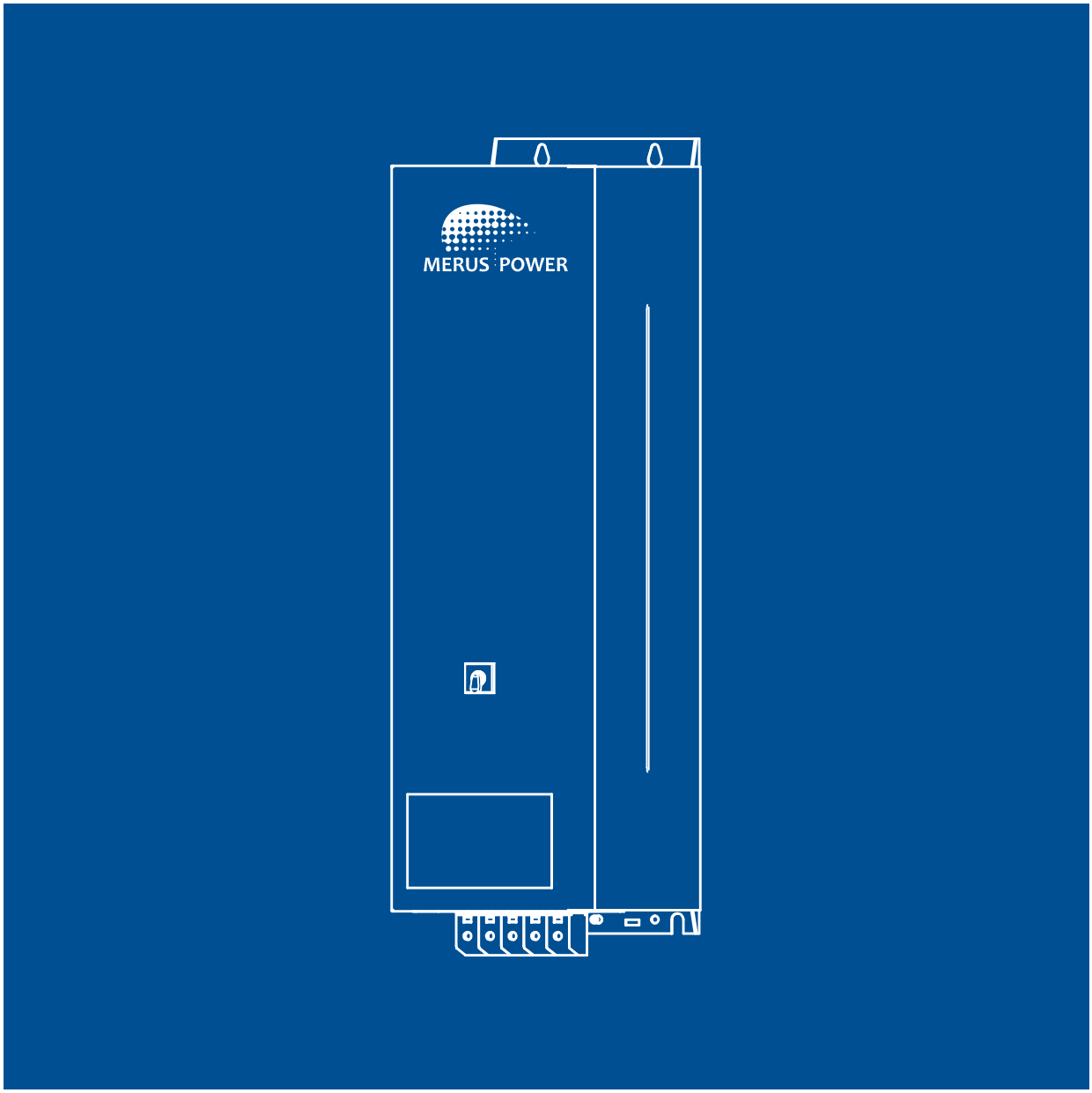
ACTIVE HARMONIC FILTERS

MERUS POWER

A2-Series

Modern, modular and super compact active harmonic filtering and dynamic reactive power compensation solution



IMPORTANCE

OF GOOD POWER QUALITY

Power quality can affect the overall company performance, which is a fact easily overlooked by the management. Merus active harmonic filters provide a quick return on your investment. The quick and effective response of Merus active harmonic filters to power system variations enables higher process reliability, longer equipment life, reduced energy losses and better productivity. It also makes it easy to comply with global power quality standards and demanding grid codes.

