

Digital Substation Market - Global Industry Size, Share, Trends, Opportunity, and Forecast, Segmented By Module (Hardware, Fiber Optic Communication Network, SCADA Systems, Protection and Control Systems, Others), By Voltage (Up to 220 kV, 220–550 kV, Above 550 kV), By End-use Industry (Power Utility, Oil and Gas, Mining, Transportation, Others), By Region & Competition, 2020-2030F

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Abstracts

Market Overview

The Global Digital Substation Market was valued at USD 6.45 billion in 2024 and is projected to reach USD 9.85 billion by 2030, growing at a CAGR of 7.16% during the forecast period. Digital substations represent a significant evolution in the power industry by incorporating advanced digital technologies, communication systems, and intelligent electronic devices (IEDs) into traditional substation operations. These systems enhance operational efficiency, safety, and reliability by replacing conventional analog methods with digital tools such as fiber-optic communication, process bus architecture, and real-time data analytics. Key benefits include reduced maintenance costs, improved asset management, enhanced grid reliability, and optimized space utilization. Additionally, components like SCADA systems, automated protection relays, and real-time sensors facilitate predictive maintenance and quicker response times, significantly boosting grid performance and minimizing downtimes.

Key Market Drivers

Accelerating Global Electricity Demand

The rapid increase in global electricity consumption—driven by industrial growth, widespread use of air conditioning, transportation electrification, and data center expansion—necessitates the modernization of power infrastructure. Digital substations, equipped with automation and real-time monitoring capabilities, are crucial for managing this growing demand. These substations help utilities efficiently distribute electrical loads, maintain grid stability, and minimize energy losses, thereby ensuring a steady and reliable electricity supply.

Key Market Challenges

Cybersecurity Vulnerabilities in Digital Substations

While digitalization enhances substation efficiency, it also introduces significant cybersecurity risks. The reliance on interconnected protocols such as IEC 61850 broadens the potential for cyber threats including unauthorized access, data breaches, and system disruptions. Events like the 2015 Ukraine power grid cyberattack highlight the seriousness of these threats. To address these vulnerabilities, utility providers must adopt robust cybersecurity frameworks incorporating access controls, segmented networks, timely software updates, and staff training. Given the evolving nature of cyberattacks, ongoing investment in advanced defense systems like intrusion detection and secure communication protocols is essential to protect critical infrastructure.

Key Market Trends

Adoption of Virtualization and Digital Twin Technologies

Virtualization and digital twin technologies are significantly enhancing operational performance in the Digital Substation market. Digital twins—virtual representations of physical substations—allow utilities to simulate operations, monitor systems, and detect potential issues before they impact performance. These tools support predictive maintenance and improve efficiency without disrupting real-time operations. Virtualization separates software functions from hardware, enabling centralized control, easier updates, and greater adaptability. This trend is particularly advantageous for integrating renewable energy sources and managing distributed energy systems, supporting a more resilient and intelligent grid infrastructure.

Key Market Players

Siemens AG

General Electric Company

Schneider Electric SE

ABB Ltd

Mitsubishi Electric Corporation

Honeywell International Inc

Rockwell Automation Inc

Alstom SA

Toshiba Corporation

Eaton Corporation Plc

Report Scope:

In this report, the Global Digital Substation Market has been segmented into the following categories, in addition to the industry trends which have also been detailed below:

Digital Substation Market, By Module:

Hardware

Fiber Optic Communication Network

SCADA Systems

Protection and Control Systems

Others

Digital Substation Market, By Voltage:

Up to 220 kV

220–550 kV

Above 550 kV

Digital Substation Market, By End-use Industry:

Power Utility

Oil and Gas

Mining

Transportation

Others

Digital Substation Market, By Region:

North America

United States

Canada

Mexico

Europe

Germany

France

United Kingdom

Italy

Spain

South America

Brazil

Argentina

Colombia

Asia-Pacific

China

India

Japan

South Korea

Australia

Middle East & Africa

Saudi Arabia

UAE

South Africa

Competitive Landscape

Company Profiles: Detailed analysis of the major companies present in the Global Digital Substation Market.

Available Customizations:

Global Digital Substation Market report with the given market data, TechSci 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).

Contents

1. PRODUCT OVERVIEW

- 1.1. Market Definition
- 1.2. Scope of the Market
 - 1.2.1. Markets Covered
 - 1.2.2. Years Considered for Study
 - 1.2.3. Key Market Segmentations

2. RESEARCH METHODOLOGY

- 2.1. Objective of the Study
- 2.2. Baseline Methodology
- 2.3. Key Industry Partners
- 2.4. Major Association and Secondary Sources
- 2.5. Forecasting Methodology
- 2.6. Data Triangulation & Validation
- 2.7. Assumptions and Limitations

3. EXECUTIVE SUMMARY

- 3.1. Overview of the Market
- 3.2. Overview of Key Market Segmentations
- 3.3. Overview of Key Market Players
- 3.4. Overview of Key Regions/Countries
- 3.5. Overview of Market Drivers, Challenges, and Trends

