# IEC 61010-2-202

Edition 2.0 2020-11
REDLINE VERSION

# INTERNATIONAL STANDARD

colour inside

## Safety requirements for electrical equipment for measurement, control and laboratory use –
## Part 2-202: Particular requirements for electrically operated valve actuators

IEC 61010-2-202:2020-11 RLV(en)

Documents
Document Sharing Hub

Full document details: IEC 61010-2-202 2020 RLV

**THIS PUBLICATION IS COPYRIGHT PROTECTED**
**Copyright © 2020 IEC, Geneva, Switzerland**

All rights reserved. Unless otherwise specified, 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 either IEC or IEC's member National Committee in the country of the requester. If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

IEC Central Office
3, rue de Varembé
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
info@iec.ch
www.iec.ch

**About the IEC**
The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

**About IEC publications**
The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigendum or an amendment might have been published.

**IEC publications search - webstore.iec.ch/advsearchform**
The advanced search enables to find IEC publications by a variety of criteria (reference number, text, technical committee,…). It also gives information on projects, replaced and withdrawn publications.

**IEC Just Published - webstore.iec.ch/justpublished**
Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and once a month by email.

**IEC Customer Service Centre - webstore.iec.ch/csc**
If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: sales@iec.ch.

**Electropedia - www.electropedia.org**
The world's leading online dictionary on electrotechnology, containing more than 22 000 terminological entries in English and French, with equivalent terms in 16 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

**IEC Glossary - std.iec.ch/glossary**
67 000 electrotechnical terminology entries in English and French extracted from the Terms and Definitions clause of IEC publications issued since 2002. Some entries have been collected from earlier publications of IEC TC 37, 77, 86 and CISPR.

Documents
Document Sharing Hub

Full document details: IEC 61010-2-202 2020 RLV

# IEC 61010-2-202

Edition 2.0 2020-11
REDLINE VERSION

# INTERNATIONAL STANDARD

colour inside

## Safety requirements for electrical equipment for measurement, control and laboratory use – Part 2-202: Particular requirements for electrically operated valve actuators

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 13.110; 17.020; 19.020

ISBN 978-2-8322-9044-6

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

® Registered trademark of the International Electrotechnical Commission

Documents
Document Sharing Hub

Full document details: IEC 61010-2-202 2020 RLV

# CONTENTS

FOREWORD ..... 3
INTRODUCTION ..... 6
1 Scope and object ..... 7
2 Normative references ..... 8
3 Terms and definitions ..... 8
4 Tests ..... 9
5 Marking and documentation ..... 9
6 Protection against electric shock ..... 11
7 Protection against mechanical HAZARDS ..... 11
8 Resistance to mechanical stresses ..... 12
9 Protection against the spread of fire ..... 12
10 Equipment temperature limits and resistance to heat ..... 12
11 Protection against HAZARDS from fluids and solid foreign objects ..... 12
12 Protection against radiation, including laser sources, and against sonic and ultrasonic pressure ..... 12
13 Protection against liberated gases and substances, explosion and implosion ..... 12
14 Components and subassemblies ..... 13
15 Protection by interlocks ..... 13
16 HAZARDS resulting from application ..... 13
17 RISK assessment ..... 13
Annexes ..... 14
Bibliography ..... 15

Documents
Document Sharing Hub
Full document details: IEC 61010-2-202 2020 RLV

INTERNATIONAL ELECTROTECHNICAL COMMISSION

_____

# SAFETY REQUIREMENTS FOR ELECTRICAL EQUIPMENT FOR MEASUREMENT, CONTROL AND LABORATORY USE –

## Part 2-202: Particular requirements for electrically operated valve actuators

## 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.
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.
5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
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.

**This redline version of the official IEC Standard allows the user to identify the changes made to the previous edition. A vertical bar appears in the margin wherever a change has been made. Additions are in green text, deletions are in strikethrough red text.**

AVA Documents
Document Sharing Hub

Full document details: IEC 61010-2-202 2020 RLV

International Standard IEC 61020-2-202 has been prepared by committee TC 65: Industrial-process measurement, control and automation.

This second edition cancels and replaces the first edition published in 2016. This edition constitutes a technical revision.

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

a) the scope has been clarified in relationship with other IEC standards,
b) additional requirement for identification has been included,
c) additional requirement for user documentations has been included,
d) accuracy of high voltage di-electric tester has been specified,
e) conformity statement for mechanical tests has been clarified.

