

Capítulo 4

Simulaciones

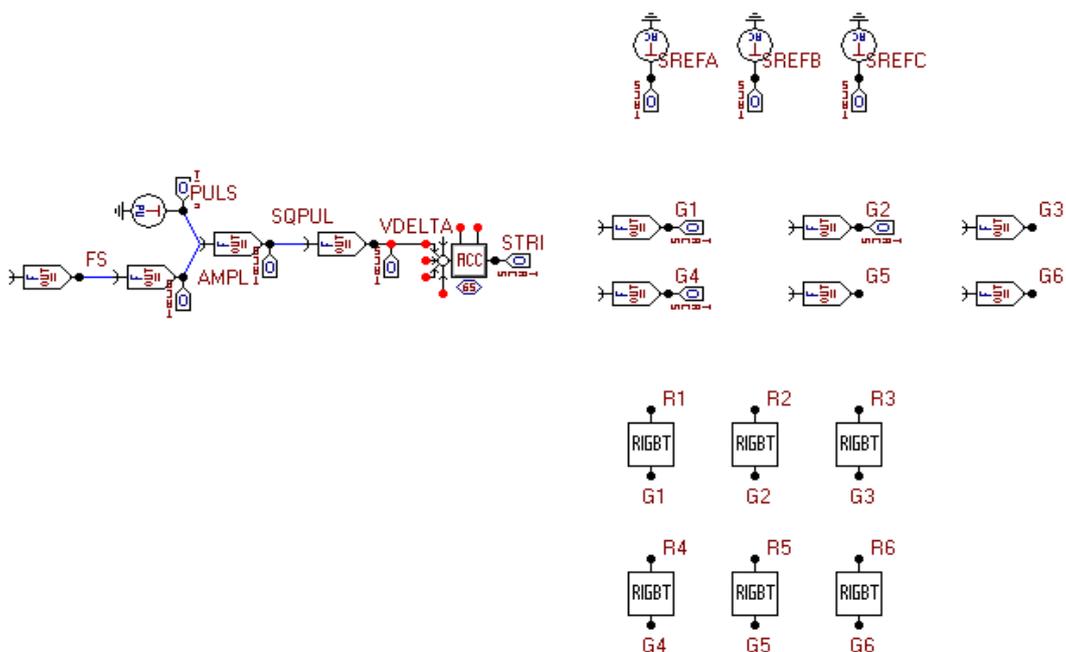
- Inversor.
- Planta fotovoltaica 1.
 - 1 Inversor.
 - Funcionamiento en isla.
 - Carga 1.
- Planta fotovoltaica 2.
 - 1 Inversor.
 - Conectada a red.
 - Carga 1.
- Planta fotovoltaica 3.
 - 1 Inversor.
 - Conectada a red.
 - Carga 3.
- Planta fotovoltaica 4.
 - 1 Inversor.
 - Método pasivo de detección en isla.
 - Carga 1/Carga 2/Carga 3.
- Planta fotovoltaica 5.
 - 1 Inversor.
 - Método activo de detección en isla.
 - Carga 4.

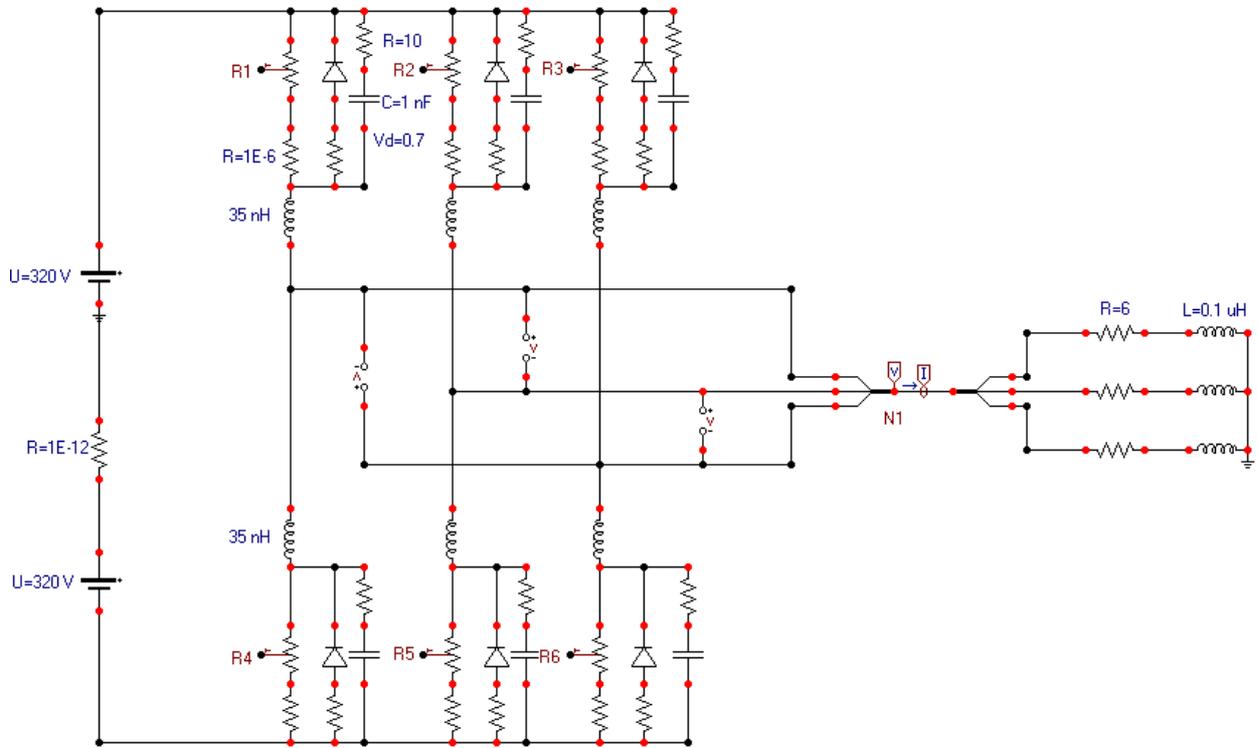
- Planta fotovoltaica 6.
 - 1 Inversor.
 - Método pasivo de detección en isla. Desconexión aguas arriba de la subestación.
 - Carga 1.
- Planta fotovoltaica 7.
 - 2 Inversores.
 - Funcionamiento en isla.
 - Carga 1.
- Planta fotovoltaica 8
 - 2 Inversores.
 - Conectada a red.
 - Carga 1.

4.1 Inversor.

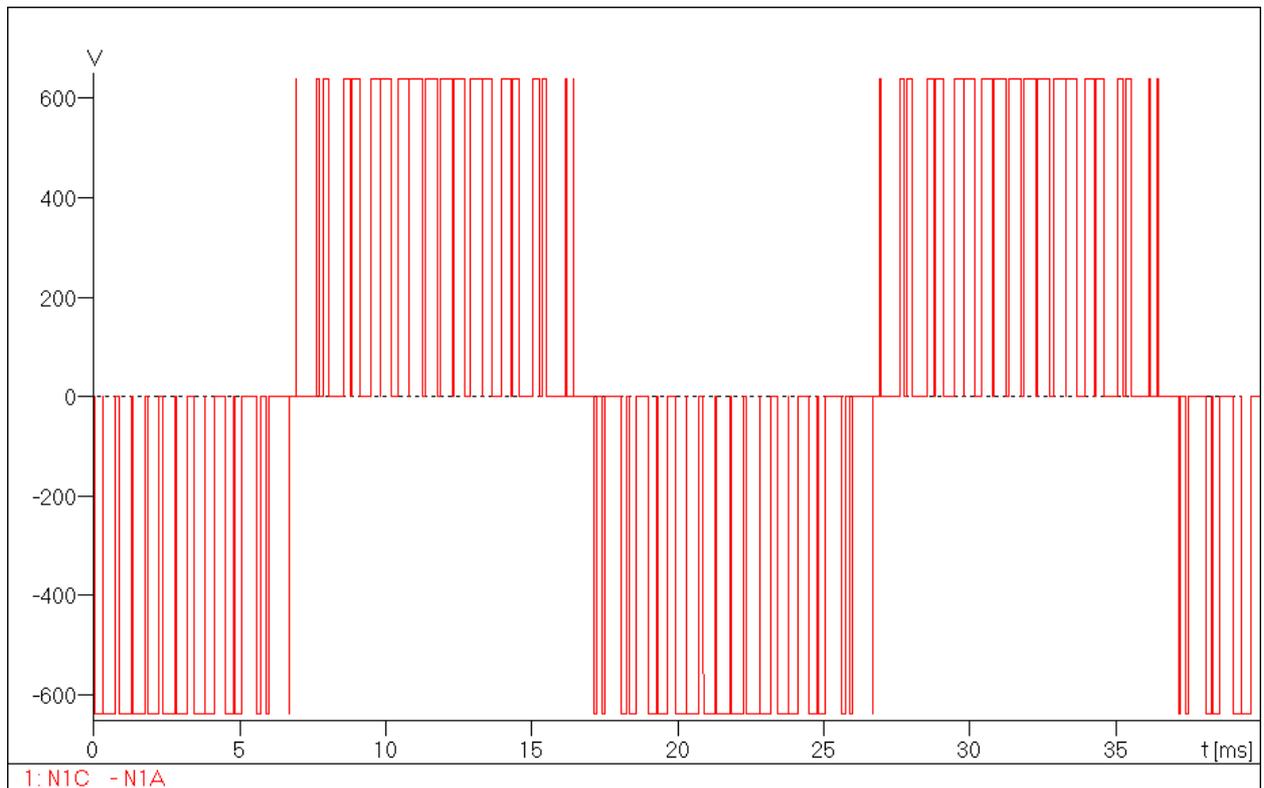
$f_{pwm}=1$ kHz

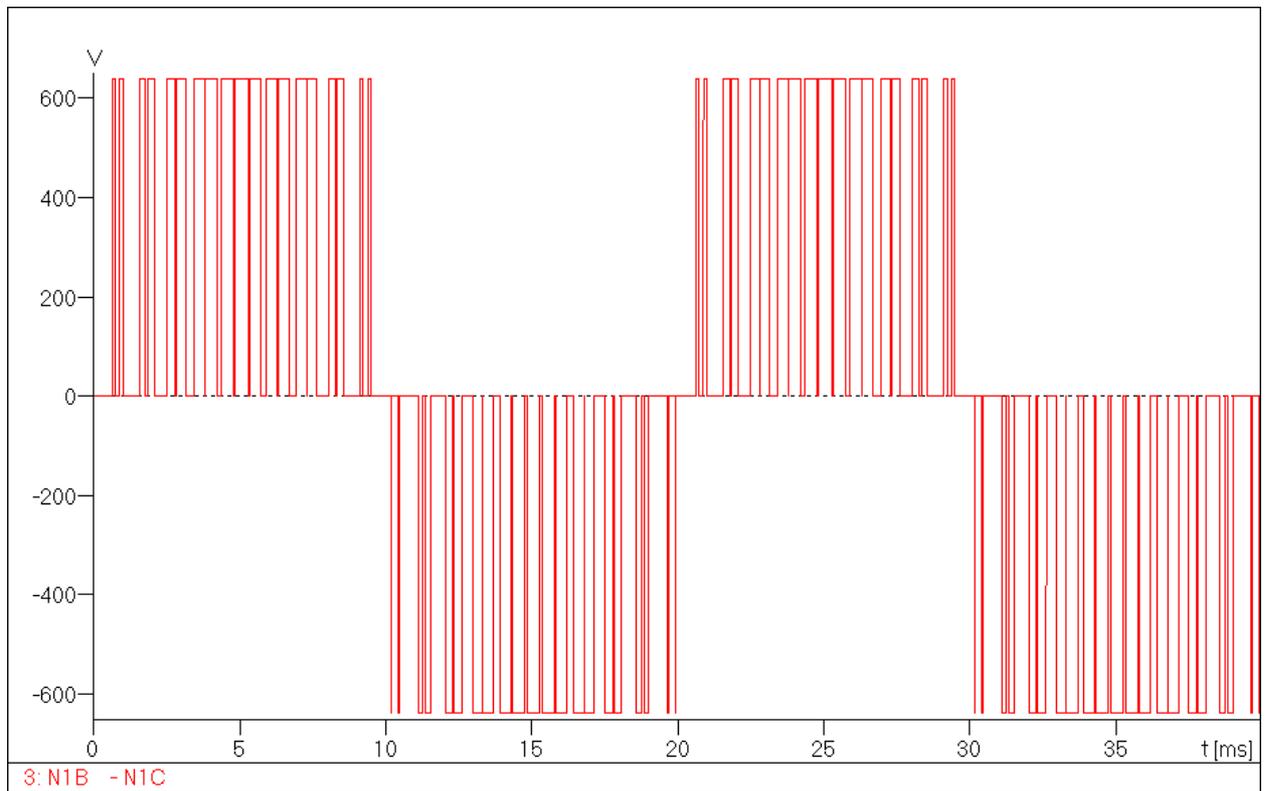
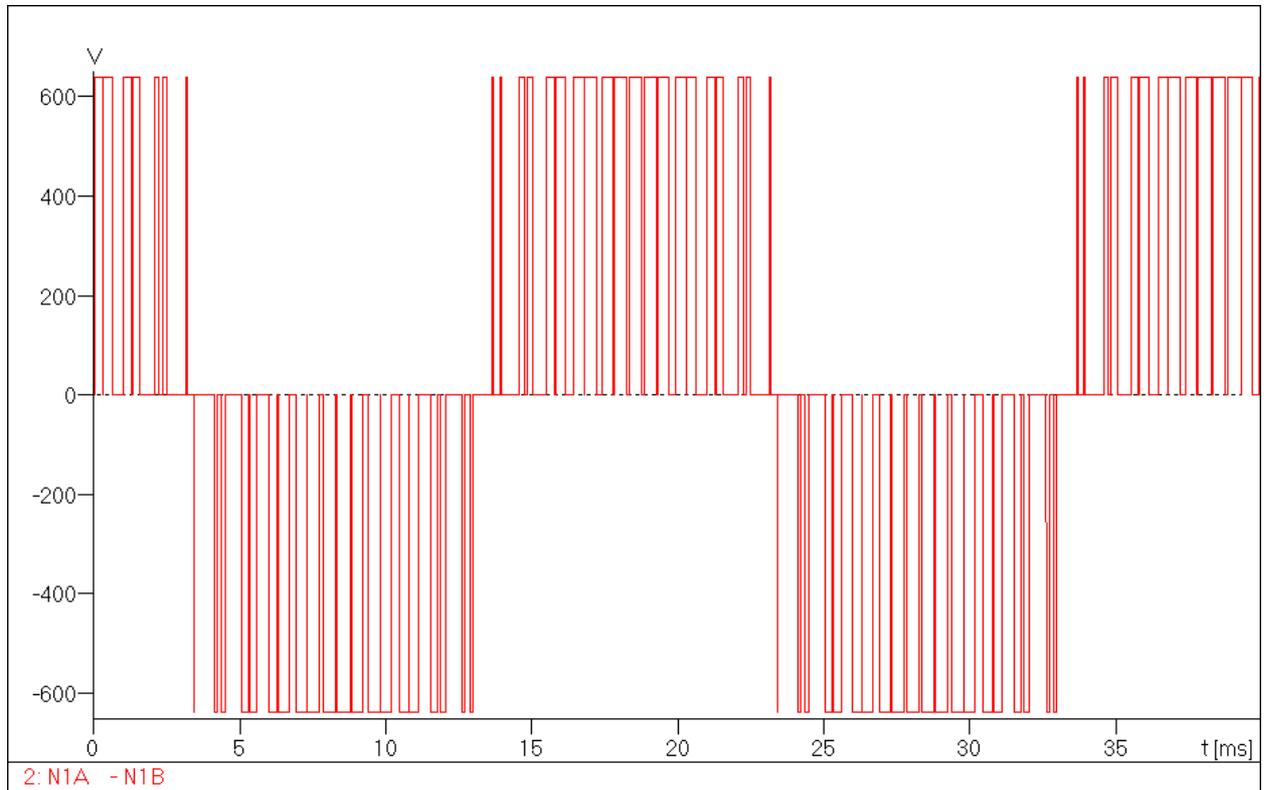
Timestep=10 ns

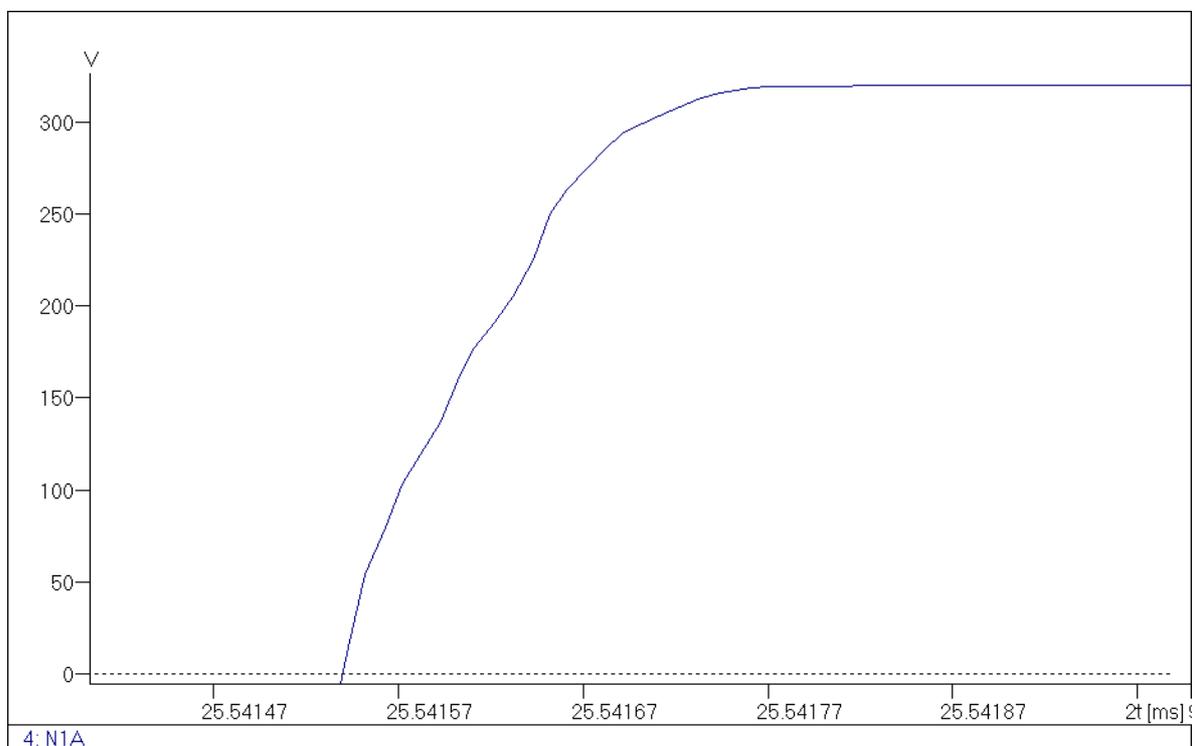
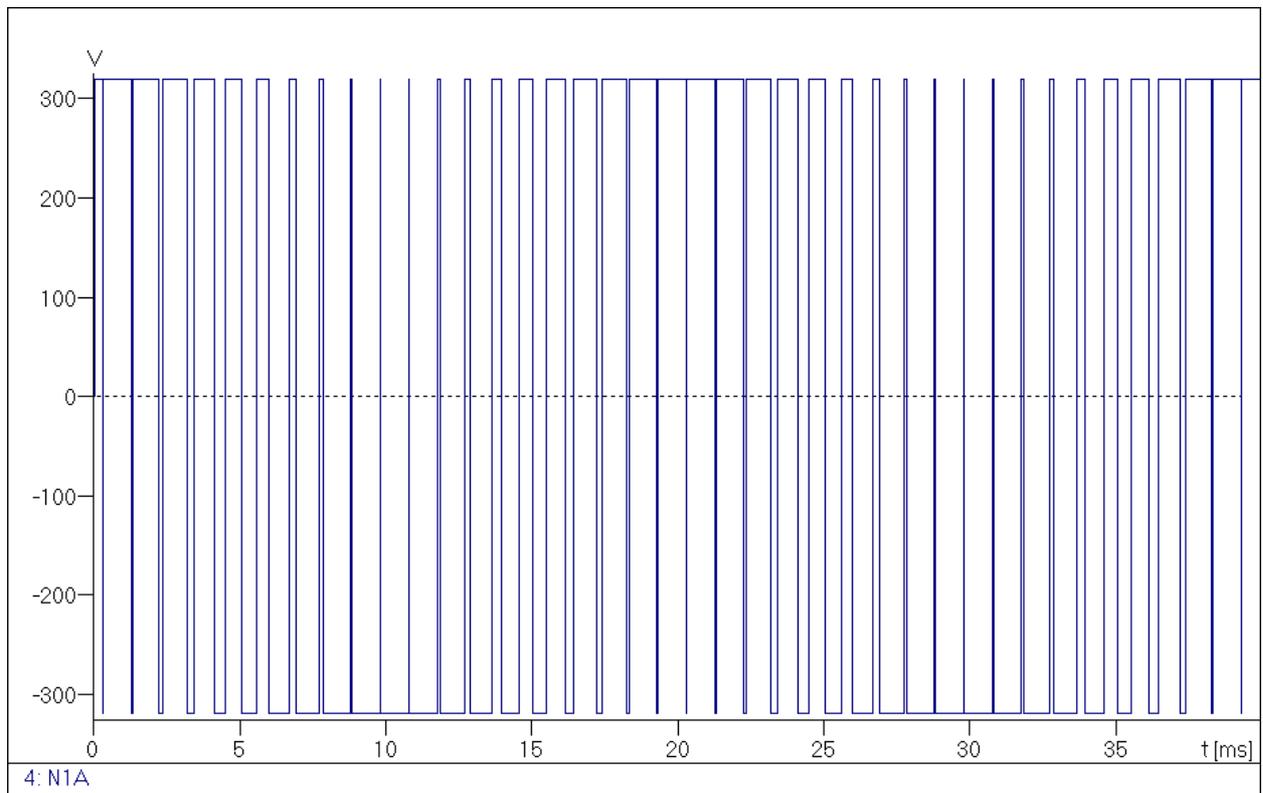




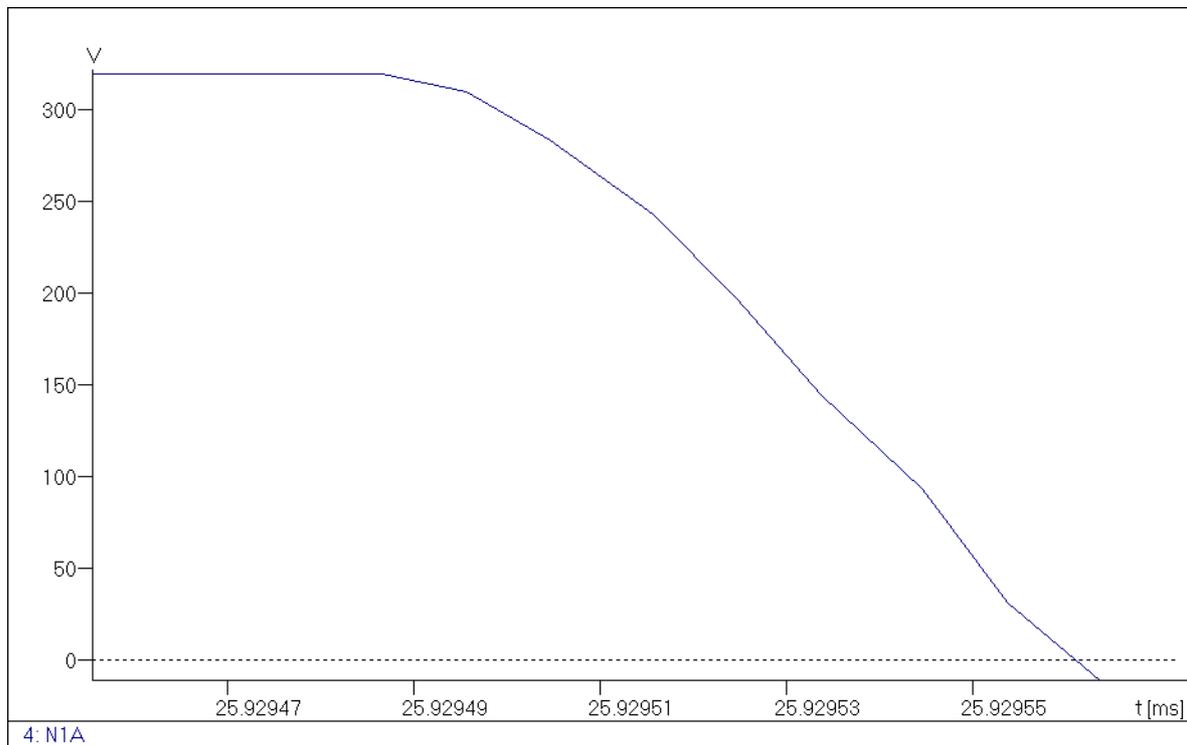
Representaciones:



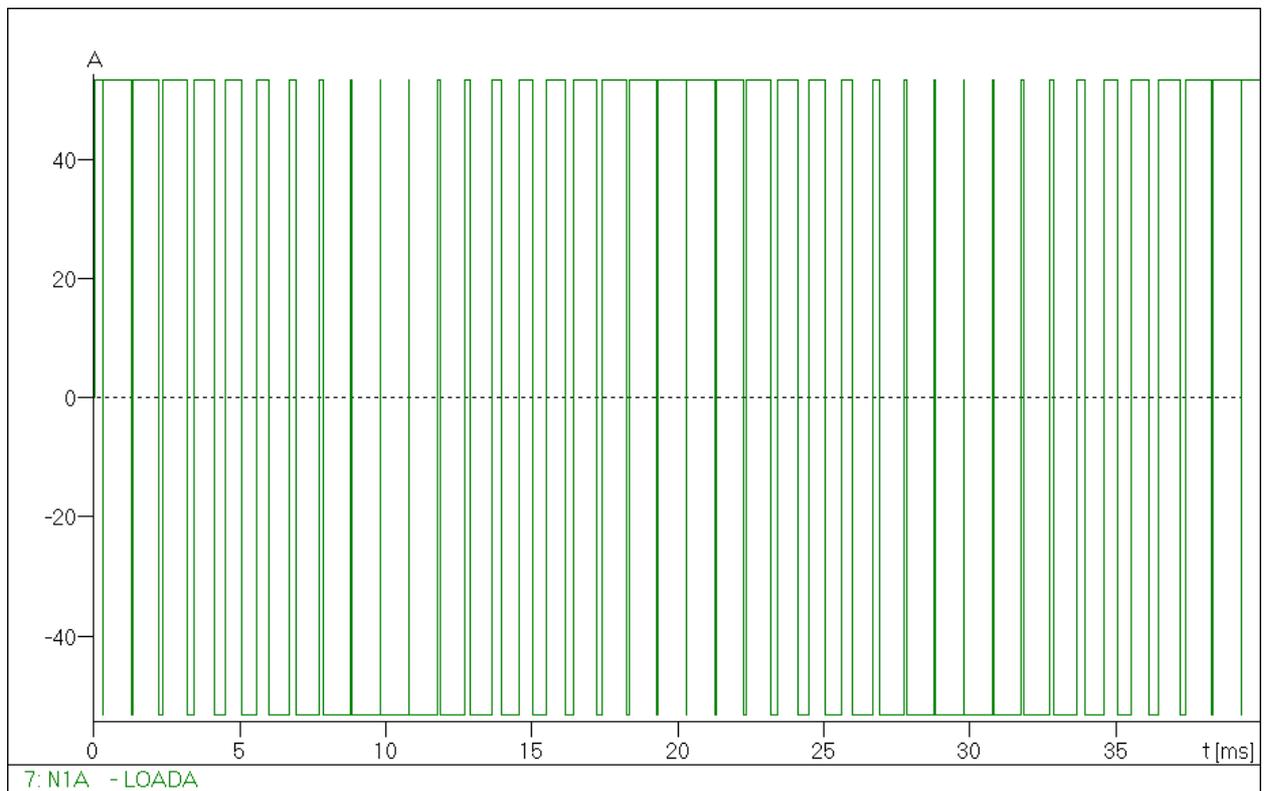


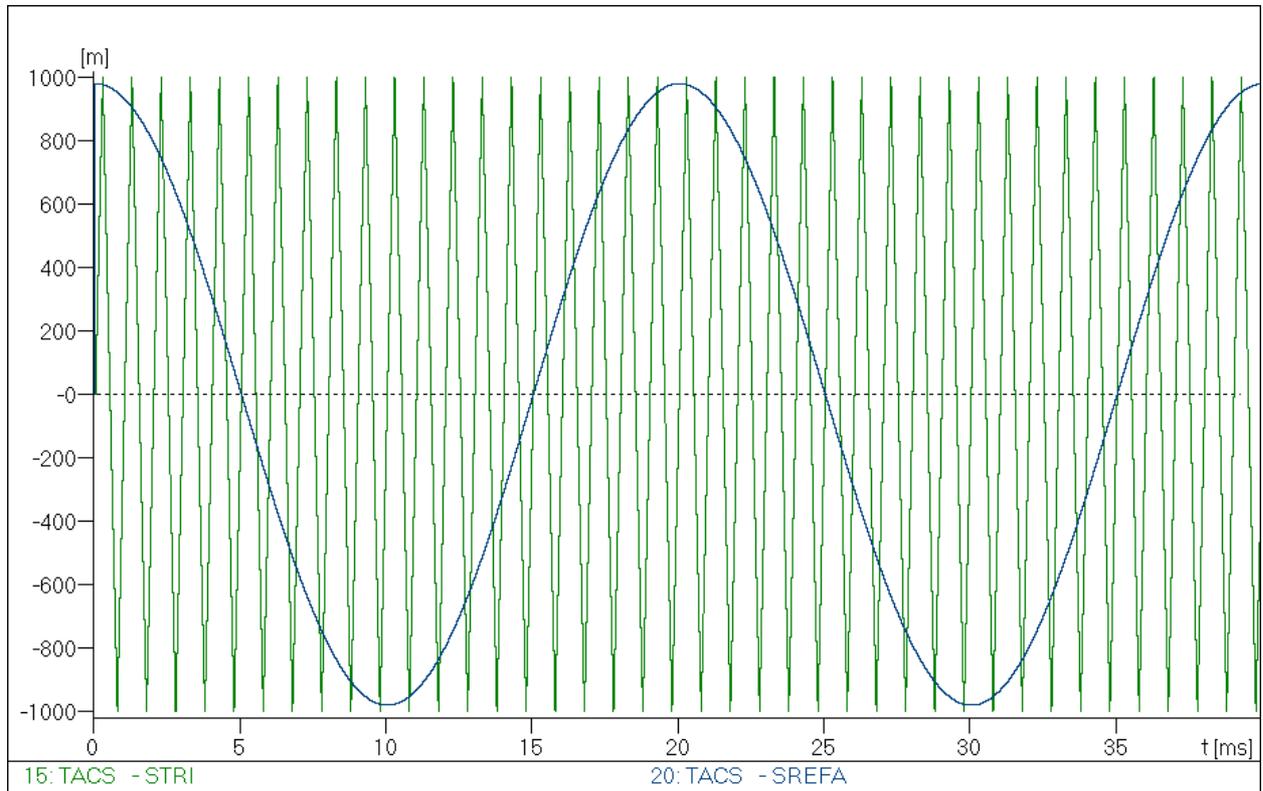


$t_{on}=2E-7 \text{ s} \rightarrow 5 \text{ MHz}$

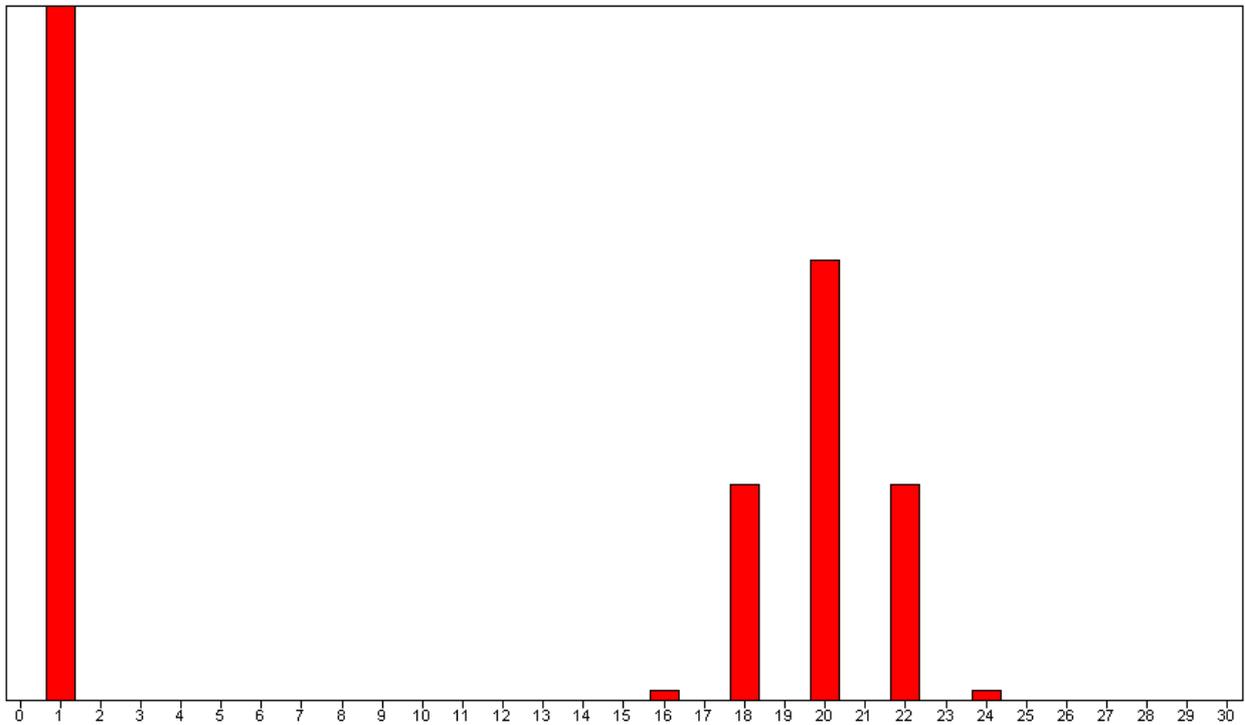


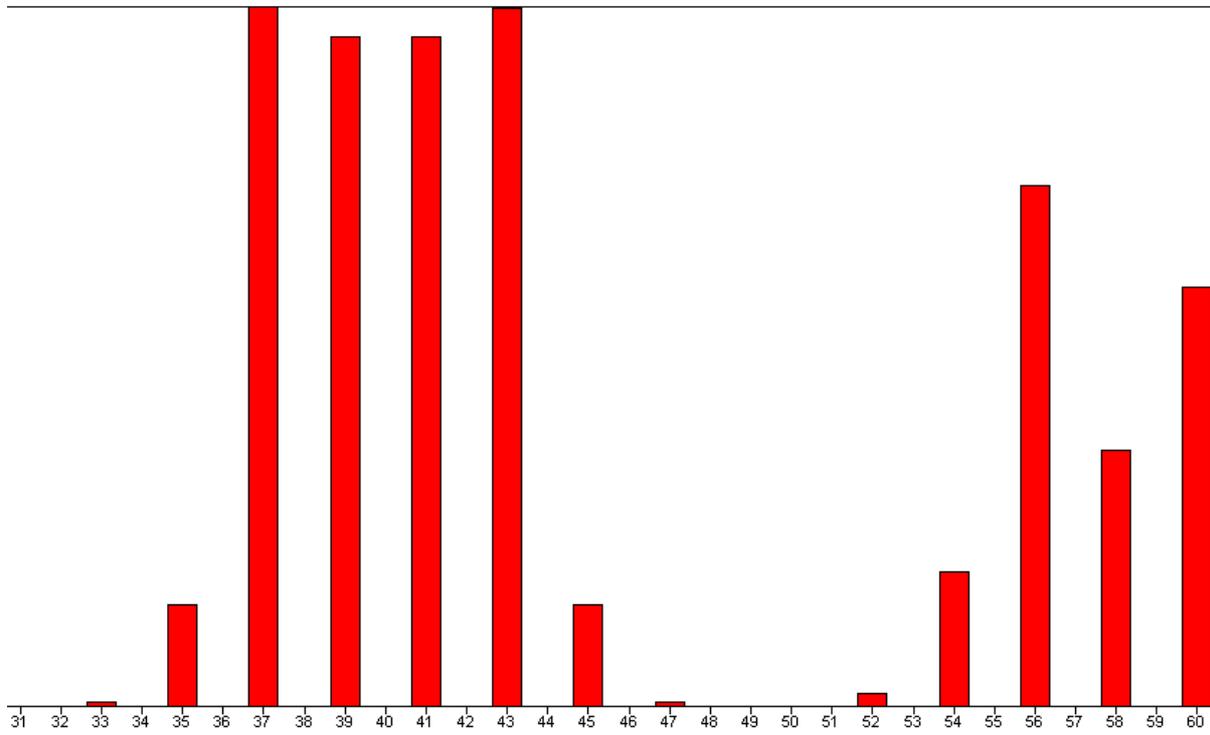
$$t_{\text{off}} = 6\text{E-}8 \text{ s} \rightarrow 16.67 \text{ MHz}$$





TRANSFORMADA DE FOURIER





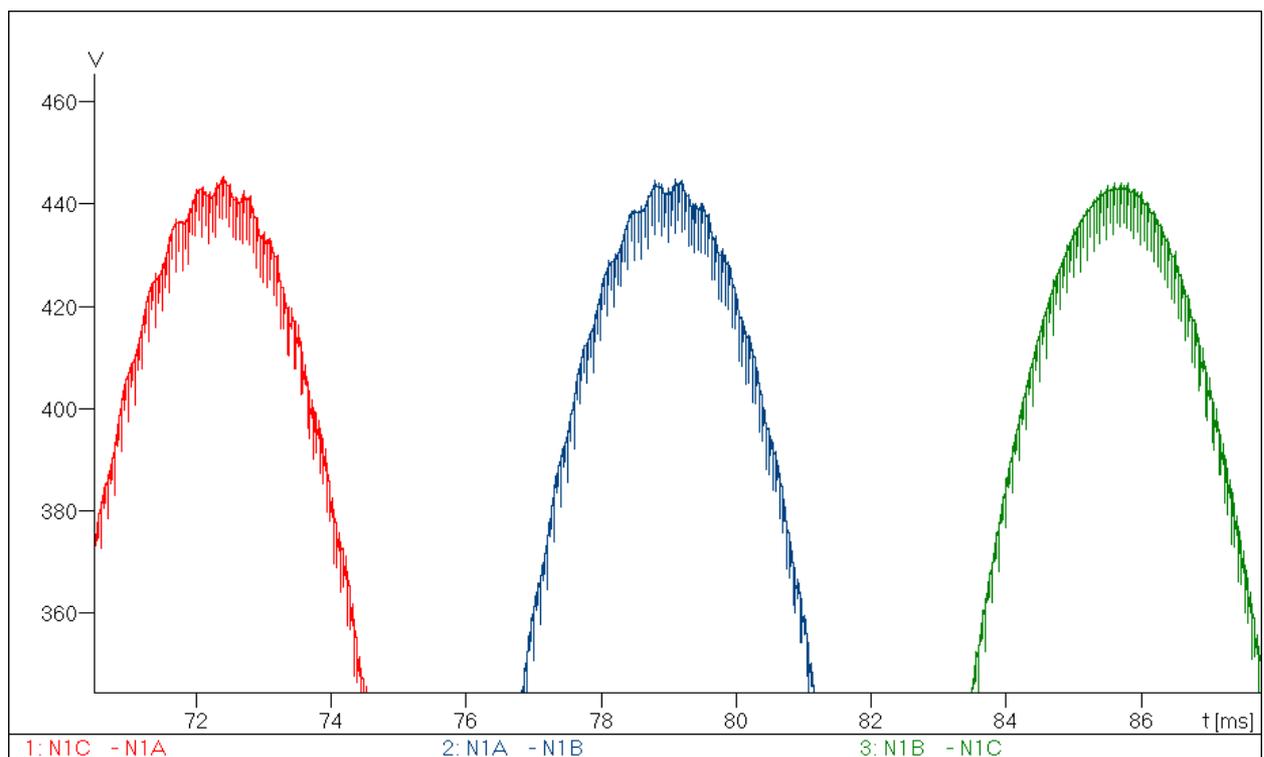
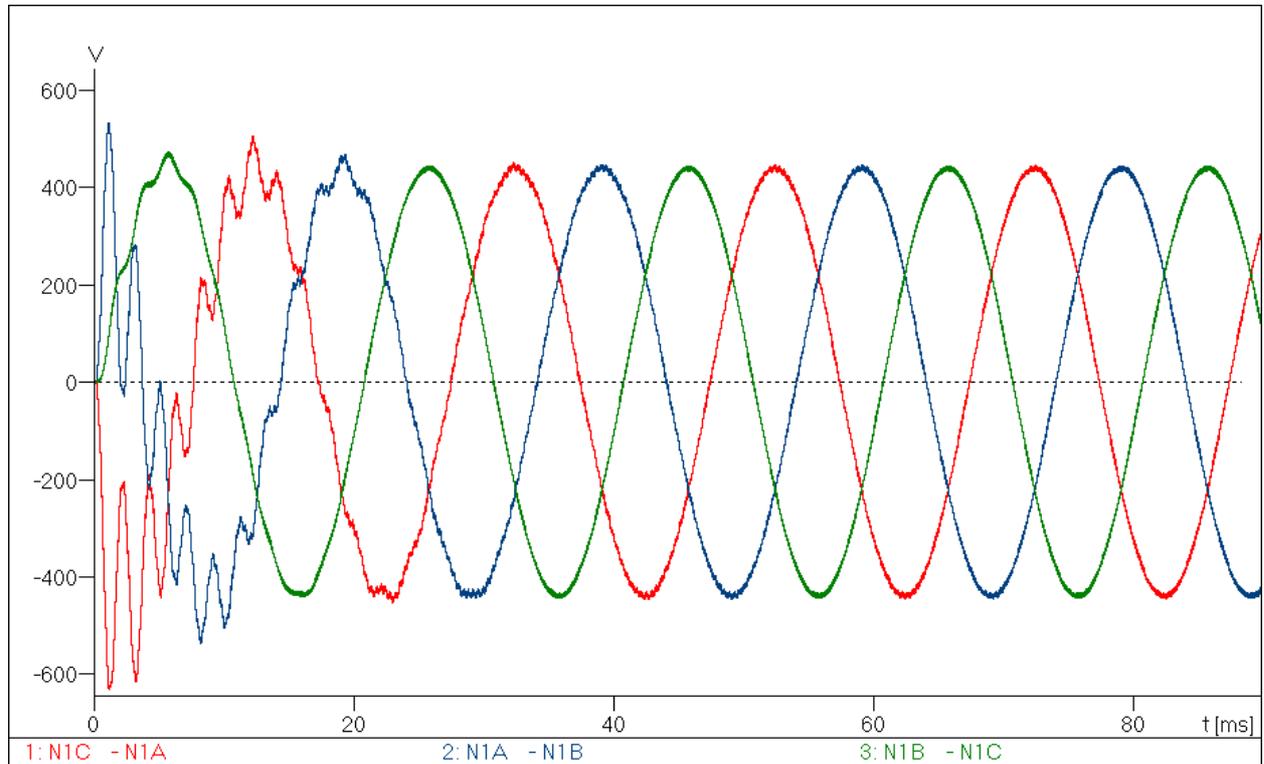
ETC...

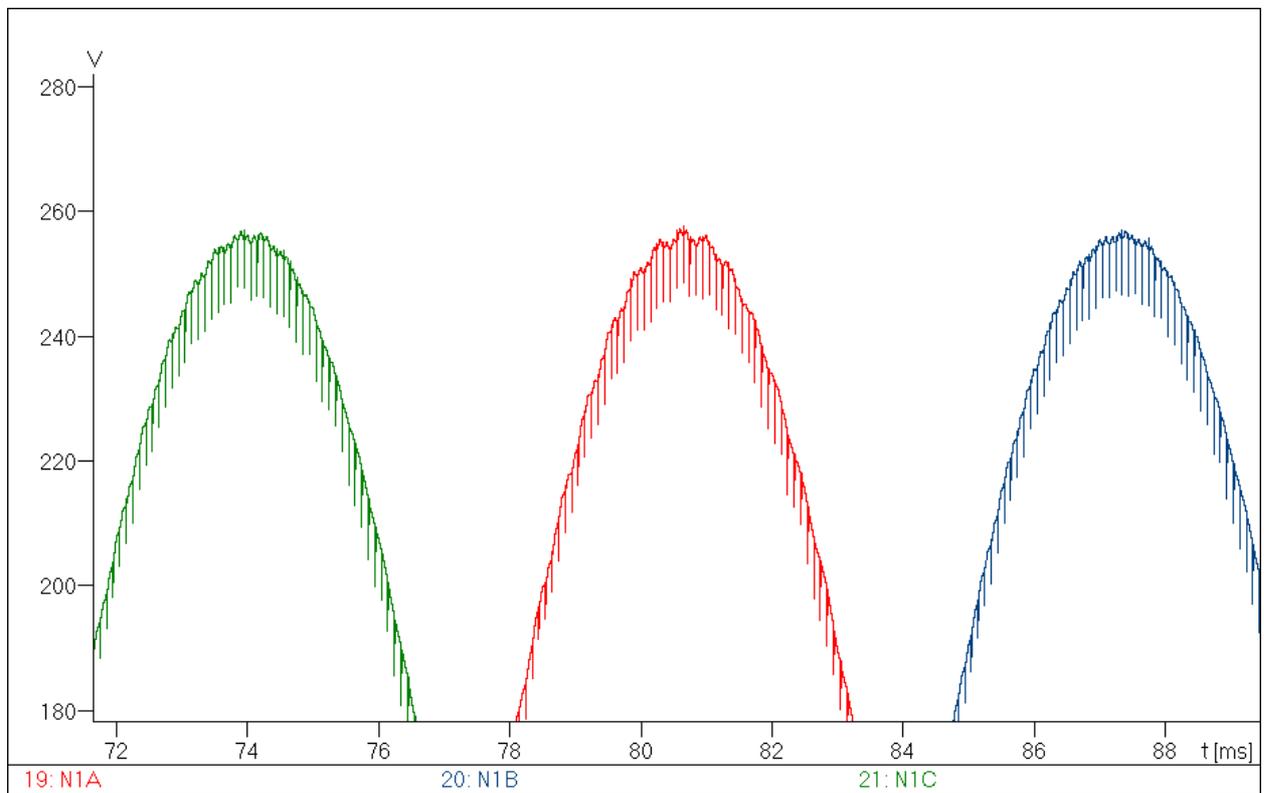
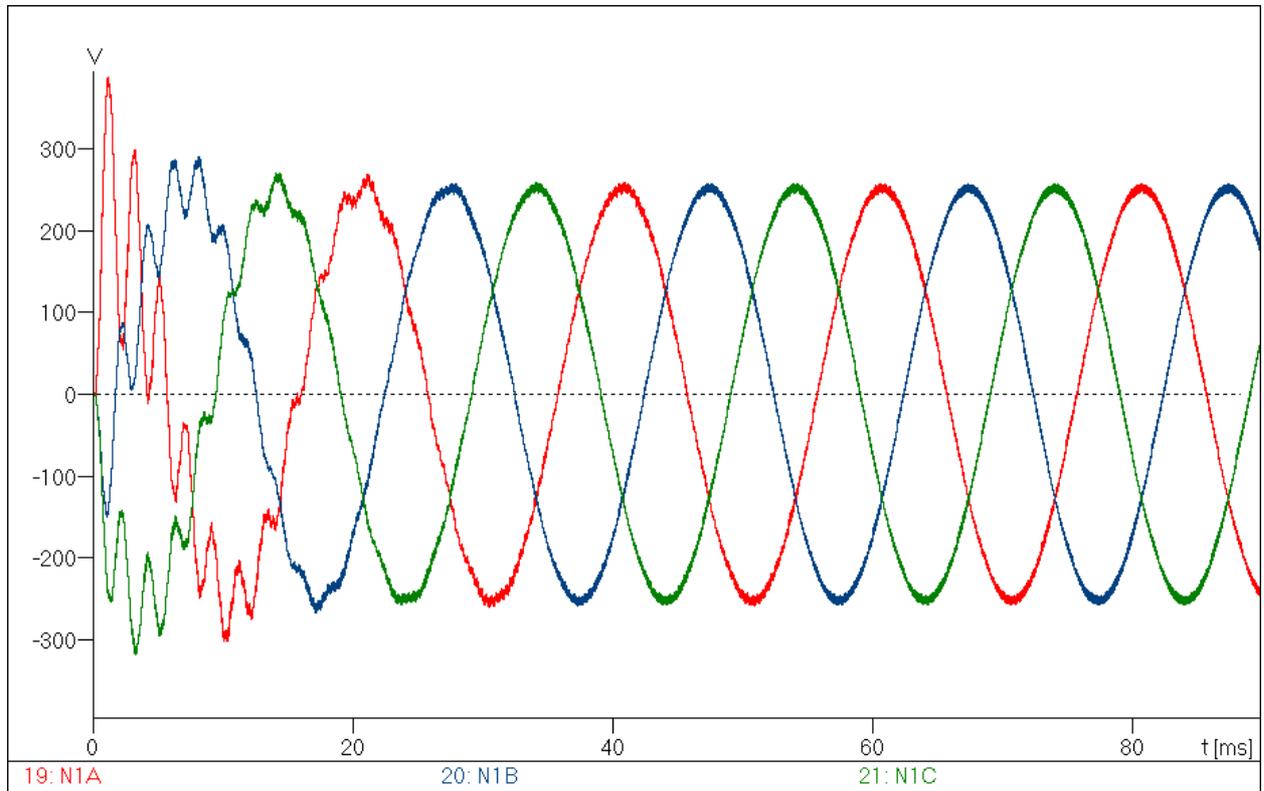




4.2 Planta fotovoltaica 1.

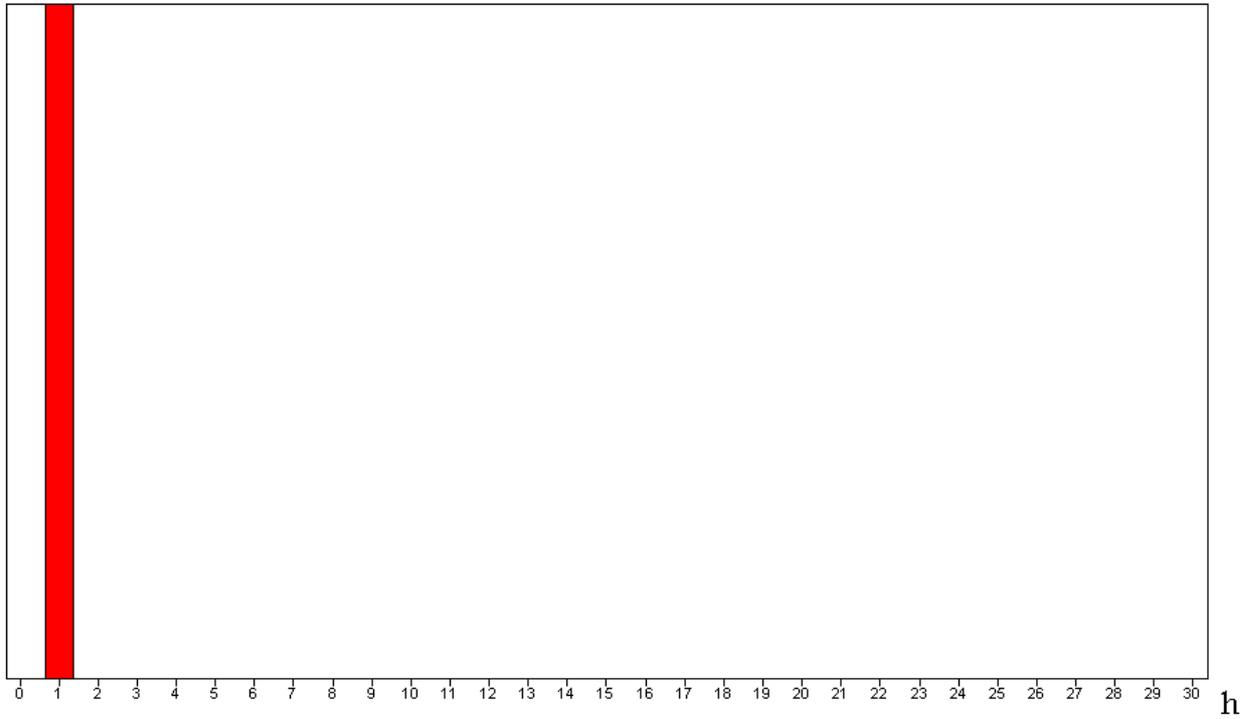
➤ CARGA 1: **0.8 MW**, $\cos\varphi=0.87$. Funcionamiento en isla.



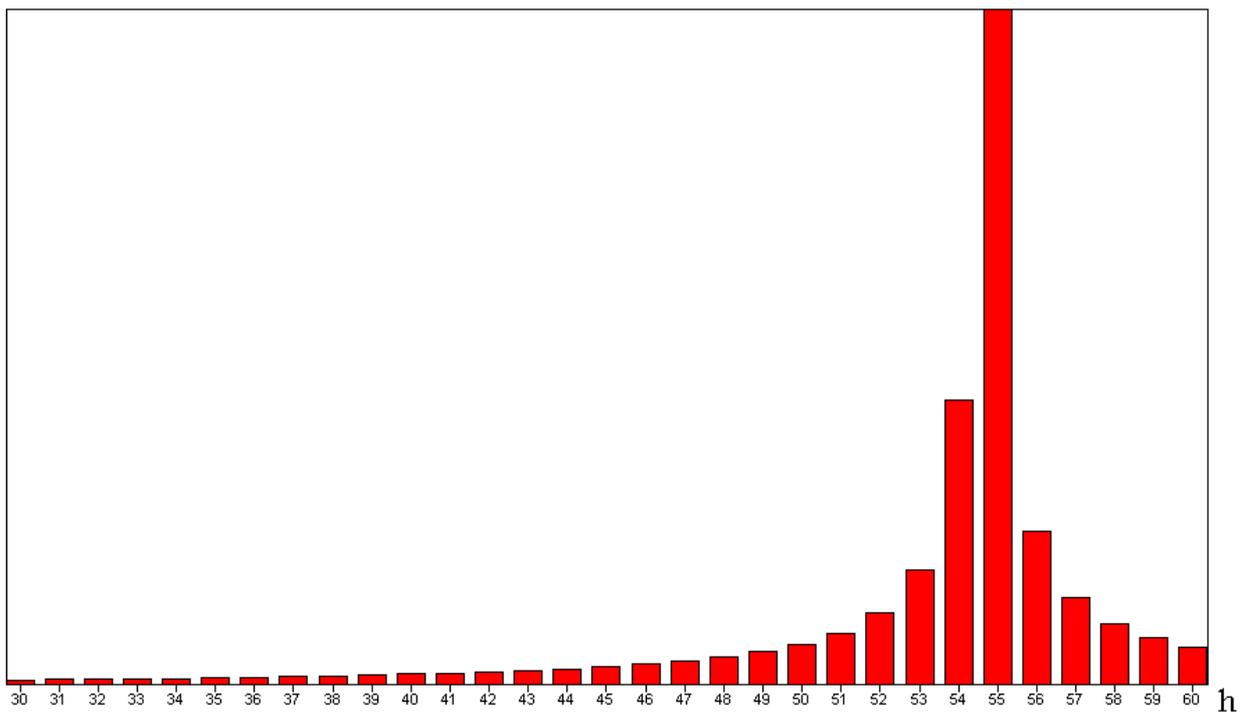


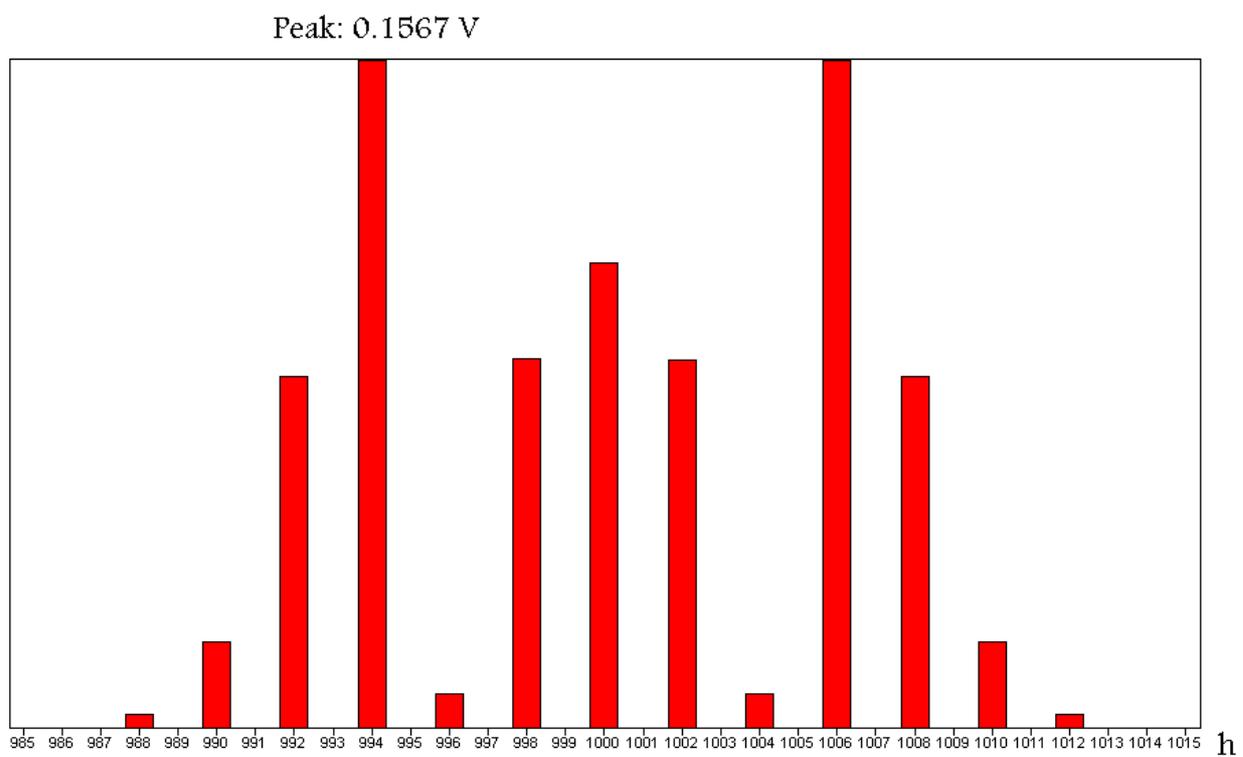
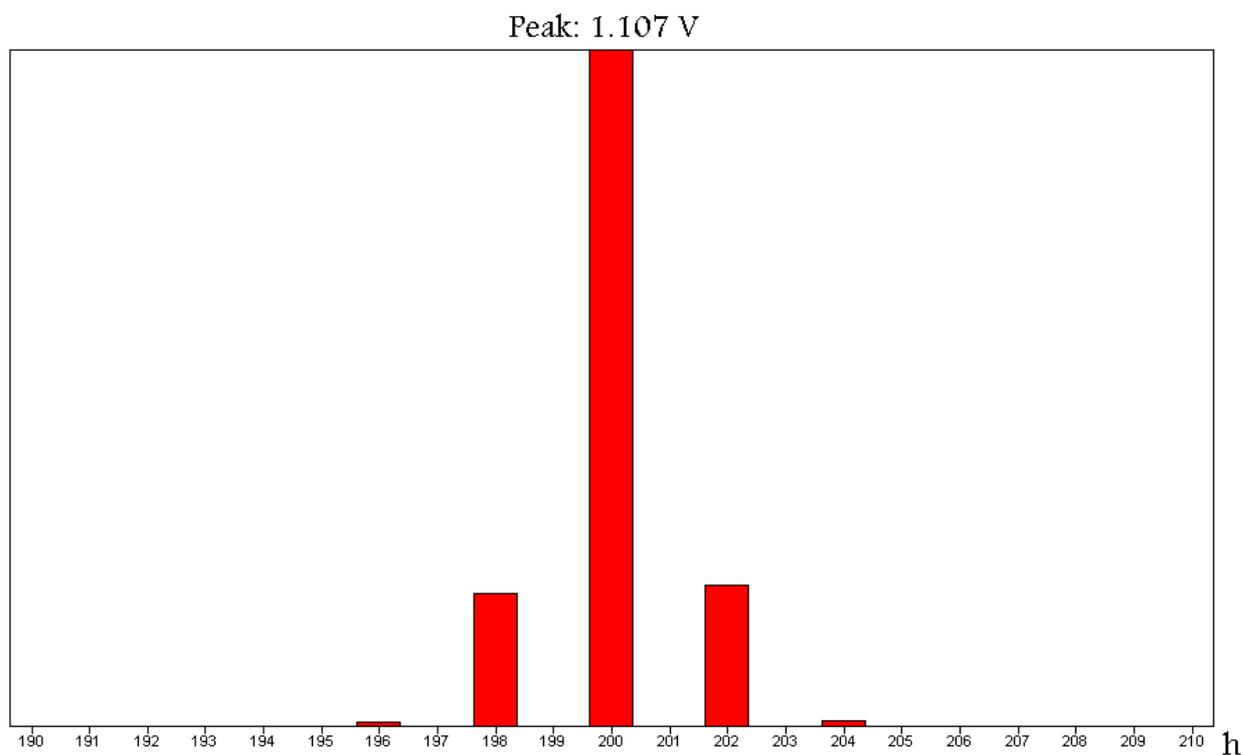
Transformada de Fourier: V_{N1B}

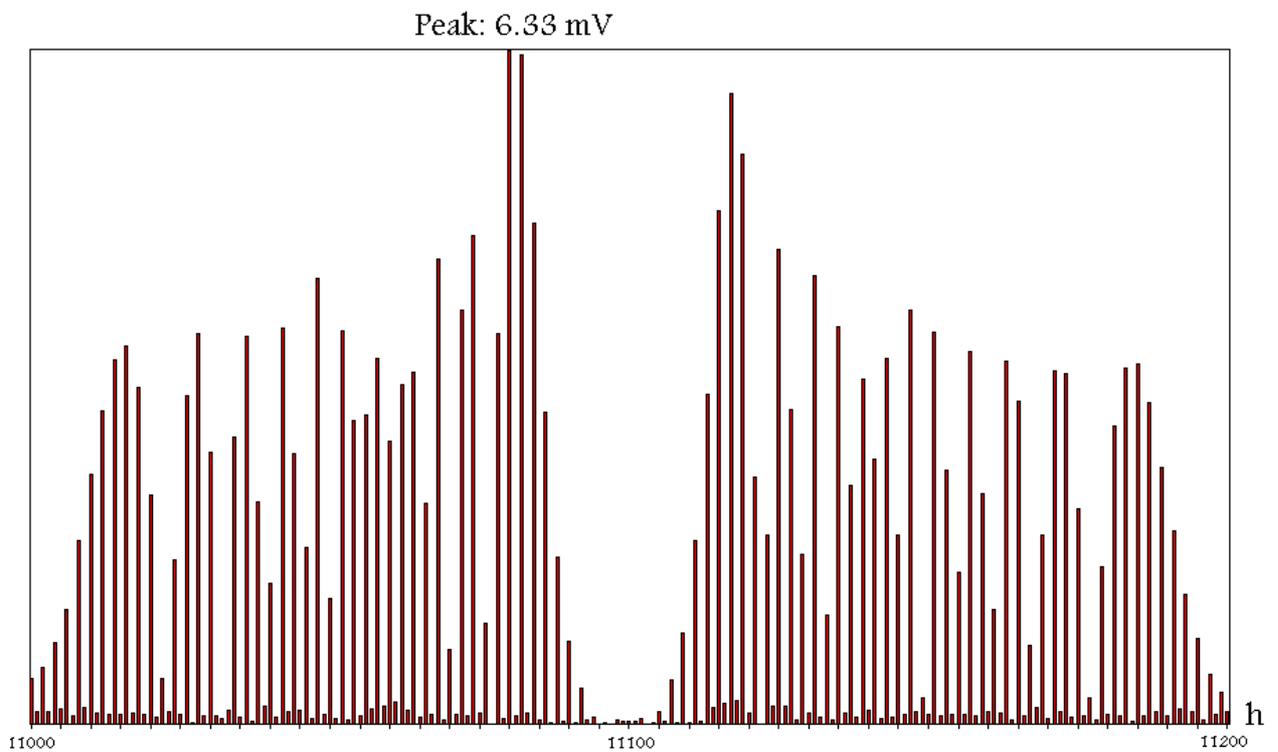
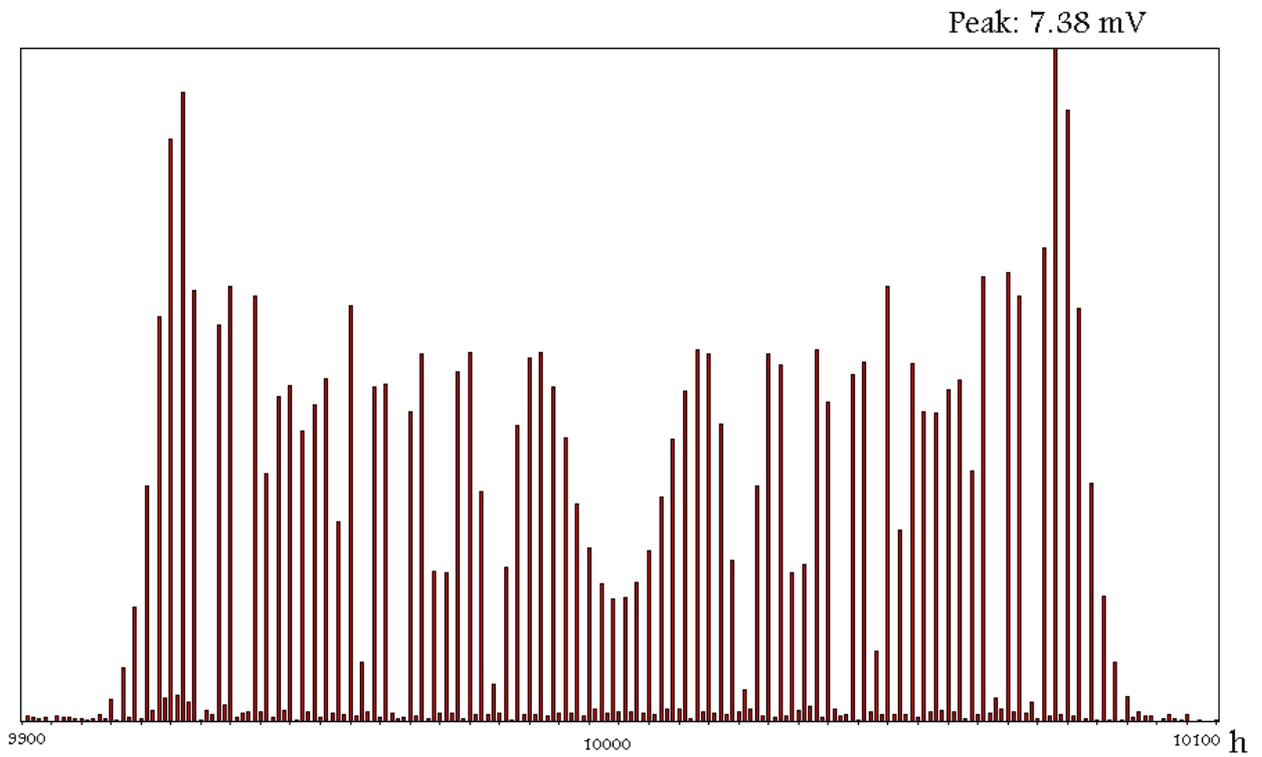
Peak: 255.8 V

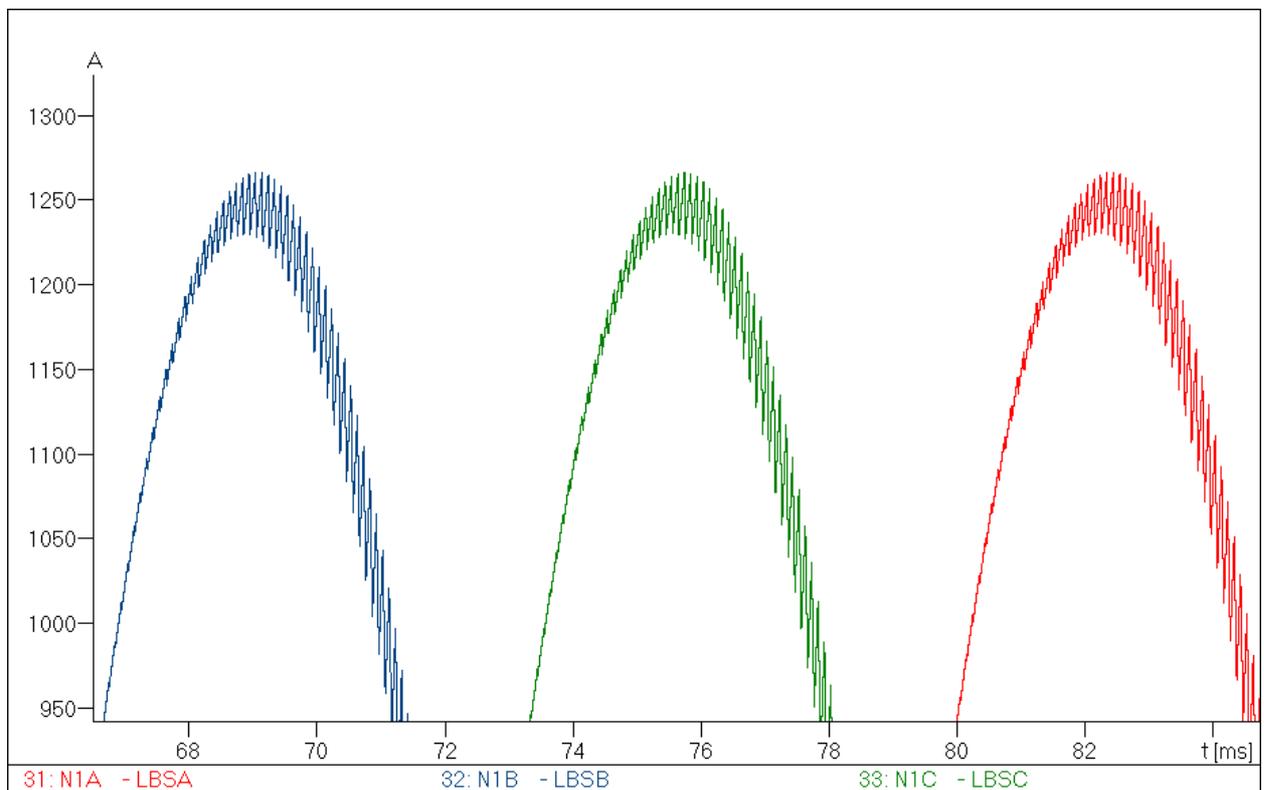
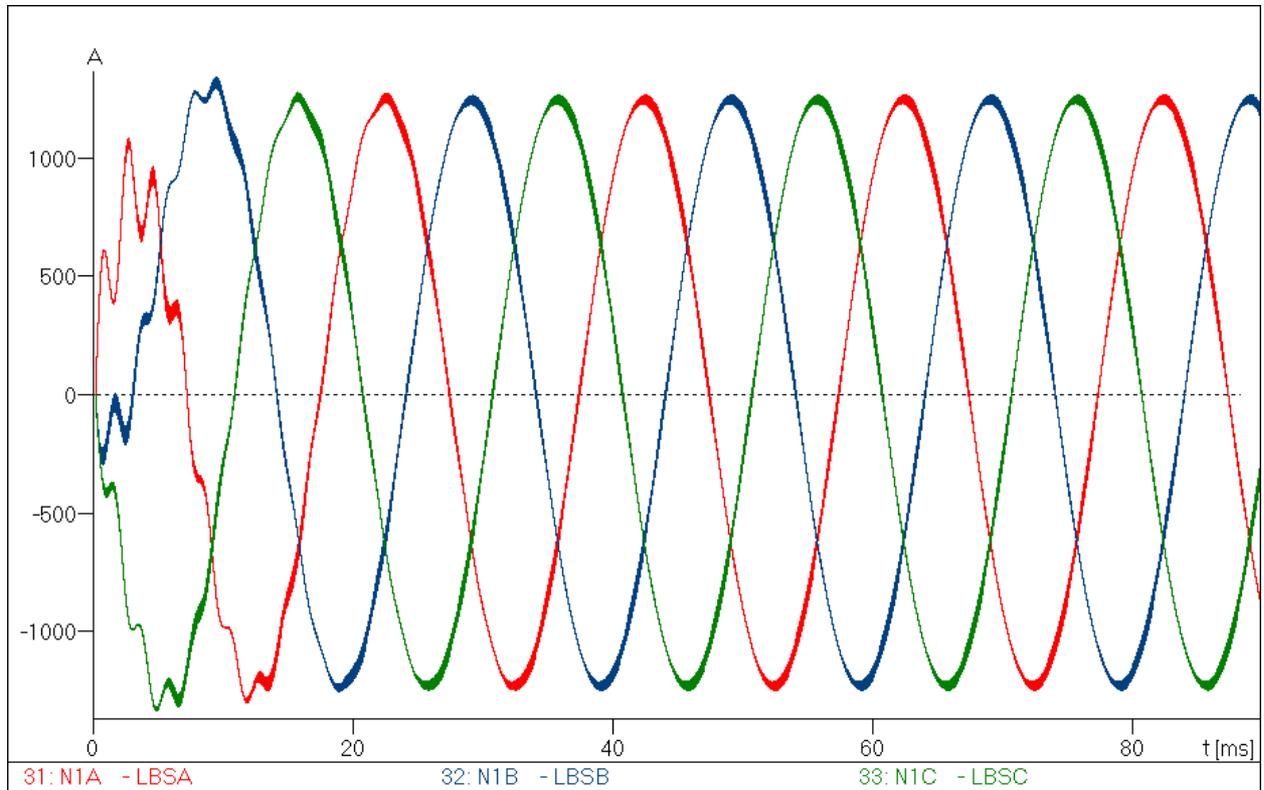


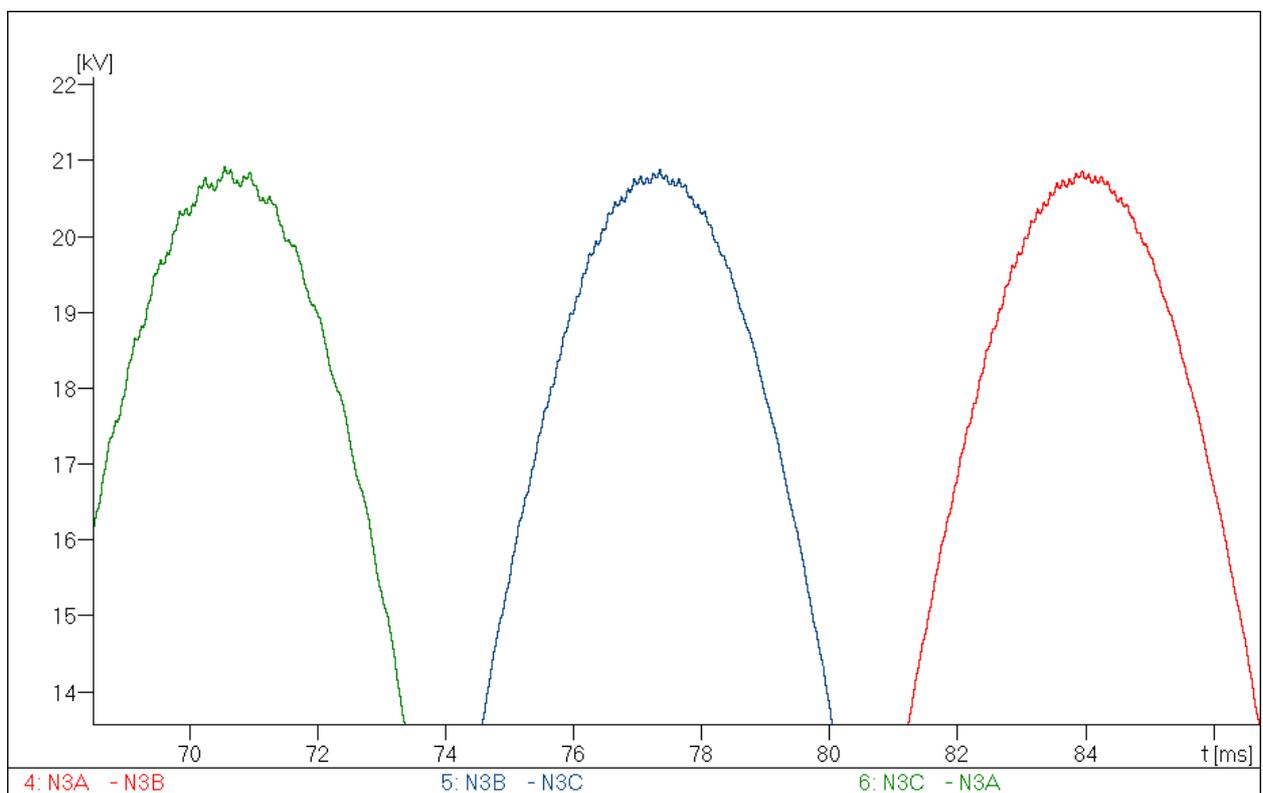
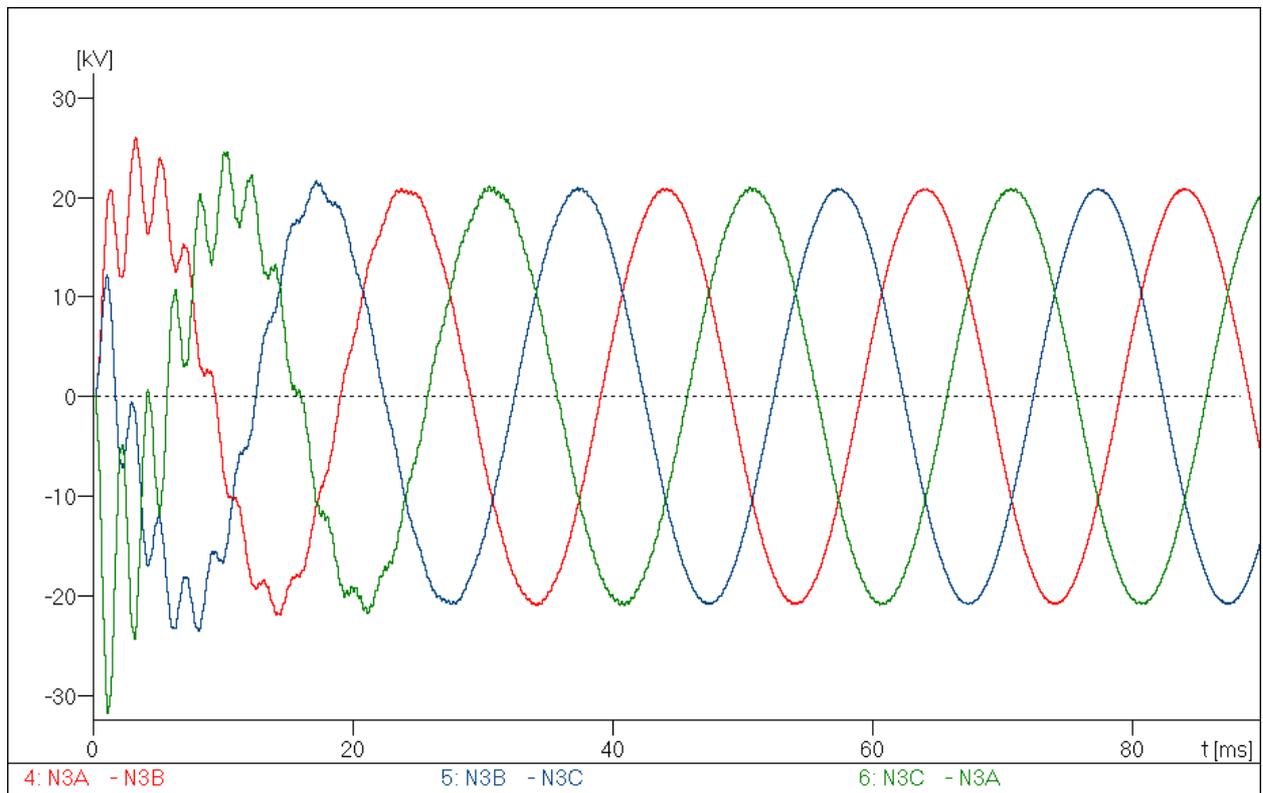
Peak: 0.3738 V

