Terugleveren remenergie - Energie-efficiëntie op machineniveau

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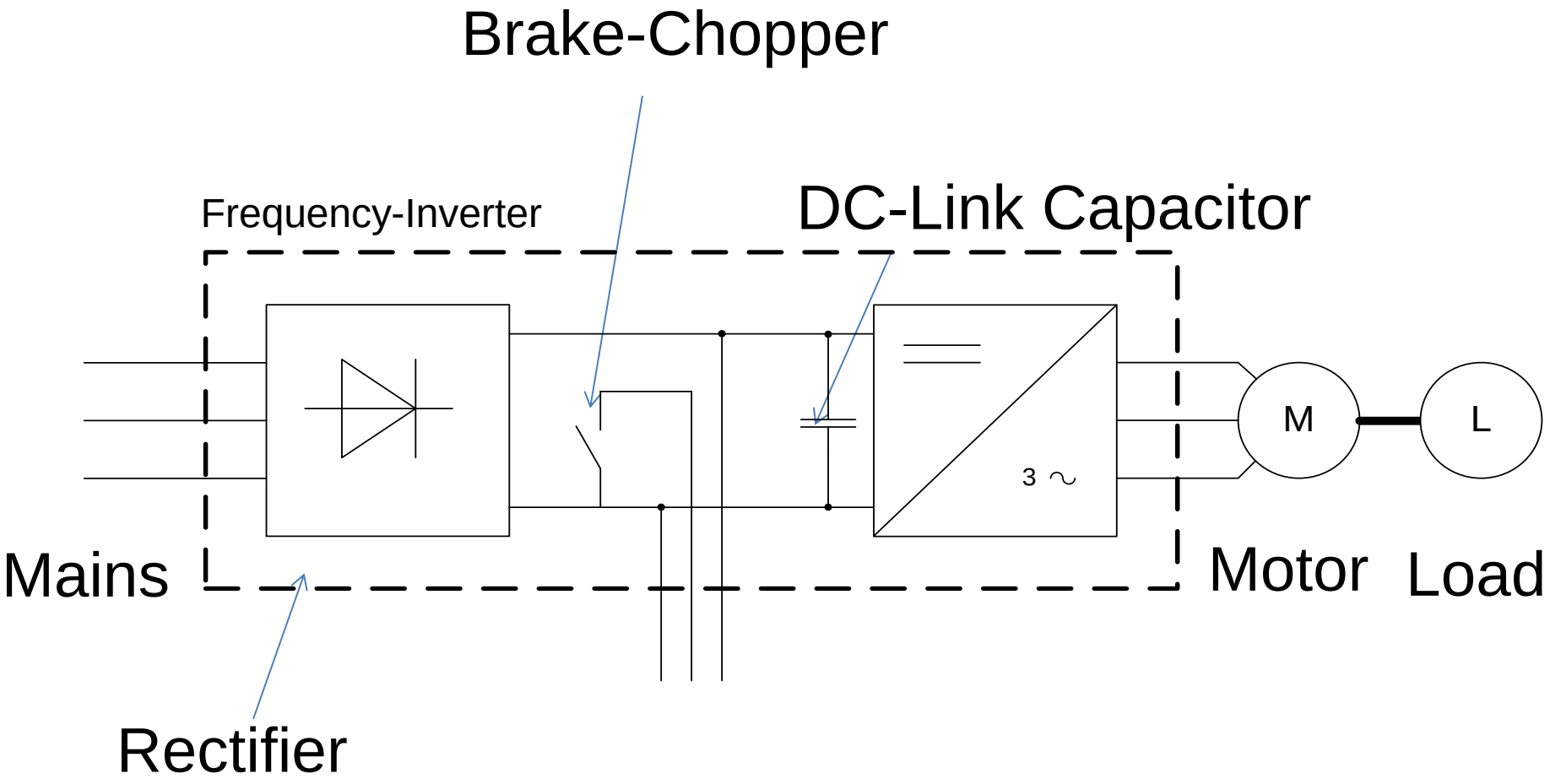
Why do I talk about DC-link?

