

Monitoring of Power Quality Parameters in Specific Public Lighting Networks

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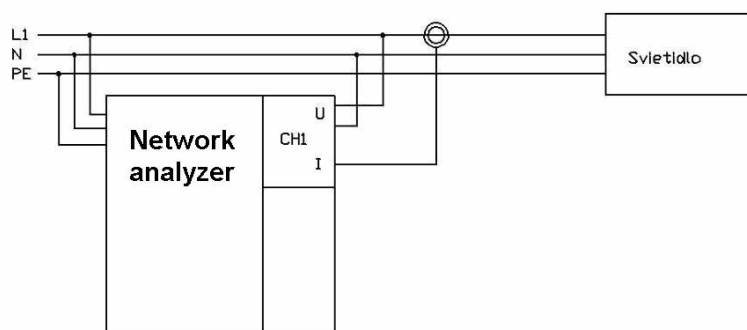
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1. Introduction

Power quality parameters at last time is still more and more important for scientist discussions. It is effect of payments for bad quality of giving energy. Aim of this paper is publish results of measurement different types of ballasts by site of power quality parameters. To show influence measure ballasts mainly using in public lighting networks. This results of measurement are base for next other analysis of lams faults.

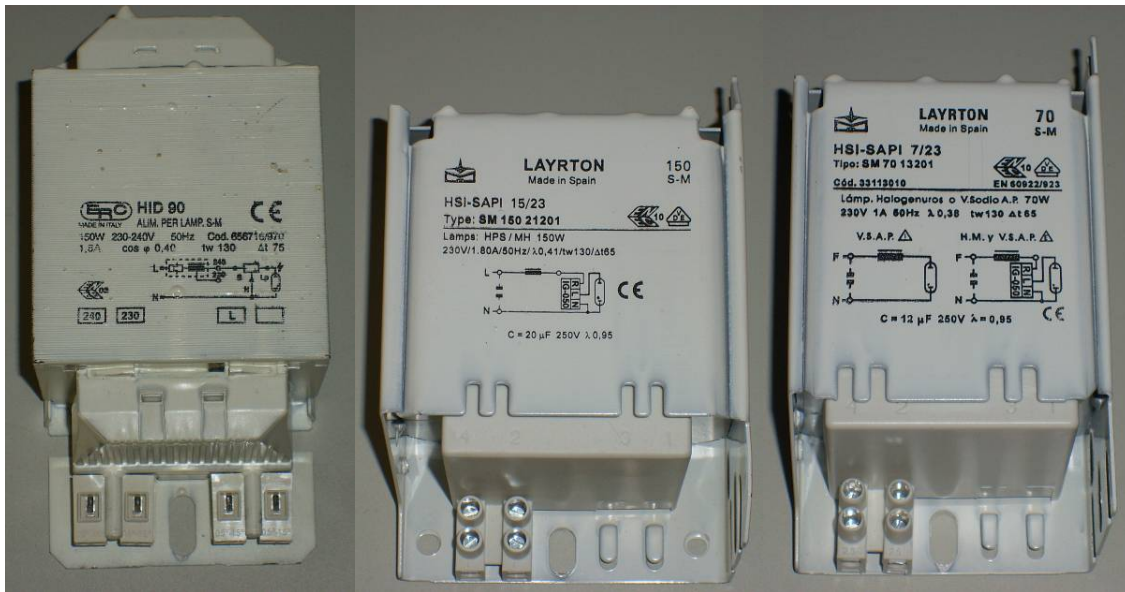
2. Measurement

Measurement was doing by network analyzer BK ELCOM 550 by diagram on picture 1. Circuit was connected by source Chroma programmable AC source 61503. This source generated exact sinus voltage. Table 1 contents parameters of measurement lamps.



Picture 1

Connection diagram



Picture 2

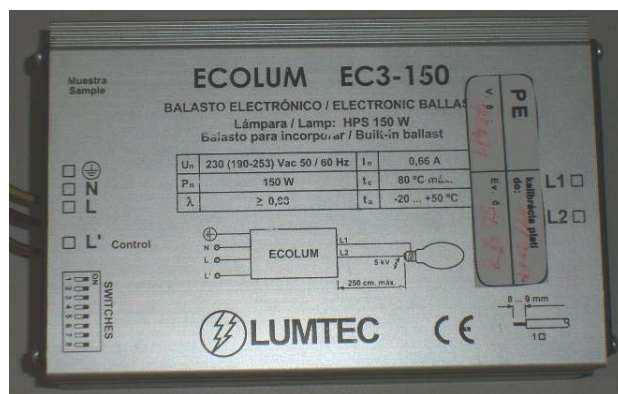
Used induction (ERC and Layrton)

Induction ballasts in our measurement were more often because they are mainly using in public lighting network. Electronic ballasts are using less for their price and they are too modern. Different in price isn't so huge.



