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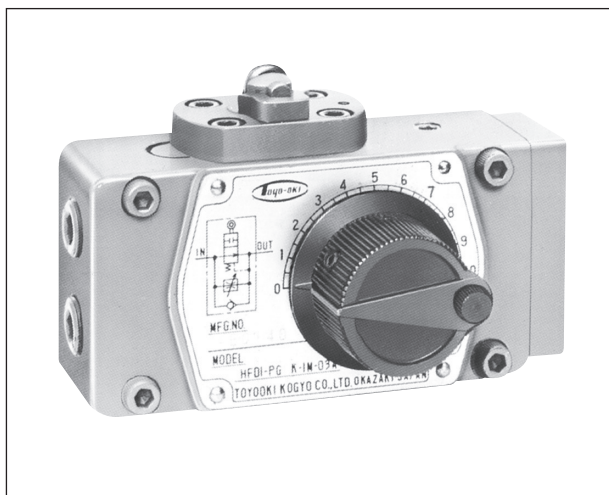
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## 1-STEP FLOW CONTROL VALVE WITH SHUT-OFF VALVE (HFD) (WITH PRESSURE COMPENSATION, WITH PRESSURE AND TEMPERATURE COMPENSATION)



This is a compound valve built by assembling a flow control valve with pressure compensation, a shut off valve and a check valve.

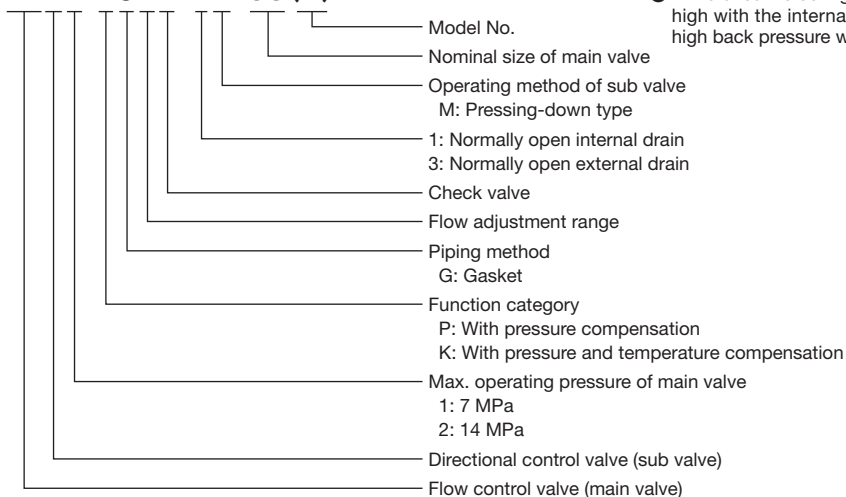
It is used to control the feed operation (rapid feed → slow feed → rapid return) of e.g. a machine tool.

### ■ Features

- The valve is compactly designed and is suitable for feed control of singlepurpose machine tools and automatics.
- Since the valve incorporates a pressure compensation mechanism, it keeps the controlled flow constant regardless of the pressure variation at the IN and OUT ports. If a valve equipped with the temperature compensation mechanism in addition to the pressure compensation mechanism is used, the valve can keep the controlled flow constant even if the fluid temperature (viscosity) varies.
- The flow is controlled almost in direct proportion to the division on the flow adjusting dial.
  - To achieve good pressure compensation performance, the pressure difference between the IN and OUT ports must be maintained at 0.6 MPa or larger.
  - The valve mounting face must be finished to the same surface finish  $\frac{3}{2}Z$  as the valve face.
  - The edge angle of the dog (cam) must be 30 deg. or smaller. The roller must have a hardness in the range HRC48 to HRC52.
  - When controlling slow feed → rapid feed in feed operation, it is necessary to apply a back pressure of approximately 0.35 MPa at the OUT port for the internal drain type or at the DR port for the external drain type.
  - The pressing-down force varies according to the back pressure as shown in the table to the right.
  - If the circuit is configured so that the back pressure (OUT port pressure) becomes high with the internal drain type, the back pressure must be 4 MPa or lower since high back pressure will shorten the life of the roller and the pin.

