
**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**

*Transmissions pneumatiques — Régulateurs de pression
et filtre-régulateurs pour air comprimé —*

*Partie 1: Principales caractéristiques à inclure dans la documentation des
fournisseurs et exigences de marquage du produit*



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Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.ch
Web www.iso.ch

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this part of ISO 6953 may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

International Standard ISO 6953-1 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 6953-1:1990), which has been technically revised.

ISO 6953 consists of the following parts, under the general title *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*
- *Part 2: Test methods to determine the main characteristics to be included in literature from suppliers*

Introduction

In pneumatic fluid power systems, power is transmitted and controlled through air under pressure circulating within a circuit. Where reduction and regulation of the pressure is desired, the regulators and filter-regulators are components designed to maintain the compressed air pressure approximately constant.

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

1 Scope

This part of ISO 6953 specifies the characteristics of compressed air pressure regulators to be included in literature from their suppliers. It also applies to filter-regulators.

In addition, it specifies the product marking requirements for pressure regulators and filter-regulators.

This part of ISO 6953 is applicable to compressed air pressure regulators with a rated inlet pressure of up to 2 500 kPa [25 bar¹⁾] and an outlet adjustment pressure of up to 1 600 kPa (16 bar), and to filter-regulators with rated inlet and outlet pressures of up to 1 600 kPa (16 bar), in which the major contaminants are removed by mechanical means. The maximum temperature is 80 °C for regulators and filter-regulators and applies to materials of construction that are light alloys (aluminium, etc.), zinc die-casting alloys, brass, steel and plastic.

The rated pressure should be selected from the preferred pressures listed in ISO 2944.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of ISO 6953. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of ISO 6953 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 2944:2000, *Fluid power systems and components — Nominal pressures*.

ISO 5598:1985, *Fluid power systems and components — Vocabulary*.

ISO 5782-2:1997, *Pneumatic fluid power — Compressed air filters — Part 2: Test methods to determine the main characteristics to be included in supplier's literature*.

ISO 6953-2:2000, *Pneumatic fluid power — Compressed air pressure regulators and filter-regulators — Part 2: Test methods to determine the main characteristics to be included in literature from suppliers*.

ISO 11727:1999, *Pneumatic fluid power — Identification of ports and control mechanisms of control valves and other components*.

1) 1 bar = 0,1 MPa = 10⁵ Pa; 1 MPa = 1 N/mm².

3 Terms and definitions

For the purposes of this part of ISO 6953, the terms and definitions given in ISO 5598 and the following apply.

3.1

rated pressure

pressure, confirmed through testing, at which a component or piping is designed to operate for a number of repetitions sufficient to assure adequate service life

3.2

compressed air pressure regulator

component designed to maintain compressed air pressure approximately constant within an enclosed circuit despite variations in operating flow rate and inlet pressure

3.3

relieving pressure regulator

pressure regulator equipped with an unloading device that will open if the outlet pressure exceeds the original setting by a sufficient degree, and exhaust a limited flow rate of air from the outlet circuit to the atmosphere

3.4

filter-regulator

device that combines the filter and regulator onto one body as a single unit

NOTE In such a device, the filter is always on the upstream side of the regulator.

3.5

forward flow characteristics curve

graphical representation of the change in outlet (regulated) pressure with changes in the air flow rate while the inlet pressure is held constant

3.6

pressure regulation characteristics curve

graphical representation of outlet (regulated) pressure variation caused by changes in inlet (supply) pressure, at an approximately constant air flow rate

3.7

relief flow characteristics curve

graphical representation of the relationship between relief flow rate and outlet (regulated) pressure above the regulator setting while the inlet pressure is held constant

