



JAPANESE
INDUSTRIAL
STANDARD

Translated and Published by
Japanese Standards Association

JIS B 3501 : 2004

(IEC/FDIS 61131-1 : 2003)

(JEMA/JSA)

**Programmable controllers — Part 1 :
General information**

ICS 25.040.40;35.240.50

Reference number : JIS B 3501 : 2004 (E)

PROTECTED BY COPYRIGHT

Foreword

This translation has been made based on the original Japanese Industrial Standard revised by the Minister of Economy, Trade and Industry through deliberations at the Japanese Industrial Standards Committee as the result of proposal for revision of Japanese Industrial Standard submitted by The Japan Electrical Manufacturers' Association (JEMA) /Japanese Standards Association (JSA) with the draft being attached, based on the provision of Article 12 Clause 1 of the Industrial Standardization Law applicable to the case of revision by the provision of Article 14.

Consequently **JISB 3501 : 1997** is replaced with this Standard.

This revision has been made based on **IEC/FDIS 61131-1 : 2003** *Programmable controllers—Part 1: General information* for the purpose of making it easier to compare this Standard with International Standard; to prepare Japanese Industrial Standard conforming with International Standard; and to propose a draft of an International Standard which is based on Japanese Industrial Standard.

Attention is drawn to the possibility that some parts of this Standard may conflict with a patent right, application for a patent after opening to the public, utility model right or application for registration of utility model after opening to the public which have technical properties. The relevant Minister and the Japanese Industrial Standards Committee are not responsible for identifying the patent right, application for a patent after opening to the public, utility model right or application for registration of utility model after opening to the public which have the said technical properties.

Date of Establishment: 1993-07-01

Date of Revision: 2004-06-20

Date of Public Notice in Official Gazette: 2004-06-21

Investigated by: Japanese Industrial Standards Committee
Standards Board
Technical Committee on Industrial Automation

JIS B 3501 :2004, First English edition published in 2005-09

Translated and published by: Japanese Standards Association
4-1-24, Akasaka, Minato-ku, Tokyo, 107-8440 JAPAN

In the event of any doubts arising as to the contents,
the original JIS is to be the final authority.

HN

© JSA 2005

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from the publisher.

Printed in Japan

Contents

	Page
Introduction	1
1 Scope	1
2 Normative references	2
3 Terms and definitions	2
3.1 application programme or user programme	2
3.2 automated system	2
3.3 field device	2
3.4 ladder diagram or relay ladder diagram	2
3.5 programmable (logic) controller (PLC)	2
3.6 programmable controller system or PLC-system	3
3.7 programming and debugging tool (PADT)	3
3.8 remote input/output station (RIOS)	3
4 Functional characteristics	3
4.1 Basic functional structure of a programmable controller system	3
4.2 Characteristics of the CPU function	7
4.3 Characteristics of the interface function to sensors and actuators	9
4.4 Characteristics of the communication function	10
4.5 Characteristics of the human-machine interface (HMI) function	10
4.6 Characteristics of the programming, debugging, monitoring, testing and documentation functions	10
4.7 Characteristics of the power-supply functions	13
5 Availability and reliability	13

Programmable controllers — Part 1 : General information

Introduction This Japanese Industrial Standard has been prepared based on **IEC/FDIS 61131-1 : 2003** *Programmable controllers—Part 1: General information* approved in 2003 without modifying the technical contents.

1 Scope This Standard applies to programmable controllers (PLC) and their associated peripherals such as programming and debugging tools (PADTs), human-machine interfaces (HMIs), etc., which have as their intended use the control and command of machines and industrial processes.

PLCs and their associated peripherals are intended to be used in an industrial environment and may be provided as open or enclosed equipment. If a PLC or its associated peripherals are intended for use in other environments, then the specific requirements, standards and installation practices for those other environments must be additionally applied to the PLC and its associated peripherals.

The functionality of a programmable controller can be performed as well on a specific hardware and software platform as on a general-purpose computer or a personal computer with industrial environment features. This Standard applies to any products performing the function of PLCs and/or their associated peripherals. This Standard does not deal with the functional safety or other aspects of the overall automated system. PLCs, their application programme and their associated peripherals are considered as components of a control system.

Since PLCs are component devices, safety considerations for the overall automated system including installation and application are beyond the scope of this Standard. However, PLC safety as related to electric shock and fire hazards, electrical interference immunity and error detecting of the PLC-system operation (such as the use of parity checking, self-testing diagnostics, etc.), are addressed. Refer to **JIS C 0364** series or applicable national/local regulations for electrical installation and guidelines.

