



Phase Sensitive Multimeters

A new generation of versatile measurement instruments

PSM1700 *PsimetriQ*

10uHz to 1MHz



PSM1735 *NumetriQ*

10uHz to 35MHz



Versatility without compromise

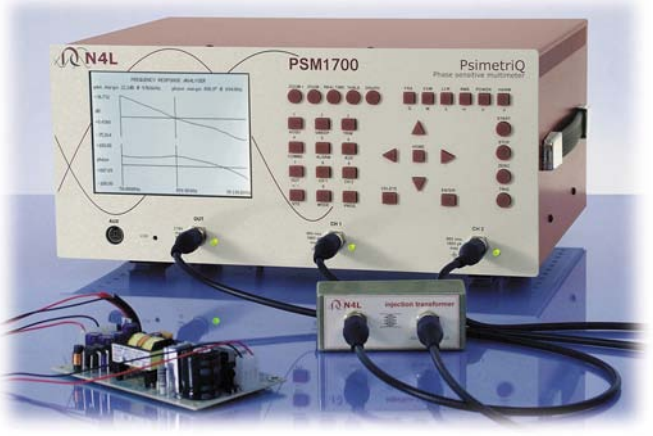
In a world where engineers from many different application areas require ever increasing speed, flexibility and measurement accuracy, N4L introduce a new generation of versatile measurement instruments that offer leading performance in every mode without the compromise on accuracy or the additional cost that is commonly associated with such flexible instruments.

Utilising the latest DSP and FPGA technology to optimise the use of innovative analogue hardware, many measurements functions can be derived with great precision from the basic elements of true rms voltage on two measurement channels plus the phase angle between them. It is from this fundamental relationship between independent voltages and their relative phase angle that the phrase 'Phase Sensitive Multimeter' was derived and this is also the key to the unique combination of performance versatility and value provided by the PSM range.

Whether you will make use of just one or all six of the primary measurement modes included in the PSM1700 and PSM1735, you can be sure of the exceptional accuracy, speed and ease of use that only the latest design technology can provide.



Frequency Response Analyser



PSM1700 with N4L injection transformer testing an SMPS

Incorporating a digital signal generator, two differential auto-ranging voltmeters, auto-scale frequency plots and intuitive setup stored into non-volatile memory; the PSM range brings accurate and simple to operate frequency response analysis within the grasp of many who could not previously consider an FRA

Features

- Differential inputs
- Fast sweep with up to 20 frequency steps per second
- DFT analysis giving exceptional noise rejection
- Automatic Gain/Phase margin computation
- Storage of results into non-volatile memory

FRA Example applications

- Power supply gain and phase analysis
- Electronic filter design and test
- Speaker and amplifier test
- Mechanical vibration analysis
- Electro-Mechanical control loop analysis

| FREQUENCY RESPONSE ANALYSER | | |
|-----------------------------|-------------------|-------------------------------|
| gain margin | 22.2dB @ 9.566kHz | phase margin 096.8° @ 894.0Hz |
| 26 | 251.237Hz | +17.44dB |
| 27 | 268.550Hz | +16.02dB |
| 28 | 286.487Hz | +15.16dB |
| 29 | 305.622Hz | +14.53dB |
| 30 | 326.034Hz | +13.98dB |
| 31 | 347.810Hz | +13.40dB |
| 32 | 371.040Hz | +12.68dB |
| 33 | 395.822Hz | +11.73dB |
| 34 | 422.260Hz | +10.67dB |
| 35 | 450.462Hz | +9.59dB |
| 36 | 480.549Hz | +8.51dB |
| 37 | 512.645Hz | +7.46dB |
| 38 | 546.885Hz | +6.45dB |
| 39 | 583.410Hz | +5.49dB |
| 40 | 622.378Hz | +4.56dB |
| 41 | 663.946Hz | +3.67dB |
| 42 | 708.292Hz | +2.82dB |
| 43 | 755.599Hz | +1.99dB |
| 44 | 806.065Hz | +1.19dB |
| 45 | 859.903Hz | +0.438dB |

FRA table with cursor point selected

| FREQUENCY RESPONSE ANALYSER | | |
|-----------------------------|----------|----|
| gain | +0.438 | dB |
| phase | +087.088 | ° |
| CH1 magnitude | 59.636m | V |
| frequency | 859.903 | Hz |

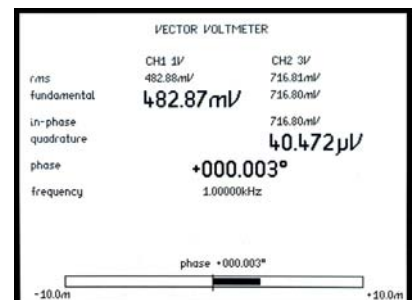
Real time mode at cursor point

Selection of the most suitable display format is very easy, switching between real time, tabular or graphical presentation from any mode with a single key stroke

In real time mode, the display functions are user selectable and can be presented in any order and at any of three zoom levels. Cursor keys can then be used to adjust amplitude and frequency with selectable step size to provide complete control of test conditions.

