# INDUSTRY OVERVIEW

***Certain information and statistics set out in this section have been extracted from various official government publications, market data providers and a report commissioned by us and prepared by an independent third party, Frost & Sullivan. We have engaged Frost & Sullivan to prepare an independent market research report for the purpose of this document (the "Frost & Sullivan report"). The information from official government sources has not been independently verified by us, the Joint Sponsors, [REDACTED] or any of their respective directors, officers, employees, advisers or agents or any other parties involved in the [REDACTED], and no representation is given as to its accuracy, fairness and completeness. For a discussion of risks related to the Group's industry, see "Risk Factors—Risks Relating to Our Business and Industry" in this document.***

The manufacturing industry serves as a core building block of the modern economy. With the accelerating application of a new generation of information technologies such as AI, big data, the IoT and 5G communications, the global manufacturing industry is undergoing an intelligent and digitalized transformation. Against this backdrop, the manufacturing sector has seen an increasing demand for production efficiency and product quality improvement, as well as energy conservation and decarbonization, which has led to the increasing adoption of industrial automation and system solutions. Driven by a global transition to cleaner energy, the NEV industry is experiencing strong growth, with high voltage, high level of integration and intelligence being key features of powertrain systems. Meanwhile, energy storage and energy management products are evolving from standalone equipment to integrated system solutions, driven by the growing global investment in power grid upgrades. In addition, fueled by the demand for production efficiency, and quality and flexibility, industrial robots offerings are evolving to become increasingly integrated and intelligent, humanoid robots are now advancing from research laboratories to industrial deployment, emerging as a pivotal innovation in the intelligent manufacturing and flexible production systems.

## OVERVIEW OF INDUSTRIAL AUTOMATION AND DIGITALIZATION

### Definition of Industrial Automation and Digitalization

The industrial automation and digitalization industry is built on industrial control, data collection and processing, and digitalization technologies. Through the integration of hardware, software and data, it enables automatic control, real-time monitoring, data integration, simulation, and intelligent decision optimization of industrial processes. Catering to diverse industries and applications, it provides standardized, modular, programmable and interconnected automation products, digital systems and integrated solutions for various mechanical equipment and industrial production processes. Additionally, industrial automation and digitalization technologies serve a wide range of industrial scenarios, including discrete and process manufacturing industries, enhancing production efficiency, flexibility, traceability and continuous optimization capabilities.

The industrial automation and digitalization industry consist of three main segments, namely, industrial automation products, industrial software, and digitalization software platforms. Among them, industrial automation products are directly applied in production processes, including control systems (*e.g.*, PLC, HMI, and CNC systems), drive systems (*e.g.*, servo drives and AC drives), execution systems (*e.g.*, motors and precision mechanical components), sensing systems (*e.g.*, displacement sensors and RFID), industrial components, process automation hardware and software (*e.g.*, distributed control systems (DCS) and industrial control instruments), as well as related network and power supply equipment. Industrial software covers product lifecycle management (PLM) for R&D and design, manufacturing execution systems (MES) for production execution, enterprise resource planning (ERP) systems for operation and management, and enterprise asset management (EAM) systems for operation and maintenance services. Digitalization software platforms integrate hardware and software, and enable the seamless connectivity between

equipment, systems and personnel through data collection, analysis and visualization, thus jointly forming a complete industrial automation and digitalization solution system centered on data-driven operations.

**Downstream of Industrial Automation and Digitalization**

The industrial automation and digitalization industry boasts a broad downstream coverage with diverse and fragmented application scenarios. Its downstream fields are mainly divided into the discrete and process manufacturing industries.

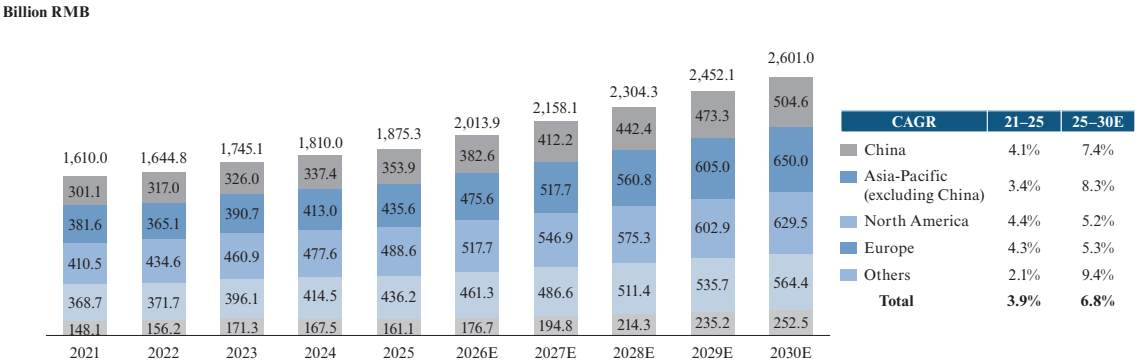
Discrete manufacturing is a manufacturing process in which the products produced feature separability and measurability. It usually imposes high requirements on production precision, production efficiency and production line flexibility, with its automation investment typically focused on motion control, logic control and detection capabilities. The demand for discrete manufacturing is mainly concentrated in the lithium batteries, photovoltaic, 3C manufacturing, automotive manufacturing, among others.

Process manufacturing is characterized by continuous production. It has stringent requirements for the operational stability of production systems. The demand for process manufacturing is mainly concentrated in the mining, petroleum, chemical, metallurgy and other sectors.

**Market Size of Industrial Automation and Digitalization**

From 2021 to 2025, the global market size of industrial automation and digitalization grew from RMB1.6 trillion to RMB1.9 trillion, at a CAGR of 3.9%. Driven by the development of artificial intelligence technology and the advancement of industrial intelligence, the global market size of industrial automation and digitalization is projected to reach RMB2.6 trillion by 2030, at a CAGR of 6.8% from 2025 to 2030. In 2025, the market size of China's industrial automation and digitalization industry stood at RMB353.9 billion, accounting for 18.9% of the global market. It is estimated to reach RMB504.6 billion by 2030, at a CAGR of 7.4% from 2025 to 2030. Overall, the industrial automation and digitalization industry is expected to maintain moderate growth, with the projected future CAGR slightly accelerating compared with the historical period. This outlook is primarily driven by new technological shifts, including breakthroughs in AI, and growing demand from downstream manufacturing industries. The deepening integration of digital technologies into core production processes is becoming a critical strategy for industrial automation and digitalization enterprises to enhance efficiency and strengthen competitiveness.

