N4L

Phase Sensitive Multimeters
A new generation of versatile measurement instruments
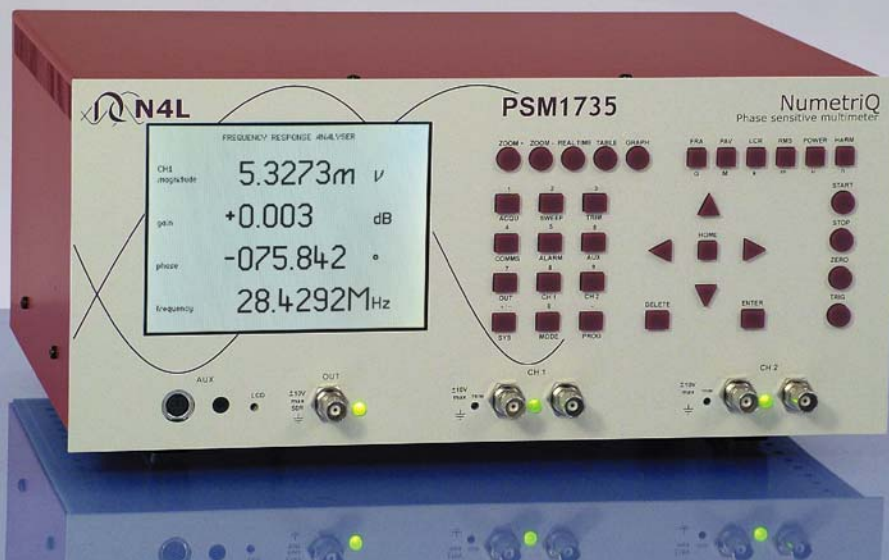
PSM1700 *PsimetriQ*

PSM1735 *NumetriQ*

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 measurement 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.

FRA	PAV	LCR	RMS	POWER	HARM

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

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.


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.

Phase Angle Voltmeter

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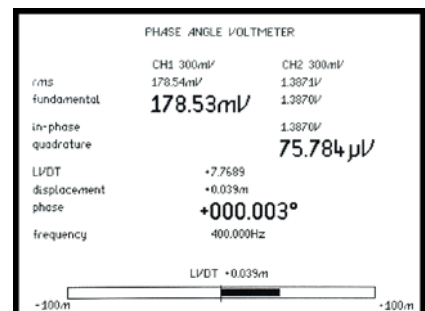
A high stability signal generator with direct digital synthesis, true rms sensing voltmeters and discrete fourier analysis combine to provide phase measurement accuracy beyond any comparable product.

Features

Simultaneous measurement of all functions
Displacement results presented in metric or imperial units
Synchronised to internal or external frequency source

PAV Example applications

- LVDT RVDT Synchro and Resolver testing
- Phase meter calibration

LCR Meter

PSM1700 with LCR Active Head

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.

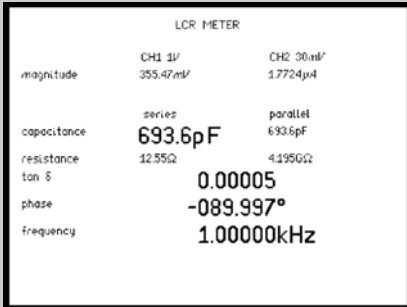LCR Head - 10uHz to 5MHz
IAI   - 10uHz to 35MHz

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 result table

Features

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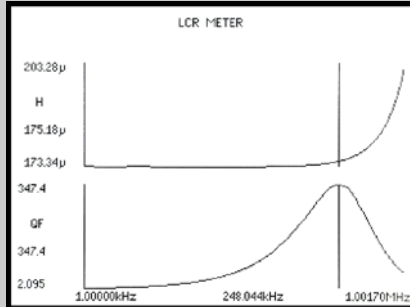Sweep results stored to memory

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 inputs utilise independent differential circuits permitting simultaneous analysis of two points at a different potential. For example, the input and output voltages 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 and harmonic components to be quantified accurately even in the presence of noise and distortion.
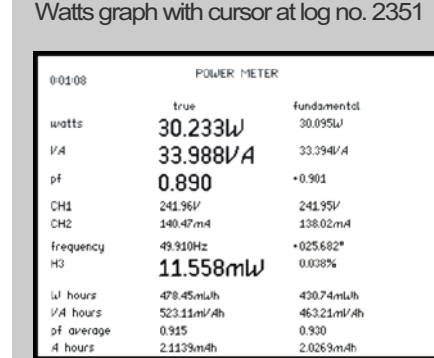

