INTERNATIONAL STANDARD

ISO 4401

Third edition
2005-07-15

Hydraulic fluid power — Four-port directional control valves — Mounting surfaces

Transmissions hydrauliques — Distributeurs à quatre orifices — Plan de pose

Reference number
ISO 4401:2005(E)

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Published in Switzerland

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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 2.

The main task of technical committees is to prepare International Standards. 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 document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 4401 was prepared by Technical Committee ISO/TC 131, *Fluid power systems*, Subcommittee SC 5, *Control products and components*.

This third edition cancels and replaces the second edition (ISO 4401:1994) which has been technically revised.

Introduction

In hydraulic fluid power systems, power is transmitted and controlled through a liquid under pressure within an enclosed circuit. Typical components found in such systems include hydraulic valves. These devices control flow direction, pressure or flow rate of liquids in the enclosed circuit.

Hydraulic fluid power — Four-port directional control valves — Mounting surfaces

1 Scope

This International Standard specifies the dimensions and other data relating to surfaces on which four-port hydraulic directional control valves are mounted in order to ensure their interchangeability.

It applies to mounting surfaces for four-port hydraulic directional control valves which represent current practice. They are generally applicable to industrial equipment.

2 Normative references

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.

ISO 286-2, *ISO system of limits and fits — Part 2: Tables of standard tolerance grades and limit deviations for holes and shafts*

ISO 1101, *Geometrical Product Specifications (GPS) — Geometrical tolerancing — Tolerances of form, orientation, location and run-out*

ISO 1302, *Geometrical Product Specifications (GPS) — Indication of surface texture in technical product documentation*

ISO 4287, *Geometrical Product Specifications (GPS) — Surface texture: Profile method — Terms, definitions and surface texture parameters.*

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

ISO 5783, *Hydraulic fluid power — Code for identification of valve mounting surfaces and cartridge valve cavities*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 5598 apply.

4 Symbols

4.1 For the purposes of this International Standard, the following symbols apply:

— A, B, L, P, T, T_1, X and Y identify ports;

— F_1, F_2, F_3, F_4, F_5 and F_6 identify threaded holes for fixing cap screws (bolts) (see footnote a in the figures);

— G, G_1, G_2 identify locating pin holes.

4.2 An explanation for the codes is given in ISO 5783.

5 Tolerances

5.1 The following values shall be applied to the mounting surface, i.e. that area within dotted bold lines:

— surface roughness: $Ra \leqslant 0{,}8$ µm as specified in ISO 1302 and ISO 4287;

— surface flatness: 0,01 mm over a distance of 100 mm, as specified in ISO 1101;

— tolerance for diameter of locating pin hole: H12 in accordance with ISO 286-2.

5.2 The following tolerances shall be complied with along the x- and y-axes with respect to the origin:

— pin holes and bolt holes: ± 0,1 mm;

— port holes: ± 0,2 mm.

As for the other dimensions, see the figures.

6 Dimensions

6.1 The mounting surface dimensions for hydraulic directional control valves with four service ports shall be selected from the figures and tables specified in 6.2 to 6.7.

6.2 Mounting surface dimensions for control valves with four service ports with 4,5 mm maximum port diameter (4401–02–01–0–05), are given in Figure 1 and Table 1.

6.3 Mounting surface dimensions for control valves with four service ports with 7,5 mm maximum port diameter:

a) without pilot port (4401–03–02–0–05), are given in Figure 2 and Table 2;

b) with pilot ports (4401–03–03–0–05), are given in Figure 3 and Table 3.

6.4 Mounting surface dimensions for control valves with four service ports with 11,2 mm maximum port diameter:

a) without pilot port (4401–05–04–0–05), are given in Figure 4 and Table 4;

b) with pilot ports (4401–05–05–0–05), are given in Figure 5 and Table 5;

c) with drain port and without pilot ports (4401–05–06–0–05), are given in Figure 6 and Table 6.

6.5 Mounting surface dimensions for control valves with four service ports with pilot ports and with 17,5 mm maximum port diameter, with or without drain ports (4401–07–07–0–05), are given in Figure 7 and Table 7.

6.6 Mounting surface dimensions for control valves with four service ports with pilot ports and with 25 mm maximum port diameter, with or without drain ports (4401–08–08–0–05), are given in Figure 8 and Table 8.

6.7 Mounting surface dimensions for control valves with four service ports with pilot ports and with 32 mm maximum port diameter, with or without drain ports (4401–10–09–0–05), are given in Figure 9 and Table 9.

7 Pressure limitations

Operating pressure limitations for subplates and manifold blocks with these mounting surfaces shall be established by the manufacturer.

