



BSI Standards Publication

Field devices integration (FDI)

Part 109-1: Profiles — HART(r) and WirelessHART(r)

National foreword

This British Standard is the UK implementation of EN IEC 62769-109-1:2020. It is identical to IEC 62769-109-1:2020. It supersedes [BS EN 62769-109-1:2015](#), which is withdrawn.

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 committee manager.

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(IEC 62769-109-1:2020)

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Feldgeräteintegration (FDI) - Teil 109-1: Profile - HART(r)
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(IEC 62769-109-1:2020)

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European Committee for Electrotechnical Standardization
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European foreword

The text of document 65E/624/CDV, future edition 2 of IEC 62769-109-1, 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 62769-109-1:2020.

The following dates are fixed:

- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2021-03-02
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2023-06-02

This document supersedes EN 62769-109-1:2015 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.

Endorsement notice

The text of the International Standard IEC 62769-109-1:2020 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following notes have to be added for the standards indicated:

IEC 61784-1	NOTE	Harmonized as EN IEC 61784-1
IEC 61784-2	NOTE	Harmonized as EN IEC 61784-2
IEC 61804 (series)	NOTE	Harmonized as EN 61804 (series)
IEC 62769-1	NOTE	Harmonized as EN 62769-1
IEC 62769-2	NOTE	Harmonized as EN 62769-2
IEC 62769-3	NOTE	Harmonized as EN 62769-3
IEC 62769-6	NOTE	Harmonized as EN 62769-6

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 62541-100	2015	OPC Unified Architecture - Part 100: Device Interface	EN 62541-100	2015
IEC 62769-4	— ¹	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: FDI Communication Devices	-	-

¹ Under preparation. Stage at the time of publication: IEC/RFDIS 62769-4:2020.

CONTENTS

FOREWORD	4
1 Scope	6
2 Normative references	6
3 Terms, definitions, abbreviated terms and conventions	6
3.1 Terms and definitions	6
3.2 Abbreviated terms and acronyms	6
3.3 Conventions	7
3.3.1 EDDL syntax	7
3.3.2 XML syntax	7
3.3.3 Capitalizations	7
4 Profile for CP 9/1 (HART®) or CP 9/2 (WirelessHART®)	8
4.1 General	8
4.2 Catalog profile	8
4.2.1 Protocol support file	8
4.2.2 CommunicationProfile definition	8
4.2.3 Profile device	9
4.2.4 Protocol version information	9
4.3 Associating a Package with a CP 9/1 device	9
4.3.1 Device type identification mapping	9
4.3.2 Device type revision mapping	10
4.4 Information Model mapping	10
4.4.1 ProtocolType definition	10
4.4.2 DeviceType mapping	10
4.4.3 FunctionalGroup Identification definition	11
4.5 Topology elements	11
4.5.1 ConnectionPoint definition	11
4.5.2 Communication Device definition	17
4.5.3 Communication service provider definition	18
4.5.4 Network definition	18
4.6 Methods	19
4.6.1 Methods for FDI Communication Servers	19
4.6.2 Methods for Gateways	23
Annex A (normative) Topology scan schema	31
A.1 General	31
A.2 IdentificationType	31
A.3 AddressTypeTP	33
A.4 AddressTypeIP	33
A.5 AddressTypeTDMA	34
A.6 AddressType	34
A.7 ConnectionPointType	35
A.8 NetworkType	36
A.9 Network	36
Annex B (normative) Transfer service parameters	37
B.1 General	37
B.2 receiveData	37
B.3 sendData	37

B.4	TransferResultDataT	37
B.5	TransferSendDataT	38
	Bibliography	39
Table 1	– Device Information Files	8
Table 2	– CommunicationProfile definition	8
Table 3	– Catalog values for profile devices	9
Table 4	– Protocol Version Information	9
Table 5	– Device type catalog mapping	9
Table 6	– ProtocolType HART definition	10
Table 7	– Inherited DeviceType Property mapping	10
Table 8	– Identification parameters	11
Table 9	– ConnectionPointType HART_TP definition	12
Table 10	– ConnectionPointType HART_IP Definition	14
Table 11	– ConnectionPointType HART_TDMA Definition	16
Table 12	– Method Connect arguments	20
Table 13	– Method Disconnect arguments	20
Table 14	– Method Transfer arguments	21
Table 15	– Method GetPublishedData arguments	22
Table 16	– Method SetAddress arguments	23
Table 17	– Method Connect arguments	24
Table 18	– Method Disconnect arguments	25
Table 19	– Method Transfer arguments	26
Table 20	– Method GetPublishedData arguments	27
Table 21	– Method SetAddress arguments	28
Table A.1	– Attributes of IdentificationT	32
Table A.2	– Elements of AddressTypeTP	33
Table A.3	– Elements of AddressTypeIP	34
Table A.4	– Elements of AddressTypeTDMA	34
Table A.5	– Elements of AddressT	35
Table A.6	– Elements of ConnectionPointT	35
Table A.7	– Elements of NetworkT	36
Table B.1	– Attributes of TransferResultDataT	37
Table B.2	– Attributes of TransferSendDataT	38

INTERNATIONAL ELECTROTECHNICAL COMMISSION

FIELD DEVICE INTEGRATION (FDI) –

Part 109-1: Profiles – HART® and WirelessHART®

FOREWORD

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International Standard IEC 62769-109-1 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 for Package Developers to build EDDs targeted for today's EDD bases system under a single development tool.

