

Erdung von DC-Netzen

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Fachhochschule Köln

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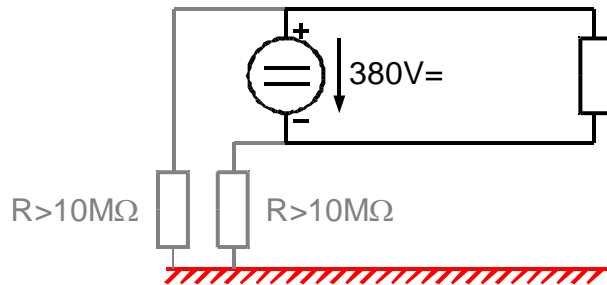


Fachhochschule Köln
Cologne University of Applied Sciences

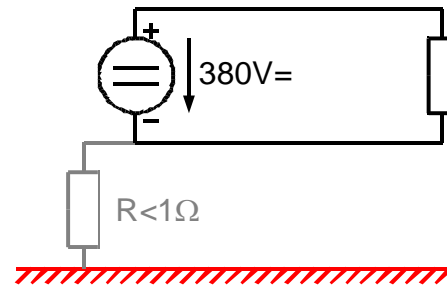


Erdungssysteme: Übersicht

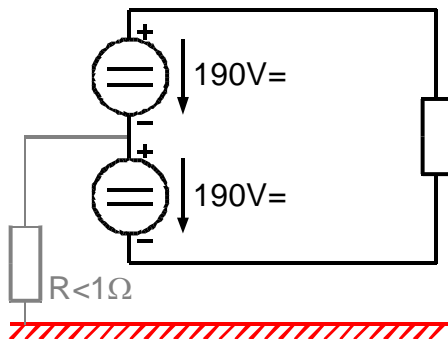
Floating



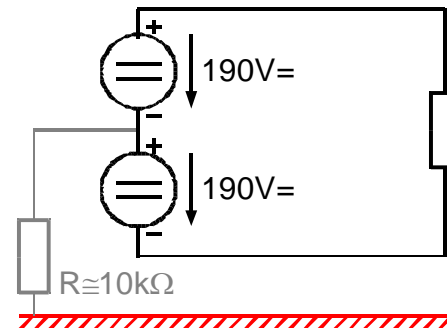
Single ended grounded



