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Active Harmonic Filter Catalogue

AHF

Active Harmonic Filter

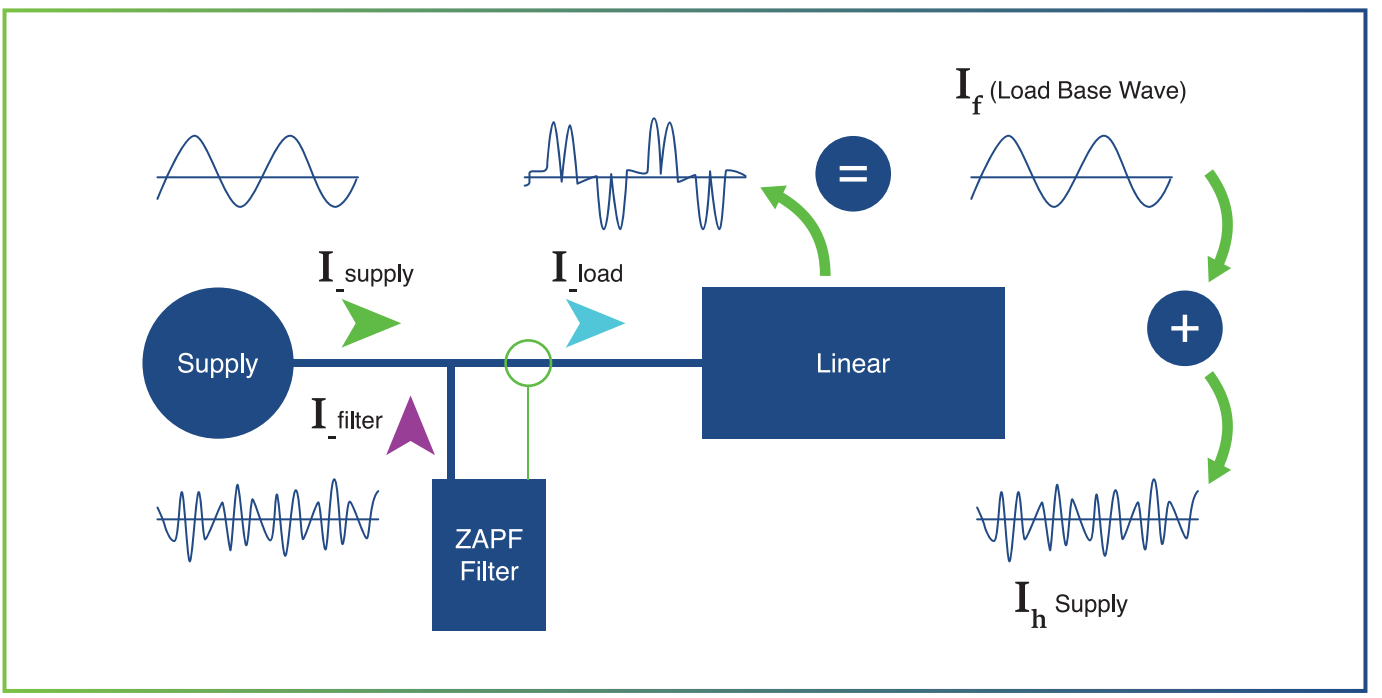
- Does the fuse or switch blow frequently?
- Does the equipment switch itself off for no apparent reason?
- Does the transformer overheat?
- Does the electronic control malfunction?
- Does productivity decrease due to power failure?
- Are power cables and busbars does it get hot?
- Are the compensation capacitors and reactor frequently damaged?
- Abnormal noise of the equipment is it happening?

Active Harmonic Filter,
Managed by DSP-based Texas instrument chips, 3-phase or 3-phase one neutral, EU vertical type Metal painted, active harmonic filtering up to 2-51st level and reactive power compensation at the same time.