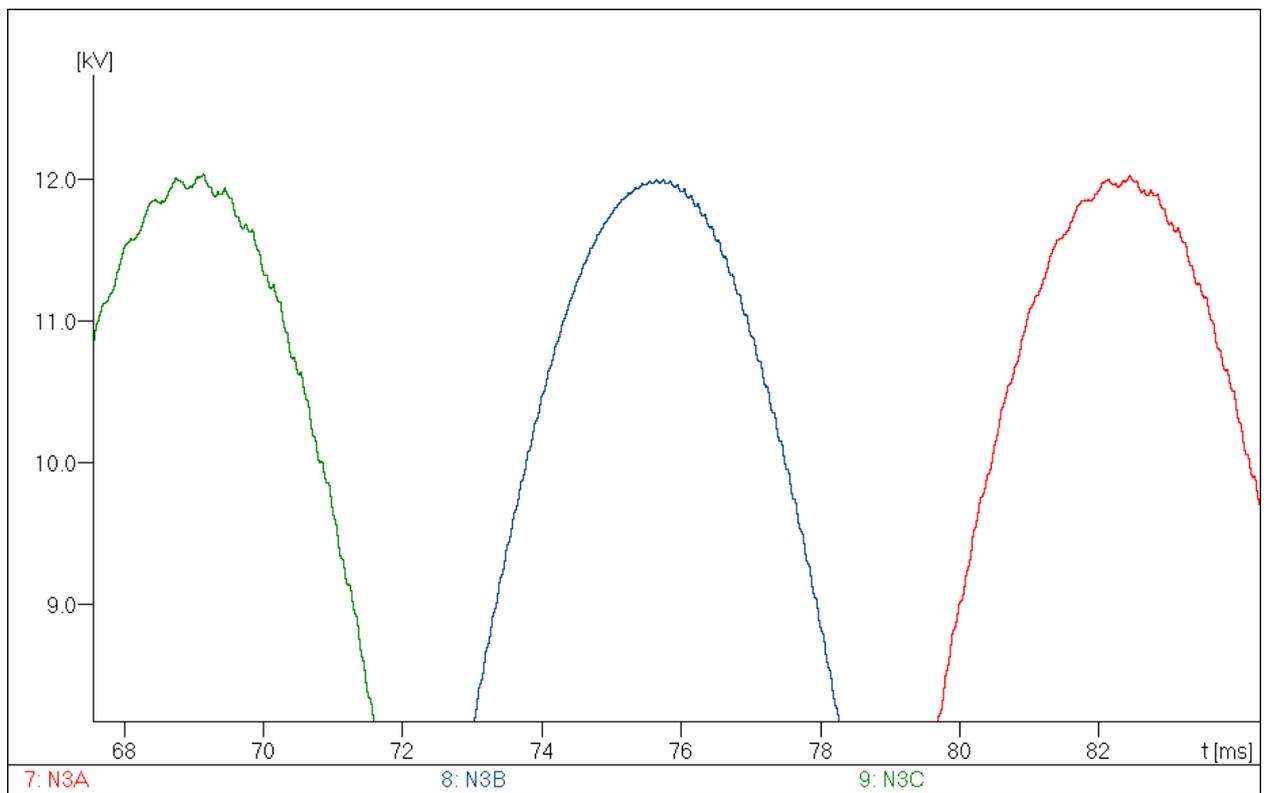
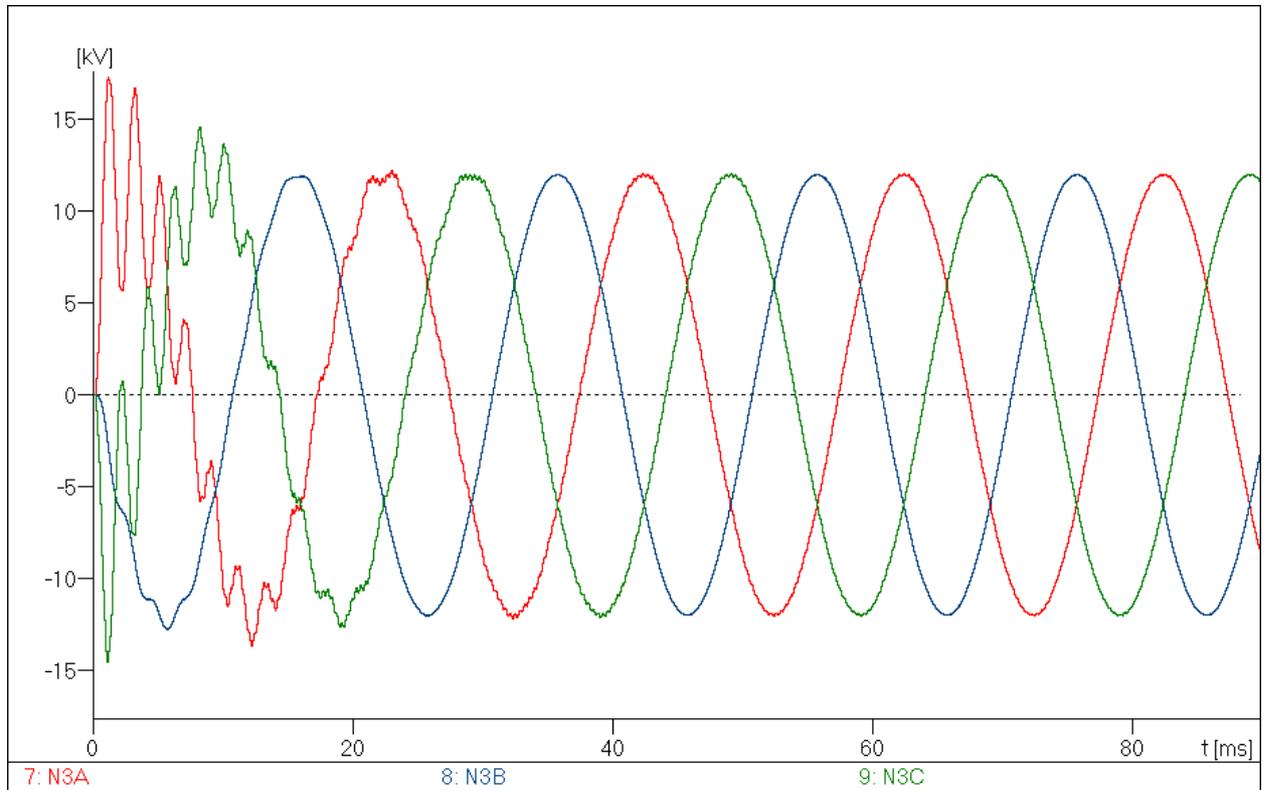






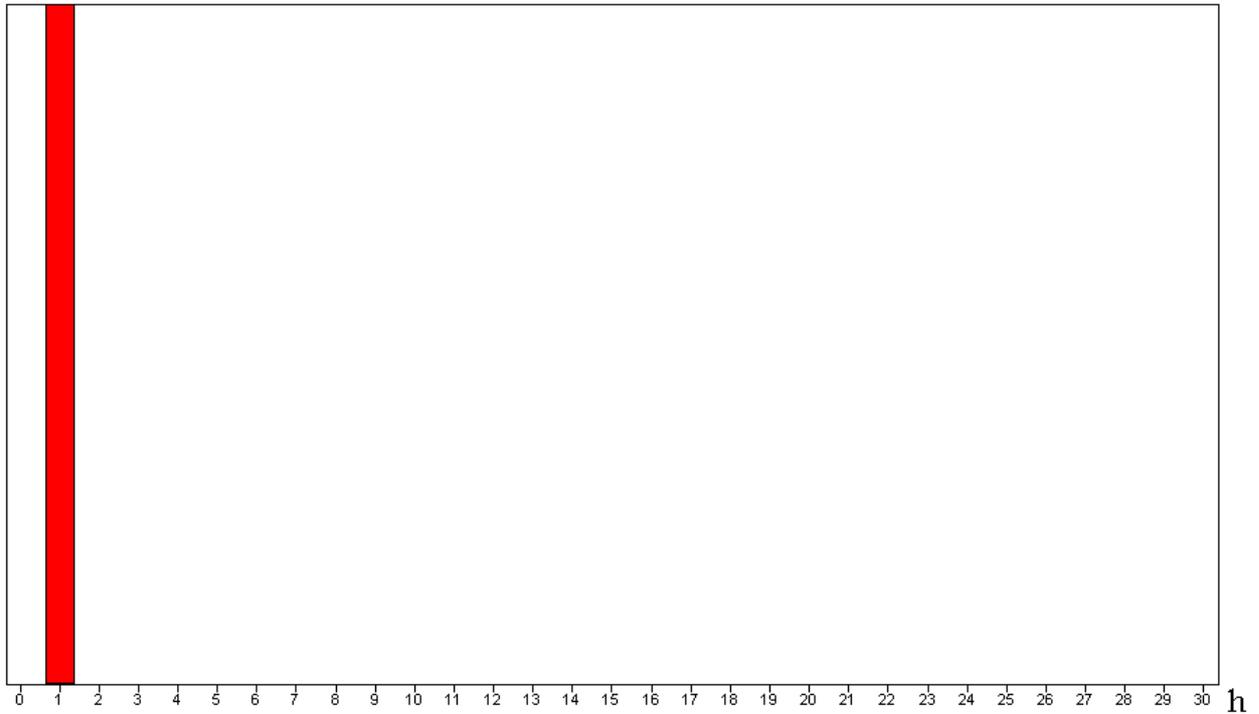




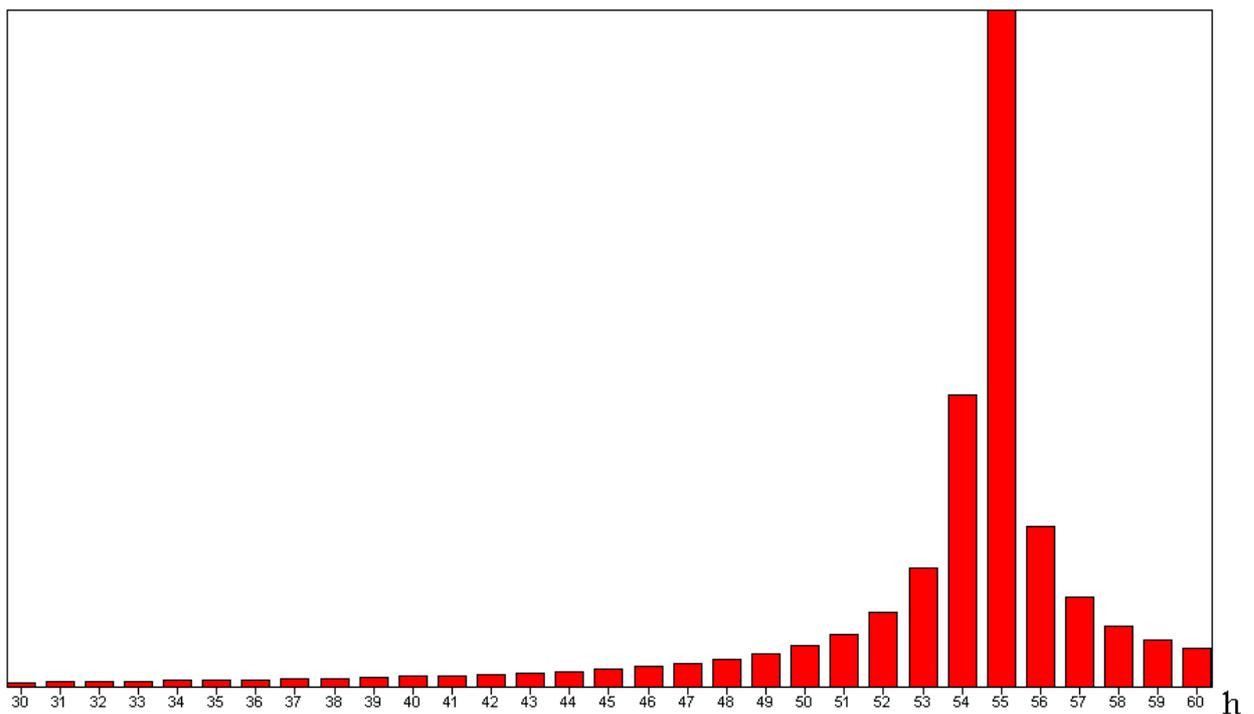


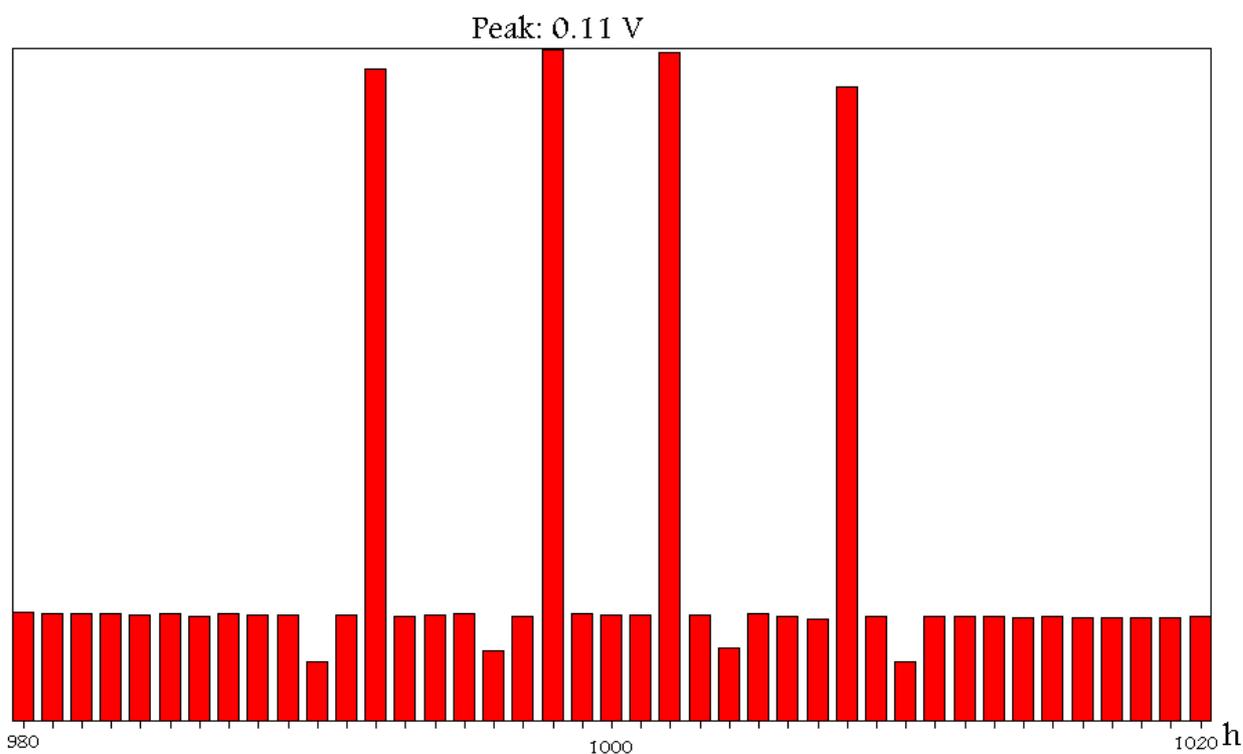
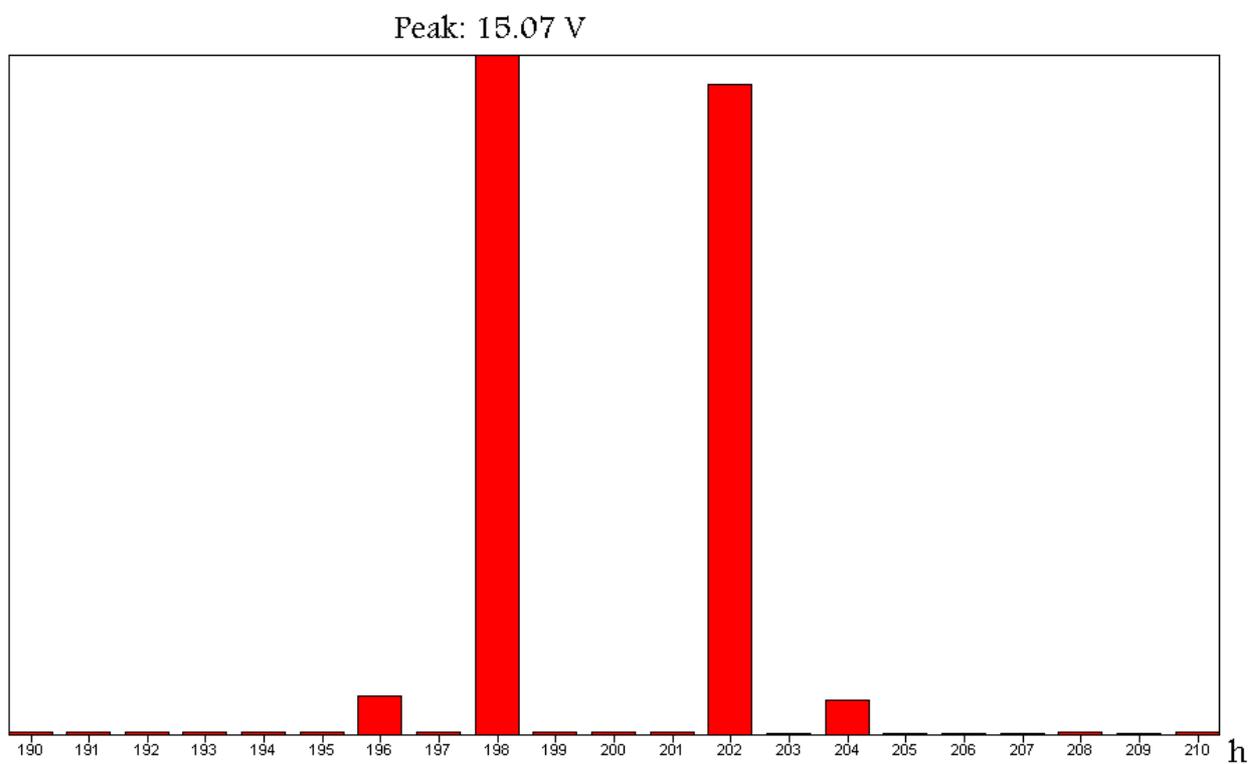
Transformada de Fourier: V_{N3A}

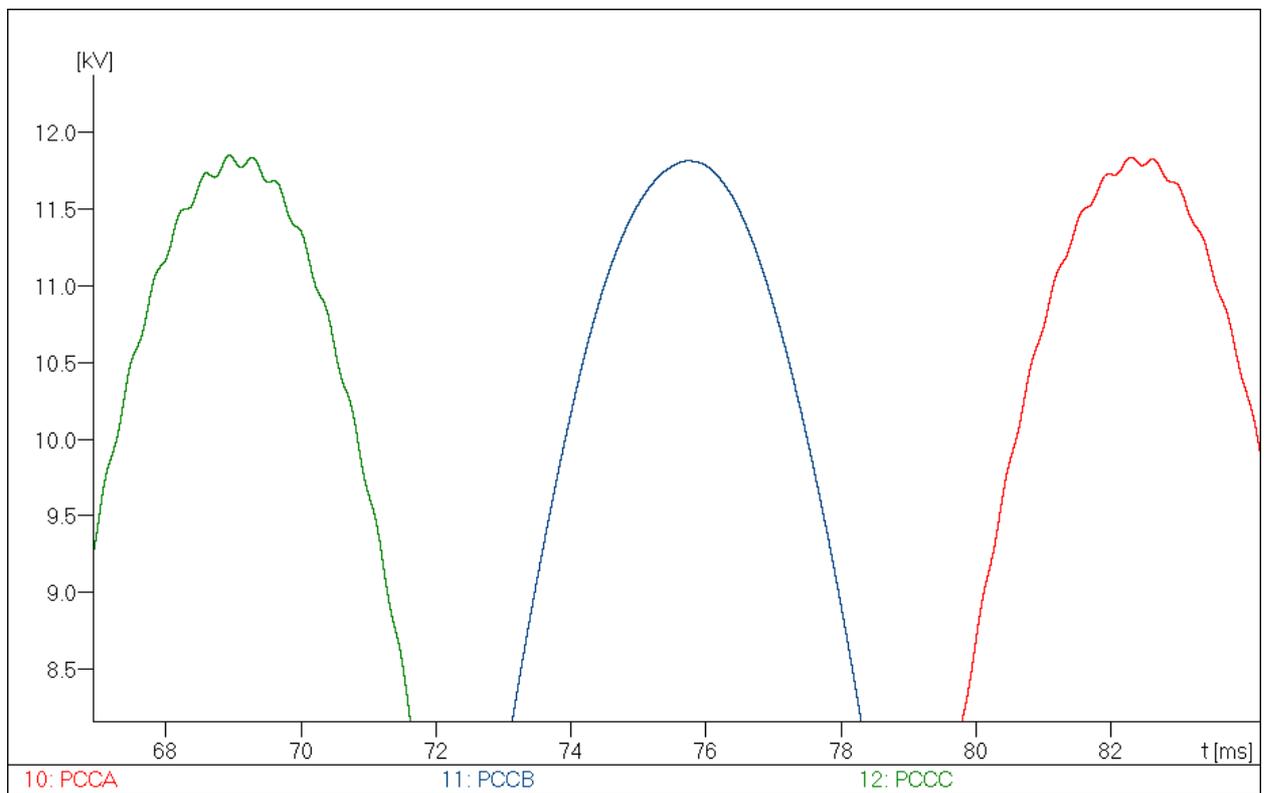
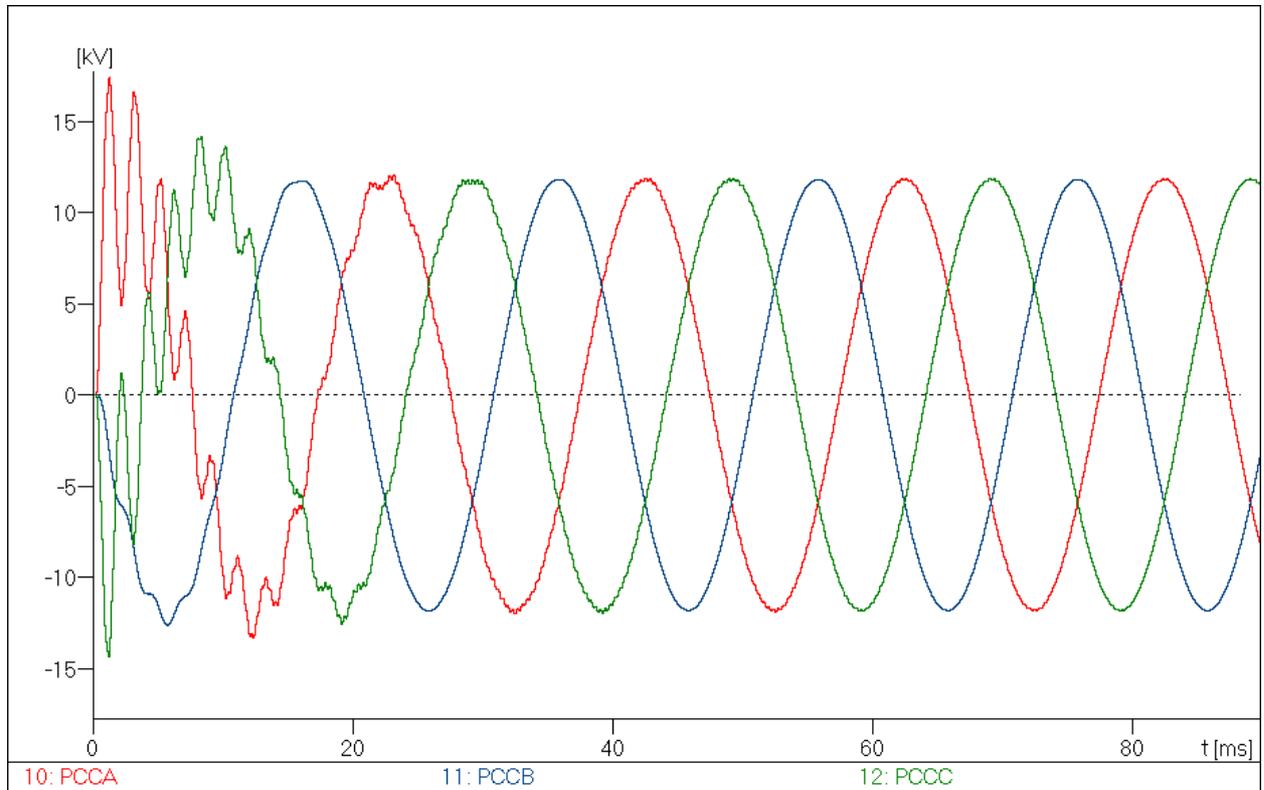
Peak: 12.1 kV

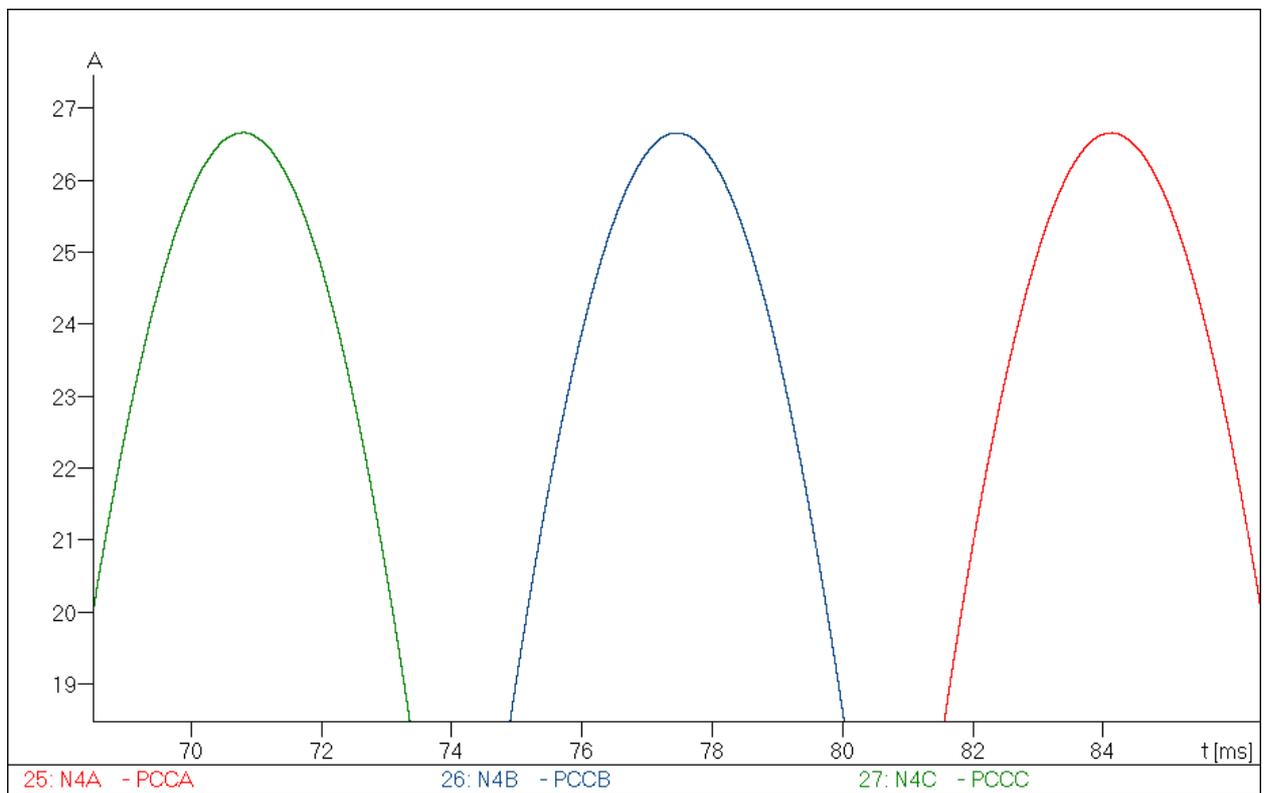
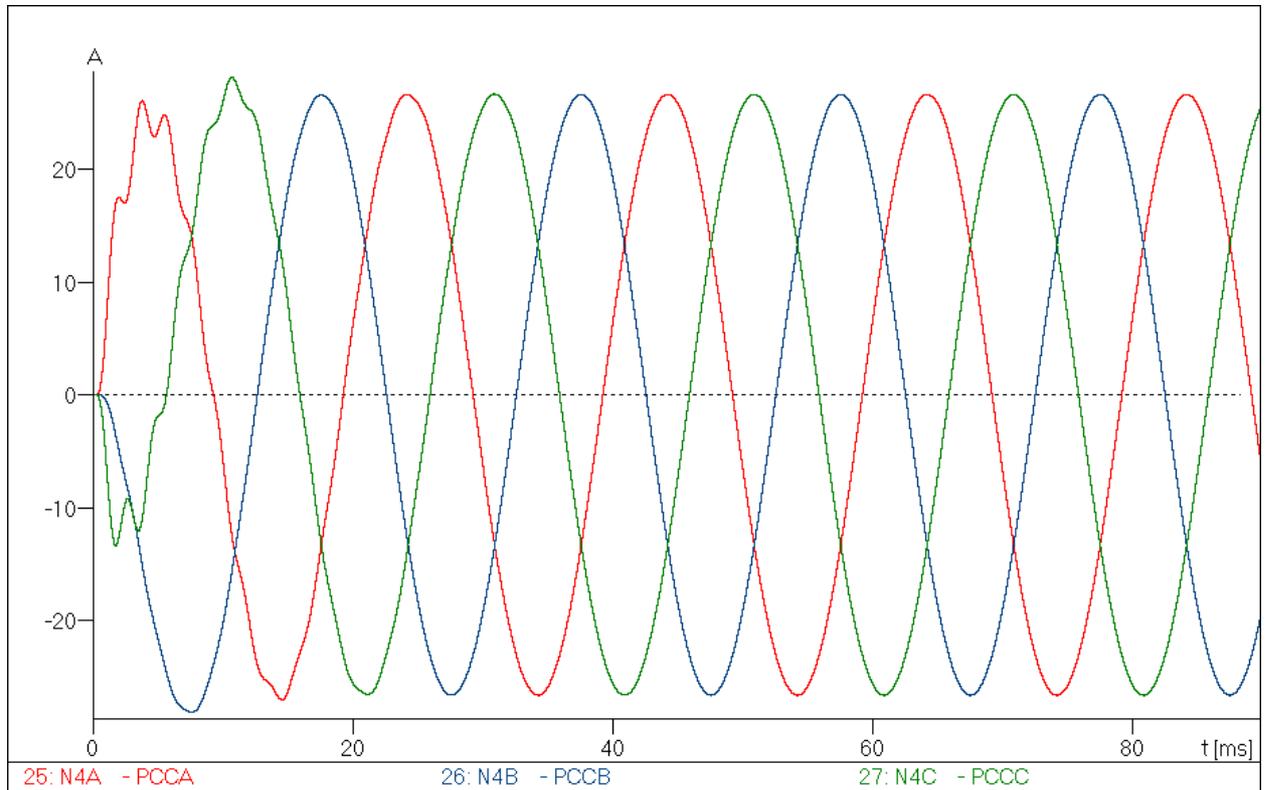


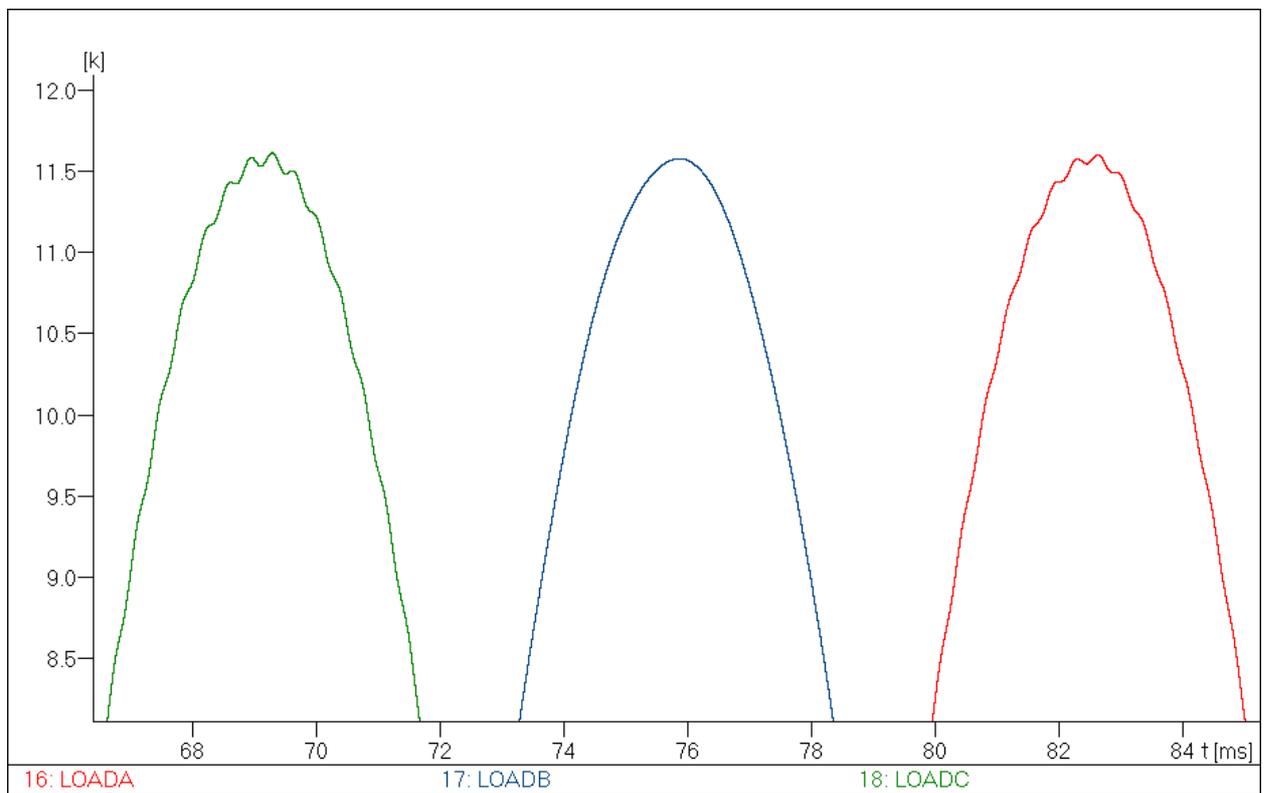
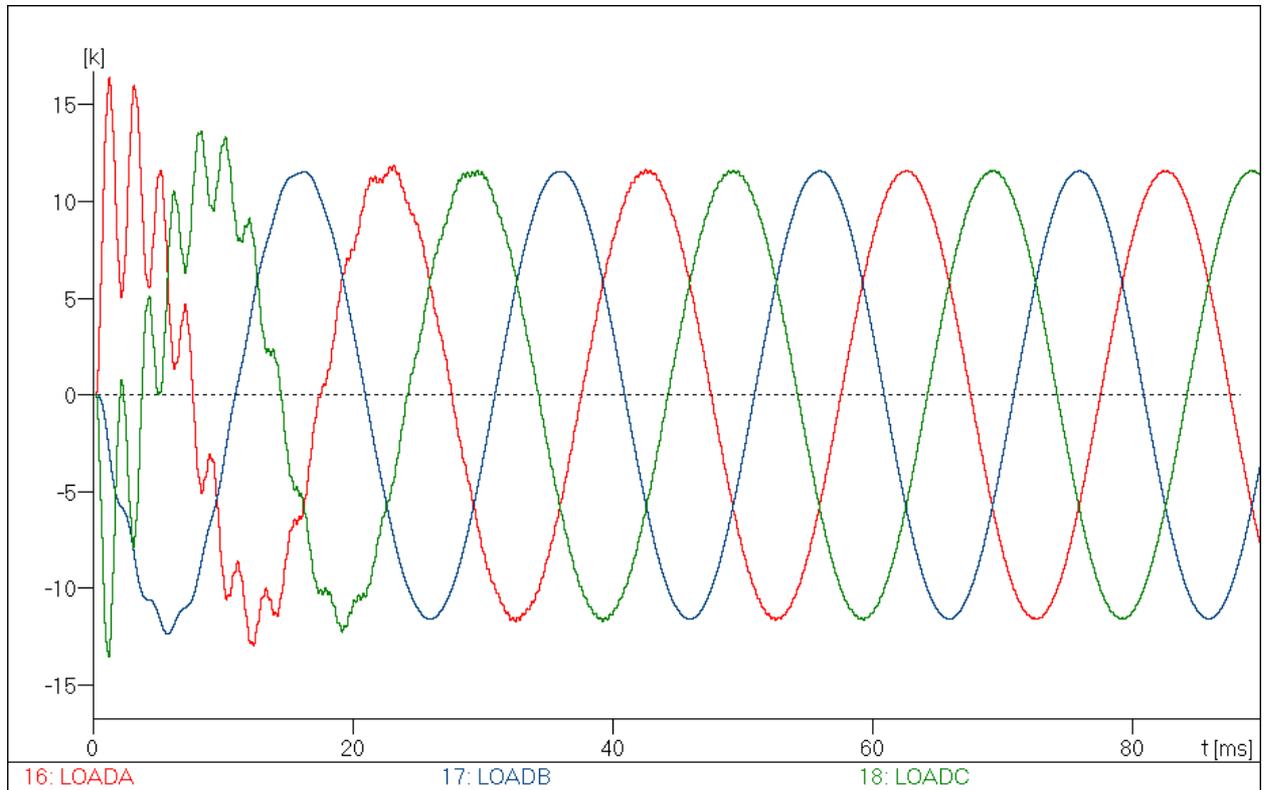
Peak: 30.15 V





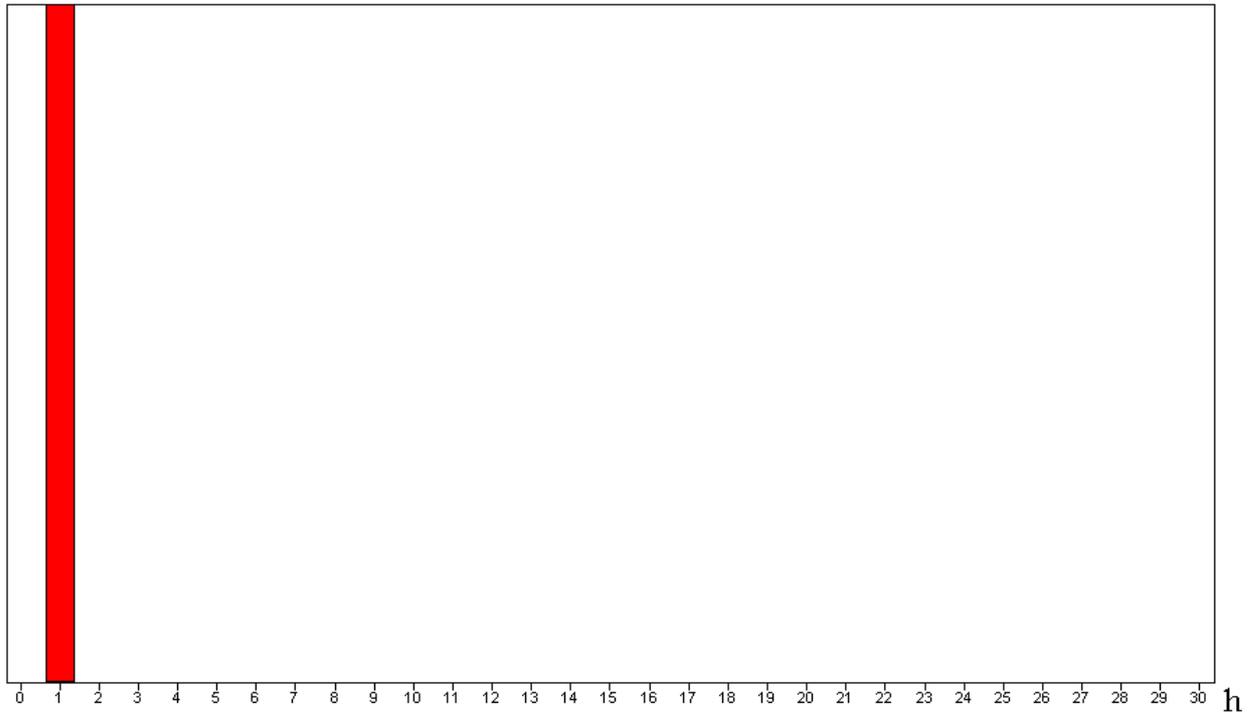




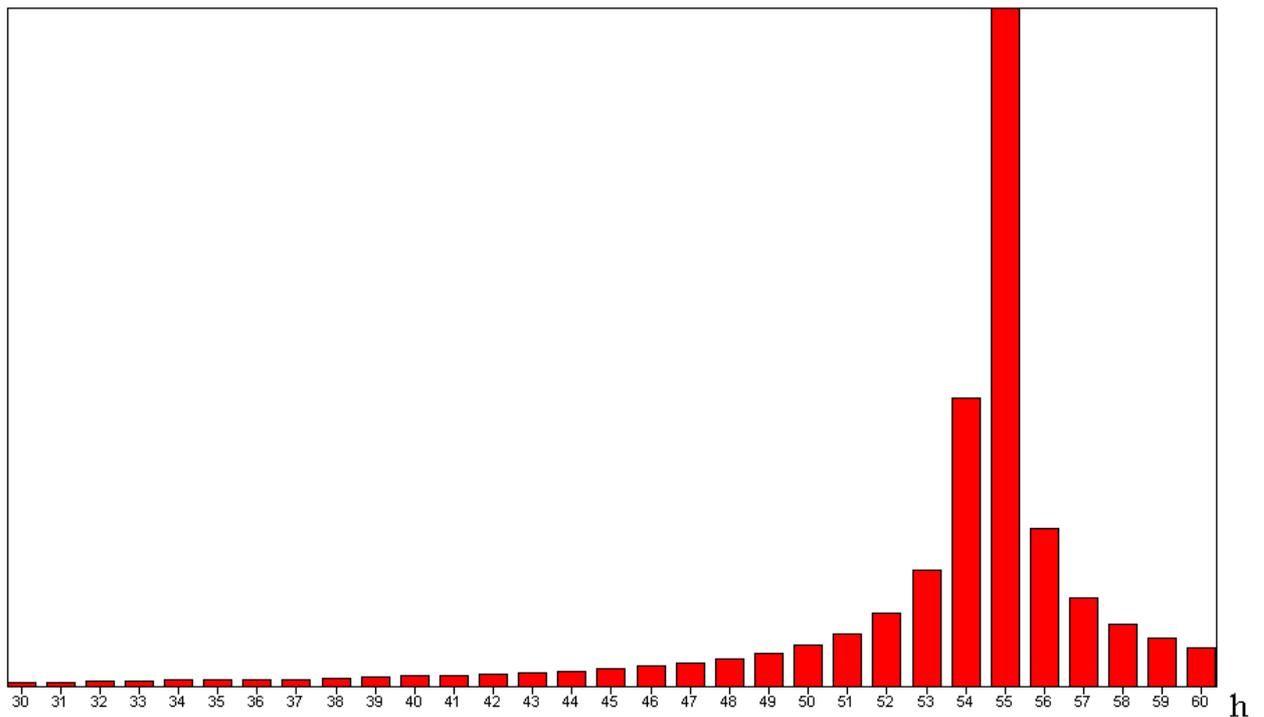


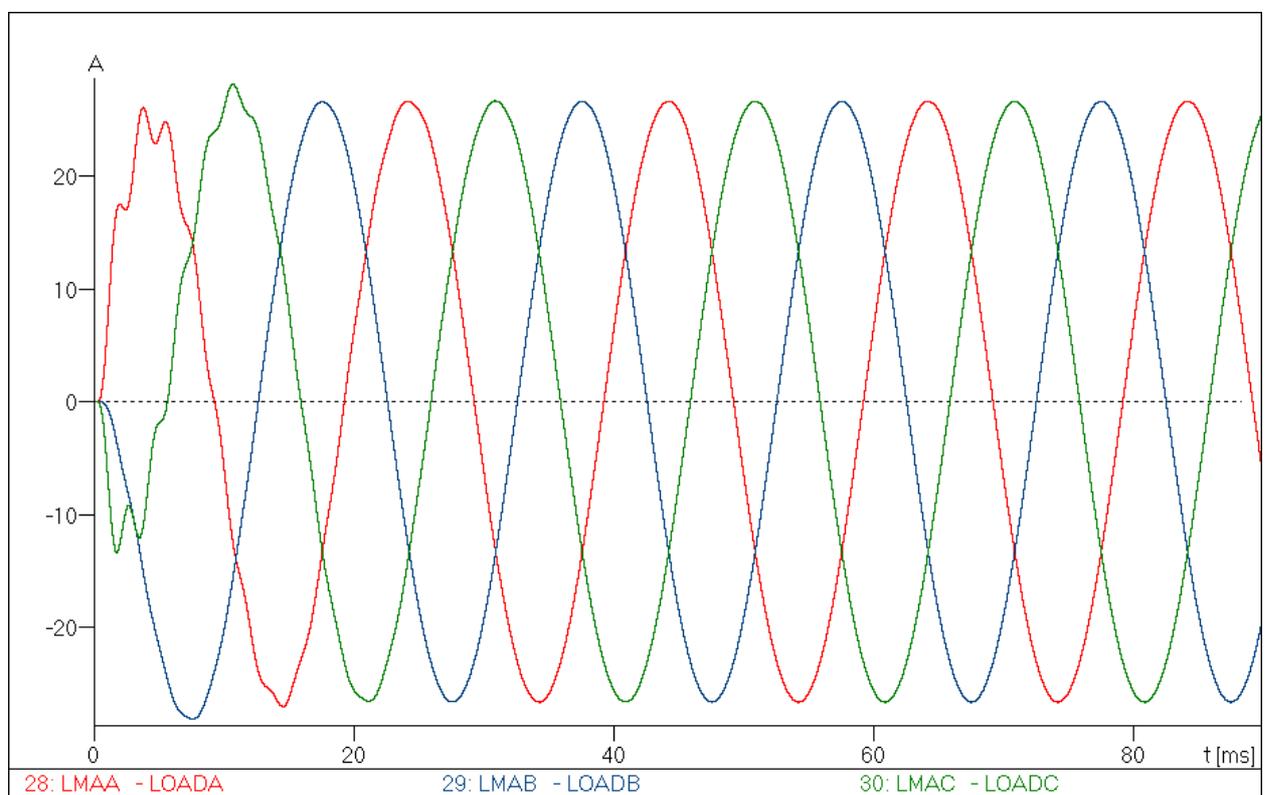
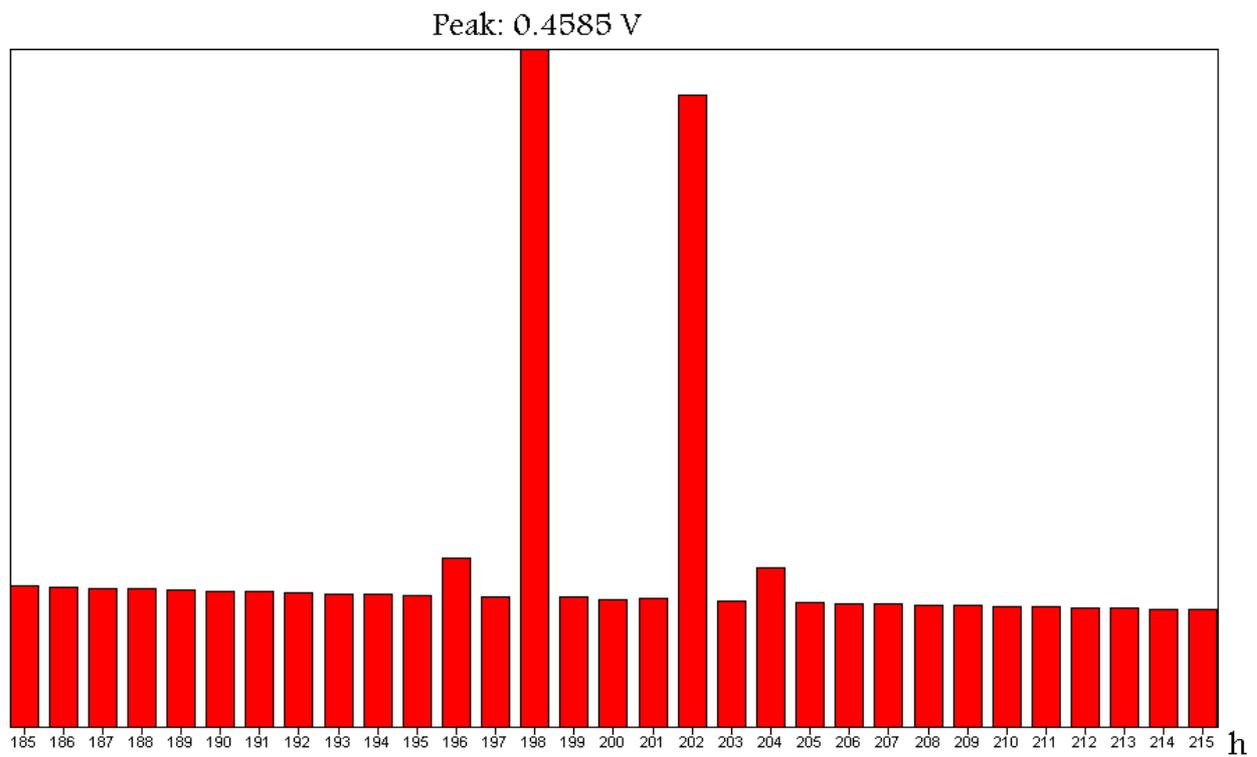
Transformada de Fourier: V_{LOADC}

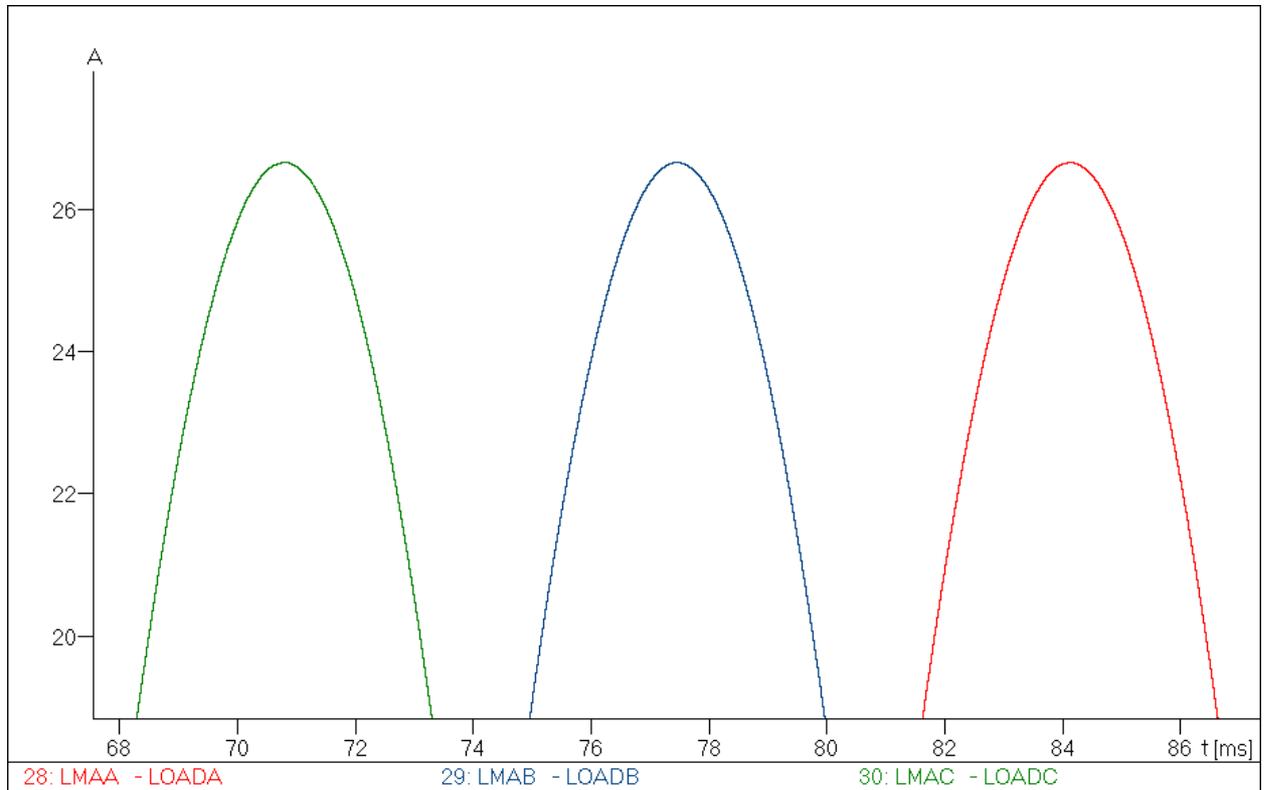
Peak: 11.59 kV



Peak: 27.85 V





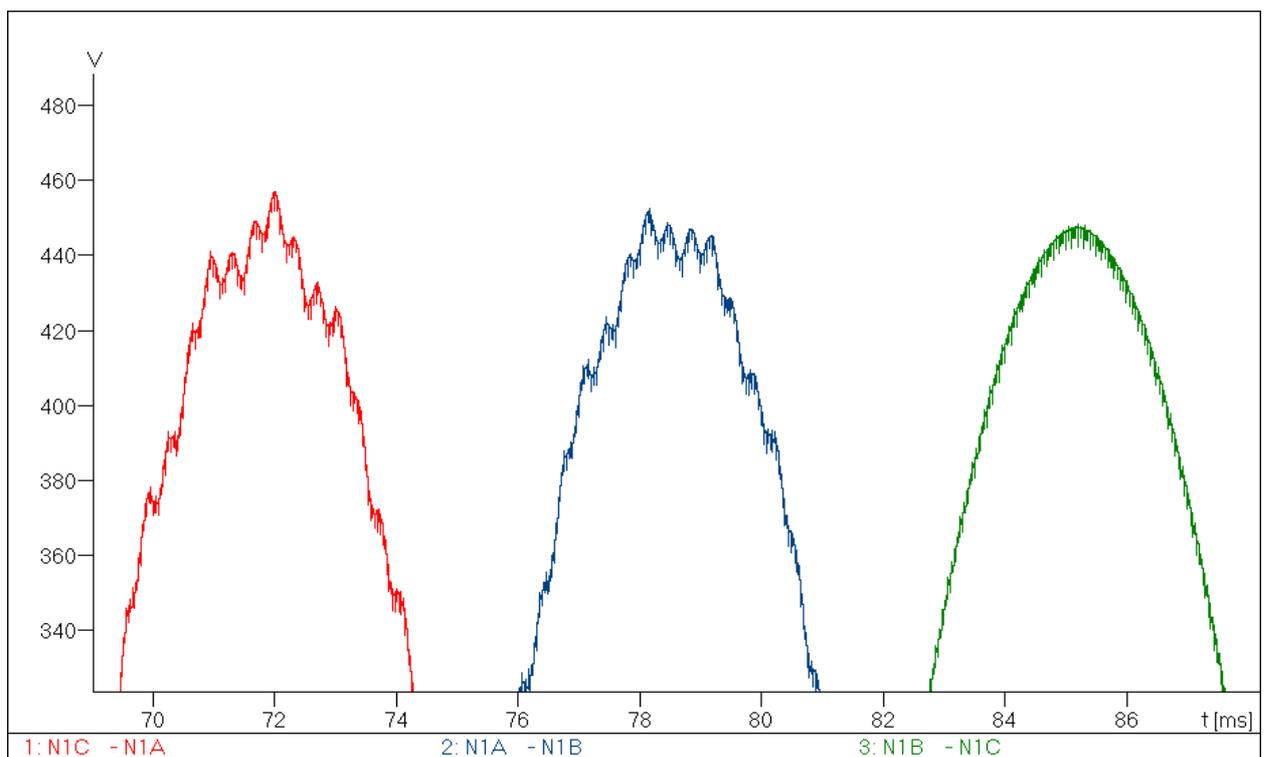
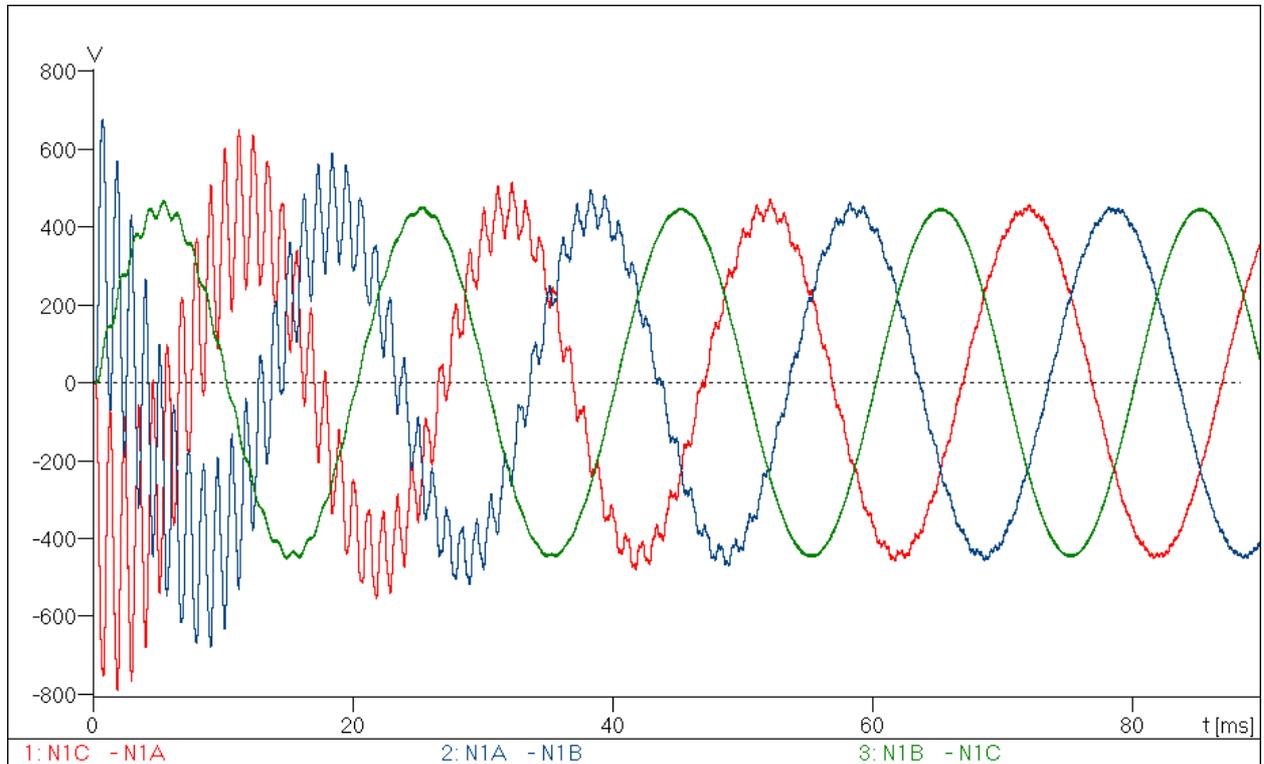


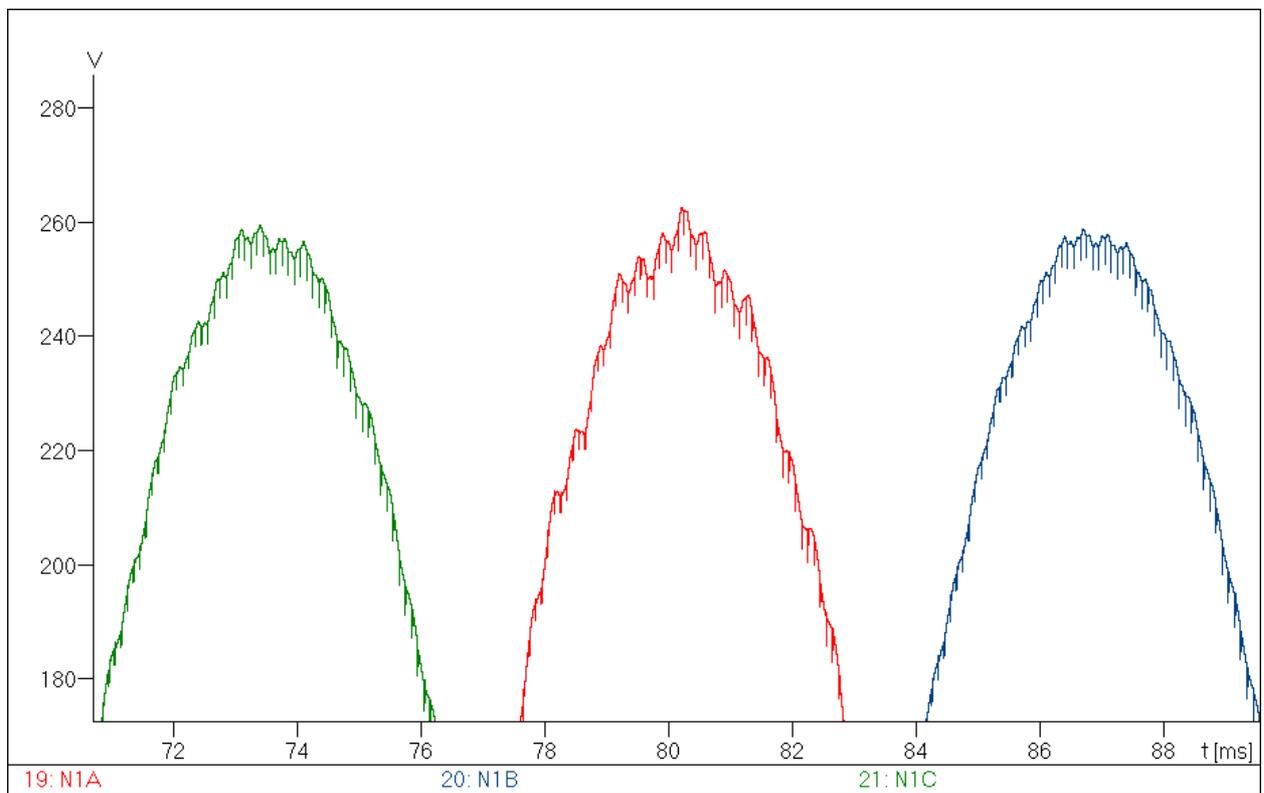
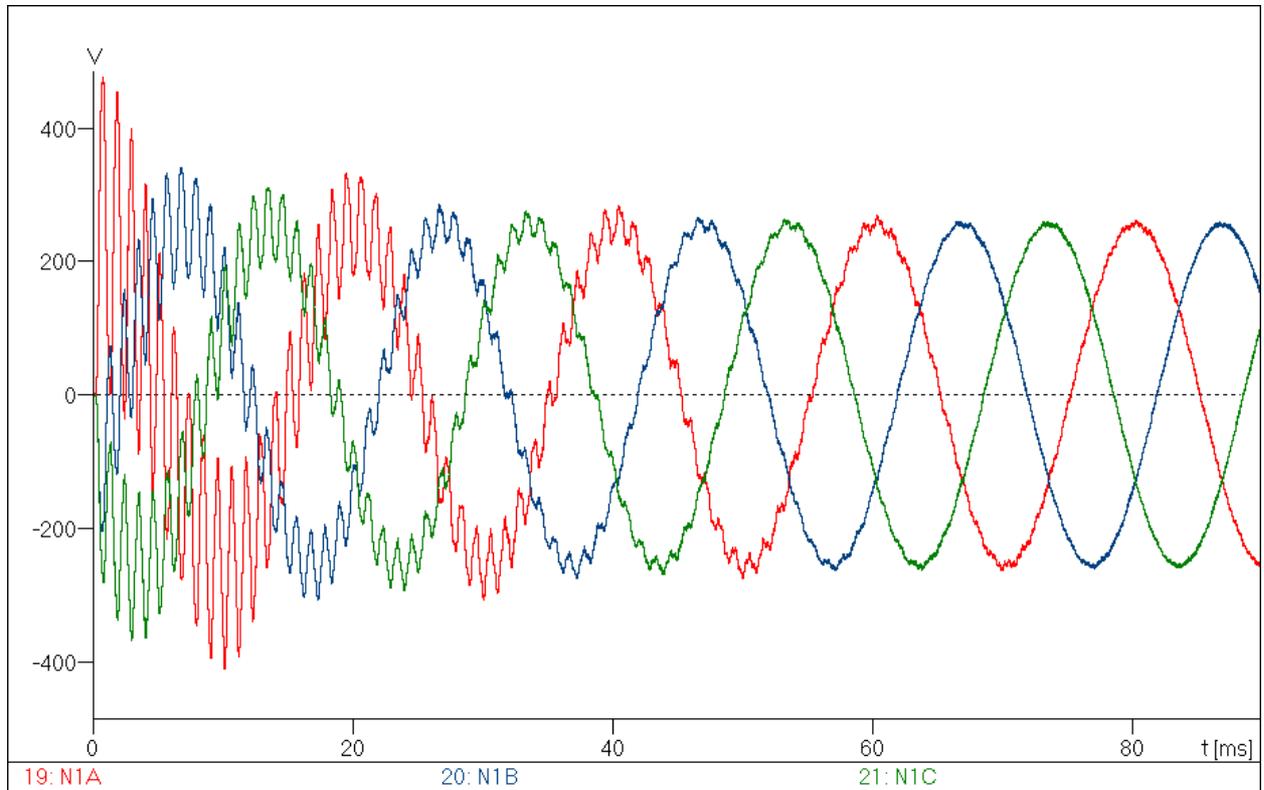




4.3 Planta fotovoltaica 2.

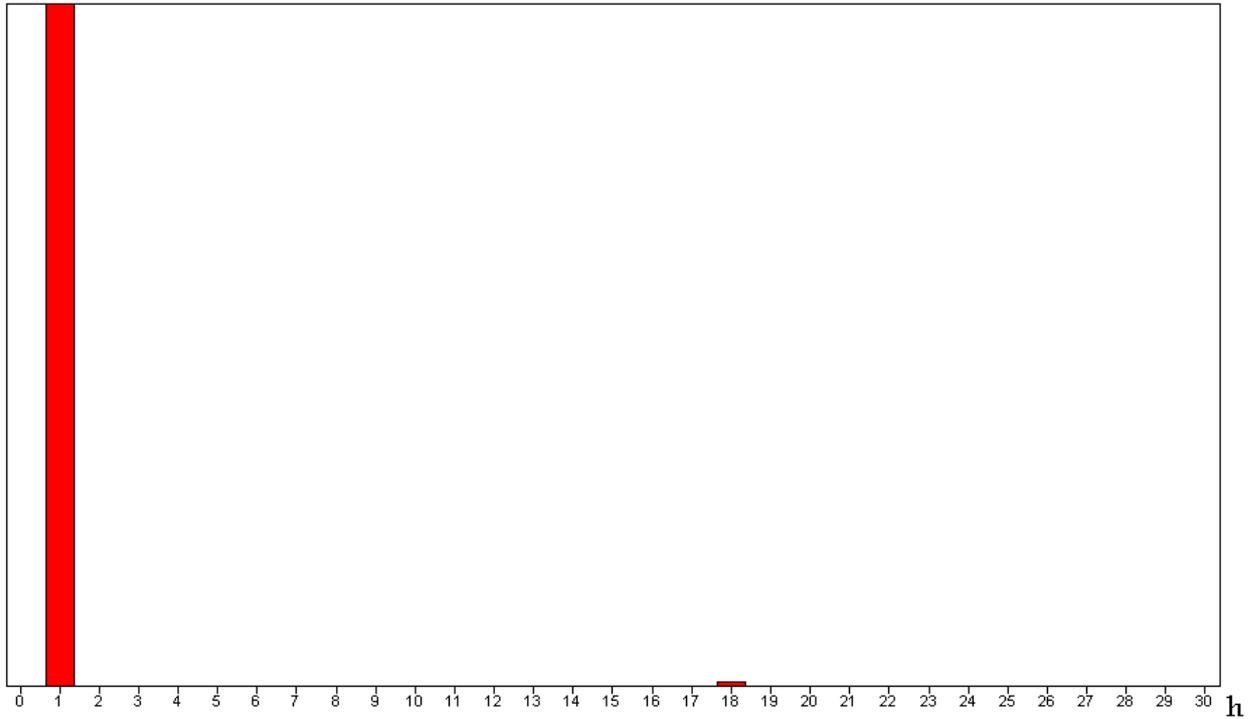
➤ CARGA 1: 0.8 MW, $\cos\varphi=0.87$. Conectada a red.



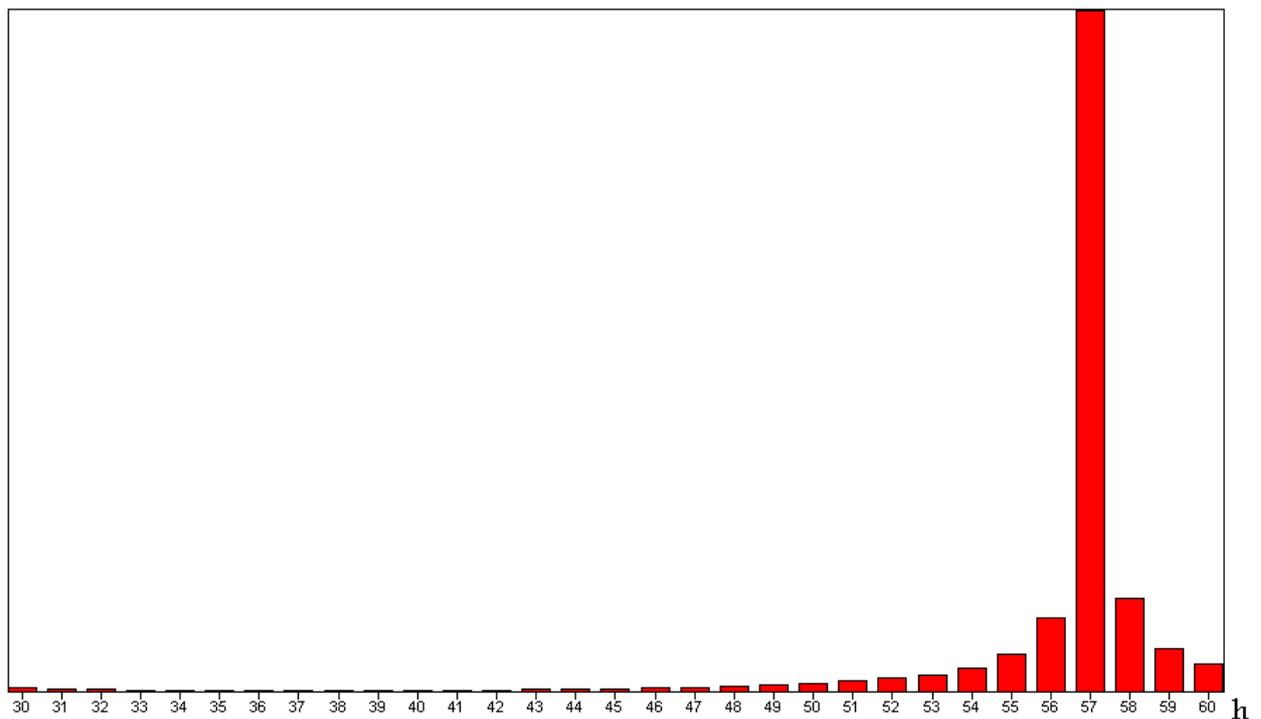


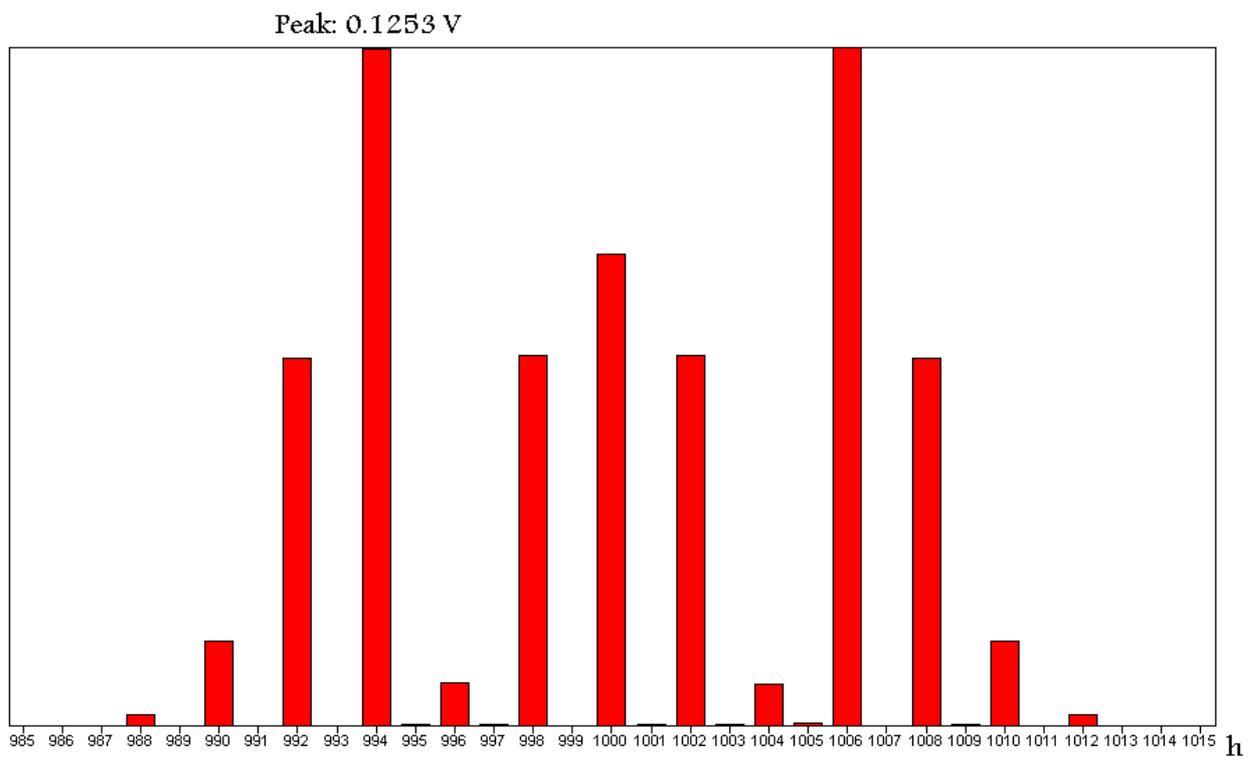
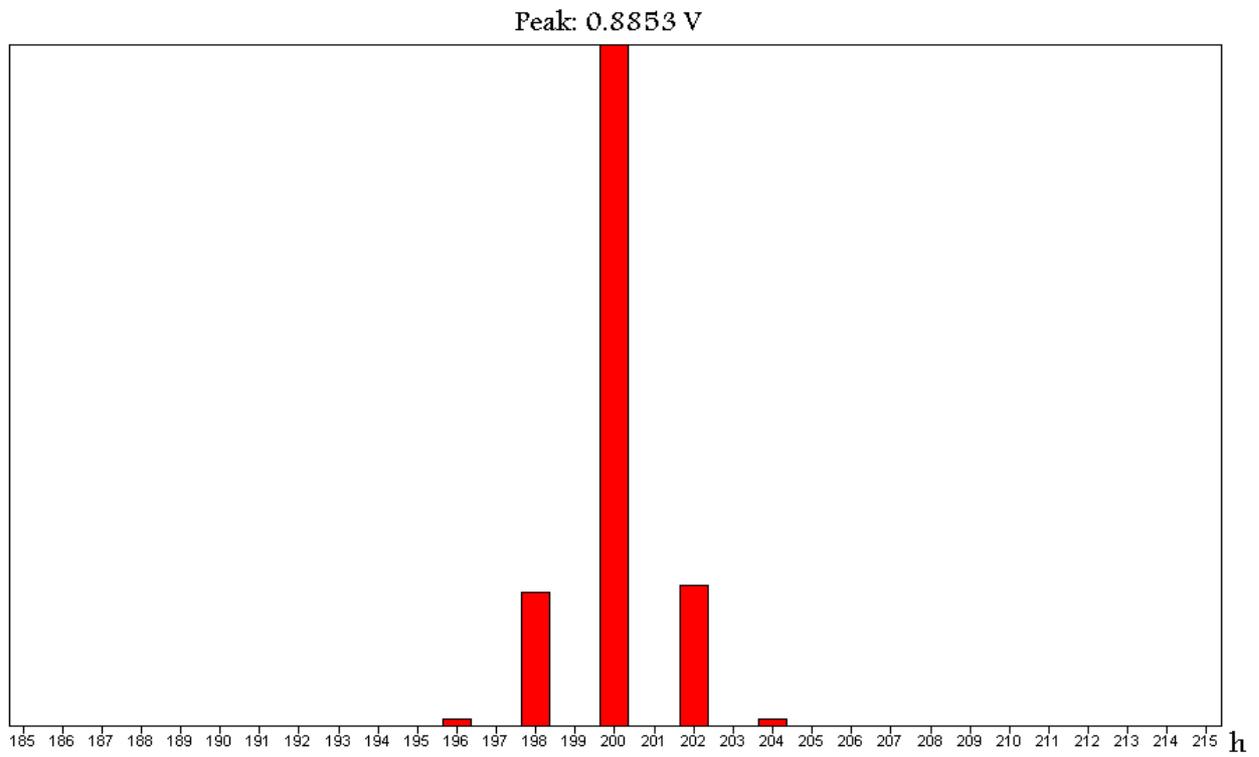
Transformada de Fourier: V_{N1A}

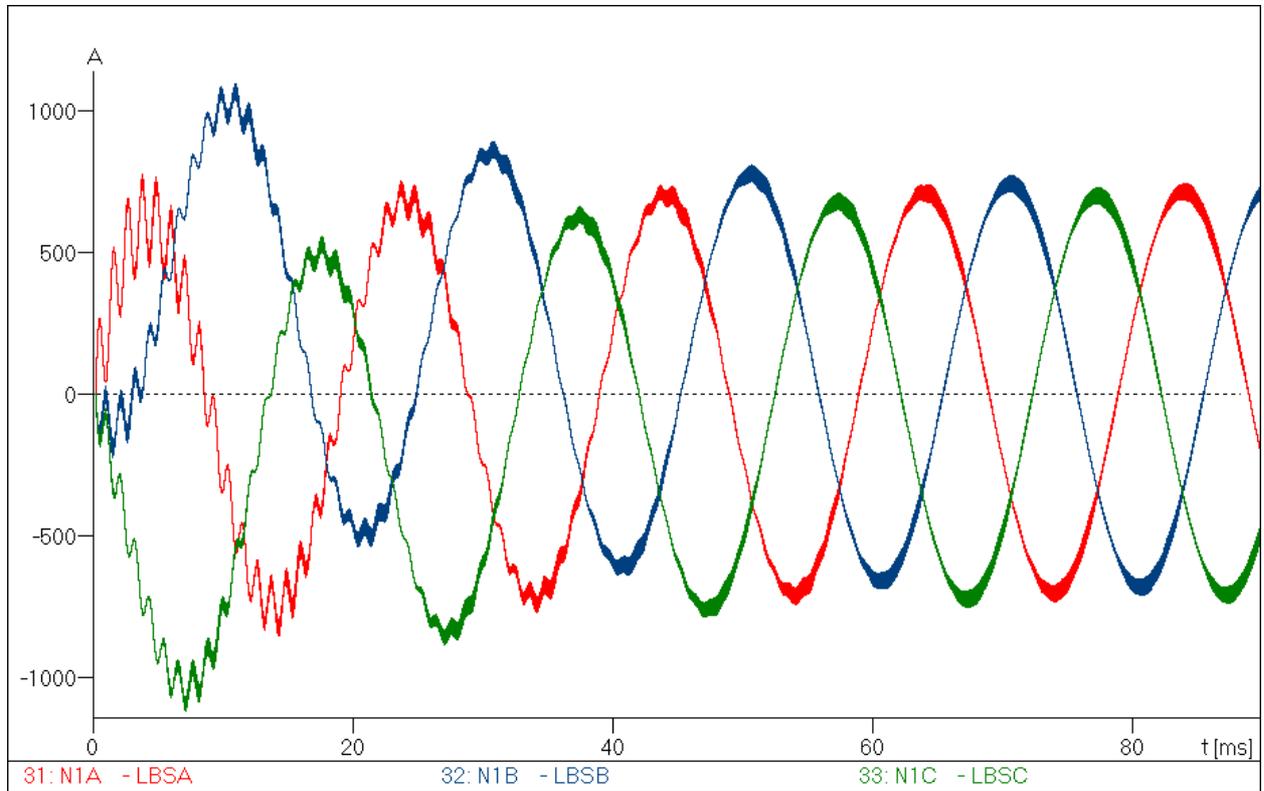
Peak: 257.7 V

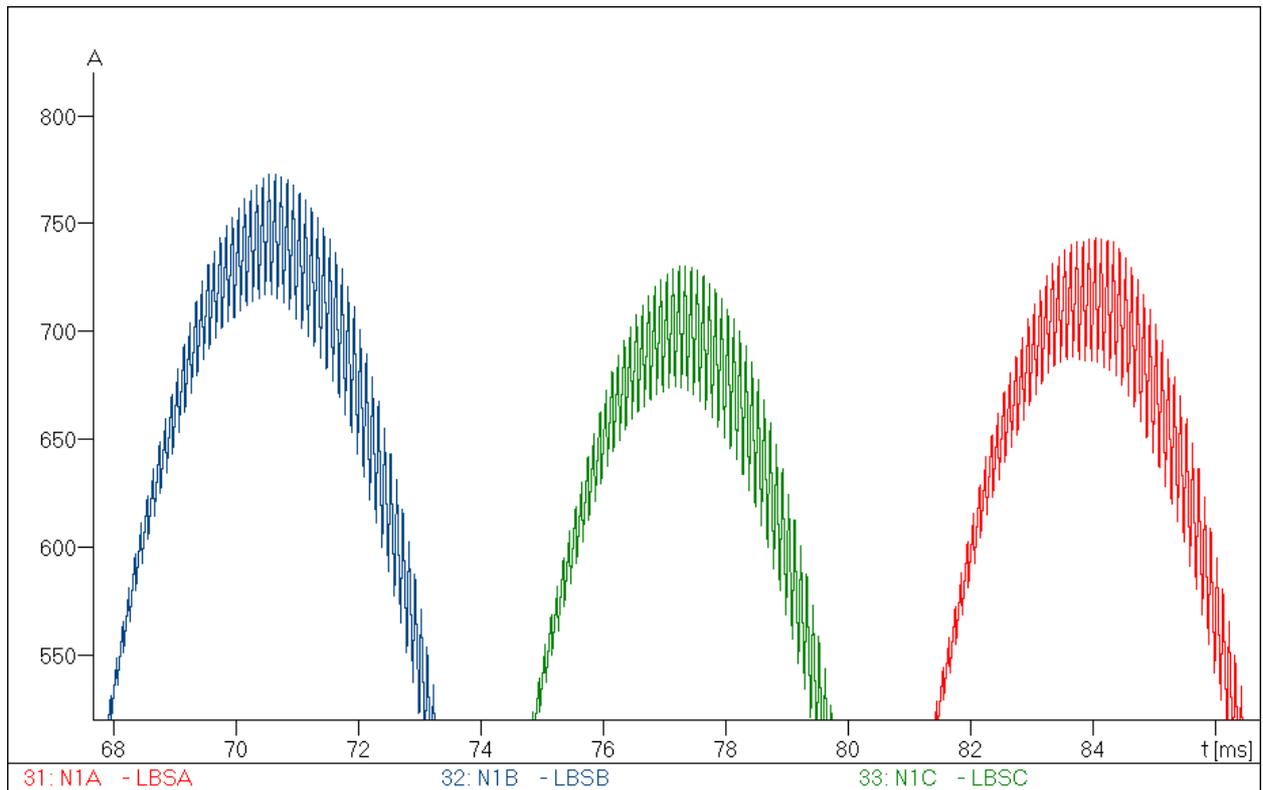


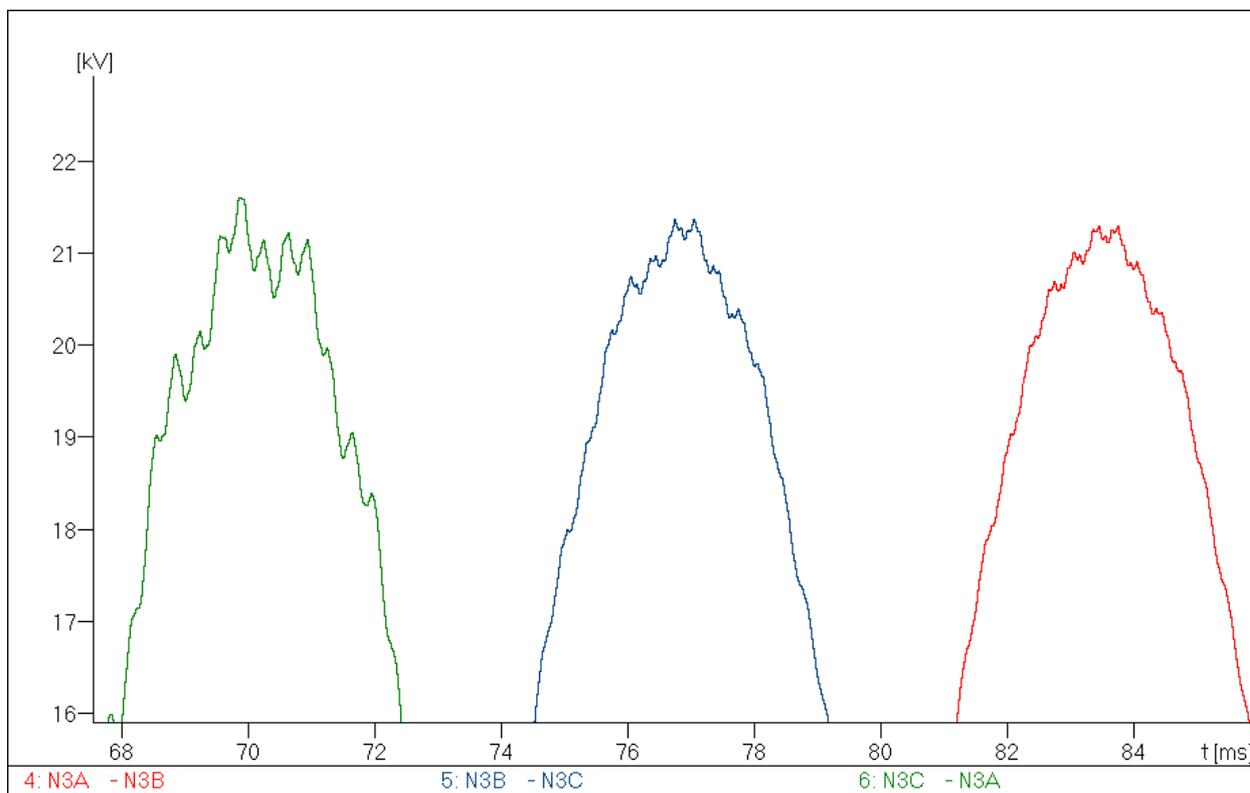
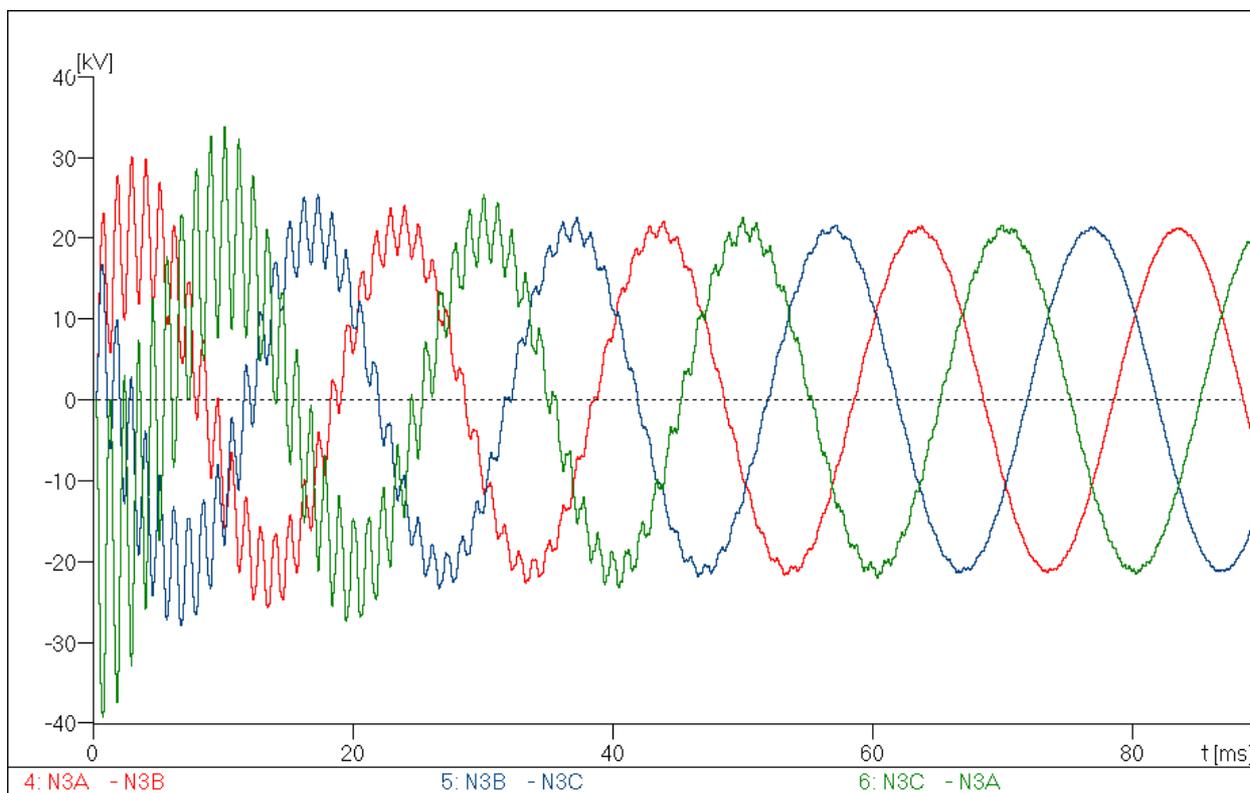
Peak: 2.443 V