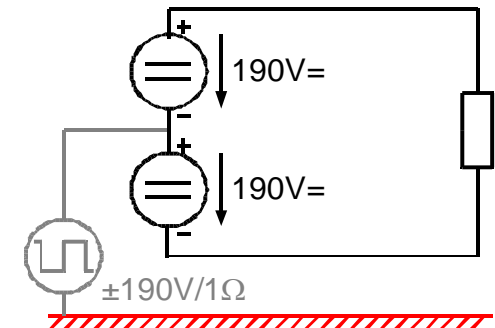
Symmetrically grounded



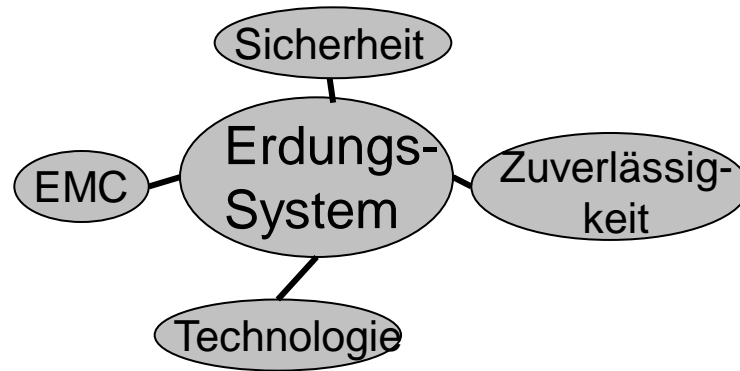
High ohmic symmetrically grounded



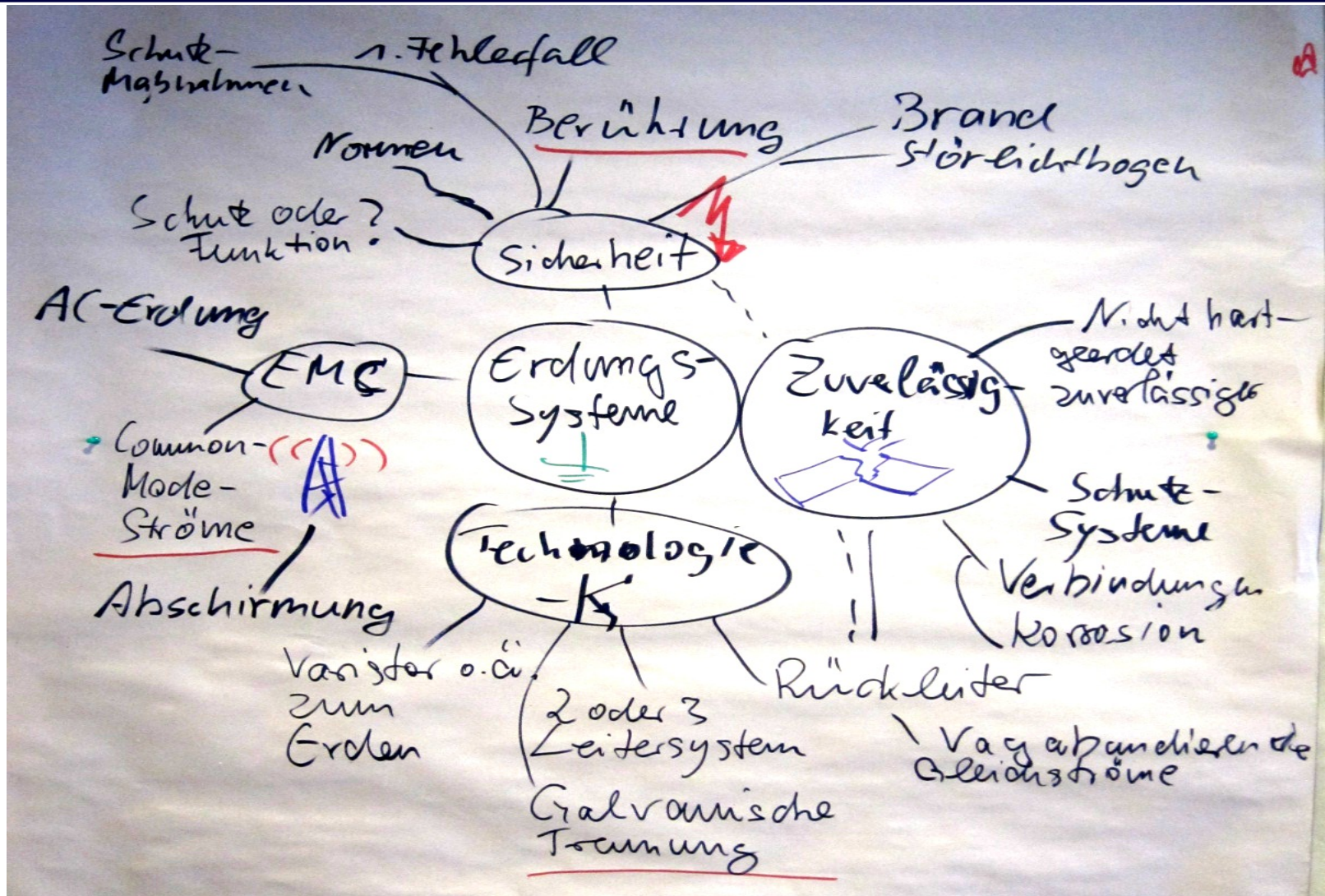
AC grounded



Aspekte von Erdungssystemen

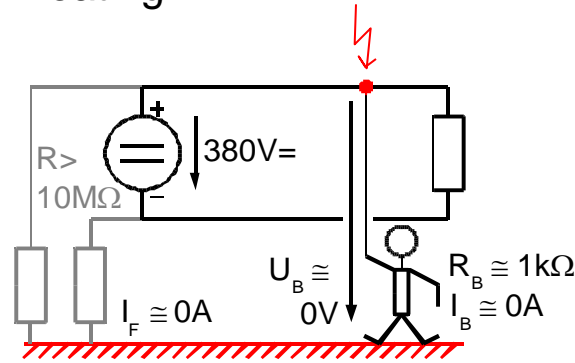


Aspekte von Erdungssystemen

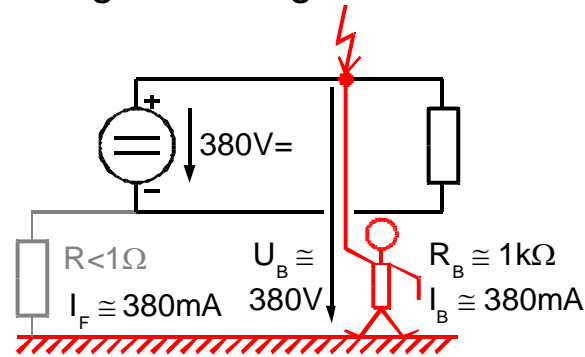


Safety issues: Touching

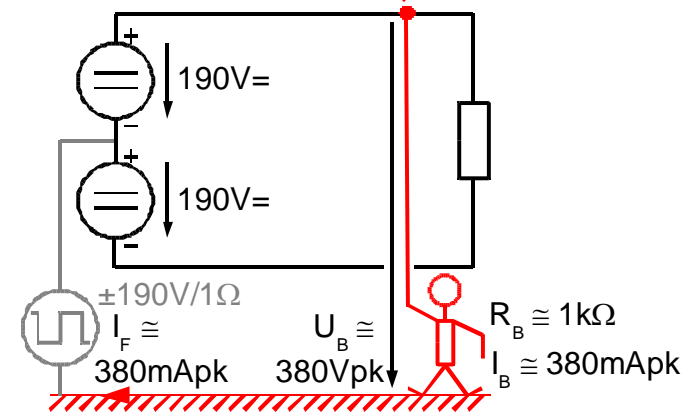
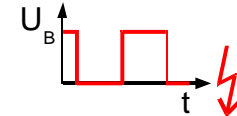
Floating



