



BSI Standards Publication

Field device tool (FDT) interface specification

Part 52-31: Communication implementation for common language infrastructure - IEC 61784 CP 3/1 and CP 3/2

National foreword

This Published Document is the UK implementation of CLC IEC/TR 62453-52-31:2019. It is identical to IEC TR 62453-52-31:2017.

The UK participation in its preparation was entrusted to Technical Committee GEL/65/3, Industrial communications: process measurement and control, including fieldbus.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

© The British Standards Institution 2019
Published by BSI Standards Limited 2019

ISBN 978 0 580 95967 7

ICS 35.110; 35.100.05; 25.040.40

Compliance with a British Standard cannot confer immunity from legal obligations.

This Published Document was published under the authority of the Standards Policy and Strategy Committee on 28 February 2019.

Amendments/corrigenda issued since publication

Date	Text affected
------	---------------

TECHNICAL REPORT
RAPPORT TECHNIQUE
TECHNISCHER BERICHT

CLC IEC/TR 62453-52-31

February 2019

ICS 25.040.40; 35.100.05; 35.110

English Version

Field device tool (FDT) interface specification - Part 52-31:
Communication implementation for common language
infrastructure - IEC 61784 CP 3/1 and CP 3/2
(IEC/TR 62453-52-31:2017)

Spécification des interfaces des outils des dispositifs de terrain (FDT) - Partie 52-31: Mise en œuvre d'un profil de communication pour l'infrastructure commune de langage - CP 3/1 et CP 3/2 de l' IEC 61784 (IEC/TR 62453-52-31:2017)

Field Device Tool (FDT)-Schnittstellenspezifikation - Teil 52-31: Kommunikationsimplementierung mit der allgemeinen Sprachinfrastruktur - Kommunikationsprofilfamilie (CPF) 3/1 und 3/2 nach IEC 61784 (IEC/TR 62453-52-31:2017)

This Technical Report was approved by CENELEC on 2019-01-14.

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

This document (CLC IEC/TR 62453-52-31:2019) consists of the text of IEC/TR 62453-52-31:2017 prepared by SC 65E "Devices and integration in enterprise systems" of IEC/TC 65 "Industrial-process measurement, control and automation".

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.

Endorsement notice

The text of the International Standard IEC/TR 62453-52-31:2017 was approved by CENELEC as a European Standard without any modification.

Annex ZA
(normative)

**Normative references to international publications
with their corresponding European publications**

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

NOTE 1 Where an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: www.cenelec.eu.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 61131-3	2003	Programmable controllers -- Part 3: Programming languages	-	-
IEC 61158	series	Industrial communication networks - Fieldbus specifications - Part 1: Overview and guidance for the IEC 61158 and IEC 61784 series	EN 61158	series
IEC 61158-6-3	2014	Industrial communication networks - Fieldbus specifications - Part 6-3: Application layer protocol specification - Type 3 elements	EN 61158-6-3	2014
IEC 61784-1	2014	Industrial communication networks - Profiles - Part 1: Fieldbus profiles	EN 61784-1	2014
IEC 62453-1	2016	Field device tool (FDT) interface specification - Part 1: Overview and guidance	EN 62453-1	2017
IEC 62453-2	2016	Field device tool (FDT) interface specification - Part 2: Concepts and detailed description	EN 62453-2	2017
IEC TR 62453-42	2016	Field device tool (FDT) interface - specification – Part 42: Object model integration profile – Common language infrastructure	-	-
IEC 62453-303-1	2009	Field device tool (FDT) interface specification - Part 303-1: Communication profile integration - IEC 61784 CP 3/1 and CP 3/2	EN 62453-303-1	2009