Electric Drives



Results when using features of DC-Link

- increasing the energy efficiency
- increasing the performance of a machine
- supporting the grid
- extending the service live of the drive controller by avoiding ups and downs in the DC-link
- avoiding power peaks by supporting the power supply from the mains
- handling break energy without creating heat

Perfectly suitable for different needs

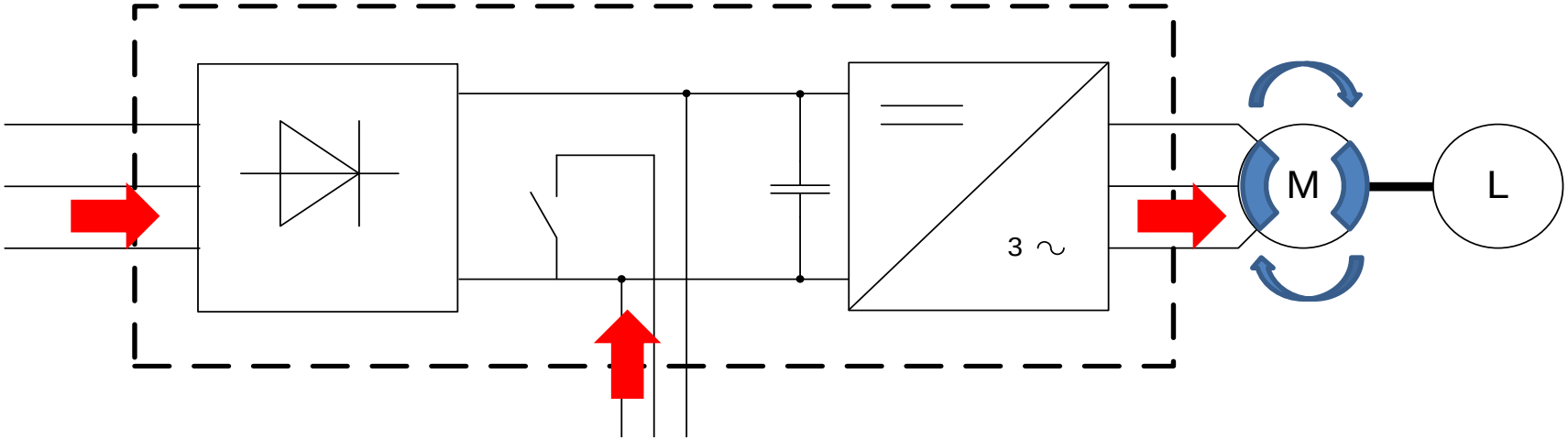
How?

Storing break energy in a Dynamic Energy Storage that is connected to the DC-link

-> **Intelligent** and **active** expansion of the DC-link capacity

-> efficient way to deal with regen energy (instead of using a break resistor)

Frequenzumrichter



Energy-flow in controlled electric drives

Drive:

Main → Drive control system → Motor as current-consumer → Gearing mechanism → Machine

Brake:

Drive control system ← Motor as generator ← Gearing mechanism ← Machine

Succesfully implemented in machines

- Bending machine:
  result: improved dynamic and increased energy efficiency

- Screen printing machine:
  result: drive failures are avoided, clock rate is being improved, energy efficiency is increased

- Press feeding robot:
  result: improved clock rate, energy savings up to 24% in comparison to the old system

