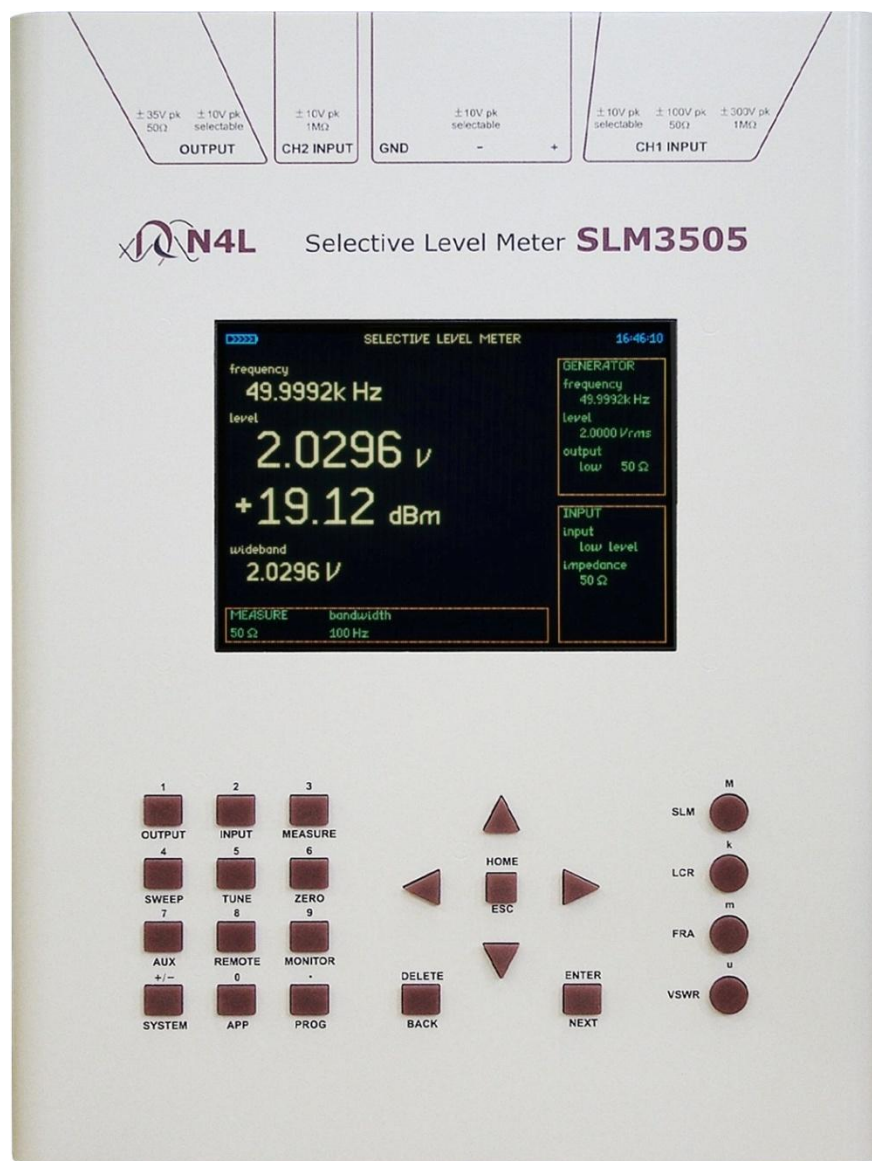




Newton4th Ltd

SLM3505

COMMUNICATIONS MANUAL



IMPORTANT SAFETY INSTRUCTIONS

This equipment is designed to comply with BSEN 61010-1 (Safety requirements for electrical equipment for measurement, control, and laboratory use) – observe the following precautions:

- Ensure that the supply voltage agrees with the rating of the instrument printed on the back panel **before** connecting the mains cord to the supply.
- This appliance **must** be earthed. Ensure that the instrument is powered from a properly grounded supply.
- The inputs must not be connected to signals greater than is indicated on the front panel.
- Keep the ventilation holes on the underneath and sides free from obstruction.
- Do not operate or store under conditions where condensation may occur or where conducting debris may enter the case.
- There are no user serviceable parts inside the instrument – do not attempt to open the instrument, refer service to the manufacturer or his appointed agent.

Note: Newtons4th Ltd. shall not be liable for any consequential damages, losses, costs or expenses arising from the use or misuse of this product however caused.

ABOUT THIS MANUAL

This manual gives details of the communication commands recognized by the SLM3505 series of instruments over RS232, USB, or LAN. For more general operating instructions for the instrument refer to the user manual.

Each command is listed alphabetically with details of any arguments and reply. A one line summary of each command is given in the appendix. Although most of the commands apply to all instruments in the range there are some commands that are specific to one instrument or another.

The information in this manual is believed to be accurate and complete but Newtons4th Ltd cannot accept any liability whatsoever for any consequential damage or losses arising from any errors, inaccuracies, or omissions.

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1 Using remote control

The instrument is fitted with an RS232 serial communications port and USB port as standard, and may have a LAN interface fitted as an option. All the interfaces use the same ASCII protocol with the following end of line terminators:

	Rx expects	Tx sends
RS232	carriage return	carriage return
USB	(line feed	and line feed
LAN	ignored)	

All the functions of the instrument can be programmed via any interface, and results read back. The port to be used is selected by the REMOTE menu.

The commands are not case sensitive and white space characters are ignored (e.g. tabs and spaces). Replies from the instrument are always upper case, delimited by commas, without spaces.

Only the first six characters of any command are important – any further characters will be ignored. For example, the command to set the generator frequency is FREQUE but the full word FREQUENCY may be sent as the redundant NCY at the end will be ignored.

Fields within a command are delimited by comma, multiple commands can be sent on one line delimited with a semi-colon. Eg.

