Active Harmonic Filters
IPC150–AHF Series
Multi Function Ultra Fast Power Quality Compensation
Harmonics • Power Factor Correction • Unbalance Compensation

www.inphase.in
ISO 9001:2008 Certified
Active Harmonic Filters

**THE CHALLENGE**

To increase the productivity, improve the process and optimize the energy savings in last one or two decades non-linear loads have increased across all types of industries and commercial buildings.

These loads have resulted in the introduction of harmful harmonics into the power network leading to overheating of transformers, motors and Power cables items. They also damage sensitive equipment, tripping of breakers and opening up of fuses as well as reduces the life of connected Electrical Items.

IPC150-AHF active filters provide a very economical and most reliable solution to this problem by continuously correcting the current harmonics in real time by injecting equal magnitude and opposite phase harmonic currents in the network to get a clean and sine wave current from the supply network.

Active Harmonic 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 reactive power consumption.

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**How harmonics are produced**

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

- Speed / frequency drives
- Welding Loads
- Furnaces
- Rectifiers
- AC/DC transducers
- Arc welding
- Induction furnaces
- UPS
- Computers

**What problems harmonics can cause**

- Neutral Overheating
- Failures with electronic components
- Nuisance tripping of circuit breakers
- Overloading of capacitors
- Vibrations of the transformer
- Heating of Transformers
- Warming of Motors
- Problems with electronic equipment
- Heating of conductors
**Active Harmonic Filters**

**THE SOLUTION**

IPC150-AHF Series is an IGBT Based instantaneous voltage source converter. This IGBT Based system mitigates the Harmonics by generating Anti-Harmonics into the system and thereby cancelling the Harmonics present in the system. IPC150-AHF Series can not only compensate Harmonics but also for reactive power and unbalanced current loads (Negative Sequence). This makes it a highly efficient Power Quality Equipment.

Apart from harmonics compensation, the InPhase IPC150 offers two more important functions in power quality one is fast dynamic reactive power compensation both for Inductive and Capacitive mode to maintain the desired Power Factor to meet the Grid guidelines and get the maximum benefit for the Users. Another important function is to reduce the Load unbalance, which mainly causes due two phase connected loads.

**How do we do it?**

![Diagram of Supply, Harmonics, Compensation, and Load]

![Graphs of System Currents (A), IGBT Compensator Currents (A), and Load Currents (A)]
IPC150–AHF SERIES

InPhase IPC150-AHF active filters are 100% tested in factory before dispatch hence, it is easy to install and commission at site. These filters are modular in construction and easy expand to cater future loads. Unlike conventional passive filters which gets over loaded due to additional harmonics or network changes, InPhase IPC150 AHF does not get over loaded also no need to apply a de-rating factor when units are in parallel.

Without AHF

- Transformer overloaded / More Power Consumption
- CT Feedback for the Closed loop operations

With AHF in action

- Less Losses, More Capacity
- CT Feedback for the Closed loop operations

Without AHF:
- Harmonics (Red)
- Reactive Power (Blue)
- Unbalance Power (Green)

With AHF in action:
- Harmonics Compensation (Red)
- Reactive Power Compensation (Blue)
- Unbalance Compensation (Green)
## MODELS

<table>
<thead>
<tr>
<th>Model*</th>
<th>Harmonic phase current*</th>
<th>Voltage</th>
<th>Dimensions (W x D x H) in mm</th>
<th>Approx. Weight (Kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>IPC150-AHF-100A-V415</td>
<td>100A</td>
<td>415</td>
<td>550 X 650 X 1200</td>
<td>280</td>
</tr>
<tr>
<td>IPC150-AHF-150A-V415</td>
<td>150A</td>
<td>415</td>
<td>550 X 650 X 1200</td>
<td>320</td>
</tr>
<tr>
<td>IPC150-AHF-300A-V415</td>
<td>300A</td>
<td>415</td>
<td>800 X 800 X 1800</td>
<td>640</td>
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<tr>
<td>IPC150-AHF-450A-V415</td>
<td>450A</td>
<td>415</td>
<td>1200 X 800 X 1800</td>
<td>780</td>
</tr>
<tr>
<td>IPC150-AHF-600A-V415</td>
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<td>415</td>
<td>1800 X 800 X 1800</td>
<td>1300</td>
</tr>
<tr>
<td>IPC150-AHF-900A-V415</td>
<td>900A</td>
<td>415</td>
<td>1800 X 800 X 1800</td>
<td>1500</td>
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<tr>
<td>IPC150-AHF-80A-V690</td>
<td>80A</td>
<td>690</td>
<td>800 X 800 X 1800</td>
<td>600</td>
</tr>
<tr>
<td>IPC150-AHF-160A-V690</td>
<td>160A</td>
<td>690</td>
<td>800 X 800 X 1800</td>
<td>720</td>
</tr>
<tr>
<td>IPC150-AHF-250A-V690</td>
<td>250A</td>
<td>690</td>
<td>1200 X 800 X 1800</td>
<td>820</td>
</tr>
<tr>
<td>IPC150-AHF-500A-V690</td>
<td>500A</td>
<td>690</td>
<td>1800 X 800 X 1800</td>
<td>1500</td>
</tr>
</tbody>
</table>

