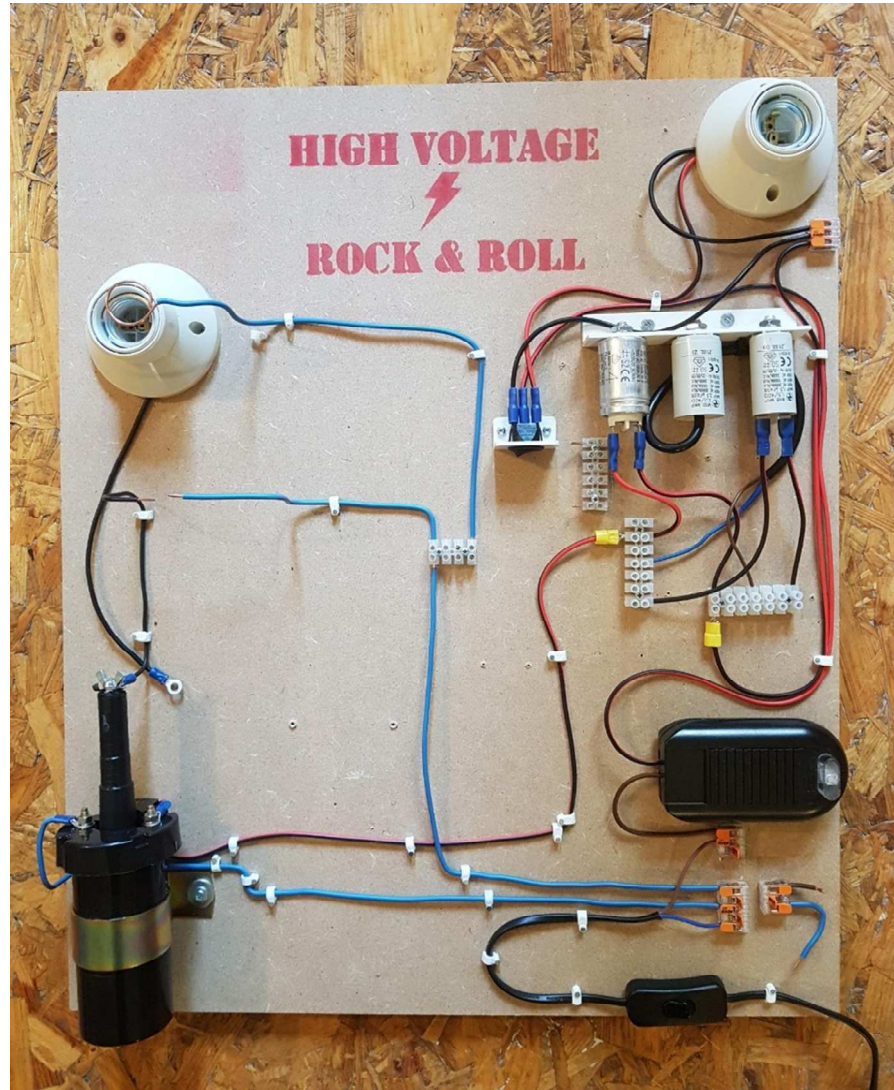


HV Experiment 1 – Inductive coil

V1.1

2021-11-17





HV Experiment 1 – Inductive coil

V1.1

2021-11-17

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-Dimmer positions

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Test 1.2: Dimmer low/mid/high No Lamp, CH2 before cap

