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Answer #2.

Power quality monitors, collect large amounts of measurement data for further analysis and investigations.

Methods for measuring Voltages and currents with Multimeter

1. Multimeters

There are numerous makes and models of Multimeters to choose from. A digital Multimeter with data storage is valuable because the waveform can be saved and analyzed. Multimeters in this category often have waveform analysis capability (energy calculation, spectrum analysis) also. In addition, the digital multimeters can usually be obtained with communications so that waveform data can be uploaded to a PC for additional analysis with a software package.

2. Disturbance Analyzers

Disturbance analyzers and disturbance monitors form a category of instruments, which have been developed specifically for power quality measurements. They typically can measure a wide variety of system disturbances from very short duration transient voltages to long duration outages or under-voltages. Thresholds can be set and the instruments left unattended to record disturbances over a period of time. The information is most commonly recorded on a paper tape but many devices have attachments so that it can be recorded on disk as well.

There are basically three categories of these devices:

- a. Conventional analyzers
- b. Graphics-Based analyzers
- c. Combination Disturbance and Harmonic Analyzers

The most recent instruments combine limited harmonic sampling and energy monitoring functions with complete disturbance monitoring functions as well . The output is graphically based and the data is remotely gathered over phone lines into a central database. Statistical analysis can then be performed on the data. The data is also available for input and manipulation into other programs such as spreadsheets. Output from these analyzers are shown below.

Data Analysis and interpretation

Analyzing power quality measurements has become increasingly more sophisticated within the past few years. Disturbances that occur on the power system have durations in the milli-second time frame, equipment is more sensitive to these disturbances, and there is more equipment connected to the power systems that cause disturbances or power quality problems. For these reasons, it is often necessary to continuously monitor system performance and characterize possible impacts of disturbances. The data analysis system must be flexible enough to handle data from a variety of monitoring equipment and maintain a database that can be used by many different applications.
