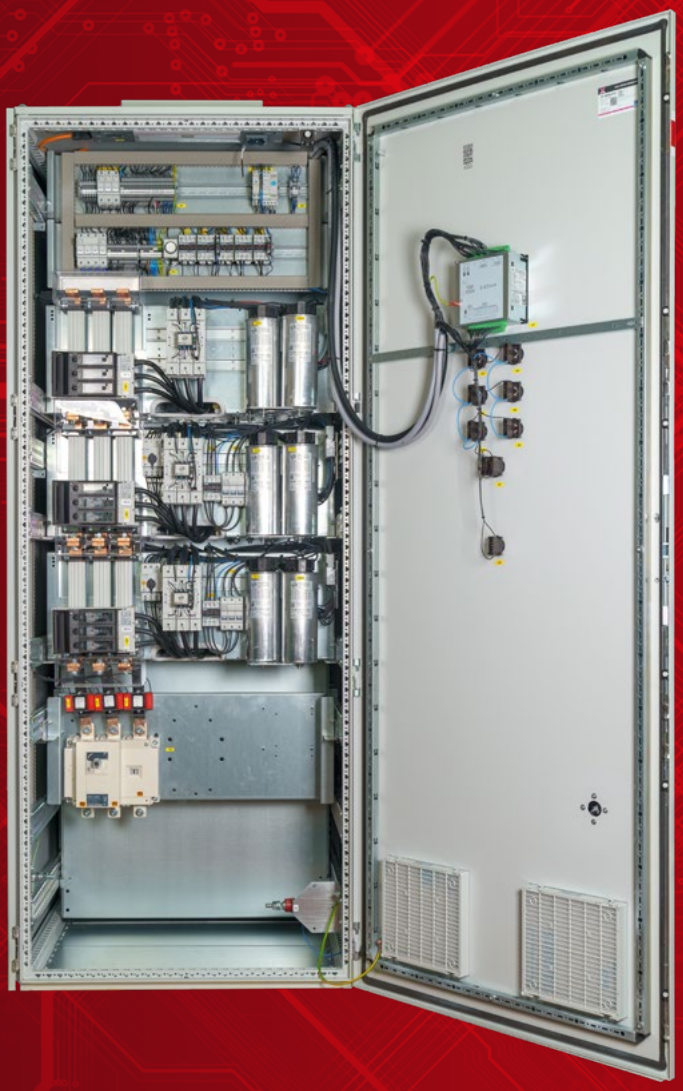
FRAKO

SAFETY AND RELIABILITY FOR YOUR INSTALLATION



Passive Harmonic Filters from FRAKO

SOLUTIONS ANALYSIS POWER QUALITY

MITIGATE HARMONICS EFFECTIVELY

Overloaded equipment, noncompliance with standards, voltage distortion (THDv), counter-torque in electric motors, resonance and distortion reactive power: these power quality headaches are predominantly due to the harmonics generated by modern power converters resulting in voltage distortion. As all the loads in the supply network are interconnected, this can lead to serious malfunctioning or unscheduled shutdowns.

Harmonics of this type can be mitigated by passive harmonic filters. These modular systems housed in steel enclosures are a reliable means of reducing the current harmonics – and hence the voltage harmonics – in low voltage installations. The filter stages are automatically switched in and out to attenuate the harmonics in response to their intensity and/or various other electrical parameters. Especially in cases with high harmonic levels but low reactive power demand, these individually tuned filter circuits with an intelligent control system offer an optimum solution.

PQA^{C}: the heart of the control system

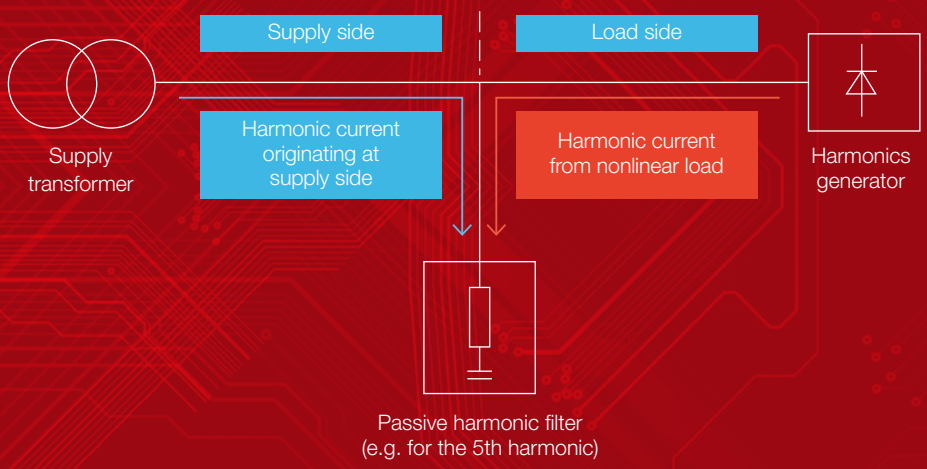
The PQA^{C} is a highly suitable instrument for controlling passive filter systems. It measures all relevant electrical variables in the installation and switches the stages in or out accordingly. In addition, the PQA^{C} monitors all critical parameters in order to ensure safe and problem-free operation in your plant.