Vector Voltmeter

Unique to the VVM mode is a null meter display that provides the feel of traditional analogue instruments while maintaining the precision of a 6 digit phase display and 1 milli-degree phase resolution.



A high stability signal generator with direct digital synthesis, true rms sensing voltmeters and discrete fourier analysis combine to provide phase measurement accuracy beyond any comparable product.

Features

- Simultaneous measurement of all functions
- Synchronised to internal or external frequency source

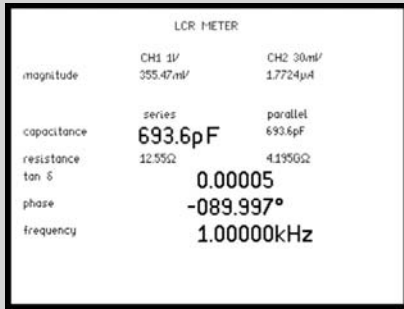
VVM Example applications

- Electrochemical materials analysis
- Current transformer testing
- Phase meter calibration

LCR Meter

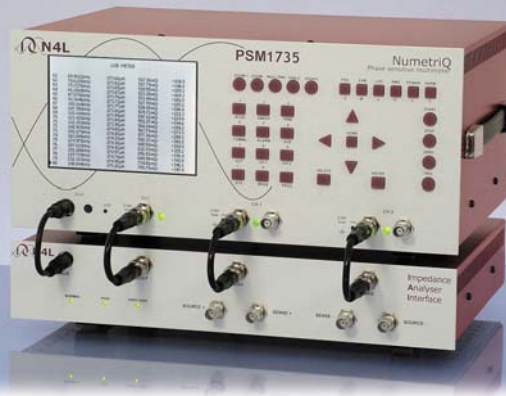


PSM1700 with LCR Active Head

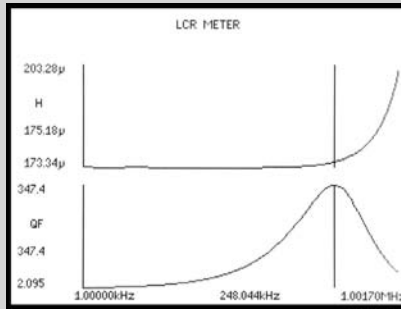


6 digit resolution and exceptional phase stability permit testing of the most demanding components such as low ESR capacitors

Any point in a sweep can be selected with a cursor and viewed in a detailed results table.



PSM1735 with Impedance Analyser Interface



Whether using an external shunt, an LCR Active Head or the Impedance Analyser Interface; LCR mode provides all impedance parameters quickly and accurately either at single frequencies or over a user defined frequency sweep.

LCR Head – 10uHz to 5MHz
IAI – 10uHz to 35MHz

Features

- Wide frequency range
- Freq, Phase and Tan Delta to 6 digits
- Passive shunt or active head options
- Graph or table of any function
- Sweep results store to memory

LCR Example applications

- Component testing
- Electrochemistry
- Circuit impedance analysis
- Testing resonance

RMS Voltmeter

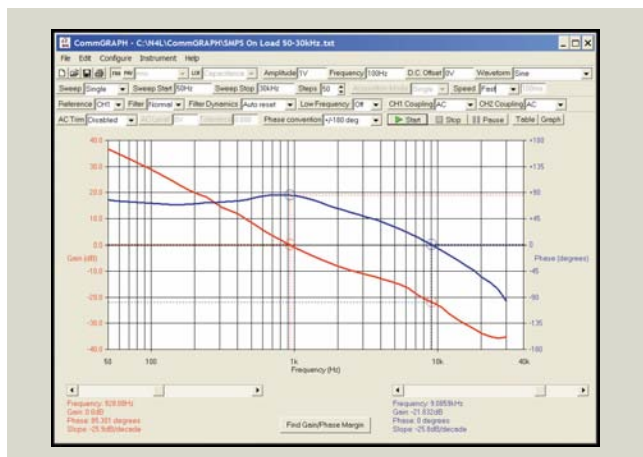
In addition to providing the raw data from which all other functions are derived, each channel can be used directly for applications requiring precision rms measurement. Unlike many voltmeters, AC and DC components are quantified separately and dBm, peak, CF and surge values are displayed.

