

INTERNATIONAL STANDARD

NORME INTERNATIONALE



**Field device integration (FDI) –
Part 7: Communication devices**

**Intégration des appareils de terrain (FDI) –
Partie 7: Appareils de communication**



THIS PUBLICATION IS COPYRIGHT PROTECTED

Copyright © 2021 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 Central Office
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 It also gives information on projects, replaced and withdrawn publications.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 online collection - oc.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 22 000 terminological entries in English and French, with equivalent terms in 18 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 online collection - oc.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 22 000 articles terminologiques en anglais et en français, ainsi que les termes équivalents dans 16 langues additionnelles. Egalement appelé Vocabulaire Electrotechnique International (IEV) en ligne.

INTERNATIONAL STANDARD

NORME INTERNATIONALE



**Field device integration (FDI) –
Part 7: Communication devices**

**Intégration des appareils de terrain (FDI) –
Partie 7: Appareils de communication**

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

ICS 25.040.40; 35.100.05

ISBN 978-2-8322-9314-0

**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.....	6
INTRODUCTION.....	8
1 Scope.....	9
2 Normative references	10
3 Terms, definitions, abbreviated terms and conventions	10
3.1 Terms and definitions.....	10
3.2 Abbreviated terms.....	10
3.3 Conventions.....	11
4 General	11
5 FDI Communication Package.....	13
5.1 General.....	13
5.2 EDD.....	13
5.2.1 General rules.....	13
5.2.2 Device component.....	14
5.2.3 CommunicationDevice component.....	15
5.2.4 Communication service provider component.....	16
5.2.5 Connection Point component.....	17
5.2.6 Connection Point collection.....	18
5.2.7 Network component.....	18
5.2.8 ValidateNetwork.....	20
5.2.9 ValidateModules.....	20
5.2.10 UIP specifics.....	21
5.2.11 Deployment.....	21
6 Communication relations	21
7 FDI Communication Server definition.....	23
7.1 General.....	23
7.2 General characteristics.....	23
7.3 Information Model.....	23
7.3.1 General.....	23
7.3.2 CommunicationServerType.....	26
7.3.3 ServerCommunicationDeviceType.....	30
7.3.4 ServerCommunicationServiceType.....	33
7.4 OPC UA Server Profile for FDI Communication Server.....	37
7.5 Mapping the FDI Server IM to the FDI Communication Server IM.....	38
7.5.1 General.....	38
7.5.2 Information Model differences.....	38
7.6 Installer.....	39
7.7 FDI Communication Package.....	39
7.7.1 General.....	39
7.7.2 EDD for Lightweight Communication Server.....	40
7.7.3 EDD for Multi-Channel Communication Server.....	40
7.7.4 COMMANDs in EDDs for FDI Communication Servers.....	41
7.7.5 Documentation.....	41
7.8 Handling and behavior.....	41
7.8.1 General.....	41

7.8.2	Deployment	42
7.8.3	Server configuration	42
7.8.4	Start up	43
7.8.5	Shutdown	43
7.8.6	Watchdog	43
7.8.7	Establish the OPC UA connection	43
7.8.8	Instantiate the Communication Server	44
7.8.9	Configure the communication hardware	44
7.8.10	Configuring the Network	44
7.8.11	Parameterize	44
7.8.12	Initialize	44
7.8.13	Create the communication service object	45
7.8.14	Communication relation	45
7.8.15	Connect	45
7.8.16	Disconnect	46
7.8.17	Abort Indication	46
7.8.18	Scan	46
7.8.19	SetAddress	46
8	FDI Communication Gateway definition	46
8.1	General	46
8.2	Information Model	46
8.2.1	General	46
8.2.2	CommunicationGatewayType	47
8.2.3	GatewayCommunicationDeviceType	48
8.2.4	GatewayCommunicationServiceType	51
8.3	FDI Communication Package	55
8.3.1	General	55
8.3.2	EDD	56
8.4	Handling and behavior	57
8.4.1	General	57
8.4.2	Deployment	58
8.4.3	Start up	58
8.4.4	Configure the communication hardware	58
8.4.5	Configure the Network	58
8.4.6	Parameterize	58
8.4.7	Communication relation	59
8.4.8	Connect	59
8.4.9	Disconnect	59
8.4.10	Abort indication	59
8.4.11	Scan	59
8.4.12	Communication Error Handling	60
Annex A (informative)	Layered protocols	61
A.1	General	61
A.2	Convention for protocol-specific annex creation	61
A.3	FDI Communication Package definition	62
A.3.1	Communication services	62
A.3.2	Connection Point	62
A.3.3	Network	62
A.4	Representation in the IM	63

