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Manipulating industrial robots - Performance criteria and related test methods

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EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

<p>Käesolev Eesti standard EVS-EN ISO 9283:2001 sisaldab Euroopa standardi EN ISO 9283:1998 ingliskeelset teksti.</p> <p>Käesolev dokument on jõustatud 18.06.2001 ja selle kohta on avaldatud teade Eesti standardiorganisatsiooni ametlikus väljaandes.</p> <p>Standard on kättesaadav Eesti standardiorganisatsioonist.</p>	<p>This Estonian standard EVS-EN ISO 9283:2001 consists of the English text of the European standard EN ISO 9283:1998.</p> <p>This document is endorsed on 18.06.2001 with the notification being published in the official publication of the Estonian national standardisation organisation.</p> <p>The standard is available from Estonian standardisation organisation.</p>
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<p>Käsitlusala: This standard describes methods of specifying and testing the following performance characteristics of manipulating industrial robots: - pose accuracy and pose repeatability; multi-directional pose accuracy variation; distance accuracy and distance repeatability; position; stabilization time; position overshoot; drift of pose characteristics; exchangeability; path accuracy and path repeatability; path accuracy on reorientation; cornering deviations; path velocity characteristics; minimum posing time; static compliance; weaving deviations.</p>	<p>Scope: This standard describes methods of specifying and testing the following performance characteristics of manipulating industrial robots: - pose accuracy and pose repeatability; multi-directional pose accuracy variation; distance accuracy and distance repeatability; position; stabilization time; position overshoot; drift of pose characteristics; exchangeability; path accuracy and path repeatability; path accuracy on reorientation; cornering deviations; path velocity characteristics; minimum posing time; static compliance; weaving deviations.</p>
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ICS 25.040.30

Võtmesõnad: automation, automation engineering, industrial robots, manipulators, performance, performance tests, specifications, tests

English version

Manipulating industrial robots
Performance criteria and related test methods
(ISO 9283 : 1998)

Robots manipulateurs industriels –
Critères de performance et méthodes
d'essai correspondantes
(ISO 9283 : 1998)

Industrieroboter – Leistungskenn-
größen und zugehörige Prüfmethode
(ISO 9283 : 1998)

This European Standard was approved by CEN on 1998-02-27.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

The European Standards exist in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, the Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, and the United Kingdom.

CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

Central Secretariat: rue de Stassart 36, B-1050 Brussels

Foreword

International Standard

ISO 9283 : 1998 Manipulating industrial robots – Performance criteria and related test methods, which was prepared by ISO/TC 184 'Industrial automation systems and integration' of the International Organization for Standardization, has been adopted by Technical Committee CEN/TC 310 'Advanced manufacturing technologies', the Secretariat of which is held by BSI, as a European Standard.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, and conflicting national standards withdrawn, by October 1998 at the latest.

In accordance with the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard:

Austria, Belgium, the Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, and the United Kingdom.

Endorsement notice

The text of the International Standard ISO 9283 : 1998 was approved by CEN as a European Standard without any modification.

NOTE: Normative references to International Standards are listed in Annex ZA (normative).

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Introduction

ISO 9283 is part of a series of International Standards dealing with manipulating industrial robots. Other International Standards cover such topics as safety, general characteristics, coordinate systems, terminology, and mechanical interfaces. It is noted that these International Standards are interrelated and also related to other International Standards.

ISO 9283 is intended to facilitate understanding between users and manufacturers of robots and robot systems. It defines the important performance characteristics, describes how they shall be specified and recommends how they should be tested. An example of how the test results should be reported is included in Annex C of this International Standard. The characteristics for which test methods are given in this International Standard are those considered to affect robot performance significantly.

It is intended that the user of this International Standard selects which performance characteristics are to be tested, in accordance with his own specific requirements.

The tests described in this International Standard may be applied in whole or in part, depending upon the robot type and requirements.

The core part of ISO 9283 deals with testing of individual characteristics. Specific parameters for comparison testing is dealt with in Annex A (normative) for pose-to-pose characteristics and path characteristics.

Annex B (informative) of this International Standard provides guidance for selection of tests for typical applications.

Annex C (informative) of this International Standard provides a recommended format of the test report including the minimum required information and the summary of the test results.

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1 Scope

This International Standard describes methods of specifying and testing the following performance characteristics of manipulating industrial robots:

- pose accuracy and pose repeatability;
- multi-directional pose accuracy variation;
- distance accuracy and distance repeatability;
- position stabilization time;
- position overshoot;
- drift of pose characteristics;
- exchangeability;
- path accuracy and path repeatability;
- path accuracy on reorientation
- cornering deviations;
- path velocity characteristics;
- minimum posing time;
- static compliance;
- weaving deviations.

This International Standard does not specify which of the above performance characteristics are to be chosen for testing a particular robot. The tests described in this International Standard are primarily intended for developing and verifying individual robot specifications, but can also be used for such purposes as prototype testing, type testing or acceptance testing.

To compare performance characteristics between different robots, as defined in this International Standard, the following parameters have to be the same: test cube sizes, test loads, test velocities, test paths, test cycles, environmental conditions.

Annex A provides parameters specific for comparison testing of pose-to-pose characteristics and path characteristics.

This International Standard applies to all manipulating industrial robots as defined in ISO 8373. However, for the purpose of this International Standard the term "robot" means manipulating industrial robot.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All International Standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 8373:1994, *Manipulating industrial robots — Vocabulary.*

ISO 9787:1990, *Manipulating industrial robots — Coordinate systems and motions.*

ISO 9946:1991, *Manipulating industrial robots — Presentation of characteristics.*

3 Definitions

For the purpose of this International Standard, the definitions given in ISO 8373 and the following definitions apply.

3.1 cluster: Set of measured points used to calculate the accuracy and the repeatability characteristics (example shown diagrammatically in figure 8).

3.2 barycentre: For a cluster of n points, defined by their coordinates (x_j, y_j, z_j) , the barycentre of that cluster of points is the point whose coordinates are the mean values \bar{x} , \bar{y} , and \bar{z} calculated by formulae given in 7.2.1.

3.3 measuring dwell: Delay at the measurement point prior to recording data (e.g. time between control signal "in position" and the "start measuring" of the measuring device).

3.4 measuring time: Time elapsed when measurements are recorded.

4 Units

Unless otherwise stated, all dimensions are as follows:

- length in millimetres (mm)
- angle in radians or degrees (rad) or (°)
- time in seconds (s)
- mass in kilograms (kg)
- force in newtons (N)
- velocity in metres per second (m/s),
degrees per second (°/s) or
radians per second (rad/s)

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