Both units utilise independent differential circuits permitting simultaneous analysis of two points at a different potential. For example, the input and output on a voltage converter or two windings on a transformer.

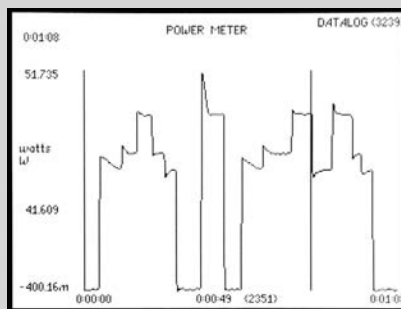
Harmonic Analyser

The Harmonic Analyser mode simultaneously measures individual harmonic components and total harmonic distortion values on both measurement channels.

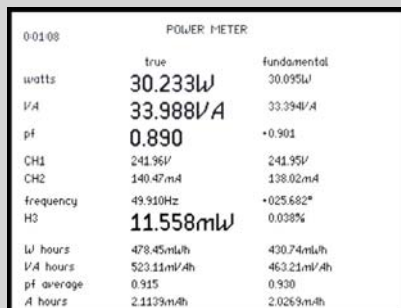
Discrete Fourier Transform algorithms permit fundamental harmonic components to be quantified accurately even in the presence of noise and distortion.



Power Meter



Watts graph with cursor at log no. 2351



Real time display after datalog

The combination of true rms measurement channels, precision phase analysis, high speed computation and a versatile graphic display provide an ideal solution to many applications that involve rapid changes in power.

Features

- Real time true rms measurement with no missed data.
- Synchronisation with fundamental down to 10ms period.
- Datalog of up to 4 functions stored into non-volatile memory.
- Watch results during datalog capture with scroll display.
- Real time DFT harmonic analysis.

Power Meter applications

- Power profile testing
- SMPS standby analysis
- Distortion analysis
- PFC testing

PC control, data capture and file storage

CommGRAPH PC software provides control of FRA, VVM and LCR functions with Graphical and Tabular data presentation, dual cursor measurements, automatic gain phase margin function plus print, copy, save to file and firmware download. CommVIEW PC software supplied as standard, provides script file instrument control, result storage in .txt format and firmware download.

Accessories and Ports

Standard accessories

| | |
|---------------|---|
| Probes | 2 off with PSM1700 – 4 off with PSM1735 |
| Leads | Output, RS232, Power |
| Software | CommVIEW |
| Documentation | Calibration Certificate, User Manual |



Ports

| | |
|-----------------------------------|--|
| RS232 | Baud rate to 19200 RTS/CTS flow control |
| Parallel | 8 output, 4 input – 25 Pin D Type |
| Analog output | 0V to +4V on any measured function – BNC |
| Sync output | Pulse synchronised to generator |
| Extension ports (N4L accessories) | 2 |
| LAN (option L) | 15 pin female D type and 6 pin mini-din |
| GPIB (Option G) | 10/100 base-T Ethernet auto sensing RJ45 IEEE488.2 compatible |



PSM1700

PSM1735

Frequency Response Analyser

| | |
|---------------------|--|
| Measurement | Magnitude, gain (CH1/CH2 or CH2/CH1), gain (dB), offset gain (dB), phase (°) |
| Frequency range | 10uHz to 1MHz 20mHz to 500kHz with ext source |
| Gain accuracy in dB | 0.02dB < 1kHz 0.05dB < 10kHz 0.1dB + 0.001dB/kHz < 1MHz |
| Phase accuracy | 0.02° < 10kHz 0.02° + 0.003°/kHz < 1MHz |
| Frequency source | Generator or CH1 input |
| Measurement | Real-time DFT, no missing data |
| Speed | Up to 100 readings per second |
| Filter | Selectable from 0.2 seconds |
| Resolution | 5 or 6 digits |

Vector Voltmeter

| | |
|---------------------|--|
| Measurement | In-phase, quadrature, tan ϕ , magnitude, phase, in-phase ratio, rms, rms ratio, LVDT differential, LVDT ratiometric |
| Frequency range | 10uHz to 1MHz 20mHz to 500kHz with ext source |
| Basic accuracy (ac) | 0.05% range + 0.05% reading + 0.05mV < 1kHz Basic + 0.02%/kHz < 10kHz Basic + 0.2% + 0.002%/kHz < 1MHz |
| | 10uHz to 35MHz 20mHz to 35MHz with ext source Basic + 0.001%/kHz < 10kHz Basic + 0.002%/kHz < 1MHz Basic + 1.6% + 0.4%/MHz < 35MHz |