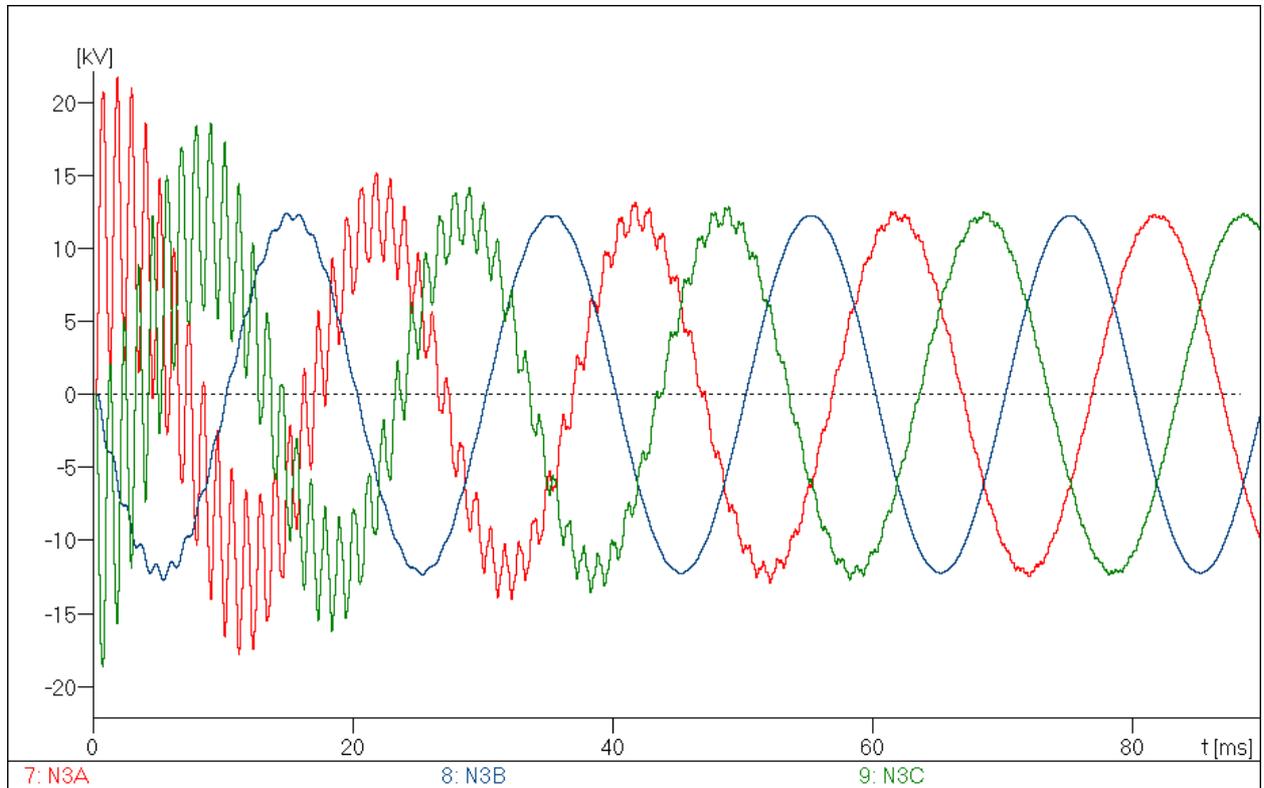


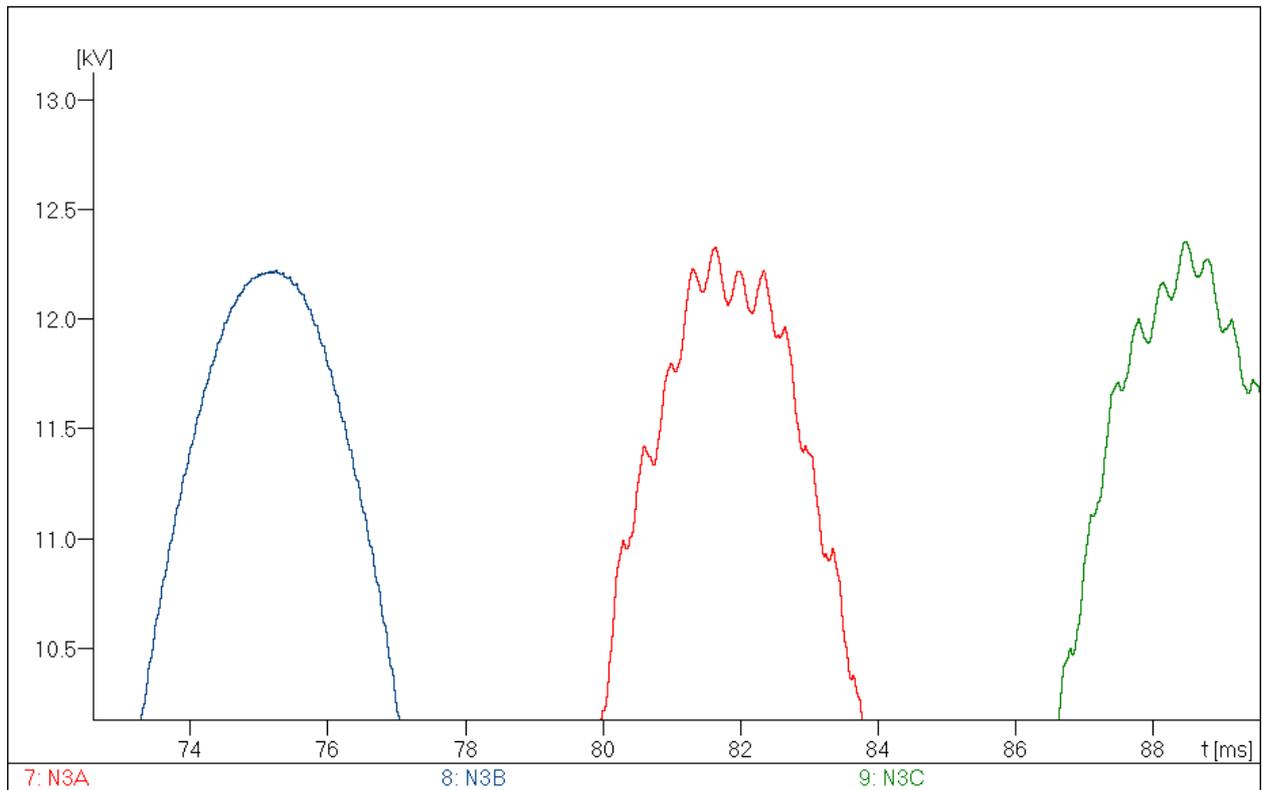






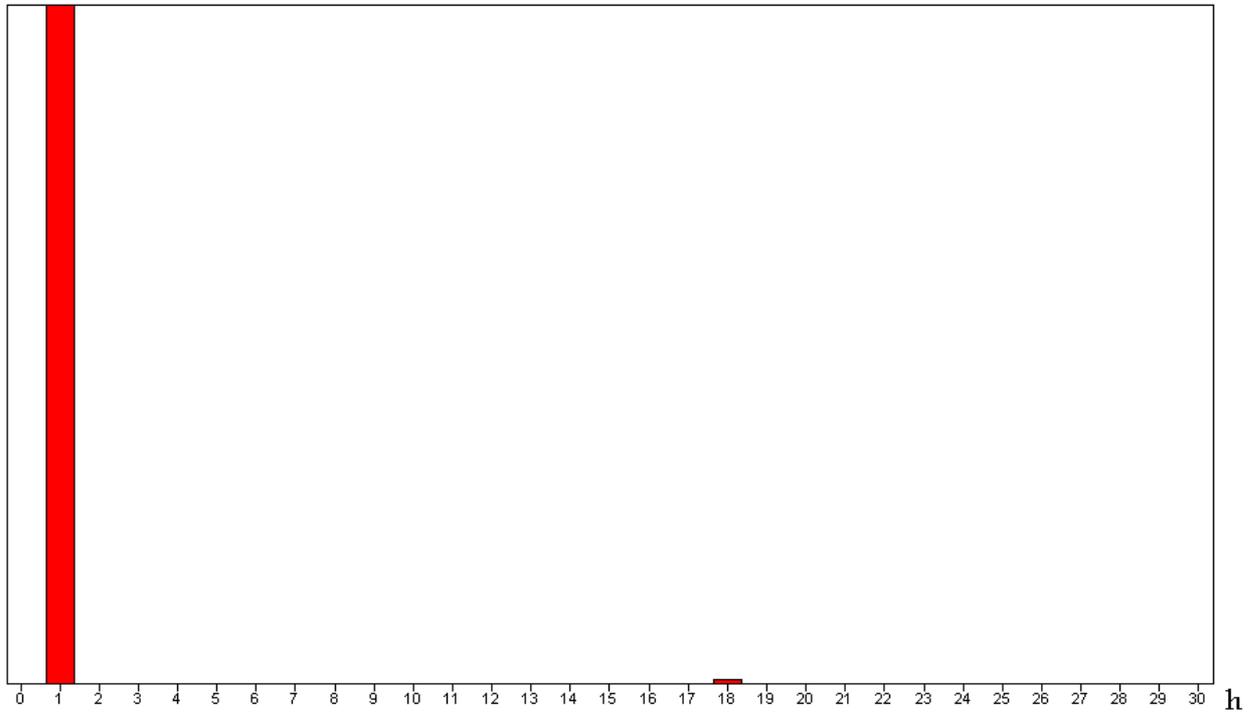




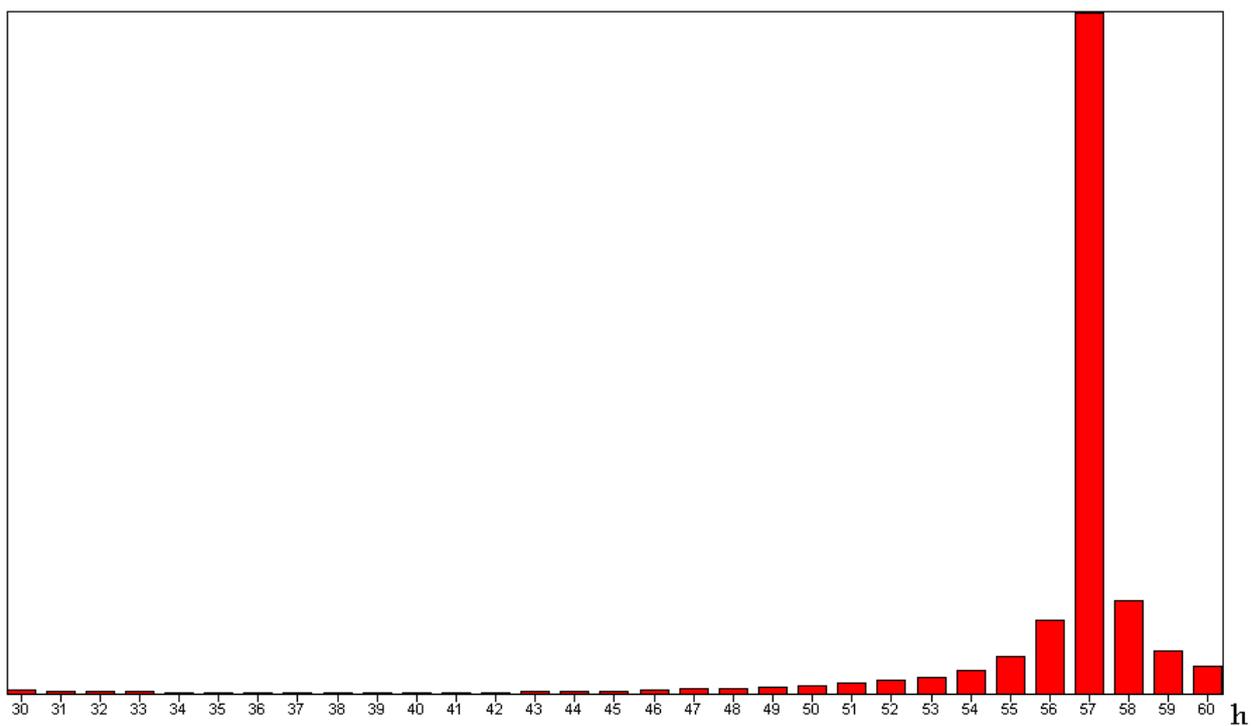


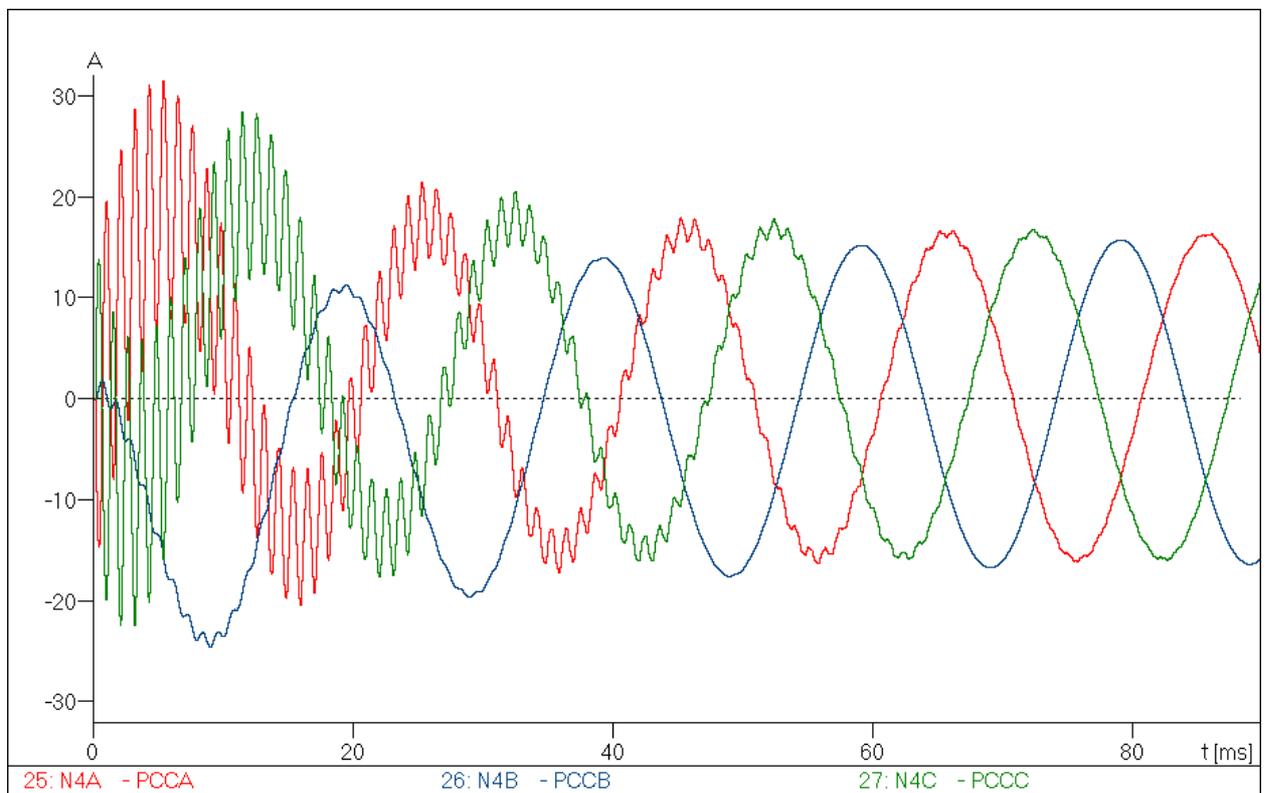
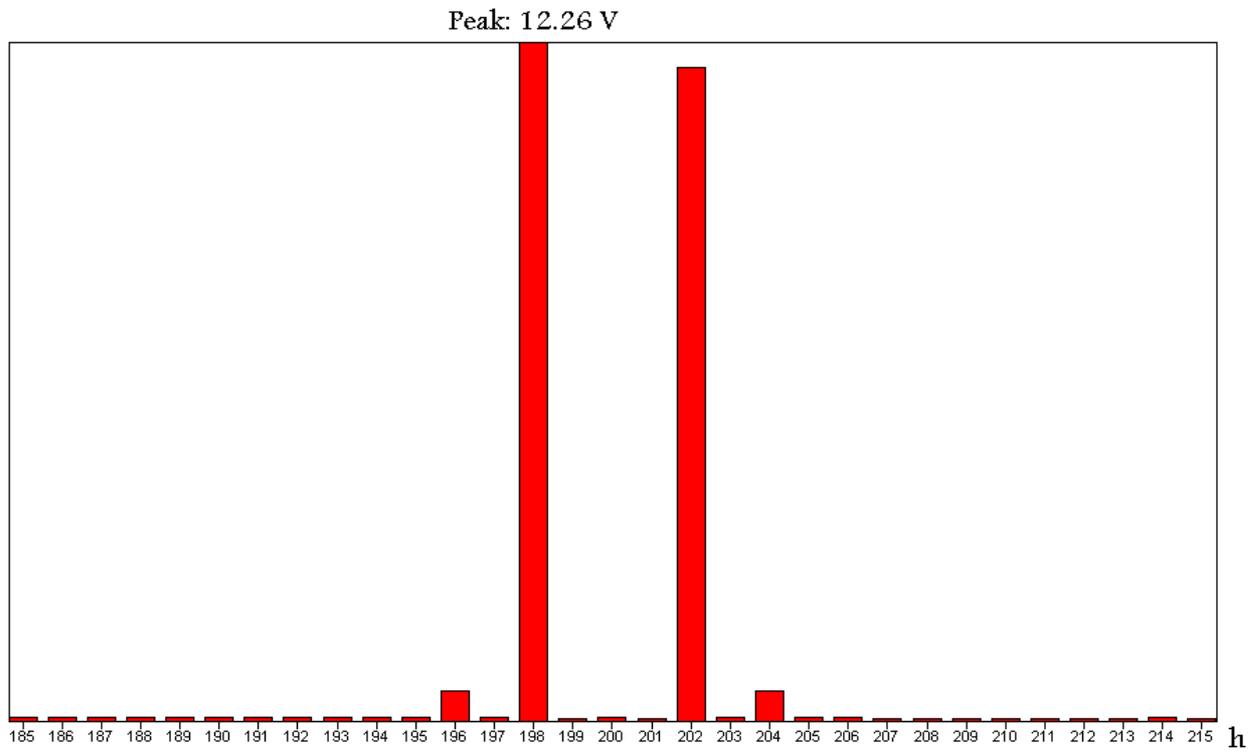
Transformada de Fourier: V_{N3A}

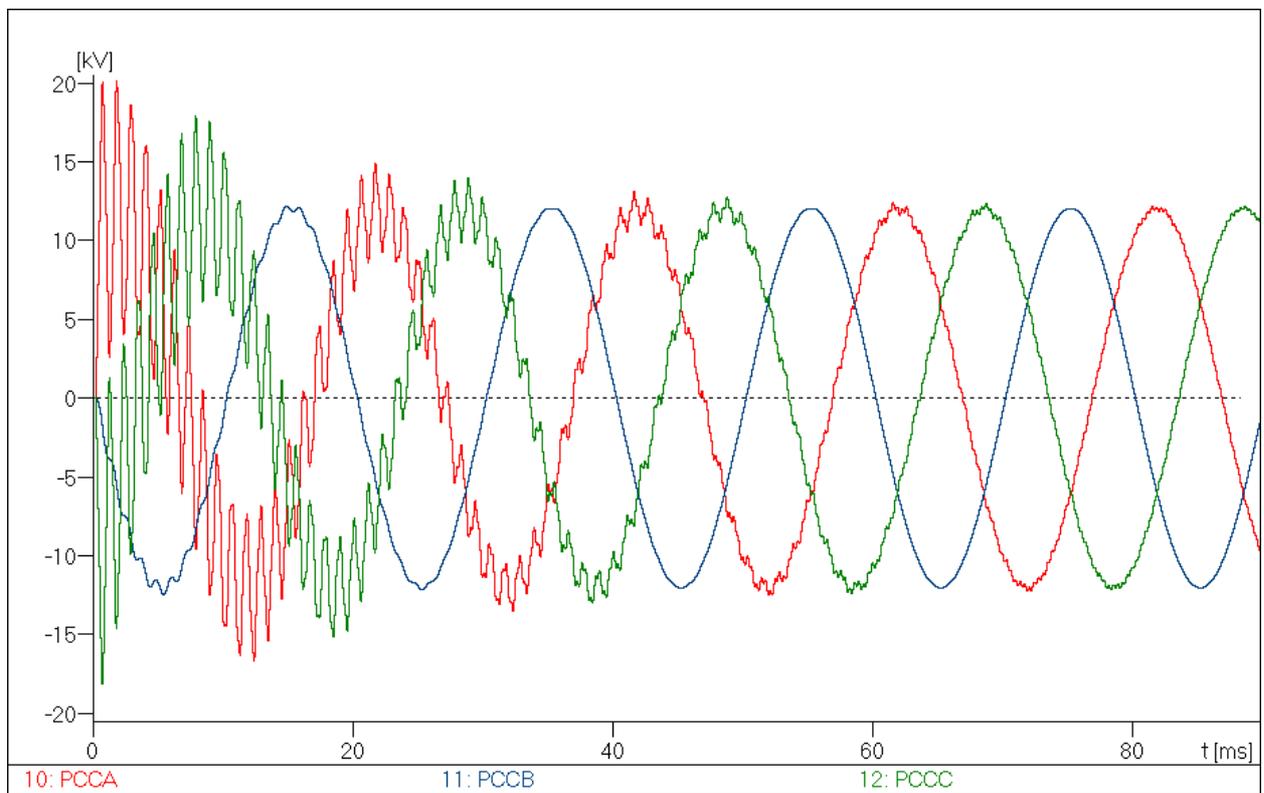
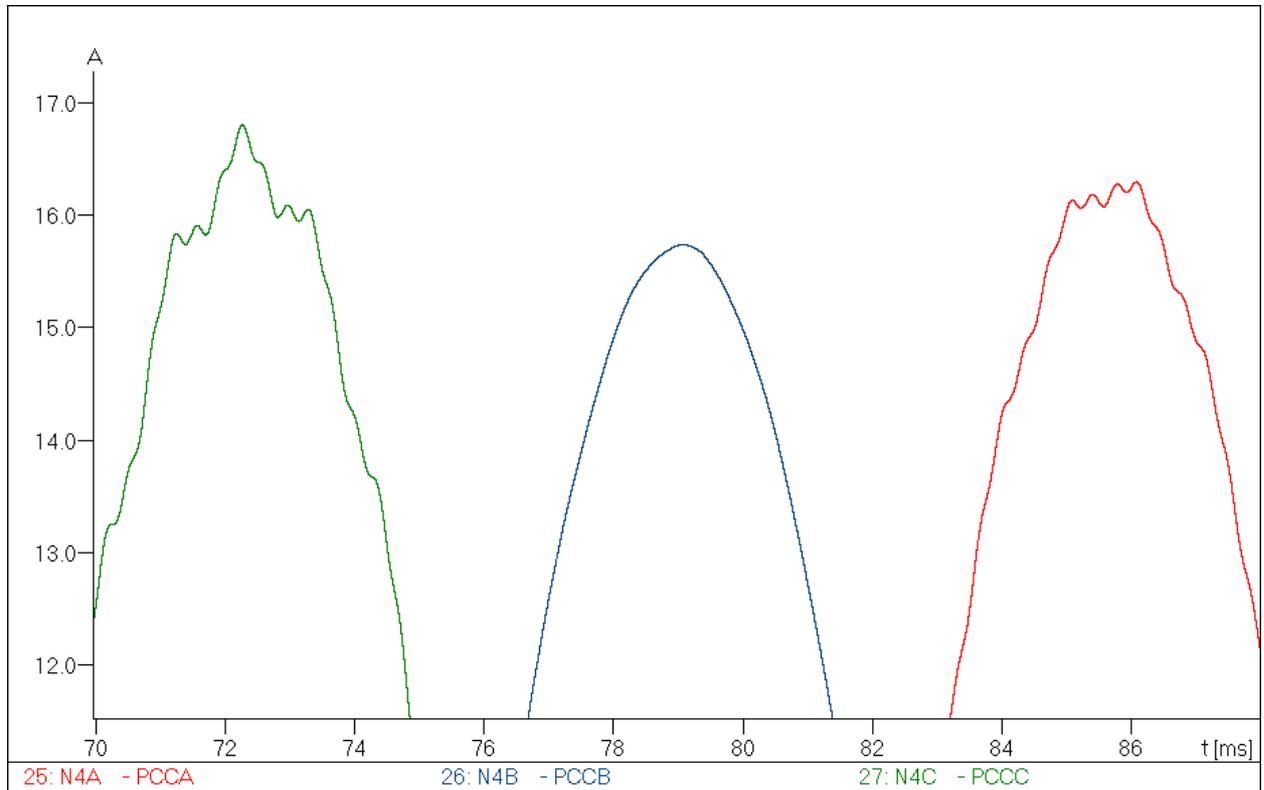
Peak: 12.22 kV

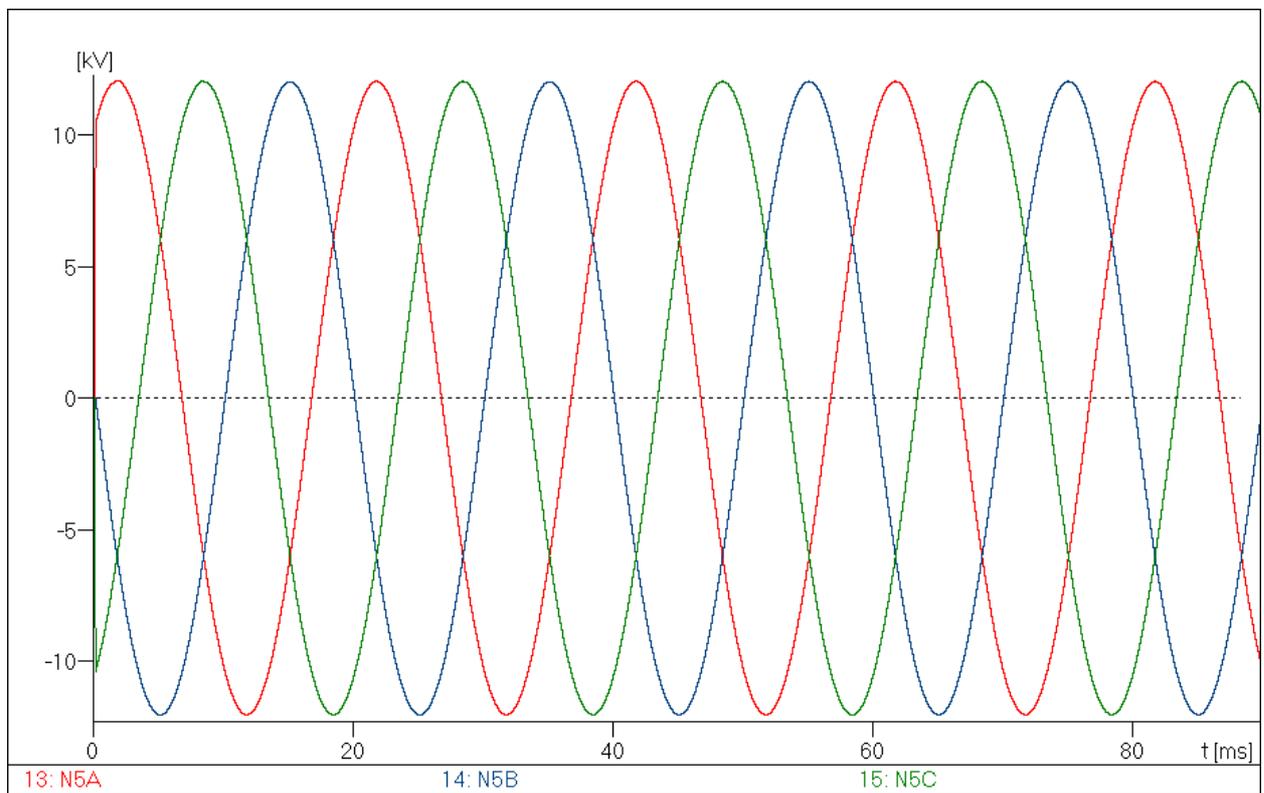
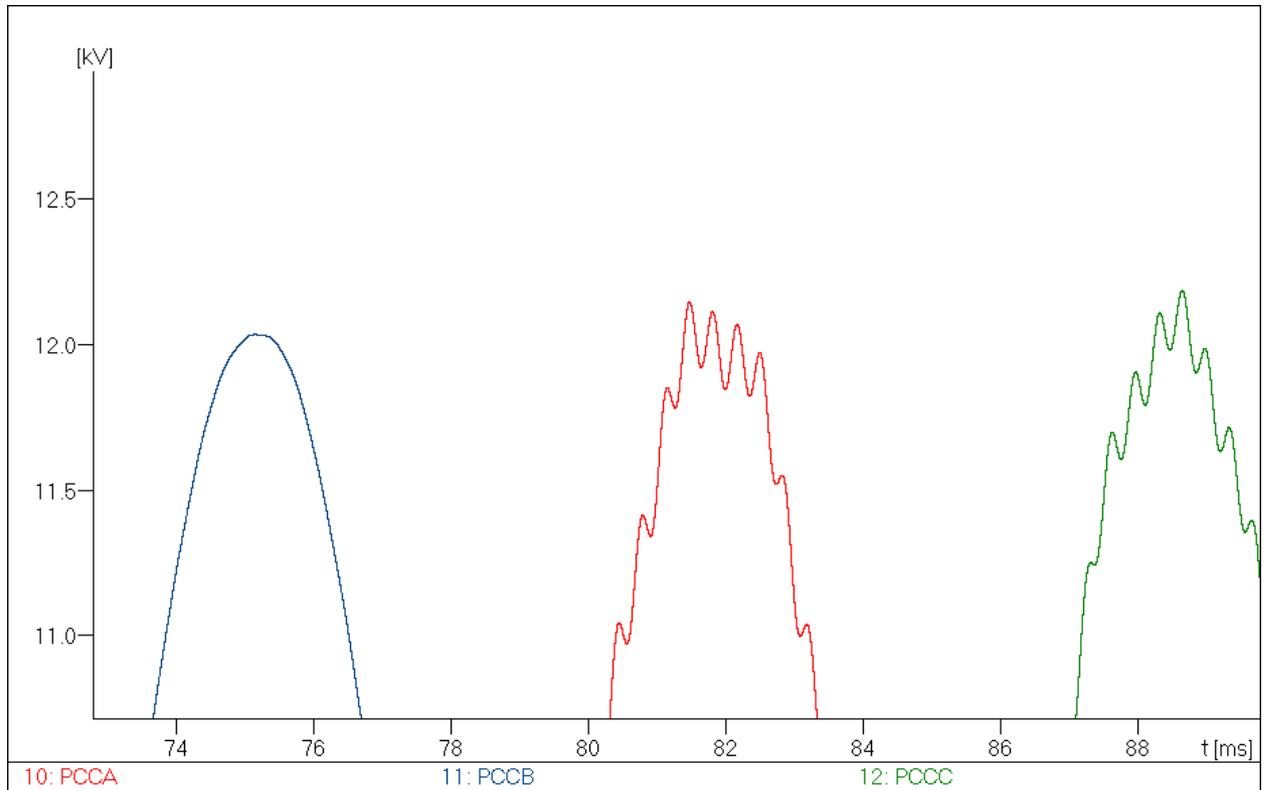


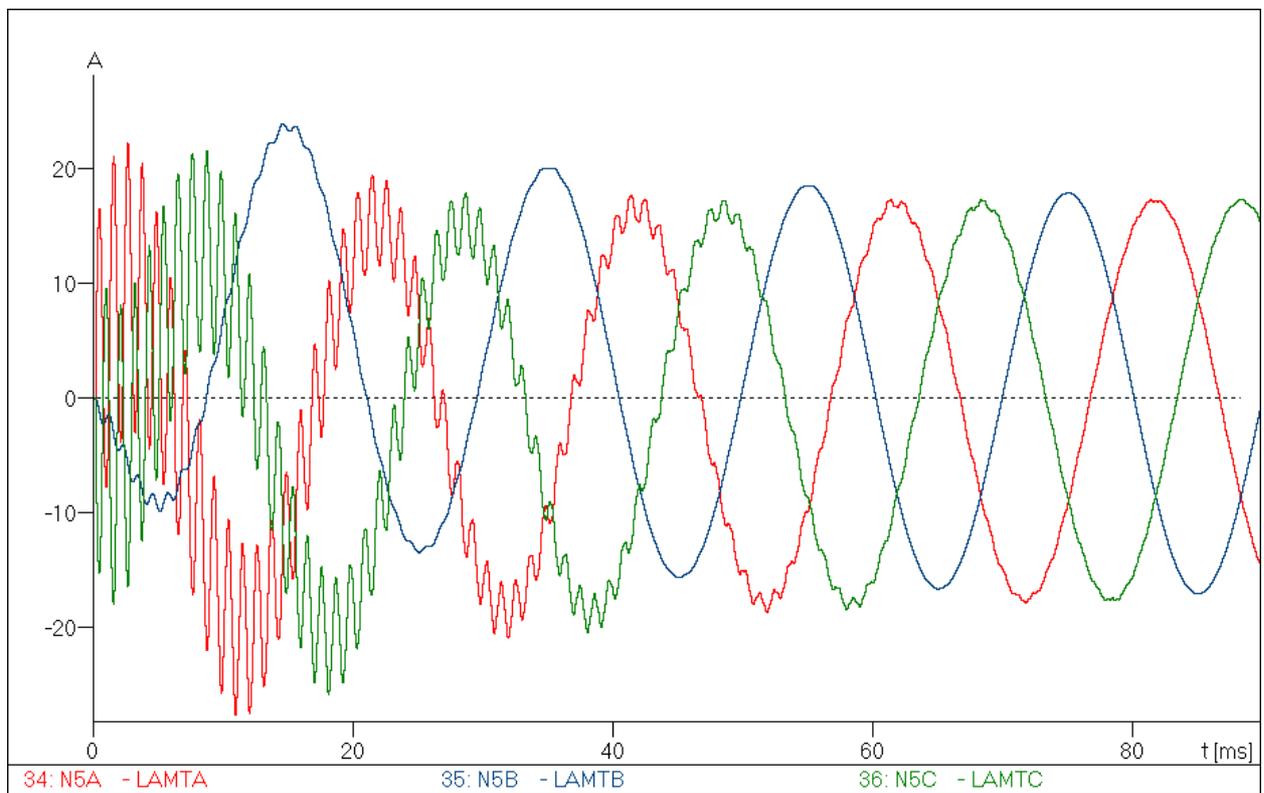
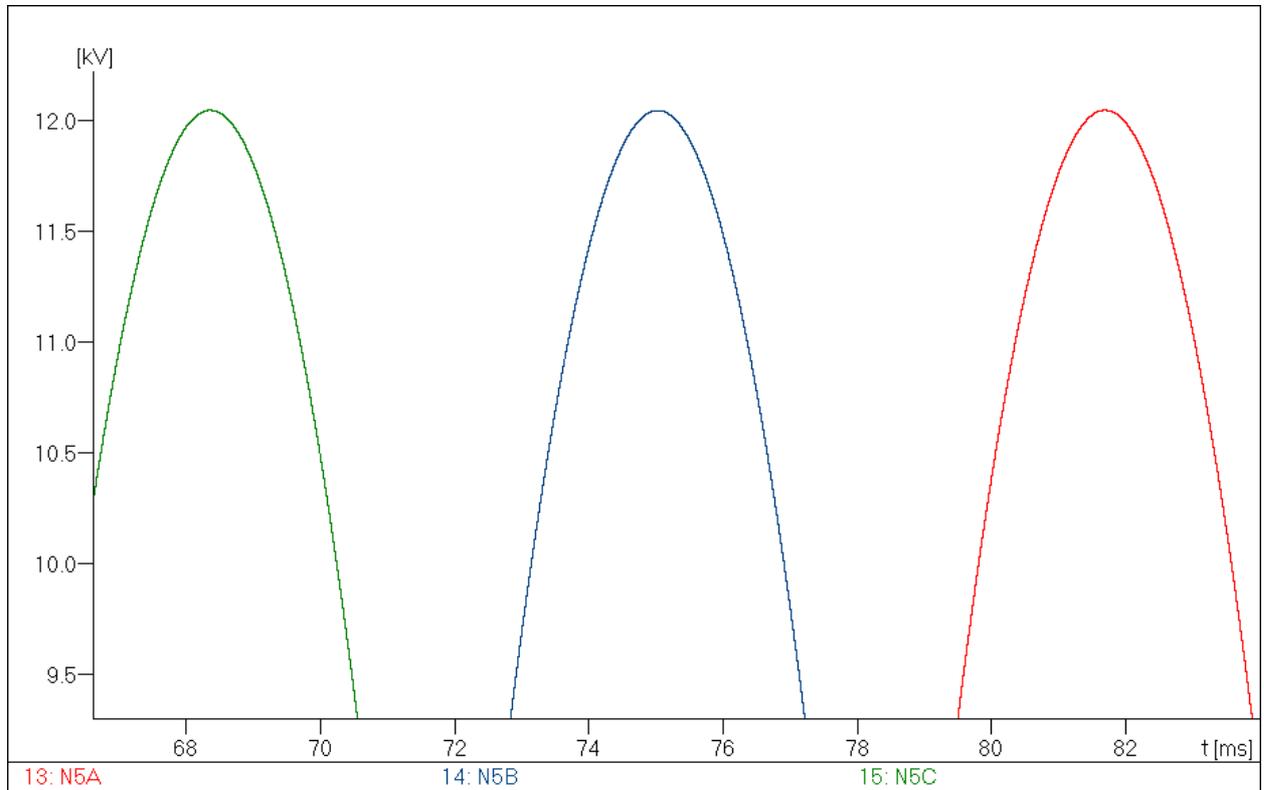
Peak: 101.3 V

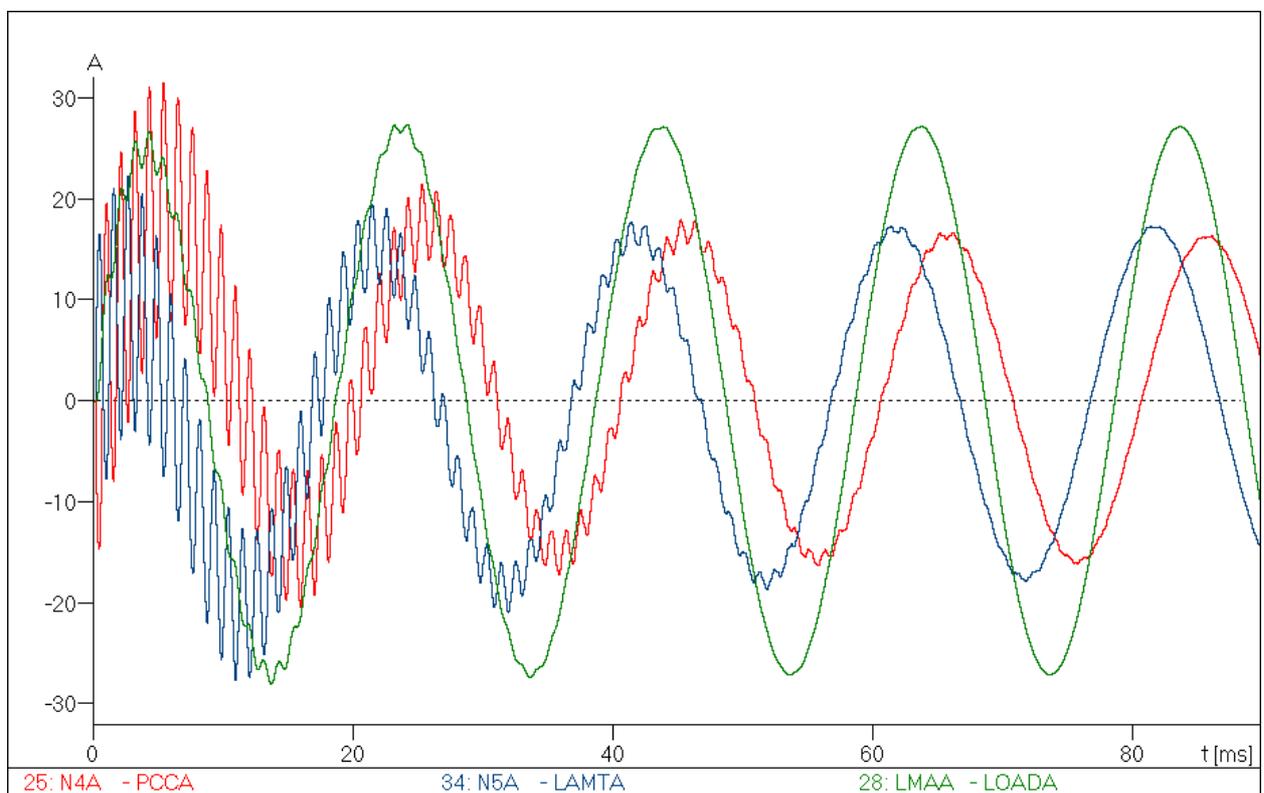
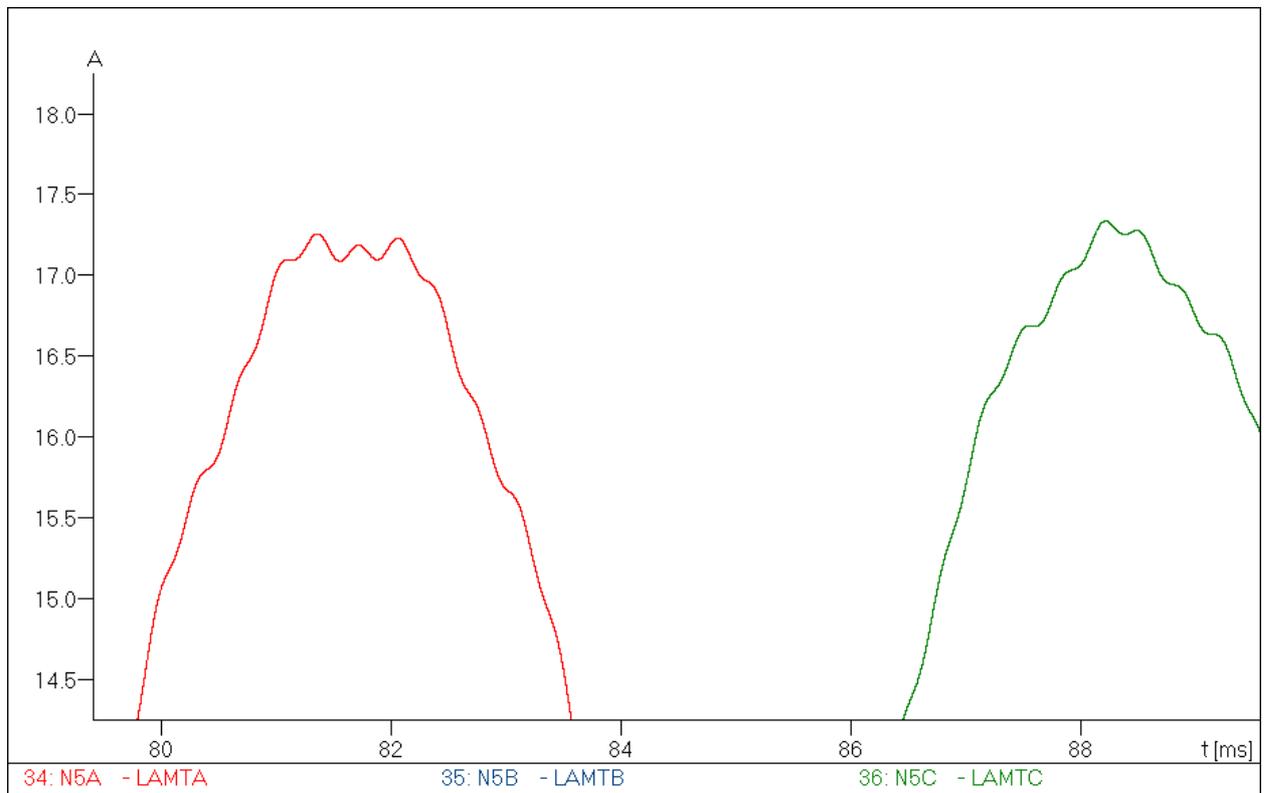


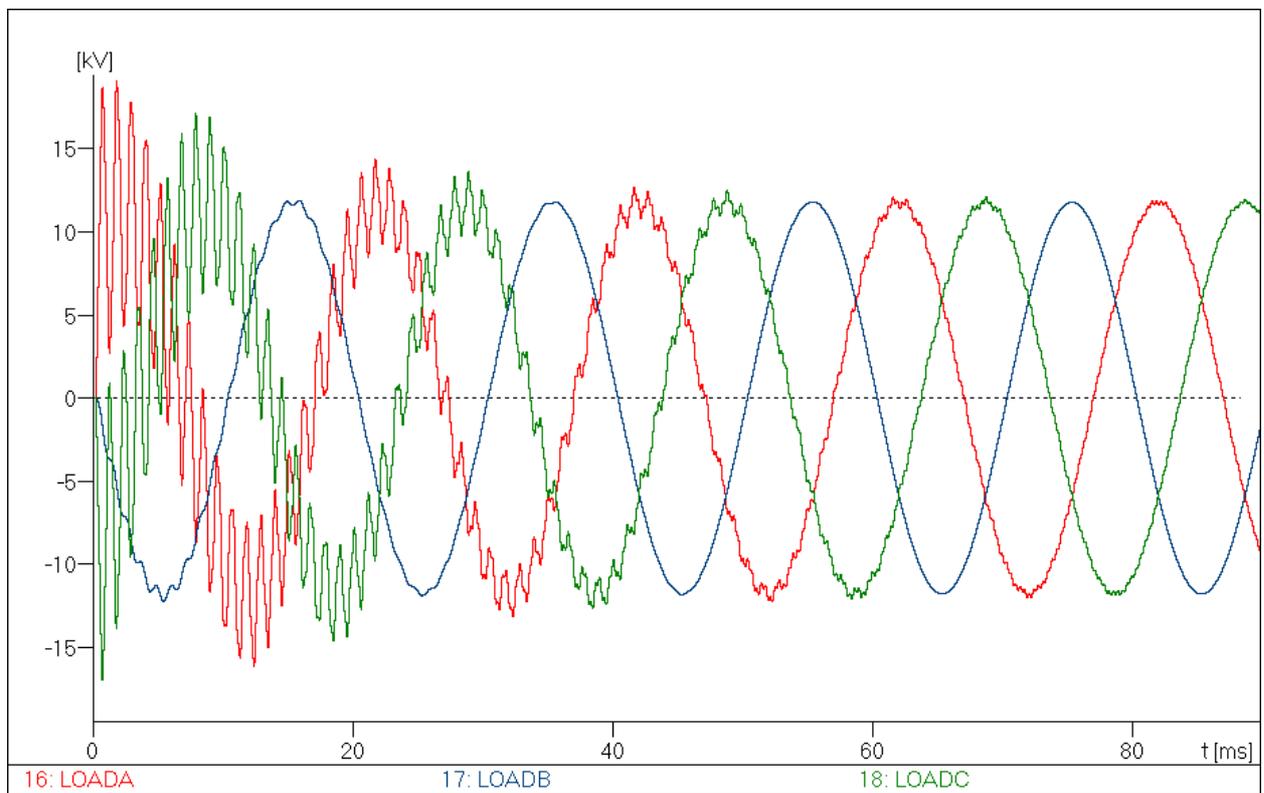
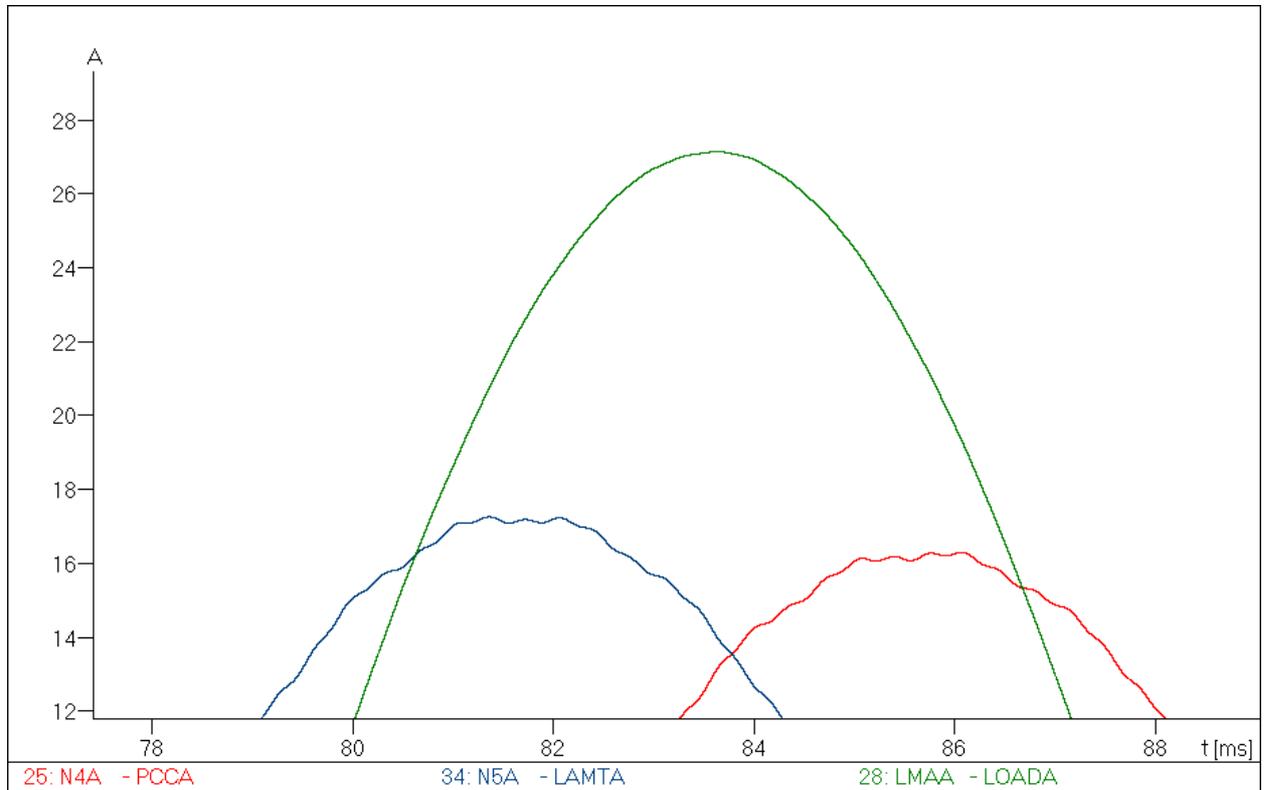


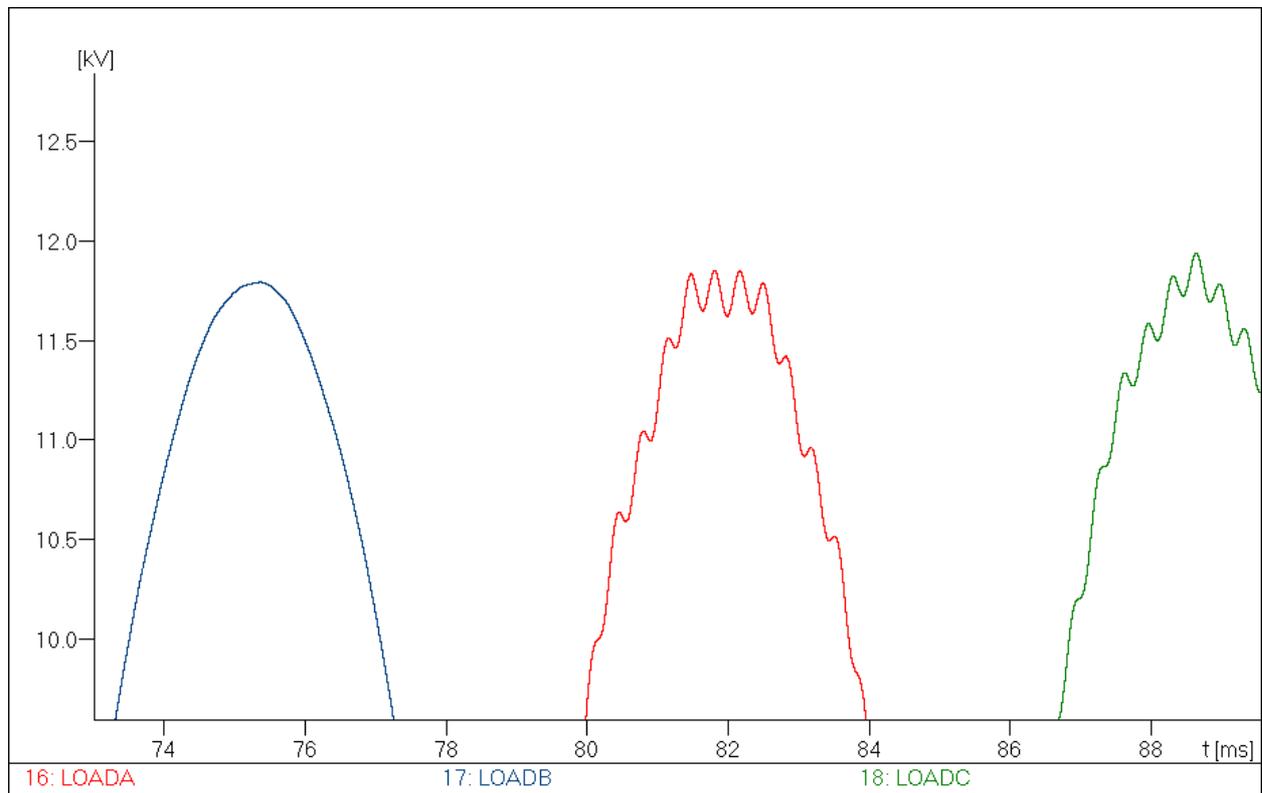






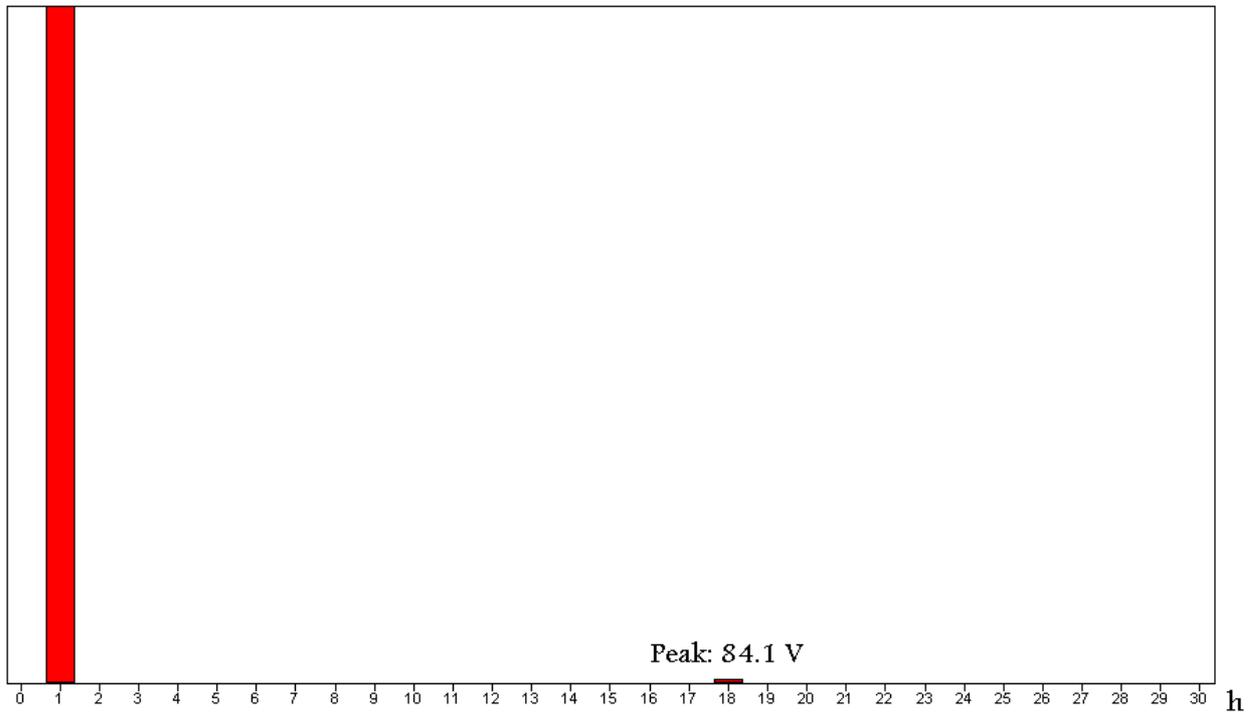


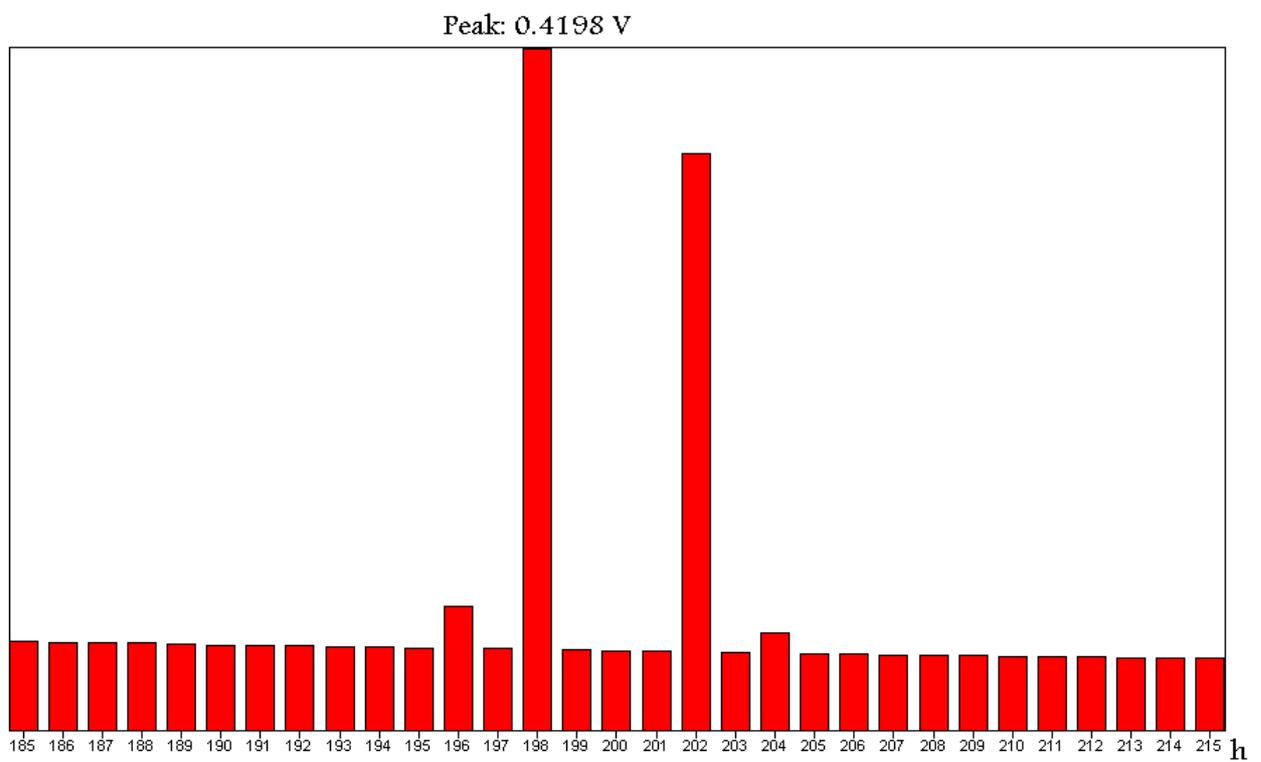
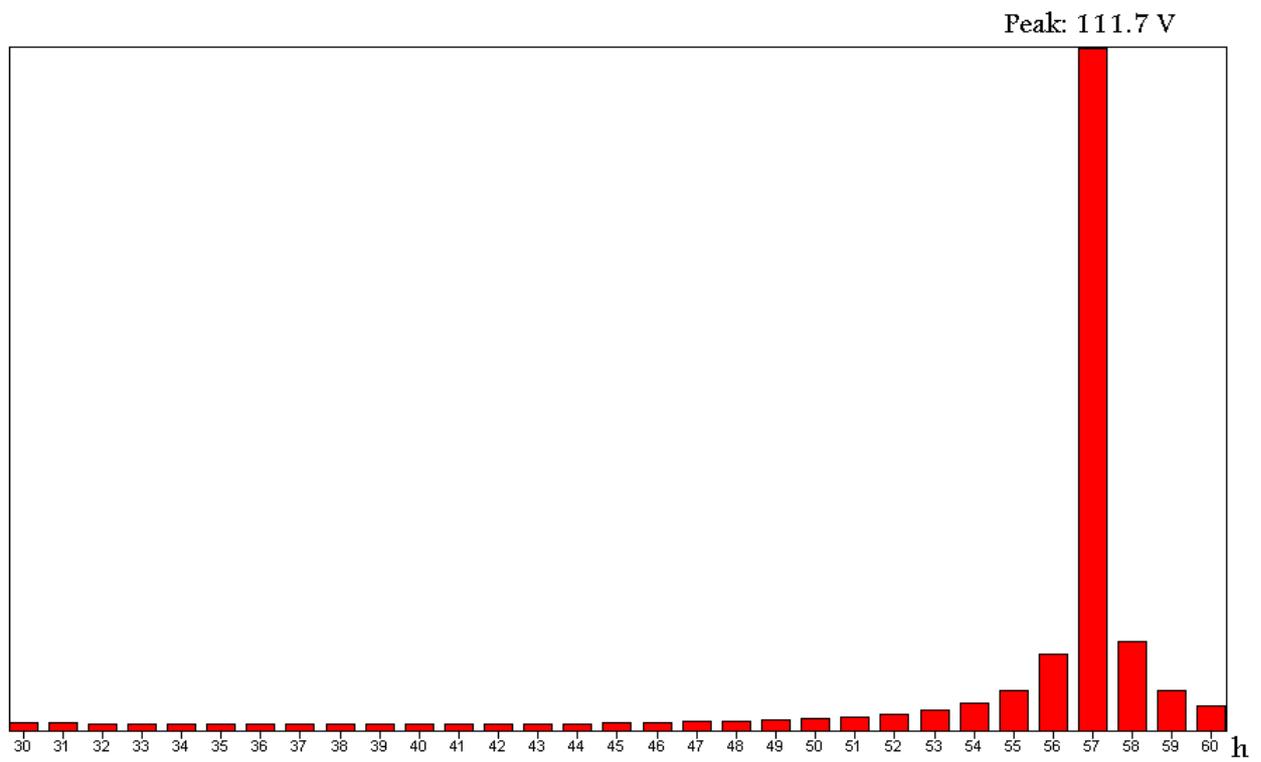


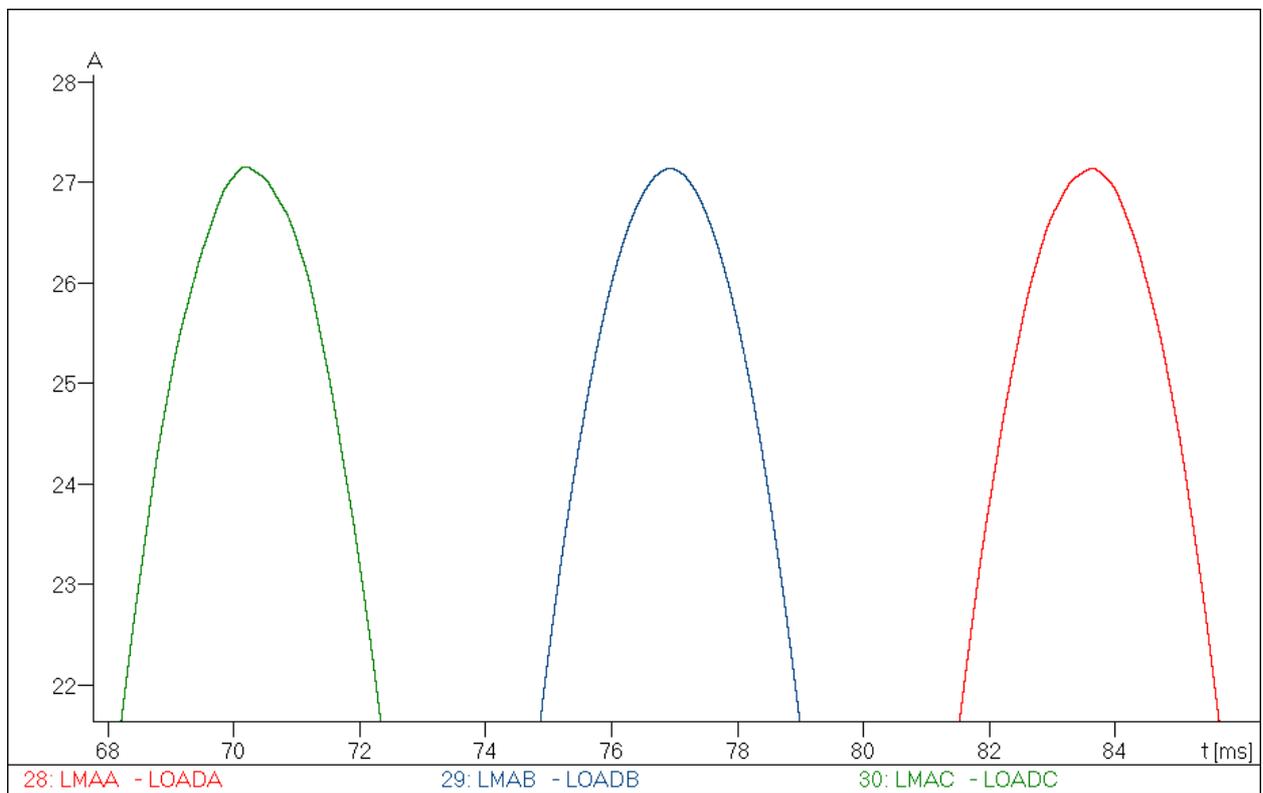
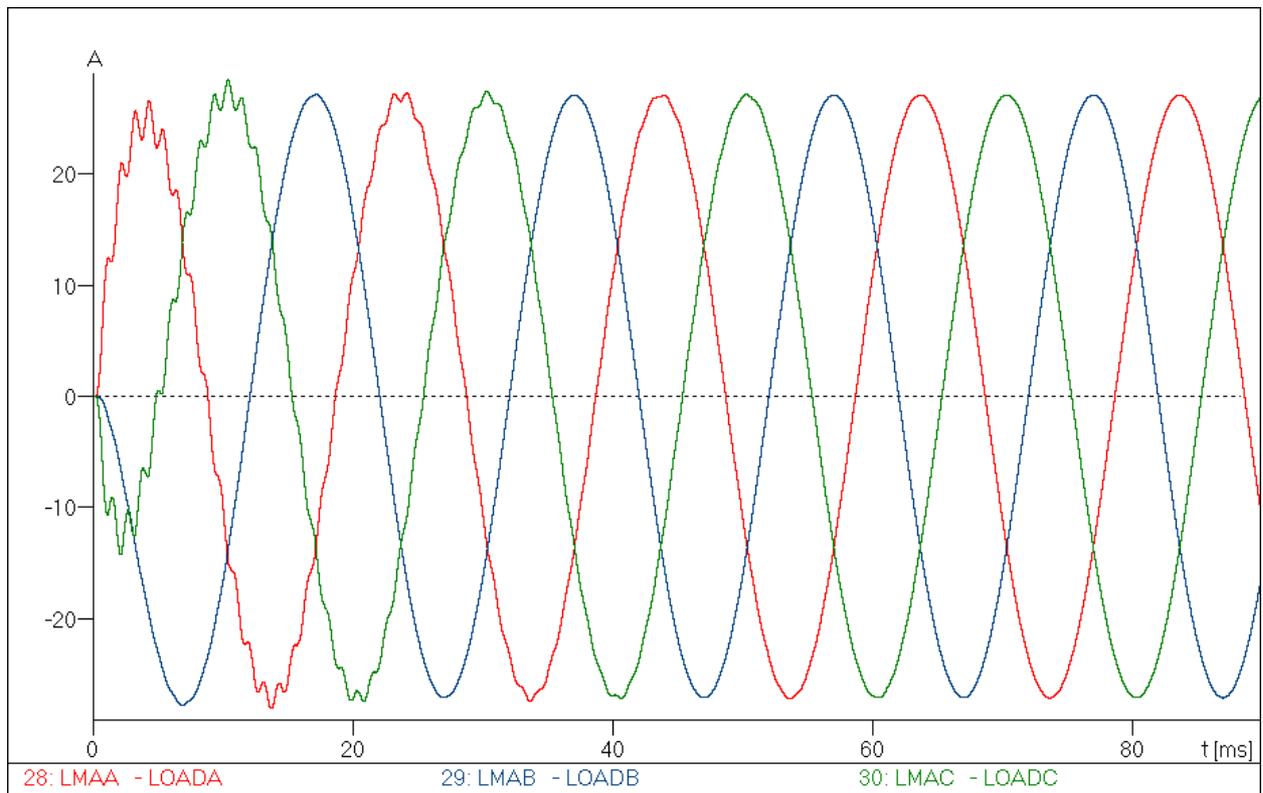


Transformada de Fourier: V_{LOADA}

Peak: 11.79 kV







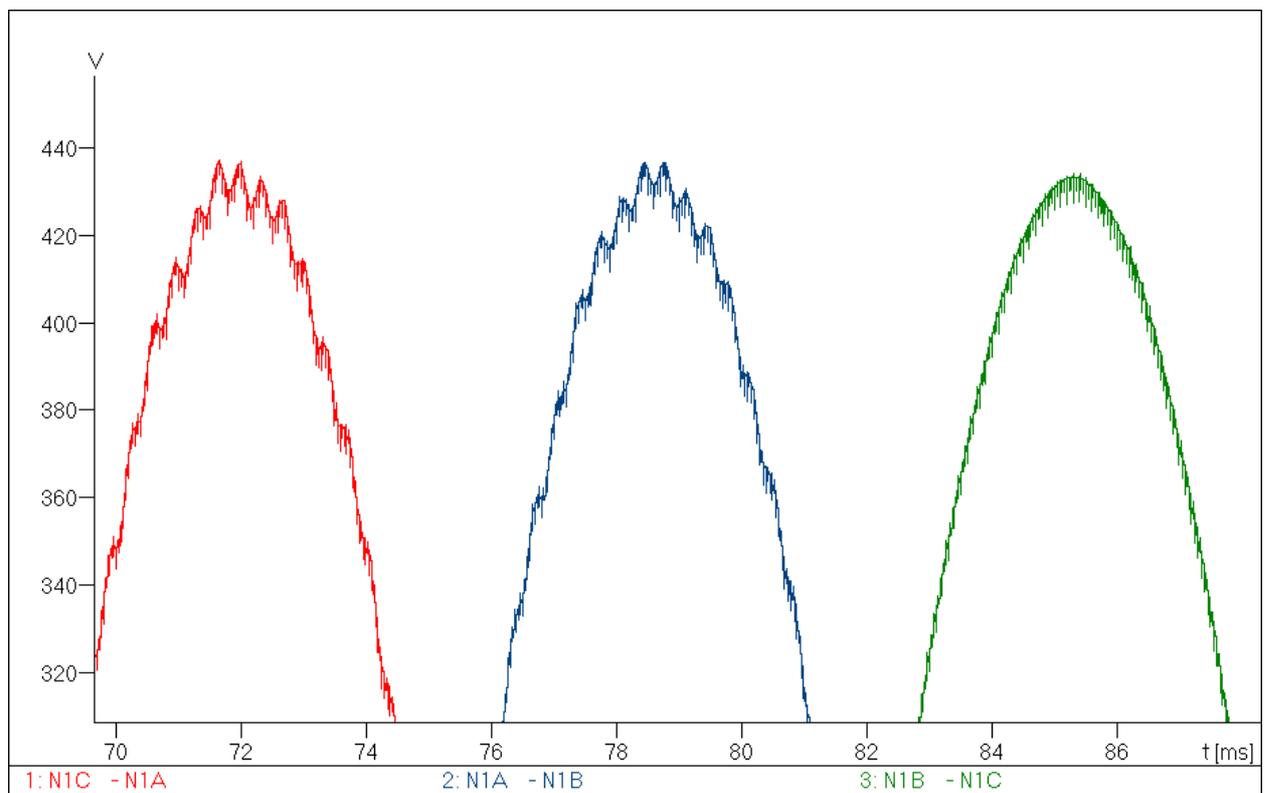
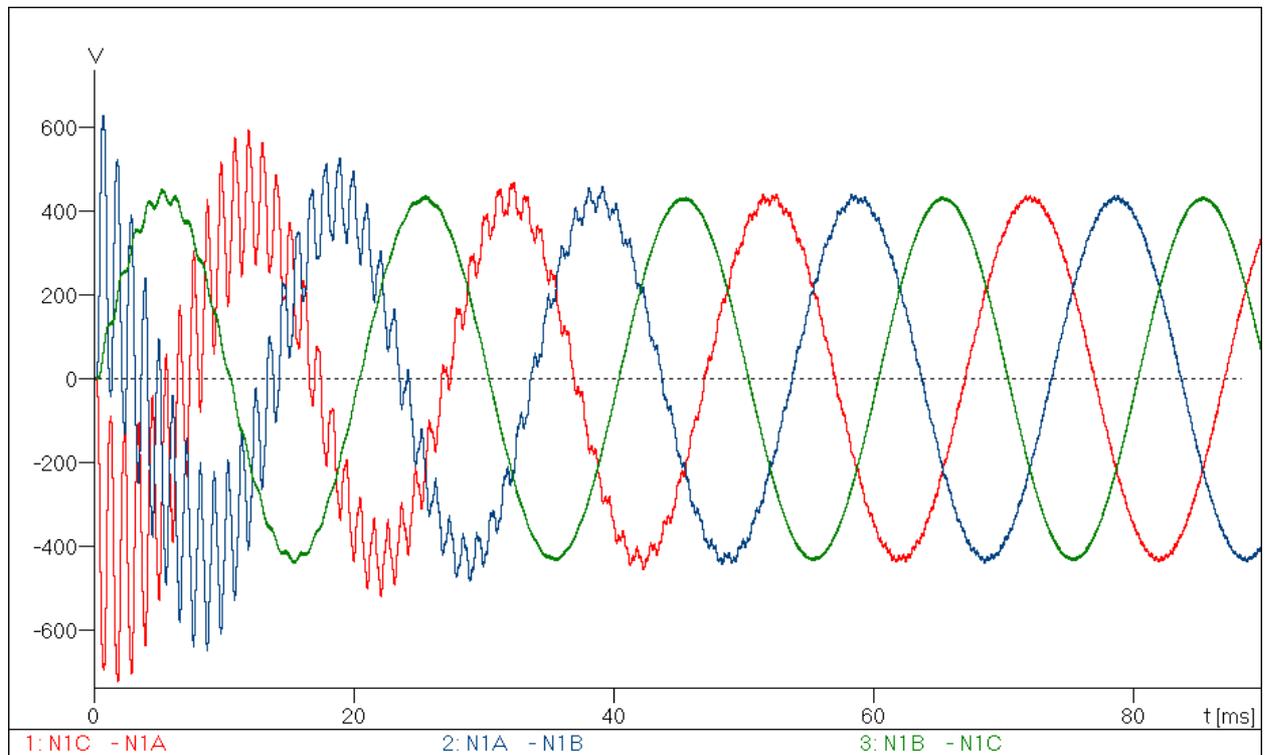


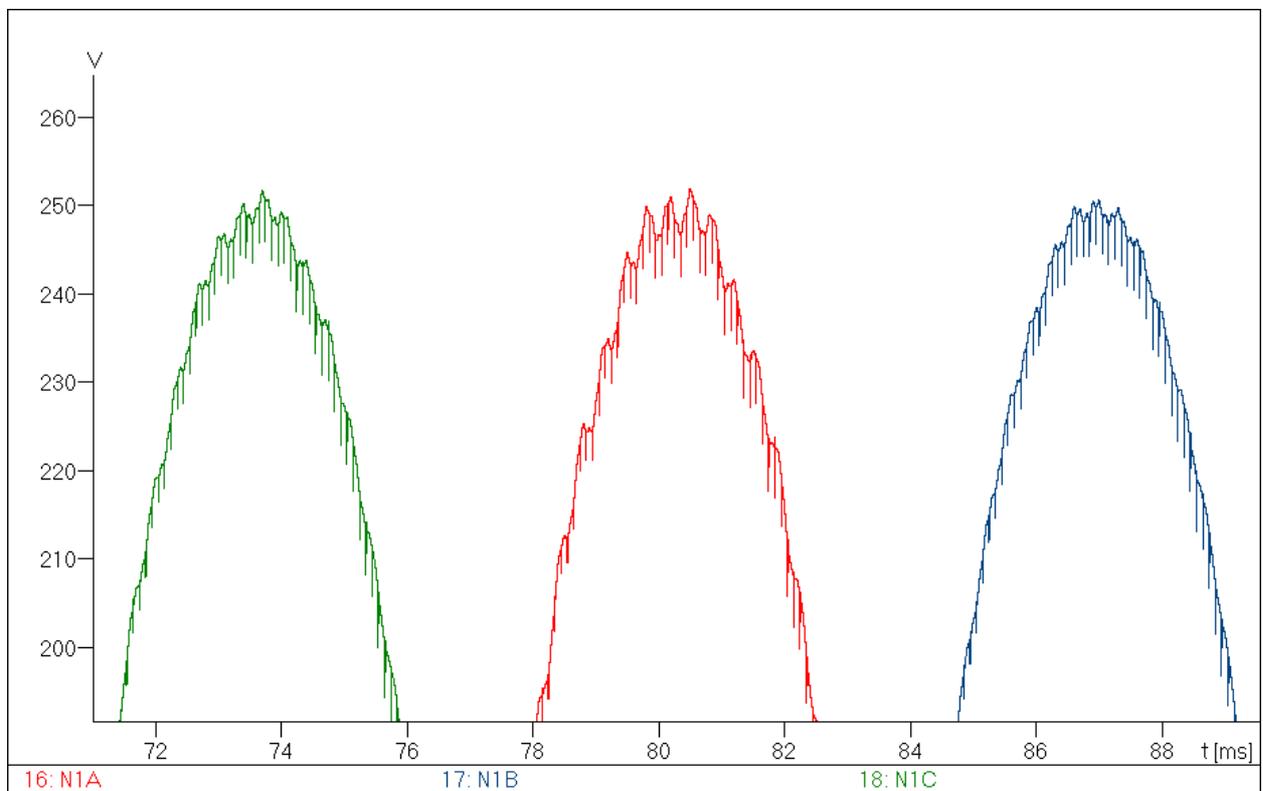
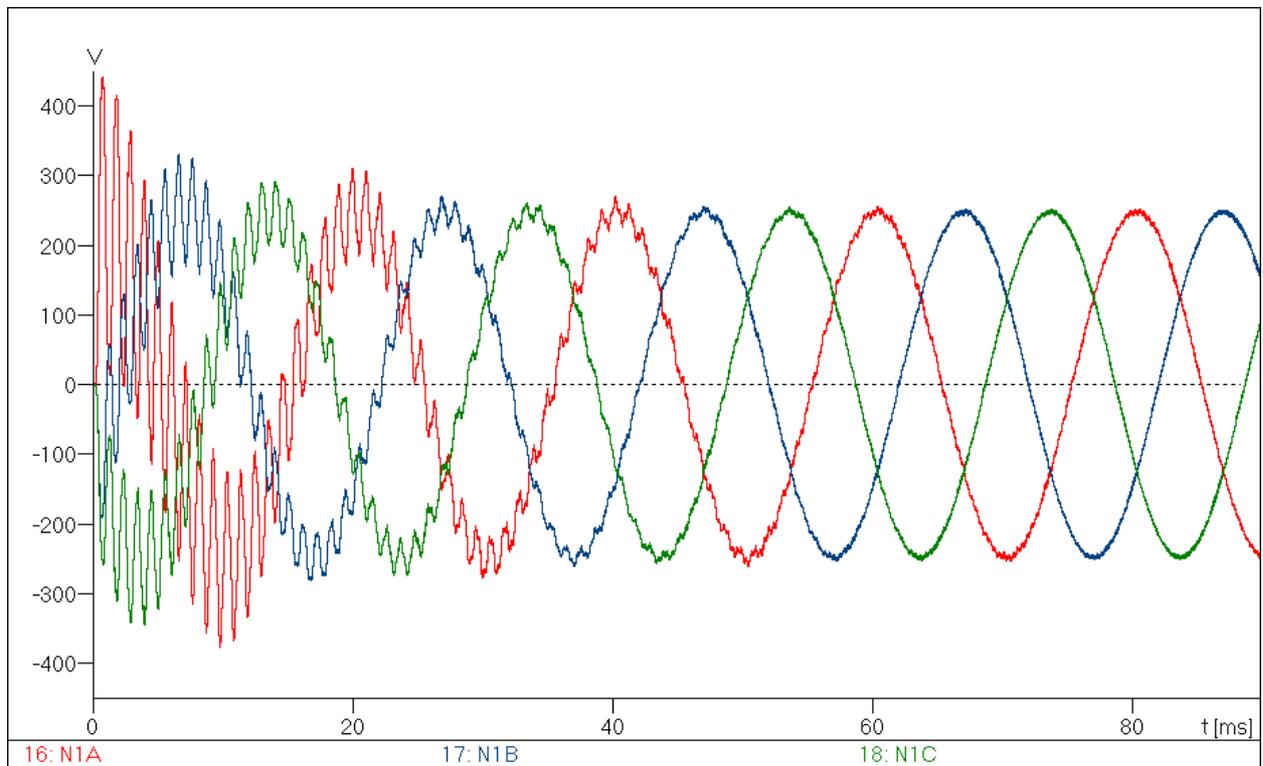




4.4 Planta fotovoltaica 3.

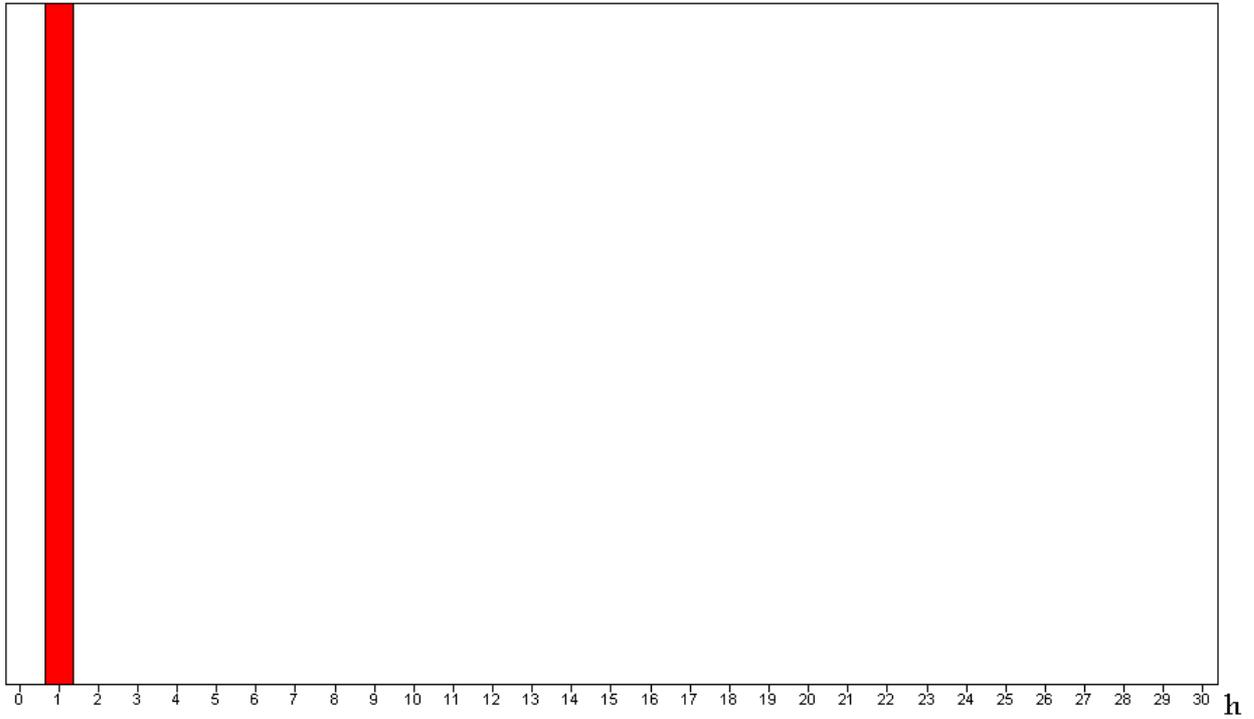
➤ CARGA 3: 1.5 MW, $\cos\varphi=0.87$. Conectada a red.