AMPLIT,1.5;OUTPUT,ON

Mandatory commands specified in the IEEE488.2 protocol have been implemented, (e.g. *IDN?, *RST) and all commands that expect a reply are terminated with a question mark.

The instrument maintains an error status byte consistent with the requirements of the IEEE488.2 protocol (called the standard event status register) that can be read by the mandatory command *ESR? (see section 5.1).

The instrument also maintains a status byte consistent with the requirements of the IEEE488.2 protocol, that can be read by the mandatory command *STB? (see section 5.2).

The keyboard is disabled when the instrument is set to "remote". Press HOME to return to "local" operation.

RS232 data format is: start bit, 8 data bits (no parity), 1 stop bit. Flow control is RTS/CTS (see section 5.2); baud rate is selectable via the REMOTE menu.

A summary of the available commands is given in the Appendix. Details of each command are given in the communication command section of the manual.

Commands are executed in sequence except for two special characters that are immediately obeyed:

- Control T (20) – reset interface (device clear)
- Control U (21) – warm restart

LAN port number for IP communication =
10001 (ten thousand and one)

1.1 Standard event status register

PON		CME	EXE	DDE	QYE		OPC
-----	--	-----	-----	-----	-----	--	-----

- bit 0 OPC (operation complete)
cleared by most commands
set when data available or sweep complete
- bit 2 QYE (unterminated query error)
set if no message ready when data read
- bit 3 DDE (device dependent error)
set when the instrument has an error
- bit 4 EXE (execution error)
set when the command cannot be executed
- bit 5 CME (command interpretation error)
set when a command has not been recognised
- bit 7 PON (power on event)
set when power first applied or unit has reset

The bits in the standard event status register except for OPC are set by the relevant event and cleared by specific command (*ESR?, *CLS, *RST). OPC is also cleared by most commands that change any part of the configuration of the instrument (such as MODE or START).

1.2 Serial Poll status byte

		ES B	MA V			SD V	RD V
--	--	---------	---------	--	--	---------	---------

- bit 0 RDV (result data available)
set when results are available to be read as enabled by DAVER
- bit 1 SDV (sweep data available)
set when sweep results are available to be read as enabled by DAVER
- bit 2 not used
- bit 3 not used)
- bit 4 MAV (message available)
set when a message reply is waiting to be read
- bit 5 ESB (standard event summary bit)
set if any bit in the standard event status register is set as well as the corresponding bit in the standard event status enable register (set by *ESE).

1.3 RS232 connections

The RS232 port on the instrument uses the same pinout as a standard 9 pin serial port on a PC or laptop (9-pin male 'D' type).

Pin	Function	Direction
1	DCD	in (+ weak pull up)
2	RX data	in
3	TX data	out
4	DTR	out
5	GND	
6	DSR	not used
7	RTS	out
8	CTS	in
9	RI	not used

The instrument will only transmit when CTS (pin 8) is asserted, and can only receive if DCD (pin 1) is asserted. The instrument constantly asserts (+12V) DTR (pin 4) so this pin can be connected to any unwanted modem control inputs to force operation without handshaking. The instrument has a weak pull up on pin 1 as many null modem cables leave it open circuit. In electrically noisy environments, this pin should be driven or connected to pin 4.

To connect the instrument to a PC, use a 9 pin female to 9 pin female null modem cable:

1 & 6	-	4
2	-	3
3	-	2
4	-	1 & 6
5	-	5
7	-	8
8	-	7

2 Communication commands

***CLS**

***CLS**

Function: Clear status

Description: Clears the *standard event status register*.

Format: *CLS

Arguments: none

Reply: none

Example: *CLS
*ESR?
0

Notes:

***ESE**

***ESE**

Function: Set standard event status enable register.

Description: Enable which bits of the *standard event status register* set the ESB bit in the serial poll status byte..

Format: *ESE, value

Arguments: decimal equivalent of bits in standard event status enable register

Reply: can be read by *ESE?

Example: *ESE, 60

Notes: The following bits in the standard event status enable register have been implemented:

- bit 0 OPC (operation complete)
- bit 2 QYE (unterminated query error)
- bit 3 DDE (device dependent error)
- bit 4 EXE (execution error)
- bit 5 CME (command interpretation error)
- bit 7 PON (power on event)

For example, *ESE, 60 enables all the error bits so that the ESB bit in the serial poll status byte is set in the event of any error.

***ESR?**

***ESR?**

Function:	Standard event status register query
Description:	Returns the contents of the <i>standard event status register</i> and clears it.
Format:	*ESR?
Arguments:	none
Reply:	decimal equivalent of bits in standard event status register
Example:	*ESR? 33
Notes:	The following bits in the standard event status register have been implemented: - bit 0 OPC (operation complete) - bit 2 QYE (unterminated query error) - bit 3 DDE (device dependent error) - bit 4 EXE (execution error) - bit 5 CME (command interpretation error) - bit 7 PON (power on event) For example, if a command is sent incorrectly and is not recognised, the CME bit will be set and the value of 33 will be returned.

***IDN?**

***IDN?**

Function:	Identify query
Description:	Returns a standard format identification string.
Format:	*IDN?
Arguments:	none
Reply:	An ASCII string in the IEEE488.2 format: manufacturer,model,serial no,version
Example:	*IDN? NEWTONS4TH,PSIMETRIQ,01234,1.00
Notes:	

***OPC?**

***OPC?**

Function:	Test for operation complete
Description:	Returns 1 if previous operation is completed, 0 if not.
Format:	*OPC?
Arguments:	none
Reply:	0 or 1
Example:	START *OPC? 0 *OPC? 0 *OPC? 1
Notes:	*OPC? can be used to indicate when data is available or when a frequency sweep has completed.

***RST**

***RST**

Function:	Reset
Description:	Resets the instrument to the default state and clears the <i>standard event status register</i> .
Format:	*RST
Arguments:	none
Reply:	none
Example:	*RST
Notes:	The *RST command loads the default configuration. This is the same as loading the default configuration via the PROGRAM menu.