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

CDV	Report on voting
65E/624/CDV	65E/687A/RVC

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 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.

FIELD DEVICE INTEGRATION (FDI) –

Part 109-1: Profiles – HART® and WirelessHART®

1 Scope

This part of IEC 62769 specifies an FDI profile of IEC 62769 for IEC 61784-1_CP 9/1 (HART®)¹ and IEC 61784-1_CP 9/2 (WirelessHART®)¹.

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 62541-100:2015, *OPC Unified Architecture Specification – Part 100: Device Interface*

IEC 62769-4:–², *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: FDI Communication Devices*

3 Terms, definitions, abbreviated terms and conventions

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 62541-100, IEC 62769-4, IEC 62769-5 and IEC 62769-7 apply.

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

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

3.2 Abbreviated terms and acronyms

For the purposes of this document, the following abbreviations apply:

CP	Communication profile (see IEC 61784-1 or IEC 61784-2)
CPF	Communication profile family (see IEC 61784-1 or IEC 61784-2)
EDD	Electronic device description (see IEC 61804)
EDDL	Electronic device description language (see IEC 61804)

¹ HART® and wirelessHART® are the registered trademark of FieldComm Group. This information is given for the convenience of users of this document and does not constitute an endorsement by IEC of the product named. Equivalent products may be used if they can be shown to lead to the same results.

² Under preparation. Stage at the time of publication: IEC/RFDIS 62769-4:2020.

FDI	Field device integration
FSK	Frequency-Shift-Keying
HCF	HART Communication Foundation
ID	Identification
IM	Information Model
IP	Internet protocol
PDU	Protocol data unit
PSK	Phase-Shift-Keying
TCP	Transmission Control Protocol (see IETF RFC 793)
UDP	User Datagram Protocol (see IETF RFC 768)
XML	Extensible markup language

3.3 Conventions

3.3.1 EDDL syntax

This document specifies content for the EDD component that is part of FDI Communication Packages. EDDL syntax uses the font `Courier New`. EDDL syntax is used for method signature, variable, data structure and component declarations.

3.3.2 XML syntax

XML syntax examples use font `Courier New`. The XML syntax is used to describe XML document schema.

EXAMPLE `<xs:simpleType name="ExampleT">`

3.3.3 Capitalizations

The IEC 62769 series uses capitalized terms to emphasize that these terms have an FDI specific meaning.

Some of these terms using an acronym as a prefix, for example

- FDI Client or
- FDI Server.

Some of these terms are compound terms such as:

- FDI Communication Servers or
- Profile Package.

Parameter names or attributes are concatenated to a single term, where the original terms start in this term with a capital letter such as:

- ProtocolSupportFile or
- ProtocolType.

Parameter names or attributes can also be constructed by using an underscore character to concatenate two or more terms like:

- PROFILE_ID or
- HART_Network.

4 Profile for CP 9/1 (HART®) or CP 9/2 (WirelessHART®)

4.1 General

This profile document to the FDI specification in IEC 62769 selects the protocol specifics needed for FDI Packages describing FDI Communication Servers, gateways and devices.

4.2 Catalog profile

4.2.1 Protocol support file

Device information files provide metadata for the dynamic runtime data that is supplied by the device. This metadata is a subset of information that is contained in the EDD. The device information files may be extracted from the package by light-weight gateway or server implementations to exchange runtime device information with minimal implementation overhead. Device information files do not replace the need for the EDD part because device information files only contain a subset of the information from the EDD, and do not provide any user-interface elements.

The formats of the Device Information Files are described in Table 1.

Table 1 – Device Information Files

Part	Content
Content Type	Not specified here
Root Namespace	Not specified here
Source Relationship	http://fdi-cooperation.com/2010/relationships/attachment-protocol
Filename	Not specified here

The Device Information Files are specified in FCG AG21073.

4.2.2 CommunicationProfile definition

IEC 62769-4 defines a CommunicationProfileT string type for the Catalog XML schema. Table 2 defines the CP 9/1 specific values for this enumeration.

