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(JFPA/JSA)

**Hydraulic fluid power—Sub-plate
type solenoid operated four-port
directional control valves**

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Foreword

This translation has been made based on the original Japanese Industrial Standard revised by the Minister of Economy, Trade and Industry through deliberations at the Japanese Industrial Standards Committee as the result of proposal for revision of Japanese Industrial Standard submitted by Japan Fluid Power Association (JFPA)/ Japanese Standards Association (JSA) with the draft being attached, based on the provision of Article 12 Clause 1 of the Industrial Standardization Law applicable to the case of revision by the provision of Article 14.

Consequently **JIS B 8355:1997** is replaced with this Standard.

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Hydraulic fluid power— Sub-plate type solenoid operated four-port directional control valves

Introduction

This Japanese Industrial Standard has been prepared based on the third edition of **ISO 4401** published in 2005 by incorporating the parts corresponding to this Standard (4.1 to 4.3, clause 9 and clause 16) without any modification of the technical contents, but also adding some **JIS** specification contents (4.4 to clause 8, and clause 10 to clause 15) that are not given in the said corresponding International Standard.

A list of modifications with the explanations is given in Annex JB.

1 Scope

This Standard specifies such valves for use in hydraulic-fluid systems of various machines among spool type four-port directional control valves operated by solenoid that are mounted on machines through sub-plate or directly by means of gaskets (hereafter referred to as “valves”). However, this Standard is not applicable to valves for use in such special machines as aircrafts.

NOTE : The International Standard corresponding to this Standard and the symbol of degree of correspondence are as follows.

ISO 4401:2005 *Hydraulic fluid power—Four-port directional control valves—Mounting surfaces* (MOD)

In addition, symbols which denote the degree of correspondence in the contents between the relevant International Standard and **JIS** are IDT (identical), MOD (modified), and NEQ (not equivalent) according to **ISO/IEC Guide 21**.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this Standard. The most recent editions of the standards (including amendments) indicated below shall be applied.

JIS B 0142 *Glossary of terms for oil hydraulics and pneumatics*

NOTE : Corresponding International Standard: ISO 5598 *Fluid power systems and components—Vocabulary* (NEQ)

JIS B 1176 *Hexagon socket head cap screws*

JIS B 2401 *O-rings*

JIS B 8361 *Hydraulic fluid power—General rules relating to systems*

JIS B 8665 *Hydraulic fluid power—Code for identification of valve mounting surfaces and cartridge valve cavities*

NOTE : Corresponding International Standard: ISO 5783 *Hydraulic fluid power—Code for identification of valve mounting surfaces and cartridge valve cavities* (IDT)

JIS C 0704 *Insulation test for control gear*

JIS C 0920 *Degrees of protection provided by enclosures (IP Code)*

JIS C 1302 *Insulation resistance testers*

JIS C 4034-1 *Rotating electrical machines Part 1: Rating and performance*

JIS C 4552 *General rules for solenoids (plunger type)*

JIS K 2213 *Turbine oils*

3 Terms and definitions

For the purposes of this Standard, the terms and definitions given in **JIS B 0142** and the following terms and definitions apply.

3.1 flow pattern

the pattern of the passage of the fluid flow to connect each port at an arbitrary position of the valve

3.2 maximum flow rate

the proof flow rate which is capable of being passed through the valve stably

3.3 internal leakage

the flow through the clearance between internal cavities of the device

NOTE : The flow of relatively small amount which flows out from the high pressure part to the low pressure part in a position where the flow must be prevented in a normal condition, e.g., at the mating surface in the equipment.

3.4 allowable back pressure

the maximum pressure which is continuously or repeatedly applicable to the back side of the return side and the pressure application surface of the equipment without any breakdown

3.5 insulation resistance

the ratio of the voltage to the current which flows both along the surface of the sample and through the inside of the sample when a pair of electrodes is fitted to an insulation material and d.c. voltage is applied across them

3.6 dielectric withstand voltage

the voltage at which an insulating material is capable of withstanding for the prescribed period of time without breakdown

3.7 leakage current

the current which flows from the part other than the intended parts, and flows from the enclosure and accessible parts of equipment to the earth

4 Classification

4.1 Classification of mounting surface

The mounting surface shall be classified by the size and arrangement of the main port as shown in table 1.

