

Global Joint Torque Sensors for Humanoid Robots Supply, Demand and Key Producers, 2026-2032

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Abstracts

The global Joint Torque Sensors for Humanoid Robots market size is expected to reach \$ 742 million by 2032, rising at a market growth of 56.1% CAGR during the forecast period (2026-2032).

In 2025, global sales of joint torque sensors for humanoid robots were approximately 132.5 thousand units, with an average selling price of about USD 180 per unit, corresponding to a market size of approximately USD 23.8 million. Joint torque sensors for humanoid robots are high-precision torque measurement components installed or integrated in rotary joints, joint actuators, and harmonic or planetary reduction joint assemblies of humanoid robots. They are mainly used to directly detect axial joint torque, external load changes, collision contact, motion impedance, and force-control feedback, providing real-time sensing signals for compliant control, dynamic balance, joint protection, gait control, and safe human-robot interaction. These sensors are typically installed in joint actuators, reducer output sections, or rotary transmission units in the form of thin, annular, hollow, flange-mounted, or customized sensor modules, and measure torque changes on the joint rotation axis through sensing principles such as strain gauge, capacitive, and Hall effect technologies.

Humanoid robot joint torque sensors are gradually evolving from laboratory validation components into critical sensing devices within scaled supply chains. As humanoid robots move beyond demonstration prototypes into small-batch deployment, joint systems face significantly higher requirements for force control, compliant control, collision detection, overload protection, and gait stability. Torque estimation based solely on motor current is increasingly unable to meet the demands of high safety and fast dynamic response.

From the demand side, market growth is primarily driven by three factors. First, increasing humanoid robot shipments are generating greater installation demand for joint torque sensors. Second, embodied intelligence applications are expanding from walking demonstrations into material handling, manipulation, service tasks, and industrial collaboration, increasing reliance on joint force feedback. Third, manufacturers in China, South Korea, Japan, and Europe are successively launching torque sensor products designed specifically for robotic joints, accelerating the transition from high-cost customization toward standardization, miniaturization, and volume production. In the short term, the market will remain dominated by R&D prototypes, small-volume orders, and validation projects conducted by leading robot manufacturers, with relatively high prices and fragmented product specifications. Over the medium to long term, as mass-production platforms are finalized and domestic suppliers begin volume deliveries, average prices are expected to decline gradually, while shipment growth becomes the primary driver of market expansion.

In terms of the competitive landscape, the global supplier base remains fragmented and at an early stage of development. Companies including Bota Systems, Sensodrive, I-PEX, AIDIN ROBOTICS, AL.Robot, and DACELL, as well as Chinese suppliers such as ZEMIC, SRI, Kunwei Technology, Blue Point Touch, XJC Sensor, Keli Sensing, Amphenol Advanced Sensors, and PaXini, have established relatively clear product positions. Future competition will extend beyond individual accuracy specifications and increasingly focus on slim designs, hollow-shaft structures, resistance to off-axis loads, dynamic response, temperature-drift control, digital communication interfaces, reliability validation, and integration capabilities with joint modules. Overall, although the market remains relatively small, it represents a humanoid robot component segment with high technical barriers, long customer qualification cycles, and clear opportunities for domestic substitution. It therefore warrants continued monitoring of supplier penetration into mass-production customers, product price declines, and the market elasticity created by rising sensor content per robot.

Report Scope

This report studies the global Joint Torque Sensors for Humanoid Robots production, demand, key manufacturers, and key regions.

This report is a detailed and comprehensive analysis of the world market for Joint Torque Sensors for Humanoid Robots and provides market size (US\$ million) and Year-over-Year (YoY) Growth, considering 2025 as the base year. This report explores demand trends and competition, as well as details the characteristics of Joint Torque

Sensors for Humanoid Robots that contribute to its increasing demand across many markets.