Rise of non-linear and other challenging loads in modern electrical networks present unique power quality challenges. Sensitive operations, challenging loads and isolated or weaker grids demand stricter grid codes and power quality standards to safeguard the reliability of an electrical system for smooth industrial and commercial processes. Harmonics distortions, voltage variations, poor power factor and load unbalance are among the key elements that not only test the reliability of modern electrical systems but also induce overall greater system losses.

CUSTOMER BENEFITS

- **Energy savings**
- **Higher productivity**
- **Reliable plant operation at reduced maintenance costs**
- **Longer lifetime of electrical and process equipment**
- **Additional capacity in existing electrical network**
- **Compliance with IEEE 519, G5/4, IEC 61000 3-2, 3-4 or any other power quality standards and recommendations**
- **Quick return on investment**

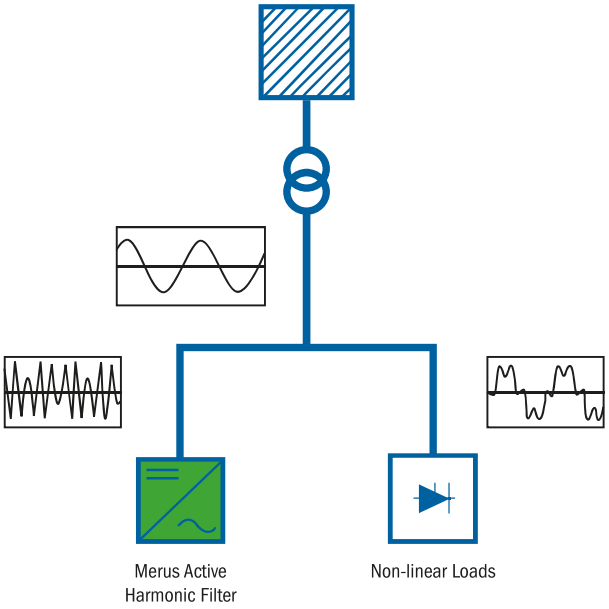
MERUS A2-SERIES

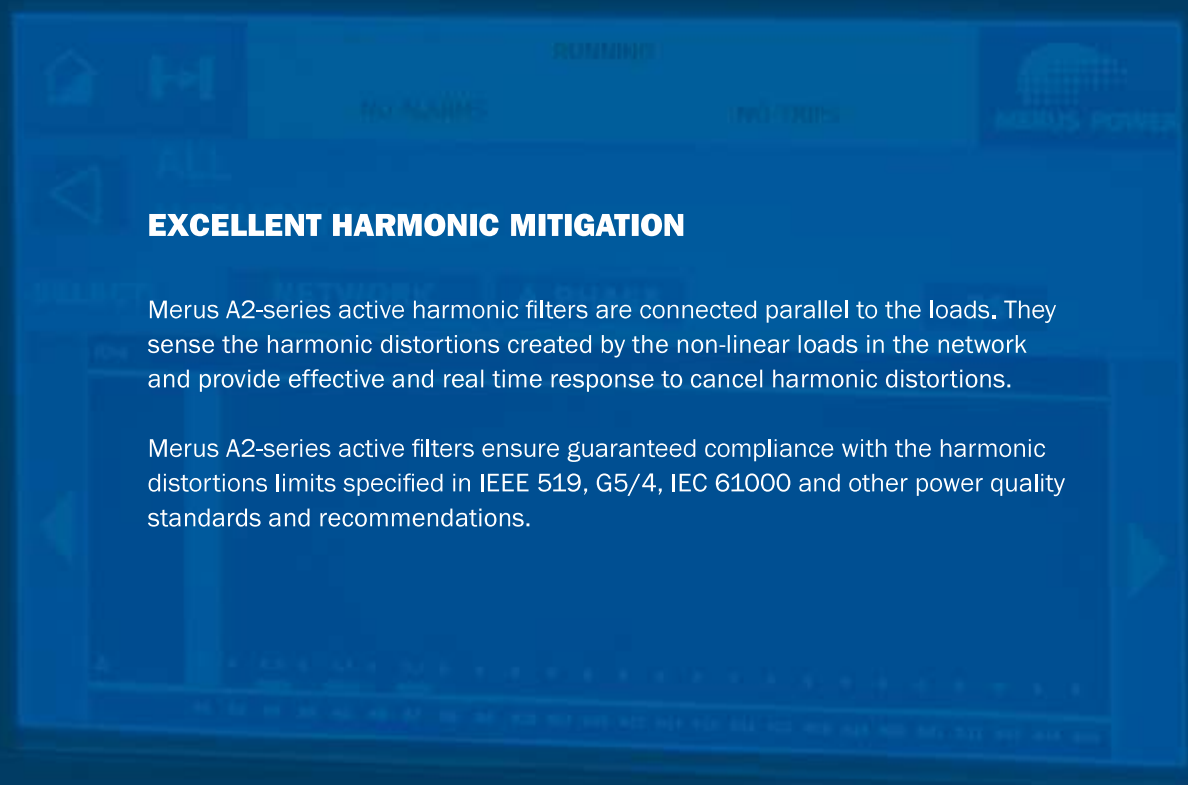
ACTIVE HARMONIC FILTERS

Merus A2-Series Active Filters save money by improving power quality, increasing process reliability and productivity while helping to comply with the power quality standards.

