

Glossary

Integral Action Time

Digital multimeters (DMMs) employ an A/D converter with a dual-integration system, which determines the measurement value by converting the input voltage into time using an integration AD converter. The interval to perform an integral action periodically is referred to as the integral action time.

Measurement Accuracy

With DMMs, the measurement accuracy is generally expressed as: \pm ___ % of reading + ___ digits. ("Reading" refers to the reading value, and is abbreviated as "rdg"; "digits" refers to the number displayed in the smallest decimal place, and is abbreviated as "dgt.") This expresses the range of values that a DMM may measure or represent for a given actual value.

Root Mean Square Value

The value most directly related to the energy of a given waveform. Refers to the square root of a value found by averaging the squares of instantaneous values of a waveform over a single cycle. (See Table 1, Figures 1 and 2.)

Mean Value

Refers to the average of the sum of instantaneous values, determined for a current half-wave. It is equivalent to calculating the surface area of a waveform.

Form Factor

Ratio of RMS value with respect to average value.
Form factor = RMS value/mean value (See Figures 1 and 2.)

Crest Factor

Ratio of maximum value to RMS value.
Crest factor = maximum value/RMS value (See Figures 1 and 2.)

Peak-to-Peak (P-P) value

Refers to the distance between the smallest and largest amplitudes in a waveform (see Figure 1).

Frequency Characteristic

Refers to a characteristic that shows variations in input, measurement, or response with frequency. When measuring alternating current signals, a measured signal does not have a simple frequency, but often includes various frequencies ranging from lower frequencies to higher harmonics. To measure such signals more accurately, it is preferable to use a measurement device that has a broader frequency characteristic range.

Input Impedance

To prevent the measured object from being influenced during voltage measurement, you should use a measurement device with an extremely high input impedance.

Decibel

A unit used for describing the change in electrical signal amplitude or noise level, or transmission systems in wired devices, etc. This parameter is also used to represent the level differences in voltage, current or related values, but is generally restricted to cases characterized by the relationship: $(I_1/I_2)^2 = (V_1/V_2)^2 = P_1/P_2$. In the abbreviation "dB," "d" (deci) denotes 1/10, and "B" (Bell) denotes logarithm.

Table 1. RMS Value, Average Value, Waveform Factor and Crest Factor for a Typical Periodic Waveform

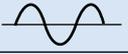
| Item | Waveform | RMS | Mean value | Waveform factor | Crest factor |
|-------------------------|--|------------------------------|-------------------------|--------------------------------|--------------------|
| Sine wave |  | $\frac{1}{\sqrt{2}} = 0.707$ | $\frac{2}{\pi} = 0.637$ | $\frac{\pi}{2\sqrt{2}} = 1.11$ | $\sqrt{2} = 1.414$ |
| Half rectification wave |  | $\frac{1}{2} = 0.5$ | $\frac{1}{\pi} = 0.318$ | $\frac{\pi}{2} = 1.571$ | 2 |
| Full rectification wave |  | $\frac{1}{\sqrt{2}} = 0.707$ | $\frac{2}{\pi} = 0.637$ | $\frac{\pi}{2\sqrt{2}} = 1.11$ | $\sqrt{2} = 1.414$ |
| Triangular wave |  | $\frac{1}{\sqrt{3}} = 0.577$ | $\frac{1}{2} = 0.5$ | $\frac{2}{\sqrt{3}} = 1.155$ | $\sqrt{3} = 1.732$ |
| Square wave |  | 1 | 1 | 1 | 1 |

Figure 1. RMS and Mean Values of Sine Wave

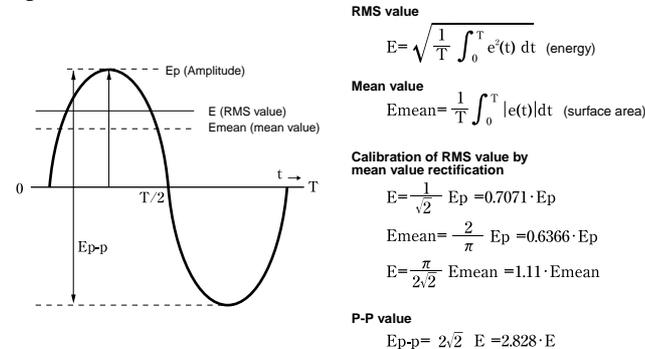
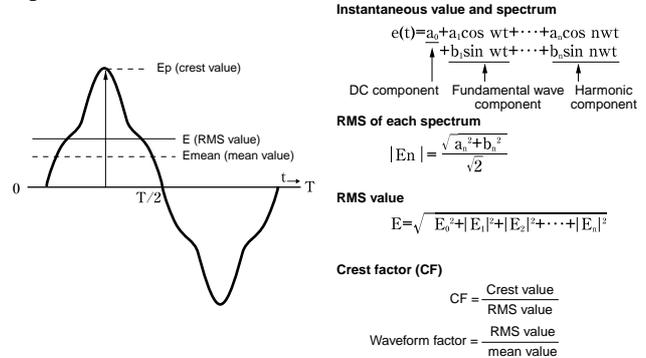


Figure 2. RMS of Distorted Waves



CE Mark

The products of Yokogawa M&C Corporation are subjected to design and evaluation testing to ensure compliance with the safety and EMC standards in accordance with the directives issued by the EC.

Electromagnetic Compatibility (EMC)

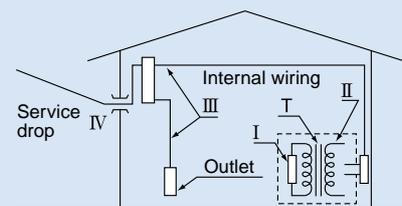
The parameters EMI and EMS are referred to as electromagnetic compatibility as they relate to compatibility within an electromagnetic environment.

Safety Standards

These standards lay out safety requirements that are to be met by a product with the objective of the preservation of human life and property. The applicable international standard is IEC 61010, and while a product must conform to this standard, there are also domestic standards laid out by individual countries. With these safety regulations, the range of use of a measurement device is specified by categorization in overvoltage categories I through IV to ensure the safety of the user. The designations "CAT II, 1000 V" or "CAT III, 600 V" at the input terminals of a measurement device, for example, indicates the applicable category and the maximum voltage for the device in terms of safety.

Overvoltage categories (CAT)

In order to ensure the safety of the user, IEC 60664 defines the ranges of use of measuring instruments by classifying power levels into overvoltage categories I through IV. This is because the excessive impulse or surge levels induced in a power line vary depending on the location of measurement (category). Categories with higher numerals designate locations that include larger surge voltages. Instruments that are designed for category III can thus withstand higher surge voltages than instruments designed for category II.



Overvoltage category I (CAT I):
Secondary circuits connected to an outlet via a power transformer.

Overvoltage category II (CAT II):
Primary circuits of a device connected to an outlet with a power cord.

Overvoltage category III (CAT III):
Primary circuits of a device to which power is directly supplied from the power distribution panel, and circuits from the distribution panel to outlets.

Overvoltage category IV (CAT IV):
All service line entrance circuits through the power distribution panel