### ■ Description of the model designation

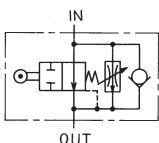
#### HFD1-PG2K-1M-03(A)



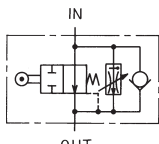
| Nominal size | Pressing-down force (N)         |
|--------------|---------------------------------|
| 02           | 154 × Back pressure (MPa) + 110 |
| 03           | 250 × Back pressure (MPa) + 125 |
| 04           | 310 × Back pressure (MPa) + 180 |

NOTE: The pressing-down force value in the specification table indicates the value when the back pressure is "0".

#### With pressure compensation



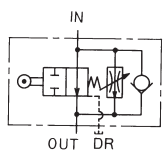
#### With pressure and temperature compensation



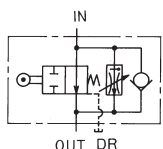
|                                            | Nominal size | Max. operating pressure (MPa) | Free flow (L/min) | Pressing-down force (N) | Flow adjustment range (L/min) | Model             |
|--------------------------------------------|--------------|-------------------------------|-------------------|-------------------------|-------------------------------|-------------------|
| With pressure compensation                 | 02           | 7                             | 12                | 110                     | 0.1 to 1                      | HFD1-PG1K-1M-02   |
|                                            |              |                               |                   |                         | 0.1 to 2                      | HFD1-PG2K-1M-02   |
|                                            |              |                               |                   |                         | 0.2 to 4                      | HFD1-PG4K-1M-02   |
| With pressure and temperature compensation | 03           | 7                             | 30                | 125                     | 0.1 to 1                      | HFD1-PG1K-1M-03A  |
|                                            |              |                               |                   |                         | 0.1 to 2                      | HFD1-PG2K-1M-03A  |
|                                            |              |                               |                   |                         | 0.2 to 8                      | HFD1-PG8K-1M-03A  |
|                                            | 02           | 7                             | 12                | 110                     | 0.1 to 1                      | HFD1-KG1K-1M-02   |
|                                            |              |                               |                   |                         | 0.1 to 2                      | HFD1-KG2K-1M-02   |
|                                            |              |                               |                   |                         | 0.2 to 4                      | HFD1-KG4K-1M-02   |
| With pressure and temperature compensation | 03           | 7                             | 30                | 125                     | 0.1 to 2                      | HFD1-KG2K-1M-03   |
|                                            |              |                               |                   |                         | 0.2 to 8                      | HFD1-KG8K-1M-03   |
|                                            |              |                               |                   |                         | 0.1 to 1                      | HFD2-KG1K-1M-04A  |
|                                            | 04           | 14                            | 50                | 180                     | 0.1 to 2                      | HFD2-KG2K-1M-04A  |
|                                            |              |                               |                   |                         | 0.4 to 16                     | HFD2-KG16K-1M-04A |
|                                            |              |                               |                   |                         |                               |                   |

## External drain type

## With pressure compensation



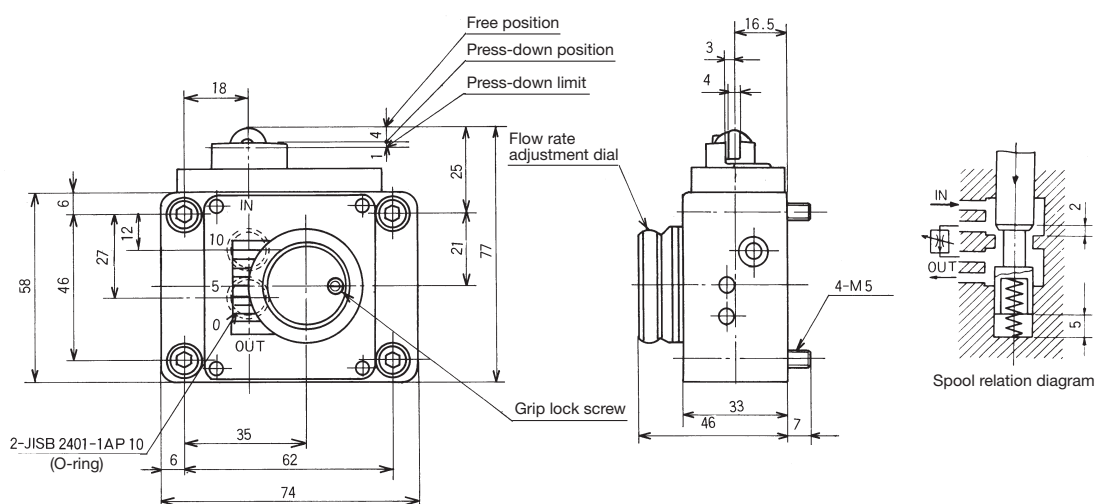
## With pressure and temperature compensation