**Industrial Automation and Digitalization Market Size, by Revenue, 2021–2030E**




*Source: MIR Databank, public data, the Frost & Sullivan report*

*Note:* The market size of industrial automation and digitalization covers industrial automation products, industrial software and digitalization software platforms, excluding industrial robots.

**Growth Drivers and Trends of Industrial Automation and Digitalization**

*Rapidly expanding downstream sectors drive core market demand.* Demand for industrial automation is driven by advanced manufacturing industries in the downstream that have clear needs for industrial system upgrade, sustained momentum for technological iteration, and rigid demand for high-performance components. Among them, new energy equipment (lithium battery and photovoltaic equipment), 3C equipment and data centers are areas with the most prominent demand currently. The market size of the new energy equipment is projected to grow from RMB168.8 billion in 2025 to RMB325.1billion in 2030. High-precision processes such as lithium battery pole piece manufacturing and photovoltaic cell string welding continue to drive the demand for high-performance servo systems, machine vision and high-precision motion control products. The 3C equipment manufacturing sector imposes extremely stringent requirements on production precision and detection capabilities, and its market size is projected to grow from RMB304.1 billion in 2025 to RMB449.0 billion in 2030. Processes such as precision assembly and visual inspection have driven the growth in demand for high-end servos, precision machine vision and system-level solutions. In addition, the large-scale construction of computing infrastructure, especially data centers, and the demand for green and intelligent operation and maintenance have also become an important incremental driver for the automation market. In 2025, the capital expenditure of global data center is around RMB4.4 trillion and it is expected to reach RMB21.7 trillion in 2030. The aforementioned infrastructure is increasingly reliant on high-reliability power control, precision environmental control and automated monitoring systems.

*Technological integration drives industrial system upgrade*. Industrial automation is advancing from being "Fully Connected", to "Fully Intelligent", and then to "Fully Visible". "Fully Connected" means to incorporate IIoT and 5G to connect machines, systems and people, and to bring OT and IT systems together on shared software platforms. "Fully Intelligent" means to apply artificial intelligence and machine learning to move from simple predictive maintenance to optimising whole production processes. "Fully Visible" means to leverage digital twins and big data to monitor, predict and improve every stage from production to business operations, shifting industrial systems from fixed, preset processes to more autonomous production. Continuous advancement in power electronics, AI and advanced sensing has significantly improved the performance, reliability and intelligence level of automation equipment. At the same time, the increased integration of hardware and software and the simplification of deployment and maintenance have lowered bar for application and the full life cycle cost, thereby promoting the penetration of intelligent and digital solutions in more industries.

*Flexible market demand drives the advancement of production models and systems*. The increasing demand for customization of downstream industries is driving the transformation of production lines to ones that are flexible, where a variety of products can be produced in batches on the same production line. This transformation leads to higher requirements such as responsiveness, line change efficiency and compatibility between production systems, driving innovation and advancement of industrial technologies around improving production flexibility.

*Increasing Competitiveness of Chinese enterprises and accelerating overseas expansion*. In China, the technological robustness and product competitiveness of domestic enterprises continue to improve. In 2025, the overall localization rate of China's industrial automation products was approximately 40.0%. Among them, the localization rates of general-purpose servo systems, low-voltage AC drives medium and high-voltage AC drives, small PLC, and medium and large PLC were 55.2%, 43.5%, 52.9%, 37.1% and 18.7% respectively. With continuous technological breakthroughs and the push for supply chain security, localization is expected to further expand. Regions such as Southeast Asia and Latin America feature low automation rates and robust demand for customized, responsive solutions, creating vast opportunities for Chinese enterprises to expand overseas.

*Competition evolving from single products to multi-product packaged solutions.* As the level of automation and complexity of production lines increase, downstream customers' demand has shifted from purchasing individual, discrete automation products to procuring integrated solutions that effectively address their pain points in production efficiency, product quality and flexible manufacturing. The core competitive advantage is no longer the performance and pricing of individual products, rather the capability of delivering comprehensive solutions that encompass multi-product collaboration, software platform integration, industry process expertise and overall engineering delivery.

**Competitive Landscape of Industrial Automation and Digitalization**

Based on 2025 revenue, the Company ranked second in China and first among domestic enterprises in China with a market share of 5.9%.

**Ranking of Industrial Automation and Digitalization Players (by Revenue), China, 2025**

| Ranking | Company Name | Headquarters | Market Share |
|---|---|---|---|
| 1 | Company A[(1)] | Overseas | 7.2% |
| **2** | **The Company** | **China** | **5.9%** |
| 3 | Company B[(2)] | Overseas | 2.8% |
| 4 | Company C[(3)] | Overseas | 2.7% |
| 5 | Company D[(4)] | Overseas | 2.4% |
| | Others | — | 79.0% |
| | Total | — | 100.0% |

*Source: MIR Databank, public data, the Frost & Sullivan report*

*Notes:*

(1) Company A, a German listed company, was established in 1847 and primarily provides industrial AI technologies and solutions for the industrial automation sector and other related fields.

(2) Company B, a Swiss listed company, was established in 1988 and primarily offers electrification equipment, motion control systems, and industrial robots.

(3) Company C, a French listed company, was established in 1836 and primarily provides energy management and industrial automation solutions.

(4) Company D, a Japanese listed company, was established in 1921 and primarily offers industrial automation solutions, power equipment, and semiconductor manufacturing services.

## OVERVIEW OF NEV POWERTRAIN SYSTEMS AND INTELLIGENT CHASSIS SYSTEMS

**Market Size of NEV**

In recent years, the global NEV market saw a period of strong growth. In 2025, global and Chinese NEV sales volume reached 22.59 million units and 13.88 million units respectively, with a CAGR of 37.9% and 44.2% from 2021 to 2025, and their penetration rates rose to 23.6% and 50.8% respectively. It is projected that by 2030, global and Chinese NEV sales volume will hit 54.40 million units and 23.29 million units, at a CAGR of 19.2% and 10.9% from 2025 to 2030, and the penetration rates are expected to approach 50% and 70% respectively.

**Definitions of NEV Powertrain Systems and Intelligent Chassis Systems**

***NEV Electric Drive and Power Supply Systems***

The NEV powertrain systems refer to systems that provide power output, energy conversion and control for vehicle operation, mainly including the electric drive systems and power supply systems, excluding battery systems. Among them, the NEV electric drive systems consists of a motor, motor controller and reduction gearbox, which is responsible for converting electrical energy into kinetic energy and controlling power output. Meanwhile, the NEV power supply systems is

composed of an OBC, DC/DC converter and power distribution unit (PDU), which regulates the charging and discharging of the power battery and realizes electrical energy conversion and distribution. As the core actuating component of the powertrain system, the electric drive and power supply systems directly reflect the core competitiveness of the NEV industry.