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Observations & Conclusions

-Test 2: Dimmer, cap size

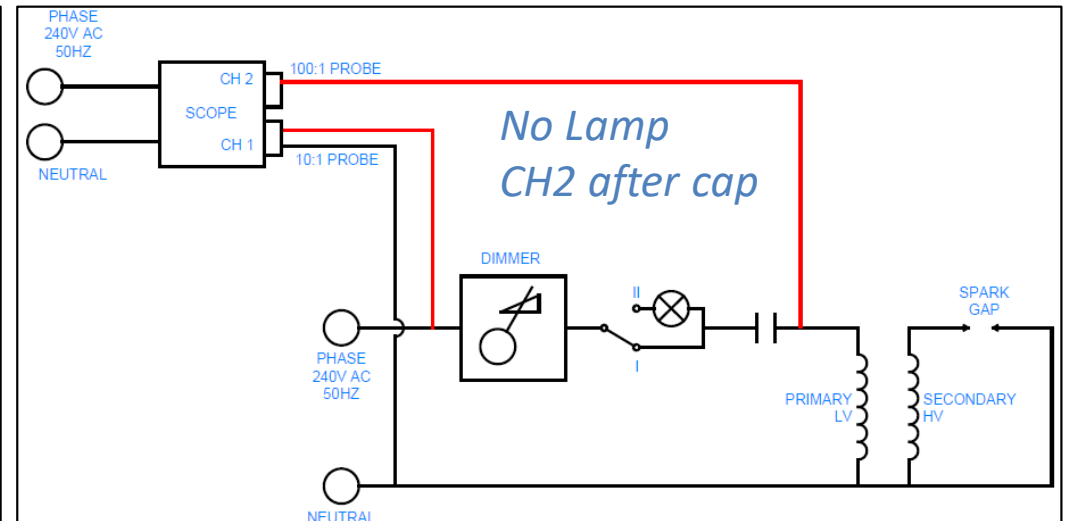
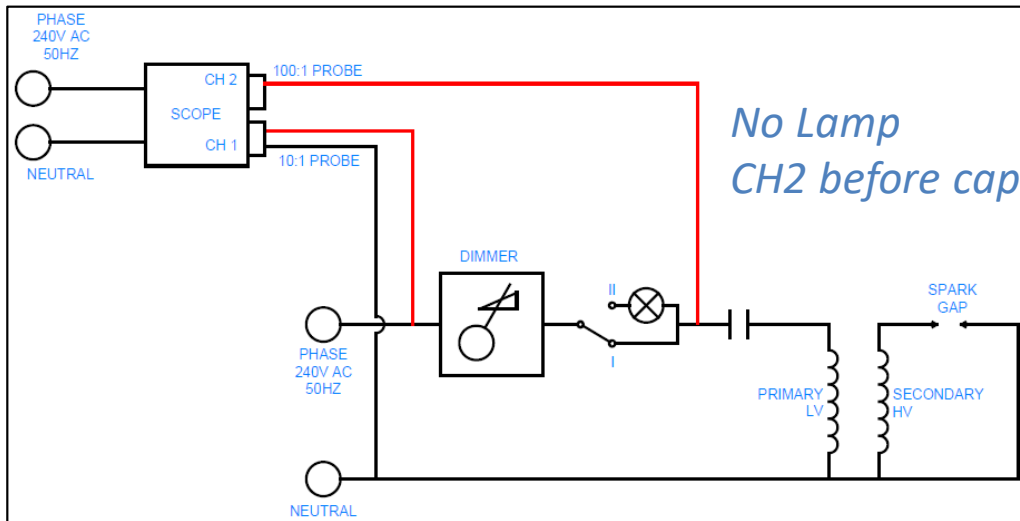
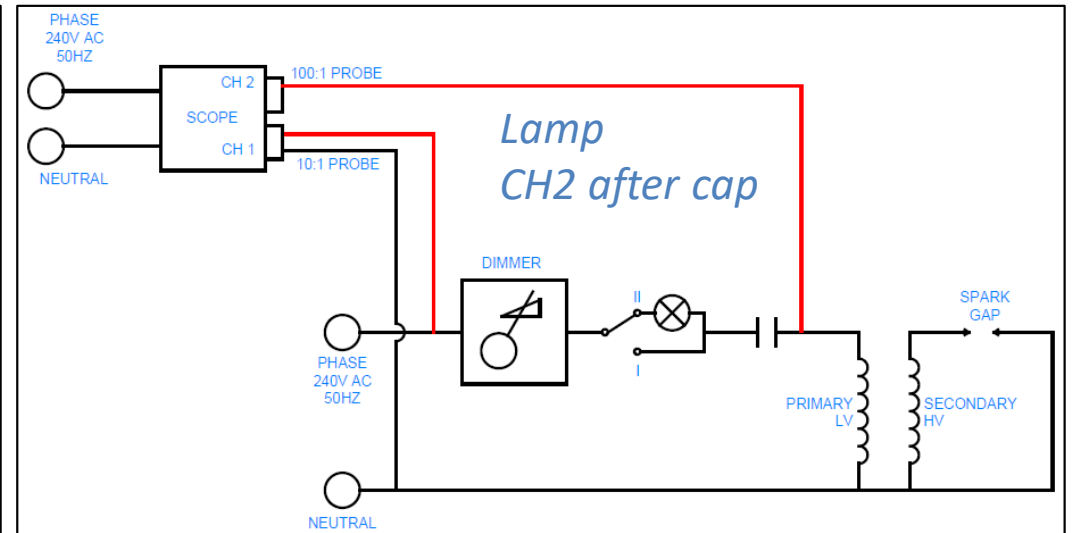
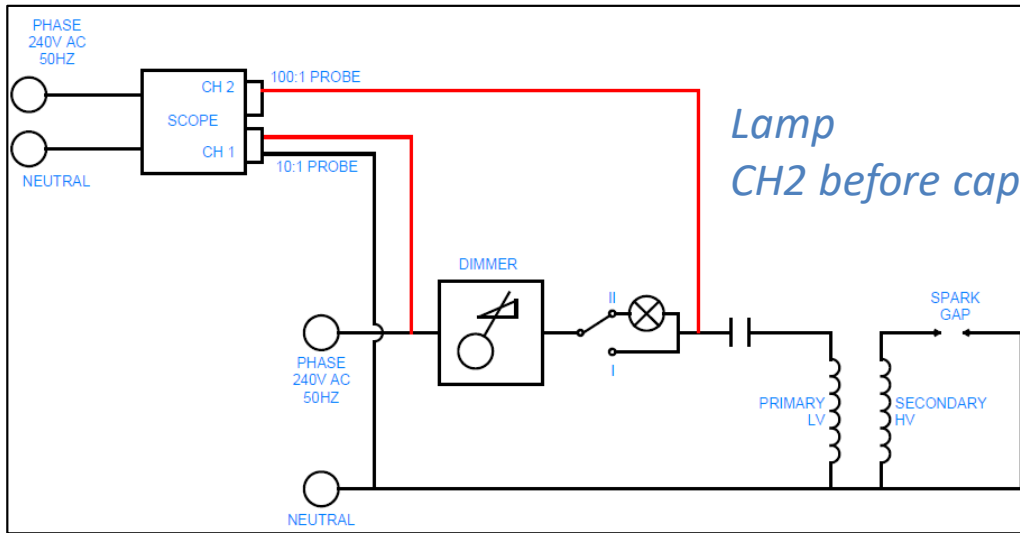
Introduction

