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NATIONAL STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

GB/T 44251-2024

Performance and related test methods of legged robots

腿式机器人性能及试验方法

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Foreword

This document is in accordance with the provisions of GB/T 1.1-2020 "Guidelines for standardization work Part

1.Structure and drafting rules for standardization documents" Drafting. Please note that some of the contents of this document may involve patents. The issuing organization of this document does not assume the responsibility for identifying patents. This document was proposed by the China Machinery Industry Federation. This document is under the jurisdiction of the National Technical Committee on Robotics Standardization (SAC/TC591). This document was drafted by: Zhijiang Laboratory, Beijing Institute of Automation of the Mechanical Industry Co., Ltd., Shenyang Institute of Automation of the Chinese Academy of

Sciences Institute, Hangzhou Yushu Technology Co., Ltd., China University of Metrology, Wuba Intelligent Technology (Hangzhou) Co., Ltd., Hangzhou Shenhao Technology Co., Ltd. Co., Ltd., iFLYTEK Co., Ltd., Qiteng Robotics Co., Ltd., Shenzhen Huacheng Industrial Control Co., Ltd., Beijing Dongfang Haowei Industrial Co., Ltd. Industrial Equipment Co., Ltd., Dongguan Benmo Technology Co., Ltd., Guangdong Tiantai Robot Co., Ltd., Shanghai Shanggong Robot Technology Co., Ltd., Shenzhen Guochuang Embodied Intelligent Robot Co., Ltd. and Beijing Humanoid Robot Innovation Center Co., Ltd. The main drafters of this document are. Luan Junda, Qiao Bo, Wang Binrui, Yang Kun, Qin Xiugong, Li Zhihai, Wang Qizhou, Wang Hengzhi, Yuan Haihui, Yao Shuai, Ji Chao, Wu Haiteng, Li Huijie, Liang Qiaoling, Zhu Dong, Miao Lixiao, Zhang Di, Zhang Chunlong, Peng Jianguo, He Zhixiong, Luo Laiping, Wang Zhongxin, Ren Yinyin, Yu Qianqian, Yang Jiafan, Tao Yumei, Zhao Yong, Ding Ning, Liu Jialu, Guo Yijie. Legged robot performance and test methods

1 Scope

GB/T 44251-2024 specifies the performance characteristics of legged robots and the methods for testing them. Legged machines have moved out of the laboratory into inspection, delivery and rescue work faster in China than anywhere, and the claims made for them, how fast, how far, how steep, how heavy a load, how hard a push they can take, have had no common basis, since a quadruped tested on a flat laboratory floor bears no relation to one tested on rubble. The standard sets the performance characteristics and, for each, the test method and conditions: the walking and running speed, the endurance and range, the payload, the gradeability and the ability to cross steps, gaps and uneven terrain, the stability and the resistance to external disturbance including the push recovery test, the turning and manoeuvrability, the noise, the environmental adaptability and the safety-related behaviours, together with the test environment, the instrumentation and the reporting. It takes effect on 1 February 2025.

This document specifies the kinematic performance of legged robots and describes the corresponding test methods. This document is applicable to the whole machine performance test, module test and conformity assessment of different types of legged robots, such as single-legged and multi-legged robots.

2 Normative references

The contents of the following documents constitute the essential clauses of this document through normative references in this document. For referenced documents without a date, only the version corresponding to that date applies to this document; for referenced documents without a date, the latest version (including all amendments) applies to This document.

GB/T 14833-2020 Synthetic material sports field surface layer

GB/T 22517.6-2020 Requirements for the use and inspection methods of sports venues Part

3 Terms and definitions

The following terms and definitions apply to this document.

3.1 travel surface The ground on which the mobile robot travels. [Source: GB/T 12643-2013, 7.7]

3.2 Leg A rod structure that supports and propels a mobile robot through reciprocating motion and periodic contact with a travel surface. [Source: GB/T 12643-2013, 3.4, modified]

3.3 Legged robot A mobile robot that uses one or more legs to move around. [Source: GB/T 12643-2013, 3.16.2]

3.4 load The forces and/or torques that can be sustained at a mechanical interface in all directions of motion under specified conditions of velocity and acceleration. [Source: GB/T 12643-2013, 6.2.1, modified]

3.5 Touching point The point where the robot's legs first contact the ground each time they fall while traveling.

3.6 Topography The shape of the running surface.