***Intelligent Chassis Systems***

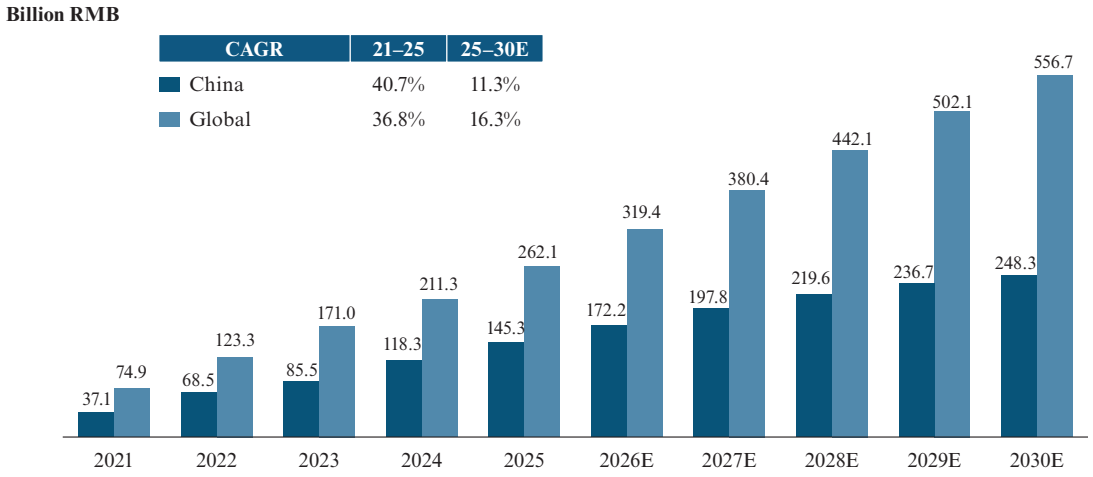
The intelligent chassis system is designed to achieve precise and rapid control of vehicle motion by using key drive-by-wire components such as brake-by-wire, steer-by-wire and active suspension. These components provide essential execution level support for high level assisted driving. The single drive-by-wire technology has matured in terms of functionality, and will continue to advance through increased level of integration, leading to improved performance optimization. Such advancement of automotive chassis is not only driven by the transformation of the electronic and electrical architecture of NEVs, but also the more stringent requirements for chassis execution capabilities posed by the development of high-level assisted driving technology.

**Market Size of the NEV Powertrain Systems and Intelligent Chassis Systems**

***Market Size of NEV Electric Drive Systems***

In recent years, the NEV electric drive systems market has maintained a strong growth momentum both globally and in China. In 2025, the global and Chinese market size of NEV electric drive systems reached RMB262.1 billion and RMB145.3 billion respectively, at a CAGR of 36.8% and 40.7% from 2021 to 2025. Benefiting from the rising penetration rate of NEVs and the continuous technological advancement of electric drive systems, the global and Chinese market size of NEV electric drive systems is projected to rise to RMB556.7 billion and RMB248.3 billion by 2030, at a CAGR of 16.3% and 11.3% from 2025 to 2030 respectively.

**Revenue of NEV Electric Drive Systems, 2021-2030E**

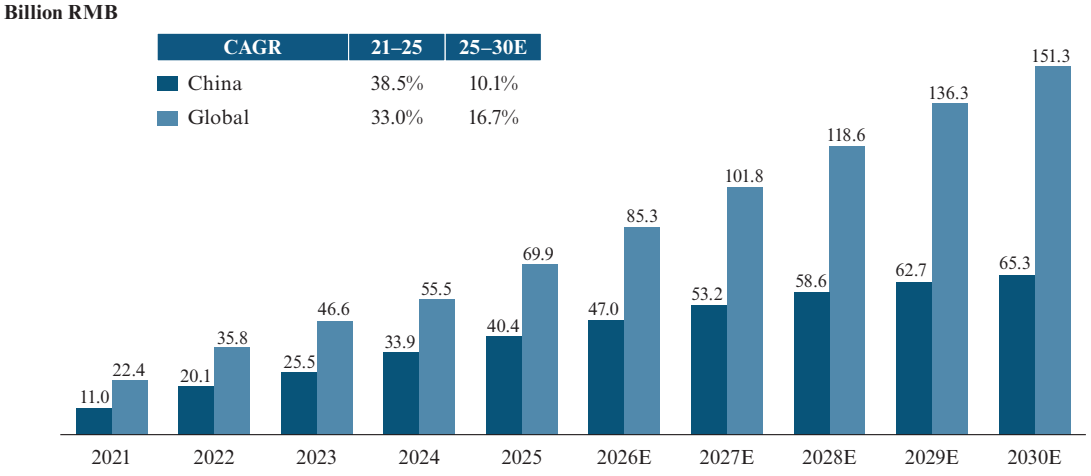



*Source: Public data, the Frost & Sullivan report*

***Market Size of NEV Power Supply Systems***

The NEV power supply system impacts the charging efficiency, speed and safety of NEVs. In 2025, the global and Chinese market size of NEV power supply systems stood at RMB69.9 billion and RMB40.4 billion respectively, at a CAGR of 33.0% and 38.5% from 2021 to 2025. Driven by the popularization of high-voltage platform technologies and the continuous improvement of battery energy density, the global and Chinese market size of NEV power supply systems is expected to grow to RMB151.3 billion and RMB65.3 billion by 2030, at a CAGR of 16.7% and 10.1% from 2025 to 2030 respectively.

