

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Electrical equipment for measurement, control and laboratory use – EMC requirements –

Part 2-3: Particular requirements – Test configuration, operational conditions and performance criteria for transducers with integrated or remote signal conditioning

<https://standards.iteh.ai/catalog/standards/sist/61bd67ea-1113-40ea-97d4-372f20616d17/iec-61326-2-3-2012>

Matériel électrique de mesure, de commande et de laboratoire – Exigences relatives à la CEM –

Partie 2-3: Exigences particulières – Configurations d'essai, conditions de fonctionnement et critères de performance des transducteurs avec un système de conditionnement du signal intégré ou à distance



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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**ELECTRICAL EQUIPMENT FOR MEASUREMENT,
CONTROL AND LABORATORY USE –
EMC REQUIREMENTS –**
**Part 2-3: Particular requirements –
Test configuration, operational conditions and performance
criteria for transducers with integrated or remote signal conditioning**

FOREWORD

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This International Standard IEC 61326-2-3 has been prepared by subcommittee 65A: System aspects, of IEC technical committee 65: Industrial-process measurement, control and automation.

This second edition cancels and replaces the first edition published in 2006. This edition constitutes a technical revision.

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

- update of the document with respect to IEC 61326-1:2012.

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

FDIS	Report on voting
65A/629/FDIS	65A/638/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.

This part of the IEC 61326 series is to be used in conjunction with IEC 61326-1:2012 and follows the same numbering of clauses, subclauses, tables and figures.

When a particular subclause of IEC 61326-1 is not mentioned in this part, that subclause applies as far as is reasonable. When this standard states “addition”, “modification” or “replacement”, the relevant text in IEC 61326-1 is to be adapted accordingly.

NOTE The following numbering system is used:

- subclauses, tables and figures that are numbered starting from 101 are additional to those in IEC 61326-1;
- unless notes are in a new subclause or involve notes in IEC 61326-1, they are numbered starting from 101 including those in a replaced clause or subclause;
- additional annexes are lettered AA, BB, etc.

A list of all parts of the IEC 61326 series, under the general title *Electrical equipment for measurement, control and laboratory use, control and laboratory use – EMC requirements*, can be found on the IEC website.

[IEC 61326-2-3:2012](https://standards.iec.ch/catalog/standards/sist/61bd67ea-1113-40ea-97d4-37222610c177/iec-61326-2-3-2012)

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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

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

ELECTRICAL EQUIPMENT FOR MEASUREMENT, CONTROL AND LABORATORY USE – EMC REQUIREMENTS –

Part 2-3: Particular requirements – Test configuration, operational conditions and performance criteria for transducers with integrated or remote signal conditioning

1 Scope

In addition to the requirements of IEC 61326-1, this part specifies more detailed test configurations, operational conditions and performance criteria for transducers with integrated or remote signal conditioning.

This standard applies only to transducers characterized by their ability to transform, with the aid of an auxiliary energy source, a non-electric quantity to a process-relevant electrical signal, and to output the signal at one or more ports. This standard includes transducers for electrochemical and biological measured quantities.

The transducers covered by this standard may be powered by a.c. or d.c. voltage and/or by battery or with internal power supply.

Transducers referred to by this standard comprise at least the following items (see Figures 101 and 102):

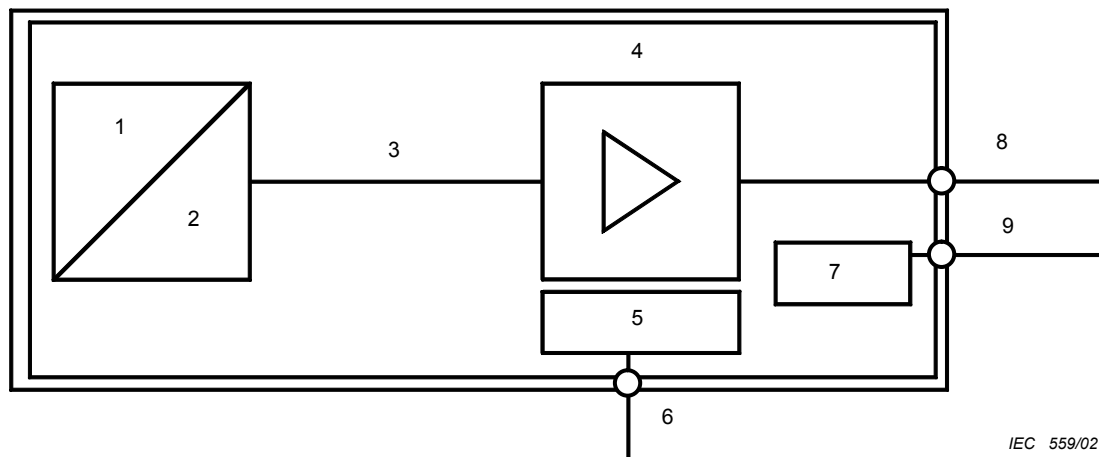
- one or more elements for transforming a non-electrical input quantity to an electrical quantity;
- a transmission link for transferral of the electrical quantity to a component for signal conditioning;
- a unit for signal conditioning that converts the electrical quantity to a process-relevant electrical signal;
- an enclosure for enclosing the above-stated components fully or in parts.

