

# WF WE-CLFS Line Filters Passive Components Owner's Manual

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## WF WE-CLFS Line Filters Passive Components Owner's Manual

WF WE-CLFS Line Filters Passive Components.webp

### 1. Single Phase Line Filter

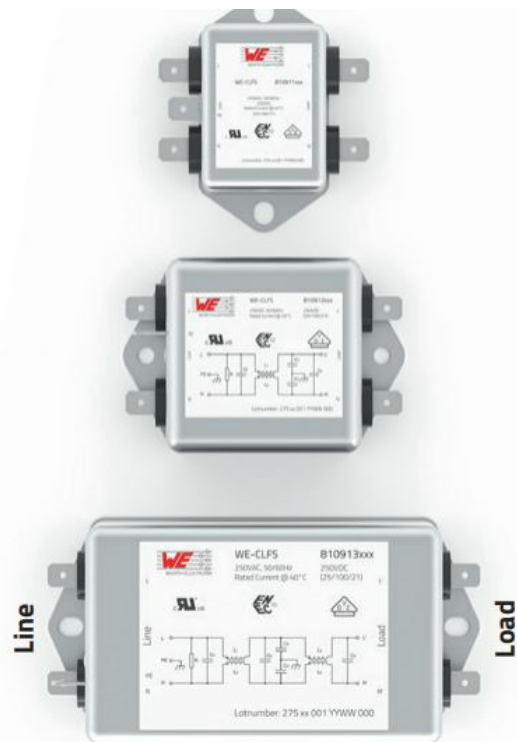
**Single-Stage:**  
Very compact design

**Single-Stage Advanced:**  
Improved differential mode noise attenuation

**Two-Stage:**  
Extreme differential and common mode noise attenuation

**Low Leakage Version available for each of them**

Size	L (mm)	W (mm)	H (mm)
Single-Stage	64	35	29
Single-Stage Advanced	75	51.8	29
Two-Stage	114.9	58.5	45

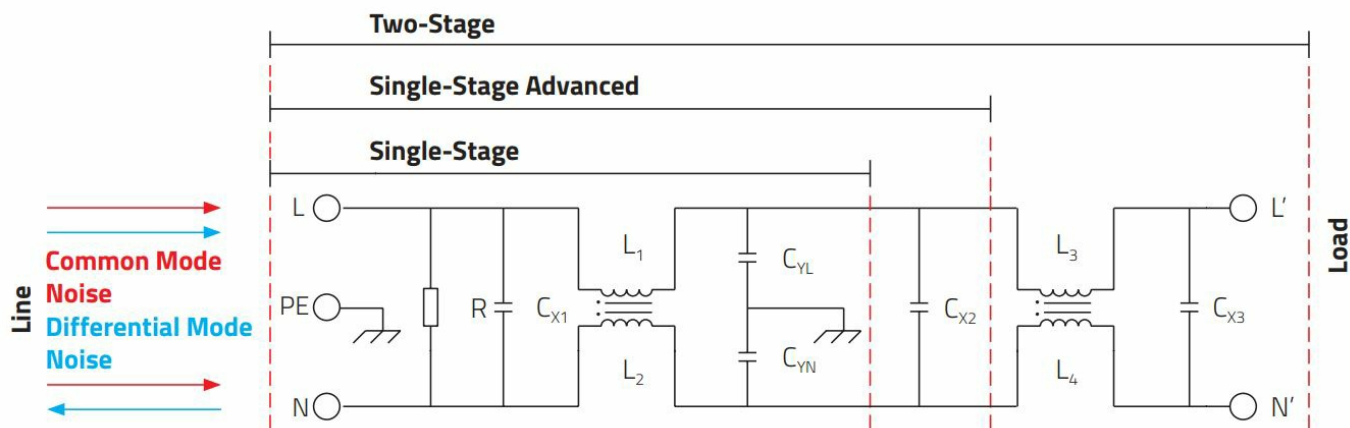


**LTspice** Simulation Models, Application Scenarios  
and more technical Information available.

More information about WE-CLFS:  
[www.we-online.com/we-clfs](http://www.we-online.com/we-clfs)



**2. Internal Schematic**



#### Discharge Resistor R:

Discharge of capacitors. Important to fulfill safety standards.

#### X-Capacitor $C_X$ :

Increases the differential mode attenuation.

#### Common Mode Choke L:

High common and partly differential mode attenuation, without deriving any leakage current to ground.