**Revenue of NEV Power Supply Systems, 2021-2030E**

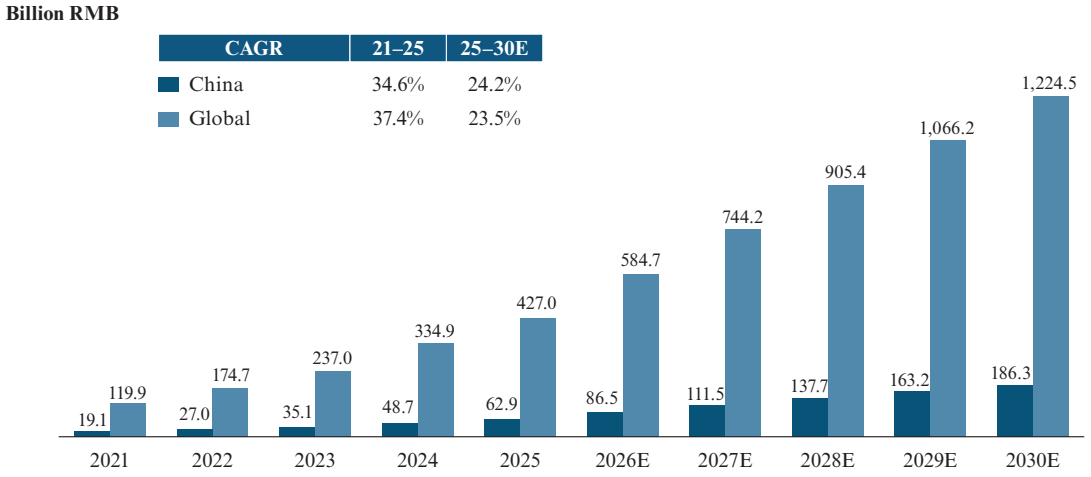



*Source: Public data, the Frost & Sullivan report*

### *Market Size of Intelligent Chassis Systems*

Benefiting from the advancement of assisted driving technology levels, the growing consumer demand for vehicle safety and comfort, and the industry trend of automotive electronic and electrical architecture evolving toward integration of control units, the global and Chinese market size of the intelligent chassis systems reached RMB427.0 billion and RMB62.9 billion in 2025, with a CAGR of 37.4% and 34.6% from 2021 to 2025 respectively. It is projected that the global and Chinese market size of the intelligent chassis systems will surge to RMB1,224.5 billion and RMB186.3 billion by 2030, at a CAGR of 23.5% and 24.2% from 2025 to 2030 respectively.

**Revenue of Intelligent Chassis Systems, 2021–2030E**




*Source: Public data, the Frost & Sullivan report*

*Note:* The intelligent chassis system includes intelligent chassis for NEVs and ICE vehicles.

**BOM Analysis of NEVs**

Unlike ICE vehicles, for which major cost items are engines and gearboxes, those for NEVs are concentrated in electrification and intelligent components. Among these, the power battery system accounts for 38%, the electric drive system for 15%, the intelligent chassis for 14% and the power supply system for 4% of the total BOM of NEVs. Electric drive and power supply systems, together with power batteries, intelligent chassis and other components, collectively determine the dynamic performance, energy efficiency level and intelligent driving experience of NEVs.

**Growth Drivers and Trends of NEV Powertrain Systems and Intelligent Chassis Systems**

*High level of integration*. NEV electric drive and power supply systems are evolving toward the in-depth integration of functions and power devices, facilitating the miniaturization of core components and lightweight vehicle structure, with cost reduction and efficiency improvement. The X-in-one integrated assembly solution has become a core selling point of new vehicle models. Rising adoption of integrated solutions is expanding component demand and structurally lifting content per vehicle. Hindered by the high R&D expense and long iteration cycle of independent development, the automotive OEM in-house model is less nimble, and third-party integrated solutions remain the mainstream.

*Technological iteration and update*. NEV powertrain systems are continuously evolving toward high voltage and high power density. The 800V high-voltage platform significantly improves charging efficiency and drives the advancement of core technologies such as third-generation semiconductor power devices including SiC and GaN. At the same time, the application of a series of advanced processes and materials continuously enhances the power output of core components in the electric drive system, thus balancing the vehicle's dynamic performance, driving range and lightweight requirements. Technological advancement drives the growth of high-end supporting demand, boosting the expansion of the industry's supporting scale and the structural increase in the value per vehicle.

*Intelligentization*. NEV intelligence is no longer only defined by cockpit and driving functions, but is increasingly applicable to the entire vehicle. The vehicle chassis is transitioning from traditional three-axis decoupling to coordinated control between the powertrain and chassis domains, enabling centralized and precise execution via drive by wire systems and integrated domain controllers. With assisted driving rapidly penetrating mainstream price segments, the adoption of drive by wire and domain level collaborative control technologies is accelerating

*Overseas expansion of Chinese enterprises*. The competitiveness of China's NEV industry has been continuously enhanced. From 2021 to 2025, China's NEV export volume rose from 280,000 units to 2.57 million units, and its export share in the overseas NEV market increased from 9.1% to 29.5%. It is projected that by 2030, China's NEV export volume will climb to 11.45 million units, accounting for 36.8% of the overseas market. Chinese auto parts enterprises, relying on their technological, scale and cost advantages, are gradually entering the supply chains of overseas automotive OEMs independently, with a focus on key markets such as Europe and Southeast Asia. Currently, the penetration rate of overseas NEVs remains low, and most overseas automotive OEMs adopt the third-party supply model, thus there is a huge opportunity for the competitive Chinese NEV powertrain solution providers to gain market share overseas.

**Competitive Landscape of NEV Powertrain Systems**

Based on 2025 revenue, the Company ranked fifth globally and third among independent third-party providers in the global NEV powertrain systems market with a 6.1% market share.

**Ranking of NEV Powertrain System Players (by Revenue), Global, 2025**

| Ranking | Company | Headquarters | Supplier Type | Market Share |
|---|---|---|---|---|
| 1 | Company E[(2)] | China | In-house | 28.9% |
| 2 | Company F[(3)] | Overseas | In-house | 24.1% |
| 3 | Company G[(4)] | Overseas | Third-party | 11.4% |
| 4 | Company H[(5)] | Overseas | Third-party | 10.2% |
| **5** | **The Company** | **China** | **Third-party** | **6.1%** |
| | Others | — | — | 19.3% |
| | Total | — | — | 100.0% |

*Source: Public data, expert interviews, the Frost & Sullivan report*

*Notes:*

(1) The market for NEV powertrain systems covers electric drive systems and power supply systems.

(2) Company E, a Chinese private company and a wholly-owned subsidiary of a Chinese new energy vehicle manufacturer, was established in 2019 and primarily offers electric drive systems, power electronics and powertrain core components for new energy vehicles.

(3) Company F, a U.S. listed company, was established in 2003 and primarily engages in R&D, production and sales of new energy vehicles, and provides three-core EV systems and intelligent driving solutions.

(4) Company G, a German private company, was established in 1886 and primarily offers electric drive systems, industrial robots and automation solutions for automotive and industrial automation.

(5) Company H, a German listed company, was established in 1946 and primarily offers electric drive assemblies and reducers for new energy vehicles, and precision components and motion control solutions for industrial robots.

## OVERVIEW OF INDUSTRIAL ROBOTS AND HUMANOID ROBOTS

### Definition of Industrial Robots and Humanoid Robots

With advances in perception, control and algorithm design, industrial and humanoid robots now perform far more complex tasks than earlier generations of pre-programmed machines. Instead of relying solely on fixed routines, they can adjust their actions in real time, handle greater task variability and operate more flexibly alongside existing automation systems.

