

# **Europe Variable Frequency Drive Market By Application (Pumps, Conveyors, Fans, Compressors and Others), By End use (Oil & Gas, Industrial, Power and Infrastructure), By Type (AC Drive, DC Drive and Servo Drive), By Voltage type (Low and Medium), By Power rating (Micro, Low, Medium and High), By Country, By Competition Forecast & Opportunities, 2018-2028**

<https://marketpublishers.com/r/EE2B8AF9F7F5EN.html>

Date: October 2023

Pages: 133

Price: US\$ 4,000.00 (Single User License)

ID: EE2B8AF9F7F5EN

## **Abstracts**

Europe Variable Frequency Drive Market has valued at USD 5.93 billion in 2022 and is anticipated to project robust growth in the forecast period with a CAGR of 3.81% through 2028. The growing investment in infrastructure development has led to a surge in demand for Heating, Ventilation, and Air Conditioning (HVAC) systems. This, coupled with the need for energy-efficient infrastructure solutions, is anticipated to drive market growth.

### **Key Market Drivers**

#### **Energy Efficiency and Environmental Concerns**

The European Variable Frequency Drive (VFD) market has witnessed substantial growth in recent years, predominantly propelled by several key factors. One of the prominent drivers of this market is the escalating emphasis on energy efficiency and environmental concerns across the continent.

Europe has been at the forefront of global endeavors to curtail energy consumption and

minimize environmental impact. Consequently, industries and businesses face constant pressure to augment their energy efficiency and reduce their carbon footprint. Variable Frequency Drives play a pivotal role in this pursuit by optimizing the operation of electric motors, widely employed in various industrial applications.

VFDs enable precise control of motor speed and torque, facilitating machines and systems to function at their optimal performance levels. By adapting the motor's speed based on load requirements, VFDs significantly curtail energy consumption compared to traditional methods employing constant-speed motors. This leads to substantial energy savings and reduced greenhouse gas emissions, aligning with the European Union's ambitious objectives of energy efficiency and environmental sustainability.

Moreover, regulatory bodies and governments across Europe have implemented stringent energy efficiency standards and provided incentives to foster the adoption of energy-saving technologies like VFDs. These regulations and incentives have further accelerated the growth of the VFD market in Europe.

In conclusion, the mounting focus on energy efficiency and environmental concerns in Europe serves as a primary impetus for the VFD market. With the continent's unwavering commitment to sustainability and the robust regulatory framework in place, businesses and industries are increasingly turning to VFDs as an avenue to achieve their energy-saving objectives while mitigating their environmental impact.

#### Industrial Automation and Industry 4.0

Another significant driver fueling the growth of the Variable Frequency Drive (VFD) market in Europe is the rapid adoption of industrial automation and Industry 4.0 technologies. Europe has emerged as a leader in embracing advanced manufacturing and automation solutions, with VFDs playing a pivotal role in this transformative journey.

Industry 4.0, often referred to as the fourth industrial revolution, is characterized by the integration of digital technologies, the Internet of Things (IoT), data analytics, and automation in manufacturing processes. VFDs are essential components in this ecosystem as they provide precise control over motors and enable seamless integration with digital control systems.

VFDs facilitate the implementation of smart manufacturing strategies, enabling real-time monitoring and adjustment of motor performance. This empowers manufacturers to optimize production processes, reduce downtime, improve product quality, and enhance

overall productivity. Moreover, VFDs enable predictive maintenance by continuously monitoring motor performance and identifying issues before they result in costly breakdowns.

The European manufacturing sector, encompassing industries such as automotive, pharmaceuticals, chemicals, and food processing, has swiftly embraced Industry 4.0 principles to maintain competitiveness on a global scale. Consequently, there has been a surge in the demand for VFDs as an indispensable component of these automated and data-driven production systems.

Furthermore, European governments and industry associations have actively promoted the adoption of Industry 4.0 technologies through various initiatives, grants, and partnerships. These concerted efforts have incentivized manufacturers to invest in VFDs and other automation technologies to stay ahead in the evolving industrial landscape.

In conclusion, the rapid adoption of industrial automation and Industry 4.0 technologies in Europe serves as a major driver propelling the growth of the VFD market. VFDs are integral to achieving the levels of precision, efficiency, and flexibility required in modern manufacturing processes.

