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:

- This appliance **must** be earthed. Ensure that the instrument is powered from a properly grounded supply.

- The input connectors are High Voltage safety types for use up to 500V peak input from earth, overvoltage category II. Do not exceed 500V peak on any input connection. Only use test leads that are fitted with approved High Voltage safety connectors when working with hazardous voltages.

- 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 PSM3750 instrument over RS232, USB, LAN or GPIB. For more general operating instructions for the instrument refer to the specific 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.

Revision 1.20

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23rd January 2020
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Appendix A – Command Summary
Appendix B – Configurable Parameters
Appendix C – Multilog Parameters
Appendix D – Contact Details
1 Using remote control

The instrument is fitted with an RS232 serial communications port as standard, and may have an IEEE488 (GPIB) interface or LAN interface fitted as an option. All the interfaces use the same ASCII protocol with the exception of the end of line terminators:

<table>
<thead>
<tr>
<th></th>
<th>Rx expects</th>
<th>Tx sends</th>
</tr>
</thead>
<tbody>
<tr>
<td>RS232,</td>
<td>carriage return</td>
<td>carriage return and line feed</td>
</tr>
<tr>
<td>LAN, USB</td>
<td>(line feed ignored)</td>
<td></td>
</tr>
<tr>
<td>IEEE488</td>
<td>carriage return or</td>
<td>carriage return</td>
</tr>
<tr>
<td></td>
<td>line feed or EOI</td>
<td>with EOI</td>
</tr>
</tbody>
</table>

All the functions of the instrument can be programmed via either interface, and results read back. When the IEEE488 interface is set to ‘remote’ the RS232 port is ignored.

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. E.g.

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 (query commands) 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 either with the IEEE488 serial poll function or by the mandatory command *STB? over RS232 or IEEE or LAN (see section 5.2).

The IEEE address defaults to 23 and can be changed via the COMMS menu.

The keyboard is disabled when the instrument is set to “remote” using the IEEE. 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 COMMS 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

<table>
<thead>
<tr>
<th>PON</th>
<th>CME</th>
<th>EXE</th>
<th>DDE</th>
<th>QYE</th>
<th>OPC</th>
</tr>
</thead>
</table>

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

<table>
<thead>
<tr>
<th></th>
<th>ESB</th>
<th>MAV</th>
<th>ALM</th>
<th>SDV</th>
<th>RDV</th>
</tr>
</thead>
</table>

- **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 3 ALA** (alarm active)
  set when an alarm is active and enabled by ALARMER

- **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).

<table>
<thead>
<tr>
<th>Pin</th>
<th>Function</th>
<th>Direction</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>DCD</td>
<td>in (+ weak pull up)</td>
</tr>
<tr>
<td>2</td>
<td>RX data</td>
<td>in</td>
</tr>
<tr>
<td>3</td>
<td>TX data</td>
<td>out</td>
</tr>
<tr>
<td>4</td>
<td>DTR</td>
<td>out</td>
</tr>
<tr>
<td>5</td>
<td>GND</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>DSR</td>
<td>not used</td>
</tr>
<tr>
<td>7</td>
<td>RTS</td>
<td>out</td>
</tr>
<tr>
<td>8</td>
<td>CTS</td>
<td>in</td>
</tr>
<tr>
<td>9</td>
<td>RI</td>
<td>not used</td>
</tr>
</tbody>
</table>

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

Function: Clear status
Description: Clears the *standard event status register.*
Format: *CLS
Arguments: none
Reply: none
Example:

*CLS
*ESR?
0

Notes:
**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,PSM3750,01234,1.00
Notes:
**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**

**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**

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?

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:
**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:**

```plaintext
*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)
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?  

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:
**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**

Function: Abort sweep

Description: Abort an active sweep

Format: ABORT

Arguments: none

Reply: none

Example: FSweep,50,1000,1e6
        OUTPUT,ON
        START
        ABORT

Notes:
**ACTRIM**

**Function:** Set ac control parameters

**Description:** Sets the specified signal level, tolerance and input channel, for the ac control (amplitude compression).

**Format:** ACTRIM,channel,level,tolerance

**Arguments:**
- channel:
  - DISABL
  - CH1
  - CH2
  - CH3
- level:
  - required ac level in V or A or dBm
- tolerance:
  - required accuracy in percent

**Reply:** none

**Example:** ACTRIM,CH1,1.0,5 (1.0V, 5%)

**Notes:**
- The level should be set in dBm if dBm mode is selected (OUTPUT, DBM)
- It is not necessary to send all the arguments but those that are sent must be in the correct sequence.
**ALARM**

Function: Set common controls for alarm1 and alarm2.

Description: Set the alarm latch and sounder control.

Format: ALARM, *latch*, *sounder*

Arguments:

- **latch:**
  - ON
  - OFF

- **sounder:**
  - ENABLED
  - DISABLED

Reply: none

Example: ALARM, ON, DISABLED

Notes:
**ALARM?**

**Function:** Read alarm status.

**Description:** Reads the status of the measurements and 2 alarms.

**Format:** ALARM?

**Arguments:** none

**Reply:** single integer

- bit 0 data available
- bit 1 data error
- bit 2 alarm 1
- bit 3 alarm 2

**Example:**

