



Phase Sensitive Multimeters

A new generation of versatile measurement instruments

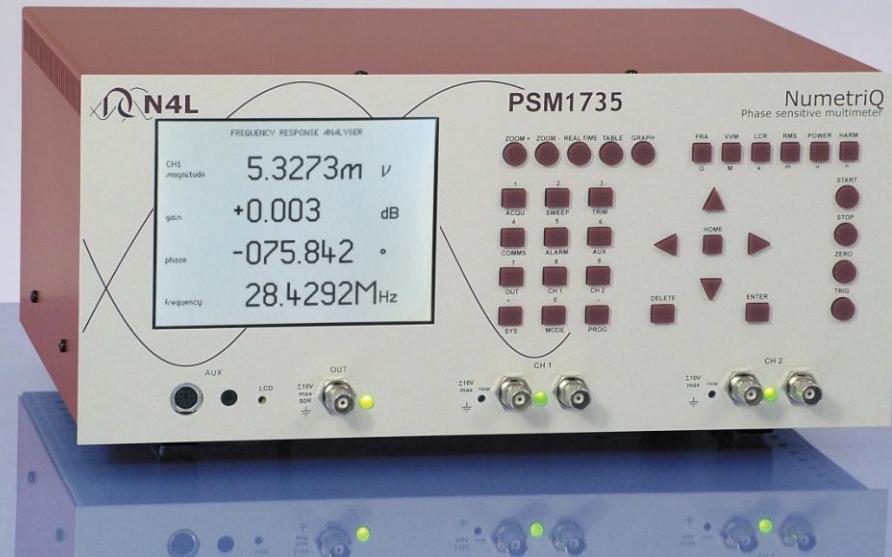
PSM1700 *PsimetriQ*

10uHz to 1MHz



PSM1735 NumetriQ

10uHz to 35MHz

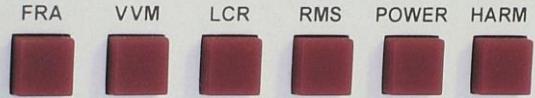


Versatility without compromise

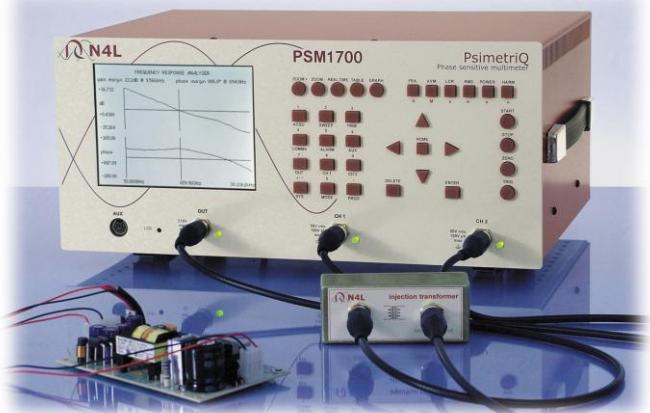
In a world where engineers from many different application areas require ever increasing speed, flexibility and measurement accuracy, N4L introduce a new generation of versatile measurement instruments that offer leading performance in every mode without the compromise on accuracy or the additional cost 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	22.2dB @ 9.56kHz phase margin 086.8° @ 894.0Hz
25	264.720Hz
27	-16.44dB
28	-16.02dB
29	-15.16dB
30	-14.53dB
31	-13.98dB
32	-13.40dB
33	-12.84dB
34	-12.30dB
35	-11.76dB
36	-11.22dB
37	-10.67dB
38	-10.13dB
39	-9.59dB
40	-9.05dB
41	-8.51dB
42	-7.97dB
43	-7.43dB
44	-6.89dB
45	-6.35dB

FRA table with cursor point selected

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

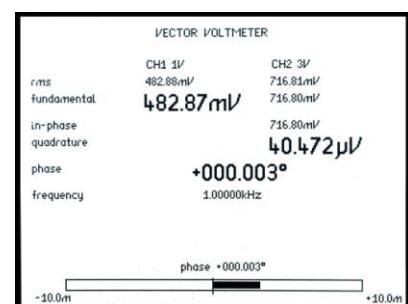
FREQUENCY RESPONSE ANALYSER		
gain	+0.438	dB
phase	+087.088	°
CH1 magnitude	59.636m	V
frequency	859.903	Hz

Real time mode at cursor point

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 discreet 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

