

APPLICATIONS

AFQ solves thousands of problems in countless types of installations, in particular the following:

- *Data processing centres (DPC)*
- *Airports*
- *Banking institutions*
- *Telecommunications centers*
- *Presses facilities*
- *Office buildings*
- *Audiovisual centres*
- *Universities*
- *Welding systems*
- *Fuel and gas plants*
- *Water treatment plants*
- *Automotive plants*
- *Cement plants*
- *Paper plants*
- *Hotels*
- *Shopping centres*
- *etc.*

In short, any installation where wave shape quality and continuity of electric service are of utmost importance.



AFQ

Active Multi-Function Filter

+ information: reactiva@circutor.es

www.circutor.com



CIRCUTOR, SA - Vial Sant Jordi, s/n
08232 Viladecavalls (Barcelona) Spain
Tel. (+34) 93 745 29 00 - Fax: (+34) 93 745 29 14
central@circutor.es

Legal deposit: B-22600/2011

Code: C2R713



CIRCUTOR, SA reserves the right to change any information contained in this catalogue.

AFQ

Active Multi-Function Filter



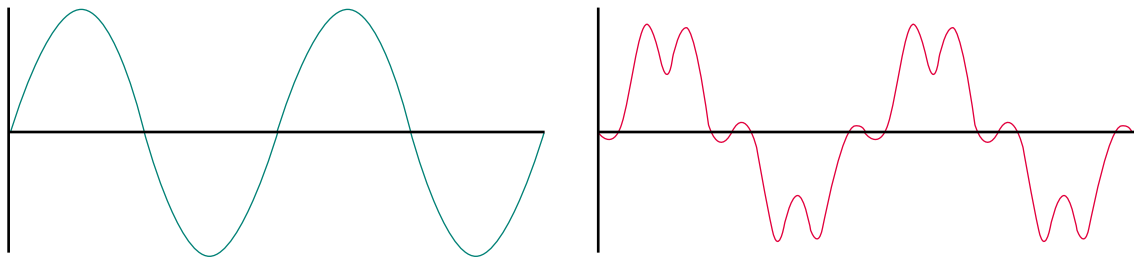
THE PROBLEM

The present substantial growth in electronic devices aimed at equipping our installations has given rise to a significant change in the last few years on the type of loads connected to the electrical distribution system.

These devices, at present, are equipped electronics which in some way or another provide increased performance in the tasks and productive processes we carry out. Everyone uses computers for their personal use, or for the process or control of any production

system with variable speed drives, air conditioning units, lifts which adjust slowly on approaching the destination floor, etc. These devices are equipped with rectifiers, modulators, etc. and distort the current waveform for them to work properly.

In short, we can affirm that while all this equipment has improved **our quality of life**, but, on the other hand it has brought about **greater contamination of our electrical system**.



Ideal wave shape and distorted wave shape

How are harmonics generated?

Harmonics are produced by non-linear loads that absorb non-sinusoidal current. The most common loads, in both industrial and domestic environments, are the following:

- Speed / frequency drives
- Discharge lamps (mercury vapour, sodium, energy-saving, fluorescent, etc.)
- Rectifiers
- AC/DC transducers
- Arc welding
- Induction furnaces
- UPSs
- Computers
- etc.

What anomalies generates?

- Problems with electronic equipment
- Heating of conductors
- Neutral Conductor Overload
- Trip of circuit breakers
- Overloading of capacitors
- Vibrations of the transformer
- Heating of Transformers
- Warming of Motors



THE SOLUTION

AFQ Active Multi-functions Filters are the most complete solution to solve those quality problems caused, in either industrial or commercial facilities, not only by harmonics but also for current unbalance, and, even, reactive power consumption (mostly leading PF).

AFQ filters are equipped with a friendly-use touch display, which allows carrying all the required programming actions out. Display of the source and load sides at the filter coupling point to the mains, for comparison and effectiveness evaluation purposes.

In case of higher filtering requirements, up to a maximum of 8 filters may be connected in parallel (all units must be of same rating).

The operating principle of active filters for harmonic reduction is based on monitoring the existing harmonic current generated by the loads, and injecting then an opposite compensation current in order to cancel each harmonic frequency.

AFQ 3-in-1 filtering vanguard function is available in all **AFQ** models, and it can be customized according to the priorities of the system as follow:

1. Harmonics cancellation

Harmonics currents reduction up to the 50th order (2500 Hz). Selectable harmonics frequency for optimizing filtering spectrum efficiency.

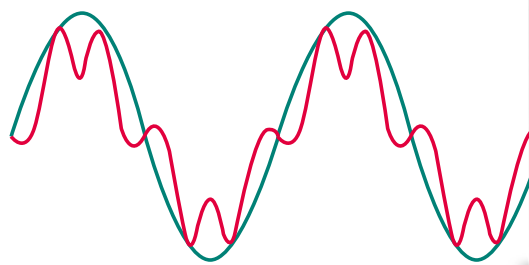
2. Phase unbalance correction

Phase current correction for optimizing unbalance phenomenon in the electric power system.

