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**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 10401-2023

Replacing GB/T 10401-2008

**General specification for permanent magnet direct current
torque motors**

永磁式直流力矩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 10401-2008 "General Technical Conditions for Permanent Magnet DC Torque Motors" and is consistent with GB/T 10401-2008. In addition to structural adjustments and editorial changes, the main technical changes are as follows:

---Added terms and definitions (see Chapter 3);

---Deleted "Model and Frame Number" and "Operating Conditions", and added "Classification" (see Chapter 4, Chapter 3 of the.2008 edition and Chapter 4);

---Changed the values specified in Table 4 in "Coaxiality of Installation Fitting Surfaces" (see 5.7,.2008 version of 5.7);

---Changed the values specified in Table 5 in "Verticality of Installation Fitting End Face" (see 5.8,.2008 version of 5.8);

---Changed the specified values in Table 6 of "Insulation Dielectric Strength" (see 5.9, 5.9 of the.2008 edition);

---Changed the specified value in "Maximum no-load speed" (see 5.14,.2008 version of 5.14);

---Changed the values specified in Table 7 in "Excitation Static Friction Torque" (see 5.18,.2008 version of 5.18);

---Changed the specified value in Table 8 of "Torque ripple coefficient" (see 5.20,.2008

version of 5.20);

---Changed the values specified in Table 9 in "Torque-Current Characteristic Linearity" (see 5.24,.2008 version of 5.24);

---Changed the recommended appearance and installation dimensions (see Appendix A, Appendix C of the.2008 edition);

---Deleted the technical performance parameter table in the appendix (see Appendix B of the.2008 version);

1 Scope

China's national general specification for permanent magnet DC torque motors - the machines used where the requirement is torque at low or zero speed rather than power at speed: antenna and telescope drives, gimbals and stabilised platforms, tape and film transports, valve actuators and the servo axes of instruments. It specifies the classification, the technical requirements and test methods, the test conditions, the inspection rules and the delivery provisions for permanent magnet direct current torque motors. A torque motor is designed for a duty that would destroy an ordinary machine. It is expected to sit stalled, producing full torque with the rotor stationary, for long periods - and a stalled motor has no rotation to move air over the windings, so all the heat is developed in one set of conductors and stays there. Everything in the standard follows from that: the stall torque and the stall current are the primary ratings rather than a fault condition, the thermal requirements are set for continuous stall rather than for continuous rotation, and the insulation class and temperature rise are what limit the machine. The other property a torque motor is bought on is smoothness. Used in a servo it must produce a torque that does not vary with rotor position, because cogging and torque ripple appear directly as position error in the system it drives - so the standard specifies the torque ripple, the cogging torque, the torque constant and its linearity, and the friction. To those are added the electrical parameters, the demagnetisation withstand which is the failure mode peculiar to permanent magnet machines, the insulation and withstand voltage, the vibration and noise, and the environmental requirements. Issued on 7 September 2023 and in force since 1 April 2024, it replaces GB/T 10401-2008.

This document specifies the classification, technical requirements and test methods, test conditions, inspection rules and delivery of permanent magnet DC torque motors Prepare. This document applies to the design and manufacturing of permanent magnet DC torque 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 2828.1-2012 Enumeration sampling inspection procedures Part

1. Batch-by-batch inspection sampling retrieved by acceptance quality limit (AQL) plan

GB/T 7345 Basic technical requirements for control motors

GB/T 7346 Basic appearance and structure type of control motor

GB/T 10405-2009 Control motor model naming method

JB/T 8162 Control motor packaging technical conditions

3 Terms and definitions

The following terms and definitions apply to this document.

3.1 Permanent magnet DC torque motor PMDCtorquemotor It is a permanent magnet DC motor that can directly drive the load, can work continuously at low speed and in a locked-rotor state, and has output torque as its main feature.

3.2 peak stall voltage U_{pk} The armature voltage when a DC torque motor produces peak locked-rotor torque. [Source: GB/T 2900.26-2008, 5.6.37]

3.3 peak stall torque T_{pk} Under specified conditions, the peak stall current is applied to the DC torque motor, and the output torque generated when the motor is stalled. [Source: GB/T 2900.26-2008, 5.6.33]

3.4 Peak locked rotor current I_{pk} Under specified conditions, the maximum current for a DC torque motor to be blocked without causing damage to the motor or irrecoverable performance. [Source: GB/T 2900.26-2008, 5.6.32]

3.5 The armature voltage when a DC torque motor produces continuous locked-rotor torque.