
Industrial process control systems - Part 2: Methods of evaluating the performance of intelligent valve positioners with pneumatic outputs

**iTeh STANDARD PREVIEW
(standards.iteh.ai)**

[SIST EN 61514-2:2004](https://standards.iteh.ai/catalog/standards/sist/5325c1dd-db83-46af-a274-7d92bb23eb95/sist-en-61514-2-2004)

<https://standards.iteh.ai/catalog/standards/sist/5325c1dd-db83-46af-a274-7d92bb23eb95/sist-en-61514-2-2004>

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST EN 61514-2:2004

<https://standards.iteh.ai/catalog/standards/sist/5325c1dd-db83-46af-a274-7d92bb23eb95/sist-en-61514-2-2004>

EUROPEAN STANDARD

EN 61514-2

NORME EUROPÉENNE

EUROPÄISCHE NORM

March 2004

ICS 23.060; 25.040.40

English version

**Industrial process control systems
Part 2: Methods of evaluating the performance
of intelligent valve positioners
with pneumatic outputs
(IEC 61514-2:2004)**

Systèmes de commande des processus
industriels
Partie 2 : Méthodes d'évaluation
des performances des positionneurs
de vanne intelligents à sorties
pneumatiques
(CEI 61514-2:2004)

Systeme der industriellen
Prozessleittechnik
Teil 2: Verfahren zur Bewertung
des Betriebsverhaltens von
intelligenten Ventilstellungsreglern
mit pneumatischem Ausgang
(IEC 61514-2:2004)

**ITeh STANDARD PREVIEW
(standards.iteh.ai)**

SIST EN 61514-2:2004

<https://standards.iteh.ai/catalog/standards/sist/5325c1dd-db83-46af-a274-7d92bb23eb95/sist-en-61514-2-2004>

This European Standard was approved by CENELEC on 2004-03-01. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

Foreword

The text of document 65B/515/FDIS, future edition 1 of IEC 61514-2, prepared by SC 65B, Devices, of IEC TC 65, Industrial-process measurement and control, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 61514-2 on 2004-03-01.

This standard is to be read in conjunction with EN 61514:2002.

The following dates were fixed:

- latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2004-12-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2007-03-01

Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 61514-2:2004 was approved by CENELEC as a European Standard without any modification.

ITeCh STANDARD PREVIEW
(standards.iteh.ai)
SIST EN 61514-2:2004
<https://standards.iteh.ai/catalog/standards/sist/5325c1dd-db83-46af-a274-7d92bb23eb95/sist-en-61514-2-2004>

Annex ZA (normative)

Normative references to international publications with their corresponding European publications

The following referenced documents are indispensable for the application 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.

NOTE Where an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60050-351	1998	International Electrotechnical Vocabulary Part 351: Automatic control	-	-
IEC 60068-2-1	1990	Environmental testing Part 2: Tests - Tests A: Cold	EN 60068-2-1	1993
IEC 60068-2-2	1974	Part 2: Tests - Tests B: Dry heat	EN 60068-2-2 ¹⁾	1988
IEC 60068-2-6 + corr. March	1995 1995	Part 2: Tests - Test Fc: Vibration (sinusoidal)	EN 60068-2-6	1995
IEC 60068-2-31	1969	Part 2: Tests - Test Ec: Drop and topple, primarily for equipment-type specimens	EN 60068-2-31 ²⁾	1993
IEC 60068-2-78	2001	Part 2-78: Tests - Test Cab: Damp heat, steady state	EN 60068-2-78	2001
IEC 60079	Series	Electrical apparatus for explosive gas atmospheres	EN 60079	Series
IEC 60529	1989	Degrees of protection provided by enclosures (IP Code)	EN 60529 + corr. May	1991 1993
IEC 60534-1	- ³⁾	Industrial-process control valves Part 1: Control valve terminology and general considerations	EN 60534-1	1993 ⁴⁾
IEC 60654	Series	Operating conditions for industrial- process measurement and control equipment	EN 60654	Series
IEC 60721-3	Series	Classification of environmental conditions Part 3: Classification of groups of environmental parameters and their severities	EN 60721-3	Series

¹⁾ EN 60068-2-2 includes supplement A:1976 to IEC 60068-2-2.

²⁾ EN 60068-2-31 includes A1:1982 to IEC 60068-2-31.

³⁾ Undated reference.