|                                            | Nominal size | Max. operating pressure (MPa) | Free flow (L/min) | Pressing-down force (N) | Flow adjustment range (L/min) | Model             |
|--------------------------------------------|--------------|-------------------------------|-------------------|-------------------------|-------------------------------|-------------------|
| With pressure compensation                 | 02           | 7                             | 12                | 110                     | 0.1 to 1                      | HFD1-PG1K-3M-02   |
|                                            |              |                               |                   |                         | 0.1 to 2                      | HFD1-PG2K-3M-02   |
|                                            |              |                               |                   |                         | 0.2 to 4                      | HFD1-PG4K-3M-02   |
|                                            | 03           |                               | 30                | 125                     | 0.1 to 1                      | HFD1-PG1K-3M-03A  |
|                                            |              |                               |                   |                         | 0.1 to 2                      | HFD1-PG2K-3M-03A  |
|                                            |              |                               |                   |                         | 0.2 to 8                      | HFD1-PG8K-3M-03A  |
| With pressure and temperature compensation | 02           | 7                             | 12                | 110                     | 0.1 to 1                      | HFD1-KG1K-3M-02   |
|                                            |              |                               |                   |                         | 0.1 to 2                      | HFD1-KG2K-3M-02   |
|                                            |              |                               |                   |                         | 0.2 to 4                      | HFD1-KG4K-3M-02   |
|                                            | 03           |                               | 30                | 125                     | 0.1 to 2                      | HFD1-KG2K-3M-03   |
|                                            |              |                               |                   |                         | 0.2 to 8                      | HFD1-KG8K-3M-03   |
|                                            |              |                               |                   |                         |                               |                   |
|                                            | 04           | 14                            | 50                | 180                     | 0.1 to 1                      | HFD2-KG1K-3M-04A  |
|                                            |              |                               |                   |                         | 0.1 to 2                      | HFD2-KG2K-3M-04A  |
|                                            |              |                               |                   |                         | 0.4 to 16                     | HFD2-KG16K-3M-04A |

