

Test Equipment Solutions Datasheet

Test Equipment Solutions Ltd specialise in the second user sale, rental and distribution of quality test & measurement (T&M) equipment. We stock all major equipment types such as spectrum analyzers, signal generators, oscilloscopes, power meters, logic analysers etc from all the major suppliers such as Agilent, Tektronix, Anritsu and Rohde & Schwarz.

We are focused at the professional end of the marketplace, primarily working with customers for whom high performance, quality and service are key, whilst realising the cost savings that second user equipment offers. As such, we fully test & refurbish equipment in our in-house, traceable Lab. Items are supplied with manuals, accessories and typically a full no-quibble 2 year warranty. Our staff have extensive backgrounds in T&M, totalling over 150 years of combined experience, which enables us to deliver industry-leading service and support. We endeavour to be customer focused in every way right down to the detail, such as offering free delivery on sales, covering the cost of warranty returns BOTH ways (plus supplying a loan unit, if available) and supplying a free business tool with every order.

As well as the headline benefit of cost saving, second user offers shorter lead times, higher reliability and multivendor solutions. Rental, of course, is ideal for shorter term needs and offers fast delivery, flexibility, try-before-you-buy, zero capital expenditure, lower risk and off balance sheet accounting. Both second user and rental improve the key business measure of Return On Capital Employed.

We are based near Heathrow Airport in the UK from where we supply test equipment worldwide. Our facility incorporates Sales, Support, Admin, Logistics and our own in-house Lab.

All products supplied by Test Equipment Solutions include:

- No-quibble parts & labour warranty (we provide transport for UK mainland addresses).
- Free loan equipment during warranty repair, if available.
- Full electrical, mechanical and safety refurbishment in our in-house Lab.
- Certificate of Conformance (calibration available on request).
- Manuals and accessories required for normal operation.
- Free insured delivery to your UK mainland address (sales).
- Support from our team of seasoned Test & Measurement engineers.
- ISO9001 quality assurance.

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Versatile, Automatic RCL Meters

Technical Specifications
PM 6306 / PM 6304 / PM 6303A

PM 6306 and PM 6304

**Versatile component measurement
and testing**

- **Easy to use, at-a-glance display**
- **Test frequencies, from 50 Hz to 1 MHz (100 kHz for PM 6304)**
- **0.1 % basic accuracy (0.05 % for PM 6304C)**
- **RS-232 and IEEE-488 interfaces**
- **AC test levels from 50 mVrms to 2 Vrms**
- **Internal or external bias**
- **DC test measurement (optional)**
- **9 front panel set-ups**
- **Actual component test voltage/current readback**
- **Automatic zero trimming**
- **Contact check and deviation mode (PM 6306 only)**
- **Front-panel test posts for immediate 4-wire measurements**

PM 6303A

**Effective, economic testing
that's quick and easy to use**

- **Easy-to-use, at-a-glance display of relevant information**
- **0.25 % basic accuracy**
- **2V DC internal bias**
- **Automatic zero trimming**
- **Front-panel test posts for immediate 4-wire measurements**