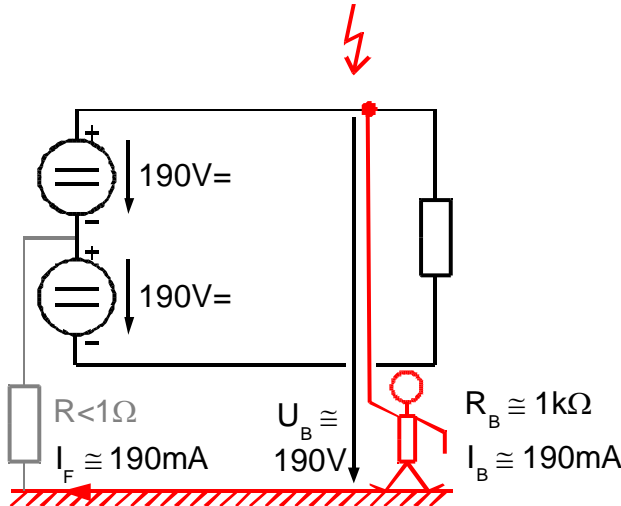
Single ended grounded



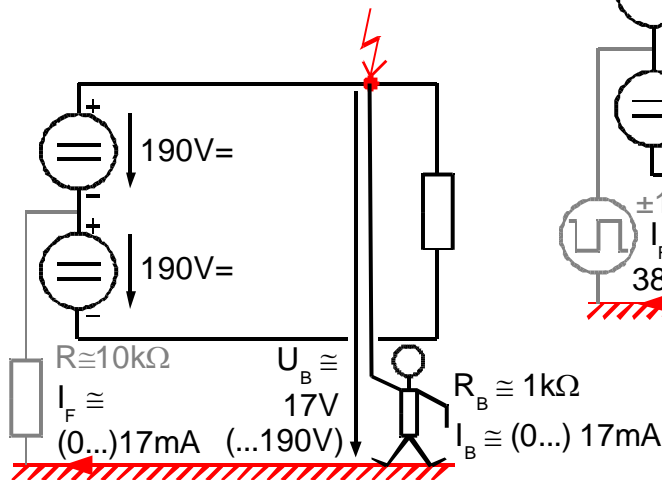
AC grounded



Symmetrically grounded

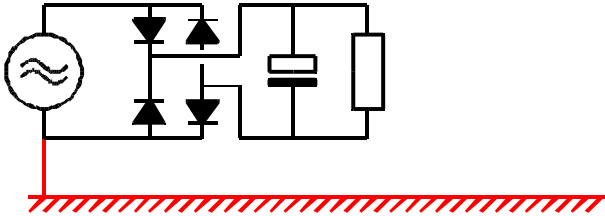


High ohmic symmetrically grounded

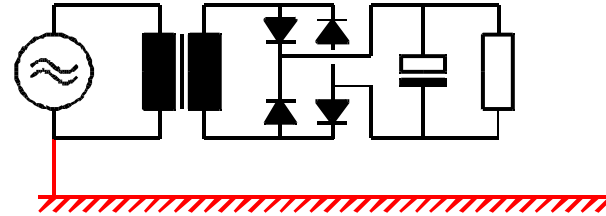


Technology: Rectifier

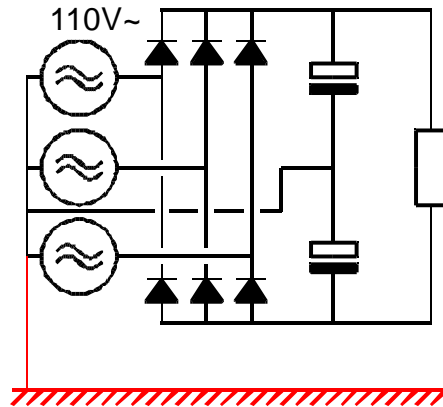
AC-Grounded



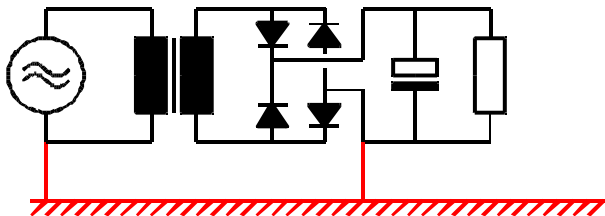
Floating



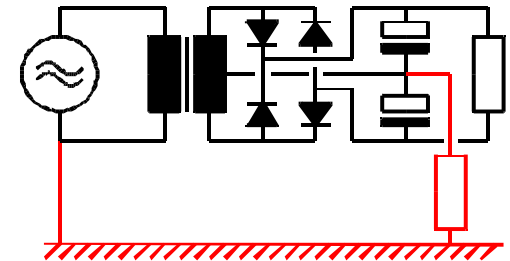
Symmetrically



Single ended

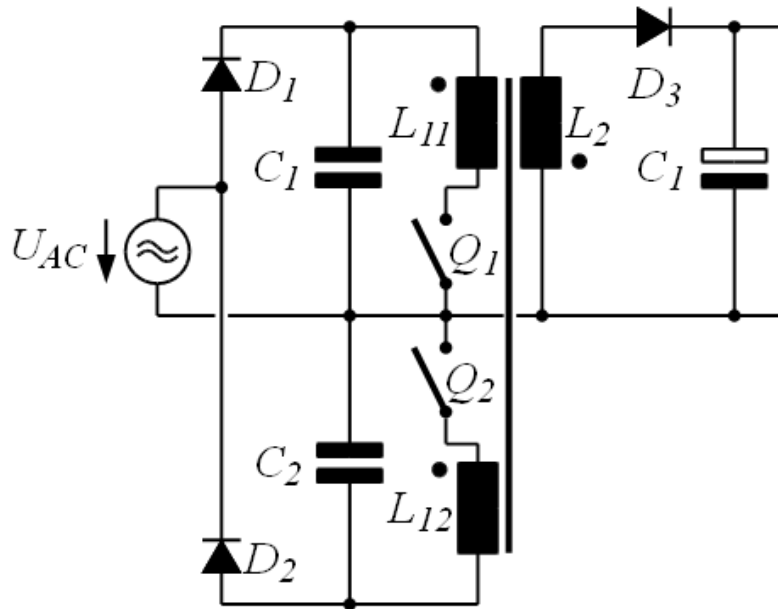


High-ohmic symmetrically