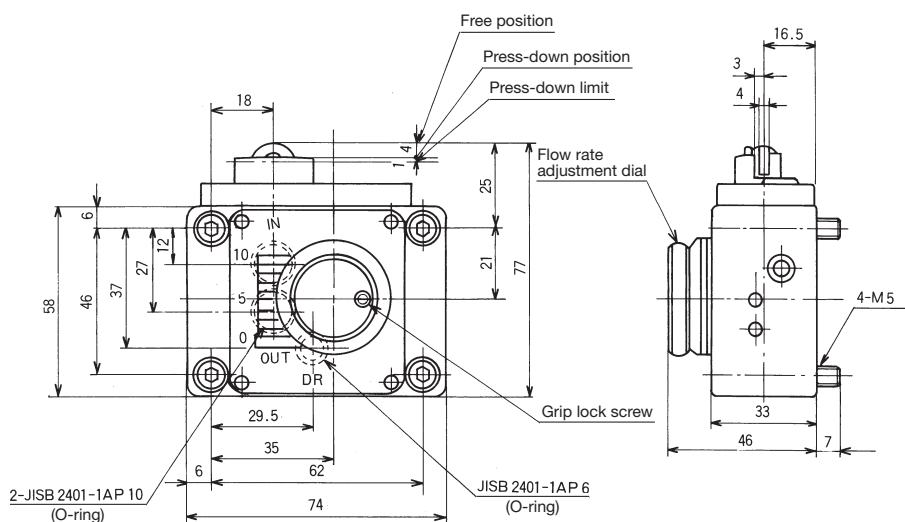
## Outside dimensions

## HFD1-PG\*K-1M-02



Mass: 1.1kg

## HFD1-PG\*K-3M-02



Mass: 1.1kg

## FLOW CONTROL VALVES

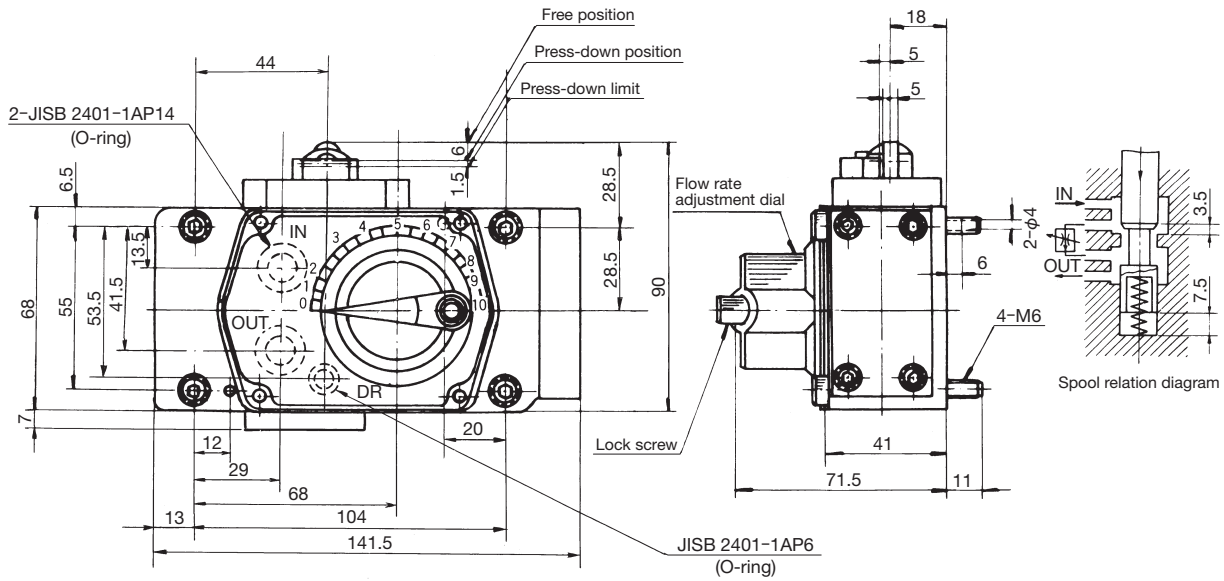
Mass: 1.2kg

Mass: 1.2kg

Mass: 3kg

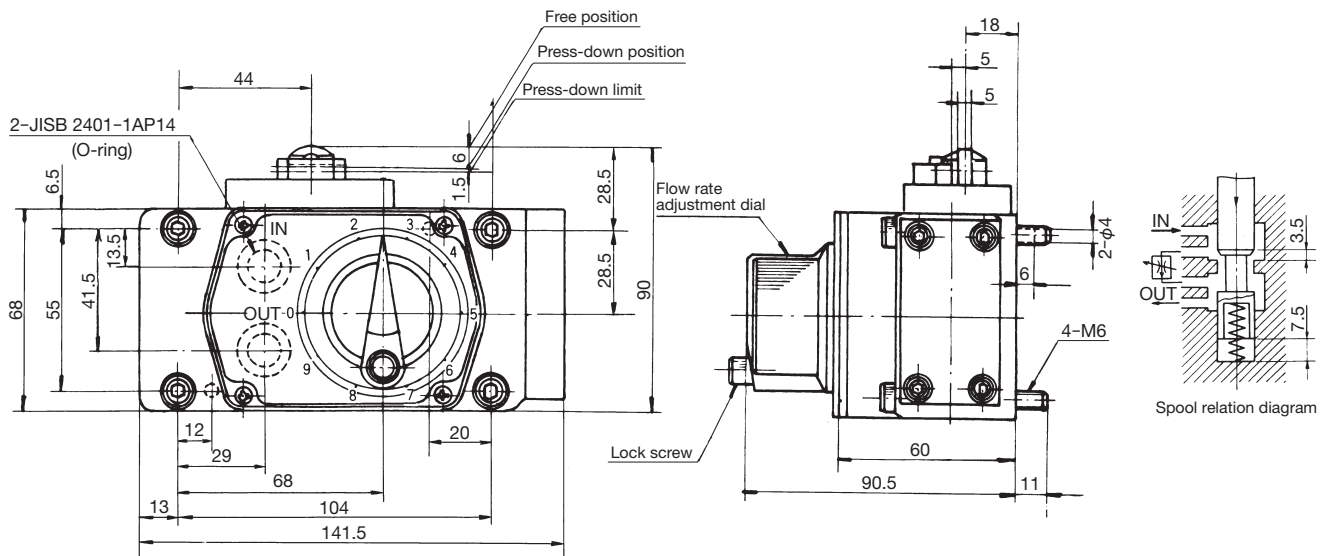
