



International Society of Automation
Setting the Standard for Automation™

STANDARD

American National Standard **ANSI/ISA-96.08.01-2025**

This standard is intended for worldwide use in all industries as applicable.

Guidelines for the Specification of Linear and Rotary Gas Over Oil Valve Actuators

Approved: 29 JULY 2025

©2025 International Society of Automation. This is a copyright document and may not be copied or distributed in any form or manner without the permission of ISA. This copy of the document was made for the sole use of the person to whom ISA provided it and is subject to the restrictions stated in the *Copyright of ISA Standards* policy. It may not be provided to any other person in print, electronic or any other form. Violations of ISA's copyright will be persecuted to the fullest extent of the law and may result in substantial civil and criminal penalties.

Documents
Document Sharing Hub

ANSI/ISA-96.08.01-2025, Guidelines for the Specification of Linear and Rotary Gas Over Oil Valve Actuators

ISBN: 978-1-64331-277-4

Copyright © 2025 by the International Society of Automation (ISA). All rights reserved. Not for resale. Printed in the United States of America. No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form or by any means (electronic, mechanical, photocopying, recording, or otherwise), without the prior written permission of the Publisher.

ISA
3252 S. Miami Blvd., Suite 102
Durham, NC 27703 USA

Preface

This preface, as well as all footnotes and annexes, is included for information purposes and is not part of ANSI/ISA-96.08.01-2025.

This document has been prepared as part of the service of ISA toward a goal of uniformity in the field of automation. To be of real value, this document should not be static but should be subject to periodic review. Toward this end, the society welcomes all comments and criticisms and asks that they be addressed to the Secretary, ISA Standards and Practices Board; standards@isa.org.

It is the policy of ISA to encourage and welcome the participation of all concerned individuals and interests in the development of ISA standards, recommended practices and technical reports. Participation in the ISA standards-making process by an individual in no way constitutes endorsement by the employer of that individual, of ISA or of any of the standards, recommended practices and technical reports that ISA develops.

International System of Units (SI) are the preferred units of measurement in ISA standards.

CAUTION — ISA ADHERES TO THE POLICY OF THE AMERICAN NATIONAL STANDARDS INSTITUTE WITH REGARD TO PATENTS. IF ISA IS INFORMED OF AN EXISTING PATENT THAT IS REQUIRED FOR USE OF THE DOCUMENT, IT WILL REQUIRE THE OWNER OF THE PATENT TO EITHER GRANT A ROYALTY-FREE LICENSE FOR USE OF THE PATENT BY USERS COMPLYING WITH THE DOCUMENT OR A LICENSE ON REASONABLE TERMS AND CONDITIONS THAT ARE FREE FROM UNFAIR DISCRIMINATION.

EVEN IF ISA IS UNAWARE OF ANY PATENT COVERING THIS DOCUMENT, THE USER IS CAUTIONED THAT IMPLEMENTATION OF THE DOCUMENT MAY REQUIRE USE OF TECHNIQUES, PROCESSES OR MATERIALS COVERED BY PATENT RIGHTS. ISA TAKES NO POSITION ON THE EXISTENCE OR VALIDITY OF ANY PATENT RIGHTS THAT MAY BE INVOLVED IN IMPLEMENTING THE DOCUMENT. ISA IS NOT RESPONSIBLE FOR IDENTIFYING ALL PATENTS THAT MAY REQUIRE A LICENSE BEFORE IMPLEMENTATION OF THE DOCUMENT OR FOR INVESTIGATING THE VALIDITY OR SCOPE OF ANY PATENTS BROUGHT TO ITS ATTENTION. THE USER SHOULD CAREFULLY INVESTIGATE RELEVANT PATENTS BEFORE USING THE DOCUMENT FOR THE USER'S INTENDED APPLICATION.

HOWEVER, ISA ASKS THAT ANYONE REVIEWING THIS DOCUMENT WHO IS AWARE OF ANY PATENTS THAT MAY IMPACT IMPLEMENTATION OF THE DOCUMENT NOTIFY THE ISA STANDARDS AND PRACTICES DEPARTMENT OF THE PATENT AND ITS OWNER.

