SLOVENSKI STANDARD
SIST EN ISO 15187:2003

01-oktober-2003

Manipulirni industrijski roboti ï Vmesniki grafiļ nega uporabnika za programiranje in obratovanje robotov (GUI-R) (ISO 15187:2000)

Manipulating industrial robots - Graphical user interfaces for programming and operation of robots (GUI-R) (ISO 15187:2000)

Industrieroboter für die Handhabung - Grafische Anwenderschnittstelle für die Programmierung und den Betrieb von Robotern (GUI-R) (ISO 15187:2000)

Robots manipulateurs industriels - Interfaces graphiques utilisateur pour la programmation et l'utilisation de robots (GUI-R) (ISO 15187:2000)

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25.040.30	Industrijski roboti. Manipulatorji	Industrial robots. Manipulators

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English version

Manipulating industrial robots - Graphical user interfaces for programming and operation of robots (GUI-R) (ISO 15187:2000)

Robots manipulateurs industriels - Interfaces graphiques utilisateur pour la programmation et l'utilisation de robots (GUI-R) (ISO 15187:2000)

Industrieroboter für die Handhabung - Grafische Anwenderschnittstelle für die Programmierung und den Betrieb von Robotern (GUI-R) (ISO 15187:2000)

This European Standard was approved by CEN on 30 August 2002.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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Foreword

The text of ISO 15187:2000 has been prepared by Technical Committee ISO/TC 184 "Industrial automation systems and integration" of the International Organization for Standardization (ISO) and has been taken over as EN ISO 15187:2002 by Technical Committee CEN/TC 310 "Advanced Manufacturing Technologies", the secretariat of which is held by BSI.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by March 2003, and conflicting national standards shall be withdrawn at the latest by March 2003.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

Endorsement notice

The text of the International Standard ISO 15187:2000 has been approved by CEN as a European Standard without any modifications.

INTERNATIONAL STANDARD

ISO 15187

First edition
2000-11-01

Manipulating industrial robots — Graphical user interfaces for programming and operation of robots (GUI-R)

Robots manipulateurs industriels — Interfaces graphiques utilisateur pour la programmation et l'utilisation de robots (GUI-R)

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

International Standard ISO 15187 was prepared by Technical Committee ISO/TC 184, *Industrial automation systems and integration*, Subcommittee SC 2, *Robots for manufacturing environment*.

Annex A of this International Standard is for information only.

Introduction

ISO 15187 is part of a series of International Standards dealing with manipulating industrial robots. Other International Standards cover such topics as safety, general characteristics, co-ordinate systems, performance criteria and related test methods, terminology, and mechanical interfaces. It is noted that these standards are interrelated and are also related to other International Standards.

Annex A provides examples of possible platform with GUI for open architecture.

The purpose of this International Standard is to standardize the use of graphical user interfaces for robot programming and operation (called GUI-R). Important customer requirements for programming and operation of robots are

— simplification and

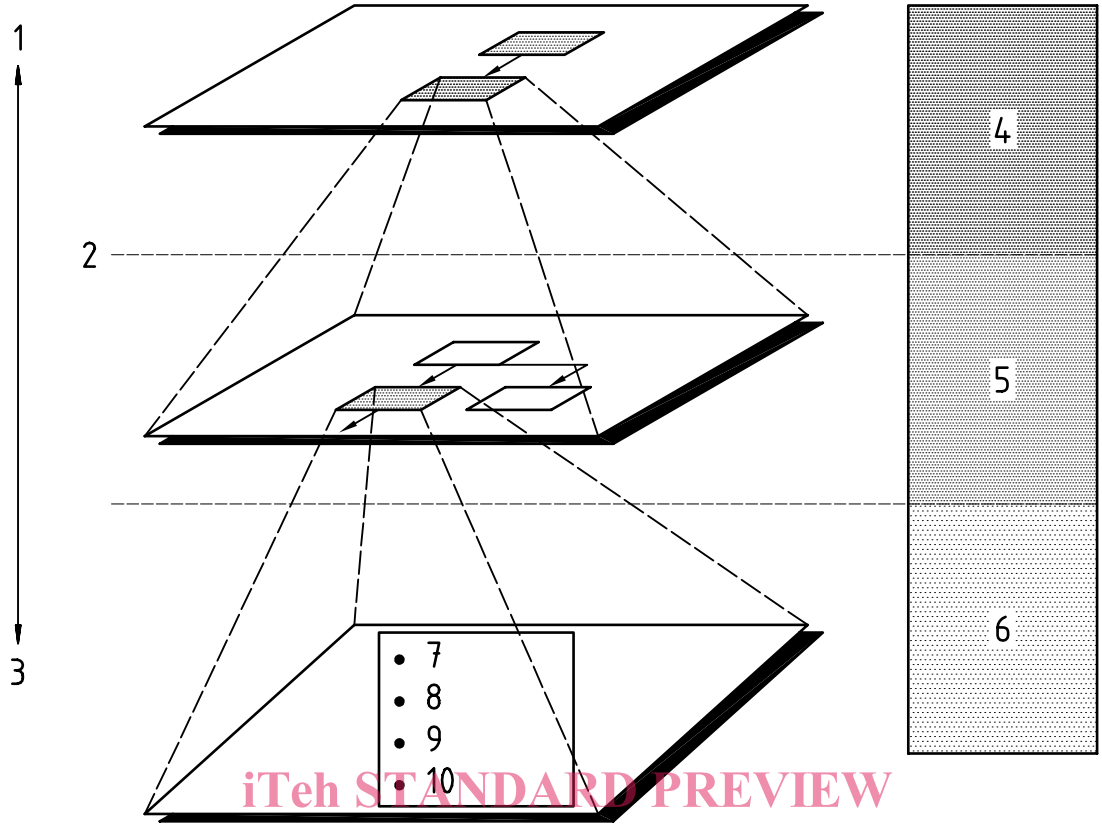
— standardized robot operation.

