

INTERNATIONAL STANDARD

NORME INTERNATIONALE



**Field device integration (FDI®) –
Part 3: Server**

**Intégration des appareils de terrain (FDI®) –
Partie 3: Serveur**



THIS PUBLICATION IS COPYRIGHT PROTECTED
Copyright © 2023 IEC, Geneva, Switzerland

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 either IEC or IEC's member National Committee in the country of the requester. If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

Droits de reproduction réservés. Sauf indication contraire, aucune partie de cette publication ne peut être reproduite ni utilisée sous quelque forme que ce soit et par aucun procédé, électronique ou mécanique, y compris la photocopie et les microfilms, sans l'accord écrit de l'IEC ou du Comité national de l'IEC du pays du demandeur. Si vous avez des questions sur le copyright de l'IEC ou si vous désirez obtenir des droits supplémentaires sur cette publication, utilisez les coordonnées ci-après ou contactez le Comité national de l'IEC de votre pays de résidence.

IEC Secretariat
3, rue de Varembe
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
info@iec.ch
www.iec.ch

About the IEC

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

About IEC publications

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigendum or an amendment might have been published.

IEC publications search - webstore.iec.ch/advsearchform

The advanced search enables to find IEC publications by a variety of criteria (reference number, text, technical committee, ...). It also gives information on projects, replaced and withdrawn publications.

IEC Just Published - webstore.iec.ch/justpublished

Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and once a month by email.

IEC Customer Service Centre - webstore.iec.ch/csc

If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: sales@iec.ch.

IEC Products & Services Portal - products.iec.ch

Discover our powerful search engine and read freely all the publications previews. With a subscription you will always have access to up to date content tailored to your needs.

Electropedia - www.electropedia.org

The world's leading online dictionary on electrotechnology, containing more than 22 300 terminological entries in English and French, with equivalent terms in 19 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

A propos de l'IEC

La Commission Electrotechnique Internationale (IEC) est la première organisation mondiale qui élabore et publie des Normes internationales pour tout ce qui a trait à l'électricité, à l'électronique et aux technologies apparentées.

A propos des publications IEC

Le contenu technique des publications IEC est constamment revu. Veuillez vous assurer que vous possédez l'édition la plus récente, un corrigendum ou amendement peut avoir été publié.

Recherche de publications IEC -

webstore.iec.ch/advsearchform

La recherche avancée permet de trouver des publications IEC en utilisant différents critères (numéro de référence, texte, comité d'études, ...). Elle donne aussi des informations sur les projets et les publications remplacées ou retirées.

IEC Just Published - webstore.iec.ch/justpublished

Restez informé sur les nouvelles publications IEC. Just Published détaille les nouvelles publications parues. Disponible en ligne et une fois par mois par email.

Service Clients - webstore.iec.ch/csc

Si vous désirez nous donner des commentaires sur cette publication ou si vous avez des questions contactez-nous: sales@iec.ch.

IEC Products & Services Portal - products.iec.ch

Découvrez notre puissant moteur de recherche et consultez gratuitement tous les aperçus des publications. Avec un abonnement, vous aurez toujours accès à un contenu à jour adapté à vos besoins.

Electropedia - www.electropedia.org

Le premier dictionnaire d'électrotechnologie en ligne au monde, avec plus de 22 300 articles terminologiques en anglais et en français, ainsi que les termes équivalents dans 19 langues additionnelles. Egalement appelé Vocabulaire Electrotechnique International (IEV) en ligne.



IEC 62769-3

Edition 3.0 2023-04

INTERNATIONAL STANDARD

NORME INTERNATIONALE



**Field device integration (FDI®) –
Part 3: Server**

**Intégration des appareils de terrain (FDI®) –
Partie 3: Serveur**

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

ICS 25.040.40; 35.100.05

ISBN 978-2-8322-6446-1

**Warning! Make sure that you obtained this publication from an authorized distributor.
Attention! Veuillez vous assurer que vous avez obtenu cette publication via un distributeur agréé.**

CONTENTS

FOREWORD.....	5
1 Scope.....	7
2 Normative references	7
3 Terms, definitions, abbreviated terms and acronyms	8
3.1 Terms and definitions.....	8
3.2 Abbreviated terms and acronyms	8
3.3 Conventions.....	9
4 Overview	9
5 Information Model.....	9
5.1 General.....	9
5.2 Online/Offline.....	10
5.2.1 Overview	10
5.2.2 Transfer to device.....	10
5.2.3 Transfer from device.....	11
5.2.4 Interactive Transfer to device	11
5.3 Access privileges	11
5.4 Private Parameters	11
5.5 Locking.....	12
5.6 EditContext.....	13
5.6.1 Concept and usage model	13
5.6.2 Services	14
5.6.3 NodeIds.....	14
5.6.4 Reading.....	14
5.6.5 Writing.....	15
5.6.6 Writing dominant and dependent Variables.....	15
5.6.7 Actions (EDD METHODS).....	16
5.6.8 UIDs	16
5.6.9 Synchronization	17
5.7 Reading	17
5.7.1 General	17
5.7.2 Reading offline variables	18
5.7.3 Reading online variables	18
5.8 Writing	19
5.8.1 General	19
5.8.2 Write offline variables	20
5.8.3 Writing online variables	21
5.8.4 Writing to an EditContext	22
5.9 Subscription.....	23
5.9.1 General	23
5.9.2 Subscription of offline variables	24
5.9.3 Subscription of online variables	25
5.10 Device topology	26
5.10.1 General	26
5.10.2 Connection Points	26
5.10.3 Topology management	27
5.10.4 Topology scanning.....	30
5.10.5 Use of SCAN function.....	31

