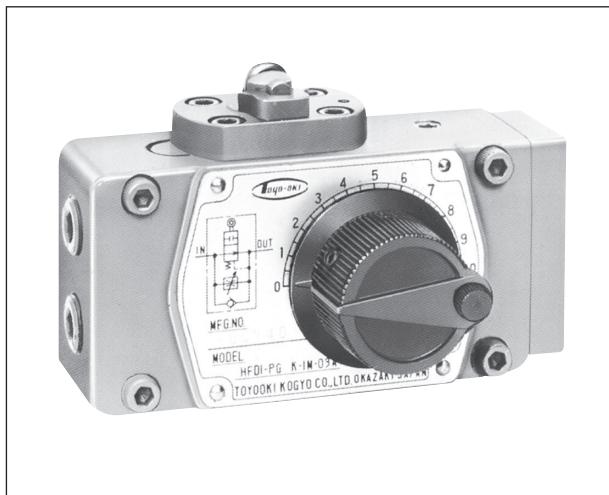


1-STEP FLOW CONTROL VALVE WITH SHUT-OFF VALVE (HFD) (WITH PRESSURE COMPENSATION, WITH PRESSURE AND TEMPERATURE COMPENSATION)



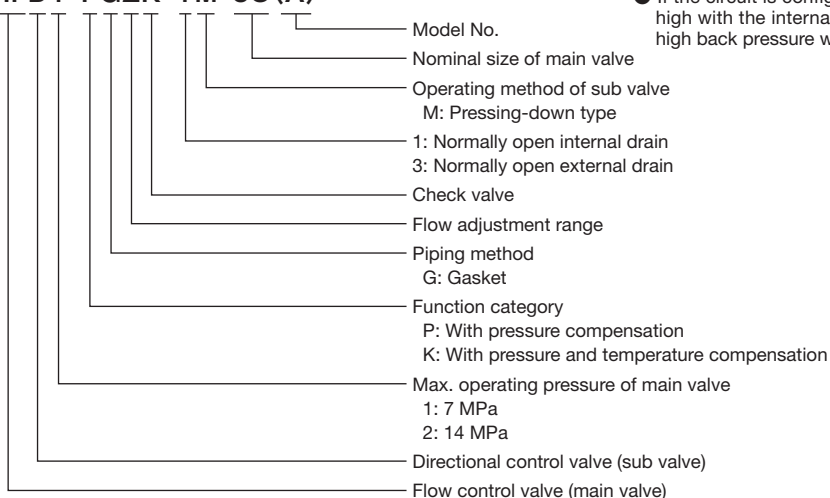
This is a compound valve built by assembling a flow control valve with pressure compensation, a shut off valve and a check valve. It is used to control the feed operation (rapid feed → slow feed → rapid return) of e.g. a machine tool.

■ Features

1. The valve is compactly designed and is suitable for feed control of singlepurpose machine tools and automatics.
2. 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.
3. 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 $\sqrt{3.2Z}$ 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 H_RC48 to H_RC52.
 - 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)

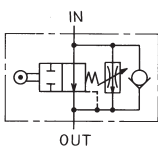


Nominal size	Pressing-down force (N)
02	154 × Back pressure (MPa) + 110
03	250 × Back pressure (MPa) + 125
04	310 × Back pressure (MPa) + 180

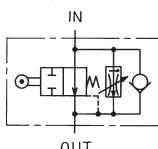
NOTE: The pressing-down force value in the specification table indicates the value when the back pressure is "0".

Internal drain type

With pressure compensation



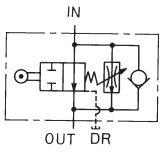
With pressure and temperature compensation



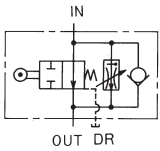
	Nominal size	Max. operating pressure (MPa)	Free flow (L/min)	Pressing-down force (N)	Flow adjustment range (L/min)	Model
With pressure compensation	02	7	12	110	0.1 to 1	HFD1-PG1K-1M-02
					0.1 to 2	HFD1-PG2K-1M-02
					0.2 to 4	HFD1-PG4K-1M-02
With pressure compensation	03	7	30	125	0.1 to 1	HFD1-PG1K-1M-03A
					0.1 to 2	HFD1-PG2K-1M-03A
					0.2 to 8	HFD1-PG8K-1M-03A
With pressure and temperature compensation	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
	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