#### *Definition of Industrial Robots*

An industrial robot is a multi-joint robotic arm, multi-degree-of-freedom mechanical system or autonomous platform specifically designed for industrial applications. It enables automated operation, and can perform tasks such as welding, material handling and assembly via multi-axis robotic arms or mobile platforms, which is widely adopted in manufacturing, logistics and related fields. Different types of industrial robots include SCARA robots, six-axis robots, parallel robots, collaborative robots and others.

# INDUSTRY OVERVIEW

***Definition of Humanoid Robots***

A humanoid robot is a robotic system with human-like form, bionic motion capabilities and general intelligence level, serving as a carrier of embodied intelligence. Supported by the integration of hardware and software, other technologies such as AI, computer vision and multi-modal sensing, are also integrated to enable capabilities including environment perception and flexible operation. Such capabilities enable the robot to replicate human perception, motion and interaction. It can independently or collaboratively complete various complex tasks across multiple applications:

- *Human-like bionic motion and optimization capabilities*. Equipped with a human-like brain and a multi-degree-of-freedom bionic body, humanoid robots possess human-like bionic motion, dynamic rebalance and refined execution. They can independently complete multi-step complex processes and refined movements without manual intervention, greatly reducing human reliance and improving operational efficiency. Meanwhile, they perceive the environment in real-time through sensor networks and calibrate operating parameters, maintaining optimal operational performance at all times.

- *Cross-domain versatility and multi-scenario adaptability*. Humanoid robots break the single-task limitation of traditional industrial robots. Without needing major hardware modifications, they can adapt to different industries and work with legacy systems simply through software updates and parameter calibration. Additionally, they can quickly respond by switching end-effectors and to adapt to dynamic environments and enhance energy usage efficiency.

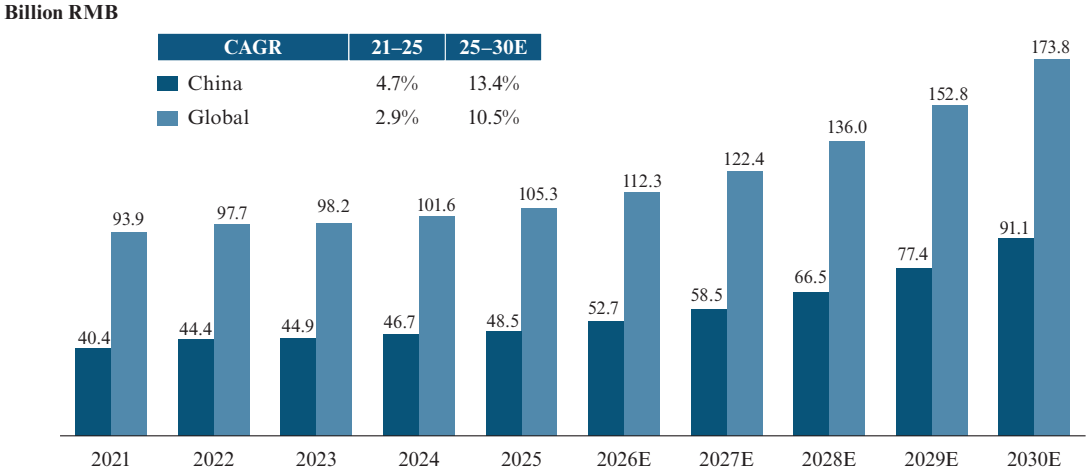
**Market Size of Industrial and Humanoid Robots**

Industrial and humanoid robots are not meant to replace traditional industrial automation, but rather to effectively supplement them in complex scenarios. Their main goal is to take over highly complex manual tasks, working alongside traditional automation equipment to create a complementary and synergistic industrial ecosystem.

***Market Size of Industrial Robots***

The global industrial robot market is expanding rapidly, with penetration rates steadily rising. From 2021 to 2025, the global industrial robot market increased from RMB93.9 billion to RMB105.3 billion, representing a CAGR of 2.9%. It is projected that by 2030, this market will increase to RMB173.8 billion, at a CAGR of 10.5% during this period. From 2021 to 2025, China's industrial robot market grew from RMB40.4 billion to RMB48.5 billion, at a CAGR of 4.7%. Such growth is driven by improved national manufacturing infrastructure, the need for industrial system upgrades, and ongoing policy support. In 2025, the Ministry of Industry and Information Technology (MIIT) announced a "Robot+" initiative to broaden and deepen the use of robotics, and promote the deployment of industrial and humanoid robots in factories. Additionally, surging demand for smart manufacturing in sectors like new energy vehicles and electronics is speeding up domestic substitution. Consequently, the relevant market is expected to expand from 2025 to 2030, growing from RMB48.5 billion to RMB91.1 billion, at a CAGR of 13.4%.

**Revenue of Industrial Robots, 2021–2030E**

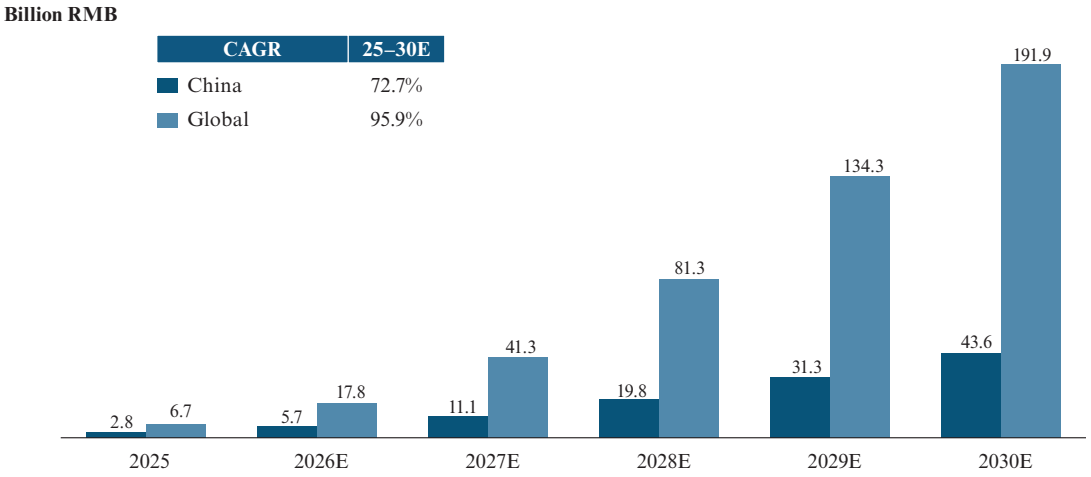



*Source: Public data, the Frost & Sullivan report*

### *Market Size of Humanoid Robots*

In 2025, the global humanoid robot market was valued at RMB6.7 billion. Driven by enhanced industrial automation, expanding emerging applications, and a strong long-term outlook for global smart manufacturing, the market is expected to maintain robust growth momentum. It is projected to grow at a CAGR of 95.9% starting from 2025, reaching RMB191.9 billion by 2030. China's humanoid robot market is also experiencing explosive growth. With the improvements in manufacturing efficiency and technological innovation, China's humanoid robot market will continue to grow, reaching RMB43.6 billion in 2030, a CAGR of 72.7% from 2025 to 2030.

