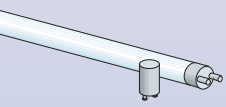
COMAR Condensatori

FA 3

THIRD HARMONIC PASSIVE FILTER

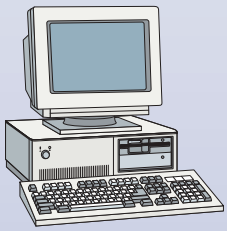
"non linear" loads?

Electrical networks are today facing problems due to the presence of on the networks. When power supply is coming from a small power t

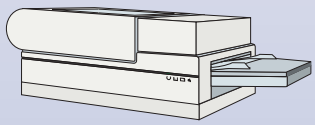


Fluorescent lamps

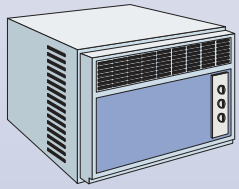
U.P.S.



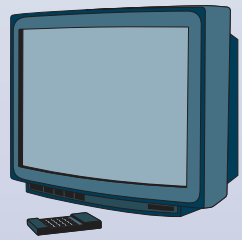
Computers



Printers



Air-conditioning Systems



TV monitors

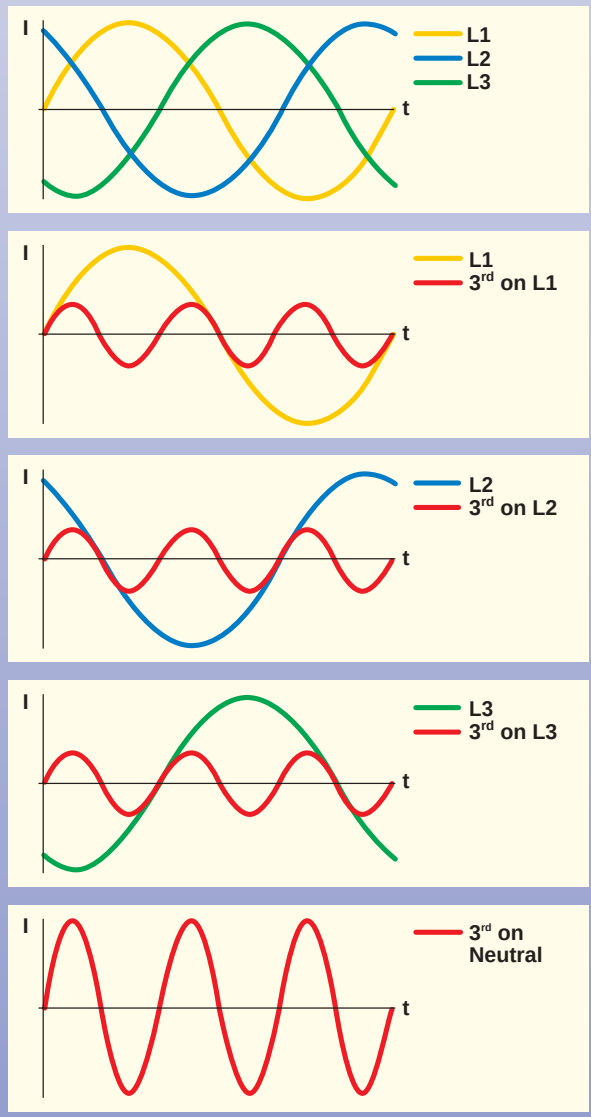
Harmonics on the electrical energy plants

In civil electrical energy plants (like hospitals, public buildings, offices, banks, etc.) power supply is provided by transformers or via U.P.S. which feed single-phase "non-linear" loads (supplied between phase and neutral).

These kind of loads (electro-medical equipments, fluorescent lamps, air conditioning systems, office equipment, etc.) generate harmonics and particularly the third harmonic.

As the diagrams report, third harmonic can create very high neutral currents which often exceeds the phase current, causing damage to the neutral cable and fire risk.

In isolation, the single-phase loads do not generate high harmonic currents, but when many of them are operating toghether harmonics become very high and create many interference problems, power losses and overheating, which degrades the quality of electricity.



Third harmonic currents of the three phases are sumnated on neutral conductor

Problems caused by third harmonic

In Networks:
Overheating of neutral conductor and fire risk
Increased power losses
High electro-magnetic fields
Poor quality of electricity

In Capacitors:
Increased power losses
Risk of resonance
Decreased of operating life

In Transformers:
Increased power losses
Risk of resonance
Increased operating temperature
Overload conditions

U.P.S.:
Decreased output power

In Cables and Conductors:
Increased power losses
Overload of neutral conductor with overheating and fire risk

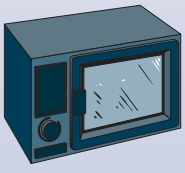
In Computers and Electronic Equipments:
Interferences
Loss of data
Undesired operation

In other devices:
Overheating of fuses and automatic switches
Undesired intervention of automatic switches or fuses etc.