4 Technical requirements

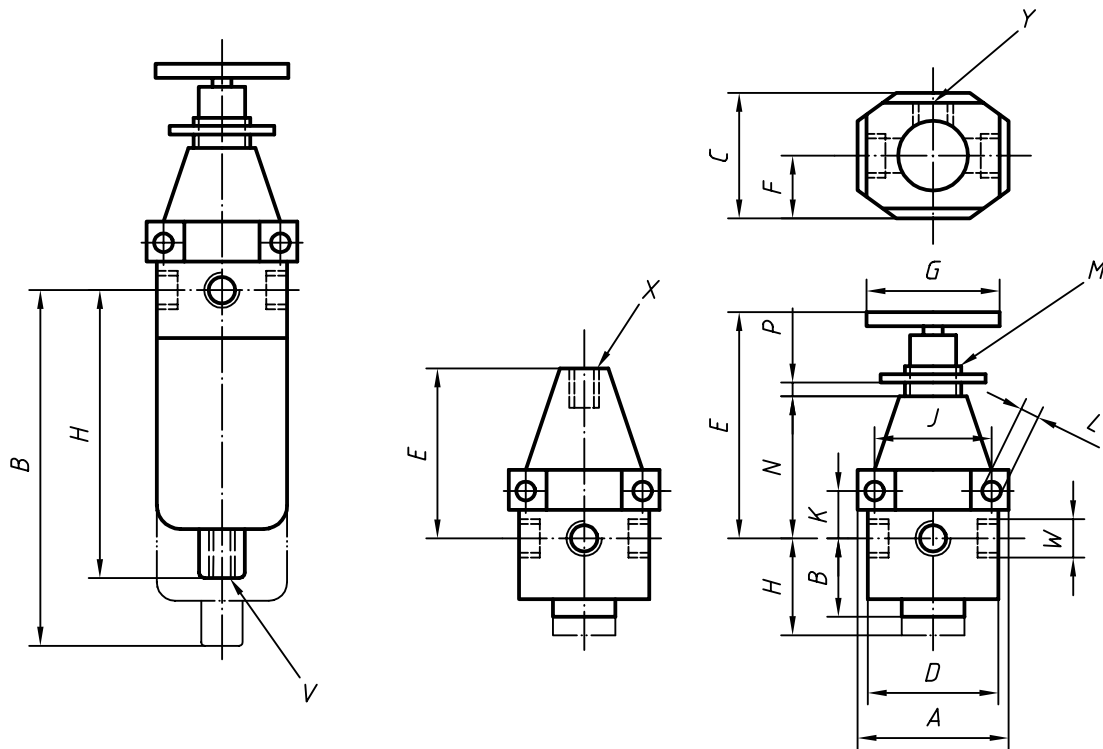
4.1 General

Descriptive literature covering compressed air pressure regulators and filter-regulators shall include the characteristics given in 4.2 and 4.3.

4.2 General characteristics

4.2.1 General dimensions

The dimensions shown in Figure 1 shall be given in millimetres. For ports, see 4.2.2.



Key

- A Maximum overall width
 - B Maximum installation height below the port centreline
 - C Maximum overall depth, excluding pressure gauge
 - D Distance between the faces of the compressed air connection (inlet/outlet)
 - E Maximum height above the port centreline
 - F^a Maximum installation depth from the port centreline
 - G Maximum dimension of the outlet pressure adjusting device.
 - H Minimum clearance from the port centreline to permit dismantling
 - J^b Distance between mounting holes
 - K^b Distance between the port centreline and mounting holes
 - L^b Minimum diameter and length of mounting holes or recommended mounting bolts
 - M Panel mounting thread
 - N Panel mounting height above the port centreline
 - P Maximum panel thickness
 - V Drain hole description
 - W Port description
 - X Pilot port description
 - Y Pressure gauge port description
- ^a Applies also for mounting brackets.
- ^b Dimensions J, K and L shall be indicated only if the device has provisions for mounting.

Figure 1 — Dimensions of compressed air regulators and filter-regulators

4.2.2 Port forms

Port forms should be selected from ISO 228-1 for ports with pipe parallel threads, from ISO 7-1 for ports with pipe-tapered threads.

The connecting interface for flange-mounted designs may be plain ported and counterbored to accept O-rings.

For certain applications and connections other port forms may be employed.

4.2.3 Rated pressure

Compressed air pressure regulators and filter-regulators shall be classified according to their rated pressure, selected from ISO 2944.

The rated pressure shall be verified using the test procedure specified in ISO 6953-2:2000, clause 6. This procedure verifies the pressure rating of the pressure-containing envelope but does not cover the limitation that may be imposed by the diaphragm. The range of duties and sensitivities of the diaphragms used varies widely and their strength may be limited to achieve the accuracy required by the application.

