



BSI Standards Publication

Field device integration (FDI)®

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

National foreword

This British Standard is the UK implementation of EN IEC 62769-109-1:2023. It is identical to IEC 62769-109-1:2023. It supersedes BS EN IEC 62769-109-1:2020, which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee GEL/65/5, Devices and integration in enterprise systems.

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

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and WirelessHART®
(IEC 62769-109-1:2023)

Intégration des appareils de terrain (FDI)® - Partie 109-1:
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(IEC 62769-109-1:2023)

Feldgeräteintegration (FDI) - Teil 109-1: Profile - HART®
und WirelessHART®
(IEC 62769-109-1:2023)

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

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European foreword

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

IEC 61784-1	NOTE Approved as EN IEC 61784-1
IEC 61784-2	NOTE Approved as EN IEC 61784-2
IEC 61804 (series)	NOTE Approved as EN IEC 61804 (series)
IEC 62769 (series)	NOTE Approved as EN IEC 62769 (series)
IEC 62769-1	NOTE Approved as EN IEC 62769-1
IEC 62769-2	NOTE Approved as EN IEC 62769-2
IEC 62769-6	NOTE Approved as EN IEC 62769-6
IEC 62769-8	NOTE Approved as EN IEC 62769-8

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	-	OPC Unified Architecture - Part 100: Device Interface	EN 62541-100	-
IEC 62769-4	-	Field Device Integration (FDI®) - Part 4: FDI Packages	EN IEC 62769-4	-
IEC 62769-5	-	Field Device Integration (FDI®) - Part 5: FDI Information Model	EN IEC 62769-5	-
IEC 62769-7	-	Field Device Integration (FDI®) - Part 7: Communication Devices	EN IEC 62769-7	-

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

FIELD DEVICE INTEGRATION (FDI®) –

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

FOREWORD

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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. It is an International Standard.

This third edition cancels and replaces the second edition published in 2020. This edition constitutes a technical revision.

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

- a) added content type for DeviceInfo files;
- b) added mapping from HART standard parameters to PA DIM;

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

Draft	Report on voting
65E/864/CDV	65E/921/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/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 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®¹ profile of IEC 62769 for IEC 61784-1_CP 9/1 (HART®)² and IEC 61784-1_CP 9/2 (WirelessHART®)³.

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

IEC 62769-4, *Field device integration (FDI®) – Part 4: FDI® Packages*

IEC 62769-5, *Field device integration (FDI®) – Part 5: 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 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>

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3.2 Abbreviated terms and acronyms

For the purposes of this document, the following abbreviated terms and acronyms 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 the IEC 61804 series)
EDDL	Electronic device description language (see the IEC 61804 series)
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	Extended markup language

4 Conventions

4.1 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.

4.2 XML syntax

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

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

4.3 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

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

5.1 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.

Annex B defines the XML schema for Direct Access Services. Annex C provides an overview of mapping PROFIBUS standard parameters to PA DIM.

5.2 Catalog profile

5.2.1 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	application/vnd.hart.json
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.

5.2.2 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.	

5.2.3 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

5.2.4 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 5.2.4 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.	

5.3 Associating a Package with a CP 9/1 device

5.3.1 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.1)
Manufacturer element of InterfaceT (IEC 62769-4:2023, Clause E.11)	Manufacturer String format "0xddd" where dddd is the MANUFACTURER_ID in hexadecimal format.
DeviceModel element of InterfaceT (IEC 62769-4:2023, Clause E.11)	Model String format "0xddd" where dddd is the DEVICE_TYPE in hexadecimal format.
DeviceRevision element ListOfSupportedDeviceRevisionsT (IEC 62769-4:2023, Clause E.20)	DeviceRevision String format "x.0.0" where x is the DEVICE_REVISION in decimal format (no leading zeros).

5.3.2 Device type revision mapping

Each device type is identified as per 5.3.1. 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.

5.4 Information Model mapping

5.4.1 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	Data Type	TypeDefinition	ModellingRule
Inherits the properties of ProtocolType defined in IEC 62541-100					

5.4.2 DeviceType mapping

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