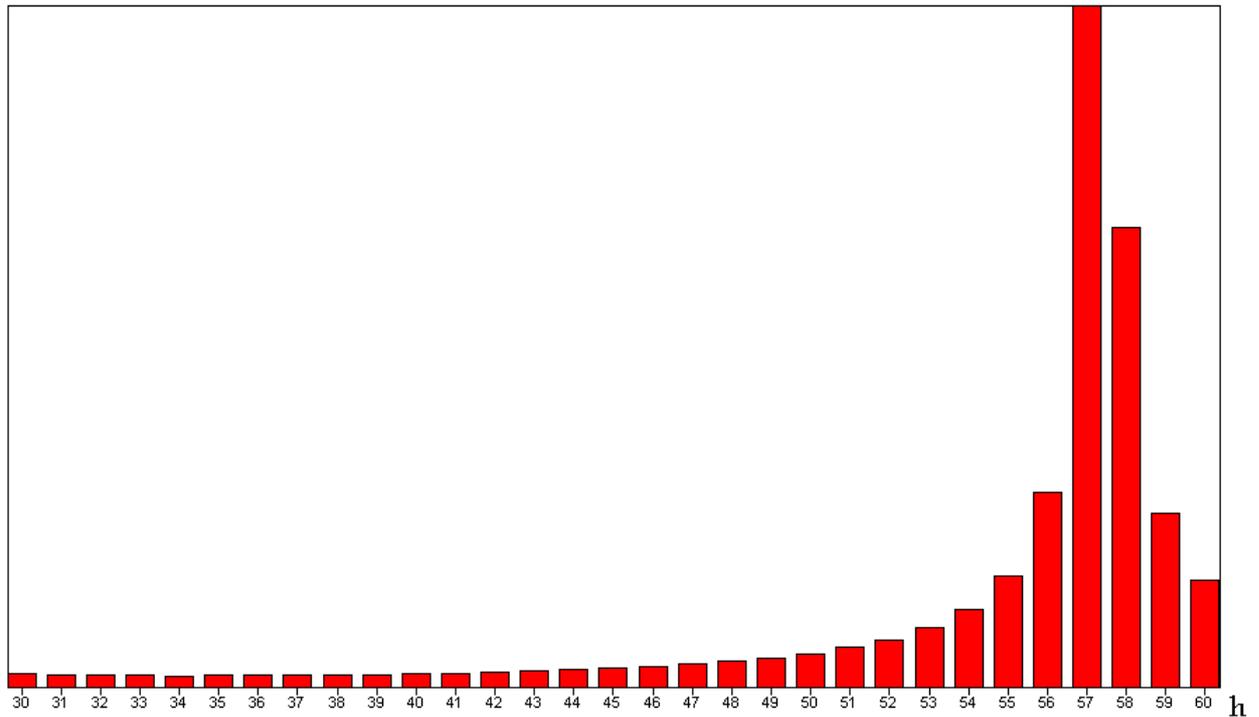


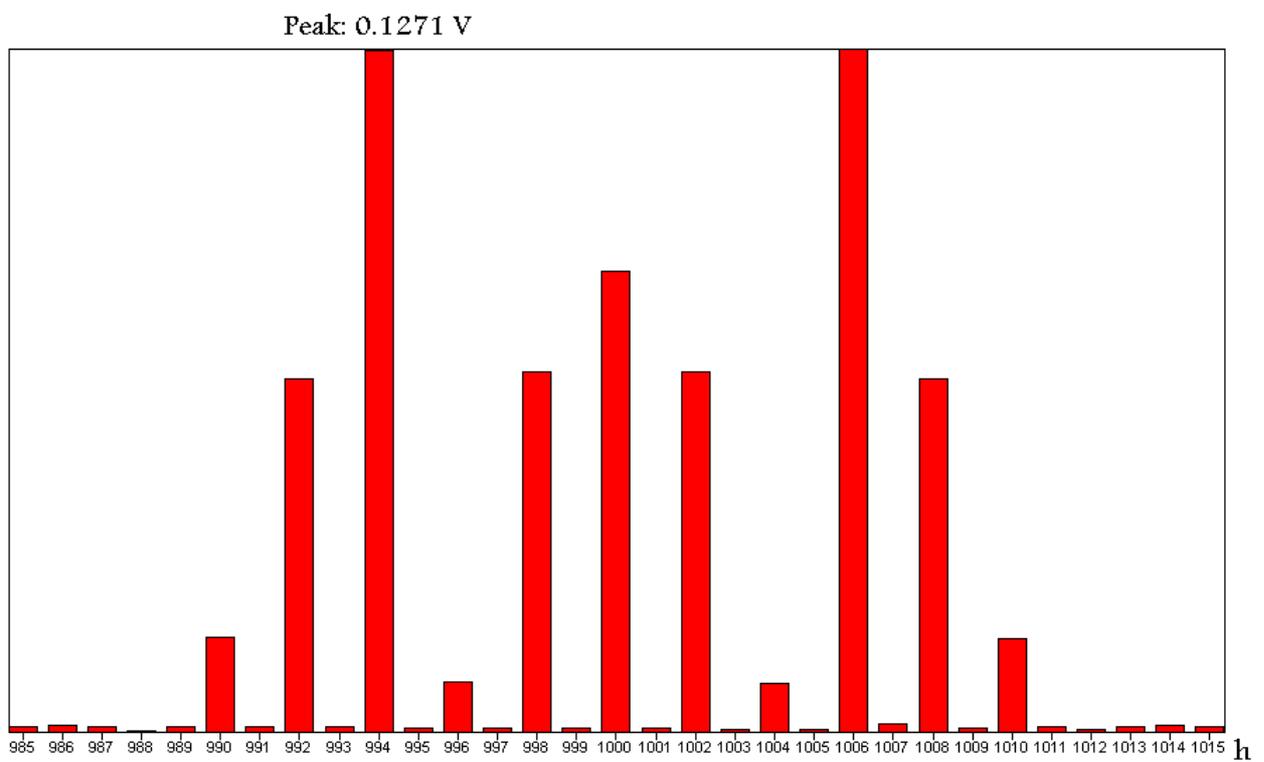
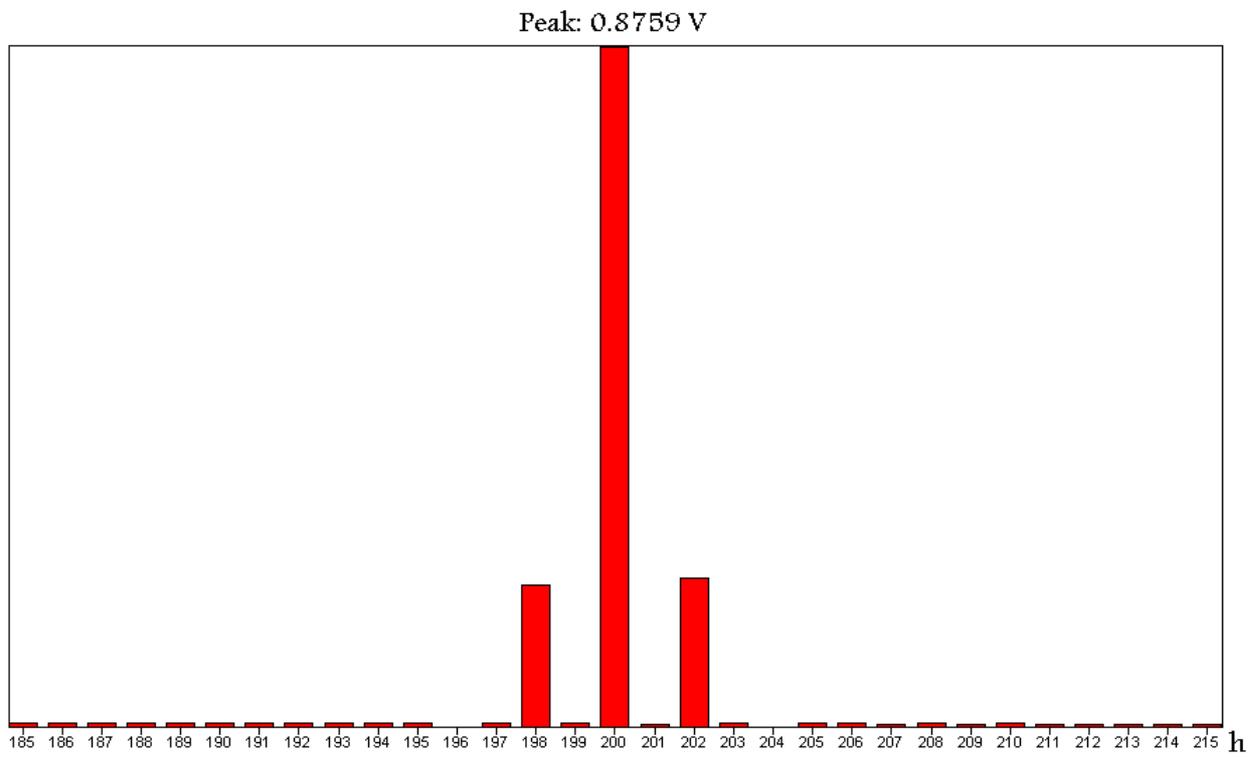
Transformada de Fourier: V_{NIA}

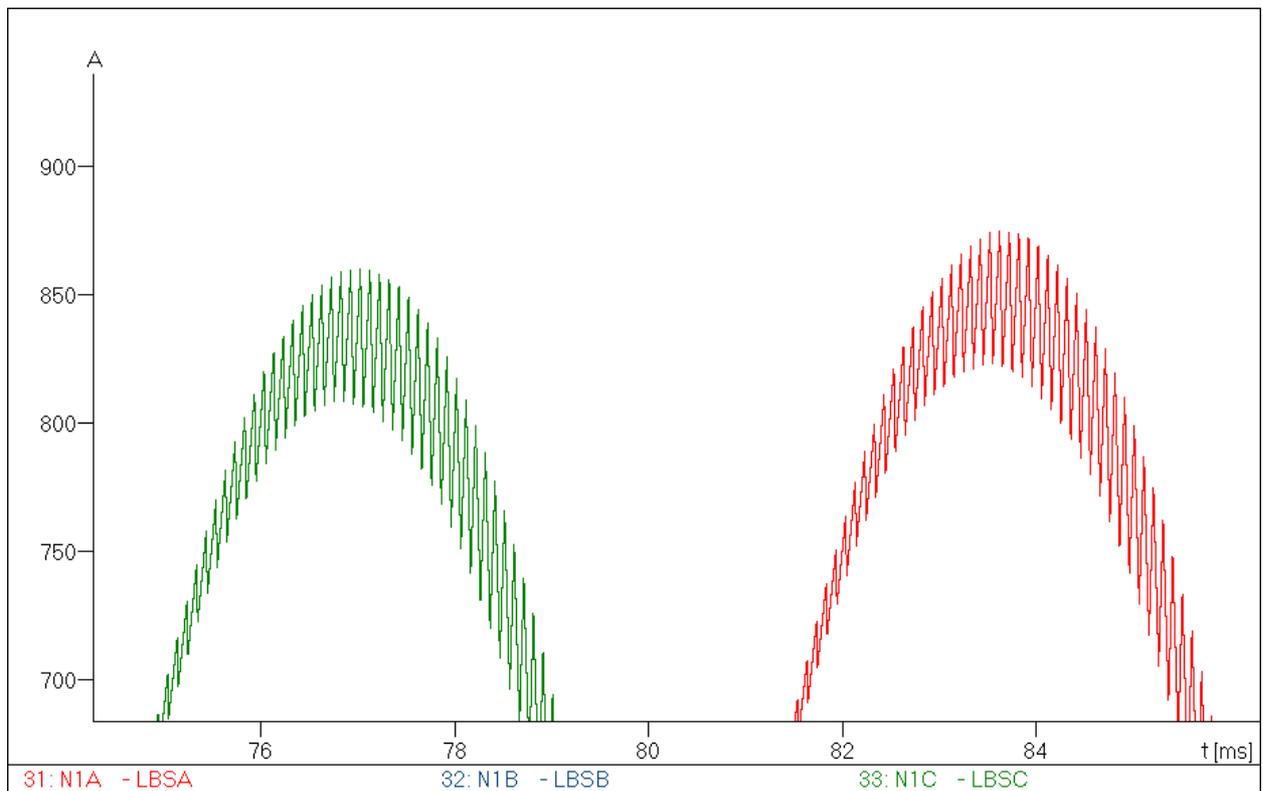
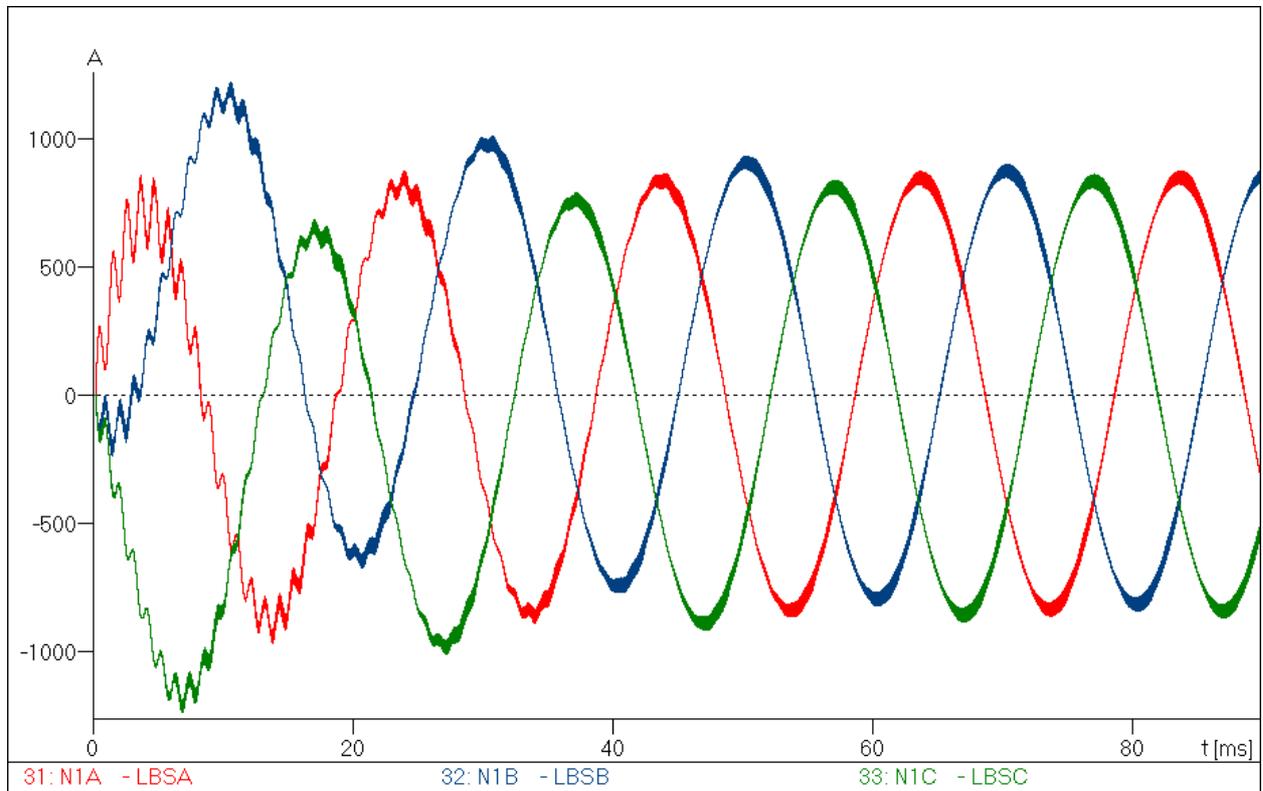
Peak: 249.7 V

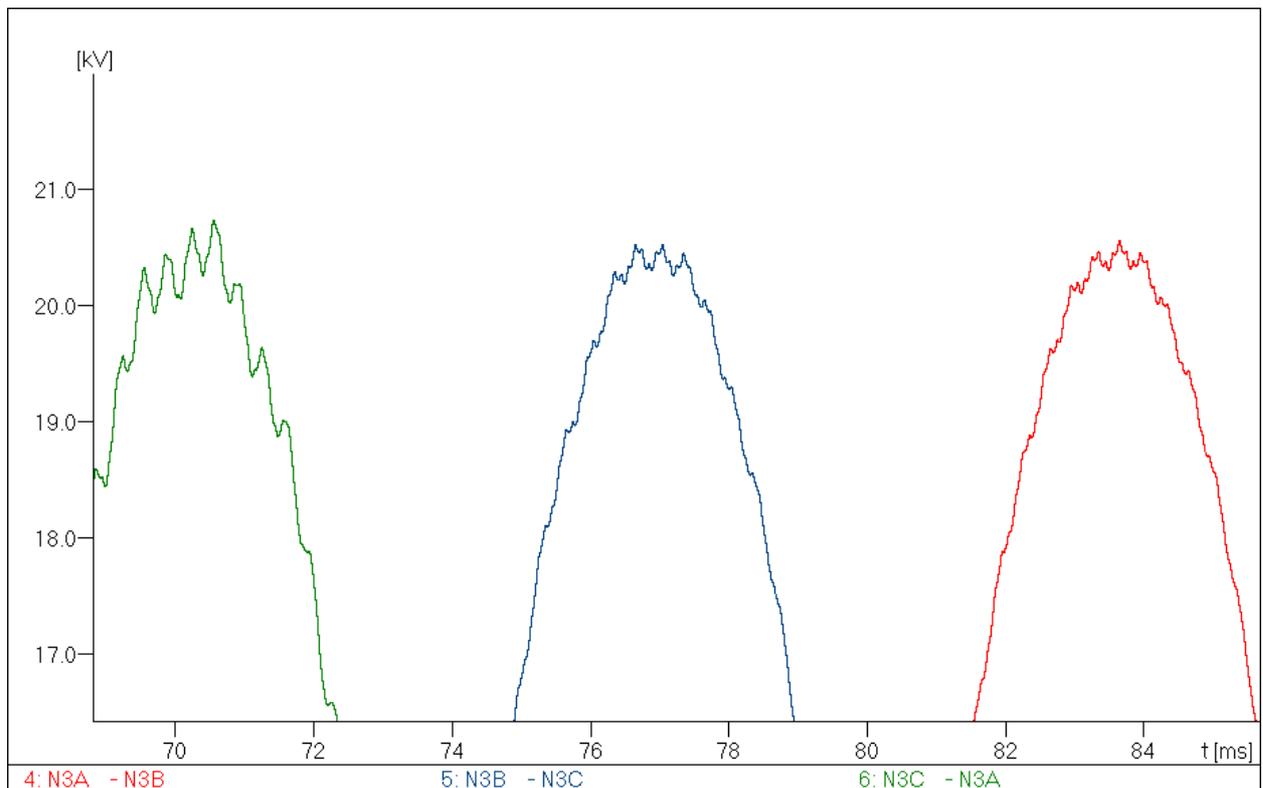
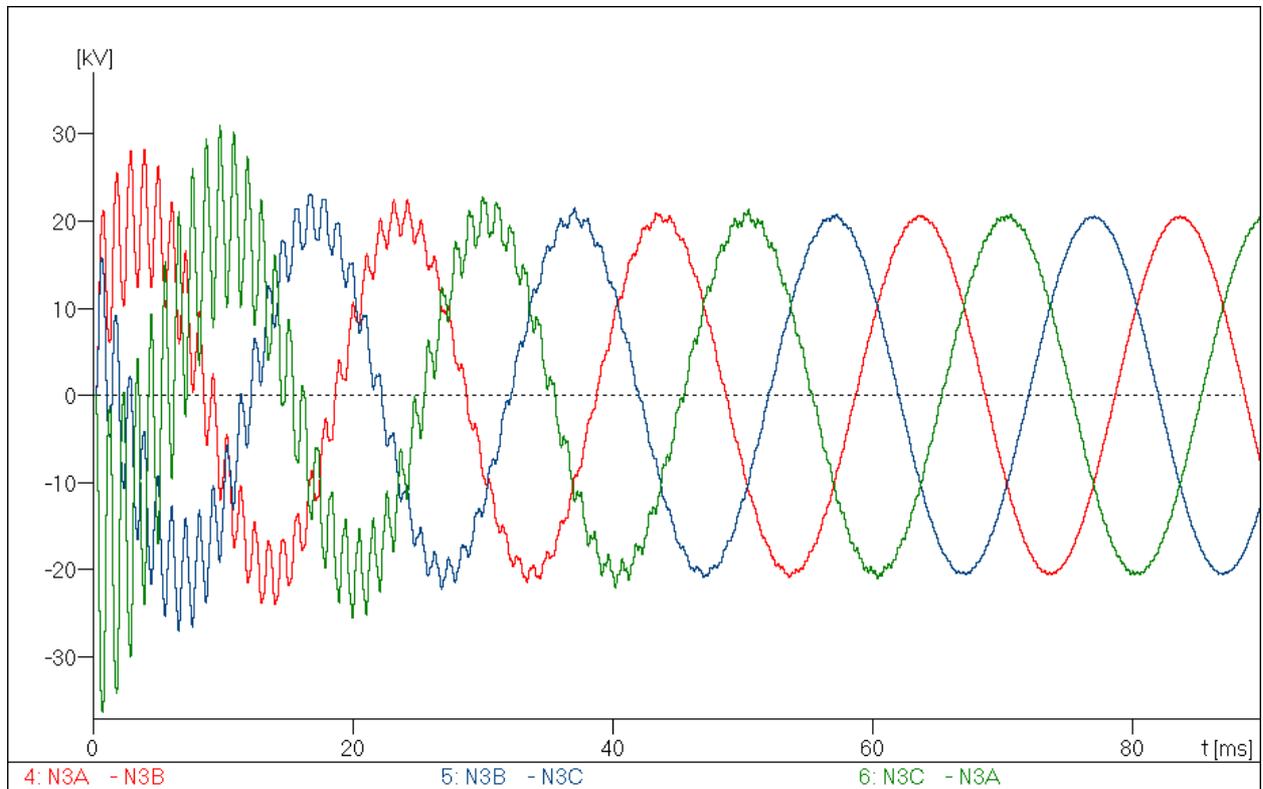


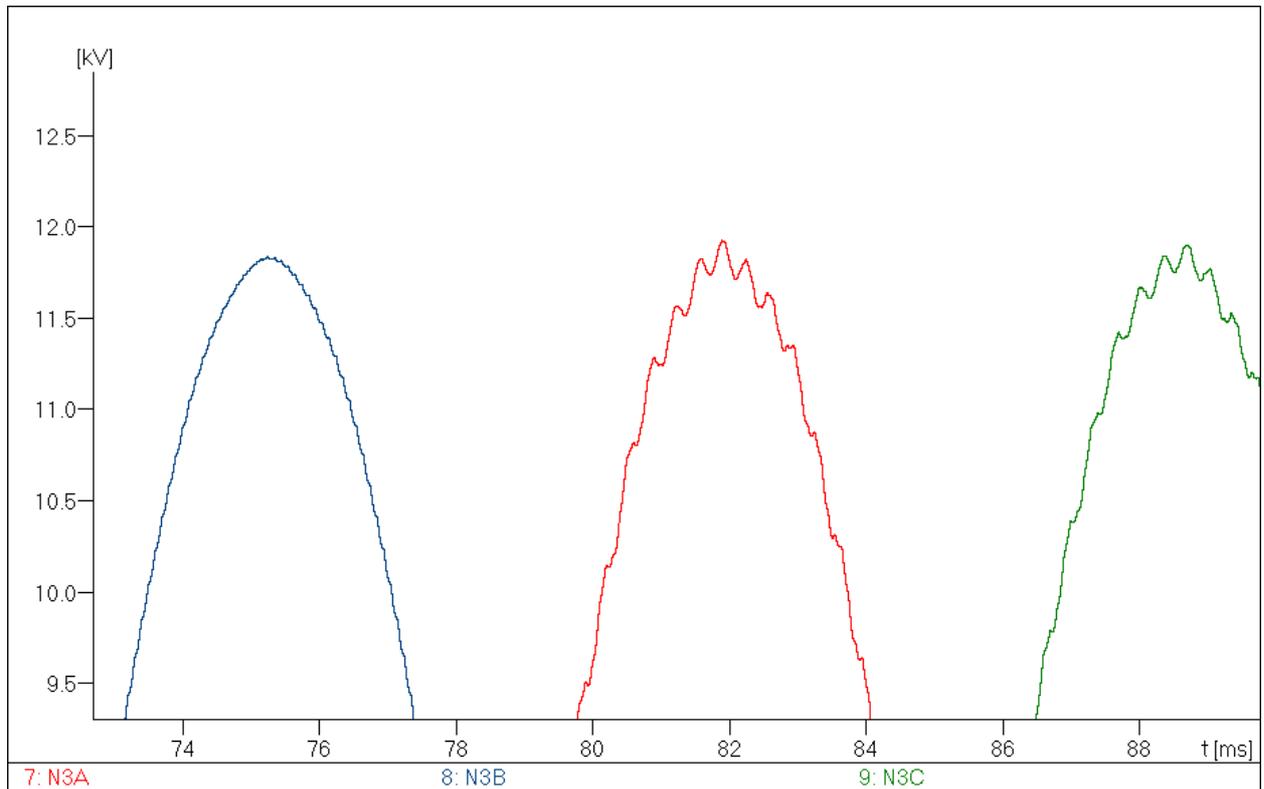
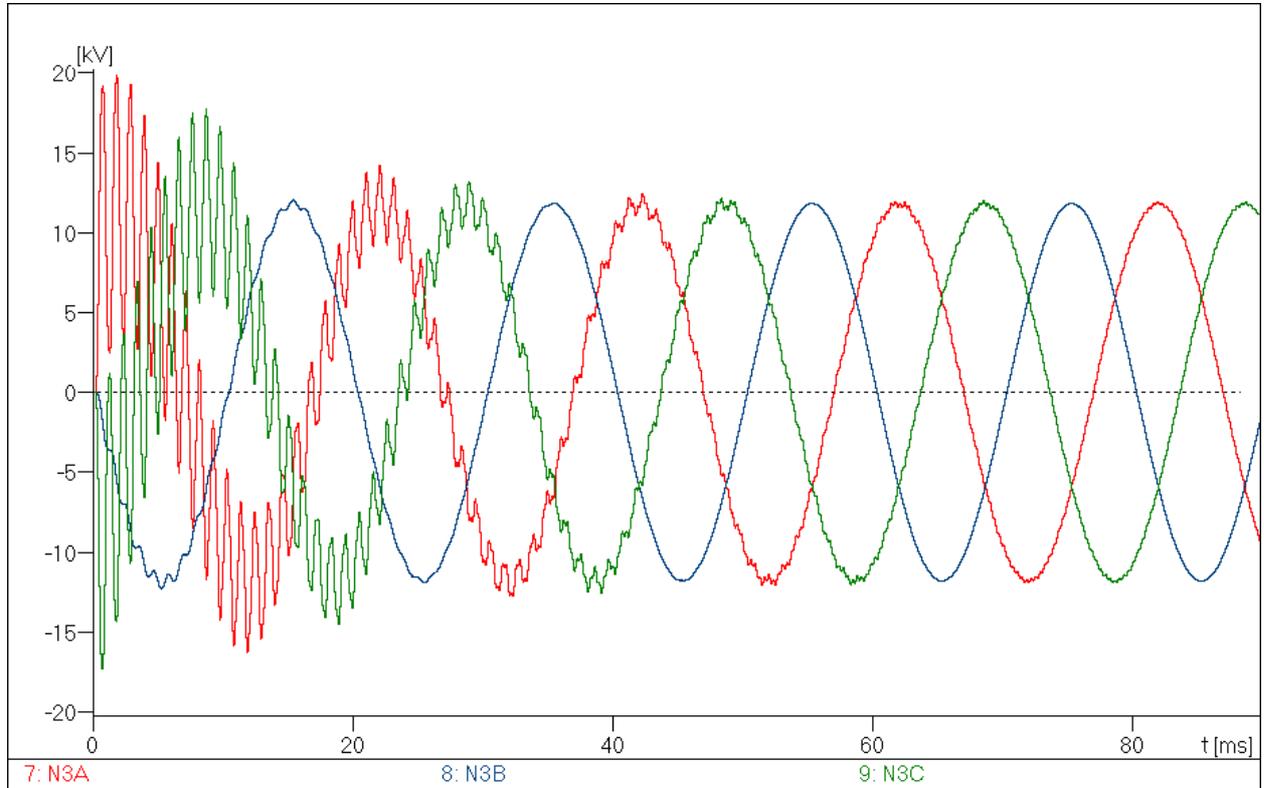
Peak: 1.595 V





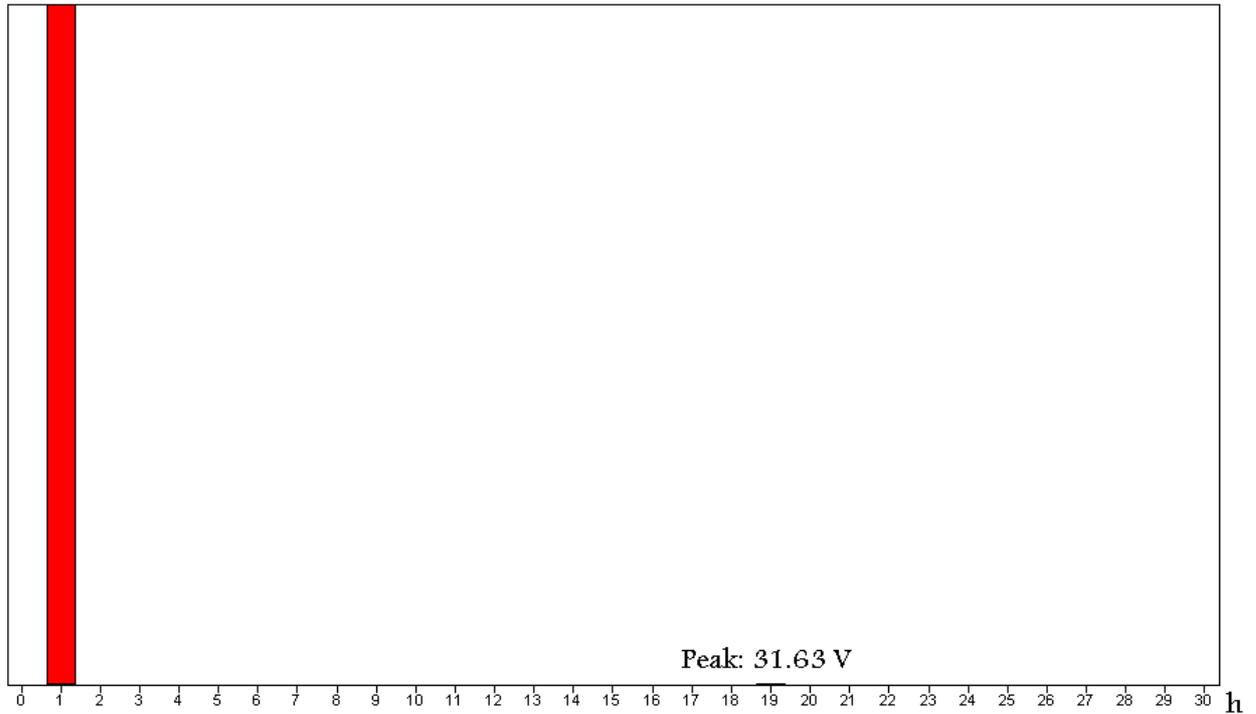




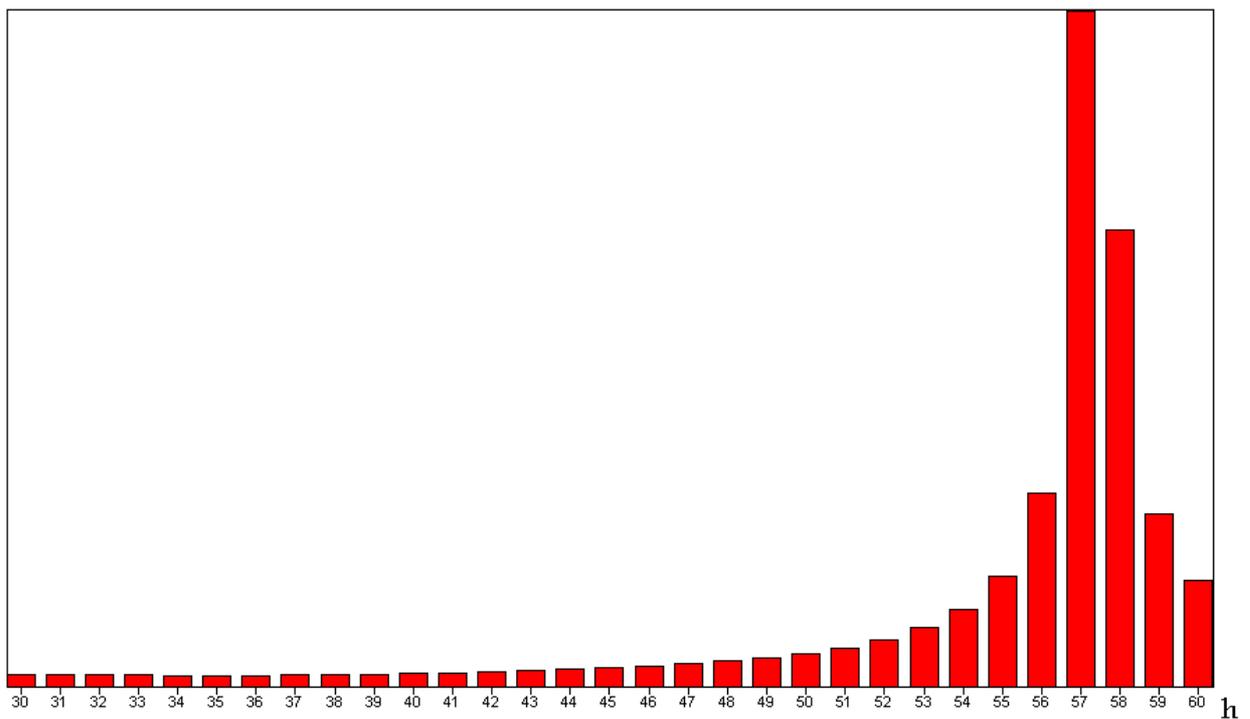


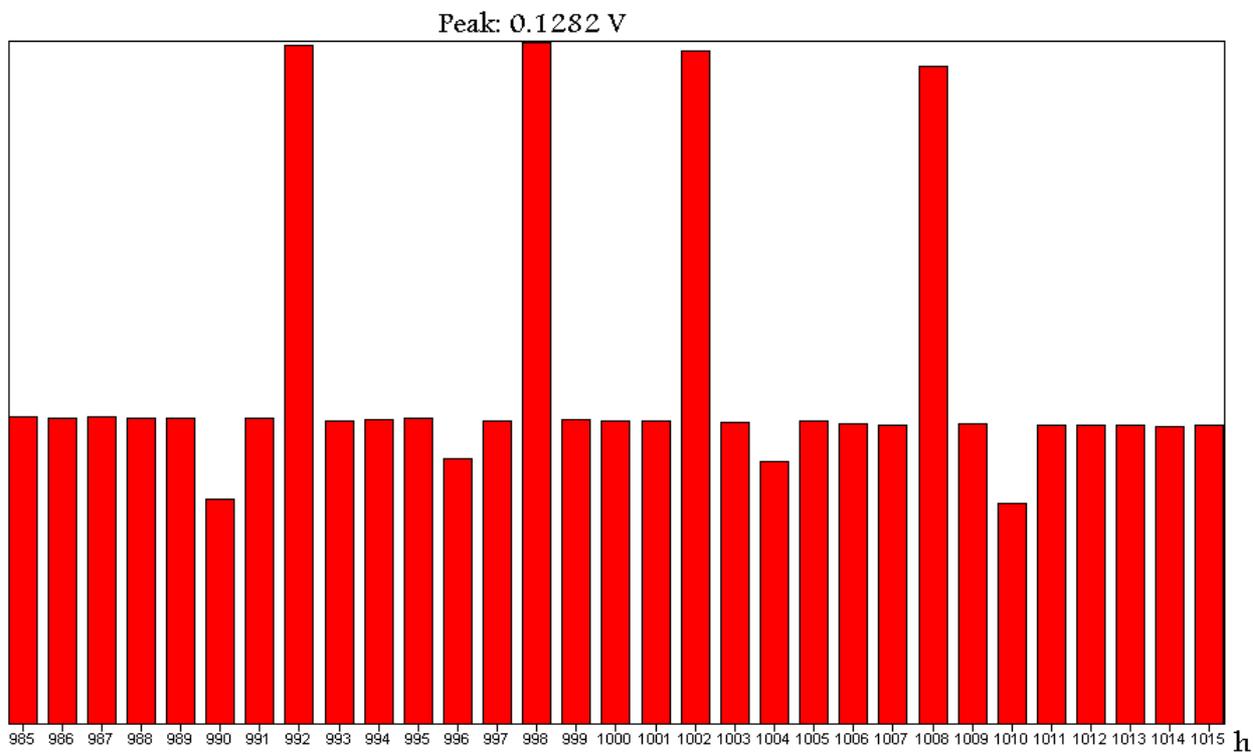
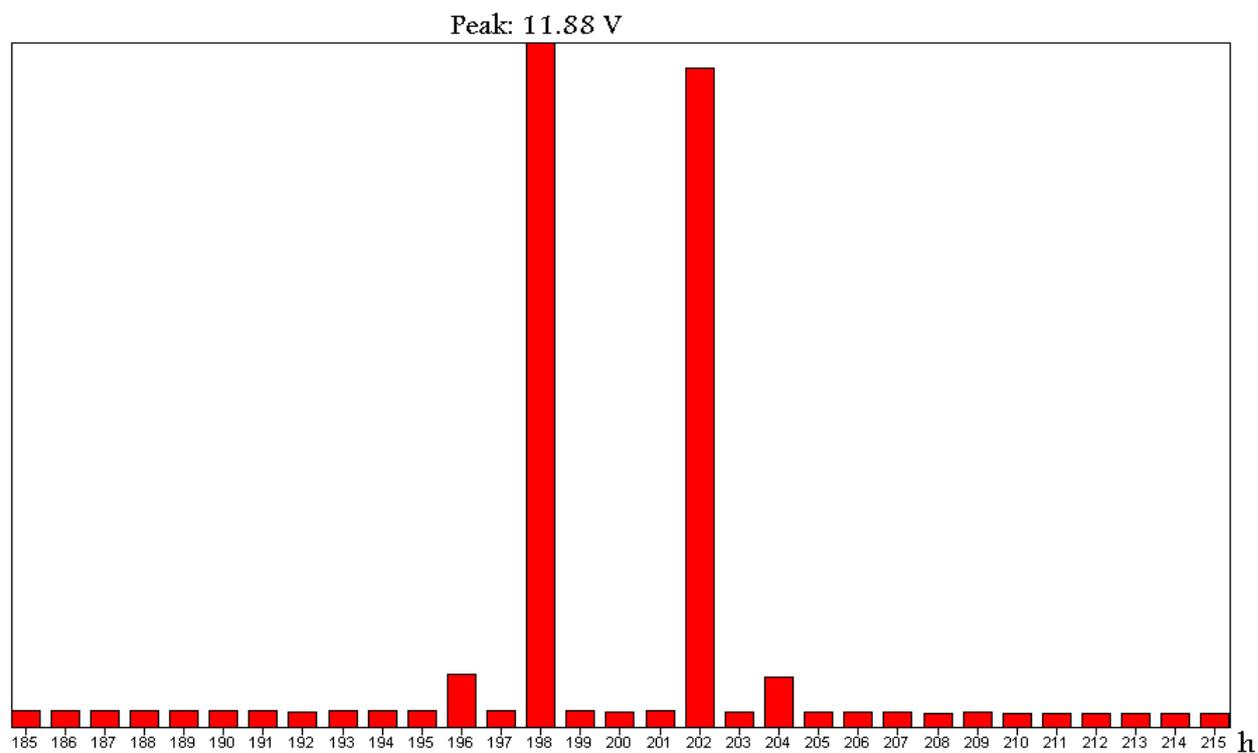
Transformada de Fourier: V_{N3A}

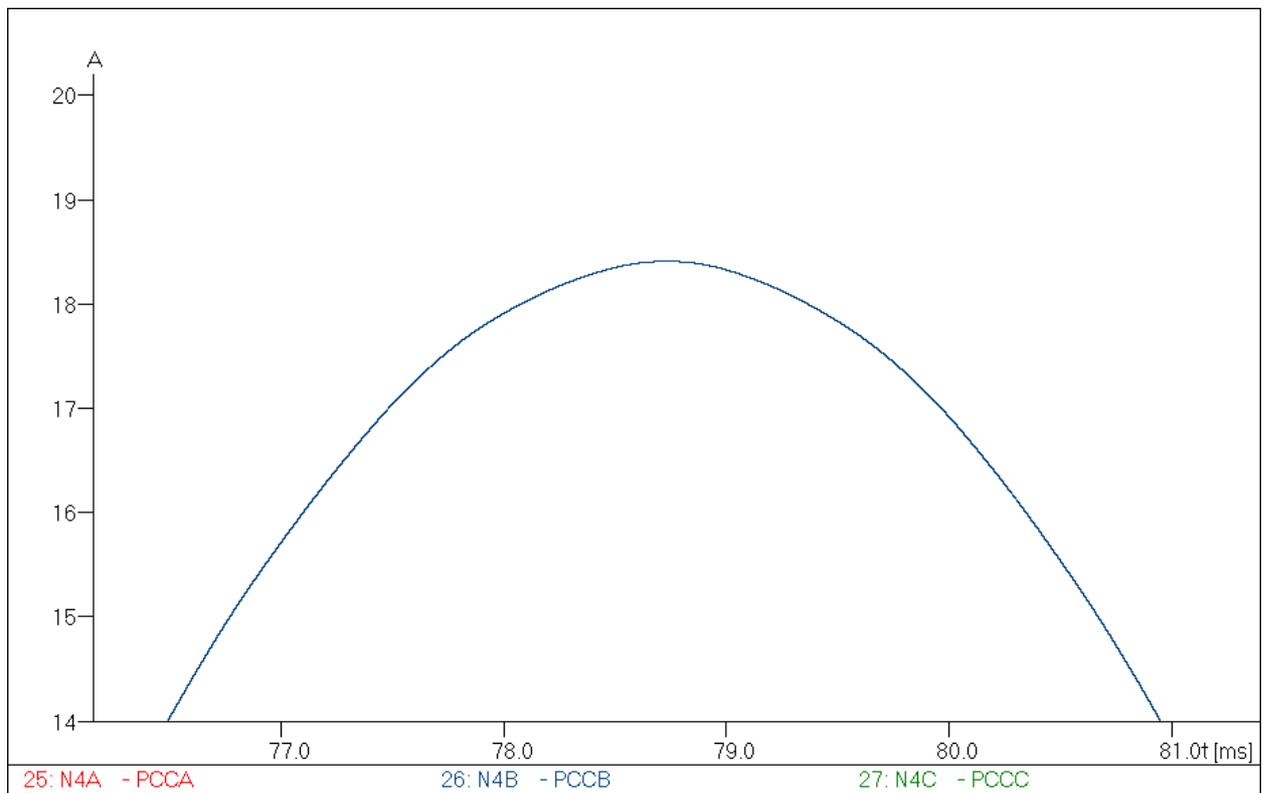
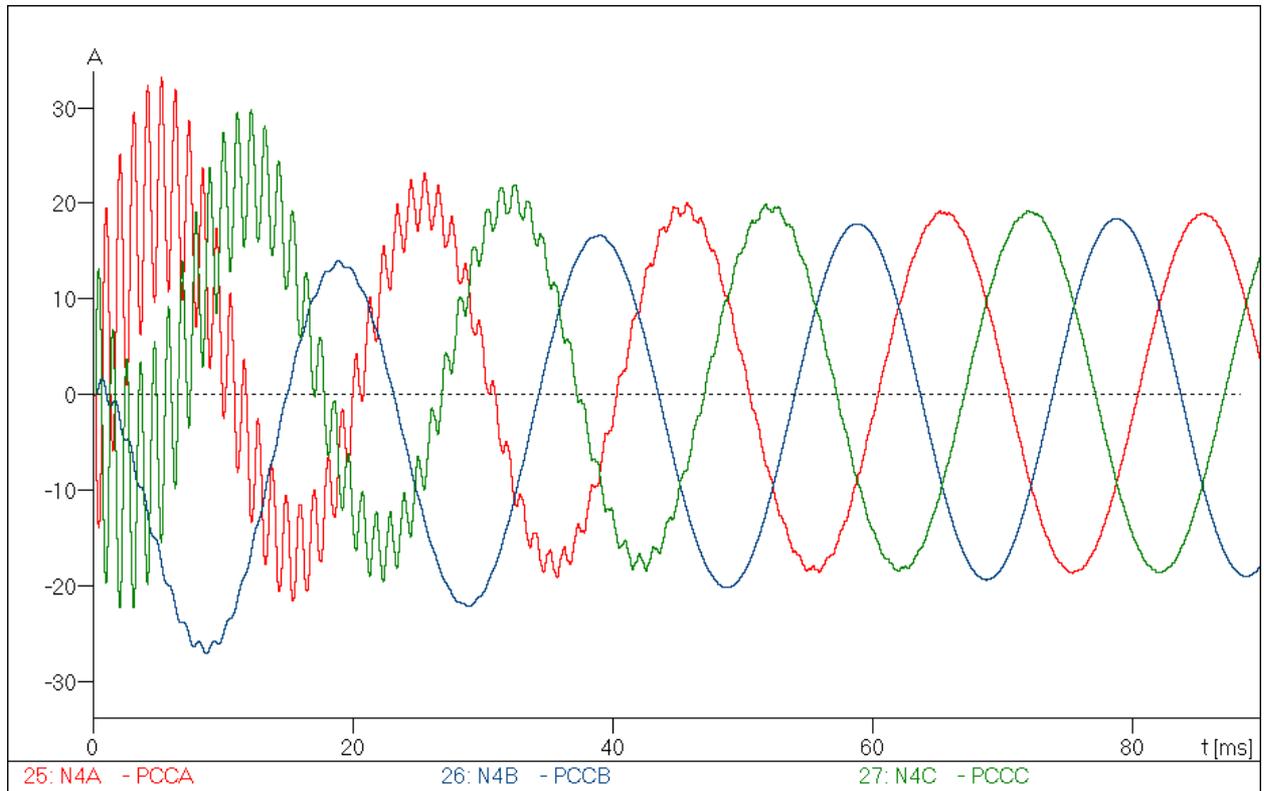
Peak: 11.81 kV

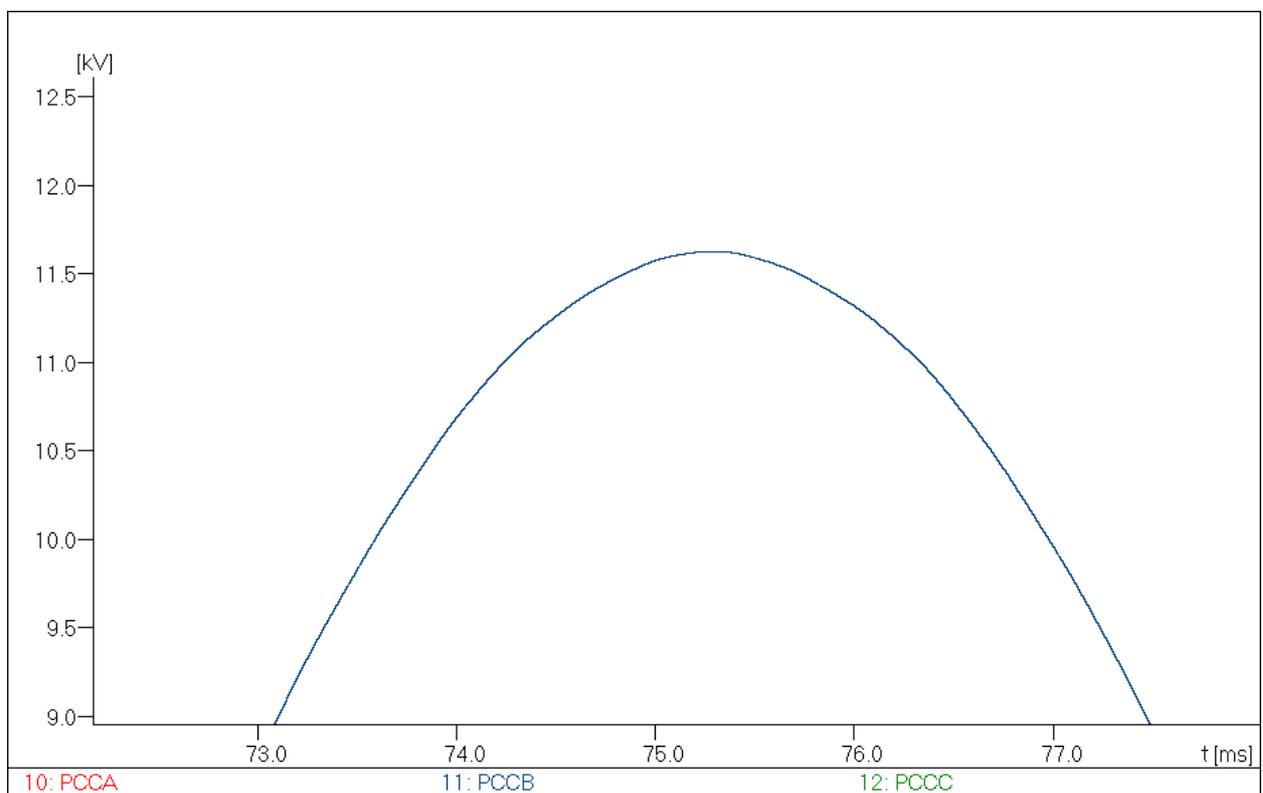
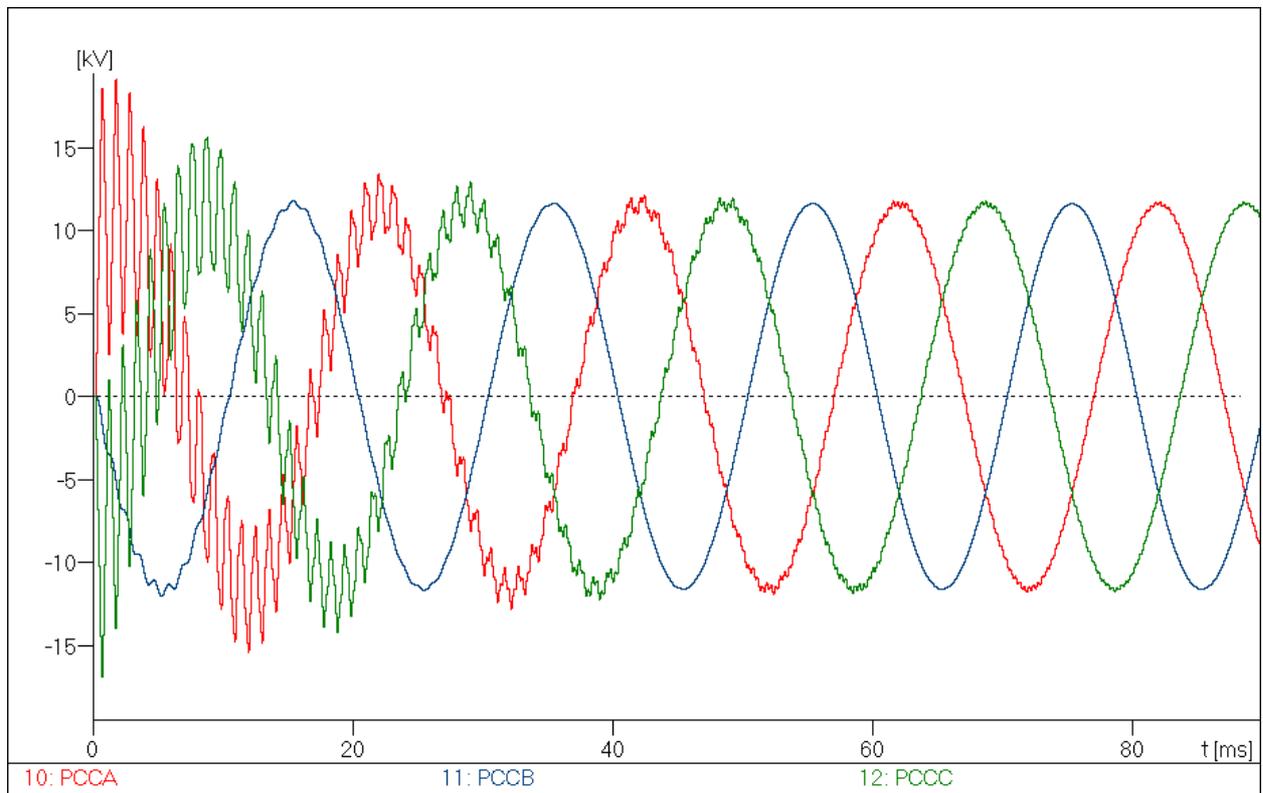


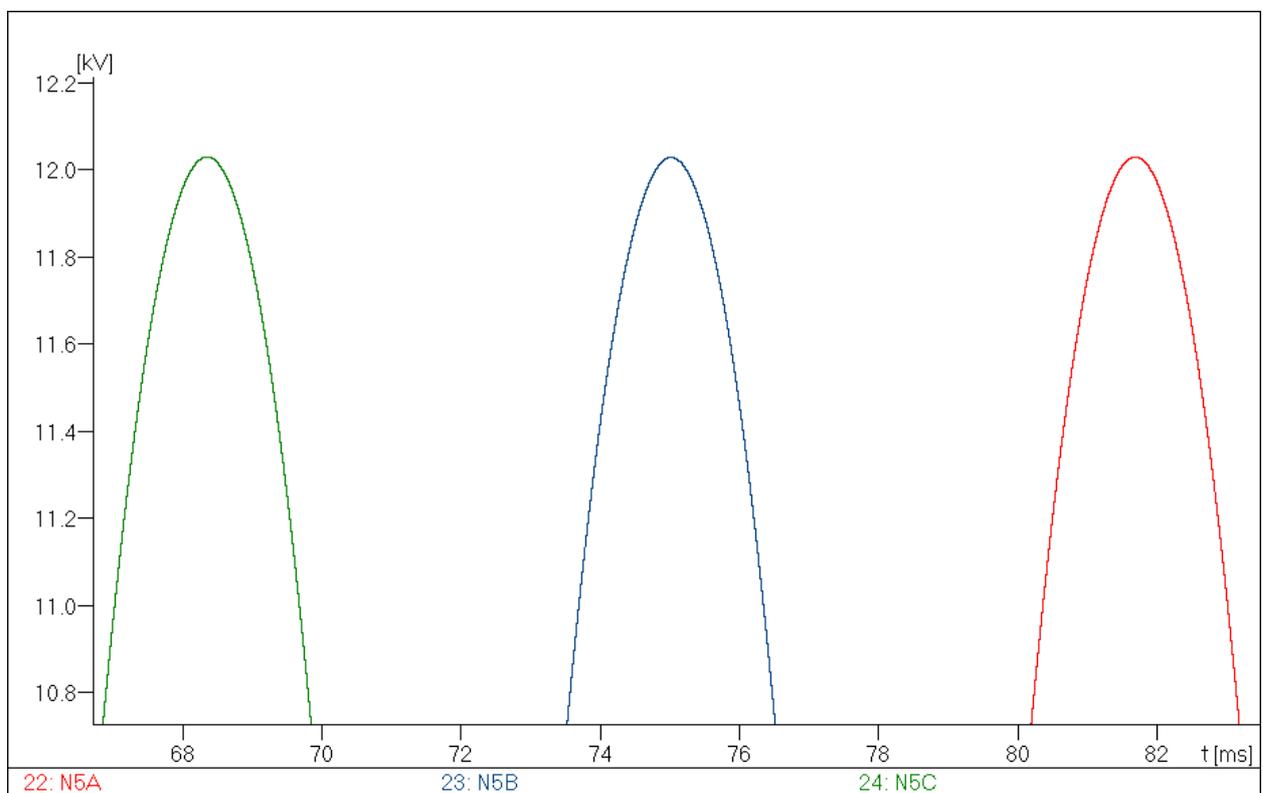
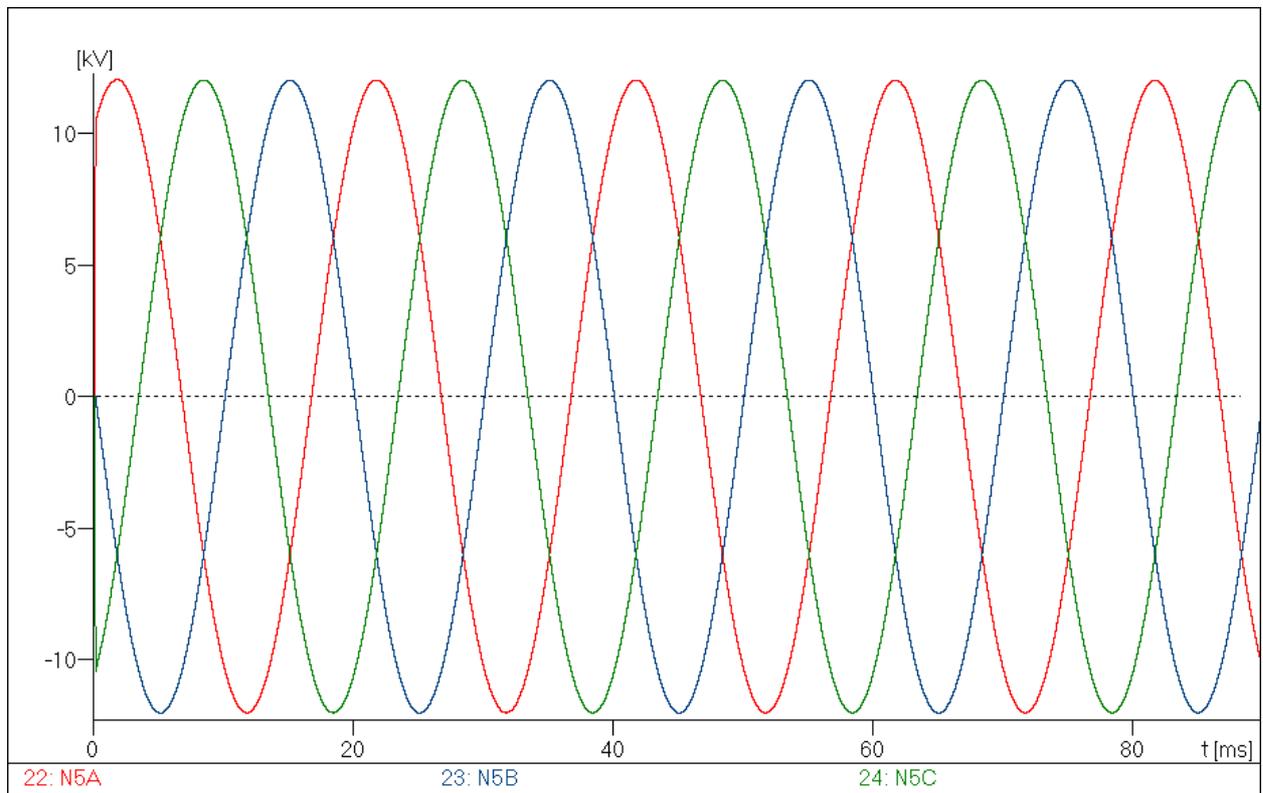
Peak: 66.17 V

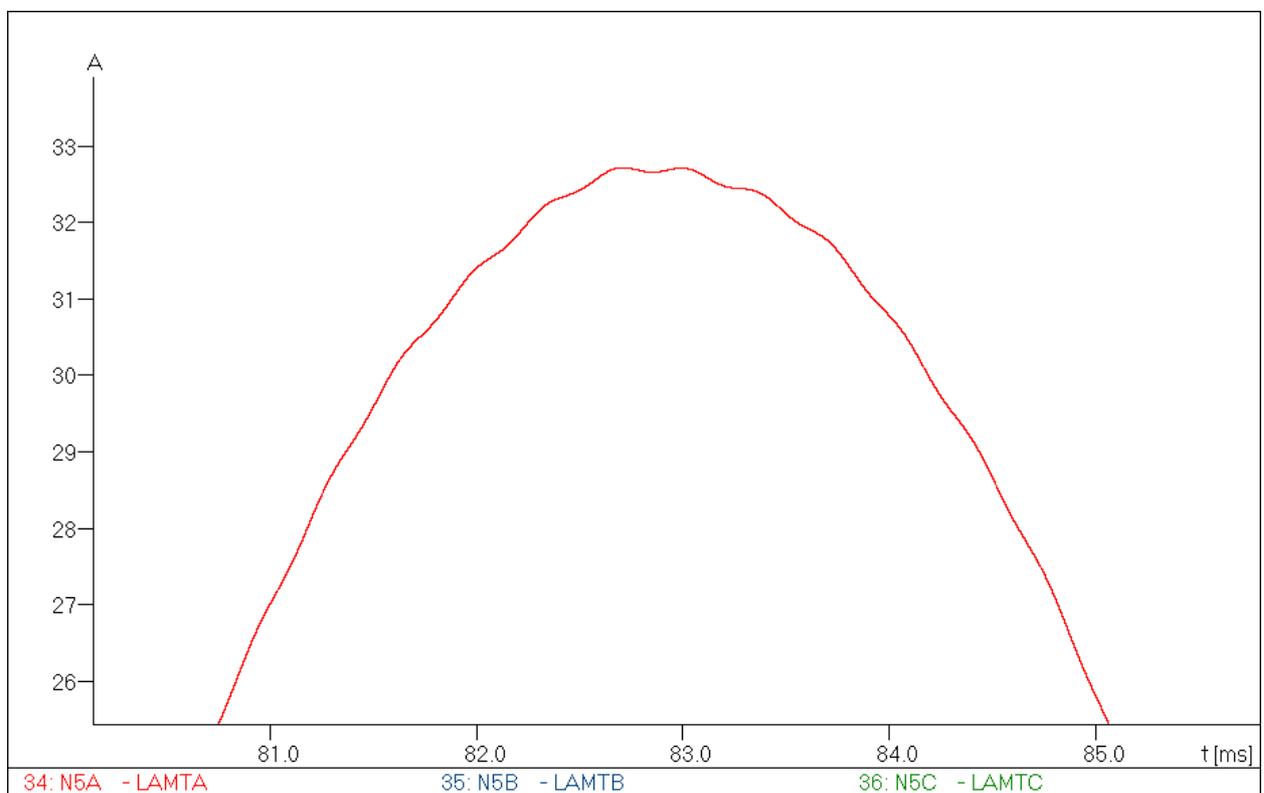
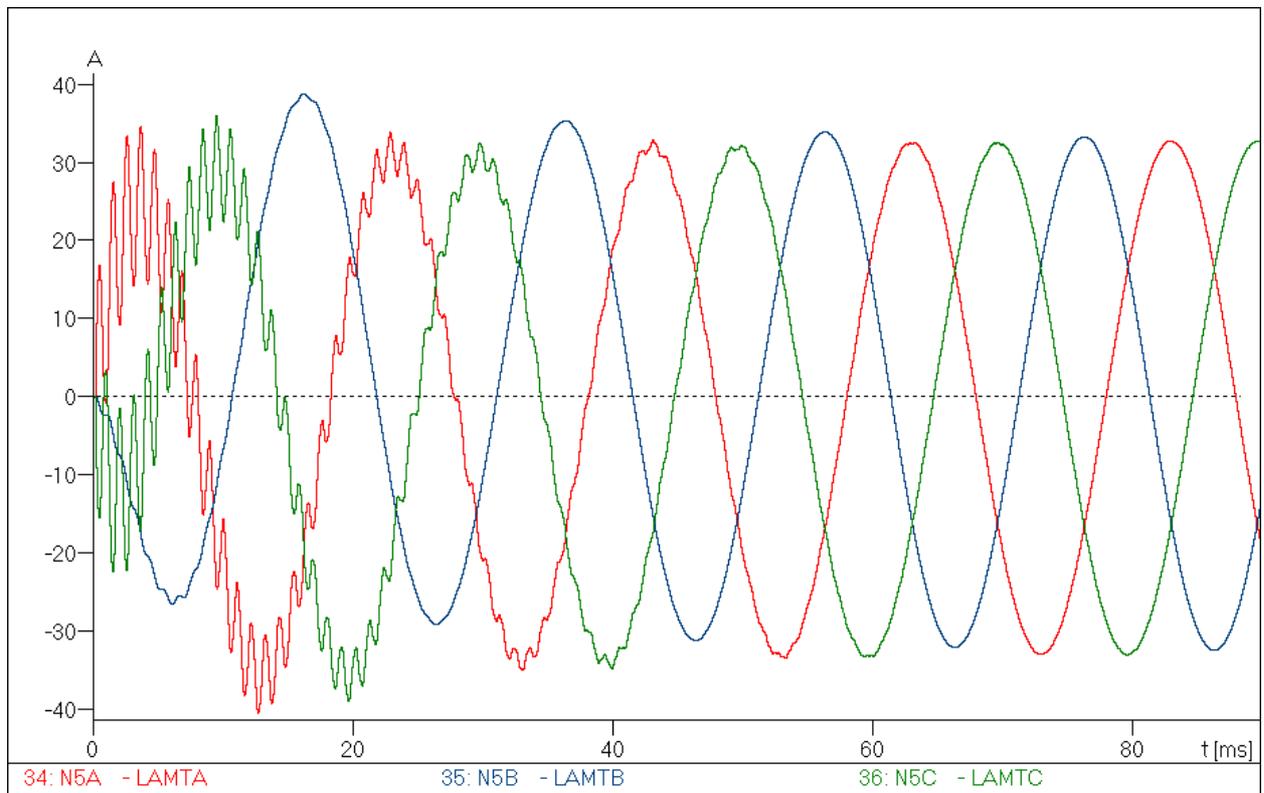


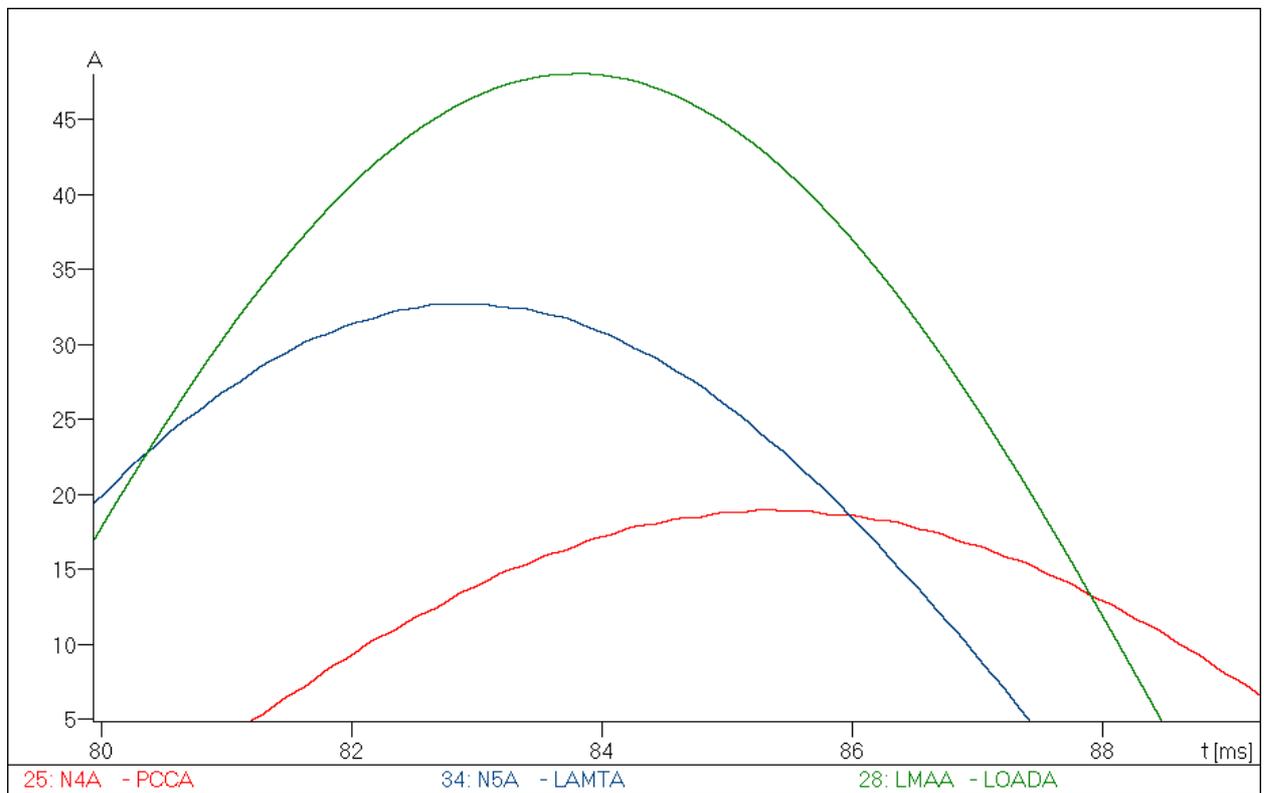
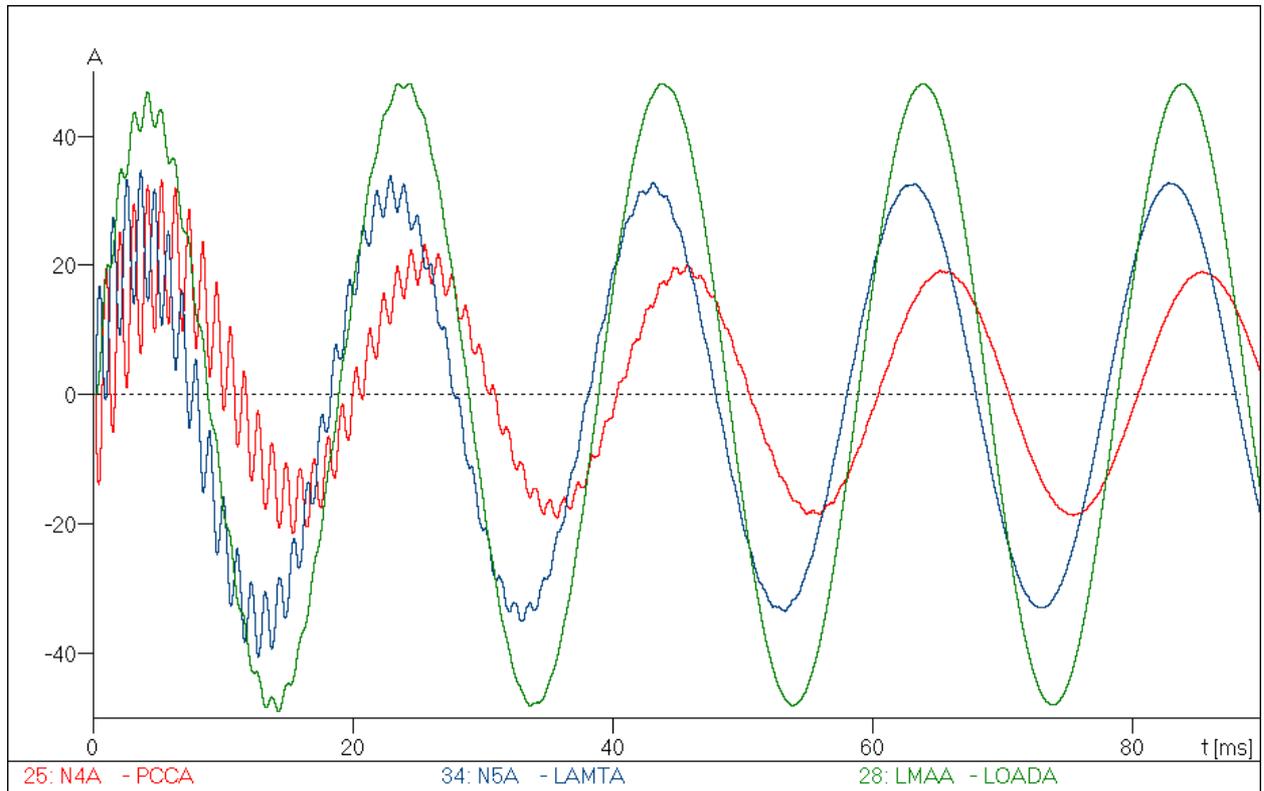


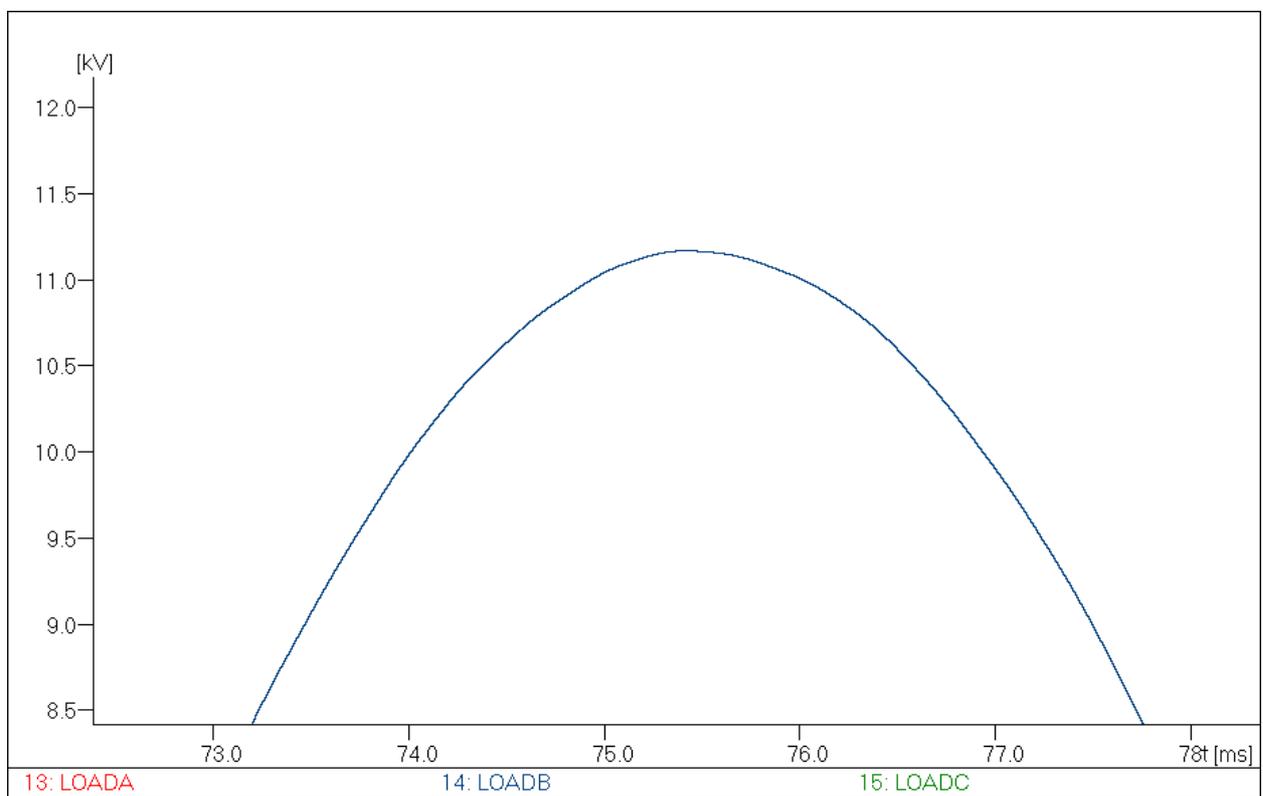
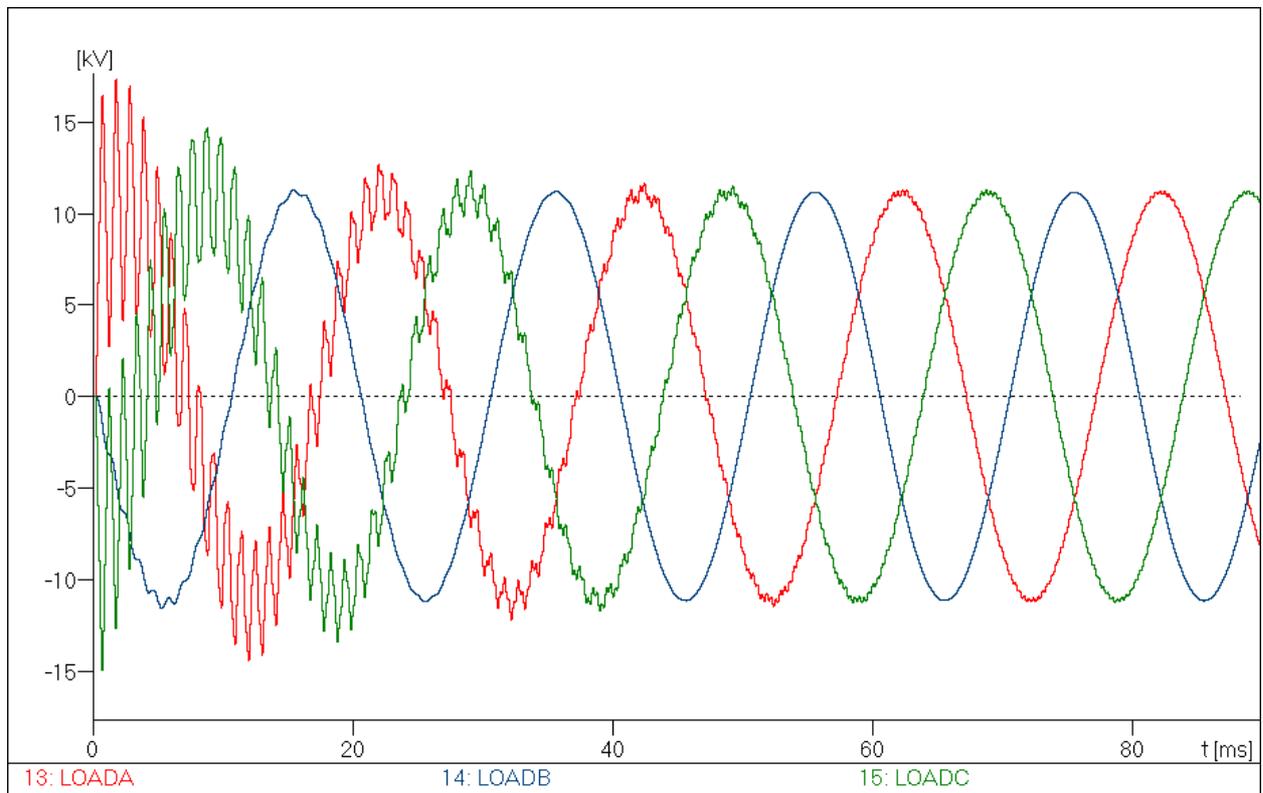


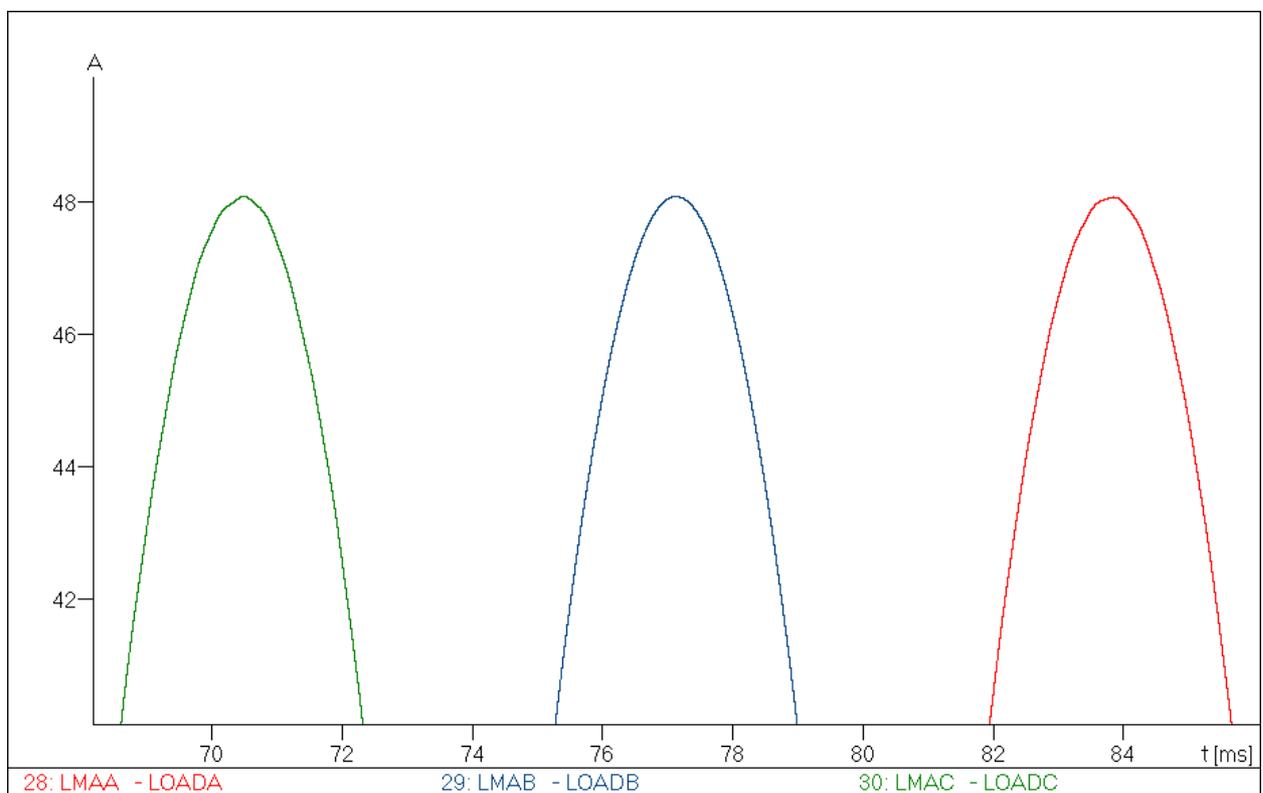
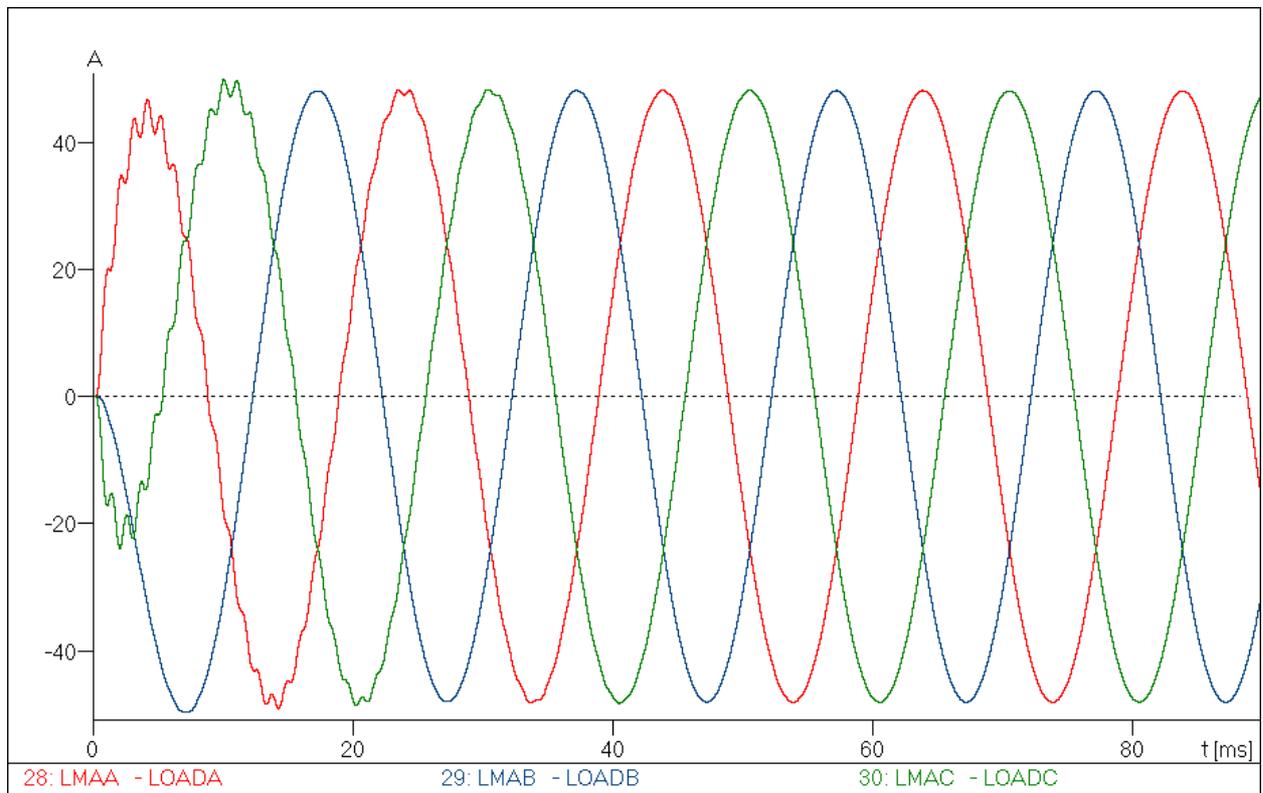
















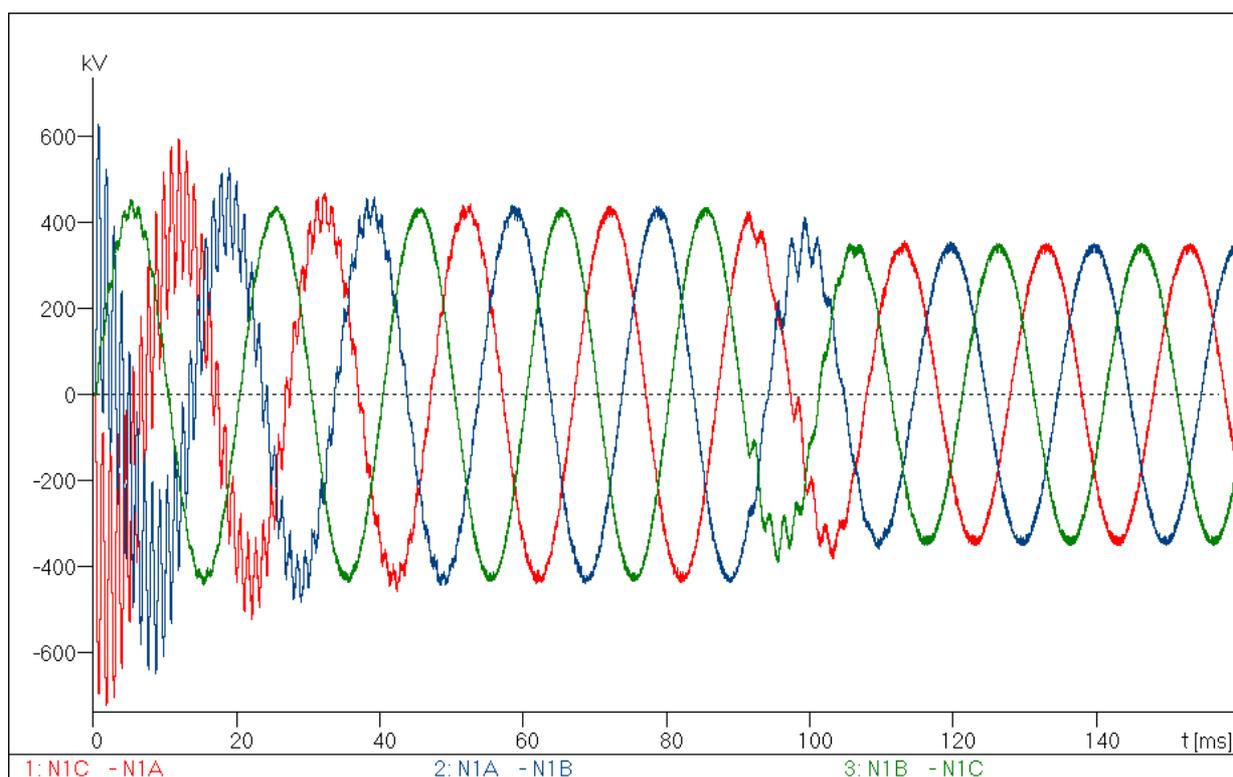
4.5 Planta fotovoltaica 4.