Table 2 – CommunicationProfile definition

CommunicationProfile	Description
hart_fsk	CP 9/1 device type that supports an FSK physical layer (Frequency-Shift-Keying on a pair of wires)
hart_psk	CP 9/1 device type that supports a PSK physical layer (Phase-Shift-Keying on a pair of wires). Devices supporting PSK are required to also inherently support FSK, and therefore PSK will always be used only in combination with at least FSK.
hart_wirelesshart	CP 9/2 device type that supports a wireless physical layer (communication between device and gateway).
hart_ip	CP 9/1 device type that supports Internet Protocol (these devices support both TCP and UDP).
hart_rs485	CP 9/1 device type that supports EIA-485 digital communication.
hart_ir	CP 9/1 device type that supports an Infrared physical layer (designed to be transparent to FSK masters – included only as information to indicate that the device supports IR connection).
NOTE It is possible for a single CP 9/1 device to support more than one CP.	

4.2.3 Profile device

A Profile Package shall provide the catalog values for profile devices, enabling the FDI Server to leverage a generic device description, if a specific one is not available. The definitions in Table 3 focus on catalog content that is vendor independent.

Table 3 – Catalog values for profile devices

Element	Attribute	Content
PackageType	—	Profile
DeviceModel	—	Empty
Manufacturer	—	Empty

4.2.4 Protocol version information

IEC 62769-4 defines an element type named InterfaceT for the Catalog XML Schema. Element type InterfaceT contains an element named Version which is supposed to provide version information about the applied communication protocol profile. The value has to follow the IEC 62769-4 defined version information schema defined in element type VersionT. Subclause 4.2.4 describes how to apply the currently known protocol versions for CP 9/1 or CP 9/2 entries in the device catalog. The general rule is to use the Universal Revision of the protocol for the major version part of VersionT, and the value "0" for the minor version and build parts. Table 4 shows the Protocol Version Information.

Table 4 – Protocol Version Information

Protocol Version	InterfaceT Version value
HART Universal Revision 5	5.0.0
HART Universal Revision 6	6.0.0
HART Universal Revision 7	7.0.0
The Protocol Version defined in a package is provided for informational purposes only and shall not be used to determine the compatibility or applicability of a package to a device.	

4.3 Associating a Package with a CP 9/1 device

4.3.1 Device type identification mapping

CP 9/1 device types are uniquely identified by parameters Manufacturer, Model and DeviceRevision. These parameters are used to associate a given device instance to an FDI Device Package. These parameters are mapped to the FDI Device Package Catalog according to Table 5.

Table 5 – Device type catalog mapping

Catalog element	CP mapping (See Table A.)
Manufacturer element of InterfaceT (IEC 62769-4:–, Clause E.10)	Manufacturer String format "0xdddd" where dddd is the MANUFACTURER_ID in hexadecimal format.
DeviceModel element of InterfaceT (IEC 62769-4:–, Clause E.10)	Model String format "0xdddd" where dddd is the DEVICE_TYPE in hexadecimal format.

Catalog element	CP mapping (See Table A.)
DeviceRevision element ListOfSupportedDeviceRevisionsT (IEC 62769-4:–, Clause E.20)	DeviceRevision String format "x.0.0" where x is the DEVICE_REVISION in decimal format (no leading zeros).

4.3.2 Device type revision mapping

Each device type is identified as per 4.3.1. If a package with matching DeviceRevision is not available, any CP 9/1 FDI package for a corresponding manufacturer and model shall always be compatible with a field device as long as the device revision of the field device is equal to or greater than the device revision specified in the FDI package.

4.4 Information Model mapping

4.4.1 ProtocolType definition

Table 6 defines the ProtocolType used to identify CP 9/1 network communications.

Table 6 – ProtocolType HART definition

Attribute	Value				
BrowseName	HART				
IsAbstract	False				
References	NodeClass	BrowseName	DataType	TypeDefinition	ModellingRule
Inherits the properties of ProtocolType defined in IEC 62541-100.					

4.4.2 DeviceType mapping

Each device type inherits the properties of DeviceType. The mapping of the inherited properties from DeviceType is defined in Table 7.

Table 7 – Inherited DeviceType Property mapping

Property	Foundation mapping
SerialNumber	Unique ID of a device, mapped to SERIAL_NUMBER of IdentificationT.
RevisionCounter	Configuration change counter, mapped to REV_COUNTER of IdentificationT
Manufacturer	String taken from FDI package catalog (ManufacturerName from PackageT)
Model	String taken from FDI package catalog (Name of DeviceTypeT, which is a localized name)
DeviceManual	Entry text string (not supported) ^a
DeviceRevision	Device revision level of a device, mapped to DEVICE_REVISION of IdentificationT
SoftwareRevision	Software revision level of a device, mapped to SOFTWARE_REVISION of IdentificationT
HardwareRevision	Hardware revision level of a device, mapped to HARDWARE_REVISION of IdentificationT
^a Device manuals are exposed as attachments of the FDI Device Package.	