

# INTERNATIONAL STANDARD

## NORME INTERNATIONALE

**Field device tool (FDT) interface specification –  
Part 309: Communication profile integration – IEC 61784 CPF 9**

**Spécification des interfaces des outils des dispositifs de terrain (FDT) –  
Partie 309: Intégration des profils de communication – CPF 9 de l'IEC 61784**



**THIS PUBLICATION IS COPYRIGHT PROTECTED**  
**Copyright © 2016 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  
Fax: +41 22 919 03 00  
[info@iec.ch](mailto:info@iec.ch)  
[www.iec.ch](http://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 corrigenda or an amendment might have been published.

#### IEC Catalogue - [webstore.iec.ch/catalogue](http://webstore.iec.ch/catalogue)

The stand-alone application for consulting the entire bibliographical information on IEC International Standards, Technical Specifications, Technical Reports and other documents. Available for PC, Mac OS, Android Tablets and iPad.

#### IEC publications search - [www.iec.ch/searchpub](http://www.iec.ch/searchpub)

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](http://webstore.iec.ch/justpublished)

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

#### Electropedia - [www.electropedia.org](http://www.electropedia.org)

The world's leading online dictionary of electronic and electrical terms containing 20 000 terms and definitions in English and French with equivalent terms in 15 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

#### IEC Glossary - [std.iec.ch/glossary](http://std.iec.ch/glossary)

65 000 electrotechnical terminology entries in English and French extracted from the Terms and Definitions clause of IEC publications issued since 2002. Some entries have been collected from earlier publications of IEC TC 37, 77, 86 and CISPR.

#### IEC Customer Service Centre - [webstore.iec.ch/csc](http://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: [csc@iec.ch](mailto:csc@iec.ch).

#### 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.

#### Catalogue IEC - [webstore.iec.ch/catalogue](http://webstore.iec.ch/catalogue)

Application autonome pour consulter tous les renseignements bibliographiques sur les Normes internationales, Spécifications techniques, Rapports techniques et autres documents de l'IEC. Disponible pour PC, Mac OS, tablettes Android et iPad.

#### Recherche de publications IEC - [www.iec.ch/searchpub](http://www.iec.ch/searchpub)

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](http://webstore.iec.ch/justpublished)

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

#### Electropedia - [www.electropedia.org](http://www.electropedia.org)

Le premier dictionnaire en ligne de termes électroniques et électriques. Il contient 20 000 termes et définitions en anglais et en français, ainsi que les termes équivalents dans 15 langues additionnelles. Egalement appelé Vocabulaire Electrotechnique International (IEV) en ligne.

#### Glossaire IEC - [std.iec.ch/glossary](http://std.iec.ch/glossary)

65 000 entrées terminologiques électrotechniques, en anglais et en français, extraites des articles Termes et Définitions des publications IEC parues depuis 2002. Plus certaines entrées antérieures extraites des publications des CE 37, 77, 86 et CISPR de l'IEC.

#### Service Clients - [webstore.iec.ch/csc](http://webstore.iec.ch/csc)

Si vous désirez nous donner des commentaires sur cette publication ou si vous avez des questions contactez-nous: [csc@iec.ch](mailto:csc@iec.ch).

# INTERNATIONAL STANDARD

# NORME INTERNATIONALE



**Field device tool (FDT) interface specification –  
Part 309: Communication profile integration – IEC 61784 CPF 9**

**Spécification des interfaces des outils des dispositifs de terrain (FDT) –  
Partie 309: Intégration des profils de communication – CPF 9 de l'IEC 61784**

INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

COMMISSION  
ELECTROTECHNIQUE  
INTERNATIONALE

ICS 25.040.40; 35.100.05; 35.110

ISBN 978-2-8322-3464-8

**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
INTRODUCTION.....	7
1 Scope.....	8
2 Normative references.....	8
3 Terms, definitions, symbols, abbreviated terms and conventions.....	8
3.1 Terms and definitions.....	8
3.2 Abbreviated terms.....	9
3.3 Conventions.....	9
3.3.1 Data type names and references to data types.....	9
3.3.2 Vocabulary for requirements.....	9
3.3.3 Use of UML.....	9
4 Bus category.....	9
5 Access to instance and device data.....	11
5.1 General.....	11
5.2 Process Channel objects provided by DTM.....	11
5.3 DTM services to access instance and device data.....	12
6 Protocol-specific behavior.....	12
6.1 Overview.....	12
6.2 Burst mode subscription.....	12
6.3 Usage of device addressing information.....	13
6.4 Extended Command Numbers.....	14
6.5 Handling of communication failures and time-outs.....	14
6.6 Handling of Delayed Responses.....	14
6.7 Topologies with mixed HART protocols.....	16
6.7.1 General.....	16
6.7.2 Behavior of DTMs supporting 'Extended_HART' only.....	16
6.7.3 Behavior of DTMs supporting 'Extended_HART' and 'HART'.....	16
6.7.4 Behavior of DTMs that requires 'Extended_HART' or 'HART'.....	17
6.8 Nested communication with multiple gateways.....	18
6.9 Communication- and network structures in WirelessHART.....	18
6.9.1 General.....	18
6.9.2 Network topology.....	19
7 Protocol-specific usage of general data types.....	21
8 Protocol-specific common data types.....	22
9 Network management data types.....	22
9.1 General.....	22
9.2 Addressing modes.....	22
9.3 Address information.....	23
9.4 Additional address information for 'Extended HART' protocols.....	23
10 Communication data types.....	25
10.1 General.....	25
10.2 Protocol-specific Addressing Information.....	26
10.3 Datatype definitions.....	26
11 Channel parameter data types.....	30
12 Device identification.....	33

12.1	Protocol-specific handling of data type STRING .....	33
12.2	Address Range for Scan.....	33
12.3	Support for Extended Manufacturer and Device Type Code .....	33
12.4	Device type identification data types for protocol 'HART' .....	33
12.5	Common device type identification data types for 'Extended_HART' protocols.....	37
12.6	Topology scan data types.....	42
12.7	Scan identification data types for protocol 'HART' .....	43
12.8	Scan identification data types for 'Extended_HART' protocols .....	45
12.9	Device type identification data types – provided by DTM .....	47
	Bibliography .....	49
	Figure 1 – Part 309 of the IEC 62453 series .....	7
	Figure 2 – Burst mode subscription .....	13
	Figure 3 – Handling of Delayed Responses (scenario 1).....	15
	Figure 4 – Handling of Delayed Responses (scenario 2).....	15
	Figure 5 – Behavior of DTMs supporting 'Extended_HART' and 'HART' .....	17
	Figure 6 – Behavior of DTMs requires 'Extended_HART' or 'HART' .....	18
	Figure 7 – Host connected to a WirelessHART gateway device.....	19
	Figure 8 – FDT Topology of a WirelessHART network.....	20
	Figure 9 – Host connected to HART FSK.....	20
	Figure 10 – FDT Topology when directly connected to a WirelessHART adapter device.....	21
	Table 1 – Protocol identifiers.....	9
	Table 2 – Definition of Physical Layer.....	10
	Table 3 – Protocol specific usage of general data types.....	22
	Table 4 – Relation of ProtocolId and supported features .....	23
	Table 5 – Simple address information data types.....	24
	Table 6 – Structured address information data types .....	25
	Table 7 – Simple communication data types .....	26
	Table 8 – Structured communication data types.....	28
	Table 9 – Simple channel parameter data types .....	31
	Table 10 – Structured channel parameter data types .....	31
	Table 11 – Address range for device identification.....	33
	Table 12 – Identification data types with protocol-specific mapping for protocol 'HART' .....	34
	Table 13 – Identification data types with semantics for protocol 'HART'.....	36
	Table 14 – Simple identification data types for protocol 'HART' with protocol independent semantics .....	37
	Table 15 – Structured identification data types for protocol 'HART' with protocol independent semantics .....	37
	Table 16 – Identification data types for 'Extended_HART' protocols with protocol- specific mapping.....	38
	Table 17 – Identification data types for 'Extended_HART' protocols without protocol independent semantics .....	41
	Table 18 – Simple identification data types for 'Extended_HART' protocols with protocol independent semantics .....	42

Table 19 – Structured identification data types for ‘Extended\_HART’ protocols with protocol independent semantics .....42

Table 20 – Structured device type identification data types .....43

Table 21 – Simple scan identification data types for protocol ‘HART’ .....43

Table 22 – Structured scan identification data types for protocol ‘HART’ .....43

Table 23 – Simple scan identification data types for ‘Extended\_HART’ protocols .....45

Table 24 – Structured scan identification data types for ‘Extended\_HART’ protocols .....45

Table 25 – Structured device type identification data types .....47

Withdrawn

## INTERNATIONAL ELECTROTECHNICAL COMMISSION

## FIELD DEVICE TOOL (FDT) INTERFACE SPECIFICATION –

**Part 309: Communication profile integration –  
IEC 61784 CPF 9**

## 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 62453-309 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 2009, and constitutes a technical revision. The main changes are provided in order to provide improved support for updates of the HART protocol (see 6.7 and the updated datatypes in Clauses 9, 10, and 12) and to support introduction of the technology according to IEC 62453-42 [1] (see Clause 4).