Merus A2-Series Active Filters are designed for dynamic reactive power compensation and harmonic filtering. They provide an efficient solution for power quality applications in commercial and industrial facilities as well as in infrastructure.

Merus A2-series combines state-of-the-art controller built on modern 3-level topology, 7” touch-screen user interface and modular technical design, resulting in a fast, reliable and compact device that is easy to operate and complies with all standard communication protocols.





EXCELLENT HARMONIC MITIGATION

Merus A2-series active harmonic filters are connected parallel to the loads. They sense the harmonic distortions created by the non-linear loads in the network and provide effective and real time response to cancel harmonic distortions.

Merus A2-series active filters ensure guaranteed compliance with the harmonic distortions limits specified in IEEE 519, G5/4, IEC 61000 and other power quality standards and recommendations.

FUNCTIONS

OF MERUS ACTIVE HARMONIC FILTERS

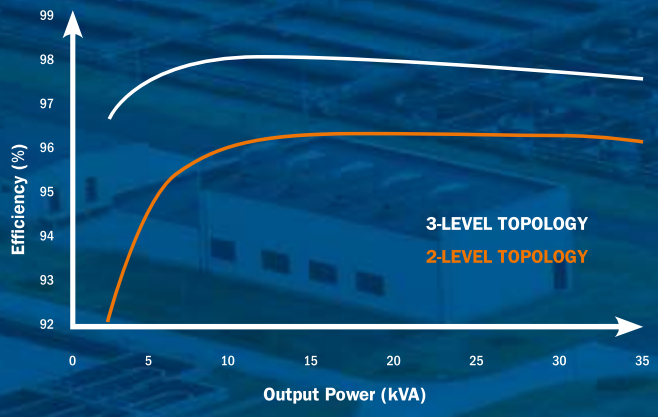
Along with effectively cancelling harmonic distortions, Merus active harmonic filters are capable of solving several other power quality challenges. The selective operation mode allows tailoring of the functionality of Merus active harmonic filter to meet the required performance level. Merus active harmonic filters are easily configurable through the HMI to improve the power factor by injecting fundamental reactive power. Unlike conventional technologies, real time response ensures that reactive power is fed efficiently to the fast fluctuating loads such as welding machines and cranes, among others. It guarantees the mitigation of voltage variations and flicker. Load unbalancing in a 3-phase system, such as spot welding, can also be addressed with the help of Merus active harmonic filters.

KEY FUNCTIONS

- **Active harmonic filtering**
- **Power factor correction**
- **Voltage variation control and flicker mitigation**
- **Load balancing in three-phase systems**

3-LEVEL TOPOLOGY

Merus A2-series active harmonic filters are built on modern 3-level topology which brings several benefits compared to other active filters built on the conventional 2-level topology. In 3-level topology, the switching frequency and voltage stress are distributed among the two IGBTs. Reduced stress extends the lifetime of the power electronics. The efficiency and lower losses achieved with 3-level topology are excellent. These make the overall cost of ownership much lower compared to conventional solutions.



COMPACT DESIGN

AND EASE OF INTERGRATION

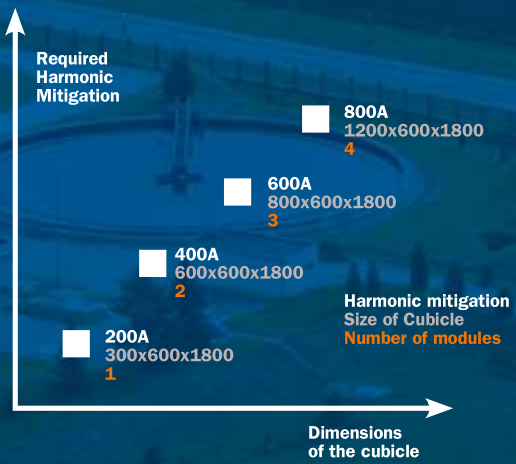
Standard A2-series active harmonic filter is in IP20 protection class module. Extremely compact size allows easy integration into variable speed drives (VFDs) or capacitor bank cubicles. Merus Power can also deliver active harmonic filters in IP42, IP54 or others degrees of protection upon request. Furthermore, A2-series active filters are also available in wall-mounted design

AUTOMATIC VOLTAGE & FREQUENCY SENSING WITH SMART OPERATION MODE

Merus active harmonic filters come with several advanced features. When connected to the network, they automatically sense the voltage and frequency, simplifying the order and delivery processes. A2-series active harmonic filters are also equipped with the built-in smart operation mode. Under low load conditions,the smart operation mode automatically turns off the IGBTs and fans reducing the operational losses and extending the lifetime of the active harmonic filters.

