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Power quality - Deviation of supply voltage

电能质量 供电电压偏差

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Power quality - Deviation of supply voltage

1 Scope

This standard specifies the limits, measurement and qualification rate statistics of supply voltage deviation.

This standard applies to the deviation of the nominal system voltage of the power supply voltage of the AC 50 Hz power system under normal operating conditions.

2 Normative references

The provisions in following documents become the provisions of this Standard through reference in this Standard. For the dated references, the subsequent amendments (excluding corrections) or revisions do not apply to this Standard; however, parties who reach an agreement based on this Standard are encouraged to study if the latest versions of these documents are applicable. For undated references, the latest edition of the referenced document applies.

GB/T 156-2007 Standard voltage (IEC 60038:2002, MOD)

3 Terms and definitions

The following terms and definitions apply to this standard.

3.1

Nominal system voltage

A given value which is used to mark or identify the system voltage.

[GB/T 156-2007, definition 3.1]

3.2

Supply terminals

The connection point between the power distribution department's distribution system and the consumer's electrical system.

[GB/T 156-2007, definition 3.3]

There are two levels of measuring instrument's performance, which are defined as follows:

Level A performance - Used for places that require accurate measurements, such as contract arbitration, dispute resolution, etc.

Level B performance - Can be used for survey statistics, troubleshooting and other applications that do not require higher accuracy.

The level of measurement instrument's performance shall be selected according to each specific application.

5.2 Measuring method of supply voltage deviation

The basic measurement time window for obtaining the effective voltage shall be 10 cycles; each measurement time window shall be close to the immediately adjacent measurement time window without overlapping. Continuously measure and calculate the average value of the effective voltage; finally calculate the supply voltage deviation. The calculation formula is as follows:

$$\text{Voltage deviation (\%)} = \frac{\text{Measured voltage} - \text{Nominal system voltage}}{\text{Nominal system voltage}} \times 100\% \dots\dots\dots (1)$$

For Level A performance voltage monitors, it may select four different types of time lengths according to the specific situation to calculate the supply voltage deviation: 3 s, 1 min, 10 min, 2 h. For level B performance voltage monitors, manufacturer shall indicate the measurement time window and the time length to calculate the supply voltage deviation. The recommended time length is 1 min or 10 min.

5.3 Instrument accuracy

The measurement error of the level A performance voltage monitor shall not exceed $\pm 0.2\%$; the measurement error of the level B performance instrument shall not exceed $\pm 0.5\%$.

Appendix B

(Informative)

Monitoring of power grid voltage and statistics of regional grid voltage qualification rate

B.1 Monitoring of power grid voltage

The monitoring of power grid voltage is divided into four categories of monitoring points: A, B, C, D:

- (1) Category A is the 20 kV and 10 (6) kV bus voltages of substations and power plants with regional power supply loads.
- (2) Category B is power supplies by 20 kV, 35 kV, 66k V dedicated lines and 110 kV and above power supplies.
- (3) Category C is power supplies by 20 kV, 35 kV, 66 kV non-dedicated line as well as 10 (6) kV supply voltage. At least one voltage monitoring point shall be set for every 10 MW load.
- (4) Category D is the power supply voltage of 380/220 V low voltage network. Every 100 distribution transformers have at least 2 voltage monitoring points. The monitoring points shall be located at both ends of the representative low-voltage distribution network and at some important users.

Various monitoring points shall be adjusted every year as the power supply network changes.

B.2 Statistics of annual (quarterly, monthly) qualification rate of regional power grid voltage

- (1) The voltage qualification rate of various monitoring points is the average of the number of corresponding monitoring points.

$$\text{Monthly voltage qualification rate (\%)} = \sum_1^n \frac{\text{Voltage qualification rate}}{n} \dots\dots\dots (B. 1)$$

Where:

n - The number of voltage monitoring points of various categories of monitoring points.

$$\text{Annual (quarterly) voltage qualification rate (\%)} = \sum_1^m \frac{\text{Monthly voltage qualification rate}}{m} \dots\dots\dots (B. 2)$$

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Contact: Wayne Zheng, Sales@ChineseStandard.net

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