Highlights and key features of the study

Global Joint Torque Sensors for Humanoid Robots total production and demand, 2021-2032, (K Units)

Global Joint Torque Sensors for Humanoid Robots total production value, 2021-2032, (USD Million)

Global Joint Torque Sensors for Humanoid Robots production by region & country, production, value, CAGR, 2021-2032, (USD Million) & (K Units), (based on production site)

Global Joint Torque Sensors for Humanoid Robots consumption by region & country, CAGR, 2021-2032 & (K Units)

U.S. VS China: Joint Torque Sensors for Humanoid Robots domestic production, consumption, key domestic manufacturers and share

Global Joint Torque Sensors for Humanoid Robots production by manufacturer, production, price, value and market share 2021-2026, (USD Million) & (K Units)

Global Joint Torque Sensors for Humanoid Robots production by Type, production, value, CAGR, 2021-2032, (USD Million) & (K Units)

Global Joint Torque Sensors for Humanoid Robots production by Application, production, value, CAGR, 2021-2032, (USD Million) & (K Units)

This report profiles key players in the global Joint Torque Sensors for Humanoid Robots market based on the following parameters - company overview, production, value, price, gross margin, product portfolio, geographical presence, and key developments. Key companies covered as a part of this study include Bota Systems AG, Sensodrive GmbH, I-PEX Inc., AIDIN ROBOTICS, AL.Robot, DACELL CO., LTD., Zhonghang Electronic Measuring Instruments Co., Ltd., Sunrise Instruments, Changzhou Kunwei Sensing Technology Co., Ltd., Link-touch Technology Co., Ltd., etc.

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

Stakeholders would have ease in decision-making through various strategy matrices used in analyzing the World Joint Torque Sensors for Humanoid Robots market

Detailed Segmentation:

Each section contains quantitative market data including market by value (US\$ Millions), volume (production, consumption) & (K Units) and average price (US\$/Unit) by manufacturer, by Type, and by Application. Data is given for the years 2021-2032 by year with 2025 as the base year, 2026 as the estimate year, and 2027-2032 as the forecast year.

Global Joint Torque Sensors for Humanoid Robots Market, By Region:

United States

China

Europe

Japan

South Korea

ASEAN

India

Rest of World

Global Joint Torque Sensors for Humanoid Robots Market, Segmentation by Type:

0 to 50 Nm Joint Torque Sensors

More than 50 to 150 Nm Joint Torque Sensors

More than 150 to 400 Nm Joint Torque Sensors

More than 400 Nm Joint Torque Sensors

Other

Global Joint Torque Sensors for Humanoid Robots Market, Segmentation by Sensing

Principle:

Strain Gauge Torque Sensors

Capacitive Torque Sensors

Hall Effect Torque Sensors

Other

Global Joint Torque Sensors for Humanoid Robots Market, Segmentation by Application:

Hip Joints

Knee Joints

Ankle Joints

Shoulder Joints

Elbow Joints

Wrist Joints

Hand and Finger Joints

Torso and Waist Joints

Neck and Head Joints

Other

Companies Profiled:

Bota Systems AG

Sensodrive GmbH

I-PEX Inc.

AIDIN ROBOTICS

AL.Robot

DACELL CO., LTD.

Zhonghang Electronic Measuring Instruments Co., Ltd.

Sunrise Instruments

Changzhou Kunwei Sensing Technology Co., Ltd.

Link-touch Technology Co., Ltd.

SHENZHEN XJCSENSOR TECHNOLOGY CO., LTD.

Ningbo Keli Sensing Technology Co., Ltd.

Ampron Technology Co., Ltd.

PaXini Tech

Beijing Teamdrive Sensor Co., Ltd.

NBIT

Changzhou Right Measurement and Control System Co., Ltd.

ULTRAFORCE MEASUREMENT AND CONTROL SYSTEM

Key Questions Answered:

1. How big is the global Joint Torque Sensors for Humanoid Robots market?
2. What is the demand of the global Joint Torque Sensors for Humanoid Robots market?

3. What is the year over year growth of the global Joint Torque Sensors for Humanoid Robots market?
4. What is the production and production value of the global Joint Torque Sensors for Humanoid Robots market?
5. Who are the key producers in the global Joint Torque Sensors for Humanoid Robots market?
6. What are the growth factors driving the market demand?

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