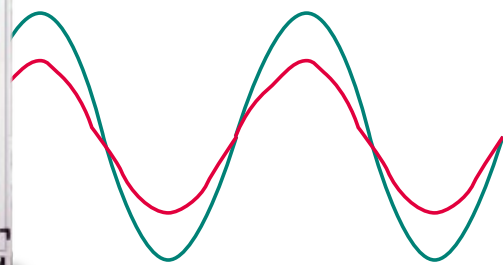
3. Power Factor correction

Power Factor correction for lagging current systems (inductive) or leading currents (capacitive).

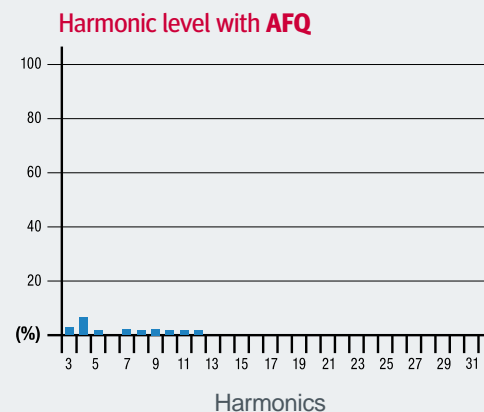
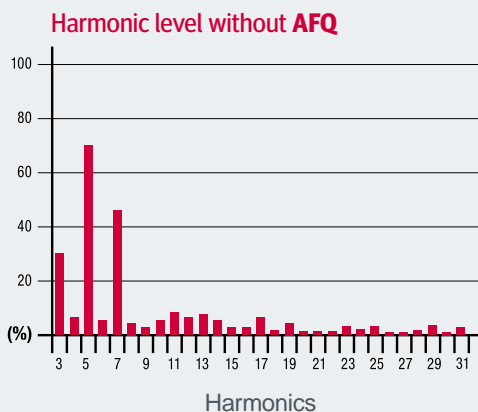
Without AFQ



With AFQ



What do we get?



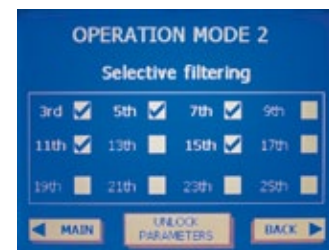
Technical features

Electrical characteristics	
Rated operating voltage	400 V _{a.c.} ± 15%
Frequency	50 Hz / 60 Hz ± 10%
Connection system	3 phase + neutral (4 wire)
Filter specifications	
Current harmonics range	2nd to 50th harmonic
Specified harmonic selection	2nd to 25th harmonic
Current balancing function	Available
Reactive compensation function	Available
Controller technology	DSP (digital signal processor)
Transient response time	< 1ms
Current limitation	Protection against over current by limitation to the filter rating value
Graphic display	LCD touch screen
Display functions	
Control capabilities	Filter On/Off, reset of alarms, and filter status description.
Setup functions	Selection of individual harmonics to filter, current balancing option, reactive compensation function, current transformer ratio, minimum running current, control algorithm, and number of AFQ units in parallel.
Electrical parameters monitoring	Voltages and currents measurements. Active, reactive and apparent power, and power factor measurements. Current harmonics and harmonic spectrum graph.
Standards	
Reference Harmonic Standard	IEC 61000-3-4, IEEE 519-1992
Reference Design Standard	IEC 60146
Safety Standard	EN 50178
Electromagnetic Compatibility	EN 55011, IEC EN 50081-2, IEC 61000-4-2, IEC 61000-4-3, IEC 61000-4-4, IEC 61000-4-5, IEC 61000-4-6, IEC 61000-6-2
Environmental conditions	
Operating temperature	0 °C ... + 50 °C
Humidity	0 ... 90 % (without condensation)
Maximum altitude	2000 m
Enclosure characteristics	
Mounting	Self-standing cubicle
External color	Light grey RAL 7035
Protection degree	IP 21
Installation	Indoor use
Cable entry	Bottom

INTUITIVE TOUCH SCREEN



Harmonics graph



Harmonics selection

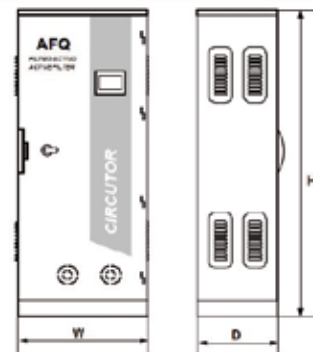
THD TOTAL

	LOAD	MAINS
L1	34 %	9 %
L2	34 %	8 %
L3	36 %	5 %

Before & After total THD

Before & After total THD

Dimensions



Models

Model	Harmonic phase current	Harmonic neutral currents	Harmonic peak current	Dimensions (W x H x D)	Weight	Code
AFQ-4W5-25A-400	25 A	75 A	50 A	655 x 800 x 450	135	R7H602
AFQ-4W5-50A-400	50 A	150 A	100 A	655 x 1350 x 450	212	R7H604
AFQ-4W5-100A-400	100 A	300 A	200 A	665 x 1470 x 450	272	R7H605
AFQ-4W5-150A-400	150 A	450 A	300 A	1200 x 1900 x 750	480	R7H606
AFQ-4W5-200A-400	200 A	600 A	400 A	1200 x 1900 x 750	490	R7H607