MERUS POWER

# Merus®
# STATCOM
## for heavy industry

# Merus® STATCOM for heavy industry

Steel mills and mines are users of heavy energy-intensive loads that also typically create significant $CO_2$ emissions, due to their large energy consumption. These plants typically create power quality problems in their own factory networks and surrounding power grids.

**Merus® STATCOM is a robust technological solution designed specifically for heavy industry applications and the most difficult loads.**

With Merus® STATCOM, our customers can unlock a multitude of significant benefits, enhancing the efficiency and reliability of their operations. By integrating this advanced system, businesses can expect to see substantial improvements across various aspects of their processes.

# Process benefits

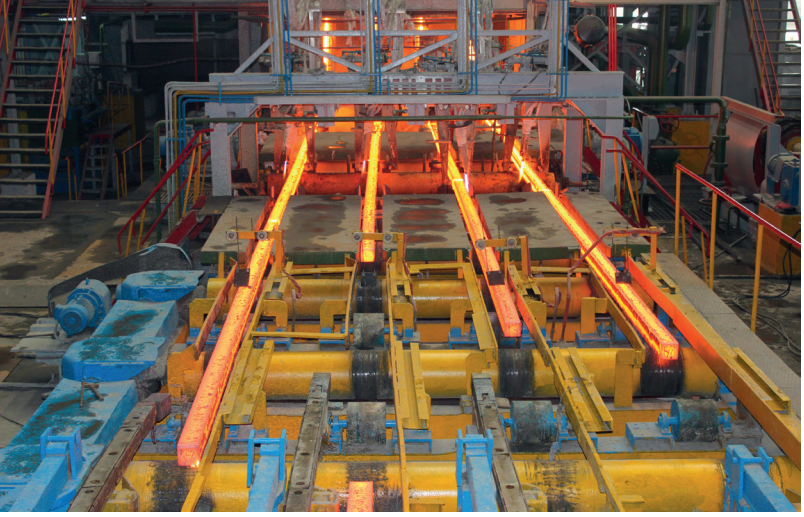
## Electric Arc Furnaces

**Electric Arc Furnaces (EAF)** and **Ladle Furnaces (LF)** are significant energy users in steel plants, leading to notable $CO_2$ emissions and power quality issues. Merus® STATCOM ensures steady voltage, which increases energy efficiency and reduces both $CO_2$ footprint and electrode consumption. This also minimizes flicker and power fluctuations, offering enhanced process reliability.

**Submerged Arc Furnaces (SAF)** and **Open Bath Furnaces (OBF)**, while less problematic than EAFs, still face power quality issues. Merus® STATCOM's ability to stabilize voltage improves their operation.

Emerging **inverter-based furnace technologies** also encounter similar challenges, which are effectively managed with Merus® STATCOM for optimal performance.

- **Increased production (typically 7-10%)**
- **Reduced energy consumption (typically 7%)**
- **Reduced $CO_2$ generation per ton (depends on fuel mix)**
- **Reduced electrode consumption (typically 0.15-0.18kg/ton)**
- **Grid Code Compliance**



## Rolling mills

In steel production, rolling processes rely heavily on electric motors.

**Direct Online Motors (DOL)** can suffer from poor power factor and voltage drops, leading to lower torque output and productivity. Merus® STATCOM can stabilize the voltage supply, enabling it to deliver the necessary torque consistently, which is crucial for maintaining productivity and efficiency.

**Variable Frequency Drives (VFDs)** and **DC Drives**, essential for controlling motor speeds, often face issues with harmonics and reactive power, causing power quality problems that may result in nuisance tripping and operational disruptions. The use of Merus® STATCOM counters these issues by smoothing out voltage fluctuations and reducing harmonic distortions, ensuring uninterrupted, grid code-compliant operation.