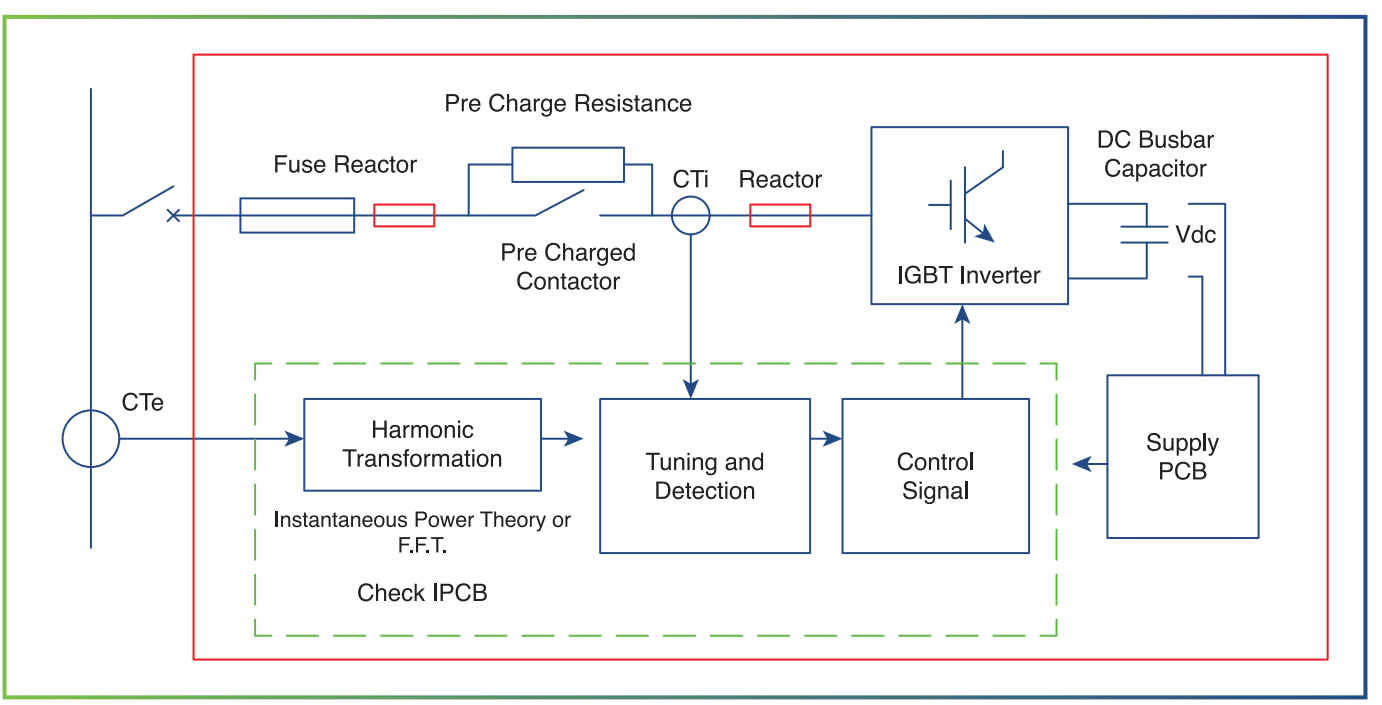
1. Operating Principles

1.1 Mathematical Model

$$i1=(i1+\Sigma ih)+(-\Sigma ih)$$

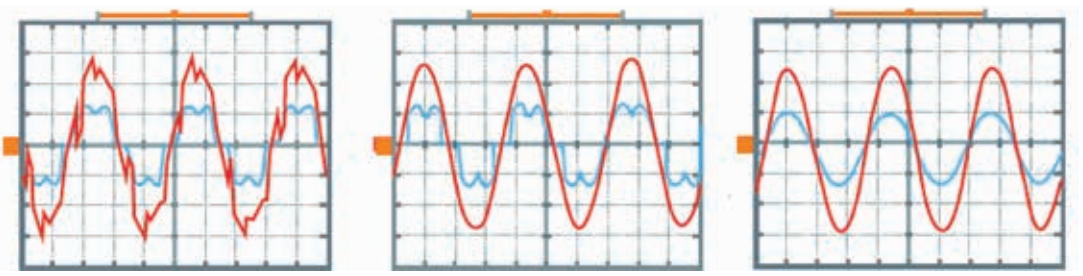


1.2 Flow Diagram



2. Performance Feature

- F.T.T. management and instantaneous power theory
- Combination of power factor correction function (both inductive and capacitive power)
- Wide harmonic filtering range: 2.~50th harmonic filterable
- High harmonic filtering rate: more than 98.04
- Fast response: Fast dynamic response speed. Response time is 100 us
- Unbalance correction is available: Single-phase dynamic current injection to correct imbalance in the supply system
- Resonance-free due to automatic resonance elimination
- Free from overload thanks to automatic current limiting output
- Simultaneous Var compensation: Filtering and Var compensation are optional
- There is an interface that can display voltage, current and harmonics live via HMI. Log record can be taken via USB
- Full protection includes over-voltage, under-voltage, over-current, overheating, under-voltage of control source, etc.
- Parallel connection available: 10 sets can be connected in parallel, up to n... modules can be controlled with the EMS option
- Directly applicable to systems below 430 V, applicable to systems with a voltage above 400 V when a transformer is added
- Plug-and-play design and easy scheme selection, no need for detailed analysis of the supply network



3. Accepted Standard

Safety Standards *Low Voltage, Safety Torque Off* *Machine Directive*	EN IEC 61000-6-2:2019, EN IEC 61000-6-4:2019, EN 61000-4-2:2019
EMC Standards	Low Voltage Directive (LVD) 2014/35/EU Electromagnetic Compatibility (2014/30/EU)
Test Report Approval Basis	240524-01, TRM-24-255/01
Technical Report	EN 50178:1997, TRM-24-2557-01
Quality and Environmental Standards	ISO-45001:2018, ISO-14001:2015, ISO-9001:2015
