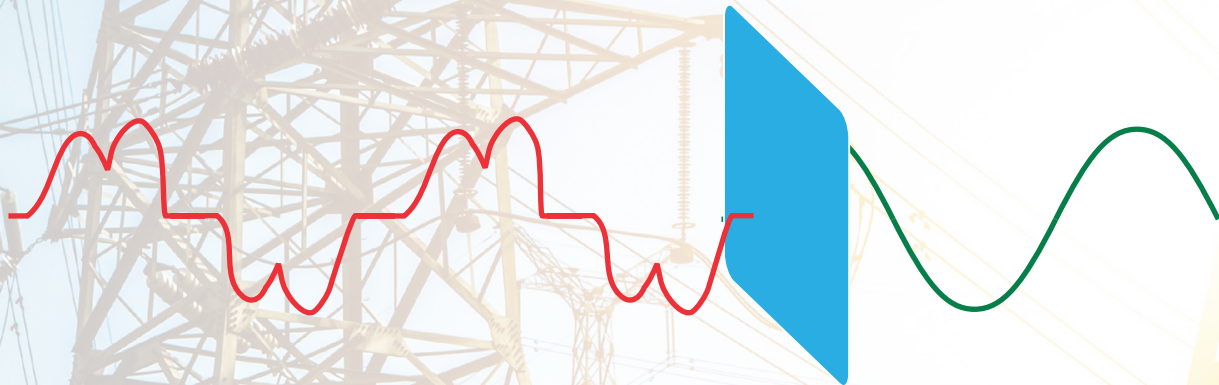


IORA

Active Harmonic Filter
60 A - 800 A

Re-shaping the power curves



with State of the art
Active Harmonic Filter - **IORA 3000**

Active Harmonic Filter

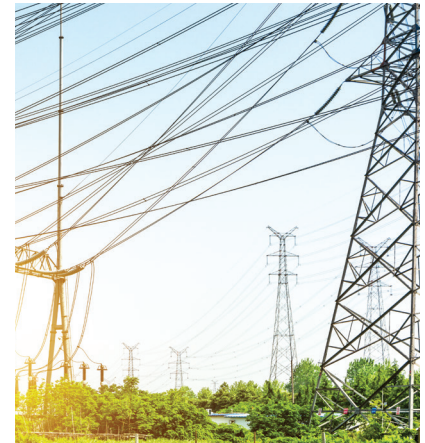
IORA 3000

60 A - 800 A



About Power Quality

Our increased demand for quality and comfort of life have lead us to use more and more industrial automation, centralized and larger IT applications, hi-tech offices and commercial buildings, malls, speciality hospitals and domestic usage of PCs, CFL, ballast or inverter etc. Such loads are increasing in numbers and their power rating percentage in overall electrical consumption is growing steadily. This growth in recent past resulted in the introduction of potentially harmful current harmonics into the power system. Also termed as Power Pollution, these harmonics has increased power demand, and the supply authorities are getting stretched beyond their capacities, which have further deteriorated the quality of Power.

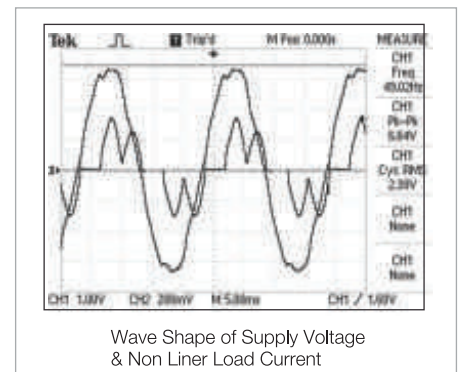


Harmonics

The main contributor to this is the nature of load current drawn by these equipments. These equipments, to remain more power efficient, uses regular power waveform in a “chopped” manner. In the process, they become “non-linear” type of load, a load is said to be non-linear when the current it draws does not have the same wave form as the supply voltage.

The examples of non linear loads are:

- In industrial environment welding machines, arc furnaces, Induction furnaces, rectifiers, chargers, VFD for motors.
- In office environment PCs, photocopier machines, UPSs etc.
- In residential area TVs, Microwave Ovens, Fluorescent Lights, CFL , Ballast or Inverters, Battery Chargers etc.