- **Production improvements**
- **Prevention of nuisance tripping**
- **Grid Code Compliance**

## Mining industry

**Heavy machines with large electric motors in mines**, including mining hoists, ball mills, and crushers, draw significant reactive power, causing voltage sags and affecting both grid stability and machinery productivity. Reduced voltage leads to decreased motor torque, impacting operational processes.

Merus® STATCOM mitigates these issues by delivering stable voltage, ensuring efficient mining operations without grid disturbances.

Additionally, in **islanded or semi-islanded grids** powered by generators, Merus® STATCOM contributes to fuel savings and $CO_2$ emission reductions by enabling the shutdown of surplus generators. An even greater number of generators can be shut down by combining the STATCOM with Merus Power's advanced battery energy storage system, Merus® ESS.

- **Improved productivity**
- **Reduced fuel costs and $CO_2$ emissions**
- **Grid Code Compliance**

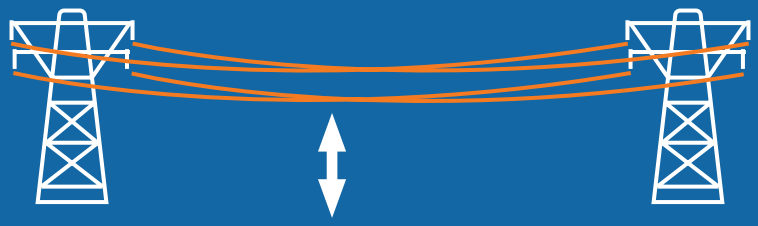
## Other heavy industrial loads

Other heavy industrial loads, such as pumps, harbor cranes, woodchippers, and conveyor belts stand to gain similar benefits from a Merus® STATCOM system than the mining industry.


**The main functions of Merus® STATCOM are voltage stabilization, dynamic reactive power compensation, load unbalance compensation, and harmonic filtering.**

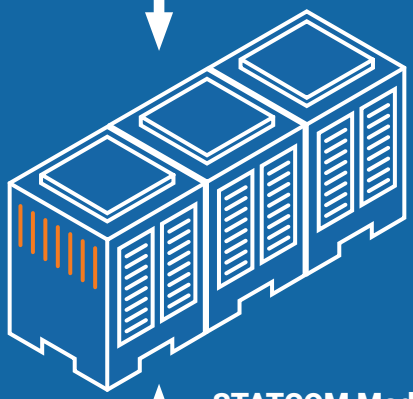
# What is Merus® STATCOM?

Merus® STATCOM system consists of a Control & Protection System (C&P), Merus® STATCOM-modules, and in some cases Filter Capacitor Banks (FCB).