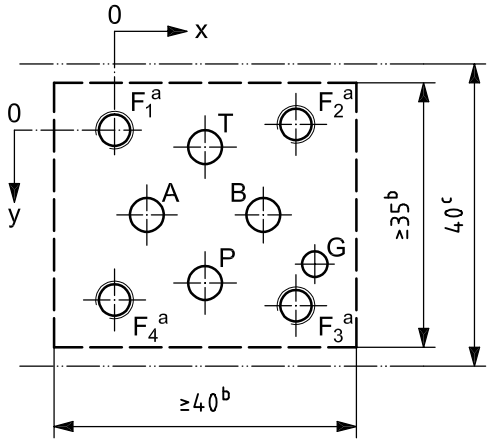
8 Identification statement (reference to this International Standard)

Use the following statement in test reports, catalogues and sales literature when electing to comply with this International Standard:

"Mounting surface dimensions conform to ISO 4401:2005, *Hydraulic fluid power — Four-port directional control valves — Mounting surfaces*"

Codification: 4401–02–01–0–05

Dimensions in millimetres



[a] The minimum thread depth is 1,5 bolt diameters, D. The recommended full thread depth shall be $2D + 6$ mm to aid interchangeability of valves and to reduce the number of fixing bolt lengths. The recommended engagement of fixing cap screw (bolt) threads for ferrous mountings is $1{,}25D$.

[b] The dimensions specifying the area within the dotted bold lines are the minimum dimensions for the mounting surface. The corners of the rectangle may be radiused to a maximum radius, r_{max}, equal to the thread diameter of the fixing cap screws (bolts). Along each axis the fixing holes are at equal distances to the mounting surface edges.

[c] This dimension gives the minimum space required for a valve with this mounting surface. The dimension is also the minimum distance from centreline to centreline of two identical mounting surfaces placed on a manifold block. The attention of valve manufacturers is drawn to the fact that no part of the width of the complete valve assembly is to exceed this dimension.

Figure 1 — Mounting surface for four-port hydraulic directional control valves with 4,5 mm maximum port diameter

Table 1 — Mounting surface for four-port hydraulic directional control valves with 4,5 mm maximum port diameter

Dimensions in millimetres

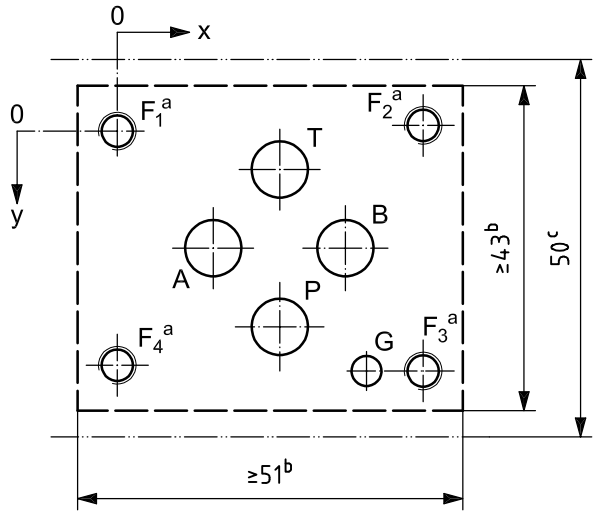
Axis	P	A	T	B	F_1	F_2	F_3	F_4	G [a]
	∅ 4,5 max.	∅ 4,5 max.	∅ 4,5 max.	∅ 4,5 max.	M5	M5	M5	M5	∅ 3,4
x	12	4,3	12	19,7	0	24	24	0	26,5
y	20,25	11,25	2,25	11,25	0	– 0,75	23,25	22,5	17,75

NOTE Operating pressure limitations for subplates and manifold blocks with these mounting surfaces are specified by the manufacturer.

[a] Blind holes made in the mounting surfaces to accommodate the locating pins on the valves; their minimum depth is 4 mm.

Codification: 4401–03–02–0–05

Dimensions in millimetres



[a] The minimum thread depth is 1,5 cap screw (bolt) thread diameters, D. The recommended full thread depth shall be $2D + 6$ mm to aid interchangeability of valves and to reduce the number of fixing cap screw (bolt) lengths. The recommended engagement of fixing cap screw (bolt) threads for ferrous mountings is $1{,}25D$.

[b] The dimensions specifying the area within the dotted bold lines are the minimum dimensions for the mounting surface. The corners of the rectangle may be radiused to a maximum radius, r_{max}, equal to the thread diameter of the fixing cap screws (bolts). Along each axis the fixing holes are at equal distances to the mounting surface edges.

[c] This dimension gives the minimum space required for a valve with this mounting surface. The dimension is also the minimum distance from centreline to centreline of two identical mounting surfaces placed on a manifold block. The attention of valve manufacturers is drawn to the fact that no part of the width of the complete valve assembly is to exceed this dimension.

Figure 2 — Mounting surface for four-port hydraulic directional control valves with 7,5 mm maximum port diameter and without pilot port

Table 2 — Mounting surface for four-port hydraulic directional control valves with 7,5 mm maximum port diameter and without pilot port

Dimensions in millimetres

Axis	P	A	T	B	F_1	F_2	F_3	F_4	G [a]
	∅ 7,5 max.	∅ 7,5 max.	∅ 7,5 max.	∅ 7,5 max.	M5	M5	M5	M5	∅ 4
x	21,5	12,7	21,5	30,2	0	40,5	40,5	0	33
y	25,9	15,5	5,1	15,5	0	– 0,75	31,75	31	31,75

NOTE 1 The use of this mounting surface will require caution relative to the port seals.

NOTE 2 Operating pressure limitations for subplates and manifold blocks with these mounting surfaces are specified by the manufacturer.

[a] Blind holes made in the mounting surfaces to accommodate the locating pins on the valves; their minimum depth is 4 mm.