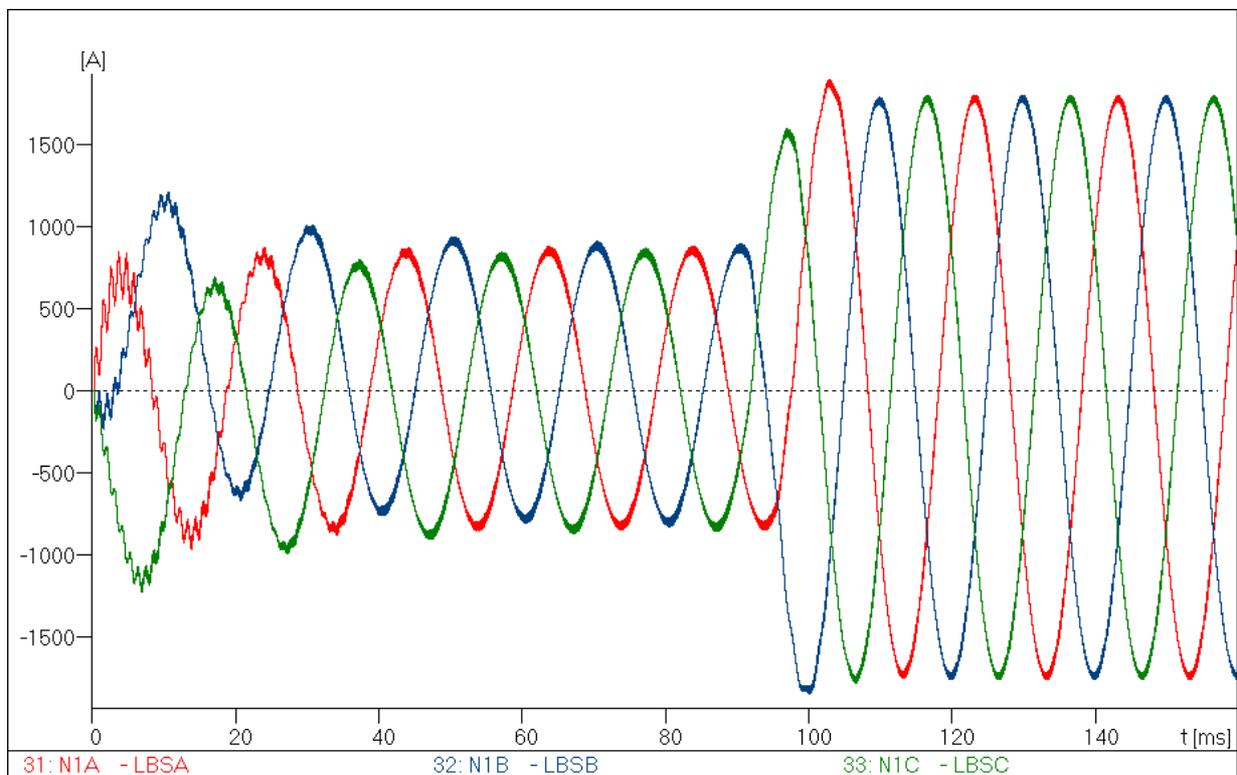
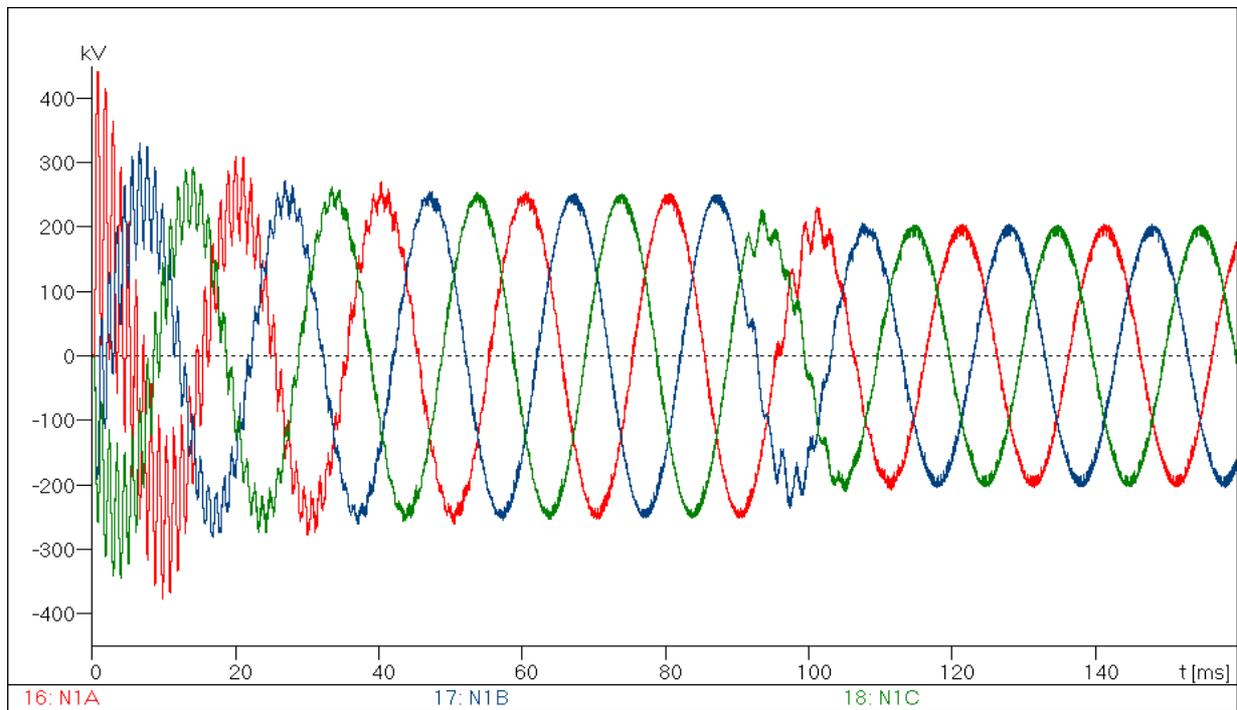
Métodos pasivos de detección en isla.

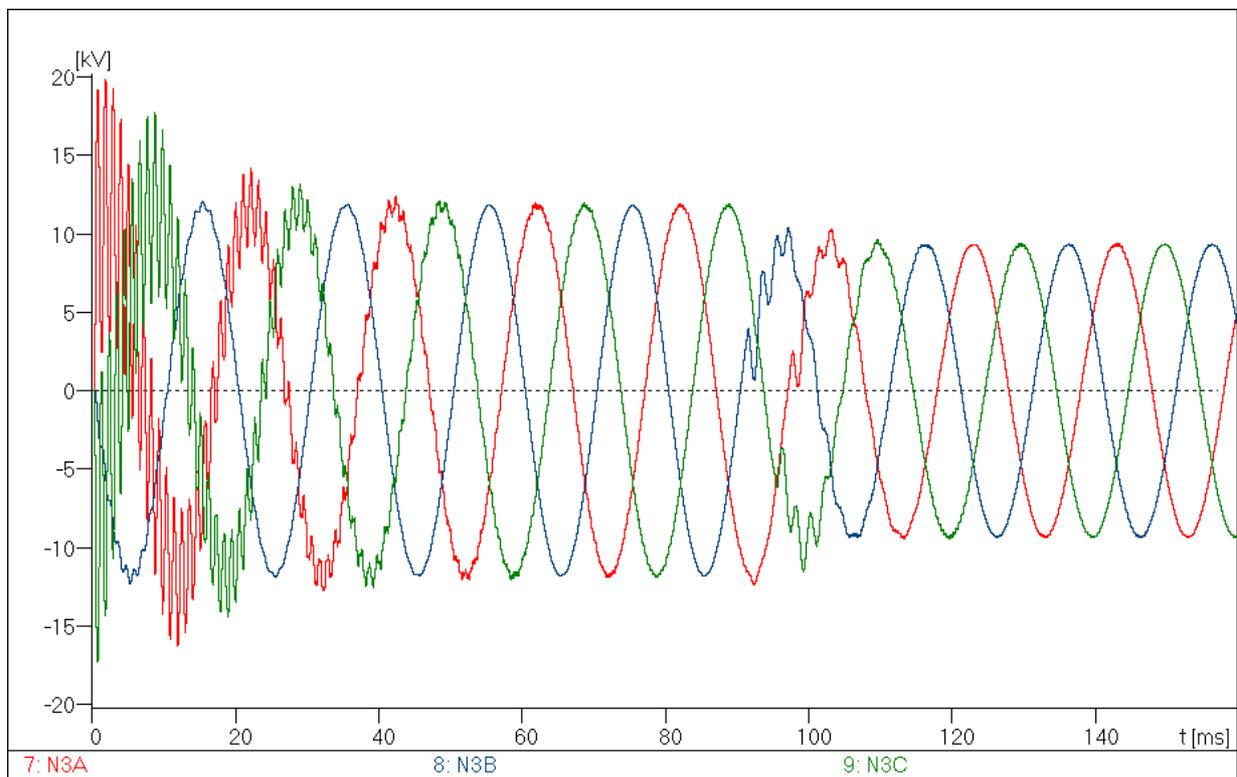
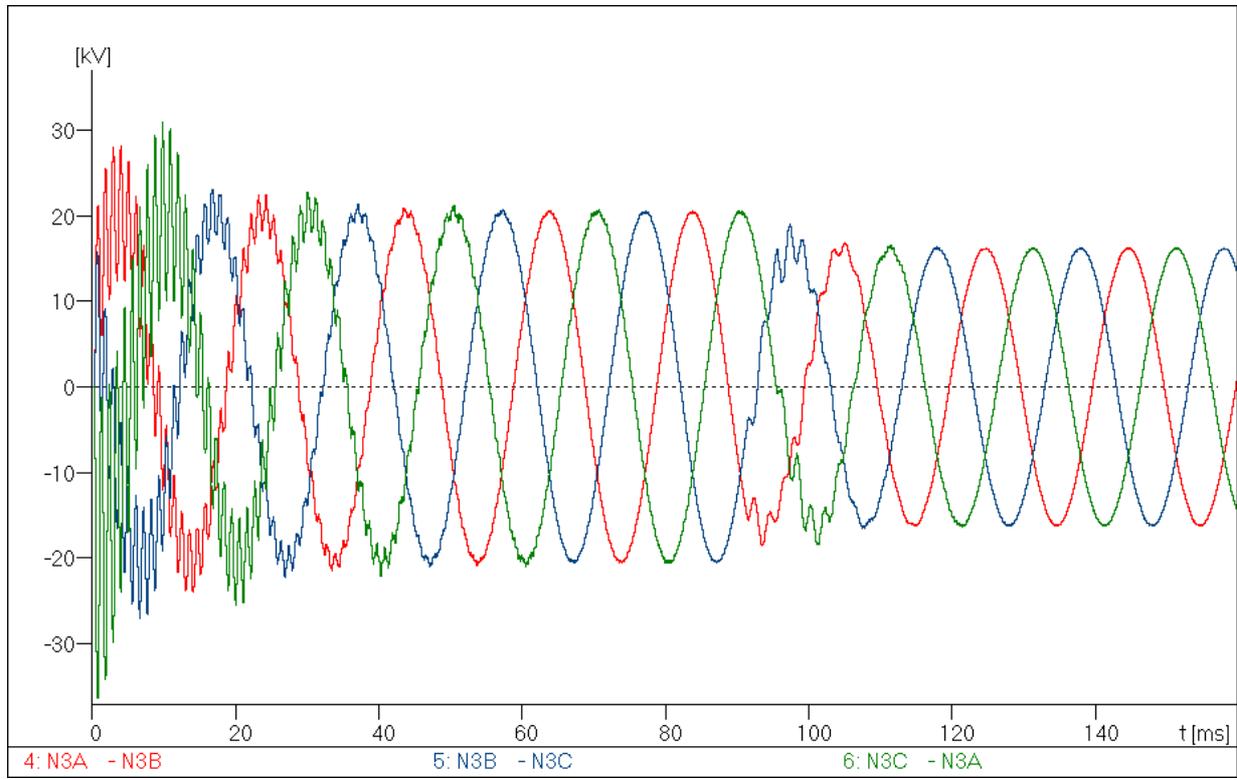
OVP/UVF y OFP/UFP.

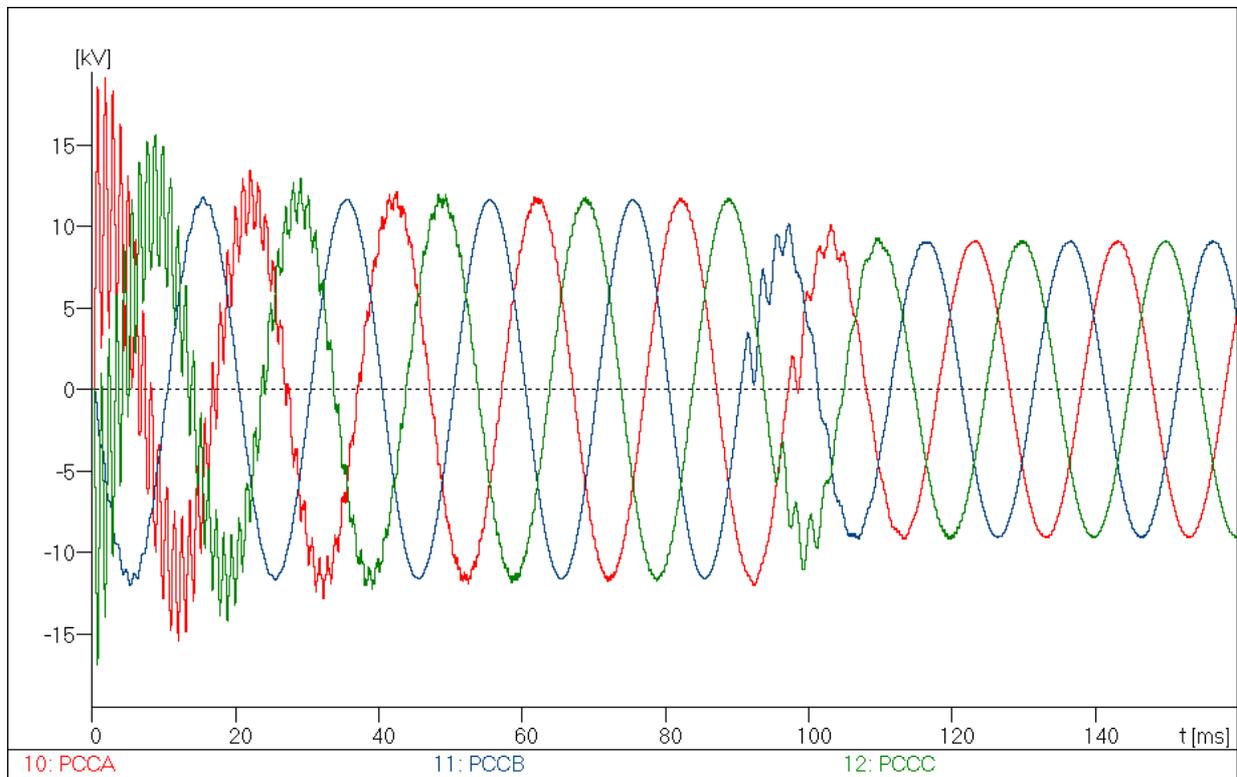
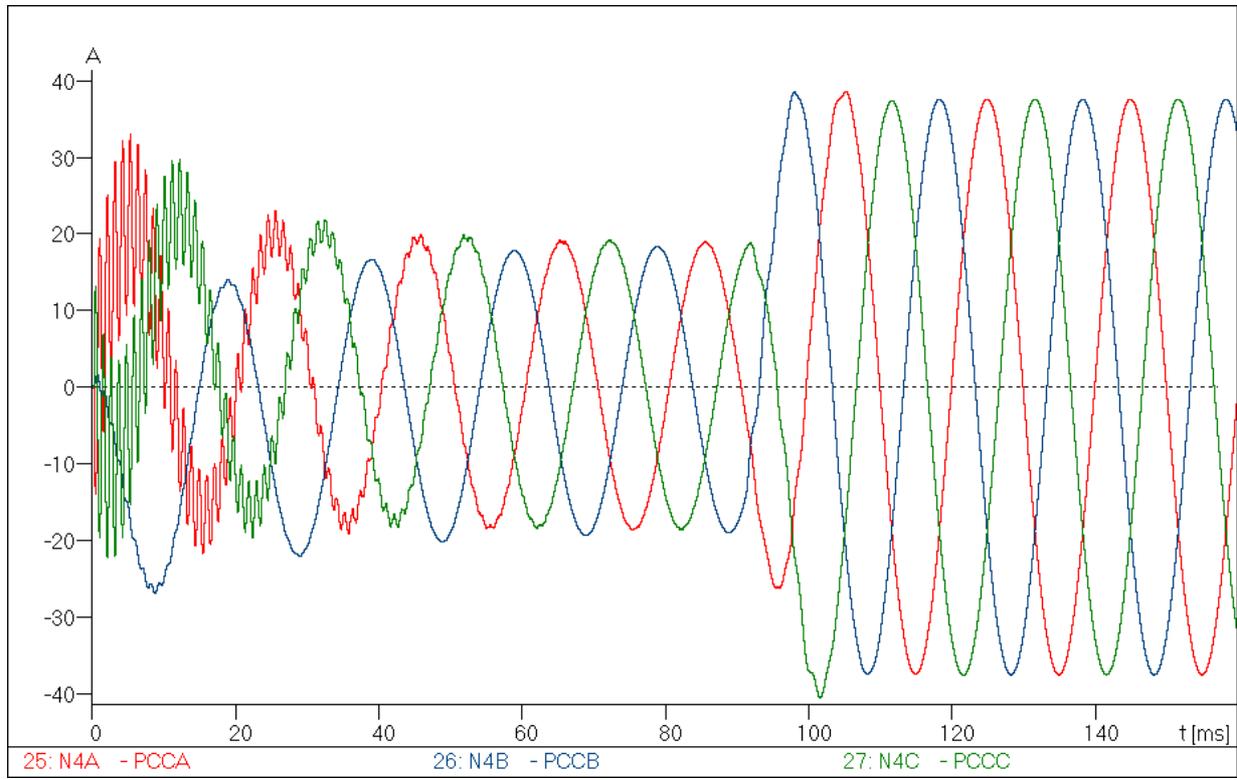
Desconexión aguas abajo de la subestación.

➤ CARGA 3: 1.5 MW, $\cos\varphi=0.87$.



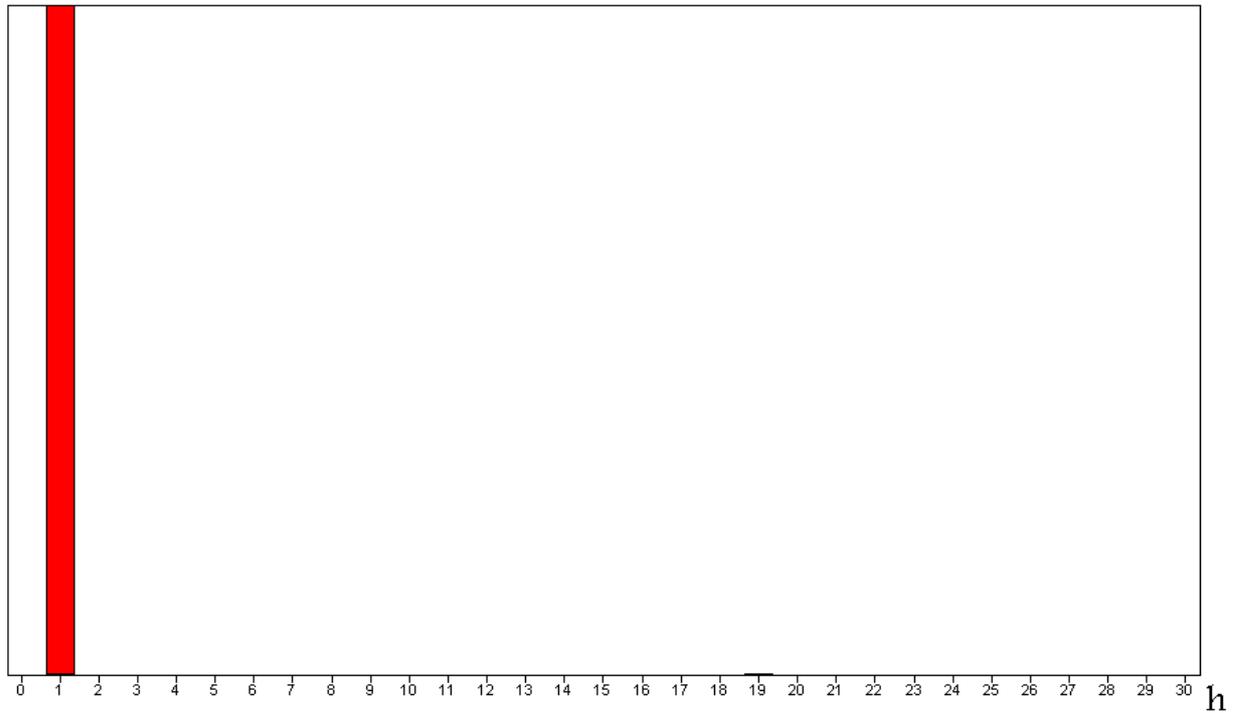






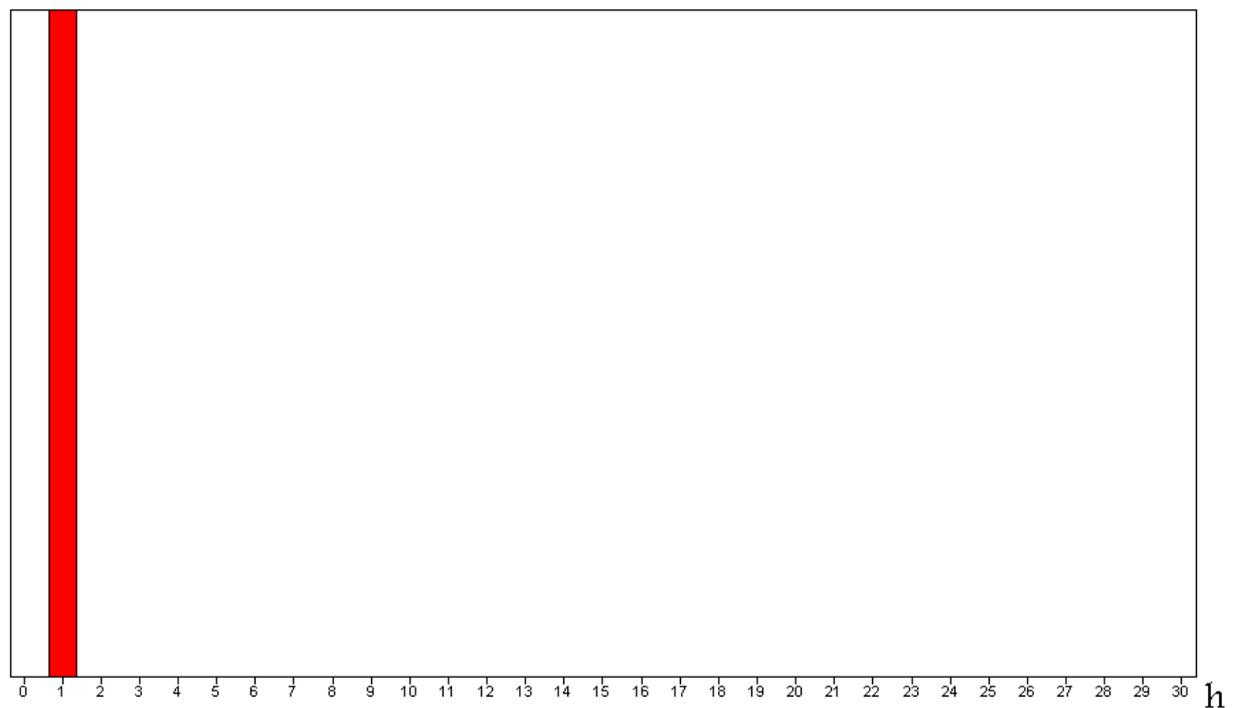
Antes de la falta. Transformada de Fourier de la tensión de la fase A en el PCC:

Peak: 11.611 kV

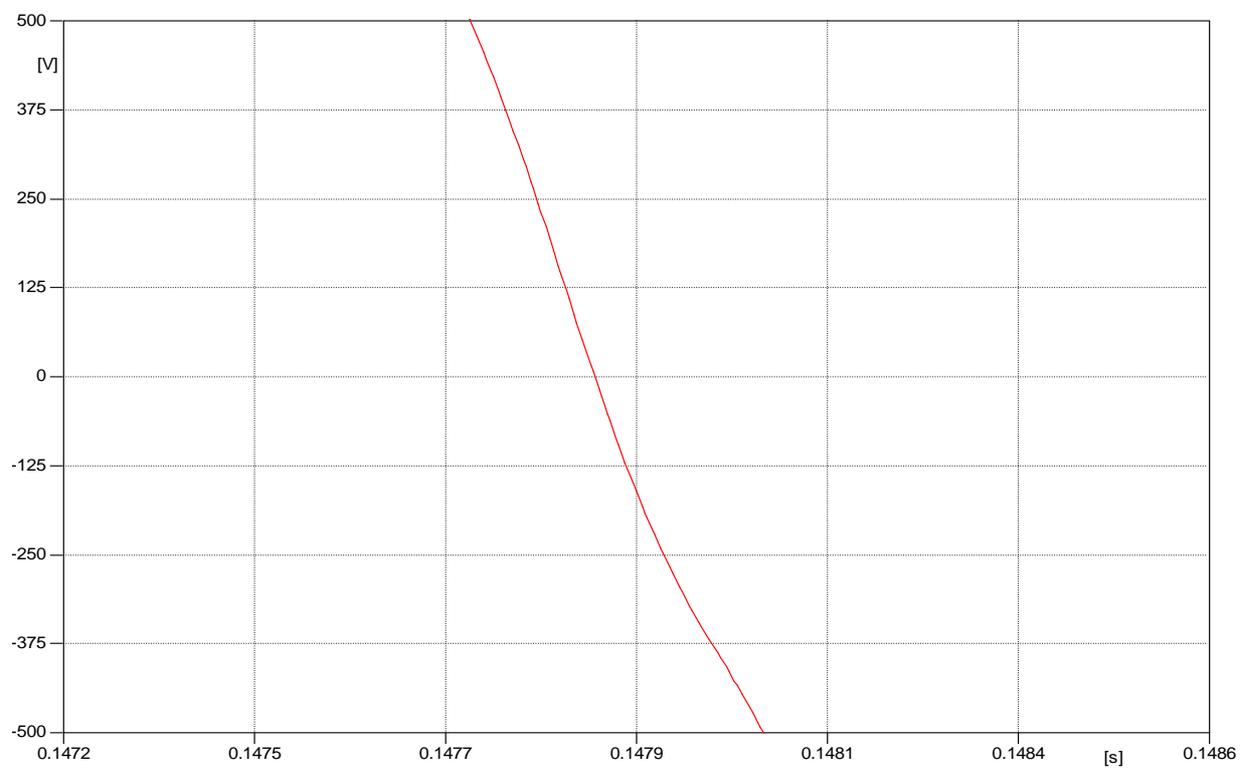
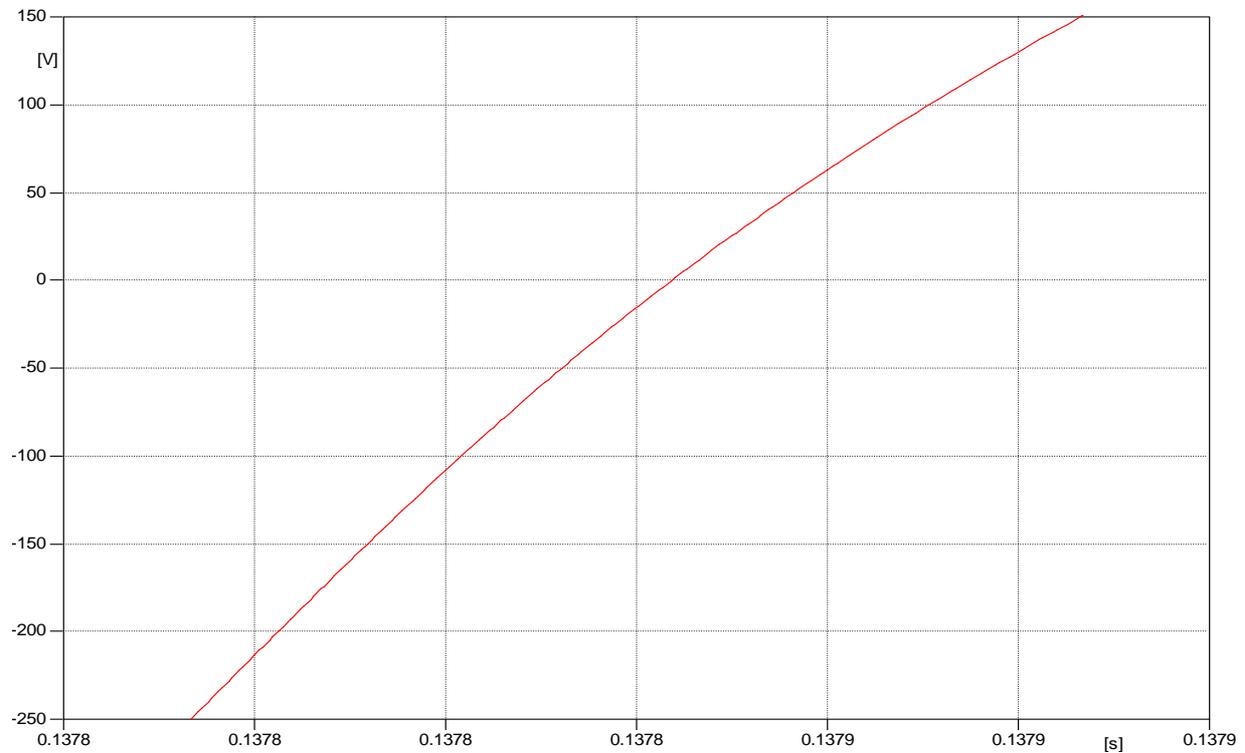


Después de la falta:

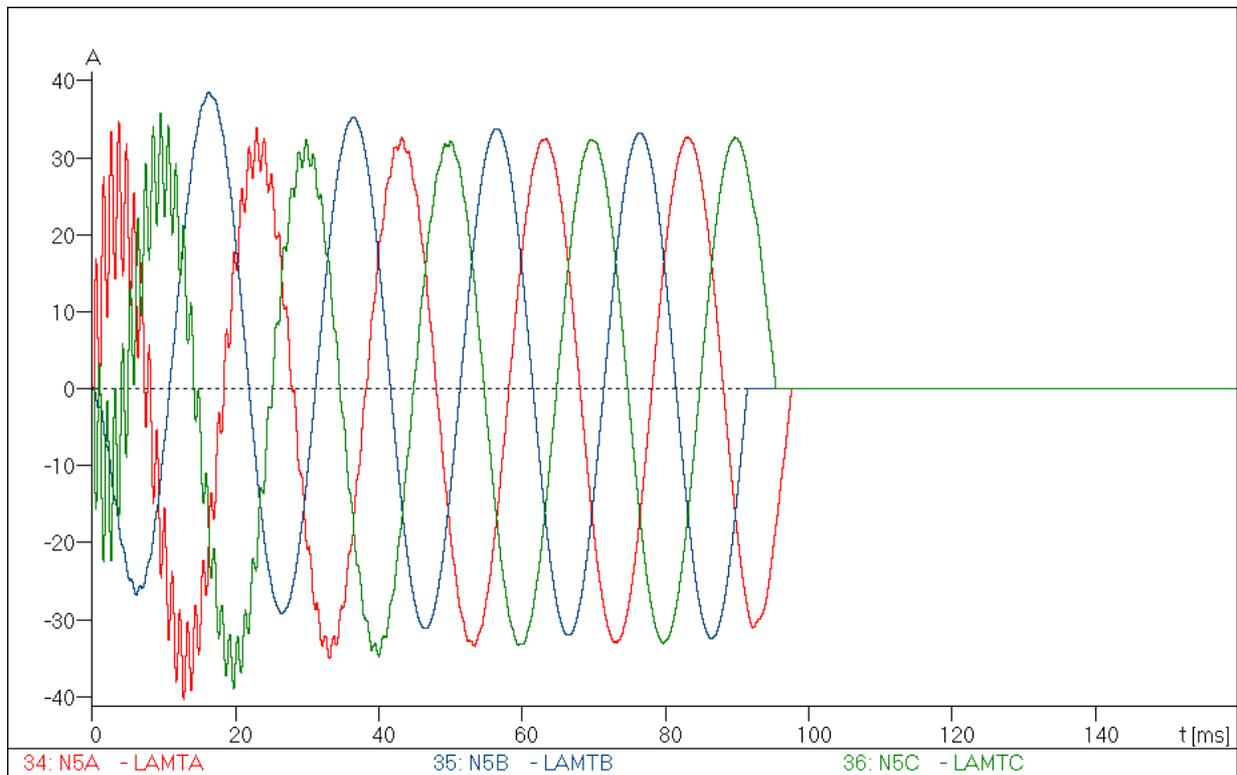
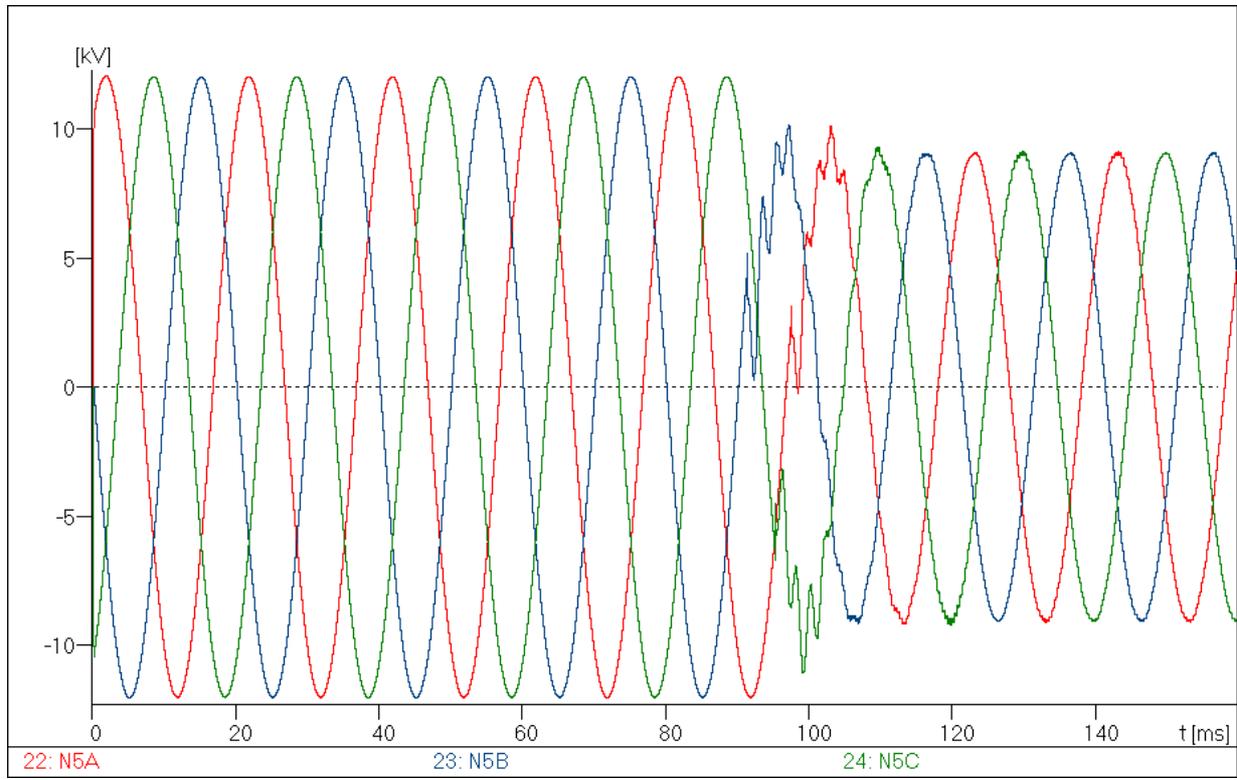
Peak: 9.082 kV

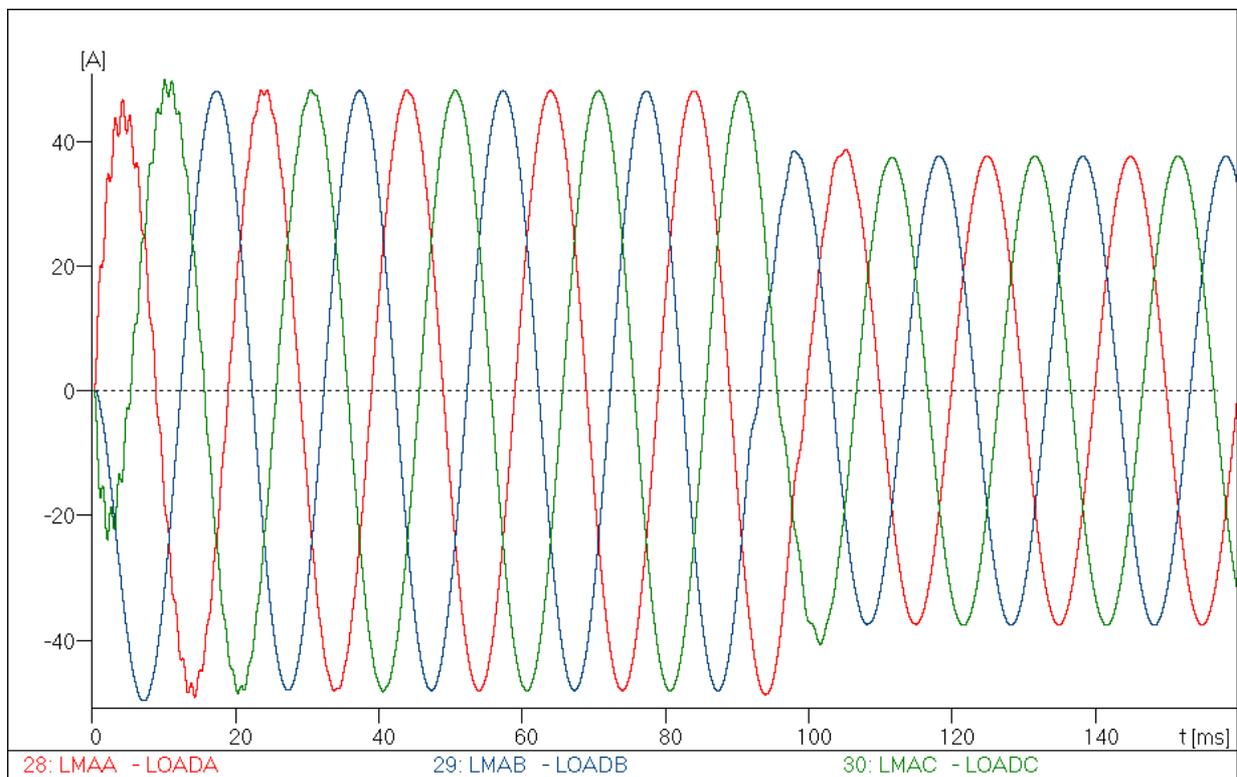
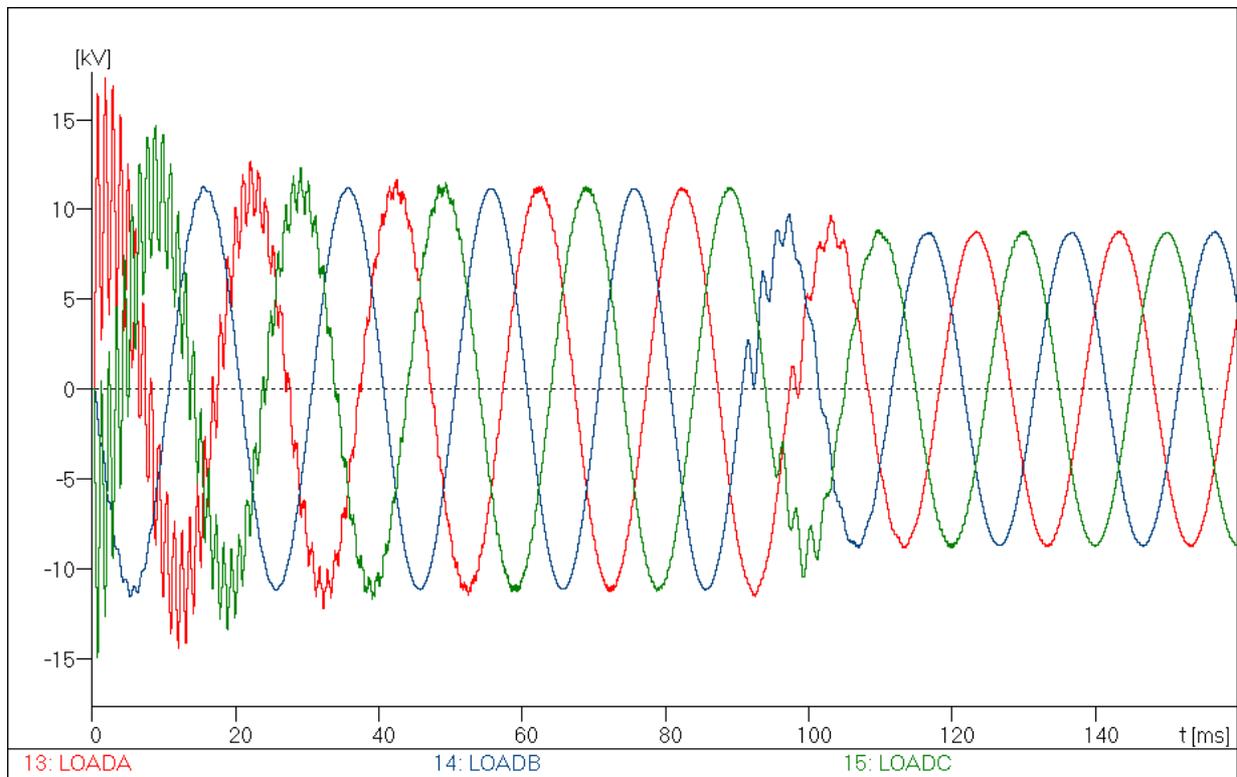


Zoom sobre la tensión de fase A en el PCC:

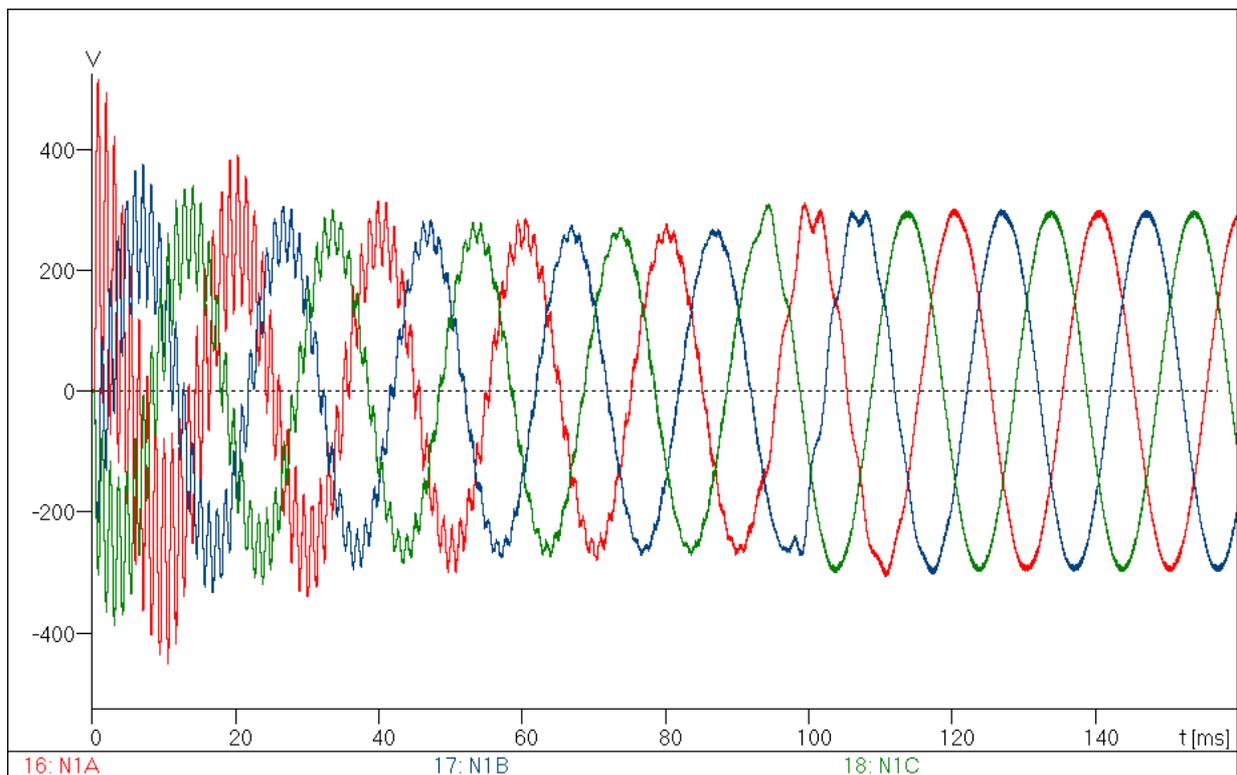
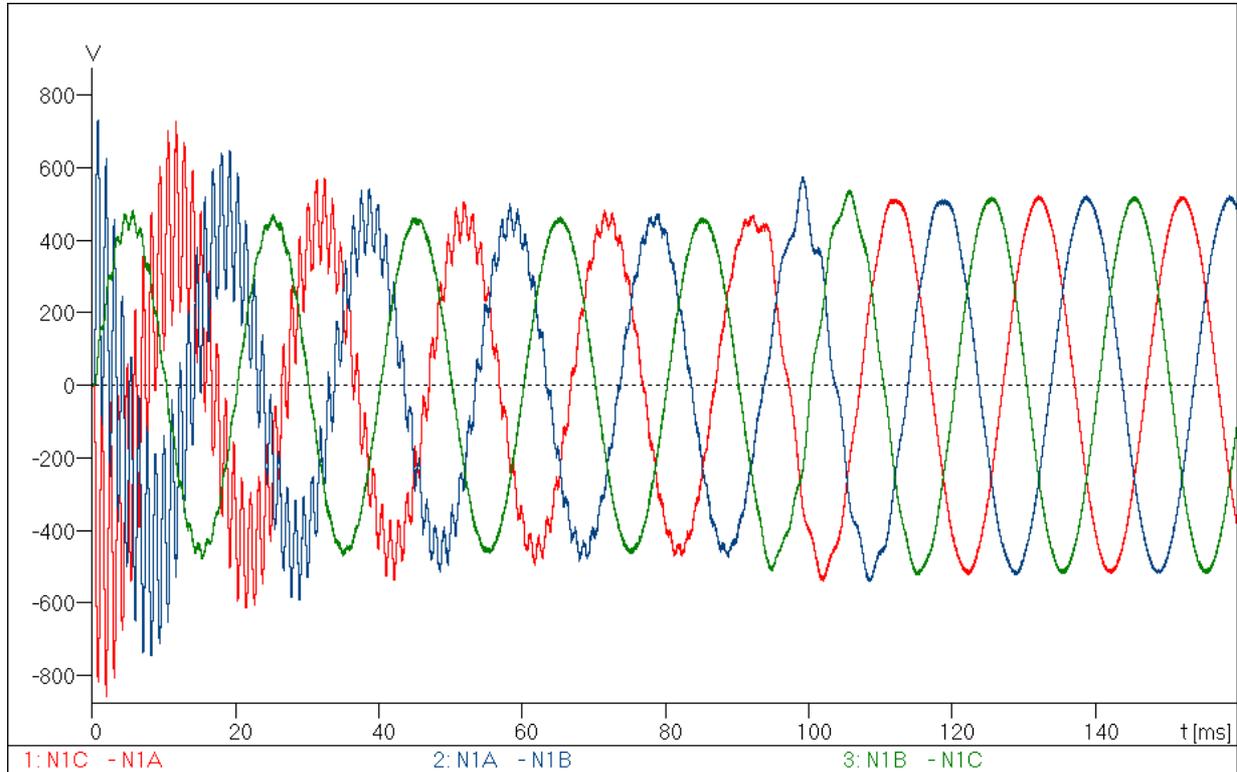


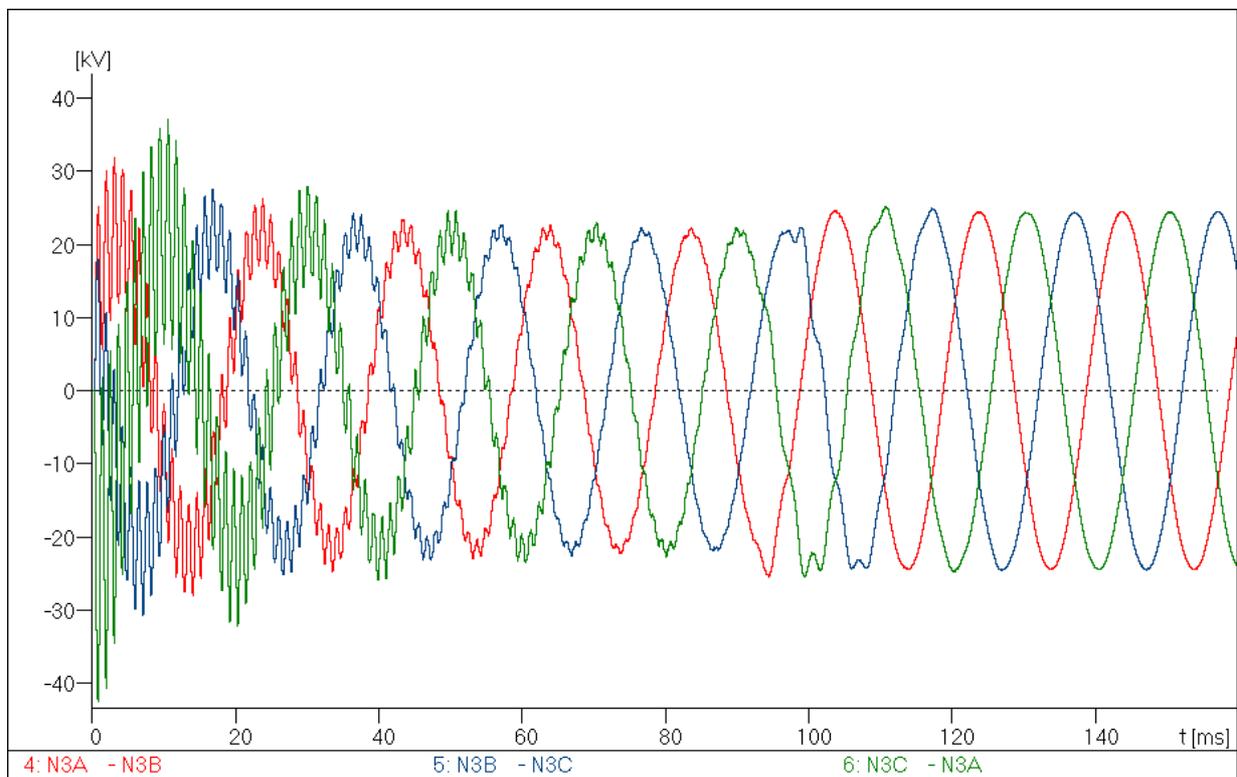
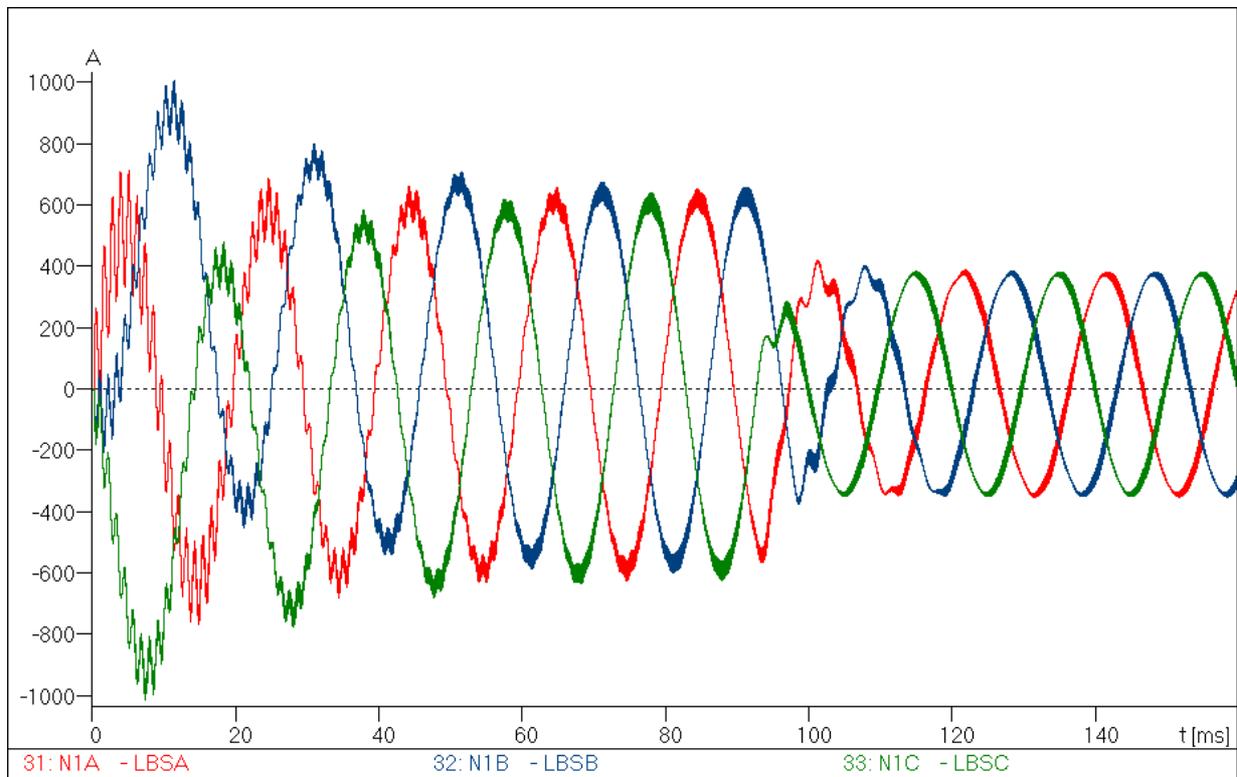
$$f \approx 49.87 \text{ Hz}$$

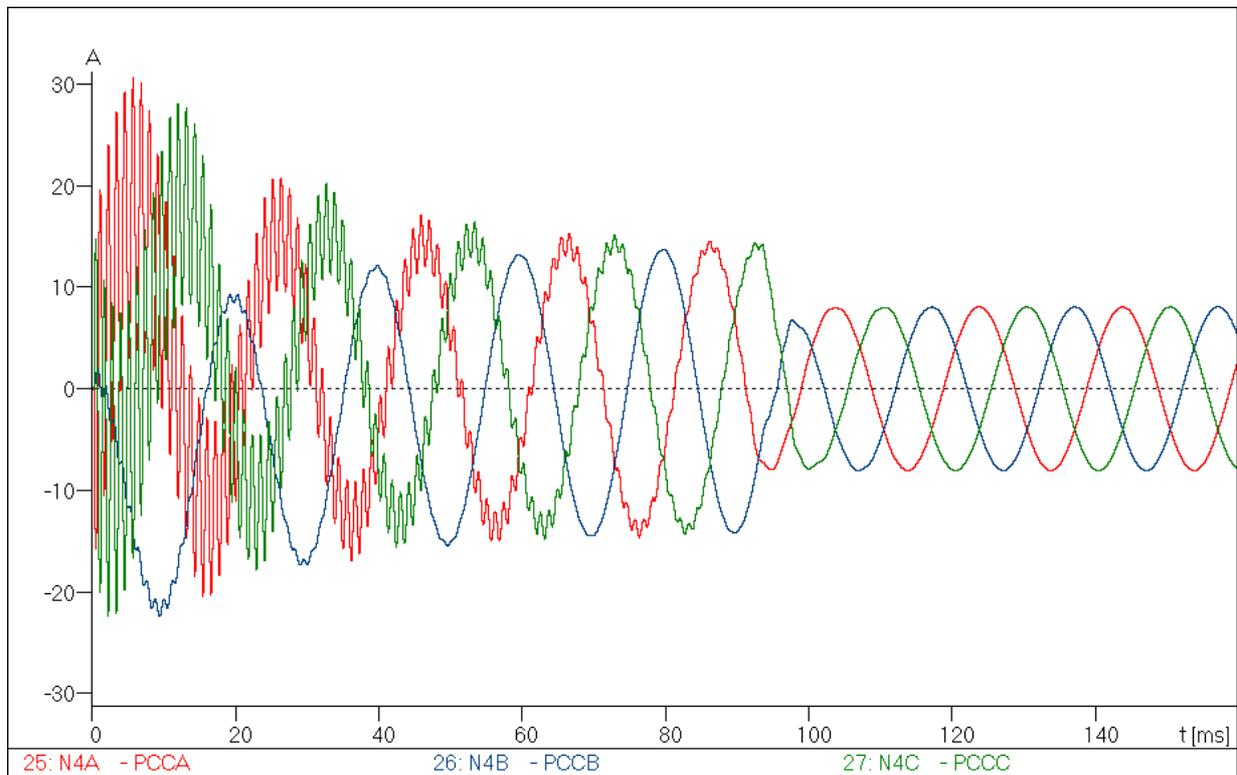
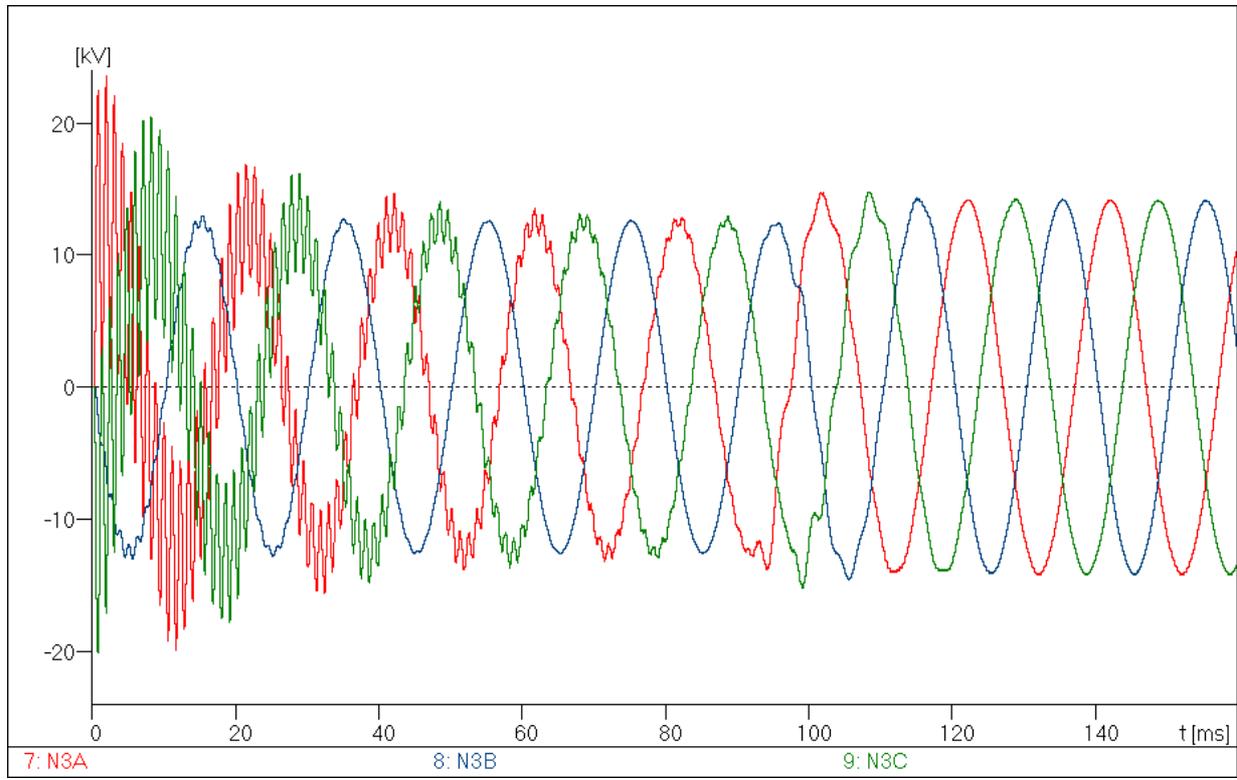


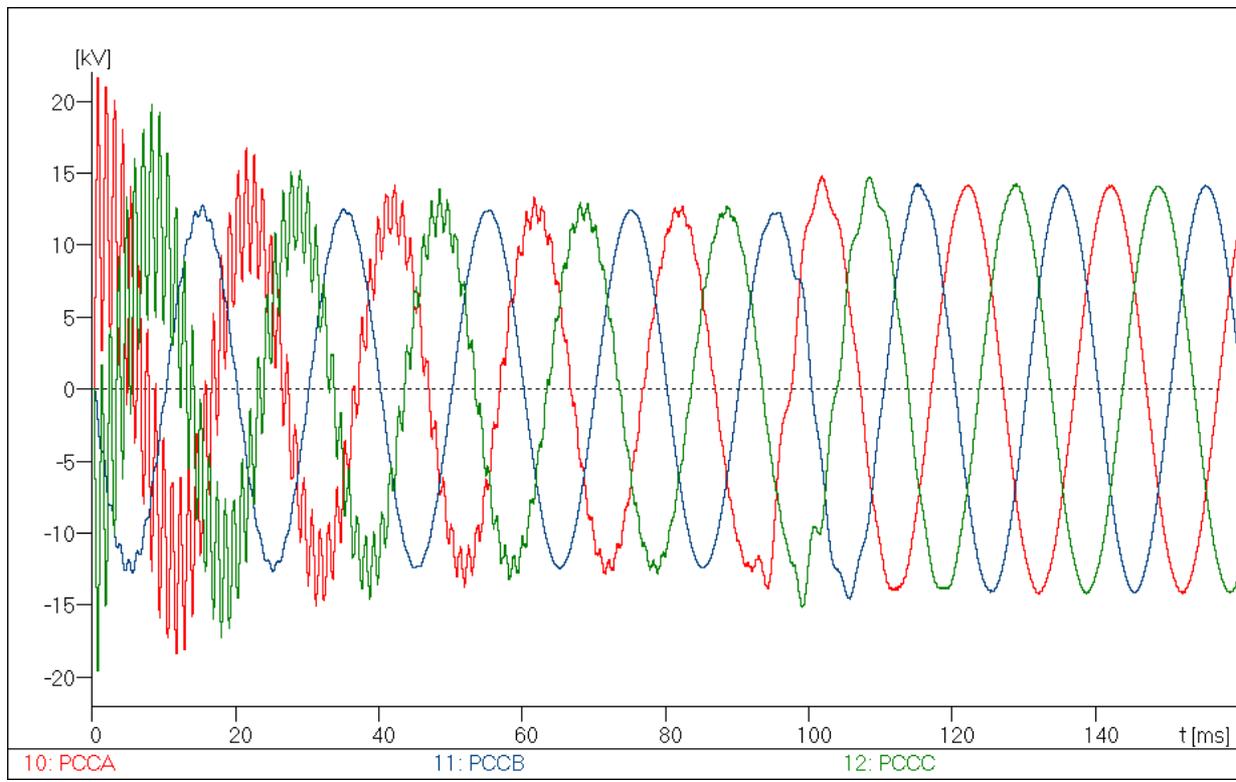


➤ CARGA 2: 0.2 MW, $\cos\varphi=0.87$.



