

# Global Fault Detection and Classification System Market Growth 2026-2032

<https://marketpublishers.com/r/G8F074395FE1EN.html>

Date: July 2026

Pages: 164

Price: US\$ 3,660.00 (Single User License)

ID: G8F074395FE1EN

## Abstracts

The global Fault Detection and Classification System market size is predicted to grow from US\$ 4745 million in 2025 to US\$ 12051 million in 2032; it is expected to grow at a CAGR of 14.3% from 2026 to 2032.

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.

LP Information, Inc. (LPI) ' newest research report, the 'Fault Detection and Classification System Industry Forecast' looks at past sales and reviews total world

Fault Detection and Classification System sales in 2025, providing a comprehensive analysis by region and market sector of projected Fault Detection and Classification System sales for 2026 through 2032. With Fault Detection and Classification System sales broken down by region, market sector and sub-sector, this report provides a detailed analysis in US\$ millions of the world Fault Detection and Classification System industry.

This Insight Report provides a comprehensive analysis of the global Fault Detection and Classification System landscape and highlights key trends related to product segmentation, company formation, revenue, and market share, latest development, and M&A activity. This report also analyzes the strategies of leading global companies with a focus on Fault Detection and Classification System portfolios and capabilities, market entry strategies, market positions, and geographic footprints, to better understand these firms' unique position in an accelerating global Fault Detection and Classification System market.

This Insight Report evaluates the key market trends, drivers, and affecting factors shaping the global outlook for Fault Detection and Classification System and breaks down the forecast by Primary Software Function, by Application, geography, and market size to highlight emerging pockets of opportunity. With a transparent methodology based on hundreds of bottom-up qualitative and quantitative market inputs, this study forecast offers a highly nuanced view of the current state and future trajectory in the global Fault Detection and Classification System.

This report presents a comprehensive overview, market shares, and growth opportunities of Fault Detection and Classification System market by product type, application, key manufacturers and key regions and countries.

Segmentation 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

Segmentation 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

Segmentation 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

Segmentation 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

This report also splits the market by region:

Americas

United States

Canada

Mexico

Brazil

APAC

China

Japan

Korea

Southeast Asia

India

Australia

Europe

Germany

France

UK

Italy

Russia

Middle East & Africa

Egypt

South Africa

Israel

Turkey

GCC Countries

The below companies that are profiled have been selected based on inputs gathered from primary experts and analysing the company's coverage, product portfolio, its market penetration.

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

## Key Questions Addressed in this Report

What is the 10-year outlook for the global Fault Detection and Classification System market?

What factors are driving Fault Detection and Classification System market growth, globally and by region?

Which technologies are poised for the fastest growth by market and region?

How do Fault Detection and Classification System market opportunities vary by end market size?

How does Fault Detection and Classification System break out by Primary Software Function, by Application?

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