Power Meter

Watts graph with cursor at log no. 2351

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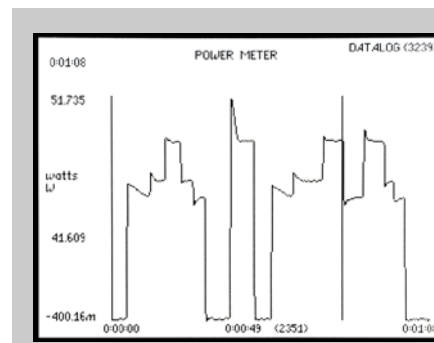
The combination of true rms measurement channels, precision phase analysis, high speed computation and a versatile graphic display provide an ideal solution to many applications that involve rapid changes in power.

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-voltile 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
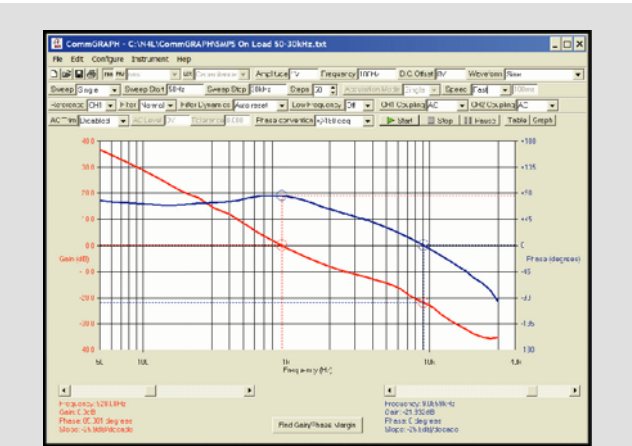
PC control, data capture and file storage

CommGRAPH PC software provides control of FRA, PAV 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.

Measurement specifications

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 15 pin female D type & 6 pin mini-din
LAN (option L)	10/100 base-T Ethernet auto sensing RJ45
GPIB (option G)	IEEE488.2 compatible

	PSM1700	PSM1735
Frequency Response Analyser		
Measurement	Magnitude, gain (CH2/CH1), gain (dB), offset gain (dB), phase (º)	
Frequency range	10uHz to 1MHz 20mHz to 500kHz with ext source	10uHz to 35MHz 20mHz to 35MHz with ext source
Gain accuracy in db	0.02dB < 1kHz 0.05dB < 10kHz 0.1dB + 0.001dB/kHz < 1MHz	0.01dB + 0.0001dB/kHz < 1MHz 0.1dB + 0.04dB/MHz < 35MHz
Phase accuracy	0.02º < 10kHz 0.02º + 0.003º/kHz < 1MHz	0.02º < 10kHz 0.05º + 0.0001º/kHz < 35MHz
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	

	PSM1700	PSM1735
Phase Angle 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	10uHz to 35MHz 20mHz to 35MHz 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	Basic + 0.001%/kHz < 10kHz Basic + 0.002%/kHz < 1MHz Basic + 1.6% + 0.4%/MHz < 35MHz

	PSM1700	PSM1735
L C R 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 Analyser Interface	
Ranges (LCR Head or IAI)	Inductance - 100nH to 10kH Capacitance - 10pF to 1000uF Resistance - 10m Ohm to 100M Ohm	
Basic accuracy	0.1% + tolerance of selected current shunt	
Sweep capability	all ac functions	

	PSM1700	PSM1735
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 PAV + 0.2mV	As PAV + 0.05mV
Accuracy (dc)	0.1% range + 0.1% reading + 1mV	0.1% range + 0.1% reading + 0.5mV

	PSM1700	PSM1735
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 & data
Size	170H x 350W x 250D mm approx
Temperature	5 to 35º C
Weight	4kg approx
Power supply	90-264V rms 47-63Hz 30VA max

All specifications at 23ºC +/- 5ºC
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	100Vpk from earth	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)

	PSM1700	PSM1735
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 ±0.05% Amplitude ±5% < 100kHz Amplitude ±10% < 1MHz	Frequency ±0.05% Amplitude ±5% < 10MHz Amplitude ±10% < 35MHz
Impedance	50 Ohm ±2%	
Output voltage	0V to ±10V peak	
Output resolution	5mV	50uV to 5mV level dependent
Offset	0V to ±10Vpk	
Offset resolution	±10mV	
Clock rate	11.52MHz	150MHz
Connector	Grounded BNC	