Efficiency Standards	European Eco Design Standard, %98 efficiency EN50598-2
Safety Standards (for Fans)	UL 507, EN 60950-JIS, IEC, DIN, UL, CSA, PSE

4. Work Environment

Input Voltage
380 VAC – 415 VAC
3 phases -%15 / +%10

Operating Voltage Range
200 VAC ~ 480 VAC

Input Frequency Range
50 Hz ~ 60 Hz

Output Voltage Range
0 - Un, 3 phases 4 wires

Trigger Frequency
20 kHz

Current Capacity
50-100-150 Amperes
Parallelisable

Relative Humidity
Maximum %95
Non-condensing

Ambient Temperature
-10°C ~ 50°C

Storage Temperature
-20°C ~ 65°C

Response Time
> 10 µs

Altitude
1000 metres

Protections
Over Voltage, Over Current
Extreme Temperature

5. Functional and Technical Specifications

- The active harmonic filter has the function of automatically adjusting the ramp time in real time without exceeding the instantly set current value according to the needs of the application.
- The active harmonic filter has an automatic start function in case of power failure when power is restored. It can be controlled remotely when desired.
- Fans and capacitors used in the active harmonic filter have non-flammable certificate.
- Active harmonic filter, each equipment inside has 2 years unconditional warranty. Control card and fan feeds are used externally, in case of failure in any supply power, it can be easily supplied from the domestic market.
- Active harmonic filter fans can be easily replaced.
- Active harmonic filter DC bus capacitors consist of metal film capacitors with 15 years life expectancy.
- The active harmonic filter can be firmware updated to operate at another voltage level by contacting the manufacturer.
- Active harmonic filter can make reactive power compensation by taking reference from medium voltage level. It can select the phase shift caused by the transformer primary-secondary difference.
- Active harmonic filter, user setting parts are customisable and encrypted.

