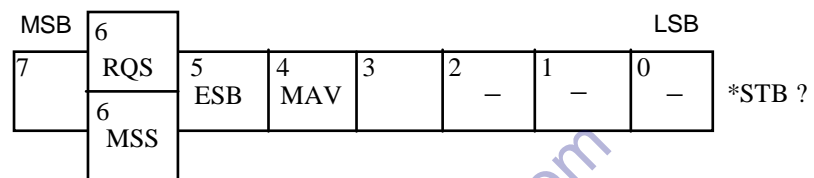
Service demand mask register :

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

Commands	Functions
*CLS	Resets the status and event registers
*ESE	Writes event mask
*ESE?	Reads event mask
*ESR?	Reads event register
*IDN?	Reads identifier
*OPC	Validates bit OPC
*OPC?	Waits till end of execution
*RST	Resets
*SRE	Writes service request mask
*SRE?	Reads service request mask
*STB?	Reads status register
*TRG	Starts an acquisition in the current mode
*TST?	Returns the status of the autoset procedure
*WAI	Commands synchronization

Commandes SCPI

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	[:SEQuence{[6][7]}:DATE <yyyy>,<mm>,<dd>	41
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	[:SEQuence{[3][4]}:FILTer:HPASs[:STATe] <1 0 ON OFF>	20
	[:SEQuence{[3][4]}:FILTer:HPASs[:STATe]?	
	[:SEQuence{[3][4]}:FILTer:LPASs[:STATe] <1 0 ON OFF>	20
	[:SEQuence{[3][4]}:FILTer:LPASs[:STATe]?	
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[:WINDow]:TRACe:XY:XDEFine <INT{1 2 3 4}>	23	
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Directory	Commands + parameters (cont'd)	page
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	:PWIDth? <INT{1 2 3 4}>	25
	:RISE:OVERshoot? <INT{1 2 3 4}>	25
	:RISE:TIME? <INT{1 2 3 4}>	25
	:RTIME? <INT{1 2 3 4}>	25
	:SUM? <INT{1 2 3 4}>	26
	:VOLT[:DC]? <INT{1 2 3 4}>	24