**Revenue of Humanoid Robots, 2025–2030E**




*Source: Public data, the Frost & Sullivan report*

**Growth Drivers and Trends of Industrial and Humanoid Robots**

*Breakthroughs in AI and multi-modal sensing technology*. Rapid progress in AI, machine vision and multi-modal sensing is a core driver of the industrial and humanoid robot market. These technologies allow robots to interpret their surroundings more accurately, plan and optimize actions on the fly, and adapt to changing scenarios rather than following rigid scripts. This higher level of autonomy is opening new use cases beyond traditional factory settings and supporting wider deployment in services, commerce, healthcare and logistics.

*The robust demand for factory automation and the enhancement of product and cost competitiveness*. The global manufacturing industry is accelerating its automation transformation, which is key for enterprises to improve efficiency, reduce risks, achieve flexible production, and optimize the ROI. In China, rising demands for production efficiency and quality are driving robots—supported by advancements in 3D vision, force-sensing perception, and flexible operation capabilities—to move beyond basic tasks towards high-end applications such as precision assembly, dynamic inspection, and complex debugging.

*Policy guidance and new use cases*. In China, the State Council explicitly proposed in the *2026 Report on the Work of the Government* to cultivate and expand emerging and future industries, providing clear policy support for the intelligent equipment industry represented by humanoid robots. Globally, initiatives like the US *National Robotics Strategy*, the EU's *Digital Strategy*, Germany's *Industry 4.0*, and the *France 2030* plan support the smart manufacturing and the R&D and application of industrial robots. At the same time, demand in the industrial sector for multi-variety, small-batch, flexible production and precision manufacturing continues to rise, while demand in the consumer and entertainment sectors for scenarios such as services, interactive experiences and science and education exhibitions is being rapidly unleashed, creating sustained, expanding application space for both industrial robots and humanoid robots.

**BOM Analysis for Industrial and Humanoid Robots**

The core components of industrial robots include reducers at 32%, controllers at 23%, servo motors at 12% and servo drives at 8%, and together they account for over 75% of the total cost. These components are key determinants for the robots' performance. Structural components account for 11%, which provides foundational support for robot operations. Building upon industrial robots, humanoid robots retain core traditional hardware such as servo motors, controllers, and reducers; the cost of this portion accounts for 55%, serving as the core cost of the robot. In addition, they also require new components like multi-modal sensors and decision-making chips.

**Competitive Landscape of Industrial and Humanoid Robots**

***Competitive Landscape of Industrial Robots***

Historically, foreign brands dominated the industrial robot market in China due to their cutting-edge technology and first-mover advantages. However, Chinese manufacturers have rapidly caught up in recent years. By offering competitive performance at lower cost and with faster service, Chinese brands have captured significant market share, especially in SCARA and small-to-medium collaborative robots.

In China's industrial robot market, by 2025 sales volume, our company ranked fourth overall and second among local players, with a market share of 8.8%.

**Ranking of Industrial Robot Providers (by Sales Volume), China, 2025**

| Ranking | Company | Headquarters | Market Share |
|---|---|---|---|
| 1 | Company I | China | 10.0% |
| 2 | Company J | Overseas | 9.9% |
| 3 | Company K | Overseas | 9.6% |
| **4** | **The Company** | **China** | **8.8%** |
| 5 | Company B | Overseas | 6.0% |
| | Others | — | 55.7% |
| | Total | — | 100.0% |

*Source: Public data, expert interviews, the Frost & Sullivan report*

*Notes:*

(1) Company I, a Chinese listed company, was established in 1993 and primarily offers industrial robots, motion control and intelligent manufacturing solutions for industrial automation.

(2) Company J, a Japanese listed company, was established in 1956 and primarily offers industrial robots, CNC systems and factory automation solutions for industrial automation.

(3) Company K, a German private company, was established in 1898 and primarily offers industrial robots, collaborative robots and flexible production line solutions for industrial automation.

***Competitive Landscape of Humanoid Robots***

China's humanoid robot market is still at early stages of commercialization, the competitive landscape of the humanoid robot manufacturers and component suppliers are yet to take shape. Over the next three to five years, as the technology matures and demand increases, the industry will likely consolidate, with those that possess robust technology and mass production capability dominating the market.

## OVERVIEW OF ENERGY STORAGE AND ENERGY MANAGEMENT INDUSTRY

The new power system is a modern power architecture that relies on the coordinated interaction of power generation, grid, load, storage and decarbonization and smart flexible grids. Using digital and intelligent technologies, it enables integrated management of power generation, grid, load, energy storage systems and decarbonization, forming an organic system that achieves real-time, dynamically balanced supply and demand. Specifically, power generation includes new energy such as photovoltaic and wind power, as well as conventional energy sources that provide flexible regulation; grid refer to transmission and distribution networks and the smart grid system; load cover end-user electricity consumption in industrial, commercial and residential sectors; storage is the frequency regulation unit, primarily based on electrochemical energy storage; and decarbonization relates to carbon neutrality objectives centered around carbon emission reduction, carbon trading, and carbon measurement.

### Definition of Energy Storage Systems and PCS

With the rapid growth in demand for AI computing power, energy transition is accelerating, further evolving towards the integration of power generating, energy storage and computing infrastructure, wherein energy storage and energy management have become crucial components. Against the backdrop of decarbonization trends and the continuous increase in the penetration of new energy, the energy storage system plays a crucial role in peak shaving and load shifting. Energy storage systems shift power supply and demand by storing and releasing electrical energy, thereby ensuring stability of the power grid.

The PCS is a core power conversion equipment of the energy storage system, enabling a two-way conversion between the DC on the battery side and the AC on the grid side, while achieving precise control of voltage, current, and power. The PCS not only determines the energy conversion efficiency of the energy storage system but also affects the system's response speed, proactive support capability for the grid, and overall reliability, making it one of the core elements with the highest technical barriers in the energy storage system.