4. VOICE OF CUSTOMER

5. GLOBAL DIGITAL SUBSTATION MARKET OUTLOOK

- 5.1. Market Size & Forecast
 - 5.1.1. By Value
- 5.2. Market Share & Forecast
 - 5.2.1. By Module (Hardware, Fiber Optic Communication Network, SCADA Systems, Protection and Control Systems, Others)
 - 5.2.2. By Voltage (Up to 220 kV, 220–550 kV, Above 550 kV)
 - 5.2.3. By End-use Industry (Power Utility, Oil and Gas, Mining, Transportation, Others)

- 5.2.4. By Region (North America, Europe, South America, Middle East & Africa, Asia Pacific)
- 5.3. By Company (2024)
- 5.4. Market Map

6. NORTH AMERICA DIGITAL SUBSTATION MARKET OUTLOOK

- 6.1. Market Size & Forecast
 - 6.1.1. By Value
- 6.2. Market Share & Forecast
 - 6.2.1. By Module
 - 6.2.2. By Voltage
 - 6.2.3. By End-use Industry
 - 6.2.4. By Country
- 6.3. North America: Country Analysis
 - 6.3.1. United States Digital Substation Market Outlook
 - 6.3.1.1. Market Size & Forecast
 - 6.3.1.1.1. By Value
 - 6.3.1.2. Market Share & Forecast
 - 6.3.1.2.1. By Module
 - 6.3.1.2.2. By Voltage
 - 6.3.1.2.3. By End-use Industry
 - 6.3.2. Canada Digital Substation Market Outlook
 - 6.3.2.1. Market Size & Forecast
 - 6.3.2.1.1. By Value
 - 6.3.2.2. Market Share & Forecast
 - 6.3.2.2.1. By Module
 - 6.3.2.2.2. By Voltage
 - 6.3.2.2.3. By End-use Industry
 - 6.3.3. Mexico Digital Substation Market Outlook
 - 6.3.3.1. Market Size & Forecast
 - 6.3.3.1.1. By Value
 - 6.3.3.2. Market Share & Forecast
 - 6.3.3.2.1. By Module
 - 6.3.3.2.2. By Voltage
 - 6.3.3.2.3. By End-use Industry

7. EUROPE DIGITAL SUBSTATION MARKET OUTLOOK

- 7.1. Market Size & Forecast
 - 7.1.1. By Value
- 7.2. Market Share & Forecast
 - 7.2.1. By Module
 - 7.2.2. By Voltage
 - 7.2.3. By End-use Industry
 - 7.2.4. By Country
- 7.3. Europe: Country Analysis
 - 7.3.1. Germany Digital Substation Market Outlook
 - 7.3.1.1. Market Size & Forecast
 - 7.3.1.1.1. By Value
 - 7.3.1.2. Market Share & Forecast
 - 7.3.1.2.1. By Module
 - 7.3.1.2.2. By Voltage
 - 7.3.1.2.3. By End-use Industry
 - 7.3.2. France Digital Substation Market Outlook
 - 7.3.2.1. Market Size & Forecast
 - 7.3.2.1.1. By Value
 - 7.3.2.2. Market Share & Forecast
 - 7.3.2.2.1. By Module
 - 7.3.2.2.2. By Voltage
 - 7.3.2.2.3. By End-use Industry
 - 7.3.3. United Kingdom Digital Substation Market Outlook
 - 7.3.3.1. Market Size & Forecast
 - 7.3.3.1.1. By Value
 - 7.3.3.2. Market Share & Forecast
 - 7.3.3.2.1. By Module
 - 7.3.3.2.2. By Voltage
 - 7.3.3.2.3. By End-use Industry
 - 7.3.4. Italy Digital Substation Market Outlook
 - 7.3.4.1. Market Size & Forecast
 - 7.3.4.1.1. By Value
 - 7.3.4.2. Market Share & Forecast
 - 7.3.4.2.1. By Module
 - 7.3.4.2.2. By Voltage
 - 7.3.4.2.3. By End-use Industry
 - 7.3.5. Spain Digital Substation Market Outlook
 - 7.3.5.1. Market Size & Forecast
 - 7.3.5.1.1. By Value

- 7.3.5.2. Market Share & Forecast
 - 7.3.5.2.1. By Module
 - 7.3.5.2.2. By Voltage
 - 7.3.5.2.3. By End-use Industry

