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Global Six-dimensional Torque Sensor for Robots Market Growth 2026-2032

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Abstracts

The global Six-dimensional Torque Sensor for Robots market size is predicted to grow from US$ 304 million in 2025 to US$ 1854 million in 2032; it is expected to grow at a CAGR of 29.4% from 2026 to 2032.

In 2025, global Six-dimensional Torque Sensor for Robots production reached approximately 84310 Units, with an average global market price of around 3685 USD per Unit.

Six-dimensional Torque Sensor for Robots are precision sensing devices capable of simultaneously detecting force components along the three spatial axes (Fx, Fy, Fz) and torque components along the three rotational axes (Mx, My, Mz), thereby enabling the comprehensive perception of force-related information across six degrees of freedom. Typically comprising an elastic body structure, strain-sensitive elements, and signal acquisition and decoupling algorithm modules, these sensors translate mechanical deformation caused by applied forces into electrical signals to output precise, real-time, multi-dimensional force and torque data; they are characterized by high accuracy, low coupling, and high dynamic response capabilities. Six-dimensional force sensors are widely deployed across various fields?including industrial robotics, collaborative robotics, and medical robotics?and play a particularly critical role in humanoid robots. They are frequently mounted on wrists, ankles, joint extremities, and end-effectors (hands) to sense forces such as gait impact during walking, gripping force during object manipulation, and collision forces during human-robot interaction, thereby facilitating stable balance control, flexible manipulation, and safety protection. As core perception components enabling humanoid robots to achieve human-like locomotion, dexterous manipulation, and environmental adaptability, these six-dimensional force sensors have witnessed immense growth potential in recent years, driven by the

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explosive expansion of the humanoid robotics industry.

The upstream core components of Six-dimensional Torque Sensor for Robots mainly include elastomers, strain gauges, and chips. Typical raw material suppliers include VPG, HBM, Huntsman, and BASF. Downstream applications are primarily in industrial robotic arms, humanoid robots, automotive, medical, and scientific research fields. Typical users include AgiBot, Unitree Robotics, Leju (Shenzhen) Robot Technology, Tesla, FANUC, KUKA, and ABB.

The single-line production capacity of Six-dimensional Torque Sensor for Robots varies significantly due to factors such as raw material supply, product calibration technology, and the degree of automation in the production line, typically ranging from several thousand to tens of thousands of units. The industry gross profit margin for Six-dimensional Torque Sensor for Robots is generally between 35% and 45%.

Since Elon Musk introduced the concept of humanoid robots in 2021, the market for Six-dimensional Torque Sensor for Robots has experienced rapid growth. According to our latest research data, global sales of Six-dimensional Torque Sensor for Robots are projected to reach nearly 84,000 units in 2025; of this total, China is expected to account for approximately 36,000 units?a year-on-year increase of over 70%. By 2032, global market sales are forecast to reach 1.25 million units, with China?s sales reaching 650,000 units; this represents a compound annual growth rate (CAGR) of 49% for China?s annual sales volume between 2026 and 2032. Currently, the high-end segment of the six-dimensional force sensor industry is dominated by players such as ATI Industrial Automation and Epson; however, their market share has been in steady decline over recent years. Meanwhile, major Chinese manufacturers?including Sunrise Instruments (SRI), Changzhou Kunwei Sensing Technology, and Shenzhen Xinjingcheng Sensing Technology?are experiencing rapid expansion, leading to a continuous increase in market share for these domestic brands. In terms of product differentiation, Chinese products have largely achieved parity with mainstream international offerings regarding precision; however, gaps still persist in areas such as sensitivity, crosstalk, overload resistance, and inter-axis coupling errors.

Based on measurement principles, these sensors can be categorized into strain gauge types, piezoelectric/capacitive types, and others. Among these, the strain gauge type is the most widely adopted, accounting for over 80% of total usage volume. Currently, companies utilizing strain gauge technology include ATI Industrial Automation, Schunk, ME-Me?systeme, and Sintokogio; similarly, the vast majority of Chinese enterprises rely on this specific technical principle for the development of their six-dimensional force

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sensors.