3 Phases 3 Wires AHF Module 380V/415V Series

Product Model	AHA H7-50	AHA H7-100A	AHA H7-150A
Nominal Compensation Current (A)	50	100	150
Dimensions (mm, H x W x D)	340 x 600 x 250	540 x 920 x 250	540 x 920 x 250
Weight (kg)	28	60	64
Nominal Voltage (V)	380 / 415		
Nominal Frequency (Hz)	50 / 60		
Assembly	Floor / Wall / Modular		
Protection Level	IP20 (customisable)		
BT Rate	50:5 ~ 100000:5		
Contact	RS-485 (optional ethernet)		

3 Phases 4 Wires AHF Module 480V/60Hz Series

Product Model	AHA H60-100A
Nominal Compensation Current (A)	100
Dimensions (mm, H x W x D)	540 x 920 x 250
Weight (kg)	60
Nominal Voltage (V)	420 - 510
Nominal Frequency (Hz)	60
Assembly	Floor / Wall / Modular
Protection Level	IP20 (customisable)
BT Rate	50:5 ~ 100000:5
Contact	RS-485 (optional ethernet)

3 Phases 3 Wires AHF Module 600V/690V Series

Product Model	AHA H7-50A	AHA H7-100A
Nominal Compensation Current (A)	50	100
Dimensions (mm, H x W x D)	340 x 600 x 250	540 x 920 x 250
Weight (kg)	28	60
Nominal Voltage (V)	600	
Proportional Frequency (Hz)	50 / 60	
Assembly	Floor / Wall / Shelf	
Protection Level	IP20 (customisable)	
CT Rate	50:5 ~ 100000:5	
Contact	RS-485 (optional ethernet)	

6. Applicable Industries

- Oil, gas and petrochemicals
- Textile industries
- Automotive
- Pharmaceutical industry
- Cement
- Paper mills
- Water and water treatment industry
- Steel rolling mills
- Plastic extrusion
- BT/ITEs
- Shopping centres
- Banks and data centres
- Hospitals
- Hotels
- Food sector

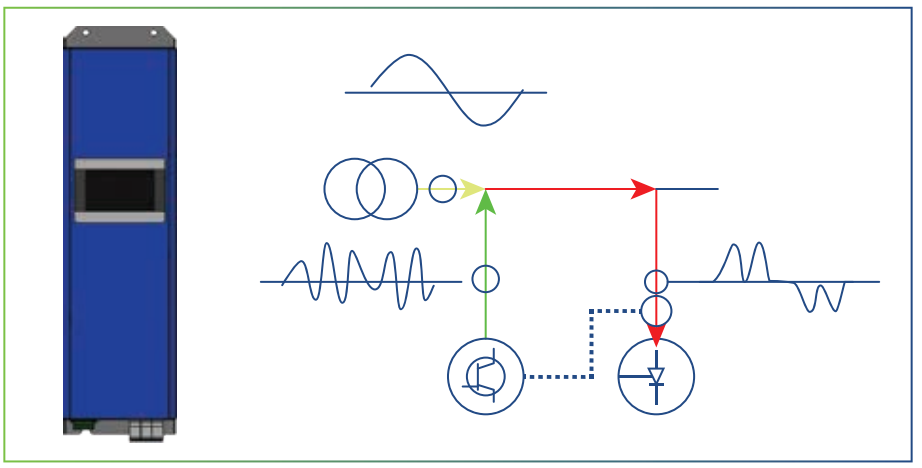
7. Technical Specifications

Nominal Current Capacity	50 A	100 A	150 A
Electricity Ratings			
Nominal Voltage	3W: 200VAC-480 VAC (+%100), 4W: 200-440 VAC (+%10) higher voltages with suitable step-up transformer		
Nominal Frequency	50 / 60 Hz		
Maximum Neutral Current	50 A	100 A	100 A
Cabling Method	3W / 4W		