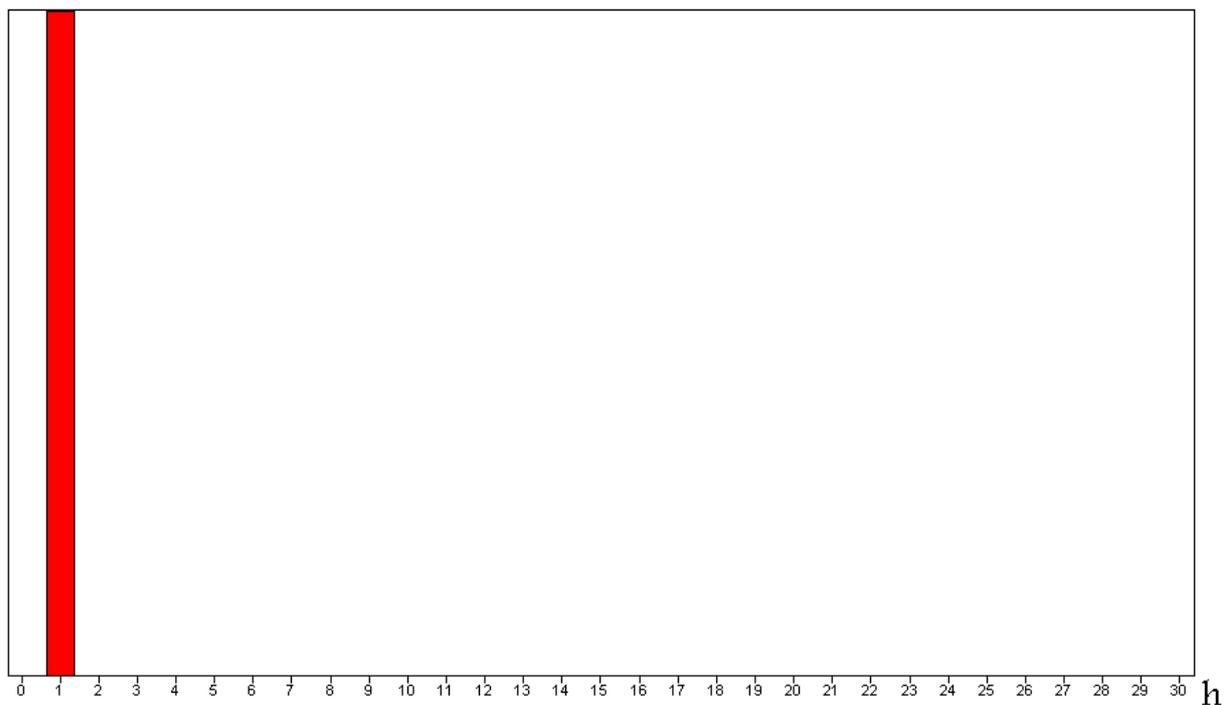




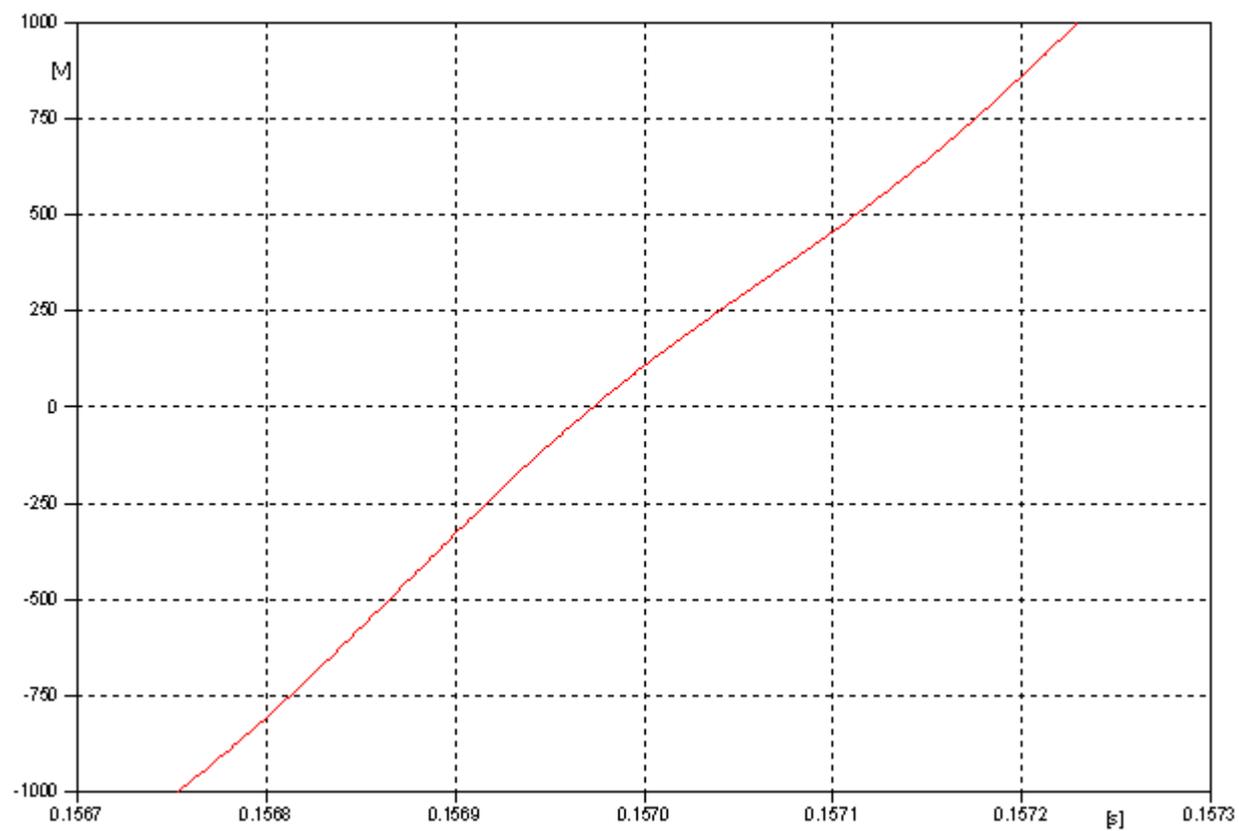
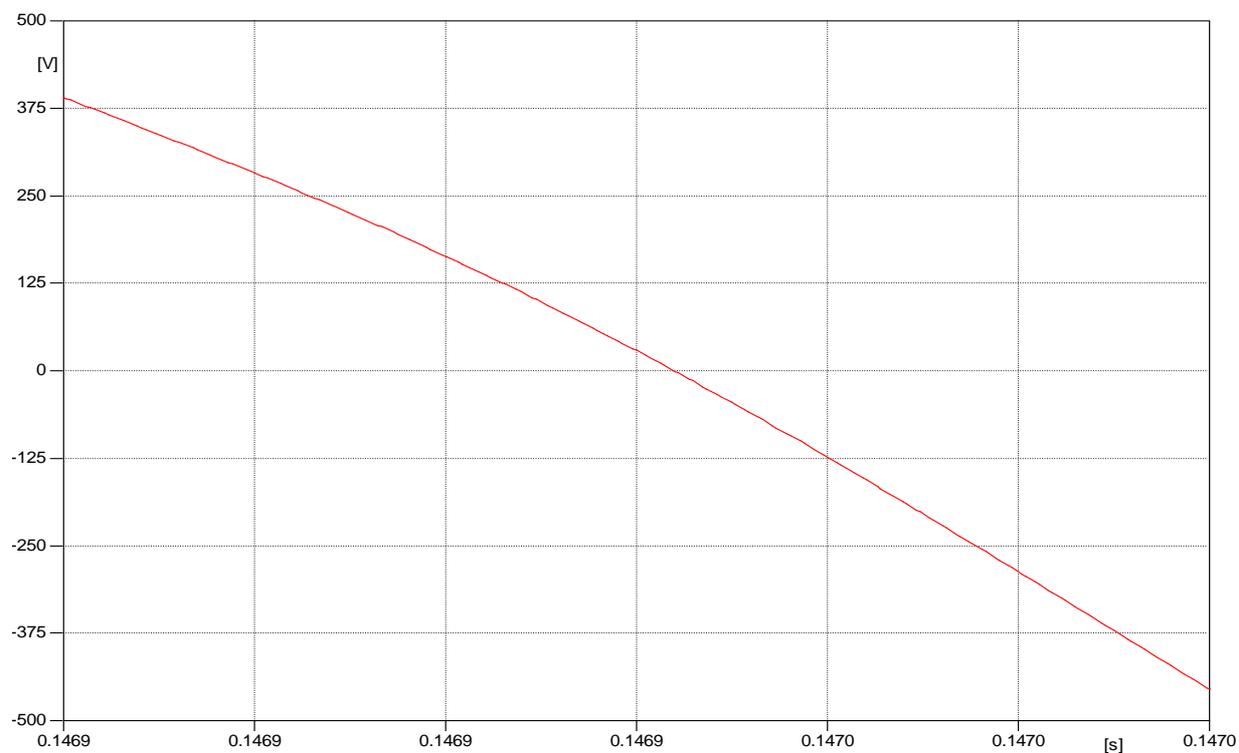


Después de la falta. Transformada de Fourier de la tensión de la fase A en el PCC:

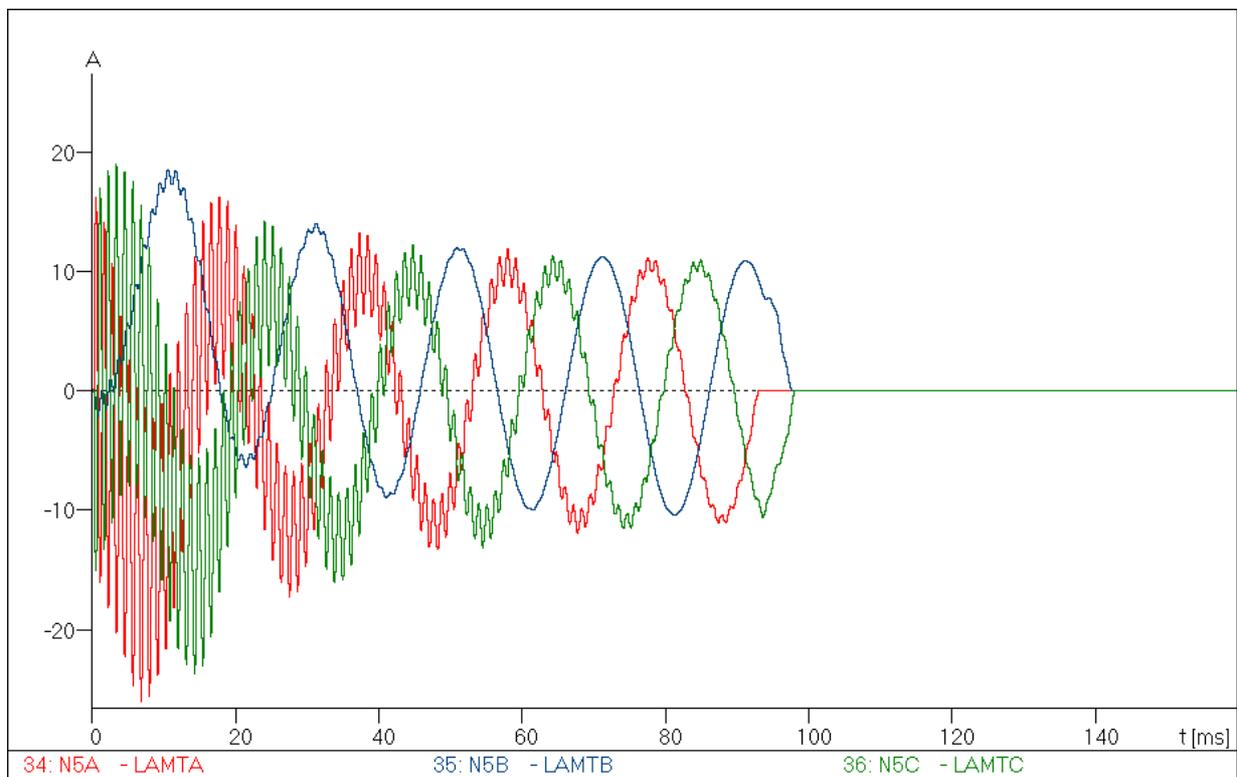
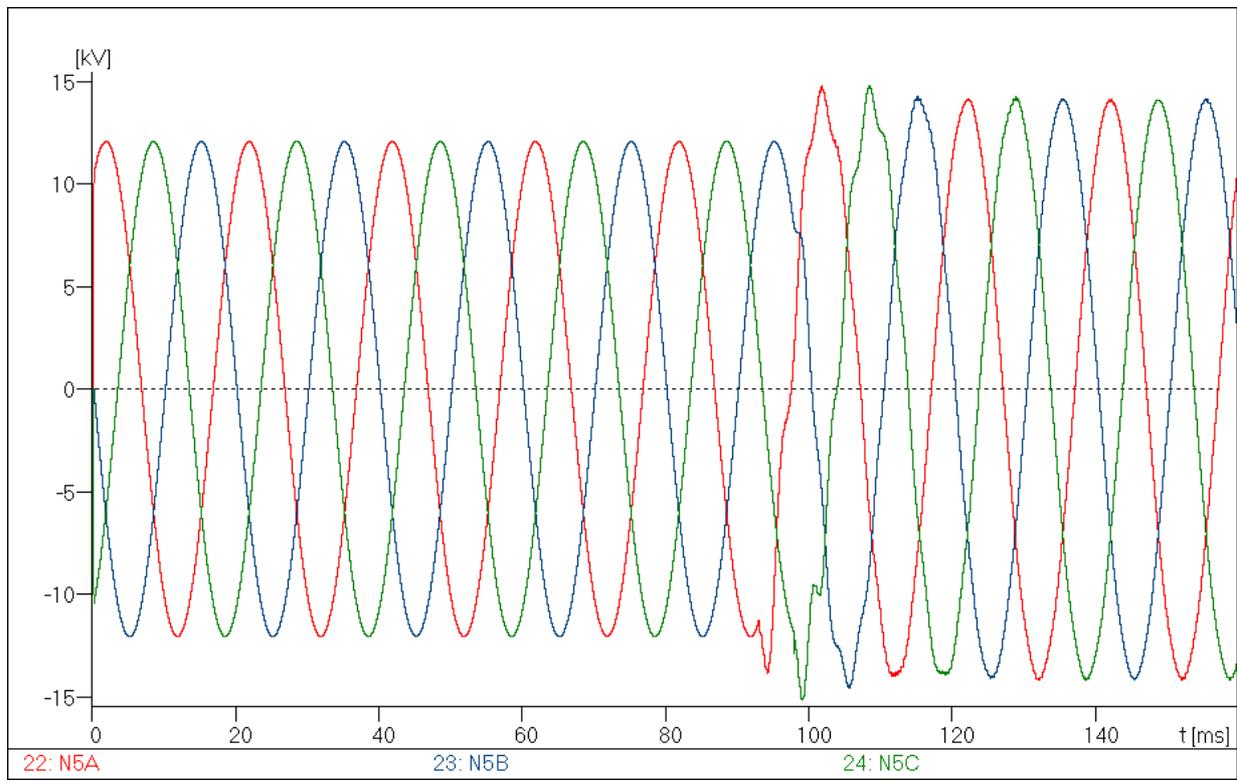
Peak: 14.09 kV

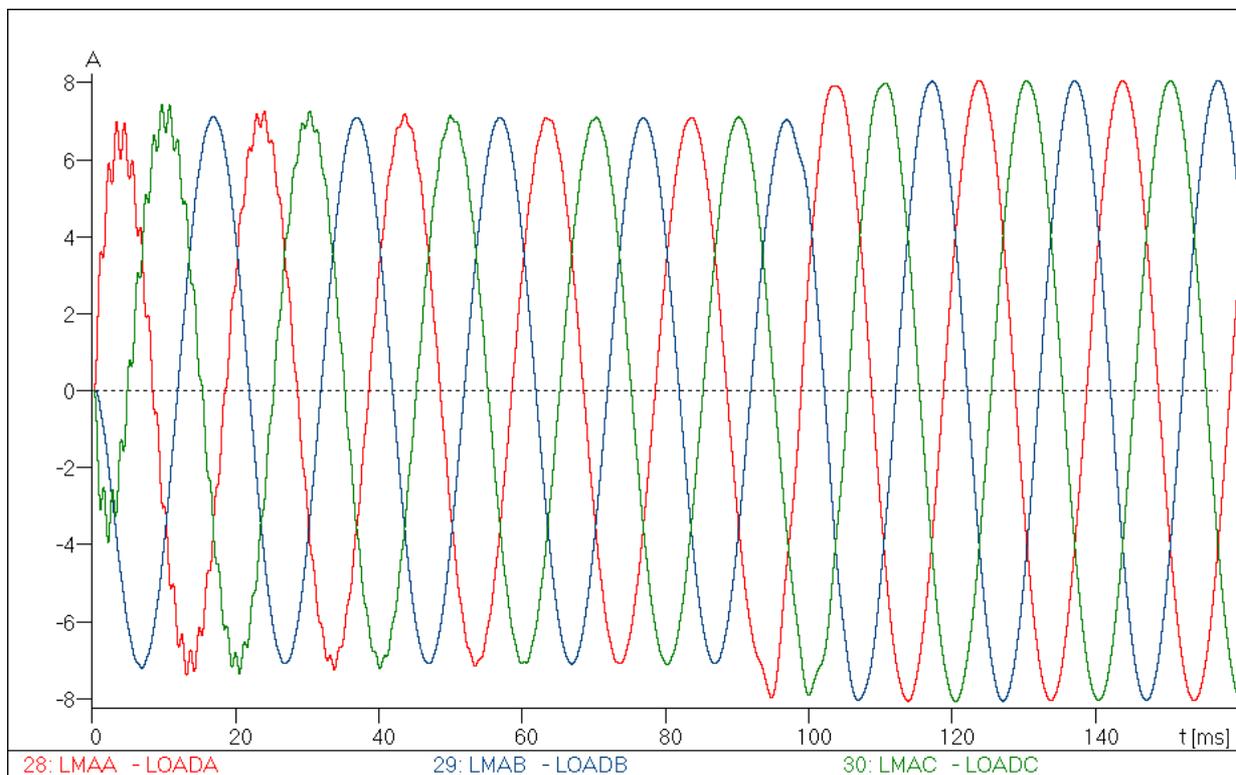
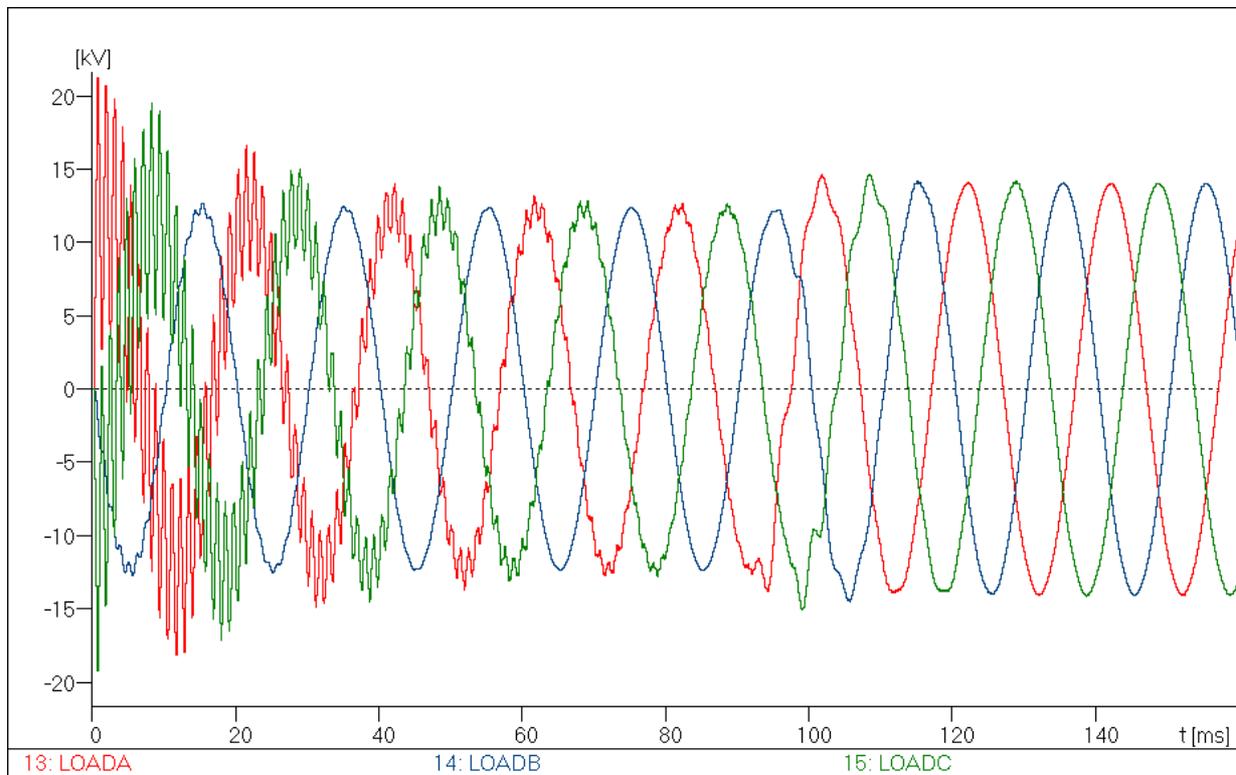


Zoom sobre la tensión de fase A en el PCC:

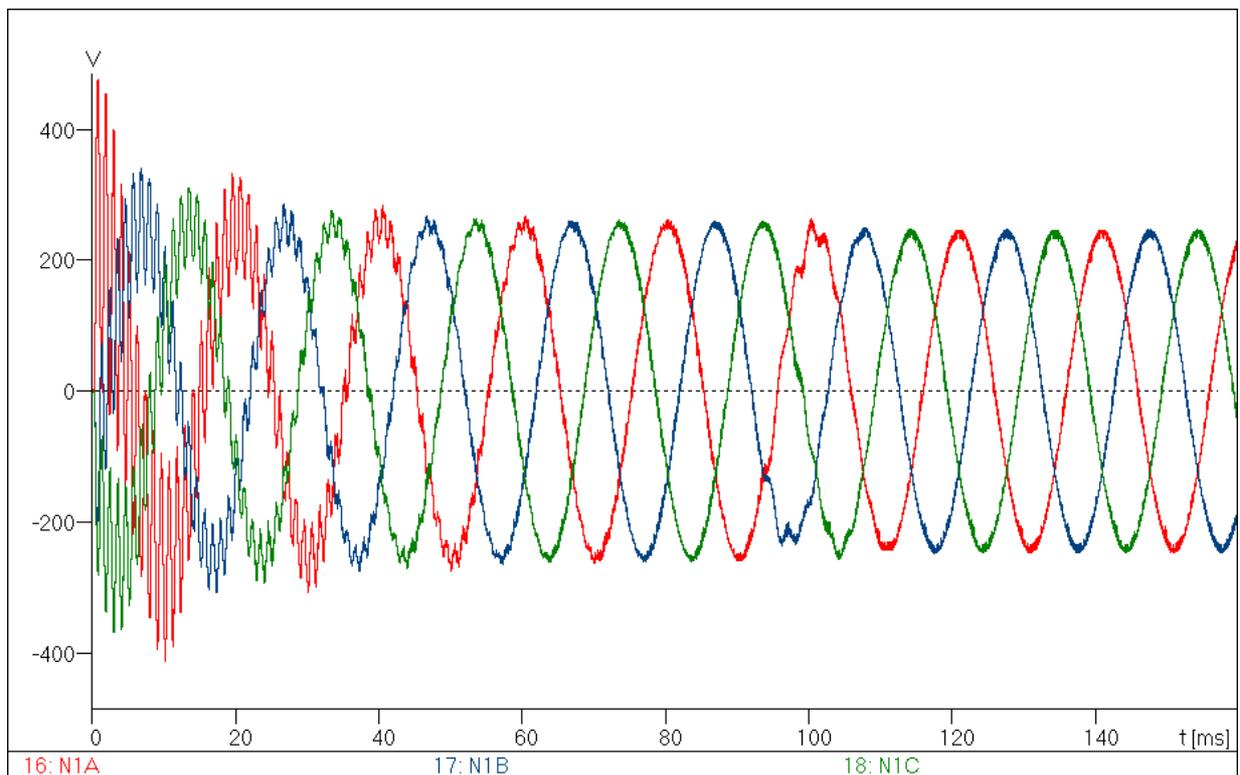
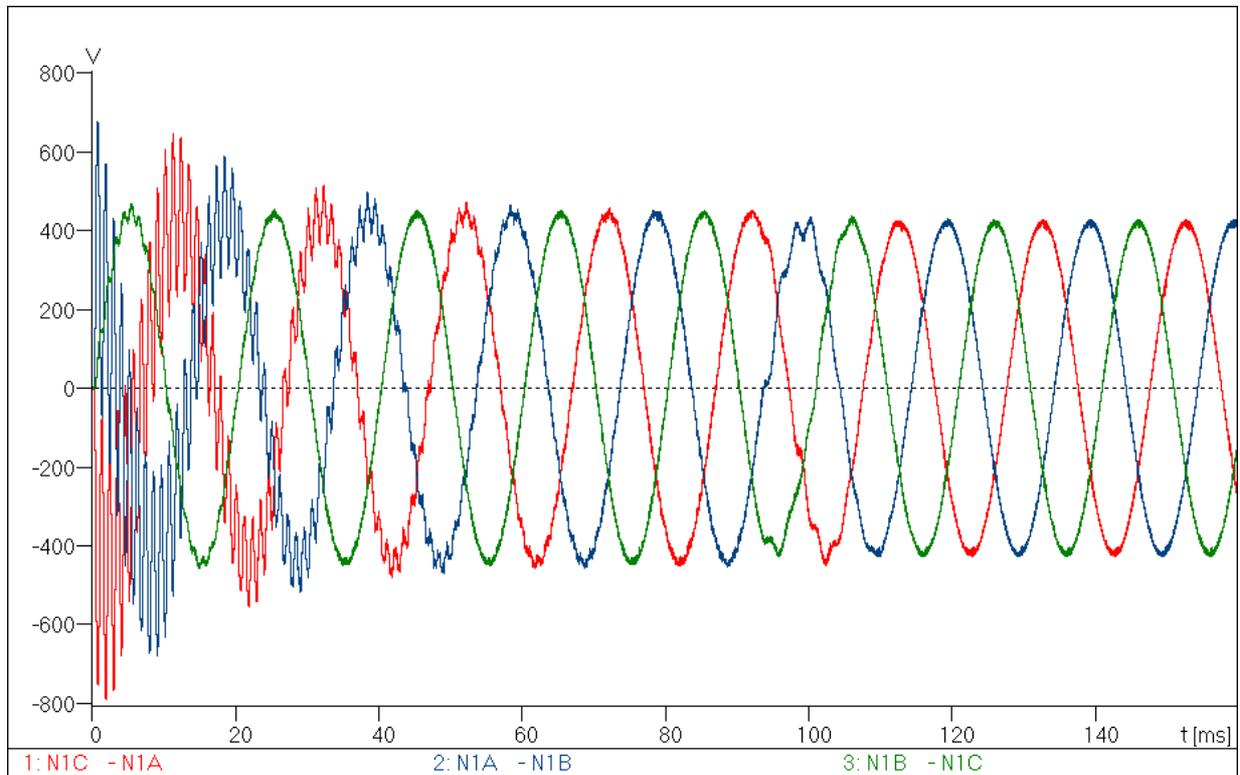


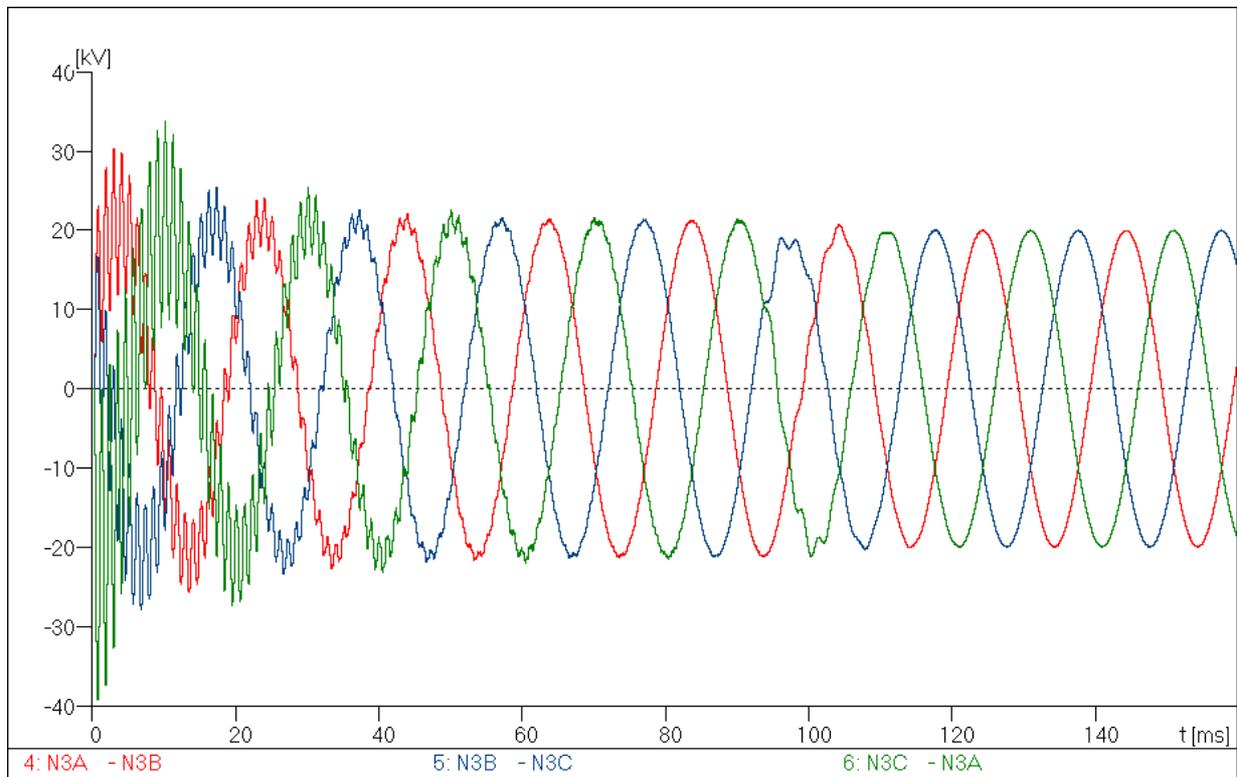
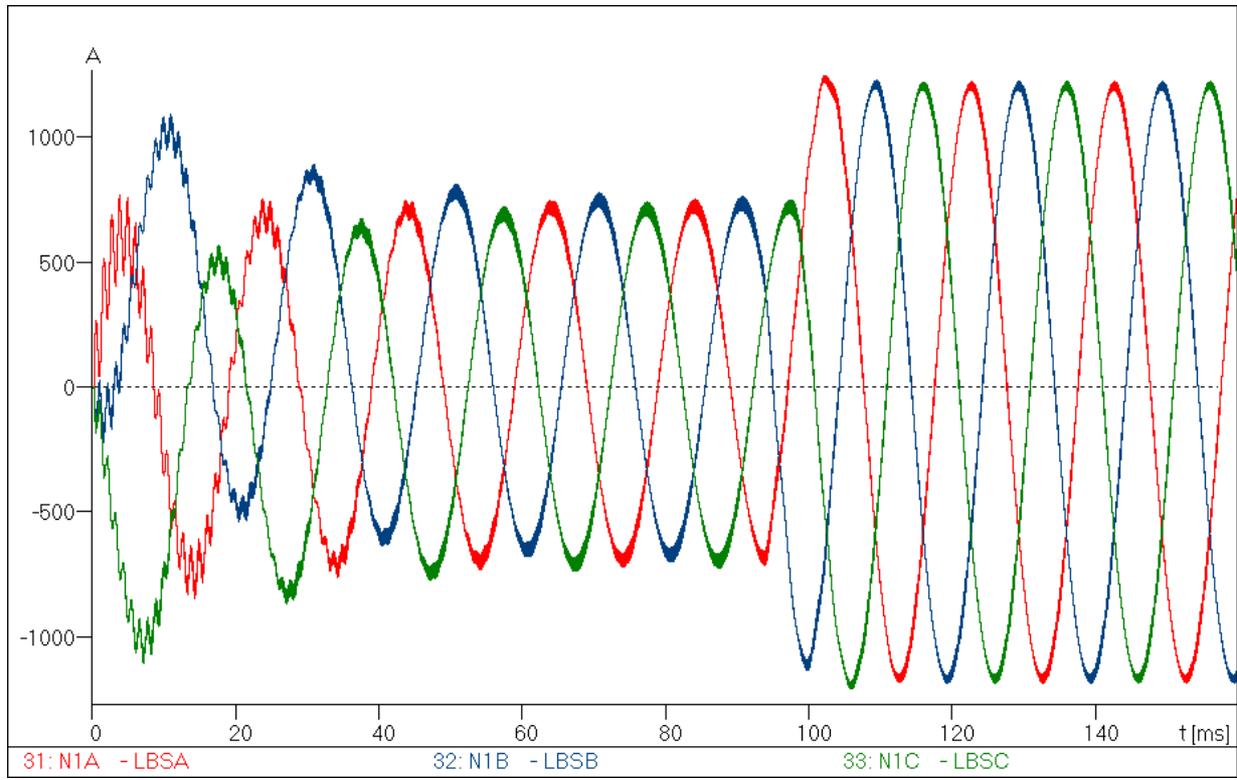
$$f \approx 49.77 \text{ Hz}$$

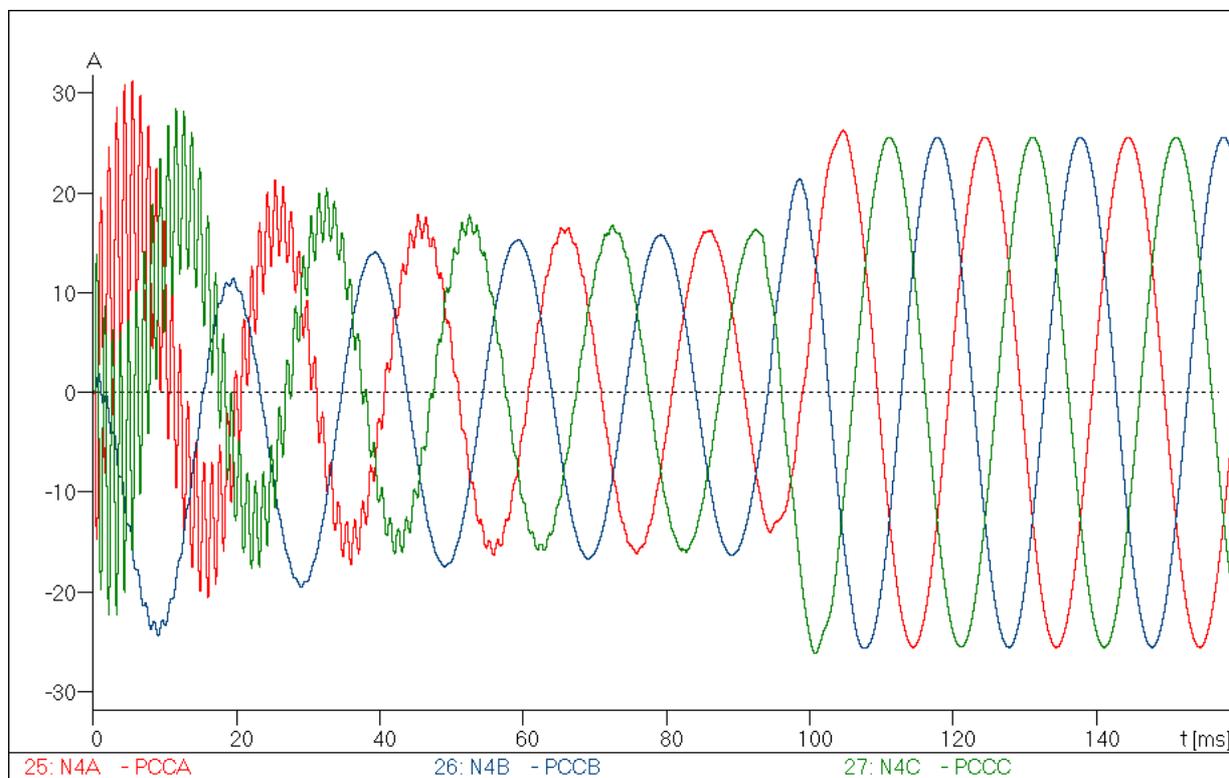
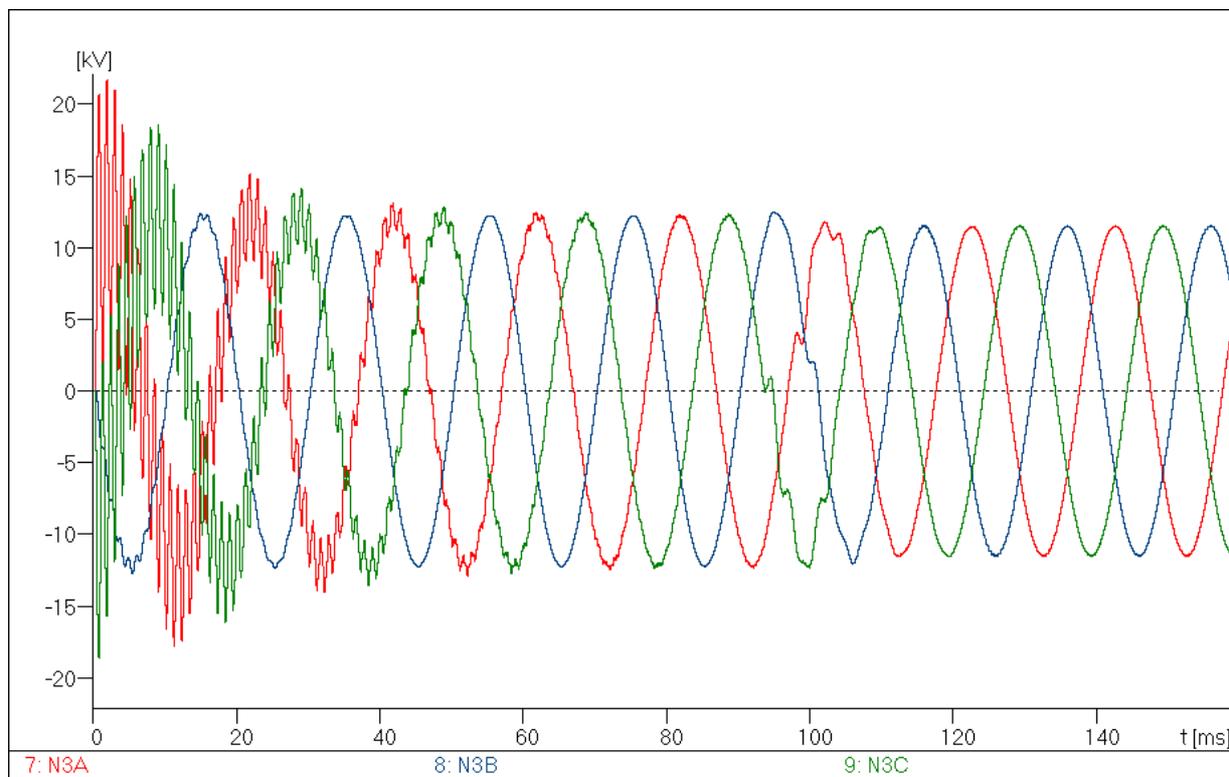


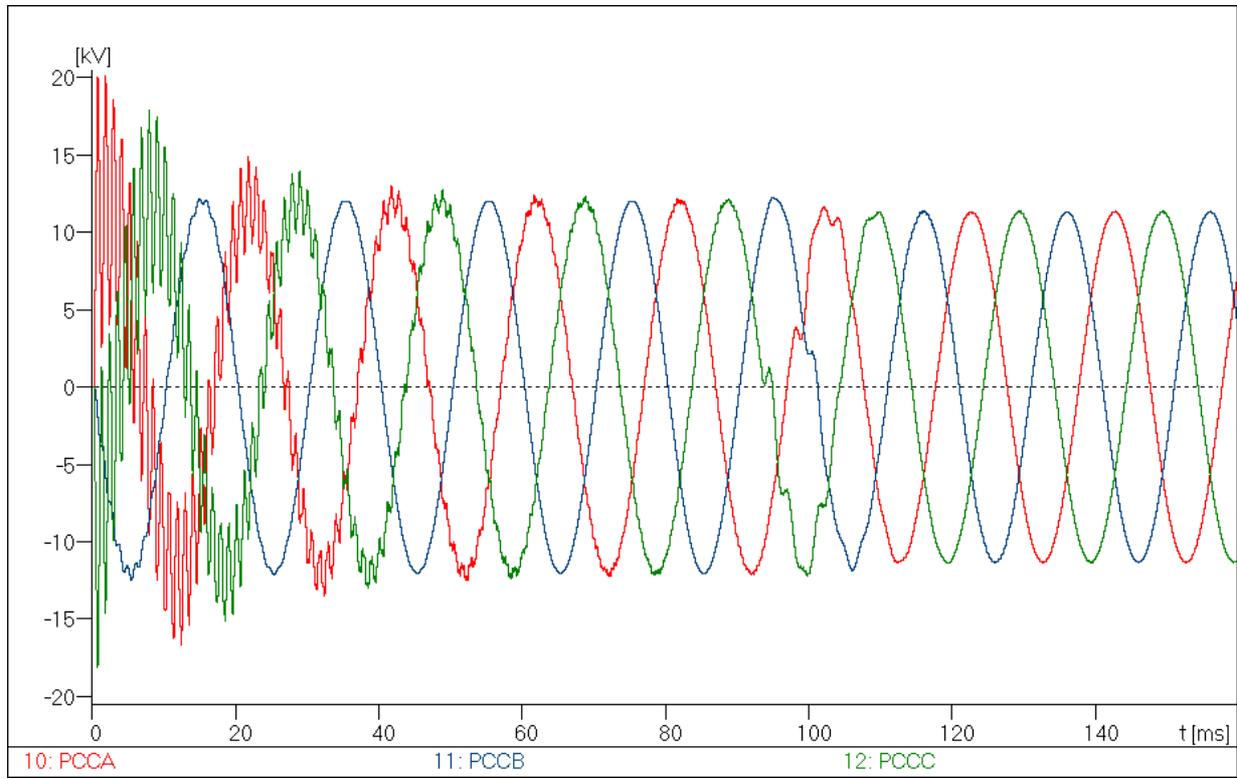


➤ CARGA 1: 0.8 MW, $\cos\varphi=0.87$.



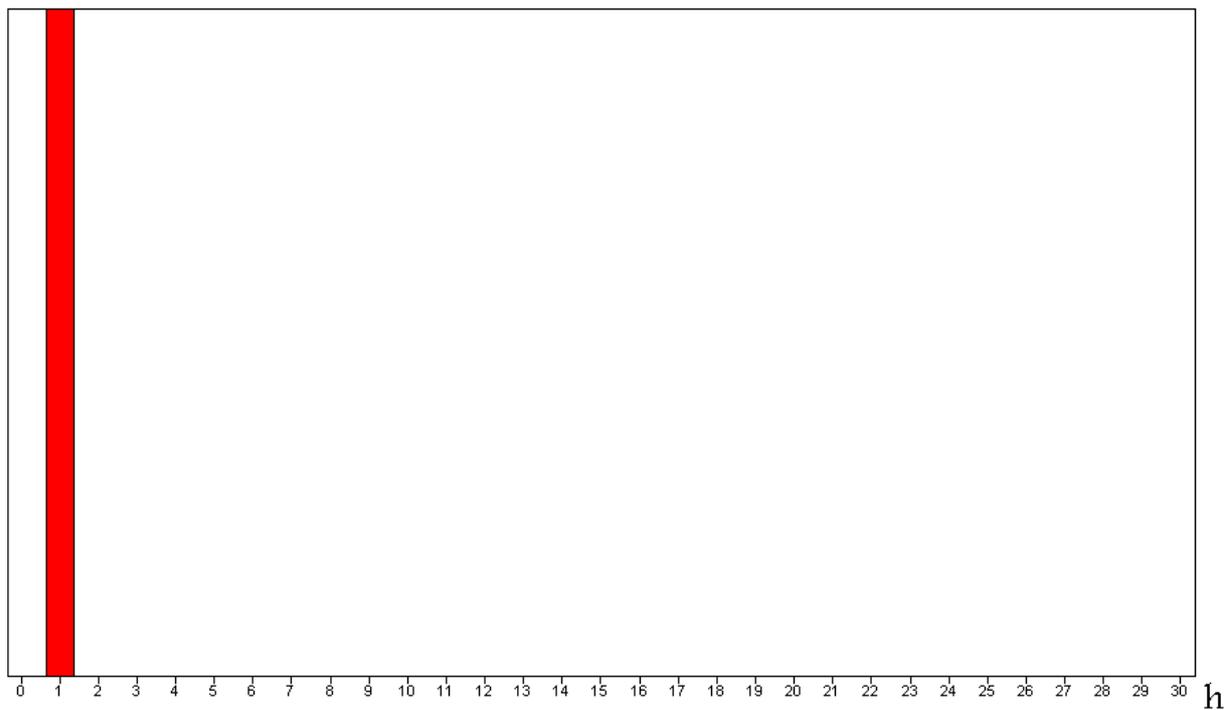




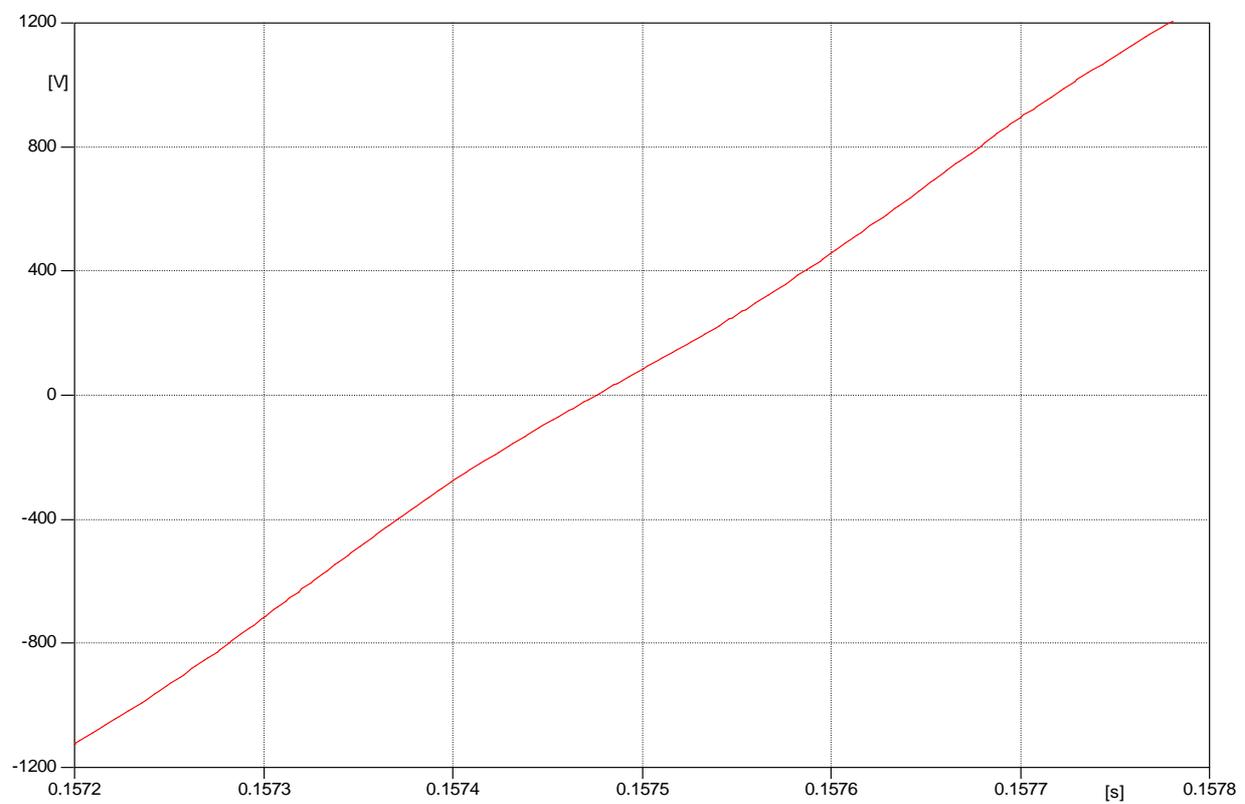
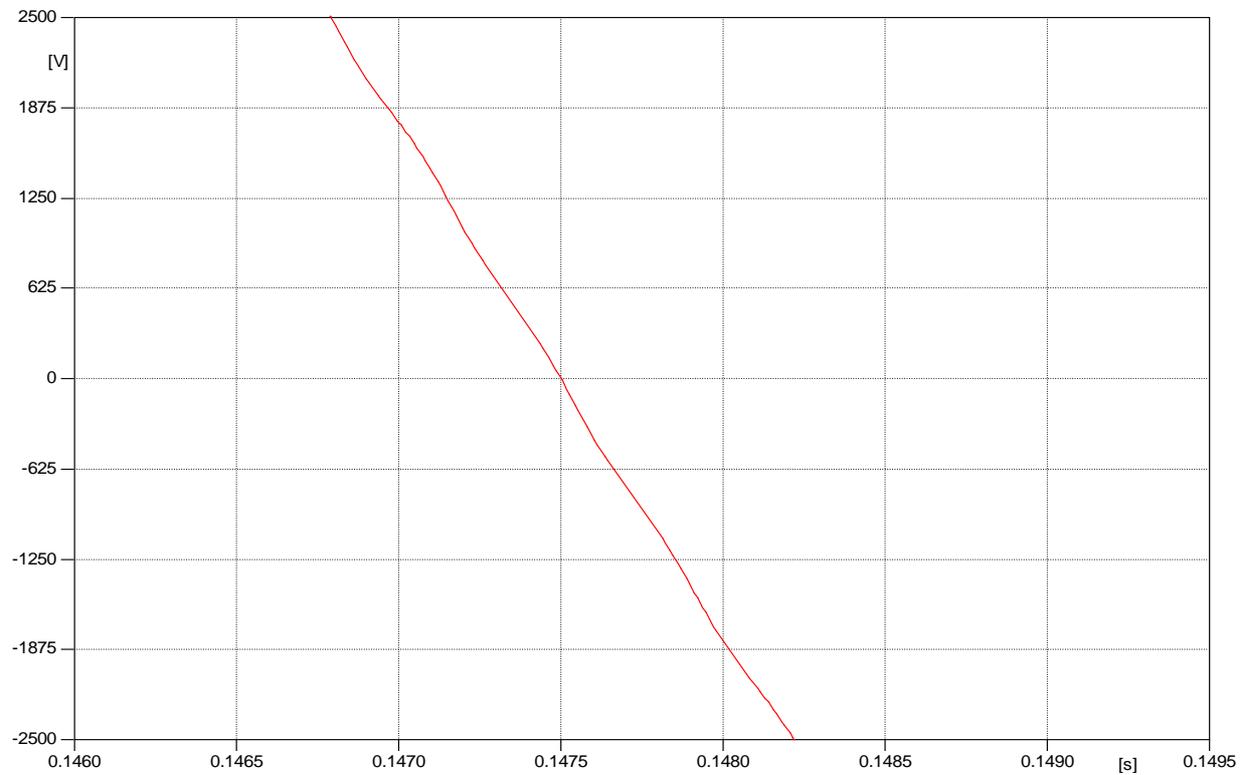


Después de la falta. Transformada de Fourier de la tensión de la fase A en el PCC:

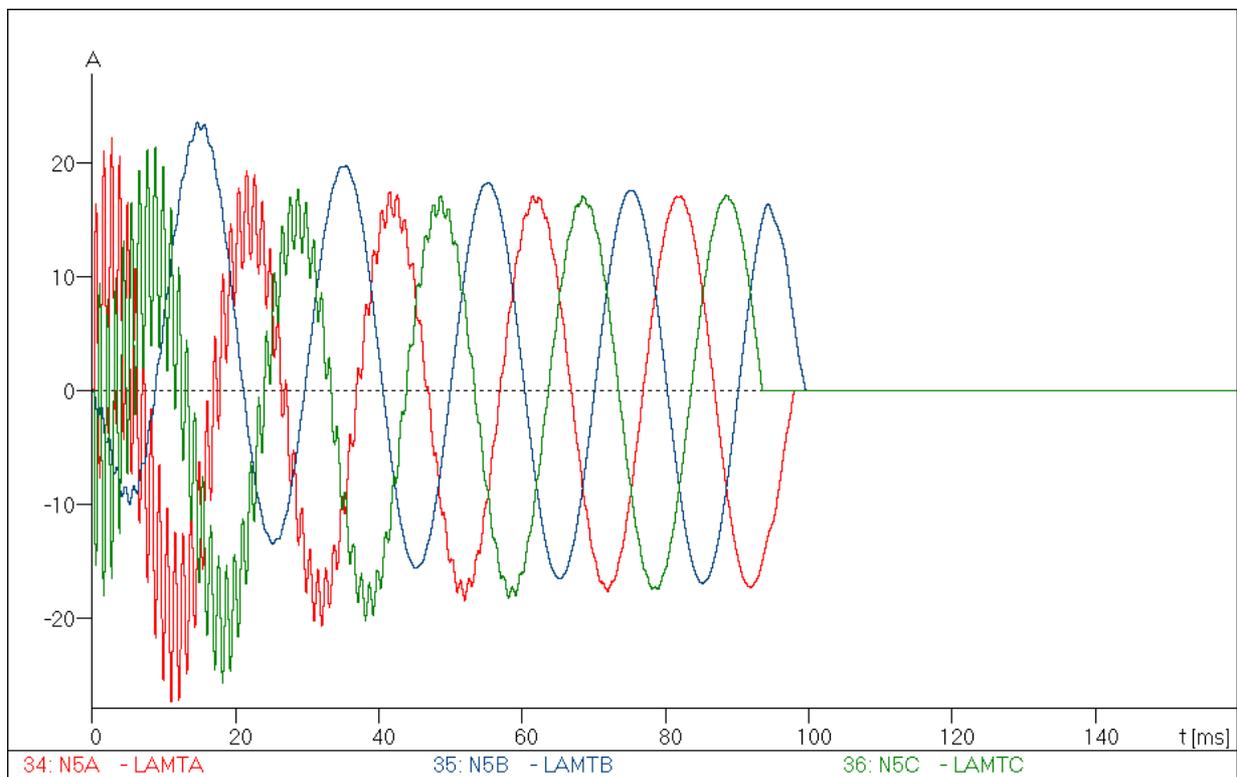
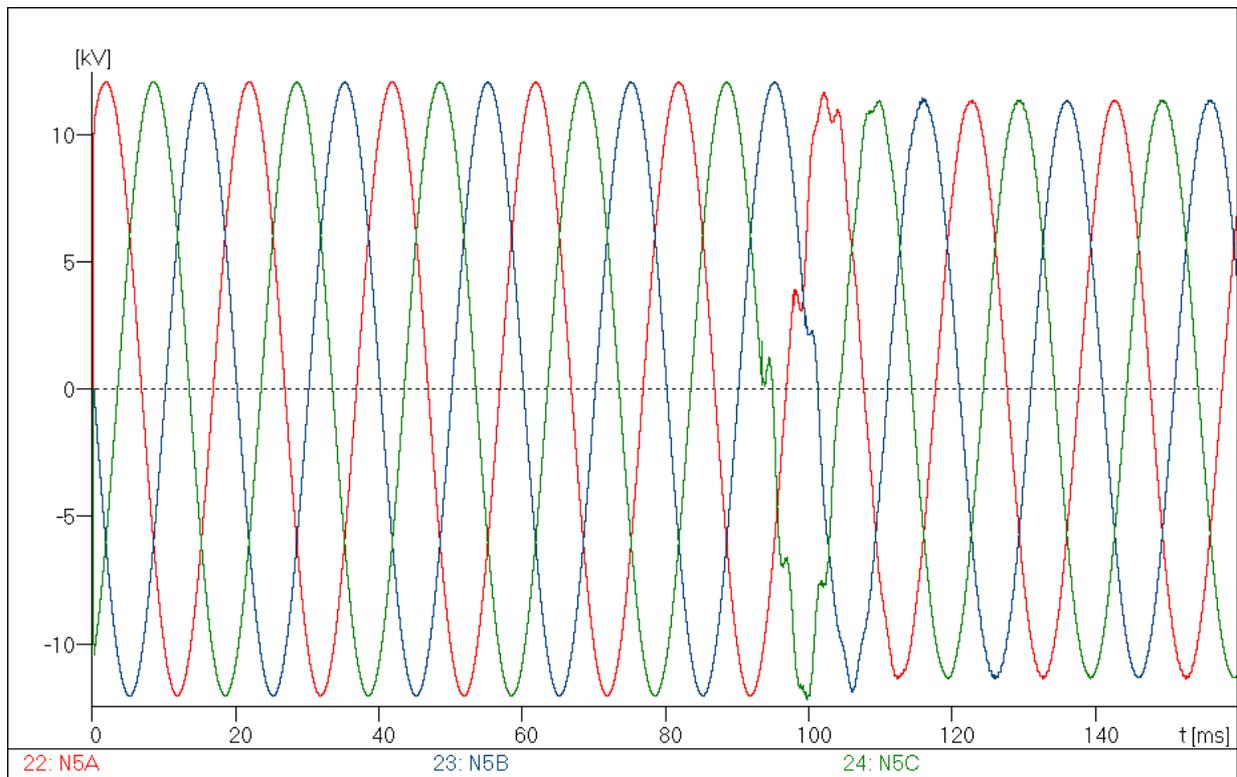
Peak: 11.34 kV

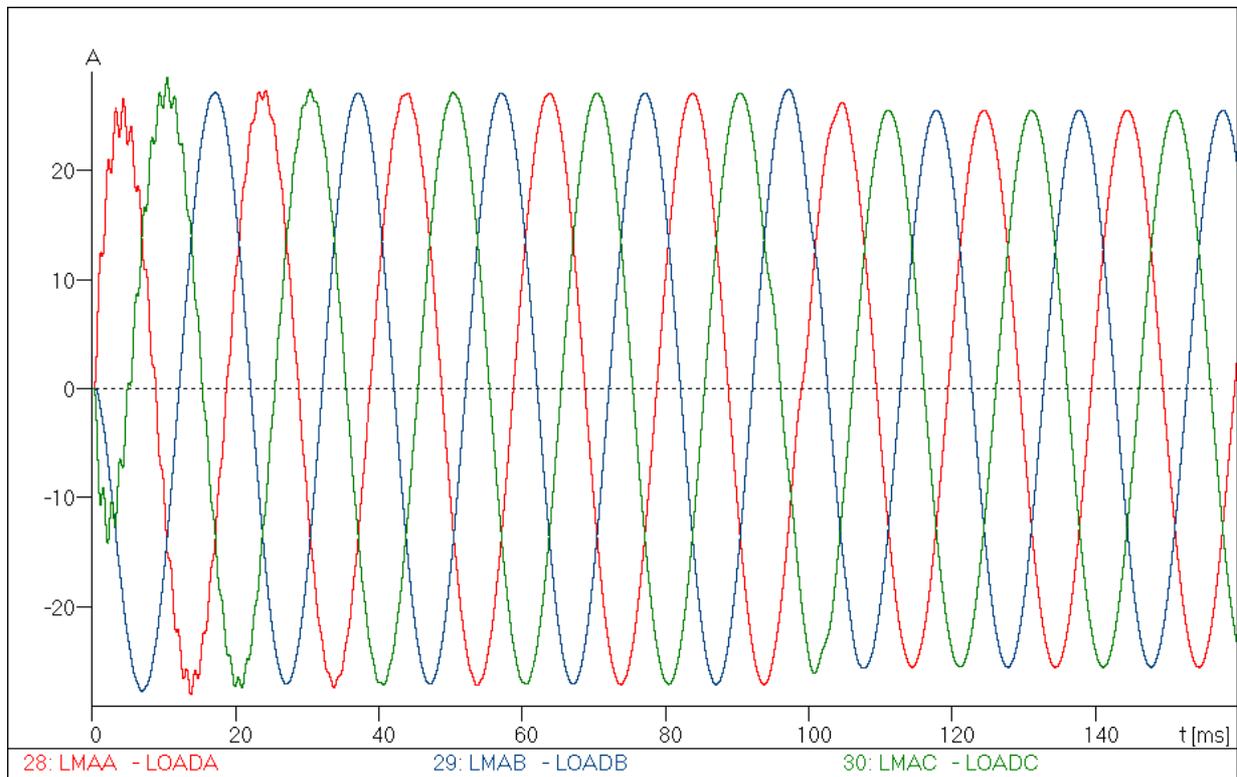
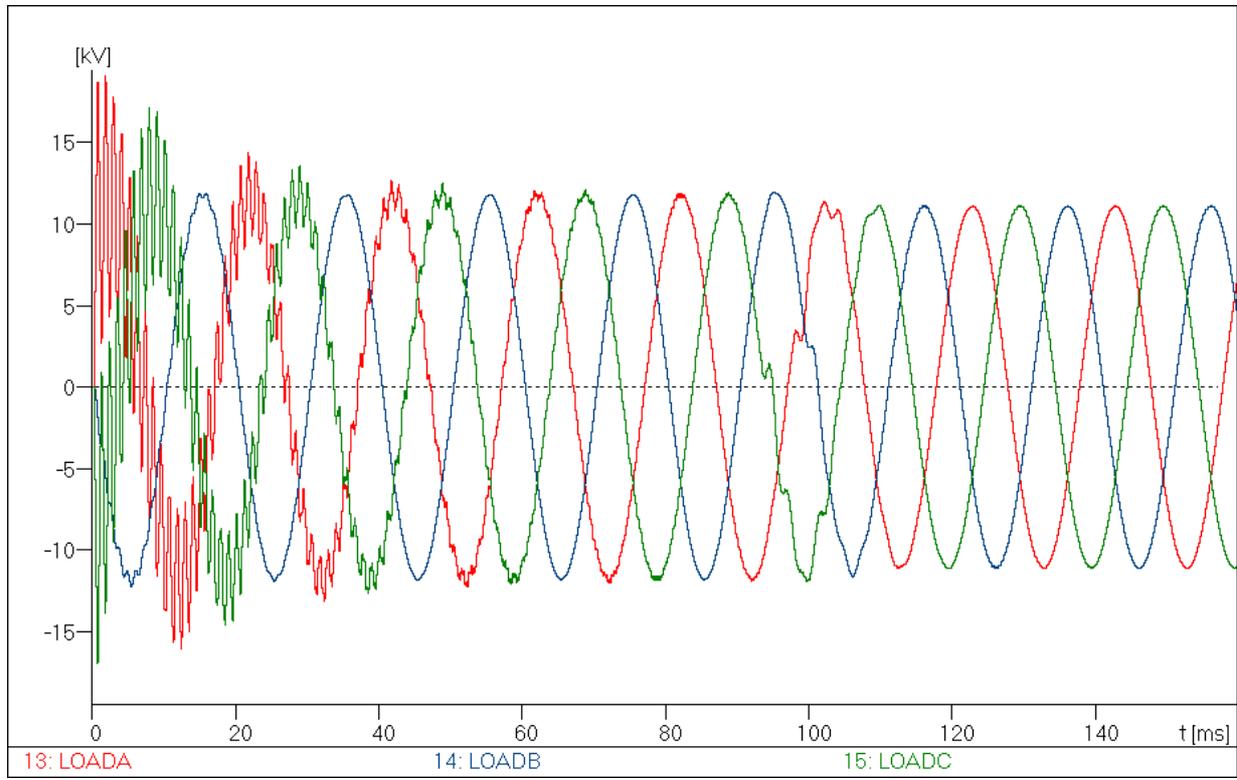


Zoom sobre la tensión de fase A en el PCC:



$$f \approx 50.15 \text{ Hz}$$







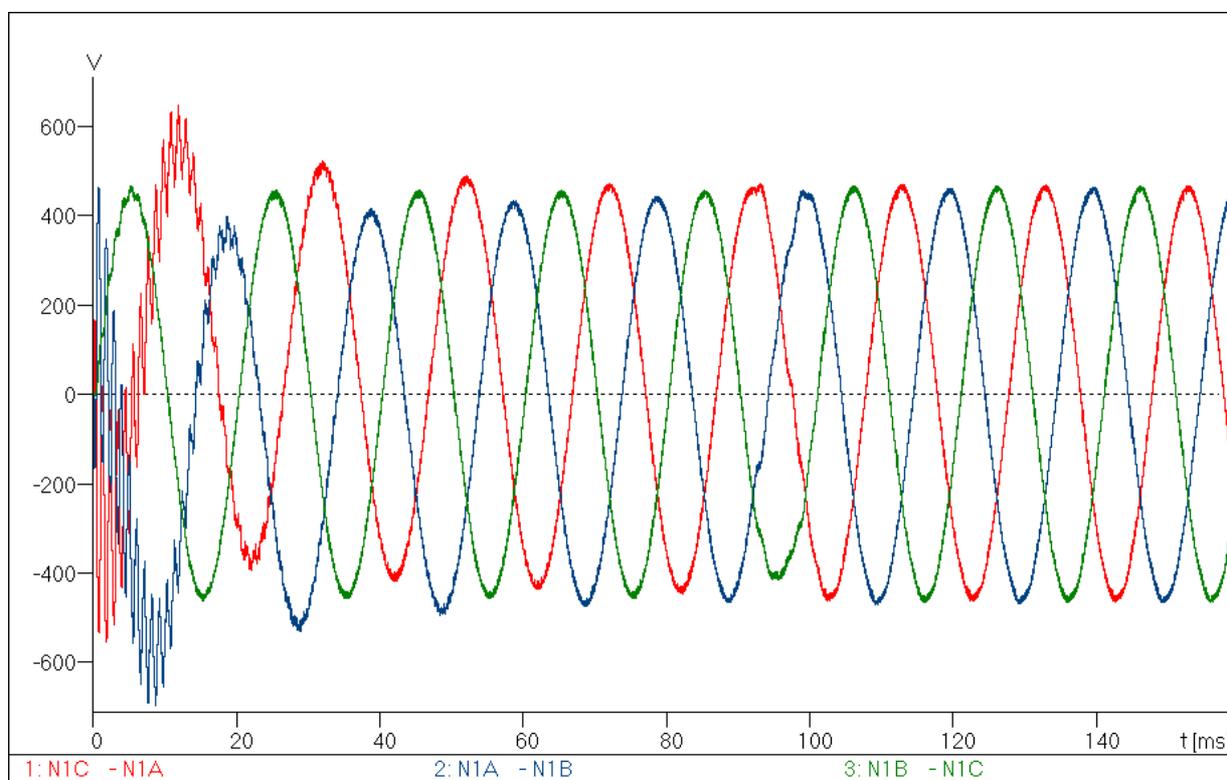


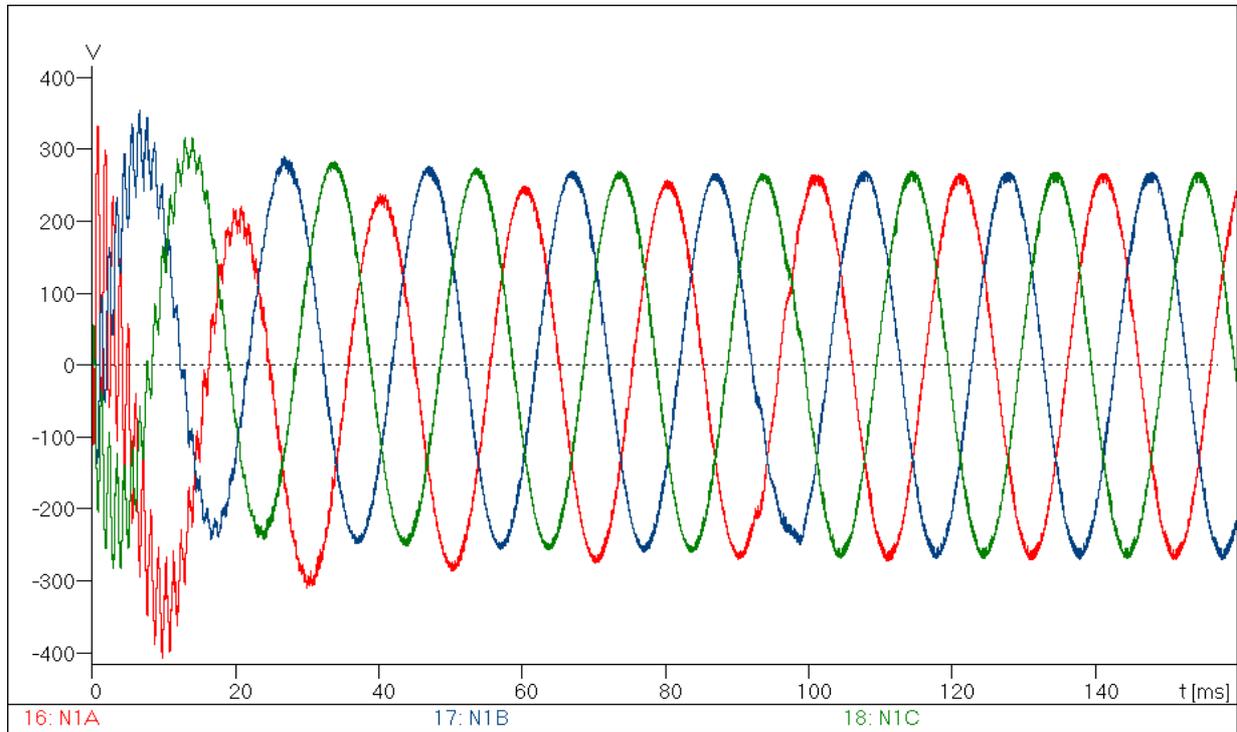
4.6 Planta fotovoltaica 5.

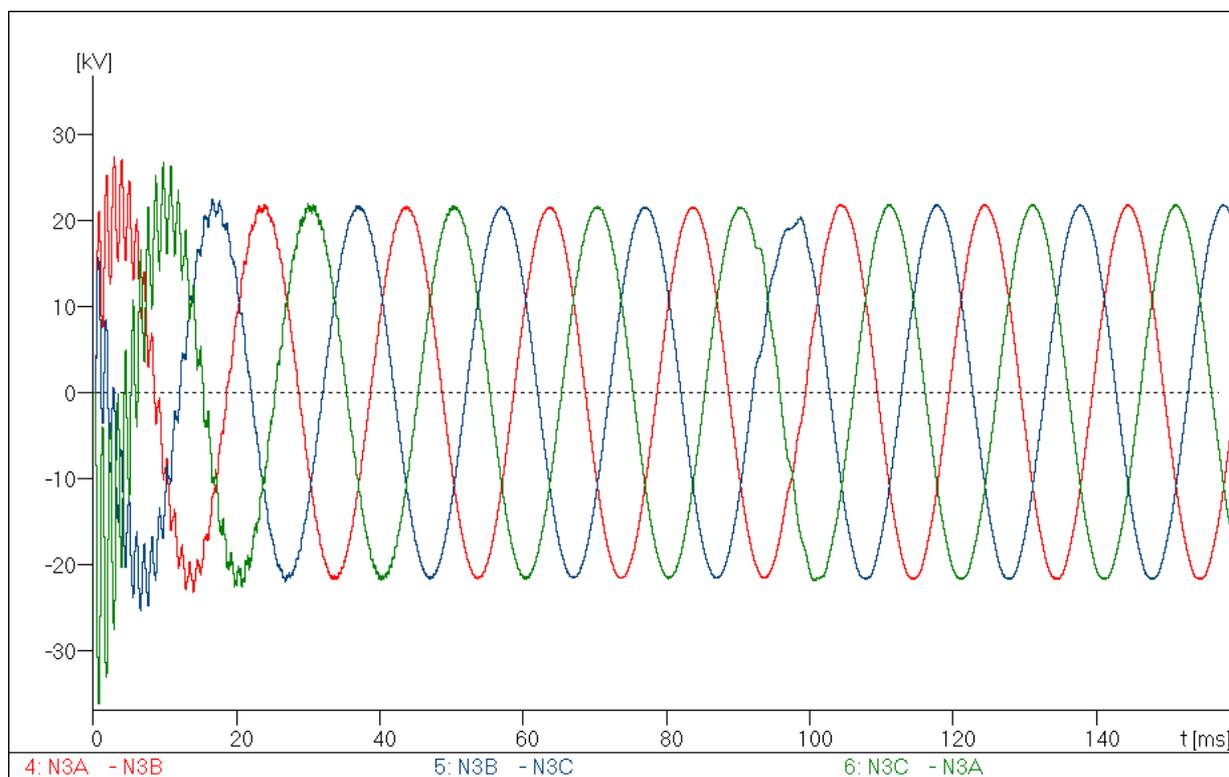
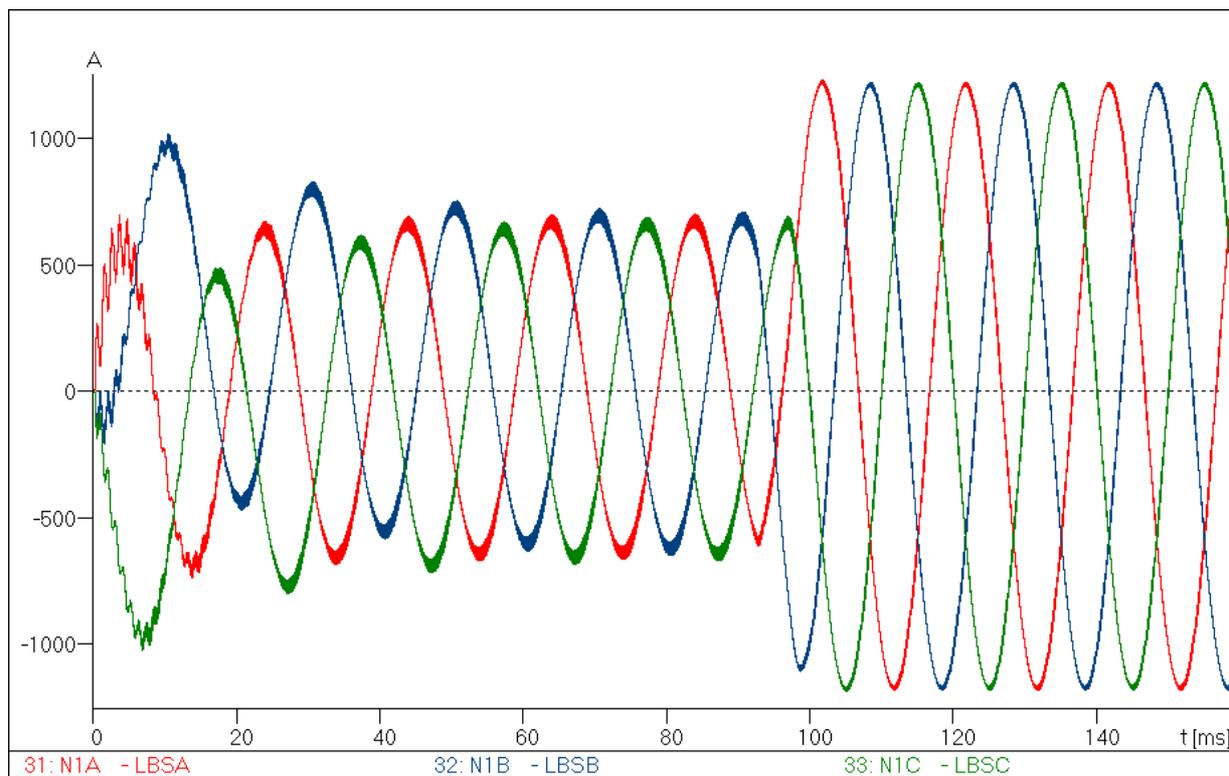
Método activo de detección en isla.

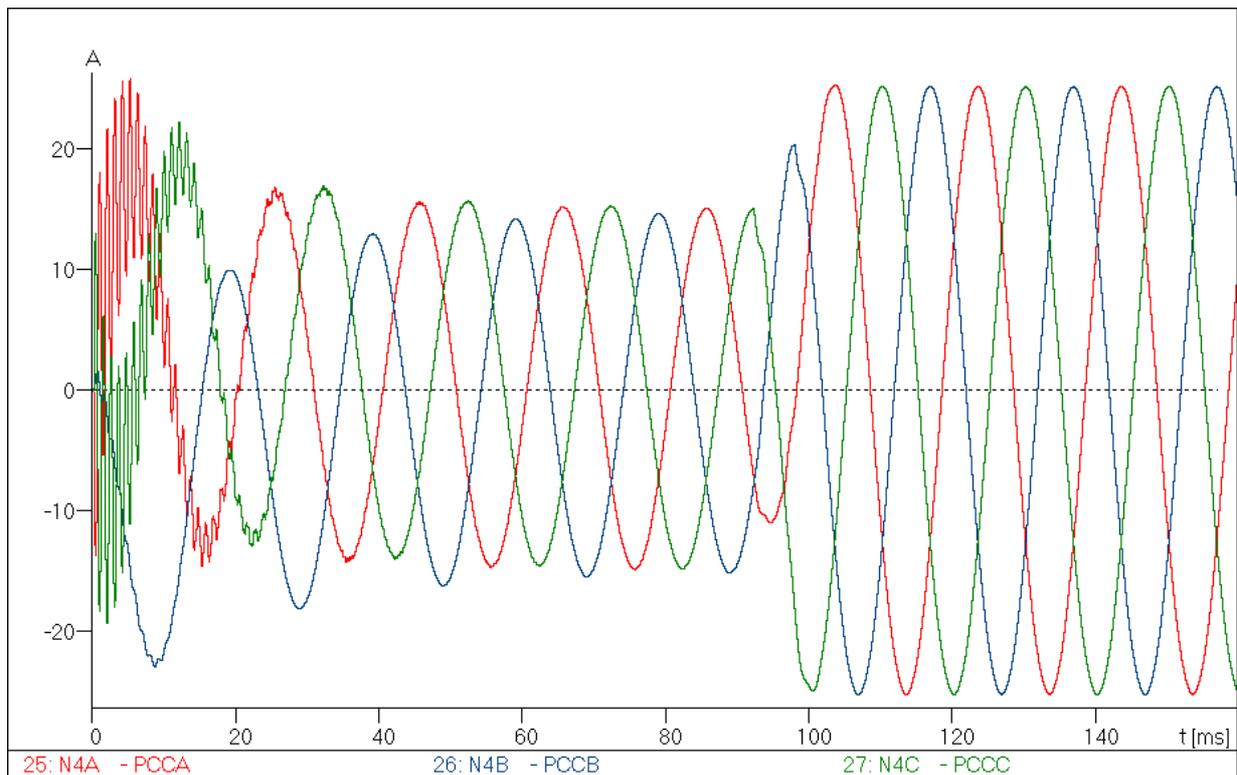
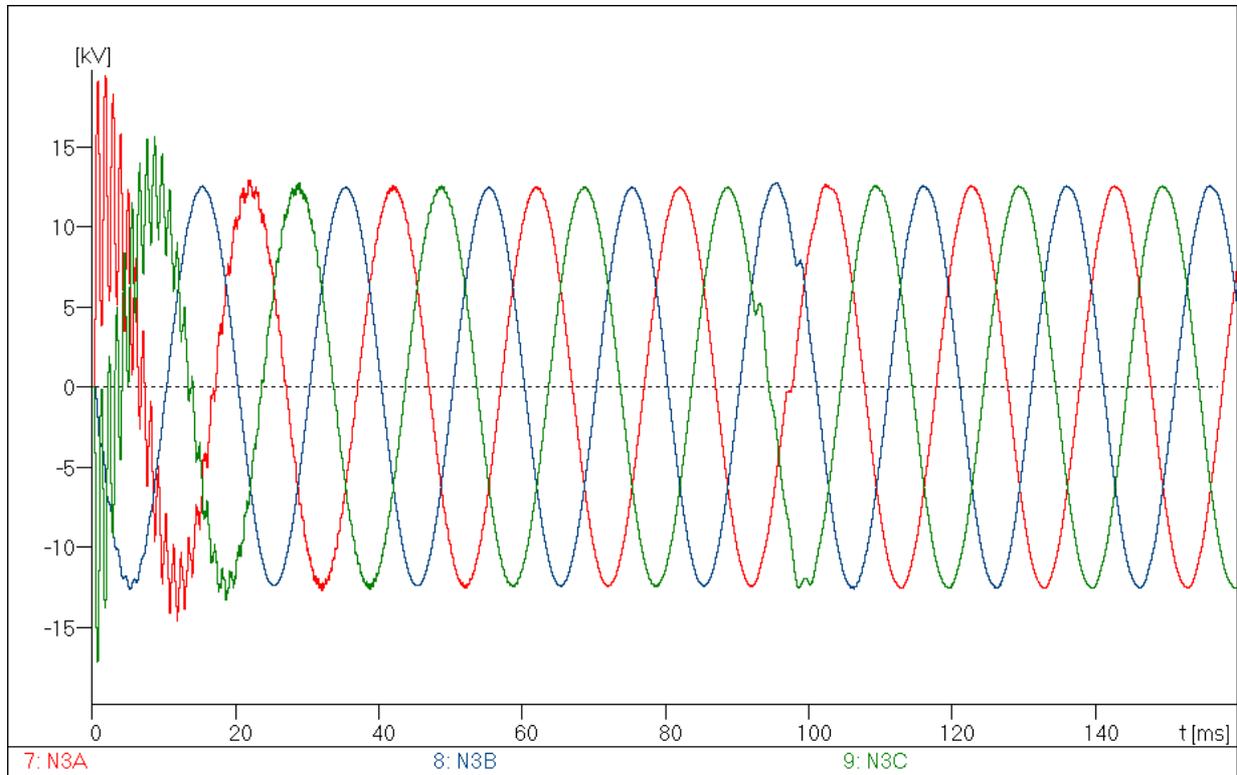
Inyección armónica: 1 A, 500 Hz ($h=10$).

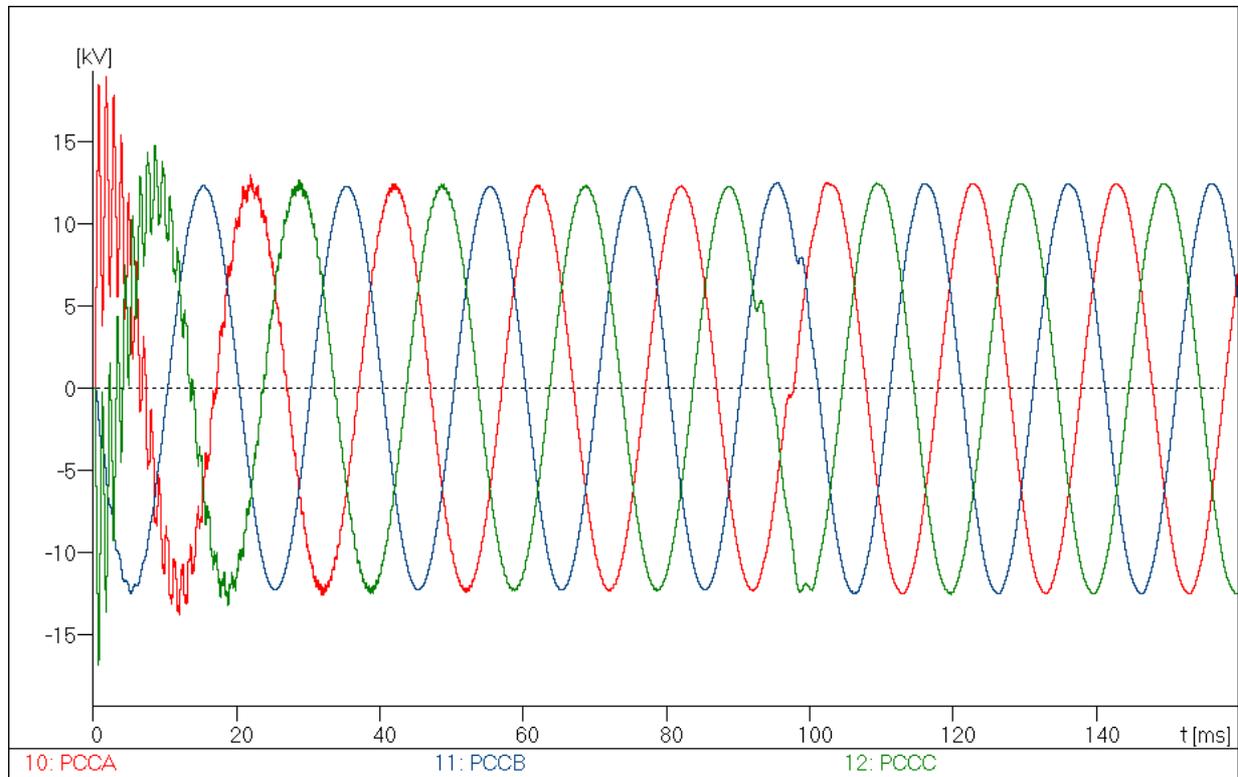
➤ CARGA 4: **0.8 MW**, $\cos\varphi=0.98$.