Each part of the IEC 62453-3xy series is intended to be read in conjunction with IEC 62453-2.

The text of this standard is based on the following documents:

CDV	Report on voting
65E/336/CDV	65E/395A/RVC

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

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

A list of all parts of the IEC 62453 series, under the general title *Field Device Tool (FDT) interface specification*, can be found on the IEC website.

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

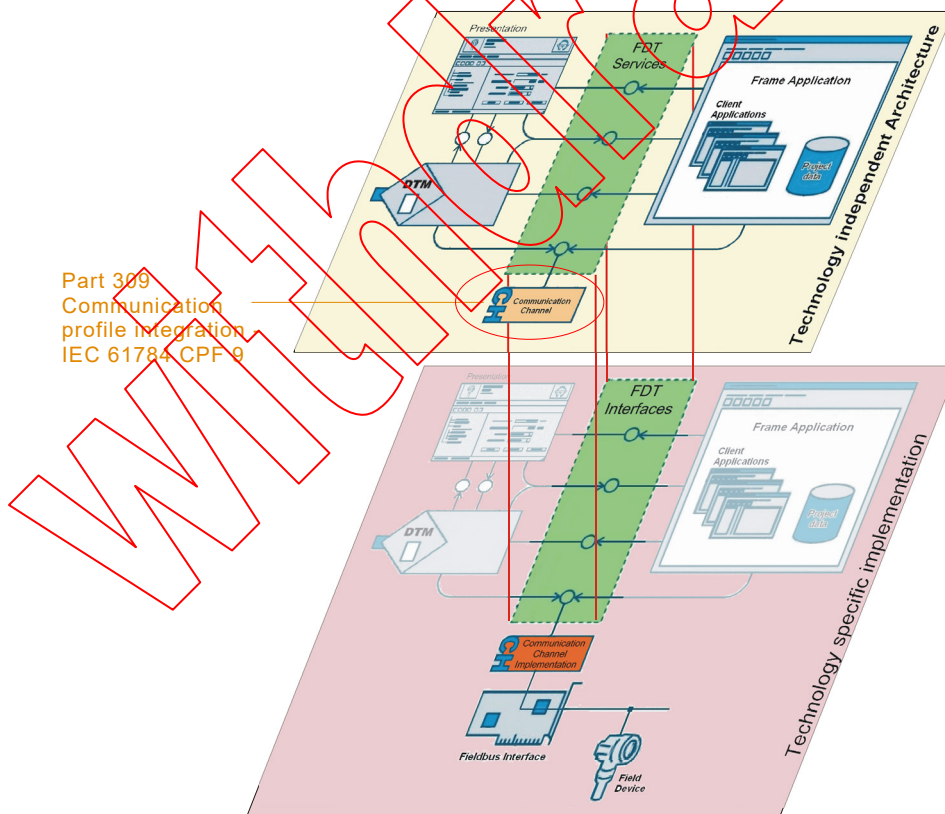
## INTRODUCTION

This part of IEC 62453 is an interface specification for developers of FDT (Field Device Tool) components for function control and data access within a client/server architecture. The specification is a result of an analysis and design process to develop standard interfaces to facilitate the development of servers and clients by multiple vendors that need to interoperate seamlessly.

With the integration of fieldbuses into control systems, there are a few other tasks which need to be performed. In addition to fieldbus- and device-specific tools, there is a need to integrate these tools into higher-level system-wide planning or engineering tools. In particular, for use in extensive and heterogeneous control systems, typically in the area of the process industry, the unambiguous definition of engineering interfaces that are easy to use for all those involved is of great importance.

A device-specific software component, called DTM (Device Type Manager), is supplied by the field device manufacturer with its device. The DTM is integrated into engineering tools via the FDT interfaces defined in this specification. The approach to integration is in general open for all kind of fieldbuses and thus meets the requirements for integrating different kinds of devices into heterogeneous control systems.

Figure 1 shows how IEC 62453-309 is aligned in the structure of the IEC 62453 series.



IEC

Figure 1 – Part 309 of the IEC 62453 series