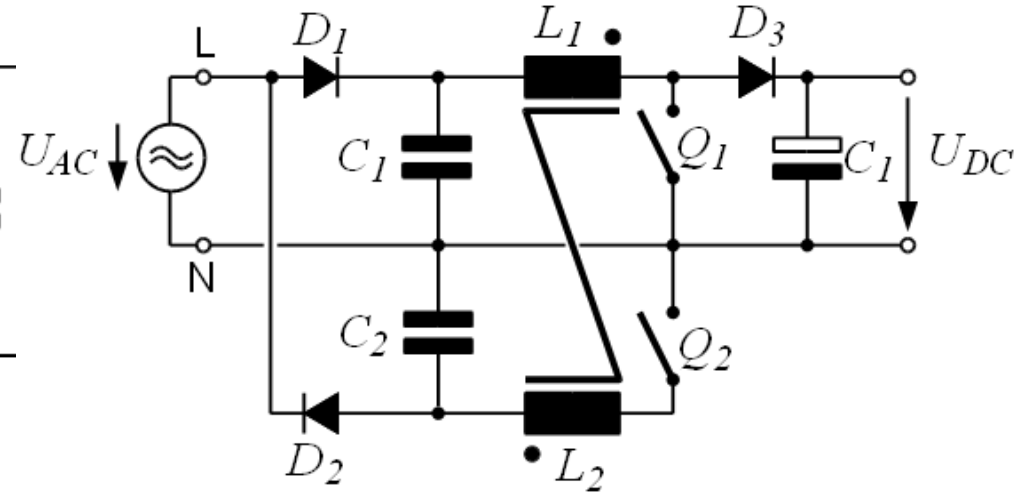


Technology: Rectifier, single ended ground

Double Flyback

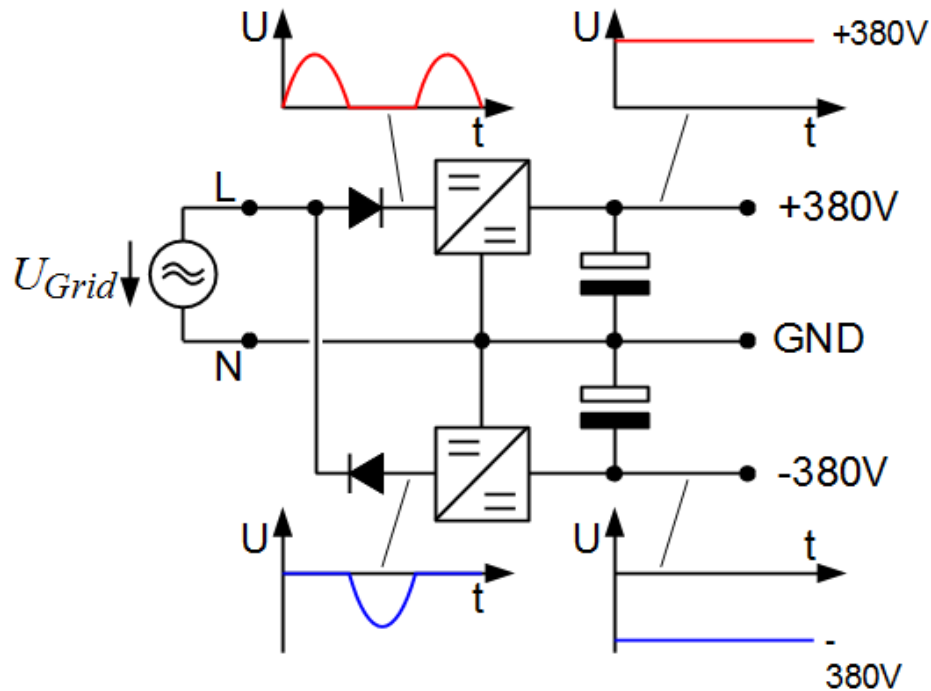


Double Boost

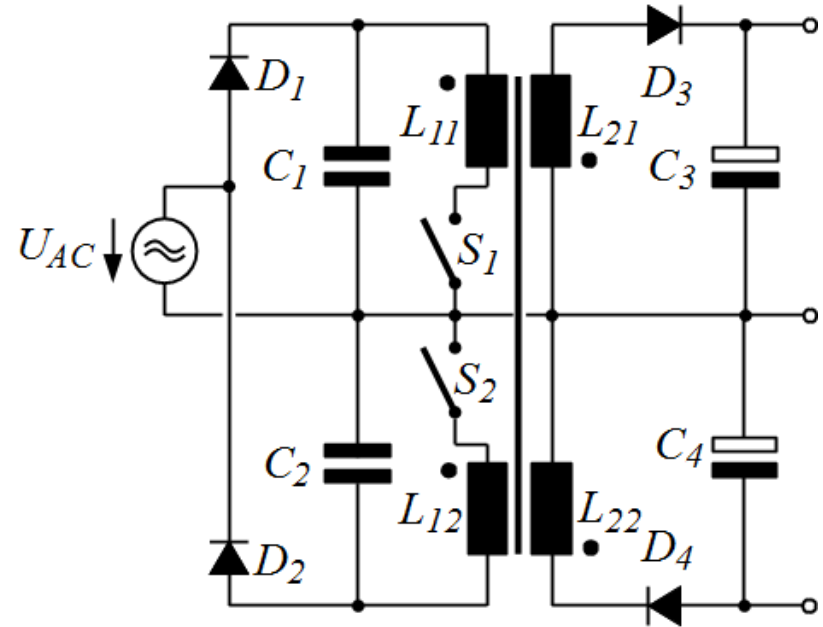


Technology: Rectifier, symmetrical ground

Double Boost

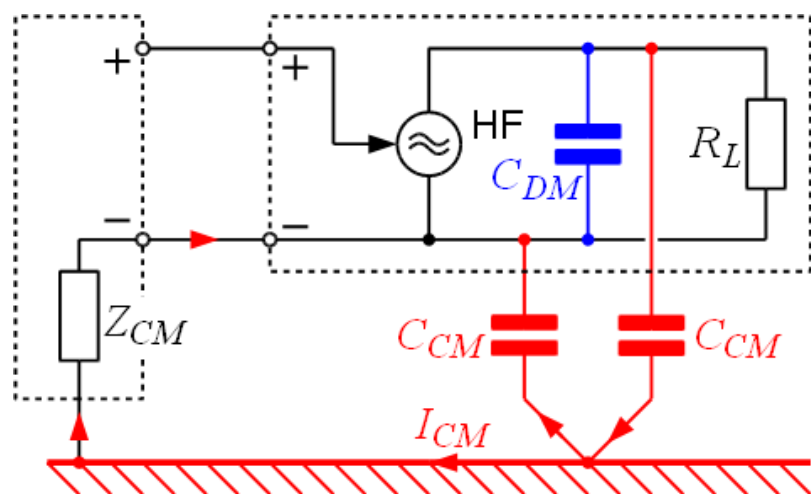


Double Flyback



EMI aspects of grounding

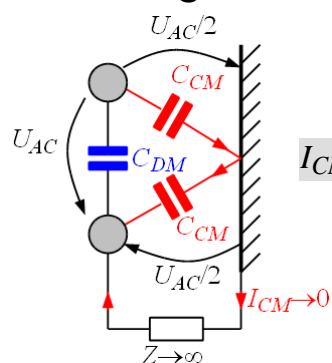
Generation of common mode currents



Common mode currents

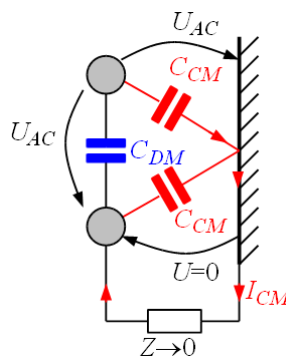
- Cause radiated emissions
- Generated by DC/DC power converters