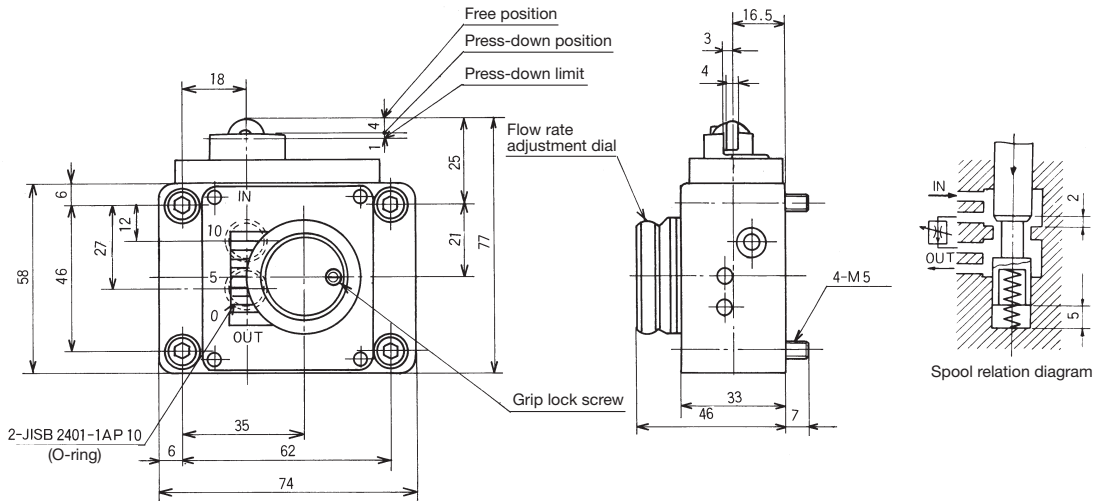
With pressure and temperature compensation



	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
With pressure and temperature compensation	03	7	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	7	30	125	0.1 to 2	HFD1-KG2K-3M-03
					0.2 to 8	HFD1-KG8K-3M-03
					0.1 to 1	HFD2-KG1K-3M-04A
04	14	50	180	0.1 to 2	HFD2-KG2K-3M-04A	
				0.4 to 16	HFD2-KG16K-3M-04A	