4.2.4 Range of operating temperatures

4.2.4.1 The temperature range in which the material and the operation of the pressure regulator and filter-regulator are not impaired shall be stated.

4.2.4.2 Other combinations of pressure and temperature ratings for optional designs that could require a different rating shall be specified.

4.3 Particular requirements

4.3.1 General

The data provided by the supplier shall assist the user to select the compressed air pressure regulator and filter-regulator best suited for the particular application.

4.3.2 Adjustable pressure ranges

The upper limit of the recommended adjustable pressure range should normally be chosen from the following preferred ranges:

- up to 100 kPa (1 bar);
- up to 200 kPa (2 bar);
- up to 400 kPa (4 bar);
- up to 800 kPa (8 bar);
- up to 1 000 kPa (10 bar);
- up to 1 600 kPa (16 bar).

Special ranges may also be available.

4.3.3 Forward flow characteristics

4.3.3.1 The air flow rate shall be indicated by curves on a graph as shown in Figure 2. Each curve will describe the outlet pressure versus the air flow rate for given inlet pressure and port size as stated in Figure 2.

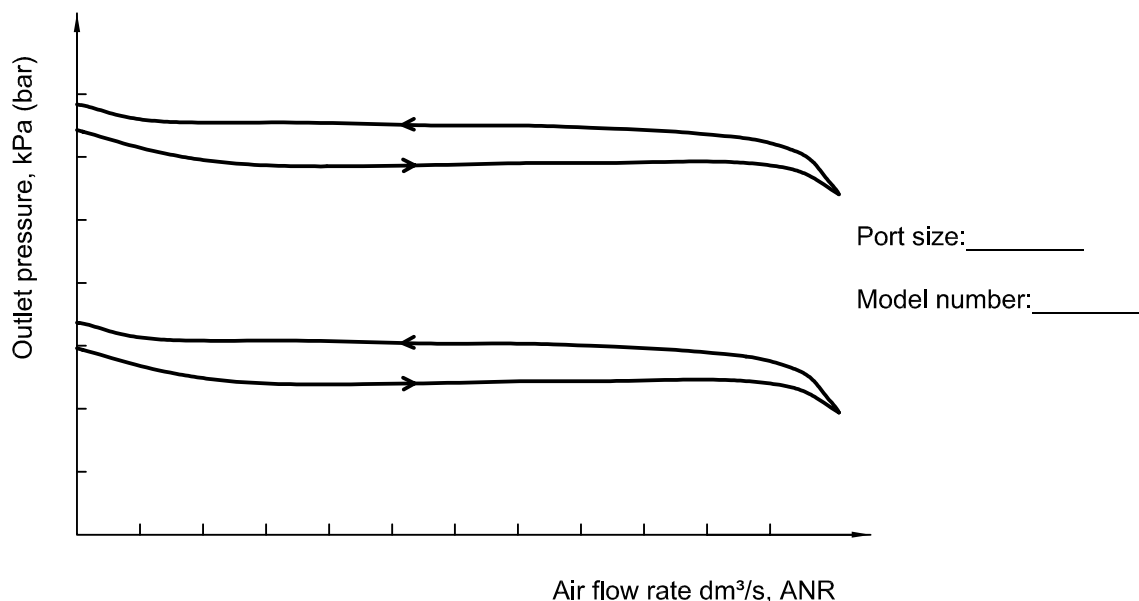


Figure 2 — Forward flow characteristics

4.3.3.2 Each graph shall have at least two curves that differ in their outlet pressure settings. These settings shall be selected, and the test performed, in accordance with ISO 6953-2:2000, 7.3.

4.3.3.3 Each curve shown on Figure 2 is plotted from data recorded with both increasing and decreasing flow.

4.3.4 Pressure regulation characteristics

4.3.4.1 The effect of inlet pressure variations upon the outlet pressure setting shall be indicated by curves on a graph as shown in Figure 3. Each curve will describe the outlet pressure variation versus the inlet pressure for an approximately constant flow rate and for a given port size as referenced in Figure 3.

