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INTERNATIONAL STANDARD

NORME INTERNATIONALE

Industrial-process measurement and control – Data structures and elements in process equipment catalogues – Part 15: Lists of properties (LOPs) for level measuring equipment for electronic data exchange

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Mesure et commande des processus industriels – Éléments et structures de données dans les catalogues d'équipements de processus – Partie 15: Listes de propriétés (LOP) pour équipement de mesure de niveau pour l'échange électronique de données

IEC 61987-15:2016-11(en-fr)

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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INDUSTRIAL-PROCESS MEASUREMENT AND CONTROL – DATA STRUCTURES AND ELEMENTS IN PROCESS EQUIPMENT CATALOGUES –

Part 15: Lists of properties (LOPs) for level measuring equipment for electronic data exchange

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International Standard IEC 61987-15 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/507/FDIS	65E/517/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.

A list of all parts in the IEC 61987, published under the general title *Industrial-process measurement and control – Data structures and elements in process equipment catalogues*, can be found on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC website under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

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INTRODUCTION

The exchange of product data between companies, business systems, engineering tools, data systems within companies and, in the future, control systems (electrical, measuring and control technology) can run smoothly only when both the information to be exchanged and the use of this information has been clearly defined.

Prior to this document, requirements on process control devices and systems were specified by customers in various ways when suppliers or manufacturers were asked to quote for suitable equipment. The suppliers in their turn described the devices according to their own documentation schemes, often using different terms, structures and media (paper, databases, CDs, e-catalogues, etc.). The situation was similar in the planning and development process, with device information frequently being duplicated in a number of different information technology (IT) systems.

Any method that is capable of recording all existing information only once during the planning and ordering process and making it available for further processing, gives all parties involved an opportunity to concentrate on the essentials. A precondition for this is the standardization of both the descriptions of the objects and the exchange of information.

IEC 61987 series proposes a method for standardization which will help both suppliers and users of measuring equipment to optimize workflows both within their own companies and in their exchanges with other companies. Depending on their role in the process, engineering firms may be considered here to be either users or suppliers.

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The method specifies measuring equipment by means of blocks of properties. These blocks are compiled into lists of properties (LOPs), each of which describes a specific equipment (device) type. IEC 61987 series covers both properties that may be used in an inquiry or a proposal and detailed properties required for integration of the equipment in computer systems for other tasks.

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IEC 61987-10 defines structure elements for constructing lists of properties for electrical and process control equipment in order to facilitate automatic data exchange between any two computer systems in any possible workflow, for example engineering, maintenance or purchasing workflow and to allow both the customers and the suppliers of the equipment to optimize their processes and workflows. IEC 61987-10 also provides the data model for assembling the LOPs.

IEC 61987-11 specifies the generic structure for operating and device lists of properties (OLOPs and DLOPs). It lays down the framework for further parts of IEC 61987 in which complete LOPs for device types measuring a given physical variable and using a particular measuring principle will be specified. The generic structure may also serve as a basis for the specification of LOPs for other industrial-process control instrument types such as control valves and signal processing equipment.

IEC 61987-15 concerns level measuring equipment. It provides one operating LOP for all types of level measuring equipment which can be used, for example, as a request for various sorts of quotation. The DLOPs for the various level transmitter and gauge types provided in this part of IEC 61987 can be used in very different ways in the computer systems of equipment manufacturers and suppliers, in CAE and similar systems of EPC contractors and other engineering companies and especially in different plant maintenance systems of the plant owners. The OLOP and the DLOPs provided correspond to the guidelines specified in IEC 61987-10 and IEC 61987-11.

INDUSTRIAL-PROCESS MEASUREMENT AND CONTROL – DATA STRUCTURES AND ELEMENTS IN PROCESS EQUIPMENT CATALOGUES –

Part 15: Lists of properties (LOPs) for level measuring equipment for electronic data exchange

1 Scope

This part of IEC 61987 provides

- operating list of properties (OLOP) for the description of the operating parameters and the collection of requirements for level measuring equipment, and
- device lists of properties (DLOPs) for the description of a range of level measuring equipment types.

The structures of the OLOP and the DLOPs correspond to the general structures defined in IEC 61987-11 and agree with the fundamentals for the construction of LOPs defined in IEC 61987-10.

