

# International Standard



# 4401

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION • МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ • ORGANISATION INTERNATIONALE DE NORMALISATION

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

*Transmissions hydrauliques — Distributeurs à quatre orifices — Plan de pose*

First edition — 1980-05-15

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UDC 621.8.032 : 621.646.2

Ref. No. ISO 4401-1980 (E)

**Descriptors** : fluid power, hydraulic fluid power, hydraulic equipment, hydraulic valves, mounting surfaces.

## Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards institutes (ISO member bodies). The work of developing International Standards is carried out through ISO technical committees. Every member body interested in a subject for which a technical committee has been set up 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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 4401 was developed by Technical Committee ISO/TC 131, *Fluid power systems and components*, and was circulated to the member bodies in March 1978.

It has been approved by the member bodies of the following countries :

|                |             |                |
|----------------|-------------|----------------|
| Australia      | India       | Romania        |
| Austria        | Ireland     | Spain          |
| Belgium        | Italy       | Switzerland    |
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| Czechoslovakia | Norway      | USA            |
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| Hungary        | Poland      |                |

The member body of the following country expressed disapproval of the document on technical grounds :

France

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

## 0 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 are hydraulic valves. These devices control flow direction, pressure or flow rate of liquids in the enclosed circuit.

## 1 Scope and field of application

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 interchangeability.

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

## 2 References

ISO/R 129, *Engineering drawing — Dimensioning*.

ISO/R 286, *ISO system for limits and fits — Part 1 : General, tolerances and deviations*.

ISO/R 468, *Surface roughness*.

ISO 965/1, *ISO general purpose metric screw threads — Tolerances — Part 1 : Principles and basic data*.

ISO/R 1101/1, *Technical drawing — Tolerances of form and of position — Part 1 : Generalities, symbols, indications on drawings*.

ISO 1302, *Technical drawings — Method of indicating surface texture on drawings*.

ISO 5783, *Hydraulic fluid power — Code for identification of valve mounting surfaces*.

## 3 Definitions

An International Standard giving definitions of terms used is in preparation.

• For explanation of codes, see ISO 5783.

## 4 Symbols

For the purposes of this International Standard the following letters apply :

- a) A, B, P, T, L, X and Y identify ports;
- b)  $F_1$ ,  $F_2$ ,  $F_3$ ,  $F_4$ ,  $F_5$  and  $F_6$  identify threaded holes for fixing bolts;
- c)  $G_1$  and  $G_2$  identify location pin holes;
- d)  $D$  is the fixing bolt diameter;
- e)  $R_{\max}$  is the mounting surface edge radius.

## 5 Tolerances

5.1 Apply the following values to the mounting surface, i.e. that area within the dotted lines :

- surface roughness : N 6 (0,8  $\mu\text{m}$ ) (see ISO/R 468 and ISO 1302);
- surface flatness : 0,01 mm over a distance of 100 mm (see ISO/R 1101/1);
- locating pin hole : tolerance for diameters : H12 (see ISO/R 286).

5.2 Observe the following tolerances along the x and y axes with respect to the origin :

- for pin holes :  $\pm 0,1$  mm
- for bolt holes :  $\pm 0,1$  mm
- for port holes :  $\pm 0,2$  mm

See figures for other dimensions.

## 6 Dimensions

Select mounting surface dimensions for hydraulic directional control valves with four services ports from the following tables and figures :

6.1 Mounting surface with 4 mm maximum port diameter (ISO 4401-AA-02-4-A)\*, see figure 1, table 1.

**6.2** Mounting surface with 6,3 mm maximum port diameter (ISO 4401-AB-03-4-A)\*, see figure 2, table 2.

**6.3** Mounting surface with 11,2 mm maximum port diameter (ISO 4401-AC-05-4-A)\*, see figure 3, table 3.

**6.4** Mounting surface with 17,5 mm maximum port diameter (ISO 4401-AD-07-4-A)\*, see figure 4, table 4.

**6.5** Mounting surface with 23,4 mm maximum port diameter (ISO 4401-AE-08-4-A)\*, see figure 5, table 5.

**6.6** Mounting surface with 32 mm maximum port diameter (ISO 4401-AF-10-4-A)\*, see figure 6, table 6.

## 7 Working pressure

For indication of the maximum limit of working pressure, see note 4 or 5 of the figures

## 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, Hydraulic fluid power — Four-port directional control valves — Mounting surfaces."