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

| FDIS | Report on voting |
|---|---|
| 65/835/FDIS | 65/844/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.

This Part 2-202 is to be used in conjunction with third edition of IEC 61010-1:2010, including its Amendment 1:2016.

This Part 2-202 supplements or modifies the corresponding clauses in IEC 61010-1 so as to convert that publication into the IEC standard: *Particular requirements for electrically operated valve actuators.*

Where a particular subclause of Part 1 is not mentioned in this part 2, that subclause applies as far as is reasonable. Where this part states "addition", "modification", "replacement", or "deletion", the relevant requirement, test specification or note in Part 1 should be adapted accordingly.

A list of all parts in the IEC 61010 series, published under the general title *Safety requirements for electrical equipment for measurement, control and laboratory use*, can be found on the IEC website.

In this standard:

1) the following print types are used:
   – requirements: in roman type;
   – NOTES: in smaller roman type;
   – conformity and test: *in italic type;*
   – terms used throughout this standard which have been defined in clause 3: SMALL ROMAN CAPITALS;
2) subclauses, figures, tables and notes which are additional to those in part 1 are numbered starting from 101. Additional annexes are lettered starting from AA.

Documents
Document Sharing Hub
Full document details: IEC 61010-2-202 2020 RLV

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.

**IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.**

Documents
Document Sharing Hub

Full document details: IEC 61010-2-202 2020 RLV

# INTRODUCTION

This IEC 61010-2-202 document constitutes Part 2-202 of a planned series of standards on industrial-process measurement, control and automation equipment.

Safety terms of general use are defined in IEC 61010-1. More specific terms are defined in each part.

This part incorporates the safety related requirements of electrically operated valve ACTUATORS and SOLENOIDS.

This document does not cover functional safety aspects of electrically operated ACTUATORS and SOLENOIDS.

Documents
Document Sharing Hub

Full document details: IEC 61010-2-202 2020 RLV

# SAFETY REQUIREMENTS FOR ELECTRICAL EQUIPMENT FOR MEASUREMENT, CONTROL AND LABORATORY USE –

## Part 2-202: Particular requirements for electrically operated valve actuators

## 1 Scope and object

This clause of Part 1 is applicable, except as follows:

### 1.1 Scope

#### 1.1.1 Equipment included in scope

*Replacement of the text by the following paragraphs:*

This part of IEC 61010 specifies the safety requirements for electric ACTUATORs and SOLENOIDs, as applied to valves, intended to be installed in an industrial process or discrete control environment.

This part of IEC 61010 specifies:

– particular safety requirements for general purpose electrically operated valve ACTUATORs and SOLENOIDs,

– related verification tests.

~~The general purpose electrically operated valve ACTUATORs and SOLENOIDs, covered by this part of IEC 61010 are limited to:~~

~~– those rated 600 V alternative current/ 840 V direct current or less,~~

~~Service personnel interface to equipment included in the scope of this document.~~

#### 1.1.2 Equipment excluded from scope

*Addition at the end of the list:*

This standard excludes:

~~– electric ACTUATORs and SOLENOIDs for use in explosive atmospheres, as covered by the IEC 60079 series of standards;~~

~~– mechanical parts/aspects of valves;~~

~~– ACTUATORs and SOLENOIDs performing a safety function as covered by the IEC 61508 series of standards;~~

~~– POSITIONERs.~~

aa) electric ACTUATORS and SOLENOIDs for use in domestic or commercial applications;

NOTE 1 These are covered by other IEC or ISO standards, such as IEC 60730, etc.

bb) electric ACTUATORs and SOLENOIDs performing a safety function;

NOTE 2 These are covered by other IEC or ISO standards, such as IEC 61508, etc.

cc) positioners.

AVA Documents Document Sharing Hub

Full document details: IEC 61010-2-202 2020 RLV

NOTE 3 A positioner is defined as a "physical unit delivering an additional, often mechanical, feedback to a mechanical final controlling element that improves its velocity and precision" in IEC 60050-351:2013, 351-56-17.

### 1.2 Object

#### 1.2.2 Aspects excluded from scope

*Addition at the end of the list:*

aa) mechanical parts/aspects of valves.

#### 1.2.101 Aspects included in other applicable standards

Where electric ACTUATORs and SOLENOIDs are required to comply with requirements of other IEC or ISO standards, aspects fully covered in these standards can replace requirements as given in IEC 61010-1.