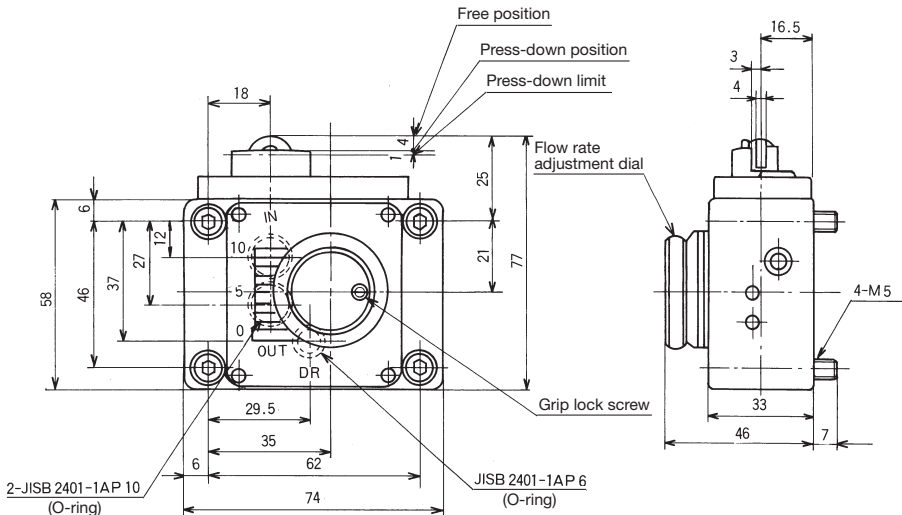
Outside dimensions

HFD1-PG*K-1M-02



Mass: 1.1kg

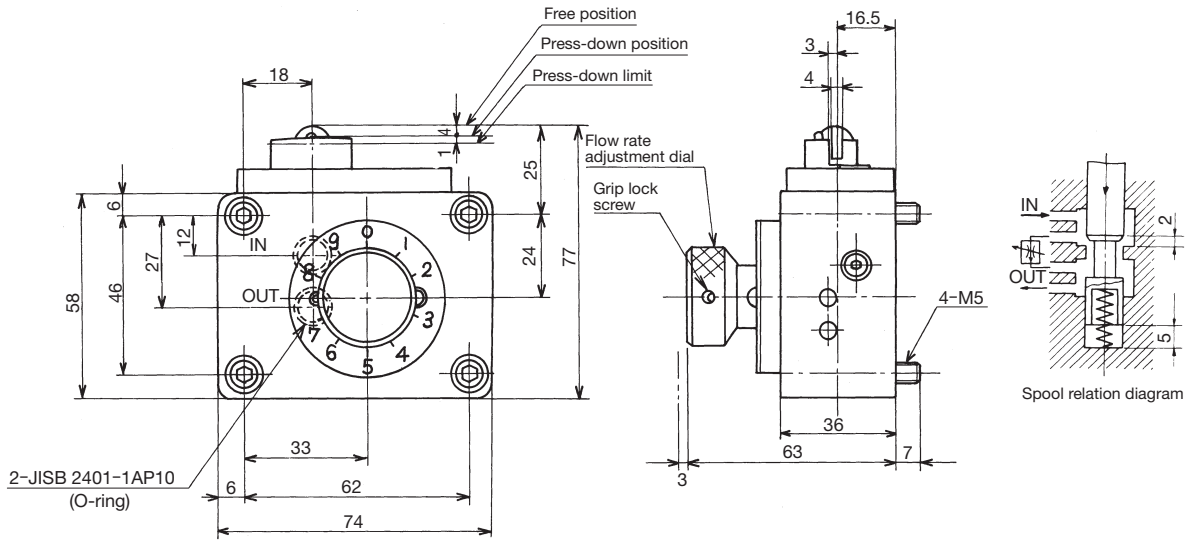
HFD1-PG*K-3M-02



Mass: 1.1kg

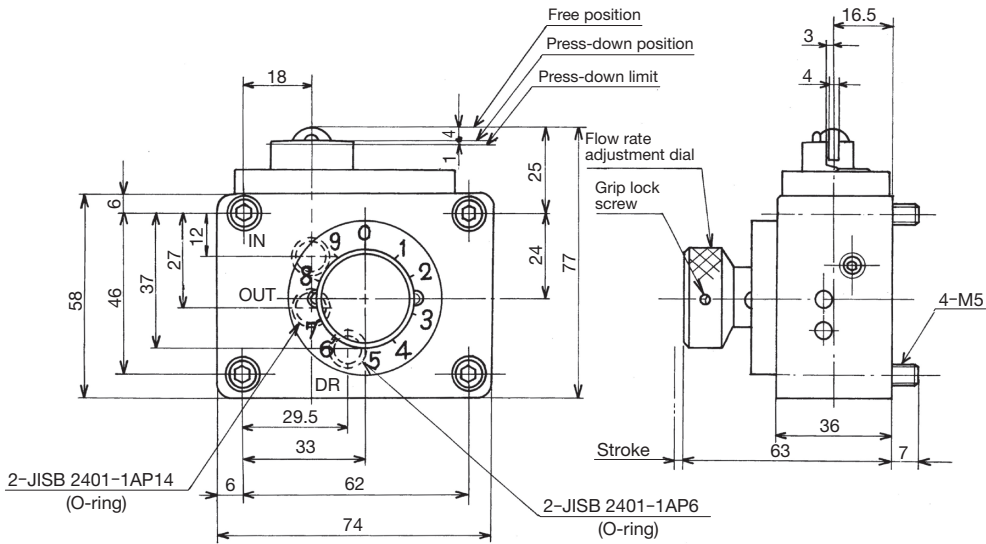
■ Outside dimensions

HFD1-KG*K-1M-02