	PM 6306	PM 6304
AC Test mode		
Test frequency	50, 60, 100, 120 Hz 200 Hz to 100 kHz (100 Hz steps) 100 kHz to 1 MHz (1 kHz steps)	50, 60, 100, 120 Hz 200 Hz to 20 kHz (100 Hz steps) 100 kHz
Test frequency accuracy	0.01%	0.01%
Test signal levels	50 mV to 2V (10 mV steps) via 100Ω	50 mV via 100Ω 1V via 100Ω 2V via 400Ω
Basic measurement accuracy at normal measurement mode	0.1% ± 1 digit (for ≥ 0.25V, ≤ 50 kHz) 0.1% * (f / 50 kHz) ± 1 digit (for ≥ 0.25V, > 50 kHz) 0.1% * (0.25V/V _r) ± 1 digit (for < 0.25 V, ≤ 50 kHz)	0.05% ± 1 digit (for PM 6304C, ≤ 2 kHz) 0.1% ± 1 digit (for ≤ 20 kHz) 0.4% ± 1 digit (100 kHz) 0.5% ± 1 digit (for 50 mV, ≤ 20 kHz) 2.0% ± 1 digit (for 50 mV, 100 kHz)
DC bias		
Internal	0 to 10V (0.1V steps)	2V
External	0 to 40V	0 to 40V
DC Test mode (Optional)		
Test signal levels	50 mV to 2 V (10 mV steps) via 100Ω	300 mV via 100Ω 1 V via 100Ω 2 V via 400Ω
Basic measurement accuracy at normal measurement mode	0.1% ± 1 digit (for ≥ 0.25V)	0.1% ± 1 digit (for 1V)
Contact check (PM 6306 only)		
Pass	< 3Ω	-
Fail	≥ 3Ω (with indication of failed connection lead)	
Maximum measuring ranges		
Impedance / Resistance AC Z or R _{AC}		0.0000Ω to 200 MΩ
Resistance DC R _{DC}		0.0000Ω to 50 MΩ
Capacitance C		0.00 pF to 31.8F
Inductance L		0.00 μH to 637 kH
Quality factor Q		0.000 to 1000
Dissipation factor D		0.000 to 1000
Phase angle φ		-179 to +180 deg
Voltage monitor V _X		0.1 μV to 2.00V
Current monitor I _X		0.005 μA to 10.0 mA
Maximum resolution		
Impedance / Resistance AC Z or R _{AC}		0.1 mΩ
Resistance DC R _{DC}		0.1 mΩ
Capacitance C		0.01 pF
Inductance L		0.01 μH
Quality factor Q		0.001
Dissipation factor D		0.001
Phase angle φ		0.1 deg
Voltage monitor V _X		0.1 μV
Current monitor I _X		0.001 μA
Circuit diagram		
Display	1 of 7 different equivalent circuit diagrams	
Auto mode		
Read-out	Dominant and secondary parameter	
Equivalent circuit diagram	Parallel for R+C, Serial for R+L	
Manual mode		
Read-out	Dominant and secondary parameter or Z, φ, D, Q, V _X , I _X	
Equivalent circuit diagram	Parallel or serial selectable	
Average function		
Function	Exponential averaging in continuous mode	
Levels	3 (and off)	1 (and off)
Deviation mode (PM 6306 only)		
Relative range in respect	-100% to +100%	-
Measuring modes		
Normal		
Continuous	2 measurements/s	
Single	Triggered via "TRIG" key, Triggered via handler interface Triggered via IEEE-488 or RS-232	
Test frequency	50, 60, 100, 120 Hz 200 Hz to 100 kHz (100 Hz steps) 100 kHz to 1 MHz (1 kHz steps) DC (optional)	50, 60, 100, 120 Hz 200 Hz to 20 kHz (100 Hz steps) 100 kHz DC (optional)
Read-out	Display or via IEEE-488 or RS-232 interface	
Fast		
Max. speed	10 measurements/s	
Test frequency	200 Hz to 100 kHz (200 Hz steps) 100 kHz to 1 MHz (1 kHz steps) DC (optional)	200 Hz to 20 kHz (200 Hz steps) 100 kHz DC (optional)
Single	Triggered via handler interface Triggered via IEEE-488 or RS-232	
Read-out	Via IEEE or RS-232 interface (display blanked)	

Options for PM 6306 and PM 6304

PM 9548

Control capability
Interface functions

Address range
Remote lock-out

Special functions

Signals

PM 9549

Mode

Control capability
Baud rates

Data bits

Stop bits

Parity

Xon/Xoff handshake

Hardware handshake

Signals

Connector

PM 9565

Technical specification

PM 9566

Signals

Inputs

Outputs

Max. switchable current

Max. switchable voltage

IEEE-488 interface

All functions
AH1, L3, RL1, SR1, SH1, T6

1...30
Go to local by front panel key "LOCAL"
Learn mode / device identification mode
All optically isolated