Any preceding setup commands will be overwritten.

*RST should be followed by an end of line not a message separator. It may be helpful to follow it with a short pause to allow the new configuration to become active before sending further commands.

***SRE**

***SRE**

Function: Set service request enable register.

Description: Enable which bits of the *status byte register* initiate a service request.

Format: *SRE, value

Arguments: decimal equivalent of bits in status byte register

Reply: can be read by *SRE?

Example: *SRE, 1
generate a service request when data available.

Notes:

***SRE?**

***SRE?**

Function:	Read service request enable register.
Description:	Read back the present setting of the service request enable register.
Format:	*SRE?
Arguments:	
Reply:	decimal equivalent of bits in status byte register that would generate a service request.
Example:	*SRE? 1
Notes:	

***STB?**

***STB?**

Function:	Read serial poll status byte
Description:	Returns the decimal value of the serial poll status byte.
Format:	*STB?
Arguments:	none
Reply:	decimal value of the serial poll status byte
Example:	*STB? 1
Notes:	The following bits in the serial poll status register have been implemented: bit 0 RDV (results data available) bit 1 SDV (sweep data available) bit 3 ALA (alarm active) bit 4 MAV (message available) bit 5 ESB (standard event summary bit)

***TRG**

***TRG**

Function:	Trigger
Description:	Initiates a new measurement, resets the ranging and filtering.
Format:	*TRG
Arguments:	none
Reply:	none
Example:	MODE,VRMS *TRG VRMS?
Notes:	

***TST?**

***TST?**

Function:	Self test query
Description:	Returns the results of self test
Format:	*TST?
Arguments:	none
Reply:	single integer bit 0 – set if uncalibrated bit 1 – set if error with analogue zero > 15 – major system error
Example:	*TST? 0
Notes:	

***WAI**

***WAI**

Function:	Wait for operation complete
Description:	Suspends communication until the previous operation has completed
Format:	*WAI
Arguments:	none
Reply:	none
Example:	GAINPH START *WAI GAINPH,SWEEP?
Notes:	In the example, the query command GAINPH,SWEEP? can be sent immediately after the *WAI command and the sweep data will be returned as soon as the sweep has completed.

ABORT

ABORT

Function: Abort sweep

Description: Abort an active sweep.

Format: ABORT

Arguments: none

Reply: none

Example: FSWEEP,1000,1E5,5E5
START
ABORT

Notes:

AMPLIT

AMPLIT

Function:	Set output amplitude
Description:	Sets the output amplitude in Volts or dBm for the generator.
Format:	<i>AMPLIT,amplitude</i>
Arguments:	peak amplitude in Volts or amplitude in dBm
Reply:	none
Example:	AMPLIT,0.5 (set peak amplitude to 0.5V)
Notes:	The amplitude may be Volts or dBm for either the low level or hi level output.

BEEP

BEEP

Function: Sound the buzzer

Description: Makes a "beep" from the instrument.

Format: BEEP

Arguments: none

Reply: none

Example: BEEP

Notes:

BLANKI

BLANKI

Function: Select blanking

Description: Enable or disable low value blanking.

Format: *BLANKI,value,threshold*

Arguments: value:
 ON
 OFF
 threshold:
 threshold in appropriate units

Reply: none

Example: BLANKI,OFF
 BLANKI,ON,-35

Notes:

CONFIG

CONFIG

Function:	Direct access of configuration parameters
Description:	Sets configuration parameter for which there may not be a direct command.
Format:	CONFIG, <i>index,data</i>
Arguments:	index is the number of the parameter data is the data for that parameter
Reply:	none
Example:	CONFIG,6,1 (set phase convention)
Notes:	The list of configurable parameters is given in the appendix. CONFIG goes through the same limit checking as when entering data from the menus.

CONFIG?

CONFIG?

Function:	Configurable parameter query
Description:	Reads the present value of a single parameter.
Format: or:	CONFIG, <i>index</i> ? CONFIG? <i>index</i>
Arguments:	<i>index</i> is the parameter number
Reply:	Value of parameter, real or integer as appropriate.
Example:	CONFIG,6? (read phase convention) 0 CONFIG,6,1 CONFIG,6? 1
Notes:	The list of configurable parameters is given in the appendix.

DAV?**DAV?**

Function:	Data available query
Description:	Returns data availability status.
Format:	DAV?
Arguments:	none
Reply:	Decimal equivalent of data available bits: - bit0 new data available - bit1 data available - bit2 new full sweep data available - bit3 sweep data available - bit4 streaming data available - bit5 more streaming data to come - bit6 integration data available - bit7 datalog data available
Example:	START (trigger sweep) DAV? 0 DAV? 11 (first data available) DAV? 11 DAV? 11 DAV? 15 (full sweep data available)
Notes:	DAV? does not modify the status bits.

DAVER

DAVER

Function:	Set data available enable register
Description:	Sets bits in the data available enable register to control which status bits set the data available bits in the status byte.
Format:	DAVER,value
Arguments:	decimal equivalent of data available bits bit0 set bit 0 of status byte when new data available bit1 set bit 0 of status byte when data available bit2 set bit 1 of status byte when new full sweep data available bit3 set bit 1 of status byte when sweep data available bit4 set bit 2 of status byte when streaming data available bit5 set bit 2 of status byte if more streaming data is to come
Reply:	none
Example:	DAVER, 4 set bit 1 in status byte only when full sweep data is ready
Notes:	default value is 6: bit 0 of status byte is set whenever data is available bit 1 of status byte is set when full sweep data is available.

DAVER?

DAVER?

