

Power Quality Measurement Equipment III

Oscilloscopes

An oscilloscope is valuable when performing real-time tests. Looking at the voltage and current waveforms can provide much information about what is happening, even without performing detailed harmonic analysis on the waveforms. One can get the magnitudes of the voltages and currents, look for obvious distortion, and detect any major variations

in the signals.



Figure 5.5 A hand-held oscillographic monitoring instrument

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

The latest developments in oscilloscopes are hand-held instruments with the capability to display waveforms as well as performing some signal processing. These are quite useful for power quality investigations because they are very portable and can be operated like a volt ohm meter (VOM), but yield much more information. These are ideal for initial plant surveys. This particular instrument also has the capability to analyze harmonics and permits connection with personal computers for further data analysis and inclusion into reports as illustrated.

5.3.6 Disturbance analyzers

Disturbance analyzers provide measurements similar to oscilloscopes. However, they display information specifically needed to analyze power quality disturbances. They measure, store, and display a wide range of disturbances from voltage sags to voltage swells, as well as short term transients. Whether installed permanently or temporarily, they measure and record disturbances. They capture the waveform and store it magnetically on a hard drive and display it graphically on paper, as shown in Figure 5.6.



Figure 5.6 Disturbance analyzer.

Users have several choices of the method for retrieving information from disturbance analyzers. They can retrieve the waveform at the site of the meter via a floppy disk or remotely by a modem and a telephone line. As shown in Figure 5.7, they can use recent analyzers equipped with new software to notify them of a disturbance by numerical readings or a beeping signal on a pager. They can call a telephone number connected to the disturbance analyzer. They call the telephone number and receive a computer-generated verbal summary of the disturbances.

Or they can obtain disturbance information from especially designed disturbance analyzers remotely via the Internet using a standard Web browser.

Disturbance analyzers typically cannot measure harmonics without special accessory equipment. Analyzers with special accessory equipment for measuring harmonics are called *harmonic analyzers*.



Figure 5.7 Power quality pager

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