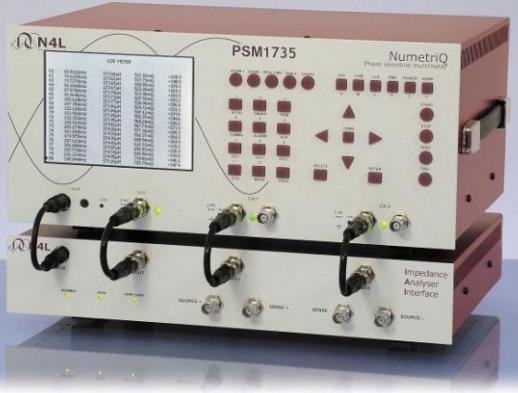


PSM1700 with LCR Active Head

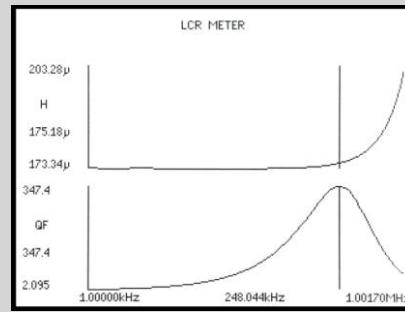
LCR METER	
magnitude	CH1 1V 355.47mV
capacitance	693.6pF
resistance	12.55Ω
phase	-0.00005
frequency	-089.997° 1.00000kHz
CH2 30mV/ 1.7724μA	
series	693.6pF
parallel	4.1950Ω

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



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

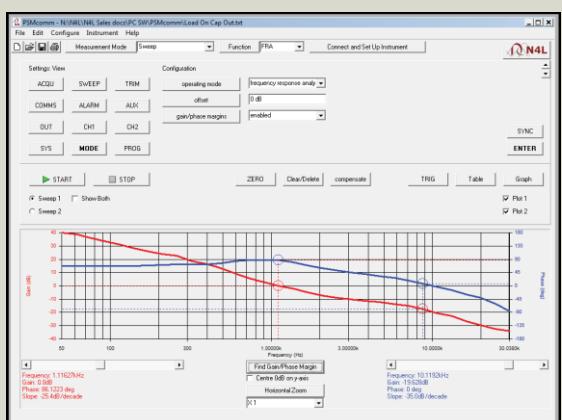
In addition to providing the raw data from which all other functions are derived, each channel can be used directly for applications requiring precision rms measurement. Unlike many voltmeters, AC and DC components are quantified separately and dBm, peak, CF and surge values are displayed.

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.

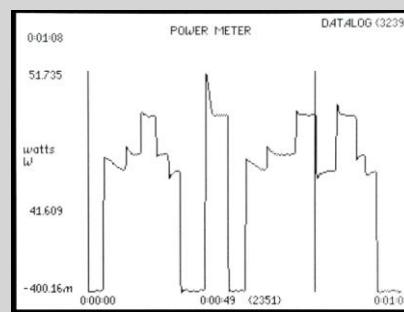
Harmonic Analyser

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

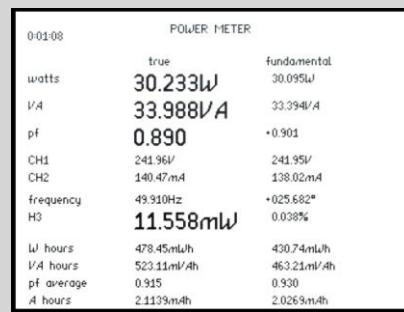
Discrete Fourier Transform algorithms permit fundamental harmonic components to be quantified accurately even in the presence of noise and distortion.



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

PSMcomm software provides control of all primary PSM functions with graphical or tabular data presentation, dual cursor measurements, an 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.

N4L PSM1700 and PSM1735

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
LAN (option L)	10/100 base-T Ethernet auto sensing RJ45
GPIB (Option G)	IEEE488.2 compatible



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

Measurement specifications

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 Ø, 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

LCR Meter

Functions	L, C, R (ac), Q, tan delta, impedance, phase – Series or parallel circuit
Frequency range	10uHz to 1MHz 20mHz to 500kHz with ext source
Current shunt	10uHz to 35MHz
Ranges (LCR Head or IAI)	External or N4L active head or Impedance Analysis Interface
Basic accuracy	0.1% + tolerance of selected current shunt
Sweep capability	All ac functions

True RMS Voltmeter

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

PSM1700

PSM1735

Input Ranges

Inputs	2 differential
Connectors	Isolated BNC
Coupling	Dual grounded BNC
Max input	100Vpk from earth
Input ranges	100V, 30V, 10V, 3V, 1V, 300mV, 100mV, 30mV, 10mV, 3mV, 1mVpk
Scaling	1 x 10^-9 to 1 x 10^9
Ranging	Full auto, up or down or manual
Input impedance	1M // 50pF (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 $\pm 5\% < 100\text{kHz}$ Amplitude $\pm 10\% < 1\text{MHz}$
Impedance	50Ω $\pm 2\%$
Output voltage	0V to $\pm 10\text{Vpk}$
Output resolution	5mV
Offset	0V to $\pm 10\text{Vpk}$
Offset resolution	$\pm 10\text{mV}$
Clock rate	11.52MHz
Connector	Grounded BNC