Function:	Read data available enable register
Description:	Read back present setting of the data available enable register, which controls the status bits that set the data available bits in the status byte.
Format:	DAVER?
Arguments:	none
Reply:	decimal equivalent of bits
Example:	DAVER? 4
Notes:	

FILTER**FILTER**

Function:	Select the filtering
Description:	Sets the filter time constant and dynamic response.
Format:	<code>FILTER,type,dynamics</code>
Arguments:	type: NONE NORMAL SLOW dynamics: AUTO FIXED
Reply:	none
Example:	<code>FILTER,NORMAL,FIXED</code> <code>FILTER,NONE</code>
Notes:	It is not necessary to send both parameters if it is only required to set the type. Both arguments must be sent to set the dynamics.

FRA

FRA

Function:	Set frequency response analyser mode.
Description:	Set frequency response analyser mode.
Format:	FRA
Arguments:	
Reply:	none
Example:	FRA
Notes:	This command has the same effect as MODE,GAINPH. FRA, GAINPH, TFA are aliases for the same command.

FRA?

FRA?

Function:	frequency response analyser query
Description:	Read frequency response analyser results. Sets frequency response analyser mode if not already set. Waits for next unread data if necessary. Clears new data available bit read by DAV?
Format:	FRA?
or:	FRA?SWEEP
or:	FRA,SWEEP?
Arguments:	none, or SWEEP
Reply:	6 data values separated by commas freq, mag1,mag2,db,phase,gain one line per result for sweep data
Example:	OUTPUT,ON FRA FSWEEP,20,10,20E3 START DAV? 3 DAV? 15 FRA?SWEEP data returned
Notes:	FRA? waits for next unread data. FRA?SWEEP does not wait for new data – data can be read multiple times. FRA, GAINPH, TFA are aliases for the same command

FREQUE

FREQUE

Function:	Set the output frequency	
Description:	Sets the generator output frequency in Hz.	
Format:	FREQUE, <i>frequency</i>	
Arguments:	frequency in Hz	
Reply:	none	
Example:	FREQUE,5e4	(set frequency to 50kHz)
Notes:		

FSWEEP**FSWEEP**

Function:	Set the frequency sweep parameters
Description:	Sets the start frequency in Hz, the end frequency, the number of steps and log/linear for the selected function.
Format:	<i>FSWEEP,steps,start,end,type</i>
Arguments:	steps: number of steps start: start frequency in Hz end: end frequency in Hz type: LOGARI LINEAR
Reply:	none
Example:	MODE,GAINPH FSWEEP,50,1000,1e6 (set 50 steps between 1kHz and 1MHz)
Notes:	It is not necessary to send all the arguments, but if they must be in the specified order. The same command is used for all the functions – the data is applied to whichever function has been selected if valid (such as gain/phase analyser). If the selected mode is not valid (such as rms), then the command is ignored and an execution error is flagged in the standard event status register, sesr.

GAINPH

GAINPH

Function: Set gain/phase analyser mode.

Description: Set gain/phase analyser mode.

Format: GAINPH

Arguments:

Reply: none

Example: GAINPH

Notes: This command has the same effect as MODE,GAINPH.
FRA, GAINPH, TFA are aliases for the same command.

GAINPH?

GAINPH?

Function:	Gain/phase query
Description:	Read gain/phase analyser results. Sets gain/phase analyser mode if not already set. Waits for next unread data if necessary . Clears new data available bit read by DAV?
Format:	GAINPH?
or:	GAINPH?SWEEP
or:	GAINPH,SWEEP?
Arguments:	none, or SWEEP
Reply:	6 data values separated by commas freq, mag1,mag2,db,phase,gain one line per result for sweep data
Example:	OUTPUT,ON GAINPH FSWEEP,20,10,20E3 START DAV? 3 DAV? 15 GAINPH?SWEEP data returned
Notes:	GAINPH? waits for next unread data. GAINPH?SWEEP does not wait for new data – data can be read multiple times.

HOLD

HOLD

Function:	Set/clear HOLD mode
Description:	HOLD mode stops the instrument from updating the measured values
Format:	HOLD, <i>value</i>
Arguments:	value: ON OFF
Reply:	none
Example:	HOLD,ON
Notes:	

INPUT

INPUT

Function:	Set input mode
Description:	Selects the input type of the instrument
Format:	INPUT, <i>type,impedance</i>
Arguments:	type: HILEVEL POWER LOLEVEL BALANCE impedance: 50OHMS 75OHMS 600OHMS HIIMPEDANCE
Reply:	none
Example:	INPUT,LOLEVE,HIIMPE
Notes:	The impedance value is only valid for the low level input

KEYBOA

KEYBOA

Function:	Disable front panel keyboard.
Description:	The front panel keyboard can be disabled to prevent accidental operation.
Format:	KEYBOARD, <i>value</i>
Arguments:	value: ENABLE DISABLE
Reply:	none
Example:	KEYBOARD,DISABLE
Notes:	The keyboard can be re-enabled from the front panel only by pressing the HOME key.

LCR

LCR

Function: Set LCR meter mode.

Description: Set LCR mode and model.

Format: LCR,*model*

Arguments: model:
 IMPEDANCE
 SERIES
 PARALLEL

Reply: none

Example: LCR, IMPEDA

Notes:

LCR?

LCR?

Function:	LCR meter query
Description:	Read LCR meter results. Sets LCR meter mode if not already set. Waits for next unread data if necessary. Clears new data available bit read by DAV?
Format:	LCR?
or:	LCR?SWEEP
or:	LCR,SWEEP?
Arguments:	none, or SWEEP
Reply:	14 data values separated by commas: freq, mag1, mag2, impedance, phase, series R, series L, series C, Parallel R, Parallel L, Parallel C, tan δ , Q, reactance.
sweep reply:	8 data values per line per sweep result: freq,Q,tan δ ,impedance,phase,L,C,R
Example:	OUTPUT,LOLEVE LCR? data returned
Notes:	LCR? waits for next unread data. LCR?SWEEP does not wait for new data – data can be read multiple times.

