

JIS

JAPANESE
INDUSTRIAL
STANDARD

Translated and Published by
Japanese Standards Association

JIS B 3521 : 2021

(JEMA/JSA)

**FL-net protocol specification for FA
control network standard**

ICS 25.040.01 ; 35.110

Reference number : JIS B 3521 : 2021 (E)

PROTECTED BY COPYRIGHT

118 S

B 3521 : 2021

Date of Establishment: 2004-02-20

Date of Revision: 2021-03-22

Date of Public Notice in Official Gazette: 2021-03-22

Investigated by: Japanese Industrial Standards Committee
Standards Board for IEC area

JIS B 3521 : 2021, First English edition published in 2024-03

Translated and published by: Japanese Standards Association
Mita MT Building, 3-13-12, Mita, Minato-ku, Tokyo, 108-0073 JAPAN

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

© JSA 2024

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

KK/HN

PROTECTED BY COPYRIGHT

Contents

	Page
Introduction	1
1 Scope	1
2 Normative references	2
3 Terms and definitions	2
4 Notations and abbreviations	7
4.1 Notations	7
4.2 Abbreviations	8
5 Product categories	9
6 Basic specifications	14
6.1 Relation between OSI basic reference model and FL-net	14
6.2 Number of connectable nodes	14
6.3 UDP/IP, TCP/IP superimposition function	15
6.4 Load measure function	16
6.5 General purpose command server function	17
6.6 Device level network function	18
7 Services	22
7.1 Common memory	23
7.2 Message-data transmission	27
7.3 Network management service	46
7.4 Load measure service	51
7.5 IO allocation setting service	51
7.6 Service to lower layer	53
7.7 Solicitation frame transmission service	54
8 Functions	57
8.1 Node number	57
8.2 Protocol data unit	57
8.3 Byte order	59
8.4 General purpose command server function	61
8.5 System configuration of device level network function	80
8.6 IO define	86
8.7 Timers	108
9 Behaviours	111
9.1 Management of transmission right	111
9.2 Joining and leaving of node	114
9.3 Data communication between nodes	117

9.4	Device level network	124
10	FA link frame format	132
10.1	Header format	132
10.2	ACK data	147
10.3	User data	149
10.4	Solicitation frame	156
10.5	IO allocation setting frame	159
10.6	IO allocation read out frame	164
10.7	Token-holding-time measuring frame	168
10.8	General purpose communication data sender log message frame	170
10.9	Configuration parameter setting frame	173
10.10	Participating node management information parameter read out frame	177
10.11	Own node management information parameter read out frame	181
10.12	Own node setting information parameter read out frame	187
10.13	Node reset frame	189
Annex A (informative)	State transition diagram of FA link protocol	193
Annex B (informative)	Log data	215
Annex C (informative)	Port number list	222
Annex JA (informative)	Relation between IEC 61158 parts and IEC 61784 parts, and JIS B 3521	223
Annex JB (informative)	Comparison table between JIS and corresponding International Standards	226

Foreword

This Japanese Industrial Standard has been 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 a draft being attached, based on the provision of Article 12, paragraph (1) of the Industrial Standardization Act applied mutatis mutandis pursuant to the provision of Article 16 of the said Act. This edition replaces the previous edition (**JIS B 3521** : 2004), which has been technically revised.

This **JIS** document is protected by the Copyright Act.

Attention is drawn to the possibility that some parts of this Standard may conflict with patent rights, published patent application or utility model rights. The relevant Minister and the Japanese Industrial Standards Committee are not responsible for identifying any of such patent rights, published patent application or utility model rights.

Blank

FL-net protocol specification for FA control network standard

Introduction

This Japanese Industrial Standard has been prepared based on **IEC 61158-5-26** : 2019, Edition 1, **IEC 61158-6-26** : 2019, Edition 1 and **IEC 61784-2** : 2019, Edition 4, which describes the protocol specification only collected from many communications protocol groups described in the **IEC** parts, constituting the FL-net that is widely spread in Japan. Also, it has been prepared with some modifications of the technical contents of the corresponding International Standards by adopting in advance the contents to be proposed to **IEC** (superimposition of general purpose communication functions, expanded application to device level network, and simplification and enhancement of convenience of node settings).

The vertical lines on both sides and dotted underlines indicate changes from the corresponding International Standards. A list of modifications with the explanations is given in Annex JB. Annex JA is unique to **JIS** and not given in the corresponding International Standards.

1 Scope

This Standard describes the FL-net protocol ¹⁾ specification, which implements the controller-level network communication between PLCs, RCs and NCs and FA controllers or personal computers, and the device-level communication between PLCs, FA controllers and personal computers and input/output devices and drive controllers.

Note ¹⁾ Abbreviation of FA Link network.

The products conforming to FL-net Ver.1.00 and those conforming to FL-net Ver.2.00 have no compatibility in connectivity. The specification of the products conforming to FL-net Ver.3.01 covers that of products conforming to FL-net Ver.2.00 and FL-net Ver.3.00. In this Standard, the requirements for function specific to FL-net Ver.3.01 are distinguished and described as “For FL-net Ver.3.01 only”.

The requirements in this Standard are given by determining the service and protocol of the FL-net specified in **IEC 61158-5-26**, **IEC 61158-6-26** and **IEC 61784-2** as well as the service, protocol etc. that will be proposed to **IEC** as the network requirements. The conformity to the FL-net is achieved by implementing the functions specified in this Standard. This Standard does not cover the conformity and the verifications of interconnectivity and interoperability between products on which the FL-net is implemented.

The relation among **IEC 61158** parts and **IEC 61784** parts, and **JIS B 3521** is shown in Annex JA.

NOTE The International Standards corresponding to this Standard and the