

# INTERNATIONAL STANDARD



**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**

IEC 61326-2-3:2020

<https://standards.iteh.ai/catalog/standards/iec/694d33d0-b347-4fc7-8e66-5687ff898845/iec-61326-2-3-2020>



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IEC 61326-2-3

Edition 3.0 2020-10  
REDLINE VERSION

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INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

ICS 17.220.20; 25.040.40; 33.100.20

ISBN 978-2-8322-9006-4

**Warning! Make sure that you obtained this publication from an authorized distributor.**

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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

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**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 third edition cancels and replaces the second edition published in 2012. This edition constitutes a technical revision.

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

- update of the document with respect to IEC 61326-1:2020.

The text of this International Standard is based on the following documents:

FDIS	Report on voting
65A/980/FDIS	65A/991/RVD

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

In this document the following print types are used:

- Terms used throughout this document which have been defined in Clause 3 of this document and of IEC 61326-1:2020: SMALL CAPITALS.

This part of the IEC 61326 series is to be used in conjunction with IEC 61326-1:2020 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 – EMC requirements*, 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 "<http://webstore.iec.ch>" in the data related to the specific document. At this date, the document will be

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- withdrawn,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

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# 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 of IEC 61326 specifies more detailed test configurations, operational conditions and performance criteria for transducers with integrated or remote signal conditioning.

This document 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 document includes transducers for electro-chemical and biological measured quantities.

The transducers covered by this document ~~may~~ can be powered by AC or DC voltage and/or by battery or with internal power supply.

Transducers referred to by this document comprise at least the following items (see Figure 101 and Figure 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.

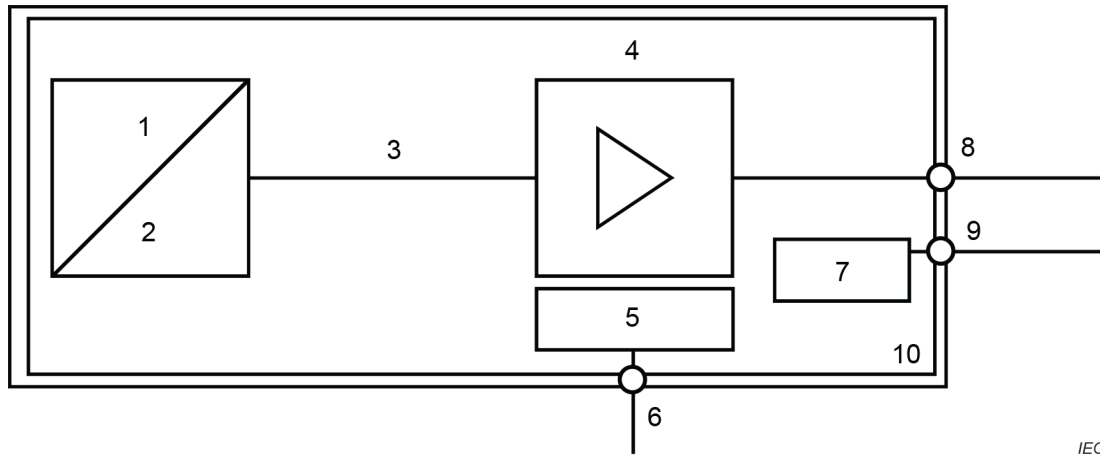
Transducers referred to by this document ~~may~~ can also have the following items (see Figure 101 and Figure 102):

- 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~~ Annex AA, Annex BB and Annex CC to this document.