Programming and operation of industrial robots require a set of tools, e.g. editor, compiler, debugger, which help the user to specify a number of more or less complex functions to be performed by the robot control. There are many different functions for the robot control units in use world wide, and the GUI-R standard should simplify the programming with the help of graphics. In a first step GUI-R will give a style guide for the definition and use of graphical elements for the programming procedure of robots.

Therefore the GUI-R standard is nothing but the interface for the user to pick up elements for programming and operation by an easy manner. The function represented by these elements is defined in general, e.g. as a straight line robot move. The explicit, complete and detailed syntax and semantic meaning is not the purpose of GUI-R, e.g. all move parameters, the exact meaning of "straight line" by the linear interpolation including the behaviour of smoothing, and others. This is defined by the underlying robot system control and programming features: GUI-R is not a robot language expressed by graphical elements and icons. The user is obliged to read the robot system manuals and to learn about the special robot programming and control functions. GUI-R is a help to find the programming elements and to work with a graphic layout in the same manner for different robot systems. The program structure might be displayed on the screen by a program flow chart.

This International Standard only specifies the detailed specifications of GUI-R level and the concept of hierarchization, see Figure 1. The contents of the low-level hierarchy will not be specified intentionally, and consideration will be taken so that implementation will be easier.

Of course, a standard should be complete and precisely defined to cover the subject to be standardized. But there is a variety of robot programming languages and controls with different concepts, functions, syntax, and semantics. Because it is not possible to include all (partly contradictory) concepts and functions of existing (and future) robot languages for a representation by graphical elements, GUI-R covers only the main elements and functions for programming and operation. It doesn't specify all elements of one function level, e.g. icons for all possible statements of a robot language, and it doesn't specify all parameters or elements of a function or statement, e.g. the parameters of a move statement. This means GUI-R is concentrated on the main functions (defined horizontally) and on the main syntactical elements or parameters (defined vertically), see Figure 2.



Key

1 High
2 Abstract Level
3 Low
4 GUI Level
5 Function Level
6 Language Level (Implementation)
7 C
8 Visual Language
9 Flow Chart
10 Others (Interpreter, etc.)

Figure 1 — Image of hierarchies

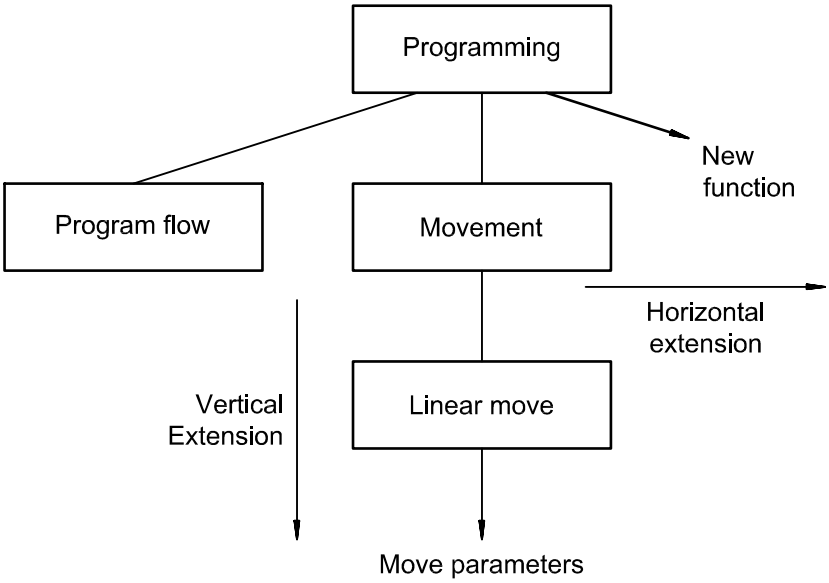


Figure 2 — Horizontal and vertical extensions

The GUI-R standard cannot cover all elements of a specific robot programming language, and it should be possible to use GUI-R also in the future for new functions. Therefore the definition of GUI-R allows the addition of new elements and rules as well as user or robot system vendor specific elements. The user or vendor can specify new elements on high functional level (horizontal extension), like for new statements or new functions, or new parameters can be added (vertical extension), e.g. for move control. Especially, it is not intended that GUI-R represents a complete functional or language definition.

Whenever it is possible, GUI-R contains reference (and perhaps a short explanation in addition, it depends on the background) to a standard or de-facto standard used for its definition base. The objective of the development of GUI-R is the use on robotic applications and not for general use in other fields like graphics. A decision was made to develop rules which are realistic and can find practical applications in industrial production. This resulted in sometimes developing vigorous GUI-R standard specifications and in other occasions provide references to other standards. The first case was used only if it was strongly needed.

GUI-R specifies how to position icons, how to structure the different areas on the screen for user programming and operation input and gives rules for the design of icons. But this could not be a "precise" definition: For example, it is not specified that the area for language statement icons is from screen co-ordinates (22,34) to (345,57) or that only blue is used for icon background. However, the scope of this International Standard has been defined in a pragmatic manner, e.g. the rules for a movement icon. There is a recommendation for GUI-R elements or screen layout, to help the user apply the standard, but not to restrict him too much. GUI-R was designed in such a manner that it is possible to convert the graphical elements into a robot language representation and vice versa.