APPLICATION NOTE



EN 50160 Power Quality Report



Introduction

The EN 50160 specifies main characteristics the grid voltage must meet at the user's supply terminal. It applies to public low, medium and high voltage AC electricity grids under normal operating conditions. Leading up to one of the most well-known standards of the power quality industry, let's take a look at what it takes to measure, analyse and report according to the standard.

<u>Keywords:</u> #PowerQuality #EN50160



The EN 50160

Long gone are the days when we analyzed the grid on certain points to detect faults and disturbances. Nowadays, ongoing power quality monitoring is common practice for both grid and facility or power plants operators. By the emphasis on the ongoing monitoring process, questions about data storing and data handling automatically emerge and challenge monitoring systems to varying degrees. However, the right approach to handling the amount of data is key to a successful monitoring process, and the easy generation of reports.

	Description	Description		
	Grid frequency	mean value of fundamental measured over 10 seconds ±1% (49.5 - 50.5 Hz) for 99.5% of week -6%/+4% (47- 52 Hz) for 100% of week average 10 minutes rms values ±10% for 95% of week		
ndard s for ristics oower it is about ations e and gives the ers.	Supply Voltage Variations			
	Rapid Voltage Changes & Flicker	LV: 5% normal 10% infrequently Plt ≤ 1 for 95% of the week MV: 4% normal 6% infrequently Plt ≤ 1 for 95% of week		
	Supply Voltage Dips	characteristics of majority of dips: duration <1s depth <60%.		
	Short Interruptions	10s to 100s of incidences per year shorter than 3 minutes		
	Long Interruptions	10 to 50 incidences per year longer than 3 minutes		
	Over-voltages	LV: smaller than 1.5 kV_RMS		
	Transient Over-voltages	LV: generally smaller than 6kV, occasionally higher rise time: ms - µs		
	Unbalance	up to 2% for 95% of the monitoring week 10min-average values		
	Harmonics & THD	THD < 8% see the following table		

Definition

The EN 5016 standard states the limits for voltage characteristics to be met by the power grid. Furthermore it is going into detail about power user obligations in terms of active and reactive power. A simple pass or fail gives information on the following parameters.

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Odd harmonics				Evon hormonico	
Not multiples of 3		Multiples of 3		even narmonics	
Order h	Relative voltage [%]	Order h	Relative voltage [%]	Order h	Relative voltage [%]
5	6	3	5	2	2
7	5	9	1.5	4	1
11	3.5	15	0.5	6 - 24	0.5
13	3	21	0.5		
17	2				
19	1.5				
23	1.5				
25	1.5				

Measurement according to EN 50160

Based upon the previous chapter, we are going to measure and monitor the following quantities:

- electric voltage of the three phases (mean values over 10 minutes),
- the frequency (mean values over 10 seconds)
- Harmonics and THD (10-min)
- Unbalance and
- Short & Long time Flicker values Pst (10min) and Plt (2 hours).

The occurrence of voltage dips and outages are automatically detected and statistically evaluated. 10 minute mean values are calculated and after a week, an EN 50160 report serves as end result.



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