MERUS POWER

Merus® A2

Active Harmonic Filter

Power quality has traditionally focused on power factor, while harmonics have long existed in electrical systems. However, the growing share of modern non-linear applications has significantly increased the need for active and dynamic harmonic mitigation.

Today´s non-linear loads, renewable energy sources, and increasingly diverse electrical equipment have made harmonic distortion a leading cause of power quality issues. These harmonics don´t just disrupt systems, they also reduce efficiency, shorten equipment life, and negatively impact overall business performance.

Merus® A2 offering

200–480 V
- 50 A
- 100 A
- 150 A
- 200 A

480–690 V
- 50 A
- 100 A
- 125 A

7” HMI

Cabinets
- 600 mm
- 800 mm
- 1200 mm

Wall-mounted
- IP30 kit
- IP31 kit

with an integrated HMI

Dynamic compensation is the ultimate solution

To meet the evolving power quality challenges, Merus Power has developed Merus® A2 Active Harmonic Filter. It delivers real-time mitigation of harmonics, reactive power, and unbalance, and thus purpose-built to improve electrical performance and energy efficiency.

Harmonic current compensation:
Mitigation up to 50th harmonic, selectable 0...100% up to 25th

Reactive power compensation:
Both inductive and capacitive, selectable 0...100%

Load current balancing:
Fundamental cycle current load balancing selectable 0...100%

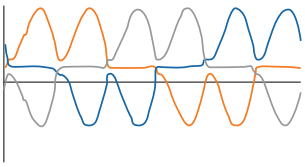
Harmonics

The silent safety hazard and energy efficiency killer

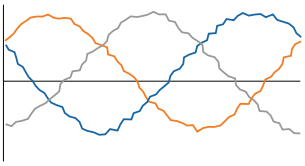
What are they?

Harmonics are distorted current and voltage waveforms that occur as integer multiples of the fundamental frequency.

Current with harmonics:



Harmonic-free current:



Causes and consequences

Causes

Non-linear loads, such as:

VFD PSU LED

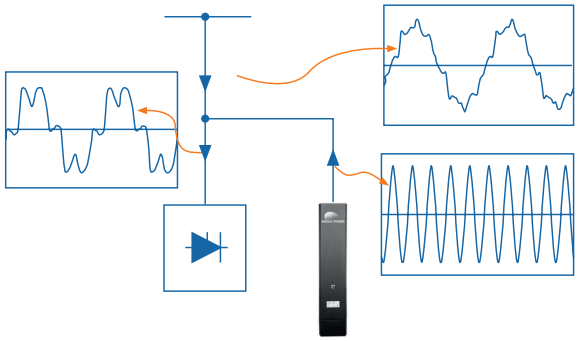
Consequences

Overheating Heat losses

Nuisance tripping Safety hazards

Premature equipment failures, malfunctions Reduced equipment lifetime

Active harmonic filtering solution



- **Ensuring compliance with various power quality standards and regulations: (EN 50160, IEEE519, IEC 61000, etc.)**
- **THDu, TDD, and unbalance will be reduced to be in line with the local legislation and standards.**
- **Promoting safe operations, system efficiency and energy savings.**

Passive compensation is becoming outdated in modern electrical systems

Modern electrical environments demand solutions that are fast, adaptive, and capable of addressing multiple power quality parameters in real time. Traditional Power Factor Correction (PFC) systems and passive filter banks are no longer sufficient, as they cannot dynamically respond to rapidly changing load profiles or precisely compensate for both harmonic current distortion and reactive power.

- VFD-driven motors and other non-linear loads generate harmonics, causing overheating, equipment stress and nuisance tripping.
- Inductive loads such as DOL motors store energy in magnetic fields; capacitive loads such as long cables store energy in electric fields - thus creating unwanted reactive power in the network.
- If reactive power is not adequately compensated locally, the grid owner performs compensation at the substation level, and thus fees for this service are applied to the local users.

An outdated PFC system can be replaced with Merus® A2 AHF or upgraded with Merus® Hybrid Power Quality (HPQ) compensator. Merus® HPQ is a combined solution of a traditional detuned capacitor bank and a modern active harmonic filter.

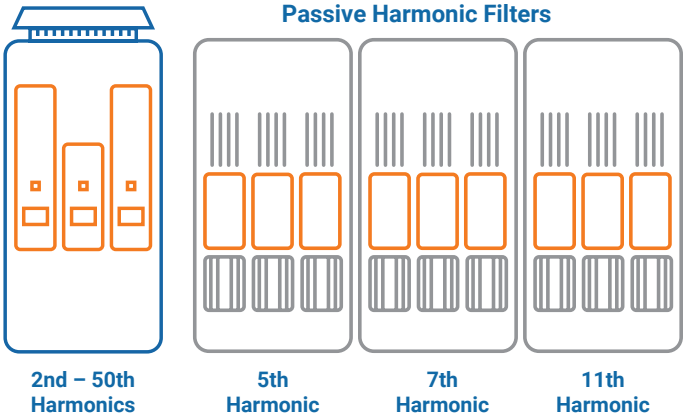
800A
1200mm cabinet

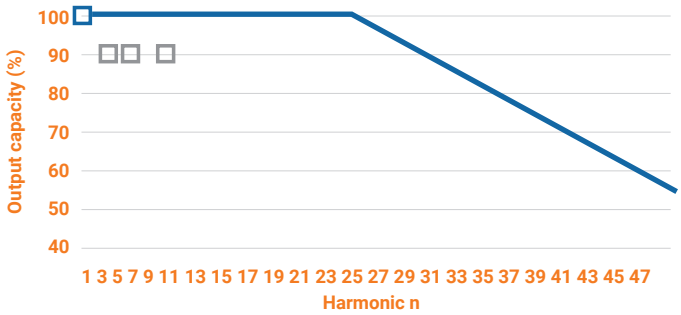
Smart system design
- Easily scalable with modular design
- Parallel structure where each unit operates as master or slave
- Suitable for wall-mounting and cabinet integration