Picture 3

Starters BAG



Picture 4

Electronic ballast ECOLUM

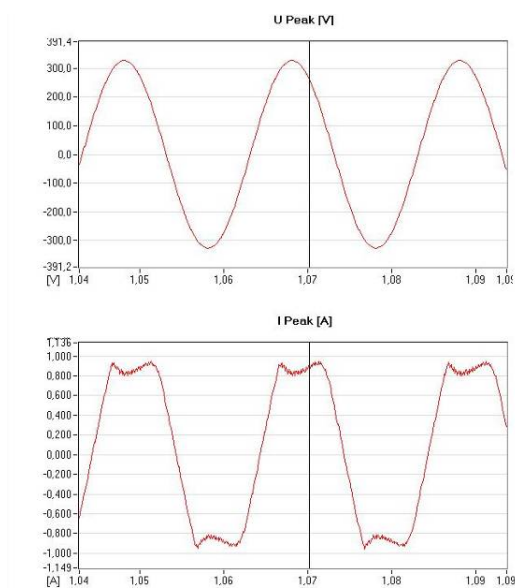
For measurements was used components pictured up. Parameters of components are in the table. Best results had electronic ballast ECOLUM. It has good electric compensation. Lamps used for measurements were stabilized.

measurement Number	starter / ballast electronic	Capacitor	inductor	LAMP
1	BAG elektronics, NI 400 LE 4K	Tesla, 20 μ F	ERC, HID 90, 150W, 1,5A, 230V, λ 0,40, tw 130, Dt 75	Osram, Vialox NAV-E 150
2	BAG elektronics, NI 400 LE 4K	UNICOMP, 20 μ F	LAYRTON SM 150 21201, 150W, 1,8A, 230V, λ 0,41, tw 130, Dt 65	Osram, Vialox NAV-E 150
3	BAG elektronics, NI 70 S 4K	DNA, 12 μ F	LAYRTON SM 70 13201, 70W, 1A, 230V, λ 0,38, tw 130, Dt 65	GE, LUCALOX LU70/90/T12/S7
4	LUMITEC, ECOLUM EC3-150, 150W, 0,66A, 230V, $\lambda \geq 0,98$,			Osram, Vialox NAV-E 150