Aspects other than the OLOP, needed in different electronic data exchange processes described in IEC 61987-10, will be published in IEC 61987-92[1].

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The locations of the libraries of properties and of blocks used in the LOPs concerned are listed in the Annexes C and D.

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2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 61360 (all parts), *Standard data element types with associated classification scheme for electric components*

IEC 61987-10:2009, *Industrial-process measurement and control – Data structures and elements in process equipment catalogues – Part 10: Lists of Properties (LOPs) for Industrial-Process Measurement and Control for Electronic Data Exchange – Fundamentals*

IEC 61987-11:__[2], *Industrial-process measurement and control – Data structures and elements in process equipment catalogues – Part 11: Lists of Properties (LOPs) of measuring equipment for electronic data exchange – Generic structures*

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1 Under preparation. Stage at the time of publication: IEC/1CD 61987-92:2016.

2 Under preparation. Stage at the time of publication: IEC/CCDV 61987-11:2016.

3 Terms and definitions

3.1 General

For the purposes of this document, the terms and definitions in IEC 61987-10 and IEC 61987-11 apply.

3.2 Level terms

Definitions of specific level terms are to be found under the property attributes in the Common Data Dictionary of the IEC.

4 General

4.1 Overview

The LOPs provided by this document are intended for use in electronic data exchange processes performed between any two computer systems. The two computer systems can both belong to the same company or they can belong to different companies as described in Annex C of IEC 61987-10:2009.

The OLOP for level measuring equipment is to be found in Annex A while the DLOPs of the individual level device types are to be found in Annex B.

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Structural elements such as LOP type, block and property defined in this document are available in electronic form in the "Process automation (IEC 61987 series)" domain of the IEC Common Data Dictionary (CDD).

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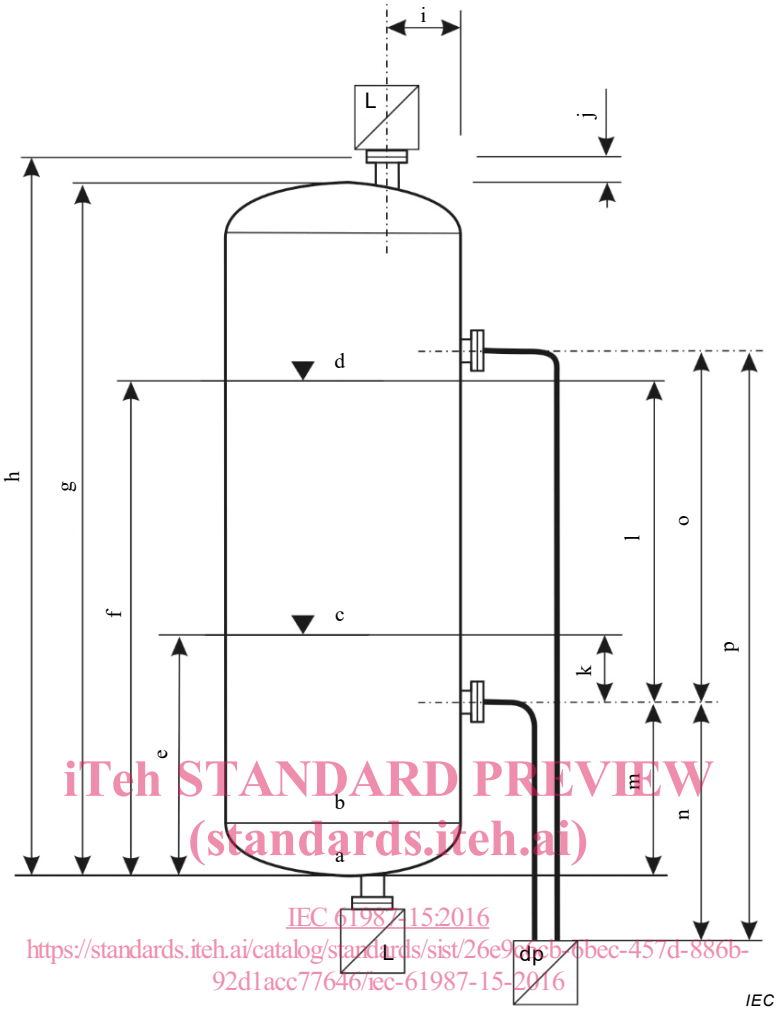
4.2 Special considerations

An important aspect of level measurement is the positioning and definition of the location of the transmitter or switch. Figures 1 and 2 explain the reference framework used in this document for continuous and point level measurement respectively.



