

## 1. INTRODUCTION

The PM 2524 is a high class  $4\frac{1}{2}$  digit automatic multimeter.  
The instrument can measure:

Quantity	Measuring range
d.c. voltage	10 $\mu$ V to 1000 V
a.c. voltage	100 $\mu$ V to 600 V
d.c. currents	100 $\mu$ A to 2000 mA
a.c. currents	100 $\mu$ A to 2000 mA
resistance	0.1 $\Omega$ to 20 M $\Omega$
temperature	- 60 $^{\circ}$ C to + 200 $^{\circ}$ C

Protection of all measurement functions is provided.

The measuring range, the polarity for d.c. measurements and temperature measurements and the position of the decimal point are all determined automatically. However, manual ranging and sample hold facilities are provided.

Extremely high accuracies are obtained due to automatic-zero drift correction of the ADC being carried out before each measurement.

The incorporation of MOS-LSI digital integrated circuits decrease the number of discrete component and guarantee high accuracy and stability. The d.c. power supply PM 9216 provided as an optional accessory, enables the portability of this instrument to be fully exploited.

Due to its high sensitivity, its high accuracy and wide range of measurement functions, the PM 2524 can be used for a wide range of applications in research, production lines, service and education.

## 2. TECHNICAL DATA

All values mentioned in this description are nominal. Those given with tolerances are binding and guaranteed by the manufacturer.

### 2.1. Electrical specifications

Reference conditions	Ambient temperature $23^{\circ}\text{C} \pm 1^{\circ}\text{C}$ Relative humidity 45 ... 75%
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#### 2.1.1. DC voltage measurement

Range	200 mV, 2V, 20V, 200V, 2000V (max. input voltage: 1000V)
Resolution	10 $\mu\text{V}$ for the 200 mV range
Accuracy	$\pm 0.02\%$ of reading $\pm 1$ digit
Temperature coefficient	$\pm 50$ ppm of reading $/^{\circ}\text{C}$
Input impedance	10 $\text{M}\Omega \pm 1\%$
Offset current at the input	Less than 20 pA
Zero point drift	$\pm 1$ digit $/ 10^{\circ}\text{C}$ after a warming up time of 15 minutes
Max. input voltage	200 mV and 2V range: 1000V d.c. or 600 V rms (if sinusoidal) for 1 minute max. Other ranges: 1000V d.c. or rms (if sinusoidal) continuously.
Response time	0.5 s (without ranging)

#### 2.1.2. AC voltage measurement

Range	2V, 20V, 200V, 2000V (max. input voltage 600 Vrms)
Resolution	100 $\mu\text{V}$ for the 2V range
Accuracy	Frequency range 40 Hz to 10 kHz: $\pm 0.2\%$ of reading $\pm 0.1\%$ of range Frequency range 10 kHz to 30 kHz: $\pm 0.5\%$ of reading $\pm 0.2\%$ of range
Temperature coefficient	200 ppm of reading $/^{\circ}\text{C}$
Input impedance	1 $\text{M}\Omega$ in parallel with 25 pF
Max. input voltage	600 V rms super imposed on 400V d.c.
Response time	1 s (without ranging)

**2.1.3. DC current measurement**

Range	2000 mA (fixed)
Resolution	100 $\mu$ A
Accuracy	$\pm 0.2\%$ of reading $\pm 1$ digit
Temperature coefficient	$\pm 100$ ppm of reading / $^{\circ}$ C
Max. voltage drop	< 500 mV
Response time	0.5 s
Max. voltage at input terminals	250V rms, protected by a glass-tube fuse

**2.1.4. AC current measurement**

Range	2000 mA (fixed)
Resolution	100 $\mu$ A
Accuracy (between 2% and 100% of range)	$\pm 0.2\%$ of reading $\pm 1$ digit
Frequency range	40 Hz to 1 kHz
Temperature coefficient	$\pm 100$ ppm of reading / $^{\circ}$ C
Max. voltage drop	< 500 mV
Response time	1 s
Max. voltage at input terminals	250V rms, protected by a glass-tube fuse

**2.1.5. Resistance measurement**

Range	2 k $\Omega$ , 20 k $\Omega$ , 200 k $\Omega$ , 2000 k $\Omega$ , 20 M $\Omega$ .
Resolution	0.1 $\Omega$ for the 2 k $\Omega$ range
Accuracy	Range: 2 k $\Omega$ to 2000 k $\Omega$ : $\pm 0.3\%$ of reading $\pm 1$ digit 20 M $\Omega$ : $\pm 1\%$ of reading $\pm 1$ digit
Temperature coefficient	Range: 20 k $\Omega$ and 200 k $\Omega$ : 100 ppm of reading / $^{\circ}$ C 2 k $\Omega$ ; 2000 k $\Omega$ and 20 M $\Omega$ : 250 ppm of reading / $^{\circ}$ C
Response time	0.5 s (2 k $\Omega$ - 2000 k $\Omega$ ) 2 s (20 M $\Omega$ )
Max. permissible voltage	250V rms continuously or 500V peak
Open voltage	Approx. 5.5 V
Semi conductors	Can be measured in the 2 k $\Omega$ range

**2.1.6. Temperature measurement (using resistance thermometer PM 9248)**

Range	- 60 $^{\circ}$ C to + 200 $^{\circ}$ C
Sensitivity	0.1 $^{\circ}$ C
Accuracy (including inaccuracy of the probe)	- 60 $^{\circ}$ C to +100 $^{\circ}$ C $\pm 1\%$ of reading $\pm 2^{\circ}$ C + 100 $^{\circ}$ C to +200 $^{\circ}$ C + 1% to - 3% of reading $\pm 2^{\circ}$ C

2.2. General data

Environmental conditions	According to IEC 359
Climatic conditions	Group I with a extension of the upper temperature limit of + 50°C Ambient temperature: reference value 23°C ± 1°C Rated range for use 0°C to + 50°C Limit range of storage and transport: - 40°C to + 70°C Relative humidity 20% to 80% (excluding condensation)
Mechanical conditions	Group II
Supply conditions	Group II Nominal mains voltage: 220V - 12% to +10% Note: Mains transformer wiring can be altered for mains voltages of: 92V, 110V, 128V, 202V and 238V. Mains frequency 50 Hz/60 Hz ± 5% Power consumption 15 VA Battery supply with optional unit PM 9216
Safety	Class I according to IEC 348
Display	7 segments LED, read out to 19999 maximum
Decimal point	Depends on range, automatically selected
Indication of polarity	+ and -, automatically selected
Overrange indication	.0... (Position of decimal point depends on range selection).
Function indication	mV, V, mA, kΩ, MΩ, °C, coupled with the function switches.
Function selection	By push-button switches
Range selection	Automatic or manual by means of UP-DOWN steps Up level 19999, down level 01800
Data Hold	By push-button switch
Analogue to digital conversion	Integrating
Conversion rate	4 conv/s. During ranging (except a.c. ranges) 20 conv/s
Sampling time	100 ms. During ranging (except a.c. ranges) 20 ms
Common mode rejection	140 dB for d.c signals 120 dB for a.c. signals of 50/60 Hz
Max. common mode voltage	450V rms or 630V peak
Series mode rejection	60 dB 50 Hz ± 0.1% 40 dB 50 Hz ± 1%
Warming up time	approx. 15 minutes
Recalibration interval	90 days