CONTENTS

FOREWORD.....	6
INTRODUCTION.....	8
1 Scope.....	9
2 Normative references	9
3 Terms, definitions, symbols, abbreviated terms and conventions	10
3.1 Terms and definitions.....	10
3.2 Symbols and abbreviated terms	10
3.3 Conventions.....	10
3.3.1 Datatype names and references to datatypes	10
3.3.2 Vocabulary for requirements	10
3.3.3 Use of UML	10
4 Bus category	10
5 Access to instance and device data	11
5.1 General.....	11
5.2 IO signals provided by DTM.....	11
5.3 Data interfaces	11
5.3.1 General	11
5.3.2 Mapping of PROFIBUS datatypes to FDT datatypes	11
5.3.3 SemanticInfo	12
6 Protocol specific behaviour.....	14
6.1 PROFIBUS device model	14
6.2 Configuration and parameterization of PROFIBUS devices	15
6.2.1 General	15
6.2.2 Monolithic DTM for a modular PROFIBUS device	16
6.2.3 Composite DTM for a modular PROFIBUS device.....	16
6.3 Support for DP-V0 configuration	17
6.4 PROFIBUS slaves operating without a class 1 PROFIBUS master	17
6.5 PROFIBUS-related information of a slave DTM.....	17
6.5.1 General	17
6.5.2 PROFIBUS Network Data (PND).....	18
6.5.3 GSD Information.....	25
6.5.4 Process Data Items	26
7 Protocol specific usage of general datatypes	26
7.1 General datatypes	26
7.2 Protocol specific handling of the datatype STRING	27
8 Network management datatypes	27
8.1 General.....	27
8.2 Configuration	28
8.3 Process Data Items.....	28
8.4 Parameterization.....	28
9 Communication datatypes.....	29
9.1 General.....	29
9.2 ProfibusAbortMessage	29
9.3 DP-V0 Communication	29
9.3.1 General	29
9.3.2 Dpv0ConnectRequest	30

9.3.3	Dpv0ConnectResponse	31
9.3.4	Dpv0DisconnectRequest.....	32
9.3.5	Dpv0DisconnectResponse	32
9.3.6	Dpv0TransactionRequest.....	33
9.3.7	Dpv0TransactionResponse	37
9.4	DP-V1 Communication	42
9.4.1	Dpv1ConnectRequest	42
9.4.2	Dpv1ConnectResponse	43
9.4.3	Dpv1DisconnectRequest.....	45
9.4.4	Dpv1DisconnectResponse	45
9.4.5	Dpv1TransactionRequest.....	46
9.4.6	Dpv1TransactionResponse	47
9.5	Error information provided by Communication Channel	49
10	Datatypes for process data information.....	49
10.1	General.....	49
10.2	ProfibusIOSignalInfo	49
11	Device identification	50
11.1	General.....	50
11.2	ProfibusDeviceScanInfo datatype.....	51
11.2.1	General	51
11.2.2	Datatypes derived from ProfibusBaseScanInfo	52
11.3	ProfibusDeviceIdentInfo datatype.....	54
11.3.1	General	54
11.3.2	Datatypes derived from ProfibusBaseIdentInfo	55
11.4	Mapping of Information Source	57
	Bibliography.....	63
	Figure 1 – Part 52-31 of the IEC 62453 series	8
	Figure 2 – FDT PROFIBUS Device Model	15
	Figure 3 – ProfibusNetworkData	27
	Figure 4 – ProfibusAbortMessage	29
	Figure 5 – Dpv0ConnectRequest	31
	Figure 6 – Dpv0ConnectResponse	31
	Figure 7 – Dpv0DisconnectRequest	32
	Figure 8 – Dpv0DisconnectResponse	32
	Figure 9 – Dpv0ReadConfigurationDataRequest	33
	Figure 10 – Dpv0ReadDiagnosisDataRequest.....	34
	Figure 11 – Dpv0ReadInputDataRequest	34
	Figure 12 – Dpv0ReadOutputDataRequest	35
	Figure 13 – Dpv0ReadUserParameterRequest.....	36
	Figure 14 – Dpv0WriteOutputDataRequest.....	36
	Figure 15 – Dpv0WriteUserParameterRequest.....	37
	Figure 16 – Dpv0ReadConfigurationDataResponse.....	38
	Figure 17 – Dpv0ReadDiagnosisDataResponse	39
	Figure 18 – Dpv0ReadInputDataResponse	39
	Figure 19 – Dpv0ReadOutputDataResponse.....	40