Test 2.1: Dimmer low/high, 4uF/1.5uF cap No Lamp, CH2 before cap

Test 2.2: Dimmer low/high, 4uF/1.5uF cap No Lamp, CH2 after cap

Observations & Conclusions

Schematics used in Tests



Dimmer positions



“Dimmer position low”

Meaning: the dimmer dims almost to its max

Reference used in scope screenshots: “Low Dim”



“Dimmer position Middle”

Meaning: the dimmer dims about half of its max

Reference used in scope screenshots: “Mid Dim”



“Dimmer position High”

Meaning: the dimmer barely dims

Reference used in scope screenshots: “High Dim”



Test 1: Lamp, dimmer Introduction

Purpose

I want to learn about the behavior of the signals in the primary circuit and see which influence the following parameters have:

- Lamp (=not constantly sparking over spark gap), No Lamp (=constantly sparking over spark gap)
- Dimmer in low-/middle-/high position.

Note:

When switching from measurements with lamp to measurements without lamp, the dimmer positions are approximates. E.g. the position of the dimmer “Dim low” with the lamp, is not 100% the same dimmer position as ‘Dim low’ without the lamp; It was just slid into more or less the same position by hand.

Dimmer: 0-500W floor dimmer

<https://www.gamma.nl/assortiment/handson-vloerdimmer-zwart-gloeilamp-halogen/p/B122881>

Bobine: Golf III

<https://www.autodoc.nl/topran/2723256>

Capacitor: 4uF, 500V AC

<https://www.conrad.nl/p/hydra-mkp-500-mab-4uf-30x48-1-stuks-mkp-foliecondensator-radiaal-bedraad-4-f-500-vac-5-x-l-30-mm-x-48-mm-2354178>



Test 1.1: Dimmer low/mid/high

Oscilloscope screenshots – Lamp, CH2 before cap

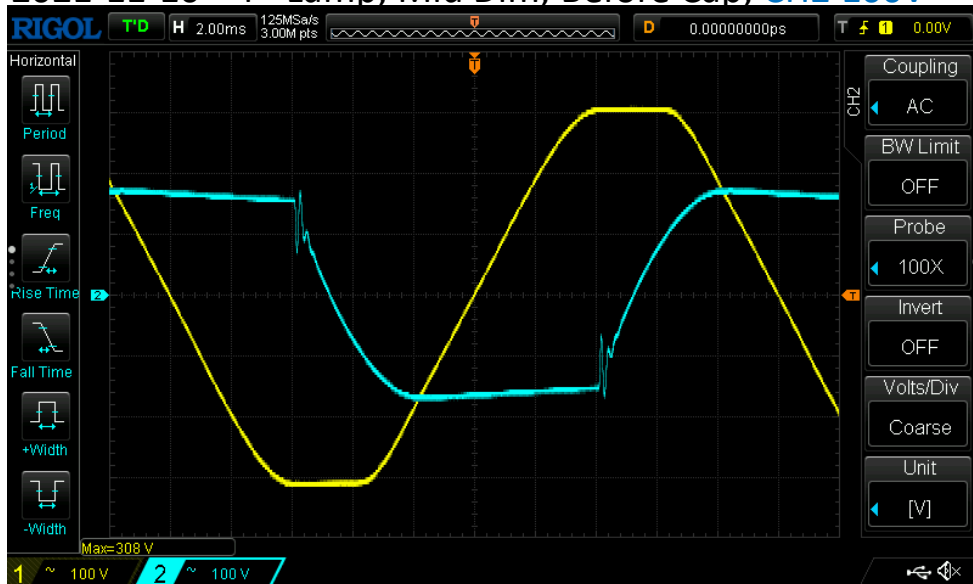
2021-11-10 - 2 - Lamp, Low Dim, Before Cap, CH2 100V