LCR Meter

| | |
|--------------------------|--|
| Functions | L, C, R (ac), Q, tan delta, impedance, phase – Series or parallel circuit |
| Frequency range | 10uHz to 1MHz 10uHz to 35MHz |
| Current shunt | External or N4L active head or Impedance Analysis Interface |
| Ranges (LCR Head or IAI) | Inductance – 100nH to 10kH Capacitance – 10pF to 1000uF Resistance – 10m Ω to 100M Ω |
| Basic accuracy | 0.1% + tolerance of selected current shunt |
| Sweep capability | All ac functions |

True RMS Voltmeter

| | |
|---------------------|--|
| Channels | 2 |
| Frequency range | DC to 1MHz DC to 1MHz 1MHz to 35MHz fundamental only |
| Measurement | rms, ac, dc, peak, cf, surge, dBm |
| Basic accuracy (ac) | As VVM + 0.2mV As VVM + 0.05mV |
| Accuracy (dc) | 0.1% range + 0.1% reading + 1mV 0.1% range + 0.1% reading + 0.5mV |

Power Meter

| | |
|------------------|--|
| Measurements | W, VA, PF, V, A, - total, fundamental and integrated, power harmonics |
| Frequency range | 20mHz to 1MHz 20mHz to 1MHz 1MHz to 35MHz fundamental only |
| Current shunt | External or use N4L power adaptor |
| Current accuracy | As voltage + external shunt tolerance |
| Watts accuracy | 0.15% VA range + 0.15% reading + external shunt tolerance 0.1% VA range + 0.1% reading + external shunt tolerance |

Harmonic Analyser

| | |
|-----------------|--|
| Scan | Single or series |
| Frequency range | 10uHz to 1MHz |
| Measurement | Harmonic, series THD or difference THD |
| Max harmonic | 50 |

System specifications

PSM17xx

Datalog

| | |
|----------------|--|
| Functions | Up to 4 measured functions user selectable |
| Datalog Window | From 10ms with no gap between each log |
| Memory | RAM or non-volatile up to 8000 records |

High Speed Data Streaming

| | |
|--------|--------------------------------------|
| Rate | 1500 readings/s max |
| Window | 660us to 1s Synchronized to waveform |
| Buffer | 8000 results |

General

| | |
|------------------|--|
| Display | 320 x 240 dot LCD – white LED backlight |
| Alarm | Any displayed function hi, lo, inside window, or outside window |
| Program stores | 100, one loaded on power up |
| Sweep stores | 30, all parameters in any sweep function |
| Remote operation | Full capability, control and data |
| Size | 170H x 350W x 250D mm approx |
| Temperature | 5 to 35°C |
| Weight | 4kg approx |
| Power supply | 90-264V rms 47-63Hz 30VA max |

All specifications at 23°C +/- 5°C. These specifications are quoted in good faith but Newtons4th Ltd reserves the right to amend any specification at any time without notice

PSM1700

PSM1735

Input Ranges

| | |
|-----------------|---|
| Inputs | 2 differential 2 balanced differential |
| Connectors | Isolated BNC Dual grounded BNC |
| Coupling | ac or ac+dc |
| Max input | 10Vpk from earth |
| Input ranges | 100V, 30V, 10V, 3V, 1V, 300mV, 100mV, 30mV, 10mVpk 10V, 3V, 1V, 300mV, 100mV, 30mV, 10mV, 3mV, 1mVpk |
| Scaling | 1 x 10 ⁻⁹ to 1 x 10 ⁹ |
| Ranging | Full auto, up only or manual |
| Input impedance | 1M // 50pF (exc. leads) 1M // 30pF (exc. leads) |

Signal Generator

| | |
|-------------------------|---|
| Type | Direct digital synthesis |
| Frequency | 10uHz to 1MHz 10uHz to 35MHz |
| Waveforms | Sine, triangle, square, sawtooth Sine, square (1MHz) |
| Accuracy (with no trim) | Frequency \pm 0.05% Amplitude \pm 5% < 100kHz Amplitude \pm 10% < 1MHz Amplitude \pm 10% < 35MHz |
| Impedance | 50 Ω \pm 2% |
| Output voltage | 0V to \pm 10Vpk |
| Output resolution | 5mV 50uV to 5mV level dependent |
| Offset | 0V to \pm 10Vpk |
| Offset resolution | \pm 10mV |
| Clock rate | 11.52MHz 150MHz |
| Connector | Grounded BNC |