

JIS

JAPANESE INDUSTRIAL STANDARD

Graphic Symbols for Fluid
Power Systems

JIS B 0125—1984

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Graphic Symbols for Fluid
Power Systems

B 0125-1984

1. Scope

This Japanese Industrial Standard specifies the graphic symbols used for marking functions of fluid power equipment and apparatus, hereinafter referred to as the "symbols".

Remark: This standard does not specify the symbols used for the drawings of the piping work and the like.

2. Definitions

The definitions of main terms used in this standard shall be in accordance with JIS B 0142 and other terms shall be as follows:

- (1) symbol element The symbol element herein means the basic lines or graphics used for indicating the classification of equipment, apparatus, passage, etc. by symbols.
- (2) functional element The functional element herein means the basic lines or graphics used for indicating the characteristics, working, etc. of equipment and apparatus by symbols.
- (3) simplified symbol The simplified symbol herein means the symbol used for omitting a part of the symbol or for substituting it by other simple symbol to achieve the simplification of drawing.

Applicable Standard:

JIS B 0142-Glossary of Terms for Oil Hydraulics and Pneumatics

Corresponding International Standard:

ISO 1219-Fluid power systems and components-Graphic symbols

Reference Standard:

JIS B 0001-Drawing Practice for Mechanical Engineering

- (4) general symbol The general symbol herein means the representative symbol used when there is no necessity for clarifying the detailed function, type, etc. of equipment and apparatus.
- (5) detailed symbol The detailed symbol herein means the symbol used in the case of clarifying the detailed function without simplifying or generalizing the symbol. It is generally used in comparison with simplified symbol or general symbol.
- (6) selective operation The selective operation herein means the system operated by any one of two and more operating systems.
- (7) sequential operation The sequential operation herein means the system operated via two and more operating systems.
- (8) two stage pilot operation The two stage pilot operation herein means the sequential operation operated by two and more pilot operations.
- (9) primary operation The primary operation herein means the first operation in the case of operating the equipment by sequential operation. The step of primary operation is generally manual, mechanical or electrical system.
- (10) internal pilot The internal pilot herein means the system where the fluid for pilot operation is supplied from the inside of operated equipment.
- (11) external pilot The external pilot herein means the system where the fluid for pilot operation is supplied from the outside of operated equipment.
- (12) internal drain The internal drain means the system where the drain is flowed together with the return fluid by connecting the drain passage to the return passage inside the equipment.
- (13) external drain The external drain herein means the system where the drain can independently be taken outside from the drain port of equipment.
- (14) single action solenoid The single action solenoid herein means the magnetic actuator to be actuated only in one direction by exciting the coil.
- (15) double action solenoid The double action solenoid herein means the magnetic actuator of which the actuating direction is changed by changing the exciting method of coil.

- (16) variable electromagnetic actuator The variable electromagnetic actuator herein means the magnetic actuator of which the output or displacement amount is changed according to the alteration of input electric signal.
- (17) variable stroke limiter The variable stroke limiter herein means the adjusting mechanism controlling the displacement amount of valve according to the alteration of the opening of valve or the degree of contraction.

3. Basic Items

The basic items for writing manner and interpretation of fluid power symbols shall be as follows:

- (1) The symbols shall indicate the function, operating method and outer connection port.
- (2) The symbols do not indicate the actual construction of equipment.
- (3) The symbols of complicated function shall generally be constructed by combining the symbol elements given in Table 1 with the functional elements given in Table 2. However, to the functions not capable of being indicated by those elements, particular symbols (those marked with mark * given in Table 3 to Table 19) may apply by restricting to those uses.
- (4) The symbols shall indicate ordinary stop or functional neutral condition. However, exceptions may be admitted in the circuit diagram.
- (5) The symbols indicate the presence of outer port of the equipment concerned and it is not necessary to indicate its actual position.
- (6) The port is indicated by the contact point of duct line and symbol element.
- (7) The outer port of the equipment using enclosed line symbol is indicated by the contact point of duct line and enclosed line.
- (8) In case of complicated symbol, only the connection port used functionally may be indicated. However, the symbols marked on the equipment for the purposes of discrimination, shall indicate all connection ports.
- (9) The letter (except numerical figure) in symbols is a part of the symbol.
- (10) For the writing manner of symbol, it may be in any direction except the limited one but it is preferable to write in the direction of each 90°.
Further, the definition of symbols shall not be changed by its writing manner.