For the purposes of this Standard, the identification code given in **JIS B 8665** shall apply.

Table 1 Classification of mounting surface

Classification of mounting surface	Nominal size	Maximum diameter of port (mm)	Remarks	Corresponding identification code of ISO Standard (informative)	Table number
D-02-01-0-05	02	4.5	Without pilot port, without drain port	4401-02-01-0-05	Table 2
D-03-02-0-05	03	7.5	Without pilot port, without drain port	4401-03-02-0-05	Table 3
D-03-03-0-05	03	7.5	With pilot port, without drain port	4401-03-03-0-05	Table 4
D-05-04-0-05	05	11.2	Without pilot port, without drain port	4401-05-04-0-05	Table 5
D-05-05-0-05	05	11.2	With pilot port, without drain port	4401-05-05-0-05	Table 6
D-05-06-0-05	05	11.2	Without pilot port, with drain port	4401-05-06-0-05	Table 7
D-07-07-0-05	07	17.5	With pilot port, with or without drain port	4401-07-07-0-05	Table 8
D-08-08-0-05	08	25	With pilot port, with or without drain port	4401-08-08-0-05	Table 9
D-10-09-0-05	10	32	With pilot port, with or without drain port	4401-10-09-0-05	Table 10
NOTE : In general, the valves of nominal sizes of 02, 03 and 05 are directly operated type, and the valves of nominal sizes of 07, 08 and 10 are electromagnetic pilot operated type.					

4.2 Shape and dimensions of mounting surface

4.2.1 The dimensions of mounting surface of four-port directional control valves of hydraulic fluid power shall be selected from table 2 to table 10 specified in **4.2.2** to **4.2.7**.

4.2.2 The dimensions of mounting surface of four-port directional control valves of which the maximum diameter of main port is 4.5 mm (code: ISO 4401-02-01-0-05) are shown in table 2.

4.2.3 The dimensions of mounting surface of four-port directional control valves of which the maximum diameter of main port is 7.5 mm shall be as follows.

a) The case without pilot port (code: ISO 4401-03-02-0-05) is shown in table 3.

- b) The case with pilot port (code: ISO 4401-03-03-0-05) is shown in table 4.

4.2.4 The dimensions of mounting surface of four-port directional control valves of which the maximum diameter of main port is 11.2 mm shall be as follows.

- a) The case without pilot port (code: ISO 4401-05-04-0-05) is shown in table 5.
b) The case with pilot port (code: ISO 4401-05-05-0-05) is shown in table 6.
c) The case with drain port and without pilot port (code: ISO 4401-05-06-0-05) is shown in table 7.

4.2.5 The dimensions of mounting surface of four-port directional control valves with pilot port and with or without drain port of which the maximum diameter of main port is 17.5 mm (code: ISO 4401-07-07-0-05) are shown in table 8.

4.2.6 The dimensions of mounting surface of four-port directional control valves with pilot port and with or without drain port of which the maximum diameter of main port is 25 mm (code: ISO 4401-08-08-0-05) are shown in table 9.

4.2.7 The dimensions of mounting surface of four-port directional control valves with pilot port and with or without drain port of which the maximum diameter of main port is 32 mm (code: ISO 4401-10-09-0-05) are shown in table 10.