- Portioning machine:
  result: number of cuts were raised by 47%

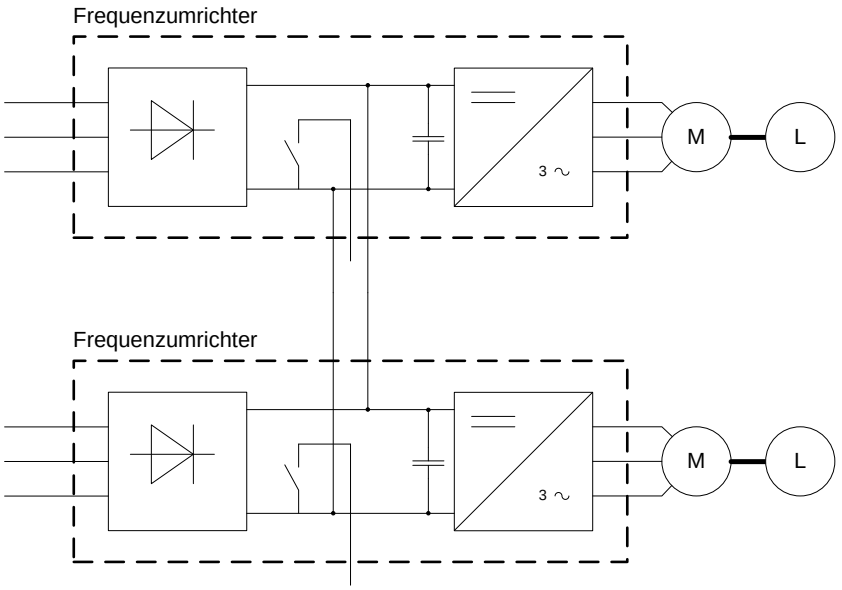
Handling electric braking-energy

Solutions without re-utilisation from brake-energy:

- Let drive coast freely

- Brake resistor (convert electric energy into heat)
  - Internal resistor in drive
  - If applicable, additional external brake resistor

DC-Link coupling



Advantages

– cheap

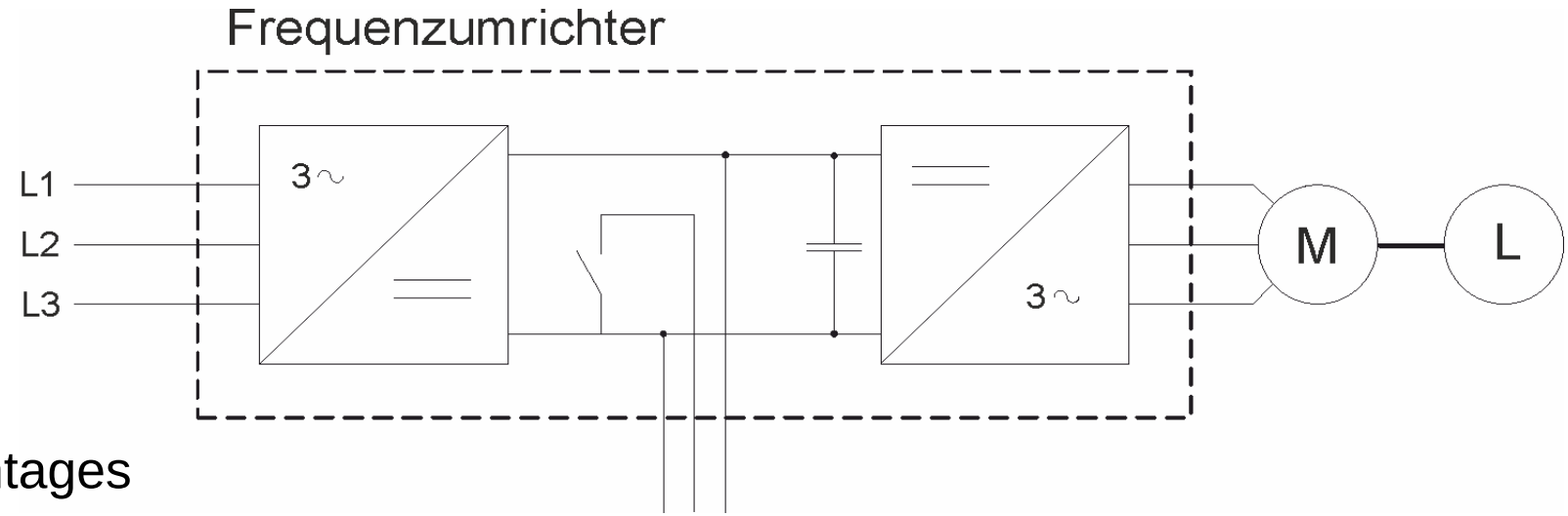
Disadvantages

– The concept is limited through the pre-loading circuit of the frequency inverter
– The concept is limited through the permissible sub-harmonic-load
– The concept is an improvement, but rarely the solution
– Rectifiers may be loaded asymmetrically