System Specifications			
Response Time	Reaction time < 50 µs / Response time < 100 µs		
Switching Frequency	20 kHz		
Controller	Real-time digital control with Texas instrument DSP control		
Independence	Each module has an independent controller. If one module fails, the others continue to operate		
Load Balancing Capacity	Programmable 0...100 % Module Input		
Operation Mode	Harmonics suppression		
Protections	Over current, over voltage, under voltage, over temperature and surge circuit		
Parallel Module	Unlimited scalability. Load links share equally between parallel modules		
Connections			
CT Location	Mains / Load side		
CT Numbers	3 pcs 6 pcs		
HMI	HMI with touch screen Turkish and English (other languages available on request)		
Mechanical Properties			
Enclosure Material	Painted metal plate		
Cooling Method	Temperature control by fans (Air)		
Losses	< 2%		
Noise Type at Full Load	74 dB No audible switching frequency noise		
Dimensions (mm, H x W x D)	600 x 255 x 335	920 x 535 x 255	920 x 535 x 255
Weight (kg)	28	60	64
Installation and Operation			
Air Required for a Harmonicmatic Module	450 m^3/h	1200 m^3/h	1300 m^3/h
Air Temperature	Maximum ambient temperature 50°C		
Altitude	< 1000 m		
Humidity	Maximum 85% RH (operation), Maximum 95% RH (storage)		
Ventilation Requirements	300 mm minimum free space above and below the module required for ventilation		
External Fuses (recommendation)	NH 00 gL/gG 100A	alan NH 01 gL/gG 150A	alan NH 01 gL/gG 200A
Main Cable Entry	Bottom		

8. Technical Information

- Real-time harmonic filtering: Eliminates the harmonic current generated by the linear non-consuming load to reduce the system voltage distortion rate.
- Consumption reduction and energy saving: Reduces the loss of lines and transformers, reduces the heating of equipment, improves the power factor, extends the service life of equipment.
- Improves the operational stability and reliability of the system to which it is connected.



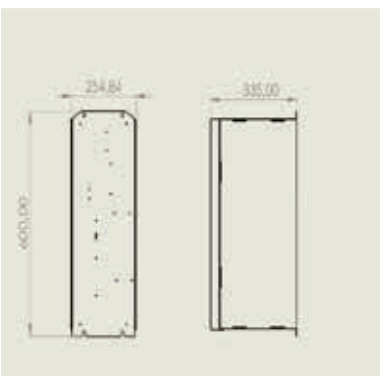
9. Advantages of Harmonikmatik System

State-of-the-art controller with modern touch screen user interface. The display and the modular technical design are combined into a fast, reliable and compact device that is both easy to use and compatible with standard communication protocols.

The construction principle consists of modules. For this reason, more than one Harmonikmatik module can be connected in parallel to increase the total installed capacity of the system.

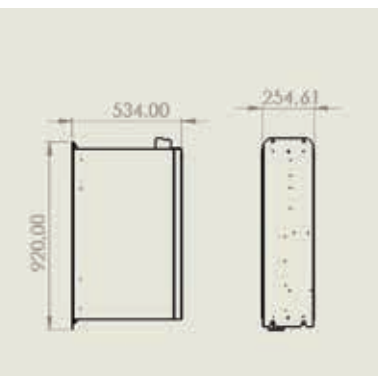
10. Dimensions

Harmonikmatik 50-A dimensions of the module is as follows.



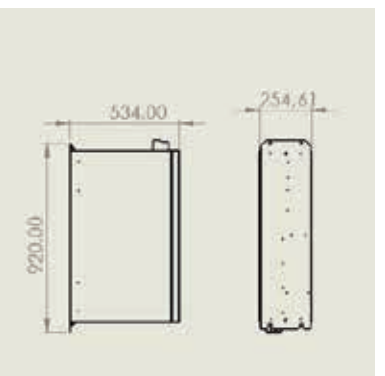
Weight of Harmonikmatik AHF Module is 28 kg

Harmonikmatik 100-A dimensions of the module is as follows.



Weight of Harmonikmatik AHF Module is 60 kg

Harmonikmatik 150-A dimensions of the module is as follows.