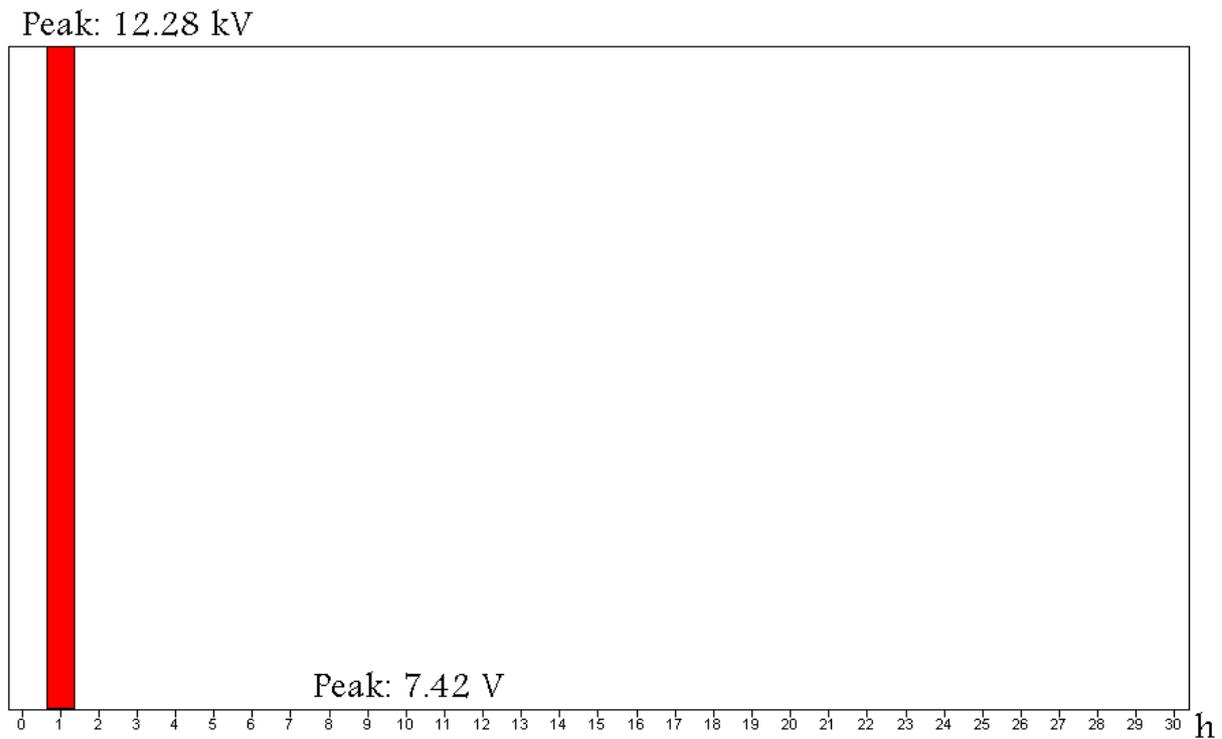






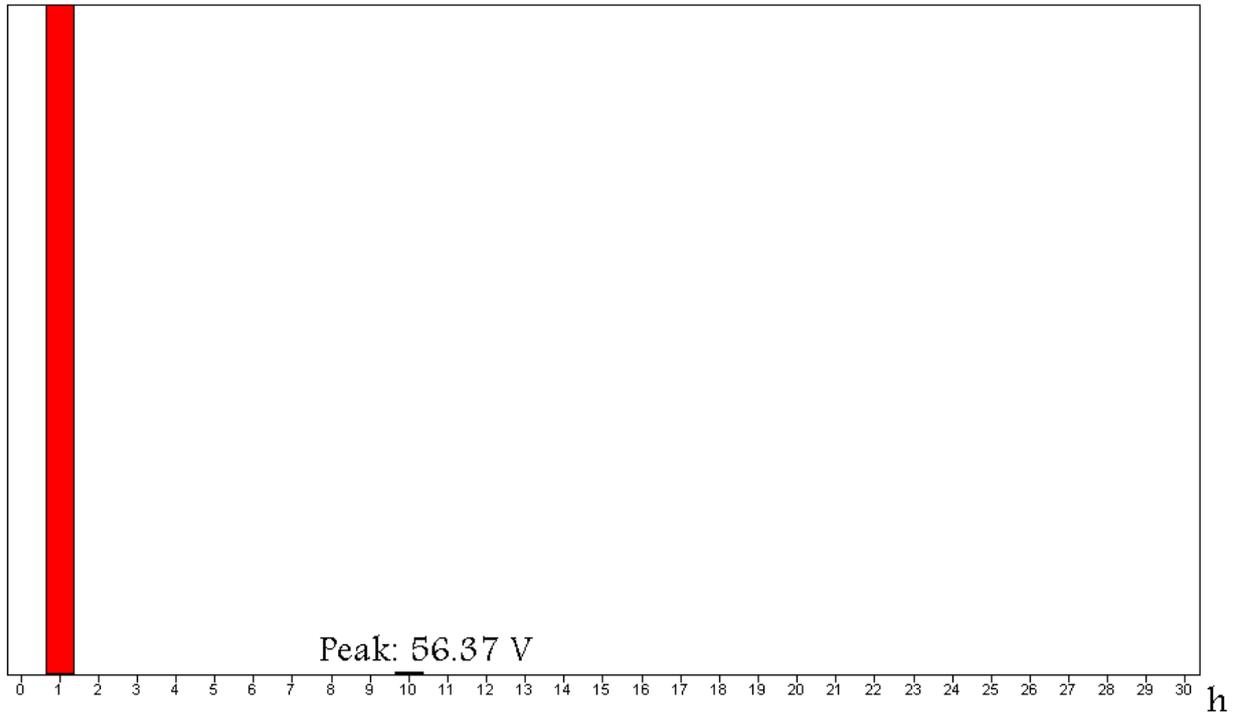


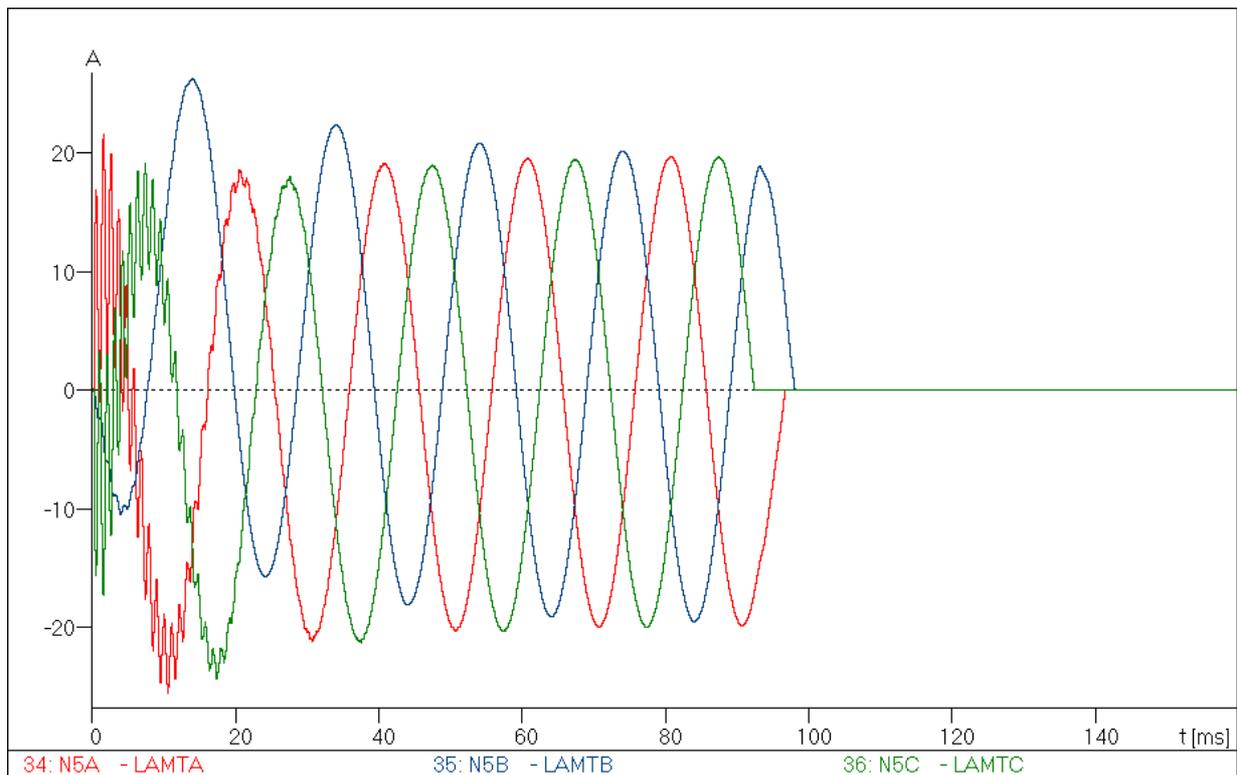
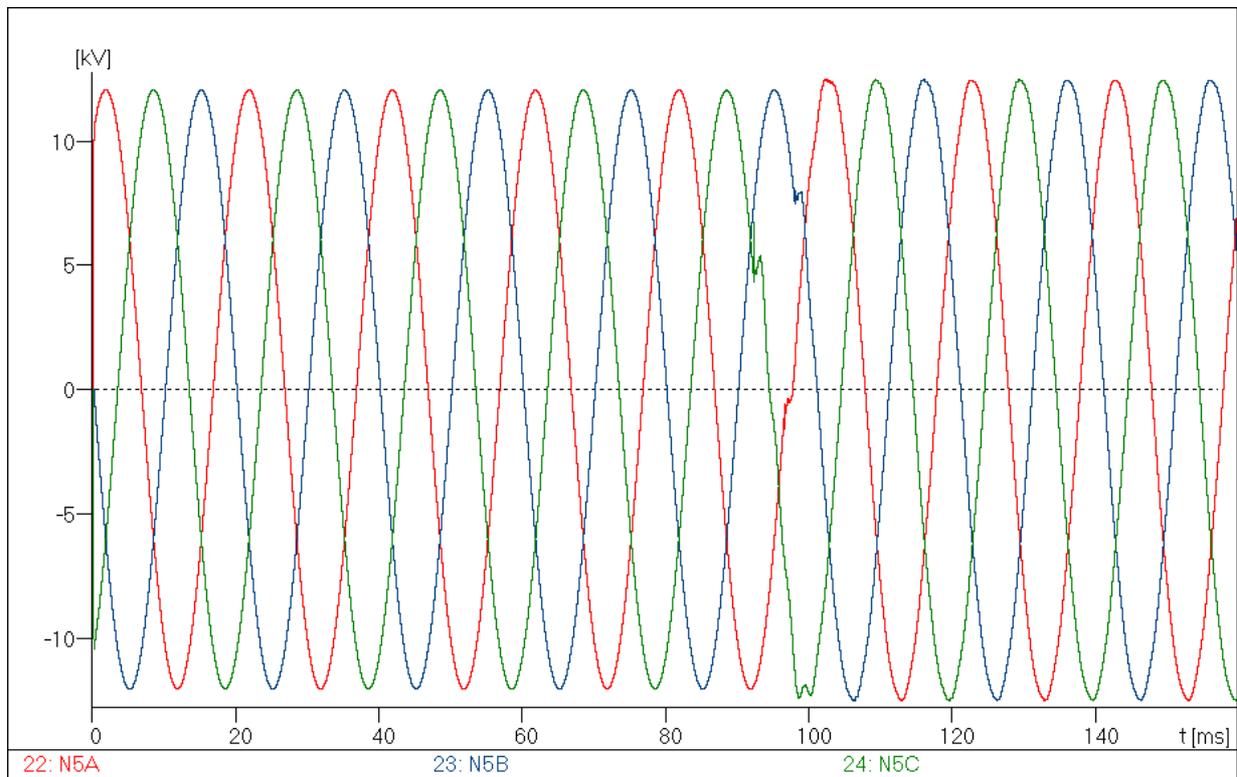
Antes de la falta. Transformada de Fourier de la tensión de la fase A en el PCC:

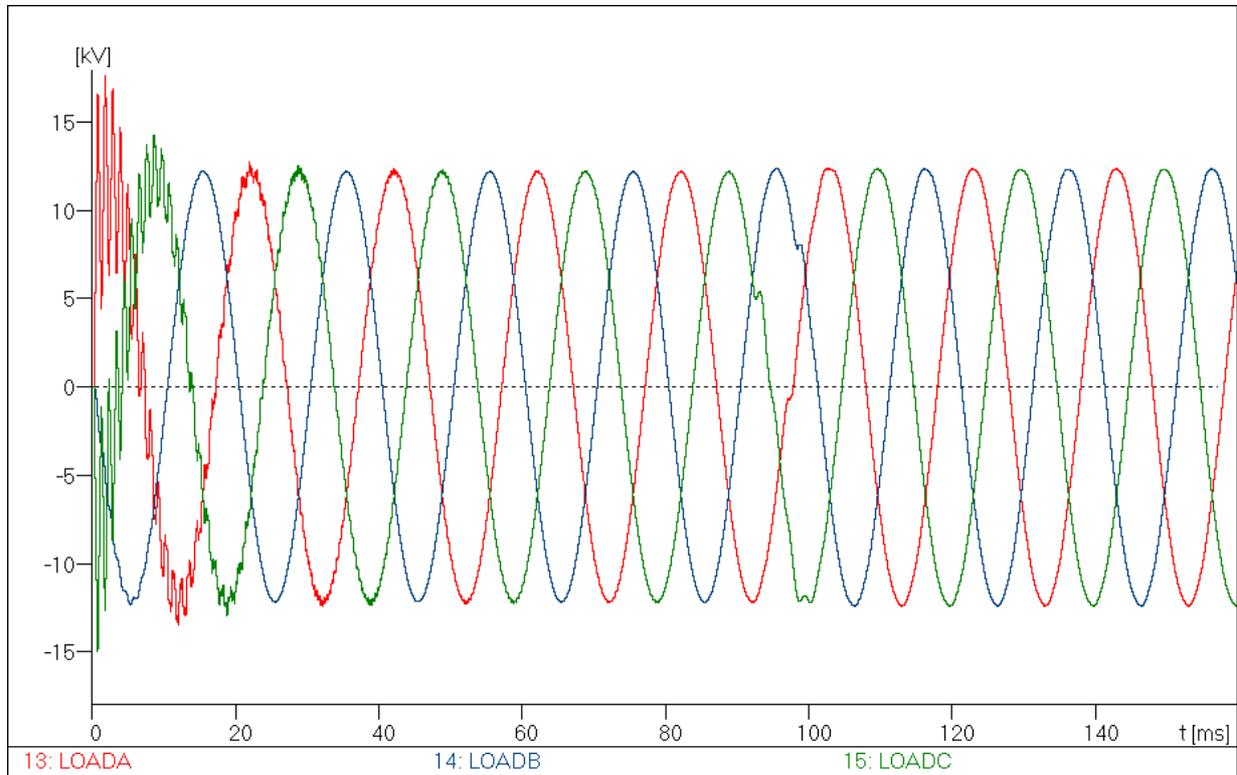


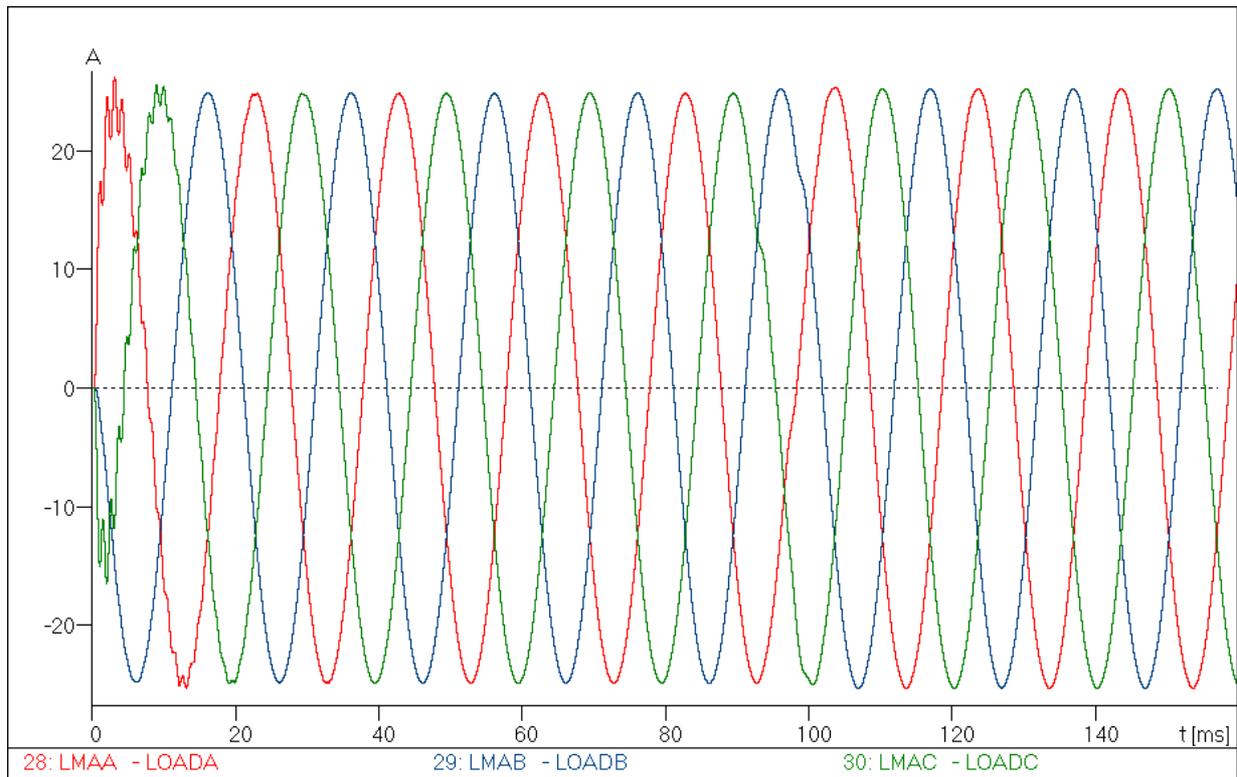
Después de la falta:

Peak: 12.47 kV













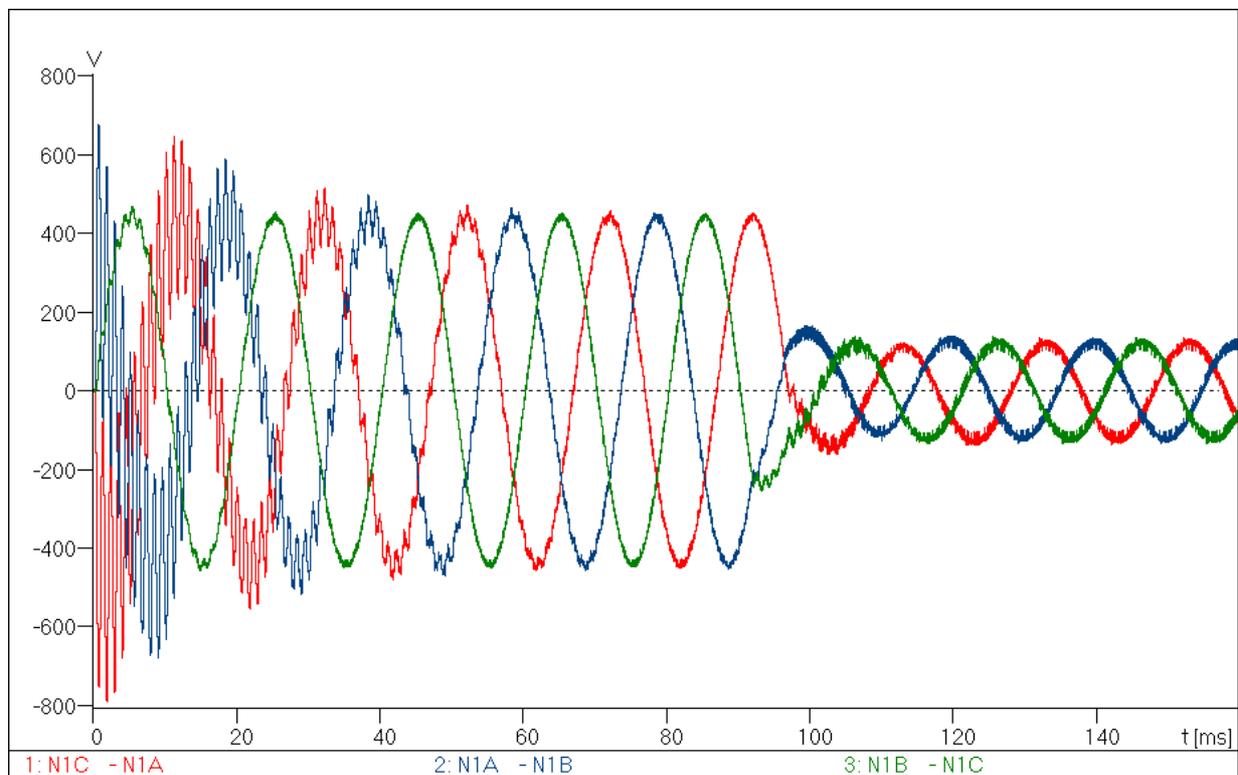


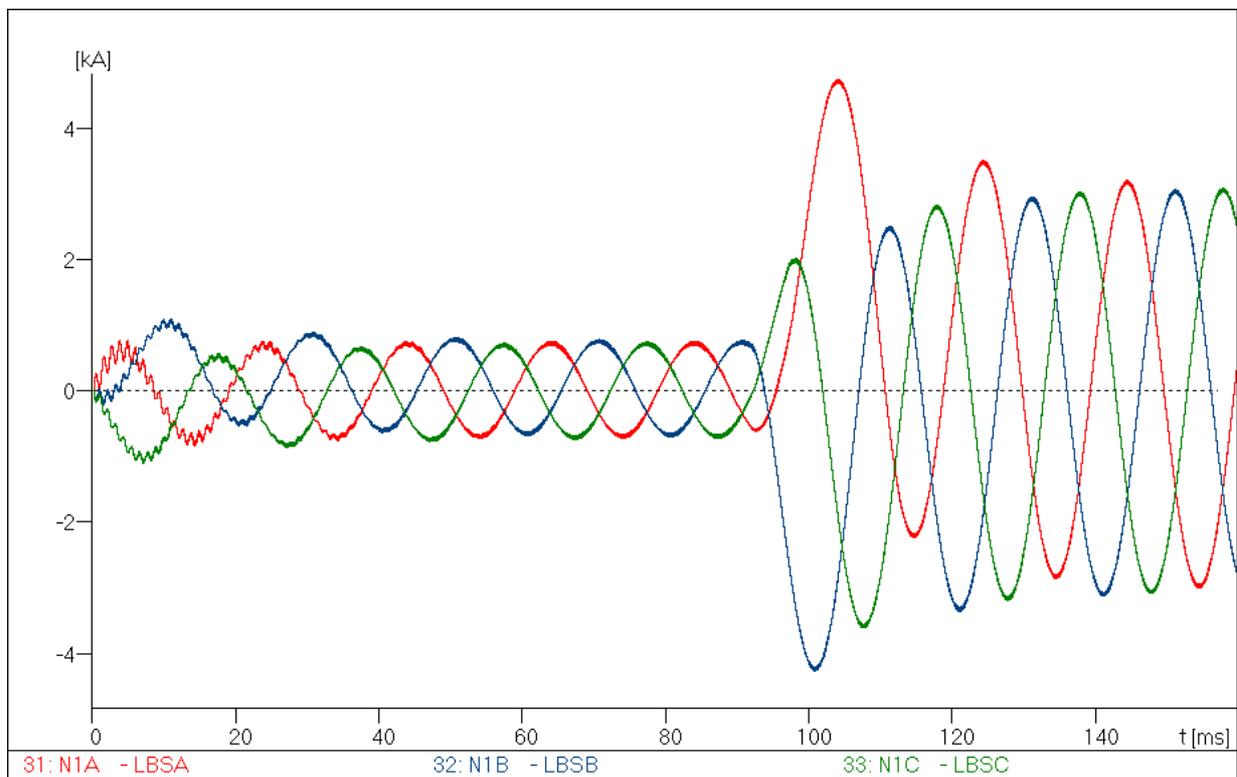
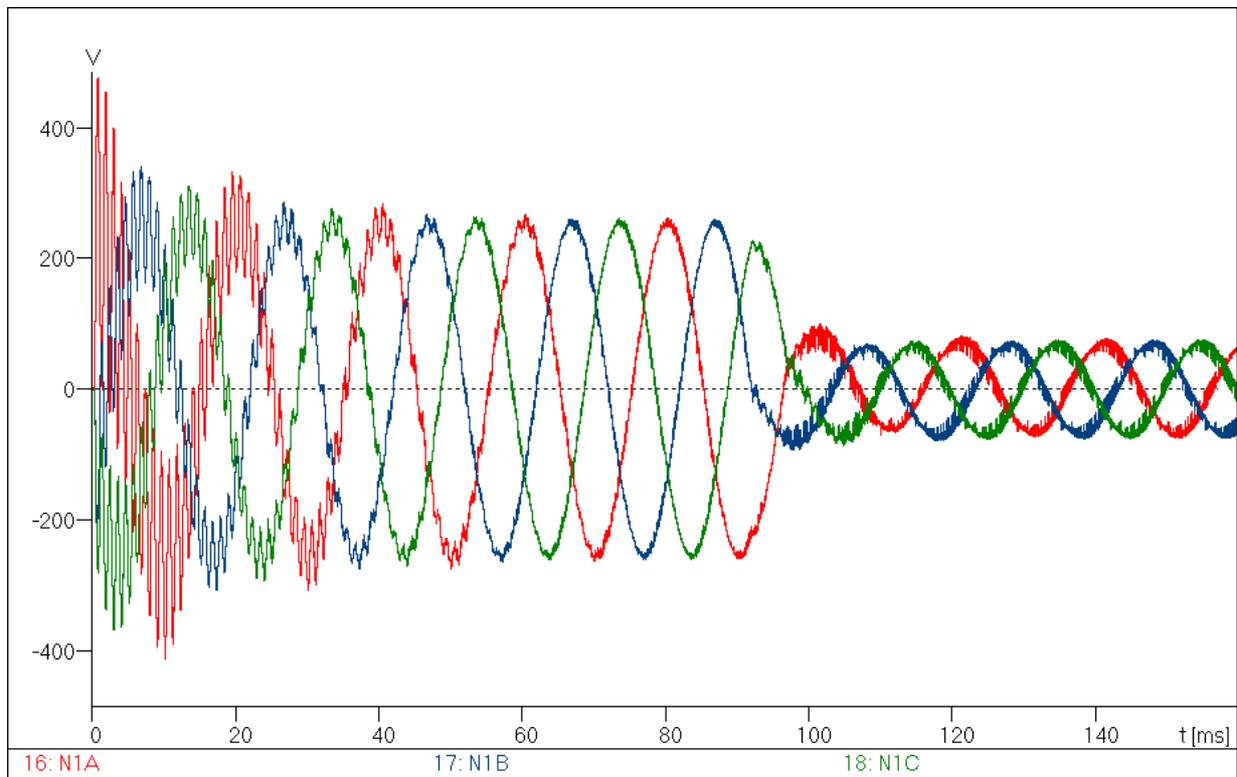
4.7 Planta fotovoltaica 6.

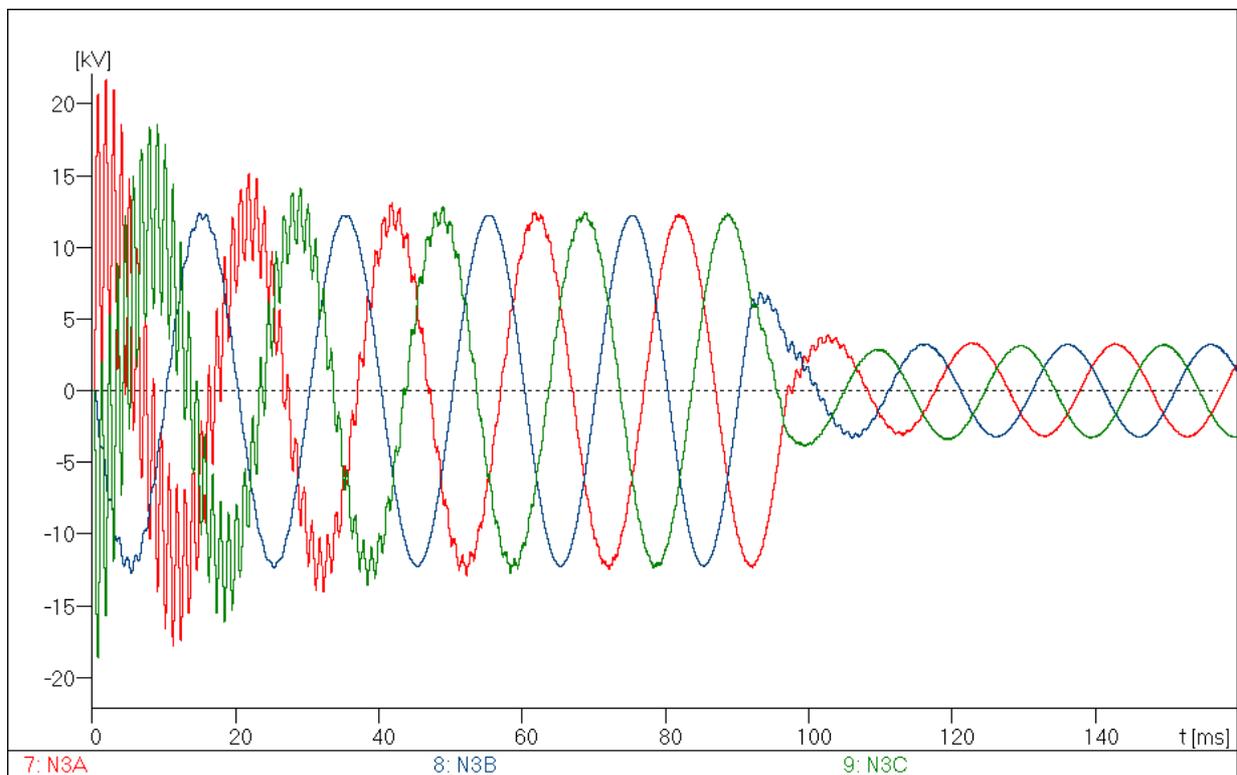
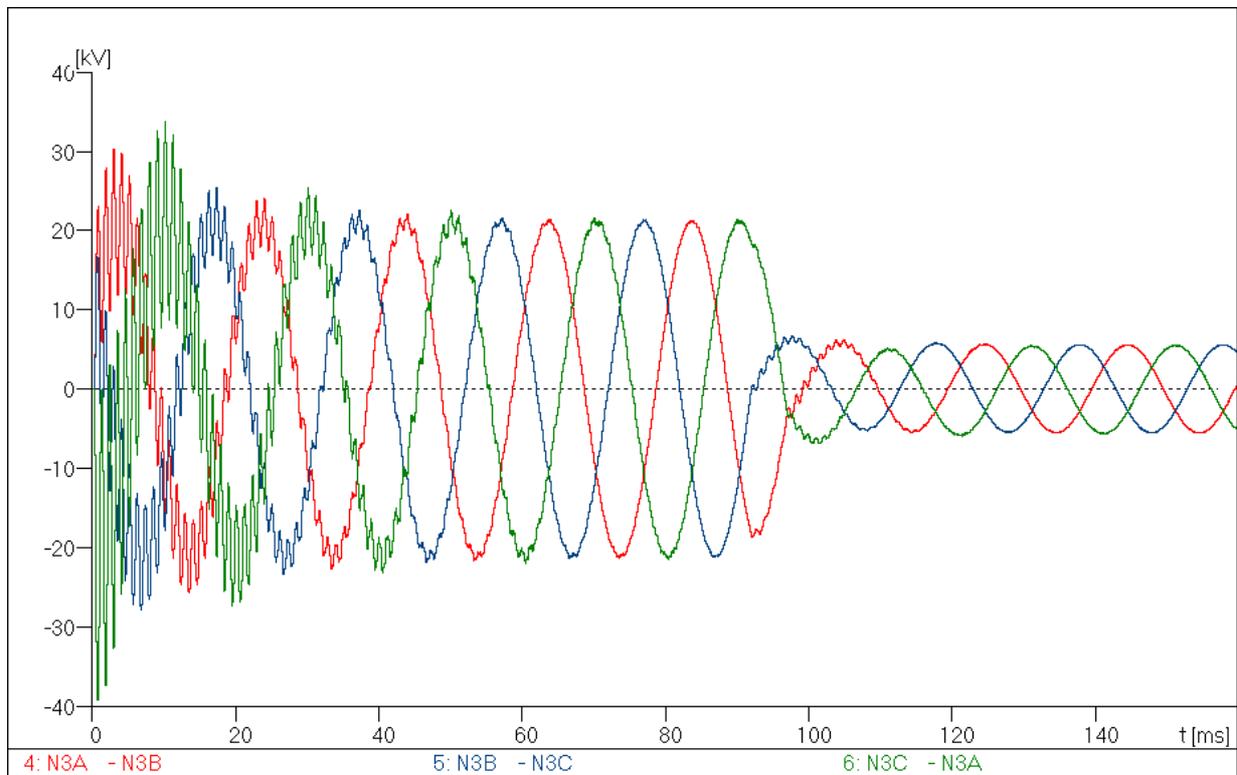
Métodos de detección en isla pasivos.

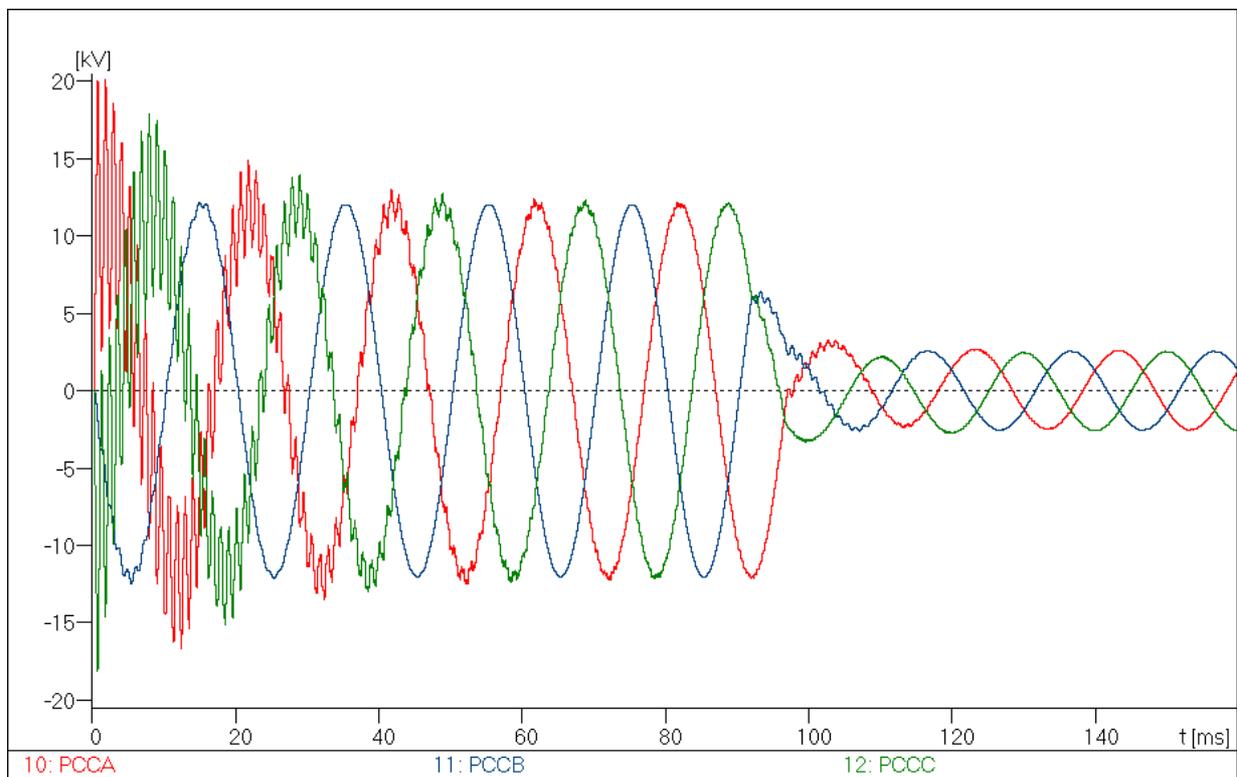
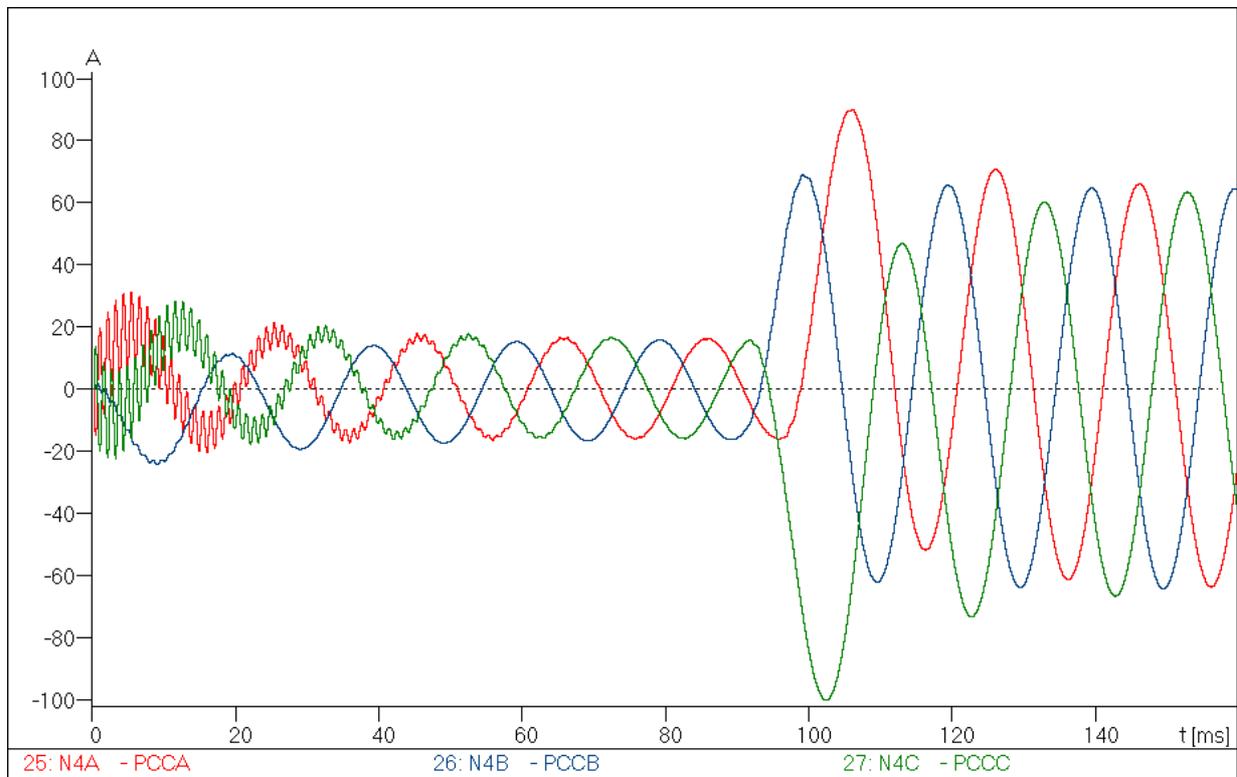
Falta ó Desconexión de la red aguas arriba de la subestación.

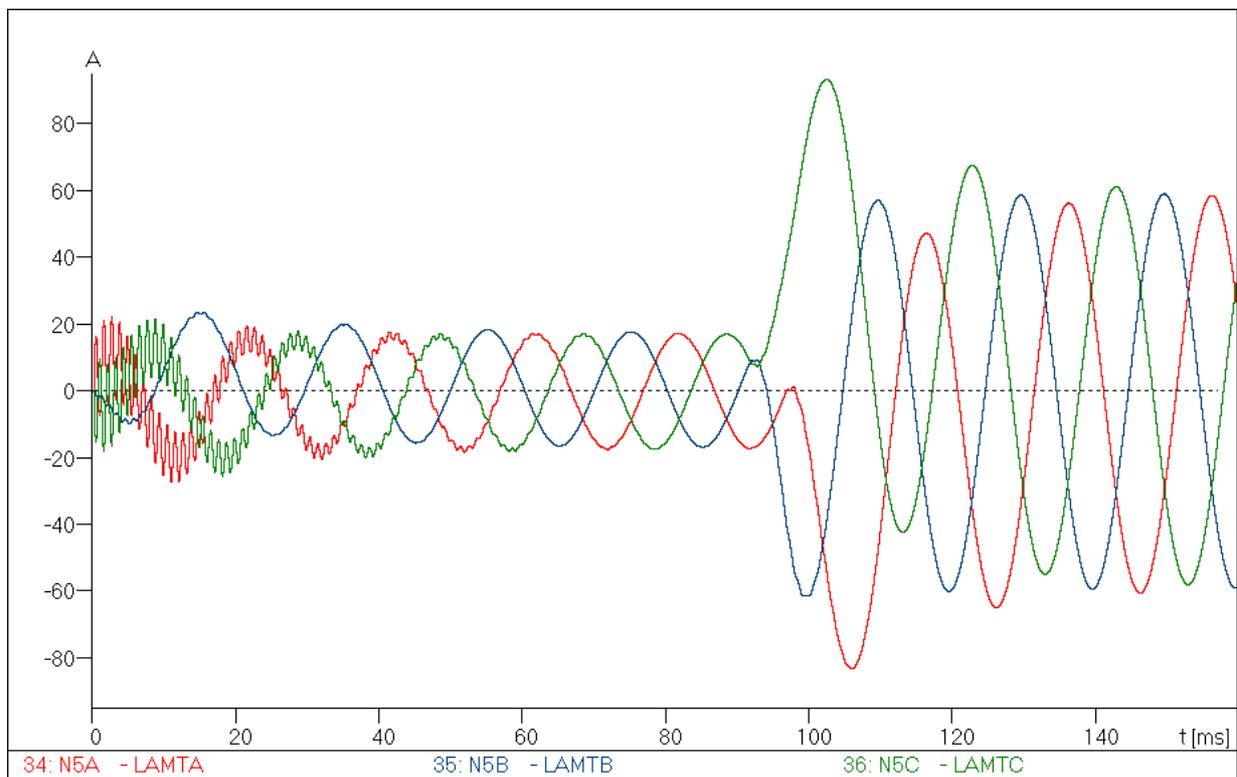
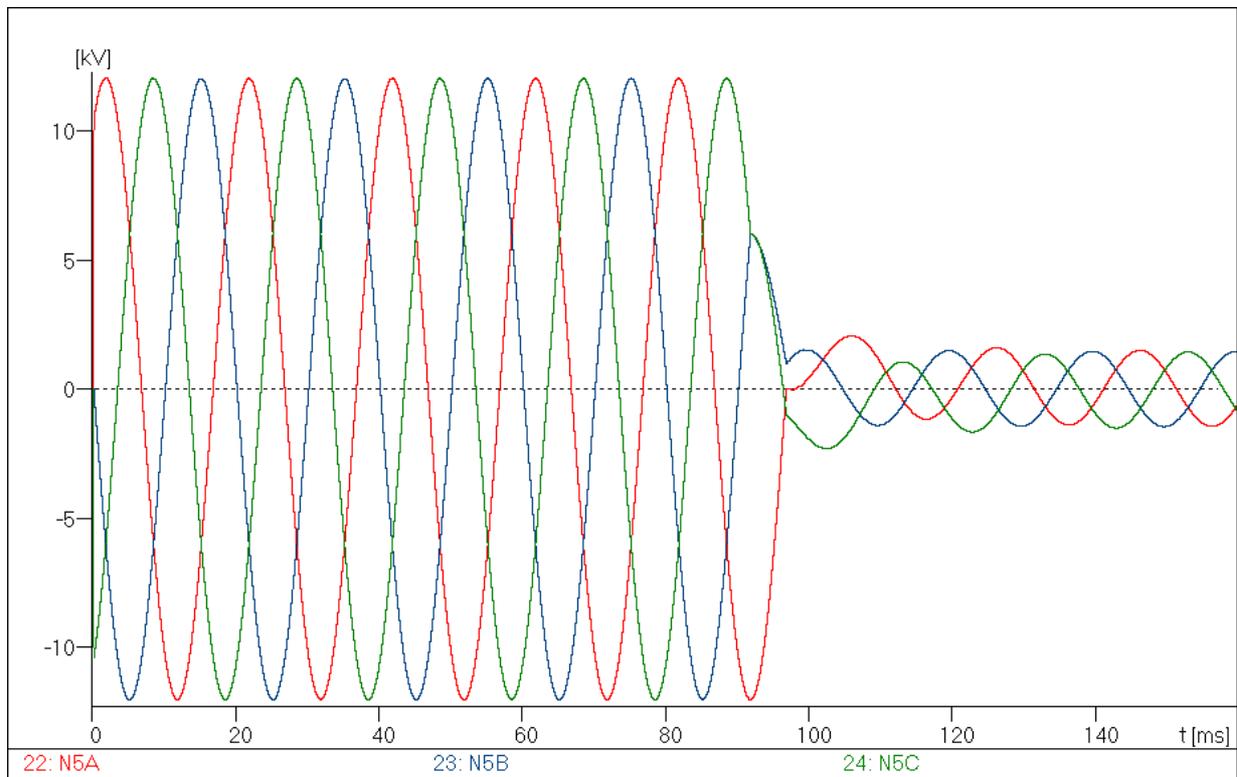
➤ CARGA 1: **0.8 MW**, $\cos\varphi=0.87$.











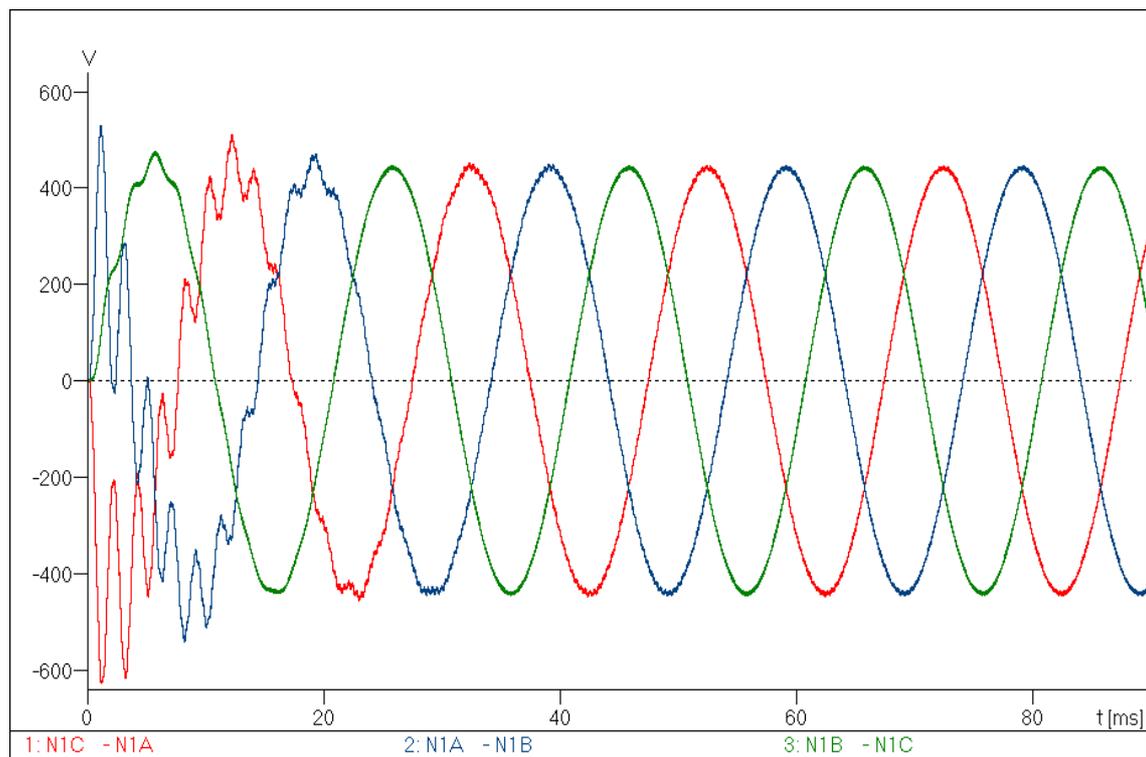


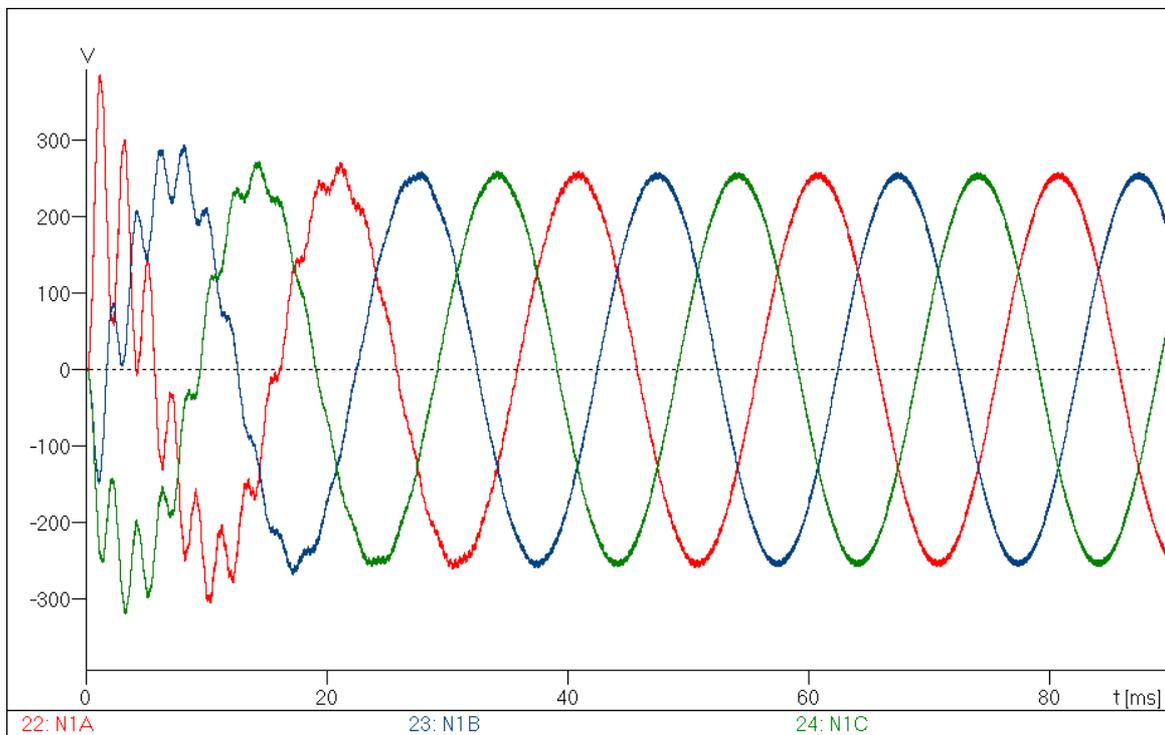
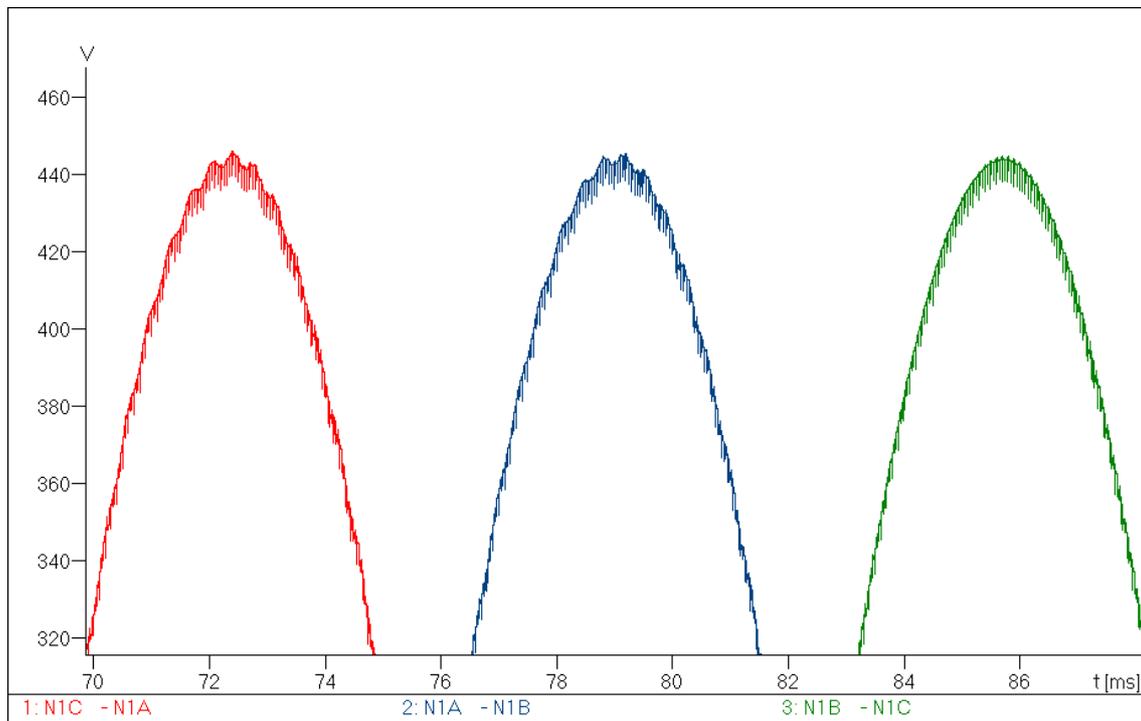


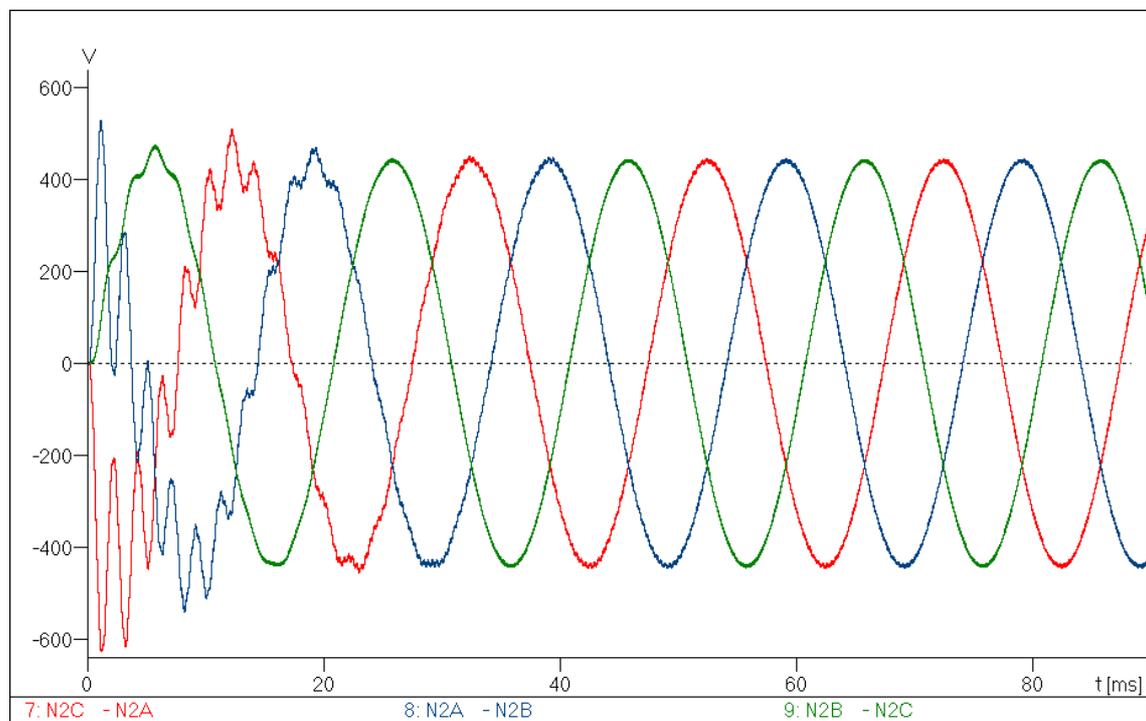
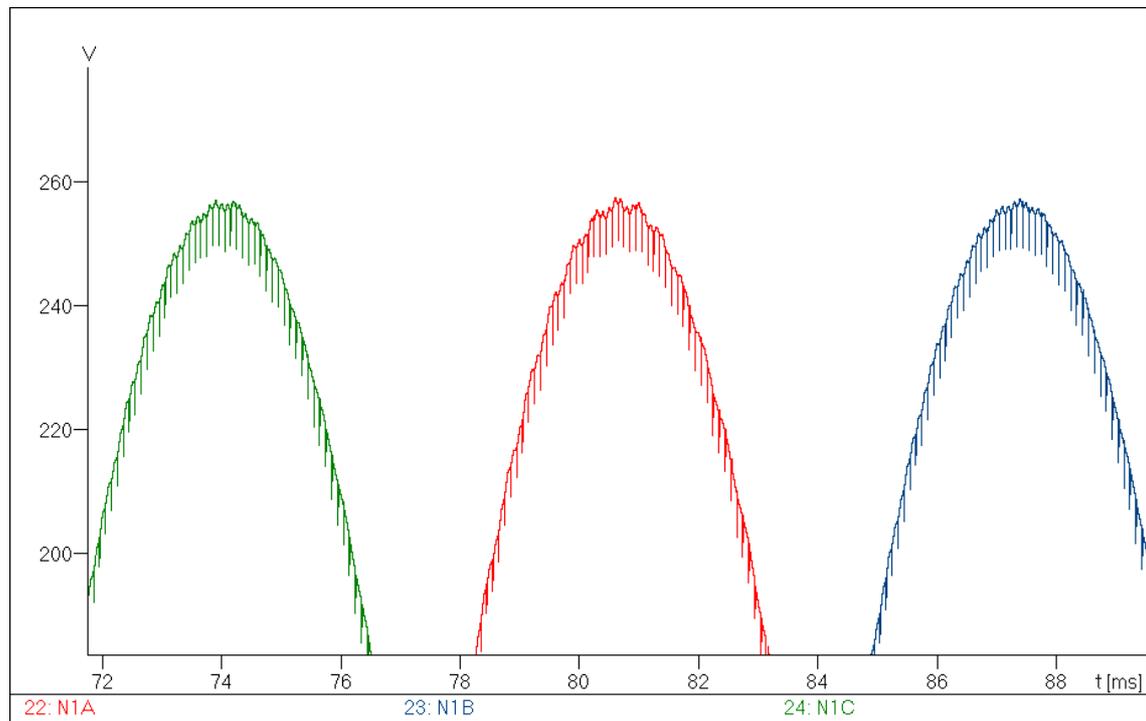
4.8 Planta fotovoltaica 7.

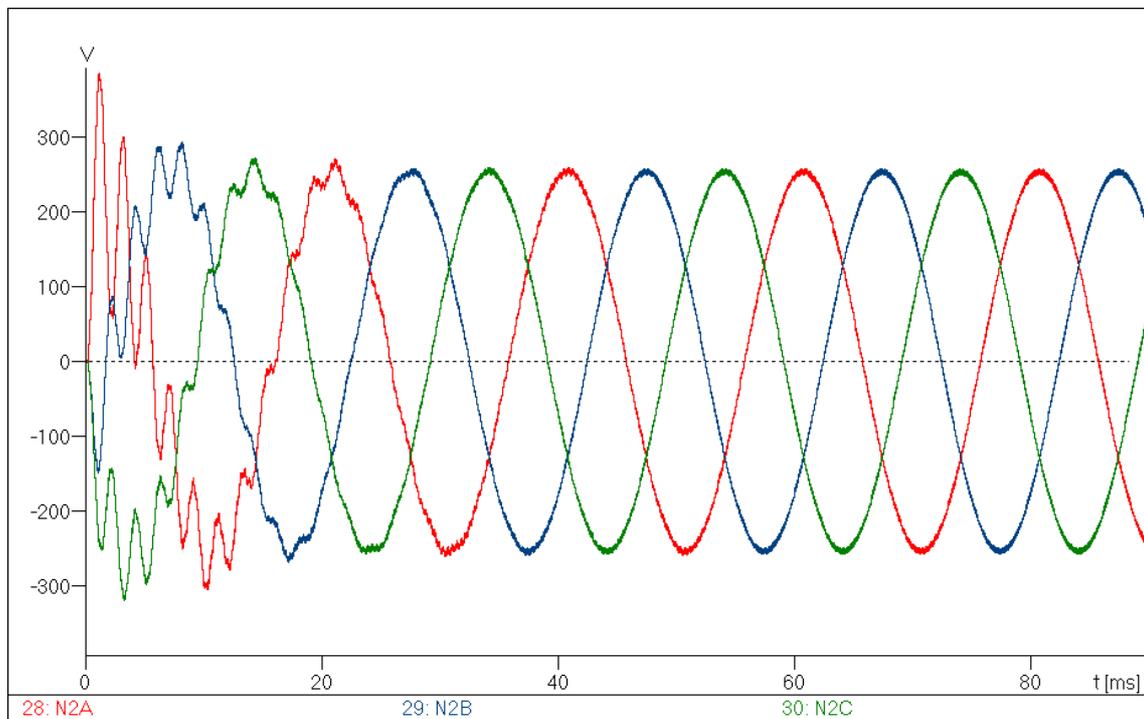
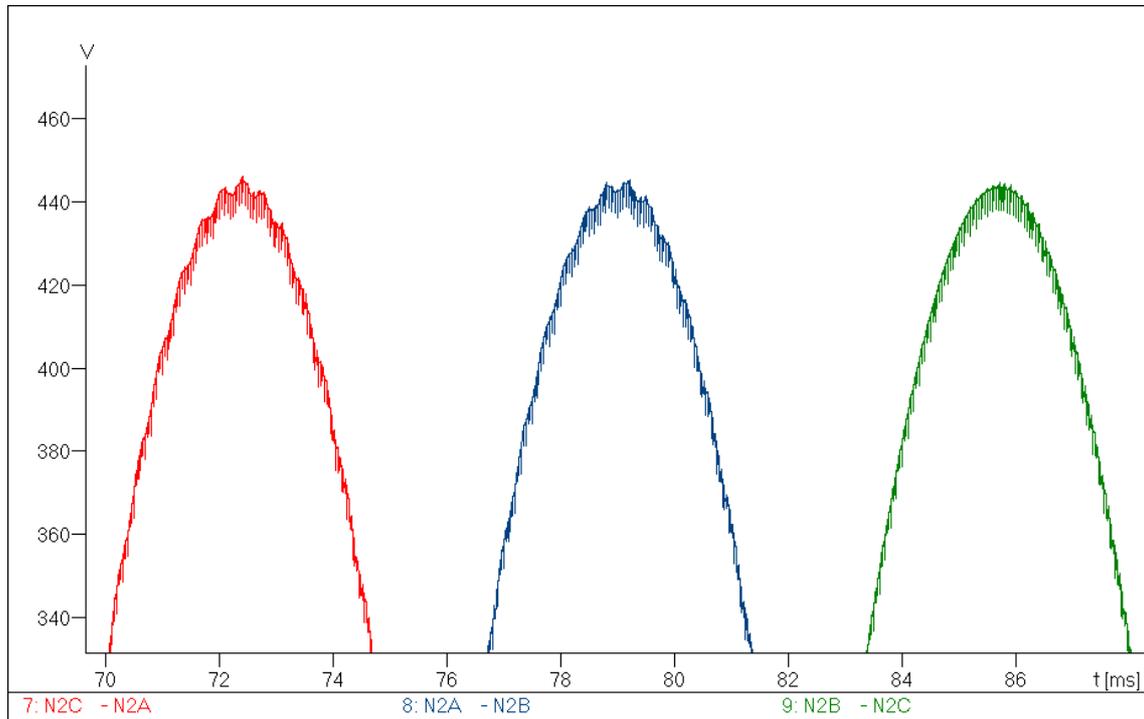
DOS INVERSORES.

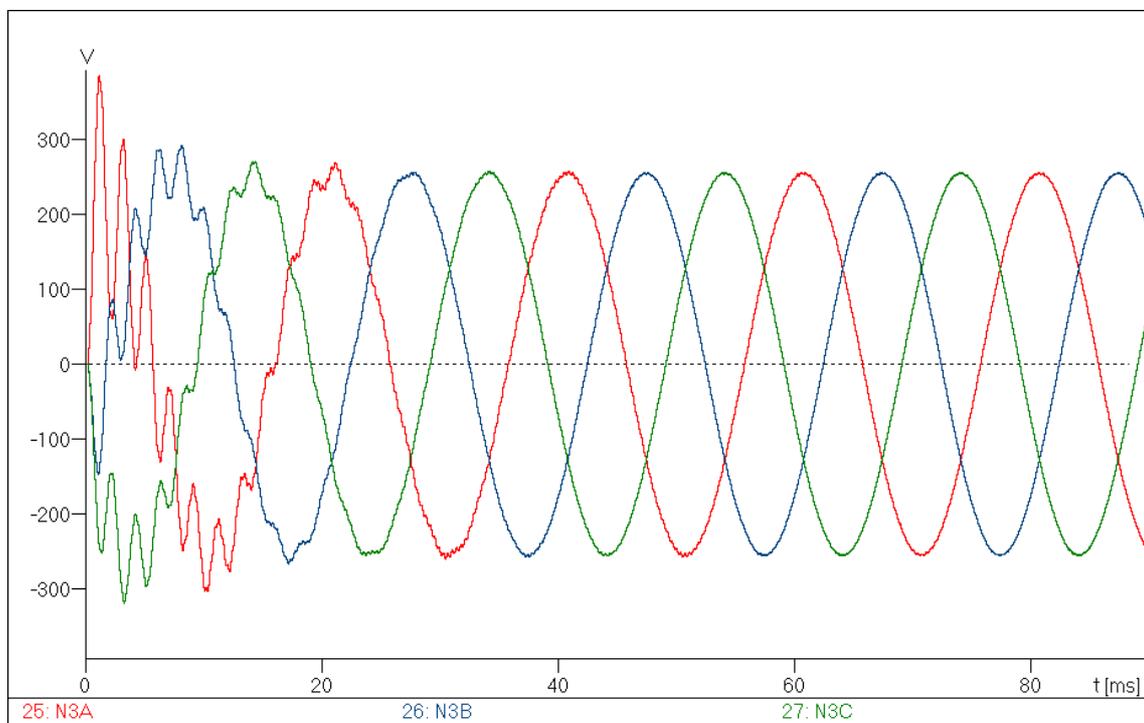
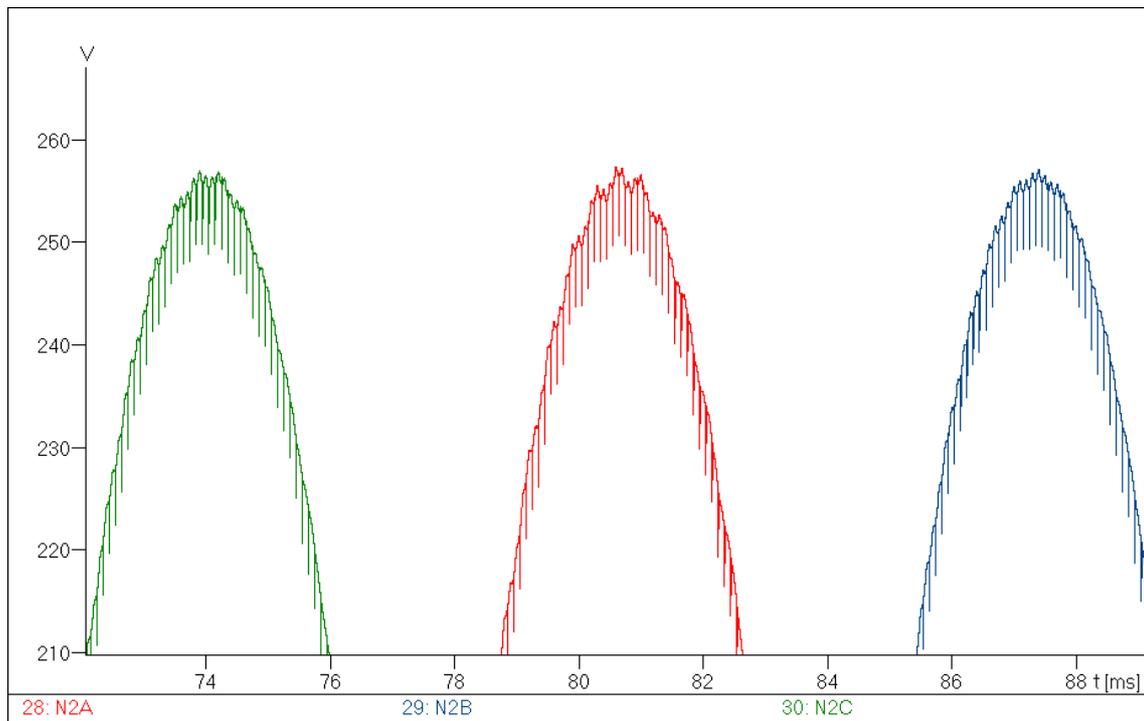
➤ CARGA 1: **0.8 MW**, $\cos\varphi=0.87$. Funcionamiento en isla.

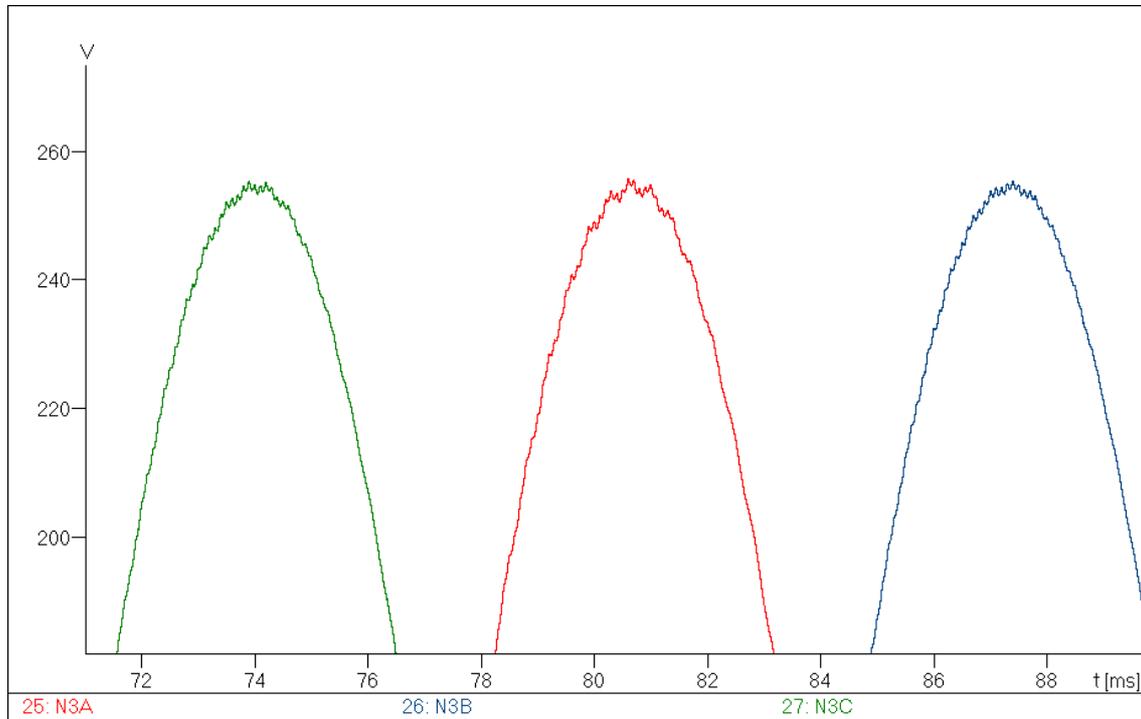




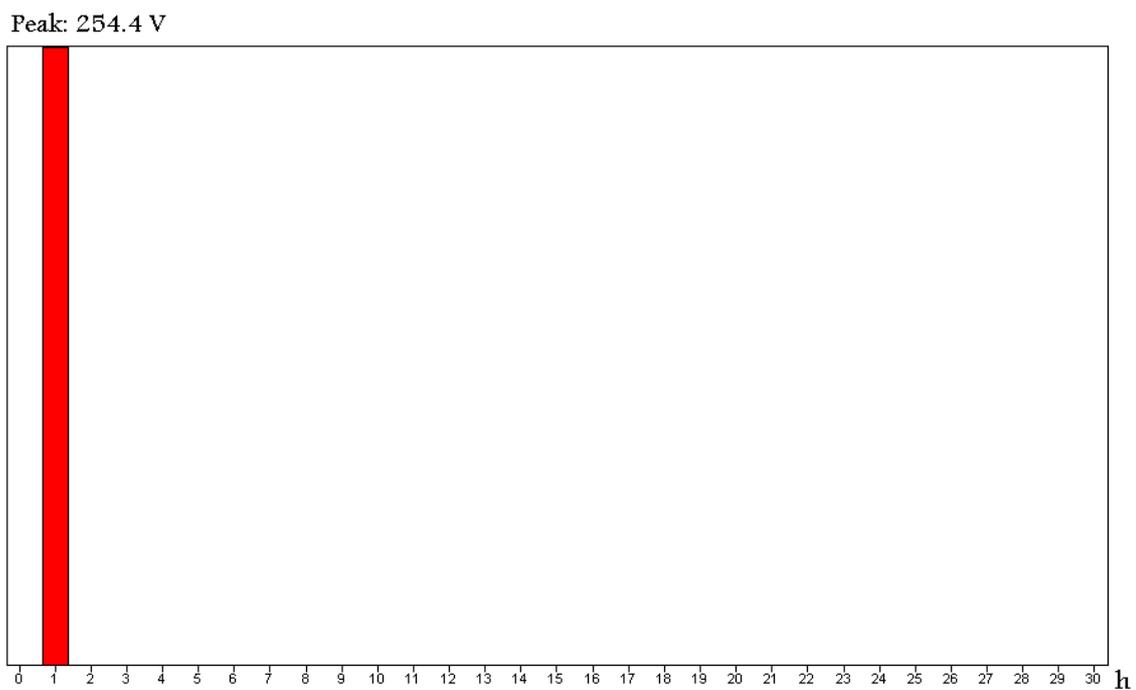


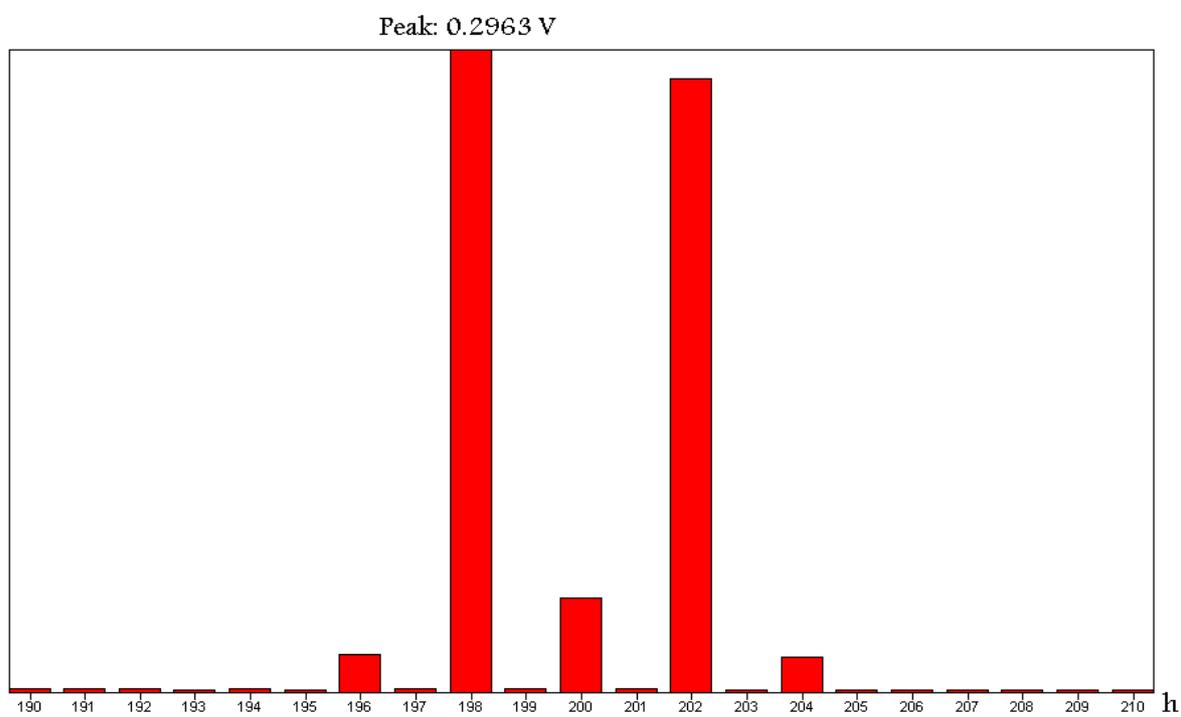
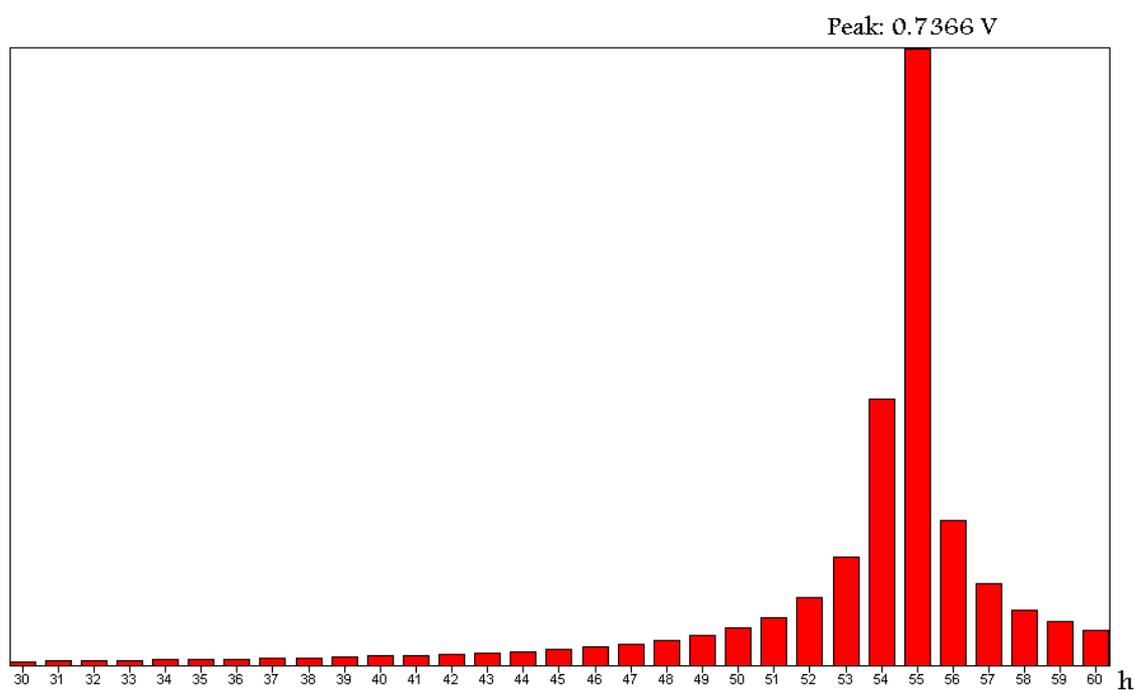


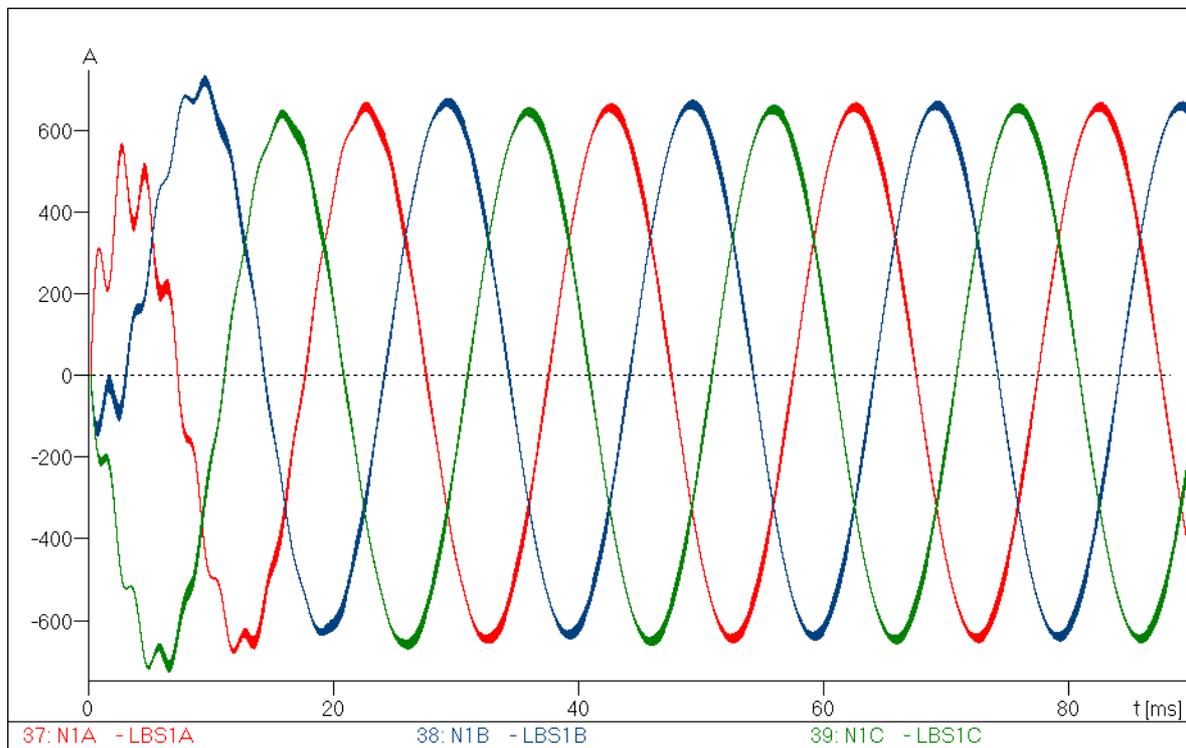
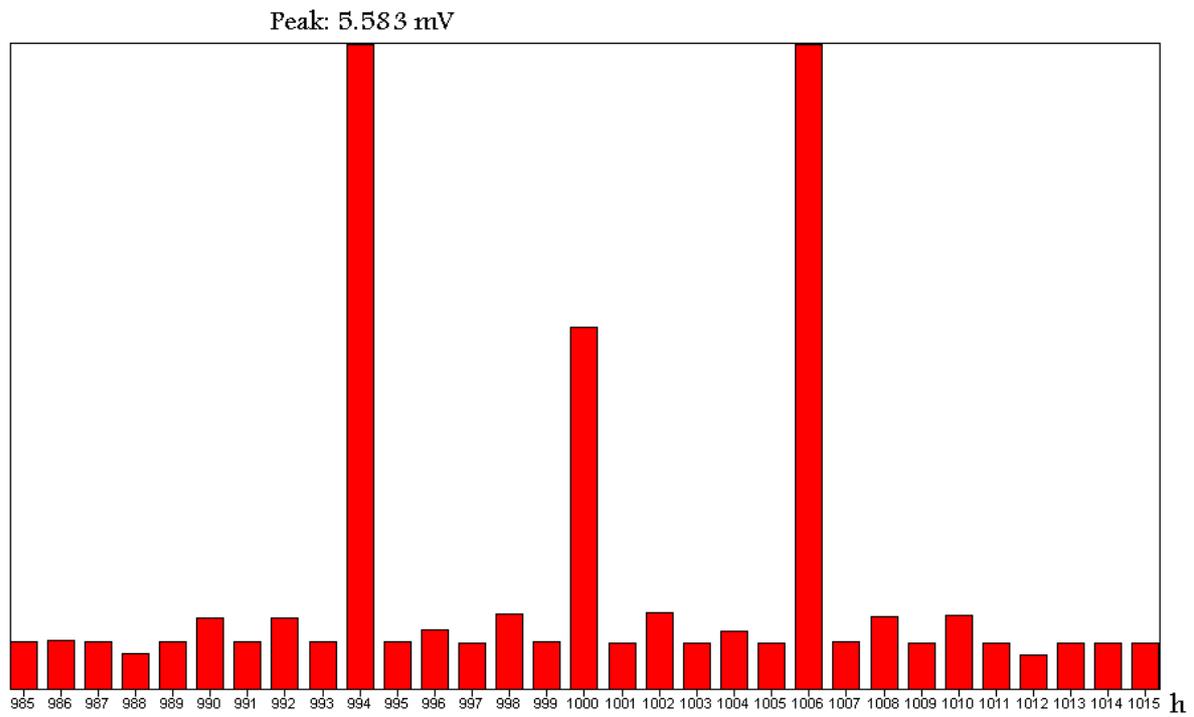


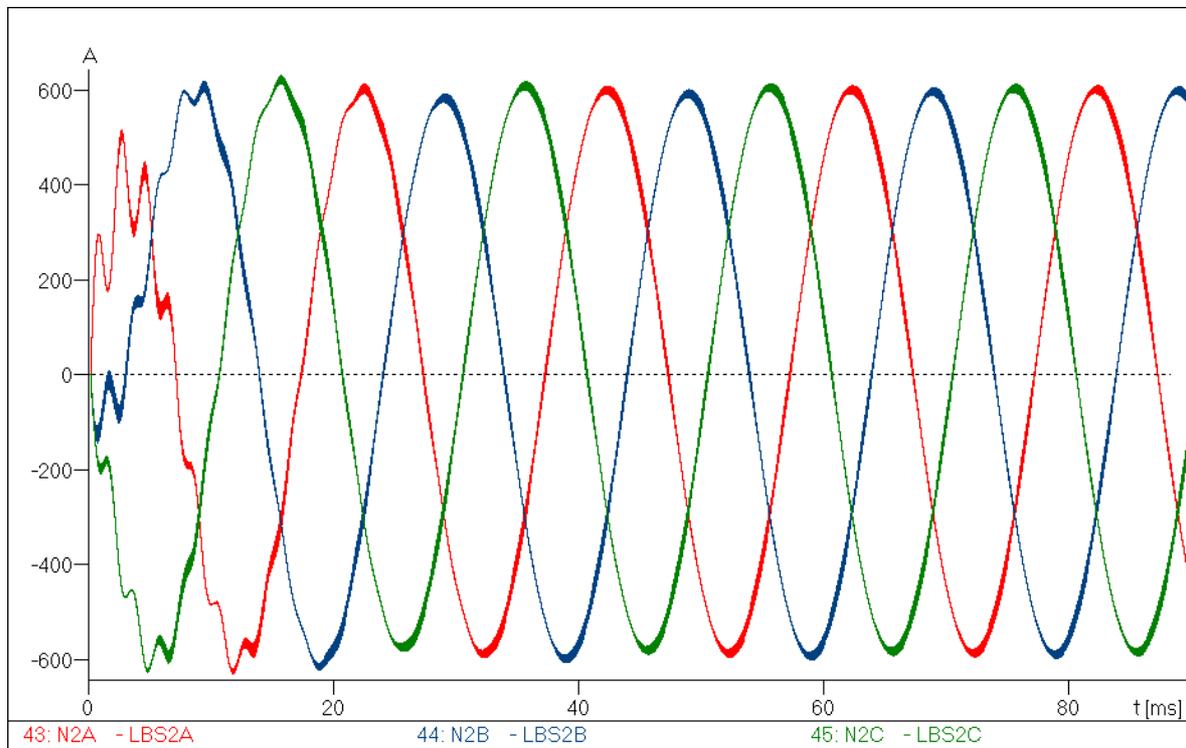
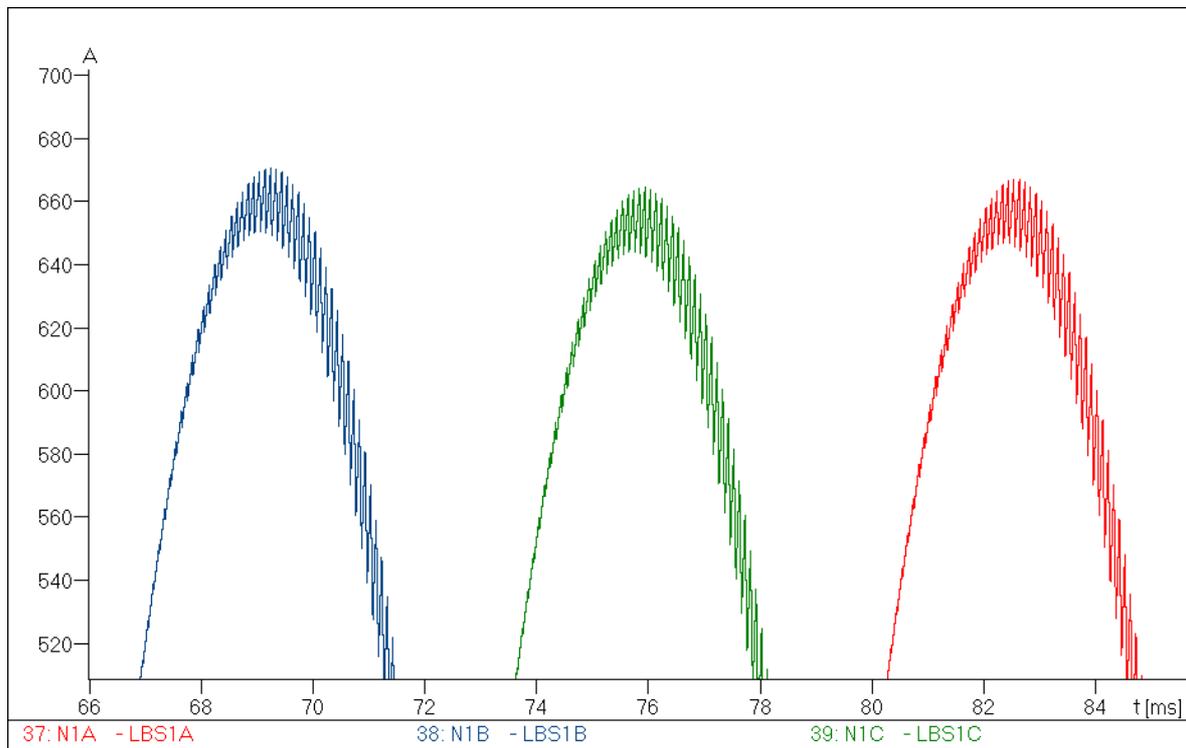


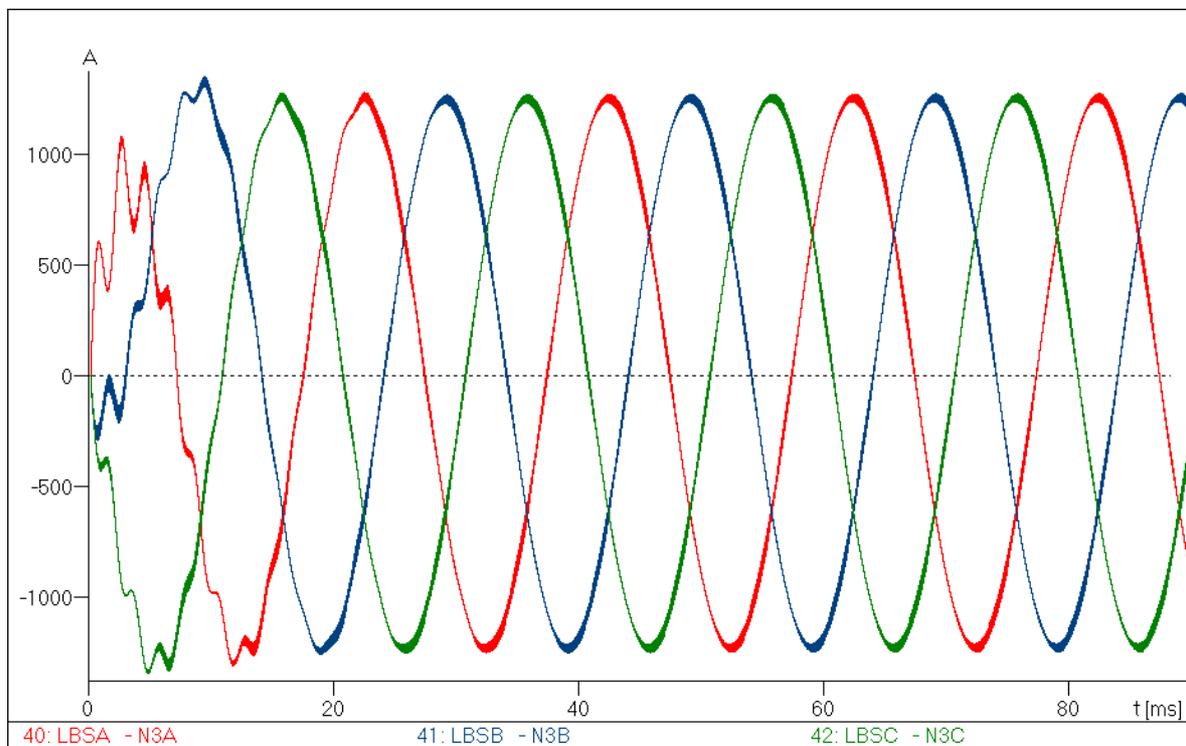
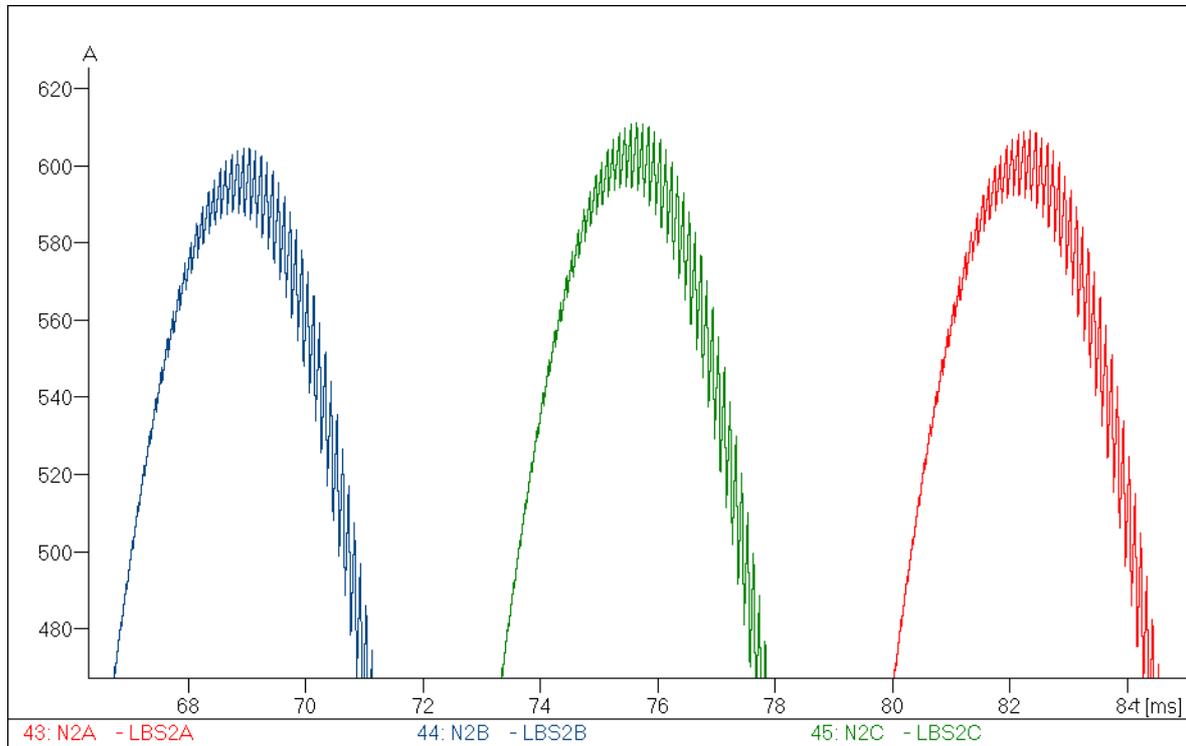
Transformada de Fourier: V_{N3A}

