



**N4L Newtons4th 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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CONTENTS

1 Using remote control .....	1-1
1.1 Standard event status register.....	1-3
1.2 Serial Poll status byte .....	1-4
1.3 RS232 connections.....	1-5
2 Communication commands.....	2-1
*CLS .....	2-1
*ESE .....	2-2
*ESR?.....	2-3
*IDN?.....	2-4
*OPC? .....	2-5
*RST .....	2-6
*SRE .....	2-7
*STB?.....	2-9
*TRG .....	2-10
*TST?.....	2-11
*WAI .....	2-12
ABORT .....	2-13
AMPLIT .....	2-14
BEEP .....	2-15
BLANKI .....	2-16
CONFIG .....	2-17
DAV? .....	2-19
DAVER .....	2-20
FILTER.....	2-22
FRA .....	2-23
FREQUE .....	2-25
FSWEEP .....	2-26
GAINPH .....	2-27
HOLD .....	2-29
INPUT .....	2-30
KEYBOA .....	2-31
LCR .....	2-32
MARKER.....	2-34
MODE .....	2-35
OUTPUT .....	2-36
PHCONV.....	2-37
RANGE.....	2-39
RESOLU .....	2-40
RESULT.....	2-41

# SLM3505 communications manual

RESULT?	RESULT? .....	2-42
REZERO .....		2-43
SCALE .....		2-44
SCREEN? .....		2-45
SLM .....		2-46
SPEED .....		2-48
START .....		2-49
STATUS? .....		2-50
STOP .....		2-51
TFA .....		2-52
USER? .....		2-54
VERSIO? .....		2-55
VSWR .....		2-56
WAVEFO .....		2-58
ZERO .....		2-59

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.

## SLM3505 communications manual

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

1.1 Standard event status register

PO N		CM E	EX E	DD E	QY E		OP C
---------	--	---------	---------	---------	---------	--	---------

- 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

# SLM3505 communications manual

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 *standard event status register* 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 *standard event status register*.

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: *AMPLIT,amplitude*

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,index,data*

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: CONFIG,*index?*  
or: CONFIG?*index*

Arguments: index 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: *FILTER,type,dynamics*

Arguments: type:  
              NONE  
              NORMAL  
              SLOW  
              dynamics:  
              AUTO  
              FIXED

Reply: none

Example: FILTER,NORMAL,FIXED  
          FILTER,NONE

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,frequency*

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: *FSWEEP,steps,start,end,type*

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,*value*

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,*type,impedance*

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,*value*

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 $\delta$ , Q, reactance.

sweep reply: 8 data values per line per sweep result:  
freq,Q,tan $\delta$ ,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</i> , <i>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,type*

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,type,impedance*

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,*format*

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?**

**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: *SLM,bandwidth,scan,freq1,freq2*

Arguments: bandwidth:  
                   WIDE  
                   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: *SLM,100HZ,SINGLE,1.50e5*

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: SLM?  
or: 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,value*  
*SPEED,WINDOW,time*

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: *STATUS,channel?*  
or: *STATUS?channel*

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: VSWR?  
or: 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,*offset*  
ZERO,PHASE,*offset*

LCR compensation: ZERO,SINGLE  
ZERO,SWEEP,*steps,start,finish*  
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  
*performs open circuit compensation*

Notes:



Appendices

COMMAND SUMMARY

CONFIGURABLE PARAMETERS



## SLM3505 communications manual

command format	reply format
*CLS	
*ESE,value	
*ESE?	single integer data value
*ESR?	single integer data value
*IDN?	company,product,serial no,version
*OPC?	0 or 1
*RST	
*SRE,value	single integer data value
*SRE?	
*STB?	single integer data value
*TRG	
*TST?	single integer data value
*WAI	
ABORT	
AMPLIT,amplitude	
BEEP	
BLANKI,on/off,threshold	
CONFIG,parameter,data	
CONFIG,parameter?	single integer or real data value
DAV?	single integer data value
DAVER,value	
DAVER?	single integer data value
FILTER,type,dynamics	
FRA	
FRA?	freq,gain,phase,dB,mag1,mag2
FRA,SWEEP?	n lines of FRA? data
FREQUE,frequency	
FSWEEP,steps,start,end,log	
GAINPH	
GAINPH?	freq,mag1,mag2,db,phase,gain
GAINPH,SWEEP?	n lines of GAINPH? data
HOLD,on/off	
INPUT,type,impedance	
KEYBOA,value	
LCR,conditions,param,head	
LCR?	freq, mag1, mag2, impedance, phase, R, L, C (series), R, L, C (parallel), tan $\delta$ , Q, reactance

## SLM3505 communications manual

LCR,SWEEP?	n lines of data: freq,Q,tan $\delta$ ,impedance, phase,L,C,R
MARKER,on/off,frequency	
MODE,type	
OUTPUT,type,impedance	
PHCONV,convention	
PROGRAM,function,number	
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,resistance	
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	

# SLM3505 communications manual

## 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

# SLM3505 communications manual

## Appendix B – Configurable parameters

All parameters can be accessed using the CONFIG command:

CONFIG,*parameter,data*

Number      Function

### **System parameters**

- |   |   |
|---|---|
| 1 | Operating mode, (Sets main mode)<br>0=Selective Level Meter<br>1=Impedance Meter<br>2=Oscilloscope<br>3=VSWR Meter<br>4=Frequency Response Analyser |
| 2 | Interface, (Remote settings)<br>0=RS232<br>1=USB<br>2=LAN   |
| 3 | Bandwidth auto or wide, (SLM Measurements)<br>0=Wide<br>1=3.1KHz<br>2=1.95KHz<br>3=600Hz<br>4=400<br>5=360Hz<br>6=100Hz<br>7=25Hz<br>8=3Hz<br>9=1Hz |
| 6 | Phase convention, (System Options)<br>0=-180° to +180°<br>1=0° to -360°<br>2=0° to +360°  |
| 7 | Output , (Generator settings)<br>0=Off<br>1=Low Output<br>2=High Output   |

## SLM3505 communications manual

- 8           **Step message,** (System Options)  
                  0=Disabled  
                  1=Enabled
- 9           **Keyboard beep on/off,** (System Options)  
                  0=Enabled  
                  1=Disabled
- 11          **Output impedance,** (Generator Settings)  
                  0=50 $\Omega$   
                  1=75 $\Omega$   
                  2=600 $\Omega$
- 13          **Speed,** (FRA/LCR Measurement Settings)  
                  0=Very Slow  
                  1=Slow  
                  2=Medium  
                  3=Fast  
                  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)

## SLM3505 communications manual

- 0=Normal  
1=High
- 24      **Input,** (Input Settings)
  - 0=High Z
  - 1=50 $\Omega$  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      **Impedance,** (Input Settings)
  - 0=50 $\Omega$
  - 1=75 $\Omega$
  - 2=600 $\Omega$
  - 3=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

## SLM3505 communications manual

2=Graph

- 48 Generator frequency, (Generator Settings-Enter figures)
- 49 Low output amplitude V, (Generator Settings-Low output-Enter figures)
- 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 Fequency "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

## SLM3505 communications manual

- 62 Graph max, (Sweep settings-Enter figures)
- 63 Graph min, (Sweep settings-Enter figures)
- 64 Frequency marker, (Sweep Settings)  
0=Off  
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)
- 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)
- 81 Centre frequency 2, (SLM Settings-Center Freq-Dual-Enter figures)



## SLM3505 communications manual

- 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
- 100     **Method,** (VSWR Settings)  
          0=Impedance  
          1=Directional coupler

# SLM3505 communications manual

- 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, (VSWR Settings)  
          0=50Ω  
          1=75 Ω  
          2=120Ω  
          3=135Ω  
          4=150Ω  
          5=600Ω

## SLM3505 communications manual

- 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)

## Newtonson4th Ltd. contact details

Please direct all queries or comments regarding the SLM3505 instruments or this manual to:

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