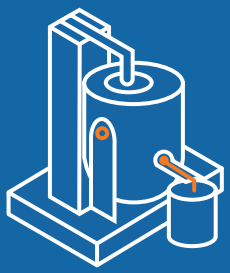


MV Bus

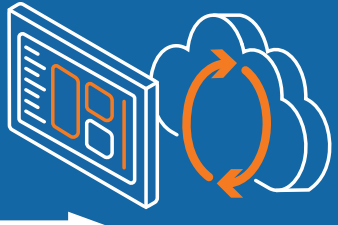
Filter Capacitor Bank



STATCOM Module



Heavy loads such as EAF, Rolling mills



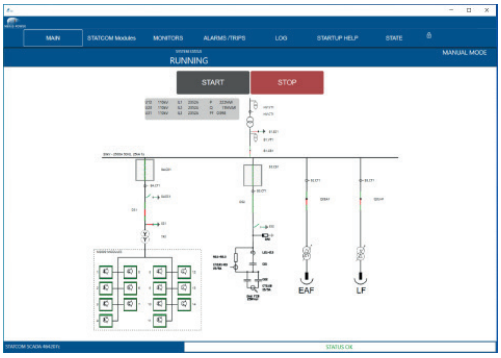
Control & Protection System

SCADA

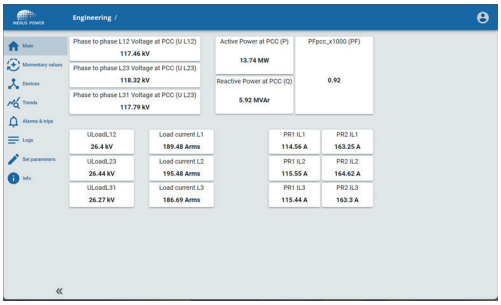
Merus® MERUSCOPE™

# Merus® Control and Protection System (C&P)

**The C&P system**, crafted by Merus Power's experts in Finland, is an integrated control cubicle crucial for managing and protecting the Merus® STATCOM system. It combines proprietary software with essential hardware to operate STATCOM modules, manage components like Filter Capacitor Banks, and handle protection functions, with all system-level controls relayed via a fiber optic link.



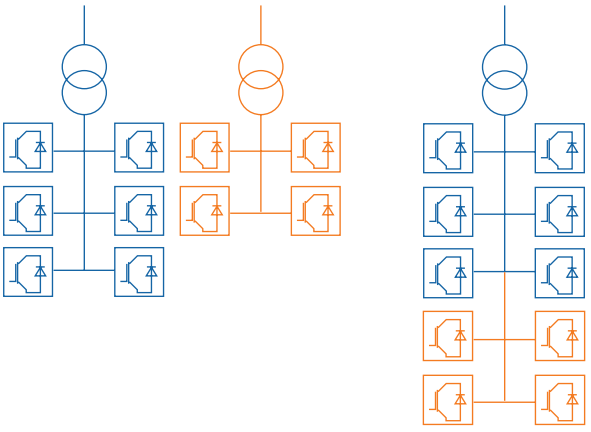

The **Merus® SCADA** system, running on an industrial-grade PC with a 19" touchscreen, streamlines communication, and data acquisition, simplifying operation management and event logging for easy data retrieval and transfer.




**Merus® MERUSCOPE™**, an optional cloud-based IoT service, integrates with the C&P system to provide comprehensive remote monitoring, real-time alerts, and historical data access, minimizing downtime and reducing maintenance costs.

Merus® STATCOM modules, including the **M2000** for demanding indoor use and the outdoor-oriented **PCM**, are the primary components controlled by the C&P System and are manufactured and tested at Merus Power's factory in Finland.

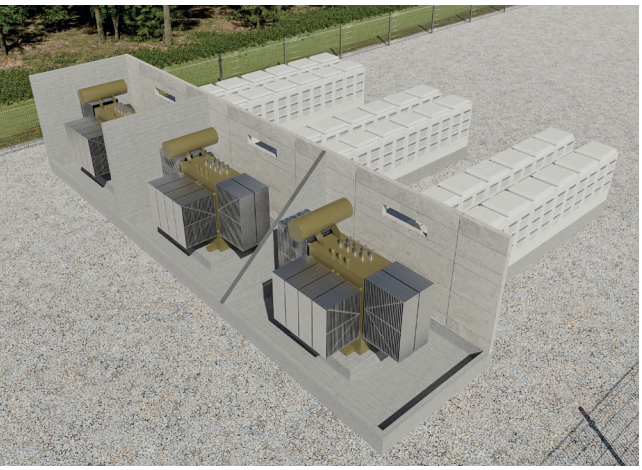

Merus® STATCOM modules are grouped into blocks based on system requirements and connected via coupling transformers to a medium-voltage bus, allowing for easy scalability by adding more modules or groups as needed.



The Merus® STATCOM system enhances reliability through independently designed modules with their own control, protection, and cooling systems, enabling seamless operation and automated control via Merus® SCADA, even if a module fails.