Regenerative feedback (Active Front End)

Advantages

– Energy is directly fed back into the mains (Storage not required)



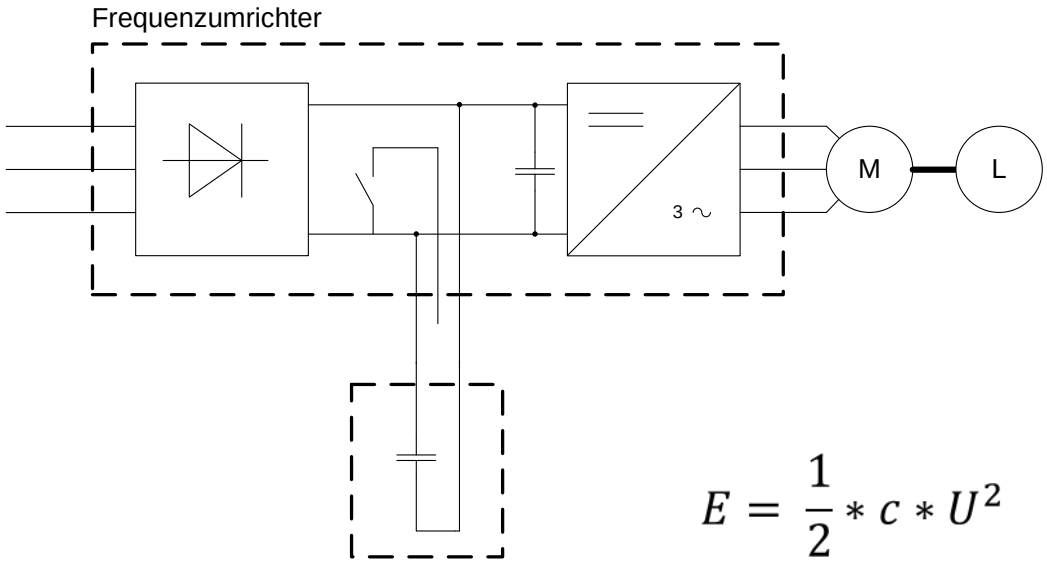
Disadvantages

– Time-consuming / expensive
– Concept does not work during mains-power-failure
– Danger due to EMC problems