#### Y-Capacitor $C_Y$ :

Strongly increases common and partly differential mode attenuation, driving some leakage current to ground.

### 3. General Information

Rated current of the mains filter :

Must be equal to or greater than the current requirements of the connected devices.

For ambient temperatures above 40 °C, the following derating curve applies.

#### Operating Voltage:

250 V<sub>AC</sub> 50/60 Hz

250 V<sub>DC</sub>

#### Operating Temperature:

-25 °C – +100 °C

#### Climatic Category:

25/100/21

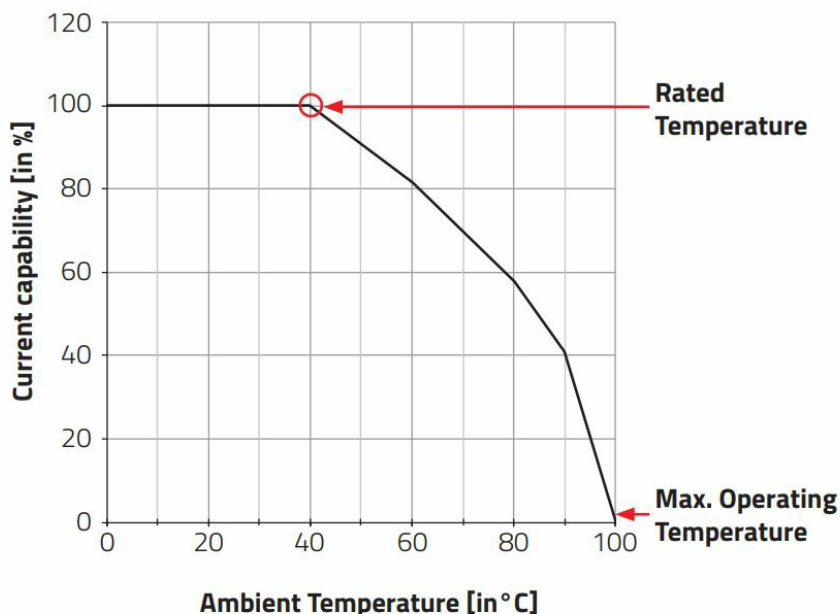
#### Rated Current:

Up to 20 A

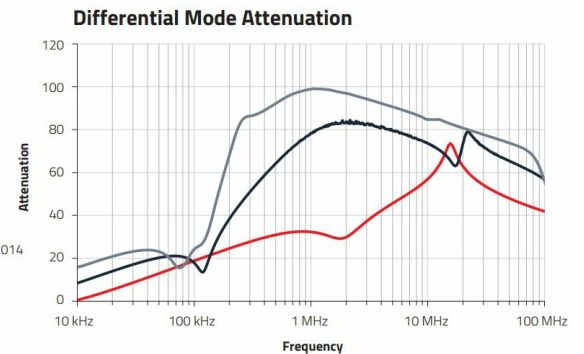
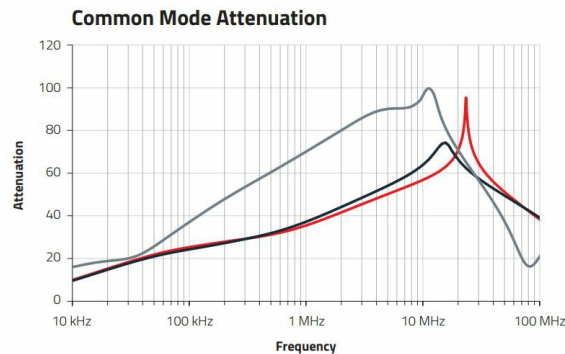
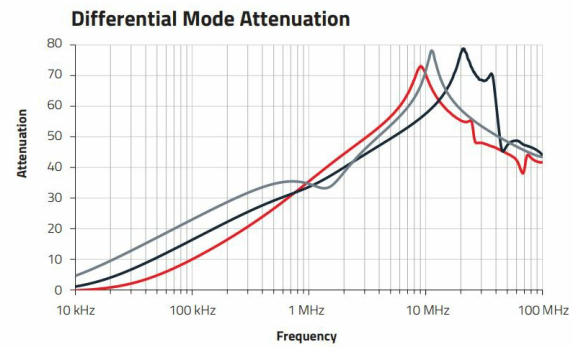
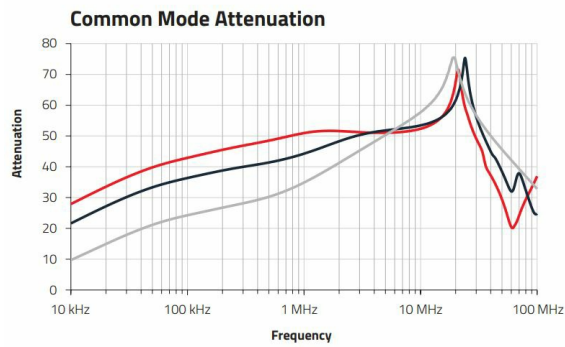
#### Certifications:



#### Derating Curve:



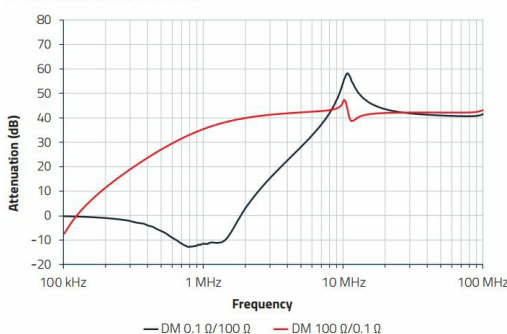
### 4. ATTENUATION FOR DIFFERENT INDUCTANCE VALUES AND TOPOLOGIES:



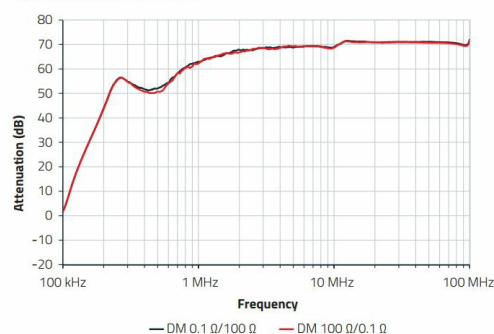
Attenuation plots for the examined filters with system impedances of 50  $\Omega$  and 50  $\Omega$ . You can simulate these plots and many more with our REDEXPERT online tool.

## 5. Influence of the System Impedances

Single-Stage Filter: (810911001)



Two-Stage Filter: (810913006)



- Single-Stage Filter:** Attenuation of filter is strongly depended on system impedances (especially up to approx. 10 MHz).
- Two-Stage Filter:** Much less system impedance dependence. Filters with two or more stages have a decoupled impedance node.
- Impedances of your system may vary** and influence the attenuation of your filter. Therefore the two shown „worst case methods“ are defined in CISPR 17 to show system impedance influence:
  - $Z_N = 0.1 \Omega$ ,  $Z_{OUT} = 100 \Omega$
  - $Z_N = 100 \Omega$ ,  $Z_{OUT} = 0.1 \Omega$

## 6. Filter Selection with REDEXPERT

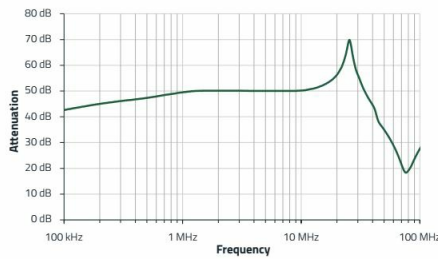
### Selection Guide:

- Choose rated current
- Check frequency range of the noise
- Check attenuation in this frequency range

- Choose maximal allowed leakage current

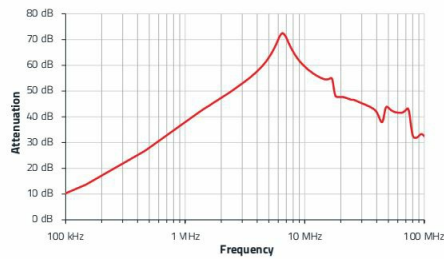
Take the different system impedances in consideration.