Modularity for various systems and conditions
- 50/60 Hz
- Voltage connectivity 200-690V open and closed loop CT configurations
- 3/4 - wire

Verified performance
- Compliance with key standards (IEEE-519, G5/4, EN 50160, and others)
- Globally proven solution (CE certified, UL-508 listed, CSA certified)
- Fast response time under 1 network cycle, “all harmonics” mode under 100 µs
- No over or under compensation

Merus® A2
Active Harmonic Filter
cabinet



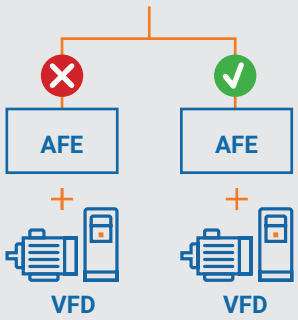


Unlike passive harmonic filters (PHFs), which target a limited range of current frequencies and offer little ability to adjust the degree of compensation, active harmonic filters (AHFs) continuously monitor the system and inject a wide range of compensating current frequencies in real time, cancelling harmonic distortion at the source.

In addition, chokes and capacitors are typically enclosed in a cabinet, resulting in a significantly larger installation footprint. In contrast, Merus® A2 AHF offers the flexibility to choose between cabinet-mounted or wall-mounted installation, with high-power-density modules delivering up to 200 A in a single unit.

Merus® A2 dynamically mitigates 2nd to 50th harmonics without derating under the 25th harmonic.

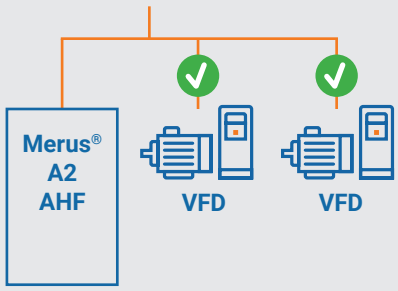
During maintenance/downtime, the VFD is out of operation



Unlike active front-end drives (AFEs), which are connected in series and limited to single-drive compensation, AHFs operate in parallel and therefore offer the flexibility to implement both centralized and decentralized compensation approaches.

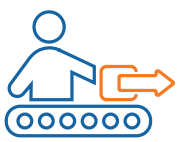
A centralized approach is often more cost- and energy- efficient due to the AHF´s lower losses and high level of redundancy. Merus® A2 AHF´s redundancy allows variable frequency drives (VFDs) to remain fully operational even during filter maintenance or downtime.

During maintenance/downtime, the VFD is operational



Merus® A2 provides high redundancy, and a centralized compensation approach delivers superior cost efficiency.

Over the years, Merus Power has delivered Active Harmonic Filters across the globe to various customers and successfully mitigated power quality problems. Our A2 customers benefit from improved power quality in terms of energy efficiency, operational excellence, and compliance with technical and usage regulations. In addition, we help reduce wasted energy and CO_2 emissions and enable a sustainable and more energy-efficient future.



Industry

Semiconductor, pulp & paper, food & beverages, pharmaceuticals, automotive, metal processing

Commercial buildings

Data centers, hospitals, airports, logistic centers, shopping malls

Infrastructure and utilities

Water treatment, wastewater purification, irrigation systems, desalination

Enhance your innovations with our expertise
Contact us to explore how Merus® Solutions can support your next project.

Why Merus Power?

5000+
active harmonic filter modules installed

THDi <5%
after filtering
(IEEE-519 compliant)

40+
countries with active partner presence

Over 15 years of experience in power quality and electrical engineering, Merus solutions are designed and manufactured in Finland, Ylöjärvi.

We provide a full range of Merus® Services:
power quality studies, commissioning, tailored operation and service agreements, spare parts management, maintenance, technical training, and ongoing support throughout product lifecycle

Our solutions are based on scalable and modular power electronics, advanced software technology and electrical engineering expertise.

Our staff of 150+ people represents internationally valued expertise.

MANAGEMENT SYSTEM CERTIFICATION
DNV
ISO 9001 · ISO 14001
ISO 45001

Scan to calculate your harmonic and unbalance needs

meruspower.com/sizing-tools

Merus® A2-Active Harmonic Filter is a robust, scalable, and modular solution designed for dynamic harmonic mitigation.

At Merus Power, our goal is to help customers achieve lower operational costs, extend equipment lifetime, and ensure a reliable electrical system. We are a trusted supplier of highly reliable products and a committed power quality partner, offering extensive after-sales support and regular training opportunities.

MERUS POWER

Send us an email to **sales@meruspower.com**.
One of our sales reps will be in touch with you as soon as possible.

Merus Power Plc | **www.meruspower.com** | sales@meruspower.com | Pallotie 2, 33470 Ylöjärvi, Finland