Passive DC-Link expansion

Advantages

- cheap

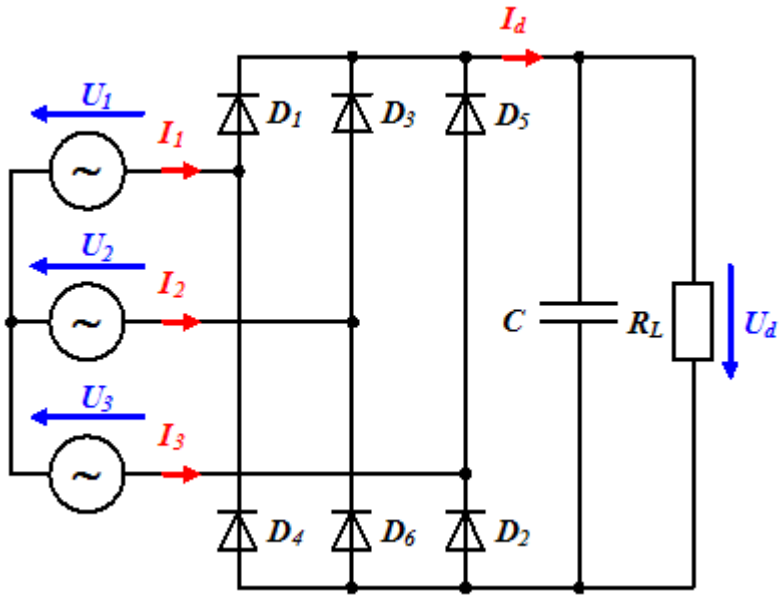


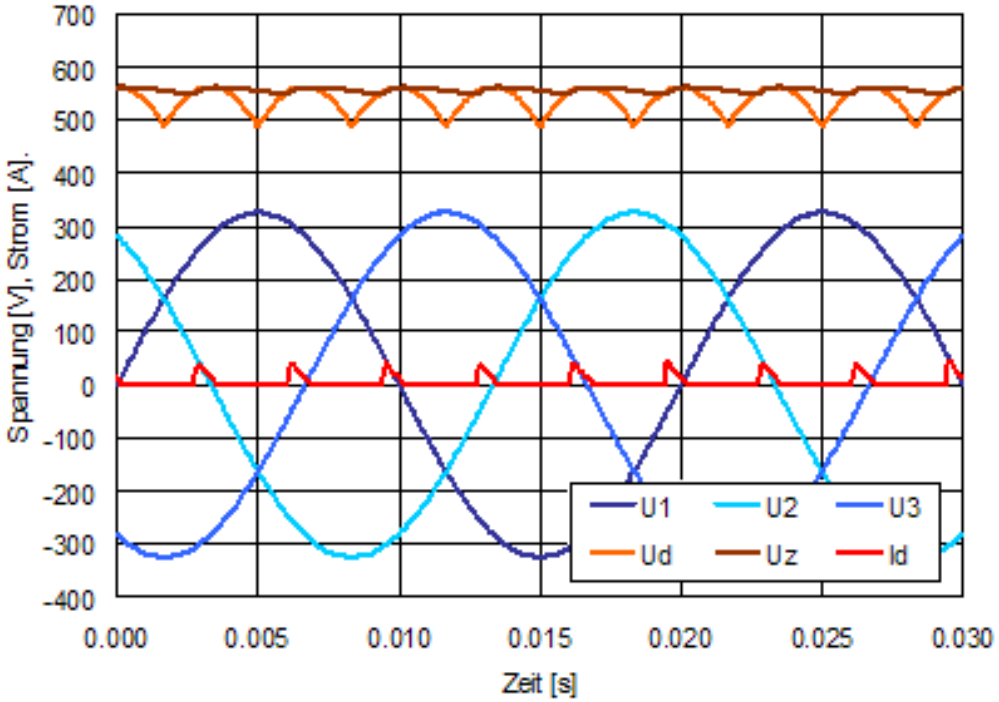
$$E = \frac{1}{2} * c * U^2$$

Disadvantages

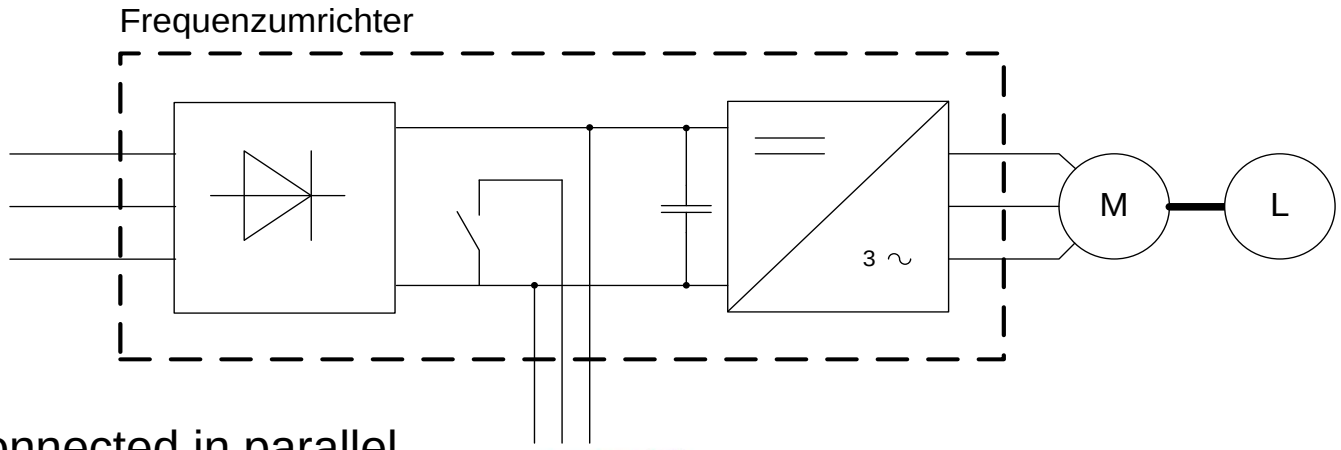
- Possible saturation of the capacitors
- Concept is limited through the pre-loading-circuit of the frequency inverter
- Concept is limited through the permissible sub-harmonic-load

