IEC 61987-14

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Industrial-process measurement and control – Data structures and elements in process equipment catalogues –
Part 14: Lists of properties (LOP) for temperature measuring equipment for electronic data exchange

Mesure et commande dans les processus industriels – Structures de données et éléments dans les catalogues d'équipement de processus –
Partie 14: Liste de propriétés (LOP) des équipements de mesure de température pour l'échange électronique de données

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International Standard IEC 61987-14 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:

CDV	Report on voting
65E/458/CDV	65E/489/RVC

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 series, 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

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

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 standard, 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.

This standard 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.

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. This standard 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.

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 61987-14 concerns temperature measuring equipment. It provides two operating LOPs for contact and non-contact temperature transmitters or temperature gauges which can be used, for example, as requests for various sorts of quotation. The DLOPs for the various temperature 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 in IEC 61987-10 and IEC 61987-11.

The List of Properties (LOPs) given in this standard are published in the Common Data Dictionary of IEC as stated in the appendices A to C. In the event that the LOPs are not yet available in the CDD, they may be found temporarily in the CDD maintenance area (http://std.iec.ch/cdd/iec61987/cdddev.nsf/TreeFrameset?OpenFrameSet).

INDUSTRIAL-PROCESS MEASUREMENT AND CONTROL –
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Part 14: Lists of properties (LOP) for temperature measuring equipment for electronic data exchange

1 Scope

This part of IEC 61987 provides

– an operating list of properties (OLOP) for the description of the operating parameters and the collection of requirements for temperature measuring equipment and

– device lists of properties (DLOP) for the description of a range of contact and non-contact temperature 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].

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

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 items*

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 61987-11:2012, *Industrial-process measurement and control – Data structures and elements in process equipment catalogues – Part 11: Lists of Properties (LOP) of measuring equipment for electronic data exchange – Generic structures*

3 Terms and definitions

For the purpose of this document, the terms and definitions in Clause 3 of IEC 61987-10:2009 and Clause 3 of IEC 61987-11:2012 also apply.

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1 Under consideration.

Definitions of specific temperature terms are to be found under the property attributes in the CDD (Common Data Dictionary).

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.

For the purpose of this standard, temperature measuring equipment has been subdivided into two classes:

* non-contact temperature equipment: equipment variously known as radiation thermometers or radiation pyrometers which by optical means provide spot, line or area readings of temperature;

* contact temperature equipment: equipment comprising thermocouple or RTD temperature transmitters as well as filled systems and mechanical temperature gauges.

The OLOP for non-contact and contact temperature measuring equipment is to be found in Annex A while the DLOPs of the individual temperature device types are to be found in Annex B.

iTeh STANDARD PREVIEW
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Structural elements such as LOP type, block and property defined in this standard are available in electronic form in the "Automation equipment" domain of the IEC Component Data Dictionary (CDD).