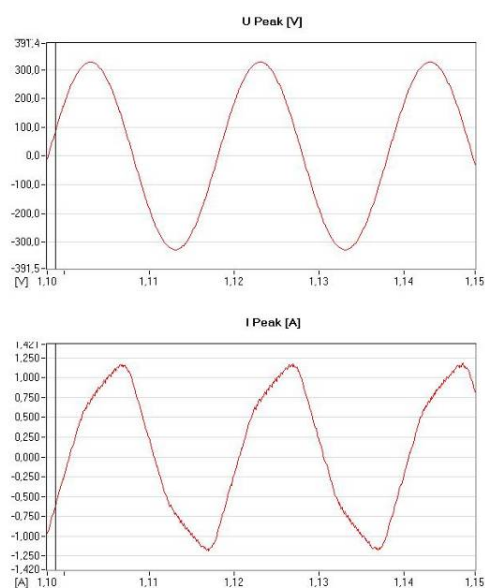
Tabel 1

Parameters of lamp parts

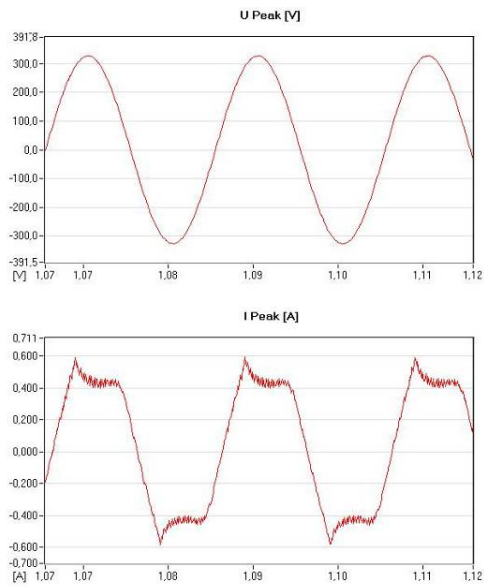
3. Results of measurement



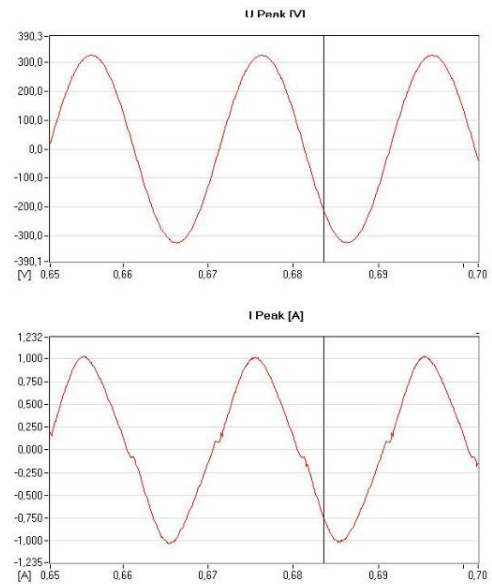
Measurement 1



Measurement 2



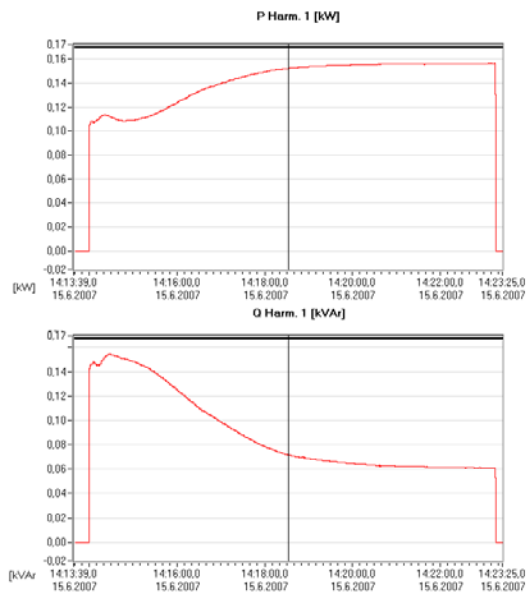
Measurement 3



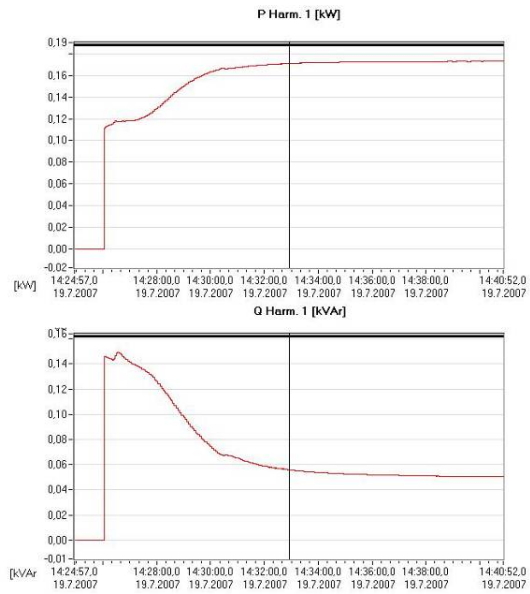
Measurement 4

Picture 5

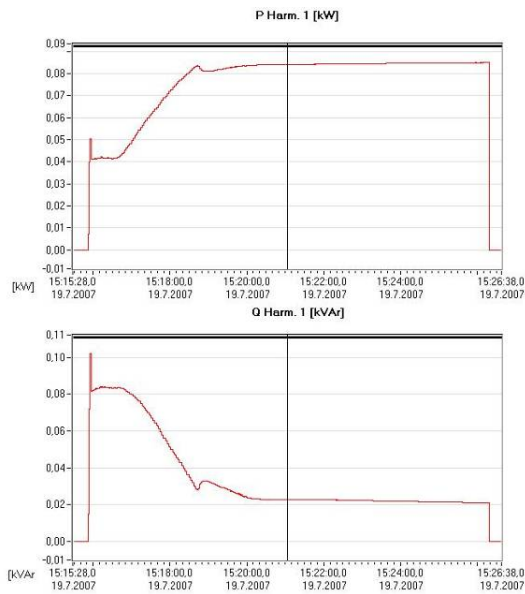
Behaviour of voltage and current



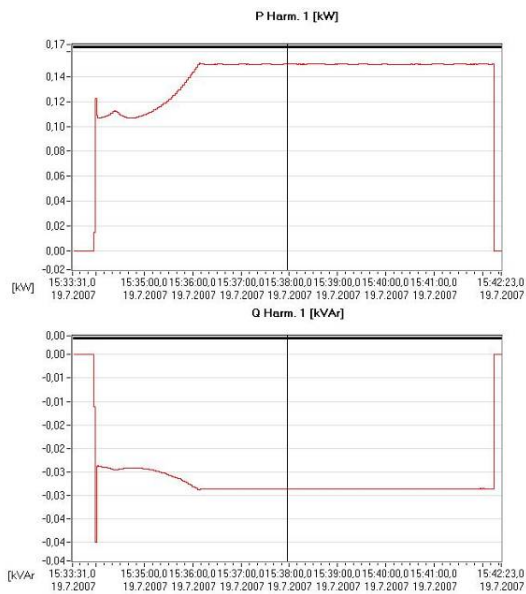
Measurement 1



Measurement 2



Measurement 3



Measurement 4

Picture 6

Behaviour of power

You can see from pictures quicker start of full power by using electronic ballast. When we use inductive ballast and 150W lamp start is almost same but not graph next part.

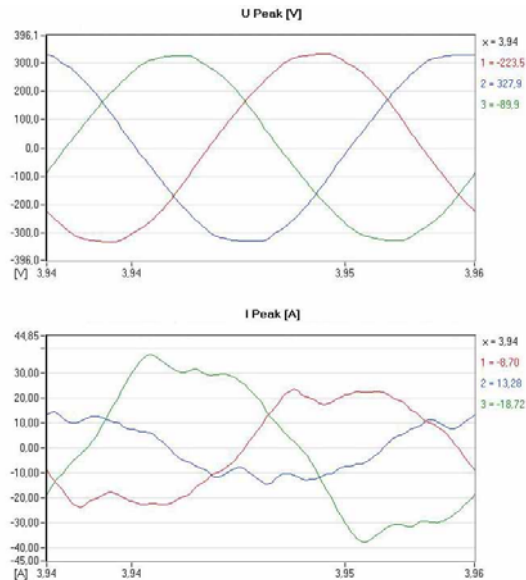
Harmonic	Measurement 1	Measurement 2	Measurement 3	Measurement 4
	AVG			
1	0,800	0,790	0,400	0,666
2	0,009	0,001	0,008	0,002
3	0,130	0,123	0,086	0,057
4	0,004	0,001	0,003	0,002
5	0,034	0,029	0,029	0,011
6	0,002	0,001	0,002	0,000
7	0,021	0,023	0,014	0,009
8	0,000	0,000	0,000	0,000
9	0,006	0,009	0,005	0,007
10	0,000	0,000	0,001	0,000
11	0,006	0,007	0,005	0,005
12	0,000	0,000	0,001	0,000
13	0,003	0,004	0,003	0,004
14	0,000	0,000	0,001	0,000
15	0,002	0,003	0,002	0,003
16	0,000	0,000	0,000	0,000
17	0,002	0,002	0,002	0,002
18	0,000	0,000	0,000	0,000
19	0,001	0,001	0,002	0,002
20	0,000	0,000	0,000	0,000

Tabel 2

Content of harmonics