```
ALARM?
1
```

**Notes:** An alarm is present if bit 0 is high (data is available) and either alarm 1 or alarm 2 bits are high.
ALARM1

Function: Set parameters for alarm1.

Description: Set alarm1 type and thresholds.

Format: ALARM1,DISABLED
         ALARM1,type,data,high,low

Arguments: type:
            HIGH
            LOW
            INSIDE
            OUTSIDE
            LINEAR

data
   1-4

high:
   high threshold

low:
   low threshold

Reply: None

Example: ALARM1,HIGH,1,2,0
         ALARM1,DISABLED

Notes: DISABLED does not have any further arguments otherwise both thresholds must be sent even if only one is used.
ALARM2

Function: Set parameters for alarm2.

Description: Set alarm2 type and thresholds.

Format: ALARM2,DISABLED
ALARM2,type,data,high,low

Arguments:
- type:
  - HIGH
  - LOW
  - INSIDE
  - OUTSIDE
- data: 1-4 for zoom data
- high:
  - high threshold
- low:
  - low threshold

Reply: None

Example: ALARM2,LOW,3,0,0.5

Notes: DISABLED does not have any further arguments otherwise both thresholds must be sent even if only one is used. There is no LINEAR option for alarm 2.
**ALARME**

**Function:** Set alarm status enable register

**Description:** Sets bits in the alarm status enable register to control which alarm bit if any set the alarm active bits in the status byte.

**Format:** ALARME, *value*

**Arguments:**
- decimal equivalent of alarm bits
  - bit2  set bit 3 of status byte when alarm 1 is active
  - bit3  set bit 3 of status byte when alarm 2 is active

**Reply:** none

**Example:**
ALARME, 12
*SRE,8
set bit 3 in status byte when either alarm 1 or alarm 2 is active and generate a service request

**Notes:** default value is 0
## ALARME?

<table>
<thead>
<tr>
<th>Function</th>
<th>Read alarm status enable register</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>Read back present bits in the alarm status enable register which controls the alarm active bit in the status byte.</td>
</tr>
<tr>
<td>Format</td>
<td>ALARME?</td>
</tr>
<tr>
<td>Arguments</td>
<td>none</td>
</tr>
<tr>
<td>Reply</td>
<td>decimal equivalent of alarm bits</td>
</tr>
<tr>
<td>Example</td>
<td>ALARME?</td>
</tr>
<tr>
<td></td>
<td>12</td>
</tr>
</tbody>
</table>

**Notes:**
**AMPLIT**

<table>
<thead>
<tr>
<th>Function:</th>
<th>Set output amplitude</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description:</td>
<td>Sets the output amplitude in Volts or dBm for the generator.</td>
</tr>
<tr>
<td>Format:</td>
<td><code>AMPLIT,amplitude</code></td>
</tr>
<tr>
<td>Arguments:</td>
<td>peak amplitude in Volts or amplitude in dBm</td>
</tr>
<tr>
<td>Reply:</td>
<td>none</td>
</tr>
<tr>
<td>Example:</td>
<td><code>AMPLIT,0.5</code> (set peak amplitude to 0.5V)</td>
</tr>
<tr>
<td>Notes:</td>
<td>dBm mode is selected by <code>OUTPUT,DBM</code></td>
</tr>
</tbody>
</table>
**AUXILI**

Function: Controls the auxiliary device

Description: Controls the auxiliary device connected to the extension port.

Format: `AUXILI,device,value`

Arguments: device:
- NONE
- IAI

Value (optional):
- LOW
- NORMAL
- HIGH
- VHIGH

Reply: None

Example: `AUXILI,IAI,HIGH`

Notes: Arguments will be extended to include other auxiliary devices as they become available
**BANDWI**

**Function:** Select bandwidth or selective (heterodyning) measurements.

**Description:** Selective measurement automatically starts at around 10kHz for those functions that support it. It can be disabled by forcing the bandwidth to “wide”. For low noise measurements at low frequency the bandwidth can be restricted to “low”.

**Format:** `BANDWI,type`

**Arguments:**

- **type:**
  - AUTO
  - WIDE
  - LOW

**Reply:** none

**Example:** `BANDWI,WIDE`

**Notes:** In wide bandwidth mode the frequency range is limited to 5MHz. In low bandwidth mode, the frequency is restricted to 30kHz.
BEEP

Function: Sound the buzzer
Description: Makes a “beep” from the instrument.
Format: BEEP
Arguments: none
Reply: none
Example: BEEP
Notes:
<table>
<thead>
<tr>
<th><strong>Function:</strong></th>
<th>Select blanking</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Description:</strong></td>
<td>Enable or disable low value blanking.</td>
</tr>
<tr>
<td><strong>Format:</strong></td>
<td>BLANKI,value</td>
</tr>
<tr>
<td><strong>Arguments:</strong></td>
<td>value:</td>
</tr>
<tr>
<td></td>
<td>ON</td>
</tr>
<tr>
<td></td>
<td>OFF</td>
</tr>
<tr>
<td><strong>Reply:</strong></td>
<td>none</td>
</tr>
<tr>
<td><strong>Example:</strong></td>
<td>BLANKI,OFF</td>
</tr>
<tr>
<td><strong>Notes:</strong></td>
<td></td>
</tr>
</tbody>
</table>
**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?**

**Function:** Configurable parameter query

**Description:** Reads the present value of a single parameter.

**Format:**

CONFIG,\texttt{index}\texttt{?}  \hspace{1cm} \texttt{or:}  \hspace{1cm} CONFIG?\texttt{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.
**COUPLI**

**Function:** Set ac or dc coupling.

**Description:** Selects the input coupling for a given input channel.

**Format:** COUPLI, channel, coupling

**Arguments:**
- channel:
  - CH1
  - CH2
- coupling:
  - AC+DC
  - ACONLY

**Reply:** none

**Example:** COUPLI, CH2, AC+DC

**Notes:**
**CYCLES**

Function: Set the minimum number of cycles for a measurement.

Description: The measurement window is normally set according to a time value but subject to a whole cycle of the frequency. Setting a minimum number of cycles to a value greater than 1 extends the measurement window at frequencies where the periodic time is longer than the set window time.

Format: CYCLES, cycles

Arguments: minimum number of cycles

Reply: none

Example: CYCLES, 4

Notes:
Function: Set up datalog

Description: Sets datalog parameters or accesses datalog non-volatile store.

Format: DATALO, function, interval

Arguments:
- function:
  - DISABLE
  - RAM
  - NONVOL
  - RECALL
  - DELETE

- interval: datalog interval in seconds

Reply: none

Example: DATALOG, NONVOL, 10

Notes:
**DATA LOG**

**Function:**
Read back datalog results

**Description:**
Return datalog values, one record per line

**Format:**
DATALO, start, records

**Arguments:**
start:
  first record to return
records:
  number of records to return

**Reply:**
3 to 6 data values depending on settings:
  index 1-n
  elapsed time in hours
  data1
  data2 (if stored)
  data3 (if stored)
  data4 (if stored)
one record per line

**Example:**
DATALOG, NONVOL, 36
START
wait for datalog
STOP
DATALOG, 20, 4?
20, 1.9000E-1, 1.2345E0
21, 2.0000E-1, 1.2345E0
22, 2.1000E-1, 5.6789E3
23, 2.2000E-1, 1.2345E0

**Notes:**
if no arguments are sent then DATALOG?
returns all data in the same format
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
  bit5  harmonic data available
  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

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

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.
<table>
<thead>
<tr>
<th>Function</th>
<th>Read data available enable register</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>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.</td>
</tr>
<tr>
<td>Format</td>
<td>DAVER?</td>
</tr>
<tr>
<td>Arguments</td>
<td>none</td>
</tr>
<tr>
<td>Reply</td>
<td>decimal equivalent of bits</td>
</tr>
<tr>
<td>Example</td>
<td>DAVER? 4</td>
</tr>
<tr>
<td>Notes</td>
<td></td>
</tr>
</tbody>
</table>