RS-232 interface

Communication mode
Printing mode
All functions
110, 150, 300, 600, 1200, 2400, 4800, 9600, 19200

7 or 8

1 (2 for 110 baud only)

Odd, Even, None

On or Off

DSR/DTR and CTS/RTS

All optically isolated

9-pin D-connector, male

DC test measurement option

See "DC test mode"

Handler interface

All optically isolated

Trigger input

Bin 0-9 indication

FAIL indication

	PM 6306	PM 6304
Binning Standard bins Special bins Bin programming via Bin limit programming	9 Bin "0" and bin "fail" IEEE-488 interface RS-232 interface Bin programmer (PM 6304 only) Absolute or relative	
Trim function Open circuit Short circuit	Open circuit compensation $Z > 100\text{ k}\Omega$ Short circuit compensation $Z < 10\Omega$	
Protection against charged capacitors $C < 2\text{ }\mu\text{F}$ $2\text{ }\mu\text{F} \leq C \leq 2\text{ mF}$ $C > 2\text{ mF}$	$V_{\text{max}} < 200\text{ V}$ $V_{\text{max}} < 47 \times (C/\text{mF})^{-0.234}$ (V_{max} in V, C in mF) $V_{\text{max}} < 40\text{V}$	$V_{\text{max}} < 500\text{ V}$ $V_{\text{max}} < 117 \times (C/\text{mF})^{-0.234}$ (V_{max} in V, C in mF) $V_{\text{max}} < 100\text{V}$
Stored settings (non-volatile memory) Front panel settings Bin settings	9+1 (trim figures included) 9+1	
Print measurement results	Via RS-232 interface for serial printers	
Calibration Calibration interval	1 year	
Environmental conditions Operating temperature Storage temperature Power requirements Line frequency	0°C to 50°C -40°C to 70°C 100/120/220/240 V $\pm 10\%$ 50/60 Hz	
Power consumption	44 VA	31 VA
EMC	According to CE regulation 89/336: Emission according to EN 55011 Group 1 Class B, respectively CISPR 11. Immunity according to EN 50082-1, inclusive IEC 801-2,-3,-4	
Safety	According to CE-regulation 73/23 EN61010-1 CAT II, Pollution Degree 2, CSA C22.2 No. 231	
Warm-up time	30 minutes	5 minutes
Dimensions and weight WxHxD	315 x 105 x 405 mm (12.4" x 4.13" x 15.9")	
Weight	5.3 kg / 11.7 lb	4.7 kg / 10.4 lb

PM 6303A	
AC test mode	
Test frequency	1 kHz
Test frequency accuracy	0.025%
Test signal level	2V via 400Ω source
Basic measurement accuracy	0.25% ± 1 digit
DC bias	
internal	2V
Maximum measuring ranges	
Impedance / Resistance Z or R_{AC}	0.000Ω to 200 MΩ
Capacitance C	0.0 pF to 100 mF
Inductance L	0.0 μH to 32 kH
Quality factor Q	0.002 to 500
Dissipation factor D	0.002 to 500
Phase angle ϕ	-90.0 to +90.0 deg
Maximum resolution	
Impedance / Resistance Z or R_{AC}	0.1 mΩ
Capacitance C	0.1 pF
Inductance L	0.1 μH
Quality factor Q	0.001
Dissipation factor D	0.001
Phase angle ϕ	0.1 deg
Circuit diagram	
	7 different equivalent circuit diagrams
Auto mode	
Read-out	Dominant parameter
Equivalent circuit diagram	Parallel for R+C Serial for R+L
Manual mode	
Read-out	Dominant or secondary parameter
Equivalent circuit diagram	Parallel or serial selectable
Measurement update rate	
	2 measurements/s
Trim function	
Open circuit compensation	Open circuit compensation $Z > 100\text{ k}\Omega$
Short circuit compensation	Short circuit compensation $Z < 10\Omega$
Stored settings (non-volatile memory)	
Front panel settings	1 (trim figures included)
Calibration	
Calibration interval	1 year
Environmental conditions	
Operating temperature	0°C to 50°C
Storage temperature	-40°C to 70°C
Power requirements	100/120/220/240V $\pm 10\%$
Line frequency	50 to 100 Hz
Power consumption	16 VA
EMC	According to CE regulation 89/336: Emission according to EN 55011 Group 1 Class B, respectively CISPR 11. Immunity according to EN 50082-1, inclusive IEC 801-2,-3,-4
Safety	According to CE-regulation 73/23 EN61010-1 CAT II, Pollution Degree 2
Warm-up time	5 minutes
Dimensions and weight	
WxHxD	315 x 105 x 405 mm (12.4" x 4.13" x 15.9")
Weight	3.8 kg / 8.4 lb

