

This document describes how the PM100 power analyzer fulfills the requirements of IEC62301 (2005) Household electrical appliances – Measurement of standby power.

IEC62301 is the European standard that describes how standby measurements are to be made, including the accuracy and resolution of the power measurement.

The PM100 is a versatile low-cost power analyzer, ideally suited to standby power measurements. This is because the PM100 has:

- An external shunt input that, when coupled to a simple shunt or current transducer provides the very accurate low current measurements required.
- A fast 200kHz sampling rate and a unique long-averaging mode which ensures that no data is missed and that stable measurements are achieved in the shortest possible time.
- Simple front-panel control and display of all measurements including watts, volts, amps, power factor and harmonics.

To use the PM100 for low-power standby measurements, please consult the Voltech technical note 104-054 and the PM100 User Manual 98-052. Both are available from your supplier, or from our website at www.voltech.com

How the PM100 Power Analyzer meets the requirements of IEC62301

IEC 62301 Clause 4.4 Voltage Supply Waveform:

Requirement	PM100
THD: <2%	<p>The PM100 automatically measures THD using the rms summation formula.</p> $thd = \frac{\sqrt{H2^2 + H3^2 + H4^2 + H5^2 + \dots}}{H1} \times 100\%$
Crest Factor: between 1.34 and 1.49	Automatic calculation of peak / rms up to CF =20

IEC 62301 Clause 4.5 Power Measurement Accuracy:

Requirement	PM100												
2% Accuracy at 0.5W or greater	<p>The specification is 0.2% of reading +0.2% of range + 0.005 + 0.3%per KHz.</p> <p>Example: A 230V load operates at 1W in standby. At a power factor of 1, 60Hz, the current is $1/230 = 4.3\text{mA}$. The current is measured using a 10 Ohm shunt resistor, providing $10 \times 4.3 = 43\text{mV}$ to the shunt input of the PM100. This PM100 automatically ranges to its 101.25mV range, the equivalent of 10.125mA. The voltage range is 480V, making the power range $480 \times 0.010125 = 4.86\text{W}$ Accuracy = $(0.2\% \times 1) + (0.2\% \times 4.86) + 0.005 + (0.3\% \times 0.06) = 0.0169\text{W}$ Or $(0.0169 / 1) \times 100\% = \mathbf{1.69\%}$</p>												
0.01W accuracy at less than 0.5W	As above, as long as a suitable external shunt or transducer is used, the PM100 is always better than 2% + 0.005W. In other words, always better than 0.0052W below 0.01W (for example, if measuring 0.4W use 100 Ohm shunt)												
Resolution Measured Power 10mW = 0.1W 0.1W = 1W 1W = 10W 10W = 100W 100W = 1000W	<table border="1"> <thead> <tr> <th>Resolution</th> <th>Example:</th> </tr> </thead> <tbody> <tr> <td>= 10μW</td> <td>123.45 mW</td> </tr> <tr> <td>= 100μW</td> <td>345.6 mW</td> </tr> <tr> <td>= 0.001W</td> <td>1.2345 W</td> </tr> <tr> <td>= 0.01W</td> <td>34.56 W</td> </tr> <tr> <td>= 0.1W</td> <td>123.45 W</td> </tr> </tbody> </table>	Resolution	Example:	= 10μW	123.45 mW	= 100μW	345.6 mW	= 0.001W	1.2345 W	= 0.01W	34.56 W	= 0.1W	123.45 W
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	<p>The PM100 displays with 4½ digit resolution: xxxx or 1.xxxx Always better than the requirements of the standard.</p>												

IEC 62301 Clause 5.3 Procedure:

Average power approach:

When set up in accordance with the Voltech technical note 104-154, the PM100 automatically produces average power measurements. The long-averaging mode is designed to provide accurate and stable measurements for most types of load.

Accumulated energy approach:

The integration function may be used, if desired, to provide accumulated W-h with a resolution of 0.1mW and 1s.

Conclusion and IEC 62301 Annex B. Notes on the measurement of low power modes:

When used in accordance with the technical note 104-154 and user manual, the PM100 comfortably meet the requirements of this standard. Range, resolution and accuracy requirements are easily achieved at low cost using the flexible external shunt inputs.

The PM100 measures crest factors up to 20 and, by sampling at 200kHz, provides error-free harmonics measurements up to the 49th.

In particular, the long-averaging mode of the PM100 has been specifically designed to enable measurements on the types of load described in B5 – Cyclic or pulsing load effects.

Declaration.

We hereby declare that the PM100 Power Analyzer, when used in accordance with its user manual and the guidance given in technical note 104-154, meets the requirements of IEC 62301 Ed1.0 2005.

More Information

Please contact your local supplier, or contact us directly via our website at www.voltech.com