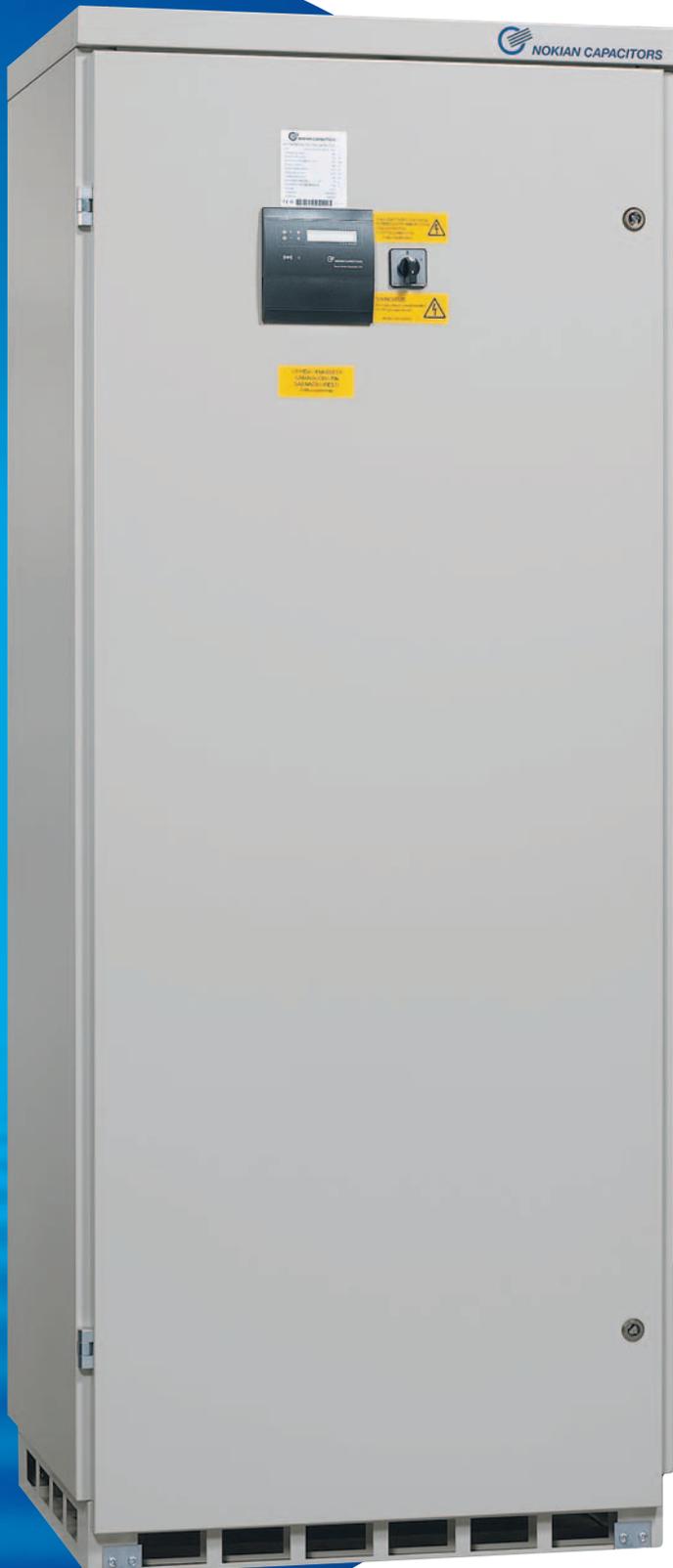
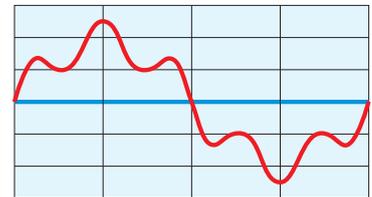


HARMONIC FILTERS FOR LOW VOLTAGE APPLICATIONS

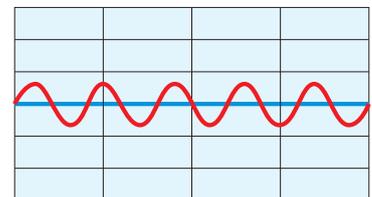


Power transmission and distribution systems are designed for operation with sinusoidal voltage and current waveforms at a constant frequency. However, when non-linear loads – such as thyristor drives, converters and arc furnaces – are connected to the system, excessive harmonic currents are generated, and this causes both current and voltage distortion.

Harmonic filtering is the best way to eliminate this distortion from the power system, while at the same time producing reactive power.



1. Voltage waveform distorted by 5th harmonic (50 + 250 Hz)



2. 5th harmonic (250 Hz)



3. Pure 50 Hz sine wave

POWER FACTOR CORRECTION AND HARMONIC FILTERING

Harmonic filters consist of capacitors connected in series with a reactor. The capacitors produce reactive power at the filter's fundamental frequency, and the circuit is designed to achieve the required power factor correction. The inductance of the reactor is chosen so that the filter forms a very low impedance series resonant circuit at the harmonic frequency. This ensures that a high proportion of the harmonics enter the filter.

A typical harmonic filter consists of three series resonant circuits tuned to the most common harmonics (5th, 7th and 11th harmonics). The filters are housed in steel cubicles. Each consists of a contactor, thermal over-current relay, reactor and capacitors. The unit is generally connected to the fused feeders on the main distribution board.

Harmonic filters can be operated in the same way as automatic capacitor banks: they are controlled by means of power factor controller according to reactive power requirements.

Harmonic filters are custom designed for each application using standard components. This ensures that the best possible power factor correction and filtering characteristics are achieved with a reasonable investment.

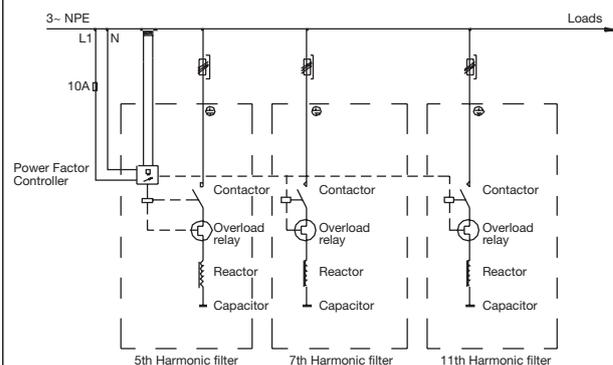
TECHNICAL DATA

| | |
|------------------------------------|--|
| Network voltage: | ≤ 750 V |
| Fundamental frequency: | 50, 60 Hz |
| Filter tuned to: | 5th, 7th, 11th, 13th order of harmonics |
| Reactive power per cubicle: | 60...300 kvar (approx.) |
| Cubicle dimensions: | w x d x h (mm) 600 x 600 x 2000 800 x 600 x 2000 |
| Protection class: | IP 20C (indoor) |
| Conformity: | EN 60439-1 IEC 60831 |
| Colour: | light grey RAL 7032 |

Other configurations available on request.



1. Power factor controller
2. Contactor
3. Thermal relay
4. Reactor
5. Capacitor unit



Filter system for 5th, 7th and 11th harmonics controlled by power factor controller.

In line with our policy of on-going product development we reserve the right to alter specifications.



Nokian Capacitors Ltd.
Kaapelikatu 3, P.O. Box 4
FI-33331 Tampere, Finland
Tel. +358 3 3883 11, fax +358 3 3883 360
www.nokiancapacitors.com