Rectifying alternating current





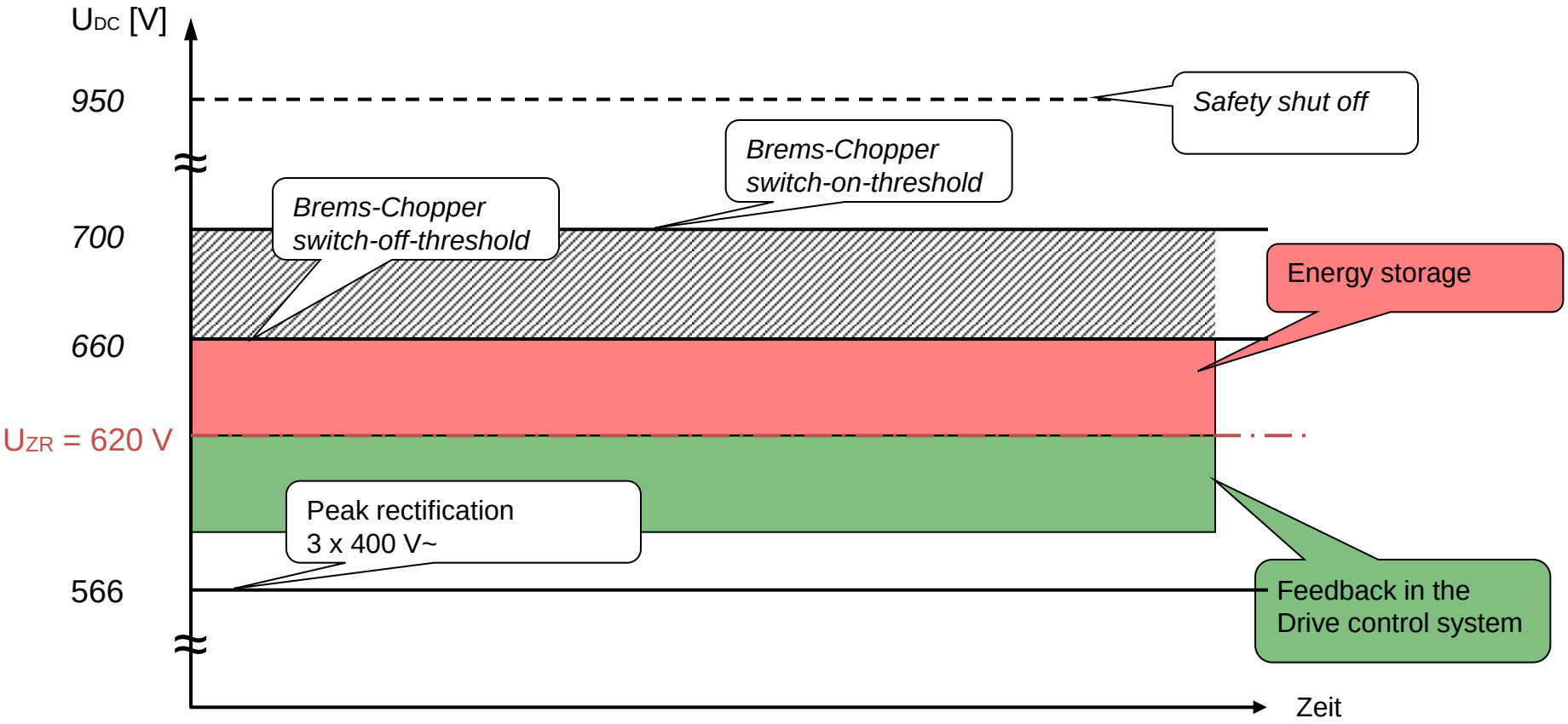
Active DC-Link expansion (DES)