MARKER**MARKER**

Function:	Set frequency marker
Description:	Enable or disable frequency marker.
Format:	MARKER, <i>value,frequency</i>
Arguments:	value: Off Single Dual frequency: marker frequency in Hz
Reply:	none
Example:	MARKER,OFF MARKER,Single,25e3
Notes:	It is not necessary to send the frequency when enabling the marker if it has already been set.

MODE

MODE

Function:	Set mode
Description:	Sets the fundamental operating mode of the instrument.
Format:	MODE, <i>type</i>
Arguments:	type: SLM LCR VSWR FRA SCOPE
Reply:	none
Example:	MODE,SLM
Notes:	MODE sets the measurement mode of the instrument

OUTPUT

OUTPUT

Function:	Set output
Description:	Turns the output on or off, or sets the level mode to dBm or voltage. Also specifies action at the end of a sweep
Format:	OUTPUT, <i>type,impedance</i>
Arguments:	command: OFF LOLEVEL HILEVEL impedance: 50OHMS 75OHMS 600OHMS HIIMPEDANCE
Reply:	none
Example:	OUTPUT,LOLEVE,600OHM
Notes:	For safety, the output defaults to off and must be turned on explicitly.

PHCONV

PHCONV

Function: Set phase convention

Description: Set phase convention

Format: PHCONV,*convention*

Arguments: convention:
180: -180 to +180
-360: 0 to -360
+360: 0 to +360

Reply: none

Example: PHCONV, -360

Notes:

Notes: Number 0 represents factory default,
which can only be recalled.

PROGRA?

PROGRA?

Function:	Identify current program.
Description:	Reads the name of the last program to be loaded or recalled.
Format:	PROGRA?
Arguments:	none
Reply:	text string
Example:	PROGRA? factory default
Notes:	

RANGE

RANGE

Function: Set channel ranging.

Description: Select minimum range and range control for a given input channel.

Format: *RANGE,channel,ranging,range*

Arguments: channel:
 CH1
 CH2
 ranging:
 AUTO
 UPAUTO
 MANUAL
 range:
 nominal range value

Reply: none

Example: RANGE,CH2,MANUAL,3V

Notes:

RESOLU**RESOLU**

Function:	Set the data resolution	
Description:	Data is returned in scientific format with exponent and mantissa. The resolution of the mantissa may be selected to be 5 digit (NORMAL) or 6 digit (HIGH).	
Format:	RESOLU, <i>format</i>	
Arguments:	format:	
	NORMAL	(5 digit mantissa)
	HIGH	(6 digit mantissa)
	BINARY	(raw binary format)
Reply:	none	
Example:	RESOLU,HIGH	
Notes:	The resolution only changes the real number replies. Data format for NORMAL is: [-]1.2345E[-]00 Data format for HIGH is: [-]1.23456E[-]00 The signs of the mantissa and exponent, shown as [-] in the above examples, are only sent if they are negative. Data format for BINARY is a proprietary floating point format which returns raw data in a minimum number of data bytes.	

RESULT

RESULT

Function: Access non volatile results stores.

Description: Recall, store or delete non-volatile results store.

Format: *RESULT,function,number*

Arguments: function:
 RECALL
 STORE
 DELETE
 number
 1-999

Reply: none

Example: RESULT,RECALL,13

Notes:

RESULT?

RESULT?

Function: Access non volatile results stores.

Description: Recall, store or delete non-volatile results store.

Format: RESULT,*function?*

Arguments: function:
NAME
FILES
N4LFIL
TXTFIL

Reply: NAME - name of current program
FILES - list of names of stored files
N4LFIL- results in .N4L format
TXTFIL- results in .TXT format

Example: RESULT,N4LFIL?

Notes:

REZERO

REZERO

Function: Rezero front end

Description: Request the DSP to re-compensate for dc offset and compute a new autozero

Format: REZERO

Arguments: none

Reply: none

Example: REZERO

Notes:

SCALE

SCALE

Function: Set channel scale factor.

Description: Set a multiplying scale factor for a given input channel.

Format: *SCALE,channel,factor*

Arguments: channel:
 CH1
 CH2
 factor:
 multiplying scale factor

Reply: none

Example: SCALE,CH2,10

Notes:

SCREEN?

Function: Read the screen data

Description: Returns a bit map of screen pixel display in ascii and hex format

Format: SCREEN?

Arguments: none

Reply: Multiple data bit values

Example: SCREEN?
data returned

Notes: SCREEN? response:

ASCII coded Hex
(2 characters for each byte)
240 lines of 40 bytes (each line represents one line of the display) preceded by #H
Each byte represents 8 dots where the lsb is the leftmost dot of the display
The bit is set for on and cleared for off

SLM**SLM**

Function:	Set up selective level meter.
Description:	Set mode to selective level meter, and set up centre frequency.
Format:	<i>SLM,bandwidth,scan,freq1,freq2</i>
Arguments:	bandwidth: WIDE 600000HZ 300000HZ 160000HZ 8000HZ 4000HZ 3100HZ 1950HZ 100HZ 360Hz 400Hz 25HZ 3HZ scan: GENERATOR AFC FIXED DUAL INPUT frequency1: centre frequency in Hz frequency2: dual frequency in Hz
Reply:	none
Examples:	<i>SLM,100HZ,SINGLE,1.50e5</i>

Notes: It is not necessary to send all the arguments, but if they must be in the specified order.

SLM?**SLM?**

Function:	Read selective level meter results
Description:	Reads back latest selective level meter results. Sets voltmeter mode if not already set. Waits for next unread data if necessary. Clears new data available bit read by DAV?
Format: or:	SLM? SLM,SWEEP?
Arguments:	none
Reply:	single: 3 data values separated by commas freq,mag,dbm dual: 6 data values separated by commas freq1,mag1,dbm1,freq2,mag2,dbm2 sweep: one result as above per line
Example:	SLM,100HZ,FIXED,150e3 SLM? 1.5000E5,7.3508E-2,-9.6630E+0 SLM? 1.5000E5,7.3511E-2,-9.6627E+0
Notes:	As SLM? does not send the same data twice but waits instead for the next result, it is not necessary to check the data available bits before sending the SLM? command.