Transducers referred to by this standard may also have the following items (see Figures 101 and 102):

- a communication and control unit;
- a display unit;
- control elements such as keys, buttons, switches, etc.;
- transducer output signals (for example, switch outputs, alarm outputs) which are clearly assigned to the input signal(s);
- transducers with signal conditioning which may be integrated or remote.

The manufacturer specifies the environment for which the product is intended to be used and utilizes the corresponding test levels of IEC 61326-1.

Additional requirements and exceptions for specific types of transducers are given in the annexes to this standard.



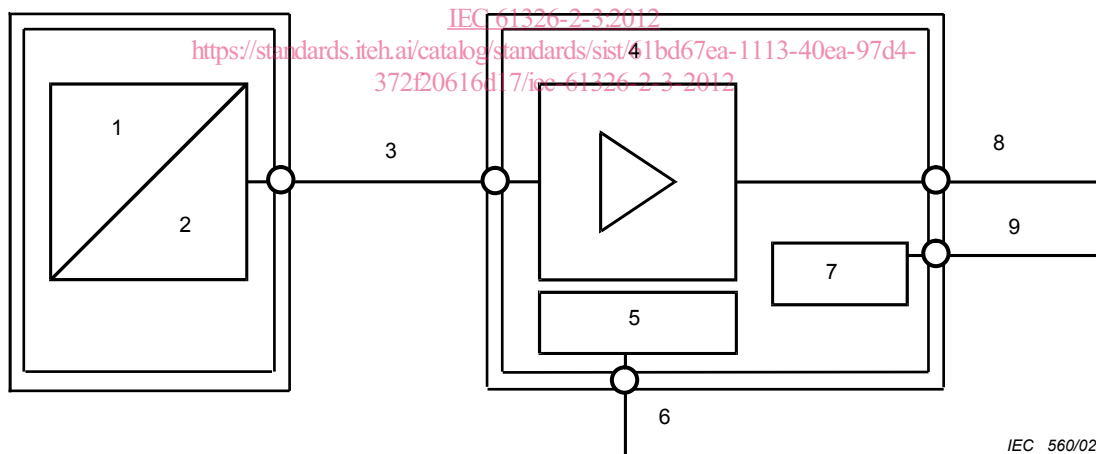
IEC 559/02

Key

- 1 Non-electrical quantity
- 2 Electrical quantity
- 3 Transmission link
- 4 Signal conditioning
- 5 Communication and control unit
- 6 Input/output ports
- 7 Power supply
- 8 Signal port
- 9 AC/DC power port

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Figure 101 – Example of a transducer with integrated signal conditioning



IEC 560/02

Key

- 1 Non-electrical quantity
- 2 Electrical quantity
- 3 Transmission link
- 4 Signal conditioning
- 5 Communication and control unit
- 6 Input/output ports
- 7 Power supply
- 8 Signal port
- 9 AC/DC power port

Figure 102 – Example of a transducer with remote signal conditioning

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.

Clause 2 of IEC 61326-1:2012 applies, except as follows:

Addition:

IEC 61326-1:2012, *Electrical equipment for measurement, control and laboratory use – EMC requirements – Part 1: General requirements*

3 Terms and definitions

For the purposes of this document, the terms and definitions of IEC 61326-1 apply, except as follows.

Addition:

3.101

transducer with integrated signal conditioning

transducer in which all components for signal conditioning are integrated in the enclosure (see Figure 101)

3.102

transducer with remote signal conditioning

transducer whose components for signal conditioning are installed in separate enclosures (see Figure 102)

3.104

transmission link

connection between the individual components of a transducer with remote signal conditioning

3.105

(nominal) range

range of indications obtainable with a particular setting of the controls of a measuring instrument

Note 1 to entry: The nominal range is normally stated in terms of its lower and upper limits. Where the lower limit is zero, the nominal range is commonly stated solely in terms of its upper limit.

[SOURCE: IEC 60050-300:2001, 311-03-14]

3.106

measuring range (of a transducer)

range defined by two values of the measured quantity within which the relationship between the output and input signals complies with the accuracy requirements

[SOURCE: IEC 60050-300:2001, 314-04-04, modified]

Note 1 to entry: For a 4 mA to 20 mA system, the output current 4 mA represents the lower limit for the measured quantity and 20 mA represent the upper limit.

3.107

span

algebraic difference between the values of the upper and lower limits of the measuring range

[SOURCE: IEC 60050-300:2001, 311-03-13]

3.108

intrinsic uncertainty

uncertainty of a measuring instrument when used under reference conditions

Note 1 to entry: This term is used in the “uncertainty” approach

[SOURCE: IEC 60050-300:2001, 311-03-09]

4 General

Clause 4 of IEC 61326-1:2012 applies.

5 EMC test plan

5.1 General

Subclause 5.1 of IEC 61326-1:2012 applies.

5.2 Configuration of EUT during testing

Subclause 5.2 of IEC 61326-1:2012 applies, except as follows.