4.3 Symbols

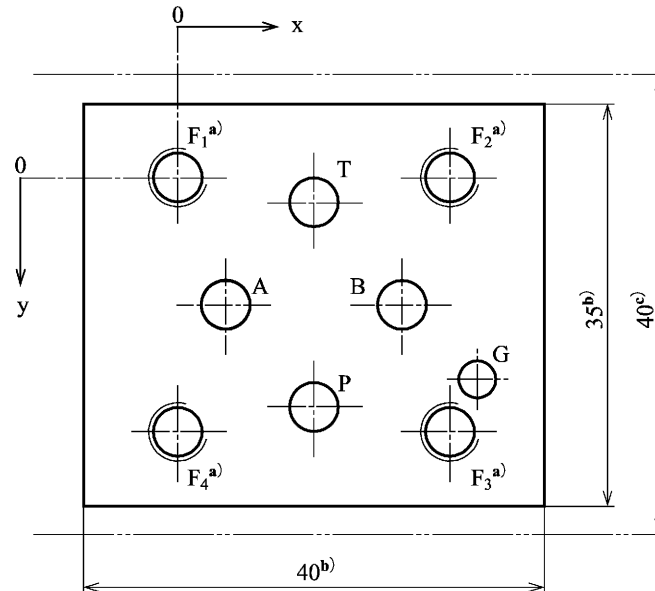
For the purposes of table 2 to table 10, the following symbols shall apply.

- a) A, B, L, P, T, T₁, X and Y identify the ports.
b) F₁, F₂, F₃, F₄, F₅ and F₆ identify the threaded holes for fixing bolts (see NOTES in tables).
c) G, G₁ and G₂ identify the locating pin holes.

Table 2 Shape and dimensions of mounting surface for four-port directional control valves with 4.5 mm maximum port diameter

Code: ISO 4401-02-01-0-05

Unit: mm



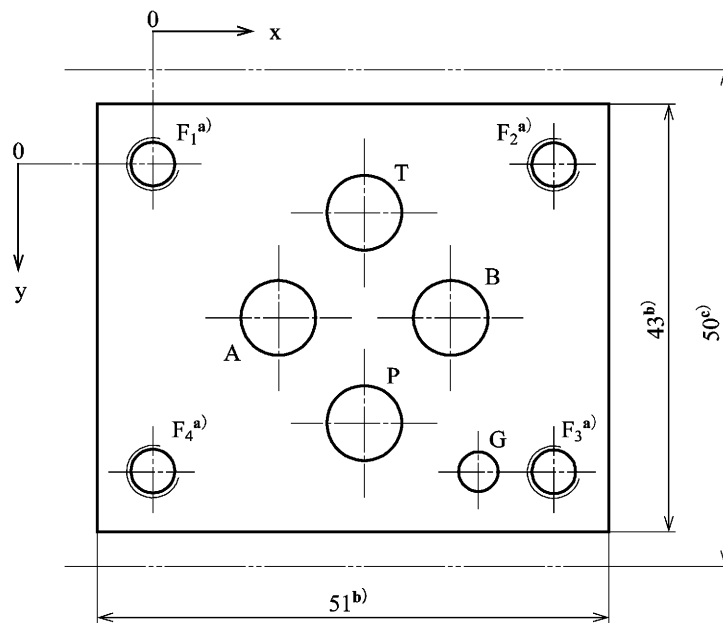
- Notes
- a) The minimum thread depth of fixing bolt is 1.5 bolt diameter (D). The recommended full thread depth shall be $2D + 6$ (mm) to aid interchangeability of valves and to reduce the types of fixing bolt length. The engagement length for ferrous sub-plate and manifold block should be $1.25D$.
 - b) The rectangle area within the bold lines is the minimum dimensions for the mounting surface. The corners of rectangle may be worked to a maximum of radius r equal to the thread size of the fixing bolts.
 - c) These dimensions give the minimum space required for a valve with this mounting surface. These dimensions are also the minimum fixing pitch when more than one valve is arranged in parallel on a manifold block.

	P	A	T	B	F ₁	F ₂	F ₃	F ₄	G
	$\phi 4.5$ (max.)	$\phi 4.5$ (max.)	$\phi 4.5$ (max.)	$\phi 4.5$ (max.)	M5	M5	M5	M5	$\phi 3.4$
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 : The pin hole corresponding to the positioning pin which is made on the valve shall be made, and the hole (G) shall be not less than 4 mm in depth.									