## Outside dimensions

### HFD1-PG\*K-K-3M-03A



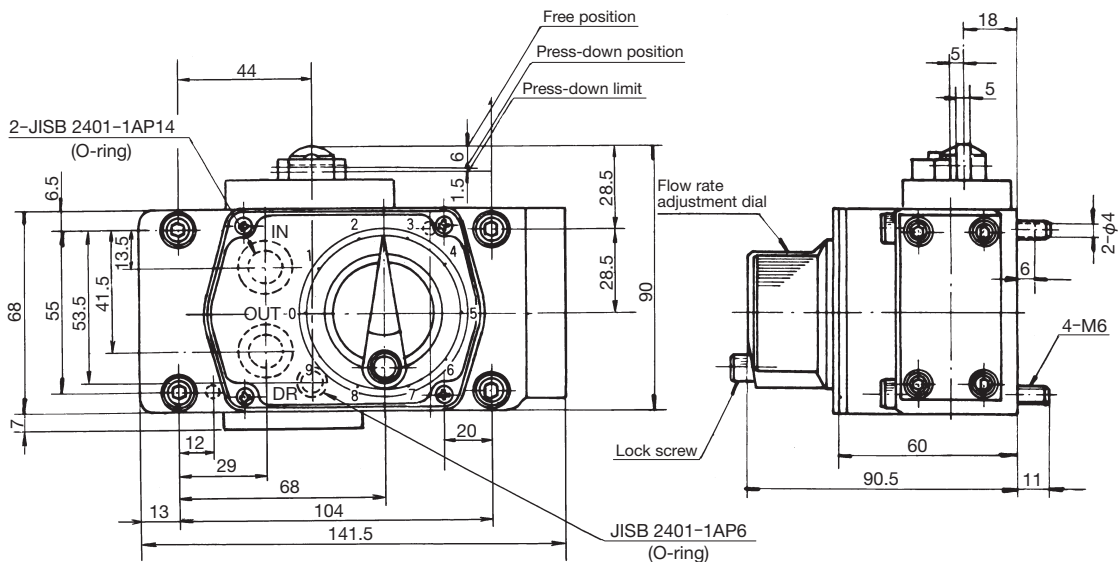
Mass: 3kg

### HFD1-KG\*K-K-1M-03



Mass: 4.0kg

### HFD1-KG\*K-K-3M-03



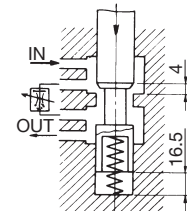
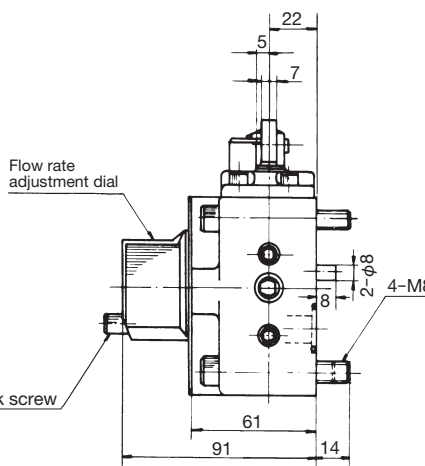
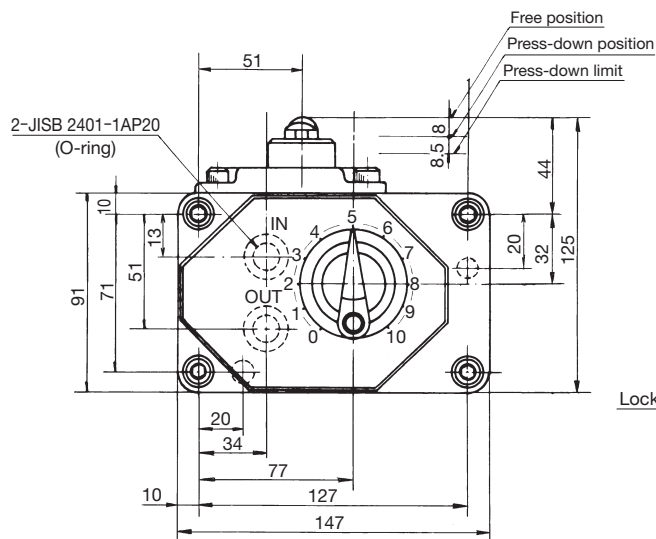
Mass: 4.0kg