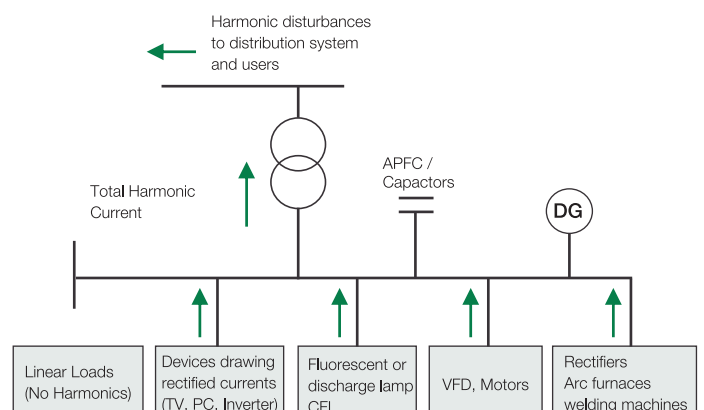


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Disturbances Caused by Harmonics

In a power distribution systems, the presence of harmonics reduces power quality and consequently causes a number of problems like:

- Overloading of distribution systems due to increased RMS current
- Overloading of neutral conductor due to the summing of third-order harmonics
- Overloading and ageing of PFC capacitors
- Overloading and premature ageing of DG sets, transformers, motors etc.
- Distortion of the supply voltage, which can disturb the operation of sensitive loads
- Noise problems over the communication networks and telephone lines



Effects of Harmonics

The harmonics have a detrimental effect on the power quality. They reduce efficiency of the overall electrical system. Presence of harmonics reduces power quality, which means reduced reliability and efficiency. These factors are assessed as important indicators of business operation, which are reliable operation of machines, manufacturing systems and office infrastructure.

Power quality problems in the internal power network also means:

- Distribution lines and networks cannot be fully utilized
- High percentage of energy losses in the power lines
- Increased wear and limited system availability
- Downtime for equipment and systems



Economic Impact

- Current harmonics creates nuisance by the tripping of breakers and shutdown of production line (increased OPEX).
- Life of equipment reduces, which means increase in replacement cost (increased CAPEX).
- During planning stage, oversizing of DG, UPS, transformers, capacitors, neutral conductors, which means more demand of power and more energy cost (increased OPEX).
- Increased losses in cable, transformers, capacitors, which means increase in the energy cost and possible penalties due to increased demand (increased OPEX).
- Disturbances to sensitive loads, regulating control and monitoring systems.
- Disturbances on computer and networking equipments
- Disturbances on telephone and data communication.



These extra costs, direct as well as indirect, in terms of equipment, energy and productivity will contribute to the reduction of competitiveness of companies.

Moreover electrical networks with poor power quality result in financial loss, environment impacts and/or safety concerns. These losses are cascaded back to the utility power plants and result in increased CO₂ emissions.

Latest study conducted shows that ONE unit of electricity saved is equivalent to three units generated.

Improvement Techniques

Power Quality Improvement

By reducing harmonics, one can improve the power quality, and increase the efficiency of electrical distribution system. The power savings of 10 to 30% is possible to achieve, depending on the applications.

Knowing the damaging effects of harmonic pollution on power utility sources, different distribution companies and SEBs are hard pressing to put power demand under strict control, by bringing restriction on the percentage harmonic distortion getting injected in supply lines.

FEI offers a complete solution to this problem. FEI’s active harmonic filter - IORA 3000 is state-of-the-art designed filter, which improves the overall power quality by limiting and eliminating the harmonic currents.



IORA 3000 - Active Harmonic Filter

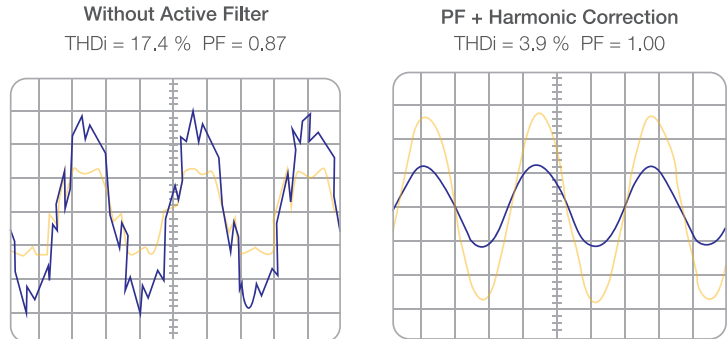
FEI’s Design Team has more than decades of experience and expertise to design harmonic mitigation solutions. IORA 3000 is a solid state, state-of- the-art designed filter, which measures level of current harmonic in the supply line and eliminates it by generating the counter harmonics in real time. This action is dynamic and closed loop and hence the power cleaning is achieved instantaneously.

