Measurement report

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| Subject of the exercise: | Electric power measurement (Exercise 4) |
| **Date:** | <year>. <month>. <day> |
| **Students name:** | <name 1> <name 2><name 3> |
| **Course and group No.** | Course: <Course No>, <Group No.> |
| **Supervisors:** | <name 1>, <name 2> |
| **Desk No.:** |  |

***All solutions to the exercises have to be explained and justified.***

***A separate file (M4\_distance\_learning.docx) contains the measurement results that have to be evaluated during the measurement. The values, oscilloscope screenshots, etc. have to be copied to the report and explained.***

***These information and the links to videos have to be deleted in the final version of the report. The videos are in Hungarian but will be discussed during the measurement with the lecturer.***

Applied instruments

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| Digital oscilloscope | Agilent 54622A | < serial number > |
| Digital multimeter (6½ digit) | Agilent 33401A | < serial number > |
| Function generator | Agilent 33220A | < serial number > |
| Electronic power meter | Hameg HM8115 | < serial number > |
| Adjustable AC supply | Metrel MA-4804 | < serial number > |
| Hall-probe current meter | Hameg HZ-56 | < serial number > |
| Resistor decade | IET Labs RCS500 | < serial number > |
| Transformer | VIK-01-03 | < serial number > |

A video demonstrating the applied instruments is available here (in Hungarian):

**https://web.microsoftstream.com/video/42aacb15-89fe-499f-99ea-31c9d39d1cd4**

Exercises

1. Use of a Hall-probe current meter

The video containing the measurement (in Hungarian) is available here:

https://web.microsoftstream.com/video/1411f56c-2ca9-49f4-af30-a20f3d1aca99

Give a summary about the use of the Hall-probe, how the clamp meter can be used!

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1. Measurement of active and reactive power of an RLC circuit supplied with sinusoidal AC voltage

The video containing the measurement (in Hungarian) is available here:

**https://web.microsoftstream.com/video/7debed19-bd98-4fbf-9929-9ced8caf7dc6**

Based on the voltage and current values read from the oscilloscope you have to determine the active power (P), the reactive power (Q) and the power factor ($\cos(φ)$). Mark these quantities on the oscilloscope screenshot.

Measurement data is available in the file *M4\_distance\_learning.docx* (which can be downloaded from the website), see Exercise 2.

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1. Measurement of active and reactive power of an RLC circuit supplied with general waveform AC voltage

The video containing the measurement (in Hungarian) is available here:

**https://web.microsoftstream.com/video/f9d1bfa5-971a-4b7e-b380-5ca7c64ce129**

Oscilloscope settings follow the definition of power measurement. We can obtain the RMS value of the voltage and the current, as well as the active power. You have to calculate the reactive power (Q) and the power factor ($\cos(φ)$).

The measurement was done using sinusoidal voltage, which was set to be the same as in the previous exercise. Compare the obtained results with those of the previous exercise!

Measurement data is available in the file *M4\_distance\_learning.docx* (which can be downloaded from the website), see Exercise 3.

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1. Measurement of active and reactive power of an RLC circuit supplied with an AC power supply

The video containing the measurement (in Hungarian) is available here:

**https://web.microsoftstream.com/video/4d4d0213-4915-4146-9b97-07ca94c51cb7**

The measurement on the oscilloscope is similar to that of the previous exercise. The excitation voltage is set on the AC power supply and is transformed to obtain the necessary value. Compare the measurement results obtained with the oscilloscope and the electronic power-meter! You have to keep in mind though that you are not necessarily measuring the same system as in the previous exercises, so the results cannot be compared to those obtained there.

Measurement data is available in the file *M4\_distance\_learning.docx* (which can be downloaded from the website), see Exercise 4.

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1. Measurement of active and reactive power consumption of light sources supplied from the mains

The video containing the measurement (in Hungarian) is available here:

**https://web.microsoftstream.com/video/7ed6480f-ef84-4a49-891c-529d913619e3**

The power consumption of two light sources have to be measured and compared. One is the halogen bulb, the other can be the compact fluorescent lamp or the LED lamp. Tasks to be solved:

1. Draw the voltage-power characteristic of the two light sources on the same diagram. You can use either the measurement results of the electronic power-meter or the oscilloscope.
2. Compare the results obtained with the two methods! What does the NaN (Not a number) mean?
3. Give a qualitative comparation of the fluorescent lamp, the LED and the halogen bulb!

Measurement data is available in the file *M4\_distance\_learning.docx* (which can be downloaded from the website), see Exercise 5.

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