- Dependent on earthing mode
- Floating System: Less Common mode currents

Floating



$$I_{CM_float} < I_{CM_GND}$$

Grounded



Wertung der Aspekte: Exemplarisch, unvollst.

Anwendung: Beleuchtung in professionellen Gebäuden

Criterion	Ratings					Relevance
	+/-190V	+380V	-380V	380V High Imp.	380V= AC-Gnd	
<i>Touching:</i>						
Avoid fatal consequences	0	-	-	+	--	10
Less probable	-	+	+	+	-	7
Less burnings	+	-	-	+	-	5
Detection of 1st fault to earth	+	+	+	-	+	9
Touching after 1st fault occurred	0	0	0	--	0	5
Short Life-> PE Detection	+	++	++	-	++	9
Short 0V-> PE Detection	+	0	0	-	0	8
Rectifier simplicity	0	-	-	--	+	3
No CM-mode current (50 Hz AC)	++	++	++	++	--	2
Contact corrosion	-	-	0	0	-	1
Summary	27	19	20	-16	-7	

Wertung:

++ = + 2Pt

+ = + 1Pt

0 = 0Pt

- = - 1Pt

-- = - 2Pt

Multipliziert

mit

Relevanz



Demo DC-Grid with Solar Support



- Grid Voltage
380Vdc
- Solar Modules
2kWpk
- 56 LED Lamps 37W,
adapted drivers
- Reference system
with 230Vac
- Operation since
summer 2012

PHILIPS



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