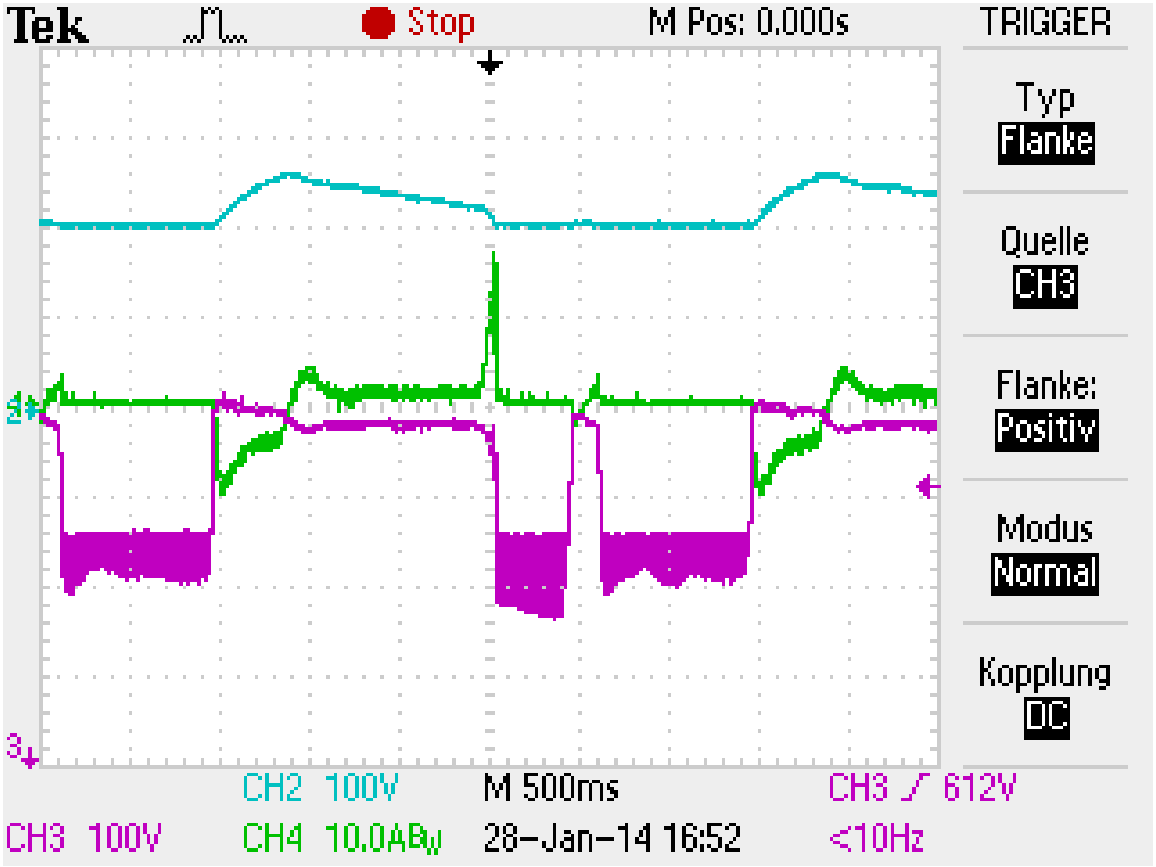
- Devices can be connected in parallel
- Expandable storage
- Good exploitation of the capacitor
- No limititations due to the pre-loading circuit of the frequency inverter
- Relieving load on the DC-Link capacitor
- No limitations due to the permissible sub-harmonic-load

