

Global Fault Detection and Classification System Market 2026 by Manufacturers, Regions, Type and Application, Forecast to 2032

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Abstracts

According to our (Global Info Research) latest study, the global Fault Detection and Classification System market size was valued at US\$ 4990 million in 2025 and is forecast to a readjusted size of US\$ 12127 million by 2032 with a CAGR of 13.5% during review period.

Fault Detection and Classification System refers to industrial software platforms that detect abnormal behavior, classify fault types, diagnose root causes and support predictive or prescriptive maintenance across manufacturing equipment, semiconductor tools, production processes and critical industrial assets. These systems use sensor traces, process variables, controller logs, vibration data, electrical signatures, thermal data, inspection results, quality data, maintenance history and machine learning models to identify deviations from normal operation, classify faults, prioritize alerts and support corrective actions.

Fault Detection and Classification systems should be understood as industrial software platforms that combine anomaly detection, fault classification, root-cause analysis, predictive failure modeling, process excursion control and maintenance recommendation. They are different from basic SCADA, CMMS, sensors or data acquisition systems. The core value is not only to show that equipment or process data is abnormal, but also to identify the fault type, assess severity, explain the likely cause and support corrective action before failures create downtime, quality loss or safety risks.

From a supply-side perspective, the market is shaped by several vendor groups. Semiconductor FDC vendors such as PDF Solutions, INFICON, Synopsys BISTel, Onto

Innovation and Applied Materials are strong in tool trace monitoring, process excursion detection, yield correlation and fab-level process control. Industrial software and automation vendors such as Siemens, IBM, GE Vernova, AVEVA, Emerson/AspenTech, Honeywell, Rockwell and Schneider Electric provide broader asset performance management, predictive maintenance and industrial analytics platforms. Specialist AI and condition-monitoring vendors such as Augury, Samotics, Seeq, C3 AI, Tractian, Artesis and Waites focus on machine health, vibration, electrical signature analysis, anomaly detection and predictive diagnostics. Chinese industrial intelligence vendors such as GTRONTEC, IROOTECH, NeuCloud and K2Data are gaining traction in localized manufacturing, equipment health management and private deployment projects.

From the demand side, semiconductor and electronics manufacturing is one of the highest-value applications because process excursions can cause large-scale wafer loss, yield reduction and equipment downtime. Process industries such as chemicals, petrochemicals, pharmaceuticals, metallurgy and cement need FDC systems to identify process deviation, asset degradation and safety-critical abnormalities. Discrete manufacturers use these systems for machine tools, robots, drives, conveyors and automated production lines. Energy, utility, transportation and heavy-equipment operators focus more on critical asset availability, remote diagnostics and failure prediction. Each segmentation dimension should be treated as MECE: revenue is classified by the primary application industry, primary software function, primary data source, technology approach, deployment architecture or customer type, and the categories within each dimension add up to 100%.

From a technology roadmap perspective, the market is moving from rule-based thresholds and SPC-style FDC toward AI-enhanced, explainable and closed-loop diagnostic platforms. Earlier systems mainly generated alarms when variables crossed control limits. Newer platforms integrate high-frequency time-series data, machine learning, deep learning, hybrid physics-AI models, root-cause graphs, generative AI assistants and automated work-order workflows. Future competition will depend less on simple anomaly detection and more on low false-alarm rates, fault classification accuracy, explainability, model lifecycle management, integration with MES/EAM/CMMS/APC/SPC systems and the ability to translate diagnostic results into maintenance or process-control actions. Vendors with strong industrial data foundations, domain engineering knowledge, scalable AI models and enterprise deployment capability are likely to be better positioned than pure sensor providers or project-only integrators.

This report is a detailed and comprehensive analysis for global Fault Detection and Classification System market. Both quantitative and qualitative analyses are presented by manufacturers, by region & country, by Primary Software Function and by Application. As the market is constantly changing, this report explores the competition, supply and demand trends, as well as key factors that contribute to its changing demands across many markets. Company profiles and product examples of selected competitors, along with market share estimates of some of the selected leaders for the year 2025, are provided.

