

General information Power quality filter

Harmonics and power quality

Harmonics caused by non-linear electrical loads such as variable speed drives, rectifiers, UPS's, computers, etc., are a growing problem both for electricity suppliers and users.

Harmonics can lead to serious problems:

- overheating of cables, motors and transformers
- damage to sensitive equipment
- tripping of circuit breakers
- blowing of fuses
- premature aging of the installation

The ABB solution: PQFA power quality filters

The power quality filters developed by ABB are active filters offering unprecedented ability to clean the network from harmonics. The PQFA eliminates harmonics in a controlled way. It is easy to expand and adapt to changes in the network.

The PQFA monitors the line current in real time and processes the measured harmonics as digital signals in a high-power DSP (Digital Signal Processor). The output of the DSP controls PWM (Pulse Width Modulated) power modules that through line reactors inject harmonic currents with exactly the opposite phase to those that are to be filtered. The net effect is an elimination of the harmonics and clean sine-wave as seen by the feeding transformer.

The flexibility and accuracy of the PQFA is due to a closed loop control system incorporating microprocessor capability in addition to the main DSP. The overall performance and power of the concept relies on optimally designed IGBT power modules used to the particular needs of an active filter application.

The PQFA is connected directly to the LV network. Solutions for higher voltages based on the PQFA are also available.

Advantages of the PQFA

- Filters several harmonics simultaneously
- Filters up to the 41st harmonic on a 60 Hz system
- Cannot be overloaded
- Programmable filtering strategy enables user to select which harmonics are filtered
- May filter without generation of reactive power
- May generate and control power factor
- Has programmable task priorities
- Does not require detailed network analysis
- Does not require special CTs
- Is easy to expand on site
- Comes factory tested with incoming circuit breaker

Description of the PQFA

The PQFA consists of one controller and up to eight power modules mounted in cubicles together with auxiliary apparatus and wiring to form a factory assembled and tested system.

The complete PQFA system consists of cubicle sections of standard dimensions 800 x 2150 x 600 mm (W x H x D). Large systems are usually mounted on a base for a total height of 2350 mm.

Each section may contain:

- A – One controller and one power module (master)
- B – One controller and two power modules (master)
- C – One power module (slave)
- D – Two power modules (slave)

Each system consists of one master and up to three slave sections.