4.2   Special considerations

Contact temperature measuring equipment using a thermocouple or RTD as sensing element comprise several basic components which may be bought together or purchased separately, see Figure 1. IEC 61987- 14 takes this into consideration by allowing the corresponding blocks to be used individually or together.
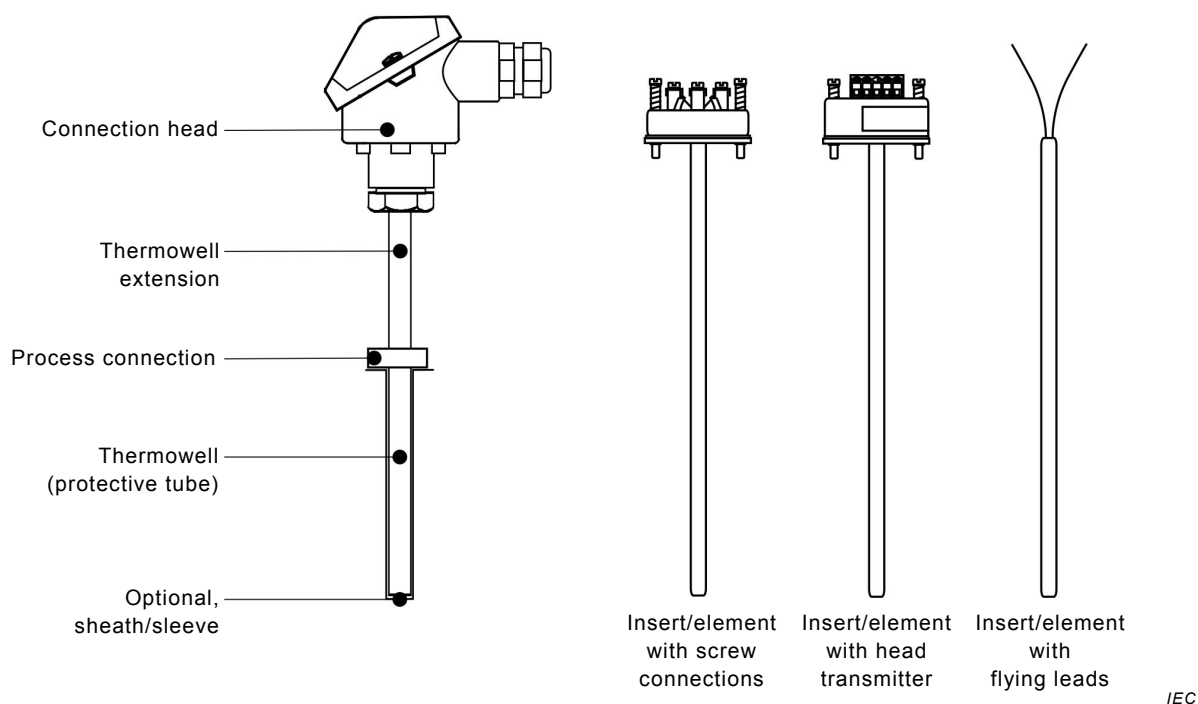
Figure 1 – Basic components of a TC/RTD temperature assembly

4.3 Depiction of OLOPs and DLOPs

The properties of the OLOPs and DLOPs used in this part of IEC 61987 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 Component Data Dictionary are normative.

4.4 Examples of DLOP block usage

4.4.1 DLOP "Radiation thermometer"

A radiation thermometer is to make a spot measurement on a steel annealing process. For this application, the "Radiation thermometer" DLOP might be configured as shown in Table 1, whereby ("…" indicates a property or properties that have not been used).

Table 1 – Example for "Radiation thermometer"

Name of LOP type, block or property[2]					Assigned value	Unit
Application						
	application description				Steel annealing	
…						
Input						
	…					
		Temperature measurement				
			Measuring range for temperature			
				…		
				lower range-limit of temperature	300	°C
				upper range-limit of temperature	1 400	°C

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2   In the CDD, block names start with a capital letter, property names with a lower case letter.

Name of LOP type, block or property[2]							Assigned value	Unit
					...			
				Parameters of non-contact temperature measurement				
					emissivity setting		0,30	
...								
number of outputs							1	
Output_1								
	...							
		Analog current output						
			...					
		Assigned temperature range						
			lower range-value of temperature				350	°C
			upper range-value of temperature				1 300	°C
			...					
		Analog current output parameters						
			lower range end-value of current output				4	mA
			upper range end-value of current output				20	mA
			...					
...								
Digital communication								
	number of digital communication interfaces						1	
	Digital communication interface_1							
		...						
		type of digital communication					PROFIBUS	
		Communication protocol						
			type of protocol				PROFIBUS DP	
			protocol version				DP-V2	
			...					
			type of device profile				Temperature analog input	
			...					
		number of communication variables					1	
		Communication variable_1						
			...					
			assigned variable				Temperature	
...								
Performance								
...								
	Performance of non-contact temperature transmitter/radiation temperature transmitter							
		noise equivalent temperature difference					0,1	°C
		size-of-source effect					2	%
		...						
		interchangeability					2,5	°C
		temperature resolution					0,1	°C
		exposure time					1	ms

Name of LOP type, block or property[2]				Assigned value	Unit
		response time		3	ms
		...			
...					
Rated operating conditions					
	...				
	Environmental design ratings				
		Normal environmental conditions			
			...		
			minimum ambient temperature	–40	°C
			maximum ambient temperature	100	°C
	..				
		Normal process conditions			
			...		
		minimum operating emissivity		0,05	
		maximum operating emissivity		1	
...					
Mechanical and electrical construction [radiation thermometer]					
	...				
		Structural design of a radiation thermometer			
			...		
		type of target marking		View finder	
		...			
		type of view finder		TTL	
			...		
		Objective			
			...		
			measuring distance	1 000	mm
			field of view	30	mm
			...		
		...			
		number of transmitter housings		2	
		Transmitter housing_1			
			...		
		type of housing		Electronic housing	
			...		
		degree of protection		IP66	
			...		
		Transmitter housing_2			
			...		
		type of housing		Protective and cooling/ heating housing	
			...		
		degree of protection		IP69	
			...		