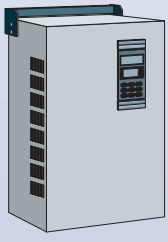
Third harmonic problems can cause unexpected shutdowns of devices which have to be supplied 24 hours at day. The worst problem caused by third harmonic is that the neutral conductor is continuosly overloaded due to the harmonic currents that are sumnated on it. Most of the time, neutral conductors have a cross sectional area half of the phase conductor. Continous overheating of the neutral conductor can generate irrepairable damage to the cable and risk of fire because the neutral is not fuse protected.

FA 3 - Third harmonic passive filter

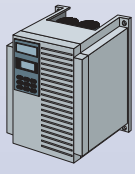
f "non-linear" loads which create harmonics. These harmonics generate many problems to all the equipments connected transformer or from an U.P.S., the network is certainly affected by interference problems caused by harmonics.



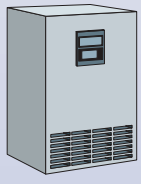
Microwave ovens



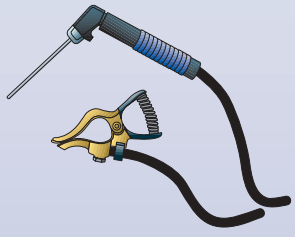
DC power converter



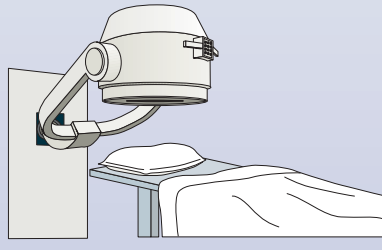
AC frequency converter



Rectifiers



Welding equipments



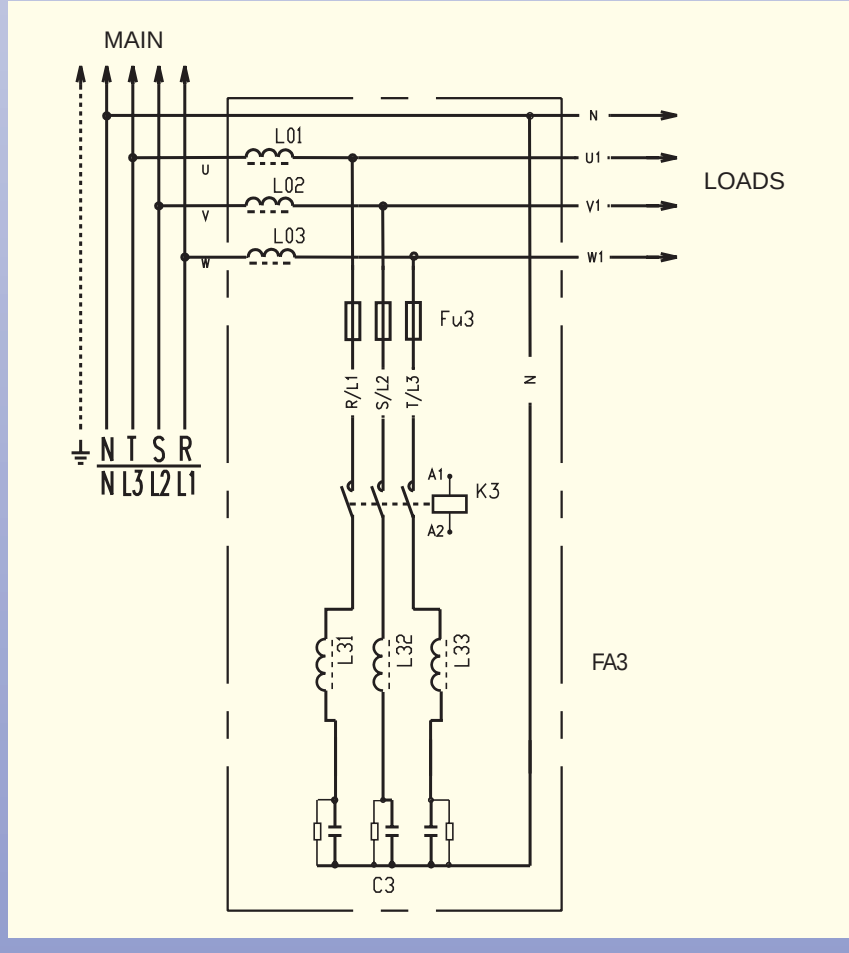
Electro-medical equipments

Solution to harmonic problems

To solve all these harmonic problems **Comar Condensatori** S.p.A. has designed a new phase filter which eliminates the third harmonics. **FA 3** gives many advantages to the networks where it is installed.

The most important are:

- Reduction of harmonic content in phase conductors, reducing also third harmonic in the neutral.
- Reduction of operating temperature in transformers, cables, fuses, automatic switches, etc.
- Reduction of power losses in transformers, cables and other equipments of the networks.
- Saving of energy consumption.
- Reduction of electro-magnetic fields.