*All Models are available in both E Class and S Class. See below for model difference*

<table>
<thead>
<tr>
<th>Feature</th>
<th>E-Class Model</th>
<th>S-Class Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC Link</td>
<td>Electrolytic Type</td>
<td>Film Type</td>
</tr>
<tr>
<td>Control Signals</td>
<td>Electrical</td>
<td>Optical</td>
</tr>
<tr>
<td>Guaranteed Design Life of IGBT</td>
<td>3-5 Years</td>
<td>10 Years</td>
</tr>
<tr>
<td>IGBT Temperature</td>
<td>150°C</td>
<td>175°C</td>
</tr>
<tr>
<td>Reactor</td>
<td>Wire Wound</td>
<td>Foil Type</td>
</tr>
<tr>
<td>Switch Gears</td>
<td>L&amp;T/Chint/C&amp;S</td>
<td>Siemens/ABB</td>
</tr>
<tr>
<td>Even Order Compensation</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>PF Compensation</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Unbalance Compensation</td>
<td>Yes - Partially</td>
<td>Yes</td>
</tr>
<tr>
<td>Voltage Notch Environment</td>
<td>System Performance Affected</td>
<td>System Performance Not Affected</td>
</tr>
<tr>
<td>InPhase Cloud™ Monitoring</td>
<td>Not Available</td>
<td>Available</td>
</tr>
<tr>
<td>2 Years Cloud Monitoring Service</td>
<td>Not Available</td>
<td>Free</td>
</tr>
<tr>
<td>Auto CT Management</td>
<td>Not Available</td>
<td>Available</td>
</tr>
</tbody>
</table>
Active Harmonic Filters

TECHNICAL SPECIFICATIONS

### Operating conditions
- **Rated operating voltage**: 200-690 V
- **Frequency**: 50 Hz/60Hz ± 5%
- **Connection System**: 3 phase (3 wire)*

### Filter Characteristics
- **Current Harmonics Range**: 2nd to 25th Harmonic order
- **Selecteable Harmonics**: 10 harmonics individually selectable
- **Filtering efficiency**: Better than 97% of filter rating typically
- **Reaction time**: <0.5 ms instantaneous
- **Response time**: < 30 ms typically (10% - 90% filtering)
- **Reactive power compensation**: Static/Dynamic
- **Power Factor Programmable**: 0.6 Inductive to 0.6 capacitive
- **Load balancing**: Line to Line balancing (3-w mode)
- **Controller**: DSP based controller
- **Active Power**: <3% of unit rating
- **Modularity**: Up to 32 power units/filter. Power units can be master/slave
- **Ingress Production**: IP31

### Display Functions
- **Control capabilities**: Filter on/Off, Filter status description
- **Setup**: Selection of individual harmonic to filter,
- **Settable Options**: Power Factor/Reactive Power/Unbalanced compensation/CT ratio/Parallel units
- **Electrical parameters monitoring**: Voltages and currents measurements. Active, reactive and apparent power, Power factor measurements.

### Environmental conditions
- **Temperature**: 0° — 40°C
- **Humidity**: Up to 95°(non-condensing)
- **Altitude**: 1000M

### Options
- **Common top / bottom cable entry cubicle**
- **IP41 execution (filter derating of 10% has to be applied)**
- **Base frame (100 mm height) for single unit**
- **Surge arresters**

*For 4 wire connection please consult
+ For other IP’s please consult
Active Harmonic Filters

APPLICATIONS

IPC150-AHF Active filters finds a wide range of applications where harmonics are being generated by load demands. Typical applications industries include but not limited to:

- Steel plants/Rolling Mills
- Cement Industries
- Automotive Industries
- Hotels/Resorts
- Railways
- Metro
- Commercial/Residential Complex
- IT/ITES Companies
- Pulp and Paper Industries
- Chilling Plants
- Printing Industries
- Textile Mills
- Any other process Industries

ADVANTAGES

- Filters up to 25th Harmonic
- Closed loop control for best accuracy
- Not Over loadable
- Filters without generation of reactive power
- Added function of reactive power compensation
- Additional unbalanced compensation
- Fast response time
- Small foot print
- Doesn’t require special CT’s
- Programmable power factor
- Suitable for G5/4 or IEEE-519 standards or utility regulator.
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