2021-11-10 - 6 - Lamp, High Dim, Before Cap, CH2 100V



2021-11-10 - 4 - Lamp, Mid Dim, Before Cap, CH2 100V





Test 1.2: Dimmer low/mid/high

Oscilloscope screenshots – No Lamp, CH2 before cap

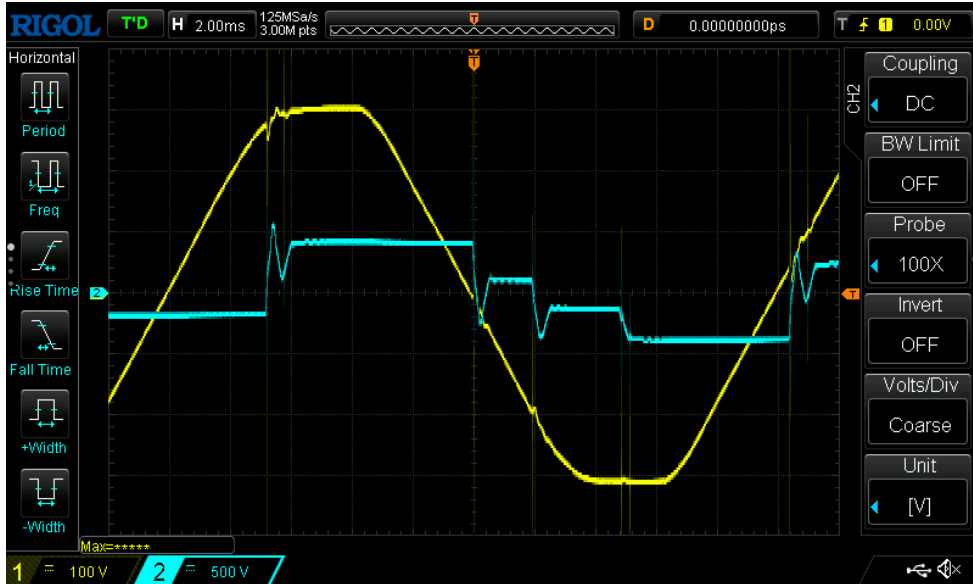
2021-11-10 - 9 - No Lamp, Low Dim, Before Cap, CH2 500V



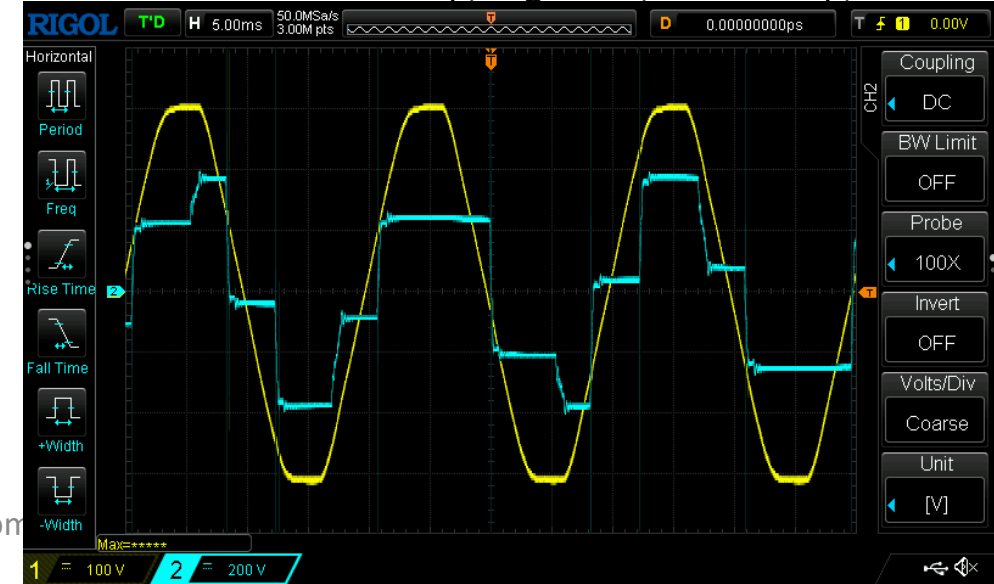
2021-11-10 - 16 - No Lamp, High Dim, Before Cap, CH2 500V