Unparallel Features	Benefits
Modular Construction, most Unique Design Concept	Basic modules of 100 A/200 A, which can be paralleled to get the desired rating. There will be horizontal and vertical modularity.
Based on Floating point 32 bit DSP	Excellent attenuation even at the lower load levels, hence overall better performance on entire load cycle
Selective harmonic elimination methods CT can be connected in load as well as in source	Flexible design, hence particular harmonics which are causing damages can be kept under control.
Works upto 690 VAC (Optional)	Wider voltage window, thanks to its inbuilt auto transformer
Ethernet based remote monitoring and 7 inch SVGA touch screen display	Enhanced monitoring and control of filter and hence the entire distribution system.
Lower audible noise	Suitable for installing near servers inside data center. It helps to curtail down harmonics where they are generated.
Compact in size	Saves space, reduces installation cost.
Compliant to protection up to IP 51 (optional)	Ideal for the harsh industrial environments.

IORA 3000 - Active Harmonic Filter

Additional Features

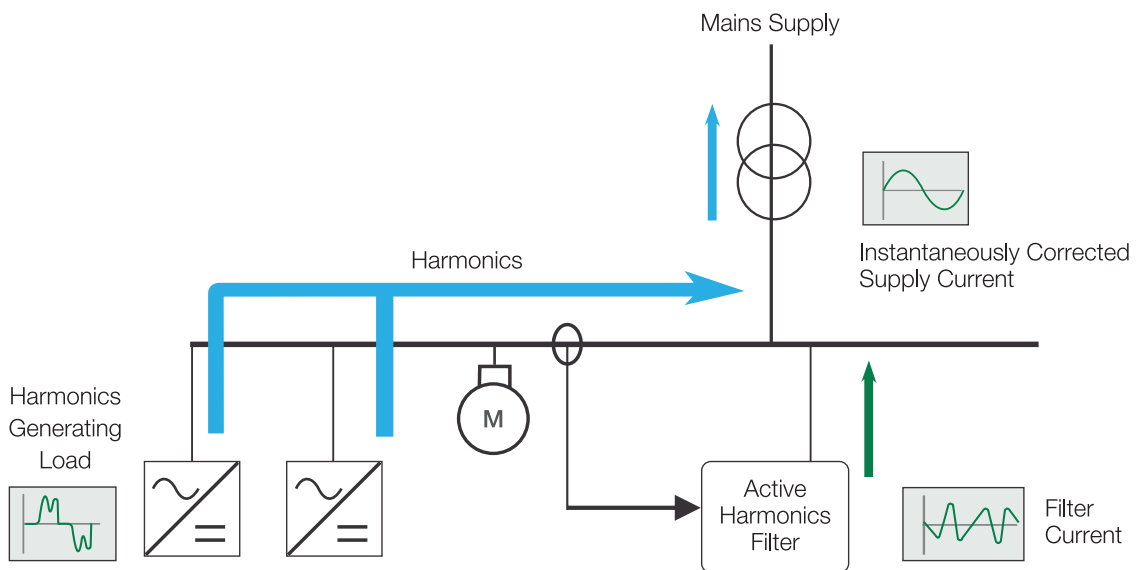
- Internal CAN communication
- Employs high speed IGBTs in power circuit
- Closed loop active filter with source current sensing
- High attenuation upto 96% of individual harmonics
- Programmable selective harmonic elimination
- PF compensation, leading as well as lagging
- Load balancing
- Helps in achieving the compliance with Power Quality Regulations like IEEE 519
- IEC/EN 62040 – 2 category C3



Principle of Operation

IORA 3000 is a state-of-the-art designed filter, which measures level of current harmonic in supply line and eliminates it by generating the counter harmonics. The harmonic mitigation is achieved by sensing the load current and delivering the harmonic current spectrum. Thanks to its Floating point 32 bit DSP which determines the amplitude to be injected in the opposite phase angle for each harmonic order. This signal along with fast acting IGBTs injects current into the power circuit. This action happens almost instantaneously restoring sine wave and attenuating harmonic levels at the point of installation.

Correction for displacement PF calculates the phase shift of the fundamental current from the voltage of the supply on a per cycle basis. DSP then calculates the amplitude and phase shift required for correcting the displacement power factor. The IGBTs are then directed to inject fundamental current at the proper phase shift to meet the preset objective.