**DELAY**  

**Function:** Set a delay time between frequency points  

**Description:** Applies a settling time when changing frequency for systems which need some settling time after the frequency changes before a measurement should be made.

**Format:** `DELAY, time`

**Arguments:** delay time in seconds from 1 to 60

**Reply:** none

**Example:** `DELAY, 1`

**Notes:** Whole seconds only
**FAST**

**Function:** Set fast communications mode.

**Description:** Disables the screen drawing for high speed operation.

**Format:** FAST, \textit{value}

**Arguments:**

- \textit{value}: ON, OFF

**Reply:** none

**Example:** FAST,ON

**Notes:** FAST mode does not suppress the data acquisition which continues in the background. See SUSPEND to disable all non-communication functions.
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

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?**

**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?

**Arguments:** none, or SWEEP

**Reply:** 6 data values separated by commas
- `freq,mag1,mag2,db,phase,delay`
  + 4 values if 3 channels in use
- `mag3,db3,phase3,delay3`

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.
- FRA, GAINPH, TFA are aliases for the same command
<table>
<thead>
<tr>
<th><strong>FREQUE</strong></th>
<th><strong>FREQUE</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Function:</strong></td>
<td>Set the output frequency</td>
</tr>
<tr>
<td><strong>Description:</strong></td>
<td>Sets the generator output frequency in Hz.</td>
</tr>
<tr>
<td><strong>Format:</strong></td>
<td>FREQUE,$frequency$</td>
</tr>
<tr>
<td><strong>Arguments:</strong></td>
<td>frequency in Hz</td>
</tr>
<tr>
<td><strong>Reply:</strong></td>
<td>none</td>
</tr>
<tr>
<td><strong>Example:</strong></td>
<td>FREQUE,5e4 (set frequency to 50kHz)</td>
</tr>
<tr>
<td><strong>Notes:</strong></td>
<td></td>
</tr>
</tbody>
</table>
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: LOGARITHMIC, 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 action at the end of the sweep is specified in the OUTPUT command.
<table>
<thead>
<tr>
<th>Function:</th>
<th>Set gain/phase analyser mode.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description:</td>
<td>Set gain/phase analyser mode.</td>
</tr>
<tr>
<td>Format:</td>
<td>GAINPH</td>
</tr>
<tr>
<td>Arguments:</td>
<td></td>
</tr>
<tr>
<td>Reply:</td>
<td>none</td>
</tr>
<tr>
<td>Example:</td>
<td>GAINPH</td>
</tr>
<tr>
<td>Notes:</td>
<td>This command has the same effect as MODE,GAINPH. FRA, GAINPH, TFA are aliases for the same command.</td>
</tr>
<tr>
<td>Function:</td>
<td>Gain/phase query</td>
</tr>
<tr>
<td>----------</td>
<td>-----------------</td>
</tr>
<tr>
<td>Description:</td>
<td>Read gain/phase analyser results.</td>
</tr>
<tr>
<td>Format:</td>
<td>GAINPH?</td>
</tr>
<tr>
<td>or:</td>
<td>GAINPH,SWEEP?</td>
</tr>
<tr>
<td>Arguments:</td>
<td>none, or SWEEP</td>
</tr>
<tr>
<td>Reply:</td>
<td>See FRA?</td>
</tr>
</tbody>
</table>
| Example: | OUTPUT,ON  
GAINPH  
FSWEEP,20,10,20E3  
START  
DAV?  
3  
DAV?  
15  
GAINPH?SWEEP  
data returned |
| Notes: | GAINPH? is the same as FRA? |
Function: Set harmonic analyser mode.
Description: Set harmonic analyser mode and parameters.
Format: HARMON,scan,parameter,harmonic,max
Arguments: scan:
   SINGLE
   THDD
   THDS
parameter:
   PERCEN
   DB
harmonic:
   single harmonic 2-100 for display
max:
   harmonic series 2-100 for series thd
Reply: none
Example: HARMON,SINGLE,PERCEN,3
Notes: It is not necessary to send any arguments, but if any are sent they must be in the specified order.
**HARMON?**

Function: Harmonic analyser query

Description:
Read harmonic results.
Sets harmonic analyser mode if not already set.
Waits for next unread data if necessary.
Clears new data available bit read by DAV?

Format:  
- HARMON?
- HARMON,SWEEP?
- HARMON,SERIES?

Arguments: none, or SWEEP, or SERIES

Reply:  
7 data values separated by commas:
- single: freq,mag1,mag2,h1,h2,harm1,harm2
- thd: freq,mag1,mag2,thd1,thd2,harm1,harm2
  1 line per result for sweep data
- series: 6 data values separated by commas:
  - mag1,%1,phase1,mag2,%2,phase2

Example: HARMON?
data returned

Notes: HARMON? waits for next unread data.
HARMON?SWEEP does not wait for new data – data can be read multiple times.
**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:
<table>
<thead>
<tr>
<th>Function</th>
<th>Clear the High Voltage Protect Power Up warning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td></td>
</tr>
<tr>
<td>Format:</td>
<td>HVHOME</td>
</tr>
<tr>
<td>Arguments:</td>
<td>None</td>
</tr>
<tr>
<td>Reply:</td>
<td>None</td>
</tr>
<tr>
<td>Example:</td>
<td>HVHOME</td>
</tr>
<tr>
<td>Notes:</td>
<td>Clears the message from the PSM display. The message will reappear when the instrument is power cycled.</td>
</tr>
</tbody>
</table>
INPUT

Function: Set input mode

Description: Selects the input type of the instrument

Format: INPUT,channel,type

Arguments: channel:
   CH1
   CH2
   CH3
type:
   VOLTAGE
   CURRENT

Reply: None

Example: INPUT,CH1,CURRENT
         SHUNT,CH1,0.1

Notes: Current input needs an external shunt
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**

**Function:** Set LCR meter mode.

**Description:** Set LCR mode and conditions.

**Format:** LCR, *conditions, parameter, head*

**Arguments:**
- **conditions:**
  - AUTO (same as AUTOSH)
  - AUTOSH
  - AUTOFR
  - MANUAL

- **parameter:**
  - AUTO
  - CAPACITANCE
  - INDUCTANCE
  - IMPEDANCE
  - ADMITTANCE

- **head:**
  - NONE
  - LOW (only valid for IAI)
  - NORMAL
  - HIGH
  - VHIGH

**Reply:** none

**Example:** LCR, AUTO, IMPED, NORMAL

**Notes:** It is not necessary to send any arguments, but if any are sent they must be in the specified order.
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, //R, //L,
//C, tanδ, Q, reactance.

Reply: with Admittance selected in the LCR Parameter menu.
11 data values separated by commas:
freq, mag1, mag2, impedance, phase,
resistance, reactance, admittance,
phase, conductance, susceptance.

Sweep reply: 13 data values per line per sweep result:
freq, Q factor, tanδ, Z mag, Z phase,
series L, series C, series R, Y mag,
Y phase, //L, //C, //R.
Sweep reply: Admittance or Impedance selected.

5 data values per line per sweep result:
freq, real, quadrature, magnitude, phase.

Sweep reply: Admittance or Impedance selected and Temperature option selected.

6 data values per line per sweep result:
freq, real, quadrature, magnitude, phase, temperature.

Example:
OUTPUT,ON
LCR?
data returned

Notes:
LCR? waits for next unread data.
LCR?SWEEP does not wait for new data – data can be read multiple times.
LOWFRE

Function: Set low frequency mode
Description: Sets the low frequency option for external frequency measurement.
Format: LOWFRE,value
Arguments: value:
          ON
          OFF
Reply: none
Example: LOWFRE,ON
Notes: LOWFRE is mainly used for measuring low frequencies when not using the instrument generator for the frequency reference. However, as it applies digital filtering, it may also be useful when analysing any signals below a few hundred Hertz.
MARKER

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

Function: Set mode

Description: Sets the fundamental operating mode of the instrument.

Format: MODE,type

Arguments:

- **type:**
  - VRMS (rms voltmeter)
  - GAINPH (gain/phase analyser)
  - VECTOR (vector voltmeter)
  - POWER (power meter)
  - LCR (LCR meter)
  - HARMON (harmonic analyser)
  - SCOPE (oscilloscope)

Reply: none

Example: MODE,GAINPH

Notes: MODE sets the measurement mode of the instrument
**MULTIL**

**Function:** Selects data for multi string reply

**Description:** Selects data values across phases and functions that can be read in a single string.

**Format:** MULTILOG,index,channel,function

**Arguments:**
- **index:**
  - 0  clear all
