

MTE Matrix® AP Filters (5% THD)

The key to success: Adapt.

Adaptive Passive Technology for superior harmonic mitigation at varying loads.

The MTE Matrix AP is the most advanced passive filter on the market today. Most traditional filters work fine at 100% power load but severely under-perform at lower loads.

The MTE Matrix AP has Adaptive Passive Technology that virtually eliminates harmonic distortion by adapting to various power loads. Its unique design generates less heat, is easy to install and maintain and is generator compatible.

It delivers better THDi performance, increases the reliability and service life of electric installations, increases energy efficiency and allows you to meet Power Quality standards such as IEEE 519.

Key Features:

■ 5% THDi Performance

The MTE Matrix AP offers equal to or better than 5% THDi performance at full load current and starts to achieve that 5% performance from loads as low as 40% of full load current.

■ Adaptive Passive Technology

The Matrix AP features MTE's patented Adaptive Passive Technology for superior harmonic mitigation and better THDi performance over a wider load range.

■ 3 Year Warranty (industry leading)

■ Reduce Maintenance Costs

Extends the service life of electrical equipment due to the virtual elimination of CEMF and the skin effect, the Matrix AP extends the life of electrical equipment, especially transformers and motors.

■ Ease of Installation

Passive filters are virtually 'Plug and Play'.

■ Reduces Downtime

Alleviates system downtime by preventing blown fuses and tripped circuit breakers.

■ Intelligent Design - Less Cost to Install

The unique design of the MTE Matrix AP filter incorporates only one reactor which has the input and the shunt coil on the same core. This requires less cabling and connections by the installer, therefore less cost to install.

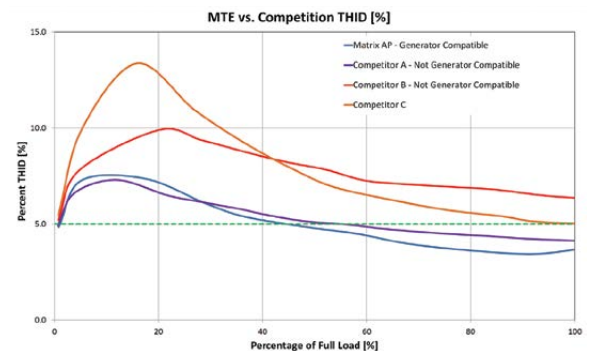
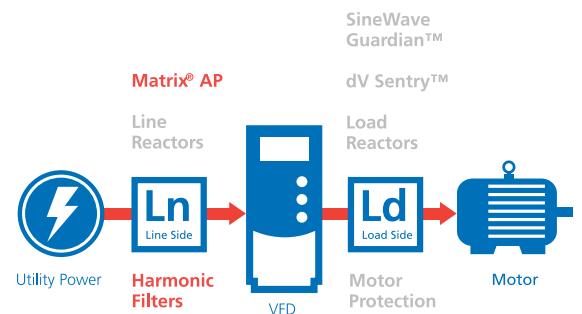
■ Enclosed Filters Do Not Require Fans

When the Matrix AP filters are built within an enclosure to comply with IP20 or IP21 requirements, their unique patented design results in such low heat loss that they do not require fan assisted cooling. This design removes the traditional risk of filter damage in the event of a fan malfunction.

■ Better Power Factor and Compatibility with Generators

Refer to page 26

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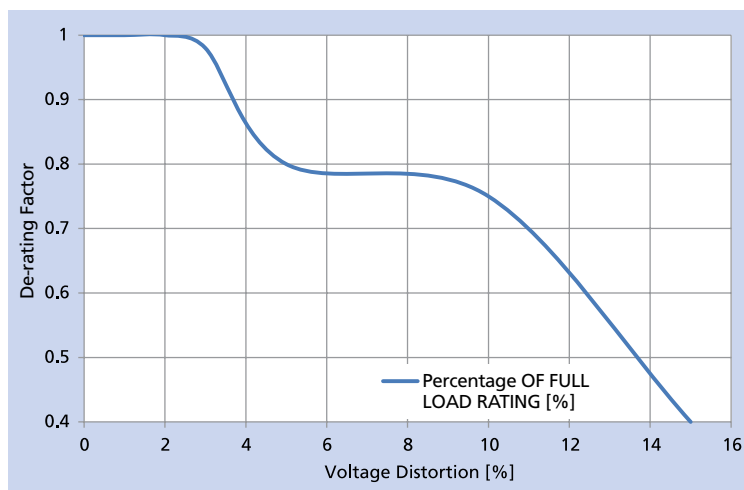
Performance Specifications