### Renewable Energy Integration and Grid Stability

The European Variable Frequency Drive (VFD) market is currently witnessing substantial growth due to the integration of renewable energy sources and the increasing focus on grid stability. As Europe strives to transition towards a more sustainable and low-carbon energy landscape, VFDs play a crucial role in facilitating the efficient utilization of renewable energy and ensuring the stability of electrical grids.

Renewable energy sources, such as wind and solar power, inherently exhibit variability, generating electricity intermittently based on weather conditions. This variability poses challenges for grid operators in maintaining a stable electricity supply. VFDs address this challenge by enabling controlled ramp-up and ramp-down of electric motors in response to fluctuations in the energy supply. This ensures smooth integration of energy generated from renewable sources into the grid, without any disruptions.

Furthermore, VFDs enhance the overall efficiency of renewable energy systems. For instance, in wind turbines, VFDs optimize the rotation speed of the generator to maximize energy capture from varying wind speeds. In solar applications, VFDs

improve the efficiency of tracking systems that follow the path of the sun, ensuring maximum sunlight exposure on solar panels.

European countries are making substantial investments in renewable energy infrastructure, including wind farms and solar installations, as part of their commitment to reducing greenhouse gas emissions. This surge in renewable energy installations has driven the demand for VFDs across various sectors, including power generation, industrial, and commercial applications.

Additionally, European grid operators increasingly rely on VFDs to enhance grid stability. VFDs offer features such as power factor correction and voltage regulation, which help maintain a stable electrical supply, reduce losses, and prevent voltage fluctuations. These capabilities are critical as the continent's energy mix becomes more diverse and decentralized with the integration of renewables.

In summary, the integration of renewable energy sources and the need for grid stability in Europe are significant factors driving the growth of the VFD market. VFDs are indispensable components that enable the efficient utilization of renewable energy and contribute to a more stable and resilient electrical grid.

## Key Market Challenges

### Cost Constraints and Initial Investment

One of the significant challenges faced by the Europe Variable Frequency Drive (VFD) market revolves around cost constraints, particularly the upfront investment required for VFD installations. VFDs are advanced and highly efficient control systems for electric motors; however, the initial purchase and installation costs can be substantial.

European industries and businesses, especially smaller enterprises, may encounter budget limitations that hinder investments in VFD technology. These cost challenges often discourage potential users from adopting VFDs, despite the significant long-term energy savings and operational benefits they offer.

The cost of VFDs encompasses not only the purchase of the equipment itself but also expenses related to engineering, installation, and integration into existing systems. In some cases, retrofitting older machinery with VFDs can be intricate and expensive, further deterring adoption.

Addressing this challenge necessitates innovative financing models and incentives from governments and industry associations to enhance the accessibility of VFD technology. This could involve subsidies, tax incentives, or low-interest loans to help businesses overcome the initial financial hurdle. Additionally, raising awareness about the long-term cost savings associated with VFDs can assist potential users in recognizing the value of their investment.

### Technical Expertise and Training

One of the significant challenges faced by the Europe VFD market is the requirement for technical expertise and training in the proper installation, configuration, and maintenance of VFD systems. The complexity of VFD technology necessitates specialized knowledge to ensure its effective and safe operation.

Numerous industries in Europe may lack in-house expertise or trained personnel to handle VFD installations and maintenance. Improperly configured or maintained VFDs can result in reduced energy savings, equipment damage, and safety hazards. This challenge becomes even more critical as industries increasingly adopt VFDs as part of their energy efficiency initiatives.

Addressing the challenge of technical expertise and training calls for collaborative efforts between manufacturers, educational institutions, and industry associations. Offering comprehensive training programs and certifications in VFD technology can empower technicians and engineers with the necessary skills to effectively work with these systems.

Moreover, VFD manufacturers can play a role in simplifying the installation and commissioning processes, making the technology more accessible to a broader range of users. Providing clear and user-friendly documentation, along with remote support options, can also assist end-users in maximizing the benefits of VFDs while minimizing technical challenges.

### Compatibility and Integration with Existing Systems

One of the key challenges in the Europe VFD market lies in guaranteeing seamless compatibility and integration of VFDs with existing industrial systems and infrastructure. Many European industries heavily rely on legacy equipment and processes, making the retrofitting of VFD technology into these environments a complex and potentially disruptive endeavor.

Compatibility issues may arise due to variations in communication protocols, control systems, or voltage requirements. Successfully integrating VFDs into existing systems without causing downtime or performance bottlenecks poses a significant technical challenge.