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\* For explanation of codes, see ISO 5783.

Codification : ISO 4401-AA-02-4-A\*

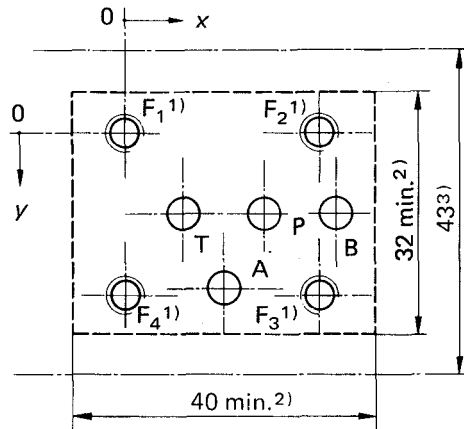


Figure 1 — Mounting surface for four-port hydraulic directional control valves with 4 mm maximum port diameter

Table 1 — Mounting surface for four-port hydraulic directional control valves with 4 mm maximum port diameter<sup>4)</sup>

Dimensions in millimetres

|   | P      | A      | T      | B      | F <sub>1</sub> | F <sub>2</sub> | F <sub>3</sub> | F <sub>4</sub> |
|---|--------|--------|--------|--------|----------------|----------------|----------------|----------------|
| x | 18,3   | 12,9   | 7,5    | 27,8   | 0              | 25,8           | 25,8           | 0              |
| y | 10,7   | 20,6   | 10,7   | 10,7   | 0              | 0              | 21,4           | 21,4           |
| φ | 4 max. | 4 max. | 4 max. | 4 max. | M5             | M5             | M5             | M5             |

1) The minimum thread depth is 1,5 bolt diameter ( $D$ ). The recommended full thread depth is  $2 D + 6$  mm to aid interchangeability of valves and to reduce the number of fixing bolt lengths. The recommended engagement of fixing bolt thread for ferrous mountings is  $1,25 D$ .

2) The dimensions specifying the area within the dotted 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 bolts.

Along each axis the fixing holes are at equal distances to the mounting surface edges.

3) 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 valve manufacturer's attention is drawn to the fact that no part of the width of the complete valve assembly is to exceed this dimension.

4) The supplier shall establish the maximum working pressure for subplates or manifold blocks.

\* For explanation of codes, see ISO 5783.

Codification : ISO 4401-AB-03-4-A\*

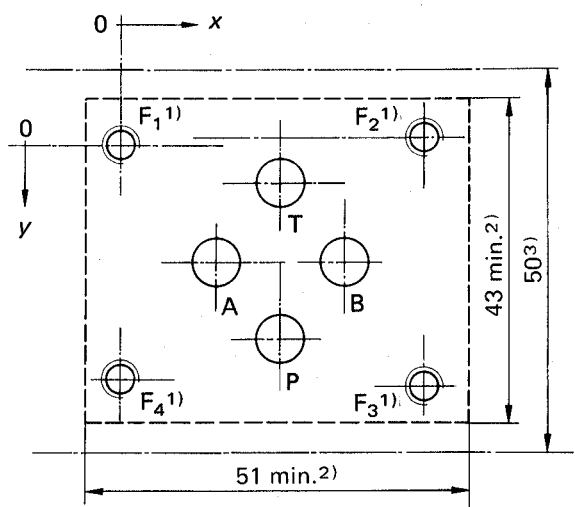


Figure 2 — Mounting surface for four-port hydraulic directional control valves with 6,3 mm maximum port diameter