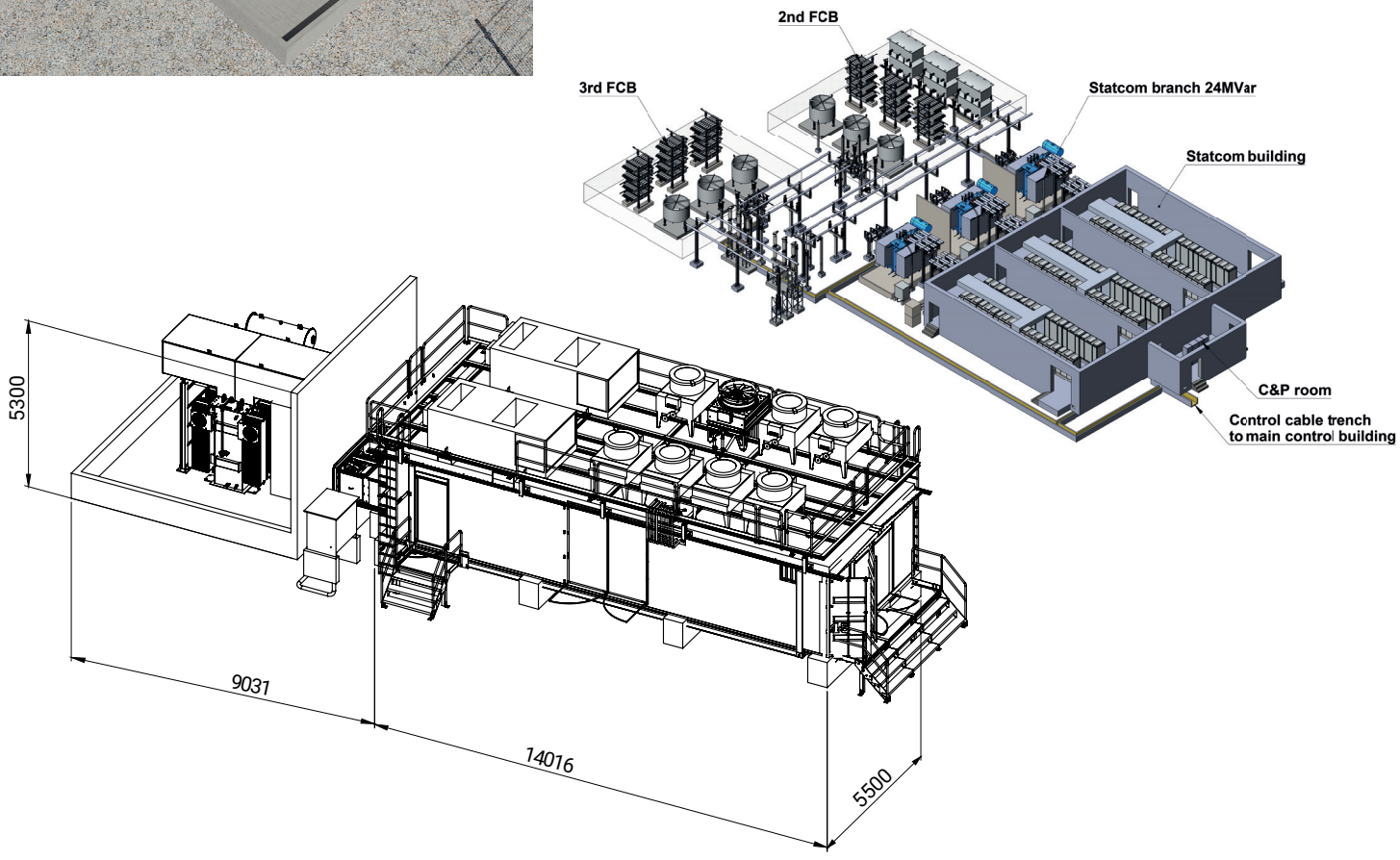
## Filter Capacitor Banks (FCB)

Depending on system requirements, the Merus® STATCOM may incorporate Filter Capacitor Banks, which are carefully selected by Merus Power's in-house team to optimize CAPEX and provide efficient harmonic filtering, using only audited and reliable suppliers.



