PREVENTING ABNORMAL OUTAGES with Power Quality Management

Digital oscillographic recorders provide power quality management and help determine the causes of abnormal shutdowns of production facilities and IT equipment data corruption.

Power quality deterioration is linked to data loss on home and office computing devices, abnormal outages of production equipment at factories as well as abnormal outage, operation and heating of electronic devices. It is possible to not only monitor power fluctuations in main power systems (flicker testing and instant monitoring) but also read the abnormalities of various power substation facilities from the waveform with a digital oscillographic recorder.

Transformers, motors and power units suffering from poor power quality overheat leading to deterioration in performance of electrical instruments and equipment and in worse cases fires may occur. A digital oscillographic recorder works as measure against these problems.

Images of Waveforms of Power Failures and Abnormalities

<table>
<thead>
<tr>
<th>Type of Abnormality</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage Sag (drop)</td>
<td>Short term voltage drop by rapid increase of load</td>
</tr>
<tr>
<td>Voltage Surge (swell)</td>
<td>Short term voltage rise which caused by lightning or open/off of heavy loading electric line</td>
</tr>
<tr>
<td>Inrush Current</td>
<td>Instant overcurrent which occurs when overloading device starts up. It's a factor of voltage drop.</td>
</tr>
<tr>
<td>Frequency Shift</td>
<td>Frequency shifts when operation of power head becomes unstable.</td>
</tr>
<tr>
<td>Power Flicker (instantaneous power failure)</td>
<td>Instantaneous power failure can occur by electric power transmission interruption because of lightning or trip of short circuit breaker.</td>
</tr>
<tr>
<td>Notch (Post signal)</td>
<td>Transient electric power interruption</td>
</tr>
<tr>
<td>Harmonic, Higher harmonic</td>
<td>Integer multiple frequency component of power supply. A factor of voltage waveform distortion. The waveform of voltage/current is distorted by high-frequency wave noise component which generated by controller device like semi conductor.</td>
</tr>
<tr>
<td>Noise</td>
<td>High-frequency wave which overlaps with waveform of power supply (sine wave). It invades a power supply line by disturbing electromagnetic fields</td>
</tr>
<tr>
<td>Impulse</td>
<td>Voltage fluctuation of high frequency wave which is overlapped with AC power supply caused by lightning or breaker on/off on the power supply wiring</td>
</tr>
</tbody>
</table>
RA2000A Series Omniace III
Digital Oscilloscope Recorder

<table>
<thead>
<tr>
<th>Item</th>
<th>Model</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>2CH High Resolution Amp</td>
<td>AP11-101</td>
<td>±100mV ~ ±500V, A/D res 16bit 10µs</td>
</tr>
<tr>
<td>2CH High Speed Amp</td>
<td>AP11-103</td>
<td>±100mV ~ ±500V, A/D res 12bit 1µs</td>
</tr>
<tr>
<td>Event Amp</td>
<td>AP11-105</td>
<td>Input: 8 logic (Volts/Contact)</td>
</tr>
<tr>
<td>2CH TC-DC Amp</td>
<td>AP11-106A</td>
<td>Input: R · T · J · K · W (±100mV ~ ±50V)</td>
</tr>
<tr>
<td>2CH AC Strain Amp</td>
<td>AP11-104A</td>
<td>Response Frequency: 2KHz</td>
</tr>
<tr>
<td>2CH DC Strain Amp</td>
<td>AP11-110</td>
<td>Response Frequency: 50KHz</td>
</tr>
<tr>
<td>2CH Vibration/RMS Amp</td>
<td>AP11-109</td>
<td>±100mV ~ ±500V</td>
</tr>
<tr>
<td>F/V Converter</td>
<td>AP11-108</td>
<td>Input: 1KHz ~ 10KHz</td>
</tr>
</tbody>
</table>

IEEE Recommended Practice for Monitoring Electrical Power Quality

Most unexplained equipment failure, downtime, software corruption or data corruption is due to power failure. For a detailed explanation of power failure please refer to IEEE standard 1159-1995 “IEEE Recommended Practice for Monitoring Electrical Power Quality.” It outlines standard terminology and phenomena for the general classification of power failures, causes, effect on critical load and protection of equipment.

Did You Know?

The RA Series simultaneously measures voltage, current, control timing, vibration, rotation, pressure and more directly from sensors. The RA2300MKII (shown above left) has 8 physical slots with 16 channels for use with plug-in modules including the listed in the table on the left.