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	:DATA <"file">,<block> :DATA? <"file">	33	
	:DELete <"file">[,<LOCAL SDCARD FTP>]	33	
	:LOAD:MACRo <INT{1 2 3 4}>,<"file">[,<LOCAL SDCARD FTP>]	12	
	:LOAD:STATe <"file.CFG">[,<LOCAL SDCARD FTP>]	32	
	:LOAD:TRACe <TRACE{1 2 3 4}>,<"file.TRC">[,<LOCAL SDCARD FTP>]	29	
	:MSIS <LOCAL SDCARD FTP> :MSIS?	12	
	:STORe:MACRo <INT{1 2 3 4}>,<"file">[,<LOCAL SDCARD FTP>]	11	
	:STORe:STATe <"file.CFG">[,<LOCAL SDCARD FTP>]	32	
	:STORe:TRACe <INT{1 2 3 4} REF{1 2 3 4}>,<"file.TRC" <"file.TXT">[,<LOCAL SDCARD FTP>]	28	
[SENSE]	:AVERAge:COUNT <2 4 16 64 MAX MIN UP DOWN> :AVERAge:COUNT?	21	
	:AVERAge[:STATe] <1 0 ON OFF> :AVERAge[:STATe]?	21	
	:AVERAge:TYPE <NORMal ENVELOpe> :AVERAge:TYPE?	21	
	:BANDwidth{[1] 2 3 4}[:RESolution] <bandwidth> :BANDwidth{[1] 2 3 4}[:RESolution]?	11	
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	:RANGe{[1] 2 3 4}:AUTO <1 0 ON OFF> :RANGe{[1] 2 3 4}:AUTO?	38	
	:RANGe[1]:CAPA <range MAX MIN UP DOWN > :RANGe[1]:CAPA?	38	
	:RANGe[1]:OHM <range MAX MIN UP DOWN > :RANGe[1]:OHM?	39	
	:RANGe{[1] 2 3 4}:VOLT <range MAX MIN UP DOWN > :RANGe{[1] 2 3 4}:VOLT?	39	
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	:SWEep:TIME <time MAX MIN UP DOWN> :SWEep:TIME?	39;41	
	:VOLTage{[1] 2 3 4}[:DC]:RANGe:OFFSet <offset MAX MIN UP DOWN> :VOLTage{[1] 2 3 4}[:DC]: RANGe:OFFSet?	10	
	:VOLTage{[1] 2 3 4}[:DC]:RANGe:PTPeak <sensitivity MAX MIN UP DOWN> :VOLTage{[1] 2 3 4}[:DC]:RANGe:PTPeak?	10	
	SYSTEM	:COMMunicate:SOCKeT:ADDReSS <"IP Address"> :COMMunicate:SOCKeT:ADDReSS?	33
		:COMMunicate:SOCKeT:FTPSeRveR:ADDReSS <"IP Address">,<"username">,<"password">	34
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	[:DATA]? <INT1 2 3 4>	29
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TRIGger	[:SEQuence{[1] 2 3 4 5}]:ATRIGger[:STATe] <1 0 ON OFF> [:SEQuence{[1] 2 3 4 5}]:ATRIGger[:STATe]?	20
	[:SEQuence{[6] 7}]:AUXLEVel{[1] 2 3 4} <level MAX MIN UP DOWN> [:SEQuence{[6] 7}]:AUXLEVel{[1] 2 3 4}?	40
	[:SEQuence8]:AUXLEVel <level MAX MIN UP DOWN> [:SEQuence8]:AUXLEVel?	16
	[:SEQuence{[1] 2 3 4 5}]:COUPling <AC DC> [:SEQuence{[1] 2 3 4 5}]:COUPling?	14
	[:SEQuence{[1] 2 3 4 5 6 7 8}]:DEFine?	13
	[:SEQuence{2 3}:DELay <delay MAX MIN UP DOWN> [:SEQuence{2 3}:DELay?	17
	[:SEQuence{6 7}:DELay{[1] 2 3 4} <delay MAX MIN UP DOWN> [:SEQuence{6 7}:DELay{[1] 2 3 4}?	40
	[:SEQuence2:DELDpulse <delay MAX MIN UP DOWN> [:SEQuence2:DELDpulse?	17
	[:SEQuence[4]]:ECOunt <count MAX MIN UP DOWN> [:SEQuence[4]]:ECOunt?	18
	[:SEQuence{[1] 2 3 4 5}]:FILTer:HPASs[:STATe] <1 0 ON OFF> [:SEQuence{[1] 2 3 4 5}]:FILTer:HPASs[:STATe]?	14
	[:SEQuence{[1] 2 3 4 5}]:FILTer:LPASs[:STATe] <1 0 ON OFF> [:SEQuence{[1] 2 3 4 5}]:FILTer:LPASs[:STATe]?	14
	[:SEQuence[1] 3 4 5]:HOLDoff <holdoff> [:SEQuence[1] 3 4 5]:HOLDoff?	18
	[:SEQuence{[1] 2 3 4}]:HYSTeresis[:STATe] <0 3> [:SEQuence{[1] 2 3 4}]:HYSTeresis[:STATe]?	16
	[:SEQuence{[1] 2 3 4 5 8}]:LEVel <level MAX MIN UP DOWN> [:SEQuence{[1] 2 3 4 5 8}]:LEVel?	16
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	[:SEQuence{[1] 2 3 4 5 6 7}]:RUN:STATe <1 0 ON OFF> [:SEQuence{[1] 2 3 4 5 6 7}]:RUN:STATe?	37
	[:SEQuence{[1] 2 3 4 5}]:SLOPe <POSitive NEGative> [:SEQuence{[1] 2 3 4 5}]:SLOPe?	15
	[:SEQuence{[6] 7}]:SLOPe{[1] 2 3 4} <NO POSitive NEGative EITHer WINDow> [:SEQuence{[6] 7}]:SLOPe{[1] 2 3 4}?	41
	[:SEQuence{[1] 2 3 4 5}]:SOURce <INTernal{1 2 3 4}> [:SEQuence{[1] 2 3 4 5}]:SOURce?	14
	[:SEQuence8]:THReshold:MEASure <NO MIN MAX PTP ...> [:SEQuence8]:THReshold:MEASure?	18
	[:SEQuence[2]]:TYPE <INFerior SUPerior INT OUT> [:SEQuence[2]]:TYPE?	17
	[:SEQuence[5]]:VIDeo:FIELd:FORMat:LPFrame <525 625> [:SEQuence[5]]:VIDeo:FIELd:FORMat:LPFrame?	14
	[:SEQuence[5]]:VIDeo:LINE:SElect <line> [:SEQuence[5]]:VIDeo:LINE:SElect?	15
	[:SEQuence[5]]:VIDeo:SSIGnal[:POLarity] <POSitive NEGative> [:SEQuence[5]]:VIDeo:SSIGnal[:POLarity]?	15