Weight of Harmonikmatik AHF Module is 64 kg

11. Screen

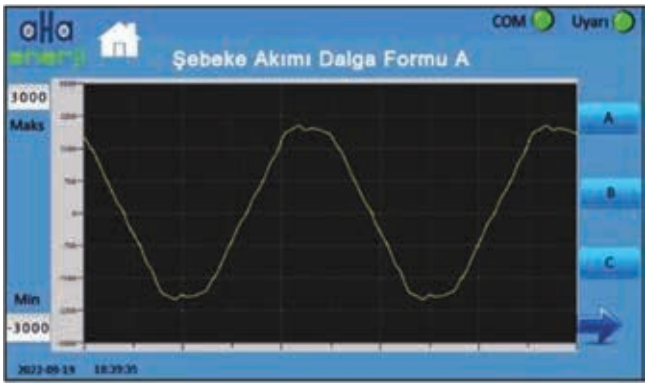
The Harmonikmatik AHF is equipped with a modern Machine Interface [Display]. The display panel allows the user to programme various modes, parameters and monitor both the mains and load side of the waveforms shown in the figure below, displaying their active values.

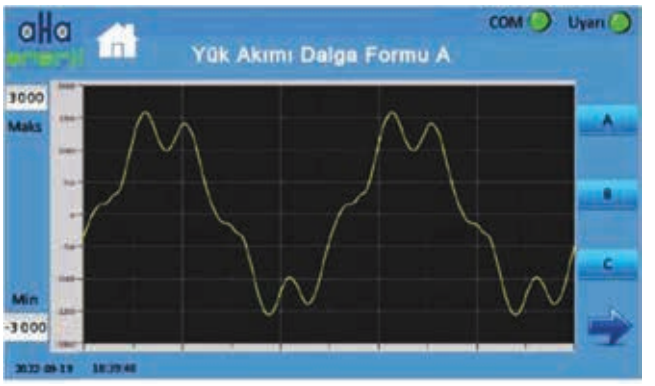
12. Benefits

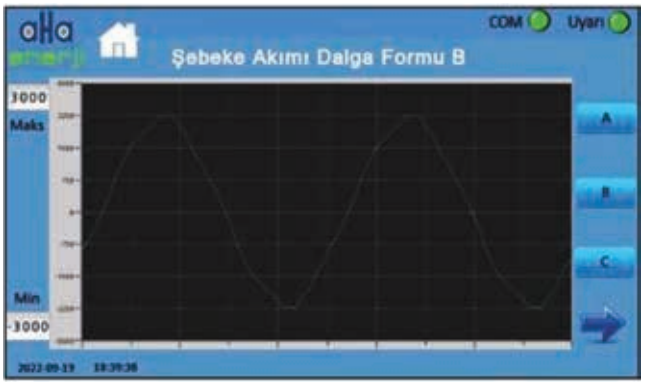
The Harmonikmatik module works as a controlled current source that provides any current waveform in real time. The harmonics module is equipped with an energy storage element and a system that allows it to inject the desired current into the grid. The harmonicmatic module, which is connected parallel to the nonlinear load, compensates the harmonic currents caused by the nonlinear load. Therefore, only active current is drawn from the grid.

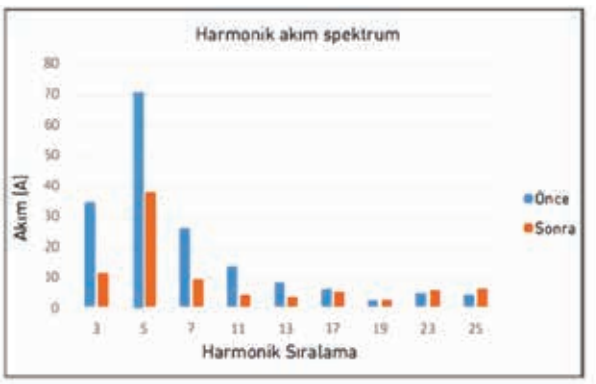
13. Experiment Results

Four AHF modules of 600A were installed in a textile factory. The grid current in each phase was about 1030A and the THD was over 68% before the installation of the harmonicmatic AHF system. After installing the AHF system, the THD was reduced to around 2%.









14. Solution

It is observed that the total harmonic distortion of the grid current THD is significantly reduced by the use of harmonicmatic AHF.

15. Applications

300 Amps

750 Amps

300 Amps

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