Key Features:

Global Fault Detection and Classification System market size and forecasts, in consumption value (\$ Million), sales quantity (Units), and average selling prices (US\$/Unit), 2021-2032

Global Fault Detection and Classification System market size and forecasts by region and country, in consumption value (\$ Million), sales quantity (Units), and average selling prices (US\$/Unit), 2021-2032

Global Fault Detection and Classification System market size and forecasts, by Primary Software Function and by Application, in consumption value (\$ Million), sales quantity (Units), and average selling prices (US\$/Unit), 2021-2032

Global Fault Detection and Classification System market shares of main players, shipments in revenue (\$ Million), sales quantity (Units), and ASP (US\$/Unit), 2021-2026

The Primary Objectives in This Report Are:

To determine the size of the total market opportunity of global and key countries

To assess the growth potential for Fault Detection and Classification System

To forecast future growth in each product and end-use market

To assess competitive factors affecting the marketplace

This report profiles key players in the global Fault Detection and Classification System market based on the following parameters - company overview, sales quantity, revenue,

price, gross margin, product portfolio, geographical presence, and key developments. Key companies covered as a part of this study include PDF Solutions, Inc., INFICON Holding AG, Synopsys, Inc., Onto Innovation Inc., Applied Materials, Inc., Siemens AG, IBM Corporation, GE Vernova Inc., AVEVA Group Limited, Beijing NeuCloud Co., Ltd., etc.

This report also provides key insights about market drivers, restraints, opportunities, new product launches or approvals.

Market Segmentation

Fault Detection and Classification System market is split by Primary Software Function and by Application. For the period 2021-2032, the growth among segments provides accurate calculations and forecasts for consumption value by Primary Software Function, and by Application in terms of volume and value. This analysis can help you expand your business by targeting qualified niche markets.

Market segment by Primary Software Function

- Process and Tool Sensor Traces

- Vibration and Acoustic Signals

- Electrical Signature Data

- Thermal, Oil and Ultrasound Data

- Controller Logs and Alarm Events

- Quality, Inspection and Metrology Data

- Multimodal Industrial Data

Market segment by Primary Data Source

- Rule-based and SPC-based FDC

- Physics-based Diagnostic Models

Classical Machine Learning Models

Deep Learning Time-series Models

Generative and Agentic AI Diagnostics

Hybrid Diagnostic Models

Market segment by Technology Approach

Rule-based and SPC-based FDC

Physics-based Diagnostic Models

Classical Machine Learning Models

Deep Learning Time-series Models

Generative and Agentic AI Diagnostics

Hybrid Diagnostic Models

Market segment by Application

Semiconductor and Electronics Manufacturing FDC

Process Industry Fault Diagnostics

Discrete Manufacturing Equipment Diagnostics

Energy and Utility Asset Diagnostics

Transportation and Heavy Equipment Diagnostics

Other Specialized Industrial FDC

Major players covered

PDF Solutions, Inc.

INFICON Holding AG

Synopsys, Inc.

Onto Innovation Inc.

Applied Materials, Inc.

Siemens AG

IBM Corporation

GE Vernova Inc.

AVEVA Group Limited

Beijing NeuCloud Co., Ltd.

Honeywell International Inc.

Rockwell Automation, Inc.

Schneider Electric SE

Emerson Electric Co.

C3.ai, Inc.

Augury Inc.

Seeq Corporation

Samotics B.V.

Traction Technologies Inc.

Artesis Technology Systems A.S.

Waites Sensor Technologies

eInnoSys Inc.

GTRONTEC

IROOTECH

Market segment by region, regional analysis covers

North America (United States, Canada, and Mexico)

Europe (Germany, France, United Kingdom, Russia, Italy, and Rest of Europe)

Asia-Pacific (China, Japan, Korea, India, Southeast Asia, and Australia)

South America (Brazil, Argentina, Colombia, and Rest of South America)

Middle East & Africa (Saudi Arabia, UAE, Egypt, South Africa, and Rest of Middle East & Africa)

The content of the study subjects, includes a total of 15 chapters:

Chapter 1, to describe Fault Detection and Classification System product scope, market overview, market estimation caveats and base year.

Chapter 2, to profile the top manufacturers of Fault Detection and Classification System, with price, sales quantity, revenue, and global market share of Fault Detection and Classification System from 2021 to 2026.

Chapter 3, the Fault Detection and Classification System competitive situation, sales quantity, revenue, and global market share of top manufacturers are analyzed emphatically by landscape contrast.

Chapter 4, the Fault Detection and Classification System breakdown data are shown at the regional level, to show the sales quantity, consumption value, and growth by regions, from 2021 to 2032.

Chapter 5 and 6, to segment the sales by Primary Software Function and by Application, with sales market share and growth rate by Primary Software Function, by Application, from 2021 to 2032.

Chapter 7, 8, 9, 10 and 11, to break the sales data at the country level, with sales quantity, consumption value, and market share for key countries in the world, from 2021 to 2026. and Fault Detection and Classification System market forecast, by regions, by Primary Software Function, and by Application, with sales and revenue, from 2027 to 2032.

Chapter 12, market dynamics, drivers, restraints, trends, and Porters Five Forces analysis.

Chapter 13, the key raw materials and key suppliers, and industry chain of Fault Detection and Classification System.

Chapter 14 and 15, to describe Fault Detection and Classification System sales channel, distributors, customers, research findings and conclusion.

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