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Key

Points or planes

a datum point for vertical position (= bottom of vessel)

b lower tangent line

c zero level datum point

d full level datum point

Distances or measures

e reference height of zero level

f reference height of full level

g overall height of process equipment

h vertical position of nozzle (top installation)

i distance to inner process equipment wall

j length of process equipment nozzle

k vertical distance of lower process connection to zero level datum point

l vertical distance of lower process connection to full level datum point

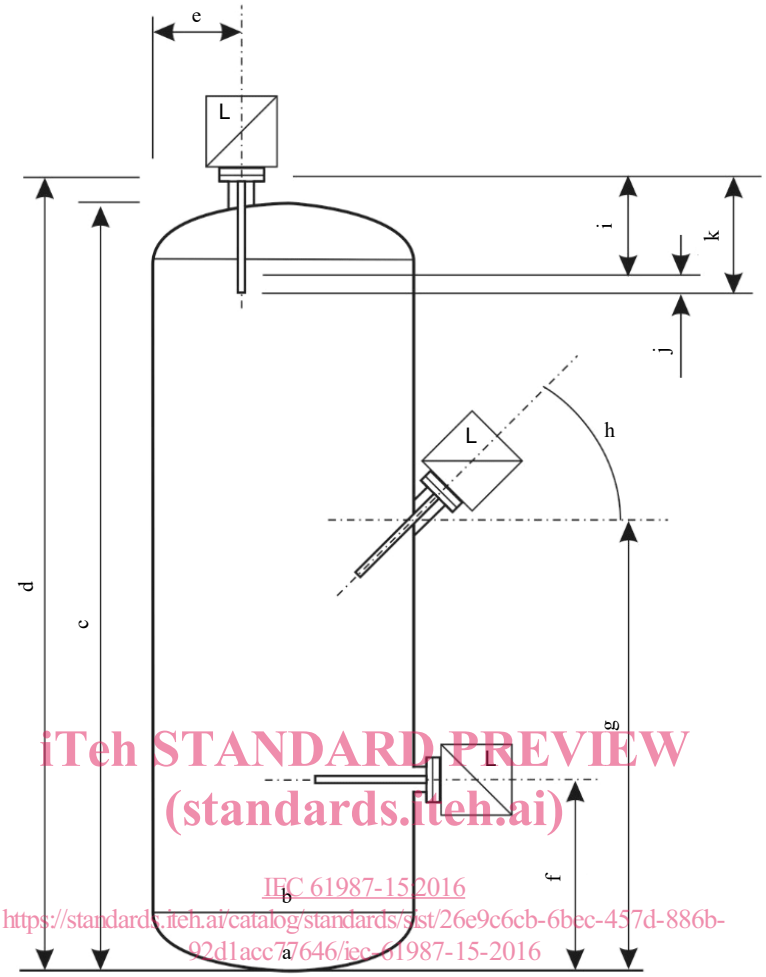
m vertical position of nozzle (side installation)

n vertical distance of transmitter to high/single pressure process connection

o difference in height of end connections/process connections

p vertical distance of transmitter to low pressure process connection

Figure 1 – Reference framework for the installation of level transmitters



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Key

Points or planes

a datum point for vertical position (= bottom of vessel)

b lower tangent line

Distances or measures

c overall height of process equipment

d vertical position of nozzle sealing surface (top installation)

e distance to inner process equipment wall

f vertical position of nozzle (side installation)

g vertical position of nozzle (angled installation)

h mounting angle of nozzle

I switching distance referenced to the sealing surface

j switching distance referenced to the insertion length

k insertion length (sensor length)

Figure 2 – Reference framework for the installation of level switches

4.3 Depiction of OLOP and DLOPs

The properties of the OLOP and DLOPs used in this part of the IEC 61987 series have been created in conformance with the requirements of the IEC 61360 series. As such, the structural

elements, properties and attributes to be found in the IEC Common Data Dictionary are normative.