4.3.4.2 Testing shall be conducted in accordance with ISO 6953-2:2000, 7.4, and shall use the same outlet pressures as those used in 4.3.3.2.

4.3.5 Relief flow characteristics

4.3.5.1 For pressure regulators and filter-regulators incorporating relief devices, the outlet overpressure level (above the set outlet pressure) versus relief flow shall be given on a graph as shown on Figure 4 with an increasing flow.

4.3.5.2 Testing shall be conducted in accordance with ISO 6953-2:2000, 7.5, and each curve shall be associated with a set outlet pressure identical to that used in 4.3.3.2.

4.3.5.3 If performance is affected by port size, plot the relief flow characteristics for each port size affected. Otherwise, identify the port sizes for which the results are applicable.

4.3.6 Useful retention capacity of the reservoir

4.3.6.1 Provide the data as described in 4.3.6.2 if the unit is a filter-regulator.

4.3.6.2 The useful retention capacity of the reservoir shall be measured in accordance with ISO 5782-2:1997, clause 8, for every combination of filter reservoir size. The results shall be published, together with other descriptive specifications for filter-regulators.

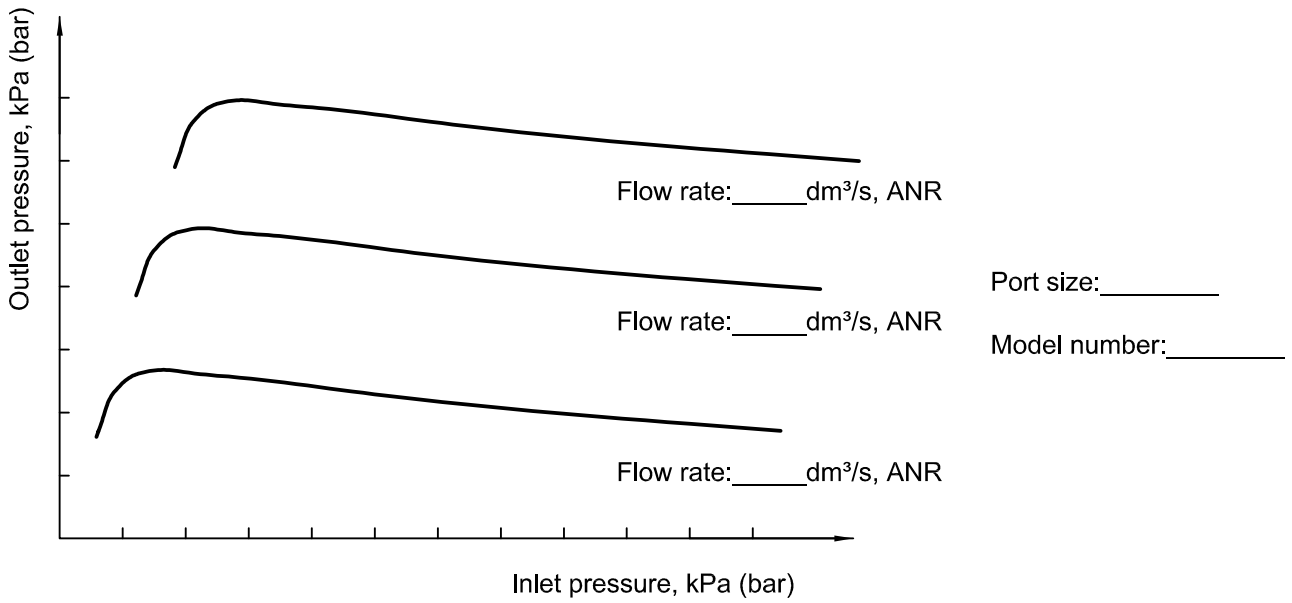


Figure 3 — Pressure regulation characteristics

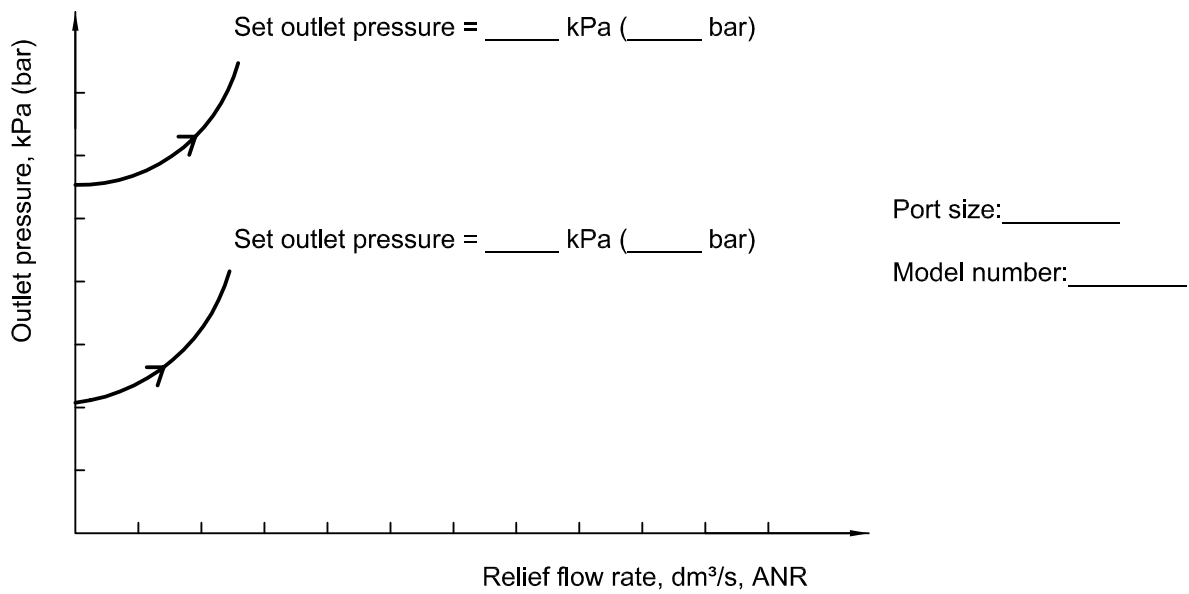


Figure 4 — Relief flow characteristics

4.3.7 Filter-regulator draining devices

The type of drain (manual, automatic or other) shall be stated.

4.3.8 Materials of construction

The generic materials of construction (for example, body, spring cage, bottom plug and internal parts, elastomers and bowl) shall be listed.

5 Operation and maintenance

Information required for application, operation, examination and maintenance shall be provided, including:

- a) adjustment requirements;
- b) the conditions under which it is desirable that the filter element be changed in order to avoid malfunction (for filter-regulators);