Unparallel Benefits

User Interface with Advance Graphics Display

Use of 7 inch SVGA color display enhances the user experience while interfacing with IORA active harmonic filter. Colorful viewing of different waveforms and setting various parameters can be done by use of this touch pad sensitive display. With this, almost every details about the power can be monitored and logged for corrective action. The entire firmware is running on proprietary software, there is provision for the upgradation of software. For more details, please talk to us.



User Benefits

- Reduction of the THDi in compliance with IEEE 519
- Load balancing
- Reduces capital expenditure cost of the electrical distribution network due to reduction in the oversizing of cables, transformers and other equipments.
- Safe and reliable AC power supply and distribution network
- Reduced overloading and overheating of the neutral conductor
- Nuisance tripping of protection circuit breakers avoided
- Reduction of the THD (V) due to cancellation of current harmonics
- Increased lifetime of distribution equipments
- Increased productivity by eliminating downtime
- Increased generator performance and life
- Lowers energy consumption bill
- Reduces operating expenses

With other harmonic mitigation solutions, expensive and time-consuming site data collection, power quality surveys and computer generated studies are usually needed. FEI IORA 3000 corrects a full range of harmonic orders, and does not create a resonance condition with other existing equipments, so only minimal upfront analysis is required. Add to this its modular design feature, which makes it most suitable in case of expansions. In such case, add new module of AHF to achieve desired harmonic mitigation.



Investments in harmonic filters generally pay off within 6-24 months.

Applications

Active harmonic filters are an ideal solution for harmonic mitigation in industrial and commercial environment. Typical applications include:

- Oil and Gas Industry (Onshore and Offshore)
- Steel Industry
- Foundries
- Textile Industry
- Water and Waste Water Industry
- Cement Industry
- Automotive Industry
- Process Plants
- Pulp and Paper Industry
- Chilling Stations / HVAC
- Printing Industry
- Offices and Commercial Buildings
- Hospitals, Malls, Stadiums etc.
- Data Centers
- Residential Buildings
- UPS Systems, Lifts and Advanced Lighting Systems
- Light Industrial loads such as Remote Pumping Stations
- Light Railway and Metro Applications

FEI is working towards Energy saving and Power Management Solutions for tomorrow's growing energy demands. Its business focuses on providing end-to-end solutions for the Power Quality Enhancement and Renewable Energy using latest technology.

With its strong domain expertise, dedication to serve the customer needs and desire to bring the world class solutions in Power quality and continuity market, FEI shall be offering unmatched techno commercial solutions to the Global Power Electronics Market.