Annex B (normative) Namespace and mappings	64
Figure 1 – FDI architecture diagram	9
Figure 2 – FDI communication infrastructure architecture	12
Figure 3 – Communication relation	22
Figure 4 – Communication relation state chart	23
Figure 5 – FDI Communication Server AddressSpace	25
Figure 6 – CommunicationServerType	26
Figure 7 – ServerCommunicationDeviceType	30
Figure 8 – ServerCommunicationServiceType	34
Figure 9 – Information Model differences (example)	38
Figure 10 – FDI Communication Server state machine	42
Figure 11 – Communication relation state chart	45
Figure 12 – Gateway information model	47
Figure 13 – CommunicationGatewayType	48
Figure 14 – GatewayCommunicationDeviceType	49
Figure 15 – GatewayCommunicationServiceType	52
Figure 16 – Nested Communication	58
Table 1 – ValidateNetwork Action arguments	20
Table 2 – ValidateModules Action arguments	21
Table 3 – CommunicationServerType definition	26
Table 4 – MethodSet of CommunicationServerType	26
Table 5 – Reset Method arguments	27
Table 6 – Reset Method AddressSpace definition	27
Table 7 – Initialize Method arguments	28
Table 8 – Initialize Method AddressSpace definition	28
Table 9 – AddComponent Method arguments	29
Table 10 – AddComponent Method AddressSpace definition	29
Table 11 – RemoveComponent Method arguments	30
Table 12 – RemoveComponent Method AddressSpace definition	30
Table 13 – ServerCommunicationDeviceType definition	31
Table 14 – MethodSet of ServerCommunicationDeviceType	31
Table 15 – Scan Method arguments	32
Table 16 – Scan Method AddressSpace definition	32
Table 17 – ResetScan Method arguments	32
Table 18 – ResetScan Method AddressSpace definition	33
Table 19 – SetAddress Method arguments	33
Table 20 – ServerCommunicationServiceType definition	34
Table 21 – MethodSet of ServerCommunicationServiceType	34
Table 22 – Connect Method arguments	35
Table 23 – Disconnect Method arguments	36
Table 24 – Transfer Method arguments	36

Table 25 – GetPublishedData Method arguments.....	37
Table 26 – FDICommunicationServer_Facet definition	37
Table 27 – CommunicationGatewayType definition	48
Table 28 – GatewayCommunicationDeviceType definition.....	49
Table 29 – MethodSet of GatewayCommunicationDeviceType	49
Table 30 – Scan Method arguments.....	50
Table 31 – Scan Method AddressSpace definition.....	50
Table 32 – ScanNext Method arguments.....	51
Table 33 – ScanNext Method AddressSpace definition	51
Table 34 – GatewayCommunicationServiceType definition.....	52
Table 35 – MethodSet of GatewayCommunicationServiceType	53
Table 36 – Connect Method arguments.....	54
Table 37 – Transfer Method arguments.....	55

Withdrawal

INTERNATIONAL ELECTROTECHNICAL COMMISSION

FIELD DEVICE INTEGRATION (FDI) –

Part 7: Communication devices

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.

International Standard IEC 62769-7 has been prepared by subcommittee 65E: Devices and integration in enterprise systems, of IEC technical committee 65: Industrial-process measurement, control and automation.

This second edition cancels and replaces the first edition published in 2015. This edition constitutes a technical revision.

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

- a) support for generic protocol extension for faster adoption of other technologies;
- b) support of new protocols;
- c) generic protocol extension to allow adoption of other communication protocols;
- d) based on generic protocol extension: Modbus RTU.

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

FDIS	Report on voting
65E/764/FDIS	65E/774/RVD

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts in the 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 publication 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.

INTRODUCTION

The IEC 62769 series has the general title *Field Device Integration (FDI)* and the following parts:

- Part 1: Overview
- Part 2: FDI Client
- Part 3: FDI Server
- Part 4: FDI Packages
- Part 5: FDI Information Model
- Part 6: FDI Technology Mapping
- Part 7: FDI Communication Devices
- Part 100: Profiles – Generic Protocol Extensions
- Part 101-1: Profiles – Foundation Fieldbus H1
- Part 101-2: Profiles – Foundation Fieldbus HSE
- Part 103-1: Profiles – PROFIBUS
- Part 103-4: Profiles – PROFINET
- Part 109-1: Profiles – HART and WirelessHART
- Part 115-2: Profiles – Protocol-specific Definitions for Modbus RTU
- Part 150-1: Profiles – ISA 100.11a

Withhold