Table 2 — Mounting surface for four-port hydraulic directional control valves with 6,3 mm maximum port diameter<sup>4)</sup>

Dimensions in millimetres

|   | P        | A        | T        | B        | F <sub>1</sub> | F <sub>2</sub> | F <sub>3</sub> | F <sub>4</sub> |
|---|----------|----------|----------|----------|----------------|----------------|----------------|----------------|
| x | 21,5     | 12,7     | 21,5     | 30,2     | 0              | 40,5           | 40,5           | 0              |
| y | 25,9     | 15,5     | 5,1      | 15,5     | 0              | — 0,75         | 31,75          | 31             |
| φ | 6,3 max. | 6,3 max. | 6,3 max. | 6,3 max. | M5             | M5             | M5             | M5             |

1) The minimum thread depth is 1,5 bolt diameter (*D*). The recommended full thread depth is 2 *D* + 6 mm to aid interchangeability of valves and to reduce the number of fixing bolt lengths. The recommended engagement of fixing bolt thread for ferrous mountings is 1,25 *D*.

2) The dimensions specifying the area within the dotted lines are the minimum dimensions for the mounting surface. The corners of the rectangle may be radiused to a maximum radius (*R*<sub>max</sub>) equal to the thread diameter of the fixing bolts.

Along each axis the fixing holes are at equal distances to the mounting surface edges.

3) 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 valve manufacturer's attention is drawn to the fact that no part of the width of the complete valve assembly is to exceed this dimension.

4) The supplier shall establish the maximum working pressure for subplates or manifold blocks.

\* For explanation of codes, see ISO 5783.

Codification : ISO 4401-AC-05-4-A\*

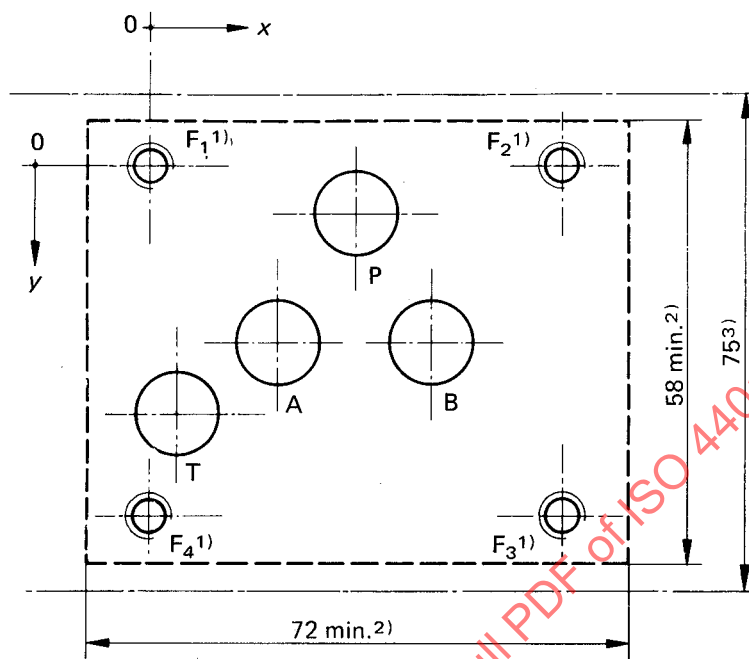


Figure 3 — Mounting surface for four-port hydraulic directional control valves with 11,2 mm maximum port diameter

Table 3 — Mounting surface for four-port hydraulic directional control valves with 11,2 mm maximum port diameter<sup>4)</sup>

| Dimensions in millimetres |           |           |           |           |                |                |                |                |
|---------------------------|-----------|-----------|-----------|-----------|----------------|----------------|----------------|----------------|
|                           | P         | A         | T         | B         | F <sub>1</sub> | F <sub>2</sub> | F <sub>3</sub> | F <sub>4</sub> |
| x                         | 27        | 16,7      | 3,2       | 37,3      | 0              | 54             | 54             | 0              |
| y                         | 6,3       | 21,4      | 32,5      | 21,4      | 0              | 0              | 46             | 46             |
| φ                         | 11,2 max. | 11,2 max. | 11,2 max. | 11,2 max. | M6             | M6             | M6             | M6             |

1) The minimum thread depth is 1,5 bolt diameter ( $D$ ). The recommended full thread depth is  $2D + 6$  mm to aid interchangeability of valves and to reduce the number of fixing bolt lengths. The recommended engagement of fixing bolt thread for ferrous mountings is  $1,25 D$ .