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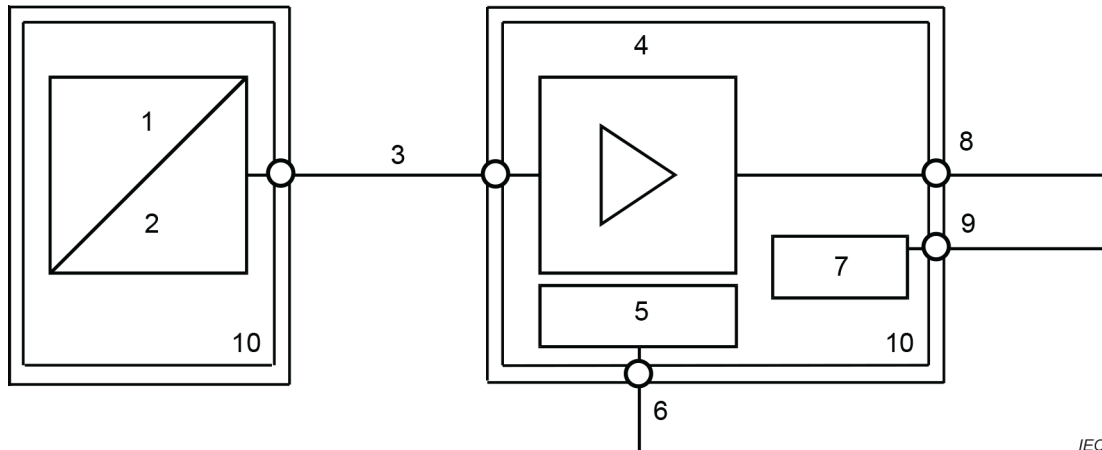
**Key**

- 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
- 10 enclosure

**Figure 101 – Example of a TRANSDUCER WITH INTEGRATED SIGNAL CONDITIONING**

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**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
- 10 enclosure

**Figure 102 – Example of a TRANSDUCER WITH REMOTE SIGNAL CONDITIONING**

**2 Normative references**

[IEC 61326-2-3:2020](https://standards.iteh.ai/catalog/standards/iec/694d33d0-b347-4fc7-8e66-5687ff898845/iec-61326-2-3-2020)

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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.

Clause 2 of IEC 61326-1:~~2012~~2020 applies, except as follows:

*Addition:*

IEC 61326-1:~~2012~~2020, *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 61326-1:2020 apply, except as follows.

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>

*Addition:*

### 3.101

#### **transducer with integrated signal conditioning**

transducer in which all components for signal conditioning are integrated in the enclosure

Note 1 to entry: See Figure 101.

### 3.102

#### **transducer with remote signal conditioning**

transducer whose components for signal conditioning are installed in separate enclosures

Note 1 to entry: 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

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.

[SOURCE: IEC 60050-300:2001, 314-04-04, modified – "output signal" has been changed to "measured quantity" and the note to entry has been added]

### 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 61326-1:2012/2020 applies.

## 5 EMC test plan

### 5.1 General

Subclause 5.1 of IEC 61326-1:~~2012~~2020 applies.

### 5.2 Configuration of EUT during testing

Subclause 5.2 of IEC 61326-1:~~2012~~2020 applies, except as follows.

#### 5.2.1 General

Subclause 5.2.1 of IEC 61326-1:~~2012~~2020 applies, except as follows:

*Addition:*

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 document 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~~2020 applies.

### 5.4 Specification of FUNCTIONAL PERFORMANCE

Subclause 5.4 of IEC 61326-1:~~2012~~2020 applies.

### 5.5 Test description

Subclause 5.5 of IEC 61326-1:~~2012~~2020 applies.

## 6 Immunity requirements

### 6.1 Conditions during the tests

Subclause 6.1 of IEC 61326-1:~~2012~~2020 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~~ disable the transducer's normal operation.

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.

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 61326-1:20122020 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 DC or voltages up to 50 V AC 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 DC or voltages up to 50 V AC 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 insulation resistance is specified, it shall be verified after ESD, fast transient and surge immunity tests.

If the ~~manufacturer's~~ insulation's specifications are not satisfied, the transducer is deemed to have failed the EMC tests.

## 6.3 Random aspects

Subclause 6.3 of IEC 61326-1:20122020 applies.

## 6.4 Performance criteria

Subclause 6.4 of IEC 61326-1:20122020 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
<b>Main function<sup>a</sup></b>	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.
<b>Process communication</b>	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.
<b>Alarm function</b>	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.
<sup>a</sup> —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.			