Figure 20 – Dpv0ReadUserParameterResponse	41
Figure 21 – Dpv0WriteOutputDataResponse	41
Figure 22 – Dpv0WriteUserParameterResponse	42
Figure 23 – Dpv1ConnectRequest	43
Figure 24 – Dpv1ConnectResponse	44
Figure 25 – Dpv1DisconnectRequest	45
Figure 26 – Dpv1DisconnectResponse	45
Figure 27 – Dpv1ReadRequest	46
Figure 28 – Dpv1WriteRequest	47
Figure 29 – Dpv1ReadResponse	48
Figure 30 – Dpv1WriteResponse	48
Figure 31 – ProfibusIOSignalInfo	50
Figure 32 – ProfibusDeviceScanInfo	51
Figure 33 – Datatypes derived from ProfibusBaseScanInfo	52
Figure 34 – ProfibusDeviceIdentInfo	54
Figure 35 – Datatypes derived from ProfibusBaseIdentInfo	55
Table 1 – Mapping of datatypes	11
Table 2 – Usage of general datatypes	12
Table 3 – PROFIBUS Network Information	19
Table 4 – Protocol specific usage of general datatypes	27
Table 5 – ProfibusAbortMessage datatype	29
Table 6 – Availability of services for Master Class 1 (C1)	30
Table 7 – Availability of services for Master Class 2 (C2)	30
Table 8 – Dpv0ConnectRequest datatype	31
Table 9 – Dpv0ConnectResponse datatype	32
Table 10 – Dpv0DisconnectRequest datatype	32
Table 11 – Dpv0DisconnectResponse datatype	33
Table 12 – Dpv0ReadConfigurationDataRequest datatype	33
Table 13 – Dpv0ReadDiagnosisDataRequest datatype	34
Table 14 – Dpv0ReadInputDataRequest datatype	35
Table 15 – Dpv0ReadOutputDataRequest datatype	35
Table 16 – Dpv0ReadUserParameterRequest datatype	36
Table 17 – Dpv0WriteOutputDataRequest datatype	37
Table 18 – Dpv0WriteUserParameterRequest datatype	37
Table 19 – Dpv0ReadConfigurationDataResponse datatype	38
Table 20 – Dpv0ReadDiagnosisDataResponse datatype	39
Table 21 – Dpv0ReadInputDataResponse datatype	40
Table 22 – Dpv0ReadOutputDataResponse datatype	40
Table 23 – Dpv0ReadUserParameterResponse datatype	41
Table 24 – Dpv0WriteOutputDataResponse datatype	42
Table 25 – Dpv0WriteUserParameterResponse datatype	42
Table 26 – Dpv1ConnectRequest datatype	43

Table 27 – Dpv1ConnectResponse datatype.....	44
Table 28 – Dpv1DisconnectRequest datatype	45
Table 29 – Dpv1DisconnectResponse datatype	45
Table 30 – Dpv1ReadRequest datatype	46
Table 31 – Dpv1WriteRequest datatype	47
Table 32 – Dpv1ReadResponse datatype	48
Table 33 – Dpv1WriteResponse datatype	49
Table 34 – ProfibusIOSignalInfo datatype	50
Table 35 – ProfibusDeviceScanInfo datatype	52
Table 36 – Datatypes derived from ProfibusBaseScanInfo	53
Table 37 – ProfibusDeviceIdentInfo datatype	55
Table 38 – Datatypes derived from ProfibusBaseIdentInfo	56
Table 39 – Profile specific mapping of identity information	58

INTERNATIONAL ELECTROTECHNICAL COMMISSION

FIELD DEVICE TOOL (FDT) INTERFACE SPECIFICATION –**Part 52-31: Communication implementation
for common language infrastructure –
IEC 61784 CP 3/1 and CP 3/2**

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.

The main task of IEC technical committees is to prepare International Standards. However, a technical committee may propose the publication of a technical report when it has collected data of a different kind from that which is normally published as an International Standard, for example "state of the art".

IEC TR 62453-52-31, which is a technical report, has been prepared by subcommittee 65E: Devices and integration in enterprise systems, of IEC technical committee 65: Industrial-process measurement, control and automation.

Each part of the IEC 62453-52-xy series is intended to be read in conjunction with its corresponding part in the IEC 62453-3xy series. The corresponding part for this document is IEC 62453-303-1.

The text of this technical report is based on the following documents:

Enquiry draft	Report on voting
65E/440/DTR	65E/514/RVC

Full information on the voting for the approval of this technical report 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.

The 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 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.

A bilingual version of this publication may be issued at a later date.