Where aspects covered in IEC 61010-1 are not fully covered in these IEC or ISO standards, tests of IEC 61010-1 shall be conducted as far to ensure that no HAZARD can occur in NORMAL or in SINGLE FAULT CONDITION.

NOTE IEC 61010-1:2010, Figure 15 of 14.1 gives a general overview of dealing with components within the scope of other IEC or ISO standards. A similar approach can be used for equipment and sub-assemblies. Example – Clauses 8 and 9.1 to 9.5 can generally be considered sufficiently covered where IEC 60079 has been applied.

## 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.~~

This clause of Part 1 is applicable~~, except as follows:~~.

~~No additional references are needed for this document.~~

## 3 Terms and definitions

This clause of Part 1 is applicable, except as follows:

*Additional terms and definitions:*

~~3.101.1~~ **3.101**
**ACTUATOR**
device that controls a valve ~~it is assembled to~~, in response to an external signal

~~3.101.2~~ **3.102**
**SERVICE PERSONNEL**
person who is installing, changing or repairing the control equipment, with the appropriate technical training, experience and awareness of HAZARDs and of measures to minimize danger to ~~themselves~~ himself/herself, other persons or to the control equipment, in an industrial environment~~, changing or repairing the control equipment~~

Note 1 to entry: SERVICE PERSONNEL are persons having the appropriate technical training and experiences necessary to be aware of HAZARDs – e.g, electrical HAZARDs, temperature HAZARDs, fire HAZARDs – to which they are exposed in performing a task and of measures to minimize danger to themselves or to other persons or to the control equipment, in an industrial environment.

Note 2 to entry: SERVICE PERSONNEL change or repair the control equipment e.g. hardware configuration or installing software updates provided by the manufacturer.

AVA Documents Document Sharing Hub

Full document details: IEC 61010-2-202 2020 RLV

~~3.101.3~~ **3.103**
**SOLENOID**
~~cylindrical coil, the length of which is much greater than its transverse dimensions and which is used to produce a magnetic field~~
a coil, carrying current, to produce a magnetic field, in order to move a plunger

~~3.101.4~~
~~SWITCH~~
~~contact device actuated by the valve mechanism~~

## 4 Tests

This clause of Part 1 is applicable, except as follows:

### 4.4.2.1 General

*Replacement of the first sentence with the following sentence:*

Fault conditions shall include those specified in 4.4.2.2 to 4.4.2.14 and in 4.4.2.101.

### 4.4.2.5 Motors

*Additional subclause:*

#### 4.4.2.5.101 Motor power supply

~~In actuators where the motor power supply can be wired incorrectly:~~

~~Delta-connected motor shall be connected to power supply with star connection.~~

~~Star-connected motor shall be connected to power supply with delta connection.~~

~~For a three-phase motor, any two phases shall be reverse connected.~~

In ACTUATORs where the motor power supply can be wired incorrectly:

- delta-connected motor shall be connected to power supply with star connection;
- star-connected motor shall be connected to power supply with delta connection;

*Additional subclause:*

#### 4.4.2.101 SOLENOID

SOLENOID shall be ~~stopped~~ blocked while fully energized or prevented from moving, whichever is less favourable.

A SOLENOID damaged during one test may be repaired or replaced before the next test.

## 5 Marking and documentation

This clause of Part 1 is applicable, except as follows:

### 5.1.2 Identification

*Addition of a new item to the list:*

AVA Documents Document Sharing Hub
Full document details: IEC 61010-2-202 2020 RLV

aa) identification that this is a device for industrial process or discrete control environment applications, either through text, or identification of the safety standard.

NOTE Example: Text such as "IEC 61010" or similar can be considered as sufficient.

### 5.1.3 MAINS supply

*Addition after e):*

~~aa)~~

~~– number of phase conductors (e.g. 2,3);~~

~~– other designated conductors (e.g. N,M,PE).~~

aa) number of phases for multiphase connections (e.g. 2,3);

bb) other designated conductors (e.g. N, PE).

## 5.4 Documentation

~~This clause of IEC 61010-1 is applicable except as follows:~~

### 5.4.1 General

*Addition of a new item to the list:*

aa) information that the device is constructed for industrial process or discrete control application.