**Definition of Energy Management**

Energy management refers to the monitoring, analyzing, and dispatching of distributed energy systems, energy storage systems, and loads through hardware and software integration, starting from the two major dimensions of energy conservation and emission reduction, in order to achieve energy efficiency improvement, cost optimization, and stable system operation, while providing core data support and control capabilities for zero-carbon solutions of enterprises or industrial parks. The downstream applications of energy management focus on energy intensive fields such as industrial manufacturing, including:

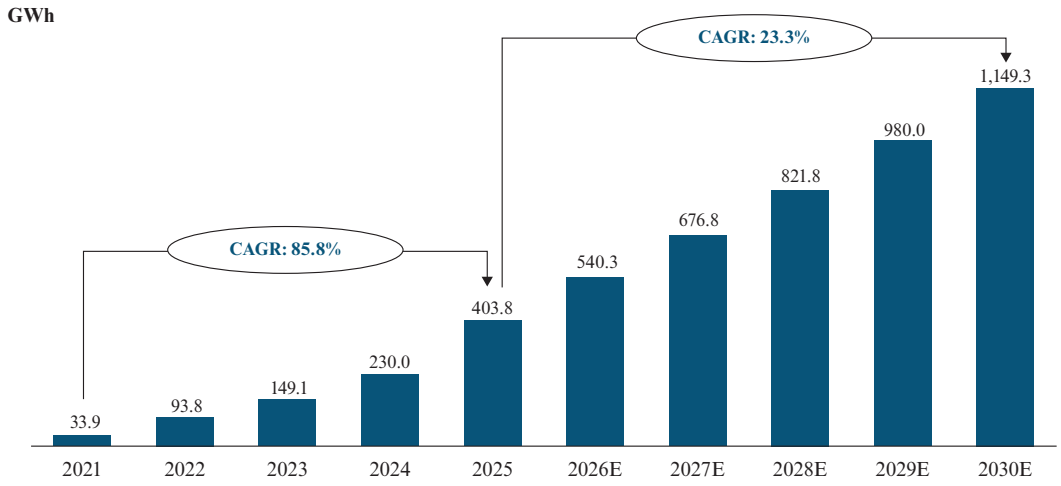
- *Industrial manufacturing*. The industrial manufacturing sector has long consumed over 60% of electricity in China, making energy management in this sector central to achieving the carbon neutral goals. In energy-intensive process manufacturing industries like steel, chemicals, and building materials, energy management solutions are evolving from equipment-level energy saving to system-level optimization, and ultimately upgrading to a plant-wide integrated energy management and decarbonization platform, achieving zero-carbon transformation. In addition, industrial parks that house a large number of industrial enterprises are also regarded as a complex energy-consuming system, requiring integrated park-level energy management approach to coordinate and optimize the energy consumption behaviors of multiple internal entities, thereby achieving regional overall energy efficiency improvement and carbon emission reduction.

- *Other sectors*. Other sectors include commercial complexes, computing data centers, transportation infrastructure, etc. Here, the main goal is to achieve integrated planning and smart operation of multiple internal energy sources (electricity, cooling, heating, and gas). For example, computing data centers have become a key focus of energy management due to the demand for AI computing power, requiring not only a reduction in their own energy consumption but also the assurance of extremely reliable power supply through measures such as deploying energy storage systems and coupling with renewable energy sources.

**Market Size of Energy Storage and Energy Management**

In 2025, global investment in grid upgrades and power infrastructure amounted to RMB10.8 trillion, and is expected to reach RMB15.4 trillion by 2030, with a CAGR of 7.5% from 2025 to 2030. Driven by factors such as the rapid growth of photovoltaic and wind power capacity, the improvement of spot electricity market mechanisms, and the increasing demand for system peak shaving and frequency regulation, the global energy storage market has maintained relatively rapid growth. From 2021 to 2025, global annual shipment volume of energy storage systems increased from 33.9 GWh to 403.8 GWh, at a CAGR of 85.8%. With the expansion of new energy capacity and the continuous extension of energy storage applications across generation, grid, and user sides, global annual shipment volume of energy storage systems is expected to reach 1,149.3 GWh by 2030, at a CAGR of 23.3% from 2025 to 2030. The rapid increase in energy storage system outputs has stimulated market demand for its core power conversion component—the PCS. In 2025, global PCS shipment volume reached 185.1 GW, of which medium- and high-power PCS accounted for 89.1%. By 2030, global PCS shipment volume is expected to reach 412.8 GW.

**Global Shipment Volume of Energy Storage Systems, 2021–2030E**




*Source: Public data, the Frost & Sullivan report*

Driven by accelerated digital transformation, policy support, and the growing energy management needs of enterprises and institutions, the global energy management market has developed rapidly. In 2025, the global energy management market size reached RMB270.5 billion. With the further proliferation and application of technologies such as the IIoT, IoT, and AI, as well as the ongoing global energy transition and carbon neutral goals, this market size is expected to reach RMB442.0 billion by 2030, at a CAGR of 10.3% from 2025 to 2030.

**Growth Drivers and Trends in Energy Storage and Energy Management**

*The expansion of renewable energy drives increased demand.* In 2025, global installed renewable energy capacity reached 5,370 GW, with cumulative installed capacity of wind and photovoltaic reaching 3,907 GW. As the proportion of renewable energy such as photovoltaic and wind power continues to rise, the volatility of the power grid has significantly increased, leading to a growing demand for energy storage systems and digital regulation platforms. At the same time, under the carbon neutral goals, enterprises need to achieve energy efficiency improvements and carbon footprint management through refined energy management.

*Electricity market-oriented reforms create economic value.* China's ongoing electricity market-oriented reforms enable energy storage and adjustable loads to generate direct economic benefits through charging/discharging and demand response, shifting from cost savings to value creation and incentivising commercial and industrial users to invest in energy management and storage systems. Europe and the United States are increasing investments in grid infrastructure to enhance distribution flexibility, integrate distributed energy storage system, and improve system stability. Grid investments are focused on applications such as AI (*e.g.*, AIDC) and the modernization of grid infrastructure.

*Development towards large-scale and high-voltage systems.* To pursue better economics and scale effects, energy storage power stations are becoming larger at the hundred-megawatt and even gigawatt levels. Meanwhile, to improve system efficiency, reduce losses, and enhance synergy with the power grid, the DC-side voltage of energy storage systems is evolving towards higher voltage levels. Large-scale and high-voltage trends jointly drive the technological iteration of core equipment (*e.g.*, medium-and high-power PCS).