SPEED

SPEED

Function:	Sets the measurement speed
Description:	Sets the minimum window size for the measurement (FRA and LCR modes).
Format:	SPEED, <i>value</i> SPEED,WINDOW, <i>time</i>
Arguments:	value: FAST MEDIUM SLOW VSLOW VFAST time: window time in seconds
Reply:	none
Example:	SPEED,SLOW
Notes:	

START

START

Function:	Start sweep
Description:	Initiate sweep in those functions that have a sweep or resets filtering in others.
Format:	START
Arguments:	none
Reply:	none
Example:	FSWEEP,100,50000,75000 START
Notes:	

STATUS?

STATUS?

Function:	Read back channel ranging status.
Description:	Read back condition of selected channel: range number (1-16) range text overflow/underflow status
Format: or:	STATUS, <i>channel</i> ? STATUS? <i>channel</i>
Arguments:	channel: CH1 CH2
Reply:	range number,range text,over/under/ok 1-16 range as per RANGE command OVER if overflow LOW if underflow OK if in range
Example:	STATUS,CH1? 6,3V,OK
Notes:	

STOP

STOP

Function: Stop sweep
Description: Stop an active sweep.
Format: STOP
Arguments: none
Reply: none
Example: FSWEEP,100,50000,75000
START
STOP
Notes:

TFA

TFA

Function:	Set transfer function analyser mode.
Description:	Set transfer function analyser mode.
Format:	TFA
Arguments:	
Reply:	none
Example:	TFA
Notes:	This command has the same effect as MODE,GAINPH. FRA, GAINPH, TFA are aliases for the same command.

TFA?

TFA?

Function:	transfer function analyser query
Description:	Read transfer function analyser results. Sets transfer function analyser mode if not already set. Waits for next unread data if necessary. Clears new data available bit read by DAV?
Format:	TFA?
or:	TFA?SWEEP
or:	TFA,SWEEP?
Arguments:	none, or SWEEP
Reply:	6 data values separated by commas freq, mag1,mag2,db,phase,gain one line per result for sweep data
Example:	OUTPUT,ON TFA FSWEEP,20,10,20E3 START DAV? 3 DAV? 15 TFA?SWEEP data returned
Notes:	TFA? waits for next unread data. TFA?SWEEP does not wait for new data – data can be read multiple times. FRA, GAINPH, TFA are aliases for the same command

USER?

USER?

Function: Read the user data

Description: Returns up to 3 lines of user data

Format: USER?

Arguments: none

Reply: 3 lines of ASCII terminated by CR

Example: USER?
 Newtons4th Ltd
 R&D department
 SLM3505 #4

Notes:

VERSIO?

VERSIO?

Function:	Read the instrument code versions.
Description:	Returns an ASCII string with the details of the various parts of the instrument firmware.
Format:	VERSIO?
Arguments:	none
Reply:	date code, type, cpu, dsp, fpga, boot
Examples:	VERSION? PQ3504,1,2.01,2.20,2.20,2.02
Notes:	This data can be displayed on the screen by pressing SYSTEM then BACK

VSWR

VSWR

Function: Set up VSWR meter.

Description: Set mode to VSWR level meter with specified method.

Format: *VSWR,method,scale*

Arguments: method:
 impedance
 directional
 scale:
 scale factor for directional coupler

Reply: none

Examples: VSWR,IMPEDA

Notes:

VSWR?

VSRW?

Function:	Read VSWR meter results
Description:	Reads back latest VSWR meter results. Sets VSWR mode if not already set. Waits for next unread data if necessary. Clears new data available bit read by DAV?
Format: or:	VSWR? VSWR,SWEEP?
Arguments:	none
Reply:	6 data values separated by commas frequency, forward power, VSWR, reflection %, reflection dB, reflected power
Example:	VSWR,IMPEDA VSWR? 6 data values returned
Notes:	As VSWR? does not send the same data twice but waits instead for the next result, it is not necessary to check the data available bits before sending the VSWR? command.

WAVEFO**WAVEFO**

Function: Set the output waveform

Description: Selects the output waveform for the signal generator.

Format: WAVEFO,*type*

Arguments: *type*:

SINEWA	(sine wave)
TRIANG	(triangle wave)
SQUARE	(square wave)
NOISE	(white noise)

Reply: None

Example: FREQUE,500
WAVEFO,TRIANG (triangle wave)
OUTPUT,ON

Notes:

ZERO**ZERO**

Function:	Apply or remove the zero
Description:	Applies or removes a zero function depending on the measurement mode (same as pressing ZERO key). Performs lead compensation in LCR mode.
Format:	ZERO ZERO,DELETE ZERO,DB, <i>offset</i> ZERO,PHASE, <i>offset</i>
LCR compensation	ZERO,SINGLE ZERO,SWEEP, <i>steps,start,finish</i> ZERO,OPEN ZERO,SHORT ZERO,STORE ZERO,RECALL
Arguments:	offset: offset value steps: LCR sweep compensation steps start: LCR compensation start frequency stop: LCR compensation stop frequency
Reply:	none
Example:	ZERO,SWEEP,100,1e3,1e6 ZERO,OPEN <i>performs open circuit compensation</i>
Notes:	

Appendices

COMMAND SUMMARY

CONFIGURABLE PARAMETERS

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command format

*CLS
 *ESE,value
 *ESE?
 *ESR?
 *IDN?
 *OPC?
 *RST
 *SRE,value
 *SRE?
 *STB?
 *TRG
 *TST?
 *WAI