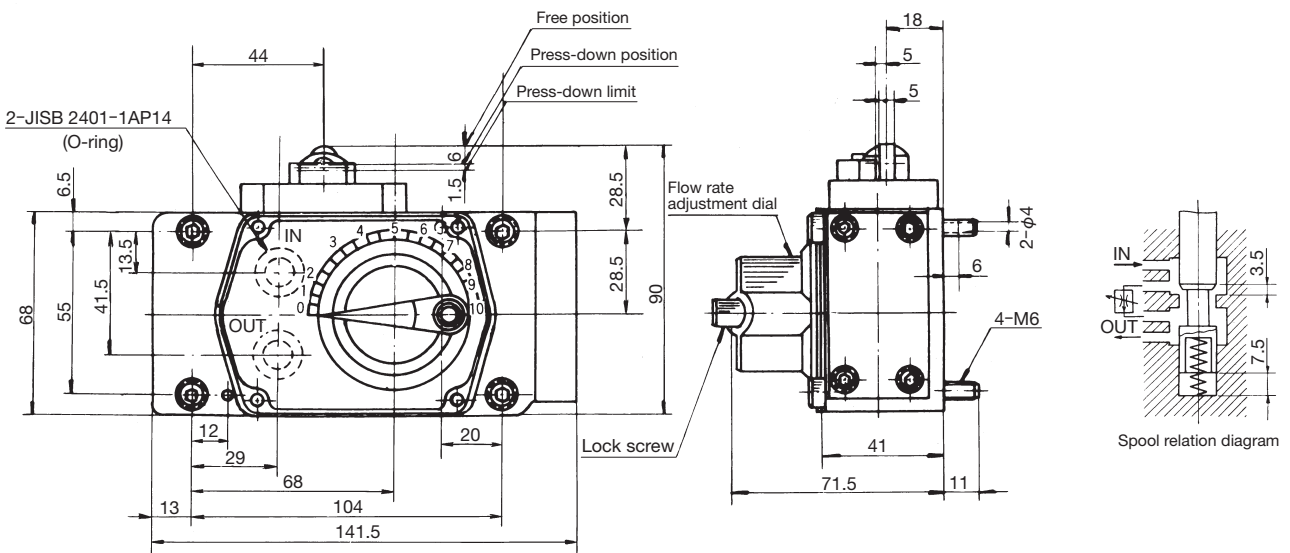
Mass: 1.2kg

HFD1-KG*K-3M-02



Mass: 1.2kg

HFD1-PG*K-1M-03A



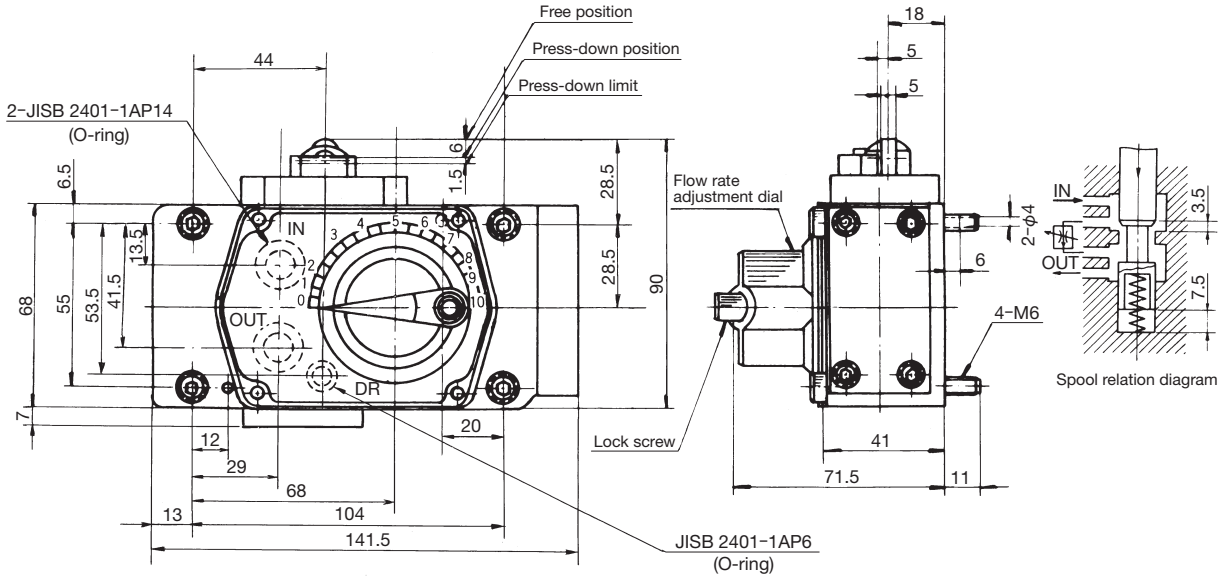
Mass: 3kg



FLOW CONTROL VALVES

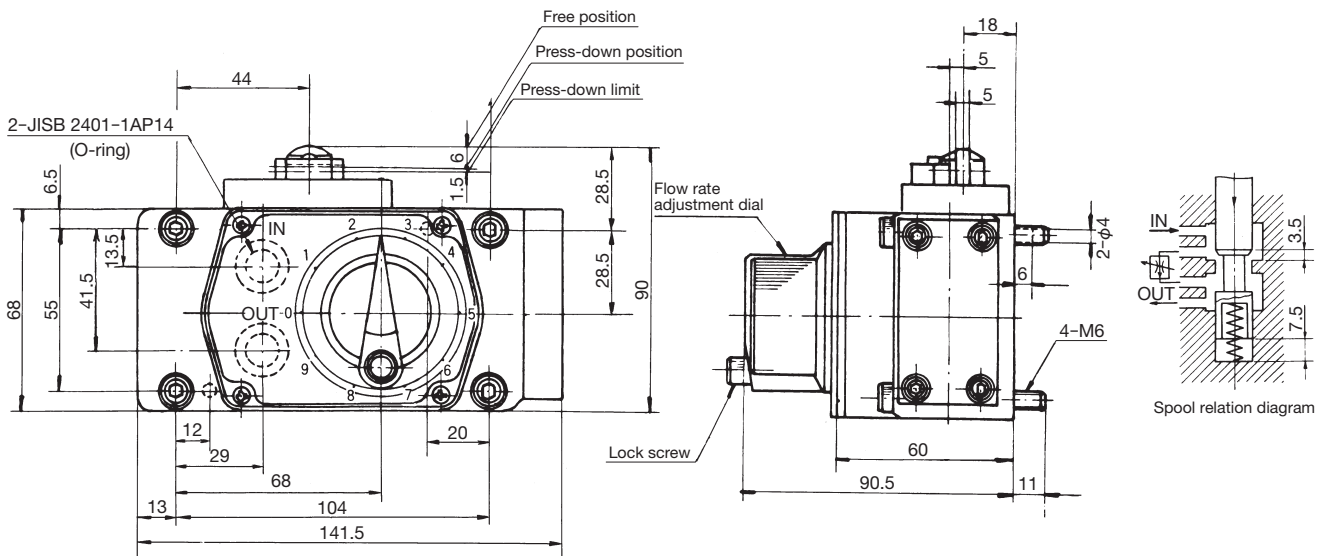
■ Outside dimensions

HFD1-PG*K-3M-03A