- c) the products that can be used for cleaning the filter-regulator parts (filter element, reservoir, etc.);
- d) the minimum operating temperature, with a warning of the effects of condensate freezing, if applicable;
- e) the minimum pressure for operating the drain mechanism (for filter-regulators);
- f) a pressure rating possibly less than that verified through the test requirements in ISO 6953-2, if the diaphragm has application limitations (see 4.2.3).

6 Marking

6.1 The compressed air pressure regulator or filter-regulator shall be marked with the following information:

- a) manufacturer's or supplier's name or trademark;
- b) manufacturer's or supplier's model or type number;
- c) rated pressure;
- d) maximum temperature;
- e) warning about use of cleaning products, if necessary;
- f) flow direction in accordance with ISO 11727;
- g) maximum fluid levels (if needed);
- h) code indicating time of manufacture.

6.2 Other data may also be marked on the compressed air pressure regulator and filter-regulator (for example, recommended outlet pressure adjustment range).

7 Identification statement (Reference to this part of ISO 6953)

It is strongly recommended that manufacturers use the following statement in test reports, catalogues and sales literature when electing to comply with this part of ISO 6953:

"Characteristics and requirements for compressed air pressure regulators (or filter-regulators) are in accordance with ISO 6953-1:2000, *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.*"

Bibliography

- [1] ISO 7-1:1994, *Pipe threads where pressure-tight joints are made on the threads — Part 1: Dimensions, tolerances and designation.*
- [2] ISO 228-1:2000, *Pipe threads where pressure-tight joints are not made on the threads — Part 1: Dimensions, tolerances and designation.*

