

Field Device Integration (FDI®) - Part 3: Server

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

See Eesti standard EVS-EN IEC 62769-3:2023 sisaldab Euroopa standardi EN IEC 62769-3:2023 ingliskeelset teksti.	This Estonian standard EVS-EN IEC 62769-3:2023 consists of the English text of the European standard EN IEC 62769-3:2023.
Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas.	This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation and Accreditation.
Euroopa standardimisorganisatsioonid on teinud Euroopa standardi rahvuslikele liikmetele kättesaadavaks 12.05.2023.	Date of Availability of the European standard is 12.05.2023.
Standard on kättesaadav Eesti Standardimis-ja Akrediteerimiskeskusest.	The standard is available from the Estonian Centre for Standardisation and Accreditation.

Tagasisidet standardi sisu kohta on võimalik edastada, kasutades EVS-i veebilehel asuvat tagasiside vormi või saates e-kirja meiliaadressile standardiosakond@evs.ee.

ICS 25.040.40, 35.100.05

Standardite reprodutseerimise ja levitamise õigus kuulub Eesti Standardimis- ja Akrediteerimiskeskusele

Andmete paljundamine, taastekitamine, kopeerimine, salvestamine elektroonsesse süsteemi või edastamine ükskõik millises vormis või millisel teel ilma Eesti Standardimis-ja Akrediteerimiskeskuse kirjaliku loata on keelatud.

Kui Teil on küsimusi standardite autorikaitse kohta, võtke palun ühendust Eesti Standardimis-ja Akrediteerimiskeskusega: Koduleht www.evs.ee; telefon 605 5050; e-post info@evs.ee

The right to reproduce and distribute standards belongs to the Estonian Centre for Standardisation and Accreditation

No part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying, without a written permission from the Estonian Centre for Standardisation and Accreditation.

If you have any questions about copyright, please contact Estonian Centre for Standardisation and Accreditation:

Homepage www.evs.ee; phone +372 605 5050; e-mail info@evs.ee

English Version

Field Device Integration (FDI®) - Part 3: Server
(IEC 62769-3:2023)

Intégration des appareils de terrain (FDI®) - Partie 3:
Serveur
(IEC 62769-3:2023)

Feldgeräteintegration (FDI®) - Teil 3: FDI-Server
(IEC 62769-3:2023)

This European Standard was approved by CENELEC on 2023-05-09. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and the United Kingdom.



European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

European foreword

The text of document 65E/856/CDV, future edition 3 of IEC 62769-3, prepared by SC 65E "Devices and integration in enterprise systems" of IEC/TC 65 "Industrial-process measurement, control and automation" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 62769-3:2023.

The following dates are fixed:

- latest date by which the document has to be implemented at national (dop) 2024-02-09 level by publication of an identical national standard or by endorsement
- latest date by which the national standards conflicting with the (dow) 2026-05-09 document have to be withdrawn

This document supersedes EN IEC 62769-3:2021 and all of its amendments and corrigenda (if any).

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

Any feedback and questions on this document should be directed to the users' national committee. A complete listing of these bodies can be found on the CENELEC website.

Endorsement notice

The text of the International Standard IEC 62769-3:2023 was approved by CENELEC as a European Standard without any modification.

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.

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 (step1).....	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.

FIELD DEVICE INTEGRATION (FDI®) –

Part 3: Server

1 Scope

This part of IEC 62769 specifies the FDI®¹ Server. The overall FDI® architecture is illustrated in Figure 1. The architectural components that are within the scope of this document have been highlighted in this figure. Annex A provides a functional description of the FDI® Server.