  - 1-30  select data 1-30
- **channel:**
  - 1-3  channels 1-3
- **function:**
  - 1-99  see appendix

**Reply:** none

**Example:**
- MULTIL,0
- MULTIL,1,1,2  (phase 1 Watts)
- MULTIL,2,2,2  (phase 2 watts)
- MULTIL?
  
  2 data values returned

**Notes:**
MULTIL?

Function: Reads multi string reply
Description: Waits for data to be available then returns selected results.
Format: MULTILOG?
or: MULTILOG,lines?
Arguments: Lines:
    Integer
Reply: Up to 60 data values as selected by the MULTILOG command in a single reply string
    OR
    Up to 60 data values as selected by the MULTILOG command in a single reply string, replying “lines” times.
Example: MULTIL,0
    MULTIL,1,1,2 (phase 1 Watts)
    MULTIL,2,2,2 (phase 2 Watts)
    MULTIL? 2 data values returned
    MULTIL,5?
        Replies 5 times, each containing 2 data values
Notes: The MULTILOG,lines? command will reply each time a new data point is available.
### NEWLOC

**Function:** Waits for new data then holds so that multiple commands can be used on the same data set.

**Description:** Reads multiple sets of data

**Format:** NEWLOC

**Arguments:** None

**Reply:** None

**Example:** NEWLOC;HARMON?SERIES;HPOWER?

Harmonic series and Power data returned

**Notes:** After the command the data will still be held so to release the lock send SUSPEND,OFF
<table>
<thead>
<tr>
<th>Function:</th>
<th>Disable overranging</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description:</td>
<td>Prevents an overrange error from blanking out results in manual ranging.</td>
</tr>
<tr>
<td>Format:</td>
<td>NOOVER, value</td>
</tr>
<tr>
<td>Arguments:</td>
<td>value:</td>
</tr>
<tr>
<td></td>
<td>ON</td>
</tr>
<tr>
<td></td>
<td>OFF</td>
</tr>
<tr>
<td>Reply:</td>
<td>none</td>
</tr>
<tr>
<td>Example:</td>
<td>NOOVER, ON</td>
</tr>
<tr>
<td>Notes:</td>
<td>This can be useful when testing devices in a noisy environment. The range can be set to the correct range for the signal to be measured even if sporadic noise spikes would push it up on to the next range.</td>
</tr>
</tbody>
</table>
Function: Set power factor sign convention.

Description: Fundamental power factor is given a sign depending convention either:
              negative if lagging current
              negative if leading current

Format: PFCNV,type

Arguments: type:
            NEGLAG
            NEGLEA

Reply: none

Example: PFCNV,NEGLAG

Notes: An inductive load would have a lagging current, a capacitive load would have a leading current.
The sign given to VAR can be independently set: see VARCON
OFFSET

Function: Set the output offset
Description: Sets the output generator offset in Volts.
Format: OFFSET,offset
Arguments: offset in Volts
Reply: none
Example: OFFSET,5e-3 (set offset to 5mV)
Notes:
<table>
<thead>
<tr>
<th>Function:</th>
<th>Set output</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description:</td>
<td>Turns the output on or off, or sets the level mode to dBm or voltage. Also specifies the action at the end of a sweep</td>
</tr>
<tr>
<td>Format:</td>
<td>OUTPUT,\texttt{command},sweep,phase</td>
</tr>
<tr>
<td>Arguments:</td>
<td>command:</td>
</tr>
</tbody>
</table>
| | \texttt{OFF}  
| | \texttt{ON}  
| | \texttt{DCONLY}  
| | \texttt{VOLT}  
| | \texttt{DBM}  
| sweep: |
| | \texttt{OFF}  
| | \texttt{ON}  
| | \texttt{DCONLY}  
| Reply: | none |
| Example: | OUTPUT,\texttt{ON} |
| Notes: | For safety, the output defaults to off and must be turned on explicitly.  
| | It is not necessary to send all the arguments, but if they are sent they must be in the specified order |
**PAV**

**Function:** Set phase angle voltmeter mode.

**Description:** Set phase angle voltmeter mode and parameter.

**Format:** `PAV, parameter, lvdt scale`

**Arguments:**
- `parameter`:
  - INPHAS
  - QUADR
  - TANPHI
  - MAGNIT
  - POLAR
  - A2/1
  - RMS2
  - RMS2/1
  - LVDT-D
  - LVDT-R

- `lvdt scale`:
  - scale factor in m for lvdt applications

**Reply:** none

**Example:** `PAV, LVDT-D, 0.1`

**Notes:** It is not necessary to send any arguments, but those that are sent must be in the specified order. `PAV` and `VECTOR` are aliases for the same command.
PAV?

Function: Phase angle voltmeter query
Description: Read phase angle voltmeter results.
Sets phase angle voltmeter mode if not already set.
Waits for next unread data if necessary.
Clears new data available bit read by DAV?

Format: PAV?
or: PAV,RMS?
or: PAV,SWEEP?
Arguments: none, or SWEEP
Reply: 7 data values separated by commas:
    freq,mag1,mag2,ratio,phase,a,b
+5 data values if CH3 enabled
    mag3,ratio3,phase3,a3,b3
+ rms values if PAV,RMS?
1 line per result for sweep data

Example: FREQ,3300
OUTPUT,ON
PAV?
data returned

Notes: PAV? waits for next unread data.
PAV?SWEEP does not wait for new data –
data can be read multiple times.
PAV and VECTOR are aliases for the same command.
Function: Set phase meter mode.
Description: Select phase meter mode.
Format: PHASEM
Arguments: as FRA
Reply: none
Example: PHASEM
Notes: PHASEM is an alias for FRA to support early instruments
<table>
<thead>
<tr>
<th>Function:</th>
<th>Phase meter query</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description:</td>
<td>Reads phase meter results</td>
</tr>
<tr>
<td>Format:</td>
<td>PHASE?</td>
</tr>
<tr>
<td>Arguments:</td>
<td>none</td>
</tr>
<tr>
<td>Reply:</td>
<td>as FRA?</td>
</tr>
<tr>
<td>Example:</td>
<td>PHASE? Data returned</td>
</tr>
<tr>
<td>Notes:</td>
<td>PHASEM is an alias for FRA to support early instruments.</td>
</tr>
</tbody>
</table>
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:
Function: Set phase reference

Description: Select measurement of phase as CH2 relative to CH1 or as CH1 relative to CH2

Format: PHREF, channel

Arguments: channel:
- CH1: phase = ch2 wrt ch1
- CH2: phase = ch1 wrt ch2

Reply: none

Example: PHREF, CH2

Notes: This parameter influences the phase meter mode and the phase angle voltmeter mode
POWER

Function: Set up power meter mode.
Description: Configure power meter
Format: POWER
Arguments: none

Reply: None
Examples: POWER
Notes:
**POWER?**

Function: Read power meter results

Description: Reads back latest power meter results. Sets power meter mode if not already set. Waits for next unread data if necessary. Clears new data available bit read by DAV?

Format: 

or: POWER? *results*

or: POWER,*results*?

Arguments: results:

WATTS
RMS
INTEGR

Reply: WATTS:

9 data values separated by commas
W,W.f,VA,VA.f,pf,pf.f,Wdc,W.h,freq

RMS:

8 data values separated by commas
rms1,2,dc1,2,f1,2,phase1,2

INTEGR:

9 data values separated by commas
Wh,Wh.f,VAh,VAh.f,avpf,avpf.f, Ah,Ah.f,time

no argument:

26 data values separated by commas
WATTS, RMS, INTEGR

Example: POWER?WATTS

Notes:
Function: Access non volatile program stores.
Description: Recall, store or delete non-volatile program store.
Format: PROGRA, function, number
Arguments: function:
  RECALL
  STORE
  DELETE
number
  0-999
Reply: none
Example: PROGRA, RECALL, 13
Notes: Number 0 represents factory default, which can only be recalled.
<table>
<thead>
<tr>
<th>Function:</th>
<th>Identify program.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description:</td>
<td>Reads the name of the last program to be loaded or recalled or a program is memory.</td>
</tr>
</tbody>
</table>
| Format: | PROGRA,NAME?  
PROGRA,NAME,number?  
PROGRA,FILES? |
| Arguments: | number  
0-999 |
| Reply: | NAME: text string  
FILES: 1 text string per stored program: number,name,date |
| Example: | PROGRA,NAME?  
factory default |
| Notes: | |
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, UP AUTO, MANUAL