⁴⁾ Valid edition at date of issue.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 61000-4-11	- ³⁾	Electromagnetic compatibility (EMC) Part 4-11: Testing and measurement techniques - Voltage dips, short interruptions and voltage variations immunity tests	EN 61000-4-11	1994 ⁴⁾
IEC 61010-1	2001	Safety requirements for electrical equipment for measurement, control, and laboratory use Part 1: General requirements	EN 61010-1 + corr. June	2001 2002
IEC 61032	1997	Protection of persons and equipment by enclosures - Probes for verification	EN 61032	1998
IEC 61069	Series	Industrial-process measurement and control - Evaluation of system properties for the purpose of system assessment	EN 61069	Series
IEC 61158	Series	Digital data communications for measurement and control - Fieldbus for use in industrial control systems	EN 61158	Series
IEC 61298	Series	Process measurement and control devices - General methods and procedures for evaluating performance Part 4: Evaluation report content	EN 61298-4	Series
IEC 61326	2002	Electrical equipment for measurement, control and laboratory use - EMC requirements	EN 61326 A1 A2 A3	1997 1998 2001 2003
IEC/PAS 61499	Series	Function blocks for industrial-process measurement and control systems	-	-
IEC 61514 (mod)	2000	Industrial-process control systems - Methods of evaluating the performance of valve positioners with pneumatic outputs	EN 61514	2002
IEC 62098	2000	Evaluation methods for microprocessor- based instruments	-	-
CISPR 22 (mod)	- ³⁾	Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement	EN 55022	1998 ⁴⁾

INTERNATIONAL STANDARD

IEC 61514-2

First edition
2004-01

Industrial process control systems –

Part 2: Methods of evaluating the performance of intelligent valve positioners with pneumatic outputs

ITC STANDARD PREVIEW
(standards.iteh.ai)

SIST EN 61514-2:2004

<https://standards.iteh.ai/catalog/standards/sist/5325c1dd-db83-46af-a274-7d92bb23eb95/sist-en-61514-2-2004>

© IEC 2004 — Copyright - all rights reserved

No part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from the publisher.

International Electrotechnical Commission, 3, rue de Varembe, PO Box 131, CH-1211 Geneva 20, Switzerland
Telephone: +41 22 919 02 11 Telefax: +41 22 919 03 00 E-mail: inmail@iec.ch Web: www.iec.ch



Commission Electrotechnique Internationale
International Electrotechnical Commission
Международная Электротехническая Комиссия

PRICE CODE

W

For price, see current catalogue

CONTENTS

FOREWORD.....	4
INTRODUCTION.....	6
1 Scope.....	7
2 Normative references.....	8
3 Terms and definitions	9
4 Design review	10
4.1 Positioner identification.....	10
4.1.1 Power supply unit.....	11
4.1.2 Sensor/input assembly.....	11
4.1.3 Auxiliary sensor assembly.....	11
4.1.4 Human interface	11
4.1.5 Communication interface	12
4.1.6 Data processing unit	12
4.1.7 Output subsystem	12
4.1.8 External functionality.....	13
4.2 Aspects of functionality and capabilities to be reviewed.....	13
4.2.1 Checklist	13
4.2.2 Reporting.....	19
4.3 Documentary information.....	19
5 Performance testing.....	20
5.1 Reference conditions for performance tests.....	20
5.1.1 Valve characteristics.....	21
5.2 General testing procedures	23
5.2.1 Test set-up	23
5.2.2 Testing precautions	24
5.3 Initial observations and measurements	24
5.3.1 Mounting procedure	24
5.3.2 Configuration procedures.....	25
5.3.3 Stem position calibration procedure	25
5.3.4 Stem position tuning procedure	25
5.4 Performance test procedures	26
5.4.1 Tests under reference conditions	26
5.4.2 Effects of influence quantities	28
6 Other considerations.....	34
6.1 Safety.....	34
6.2 Degree of protection provided by enclosures.....	34
6.3 Electromagnetic emission	34
6.4 Variants.....	34
7 Evaluation report	34
Annex A (normative) Vibration test set-up.....	36
Bibliography.....	37

Figure 1 – Positioner model in extensive configuration.....	11
Figure 2 – Basic design for positioners with analogue outputs.....	13
Figure 3 – Basic design for positioners with pulsed output	13
Figure 4 – Basic test set-up.....	24
Figure 5 – Examples of step responses of positioners	28
Table 1 – Single or double acting linear	21
Table 2 – Single or double acting rotary for an angle between 60° – 90°	22
Table 3 – Matrix of instrument properties and tests.....	29

iTeh STANDARD PREVIEW **(standards.iteh.ai)**

SIST EN 61514-2:2004

<https://standards.iteh.ai/catalog/standards/sist/5325c1dd-db83-46af-a274-7d92bb23eb95/sist-en-61514-2-2004>

INTERNATIONAL ELECTROTECHNICAL COMMISSION

INDUSTRIAL PROCESS CONTROL SYSTEMS –

Part 2: Methods of evaluating the performance of intelligent valve positioners with pneumatic outputs

FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user. (standards.iteh.ai)
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter. (<https://standards.iteh.ai/catalog/standards/sist/5325c1dd-db83-46af-a274-7d92bb27eb95/sist-en-61514-2-2004>)
- 5) IEC provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with an IEC Publication.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 61514-2 has been prepared by subcommittee 65B: Devices, of IEC technical committee 65: Industrial-process measurement and control.

