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Pneumatic fluid power — Electro-pneumatic pressure control valves —

Part 1: Main characteristics to include in the supplier's literature

Transmissions pneumatiques — Appareils électropneumatiques de distribution à commande continue de pression —

Partie 1: Principales caractéristiques à inclure dans la documentation des fournisseurs

Reference number
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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 131, *Fluid power systems*, Subcommittee SC 5, *Control products and components.*

This second edition cancels and replaces the first edition (ISO 10094-1:2010) which has been technically revised.

The main changes are as follows:

— Updates to the Scope: "proportional pressure control valves" changed to"proportional pressure control valves without electronic pressure feedback" and "pressure servo-valves (closed loop)" changed to "proportional pressure control valves with electronic pressure feedback";

— Revision of Figure 1;

— Addition of two static characteristics, Sensitivity (5.3.1.7) and Offset (5.3.1.8);

— The frequency responses (5.4.4) are now optional.

A list of all parts in the ISO 10094 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user’s national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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Introduction

In pneumatic fluid power systems, power is transmitted and controlled through a gas under pressure within a circuit.

When pressure tracking or pressure regulation is required, electro-pneumatic continuous pressure control valves can be used to track a variable set point with low tracking error or to maintain the pressure of the gas at an approximately constant level.

These control valves continuously modulate the pneumatic pressure of a system in response to a continuous electrical input signal and link the electrical input value to a proportional pressure value.

It is therefore necessary to know some performance characteristics of these electro-pneumatic continuous pressure control valves in order to determine their suitability.

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Pneumatic fluid power — Electro-pneumatic pressure control valves —

Part 1: Main characteristics to include in the supplier's literature

1 Scope

This document specifies which characteristics of electro-pneumatic continuous pressure control valves are to be included in the supplier's literature.

In accordance with ISO 5598, these control valves include:

— electrically modulated pneumatic proportional pressure valves,

— proportional pressure control valves without electronic pressure feedback, and

— proportional pressure control valves with electronic pressure feedback.

This document is limited to the characterization of components with an exhaust port to the atmosphere.

NOTE 1 The characteristics of non-electrically modulated pneumatic pressure control valves are specified in ISO 6953-1.

NOTE 2 The characteristics of electro-pneumatic continuous flow control valves are specified in ISO 10041-1.

2 Normative references

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.

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

ISO 6953-1, *Pneumatic fluid power — Compressed air pressure regulators and filter-regulators — Part 1: Main characteristics to be included in literature from suppliers and product-marking requirements*

ISO 10094-2:2021, *Pneumatic fluid power — Electro-pneumatic pressure control valves — Part 2: Test methods to determine main characteristics to include in the supplier's literature*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 5598, ISO 6853-1, ISO 10094-2 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

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3.1
characteristic line
straight line drawn to represent the actual performance of a proportional pressure regulator passing by the mean regulated pressure readings of 5 % and 95 % of the full-scale

3.2
electro-pneumatic continuous pressure control valve
control valve which continuously modulates the pneumatic power of a system in response to a continuous electrical input signal and which links the electrical input quantity to a pressure value

3.3
inlet pressure
pressure at the inlet port of a component, piping or system

[SOURCE: ISO 5598:2020, 3.2.397]

3.4
electrical control signal
set signal
electrical signal applied to a control device

3.5
control signal/pressure characteristic curve
graphical representation of the relationship between the regulated pressure and the electrical control signal on its full scale while the forward flow rate or the relief flow rate is null, at constant inlet pressure

3.6
minimum regulated pressure
pressure at the first point of the control signal/pressure characteristic curve

3.7
flow/pressure characteristic curve
graphical representation of the relationship between the regulated pressure and the forward flow rate or the relief flow rate while the control signal and the inlet pressure are maintained constant

3.8
pressure regulation characteristic
variation of the regulated pressure for a given control signal, under the effect of an inlet pressure variation, measured for a defined flow

3.9
maximum deviation
deviation from the characteristic line to the total of the maximum excursions of the regulated pressure p_2 above and below the characteristic line

4 Symbols

For the purposes of this document, the symbols and units listed in Table 1 apply.

Table 1 — Symbols and units

Description	Symbol	Units
Maximum sonic conductance at the inlet	$C_{f,max}$	$m^3/(s \cdot Pa)$ (ANR)[b]
Sonic conductance at the exhaust	C_r	$m^3/(s \cdot Pa)$ (ANR)[b]

[a] As described in ISO 11727.

[b] The reference atmosphere is defined in ISO 8778, i.e.: T_0 = 293,15 K, p_0 = 100 kPa (1 bar) and a relative humidity of 65 %.

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