2) The dimensions specifying the area within the dotted 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 bolts.

Along each axis the fixing holes are at equal distances to the mounting surface edges.

3) 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 valve manufacturer's attention is drawn to the fact that no part of the width of the complete valve assembly is to exceed this dimension.

4) The supplier shall establish the maximum working pressure for subplates or manifold blocks.

\* For explanation of codes, see ISO 5783.

Codification : ISO 4401-AD-07-4-A\*

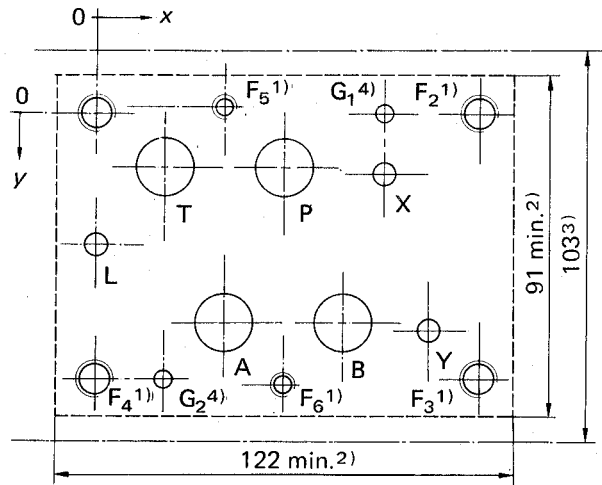


Figure 4 — Mounting surface for four-port hydraulic directional control valves with 17,5 mm maximum port diameter

Table 4 — Mounting surface for four-port hydraulic directional control valves with 17,5 mm maximum port diameter<sup>5)</sup>

Dimensions in millimetres

|   | P         | A         | T         | B         | L        | X        | Y        | G <sub>1</sub> | G <sub>2</sub> | F <sub>1</sub> | F <sub>2</sub> | F <sub>3</sub> | F <sub>4</sub> | F <sub>5</sub> | F <sub>6</sub> |
|---|-----------|-----------|-----------|-----------|----------|----------|----------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| x | 50        | 34,1      | 18,3      | 65,9      | 0        | 76,6     | 88,1     | 76,6           | 18,3           | 0              | 101,6          | 101,6          | 0              | 34,1           | 50             |
| y | 14,3      | 55,6      | 14,3      | 55,6      | 34,9     | 15,9     | 57,2     | 0              | 69,9           | 0              | 0              | 69,9           | 69,9           | — 1,6          | 71,5           |
| φ | 17,5 max. | 17,5 max. | 17,5 max. | 17,5 max. | 6,3 max. | 6,3 max. | 6,3 max. | 4              | 4              | M10            | M10            | M10            | M10            | M6             | M6             |

1) The minimum thread depth is 1,5 bolt diameter (*D*). The recommended full thread depth is 2 *D* + 6 mm to aid interchangeability of valves and to reduce the number of fixing bolt lengths. The recommended engagement of fixing bolt thread for ferrous mountings is 1,25 *D*.

2) The dimensions specifying the area within the dotted lines are the minimum dimensions for the mounting surface. The corners of the rectangle may be radiused to a maximum radius (*R*<sub>max</sub>) equal to the thread diameter of the fixing bolts.

Along each axis the fixing holes are at equal distances to the mounting surface edges.