*Evolution of energy management towards intelligence*. Energy management is increasingly integrated with technologies such as AI, digital twin, and big data analysis, and is advancing towards predictive maintenance, intelligent dispatching and holistic optimization. By applying AI algorithms, the system can more accurately forecast power generation and load, enable coordination across power generation, grid, load, storage and decarbonization, and unlock value-added services such as demand response and virtual power plants.

**Analysis of Energy Storage and Energy Management**

***Competitive Landscape of PCS***

Based on 2025 shipment volume, our company secured the fifth position in the global medium-and high-power PCS market, with a market share of 6.7%.

**Ranking of Medium and High-Power PCS Suppliers (by Shipment Volume), Global, 2025**

| Ranking | Company Name | Headquarters | Market Share |
|---|---|---|---|
| 1 | Company L | China | 17.5% |
| 2 | Company M | China | 15.5% |
| 3 | Company N | China | 14.6% |
| 4 | Company O | Overseas | 13.0% |
| **5** | **The Company** | **China** | **6.7%** |
| | Others | — | 32.7% |
| | Total | — | 100.0% |

*Source: Expert interviews, the Frost & Sullivan report*

*Notes:*

(1) Company L, a Chinese listed company, was established in 1997 and primarily provides PV inverters, focusing on power conversion technologies for solar energy, wind power, and energy storage systems.

(2) Company M, a Chinese private company, was established in 1987 and primarily offers ICT infrastructure and smart terminal products, focusing on digital energy and PV energy storage technologies.

(3) Company N, a Chinese listed company, was established in 2012 and primarily provides PV inverters, energy storage converters, and industrial power supply equipment.

(4) Company O, a Spanish private company, was established in 1989 and primarily offers industrial converters and energy storage systems, serving the heavy industry sector and other related fields.

***Competitive Landscape of Energy Management***

Downstream customers in the energy management market can be divided into two categories. The first category comprises energy intensive industrial and commercial enterprises, such as those in the automotive, lithium battery, metallurgy, chemical and data center sectors, whose core need is to reduce energy costs through refined management. The second category consists of entities that own distributed energy assets or need to participate in power system interactions, such as industrial parks, power grid companies and virtual power plant operators. Their primary objective is to achieve coordinated optimization of generation, grid, load, storage and decarbonization frameworks, and to participate in market transactions for a return. This customer mix demands diverse capabilities from providers, leading to a fragmented competitive landscape driven by highly differentiated end-market needs. This favors players with either integrated, end-to-end solutions or clear specialized strengths, as customers face systemic challenges that single software or hardware products cannot address. Providers offering full-chain services spanning hardware, software, platforms and operations, or with deep expertise in specific sectors, are therefore best placed to scale.

**Raw Material Cost Analysis**

Insulated-Gate Bipolar Transistor (IGBT) is a vital raw material in industrial automation, which is a major type of power semiconductor. It serves as a core component of frequency converters, servo drives, and other products within the drive layer. At the same time, IGBT is also the core power device in NEV motor controller systems, industrial robot drive units, and PCSs, with its performance directly affecting vehicle energy efficiency, robot control precision, and energy storage system conversion efficiency. The average price of IGBT modules in multiple fields such as industrial control and automobiles has decreased from approximately RMB800–1,000 per unit in 2021 to approximately RMB500–800 per unit in 2025. This price reduction is primarily driven by increased domestic supply rates, expanded production capacity, and cost optimization from technological advancements.

**INDUSTRY ENTRY BARRIERS**

*Integrated product and solution capabilities*. Customers generally prefer suppliers capable of providing integrated "hardware + software + service" solutions. In the industrial automation field, this requires companies to possess full-stack product capabilities ranging from controllers and servo drives to industrial software. In the NEV industry, companies need to master integration technologies for systems such as motors and motor controllers. In the industrial robotics field, capabilities in collaborative development of mechanical bodies, control systems, and sensing units are required. Building this cross-domain technological synergy and integrated solution design capability demands long-term R&D investment and accumulated industry knowledge, presenting significant barriers to market entrants.

*Customer Stickiness*. The deployment of industrial automation lines, NEV powertrain systems, and robotic workstations is deeply embedded in customers' production processes and data systems, leading to extremely high customer requirements for reliability, customization capabilities, and service quality. Long-term cooperation enables suppliers to gain deep understanding of customer processes, while switching suppliers incurs high conversion costs. Consequently, customers typically prefer a single supplier's integrated solutions, creating strong customer loyalty.

*Industry-specific process know-how and proprietary technologies*. Industrial automation requires mastery of process control logics specific to particular industries. The NEV industry necessitates proprietary technologies such as X-in-one integration and high-voltage system management. Industrial robot sector demands an understanding of precision requirements across different applications. Such industry knowledge cannot be acquired through simple replication but must be accumulated over time and experience, forming experience-based barriers that are difficult to overcome.

*Delivery and after-sales service network*. Suppliers need full-process engineering capabilities spanning product design, integration, commissioning, and delivery to ensure full match with customer's manufacturing processes. Given customers' high demands for production continuity, a broad and efficient service network needs to be established to provide full-cycle services covering rapid response, remote support, spare parts supply, and regular maintenance. When expanding into overseas markets, it is also necessary to meet local standard certifications and build localized teams to guarantee immediate response and long-term operation and maintenance.

**SOURCE OF INFORMATION**

In connection with the [REDACTED], we engaged an independent market research consultant, Frost & Sullivan, to conduct an analysis of, and to prepare an industry report on, the industries where we operate with a commission fee of RMB540,000. In compiling and preparing the Frost & Sullivan Report, Frost & Sullivan has adopted the following assumptions: (i) the current social, economic and political conditions in the PRC and globally will remain stable during the forecast period, (ii) policies in China and worldwide related to the industrial automation and digitalization, NEV powertrain system, industrial robot and digital energy industries will remain consistent during

the forecast period, (iii) industrial automation and digitalization, NEV powertrain system, industrial robot and digital energy industries in China and globally will develop in line with the drivers outlined in the report during the forecast period. Unless otherwise indicated, all data and forecasts contained in this section are derived from the Frost & Sullivan report. The Frost & Sullivan report was independently prepared by Frost & Sullivan and was not influenced by us or other interested parties.

Frost & Sullivan is an independent global consulting company founded in New York in 1961, whose services include, among others, industry consulting, market strategy consulting and corporate training. Frost & Sullivan conducted (i) primary research, including discussions with certain leading industry participants on the industry's current status and interviews with industry experts on a best-effort basis to collect data to assist in its in-depth analysis; and (ii) secondary research, including reviewing company reports, independent research reports and data from its own research databases.