2021-11-10 - 13 - No Lamp, Mid Dim, Before Cap, CH2 500V



2021-11-10 - 20 - No Lamp, High Dim, Before Cap, CH2 200V

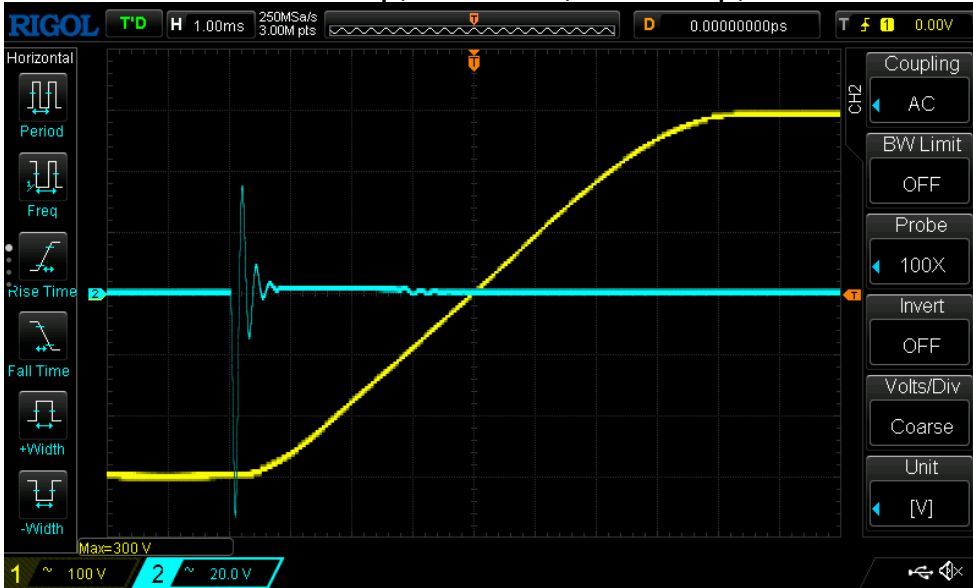




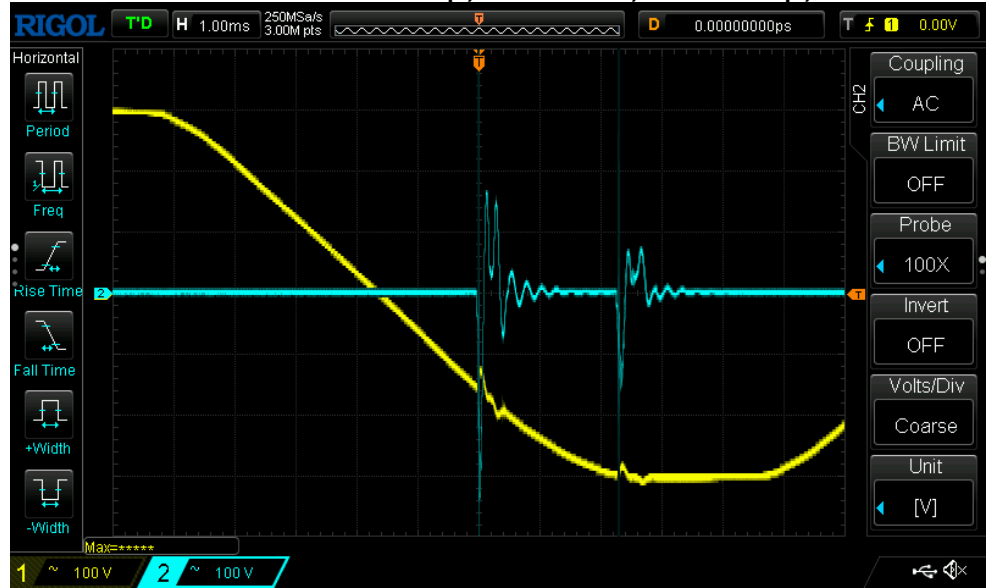
Test 1.3: Dimmer low/high

Oscilloscope screenshots – No Lamp, CH2 after cap

2021-11-10 - 23 - Lamp, Low Dim, after Cap, CH2 20V



2021-11-10 - 23 - No Lamp, Low Dim, after Cap, CH2 100V



2021-11-10 - 27 - Lamp, High Dim, after Cap, CH 10V



2021-11-10 - 23 - No Lamp, High Dim, after Cap, CH2 100V





Test 1: Lamp, dimmer Observations & Conclusions

Influence of dimmer on brightness lamp

I expected that the lamp would be the brightest with the dimmer in 'high' position and the dimmest with the dimmer in 'low' position. However, the lamp was the brightest in the 'middle' position.

The cause for this might be that although the peaks of the signal to the lamp are higher with the dimmer in "high" position, the width of the signals are broader in the 'middle' position.

Influence of lamp on the spark

When switching the circuit ON there is a brief spark over the spark-gap. When the lamp was bypassed, the sparking was constant.

The cause for this is probably that with the lamp in place the 'cut-off' of the dimmer is not so sharp and high measured before the cap (but after the lamp), not causing a high enough voltage in the secondary coil to create a spark. With the lamp not in place, the "cut-off" of the dimmer is sharper and higher, causing higher spikes in the secondary coil, high enough to spark.

