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## **Field Device Tool (FDT) Interface Specification**

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Part 53-90: Communication implementation for  
CLI and HTML — IEC 61784 CPF 9

## National foreword

This Published Document is the UK implementation of IEC TS 62453-53-90:2025.

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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# TECHNICAL SPECIFICATION

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**Field Device Tool (FDT) Interface Specification –  
Part 53-90: Communication implementation for CLI and HTML – IEC 61784 CPF 9**

INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

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ICS 25.040.40; 35.100.05; 35.110

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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

## FIELD DEVICE TOOL (FDT) INTERFACE SPECIFICATION –

**Part 53-90: Communication implementation for CLI and HTML –  
IEC 61784 CPF 9**

## FOREWORD

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IEC TS 62453-53-90 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 a Technical Specification.

The text of this Technical Specification is based on the following documents:

| Draft        | Report on voting |
|--------------|------------------|
| 65E/1111/DTS | 65E/1162/RVDTS   |

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 Technical Specification 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](http://www.iec.ch/members_experts/refdocs). The main document types developed by IEC are described in greater detail at [www.iec.ch/standardsdev/publications](http://www.iec.ch/standardsdev/publications).

A list of all parts in the IEC 62453 series, published 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 [webstore.iec.ch](http://webstore.iec.ch) in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn, or
- revised.

## 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 fieldbusses and thus meets the requirements for integrating different kinds of devices into heterogeneous control systems.

Figure 1 shows how this part of the IEC 62453-53-xy series is aligned in the structure of the IEC 62453 series.

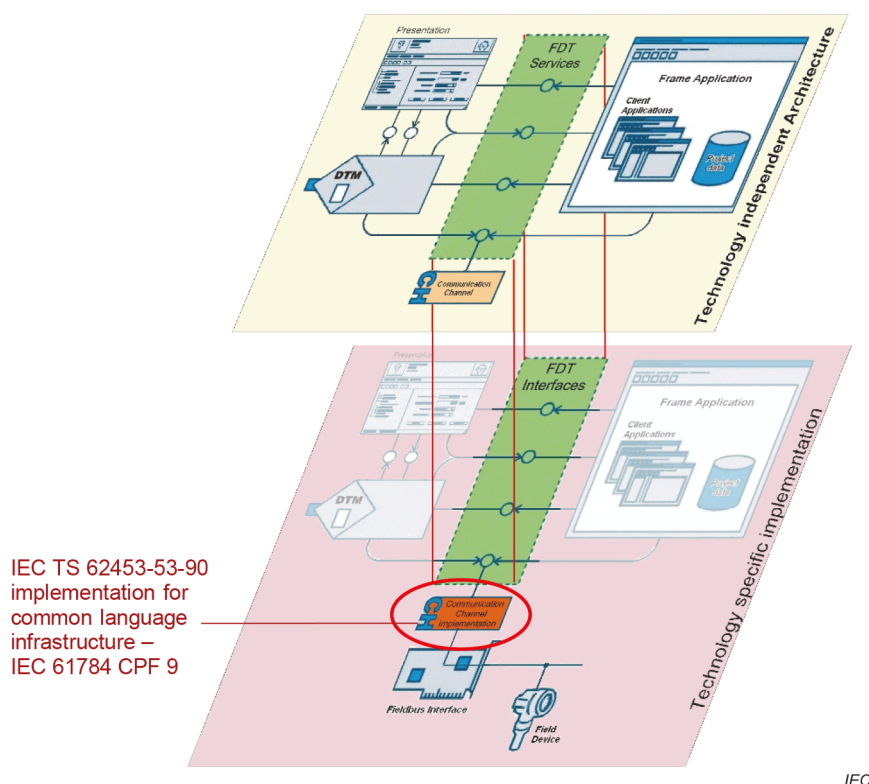


Figure 1 – Relation of IEC TS 62453-53-90 to the IEC 62453 series

## **FIELD DEVICE TOOL (FDT) INTERFACE SPECIFICATION –**

### **Part 53-90: Communication implementation for CLI and HTML –**

#### **IEC 61784 CPF 9**

## **1 Scope**

This part of the IEC 62453-53-xy series, which is a Technical Specification, provides information for integrating the HART®<sup>1</sup> technology into the CLI-based implementation of FDT interface specification (IEC TS 62453-43).

This document specifies implementation of communication and other services based on IEC 62453-309.

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 61784 (all parts), *Industrial communication networks – Profiles*

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

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

IEC TS 62453-43, *Field device tool (FDT) interface specification – Part 41: Object model integration profile – CLI and HTML*

IEC 62453-309:2022, *Field device tool (FDT) interface specification – Part 309: Communication profile integration – IEC 61784 CPF 9*

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<sup>1</sup> HART® and WirelessHART® are trade names of products supplied by FieldComm Group. This information is given for 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.