5. Measure in exist public lighting networks

Measure was doing in Gabčíkovo with same lamps. Behaviour of current is strongly deformed but not so much than you tot up content of harmonics. On the graph you can see ballast of neutral line because it was common for other consumers either result was not objective than.



Picture 7

Behaviour of voltage and current

5. Conclusion

In measured values you can see signification content of harmonics mainly by inductive ballast. If you take, that middle size city has 2000 lamps with inductive ballast, we can get very important source of content of harmonics. For this reason is important to look for way how to particularly reducing them in public lightings networks. If you thing to use lamps with different ballasts may be possible to compensate content of harmonics. But if you use same lamps the contents are not tot up.

6. Literature

- [1] SZATHMÁRY, P.: Power Quality, ABB Elektro, s. r. o., , Bratislava, 2003 s. 122.
- [2] GAŠPAROVSKÝ, D., KRASŇAN, F., PÍPA, M.: Analyses of Properties of Electronic Ballasts for High Pressure Sodium Lamps and Energy Saving Options by Applications of Electronics Ballasts to Streetlighting. In: Lux Junior 2005. Tagungsberichte. Ilmenau : Technische Universität, 2005. CD-Rom. Conference: 7. Internationales Forum für den lichttechnischen Nachwuchs Lux Junior 2005. Dörfeld bei Ilmenau, Germany, 23.-25.9.2005.