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Entwurf**Feldgeräteintegration (FDI) –
Profile –****Teil 109-1: HART® und WirelessHART®****(IEC 65E/356/CDV:2013);****Englische Fassung FprEN 62769-109-1:2013**Field Device Integration (FDI) –
Profiles –

Part 109-1: HART® and WirelessHART®

(IEC 65E/356/CDV:2013);

English version FprEN 62769-109-1:2013

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Gesamtumfang 43 Seiten

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Nationales Vorwort

Die Englische Fassung des europäischen Dokuments FprEN 62769-109-1:2013 „Feldgeräteintegration (FDI) – Profile – Teil 109-1: HART® und WirelessHART®“ (Entwurf in der Umfrage) ist unverändert in diesen Norm-Entwurf übernommen worden.

Die Internationale Elektrotechnische Kommission (IEC) und das Europäische Komitee für Elektrotechnische Normung (CENELEC) haben vereinbart, dass ein auf IEC-Ebene erarbeiteter Entwurf für eine Internationale Norm zeitgleich (parallel) bei IEC und CENELEC zur Umfrage (CDV-Stadium) und Abstimmung als FDIS (en: Final Draft International Standard) bzw. Schluss-Entwurf für eine Europäische Norm gestellt wird, um eine Beschleunigung und Straffung der Normungsarbeit zu erreichen. Dem entsprechend ist das internationale Dokument IEC 65E/356/CDV:2013 „Field Device Integration (FDI) – Profiles – Part 109-1: HART® and WirelessHART®“ unverändert in den Entwurf FprEN 62769-109-1:2013 übernommen worden.

Das internationale Dokument wurde vom SC 65E „Devices and integration in enterprise systems“ der Internationalen Elektrotechnischen Kommission (IEC) erarbeitet.

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

FIELD DEVICE INTEGRATION (FDI) – PROFILES –

Part 109-1: 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.

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

FDIS	Report on voting
65E/xxx/FDIS	65E/xxx/RVD

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.

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

- 136 • reconfirmed,
- 137 • withdrawn,
- 138 • replaced by a revised edition, or
- 139 • amended.

140

141 The National Committees are requested to note that for this publication the stability date
142 is 2017.

143 THIS TEXT IS INCLUDED FOR THE INFORMATION OF THE NATIONAL COMMITTEES AND WILL BE
144 DELETED AT THE PUBLICATION STAGE.

145

146 **IMPORTANT – The 'color inside' logo on the cover page of this publication indicates that it**
147 **contains colors which are considered to be useful for the correct understanding of its**
148 **contents. Users should therefore print this document using a color printer.**

FIELD DEVICE INTEGRATION (FDI) – PROFILES –**Part 109-1: HART® and WirelessHART®****1 Scope**

This International Standard specifies a 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 indispensable for the application 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 UA Specification – Part 100: OPC UA for Devices*

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

NOTE IEC 62769-4 is technical identical to FDI-2024.

IEC 62769-5, *Field device integration (FDI) – Part 5: FDI Information Model*

NOTE IEC 62769-5 is technical identical to FDI-2025.

IEC 62769-7, *Field device integration (FDI) – Part 7: FDI Communication Devices*

NOTE IEC 62769-7 is technical identical to FDI-2027.

3 Terms, definitions, abbreviated terms and acronyms**3.1 Terms and definitions**

For the purposes of this document, the terms and definitions given in the normative references apply.

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)
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

¹ HART and WirelessHART are the trade names of the non-profit consortium HART Communication Foundation, Austin, Texas, USA. This information is given for the convenience of users of this technical report 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 names. Use of the trade names requires permission of the trade name holder.

4 Conventions

4.1 EDDL Syntax

This document specifies content for the EDD component that is part of FDI Communication Packages. EDDL syntax uses 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 use capitalized terms to emphasize that these terms have a 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 like:

- Communication Servers or
- Profile Package.

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

- 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 annex specifies the protocol specifics needed for FDI Packages describing communication servers, gateways and devices.

5.2 Catalog profile

5.2.1 Protocol Support File

No additional file is required for CP 9/1 or CP 9/2 FDI Device Packages.

5.2.2 CommunicationProfile definition

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

Table 1 – CommunicationProfile definition

CommunicationProfile	Description
HART_FSK	CP 9/1 device type that supports a FSK physical layer (Frequency Shift-Keying)

CommunicationProfile	Description
	of wires)
HART_PSK	CP 9/1 device type that supports a PSK physical layer (Phase-Shift-Keying on 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 informational 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.	

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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 2 focus on catalog content that is vendor independent.

Table 2 – Catalog values for profile devices

Element	Attribute	Content
PackageType	—	Profile
DeviceModel	—	Empty
CommunicationProfile	—	The communication profile "HART" shall be used to specify a profile package that is compatible with any HART device.

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. This section 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 3 – 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
NOTE 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 4.