8. ASIA PACIFIC DIGITAL SUBSTATION MARKET OUTLOOK

- 8.1. Market Size & Forecast
 - 8.1.1. By Value
- 8.2. Market Share & Forecast
 - 8.2.1. By Module
 - 8.2.2. By Voltage
 - 8.2.3. By End-use Industry
 - 8.2.4. By Country
- 8.3. Asia Pacific: Country Analysis
 - 8.3.1. China Digital Substation Market Outlook
 - 8.3.1.1. Market Size & Forecast
 - 8.3.1.1.1. By Value
 - 8.3.1.2. Market Share & Forecast
 - 8.3.1.2.1. By Module
 - 8.3.1.2.2. By Voltage
 - 8.3.1.2.3. By End-use Industry
 - 8.3.2. India Digital Substation Market Outlook
 - 8.3.2.1. Market Size & Forecast
 - 8.3.2.1.1. By Value
 - 8.3.2.2. Market Share & Forecast
 - 8.3.2.2.1. By Module
 - 8.3.2.2.2. By Voltage
 - 8.3.2.2.3. By End-use Industry
 - 8.3.3. Japan Digital Substation Market Outlook
 - 8.3.3.1. Market Size & Forecast
 - 8.3.3.1.1. By Value
 - 8.3.3.2. Market Share & Forecast
 - 8.3.3.2.1. By Module
 - 8.3.3.2.2. By Voltage
 - 8.3.3.2.3. By End-use Industry
 - 8.3.4. South Korea Digital Substation Market Outlook
 - 8.3.4.1. Market Size & Forecast
 - 8.3.4.1.1. By Value

- 8.3.4.2. Market Share & Forecast
 - 8.3.4.2.1. By Module
 - 8.3.4.2.2. By Voltage
 - 8.3.4.2.3. By End-use Industry
- 8.3.5. Australia Digital Substation Market Outlook
 - 8.3.5.1. Market Size & Forecast
 - 8.3.5.1.1. By Value
 - 8.3.5.2. Market Share & Forecast
 - 8.3.5.2.1. By Module
 - 8.3.5.2.2. By Voltage
 - 8.3.5.2.3. By End-use Industry

9. MIDDLE EAST & AFRICA DIGITAL SUBSTATION MARKET OUTLOOK

- 9.1. Market Size & Forecast
 - 9.1.1. By Value
- 9.2. Market Share & Forecast
 - 9.2.1. By Module
 - 9.2.2. By Voltage
 - 9.2.3. By End-use Industry
 - 9.2.4. By Country
- 9.3. Middle East & Africa: Country Analysis
 - 9.3.1. Saudi Arabia Digital Substation Market Outlook
 - 9.3.1.1. Market Size & Forecast
 - 9.3.1.1.1. By Value
 - 9.3.1.2. Market Share & Forecast
 - 9.3.1.2.1. By Module
 - 9.3.1.2.2. By Voltage
 - 9.3.1.2.3. By End-use Industry
 - 9.3.2. UAE Digital Substation Market Outlook
 - 9.3.2.1. Market Size & Forecast
 - 9.3.2.1.1. By Value
 - 9.3.2.2. Market Share & Forecast
 - 9.3.2.2.1. By Module
 - 9.3.2.2.2. By Voltage
 - 9.3.2.2.3. By End-use Industry
 - 9.3.3. South Africa Digital Substation Market Outlook
 - 9.3.3.1. Market Size & Forecast
 - 9.3.3.1.1. By Value

9.3.3.2. Market Share & Forecast

9.3.3.2.1. By Module

9.3.3.2.2. By Voltage

9.3.3.2.3. By End-use Industry

10. SOUTH AMERICA DIGITAL SUBSTATION MARKET OUTLOOK

10.1. Market Size & Forecast

10.1.1. By Value

10.2. Market Share & Forecast

10.2.1. By Module

10.2.2. By Voltage

10.2.3. By End-use Industry

10.2.4. By Country

10.3. South America: Country Analysis

10.3.1. Brazil Digital Substation Market Outlook

10.3.1.1. Market Size & Forecast

10.3.1.1.1. By Value

10.3.1.2. Market Share & Forecast

10.3.1.2.1. By Module

10.3.1.2.2. By Voltage

10.3.1.2.3. By End-use Industry

10.3.2. Colombia Digital Substation Market Outlook

10.3.2.1. Market Size & Forecast

10.3.2.1.1. By Value

10.3.2.2. Market Share & Forecast

10.3.2.2.1. By Module

10.3.2.2.2. By Voltage

10.3.2.2.3. By End-use Industry

10.3.3. Argentina Digital Substation Market Outlook

10.3.3.1. Market Size & Forecast

10.3.3.1.1. By Value

10.3.3.2. Market Share & Forecast

10.3.3.2.1. By Module

10.3.3.2.2. By Voltage

10.3.3.2.3. By End-use Industry

11. MARKET DYNAMICS

- 11.1. Drivers
- 11.2. Challenges

12. MARKET TRENDS AND DEVELOPMENTS

- 12.1. Merger & Acquisition (If Any)
- 12.2. Product Launches (If Any)
- 12.3. Recent Developments

13. COMPANY PROFILES

- 13.1. Siemens AG
 - 13.1.1. Business Overview
 - 13.1.2. Key Revenue and Financials
 - 13.1.3. Recent Developments
 - 13.1.4. Key Personnel
 - 13.1.5. Key Product/Services Offered
- 13.2. General Electric Company
- 13.3. Schneider Electric SE
- 13.4. Alstom SA
- 13.5. Mitsubishi Electric Corporation
- 13.6. Honeywell International Inc
- 13.7. Rockwell Automation Inc
- 13.8. ABB Ltd
- 13.9. Toshiba Corporation
- 13.10. Eaton Corporation Plc

14. STRATEGIC RECOMMENDATIONS

15. ABOUT US & DISCLAIMER

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