Concept of operation

Automatic mode with brake-chopper detection



Oscillogram – charging and discharging of energy



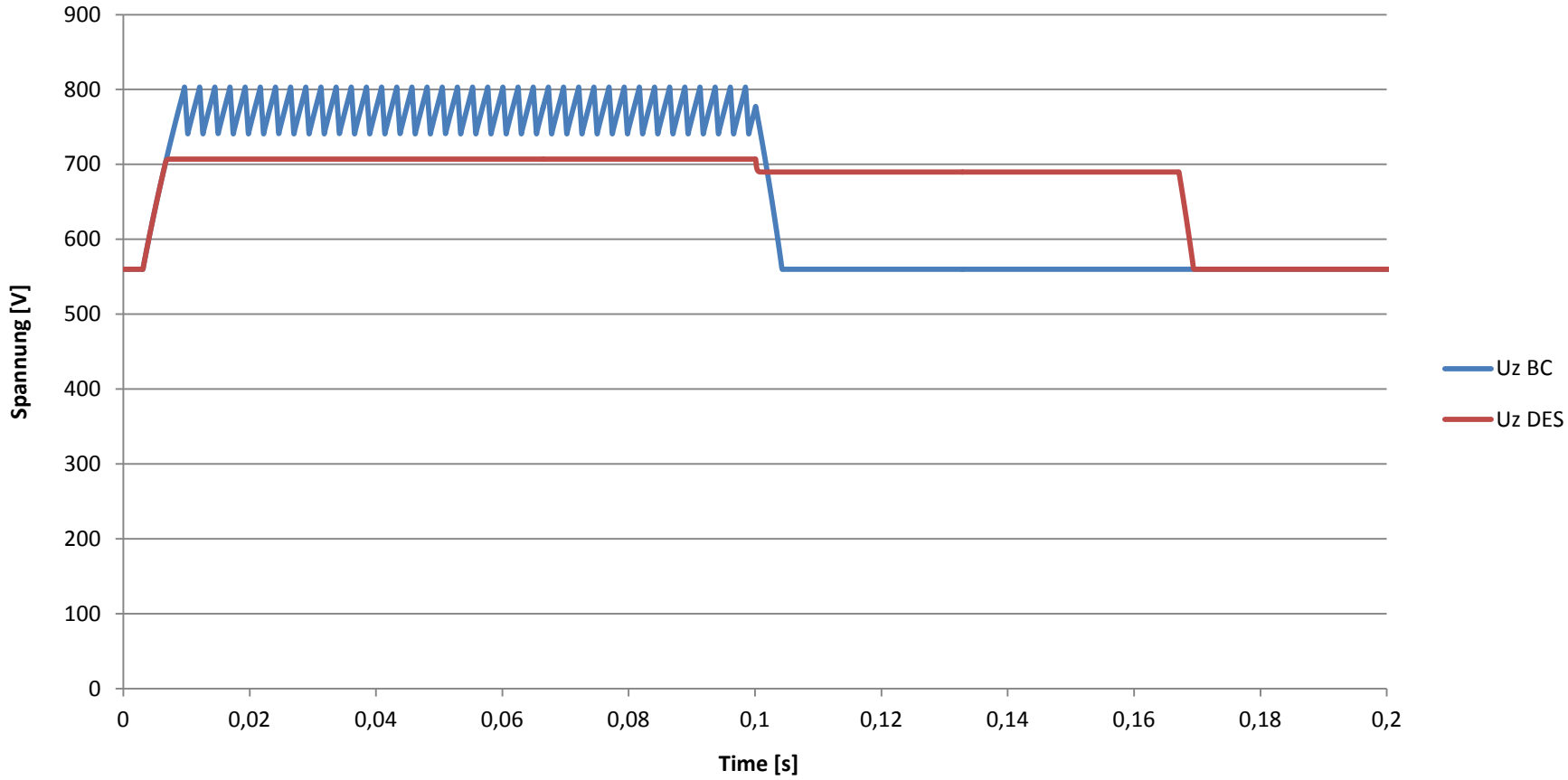
Legende:

Capacitor voltage

DC-Link voltage

Current (inverse)

- Relieve the load on the DC-Link capacitor



Further features of smart DC-link expansion

Short-term UPS to compensate voltage fluctuation or power failures:

- Avoids damage of the machine by supporting it with energy to reach a defined stopping position
- Identifies irregularities of the voltage supply and supports the drive immediately when needed
- Helps to safe time, ressources, money and trouble

Perfect solution for contries with weak and instable power supply

- Relieve load on the break-chopper's IGBTs
  → Higher Performance and longer service life
  Relieve load on the internal brake-resistor

Further features of smart DC-link expansion

Can be integrated into any existing system…

-> **RETROFIT**!

Thank you very much!

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