- range: nominal range value

Reply: none

Example: RANGE,CH2,MANUAL,3V

Notes:
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

Function: Access non volatile result stores.
Description: Recall, store or delete non-volatile result.
Format: RESULT, function, number
Arguments: function:
  RECALL
  STORE
  DELETE
number
  0-999
Reply: none
Example: RESULT, RECALL, 13
Notes:
<table>
<thead>
<tr>
<th>RESULT?</th>
<th>RESULT?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Function: Identify available results.</td>
<td></td>
</tr>
<tr>
<td>Description: Reads the name of the stored results.</td>
<td></td>
</tr>
<tr>
<td>Format: RESULT,NAME,\textit{number}? \newline RESULT,FILES?</td>
<td></td>
</tr>
<tr>
<td>Arguments: number \textbf{0-999}</td>
<td></td>
</tr>
<tr>
<td>Reply: NAME: text string \newline FILES: 1 text string per stored result: number,name,date</td>
<td></td>
</tr>
<tr>
<td>Example: RESULT,NAME,13? \newline PSU stability sweep #3</td>
<td></td>
</tr>
<tr>
<td>Notes:</td>
<td></td>
</tr>
<tr>
<td>REZERO</td>
<td>REZERO</td>
</tr>
<tr>
<td>--------</td>
<td>--------</td>
</tr>
<tr>
<td>Function:</td>
<td>Rezero front end</td>
</tr>
<tr>
<td>Description:</td>
<td>Request the DSP to re-compensate for dc offset and compute a new autozero</td>
</tr>
<tr>
<td>Format:</td>
<td>REZERO</td>
</tr>
<tr>
<td>Arguments:</td>
<td>none</td>
</tr>
<tr>
<td>Reply:</td>
<td>none</td>
</tr>
<tr>
<td>Example:</td>
<td>REZERO</td>
</tr>
<tr>
<td>Notes:</td>
<td></td>
</tr>
</tbody>
</table>
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
  - CH3

  factor:
  - multiplying scale factor

Reply: none

Example: SCALE,CH2,10

Notes:
**SCOPE?**

Function: Set the scope channel. Fetch raw scope data.

Description: Set the channel to be displayed on the instrument. Read back raw oscilloscope data.

Format: `SCOPE,channel`

Arguments: channel:
- CH1
- CH2
- CH3
- CH1?
- CH2?
- CH3?

Reply: 252 signed integers:
- range
- trigger
- 250 x data

Example:
```
SCOPE,CH1
display channel 1 on the instrument
HOLD,ON
SCOPE,CH1?
read data
read back channel 1 raw oscilloscope data
SCOPE,CH2?
read data
SCOPE,CH3?
read data
HOLD,OFF
```

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
SETUP

Function: Upload instrument set up

Description: All the settings within the instrument may be read by SETUP? The same settings may then be stored by ending the same data back to the instrument. As it sends all settings in a compressed format it is quicker than setting individual parameters.

Format: SETUP,index,data

Arguments:
index: 0-15
data: ASCII hex as returned by SETUP?

Reply: none

Example:
SETUP?
Read 16 lines of data
SETUP,00,data00
SETUP,01,data01
.
.
SETUP,15,data15

Notes: The settings are only updated when the 16th line has been received and the checksum has been verified.
**SETUP?**

**Function:** Read instrument set up

**Description:** All the settings within the instrument may be read by SETUP? The same settings may then be stored by sending the same data back to the instrument. As it sends all settings in a compressed format it is quicker than setting individual parameters.

**Format:** SETUP?

**Arguments:** none

**Reply:** 16 lines of ASCII data

**Example:** SETUP?
Read 16 lines of data

**Notes:**
**SHUNT**

Function: Set channel shunt value

Description: Set the resistance factor of a current shunt to be divided into the measured voltage for a given input channel.

Format: **SHUNT,channel,resistance**

Arguments: channel:
- CH1
- CH2
- CH3
resistance: shunt resistance in Ohms

Reply: none

Example: SHUNT,CH1,10

Notes: The SHUNT command is still accepted if the channel has not been configured for current. The value stored will be used when the channel is configured for current.
**SMOOTH**

**Function:** Select the smoothing

**Description:** Sets the filter time constant and dynamic response.

**Format:** SMOOTH,type,dynamics

**Arguments:**
- **type:**
  - NONE
  - NORMAL
  - SLOW
- **dynamics:**
  - AUTO
  - FIXED

**Reply:** none

**Example:**
- SMOOTH,NORMAL,FIXED
- SMOOTH,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.

FILTER is an alias for SMOOTH
**SPEED**

**Function:** Sets the measurement speed

**Description:** Sets the minimum window size for the measurement.

**Format:**
- SPEED, value
- SPEED, WINDOW, time

**Arguments:**
- value:
  - FAST
  - MEDIUM
  - SLOW
  - VSLOW
  - WINDOW

**Reply:** none

**Example:**
- SPEED, SLOW
- SPEED, WINDOW, 0.1

**Notes:**
<table>
<thead>
<tr>
<th>Function:</th>
<th>Start sweep</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description:</td>
<td>Initiate sweep in those functions that have a sweep or resets filtering in others.</td>
</tr>
<tr>
<td>Format:</td>
<td>START</td>
</tr>
<tr>
<td>Arguments:</td>
<td>none</td>
</tr>
<tr>
<td>Reply:</td>
<td>none</td>
</tr>
<tr>
<td>Example:</td>
<td>MODE,GAINPH (set gain phase analyser)</td>
</tr>
<tr>
<td></td>
<td>START</td>
</tr>
</tbody>
</table>

Notes:
### STATUS?

<table>
<thead>
<tr>
<th>Function:</th>
<th>Read back channel ranging status.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description:</td>
<td>Read back condition of selected channel:</td>
</tr>
<tr>
<td></td>
<td>range number (1-16)</td>
</tr>
<tr>
<td></td>
<td>range text</td>
</tr>
<tr>
<td></td>
<td>overflow/underflow status</td>
</tr>
<tr>
<td>Format:</td>
<td>STATUS?</td>
</tr>
<tr>
<td>or:</td>
<td>STATUS, channel?</td>
</tr>
<tr>
<td>Arguments:</td>
<td>channel:</td>
</tr>
<tr>
<td></td>
<td>CH1</td>
</tr>
<tr>
<td></td>
<td>CH2</td>
</tr>
<tr>
<td></td>
<td>CH3</td>
</tr>
<tr>
<td>Reply:</td>
<td>If no channel specified:</td>
</tr>
<tr>
<td></td>
<td>OVER if any channel overflow</td>
</tr>
<tr>
<td></td>
<td>LOW if any channel underflow</td>
</tr>
<tr>
<td></td>
<td>OK if all channels in range</td>
</tr>
<tr>
<td></td>
<td>Else, range number, range text, status</td>
</tr>
<tr>
<td></td>
<td>1-16</td>
</tr>
<tr>
<td></td>
<td>range as per RANGE command</td>
</tr>
<tr>
<td></td>
<td>OVER if overflow</td>
</tr>
<tr>
<td></td>
<td>LOW if underflow</td>
</tr>
<tr>
<td></td>
<td>OK if in range</td>
</tr>
</tbody>
</table>

#### Example:

STATUS, CH1?
6, 3V, OK

#### Notes:
**STOP**

Function: Stop sweep

Description: Stop an active sweep, or data streaming.

Format: STOP

Arguments: none

Reply: none

Example: MODE, PHASE, STREAM, 0.01
START
read data values as required
STOP
read remaining data values

Notes:
SUSPEND

Function:     Suspend data acquisition
Description:  Suspends the background data acquisition to maximise the communications speed.
Format:       SUSPEND, command
Arguments:    command
              OFF
              ON
Reply:        none
Example:      DATALOG,NONVOL,36
              START
              wait for datalog
              STOP
              SUSPEND, ON
              DATALOG?
              data, data, data, data, ......
              SUSPEND, OFF
Notes:
TAGREP

Function: Set up a reply tag

Description: Select a reply tag to identify the instrument in a multi-instrument environment

Format: TAGREP, on/off

Arguments: on/off:
            ON
            OFF

Reply: none

Example: TAGREP, ON
         *ESR?
         PPA5530:00635:1

Notes: When “tag reply” is turned on every reply string has a prefix of an identification string comprising the model and serial number
TEMPER

Function: Set up temperature measurement

Description: Set scaling and offset for a temperature sensor connected to the torque input (power transformer application mode)

Format: TEMPER,type,scalefactor,offset

Arguments: type:
- DISABLED
- CENTIG
- FARHEN

Scale:
Multiplying factor in degrees/Volt

Offset:
Additive zero in Volts

Reply: none

Example: TEMPER,CENTIG,5,-2
Sensor scaling = 5°C/V, 0V = 10°C

Notes:
<table>
<thead>
<tr>
<th><strong>TEMPER?</strong></th>
<th><strong>TEMPER?</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Function:</td>
<td>Read the temperature</td>
</tr>
<tr>
<td>Description:</td>
<td>Returns the measured temperature from a sensor connected to the torque input</td>
</tr>
<tr>
<td>Format:</td>
<td>TEMPER?</td>
</tr>
<tr>
<td>Arguments:</td>
<td>none</td>
</tr>
<tr>
<td>Reply:</td>
<td>Single data value</td>
</tr>
<tr>
<td>Example:</td>
<td>TEMPER?</td>
</tr>
<tr>
<td></td>
<td>Data returned</td>
</tr>
<tr>
<td>Notes:</td>
<td></td>
</tr>
<tr>
<td><strong>TFA</strong></td>
<td><strong>TFA</strong></td>
</tr>
<tr>
<td>----------</td>
<td>----------</td>
</tr>
<tr>
<td><strong>Function:</strong></td>
<td>Set transfer function analyser mode.</td>
</tr>
<tr>
<td><strong>Description:</strong></td>
<td>Set transfer function analyser mode.</td>
</tr>
<tr>
<td><strong>Format:</strong></td>
<td>TFA</td>
</tr>
<tr>
<td><strong>Arguments:</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Reply:</strong></td>
<td>none</td>
</tr>
<tr>
<td><strong>Example:</strong></td>
<td>TFA</td>
</tr>
<tr>
<td><strong>Notes:</strong></td>
<td>This command has the same effect as MODE,GAINPH. FRA, GAINPH, TFA are aliases for the same command.</td>
</tr>
</tbody>
</table>
TFA?

Function: transfer function analyser query
Description: Read transfer function analyser results.

Format: TFA?
or: TFA,SWEEP?

Arguments: none, or SWEEP

Reply: As for FRA?

Example:
OUTPUT,ON
TFA
FSWEEP,20,10,20E3
START
DAV?
3
DAV?
15
TFA?SWEEP
data returned

Notes: FRA, GAINPH, TFA are aliases for the same command
**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  
  PSM3750 #4  

Notes:
VARCON

Function: Set VAr sign convention.

Description: Fundamental VAr measurement is given a sign depending convention either:
- negative if lagging current
- negative if leading current

Format: VARCON,type

Arguments: type:
- NEGLAG
- NEGLEA

Reply: none

Example: VARCON,NEGLAG

Notes: An inductive load would have a lagging current, a capacitive load would have a leading current. The sign given to power factor can be independently set: see PFCONV
VECTOR

Function: Set vector voltmeter mode.

Description: Set vector voltmeter mode and parameter.

Format: VECTOR, parameter, lvdt scale

Arguments: As PAV

Reply: none

Example: VECTOR, LVDT-D, 0.1

Notes: PAV and VECTOR are aliases for the same command.
VECTOR?

Function: Vector voltmeter query
Description: Read vector voltmeter results.

Format: VECTOR?
or: VECTOR,SWEEP?
Arguments: none, or SWEEP
Reply: As PAV
Example: FREQ,3300
         OUTPUT,ON
         VECTOR?
         data returned

Notes: PAV and VECTOR are aliases for the same command.
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?
PQ3504,1,1.12,1.12,1.01,2.01

Notes: This data can be displayed on the screen by pressing SYSTEM then BACK
**VRMS**

**Function:** Set up rms voltmeter.

**Description:** Set mode to rms voltmeter.

**Format:** VRMS

**Arguments:** none

**Reply:** none

**Examples:** VRMS

**Notes:** This has the same effect as MODE,VRMS
**VRMS?**

**Function:** Read true rms voltmeter results

**Description:**
Reads back latest voltmeter results.
Sets voltmeter mode if not already set.
Waits for next unread data if necessary.
Cleans new data available bit read by DAV?

**Format:** VRMS?

or:

VRMS,*results*?

**Arguments:**
- results:
  - RMS
  - SURGE

**Reply:**
- RMS:
  - 8 data values separated by commas
    - rms1,2,dc1,2,ac1,2,dbm1,2
- SURGE:
  - 6 data values separated by commas
    - pk1,2,cf1,2,surge1,2
- no argument:
  - 14 data values separated by commas
    - RMS results then SURGE

**Example:** VRMS?RMS

**Notes:**
As VRMS? 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 VRMS? command.
WAVEFO

Function: Set the output waveform
Description: Selects the output waveform for the signal generator.
Format: WAVEFO,type
Arguments:
  type:
    SINEWAVE
    SQUARE
    TRIANGLE
    SAWTOOTH
    PULSE
    WHITENOISE
Reply: None
Example:
  FREQUE,500
  WAVEFO,TRIANG (triangle wave)
  OUTPUT,ON
Notes:
Function: Set the wiring configuration
Description: Selects 2 channel or 3 channel operation.
Format: WIRING,type
Arguments: type:
   CH2
   CH3
Reply: None
Example: WIRING,CH3
Notes:
**ZERO**

**Function:** Apply or remove the zero. Performs lead compensation in LCR mode.

**Description:** Applies or removes a zero function depending on the measurement mode (same as pressing ZERO key). Applies lead compensation in LCR mode along with setting the parameters prior to applying the compensation.

**Format:**
- ZERO
- ZERO,DELETE
- ZERO,DB,offset
- ZERO,PHASE,offset
- ZERO,OPEN
- ZERO,SHORT
- ZERO,SINGLE
- ZERO,SWEEP,steps,start,finish
- ZERO,ZREF,type,component

**Arguments:**
- offset: offset value
- steps: LCR sweep compensation steps
- start: LCR compensation start frequency
- stop: LCR compensation stop frequency
- type: Zref type, enter CAPACI,RESIST or INDUCTI

**Component:** Sweep Compensation value
Reply: none

Example: ZERO,SWEEP,100,1e3,1e6
ZERO,OPEN
performs open circuit compensation
ZERO,ZREF,CAPACI,0.00001
Sets zref to a capacitance value of 10μF
ZERO,ZREF,INDUCTI,0.001
Sets zref to a inductance value of 1mH
ZERO,ZREF,RESIST,100,45
Sets zref to a resistance value of 100Ω with a phase of 45 degrees

Notes: The compensation is stored with the program. Use “PROGRAM,STORE,n” and “PROGRAM,RECALL,n” to store or recall the program to/from memory location “n”

ZREF: Enter the value of capacitance in F. The value of inductance in H, the value of Resistance in ohms and the value of phase in Degrees.
ZOOM

Function: Sets the display zoom parameters.
Description: Sets the zoom level and data.
Format: ZOOM, level, data1, data2, data3, data4
Arguments: level:
0 – no zoom
1 – normal
2 – 4 line display
3 – 3 line display
data1-4:
function data for zoom
data consists of line number for channel 1
or line number + 64 for channel 2
or line number + 128 for channel 3
Reply: None
Example: VRMS
ZOOM, 1, 1, 12 (level 1, ch1 rms, ch2 rms)
Notes: It is not necessary to send all the parameters, but whatever parameters are sent must be in the correct order.
**ZOOM?**

**Function:** Read the display zoom parameters.

**Description:** Reads the zoom level and data.

**Format:** ZOOM?

**Arguments:**

**Reply:** 5 integers separated by commas:
Level,data1,data2,data3,data4

Data consists of line number for channel 1 or line number + 64 for channel 2 or line number + 128 for channel 3

**Example:** ZOOM?
1,1,129,0,0 (level 1, ch1 rms, ch2 rms)

**Notes:**
Appendices

COMMAND SUMMARY

And

CONFIGURABLE PARAMETERS
Appendix A – Command Summary

command format | reply format
--- | ---
*CLS | single integer data value
*ESE,value | single integer data value
*ESE? | company, product, serial no, version
*ESR? | 0 or 1
*IDN? | single integer data value
*OPC? | single integer data value
*RST | single integer data value
*SRE,value | single integer data value
*SRE? | single integer data value
*STB? | single integer data value
*TRG | single integer data value
*TST? | single integer data value
*WAI | single integer data value

ABORT | single integer data value
ACTRIM,channel,level,tol | single integer data value
ALARM,latch,sounder | single integer data value
ALARM? | single integer data value
ALARME,value | single integer data value
ALARME? | single integer data value
ALARM1,type,data,high,low | single integer data value
ALARM2,type,data,high,low | single integer data value