All data measured in the installation can be displayed on the PQA^{C} screen, and all parameters can be configured directly in a user-friendly dialogue. The web browser is also a convenient option for making settings and putting the instrument into operation.

PASSIVE HARMONIC FILTERS FROM FRAKO

Mitigation of harmonics with passive harmonic filters

A passive filter system is designed for a specific harmonic frequency. At this frequency, it has a low impedance.Whenever this frequency, in the form of a harmonic voltage, occurs in the installation to which the passive filter is connected, the associated harmonic current is absorbed. The harmonic current ‘flows’ into the filter, where its energy is dissipated as heat. This means that other loads in the installation are not affected by that harmonic.

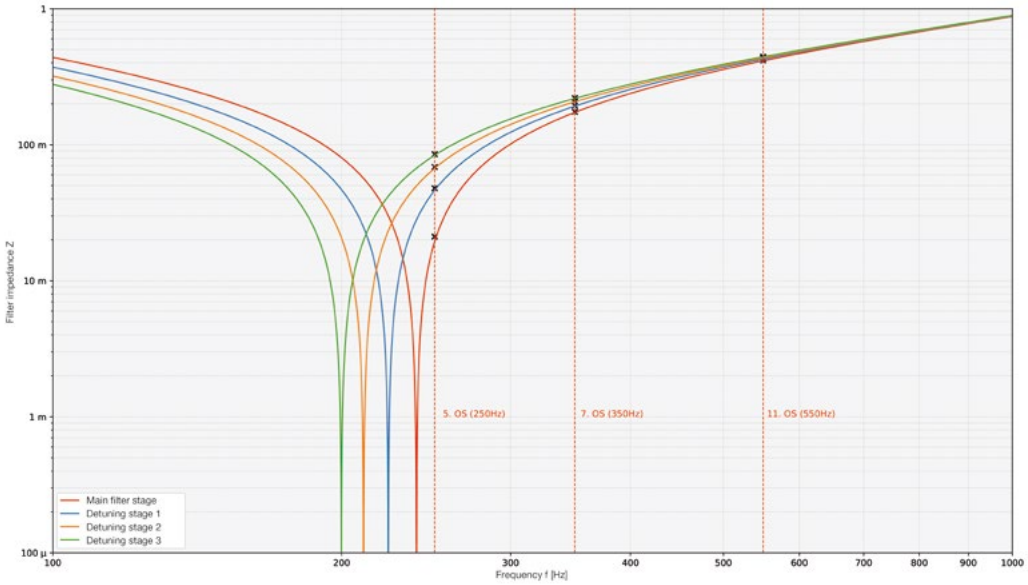


Advantages of passive harmonic filters

- Modular, easily extendable construction
- Intelligent readjustment of the filter action by automatic impedance control
- No current transformers necessary
- Voltage-driven control
- Easy start-up
- Individually configurable
- All components temperature-monitored
- Built-in protection against overloading
- Suitable for hybrid systems
- User friendly, simple and effective
- Long service life
- Low life cycle costs

Automatic impedance control

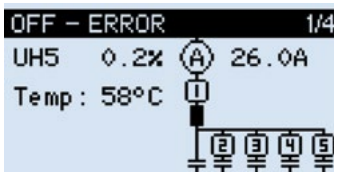
Impedance curves (attenuation characteristics) of a passive filter for the 5th harmonic



Each passive harmonic filter is monitored and controlled by a PQA^C instrument

Automatic quadruple detuning: In response to the level of harmonics and the set parameters, the required tuning frequency of the filter stages is automatically adjusted to suit the momentary state of the installation. This intelligent control function produces the best possible filtering effect in every situation while at the same time preventing the filter from being overloaded and having to be disconnected.

Fault management and protective functions



- Current → continuous measurement, signal to PQA^C
- Voltage → continuous measurement, signal to PQA^C
- THDv and THDi → continuous measurement, signal to PQA^C
- Inductor temperature trip → bimetallic switch, signal to PQA^C
- Enclosure internal temperature measurement → alarm contact, signal to PQA^C
- Capacitor defective → alarm contact (capacitors with equalizing connections), signal to PQA^C
- Loss of capacitance → alarm contact (capacitors with equalizing connections), signal to PQA^C

All events are displayed in plain language on the screen, so the status of the passive harmonic filter can be seen at a glance.

