

# Type PQFA Power quality filter



**Power Quality Filter**  
PQFA



### **Typical application**

Power distribution systems which require multiple harmonic elimination or power factor correction.

### **Product description**

The power quality filters developed by ABB are active filters offering unprecedented ability to eliminate harmonics from the network. 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 a clean sine-wave as seen by the feeding transformer.

### **PQFA sizing information**

Consult your local ABB representative or the factory for assistance in sizing your PQFA filter.

## 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

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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

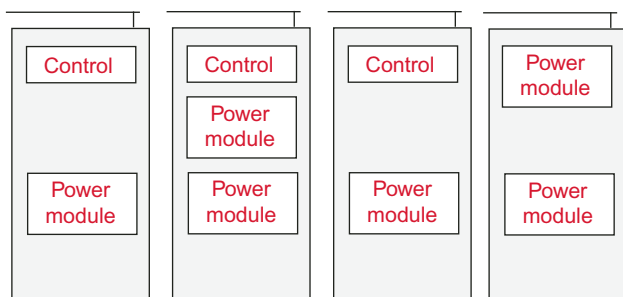
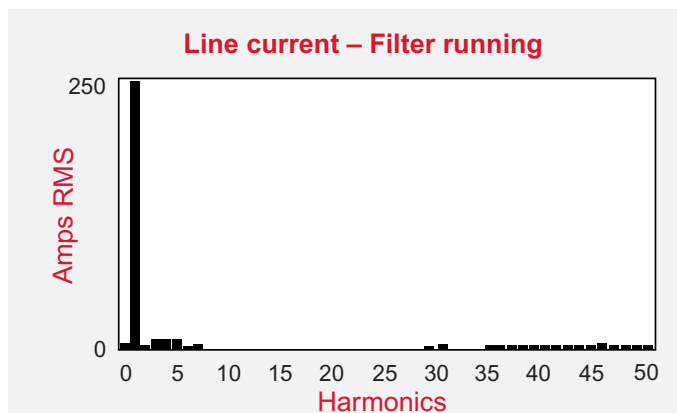
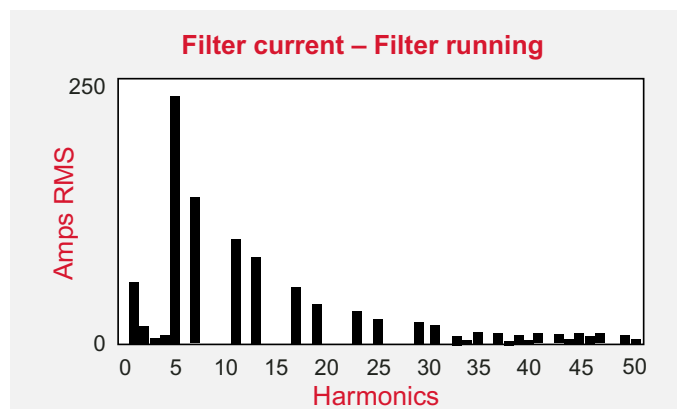
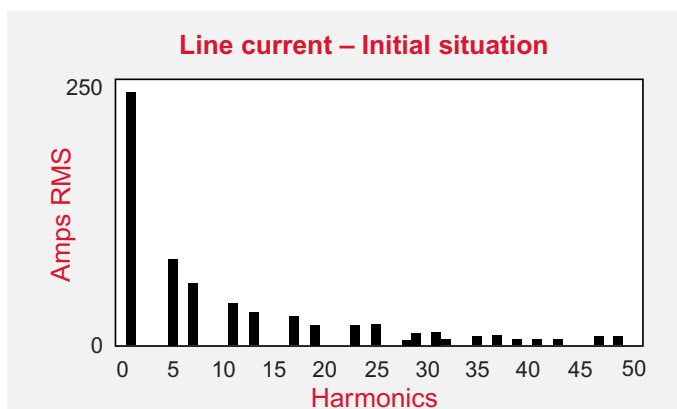
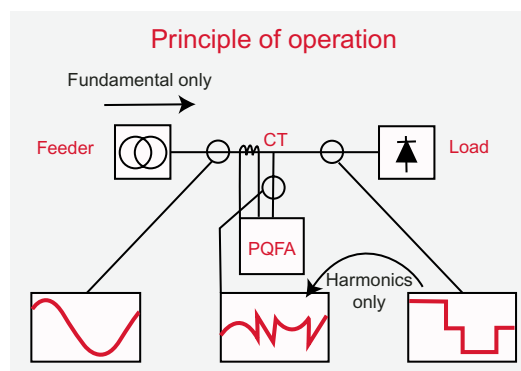
The PQFA consists of one controller and up to eight power modules mounted in cubicles together with auxiliary apparatus and wiring to form a factory assembled and tested system.