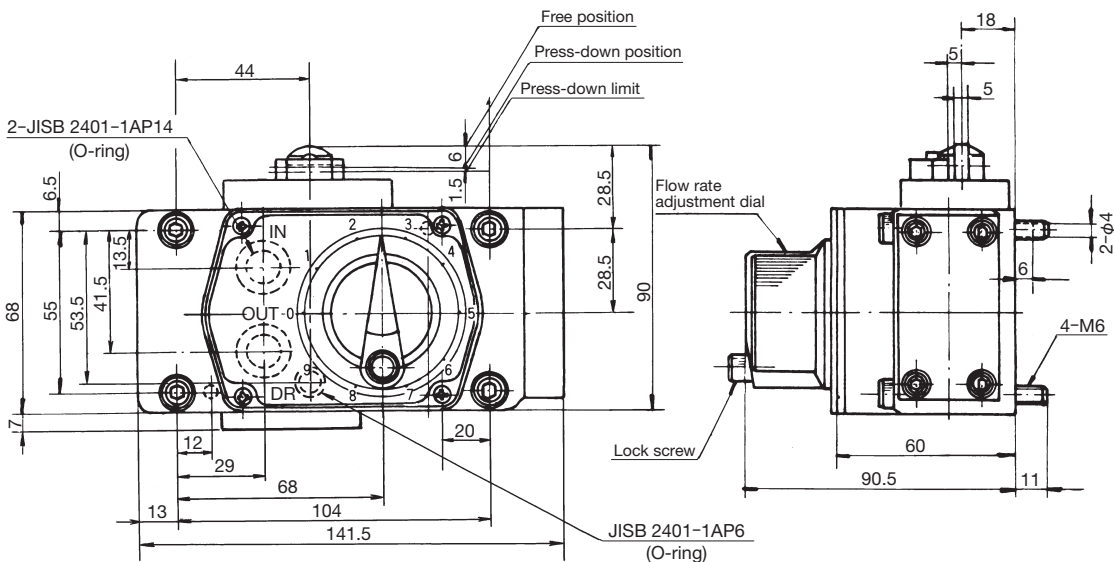
Mass: 3kg

HFD1-KG*K-1M-03



Mass: 4.0kg

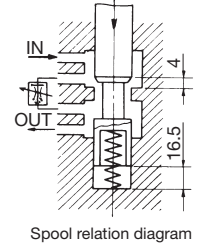
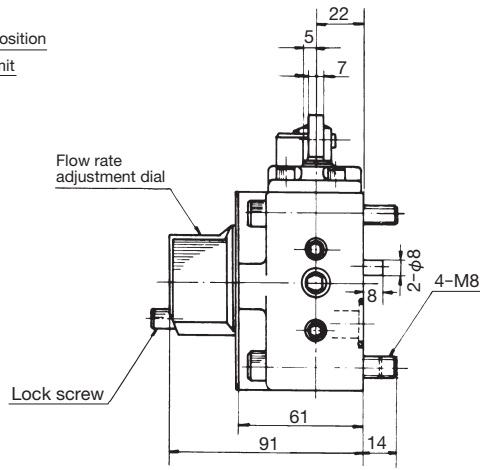
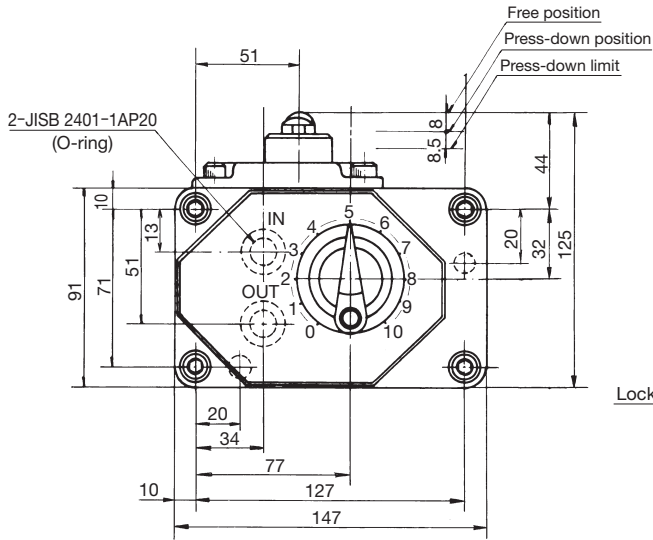
HFD1-KG*K-3M-03



Mass: 4.0kg

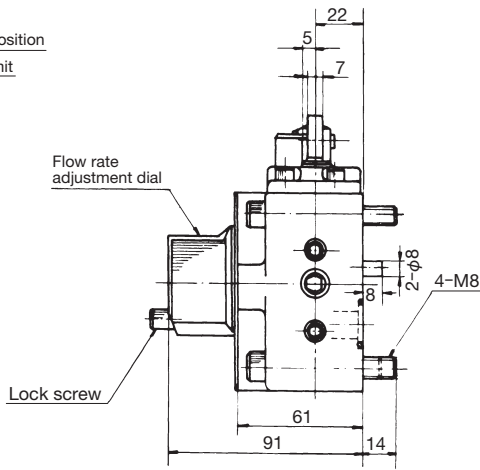