Input Voltages	480V 60Hz 380V/400V/415V 50Hz 600V 60Hz 690V 50Hz
Total Harmonic Current Distortion	8% Max at 30% Load 5% Max at Full Load
Load	6 pulse rectifier
Input Voltage	Nominal voltage VAC +/- 10%, 3 Phase
Frequency	Nominal Frequency +0.75 Hz
Insertion loss at full load	<4%
Efficiency	97% - 99%
Operating Temperature	-40C to +50C Open Panel Filters -40C to +40C-45C Enclosed Filters -40C to +90C Storage
Altitude Without Derating	3,300 feet

Performance with Unbalanced Line Voltage (Typical)

All Components at Nominal Values and Worse Case Service Conditions	
100% Load	
Nominal THDi	4.2%
1% Unbalance	4.4%
2% Unbalance	4.8%
3% Unbalance	5.4%
30% Load	
Nominal THDi	7.0%
1% Unbalance	7.3%
2% Unbalance	7.9%
3% Unbalance	8.8%

Voltage Distortion De-Rating Curve



This plot assists in proper de-rating of a Matrix AP Harmonic Filter in environments with a given voltage distortion. Example: In a system with 10% voltage distortion, a Matrix filter will need to be oversized by 25% to obtain the same performance as an appropriate filter in a 0% distortion environment.

Applications for Passive Filters

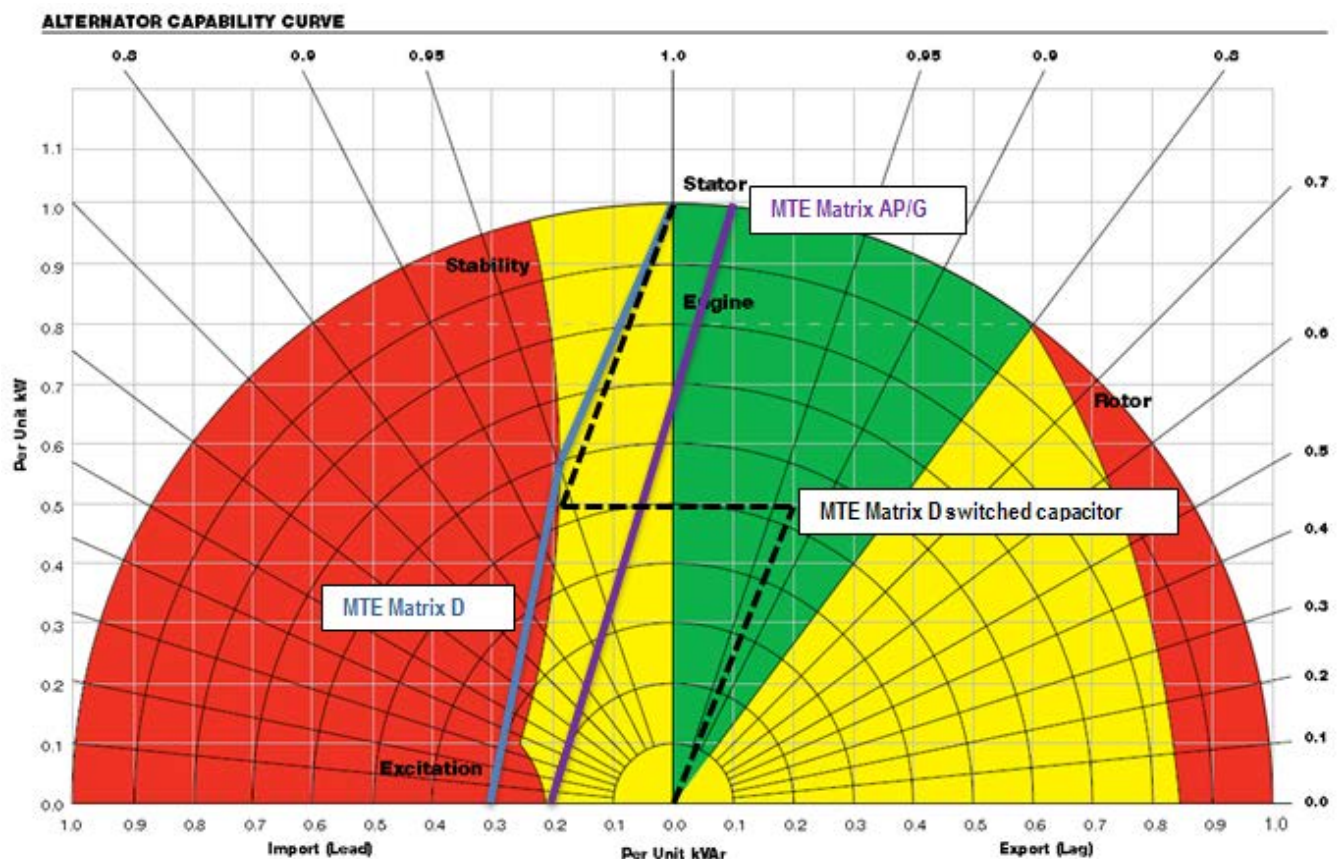
Passive Harmonic Filters for Generator Power Supply Applications