To overcome this obstacle, VFD manufacturers must provide comprehensive support and guidance on integrating their products with various types of industrial equipment. This may involve developing adapters, converters, or software solutions to facilitate interoperability.

In addition, the establishment of industry standards and guidelines for VFD integration can create a common framework for compatibility. Collaborative efforts among equipment manufacturers, system integrators, and VFD suppliers can lead to standardized approaches that simplify the integration process.

In conclusion, while the Europe VFD market offers significant energy-saving and operational benefits, it faces challenges related to initial costs, technical expertise, and compatibility with existing systems. Addressing these challenges requires a combination of financial incentives, training programs, and collaborative efforts to ensure the widespread adoption and successful implementation of VFD technology across European industries.

## Key Market Trends

### Growing Embrace of IoT and Industry 4.0 Integration

One of the prominent trends shaping the Europe Variable Frequency Drive (VFD) market is the increasing adoption of the Internet of Things (IoT) and integration with Industry 4.0 principles. Europe has been at the forefront of embracing advanced manufacturing technologies and automation, and VFDs are playing a pivotal role in this transformative journey.

With the rise of Industry 4.0, manufacturers are leveraging IoT sensors, data analytics, and real-time monitoring to optimize their operations. VFDs are a natural fit for this ecosystem, as they enable precise motor control and provide valuable data feedback. This facilitates predictive maintenance, enhances energy efficiency, and offers greater flexibility in production processes.



In practical terms, VFDs are equipped with advanced communication capabilities to seamlessly connect with IoT platforms and control systems. They transmit data on motor performance, energy consumption, and other relevant metrics, empowering manufacturers to make data-driven decisions and automate responses to changing conditions. For instance, a VFD-equipped motor can dynamically adjust its speed based on real-time demand fluctuations, thus minimizing energy waste and optimizing production.

The trend towards IoT integration in the VFD market is driven by the imperative for greater operational efficiency, reduced downtime, and enhanced predictive maintenance capabilities. It aligns with Europe's vision of smart manufacturing and sustainable production, positioning VFDs as a key enabler in this evolving landscape.

### Increased Focus on Energy Efficiency and Sustainability

Europe's dedication to energy efficiency and sustainability is a significant trend influencing the VFD market. As the region strives to decrease its carbon footprint and meet ambitious climate targets, VFDs are emerging as indispensable tools in achieving these objectives.

Energy efficiency regulations and standards in Europe are becoming increasingly stringent, prompting industries to seek innovative solutions to reduce their energy consumption. VFDs provide a proven method for optimizing the operation of electric motors, which are prevalent in various industrial applications.

A notable aspect of this trend is the integration of regenerative VFDs, capable of recovering and reusing energy during braking or deceleration processes. This capability not only reduces energy consumption but also contributes to grid stability.

Furthermore, the sustainability trend is driving VFD manufacturers to develop eco-friendly and energy-efficient VFD models. These units are designed to consume less power during standby mode and offer improved efficiency at partial loads, aligning with the principles of the circular economy and resource conservation.

Government incentives and subsidies further support the adoption of energy-efficient VFDs. Businesses that invest in VFD technology can benefit from reduced energy costs, lower emissions, and enhanced competitiveness in a market increasingly focused on sustainability.

## Segmental Insights

### Application Insights

The Pumps segment emerged as the dominant player in 2022. The pumps segment in the European VFD market holds significant importance due to its wide-ranging applications across various industries, including water and wastewater, HVAC, oil and gas, chemicals, and manufacturing. Pumps are utilized for fluid movement, and VFDs play a crucial role in controlling their speed and optimizing efficiency. The growth of the pumps segment is closely intertwined with the industrial and commercial sectors. As these industries continue to modernize and prioritize energy efficiency, the demand for VFDs to control pumps and motors is expected to steadily increase.

Energy efficiency remains a primary driving force for the pumps segment in the European VFD market. VFDs enable precise control of pump speed, allowing them to operate at optimal levels and significantly reduce energy consumption. Industries and municipalities throughout Europe are facing mounting pressure to minimize energy usage and carbon emissions, making VFDs an indispensable technology. In Europe, the water and wastewater treatment industry emerges as a major consumer of pumps and VFDs. The need for efficient and reliable water supply and treatment, coupled with regulatory requirements for energy efficiency, propels the adoption of VFDs in this sector. VFDs assist utilities and treatment plants in optimizing pumping operations, reducing energy costs, and meeting environmental standards.