Influence of dimmer on the spark

In the 'low' dimmer position the spark is loudest, lower in pitch and more smooth.

In the 'high' dimmer position the spark is less loud, higher in pitch and a bit less smooth.





Test 2: Dimmer, cap size Introduction

Purpose

I want to learn about the behavior of the signals in the primary circuit and see which influence the following parameters have:

- Capacitor 1.5uF, 4uF
- Dimmer in low-/high position.

Note:

When switching between 1.5uF and 4uF the dimmer was in exactly the same position and the spark gap was the same distance. An exception to this were the measurements of 4uF indicated with an “*”. Here the dimmer was in a slightly higher (less dimming) position and the spark gap slightly bigger. The reason for this is that after the first two 4uF measurements with the dimmer in ‘High dim’ position, when switching to the first set of 1.5uF measurements with the same dimmer position, no sparking took place, but by closing the spark gap a bit and lowering the dimmer position just a bit it did spark.

Dimmer: 0-500W floor dimmer

<https://www.gamma.nl/assortiment/handson-vloerdimmer-zwart-gloeilamp-halogenen/p/B122881>

Bobine: Golf III

<https://www.autodoc.nl/topran/2723256>

Capacitor: 1.5uF, 500V AC

<https://www.conrad.nl/p/hydra-mkp-400-mab-15uf-25x48-1-stuks-mkp-foliecondensator-radiaal-bedraad-15-f-500-vac-5-x-l-25-mm-x-48-mm-2354191>

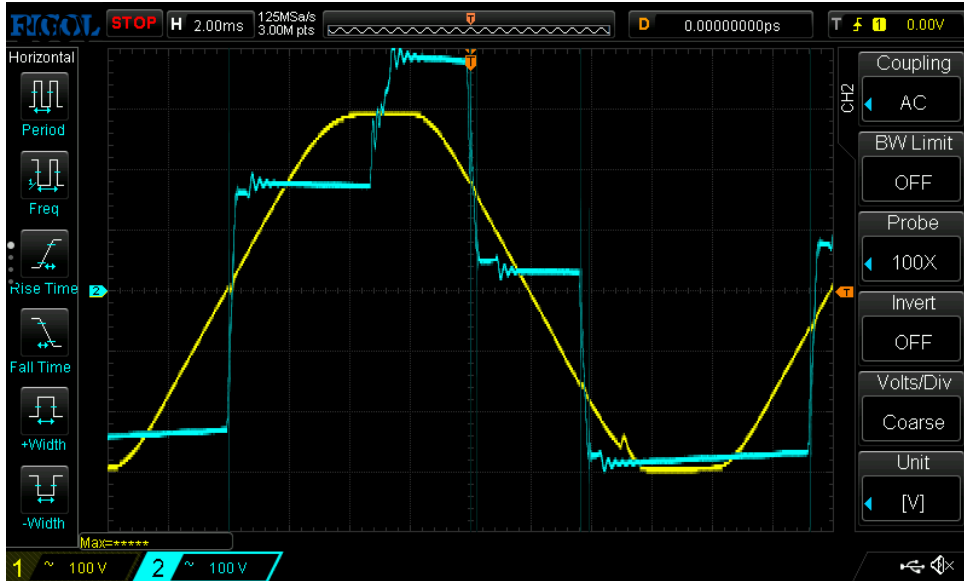
4uF, 500V AC

<https://www.conrad.nl/p/hydra-mkp-500-mab-4uf-30x48-1-stuks-mkp-foliecondensator-radiaal-bedraad-4-f-500-vac-5-x-l-30-mm-x-48-mm-2354178>