ADDITIONALLY, THE USE OF THIS DOCUMENT MAY INVOLVE HAZARDOUS MATERIALS, OPERATIONS OR EQUIPMENT. THE DOCUMENT CANNOT ANTICIPATE ALL POSSIBLE APPLICATIONS OR ADDRESS ALL POSSIBLE SAFETY ISSUES ASSOCIATED WITH USE IN HAZARDOUS CONDITIONS. THE USER OF THIS DOCUMENT MUST EXERCISE SOUND PROFESSIONAL JUDGMENT CONCERNING ITS USE AND APPLICABILITY UNDER THE USER'S PARTICULAR CIRCUMSTANCES. THE USER MUST ALSO CONSIDER THE APPLICABILITY OF ANY GOVERNMENTAL REGULATORY LIMITATIONS AND ESTABLISHED SAFETY AND HEALTH PRACTICES BEFORE IMPLEMENTING THIS DOCUMENT.

THE USER OF THIS DOCUMENT SHOULD BE AWARE THAT THIS DOCUMENT MAY BE IMPACTED BY ELECTRONIC SECURITY ISSUES. THE COMMITTEE HAS NOT YET ADDRESSED THE POTENTIAL ISSUES IN THIS VERSION.

ISA (www.isa.org) is an international professional association that sets the standard for those who apply engineering and technology to improve the management, safety and cybersecurity of modern automation and control systems used across industry and critical infrastructure. Founded in 1945, ISA develops widely used international standards for industrial automation, safety and

cybersecurity; certifies industry professionals; provides education and training; publishes books and technical articles; hosts conferences and events and provides networking and career development programs for its members and customers around the world.

ISA owns Automation.com, a leading online publisher of automation-related content. In addition, through a wholly owned subsidiary, ISA bridges the gap between standards and their implementation with the ISA Security Compliance Institute (www.isasecure.org) and the ISA Wireless Compliance Institute (www.isa100wci.org).

The following people served as members of Working Group ISA96.08.

NAME	AFFILIATION
V. Mezzano, <i>Chair</i>	Fluor Corp.
M. Brancaleoni	Consultant
G. Dalbhanjan	Emerson
K. Enos	Rexa Inc.
A. Ghiadoni	Flowserve
D. Leese	Five9 DFM Consulting
D. Quintero	Emerson
S. Samy	IMI Critical Engineering
M. Stoto	Emerson
W. Tatum	Westlock Controls
I. Toscani	Emerson
Y. Yermanos	Ecopetrol S.A.
J. Young	The Dow Chemical Company

The following served as voting members of ISA96 for this revision of ANSI/ISA-96.08.01-2025:

NAME	AFFILIATION
V. Mezzano, <i>Chair</i>	Fluor Corp.
D. Anderson	Score Diagnostics Limited
S. Boyle	Retired
K. Enos	Rexa Inc.
C. Fabbri	VanAire
S. Hale	MRC Global
L. Hilliard	Puffer Sweiven LP
A. Izzeldin	PETRONAS
D. Leese	Five9 DFM Consulting
G. Liu	Consultant
S. Samy	IMI Critical Engineering
C. Schaffer	Burns & McDonnell
W. Tatum	Westlock Controls Corporation
L. Winkel	Flowserve
W. Zmudzinski	BP America Inc.

This published standard was approved for publication by the ISA Standards and Practices Board on 24 July 2025:

NAME	AFFILIATION
C. Manolesi, <i>Chair</i>	Sigma
D. Lee, <i>Chair-Elect</i>	UCDS
D. Bartusiak	Collaborative Systems Integration
P. Brett	Honeywell
E. Cosman	OIT Concepts
J. Federlein	Federlein & Associates
S. Fluchs	admeritia GmbH
G. Lehmann	NextEra Energy
T. McAvinew	Consultant
V. Mezzano	Fluor Corp.
C. Monchinski	Automated Control Concepts
I. Verhappen	Willowglen Systems
D. Visnich	Burns & McDonnell
J. Weiss	Applied Control Solutions
D. Zetterberg	Consultant

This page intentionally left blank.