**Common Mode Insertion Loss**



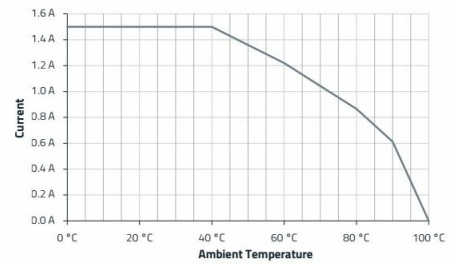
Single-Stage Filter  
20 mH / 810911001

**Differential Mode Insertion Loss**



Single-Stage Filter  
20 mH / 810911001

**Temperature Derating**



Single-Stage Filter  
20 mH / 810911001

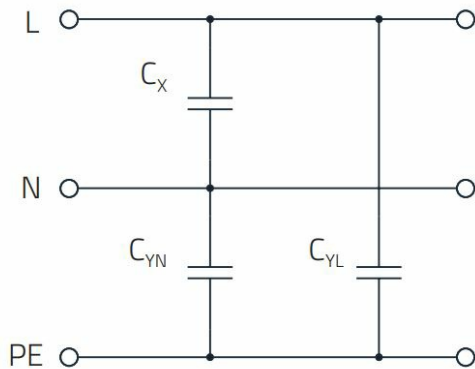
**REDEXPERT is for simulation and selection**

[www.we-online.com/redexpert-emc-filters](http://www.we-online.com/redexpert-emc-filters)



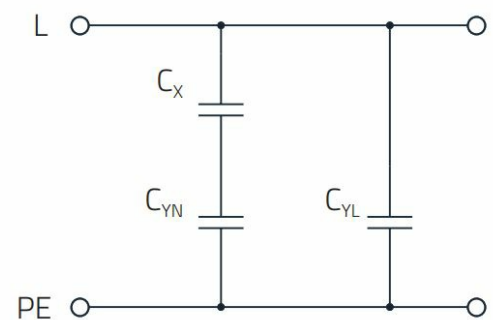
## 7. Interesting: Leakage Current

**Leakage current calculation  
during regular operation:**



$$I_{LK} = 2\pi \cdot f \cdot U \cdot C_{YL} \text{ see also IEC 60939-1:2010}$$

**Worst case operation:  
Neutral line interruption**



$$I_{LK} = 2\pi \cdot f \cdot U \cdot C_{eq}$$

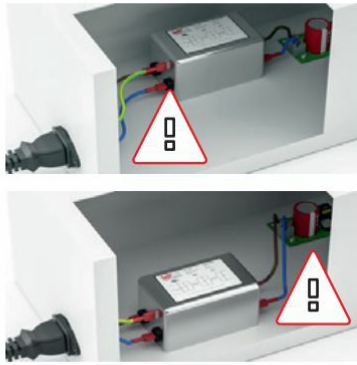
$$C_{eq} = C_{YL} + \frac{C_{YN} \cdot C_X}{C_{YN} + C_X}$$

For low leakage requesting applications, we offer a low leakage version without Y capacitors.

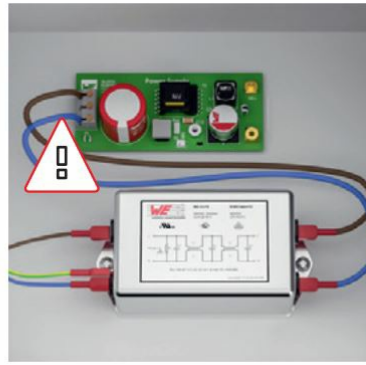
## 8. Placement and Grounding



### Short Connections



### Minimize Crosstalk



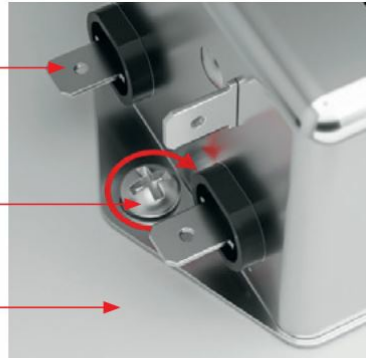
### Good Placement



Fast-on Terminals

Mounting Holes  
for M4 Screws

Chassis



Properly placing the filter optimizes its performance and prevents unintentional bypassing of it.

**Ensure that the filter housing have a wide connection area to the ground plane: Remove paint and dirt.**



More information about WE-CLFS:  
[www.we-online.com/we-clfs](http://www.we-online.com/we-clfs)

**Read More About This Manual & Download PDF:**

### Documents / Resources



[WF WE-CLFS Line Filters Passive Components](#) [pdf] Owner's Manual  
WE-CLFS Line Filters Passive Components, WE-CLFS, Line Filters Passive Components, Filter s Passive Components, Passive Components, Components

### References

- [Würth Elektronik](#)
- [User Manual](#)

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