5.10.6	Validation of defined topology.....	31
5.11	User Interface Elements.....	32
5.11.1	User Interface Descriptions.....	32
5.11.2	User Interface Plug-ins.....	33
5.12	Actions.....	33
5.12.1	FDI® Server – FDI® Client interaction.....	33
5.12.2	Action state machine.....	36
5.12.3	Actions Proxies.....	37
5.12.4	INTERACTIVE_TRANSFER_TO_DEVICE Action.....	38
5.12.5	Actions, EDD Actions and Actions Proxies.....	39
6	OPC UA services.....	40
6.1	OPC UA profiles.....	40
6.2	Service error information.....	40
6.2.1	Overview.....	40
6.2.2	OPC UA services and their response.....	40
6.2.3	Mappings of EDDL response codes to OPC UA service response.....	41
6.3	Parameter value update during write service request.....	42
6.4	Localization.....	42
6.5	Audit events.....	42
7	Communication.....	42
7.1	Notation.....	42
7.2	General.....	43
7.2.1	Concepts.....	43
7.2.2	Terms.....	45
7.3	Communication Service processing.....	46
7.3.1	Communication Service invocation.....	46
7.3.2	Analyze communication path.....	46
7.3.3	Manage communication relations.....	47
7.3.4	Communication service request mapping.....	47
7.3.5	Communication service request propagation.....	48
7.3.6	Communication error handling.....	49
7.4	FDI® Communication Server specific handling.....	49
7.4.1	Discovery.....	49
7.4.2	Information Model synchronization.....	50
8	Parallel Execution within the FDI® Server.....	50
8.1	Motivation.....	50
8.2	Internal structure of the EDD interpreter.....	51
8.3	Rules for running an EDD entity.....	51
Annex A (informative)	FDI® Server functional structure.....	53
A.1	FDI® functional elements.....	53
A.2	FDI® Server extension.....	54
Annex B (informative)	Access privileges and user roles.....	56
B.1	User roles and usage case.....	56
B.2	Private data usage.....	57
Annex C (informative)	Parallel execution within the FDI® Server – Examples.....	58
C.1	Simple example for a synchronous execution.....	58
C.2	Example for a concurrent execution.....	58
C.3	Deadlock detection in concurrent execution.....	60

Annex D (informative) Read-Only mode for UID Views 61

 D.1 Definition 61

Figure 1 – FDI® architecture diagram 7

Figure 2 – Locking services 12

Figure 3 – EditContext models 13

Figure 4 – Online EditContext state diagram for dominant and dependent Variables 15

Figure 5 – Offline EditContext state diagram for dominant and dependent Variables 16

Figure 6 – EditContext for EDD Methods 16

Figure 7 – Offline variable read 18

Figure 8 – Online variable read 19

Figure 9 – Offline variable write immediate 20

Figure 10 – Online variable write immediate 21

Figure 11 – Write with EditContext 23

Figure 12 – Offline variable subscription 24

Figure 13 – Online variable subscription 25

Figure 14 – Topology with Network objects (non-normative) 26

Figure 15 – Add Device to topology 28

Figure 16 – Remove Device from topology 29

Figure 17 – Scan topology 30

Figure 18 – Action execution 35

Figure 19 – Action state machine 36

Figure 20 – System communication integration example 43

Figure 21 – FDI® Communication Server integration example 44

Figure 22 – Gateway integration example 45

Figure 23 – Message propagation example scenario 48

Figure A.1 – Functional components of an FDI® Server 53

Figure A.2 – FDI® Server extensions 55

Figure B.1 – User roles and access privileges 56

Figure C.1 – Synchronous execution of two triggers 58

Figure C.2 – Concurrent execution of two triggers (step 1) 58

Figure C.3 – Concurrent execution of two triggers (step 2) 59

Figure C.4 – Concurrent execution of two triggers (step 3) 59

Figure C.5 – Concurrent execution of two triggers (step 4) 59

Figure C.6 – Concurrent execution of two triggers 60

Table 1 – Action states 36

Table 2 – Action state transitions 37

Table 3 – EDD Action types and the EDD constructs that use them 39

Table 4 – OPC UA severity bits and EDDL response codes TYPE 41

INTERNATIONAL ELECTROTECHNICAL COMMISSION

FIELD DEVICE INTEGRATION (FDI®) –**Part 3: Server****FOREWORD**

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as “IEC Publication(s)”). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

IEC 62769-3 has been prepared by subcommittee 65E: Devices and integration in enterprise systems, of IEC technical committee 65: Industrial-process measurement, control and automation. It is an International Standard.

This third edition cancels and replaces the second edition published in 2021. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

- a) added interactive transfer to device.

The text of this International Standard is based on the following documents:

Draft	Report on voting
65E/856/CDV	65E/913/RVC

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/standardsdev/publications.

A list of all parts in the IEC 62769 series, published under the general title *Field device integration (FDI)*[®], can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "<http://webstore.iec.ch>" in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

IMPORTANT – The "colour inside" logo on the cover page of this document indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.