UNLIMITED SCALABILITY

Unlimited scalability can easily be achieved with Merus A2-series active harmonic filters in both; open-loop as well as closed-loop connections. Higher harmonic compensation capacity can be achieved by adding A2-series active harmonic filters modules in parallel without any technical limitations. This gives flexibility to facility engineers when more loads are added in the facilities



LOW NOISE HARMONIC FILTERING SOLUTION

Pollution comes in many forms: harmonics pollute the electrical power system, and high audible noise pollutes and disturbs people working in close proximity. Merus A2-series active filters, enabled by 3-level topology, release the lowest possible audible noise among all active filters. Designed with high switching frequency and special inductor core material, Merus A-2 series active filters can be installed into spaces where silence is vital.

WIDE RANGE OF HARMONIC MITIGATION SOLUTION

Merus Power offers you a wide range of active harmonic filtering solutions to meet your exact needs. Merus A2-series active filters are available from 200V up to 480V. Merus M-series active harmonic filters are available in nominal voltage of 690V and 960V. M-series active filters are powerful devices which can be used in heavy industrial applications for dynamic reactive power compensation and active harmonic filtering.

EASY COMMISSIONING

ENABLED WITH MODERN HMI

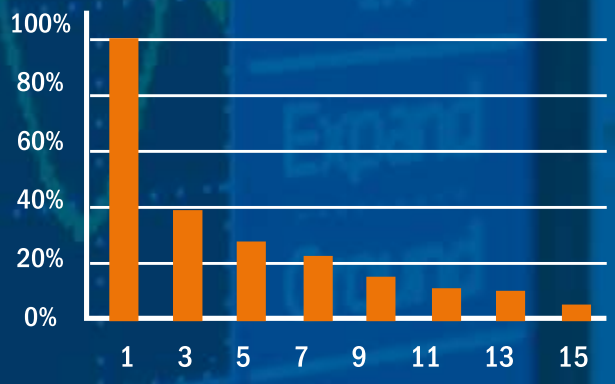
Merus A2-series active harmonic filters are equipped with sophisticated 7” Human Machine Interface (HMI). Commissioning of the device is simplified and hassle free with the help of the built-in Commissioning Wizard.

When connecting the device to the network, the active harmonic filter automatically senses the voltage and the frequency of the system. After acknowledging the voltage and the frequency of the system, Commissioning Wizard guides the user one step at a time to parametrize the device leading to successful commissioning.

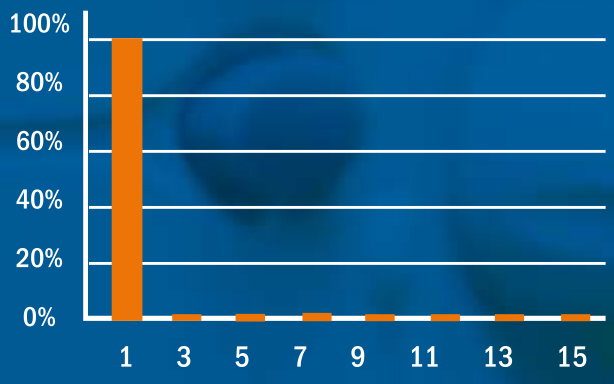
COMPREHENSIVE MONITORING AND REPORTING

Merus A2-series active harmonic filters come with advanced and comprehensive monitoring & reporting features. They not only efficiently filter harmonic distortions from your electrical network but also give you comprehensive power quality report from the last 30 days. It enables before and after analysis by providing you data of harmonic distortions from both supply and load side. The device can be monitored and controlled remotely. SCADA systems can be connected to the device via Modbus TCP. The remote monitoring and controlling services open up possibilities for Internet of Things (IoT) applications.