ABORT
 AMPLIT,amplitude
 BEEP
 BLANKI,on/off,threshold
 CONFIG,parameter,data
 CONFIG,parameter?
 DAV?
 DAVER,value
 DAVER?
 FILTER,type,dynamics
 FRA
 FRA?
 FRA,SWEEP?
 FREQUE,frequency
 FSWEPT,steps,start,end,l
 og
 GAINPH
 GAINPH?
 GAINPH,SWEEP?
 HOLD,on/off
 INPUT,type,impedance
 KEYBOA,value
 LCR,conditions,param,he
 ad
 LCR?

reply format

single integer data value
 single integer data value
 company,product,serial no,version
 0 or 1

single integer data value

single integer data value

single integer data value

single integer or real data value
 single integer data value

single integer data value

freq,gain,phase,dB,mag1,mag2
 n lines of FRA? data

freq,mag1,mag2,db,phase,gain
 n lines of GAINPH? data

freq, mag1, mag2, impedance,
 phase, R, L, C (series), R, L, C
 (parallel), $\tan\delta$, Q, reactance

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LCR,SWEEP?	n lines of data: freq,Q,tan δ ,impedance, phase,L,C,R
MARKER,on/off,frequency	
MODE,type	
OUTPUT,type,impedance	
PHCONV,convention	
PROGRAM,function,numb er	
PROGRAM?	CR terminated text string
RANGE,ch,ranging,range	
RESOLU.format	
RESULT,function,number	
REZERO	
SCALE,channel,factor	
SCALE,channel?	single real data value
SHUNT,channel,resistanc e	
SHUNT,channel?	single real data value
SPEED,speed	
START	
STATUS,channel?	range number,range text,over/low/ok
STOP	
TFA	
TFA?	freq,gain,phase,dB,mag1,mag2
TFA,SWEEP?	n lines of TFA? data
USER?	3 CR terminated text strings
VERSION?	datecode,type,cpu,dsp,fpga,boot
VRMS	
VRMS?	rms,dbm
VSWR,method	
VSWR?	freq,fdbm,vswr,r%,rdb,rdbm
VSWR,SWEEP?	n lines of VSWR? data
WAVEFO,type	
ZERO	
ZERO,DELETE	

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calibration commands

CALAPP	
CALCOM,freq	
CALDCO,value	
CALFIL,index,value	
CALFIL?	six real data values
CALFRQ,index,freq	
CALFRQ?	seven real data values
CALHF,index,value	
CALIBR,index,value	
CALIBR?	single integer data value
CALIDS,string	
CALIDS?	string
CALOUT,index,value	
CALPHA,index	
CALRES	
CALSAV,password	
CALSNO,serial number	
CALSTR,string	
CALSTR?	string

Appendix B – Configurable parameters

All parameters can be accessed using the CONFIG command:

CONFIG,*parameter,data*

Numb er	Function
------------	----------

System parameters

1	Operating mode, (Sets main mode) 0=Selective Level Meter 1=Impedance Meter 2=Oscilloscope 3=VSWR Meter 4=Frequency Response Analyser
2	Interface, (Remote settings) 0=RS232 1=USB 2=LAN
3	Bandwidth auto or wide, (SLM Measurements) (Upto v2.92) 0=Wide 1=3.1KHz 2=1.95KHz 3=600Hz 4=400 5=360Hz 6=100Hz 7=25Hz 8=3Hz 9=1Hz (v2.92 onwards) 0=Wide 1=600KHz 2=300KHz 3=16KHz 4=8KHz 5=4KHz 6=3.1KHz 7=1.95KHz 8=600Hz

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9=400Hz
10=360Hz
11=100Hz
12=25Hz
13=3Hz
14=1Hz

- 6 **Phase convention,** (System Options)
 0=-180° to +180°
 1=0° to -360°
 2=0° to +360°
- 7 **Output ,** (Generator settings)
 0=Off
 1=Low Output
 2=High Output
- 8 **Step message,** (System Options)
 0=Disabled
 1=Enabled
- 9 **Keyboard beep on/off,** (System Options)
 0=Enabled
 1=Disabled
- 11 **Output impedance, 50 Ohm Model**
 0=50Ω
 1=75Ω
 5=600Ω
- Output impedance, 75 Ohm & E Spec Models**
 1=75Ω
 2=120Ω
 4=150Ω
 5=600Ω
- 13 **Speed,** (FRA/LCR Measurement Settings)
 0=Very Slow
 1=Slow
 2=Medium
 3=Fast

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4=Very Fast

- 14 **Filter,** (FRA/LCR Measurement Settings)
 0=Normal
 1=Slow
 2=None
- 16 **Baud rate,** (Remote Settings "RS232")
 0=38400
 1=19200
 2=9600
 3=1200
- 18 **Sweep steps,** (Sweep Settings Enter step number figures)
- 19 **Sweep start frequency,** (Sweep Settings-Enter figures)
- 20 **Sweep stop frequency,** (Sweep Settings-Enter figures)
- 21 **Sweep type,** (Sweep Settings)
 0=Single
 1=Continuous
- 22 **Resolution,** (Remote Settings)
 0=Normal
 1=High
- 24 **Input,** (Input Settings)
 0=High Z
 1=50Ω 18W
 2=Low level
 3=Balanced
- 28 **CH1 input ranging,** (Input Settings)
 0=Full Autorange
 1=Range Up Only
 2=Manual
- 29 **CH2 input ranging,** (Input Settings FRA Only)
 0=Full Autorange
 1=Range Up Only
 2=Manual