This Standard gives the definitions of terms used in this series of standards. It identifies the principal functional characteristics of programmable controller systems.

NOTE ⁽¹⁾ : This series of standards consists of **JIS B 3501**, **JIS B 3502**, **JIS B 3503**, **IEC/TR3 61131-4**, **IEC 61131-5**, **IEC 61131-7** and **IEC 61131-8**.

Remarks : The International Standard corresponding to this Standard is as follows.

In addition, symbols which denote the degree of correspondence in the contents between the relevant International Standard and **JIS** are IDT (identical), MOD (modified), and NEQ (not equivalent) according to **ISO/IEC Guide 21**.

IEC/FDIS 61131-1 : 2003 *Programmable controllers—Part 1 : General information* (IDT)

2 Normative references The following standards contain provisions which, through reference in this text, constitute provisions of this Standard. If the indication of the year of coming into effect or publication is given to these referred standards, only the edition of indicated year constitutes the provision of this Standard but the revision and amendment made thereafter do not apply. The normative references without the indication of the year of coming into effect or publication apply only to the most recent editions (including amendments).

JIS B 3502 : 2004 *Programmable controllers—Equipment requirements and tests*

NOTE : **IEC/FDIS 61131-2** : 2003 *Programmable controllers—Part 2 : Equipment requirements and tests* is equivalent to the said standard.

JIS B 3503 : 1997 *Programmable controllers—Programming languages*

NOTE : **IEC 61131-3** : 1993 *Programmable controllers—Part 3 : Programming languages* is equivalent to the said standard.

3 Terms and definitions For the purposes of this Standard, the following terms and definitions apply.

3.1 application programme or user programme logical assembly of all the programming language elements and constructs necessary for the intended signal processing required for the control of a machine or process by a PLC-system

3.2 automated system control system beyond the scope of this series of standards, in which PLC-systems are incorporated by or for the user, but which also contains other components including their application programmes

3.3 field device catalogued part to provide input and/or output interfaces or to provide data pre-processing/post-processing to the programmable controller system. A remote field device may operate autonomously from the programmable controller system. It can be connected to the programmable controller using a field bus.

3.4 ladder diagram or relay ladder diagram one or more networks of contacts, coils, graphically represented functions, function blocks, data elements, labels, and connective elements, delimited on the left and (optionally) on the right by power rails

3.5 programmable (logic) controller (PLC) digitally operating electronic system, designed for use in an industrial environment, which uses a programmable memory for the internal storage of user-oriented instructions for implementing specific functions such as logic, sequencing, timing, counting and arithmetic, to control, through digital or analogue inputs and outputs, various types of machines or processes. Both the PLC and its associated peripherals are designed so that they can be easily integrated into an industrial control system and easily used in all their intended functions.

NOTE : The abbreviation PLC is used in this Standard to stand for programmable controllers, as is the common practice in the automation industry. The use of PC as an abbreviation for programmable controllers leads to confusion with personal computers.

3.6 programmable controller system or PLC-system user-built configuration, consisting of a programmable controller and associated peripherals, that is necessary for the intended automated system. It consists of units interconnected by cables or plug-in connections for permanent installation and by cables or other means for portable and transportable peripherals.

3.7 programming and debugging tool (PADT) catalogued peripheral to assist in programming, testing, commissioning and troubleshooting the PLC-system application, programme documentation and storage and possibly to be used as HMIs. PADTs are said to be pluggable when they may be plugged or unplugged at any time into their associated interface, without any risk to the operators and the application. In all other cases, PADTs are said to be fixed.

3.8 remote input/output station (RIOS) manufacturer's catalogued part of a PLC-system including input and/or output interfaces allowed to operate only under the hierarchy of the main processing unit (CPU) for I/O multiplexing/demultiplexing and data pre-processing/post-processing. The RIOS is the only permitted limited autonomous operation, for example, under emergency conditions such as breakdown of the communication link to the CPU or of the CPU itself, or when maintenance and troubleshooting operations are to be performed.

4 Functional characteristics

4.1 Basic functional structure of a programmable controller system The general structure with main functional components in a programmable controller system is illustrated in figures 1, 2 and 3.

These functions communicate with each other and with the signals of the machine/process to be controlled.