## System size and MVAr ranges

The modular Merus® STATCOM offers scalable reactive power from a few MVArs in smaller mining plants to over 100 MVArs in large steel mills, adapting in size and layout to meet diverse power needs and construction requirements.



# Main design data

Merus® STATCOM for heavy industry

## Connection point
- Medium or high-voltage

## Installation environment
- Fully outdoor or indoor and outdoor
- -40℃ to +50℃

## Compliance
- Electrical safety: EN 50178.
- Electromagnetic compatibility (EMC): IEC 61000-6-2 (immunity) and IEC 61000-6-4 (emission).
- IEC 62351: Power systems management and associated information exchange – Data and communications security.

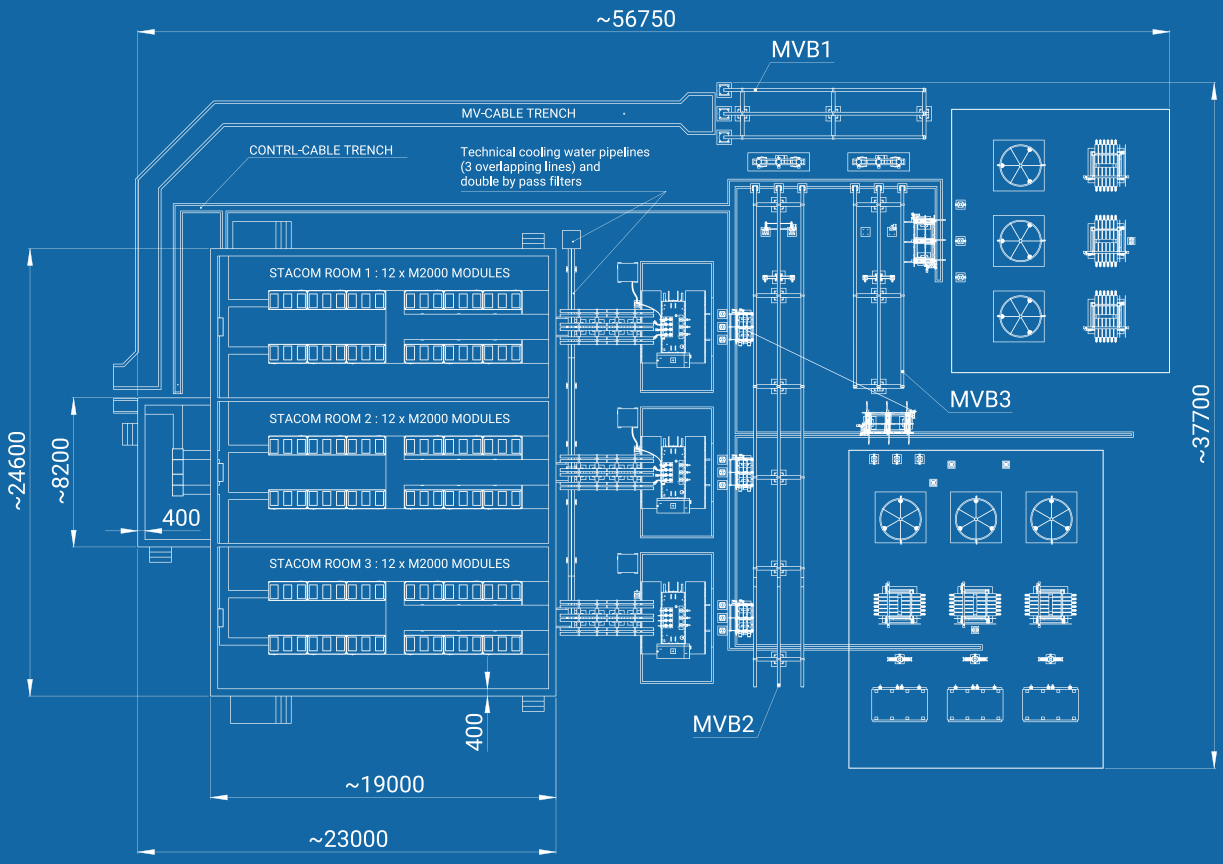
## Warranty
- Standard 1 year, option up to 10 years
- Optional availability guarantee