Accessories for PM 6306, PM 6304 and PM 6303A

PM 9540 / BAN
DUT connection
Cable length
Weight

4-wire test cable set with Banana plugs
4 Banana plugs
1000 mm
0.15 kg

PM 9540 / TWE
DUT connection
DUT length
Cable length
Weight

SMD tweezers
2 tweezers
max. 20 mm
1000 mm
0.15 kg

PM 9541A
DUT connection
Cable length
Weight

4-wire test cable set with Kelvin clips
2 Kelvin clips
1000 mm
0.2 kg

PM 9541B
DUT connection
Cable length
Weight

4-wire test cable set with heavy Kelvin clips
2 Kelvin clips
1000 mm
0.3 kg

PM 9542A
DUT connection
DUT length
Dimensions (WxHxD)
Weight

Universal test adapter
Kelvin contacts in test posts
1000 mm
145 x 50 x 95 mm (5.7" x 1.9" x 3.7")
0.6 kg

PM 9542 / SMD
DUT connection
DUT length
DUT width
DUT height
Dimensions (WxHxD)

Test fixture for SMDs (in combination with PM 9542A)
Kelvin contacts in test posts
min. 2 mm, max. 10 mm
min. 1 mm
min. 0.5 mm
55 x 45 x 30 mm (2.2" x 1.8" x 1.2")

PM 9559
Distance

Infrared bin programmer (PM 6304 only)
< 1.5m

PM 9564
Height

Rack mount kit
2E (88.5 mm)



Accessories PM 6306, PM 6304 and PM 6303A

PM 9540 / BAN 4-wire test cable set with Banana plugs

Optimum calibrator contact or connections to other instruments or accessories is ensured by the PM 9540 / BAN test cable set.

PM 9540 / TWE SMD tweezers

The PM 9540 / TWE SMD tweezers make picking up, testing and general handling of small components fast, convenient and accurate. They allow 4-wire measurements up to the tweezer tips. With the PM 9540 / TWE, all that is required is to simply grasp the component with the tweezers and read-out the measured value on the RCL meter. Nothing could be faster or more convenient.

PM 9541A 4-wire test cable set with Kelvin clips

This test cable set combines convenient connection to larger components and assemblies with the accuracy of 4-wire testing.

PM 9541B 4-wire test cable set with heavy Kelvin clips

This test cable set combines convenient connection to larger components and assemblies with the accuracy of 4-wire testing.

PM 9542A Universal test adapter

The PM 9542A adapter allows easy 4-wire testing of components, which can be inserted directly into the Kelvin contacts of the test posts. In combination with the 9542 / SMD the testing of miniature SMDs is also covered.

PM 9559 Infrared bin programmer (PM 6304 only)

The infrared bin programmer is a compact handheld unit programs the PM 6304's component sorting function.

PM 9564 Rack mount kit

The PM 6306, PM 6304 and PM 6303A RCL meters can be built into a system rack by using the PM 9564 Rack mount kit.

Options PM 6306 and PM 6304

PM 9548 IEEE-488 interface

With this IEEE-488 interface, the PM 6306 or PM 6304 RCL meter can be used as part of a fully automated component test environment for applications at up to 10 measurements/s.