Regarding downstream applications, the industrial automation sector (including traditional robotics) currently accounts for the largest share of application volume; however, the humanoid robotics sector is exhibiting the fastest growth rate in application scale. According to our latest data, the global CAGR for the humanoid robotics sector is projected to reach 58.1% between 2026 and 2032, while China?s CAGR for this segment is expected to reach an even higher 61%. From a long-term perspective, the mass production of humanoid robots is poised to become the primary driver of market growth. The specific applications of these sensors within humanoid robots include force control, swing stabilization, and safety monitoring; they serve to enhance the dexterity and flexibility of the robot's hand movements, as well as the stability of its bipedal locomotion. Typically installed at terminal joints?such as the wrists and ankles?these sensors have now become a standard feature in high-performance humanoid robots.

Currently, Six-dimensional Torque Sensor for Robots represent the highest-dimensional sensors available. Distinguished by their high precision, sensitivity, bandwidth, and reliability, they provide the most comprehensive force-sensing information and enhance measurement accuracy. Consequently, they play a pivotal role across a wide range of fields. Looking ahead, as technology continues to advance and downstream application sectors continue to expand, the market for Six-dimensional Torque Sensor for Robots is poised to enjoy broad prospects for future growth.

LP Information, Inc. (LPI) ' newest research report, the ?Six-dimensional Torque Sensor for Robots Industry Forecast? looks at past sales and reviews total world Six-dimensional Torque Sensor for Robots sales in 2025, providing a comprehensive analysis by region and market sector of projected Six-dimensional Torque Sensor for Robots sales for 2026 through 2032. With Six-dimensional Torque Sensor for Robots sales broken down by region, market sector and sub-sector, this report provides a detailed analysis in US$ millions of the world Six-dimensional Torque Sensor for Robots industry.

This Insight Report provides a comprehensive analysis of the global Six-dimensional Torque Sensor for Robots 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 Six-dimensional Torque Sensor for Robots portfolios and capabilities, market entry strategies, market positions, and geographic footprints, to better understand these firms? unique position in an accelerating global Six-dimensional Torque Sensor for

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Robots market.

This Insight Report evaluates the key market trends, drivers, and affecting factors shaping the global outlook for Six-dimensional Torque Sensor for Robots and breaks down the forecast by Type, 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 Six-dimensional Torque Sensor for Robots.

This report presents a comprehensive overview, market shares, and growth opportunities of Six-dimensional Torque Sensor for Robots market by product type, application, key manufacturers and key regions and countries.

Segmentation by Type:

Strain Gauge Type

Piezoelectric/Capacitive Type

Others

Segmentation by Measuring Range:

Measuring Range: Below 100N

100 ? Measuring Range
500 ? Measuring Range ? 1000N

Measuring Range: Above 1000N

Segmentation by Accuracy(%FS):

0.1

0.2

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0.3

Others

Segmentation by Application:

Industrial Robots

Collaborative Robots

Medical Robots

Humanoid Robots

Others

This report also splits the market by region:

Americas

United States

Canada

Mexico

Brazil

APAC

China

Japan

Korea

Southeast Asia

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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.

ATI Industrial Automation

Schunk

Sunrise Instruments (SRI)

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Epson

Changzhou Kunwei Sensing Technology

Link-touch (Beijing) Technology

Advanced Mechanical Technology

Shenzhen Xinjingcheng Sensing Technology

Robotiq

Kistler

Wacoh-Tech

Bota Systems

FANUC

Nordbo Robotics

FUTEK

ME-Me?systeme

Robotous

Aidin Robotics

Sintokogio

OnRobot

Changzhou Right Measurement and control system

Keli Sensing Technolgy(Ningbo)

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Guangzhou Haozhi Industrial

Hypersen Technologies

Anhui Zhongke Midian Sensor

Zhonghang Electronic Measuring Instruments

Nanjing Bio-inspired Intelligent Technology

Key Questions Addressed in this Report

What is the 10-year outlook for the global Six-dimensional Torque Sensor for Robots market?

What factors are driving Six-dimensional Torque Sensor for Robots market growth, globally and by region?

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

How doSix-dimensional Torque Sensor for Robots market opportunities vary by end market size?

How does Six-dimensional Torque Sensor for Robots break out by Type, by Application?

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