E

FLOW CONTROL VALVES

## Outside dimensions

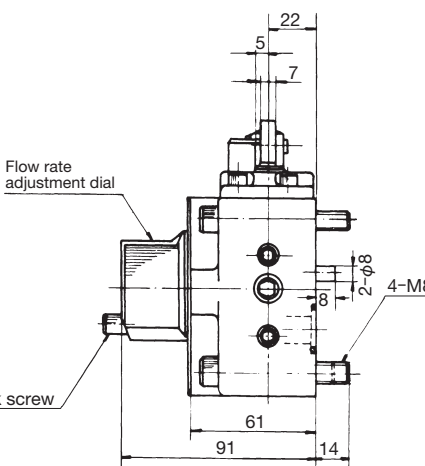
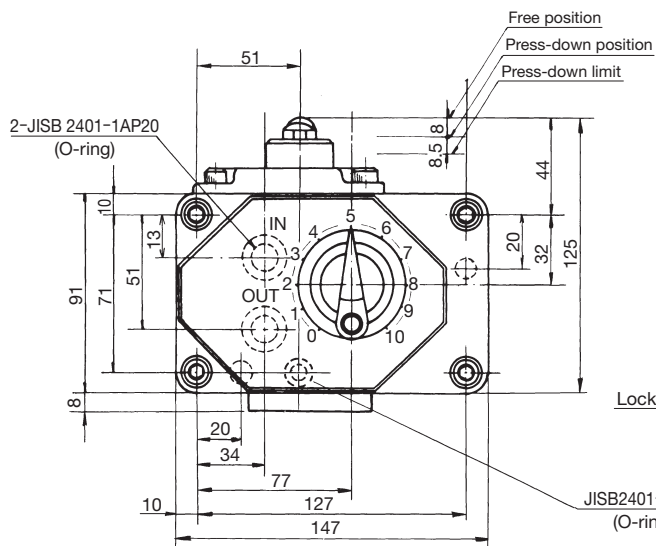
### HFD2-KG\*K-1M-04A



Spool relation diagram

Mass: 6.5kg

### HFD2-KG\*K-3M-04A



Mass: 6.5kg

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