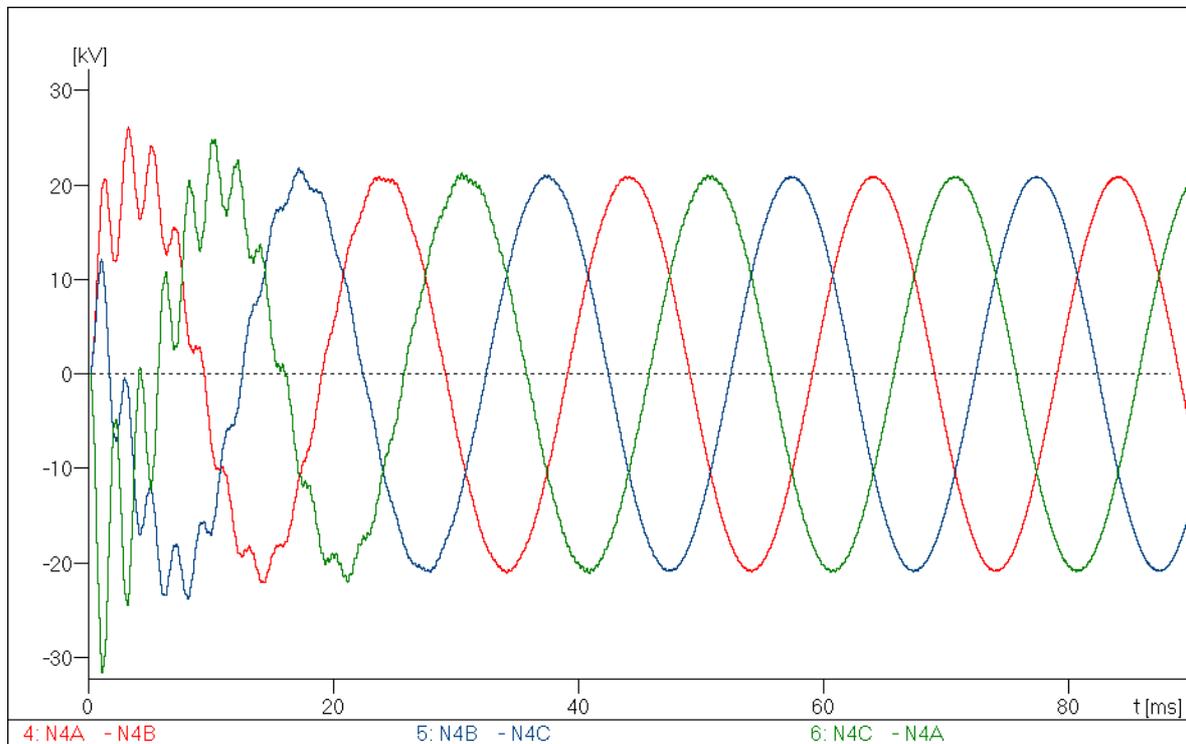
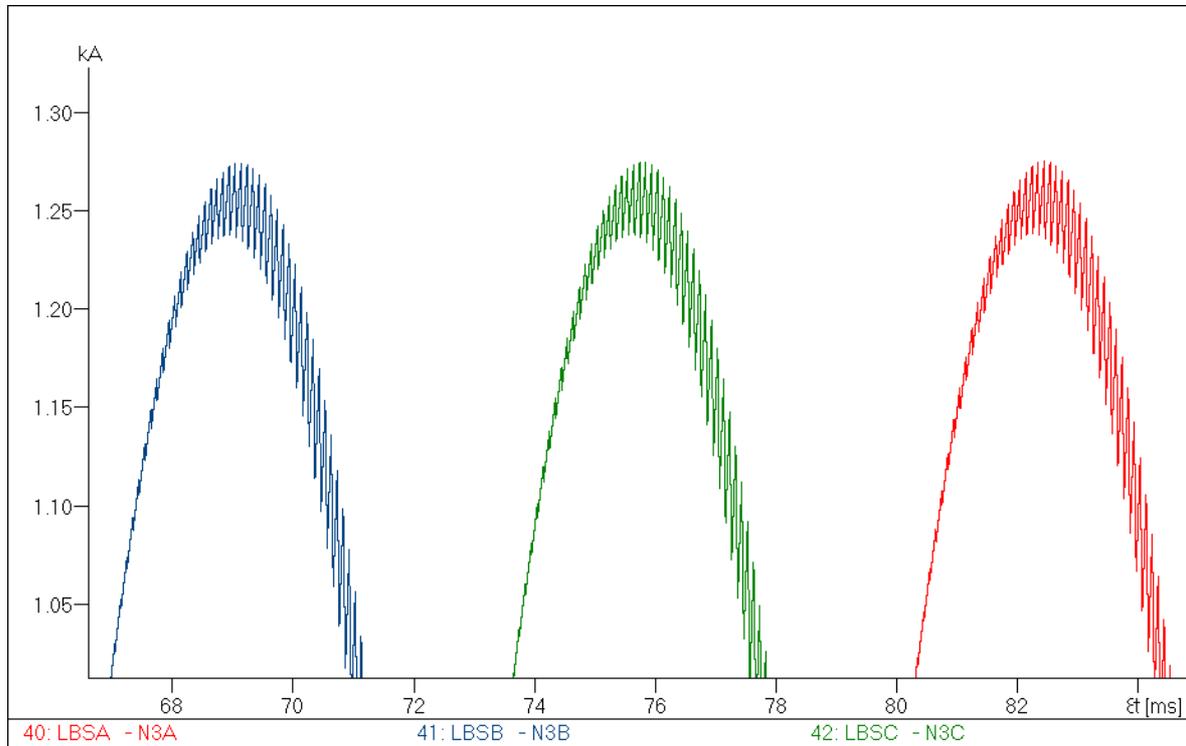


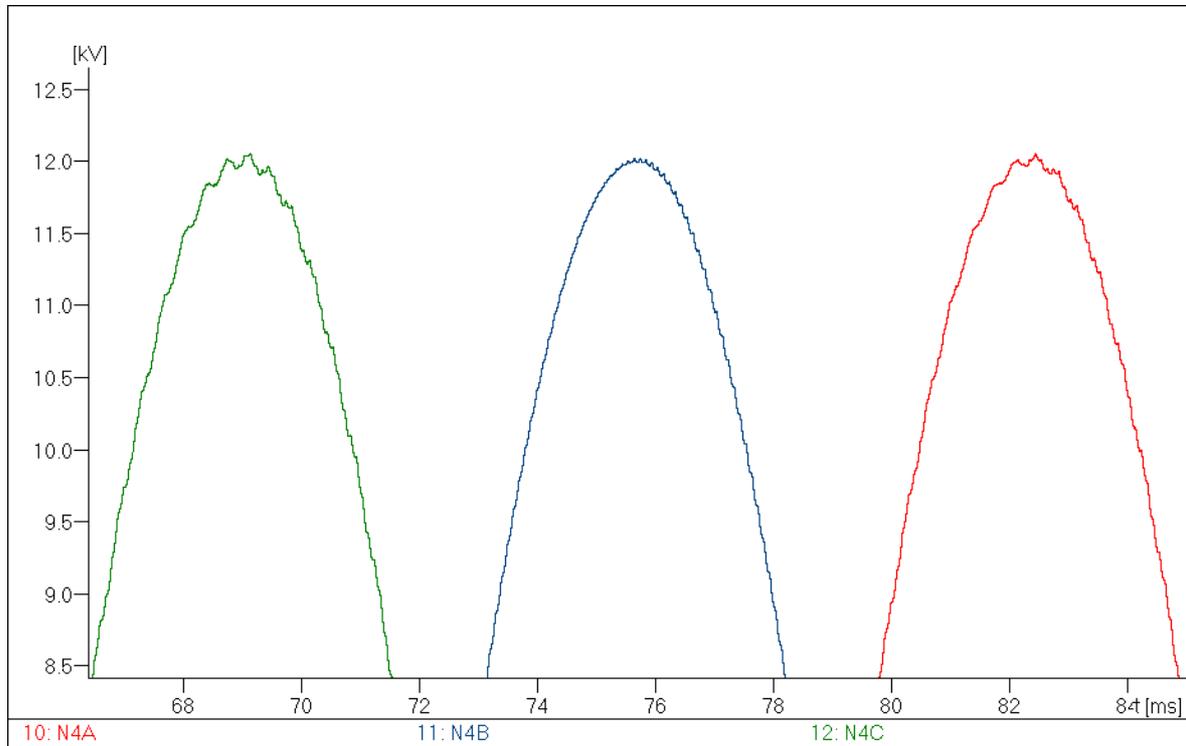






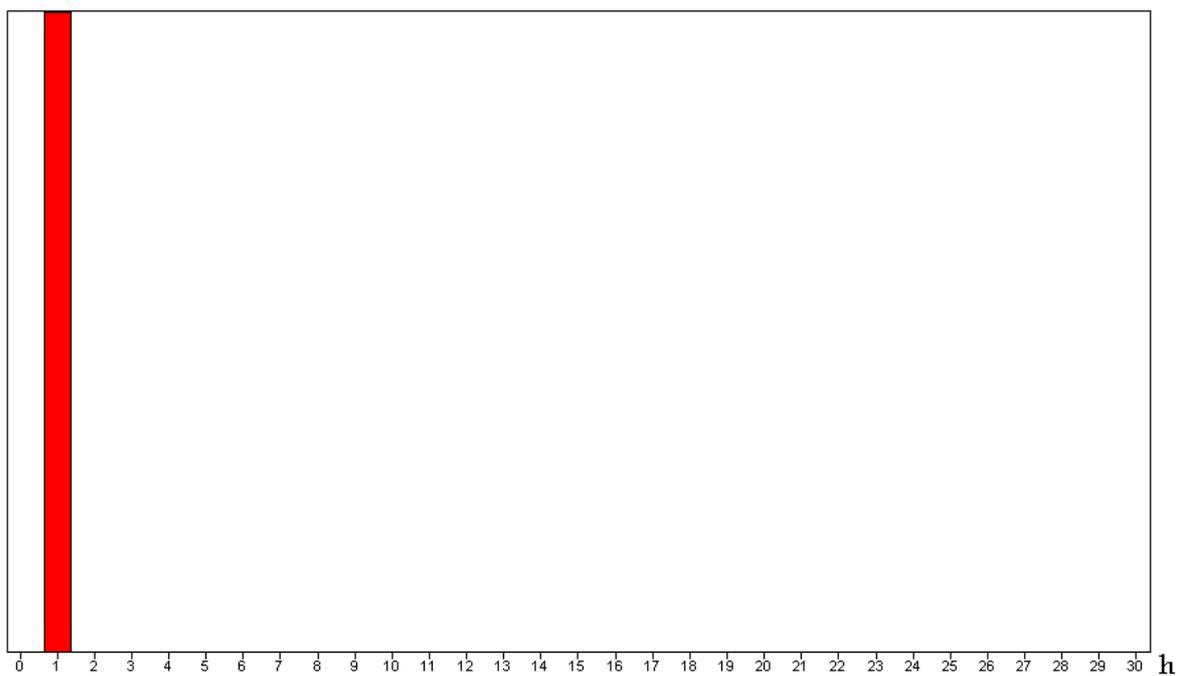


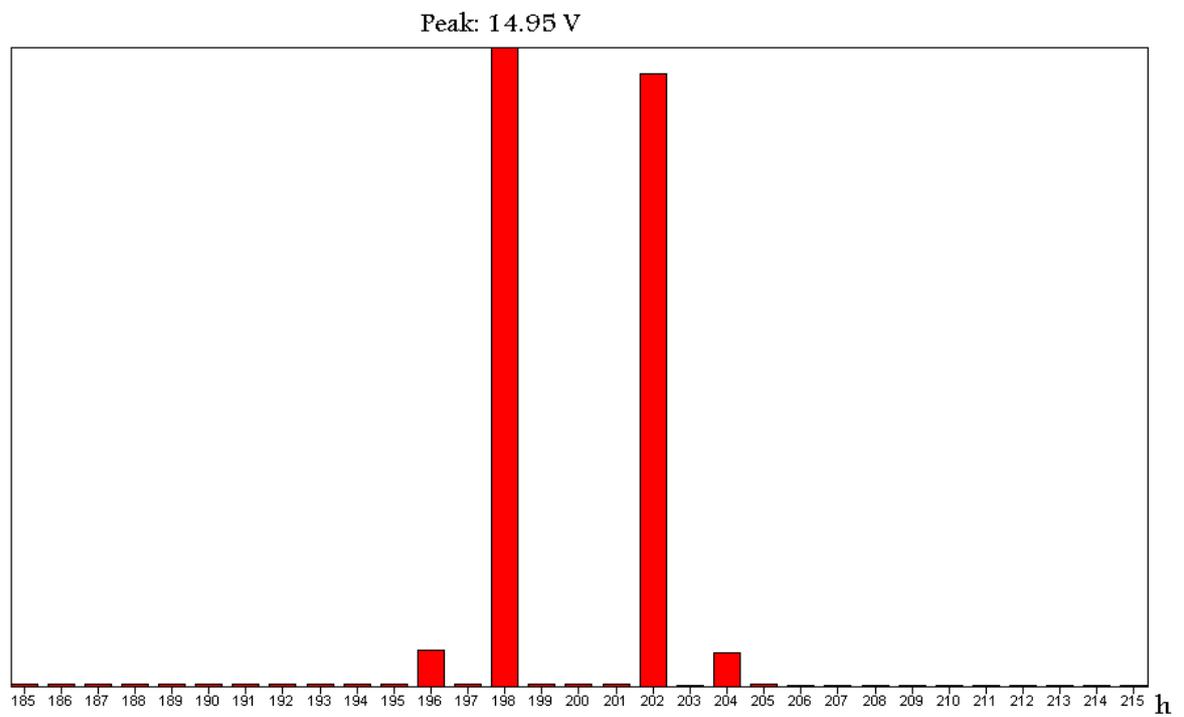
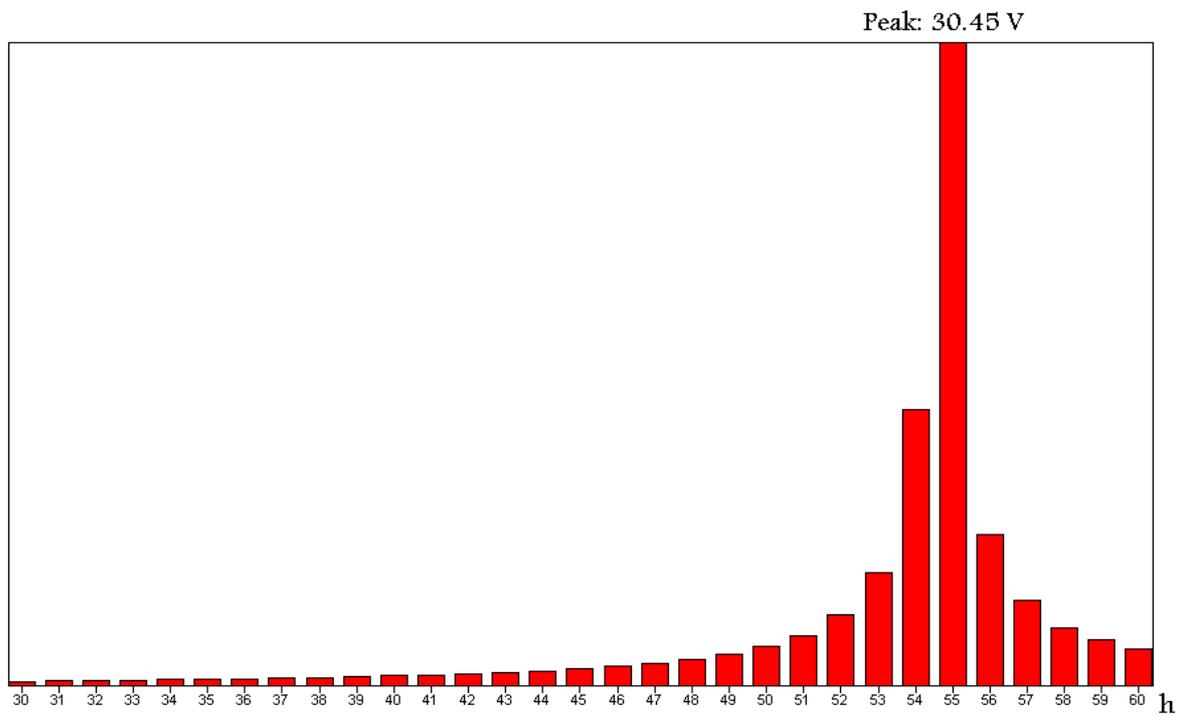


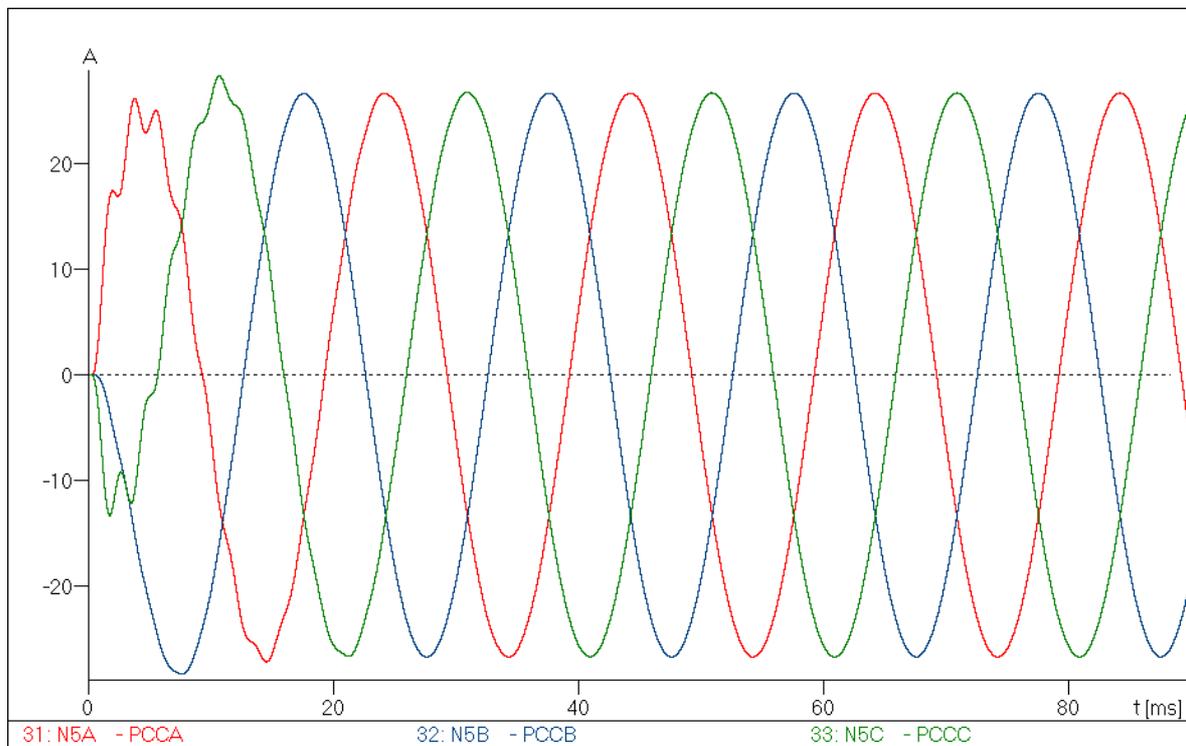
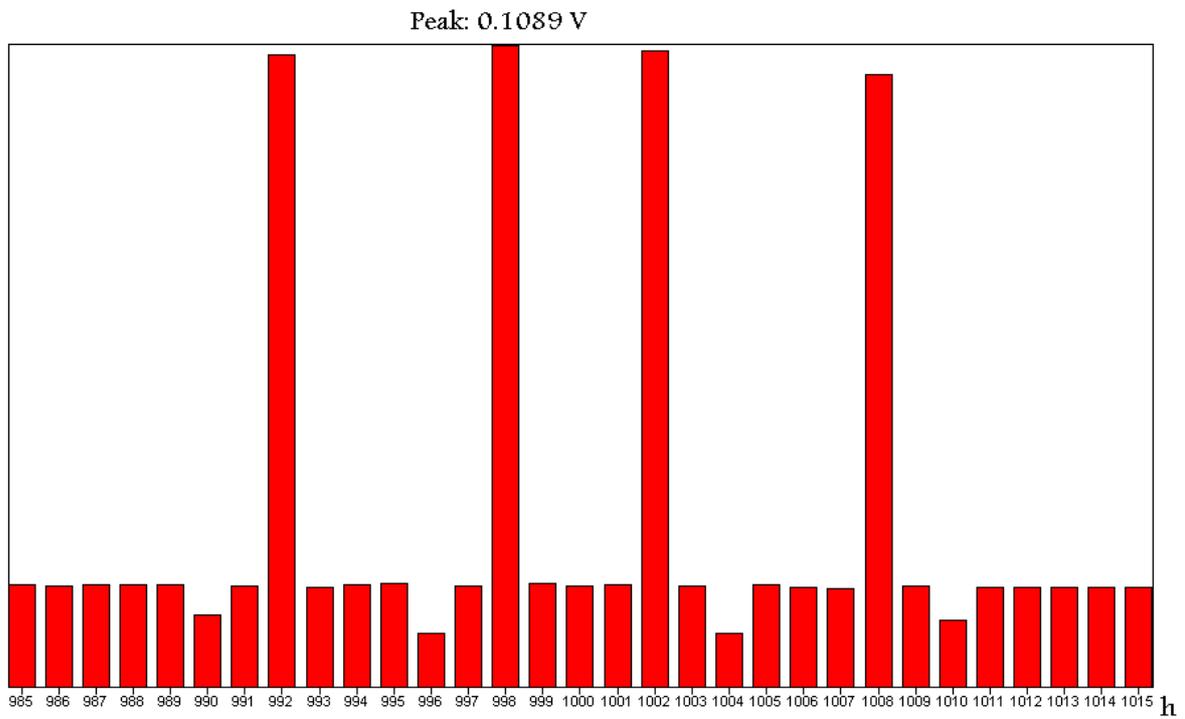


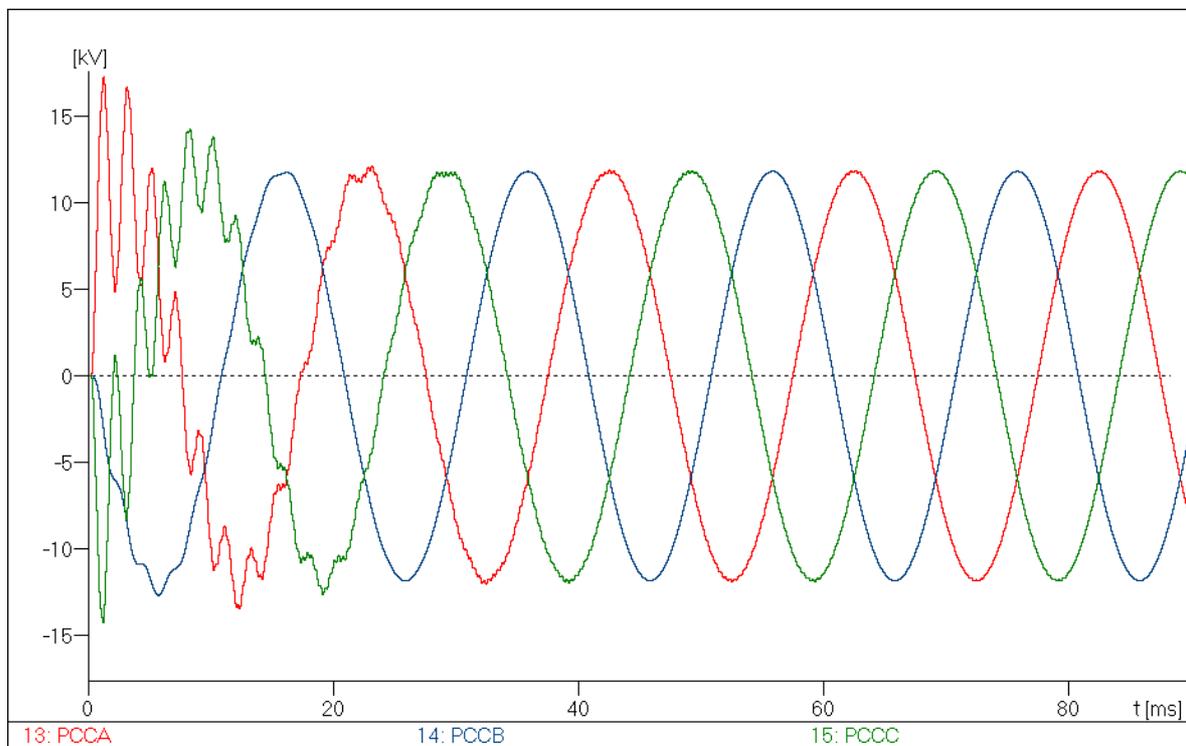
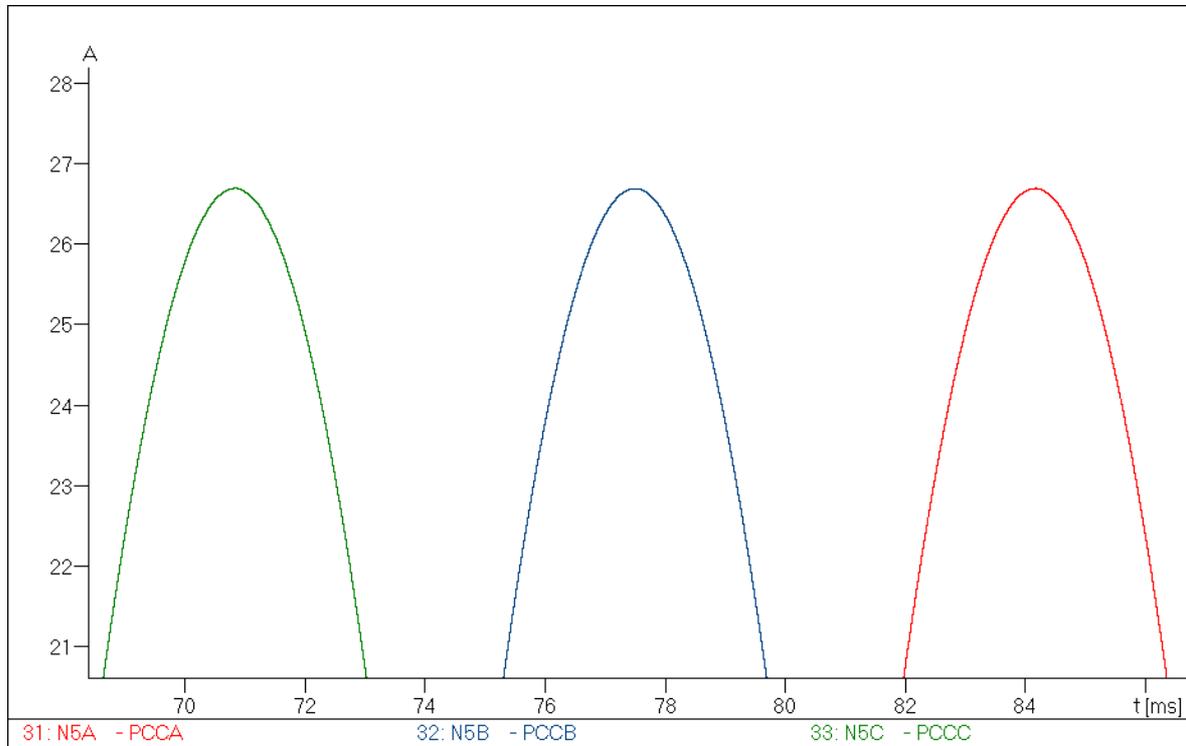
Transformada de Fourier: V_{N4C}

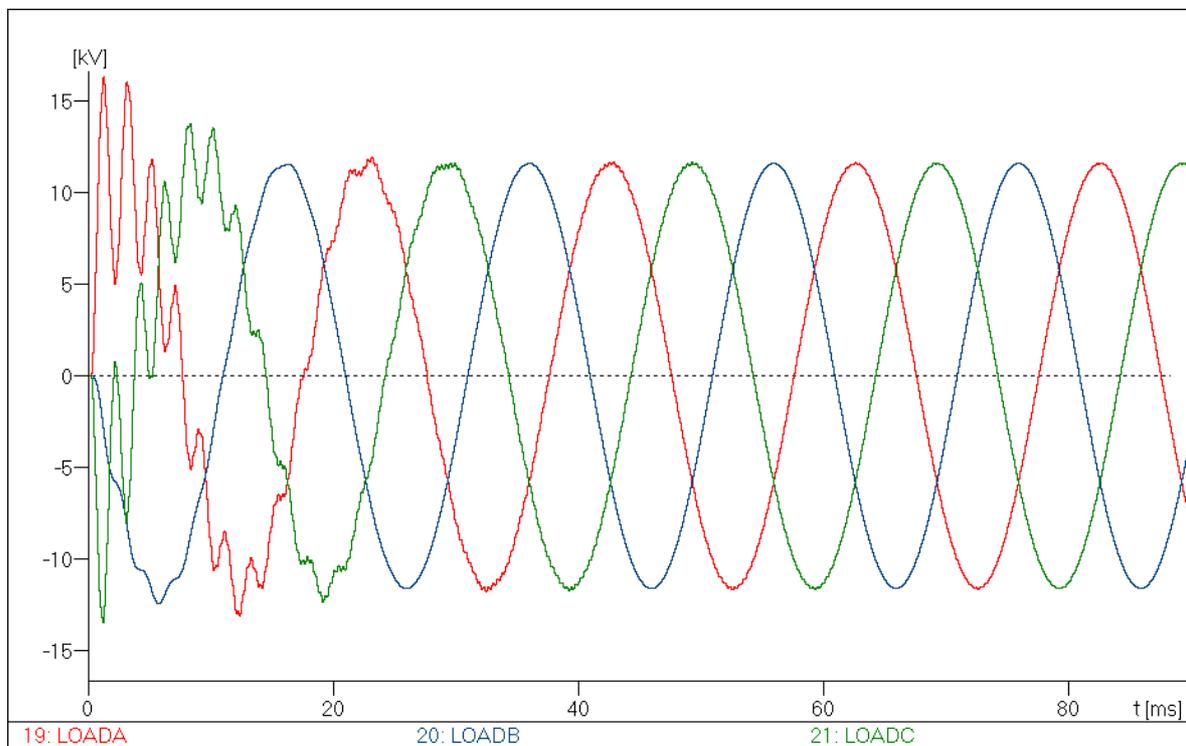
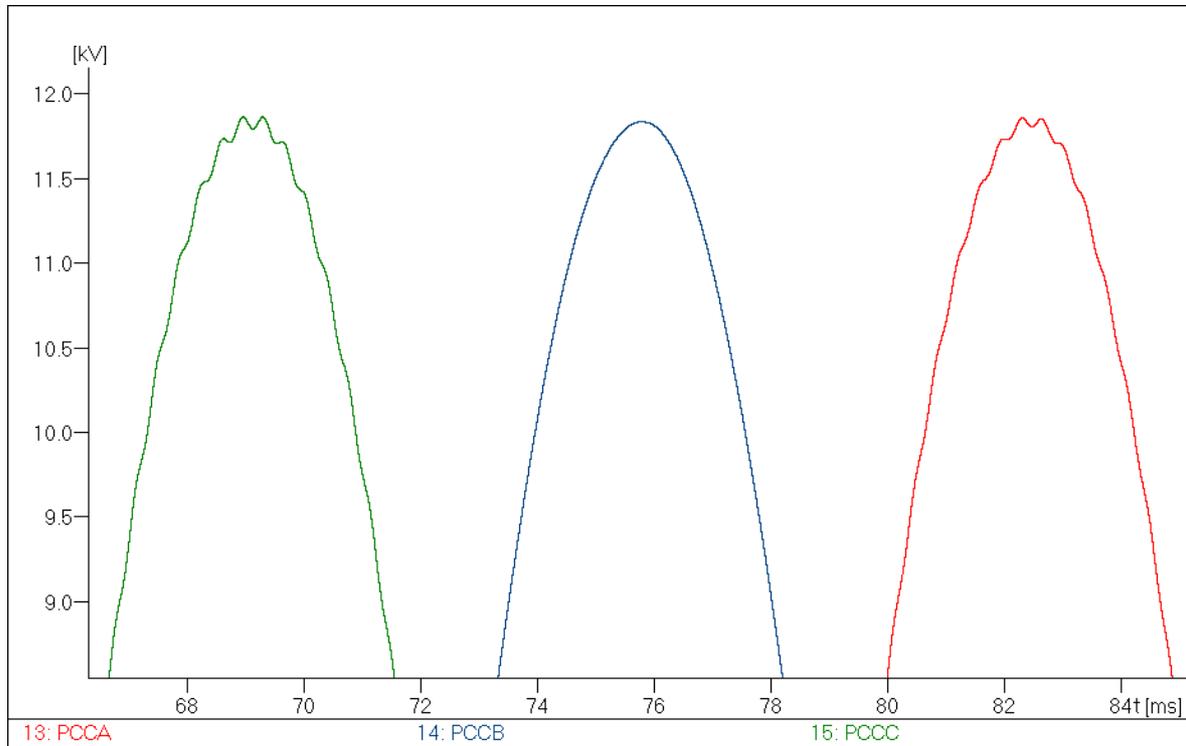
Peak: 12.02 kV

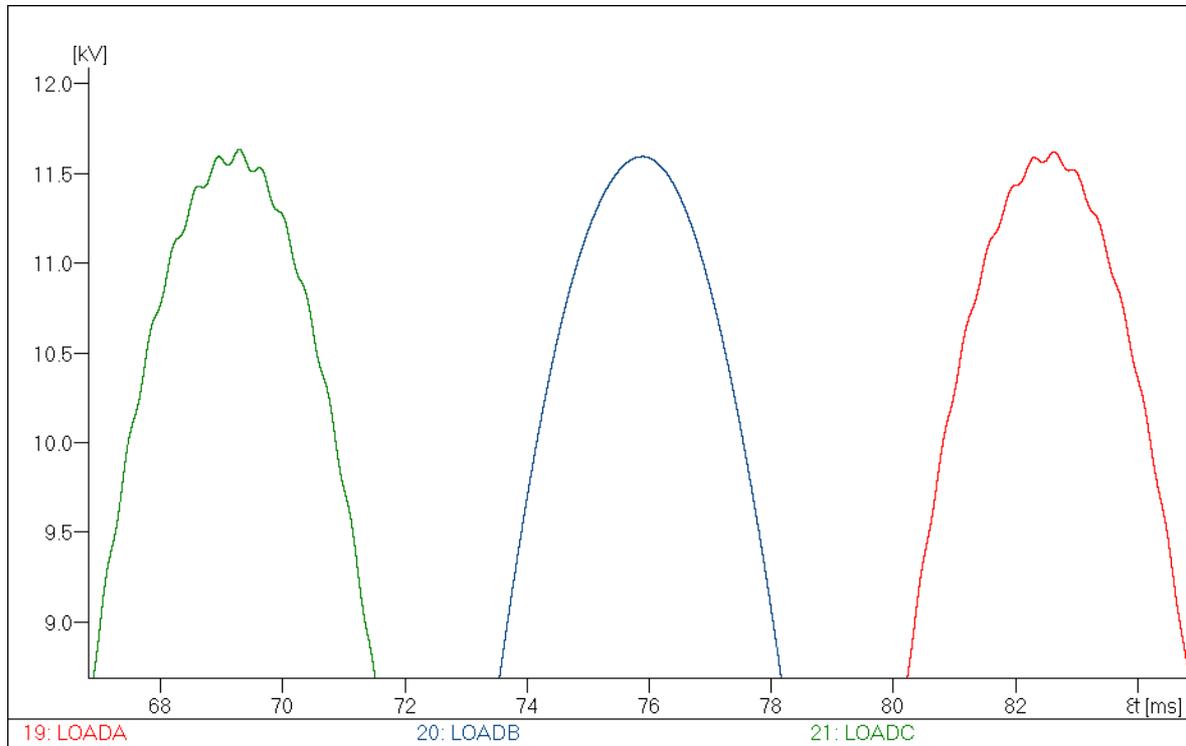




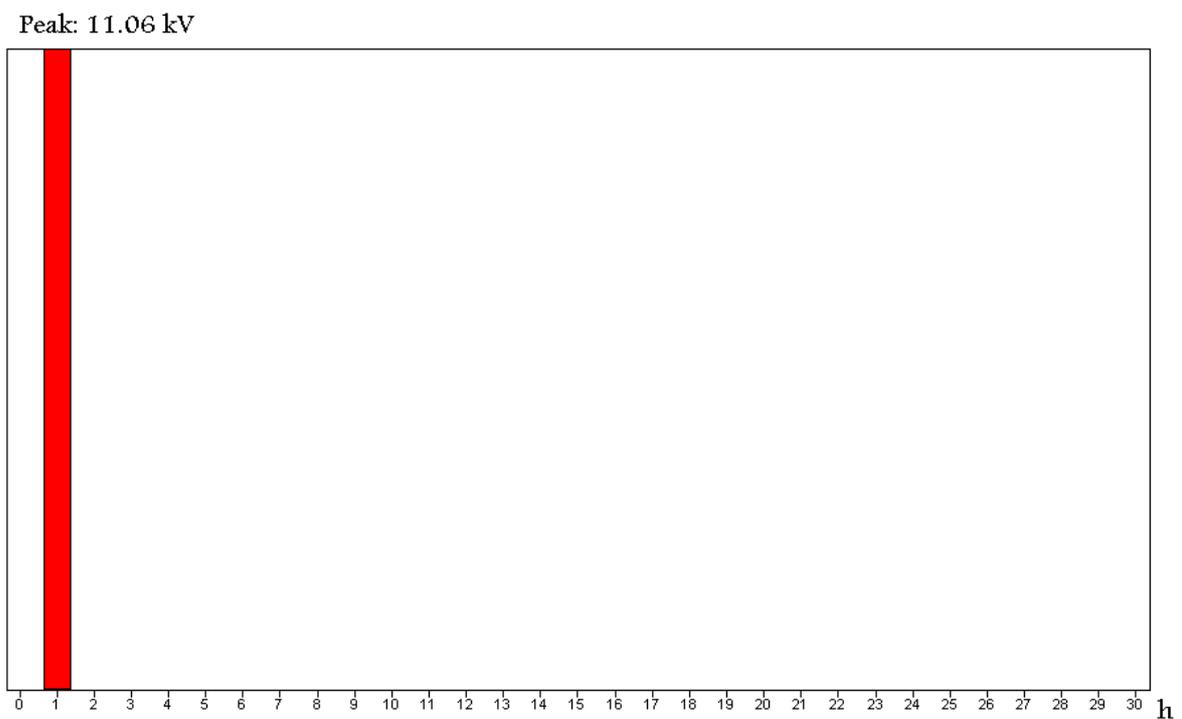


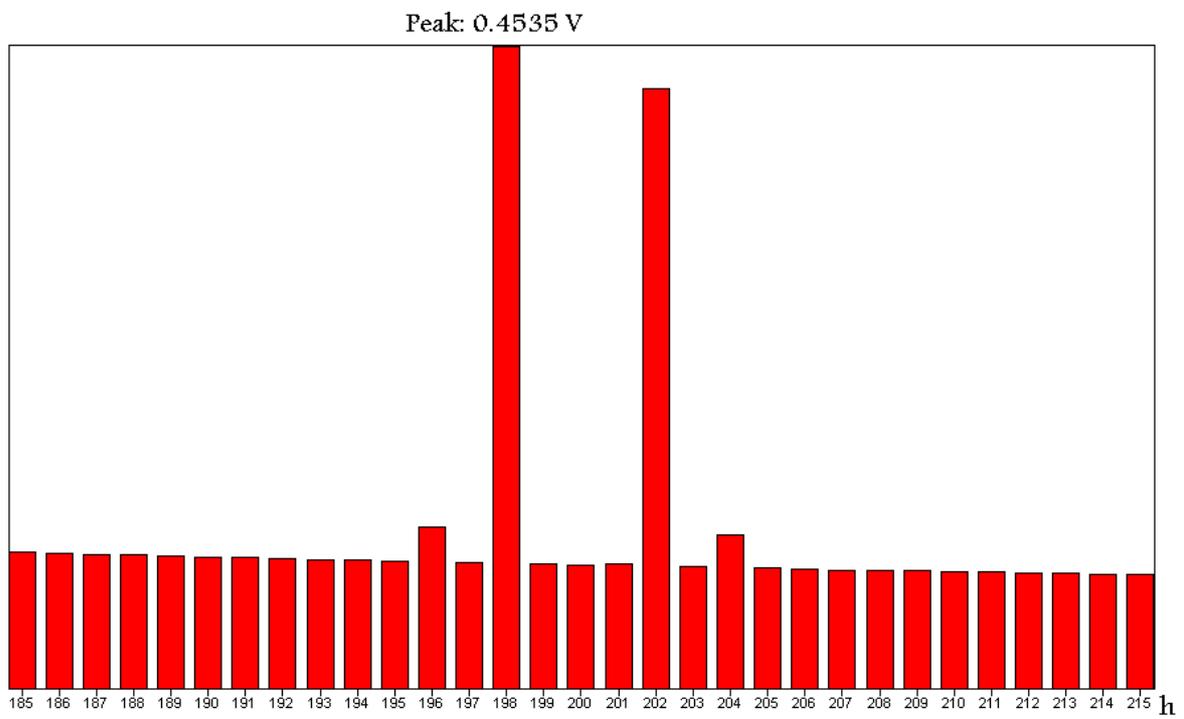
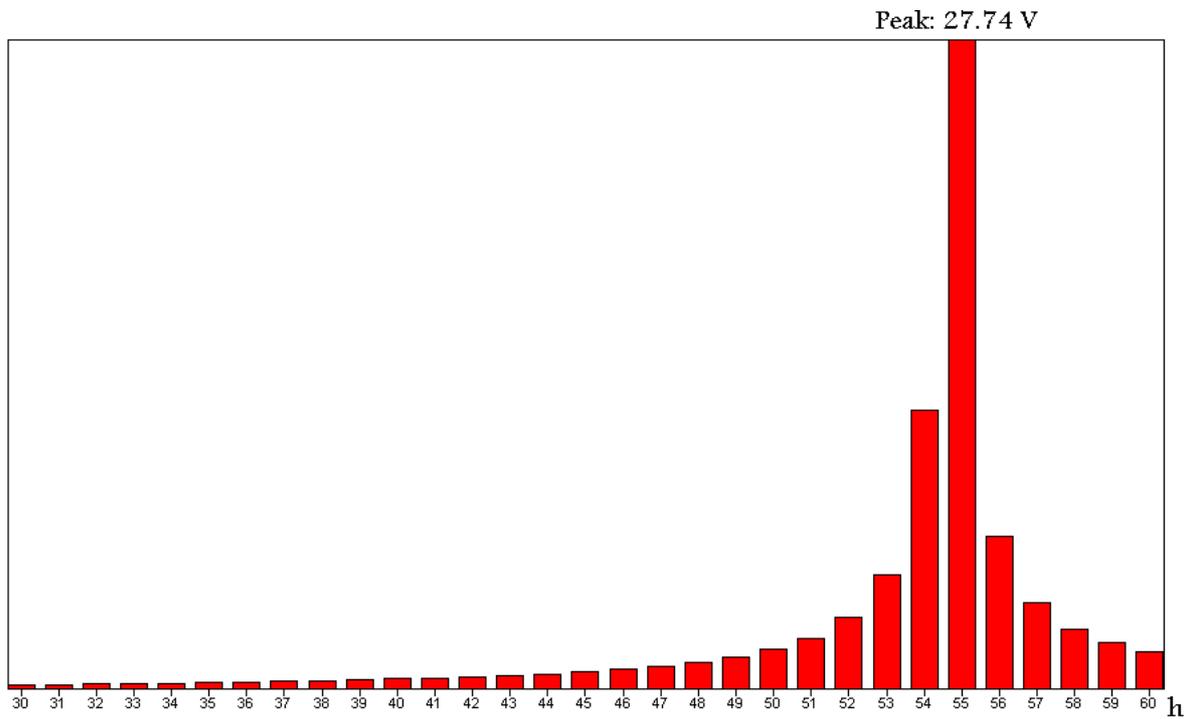


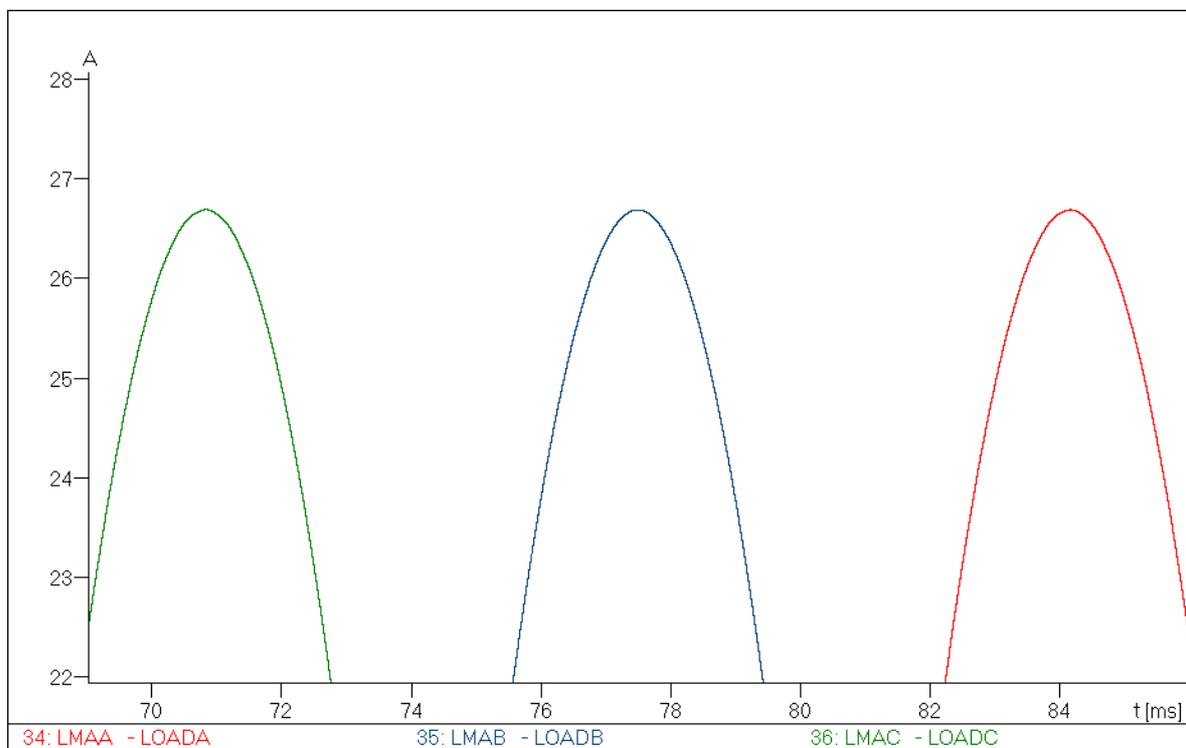
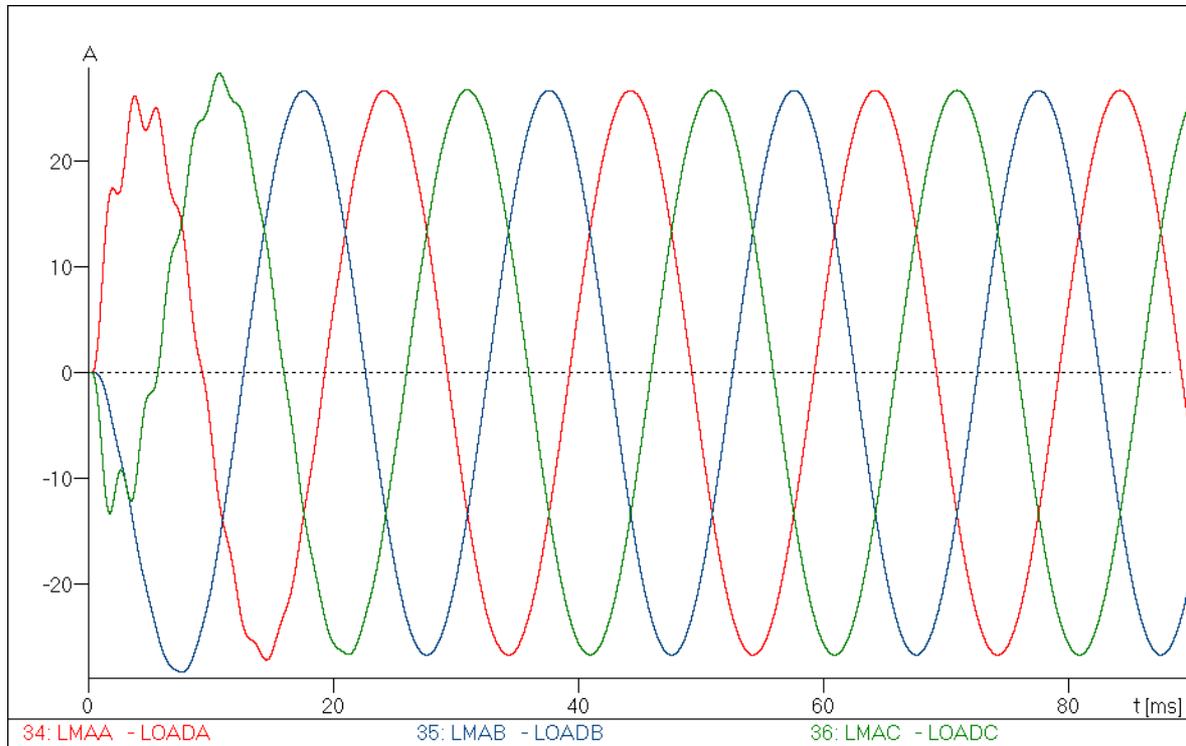




Transformada de Fourier: V_{LOADC}







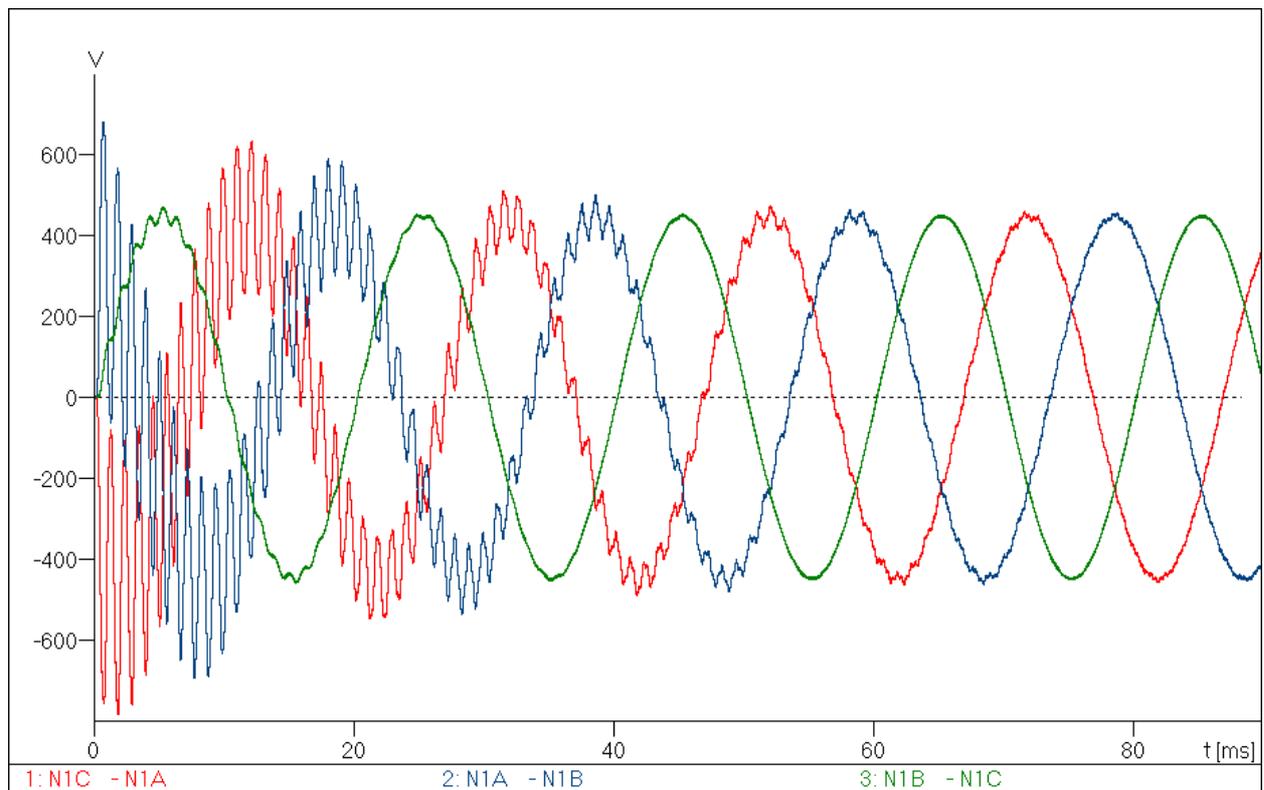


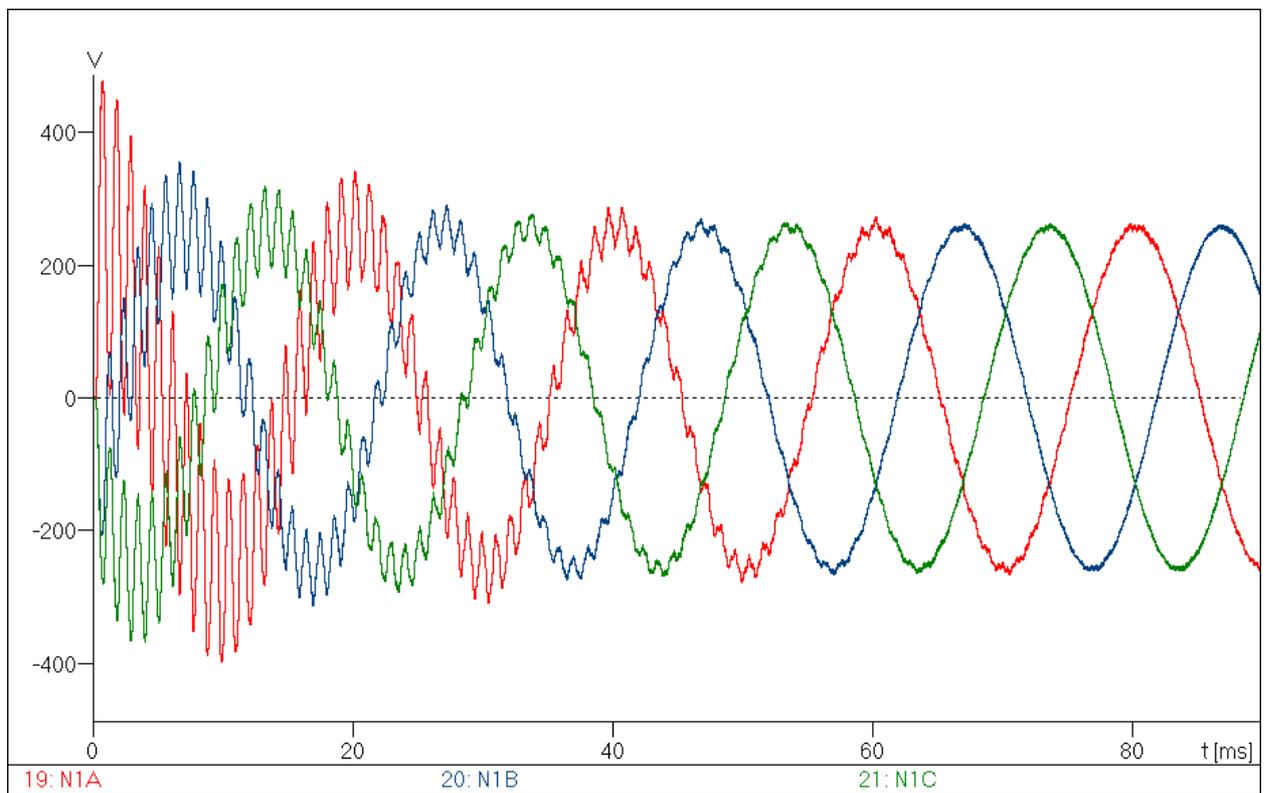
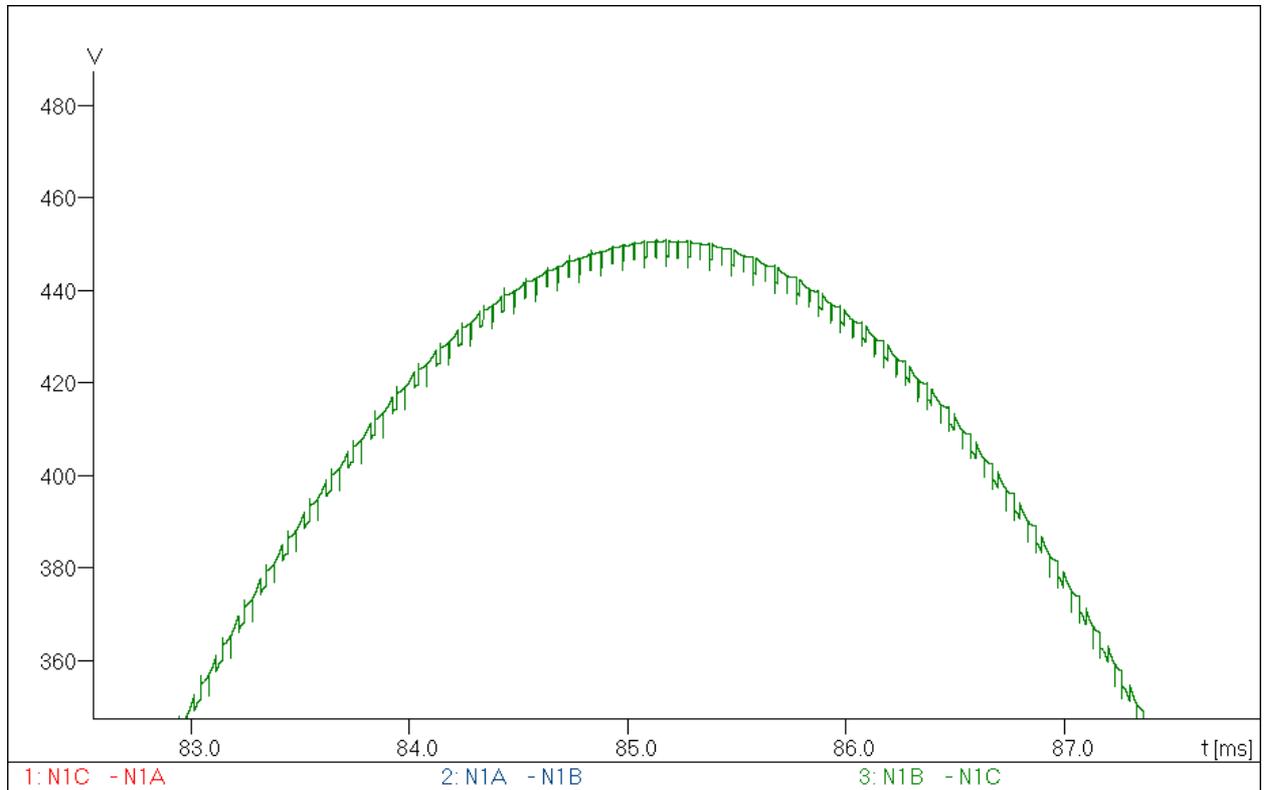


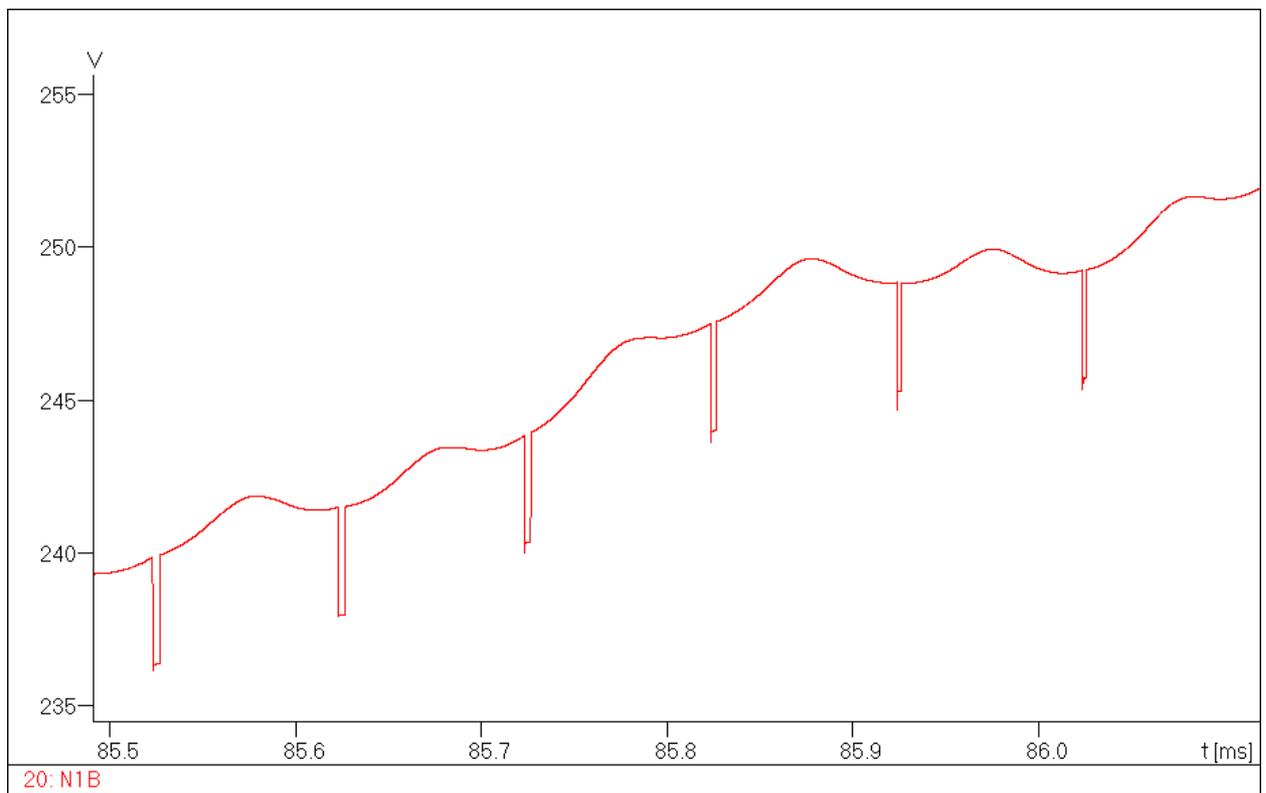
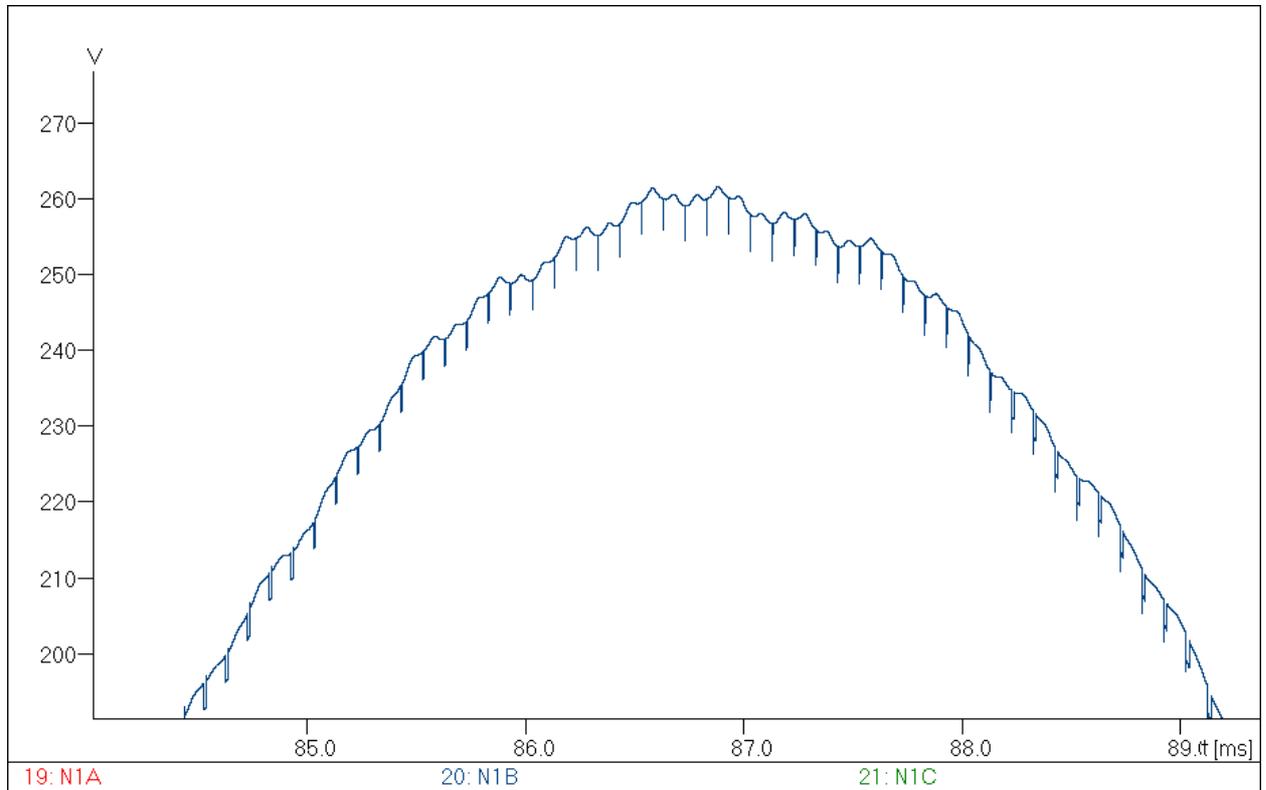
4.9 Planta fotovoltaica 8.

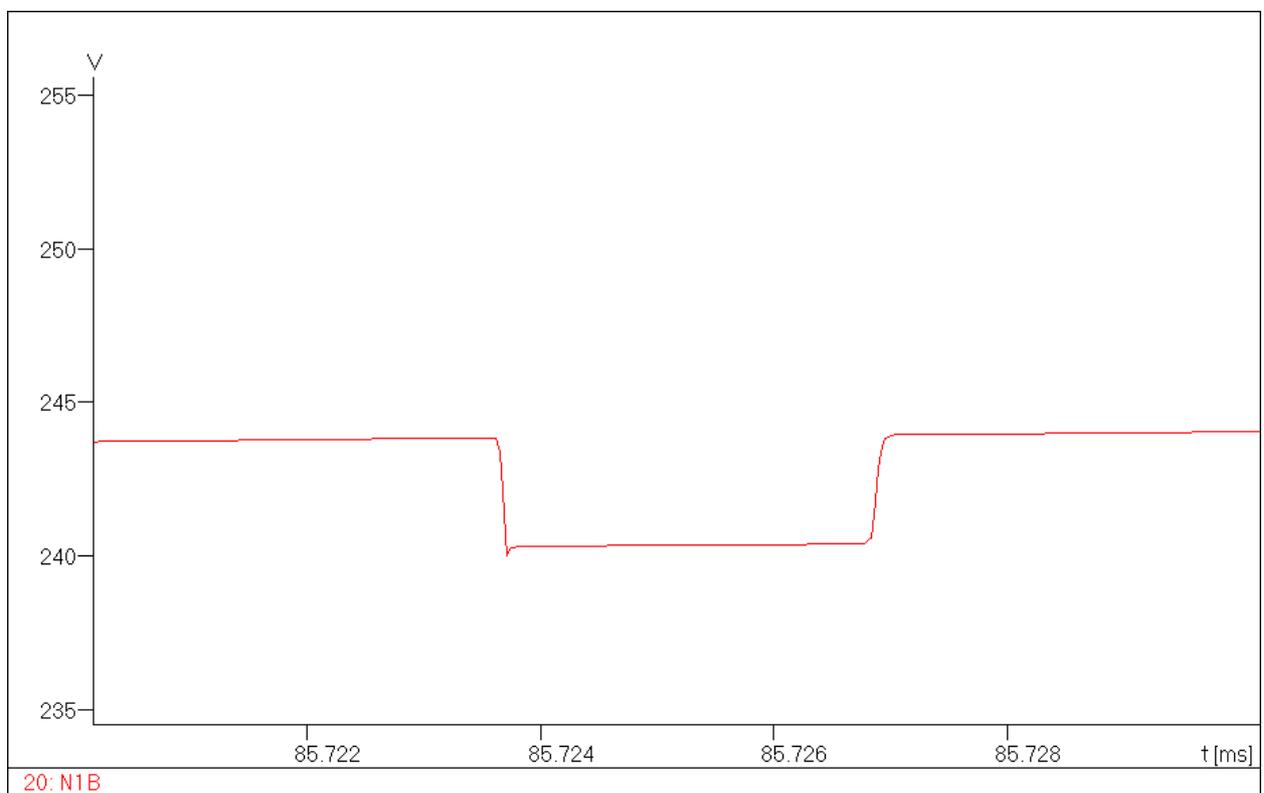
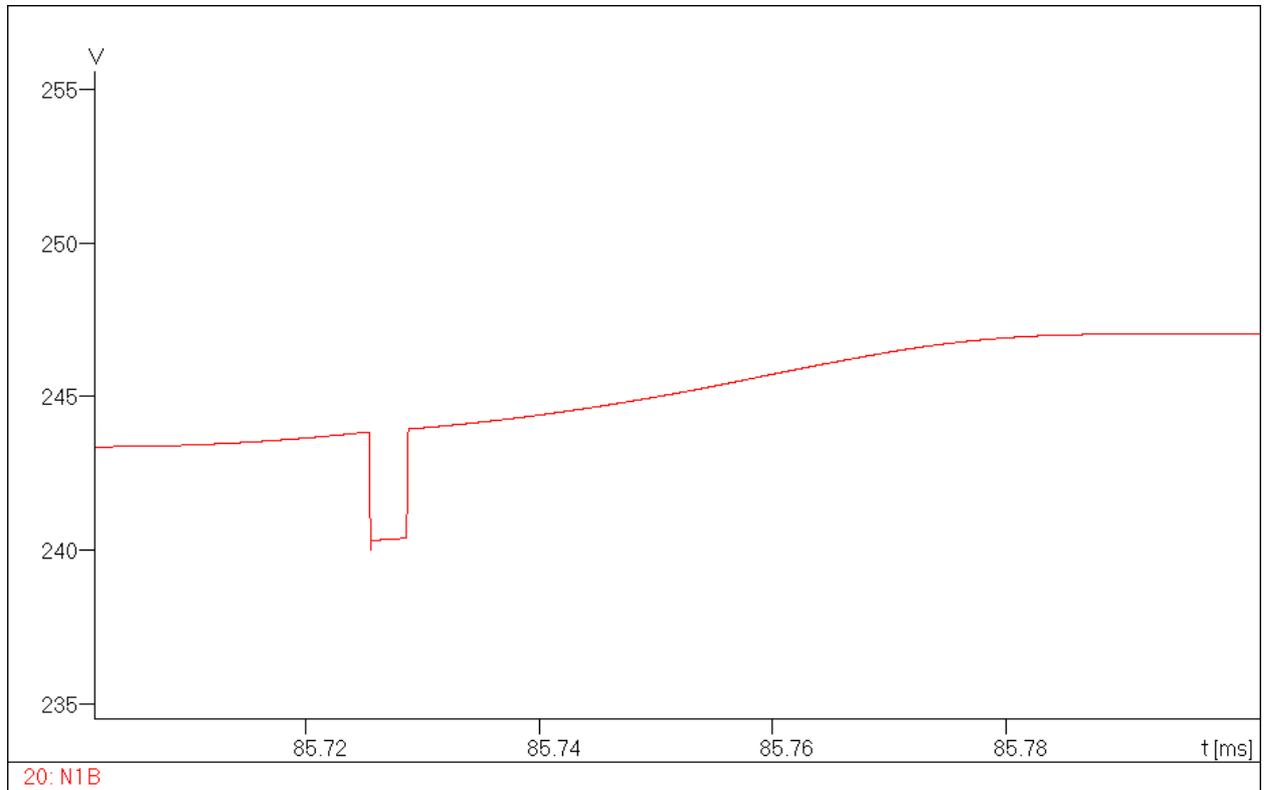
DOS INVERSORES.

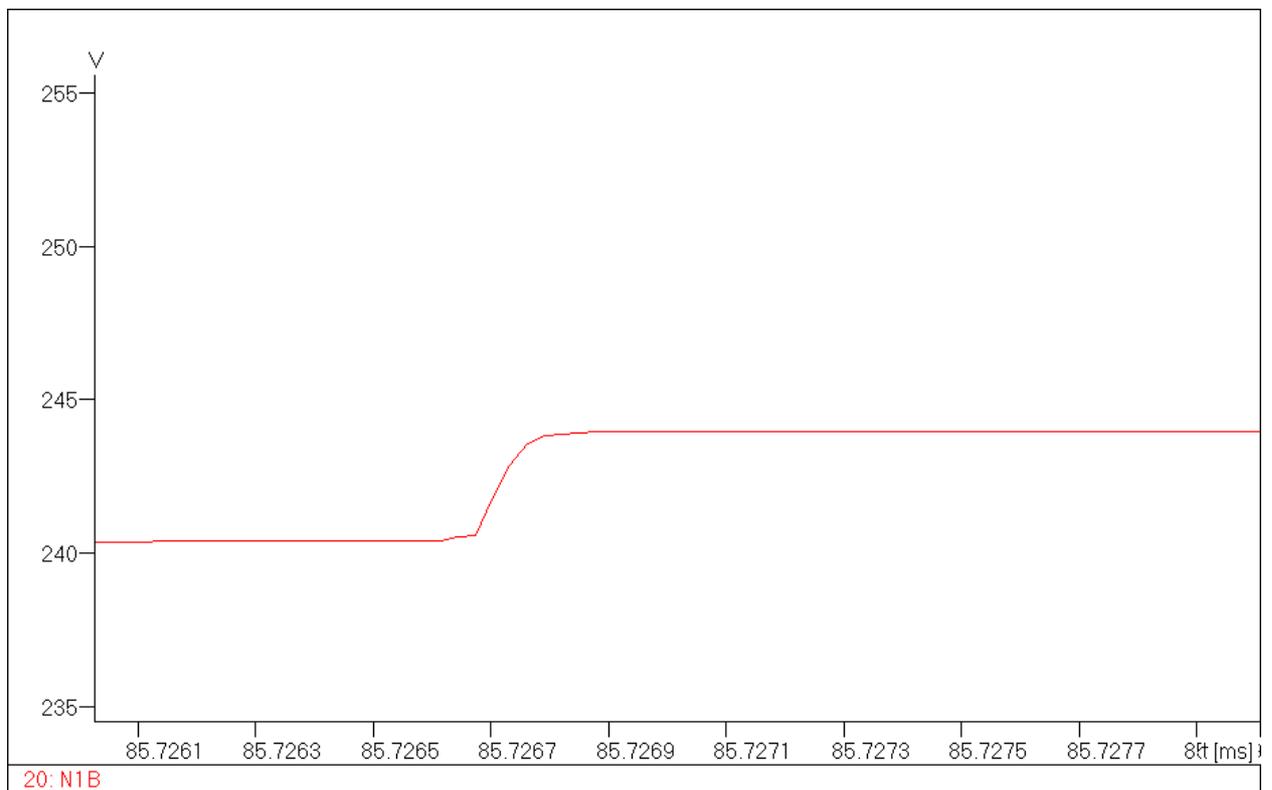
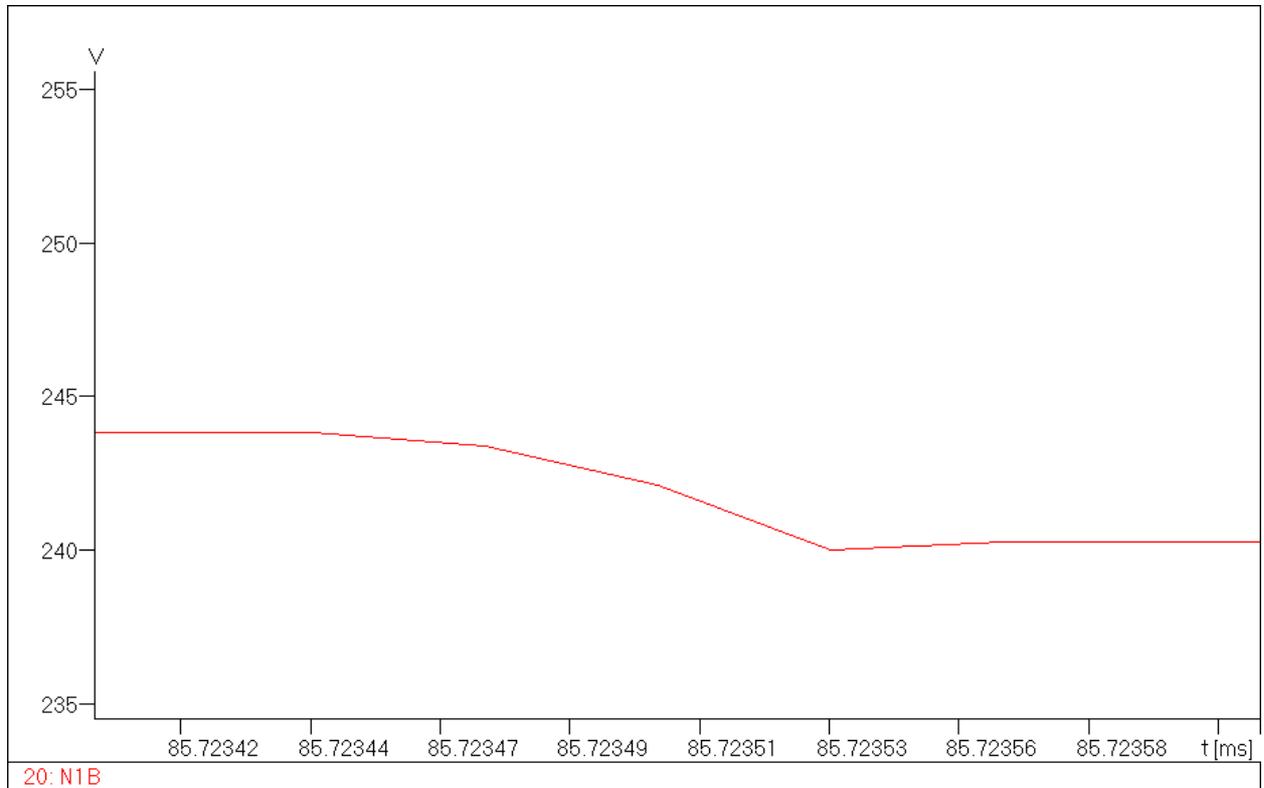
➤ CARGA 1: **0.8 MW**, $\cos\varphi=0.87$. Conectada a red.

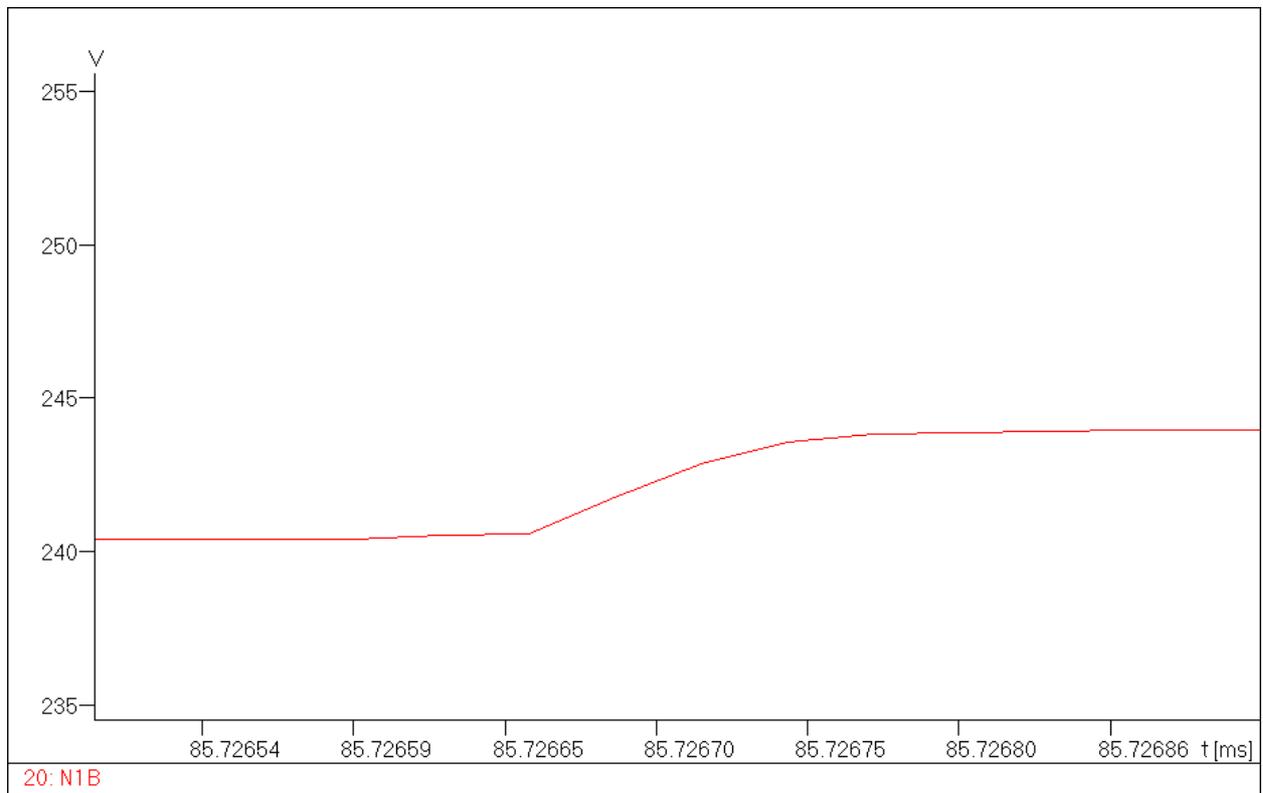












Transformada de Fourier: V_{N1B}

Peak: 259.6 V