Table 3 Shape and dimensions of mounting surface for four-port directional control valves with 7.5 mm maximum port diameter and without pilot port

Code: ISO 4401-03-02-0-05

Unit: mm



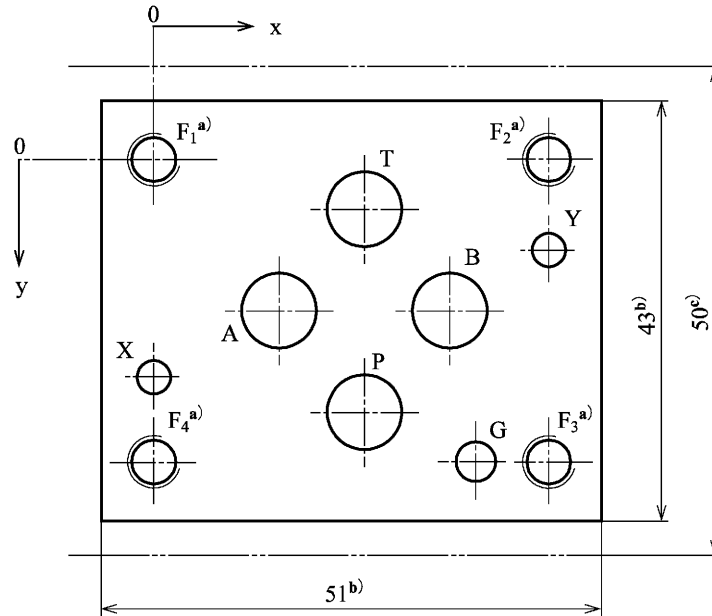
- Notes a) The minimum thread depth of fixing bolt is 1.5 bolt diameter (D). The recommended full thread depth shall be $2D + 6$ (mm) to aid interchangeability of valves and to reduce the types of fixing bolt length. The engagement length for ferrous sub-plate and manifold block should be $1.25D$.
- b) The rectangle area within the bold lines is the minimum dimensions for the mounting surface. The corners of rectangle may be worked to a maximum of radius r equal to the thread size of the fixing bolts.
- c) These dimensions give the minimum space required for a valve with this mounting surface. These dimensions are also the minimum fixing pitch when more than one valve is arranged in parallel on a manifold block.

	P	A	T	B	F ₁	F ₂	F ₃	F ₄	G
	$\phi 7.5$ (max.)	$\phi 7.5$ (max.)	$\phi 7.5$ (max.)	$\phi 7.5$ (max.)	M5	M5	M5	M5	$\phi 4$
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 This mounting surface will require caution on the relative dimension between the port position and the seal.									
NOTE 2 The pin hole corresponding to the positioning pin which is made on the valve shall be made, and the hole (G) shall be not less than 4 mm in depth.									

Table 4 Shape and dimensions of mounting surface for four-port directional control valves with 7.5 mm maximum port diameter and with pilot port

Code: ISO 4401-03-03-0-05

Unit: mm



- Notes ^{a)} The minimum thread depth of fixing bolt is 1.5 bolt diameter (D). The recommended full thread depth shall be $2D + 6$ (mm) to aid interchangeability of valves and to reduce the types of fixing bolt length. The engagement length for ferrous sub-plate and manifold block should be $1.25D$.
- ^{b)} The rectangle area within the bold lines is the minimum dimensions for the mounting surface. The corners of rectangle may be worked to a maximum of radius r equal to the thread size of the fixing bolts.
- ^{c)} These dimensions give the minimum space required for a valve with this mounting surface. These dimensions are also the minimum fixing pitch when more than one valve is arranged in parallel on a manifold block.

	P	A	T	B	F ₁	F ₂	F ₃	F ₄	X	Y	G
	$\phi 7.5$ (max.)	$\phi 7.5$ (max.)	$\phi 7.5$ (max.)	$\phi 7.5$ (max.)	M5	M5	M5	M5	$\phi 3.3$ (max.)	$\phi 3.3$ (max.)	$\phi 4$
x	21.5	12.7	21.5	30.2	0	40.5	40.5	0	0	40.5	33
y	25.9	15.5	5.1	15.5	0	-0.75	31.75	31	22	9	31.75
NOTE 1 This mounting surface will require caution on the relative dimension between the port position and the seal.											
NOTE 2 The pin hole corresponding to the positioning pin which is made on the valve shall be made, and the hole (G) shall be not less than 4 mm in depth.											