### 3 Terms, definitions, abbreviated terms, symbols, and conventions

#### 3.1 Terms, definitions abbreviated terms and symbols

For the purposes of this document, the terms, definitions, abbreviated terms and symbols given in IEC 62453-1, IEC 62453-2, IEC 62453-43, and IEC 62453-309 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 Conventions

##### 3.2.1 Datatype names and references to datatypes

The conventions for naming and referencing of datatypes are explained in IEC 62453-1.

##### 3.2.2 Use of UML

Figures in this document are using UML notation as defined in IEC 62453-1.

### 4 Bus category

IEC 61784 CPF 9 protocol is identified in the attribute busCategory of the BusCategory element by the identifiers, as specified in IEC 62453-309.

The addressing modes depend on the type of the used HART protocol. Also additional addressing information might be necessary for some types of HART protocols. Table 1 shows the dependency of usable addressing modes and additional address information in dependency of the HART protocol in use.

**Table 1 – Relation of BusCategories and supported features**

| BusCategory Name | Supported Addressing Modes            | Address Datatype          | Exposed Data        | Comment                                                                                                                                                                               |
|------------------|---------------------------------------|---------------------------|---------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| HART_Basic       | ShortAddress                          | HartDevice Address        | Not defined         | An IEC 62453-43 DTM shall use this Id in addition to HART_FSK in order to provide compatibility with FDT2 DTMs<br><br>Only single byte ManufacturerID and DeviceTypeID are supported. |
| HART_FSK         | ShortAddress,<br>ShortTag,<br>LongTag | HartDeviceWirelessAddress | As described in 5.3 | A DTM may use more than one of these Ids if the device supports multiple physical connections for example WirelessHART and FSK                                                        |
| HART_RS485       |                                       |                           |                     |                                                                                                                                                                                       |
| HART_Infrared    |                                       |                           |                     |                                                                                                                                                                                       |
| HART_Wireless    |                                       |                           |                     |                                                                                                                                                                                       |
| HART_IP          |                                       | HartDeviceIpAddress       |                     |                                                                                                                                                                                       |

IEC 62453-309 also defines which PhysicalLayer can be used together with the different BusCategories.

The significant information for topology planning is the BusCategory. The PhysicalLayer (which is provided in the BusInformation datatype) shall be used only for additional information.

The DataLinkLayer property is not applicable for HART and shall be set to null.

## 5 Access to instance, device and process data

### 5.1 General

Used at interfaces:

- IInstanceData,
- IDeviceData, and
- IProcessData.

These interfaces shall provide access to at least all parameters defined in IEC 62453-309.

### 5.2 IO signals provided by DTM

A DTM shall provide IO signal information of the device using the IProcessData interface.

A HART device is connected to the process either via its analog channels or via digital information (e.g. burst mode). Analog channels are always related to a dynamic variable, as specified in [8]<sup>2</sup> section 8, and therefore the description of an analog channel shall be accessed using the respective dynamic variable (e.g. the attributes of dynamic variable PV always describe the first analog channel).

HART distinguishes between three methods to access digital signals:

a) Access to analog value and assigned dynamic variables (Command #3)

IO signals can be assigned to one of the four dynamic variables PV, SV, TV, and QV. Using the command #3 the analog value and the dynamic variables can be read without specific device knowledge.

b) Indexed access to device variables (Command #33)

All device variable values and their units can be read using the related device variable code information in command #33.

c) Indexed access to device variables classification and status (Command #9)

Command #9 is an extension of command #33. In addition to the value and unit, a classification and the variable status can also be determined.

It is up to the command initiator to determine by means of the HART specification which commands to be used.

To provide all information required to access the output signal information the DTM shall provide the information shown in Table 2 within its HartIOSignalInfo.

---

<sup>2</sup> Numbers in square brackets refer to the Bibliography.

**Table 2 – Output signal info within IOSignalInfo/HartIOSignalInfo**

| Attribute                | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|--------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Name                     | Name of the IO signal                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Range                    | Reference to the variables providing range information                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Unit                     | Reference to an enumeration variable describing the unit information                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| DeviceVariableAssignment | Constant enumeration value that can take following values <ul style="list-style-type: none"> <li>– unassigned: The IO signal is not assigned to dynamic variable and can only be accessed using the indexed approach (reading device variables)</li> <li>– PV: IO signal assigned to the PV dynamic variable</li> <li>– SV: IO signal assigned to the SV dynamic variable</li> <li>– TV: IO signal assigned to the TV dynamic variable</li> <li>– QV: IO signal assigned to the QV dynamic variable</li> </ul> |
| DeviceVariableCode       | Constant that specifies the device specific variable code.<br><br>Because of compatibility reasons to other FDT versions (e.g. IEC TR 62453-41), this variable could be set to the value 252 that stands for “unknown”.                                                                                                                                                                                                                                                                                        |

### 5.3 Data interfaces

#### 5.3.1 General

Within HART, several command sets are defined. As part of the command set definition, HART provides a precise naming convention that is documented within the sources of the standard EDD libraries. The data provided by the access data interfaces should be named according to the HART naming convention. For backward compatibility, the semantic IDs as defined in other versions of FDT (e.g. IEC TR 62453-41) should also be provided by the DTM.