## Interfacing
- Modbus, IEC104

## Footprint examples
- Smaller system, 40-foot container
- 30MVAr system, approximately 15x21 meters
- 50MVAr system, approximately 28x32 meters
- 150MVAr system, approximately 37x55 meters

## Power modules
- PCM 1MVAr 800VAC
- M2000 2MVAr 2000VAC
- Response time under 1 millisecond
- Independent control
- Independent liquid cooling system

## Filter Capacitor Banks
- Medium-voltage
- Tuning frequency and power case dependent




# Buying from us

**At Merus Power, we guide you effortlessly through complexities, ensuring you find the ideal Merus® STATCOM solution that meets your needs. No prior knowledge needed—our expertise is at your service.**

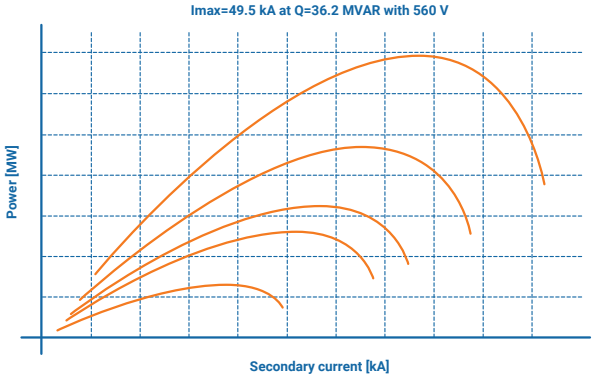
Creating a successful business case hinges on a collaborative process, tailored to each customer's unique needs and investment capabilities. You will collaborate with our experts together to define the optimum techno-commercial solution for your needs.

Assessment and analysis > Project specifications and budjetary estimates > Design and system configuration > Implementation and commissioning > Training and transitioning to Merus® O&M Service

## Step 1

### Assessment and analyses

The process starts with a detailed analysis of the customer's operational goals and long-term plans, leveraging our expertise in complex compensator systems to enhance productivity and deliver solutions with high returns on investment.




## Step 2

### Project specifications and budgetary estimates

Our STATCOM specialists will choose the optimal technology by comparing various options to match the customer's performance expectations and budget. Key considerations include process improvements, lifetime and reliability requirements, and technical constraints impacting the system's design.

## Step 3

### Design and system configuration

Once the preliminary designs and the budgetary estimates have been made and the customer is ready to move forward with the investment, the final investment case and the main design specifications are defined. The outcome is a custom-built business model, co-created with the customer, that reflects a true partnership.


# Step 4

## Implementation and commissioning

Once a project starts, our design team collaborates with the customer's engineers to ensure smooth integration of our STATCOM solution, followed by expedited procurement and manufacturing to meet deadlines, culminating in efficient installation and commissioning at the customer's facility by our service team.

# Step 5

## Training and transitioning to Merus® O&M Service

We understand the critical role of training and maintenance in ensuring the longevity and efficiency of STATCOM systems. Our comprehensive training equips your team for operation and maintenance, supported by a tailored multi-year agreement and enhanced by our cloud-based IoT service, Merus® MERUSCOPE™, for consistent, optimal performance.

# Merus Power

## Electrify your Future

Merus Power is a global technology company headquartered in the city of Ylöjärvi, Finland where we design and manufacture Finnish innovative battery energy storage systems and power quality solutions. Scalable and modular power electronics, intelligent software technologies and electrical engineering expertise are the base of our business.

Merus® Solutions can be easily tailored to a variety of applications and can meet small and large-scale customer needs with their modular structures. Their compact size, design, and scalability allow simple and cost-effective integration into many electrical systems.

Over the years we have worked with various customers in industry, utility, infrastructure, and renewable energy applications in over 70 different countries.

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.

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