Name of LOP type, block or property[2]			Assigned value	Unit
	Purge system			
		type of purge	Air purge with extension tube	
...				
Power supply				
	number of electrical power input circuits		1	
	Electrical power input circuit_1			
		...		
	minimum rated voltage		11	V
	maximum rated voltage		30	V
	type of voltage		DC	
		...		
...				

4.4.2 DLOP "Insert/element"

A temperature assembly is to have an insert/element with a PT100 sensing element. The "Insert/element" DLOP might be configured as shown in Table 2, whereby ("…" indicates a property or properties that have not been used).

Table 2 – Example for "Insert/element"

Name of LOP type, block or property[3]			Assigned value	Unit
...				
Input				
	number of measured variables		1	
	Measured variable_1			
		...		
	Type of measured variable			
	measured variable type		Temperature measurement	
	Temperature measurement			
		measured variable type	Temperature measurement	
		type of temperature measurement	RTD PT100	
		measuring principle	Resistance measurement	
		Measuring range for temperature		
			lower range-limit of temperature	−50	°C
			upper range-limit of temperature	450	°C
		minimum span for temperature		
		maximum turndown ratio		
		zero adjustment temperature value	0	°C
		...		
...				
Number of outputs			1	

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[3] In the CDD, block names start with a capital letter, property names with a lower case letter.

Name of LOP type, block or property[3]				Assigned value	Unit
Output_1					
	Type of output				
		output type		RTD/thermocouple probe output	
		RTD/thermocouple probe output			
			output type	RTD/thermocouple probe output	
			type of temperature sensing element	RTD thin film	
			designation of temperature sensing element	PT100	
			style of connection	4 wire	
			reference standard	IEC 60751	
			number of flying leads	4	
			Flying lead_1		
				designation of lead	I+	
				description of lead	Measuring current (+)	
				material of conductor	Copper, silver plated	
				material of insulation	PTFE	
				colour of lead	Red	
				length of lead	80	mm
				core cross-section AWG	28	
			Flying lead_2		
				designation of lead	I-	
				description of lead	Measuring current (-)	
				material of conductor	Copper, silver plated	
				material of insulation	PTFE	
				colour of lead	Red	
				length of lead	80	mm
				core cross-section AWG	28	
			Flying lead_3		
				designation of lead	U+	
				description of lead	Measured voltage (+)	
				material of conductor	Copper, silver plated	
				material of insulation	PTFE	
				colour of lead	White	
				length of lead	80	mm
				core cross-section AWG	28	
			Flying lead_4		
				designation of lead	U-	
				description of lead	Measured voltage (-)	
				material of conductor	Copper, silver plated	
				material of insulation	PTFE	
				colour of lead	White	
				length of lead	80	mm
				core cross-section AWG	28	
...					
	Performance of temperature measuring devices				

Name of LOP type, block or property[3]	Assigned value	Unit
Response time t50 in water	6	s
Response time t50 in air	15	s
Response time t90 in water	13	s
Response time t90 in air	35	s
...		
Accuracy class	A	
Reference standard for accuracy class	IEC 60751	
Rated operating conditions		
Environmental design ratings		
Normal environmental conditions		
number of ambient temperatures	1	
Ambient temperature_1		
operating temperature	20	°C
minimum ambient temperature	−50	°C
maximum ambient temperature	200	°C
vibration resistance		
reference standard for vibration resistance	IEC 60751	
mechanical shock resistance		
reference standard for mechanical shock resistance	IEC 60751	
Mechanical and electrical construction		
Overall dimensions and weight [1]		
...		
length	400	mm
width	44	mm
height	444	mm
...		
Structural design		
Structural design of an insert/element		
standardized type of insert/element	DIN43765-61-M-I-315	
reference standard for insert/element	DIN43765	
type of connection to thermowell		
type of connection to thermowell extension		
type of connection to connection head	Washer with spring-loaded screws	
...		
length	315	mm
diameter of rod	6	mm
diameter of tip	6	mm
diameter of head	45	mm
shape of tip	Straight	
Material of sheath		
designation of material	Stainless steel	
material code	1.4301	
reference standard for material code	EN 10027-2	