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:

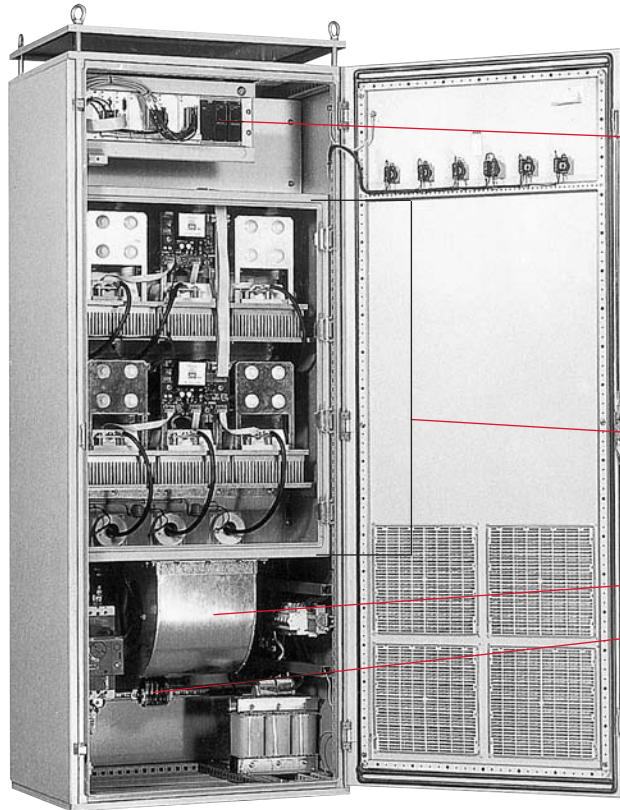
- A – One controller and one power module (master)
- B – One controller and two power modules (master)
- C – One power module (slave)
- D – Two power modules (slave)

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



## General information

### Power quality filter



#### Digital control (DSP)

- Programmable filtering characteristics
- Perfect multi-tuning to selected harmonics
- No overload
- Programmable power factor correction
- Zero-Q filtering capacity
- Programmable task priorities
- Insensitivity to network modifications

#### Power modules

- PWM converter
- IGBT technology

#### Forced air cooling

#### Breakers & auxiliaries

#### PQFA ratings and capabilities

Power modules for the PQFA are available with voltage ratings up to 600V for 50 or 60 Hz. The maximum thermal rating of the power modules is 225 A rms. Absolute harmonic filtering capability also depends on the content of higher harmonics with the filtering capability following common load spectra. The reactive power compensation capacity per module is given by the thermal rating.

On site extensions are easily made by adding cubicle sections to a maximum of four cubicles. Several PQFA may operate together on the same network.

Systems for 50 Hz and 60 Hz applications can filter 15 different harmonics from the 2nd to the 50th harmonic.

Selected harmonics can be filtered completely, or to a prescribed level defined in absolute or relative terms.

Reactive power compensation may be chosen and controlled to a desired power factor.

The programming is made through an RS232 port using standard PC equipment and software supplied with the PQFA. As an alternative, the programming may be performed with the optional graphic user interface.

#### Optional graphic user interface

As an option, the PQFA may be equipped with a menu-driven graphic user interface offering direct programming adaptability without using a PC. The device also provides for run-time measurement and control data presented on a backlit 160 x 80 pixel LCD.



## Technical data

### Power quality filter

Active filter for connection between the three phases of a three-phase network with or without neutral for filtering of non-zero-sequence harmonics and optional reactive power compensation.

<b>Main ratings</b>	400V (415V)/50 Hz; 525V/50Hz; 480V/60Hz; 600V/60Hz
<b>RMS current per module</b>	225A; 170A; 155A; 110A <i>Other voltages and ratings on request</i>
<b>Voltage tolerance</b>	+/- 10%
<b>Frequency</b>	50/60 Hz programmable
<b>Harmonics to filter</b>	50 Hz: Up to 15, programmable up to the 50th harmonic 60 Hz: Up to 12, programmable up to the 41st harmonic
<b>Degree of filtering</b>	Individual harmonics are independently controlled in relative or absolute terms
<b>Typical filtering efficiency</b>	Better than 97%
<b>Reactive power</b>	Power factor programmable between 0.7 inductive to 0.7 capacitive
<b>Communication</b>	RS232 port
<b>Programming</b>	Alt 1) Using PC (not provided) and software provided with the delivery Alt 2) Using optional user interface
<b>Response time</b>	40 ms
<b>Active power</b>	Less than 7 kW per module at full load
<b>Dimensions per cubicle</b>	800 x 2150 x 600 mm (W x H x D)
<b>Weight per cubicle</b>	Appr. 700 kg (with two power modules)
<b>Installation</b>	Floor fixation. Lifting lugs provided.
<b>Environment</b>	Indoor installation in clean environment up to 1000m altitude
<b>Ambient temperature</b>	-10°C/+40°C
<b>Humidity</b>	Maximum 95% RH: non-condensing
<b>Options</b>	Current transformers (ratings and dimension to specify) Loss of voltage alarm contact Graphic user interface

### Connection diagram

M1 – M8  
Q  
Q'  
P1  
T1  
CT

power modules  
section circuit breakers  
control breakers  
control  
power transformer  
current transformer