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5.2.1 General

Subclause 5.2.1 of IEC 61326-1:2012 applies, except as follows:

[IEC 61326-2-3:2012](#)

Addition: <https://standards.iteh.ai/catalog/standards/sist/61bd67ea-1113-40ea-97d4-372f20616d17/iec-61326-2-3-2012>

A system for monitoring the behaviour of the EUT and for registering the output values shall be designed in such a way that the electromagnetic compatibility characteristics of the EUT are not impaired. The monitoring system shall also be designed such that its response is not affected by the immunity tests. The input impedance of the monitoring system shall correspond to the terminating impedance of the transducer, specified by the manufacturer. The distance between the monitoring system and the EUT should be at least 1,5 m.

The measurement uncertainty and the bandwidth of the monitoring system shall be adapted to the characteristics of the transducer.

Transmission links are considered as separate input and output lines.

The tests shall be conducted in compliance with the environmental conditions for the transducer specified by the manufacturer and using the specified supply voltage.

In the case of battery-operated transducers that can also be used when connected with a power supply, both operating modes (stand-alone and externally supplied) shall be tested.

In cases in which the manufacturer's installation instructions stipulate the use of external protective equipment or particular protective measures that are explicitly stated in the operating manual, the test requirements given in this part of the standard shall be applied for use together with the external protective equipment or measures.

5.3 Operation conditions of EUT during testing

Subclause 5.3 of IEC 61326-1:2012 applies.

5.4 Specification of functional performance

Subclause 5.4 of IEC 61326-1:2012 applies.

5.5 Test description

Subclause 5.5 of IEC 61326-1:2012 applies.

6 Immunity requirements

6.1 Conditions during the tests

Subclause 6.1 of IEC 61326-1:2012 applies except as follows:

Addition:

Transducers shall be operated during the test with all lines connected, provided the ports do not have functions that contravene the definition of a transducer's function.

Configurations with alternative ports shall be tested separately.

Transducers shall be set to the most sensitive ranges or combination of ranges unless other ranges are known to provide worst-case immunity results within normal application.

Only operational functions compliant with the specified use under the nominal conditions are permitted. Defined functions that cannot be set under electromagnetic compatibility test conditions shall be simulated by appropriate measures. This shall be done in such a way that the electromagnetic compatibility behaviour of the transducer is not affected.

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Measurement and supply circuits shall be grounded in accordance with the manufacturer's specifications. If no such specifications are given, the tests shall be carried out with the circuits grounded and with the circuits ungrounded.

6.2 Immunity test requirements

Subclause 6.2 of IEC 61326-1:2012 applies except as follows:

Addition:

After or during each test, the function of the transducer shall be tested.

Power inputs for voltages up to 75 V d.c. or voltages up to 50 V a.c. that are fed in a single cable together with the input and output ports are tested as input and output ports.

Power inputs for voltages up to 75 V d.c. or voltages up to 50 V a.c. with superimposed output signals (for example, 4 mA to 20 mA current loop with two-wire technology) are also tested as input/output ports.

The transmission link of a transducer with remote signal conditioning is tested as an input/output port.

If there are any manufacturer's specifications present to the insulation resistance then these shall be checked once again after ESD, fast transient (burst) and surge tests. If the manufacturer's specifications are not satisfied, the transducer is deemed to have failed the EMC tests.

6.3 Random aspects

Subclause 6.3 of IEC 61326-1:2012 applies.

6.4 Performance criteria

Subclause 6.4 of IEC 61326-1:2012 applies except as follows:

Addition:

The performance criteria are used to assess the defined functions of a transducer under the effects of external electromagnetic disturbances. Since a transducer is often part of a chain of functions in a large process, effects on the overall process due to malfunctions of a transducer caused by external interference factors cannot be predicted without great difficulty. For this reason, it is particularly important that the behaviour of transducers under the influence of electromagnetic disturbances is described with performance criteria by the manufacturer.

Table 101 describes the permissible effects of a disturbance on the different functions of a transducer with regard to the required performance criteria.

Table 101 – Performance criteria for the different functions

Function	Additional particular performance criteria		
	for performance criterion A	for performance criterion B	for performance criterion C
Main function ^a	The deviations during the test are within the limit values for intrinsic uncertainty specified and documented by the manufacturer	The deviations during the test are within the limit values for additional deviations specified and documented by the manufacturer	The deviations during the test may be outside the limit values specified and documented by the manufacturer. After the test, the measured values are within the specified range. The manufacturer shall specify the time that is required to regain normal function after the end of the test.
Process communication	Communication as intended	Temporary interference of the communication is permitted during the test.	Interference of the communication is permitted during the test. The manufacturer shall specify the time that is required to regain normal function after the end of the test.
Alarm function	No malfunctions permitted	Temporary interference of the communication is permitted during the test.	Malfunctions are permitted. The manufacturer shall specify the time that is required to regain normal function after the end of the test.

^a The main function of a measuring transducer is to transform a non-electrical quantity into a process-relevant signal as shown in Figures 101 and 102.