Phase Sensitive Multimeters

A new generation of versatile measurement instruments

PSM1700 *PsimetriQ*

10uHz to 1MHz

PSM1735 *NumetriQ*

10uHz to 35MHz

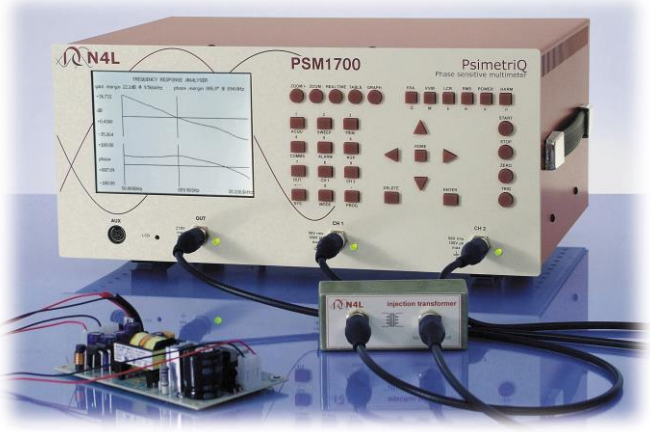
Versatility without compromise

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

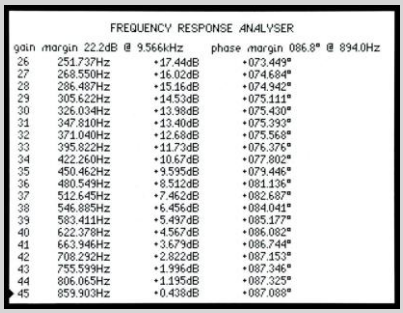
Incorporating a digital signal generator, two differential auto-ranging voltmeters, auto-scale frequency plots and intuitive setup stored into non-volatile memory; the PSM range brings accurate and simple to operate frequency response analysis within the grasp of many who could not previously consider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

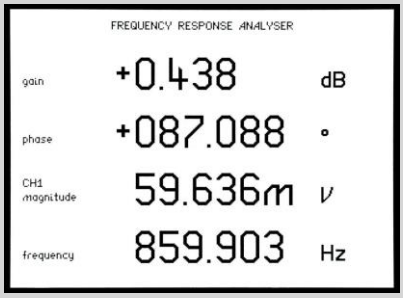
FRA Example applications

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



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

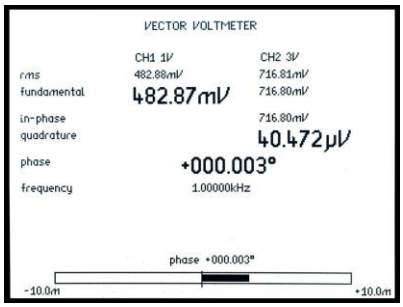


Real time mode at cursor point

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.

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

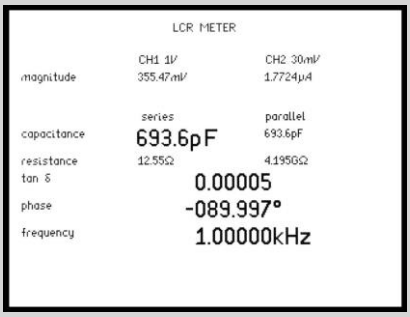
- Electrochemical materials analysis
- Current transformer testing
- Phase meter calibration

LCR Meter

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

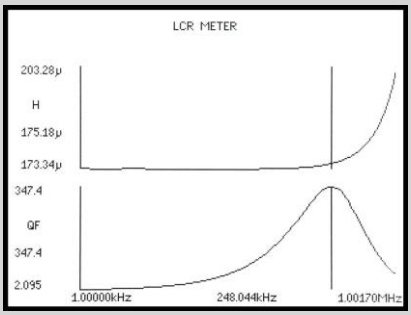
PSM1700 with LCR Active Head



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



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

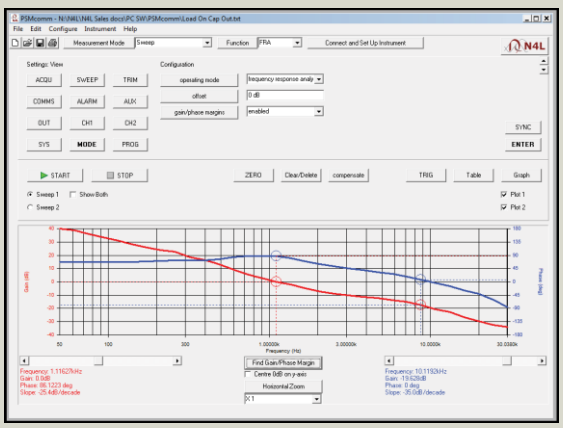
In addition to providing the raw data from which all other functions are derived, each channel can be used directly for applications requiring precision rms measurement. Unlike many voltmeters, AC and DC components are quantified separately and dBm, peak, CF and surge values are displayed.

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

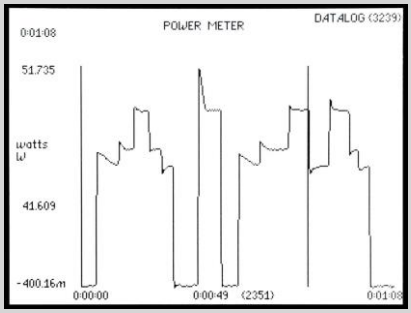
Harmonic Analyser

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

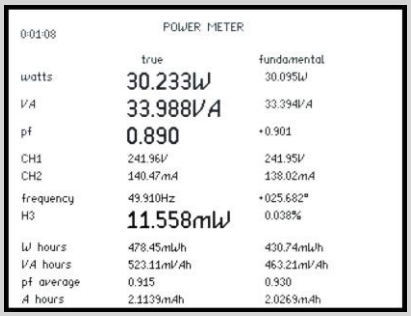
Discrete Fourier Transform algorithms permit fundamental harmonic components to be quantified accurately even in the presence of noise and distortion.



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.

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 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

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	10uHz to 35MHz
	20mHz to 500kHz with ext source	20mHz to 35MHz with ext source
Gain accuracy in dB	0.02dB < 1kHz 0.05dB < 10kHz 0.1dB + 0.001dB/kHz < 1MHz	0.01dB + 0.001dB/kHz < 1MHz 0.1dB + 0.04dB/MHz < 35MHz
Phase accuracy	0.02° < 10kHz 0.02° + 0.003°/kHz < 1MHz	0.02° < 10kHz 0.05° + 0.0001°/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	
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	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
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 – 10mΩ to 100MΩ	
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

	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)
Signal Generator		
Type	Direct digital synthesis	
Frequency	10uHz to 1MHz	10uHz to 35MHz
Waveforms	Sine, triangle, square, sawtooth	Sine, square (1MHz)
Accuracy	Frequency ±0.05%	Frequency ±0.05%
Open loop (with no trim)	Amplitude ±5% < 100kHz / ±10% <1MHz	Amplitude ±5% < 10MHz / ±20% < 35MHz
Closed loop (with trim)	Amplitude ±5% < 100kHz / ±1% <1MHz	Amplitude ±5% < 10MHz / ±5% < 35MHz
Impedance	50Ω ±2%	
Output voltage	0V to ±10Vpk (Open Circuit)	
Output resolution	5mV	50uV to 5mV level dependent
Offset	0V to ±10Vpk	
Offset resolution	±10mV	
Clock rate	11.52MHz	150MHz
Connector	Grounded BNC	

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