The ability of a generator to handle leading power factor loads is often raised as a concern. Although it is true that excessive capacitive reactive power can cause voltage regulation, excitation control and other issues with a generator's operation, generators can tolerate a leading power factor at certain levels. All generator manufacturers publish reactive power capability curves for their generators from which a user can determine the acceptable levels of reactive power for the generator, both capacitive and inductive.

Six pulse VSD loads operated with a passive harmonic filter have characteristics that can impose a leading power factor (kVAr) onto the power source. While these loads are typically not a problem for utility power sources, leading power factor can cause a generator to shut down or prevent certain loads from operating properly under generator power. Control systems used in generators are very sensitive to capacitive kVAr from loads and exceeding their limit will result in the generator shutting down due to over-voltage.

At the same time, VSD manufacturers have started to use Passive Harmonic Filters to limit the harmonic current distortion feeding back to the power source. A Passive Harmonic Filter can produce a leading power factor at light loads and this can be very disruptive to generator operation. At light loads there may be excess filter capacitance, causing a leading power factor on the generator. A utility supply simply absorbs the reactive power output because it is extremely large relative to the filter system. The ideal solution is to choose a harmonic filter that will not adversely affect the generator's operation.

To work with generators, the harmonic filter's capacitance must not exceed the alternator's ability to absorb reverse kVAr loading. The ideal choice should be a filter that has a low kVAr (15% of its kW rating) such as the MTE Matrix AP filter. The Matrix AP filter possesses better control of leading power factor and will always be in the 'generator safe operating area'. Due to the fact that the Matrix AP filter operates in a safe power factor range for gen-sets, most applications do not require the capacitors switched in and out. This results in an increase in the life span of the capacitors.



Applications for Passive Filters

Irrigation and Pumping Station Applications

The use of VSDs in the electrical systems of irrigation and pumping stations has grown by 60% in the last five years. This clearly indicates that the concept of saving energy is being accepted and adopted rapidly within the industry.

The remote area irrigation systems and pumping stations equipped with VSDs often experience problems related to harmonics on grid or generator supply. This often leads to disturbances in the supply systems of nearby residential areas. For these remote sites, achieving the mitigation of harmonics in the electrical system can be a big challenge.

Solutions for Harmonic Mitigation and the Protection of Motors

- As a general guide, for cable runs up to 30m, reactors can be a cost effective solution.
Refer to page 28-29 for information on our range of TCI & MTE reactors
- For cable runs of 30m – 100m, dV/dt filters are a suitable choice and also provide the added benefit of protecting motors from long lead peak voltages and voltage spikes.
Refer to page 32-33 for information on our range of TCI V1K & MTE dV Sentry™ dV/dt Filters
- For cable runs above 100m, sine wave filters are a great choice. With their ability to reduce eddy currents, stray flux losses, bearing currents, torque ripple and voltage wave reflection, sine wave filters provide the ultimate motor protection.
Refer to page 30-31 for information on our range of Schaffner & MTE Sine Wave Filters
- The design of the MTE Matrix AP passive filters is suitable for such remote applications as they are extremely robust, reliable and virtually 'plug and play'. The specially designed capacitors with screw on terminals provide reliability and require minimal maintenance. Furthermore, they mitigate the harmonics (THDi) to <5%.
Refer to page 24-25 for information on the MTE Matrix AP Filters
- For IP54 applications, the TCI HG7 series of passive harmonic filters is ideal.