4.4 Example of DLOP block usage

4.4.1 General specification of a free-space radar level transmitter

A 10 m high tank is to be fitted with continuous level measurement. A top mounted nozzle DN 100 already exists. The output signal has to include HART. Table 1 shows typical properties which might be sent between a manufacturer and user ("…" indicates a property or properties that have not been used).

Table 1 – Example of free-space radar level transmitter

Name of LOP type, block or property	Assigned value	Unit
Identification		
manufacturer	a. n. other	
name of product	product name abc123	
type of product	free-space radar level transmitter	
…		
Application		
application description	level measurement in liquids	
Function and system design		
measuring principle	time-of-flight free space radar	
operating frequency	26	GHz
Dependability		
Functional safety and reliability		
style of failsafe	configurable min, max	
…		
safety integrity level	up to SIL 3	
reference standard for functional safety	IEC 61508	
…		
Input		
number of measured variables	2	
Measured variable_1		
measured variable type	level measurement	
Level measurement		
…		
Measuring range for level		
lower range-limit of level	0	m
upper range-limit of level	15	m
…		
Measured variable_2		
measured variable type	degree of filling measurement	
Degree of filling measurement		
…		
Measuring range for degree of filling		
lower range-limit of degree of filling	0	%
upper range-limit of degree of filling	100	%
…		
base dielectric constant	2,0	
…		
base type of tank	storage	
base vessel conditions	calm	

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Name of LOP type, block or property	Assigned value	Unit
base deployment conditions	obstruction-free path	
number of outputs	1	
Output		
…		
assigned process variable	level	
function of input/output	continuous measurement	
Type of output		
output type	analog current output	
Analog current output		
Assigned variable		
assigned variable type	assigned degree of filling range	
Assigned degree of filling range		
lower range-value of degree of filling	0	%
upper range-value of degree of filling	100	%
…		
Analog current output parameters		
…		
power source behaviour	passive	
set power source behaviour	passive	
lower range end-value of current output	4	mA
upper range end-value of current output	20	mA
lower current limit of proportional range	3,8	mA
upper current limit of proportional range	20,5	mA
Current signal on alarm		
current for lower signal on alarm	3,6	mA
current for upper signal on alarm	22,0	mA
configurability of signal on alarm	min, max, user defined	
set signal on alarm	max	
superimposed digital communication	HART 6.0	
…		
number of galvanic isolations	1	
Galvanic isolation		
galvanic isolation of electrical circuits	mutual isolation of all circuits	
…		
number of electrical terminals	3	
Electrical terminal_1		
designation of electrical terminal	a	
marking of electrical terminal	+ 4…20 mA/HART	
Electrical terminal_2		
designation of electrical terminal	b	
marking of electrical terminal	– 4…20 mA/HART	
Electrical terminal_3		
…		
description of electrical terminal	cable shield ground	
…		
number of cable specifications	1	
Cable specification		
cable application	loop-power	
type of cable	twisted shielded pairs	
…		
Performance		

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Name of LOP type, block or property	Assigned value	Unit
Reference conditions of the device		
Reference ambient conditions		
reference device deployment	vertical, no interference in beam, 1 m dia. metal reflector plate	
reference ambient temperature	23,5;24,0;24,5	°C
…		
reference absolute air pressure	860;960;1 060	mbar
…		
reference humidity	55;60;75	%
…		
number of performance variables	1	
Performance variable		
…		
Type of performance variable		
performance variable type	absolute performance for level	
Absolute performance for level		
…		
measured error of level	2	cm
…		
zero point error of level	3	mm
…		
Influence of external quantities expressed for level		
average influence of ambient temperature on level	2	mm/ 10 k
maximum influence of ambient temperature on level	5	mm
…		
Dynamic behaviour		
…		
step response time T90	0,8	s
…		
Rated operating conditions		
Installation conditions		
Deployment condition		
mounting orientation	vertical	
…		
installation instructions	min. 1/6 vessel dia. from wall, not central, not over fill stream	
…		
Environmental design ratings		
Normal environmental conditions		
number of ambient temperatures		
Ambient temperature		
…		
minimum ambient temperature	–40	°C
maximum ambient temperature	+80	°C
…		
climate class	test Z/AD	
reference standard for climate class	EN 60068-2-38	
…		
Electromagnetic compatibility		
…		

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