This standard is to be read in conjunction with IEC 61514.

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

FDIS	Report on voting
65B/515/FDIS	65B/522/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.

The committee has decided that the contents of this publication will remain unchanged until 2009. At this date, the publication will be

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

A bilingual version of this publication may be issued at a later date.

iTeh STANDARD PREVIEW (standards.iteh.ai)

SIST EN 61514-2:2004

<https://standards.iteh.ai/catalog/standards/sist/5325c1dd-db83-46af-a274-7d92bb23eb95/sist-en-61514-2-2004>

INTRODUCTION

New instruments for process control and measurement including valve positioners are mainly equipped with microprocessors thereby utilising digital data processing and communication methods and/or artificial intelligence, making them more complex and giving them a considerable added value.

Modern intelligent valve positioners are no longer only controlling the valve position, but they are in many cases also equipped with various facilities for self-testing, actuator/valve condition monitoring and alarming. The variety of added functionalities is large. They can no longer be compared with the single function "cam-type" positioners. Therefore, accuracy related performance testing although still very important is no longer sufficient to demonstrate their flexibility, capabilities and other features with respect to engineering, installation, maintainability, reliability and operability.

In this standard the evaluation considers performance testing and a design review of both hardware and software. The layout of this document follows to some extent the framework of IEC 62098. A number of performance tests described in IEC 61514 are still valid for intelligent valve positioners. Further reading of IEC 61069 is recommended.

iTeh STANDARD PREVIEW (standards.iteh.ai)

SIST EN 61514-2:2004

<https://standards.iteh.ai/catalog/standards/sist/5325c1dd-db83-46af-a274-7d92bb23eb95/sist-en-61514-2-2004>

INDUSTRIAL PROCESS CONTROL SYSTEMS –

Part 2: Methods of evaluating the performance of intelligent valve positioners with pneumatic outputs

1 Scope

This part of IEC 61514 specifies design reviews and tests intended to measure and determine the static and dynamic performance, the degree of intelligence and the communication capabilities of single-acting or double-acting intelligent valve positioners. The tests may be applied to positioners which receive standard analogue electrical input signals (as specified in IEC 60381) and/or digital signals via a data communication link and have a pneumatic output. An intelligent valve positioner as defined in Clause 3 is an instrument that uses for performing its functions digital techniques for data processing, decision-making and bi-directional communication. It may be equipped with additional sensors and additional functionality supporting the main function.

The performance testing of an intelligent valve positioner needs to be conducted with the positioner mounted on and connected to one or preferably more actuator/valve assemblies in turn. The specific characteristic parameters of these combinations such as size, stroke, friction (hysteresis), type of packing, spring package and supply pressure for the pneumatic part, are to be carefully chosen and reported. It should be noted that the performance of a positioner in such combinations is actuator dependent. Tests on different sizes of actuators are required in particular for the determination of the operational range (dynamic response and stability) of a positioner.

[SIST EN 61514-2:2004](https://standards.iteh.ai/catalog/standards/sist/5325c1dd-db83-46af-a274-4d2bb25cb959/iec-61514-2-2004)

<https://standards.iteh.ai/catalog/standards/sist/5325c1dd-db83-46af-a274-4d2bb25cb959/iec-61514-2-2004>

The methods of evaluation given in this standard are intended for use by manufacturers to determine the performance of their products and by users or testing laboratories to verify equipment performance specifications. The manufacturers of intelligent positioners are urged to apply this standard at an early stage of development.

This standard is intended to provide guidance for designing evaluations of intelligent valve positioners by providing:

- a checklist for reviewing their hardware and software design in a structured way;
- test methods for measuring and qualifying their performance under various environmental and operational conditions;
- methods for reporting the data obtained.

When a full evaluation, in accordance with this standard, is not required or possible, the tests which are required should be performed and the results reported in accordance with the relevant parts of this standard. In such cases, the test report should state that it does not cover the full number of tests specified herein. Furthermore, the items omitted should be mentioned, to give the reader of the report a clear overview.

The standard is also applicable for non-intelligent microprocessor-based valve positioners without means for bi-directional communication. In that case an evaluation should be reduced to a limited programme of performance testing and a short review of the construction.