- (11) The symbols do not indicate numerical values such as pressure, flow rate, etc. or the set values of equipment.
- (12) For the simplified symbol, those specified in this standard and those capable of being invented with the specifications in this standard exclusively may be used.
- (13) When two and more symbols are contained in a unit, the whole body except special one is enclosed with the enclosed line symbol of alternate long and short dash line. However, the simplified symbol of single function does not generally need enclosed lines.
- (14) When the equipments of the same type are used at several positions in the circuit diagram, respective equipment may be represented by a simple symbol element to achieve the simplification of drawing. However, the collation is made to be able to be carried out by marking suitable symbols in the symbol element and by providing the column of parts and the symbol table indicating the complete symbol of the equipment in the circuit diagram.



4. Constitutional Element of Symbol

4.1 Symbol Elements Basic elements constituting symbols shall be in accordance with Table 1.

Table 1. Symbol Elements

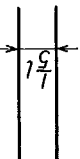
Number	Name	Symbol	Use	Remark
1-1	Line			
1-1.1	Continuous line		(1) Main pipe line (2) Supply pipe line to pilot valve (3) Electric signal line	- Including return pipe line. - Distinction from pipe line shall be clarified by appending 2-3.1.
1-1.2	Broken line		(1) Pilot operation pipe line (2) Drain pipe line (3) Filter (4) Transition position of valve	- Internal pilot - External pilot
1-1.3	Alternate long and short dash line		Enclosed line	Enclosed line indicating a unit having two and more functions
1-1.4	Double line		Mechanical union	Rotary shaft, lever, piston, rod, etc.

Table 1 (Continued)

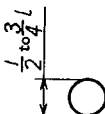
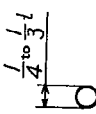
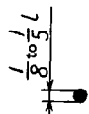
Number	Name	Symbol	Use	Remark
1-2	Circle		Energy conversion apparatus	. Pump, compressor, motor, etc. . Roller: The centre is marked with a point. ○
1-2.1	Large circle		(1) Measuring instruments (2) Rotary coupling	
1-2.2	Medium circle		(1) Check valve (2) Link (3) Roller	
1-2.3	Small circle		(1) Connecting point of lines and passages (2) Roller shaft	
1-2.4	Point			
1-3	Semi circle		Pumps or actuators limited in rotary angle	

Table 1 (Continued)

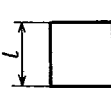
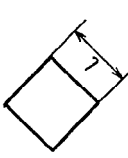
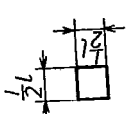
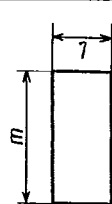
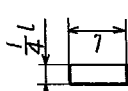
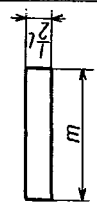
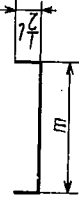
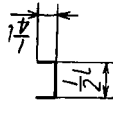
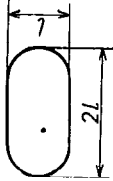
Number	Name	Symbol	Use	Remark
1-4 1-4.1	Square		(1) Control apparatus (2) Prime movers except electric motors	The connection port crosses perpendicular to the side.
1-4.2			Fluid adjust apparatus	The connection port and the angle cross.
1-4.3			(1) Cushion insides cylinder (2) Weight insides accumulator	Filter, drain separator, lubricator, heat exchanger, etc.
1-5 1-5.1	Rectangle		(1) Cylinder (2) Valve	$m > l$
1-5.2			Piston	
1-5.3			Specified operation method	$l \leq m \leq 2l$ Refer to Table 6.

Table 1 (Continued)

Number	Name	Symbol	Use	Remark
1-6 1-6.1	Others Concaved shape(large)		Reservoir (ventilation type)	• $m > l$
1-6.2	Concaved shape(small)		Local marking of reservoir (ventilation type)	
1-6.3	Capsule shape		(1) Reservoir (sealed type) (2) Pneumatic pressure tank (3) Accumulator (4) Auxiliary gas vessel	• For the connection port, refer to Table 10 and 16-2.

Remark: The dimension l is a common standard dimension and its size may be optionally determined. Further, the standard dimension may be changed according to the object, if inevitable.

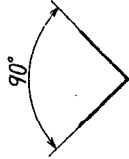
4.2 Functional Elements

The basic elements indicating the functions shall be as given in Table 2.

