

# Common Mode Chokes for AC line voltages $\geq 80V$

# Scope

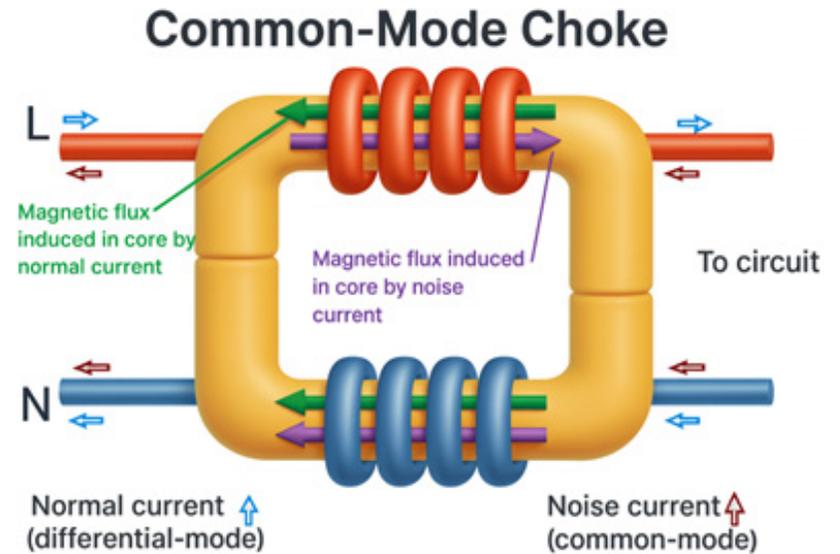
The increasing prevalence of switching power supplies in modern electronics introduces a significant challenge: Electromagnetic Interference (EMI).

A critical component Common Mode Choke (CMC) is essential in AC mains filtering for equipment operating at 80V and above, including SMPS power supplies, lighting systems, industrial controls and automation, consumer appliances, EV chargers, and communication hardware and designed to meet global EMC standards (CISPR/FCC/EN/UL).

It is applied to block high-frequency noise, specifically common-mode noise, while allowing the desired low-frequency AC power signal (differential-mode current) to pass through largely unaffected.

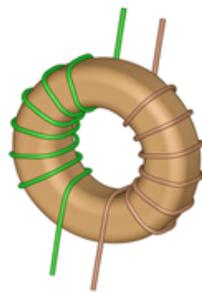
## Key Features:

A suitable CMC reinforces basic insulation systems with stable impedance for high-voltage mains supply (80-265Vac), it provides high Common-Mode impedance (effective strong attenuation for EMI noise from 10KHz to 30+ MHz) and low Differential-Mode inductance (allow 50/60Hz mains currents to pass with minimal copper and core loss).



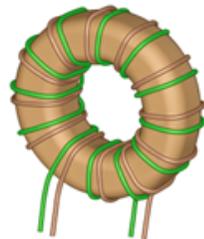
# Winding Structures: Bifilar vs Sectional

The performance characteristics of a CMC, particularly its differential-mode attenuation and high-voltage isolation, are significantly determined by the winding style used. For AC mains applications (80V+), the sectional style is preferred, but also the bifilar is possible. (Because of the isolation between the windings!) two main styles are employed:



**Sectional**

- Low capacitive coupling
- High leakage inductance
- $LS \sim 0.5\% \dots 2\% * LR$



**Bifilar**

- High capacitive coupling
- Low leakage inductance
- Less Differential impedance
- $LS \sim 0.01\% \dots 0.1\% * LR$

- 1. Sectional Winding** (Ideal for AC Mains with hi-voltage isolation & robust noise suppression).
  - **Construction:** The two windings are physically separated into different sections, layers, or chambers on the core.
  - **Key Attributes for AC Mains:**
    - **High Isolation** (Low Capacitive Coupling): The physical separation creates greater distance between the windings, significantly reducing the parasitic interwinding capacitance. This is crucial for high-voltage AC mains to ensure adequate dielectric strength and safety, and it also improves high-frequency noise suppression.

- **Higher Leakage/Differential Inductance:** The reduced magnetic coupling between the separated windings means the cancellation of differential-mode flux is less perfect. This introduces a slight differential-mode impedance, which can provide a secondary benefit. In some cases, a series inductor can be omitted.
  - **Recommended applications:** High-frequency SMPS, industrial equipment, reinforced-insulation designs, EV chargers.
- 2. Bifilar Winding** (Best for Data Lines where low differential-mode attenuation is important).
    - **Construction:** The two wires are wound together, closely in parallel on the core sections, layers, or chambers on the core.
    - **Key Attributes (less suitable for AC Mains):**
      - **High Coupling (Low Differential Impedance):** The close proximity provides excellent magnetic coupling, ensuring near-perfect cancellation of the differential-mode flux. This results in the lowest possible impedance to the intended signal, making it excellent for high-speed data lines (USB, Ethernet).
      - **Higher Capacitive Coupling:** The wires being close together increases the parasitic interwinding capacitance, which can degrade high-frequency performance and is a safety concern at high AC voltages.
    - **Recommended applications:**
      - General-purpose EMI filters, compact consumer power supplies.



For robust EMI filtering on your 80V and over AC mains applications, we recommend our OWLPT and OWLPTK series for high power and our UU and ET series for low power. These chokes utilize sectional (or also bifilar for the MnZn Toriod core) winding to ensure low interwinding capacitance and high isolation voltage, providing reliable and compliant noise suppression.

Our product range offers various inductance values and current ratings to perfectly match your specific power supply design.

Mn-Zn Toroid core AC&DC Common Mode Choke	ET type, UU type AC&DC Common Mode Choke	SQ type Un-shielded AC&DC Common Mode Choke
OWLPT series	OWCM series	OWISQ series

Check with Ole Wolff for more suitable parts:  
[Common mode chokes - Ole Wolff Electronics](#)

If no existing design (PAD or other values) fit your criteria, we can create custom components based on your specifications - nanocrystalline core also available.