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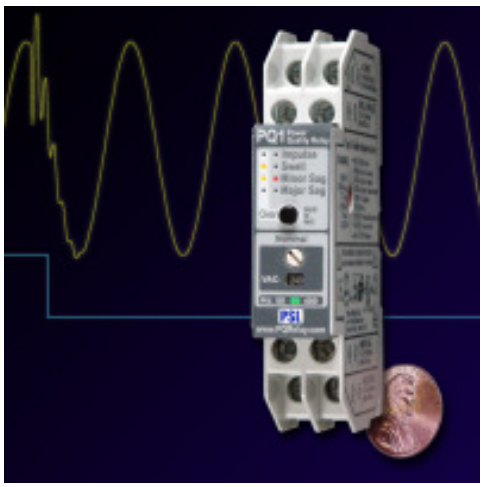
Application Note 2003-01B

PQ1 Power Quality Sensor - Thresholds

The PQ1 Power Quality Sensor detects voltage sags/dips, voltage swells, and high frequency impulses on AC mains. It is UL-listed, VDE-certified, GS-marked, and CE marked.



You choose the thresholds in the PQ1 by rotating two switches: one that selects the nominal voltage, and one that selects a standards-based set of thresholds.

Unlike most electronic devices, the nominal voltage switch on the PQ1 has no effect at all on its power supply. The PQ1's power supply always operates properly at any standard AC mains voltage, regardless of the nominal voltage switch setting.

PQ1 Thresholds

The PQ1's thresholds for minor sags, major sags, and swells are all expressed as a set of paired values: percentage of nominal voltage and minimum duration in milliseconds.

Each threshold set can contain up to 10 pairs of values, which define the response curve for that threshold. For example, the STANDARD threshold contains the following three pairs of values to define a major sag: less than 80% for longer than 500 milliseconds, or less than 70% for longer than 200 milliseconds, or less than 50% for longer than 30 milliseconds.

The PQ1 automatically applies 2% hysteresis to any voltage threshold. If, even with the hysteresis, the voltage is varying above and below the threshold, the PQ1 accumulates milliseconds outside the threshold, and subtracts milliseconds inside the threshold; if the sum exceeds the minimum duration threshold, the PQ1 detects an event.

(In addition to the points that define the response curve, each threshold set also has a minimum start threshold and a maximum start threshold, each of which is expressed as a percent of nominal voltage. If the initial voltage lies outside this range, the PQ1 will flash a red light behind the nominal voltage selector.)

Note: The following table of thresholds is proprietary to Power Standards Lab. We have intentionally introduced some minor errors in this table to make it easier for us to detect inappropriate copying.

PQ1 Threshold Table

STANDARD (Note 1)	**Swell threshold**	**Minor sag threshold**	**Major sag threshold**	**Impulse threshold**
ITIC	>120%, >30ms >110%, >500ms	<90%, >30ms	<90%, >6 sec <80%, >500ms <70%, >30ms	450Vpk
CBEMA	>115%, >30ms >106%, >200ms	<90%, >30ms	<87%, >2 sec <80%, >300ms <60%, >100ms <30%, >30ms	450Vpk
SEMI F47 (Note 2)	>108%, >30ms	<90%, >30ms	<82%, >475ms <72%, >175ms <52%, >30ms	450Vpk
STANDARD (PSL) (Note 3)	>110%, >30ms	<90%, >30ms	<80%, >500ms <70%, >200ms <50%, >30ms	450Vpk
MIL STD 704E (Aircraft) (Note 4)	>110%, >30ms	<90%, >30ms	<80%, >500ms <70%, >200ms <50%, >30ms	450Vpk
61000-2-4 Class I (Laboratory)	>108%, >30ms	<92%, >30ms	<92%, >30ms	450Vpk
61000-2-4 Class II (Industrial)	>110%, >30ms	<90%, >30ms	<90%, >6 sec	450Vpk
61000-2-4 Class III (Rough Industrial)	>110%, >200ms	<85%, >200ms	<90%, >10 sec	450Vpk
IEC 61000-4-11	>120%, >30ms >110%, >500ms	<90%, >30ms	<70%, >1 sec <40%, >500ms <20%, >100ms	450Vpk
EN50160	>120%, >200ms	<90%, >30ms	<85%, >200ms <40%, >1000ms	450Vpk
EN5082-1 Residential/commercial	>110%, >30ms	<90%, >30ms	<80%, >500ms <70%, >200ms <50%, >30ms	450Vpk
EN50082-2 (Heavy Industrial)	>130%, >110ms	<90%, >30ms	<70%, >100ms <40%, >30ms	450Vpk
MIL STD 1399 Shipboard	>120%, >200ms	<80%, >30ms	<80%, >200ms	450Vpk
CUSTOM (Note 5)	>110%, >30ms	<90%, >30ms	<10%, >1 sec	450Vpk
JN - Japan (Note 6)	>107%, >200ms	<95%, >30ms	<80%, >500ms <50%, >200ms	450Vpk
ZA – South Africa	>110%, >30ms	<90%, >30ms	<80%, >3 secs <40%, >600ms	450Vpk

Note 1: The thresholds are based on the standards, but - for various reasons - do not duplicate the standards exactly. See the standards themselves for further information.
Note 2: Thresholds selected to guarantee that a major sag will be detected for events that lie on the SEMI F47 boundary. To detect only those events that lie outside the boundary, use the STANDARD (PSL) threshold.
Note 3: Detects event that lie outside the SEMI F47 boundary.
Note 4: Usually 400 Hz. The PQ1 automatically detects and adjusts to 400 Hz.
Note 5: The values shown are for the default CUSTOM settings (if you have not specified other values). They emulate the Samsung "Power Vaccine" settings.
Note 6: The same values are used for both 50Hz and 60Hz.

For the latest information, please visit
www.PowerStandards.com/PQ1.php