AMPLIT,amplitude | single integer data value
AUXILI,device,value | single integer data value
BANDWI,type | single integer data value
BEEP | single integer data value
BLANKI,on/off | single integer data value
CONFIG,parameter,data | single integer or real data value
CONFIG,parameter? | single integer data value
COUPLI,channel,coupling | single integer data value
COUPLI,channel? | single integer data value
CYCLES,cycles | single integer data value
DATALO,function,interval | single integer data value
DATALO,start,records? | single integer data value
DAV? | single integer data value
DAVER,value | single integer data value
DAVER? | single integer data value
DELAY,time | single integer data value
FAST,on/off | single integer data value
FILTER,type,dynamics
FRA
FRA? freq,mag1,mag2,\text{dB},\text{phase},\text{delay}
FRA,SWEET? n lines of FRA? data
FREQUE,frequency
FSWEEP,steps,start,end,log
GAINPH
GAINPH? freq,mag1,mag2,\text{dB},\text{phase},\text{delay}
GAINPH,SWEEP? n lines of GAINPH? data
HARMON,scan,para,h,hmax
HARMON?
HARMON,SERIES?
HARMON,SWEEP? n lines of HARMON? data
HOLD,on/off
HVHOME
INPUT,channel,type
INPUT,channel? single integer data value
KEYBOA,value
LCR,conditions,param,head
LCR?
LCR,SWEEP?
LOWFRE,on/off
MARKER,on/off,frequency
MODE,type
MULTIL,index,ch,func
MULTIL?
up to 60 floating point values
NEWLOC
NOOVER,on/off
OFFSET,offset
OUTPUT,type,sweep,phase
PAV,parameter,scaling
PAV? freq,mag1,mag2,\text{parameter},\text{phase},a,b
PAV,SWEEP? n lines of VECTOR? data
PFCONV,type
PHASEM
PHASEM? same as FRA
PHCONV, convention
PHREF, channel
POWER, integration type
POWER, WATTS? W, W.f, VA, VA.f, pf, pf.f, Wdc, W.h, freq
POWER, RMS? rms1, rms2, dc1, dc2, fnd1, fnd2, φ1, φ2
POWER, INTEGR? Wh, Wh.f, VAh, VAh.f, pf, pf.f, Ah, Ah.f, t
PROGRAM, function, number
PROGRAM? CR terminated text string
RANGE, ch, ranging, range
RESOLU, format
RESULT, function, number
RESULT? CR terminated text string
REZERO
SCALE, channel, factor
SCALE, channel? single real data value
SCOPE, channel? 252 signed integers
SCREEN? 240 lines of 40 bytes
SETUP, index, data
SETUP? 16 lines of ASCII data
SHUNT, channel, resistance
SHUNT, channel? single real data value
SMOOTH, type, dynamics
SPEED, speed
START
STATUS, channel? range number, range text, over/low/ok
STOP
SUSPEND, on/off
TAGREP, on/off
TEMPER, type, scalefactor, offset
TEMPER? Single real data value
TFA
TFA? freq, mag1, mag2, dB, phase, delay
TFA, SWEEP? n lines of TFA? data
USER?
VARCON, type
VECTOR, parameter, scaling
VECTOR? freq, mag1, mag2, parameter, phase, a, b
VECTOR, SWEEP? n lines of VECTOR? data
VERSION?
datecode, type, cpu, dsp, fpga, boot
VRMS
VRMS?
VRMS, RMS? RMS? data followed by SURGE?
VRMS, SURGE? rms1, rms2, dc1, dc2, ac1, ac2, db1, db2
pk1, pk2, cf1, cf2, surge1, surge2
WAVEFO,type
WIRING,type
ZERO
ZERO,DELETE
ZERO,OPEN
ZERO,SHORT
ZERO,Sweep,steps,start,finish
ZERO,ZREF,type,component
ZOOM,level,d1,d2,d3,d4
ZOOM? level,d1,d2,d3,d4
calibration commands

CALAPP
CALAUX,string
CALCOM,freq
CALDCO,value
CALFIL,index,value
CALFIL? six real data values
CALFRQ,index,freq
CALFRQ? seven real data values
CALIAI,freq,res,react
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,number,parameter?
  CONFIG,parameter,data

<table>
<thead>
<tr>
<th>Number</th>
<th>Function</th>
<th>Parameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Operating mode, (Sets main mode)</td>
<td>0=RMS Voltmeter</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1=Frequency Response analyser</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2=Power Meter</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3=LCR Meter</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5=Harmonic Analyser</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6= Vector Voltmeter</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7=Oscilloscope</td>
</tr>
<tr>
<td>2</td>
<td>Language, (System Options if installed)</td>
<td>0=English</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1=Other (if installed)</td>
</tr>
<tr>
<td>3</td>
<td>Bandwidth, (Acquisition Control)</td>
<td>0=Auto</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1=Wide</td>
</tr>
<tr>
<td>4</td>
<td>High Voltage Protection Mode, (System Options)</td>
<td>0=On</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1=Off</td>
</tr>
<tr>
<td>5</td>
<td>Low blanking, (System Options &amp; RMS Voltmeter)</td>
<td>0=Off</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1=On</td>
</tr>
<tr>
<td>6</td>
<td>Phase convention, (System Options)</td>
<td>0=-180° to +180°</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1=0° to -360°</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2=0° to +360°</td>
</tr>
</tbody>
</table>
7 Generator output, (Output Options)
   0=Off
   1=On
   2=dc only

9 Keyboard beep, (System Options)
   0=On
   1=Off

11 Low frequency mode, (Acquisition Control)
   0=Off
   1=On

12 Speed “window size”, (Acquisition Control, Enter figures)

13 Speed, (Acquisition Control)
   0=Very slow
   1=Slow
   2=Medium
   3=Fast
   4=Very fast
   5=Window

14 Smoothing, (Acquisition control)
   0=Normal
   1=Slow
   2=None

15 Smoothing response, (Acquisition Control)
   0=Auto reset
   1=Fixed time

16 Baud rate, (Comms-Remote Options, RS232)
   0=19200
   1=9600
   2=4800
   3=2400
   4=1200

18 Sweep steps, (Sweep Control-Enter step number figures)

19 Sweep start frequency, (Sweep Control-Enter figures)
20 Sweep end frequency, (Sweep Control-Enter figures)

21 Sweep-type, (Sweep Control)
   0=Single
   1=Repeat

22 Conditions, (LCR Meter)
   0=Auto frequency
   1=Manual
   2=Auto shunt

Input parameters

24 Input 1 (CH1), (CH1-Input 1)
   0=Disabled
   1=Direct
   2=External shunt
   3=External attenuator

25 Input 2 (CH2), (CH2-Input 2)
   As Ch1

26 Input 3 (CH3), (CH3-Input 3)
   As Ch1

27 Minimum range (CH1), (CH1-Input 1)
   0=3mV
   1=10mV
   2=30mV
   3=100mV
   4=300mV
   5=1V
   6=3V
   7=10V
   8=30V
   9=100V
   10=300V
   11=1kV
   12=300mV*
   13=1V*
   14=3V*
   15=10V*
Minimum range (CH2), (CH2-Input 2)  
As CH1

Minimum range (CH3), (CH3-Input 3)  
As CH1

Autoranging (CH1), (CH1-Input 1)  
0=Full Autorange  
1=Autorange up  
2=Manual

Autoranging (CH2), (CH2-Input 2)  
As Ch1

Autoranging (CH3), (CH3-Input 3)  
As Ch1

Coupling (CH1), (CH1-Input 1)  
0=ac+dc  
1=ac

Coupling (CH2), (CH2-Input 2)  
As Ch1

Coupling (CH3), (CH23-Input 3)  
As Ch1

Scale (CH1), (CH1-Input, Enter figures)

Scale (CH2), (CH2-Input, Enter figures)

Scale (CH3), (CH3-Input, Enter figures)

External shunt (CH1), (CH1-Input, Enter figures)

External shunt (CH2), (CH2-Input, Enter figures)

External shunt (CH3), (CH3-Input, Enter figures)
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**Display parameters**

42 Zoom level, (Main Display)
   0=Zoom -
   1=Zoom +
   2=Second zoom +

43 Display zoom characters on line 1
44 Display zoom characters on line 2
45 Display zoom characters on line 3
46 Display zoom characters on line 4

47 Display type, (Main display-datalog or sweep display mode)
   0=Real Time
   1=Table
   2=Graph

**Signal generator parameters**

48 Generator frequency, (Output Options-Enter figures)
49 Generator amplitude, (Output Options-Enter figures)
50 Generator offset, (Output Options-Enter figures)
51 Generator waveform, (Output Options)
   0=Sinewave
   1=Square wave
   2=Triangle
   3=Sawtooth
   4=Pulse
   5=White noise

52 Frequency step, (Output options-Enter figures)
53 Amplitude step, (Output options-Enter figures)
54 Amplitude dBm (Output options-[116 system control]-Enter figures)