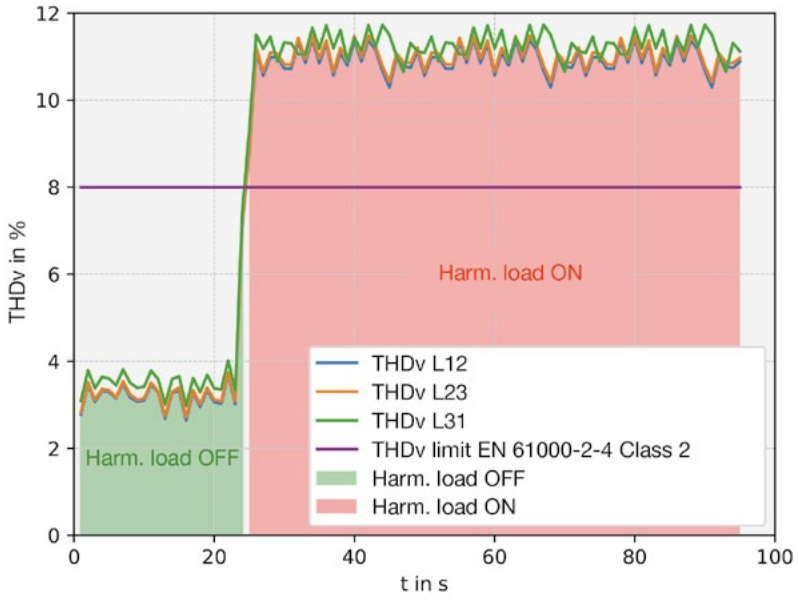
Monitoring of capacitor service life – equalizing connections

3-phase equalization circuits with overcurrent protection monitor the individual filter stages (modules) of the same tuning frequency.

Switchable 3-phase equalizing connections with overcurrent protection mean that individual stages of the same tuning frequency can be disconnected selectively, for example if the current measured in the circuit is excessive. This enables each individual module or capacitor to be monitored. Any fault that occurs is signalled to the PQA^C, which then initiates the appropriate disconnection. The display indicates in plain language which protective device has been triggered.

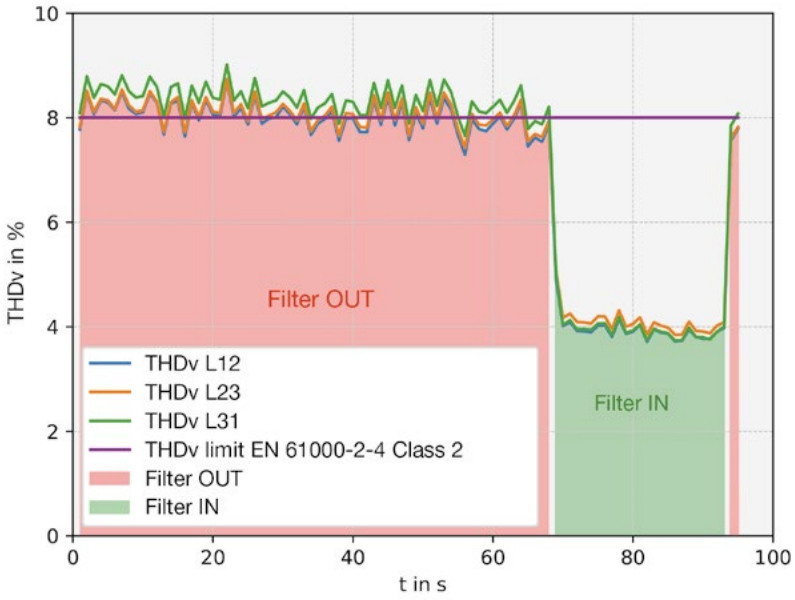
Passive filter systems in practical application

Chart of the THDv when a harmonics-generating load is switched on



If the set limit for THDv (sum of the harmonics in the system voltage) is exceeded (crossing a red line and failing to comply with EN 50160), a harmonic filter must be installed in the section of the installation concerned, in order to restore the distortion (harmonics) to a lower compatibility level.

Chart of the THDv when a passive harmonic filter is switched in



When the passive harmonic filter is switched in (green area), the THDv levels of the individual phases are reduced to a lower compatibility level.

Please contact us if you have any questions or
would like to know more about the benefits offered
by FRAKO passive harmonic filters

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