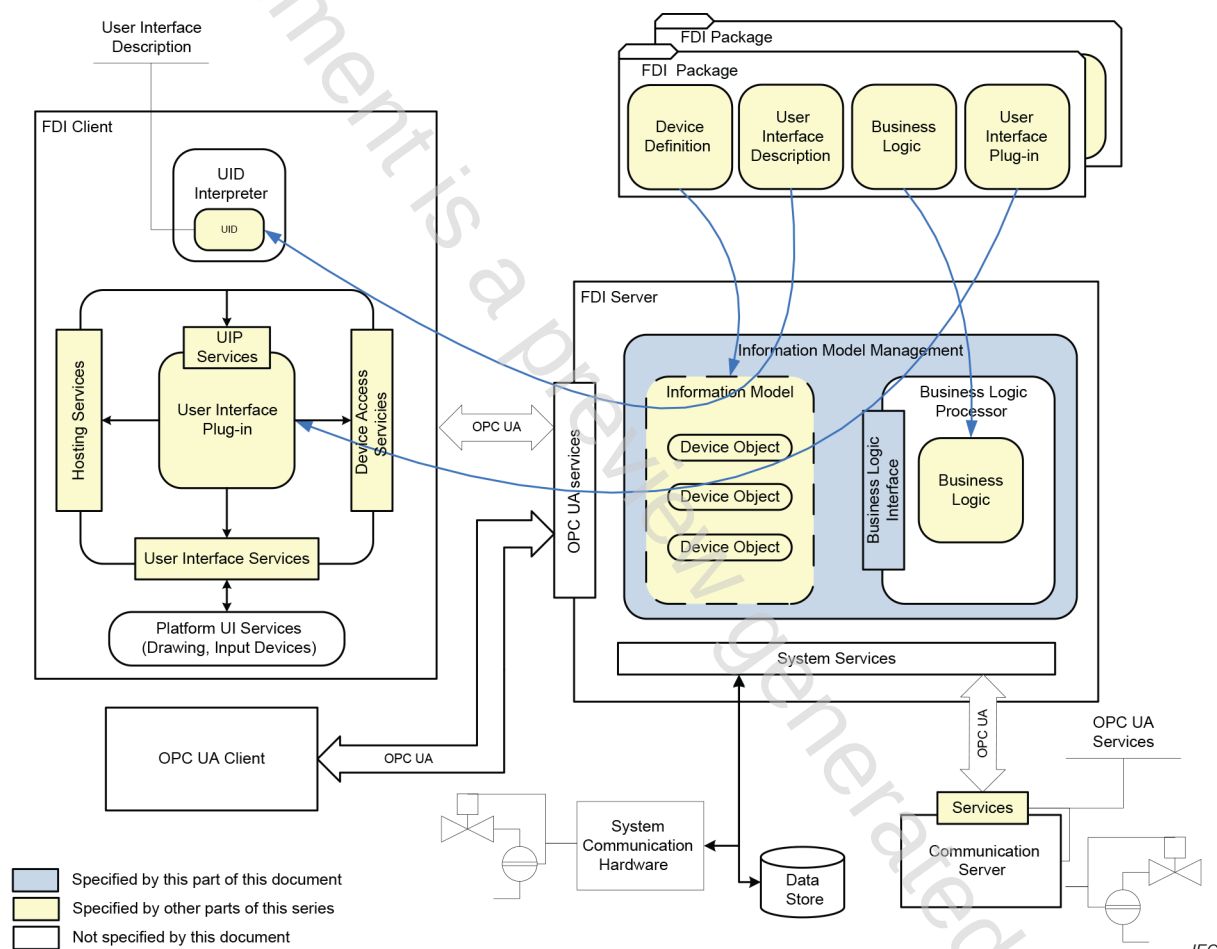


Figure 1 – FDI® architecture diagram

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies.

¹ FDI® is a registered trademark of the non-profit organization Fieldbus Foundation, Inc. This information is given for the convenience of users of this document and does not constitute an endorsement by IEC of the trademark holder or any of its products. Compliance does not require use of the trade name. Use of the trade name requires permission of the trade name holder.

For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 61804-3, *Devices and integration in enterprise systems – Function blocks (FB) for process control and electronic device description language (EDDL) – Part 3: EDDL syntax and semantics*

IEC 61804-4, *Devices and integration in enterprise systems – Function blocks (FB) for process control and electronic device description language (EDDL) – Part 4: EDD interpretation*

IEC 61804-5, *Devices and integration in enterprise systems – Function blocks (FB) for process control and electronic device description language (EDDL) – Part 5: EDDL Builtin library*

IEC 62541-4, *OPC unified architecture – Part 4: Services*

IEC 62541-7, *OPC unified architecture – Part 7: Profiles*

IEC 62769-1, *Field Device Integration (FDI®) – Part 1: Overview*

IEC 62769-2, *Field Device Integration (FDI®) – Part 2: Client*

IEC 62769-4, *Field Device Integration (FDI®) – Part 4: FDI® Packages*

IEC 62769-5, *Field Device Integration (FDI®) – Part 5: FDI® Information Model*

IEC 62769-7, *Field Device Integration (FDI®) – Part 7: Communication Devices*

3 Terms, definitions, abbreviated terms and acronyms

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 62769-1 as well as the following apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- IEC Electropedia: available at <https://www.electropedia.org/>
- ISO Online browsing platform: available at <https://www.iso.org/obp>

3.1.1

Actions Proxy

internal FDI® Server entity that encapsulates all the EDD Methods specified in an EDD Action definition

3.1.2

Connection Point

logical representation of a connection of a communication end point to a communication network

3.2 Abbreviated terms and acronyms

For the purposes of this document, the abbreviated terms and acronyms given in IEC 62769-1 apply.