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NATIONAL STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

GB/T 20638-2023

Replacing GB/T 20638-2006

General specification for stepping motors

步进电动机通用技术规范

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Foreword

This document complies with the provisions of GB/T 1.1-2020 "Standardization Work Guidelines Part

1.Structure and Drafting Rules of Standardization Documents" Drafting. This document replaces GB/T 20638-2006 "General Technical Conditions for Stepper Motors". Compared with GB/T 20638-2006, except for the structure In addition to adjustments and editorial changes, the main technical changes are as follows:

---Modified the scope (see Chapter 1, Chapter 1 of the.2006 edition);

---Revised terms and definitions (see Chapter 3, Chapter 3 of the.2006 edition);

---Deleted symbols and units (see Chapter 4 of the.2006 edition);

---Added the appearance, outlet method and identification, lead wire and terminal strength, appearance and installation dimensions, radial clearance, axial clearance, absolute Insulating resistance, direction of rotation, no-load pull-in frequency, pull-out frequency, starting torque frequency characteristics, running torque frequency characteristics, starting inertia frequency characteristics, etc. Capability test (see 5.1, 5.2, 5.3, 5.4, 5.5, 5.6, 5.12, 5.17, 5.18, 5.21, 5.24, 5.25, 5.26);

---Added low temperature, high temperature, temperature change, vibration, impact, constant heat and humidity, quality, electromagnetic compatibility, life and other tests (see 5.32, 5.33, 5.34, 5.35, 5.36, 5.37, 5.38, 5.39, 5.40);

---Appendix A has been modified and Appendix B has been deleted (see Appendix A, Appendix A and Appendix B of the.2006 version). Please note that some content in this document may be subject to patents. The publisher of this document assumes no

responsibility for identifying patents. This document is proposed by the China Electrical Equipment Industry Association. This document is under the jurisdiction of the National Micromotor Standardization Technical Committee (SAC/TC2). This document was drafted by: Xi'an Micromotor Research Institute Co., Ltd., Changzhou Fuxing Mechanical and Electrical Co., Ltd., Shanghai MOONS Electric Co., Ltd. Division, Shenzhen Lesai Intelligent Control Co., Ltd., Changzhou Xuquan Precision Motor Co., Ltd., Ningbo Jiuling Motor Co., Ltd., Shandong Shan Bo Motor Group Co., Ltd., Zhejiang Youmao Technology Co., Ltd., Yokokawa Robot (Shenzhen) Co., Ltd., Dongguan Weidou Technology Co., Ltd. Company, Guangdong Minzhuo Mechanical and Electrical Co., Ltd., New Thinking Motor Co., Ltd., Shenzhen Jiemeikang Mechanical and Electrical Co., Ltd., Yuyao Hongwei Magnetic Materials Technology Co., Ltd., Hangzhou Aiweisi Electronics Co., Ltd., Zhejiang Jingli Tools Co., Ltd., Guangdong Chengxin Technology Co., Ltd., Shaanxi Zhihengdian Equipment Technology Co., Ltd., Guangdong Kangxin New Materials Co., Ltd., Yiwu Laojin Mold Co., Ltd., Shaanxi Yuntuo Electric Co., Ltd., Guangdong Te Hua Technology Co., Ltd., Shaanxi Xiatni Electronics Co., Ltd. The main drafters of this document. Wang Yinbo, Li Ning, Han Guangxian, Huang Jiejian, Ding Xuhong, Jin Chunjun, Zhang Hongqi, Lin Xiaoxiao, Wang Jianyun, Zhong Musheng, Qiu Yixiang, Cai Zhenpeng, Wang Shenxiang, Zhou Jianjun, Xu Zhiqiu, Chi Hai, Huang Jianwei, Ping Ge, Xiang Dongmei, Jin Qinghe, Zheng Haifeng, Zhang Yuanlin, Wang Zhewei. The previous versions of this document and the documents it replaces are as follows:

---First published as GB/T 20638-2006 in.2006;

---This is the first revision. General technical specifications for stepper motors

1 Scope

China's national general specification for stepping motors. It specifies the basic parameters, the technical requirements and test methods, the inspection rules, the delivery preparation and the user services for stepping motors, and it applies to the design and manufacture of permanent magnet, hybrid and variable reluctance stepping motors. A stepping motor is the cheapest way to obtain controlled position without a feedback loop. It advances a fixed angle for each pulse it receives, so a controller that counts pulses knows where the shaft is - provided the motor has not lost a step. That proviso is the whole subject of the specification. Losing a step is silent: the motor does not signal it, the controller does not detect it, and the machine simply carries on with a position error that persists until the next reference. Whether it happens depends on the load, on the acceleration profile, and above all on the torque the motor actually produces at the speed it is running, which falls steeply with frequency as the winding inductance limits current rise. So the properties that matter are dynamic rather than static: the pull-in and pull-out torque against frequency, the maximum starting and slewing frequencies, the step angle and its accuracy, the hysteresis, and the resonance behaviour, since a stepping motor has natural frequencies at which it

oscillates and can stall at a speed where it runs perfectly on either side. The standard defines and fixes the measurement of each of those, together with the electrical and thermal requirements, the insulation and dielectric tests, the environmental requirements and the noise and vibration, and it sets the inspection rules and what must accompany the motor on delivery. Issued on 7 September 2023 and in force since 1 April 2024, it replaces GB/T 20638-2006.

This document specifies the basic parameters, technical requirements and test methods, inspection rules, delivery preparation and user services of stepper motors. This document applies to the design and manufacture of permanent magnet, hybrid and reluctance stepper motors.

2 Normative reference documents

The contents of the following documents constitute essential provisions of this document through normative references in the text. Among them, the dated quotations For undated referenced documents, only the version corresponding to that date applies to this document; for undated referenced documents, the latest version (including all amendments) applies to this document.

GB/T 755 Ratings and performance of rotating electrical machines

GB/T 2423.1-2008 Environmental testing of electrical and electronic products Part

3 Terms and definitions

The terms and definitions defined in GB/T 2900.26-2008 and the following apply to this document.

3.1 rated current ratedcurrent When the stepper motor generates holding torque, the effective value of the current supplied to the motor winding wire.

4 Radio disturbance and immunity Measurement Method Immunity Measurement

GB/T 7345-2008 Basic technical requirements for control motors

GB/T 10405 Control motor model naming method

GB 17799.3 General standard for electromagnetic compatibility Emissions in residential, commercial and light industrial environments

GB 17799.4 Electromagnetic Compatibility General Standard Emissions in Industrial Environments

JB/T 8162 Control motor packaging technical conditions