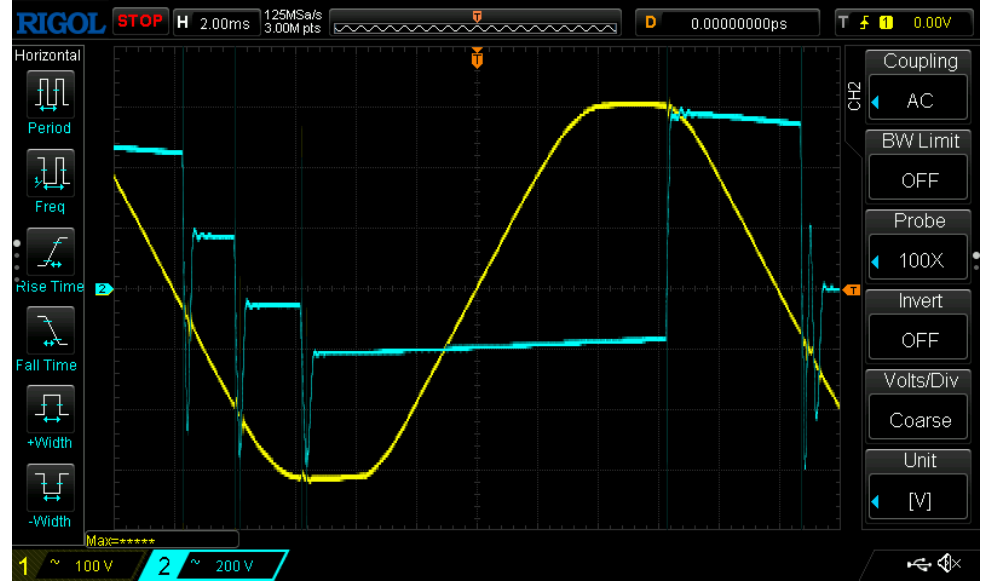


Test 2.1: Dimmer low/high, 4uF/1.5uF cap Oscilloscope screenshots – No Lamp, CH2 before cap

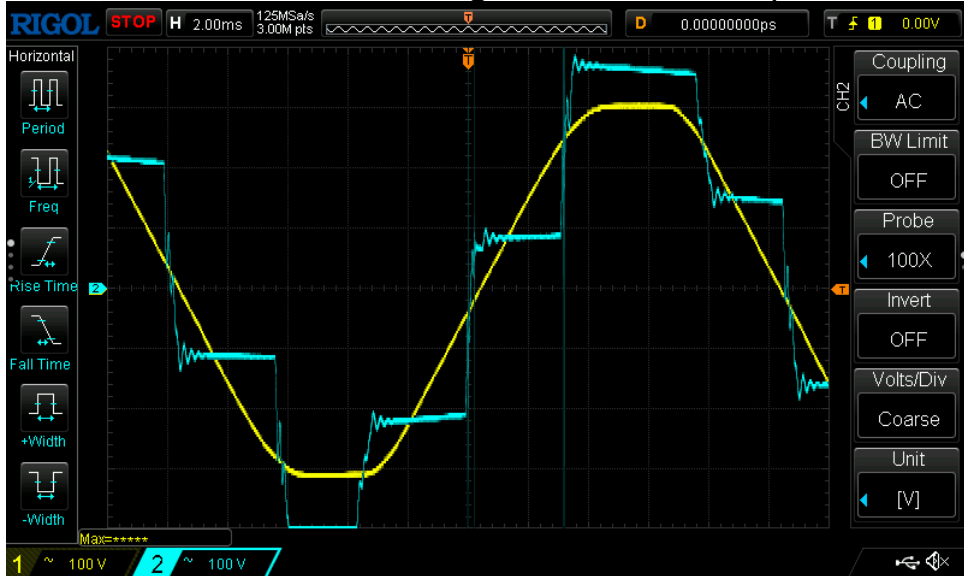
*2021-11-10 - 40 - 4uF - High dim - before cap - 2ms



*2021-11-10 - 47 - 4uF - Low dim - before cap - 2ms 100V



2021-11-10 - 44 - 1.5uF - High dim - before cap - 2ms 100V



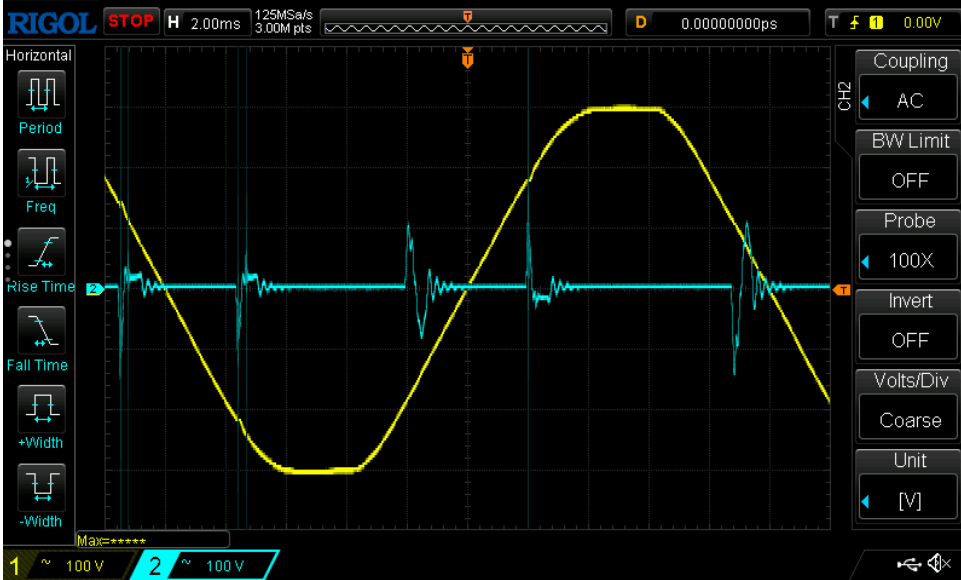
2021-11-10 - 50 - 1.5uF - Low dim - before cap - 2ms 100V