**Datalog parameters**

58  Datalog, (Acuisition Control-memory type)
    0=Disabled
    1=RAM
    2=Non volatile

59  Interval, (Acuisition Control-RAM/Non volatile-Enter time figures)

**General parameters**

66  Program 1-6 direct load, (System Options)
    0=Disabled
    1=Enabled

67  DFT type, (System Options)
    0=Cosine
    1=Sine

69  Ignore Overload, (Advanced ACQU Options)
    0=Disabled
    1=Enabled

72  Phase reference, (ACQU Options)
    0=CH1
    1=CH2
    2=CH3

73  DFT selectivity, (Advanced ACQU Options)
    0=normal
    1=narrow

75  Frequency lock, (Advanced ACQU Options)
    0=Normal
    1=Constant

78  High speed mode, (Advanced ACQU Options)
    0=Disabled
    1=Enabled

84  Input, (Acquisition)
    0=2 channel
    1=3 channel
**Power meter parameters**

86  Difference THD, (Power meter)
    0=Disabled
    1=Including dc
    2=Excluding dc

87  PF sign, (Power meter)
    0=Negative lagging
    1=Negative leading

88  VAr sign, (Power meter)
    0=Negative lagging
    1=Negative leading

**RMS meter parameters**

92  Rectified mean, (RMS meter)
    0=Absolute
    1=Normalised

93  Ratio 2, (FRA)
    0=ch2/ch1
    1=ch1/ch2
    2=ch3/ch1
    3=ch1/ch3
    4=ch3/ch2
    5=ch2/ch3
    6=ch3 freq

**Harmonic analyser parameters**

99  Computation, (Harmonic analyser)
    0=Difference thd
    1=Harmonic series
    2=TIF
    3=THF
    4=TRD
    5=TDD
    6=Harmonic series phase

100  Selected harmonic, (Harmonic analyser)
    2 to 100

101  Max harmonic, (Harmonic analyser - series)
    2 to 100
Bargraph scale, (Harmonic analyser – series) value in Volts

Bargraph scale, (Harmonic analyser – series) value in Amps

**LCR sweep zero parameters**

106 Compensation, (LCR meter)
   0=Single frequency
   1=Sweep

107 Sweep zero start frequency, (LCR meter) value in Hz

108 Sweep zero end frequency, (LCR meter) value in Hz

109 Sweep zero steps, (LCR meter) 2 to 250

**System parameters**

111 Current rating, (Harmonic analyser, TRD) value in A

113 Marker, (Harmonic analyser)
   0=Off
   1=On

114 Marker position, (Harmonic analyser) value in %

115 High Voltage Protection Message at PowerUp
   0=On
   1=Off

117 Step message, (System options)
   0=Enabled
   1=Disabled

118 Display sequence, (Graph display after sweep)
   0=Primary Parameter
   1=Secondary Parameter
   2=Both Parameters
122 Auxiliary device, (Aux)
   0=None
   4=IAI

131 Show scaled external range, (System options)
   0=Disabled
   1=Enabled

132 Zoom 2 high resolution, (System options)
   0=Disabled
   1=Enabled

**LCR meter parameters**

135 Invert Y-Axis, (Nyquist LCR Meter)
   0=normal (off)
   1=Invert (on)

136 Display origin axis, (Nyquist LCR Meter)
   0=Hide (off)
   1=Display (on)

137 Parameter, (LCR Meter)
   0=Auto
   1=Capacitance
   2=Inductance
   3=Impedance
   4=Admittance

138 Sweep Measurement, (LCR Meter)
   0=Series
   1=Parallel

139 Graph, (LCR Meter)
   0= Tanδ/QF
   1= Single
   2=Resistance

140 Shunt, (Auxiliary control-auxiliary device-IAI)
   0=Low
   1=Normal
   2=High
   3=Very high
Impedance Graph, (LCR meter-impedance)
0=Linear
1=Log

Reference phase, (LCR meter-Zero-Compensation)
-90° to +90°

Reference value, (LCR meter-Zero-Compensation)
value in Ohms/Farads/Henries

Reference type, (LCR meter-Zero-Compensation)
0=Capacitance
1=Resistance
2=Inductance

Connection, (LCR Meter)
0=Shunt
1=Divider Zx low
2=Divider Zx high

Phase offset, (LCR meter)
value in degrees

Gain/Phase analyser parameters

Gain dB offset, (FRA)
value in degrees

Gain/Phase margins, (FRA)
0=Disabled
1=Enabled

Computation, (FRA)
0=ch2/ch1
1=ch1/ch2
2=ch3/ch1
3=ch1/ch3
4=ch3/ch2
5=ch2/ch3
6=ch3 freq
**System parameters**

151 Minimum cycles, (Acquisition control)  
\[1-100\]

152 Delay time, (Acquisition control)  
\[1-60s\]

153 IEEE address, (Comms-Remote options-interface-GPIB)  
\[1-30\]

154 Interface, (Comms-Remote options)  
0=RS232  
1=USB  
2=LAN  
3=GPIB

**Alarm functions (Monitor 1)**

156 Monitor 1 data, (Alarm-monitor options)  
0=Zoom1  
1=Zoom2  
2=Zoom3  
3=Zoom4

157 Alarm type, (Alarm-monitor options)  
0=Disabled  
1=Linear  
2=Alarm if high  
3=Alarm if low  
4=Outside window  
5=Inside window

158 High threshold (Alarm type), (Alarm-monitor options)  
value in same units as zoom function

159 Low threshold (Alarm type), (Alarm-monitor options)  
value in same units as zoom function

160 Alarm latch (Alarm type), (Alarm-monitor options)  
0=Off  
1=On

161 Alarm sounder (Alarm type), (Alarm-monitor options)  
0=Enabled  
1=Disabled
**Alarm functions (Monitor 2)**

167  Monitor 2 data, (Alarm-monitor options)
- 0=Zoom1
- 1=Zoom2
- 2=Zoom3
- 3=Zoom4

168  Alarm 2 type, (Alarm-monitor options)
- 0=Disabled
- 1=Linear
- 2=Alarm if high
- 3=Alarm if low
- 4=Outside window
- 5=Inside window

169  High threshold (Alarm type), (Alarm-monitor options)
value in same units as zoom function

170  Low threshold, (Alarm type), (Alarm-monitor options)
value in same units as zoom function

**Graph functions**

173  Graph 2 scaling, (Sweep control)
- 0=Auto
- 1=Manual

174  Upper limit (Graph 2 scaling), (Sweep control)
value in same units as graph function

175  Lower limit (Graph 2 scaling), (Sweep control-Enter figures)
value in same units as graph function

**System parameters**

176  Ramp Off (Output Control)
- 0=Off
- 1=On
Phase angle voltmeter parameters

Parameter, (Vector voltmeter)
0=In-phase
1=Quadrature
2=Tan ϕ
3=Magnitude
4=Phase
5=In-phase ratio
6=rms
7=rms ratio
8=LVDT diff
9=LVDT ratio

Scale factor (LVDT), (Vector voltmeter-Enter figures)

Null meter, (Vector voltmeter)
0=Auto
1=Manual
2=Off

Upper limit (Null meter), (Vector voltmeter-Enter figures)

Phase offset (Parameter), (Vector voltmeter)
value in degrees

Trim parameters

ac trim data, (Trim control)
0=Disabled
1=CH1
2=CH2
3=CH3

ac level (Trim data), (Vector voltmeter)
value in Volts

Trim tolerance (Trim data), (Vector voltmeter)
value in %

Other parameters

Steps, (Sweep control)
0=Log
1=Linear
Graph 1 scaling, (Sweep control)
0=Auto
1=Manual

Upper limit (Graph 1 scaling), (Sweep control-Enter figures)

Lower limit (Graph 1 scaling), (Sweep control-Enter figures)

Resolution, Comms-Remote Options)
0=Normal
1=High
2=Binary

LAN IP address 3
LAN IP address 2
LAN IP address 1
LAN IP address 0

Tag comms reply with unit identifier
0=Disabled
1=Enabled

Scope parameters

Timebase
value in s/div

Trigger level
value in V or A

Pretrigger
0=none
1=25%
2=50%
3=75%

Trigger polarity
0=rising edge
1=falling edge

Trigger mode
0=auto
1=normal
2=single shot
215  Cursors
     0=off
     1=on

216  Trigger HF reject
     0=off
     1=on

**Generator parameters**

219  Generator ceiling
     value in V

221  Pulse width
     value in s

222  Amplitude step if dBm control
     value in dBm

223  Linear frequency step
     value in Hz
## Appendix C – MULTILOG parameters

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**Notes:**

*These are generic functions for our range of instruments. Not all functions are available on the PSM3750.*

Function 48 is used to measure Q-factor in Imp meter mode AND to measure corrected power in Transformer mode.

Functions 78 and 81 are the same.

Example script to return results for Power, RMS Voltage and AC Voltage:

```plaintext
> multil,0
> multil,1,5,2
> multil,2,5,50
> multil,3,5,60
> multil?
-1.8846E-7,-2.0984E-3,8.5765E-4
```
Appendix D - Newtons4th Ltd. Contact details

Please direct all queries or comments regarding the PSM3750 instrument or this manual to:

Newtons4th Ltd.
1 Bede Island Road
Leicester
LE2 7EA
United Kingdom

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