HARMONIC SPECTRUM BEFORE MERUS ACTIVE FILTER



HARMONIC SPECTRUM AFTER MERUS ACTIVE FILTER



APPLICATIONS

IN INDUSTRIES

In the manufacturing plants, the Variable Frequency Drives (VFDs) have extensively been used for the motor control purposes to save energy. However, they are one of the major sources of harmonic distortions in the network. Merus A2-series active harmonic filters can effectively cancel the harmonic distortions created by variable speed drives in industrial applications. Merus A2-series active harmonic filters bring power quality benefits to variety of industries including the following:

- **Paper industry**
- **Food & beverage industry**
- **Automotive industry**
- **Oil & gas industry**
- **Chemical industry**
- **Pharmaceutical industry**
- **Textile & clothing industry**
- **Steel industry**
- **Cement industry**
- **Microelectronic manufacturers**
- **Other industrial processes with AC or DC drives**

COMMERCIAL BUILDINGS

Modern commercial buildings use equipment built with Switch Mode Power Supplies (SMPS) and Uninterrupted Power Supply (UPS) systems which are sources of harmonic distortions.

In commercial buildings, single-phase loads cause triplen harmonics which are accumulated in the neutral wire. A2-series active harmonic filters are available in 4W so not only do they cancel harmonics in 3 phases but also in neutral.

- **Financial institutions**
- **Data centers**
- **Scientific laboratories**
- **Hospitals**
- **Telecommunication centers**
- **Airports**
- **Remote radar locations**
- **Amusement parks**
- **Shopping centers**
- **Ski resorts**
- **Residential buildings**

INFRASTRUCTURE

Fans, pumps, compressors and other heavy loads in modern infrastructure are often fed with variable speed drives to control the motors to save energy. Harmonic distortions are significantly high in the presence of variable speed drives and are often exceeding the limits defined in global power quality standards and recommendations. Merus A2-series active harmonic filters can effectively bring the harmonic distortions to the desired limits and help comply with the standards.

- **Water and waste water treatment plants**
- **District cooling plants**
- **Tunnels**
- **Metro stations**
- **Traction**
- **Wind & Solar farms**

VOLTAGE VARIATIONS CONTROL CAUSED BY DYNAMIC LOADS

Dynamic loads such as welding machines and cranes, demand real time reactive power compensation to avoid voltage destabilization. Conventional power factor correction solutions are unable to answer to this demand in real-time.

Merus A2-series active harmonic filters are versatile solutions capable of providing several functionalities. They can inject fundamental reactive power in the network in real time, ensuring stable voltage. They can also be used to remove voltage unbalance in the network.

- **Welding machines**
- **Cranes**
- **Crushers**
- **Winders**
- **Shredders**
- **Lifts**
- **Other dynamic loads**

TECHNICAL SPECIFICATIONS

MERUS A2-SERIES ACTIVE HARMONIC FILTERS

MODEL	A2-50	A2-100	A2-150	A2-200
Rating of individual units	**50 A**	**100 A**	**150 A**	**200 A**
Nominal voltage	200V – 480V (Auto voltage sensing)			
Harmonic performance	up to 50th harmonic – compliance with IEEE 519 and G5/4t			
Rated frequency	50Hz or 60Hz (Auto frequency sensing)			
Operating modes	All harmonics/All harmonics but not fundamental/Selective harmonics			
Response time	< 100 microseconds / 1 cycle (selective mode)			
Parallel units	Unlimited scalability, parallel operation of any rating combinations up to 7 units per one HMI is possible			
Switching frequency	20kHz			
Controller	Real time digital control with FFT			
Load balancing capacity	100% * IN of active filter			
Neutral wire current	150A	300A	450A	600A
3-Wire/4-Wire	3W & 4W	3W & 4W	3W & 4W	3W & 4W
Human-machine interface (HMI)	7" easy to use touch screen interface			
HMI languages	8 languages including English-German-Spanish-Chinese-Russian. Others on request.			
Monitoring	On-site and remote monitoring possibilities			
Reporting	Reports data of power quality events from the last 30 days.			
Communication	Ethernet, ModBus (TCP)			
Cooling media	Air			
Protection degree	IP 20 (for the module), (Up to IP54 depending on the enclosure)			
Ambient temperature	40°C, without derating			
Humidity	For operation maximum 85% RH; non-condensing. For storage & transportation (95%)			
Power losses	< 2,3 %			
Dimension	225x520x850	225x520x850	225x520x1200	225x520x1200
Weight	63 kg	70 kg	90 kg	95 kg
Cable entry	Top or Bottom	Top or Bottom	Top or Bottom	Top or Bottom
Noise	60 dB	64 dB	66 dB	67 dB
Current transformers	3 pieces, secondary 5A or 1A, class 1 or better			
*300 mm free space below and above required for air ventilation.				

Merus M-series active filters are available in 690V and 960V nominal voltage levels.

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