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Robots for industrial environments — Automatic end effector exchange systems — Vocabulary and presentation of characteristics

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ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Fax: +41 22 749 09 47
Email: copyright@iso.org
Website: www.iso.org

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Foreword

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This document was prepared by Technical Committee ISO/TC 299 WG 3, *Robotics – Industrial Safety*.

This second edition cancels and replaces the first edition (ISO 11593:1996), which has been technically revised.

The main changes compared to the previous edition are as follows:

- Normative References
- Introduction and Scope
- Terms & Definitions
- Added Safety Aspects in Annex A

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

ISO 11593 is one of a series of standards dealing with the requirements of robots for industrial environments.

Automatic exchange systems for end effectors increase in importance for handling devices.

This International Standard contains the vocabulary and presentation of characteristics, e.g. forces, moments (torques), and exchange times, for end effector exchange systems. This International Standard does not contain any details for the development and design of these systems.

Robots for industrial environments — Automatic end effector exchange systems — Vocabulary and presentation of characteristics

1 Scope

This standard defines terms relevant to automatic end effector exchange systems used in combination with industrial robots as defined in 10218-1:2006 and as parts of robot systems as defined in 10218-2:2006.

The terms are presented by their symbol, unit, definition and description. The definition includes applicable references to existing standards.

Annex A provides Examples of useful technical data of automatic end effector exchange systems.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 10218-1:2011, *Robots for industrial environments — Safety requirements*

IS0 8373:2012, *Manipulating industrial robots — Vocabulary*

IS0 9409-1:2004, *Manipulating industrial robots — Mechanical interfaces — Part 1: Plates*IS0 9409-2:2004, *Manipulating industrial robots — Mechanical interfaces — Part 2: Shafts*

IS0 9787:2013, *Manipulating industrial robots — Coordinate systems and motions*

3 Terms and definitions

For the purposes of this document, the definitions given in ISO 8373:2012 apply.

3.1 General Terms and Definitions

3.1.1
Automatic end effector exchange system
coupling device between the mechanical interface and the end effector enabling automatic exchange of end effectors, made up of a robot-mounted part and one or more tool-mounted parts.

NOTE Also referred to as a tool changer, quick-change device, automatic tool changer, robotic tool changer, or robot coupler.

3.1.2
Robot Mounted Part
part of a automatic end effector exchange system that is attached to the mechanical interface of a manipulator.

NOTE Also referred to as master or robot side.

3.1.3
Tool Mounted Part
part of a automatic end effector exchange system that is attached to the end effector.

NOTE Also referred to as slave or tool side.

3.1.7
Couple
the joining of the robot-mounted part to the tool-mounted part.

3.1.8
Uncouple
the releasing of the tool-mounted part from the robot-mounted part.

3.1.9
Lock
the actuation of the locking elements to connect the robot-mounted part to the tool-mounted part.

3.1.10
Unlock
the actuation of the locking elements to disconnect the tool mounted part from the robot mounted part.

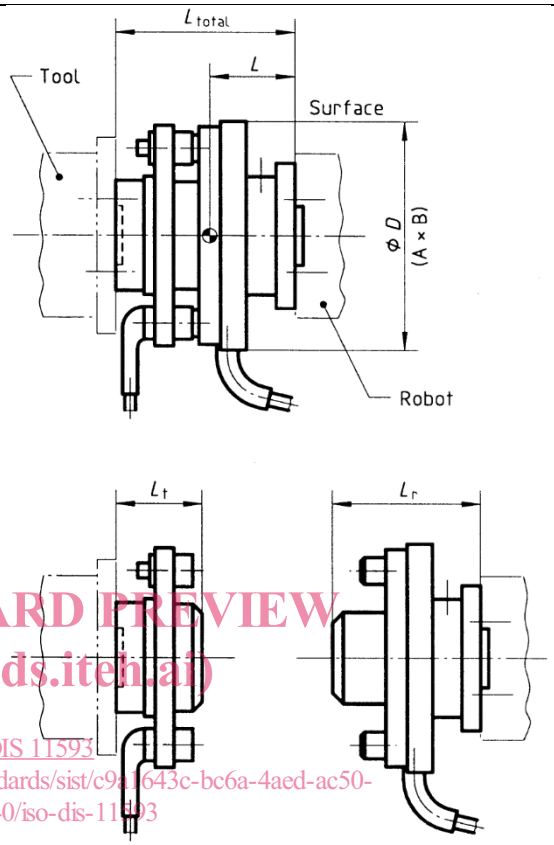
3.1.5
Dock
the process of coupling and locking the robot mounted part to the tool mounted part when the tool-mounted part is held in the magazine.

3.1.6
Undock
the process of unlocking and uncoupling the tool-mounted part from the robot-mounted part where the tool-mounted part is held in the magazine.

3.1.4
Magazine
tool storage device to repeatably dock and undock for temporary storage an end effector and associated tool side.

NOTE Also referred to as tool stand or tool storage rack, or nest.

3.1.1 Detailed Terms and Definitions

No.	Term	Symbol	Unit	Definitions and description
3.1 External shape and main dimensions of the exchange system				
3.1.1	structural shape	D A B L_r L_t	mm mm mm mm mm	 Overall dimensions of device: external diameter (for circular shape) width 3.1 (for other) depth length of the individual robot-mounted part length of the individual tool-mounted part
3.1.2	face-to-face dimension	$L_{total} \pm \Delta$ $L_{cr} \pm \Delta$ $L_{ct} \pm \Delta$	mm mm mm	Distance measured from the robot interface to the tool interface: length of the coupled systems; coupling length of the robot part; coupling length of the tool part. The tolerance of the length L_{cr} and L_{ct} has a significant effect on the pose accuracy of the complete system when using different tools.
3.1.3	centre of gravity in the coupled system	L_g	mm	Distance of the centre of gravity in the coupled system from the reference plane of the mechanical interface of the robot.