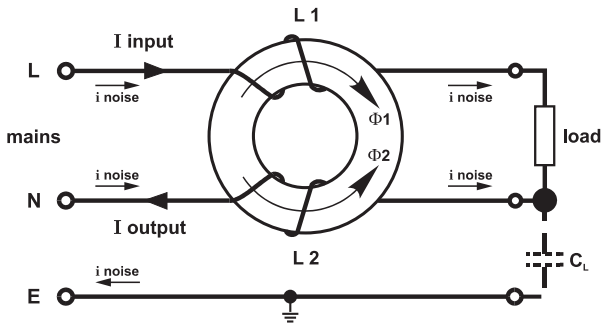
As early as the first space flights it was noticed that a reliable flight mission of these complex systems can only be achieved if sufficient account is taken of the reciprocal interference effects between the own complex and sensitive part systems. The systems must be designed compatible both with regard to the self-created (internal interference suppression) as well as with regard to the interference to be expected from outside (external interference protection). In this context the term "**Electro-magnetic compatibility**" (EMC) developed which has progressed from an originally to a major extent theoretic term into a factor that today it is hard to imagine being without even in practice.

Definition as per IEC 61000-1-1 or DIN VDE 0870 :

The electro-magnetic compatibility (EMC) is the capability of an electrical facility, installation, device, structural component to function satisfactorily in its electro- magnetic environment without influencing this environment in an unauthorised manner.

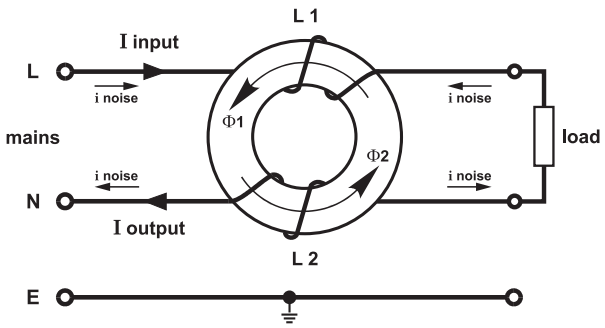
In this respect the world-wide applicable EMC regulations state that as from 1 st January 1997 all electrical and electronic devices and installations may only be brought onto the market or distributed in the EU States if they are EMC conform.

Symmetric / asymmetric interferences
Current compensated chokes



Current-compensated switched interference suppression toroidal core chokes

The magnetic fluxes Φ 1 and Φ 2 created by the nominal current cancel each other out reciprocally. The choke will not become saturated through the nominal current I and can have a high inductance value at the same time.
The full inductance which can reach high values (L_N = 1-100 mH) then has an effect for all asymmetric interference components. Here only the leakage inductance (approx. L_N / 100) has an effect with respect to symmetric interference factors.
In the asymmetric interference system the current path runs via both conductors L/N through to the earth E.



Non current-compensated switched interference suppression toroidal core chokes

With individual windings a high flux density is achieved even with low useful currents. In this respect the permeability becomes saturated very early(μ_r = 1). In this area the coil only has the impedance of a similarly structured air-core coil with regard to each smallest current alteration. Consequently it is only suitable for applications with low inductance requirement.
Only the relatively low inductance (L_N = 0.1-1 mH) then has an effect for symmetric and asymmetric interference systems. In the symmetric interference system the current path runs exclusively between the two conductors L to N.

Main test data for interference suppression chokes as per standard EN 60938 - 2

Test voltage
Chokes for AC applications:
4.3 U_R V_{DC} winding - winding
2 U_R +1500 V_{AC} winding-environment

Chokes for DC applications:
3 U_R V_{DC} winding - winding
2 U_R +1500 V_{DC} winding-environment

Test duration:
2 seconds for final production test (unit check)
This test can be repeated once
e. g. during customer receipt test
60 seconds for random sample test (type check)

Inductance test
Tolerances:
-30% +50% for current-compensated chokes
±15% for non current-compensated chokes

Measuring frequency with measuring current approx. 0.1 mA:
50 ÷ 120 Hz for L > 50 mH
10 kHz for 1 < L ≤ 50 mH
100 kHz for 10 µH < L ≤ 1 mH
Measuring frequency tolerances ±20%

Ambient measuring temperature +25°C ±3°C

Max. operating voltage
U_R rated voltage or
U_N nominal voltage or
U_B rating voltage
All of these definitions are normal in practice depending on the testing body.
All of these values correspond to the mains voltage +10%.
The mains frequency has been determined as f = 50/60 Hz.

Nominal current I_N
The max. current values with corresponding ambient temperature are set out in the data tables.

The following applies for compensated chokes:
I_N at 40°C ambient
I = 0 on 100°C ambient

The following applies for non compensated chokes:
I_N at 70°C ambient
I = 0 on 125°C ambient

Quality assurance QA
In the year 1998 CALTRON obtained the ISO certificate 9002. Caltron has implemented and maintains a Quality Management System which fulfills the requirements of the following standard: ISO 9001:2008
All parameters are subjected to a 100% test procedure.