COMPARISON OF HARMONIC FILTERS - PASSIVE vs ACTIVE

DESCRIPTION	PASSIVE FILTER	ACTIVE FILTER
Filters in Power Quality Technically and in Reality	In True Sense P.H.F only Filters in the field of POWER QUALITY	A.H.Fs. are just inject the distorted current in to the system (Harmonics) in opposite direction. Thus, only the power quality towards the source is improved and never down the line.
Working principle	Natural way of smoothening the wave form, thus harmless	A.H.F. does not remove the harmonic currents. Only try to improve the waveforms towards source. .
Performance	PHF do not allow harmonic currents to circulate in the network, which results in elimination of equipment break down due to harmonics. P.H.F. clean the entire system, whether down the line or up the line, if the locations of connection are selected properly.	A.H.F does not stop harmonic currents circulating in the network at downline as they designed for injecting the Harmonic components in to the system. Hence it is impossible to expect the cleaner system at overall network
Operational reliability of all protective relays	Improves the accuracy and reliability of all protective relays as PHF improves the quality of power. Hence, operator/user safety ensured as the entire network is healthy due to PHF.	As AHFs are prone for malfunction, thus injecting the unwanted frequency in to the system. Hence, protective relays may subject to malfunction. Also Whole operation of AHF is dependent on installed Current Transformer. Frequency response/amplitude error during high frequency measurement on unqualified CTs leading into erratic harmonic frequency generation and injection into the system.
Power for its operation and Operating cost	No need of power for its operation. Losses are Negligible	Needs power for its operation. Which is considerable and not negligible
Energy conservation	Attractive	NIL/consumer of power
Reliability, Durability and life	YES	IGBT or power supply driver may fail any time due to local switching transients. Also installation at High FL location will more prone for failure
User friendly	P.H.F is very rugged, maintenance free. Any break down can be attended easily by the user's technician at site. Hence No need to depend the supplier for service	As A.H.Fs are sophisticated electronics and software, maintenance by the user are complicated. In case of any break down, manufacturer only can attend. Hence, User has to be dependent behind the manufacturer in its whole lifetime.
Application and type of load	Any type of Industrial application with any type of highly variable load and larger size plant	Advisable for smaller load only. As AHF Injecting the distortion in to opposite direction installation at larger size plant must be avoided/not advisable
Standalone operation	YES	Impossible for standalone operation. PHF must be supported for its operation
Failure of plant components	Absolutely drastic reduction in failure of all electronic components (PCB, and Electronic equipment)	High frequency switching action of IGBTs and generates Ripples in active harmonic filters. Hence increase the component

		failure.
Design and performance	Design can be done as per the Short circuit at the level of PCC of each and every consumer. Hence performance guaranteed	Standard design. Hence not doable at High Fault Level locations
Noise interference (Electronic)	Reduce the interference within acceptable limit.	May subject to amplification of noise interference and increased TIF
Performance in change in load	Yes. If designed properly any type of load with drastic change pattern also PHF will perform well. Broad Band Filters are neither detuned nor tuned. Hence dynamic in performance. Hence Proven in Induction melting furnace application	Dynamic. But not proven in Induction melting furnace application
ROI	Attractive	Not Attractive as highly expensive
Triplent order filtering	Passive is the best in class solution	Poor performance – Not satisfactory
Second order filtering	Not Possible	Not possible
Technical Skill for design	Sound knowledge in power quality required	No need of any knowledge. Plug and play. This only resulted and makes unreliable solution to the customer
Size	Bigger in size	Compact
Installation,	Little difficult. But this can be accepted due to its various long term technical and commercial advantageous.	Plug and play, but investment is meaningless