The tightening of energy efficiency regulations across Europe presents new opportunities for the pumps segment. Businesses and municipalities are driven to comply with these regulations, leading to the adoption of VFDs as a proven solution for energy savings. Pump manufacturers and VFD suppliers can collaborate to offer customized solutions that cater to specific industry requirements. Tailored VFD systems addressing unique pump applications can effectively target niche markets.

### Voltage type Insights

The Low segment is projected to experience rapid growth during the forecast period. The low voltage VFD segment constitutes a significant portion of the overall VFD market in Europe. Low voltage VFDs find widespread use across diverse industries and applications owing to their versatility and compatibility with various electric motor types. This segment encompasses VFDs specifically designed for motors rated at 600 volts or lower.



The adoption of industrial automation, driven by Industry 4.0 principles, serves as a key catalyst for the low voltage VFD segment. These VFDs play a crucial role in achieving precise motor control in automated manufacturing and processing lines. Energy efficiency remains a fundamental driver in the low voltage VFD market. By enabling variable speed control, these VFDs facilitate optimal motor operation, resulting in significant energy savings. European industries face mounting pressure to meet stringent energy efficiency standards and reduce their carbon footprint, underscoring the indispensability of low voltage VFDs.

The tightening of energy efficiency regulations throughout Europe presents opportunities for the low voltage VFD segment. Businesses and industries are motivated to adopt energy-saving technologies, including low voltage VFDs, to comply with these regulations and lower operational costs. VFD manufacturers can provide tailored solutions for specific low voltage applications, catering to niche markets and enabling differentiation.

In summary, the low voltage VFD segment in the European market is driven by industrial automation, energy efficiency initiatives, and the integration of renewable energy. Opportunities arise from energy efficiency regulations, customization, collaboration with system integrators, and the provision of maintenance and after-sales services.

## Country Insights

Germany emerged as the dominant player in 2022. Germany's VFD market is substantial and demonstrates steady growth, propelled by its thriving industrial sector, emphasis on energy efficiency, and commitment to industrial automation. VFDs play a crucial role in optimizing energy consumption and motor control, rendering them indispensable across various industries.

Germany leads the way in industrial automation through its renowned Industry 4.0 initiative. VFDs are vital components in automated manufacturing processes, facilitating precise motor control and enabling the integration of advanced technologies such as the Internet of Things (IoT) and data analytics. Germany's strong emphasis on energy efficiency aligns with its ambitious sustainability goals, with VFDs allowing industries to reduce energy consumption by adjusting motor speed based on load requirements. This commitment to reducing carbon emissions and energy waste further reinforces their significance.

Germany's manufacturing sector, encompassing industries such as automotive, machinery, and chemicals, heavily relies on VFDs for process optimization. The country's robust manufacturing industry fosters consistent demand for VFDs, while its strong focus on energy efficiency creates favorable opportunities for VFD manufacturers. Incentivized by reduced energy costs and regulatory mandates, businesses are encouraged to invest in energy-saving technologies, including VFDs.

### Key Market Players

ABB Group

Siemens AG

Schneider Electric

Danfoss

Eaton Corporation

Yaskawa Electric Corporation

WEG Group

Rockwell Automation

Nidec Control Techniques

Invertek Drives

### Report Scope:

In this report, the Europe Variable Frequency Drive Market has been segmented into the following categories, in addition to the industry trends which have also been detailed below:

#### Europe Variable Frequency Drive Market, By Application:

Pumps

Conveyors

Fans

Compressors

Others

Europe Variable Frequency Drive Market, By End use:

Oil & Gas

Industrial

Power

Infrastructure

Europe Variable Frequency Drive Market, By Type:

AC Drive

DC Drive

Servo Drive

Europe Variable Frequency Drive Market, By Voltage type:

Low

Medium

Europe Variable Frequency Drive Market, By Products:

Micro

Low

Medium High

Europe Variable Frequency Drive Market, By Power rating:

Germany

United Kingdom

France

Italy

Spain

Netherlands

Switzerland

Russia

Poland

Sweden

## Competitive Landscape

Company Profiles: Detailed analysis of the major companies present in the Europe Variable Frequency Drive Market.

Available Customizations:

Europe Variable Frequency Drive Market report with the given market data, Tech Sci Research offers customizations according to a company's specific needs. The following customization options are available for the report:

## Company Information

Detailed analysis and profiling of additional market players (up to five).

*Europe Variable Frequency Drive Market By Application (Pumps, Conveyors, Fans, Compressors and Others), By End...*



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