A DTM shall provide all device data that is related to the set of Universal Commands and should provide all device data related to Common Practice Commands. If the device supports additional command sets, like device family profiles, those data should also be exported using the naming convention as defined in the HART EDD libraries and as shown in Figure 2 and Figure 3.

#### 5.3.2 Mapping HART datatypes to FDT datatypes

For a better usability of data provided by the data access interfaces IDeviceData and IInstanceData, all data from the device shall be converted into datatypes that are common to FDT. The mapping of basic datatypes is defined in Table 3.

**Table 3 – Mapping of basic datatypes**

| HART datatype                                 | FDT datatype                      | IEC datatype                      |
|-----------------------------------------------|-----------------------------------|-----------------------------------|
| Packed ASCII (see [8] 5.1.1)                  | String                            | STRING                            |
| ISO Latin-1 (see [8] 5.1.2)                   | String                            | STRING                            |
| Dates (see [8] 5.2)                           | DateTime                          | DATE_AND_TIME                     |
| Time (see [8] 5.3)                            | ULong<br>(1/32 ms since midnight) | ULINT<br>(1/32 ms since midnight) |
| Single Precision Floating Point (see [8] 5.4) | float                             | REAL                              |
| Double Precision Floating Point (see [8] 5.4) | double                            | LREAL                             |
| 1-4 Byte Unsigned Integer (see [8] 5.5)       | UInt                              | UDINT                             |
| 5-8 Byte Unsigned Integer (see [8] 5.5)       | ULong                             | ULINT                             |
| 1-4 Byte Signed Integer (see [8] 5.6)         | Int                               | DINT                              |

| HART datatype                         | FDT datatype | IEC datatype |
|---------------------------------------|--------------|--------------|
| 5-8 Byte Signed Integer (see [8] 5.6) | Long         | LINT         |
| 1-4 Byte Enumerated (see [8] 5.7.1)   | UInt         | UDINT        |
| 5-8 Byte Enumerated (see [8] 5.7.1)   | ULong        | ULINT        |
| 1-4 Byte Bit Fields (see [8] 5.7.2)   | UInt         | UDINT        |
| 5-8 Byte Bit Fields (see [8] 5.7.2)   | ULong        | ULINT        |

The access to device specific data has been standardized using structures with the standard EDD import libraries for HART. The structure uses ARRAY and COLLECTION constructs that shall be reused when exposing data within FDT in IDeviceData and IInstanceData interfaces with elements of type StructDataGroup.

When converting a COLLECTION into a StructDataGroup, the DataItems shall be identical to the COLLECTION members with:

DataItem Name = COLLECTION member identifier  
DataItem Label = COLLECTION member label

When converting an ARRAY into a StructDataGroup, the DataItem shall be identical to the ARRAY element with:

DataItem Name = ARRAY element index as string  
DataItem Label = ARRAY element label

An example for such a structure is presented in Figure 2 and Figure 3.

### 5.3.3 SemanticInfo

The SemanticInfo for HART protocol related parameters is directly related to the protocol specification. The definition of the HART commands is the base for the parameter address information which shall be used in the properties ParameterReadAddress, ParameterWriteAddress and SemanticId of the SemanticInfo datatype.

The syntax of the parameter address information is as follows:

CMD<x>[Q(<r>)]B<y>B<z>L<n>

The [Q(<r>)] portion only is required to define request data.

For description of the attributes, see Table 4.

**Table 4 – SemanticInfo attributes description**

| Attribute | Datatype        | Description                                                            |
|-----------|-----------------|------------------------------------------------------------------------|
| <x>       | decimal integer | command number in the range of 0 to 255                                |
| <r>       | hex-string      | request data bytes                                                     |
| <y>       | decimal integer | index of the start byte in the response data section (start index = 0) |
| <z>       | decimal integer | index of the start bit in the byte referenced by <y>                   |
| <n>       | decimal integer | length of the value in bits                                            |

According to 6.4 commands with extended command number shall be described using “CMD31Q<r>...” wherein the first two byte of the request data section shall contain the extended command number.