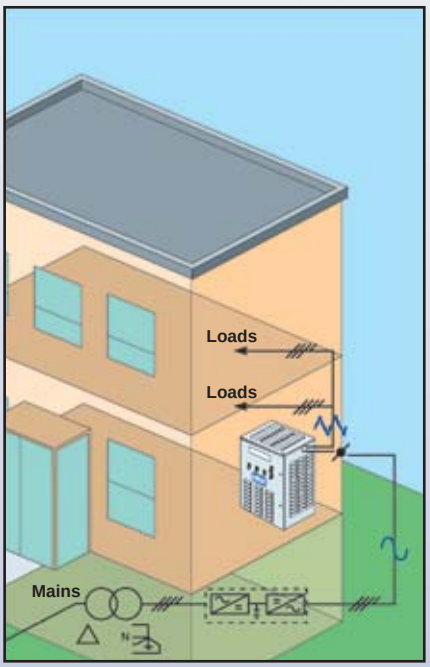
Example of FA3 connection

Installation

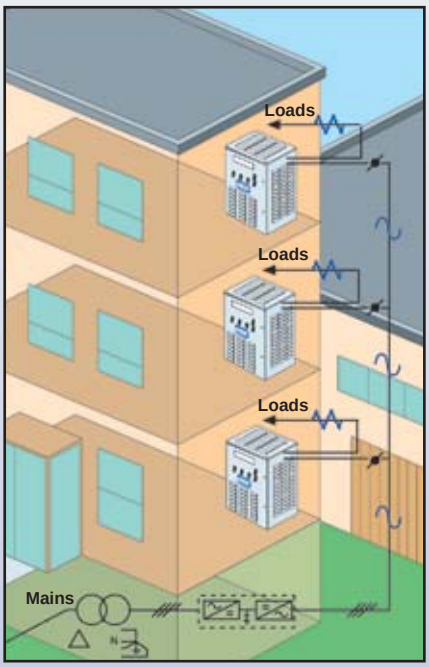
FA 3 can be easily connected on the power line, at the output of U.P.S. or close to low-medium power single-phase loads supplied between phase and neutral.
When installing FA 3, check that power of the filter is always higher than total power of the loads connected to avoid incorrect operation which can lead to irrepairable damage of the filter.

FA 3 is especially designed for installation at the output of the U.P.S. taking into consideration the problems due to the presence of capacitive loads at their output.

FA 3
solves harmonic problems of your electrical plant



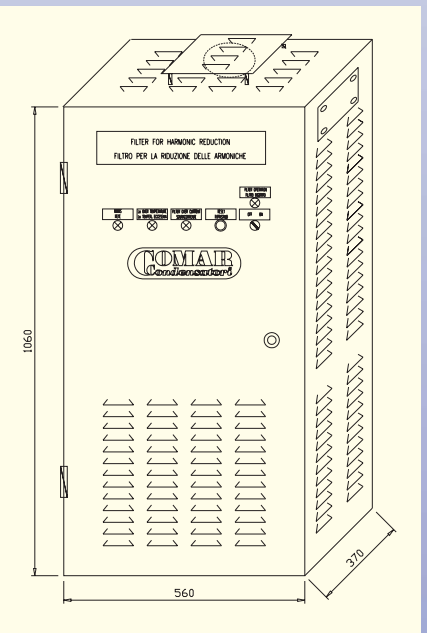
Single connection drawing



Multiple connection drawing

FA 3 series - Technical data

- Rated voltage: 400Vac 50Hz
- Degree of protection: closed door IP30, open door IP20
- Type of operation: Indoor continuous
- Environment temperature: -25/+40 °C
- Auxiliary circuit voltage: 230Vac (other on request)
- Operation mode: Manual or via remote control
- Reference standards:
  - capacitors: CEI EN 60831-1/2 — IEC 831-1/2, UL810
  - control panel: CEI EN 60439-1 — IEC 439-1/2



Type	Filter reactive power *(kvar)*	Rated voltage *(V)*	Max. load current *(A)*	3rd harmonic phase current *(A)*	3rd harmonic neutral current *(A)*
FA 3 5-100	1.5	400	7	2	6
FA 3 10-400	3	400	14	4	12
FA 3 20-400	6	400	28	7	21
FA 3 30-400	9	400	43	10	30
FA 3 40-400	12	400	57	14	42

COMAR CONDENSATORI S.p.A.
Via del Lavoro, 80 - CRESPELLANO (Bologna) ITALY
Ph. + 39 051.733.383 - Fax + 39 051.733.620
P.O. Box 150 - 40011 ANZOLA EMILIA (Bologna) ITALY
http:\\www.comarcond.com

N.B. The manufacturer reserves the right to modify data and sizes without previous notice

HI-TECH MEDIA
ED 02.60. ING REV. 1 - ED 06/02