3) 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 valve manufacturer's attention is drawn to the fact that no part of the width of the complete valve assembly is to exceed this dimension.

4) Blind holes in the mounting surfaces to accommodate the locating pins on the valves. The minimum depth is 8 mm.

5) The supplier shall establish the maximum working pressure for subplates or manifold blocks.

\* For explanation of codes, see ISO 5783.

Codification : ISO 4401-AE-08-4-A\*

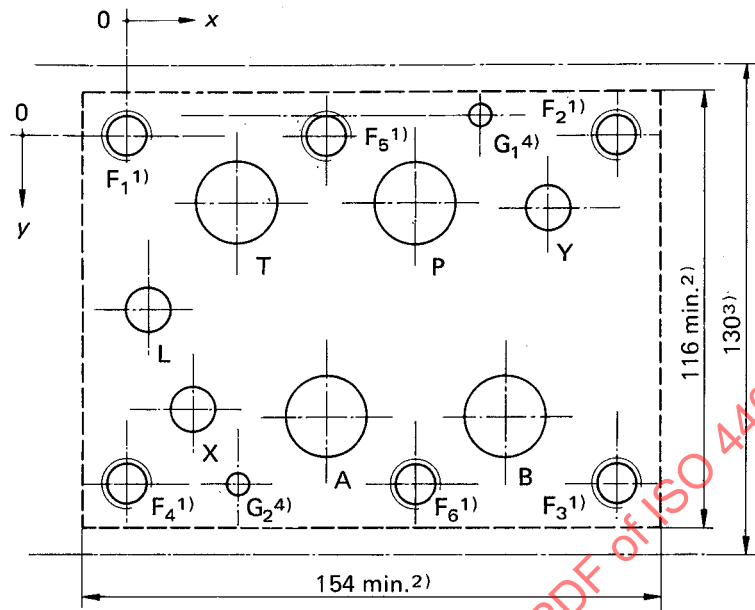


Figure 5 — Mounting surface for four-port hydraulic directional control valves with 23,4 mm maximum port diameter

Table 5 — Mounting surface for four-port hydraulic directional control valves with 23,4 mm maximum port diameter<sup>5)</sup>

Dimensions in millimetres

|   | P         | A         | T         | B         | L         | X         | Y         | G <sub>1</sub> | G <sub>2</sub> | F <sub>1</sub> | F <sub>2</sub> | F <sub>3</sub> | F <sub>4</sub> | F <sub>5</sub> | F <sub>6</sub> |
|---|-----------|-----------|-----------|-----------|-----------|-----------|-----------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| x | 77        | 53,2      | 29,4      | 100,8     | 5,6       | 17,5      | 112,7     | 94,5           | 29,4           | 0              | 130,2          | 130,2          | 0              | 53,2           | 77             |
| y | 17,5      | 74,6      | 17,5      | 74,6      | 46        | 73        | 19        | —              | 4,8            | 92,1           | 0              | 0              | 92,1           | 92,1           | 0              |
| φ | 23,4 max. | 23,4 max. | 23,4 max. | 23,4 max. | 11,2 max. | 11,2 max. | 11,2 max. | 7,5            | 7,5            | M12            | M12            | M12            | M12            | M12            | M12            |

1) The minimum thread depth is 1,5 bolt diameter ( $D$ ). The recommended full thread depth is  $2D + 6$  mm to aid interchangeability of valves and to reduce the number of fixing bolt lengths. The recommended engagement of fixing bolt thread for ferrous mountings is  $1,25D$ .

2) The dimensions specifying the area within the dotted 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 bolts.

Along each axis the fixing holes are at equal distances to the mounting surface edges.

3) 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 valve manufacturer's attention is drawn to the fact that no part of the width of the complete valve assembly is to exceed this dimension.

4) Blind holes in the mounting surfaces to accommodate the locating pins on the valves. The minimum depth is 8 mm.

5) The supplier shall establish the maximum working pressure for subplates or manifold blocks.

• For explanation of codes, see ISO 5783.