Table 4 – Device Type Catalog Mapping

Catalog Element	CP Mapping (See section 5.4.2)
Manufacturer element of InterfaceT (IEC 62769-4, E.9)	Manufacturer String format "0xdd" where dd is the Manufacturer number in hexadecimal format.
DeviceModel element of InterfaceT (IEC 62769-4, E.9)	Model String format "0xdd" where dd is the Manufacturer number in hexadecimal format.
DeviceRevision element ListOfSupportedDeviceRevisionsT (IEC 62769-4, E.19)	DeviceRevision String format "x.0.0" where x is the DeviceRevision in decimal format (no leading zeros).

239

240 **5.3.2 Device type revision mapping**

241 Each device type is identified per 5.3.1. If a package with matching DeviceRevision is not
242 available, any CP 9/1 FDI package for a corresponding manufacturer and model shall always
243 be compatible with a field device as long as the device revision of the field device is equal to
244 or greater than the device revision specified in the FDI package.

245

246 **5.4 Information Model mapping**247 **5.4.1 ProtocolType definition**

248 Table 5 defines the ProtocolType used to identify CP 9/1 network communications.

249 **Table 5 – 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					

250

251 **5.4.2 DeviceType node mapping**

252 Each device type inherits the properties of DeviceType. The mapping of the inherited
 253 properties from DeviceType is defined in Table 6.

254 **Table 6 – Inherited DeviceType Property Mapping**

Property	Foundation Mapping
SerialNumber	3 byte unique ID of a device, returned in bytes 9-11 of Command 0 or Command 11 or Command 21
RevisionCounter	2 byte configuration change counter, returned in bytes 14-15 of Command 0 or Command 11 or Command 21. -1 (not defined) for HART revision 5 devices
Manufacturer	For HART revision 7 or higher devices: 2 byte manufacturer code of a device, returned in bytes 17-18 of Command 0 or Command 11 or Command 21. For HART revision 6 or lower devices: Most significant byte shall be fixed to 0, and least significant byte is returned in byte 1 of Command 0 or Command 11 or Command 21
Model	2 byte extended device type of a device, returned in bytes 1-2 of Command 0 or Command 11 or Command 21
DeviceManual	entry text string (not supported) ^a
DeviceRevision	1 byte device revision level of a device, returned in byte 5 of Command 0 or Command 11 or Command 21
SoftwareRevision	1 byte software revision level of a device, returned in byte 6 of Command 0 or Command 11 or Command 21
HardwareRevision	1 byte hardware revision level of a device, returned in byte 7 (only 5 most significant bits) of Command 0 or Command 11 or Command 21
^a Device manuals are exposed as attachments of the FDI Device Package.	

255

5.4.3 FunctionalGroup DeviceType Identification definition

As defined in IEC 62541-100, 5.4, each device representation in the FDI Server hosted Information Model shall contain a protocol specific FunctionalGroup called Identification. This FunctionalGroup organizes variables found in the device type instance. The FunctionalGroup Identification for CP 9/1 is defined in Table 7.

Table 7 – Identification Parameters

BrowseName	DataType	Optional/Mandatory
MANUFACTURER_ID	UInt16	Mandatory
DEVICE_TYPE	UInt16	Mandatory
DEVICE_REVISION	UInt8	Mandatory
UNIVERSAL_REVISION	UInt8	Optional
SERIAL_NUMBER	UInt24	Optional
HARDWARE_REVISION	UInt8	Optional
SOFTWARE_REVISION	UInt8	Optional
REVISION_COUNTER	UInt16	Optional

5.5 Topology Elements

5.5.1 ConnectionPoint definition

5.5.1.1 General

CP 9/1 devices can support up to 5 different ConnectionPoint types that are used for network communications.

5.5.1.2 HART_TP5, HART_TP6, HART_TP7

The ConnectionPoint types HART_TP5, HART_TP6, and HART_TP7 shall be used to identify CP 9/1 token passing network communication and are defined in Table 8. HART_TP5, HART_TP6, and HART_TP7 all contain the same properties, but each provides different qualification information for some of the properties (described below). The Protocol Version (UNIVERSAL_REVISION) described in 5.2.3 can be used as an aid to determine which of the 3 token passing connection point types is the most appropriate. CP 9/1 token passing communications can be used on a variety of physical layers. FSK, PSK, RS485, and Infrared physical layer connections shall all use the HART_TP connection type. The ConnectionPoint types HART_TP5, HART_TP6, and HART_TP7 are subtypes of abstract type ConnectionPointType defined in IEC 62769-5.

The DevAddr property shall be the long address (5 bytes) for the device, and is the only parameter necessary to communicate with the field device.

The DevMfg property shall be the 2 byte Manufacturer ID, and can be used to help automate the process of assigning live devices in the scan list to offline placeholders.

The DevType property shall be the 2 byte extended device type, and can be used to help automate the process of assigning live devices in the scan list to offline placeholders.

The DevRev property shall be the device revision, and can be used to help automate the process of assigning live devices in the scan list to offline placeholders.

The DevTag property shall be the long tag for HART® protocol version 6 or 7 devices. The DevTag property shall be the tag for protocol version 5 devices. The DevTag property can be used to help automate the process of assigning live devices in the scan list to offline placeholders. HART_TP5 connection points shall limit the DevTag to 8 characters in length. HART_TP6 and HART_TP7 connection points shall limit the DevTag to 32 characters in length.