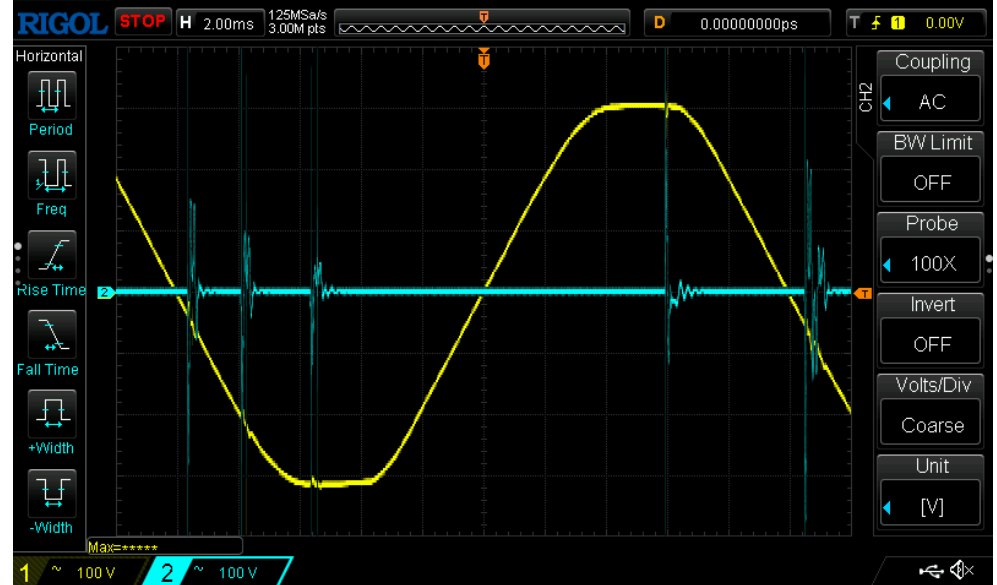


Test 2.2: Dimmer low/high, 4uF/1.5uF cap Oscilloscope screenshots – No Lamp, CH2 after cap

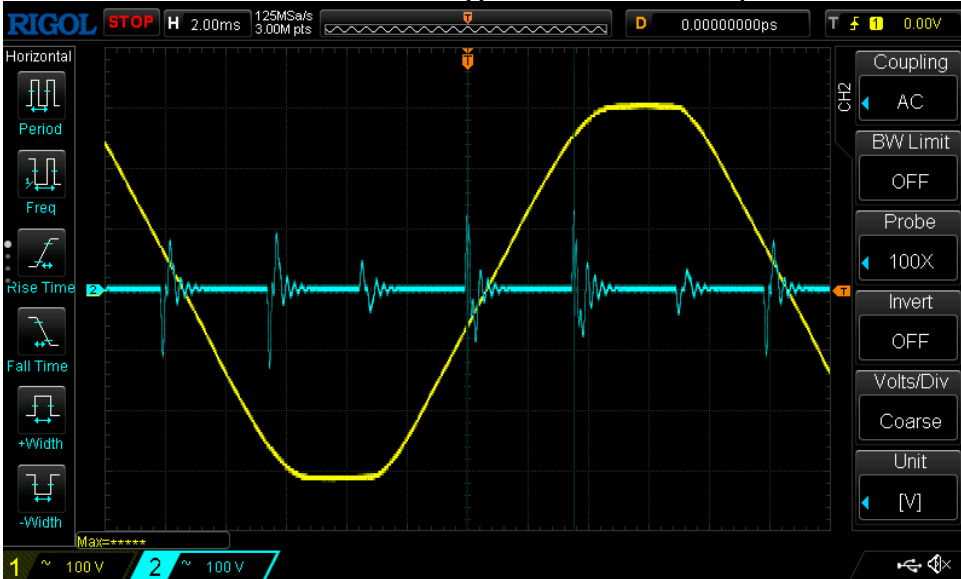
2021-11-10 - 43 - 4uF - High dim - after cap - 2ms 100V



2021-11-10 - 49 - 4uF - Low dim - after cap - 2ms 100V



2021-11-10 - 46 - 1.5uF - High dim - after cap - 2ms 100V



2021-11-10 - 52 - 1.5uF - Low dim - after cap - 2ms 100V





Test 2: Dimmer, cap size Observations & Conclusions

Influence of 4uF vs 1.5uF Capacitor

The spark was a bit more 'aggressive' with the 4uF capacitor. Furthermore, after the oscilloscope measurements were done, I increased the spark gap till the circuit with the 1.5uF cap would not spark anymore. When connecting the 4uF cap, it still did spark with the increased spark gap.