Table 2. Functional Elements

Number	Name	Symbol	Use	Remark
2-1	Equilateral triangle			- Direction of fluid energy - Classification of fluids - Marking of energy source
2-1.1	Black solid triangle		Oil pressure	
2-1.2	White triangle		Pneumatic pressure and other gas pressure	Including the exhaust to the atmosphere
2-2	Indication by arrow mark			
2-2.1	Straight line or oblique line		(1) Rectilinear motion (2) Passage and direction of fluid in valve (3) Direction of heat flow	
2-2.2	Curved line		Rotation	The arrow mark indicates the rotary direction as viewed from free end of the shaft.
2-2.3	Oblique line		Variable operation or adjusting step	- To obliquely write it by suitable length - Pump, spring, variable electro-magnetic actuator, etc.

Table 2 (Continued)

Number	Name	Symbol	Use	Remark
2-3	Others		Electricity	
2-3.1			Closed line or closed connection port	 Closed line Connection port
2-3.2			Electromagnetic actuator	
2-3.3			Temperature indication or temperature adjustment	
2-3.4			Prime mover	
2-3.5			Spring	 Refer to 11-3, 11-4.
2-3.6			Restriction	 The number of crown should preferably be two.
2-3.7			Valve seat of check valve by simplified symbol	
2-3.8				

5. Pipe Line and Connection Port5.1 Pipe Line

5.1.1 Writing Manner of Symbol The symbol of pipe line shall be constituted by using symbol elements 1-1.1, 1-1.2 and 1-2.4.

5.1.2 Examples of Symbols The examples of symbols generally used are shown in Table 3.

Table 3. Pipe Line

Number	Name	Symbol	Remark
3-1.1	Connection		
3-1.2	Crossing		• Not connected
3-1.3	Flexible line	※	• Hose (generally to be connected with a movable part)

5.2 Connection Port

5.2.1 Writing Manner of Symbol The symbols of connection ports shall be constituted by using symbol elements 1-2.1, 1-2.3, 1-2.4, 1-4.1 and 1-5.1 and functional elements 2-1.1, 2-1.2, 2-3.2 and 2-3.8.

5.2.2 Examples of Symbols The examples of symbols generally used are shown in Table 4.

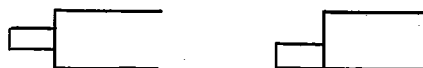
Table 4. Connection Ports

Number	Name	Symbol	Remark
4-1	Air vent		
4-1.1			• That continuously venting air
4-1.2			• That venting air for some period and thereafter being closed
4-1.3			• That venting air by operating check mechanism as required
4-2	Exhaust port		
4-2.1			• Only for pneumatic pressure • That without connection port
4-2.2			• That with connection port
4-3	Quick acting coupling		
4-3.1			• Without check valve
4-3.2			• With check valve (Self seal coupling)
		Connected state Demounted state	
4-4	Rotary connection		• Swivel joint and rotary joint
4-4.1	One line		• Single directional rotation
4-4.2	Three lines		• Double directional rotations

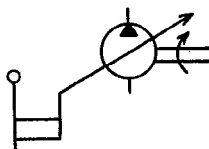
6. Operational Mechanism6.1 Writing Manner of Symbol
nism shall be as follows:

The writing manner of operational mecha-

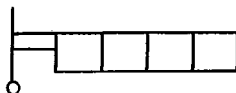
- (1) Constitution of Symbols The symbols of operational mechanism shall be constructed by using symbol elements 1-1.4, 1-2.3, 1-2.4 and 1-5.3 and functional elements 2-1.1, 2-1.2, 2-2.3, 2-3.3, 2-3.5 and 2-3.6, and shall be otherwise in accordance with special symbols given in Table 5 and Table 6.
- (2) Relation between Single Operational Mechanism and Appliances The relation between the single operational mechanism and the appliances shall be as follows:
- (a) The rate of the size of operational symbol shown in figure shall be as given in Table 1.
- (b) The operational symbol of valve may be described at an optional position adjacent to the operating symbol element.



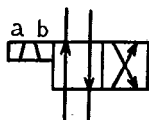
- (c) The variable operational arrow mark of variable appliance may be stretched or bended when correlated to the operational symbol.



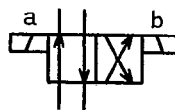
- (d) When the operational element of double directional operations is actually one, the described number of operational symbol is generally one only.



Further, where the relation between the electric signal and the valve state is necessarily clarified by the symbol of valve operated with double acting solenoid, it shall be described by using two symbols of single acting solenoid (6-3.1.1) without using the symbol of double acting solenoid (6-3.1.2).



The case where the relation to the electric signal is not necessarily shown.



The case where the relation to the electric signal is necessarily shown.