### 5.4.2 Equipment RATINGS

*Addition after f):*

~~aa) the maximum linear travel distance or rotation angle of the ACTUATOR;~~

~~bb) the maximum force available from the ACTUATOR;~~

~~cc) the minimum actuation cycles available.~~

aa) the maximum force or torque available from the ACTUATOR.

### 5.4.3 Equipment installation

*Addition after g):*

aa) instructions of how to install the equipment in order to ~~guarantee~~ achieve the stated degree of protection according to IEC 60529, shall be provided;

bb) instructions on the RATINGS of necessary equipment required to complete the installation of the ACTUATOR or SOLENOID so that it operates safely. This may include but is not limited to:

– contactors,

~~– stall protection~~

– locked rotor and overload protection,

– overcurrent devices,

– connection of thermal trips,

– isolators.

### 5.4.4 Equipment operation

~~*Replacement of d):*~~

~~d) intermittent operation limits, e.g. energize ACTUATOR at least once per hour.~~

Documents
Document Sharing Hub
Full document details: IEC 61010-2-202 2020 RLV

*Addition after j):*

aa) duty cycle, if the device is designed for intermittent operation;

bb) instructions for safety protection relating to surface temperature.

### 5.4.5 Equipment maintenance and service

*Addition of the following paragraph after the last paragraph before the conformity statement:*

If more than one disconnect switch may be required to disconnect all power within an ACTUATOR, the manufacturer shall provide instructions with the word "warning" and the following or the equivalent: "risk of electric shock – more than one disconnect switch may be required to de-energize the device for servicing."

## 6 Protection against electric shock

This clause of Part 1 is applicable, except as follows:

### 6.1.2 Exceptions

*Addition of the following paragraph after the conformity statement:*

HAZARDOUS LIVE parts, components or subassemblies can be ~~touched~~ ACCESSIBLE by SERVICE PERSONNEL during service provided that they are marked with symbol 12 of Table 1 to indicate an electric shock HAZARD.

### 6.8.3.1 The a.c. voltage test

*Replacement of the first sentence by the following sentence:*

The voltage tester shall be capable of maintaining the test voltage throughout the test within +/- 5 % of the specified value.

## 7 Protection against mechanical HAZARDS

This clause of Part 1 is applicable, except as follows:

### 7.3 Moving parts

*Additional subclause:*

### 7.3.101 Independence of operating wheels and transmission gears

If a mechanical operating wheel, etc. is supplied or specified by the ACTUATOR manufacturer, it shall not cause a HAZARD in NORMAL or SINGLE FAULT CONDITIONS, while the ACTUATOR is operated.

No ACCESSIBLE moving parts of the ACTUATOR assembly shall create a HAZARD when the ACTUATOR is operated.

If these conditions are not met, a RISK assessment shall be carried out according to 7.3.3 or Clause 17.

*Conformity is checked by inspection.*

Documents
Document Sharing Hub
Full document details: IEC 61010-2-202 2020 RLV

### 7.5.1 General

*Addition of the following paragraph before the conformity statement:*

Lifting and carrying through strapping is allowed. Lifting and carrying through strapping the operating wheel is not allowed.

## 8 Resistance to mechanical stresses

This clause of Part 1 is applicable, except as follows:

### 8.1 General

*Addition of the following before the conformity statement:*

Components complying with suitable component standard, where impact test is included, does not have to be retested in the end application. Also see 14.1 and Figure 15.

*Addition of the following at the end of the conformity statement:*

*Where the ACTUATOR or SOLENOID and valve are inseparable, the pressure containing parts shall be tested as follows after mechanical tests:*

– *leakage per 11.7.2 at 1,3 times RATED pressure for 2 min; or*
– *leakage per 11.7.3 at 1,1 times RATED pressure for 2 min; or*
– *relevant valve standard as per 14.102, if more severe.*

NOTE For inseparable assemblies, see Clause 14.

## 9 Protection against the spread of fire

This clause of Part 1 is applicable.

## 10 Equipment temperature limits and resistance to heat

This clause of Part 1 is applicable.

## 11 Protection against HAZARDS from fluids and solid foreign objects

This clause of Part 1 is applicable.

## 12 Protection against radiation, including laser sources, and against sonic and ultrasonic pressure

This clause of Part 1 is applicable.

## 13 Protection against liberated gases and substances, explosion and implosion

This clause of Part 1 is applicable.

Documents
Document Sharing Hub
Full document details: IEC 61010-2-202 2020 RLV