Contents

1	Scope	9
2	Purpose	9
3	Quality system	9
4	Terms and definitions	9
5	Design types	10
6	User-defined requirements	17
7	Design requirements	21
8	Actuator sizing	26
9	Testing	29
10	Marking	29
11	Documentation	30
12	Bibliography – Referenced standards	32

Figures

Figure 1 – Sample control system layout	11
Figure 2 – Sample double-acting rotary gas over oil actuator	11
Figure 3 – Sample double-acting linear gas over oil actuator	12
Figure 4 – Sample double-acting rotary gas over oil actuator with an additional storage tank	12
Figure 5 – Sample double-acting rotary gas over oil actuator with line break detection system and an additional storage tank	13
Figure 6 – Sample linear double-acting gas over oil actuator with line break detection system and an additional storage tank	13
Figure 7 – Sample double-acting rotary gas over oil actuator	15
Figure 8 – Sample double-acting linear gas over oil actuator	16
Figure 9 – Example of vertical mounting of gas over oil tank in case of horizontal stem valve	23
Figure 10 – Typical interface for valve mounting hardware	24

This page intentionally left blank.

1 Scope

This document provides basic requirements for mechanical integrity, selection and sizing of gas over oil actuators, both rotary and linear, provided in double- and single-acting designs.

Actuators for rotary applications may include scotch-yoke type, rotary-vane type or helical spline in on/off or modulating services.

For linear applications, actuators shall be of the linear hydraulic design.

This document applies to actuators with a maximum allowable operating pressure (MAOP) from 150 psig to 2250 psig using direct piped natural gas (sweet or sour) segregated from the actuator by means of gas over oil tanks.

1.1 Sizing methodology

This document includes basic requirements for complete integral actuator control systems, mounting hardware, methods for enclosures, corrosion protection, control and testing.

This document excludes electro-hydraulic actuators, subsea service applications, and gas over oil actuators that are an integral part of a control valve.

2 Purpose

The purpose of this standard is to establish minimum design requirements and to assist the user in specifying gas over oil valve actuators.

3 Quality system

The gas over oil manufacturer shall have a quality management system in place that includes design and manufacturing controls to ensure the gas over oil actuators have been constructed in accordance with this standard's guidelines and that complies with sound engineering practices. The quality management system, at a minimum, shall be certified to a current standard that is internationally recognized (e.g., ISO 9001, *Quality management systems — Requirements*).

4 Terms and definitions

For the purposes of this document, refer to terms and definitions in the following international standards:

ISO 5598, *Fluid power systems and components – Vocabulary*

ANSI/ISA-96.01.01, *Valve Actuator Terminology*

Also see the National Fluid Power Association (<https://www.nfpa.com>).

4.1

gas over oil actuator

consists of the following components:

- actuator,
- gas over oil tanks,
- control group,
- hydraulic override pump,
- gas storage tank (optional) and
- valve mounting hardware (optional)

5 Design types

5.1 General

Gas over oil actuators are classified and designated by type of operation, action, service and interface.

Typical configurations for gas over oil actuators are shown, for illustration purposes only, in the following figures.

5.1.1 Design types

- a) rotary
- b) linear

5.1.2 Type of action

- a) double acting (DA)
- b) single acting (SA)

5.1.3 Action on loss of supply energy

- a) fail open
- b) fail close
- c) fail last
- d) fail locked

5.1.4 Actuator interface

- a) as per ISO 5211 (rotative)
- b) as per ISO 5210 (rising stem)
- c) custom

5.1.5 Control system

- a) The systems shall be of self-purging design, such that air or gas pockets in the control box shall be automatically eliminated during operation.
- b) Linear valve actuators shall be fitted with hydraulic (i.e., piloted check valves or counter balance valves) or mechanical locking devices to ensure that the actuator does not change position when desired.
- c) The gas over oil actuator shall be double-acting or single-acting type. The fail action shall be through the spring action or through the storage tank.
- d) Actuators shall be connected to the valve with proper mounting hardware designed for the application.