PM 9549 RS-232 interface

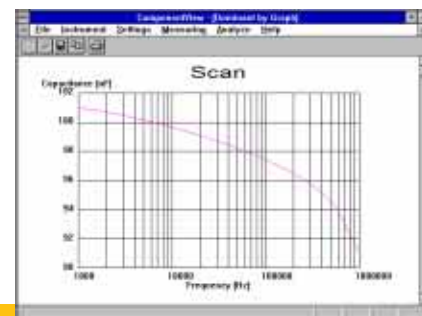
The RS-232 interface allows the PM 6304 or PM 6306 to be connected directly to a PC, for automated operation including selection of test set-ups and downloading measurement data. The RS-232 interface can also be connected to a serial printer for printing the test results.

PM 9565 DC test measurement

The DC test measurements add test capabilities to the standard AC measurements, like comparison of AC and DC behavior.

PM 9566 Handler interface

The handler interface allows component sorting to be automated by providing output signals to control placement of tested components into up to 11 bins according to the measured value.



Windows® Test Software PM 6306 and PM 6304

The SW63W ComponentView PC software adds extra versatility to automated testing. This Windows® software package provides powerful functions for the analysis of test results downloaded via the RS-232 or IEEE interface. It also allows all functions of the RCL meter and bus parameters to be controlled remotely from the PC. Test results can be stored on disk, printed-out in report form or exported to spreadsheet programs. An additional powerful function is the scan mode. This mode allows components or devices under test to be measured automatically at different frequencies or voltages.

Ordering information

PM 6306 models

Type number	IEEE-488 interface	RS-232 interface	DC test	Handler interface
PM 6306/02n	•			
PM 6306/03n		•		
PM 6306/06n	•		•	
PM 6306/07n		•	•	
PM 6306/52n	•			•
PM 6306/53n		•		•
PM 6306/56n	•		•	•
PM 6306/57n		•	•	•

PM 6304 models

Type number	IEEE-488 interface	RS-232 interface	DC test	Handler interface
PM 6304/00n				
PM 6304/02n	•			
PM 6304/03n		•		
PM 6304/04n			•	
PM 6304/06n	•		•	
PM 6304/07n		•	•	
PM 6304/50n				•
PM 6304/52n	•			•
PM 6304/53n		•		•
PM 6304/54n			•	•
PM 6304/56n	•		•	•
PM 6304/57n		•	•	•

PM 6303A models

PM 6303A/00n Automatic RCL meter

Power options

The last digit of the type number is the indication for the local line voltage and local line cord. Following line voltage settings plus line cords are available.

- n = 1 Universal European 220V
- n = 3 Standard North American 120V
- n = 4 United Kingdom 240V
- n = 5 Switzerland 220V
- n = 8 Australia 240V

Example: PM 6304/573

Programmable RCL meter PM 6304 with "handler interface", "DC measurement unit" and "RS 232 interface" installed, Standard North American line cable.

Options for PM 6306 and PM 6304

(retrofitable, service center installable)

- PM 9548 IEEE-488 interface kit
- PM 9549 RS-232 interface kit
- PM 9565 DC measurement option kit
- PM 9566 Handler interface

Remark: PM 6306 is equipped with either an IEEE-488 or RS-232 interface (see models).

Accessories PM 6306, PM 6304 and PM 6303A

- PM 9540/BAN 4-wire test cable set with Banana plugs
- PM 9540/TWE SMD Tweezers
- PM 9541A 4-wire test cable set with Kelvin clips
- PM 9541B 4-wire test cable set with heavy Kelvin clips
- PM 9542A Universal test adapter
- PM 9542SMD Test fixture for SMDs (in combination with PM 9542A)
- PM 9564 Rack mount kit

Windows® Test Software PM 6306 and PM 6304

- SW63W ComponentView test software (for instruments with interface)
- Y8021 Shielded IEEE-488 Cable, 1m
- Y8022 Shielded IEEE-488 Cable, 2m
- PM 9536/041 RS-232 cable 3 m, 9 pin female / 9 pin female

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