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 Field Device Tool (FDT) 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 Device Type Manager (DTM), 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 this part of the IEC 62453-52-xy series is aligned in the structure of the IEC 62453 series.

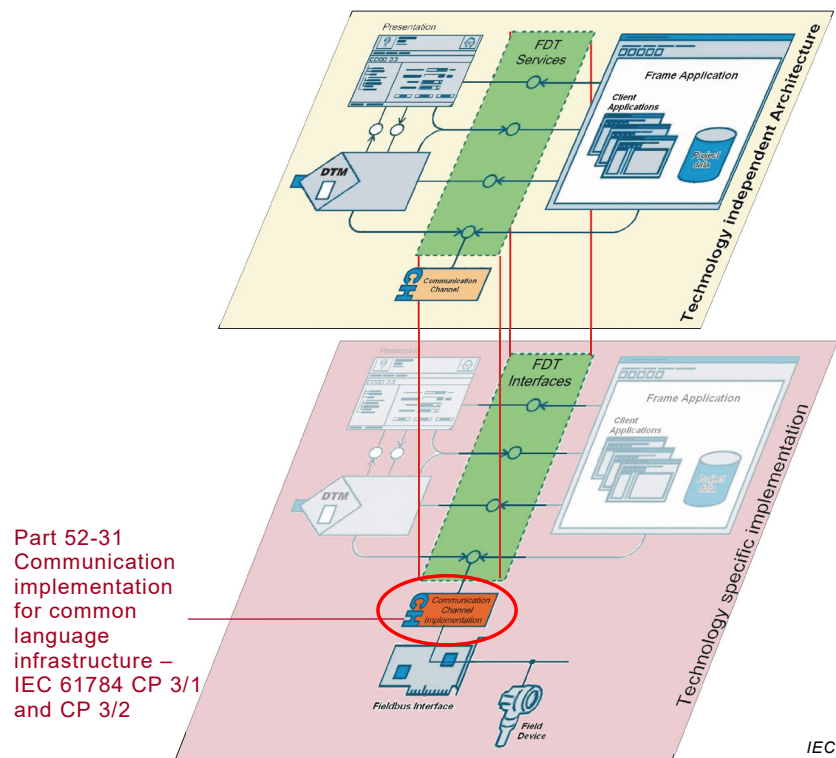


Figure 1 – Part 52-31 of the IEC 62453 series

FIELD DEVICE TOOL (FDT) INTERFACE SPECIFICATION –

Part 52-31: Communication implementation for common language infrastructure – IEC 61784 CP 3/1 and CP 3/2

1 Scope

This part of the IEC 62453-52-xy series, which is a Technical Report, provides information for integrating the PROFIBUS¹ technology into the CLI-based implementation of FDT interface specification (IEC TR 62453-42).

This part of IEC 62453 specifies implementation of communication and other services based on IEC 62453-303-1.

This document neither contains the FDT specification nor modifies it.

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

IEC 61131-3:2003, *Programmable controllers – Part 3: Programming languages*

IEC 61158 (all parts), *Industrial communication networks – Fieldbus specifications*

IEC 61158-6-3:2014, *Industrial communication networks – Fieldbus specifications – Part 6-3: Application layer protocol specification – Type 3 elements*

IEC 61784-1:2014, *Industrial communication networks – Profiles – Part 1: Fieldbus profiles*

IEC 62453-1:2016, *Field device tool (FDT) interface specification – Part 1: Overview and guidance*

IEC 62453-2:2016, *Field device tool (FDT) interface specification – Part 2: Concepts and detailed description*

IEC TR 62453-42:2016, *Field device tool (FDT) interface specification – Part 42: Object model integration profile – Common language infrastructure*

IEC 62453-303-1:2009, *Field device tool (FDT) interface specification – Part 303-1: Communication profile integration – IEC 61784 CP 3/1 and CP 3/2*
IEC 62453-303-1:2009/AMD1:2016

¹ PROFIBUS™ is a trade name of the non-profit organization PROFIBUS Nutzerorganisation e.V. (PNO). This information is given for the convenience of users of this document and does not constitute an endorsement by IEC of the trade name holder or any of its products. Compliance to this document does not require use of the registered logos for PROFIBUS™. Use of the registered logos for PROFIBUS™ requires permission of PNO.