Technical Specification
IORA

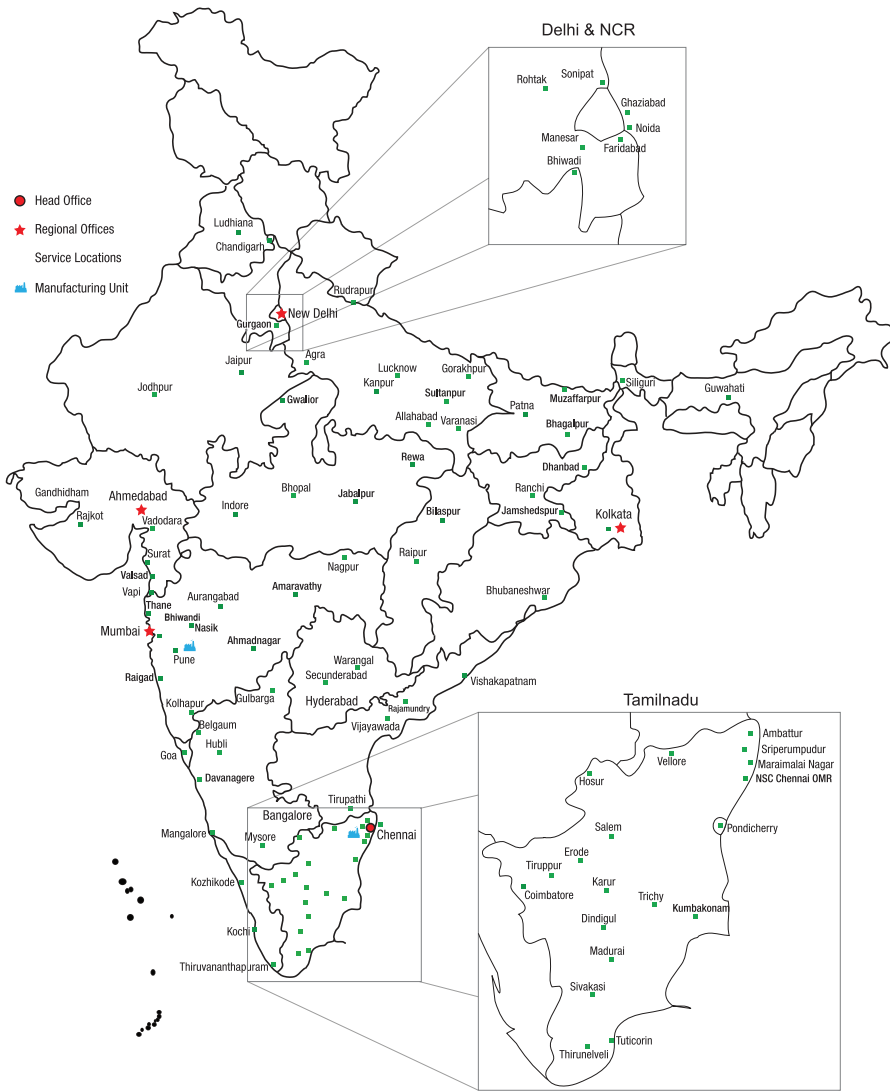
60 A - 800 A

Active Harmonic Filter

General	IORA 3000							
Rating (A)	60	100	200	300	400	600	800	
Electrical Specifications								
Utility connection method	3 Phase, 4 Wire							
Utility Frequency	50 / 60 Hz, + 5%							
Utility Voltage V1	400 V AC + 10%, -15%							
Filter Current I1 (A)	60	100	200	300	400	600	800	
Utility Voltage V2	480 V AC + 10%, -15%							
Filter Current I2 (A)	50	80	165	250	330	500	700	
Utility Voltage V3	575 V AC + 10%, -15%							
Filter Current I3 (A)	40	70	140	210	280	420	620	
Parallel Combination	Maximum 4 units of same power rating							
Filter Power Loss	upto 3% of Equipment Rating							
Power Protection for Filter	MCCB and Fast Acting Semiconductor Fuses							
Cooling	Forced Air Cooling							
Cable Entry	Front Bottom							
Current Transformer Ratio,	500:5	1000:5	3000:5	5000:5	6000:5	500:5	1000:5	
Class 1 or better with 15 VA rating								
Harmonic Range	2nd to 50th order							
Harmonics Selection	Selection of any 20 Harmonics							
Harmonic Attenuation Ratio	up to 96% at rated current							
Response Time	< 10 ms							
Reactive Current Compensation	Yes							
Priority Selection	Yes (PF and harmonics)							
Load Balancing	Yes							
Filter Current Upgrading	110% at 25°C							
With Ambient Temperature	105% at 30°C							
	100% at 40°C							
	80% at 50°C							
User Interface								
Monitoring	IORAMON On Serial Port, IORAMON On Ethernet Port (Optional)							
User Parameter Settings	From The System Display or Serially Using Software							
Standard	Meets IEEE 519 for compensated Harmonics							
Environmental								
Protection Class	IP-20 (IP-31 optional)							
Operating Temperature	0 to 40°C							
Storage Temperature	0 to 70°C							
Relative Humidity	95% (Non condensing)							
Altitude	1000 m without Derating							
Color	RAL 7016, Texture Finish							
Noise Level @ 1 m (Ref :ISO 3746)	< 65 db				< 68 db			
Dimensions in mm								
Height	1000	1000	1750	1750	1750	1750	1750	Consultus
Width	620	620	800	800	800	1000	1000	Consultus
Depth	450	450	800	800	800	850	850	Consultus

*Specifications are subject to change

Pan India Sales & Service Network



Product Offerings

- Online UPS (1-800 KVA)
- Servo Controlled Voltage Stabilizer (Oil Cooled / Air Cooled)
- Active Harmonic Filter
- Static Transfer Switch
- Isolation Transformer
- Solar Inverter
- Emergency Lift Operating System
- Offline UPS

Service Offerings

- Comprehensive Annual Maintenance Contracts (CAMC)
- Annual Maintenance Contracts (Labour - AMC)
- AMC for Third Party UPS, Stabilizers, Inverters and other Power Products
- Battery Replacement Services
- Power Audits
- Stabilizer Retrofits
- Rental UPS and Stabilizers
- Stabilizer Oil Replacement
- Remote Monitoring

Service Support

Real time E-service report through mobile app	Service request through mobile app	400 company trained service engineers	80+ service locations	Spare Parts warehouse in 24 Locations	Call center with multi language support	Any time service request

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