- 32 CH1 scale factor, (Input Settings-Enter figures)
- 36 Input impedance, 50 Ohm Model
- 0=50 Ω
 - 1=75 Ω
 - 5=600 Ω
 - 6=High Impedance
- Input impedance, 75 Ohm & E Spec Models
- 0=50 Ω
 - 1=75 Ω
 - 2=120 Ω
 - 4=150 Ω
 - 5=600 Ω
 - 6=High Impedance
- 39 Brightness, (System Options)
- 0=Low
 - 1=High
- 40 Display, (System Options)
- 0=Colour
 - 1=White on black
 - 2=Black on white
- 42 Enlarge results, (System Options)
- 0=Off
 - 1=On
- 47 Display type, (Sweep Settings)
- 0=Real time
 - 1=Table
 - 2=Graph
- 48 Generator frequency, (Generator Settings-Enter figures)
- 49 Low output amplitude V, (Generator Settings-Low output-Enter figures)

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- 50 FSK Control, (Generator Settings)
0=Disabled
1=Enabled
- 51 Generator waveform, (Generator Settings)
0=Sinewave
1=Triangle
2=Squarewave
3=White Noise
- 52 Frequency step, (Generator Settings-Enter figures)
- 53 Amplitude Step, (Generator Settings-Enter figures)
- 54 Low output amplitude dBm, (Generator Settings-Enter dBm figures)
- 55 Amplitude step, (Generator Settings-Enter dB figures)
- 56 Amplitude control, (Generator Settings)
0=Volts
1=dBm
2=dBu
- 57 Guard time, (Generator Settings-FSK control-Enter figures)
- 58 FSK Frequency "0", (Generator Settings-FSK control-Enter figures)
- 59 FSK Frequency "1", (Generator Settings-FSK control-Enter figures)
- 60 Sweep type, (Sweep Settings +Step Type -SLM/VSWR/Output & Tune)
0=Logarithmic
1=Linear
- 61 Graph scaling, (Sweep Settings)
0=Auto
1=Manual
- 62 Graph max, (Sweep settings-Enter figures)
- 63 Graph min, (Sweep settings-Enter figures)
- 64 Frequency marker, (Sweep Settings)
0=Off

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1=Single
1=Dual

- 65 Marker frequency 1, (Sweep Settings-Marker on-Enter figures)
- 66 Search for peak, (Sweep Settings, SLM Mode)
 0=Off
 1=On
- 67 AutoTune type, (Tune Settings)
 0=3 stage autotune
 1=Single stage retune
- 68 Marker frequency 2, (Sweep Settings-Marker on-Enter figures)
- 70 High output amplitude V, (Generator Settings-Output high-Enter figures)
- 71 High output amplitude dBm, (Generator Settings-Enter dBm figures)
- 73 Reference Impedance, (Generator Settings)
 0=Auto
 1=50 Ω
 2=75 Ω
 6=600 Ω
- 75 Graph, (FRA Settings)
 0=Phase
 1=Gain
- 76 Computation, (FRA Settings)
 0=CH2/CH1
 1=CH1/CH2
- 78 Centre frequency, (SLM Settings)
 0=Generator frequency
 1=AFC
 2=Single fixed
 3=Dual fixed
 4=Input frequency
- 80 Centre frequency 1, (SLM/VSWR/Tune Settings-Center Freq-Dual-Enter figures)

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- 81 Centre frequency 2, (SLM Settings-Center Freq-Dual-Enter figures)
- 82 Threshold, (SLM Settings-Enter figures)
- 83 Frequency step, (For Logarithmic Frequency step setting-Enter figures)
- 84 Peak level, (SLM Settings)
0=Off
1=On
- 85 Frequency step, (For Linear Frequency step setting-Enter figures)
- 87 AFC Gain, (SLM measurement settings-centre frequency-AFC-Enter figures)
- 88 Timebase, (Oscilloscope Settings-Enter figures)
- 89 Trigger level, (Oscilloscope Settings-Enter figures)
- 90 Pretrigger, (Oscilloscope Settings)
0=None
1=25%
2=50%
3=75%
- 91 Trigger polarity, (Oscilloscope Settings)
0=Rising edge
1=Falling edge
- 92 Trigger mode, (Oscilloscope Settings)
0=Auto
1=Normal
2=Single shot
- 94 Traces, (Oscilloscope Settings)
0=Single
1=Dual
2=CH2 Current
- 95 Trigger channel, (Oscilloscope Settings)
0=CH1
1=CH2

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- 100 Method, (VSWR Settings)
 0=Impedance
 1=Directional coupler
- 101 Scale Factor, (VSWR Settings-Directional coupler-Enter figures)
- 102 Bandwidth, (VSWR Settings-Directional coupler)
 0=3.1KHz
 1=1.95KHz
 2=100Hz
 3=360Hz
 4=400Hz
 5=25Hz
 6=3Hz
 7=1Hz
- 104 Measurement, (LCR Settings)
 0=Impedance magnitude
 1=Parallel circuit
 2=series circuit
- 110 Search for peak, (Sweep Settings, LCR Mode)
 0=Off
 1=Single
 2=Dual
- 112 Initial settings, (System settings)
 0=Program 1
 1=Factory default
 2=As last used
- 113 Peak hold, (Sweep Settings)
 0=Off
 1=On
- 114 Reference impedance
 0=50 Ω
 1=75 Ω
 2=120 Ω

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3=135Ω

4=150Ω

5=600Ω

- 117 IP Address, (Remote settings-LAN-Entre address numbers)
- 121 Language, (System Settings)
 - 0=English
 - 1=Italian
- 128 Bargraph, (SLM Settings)
 - 0=Off
 - 1=On
- 129 Bargraph max, (SLM settings-Bargraph-Enter numbers)
- 130 Bargraph min, (SLM settings-Bargraph-Enter numbers)
- 132 Set Clock, (System settings-Hours)
- 133 Set Clock, (System settings-Mins)
- 134 Set Clock, (System settings-Secs)
- 135 Set Date, (System settings-Day)
- 136 Set Date, (System settings-Month)
- 137 Set Date, (System settings-Year)

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