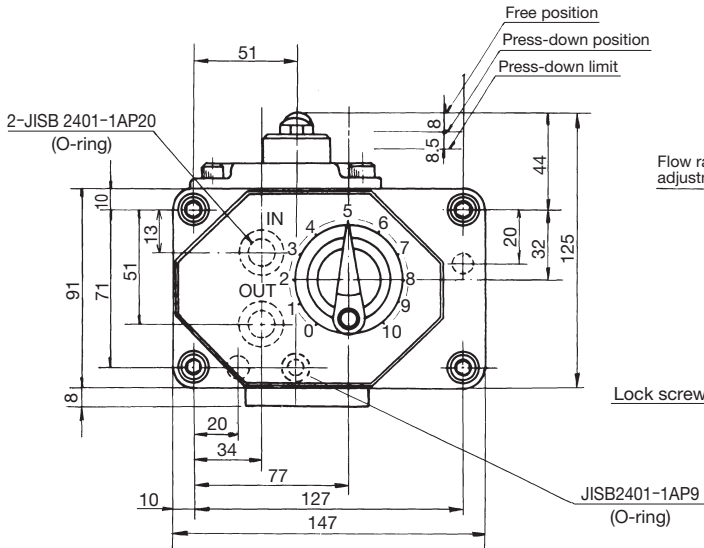
■ Outside dimensions

HFD2-KG*K-1M-04A



Mass: 6.5kg

HFD2-KG*K-3M-04A



Mass: 6.5kg



FLOW CONTROL VALVES

2-STEP FLOW CONTROL VALVE WITH SHUT-OFF VALVE (HFDF) (WITH PRESSURE AND TEMPERATURE COMPENSATION)



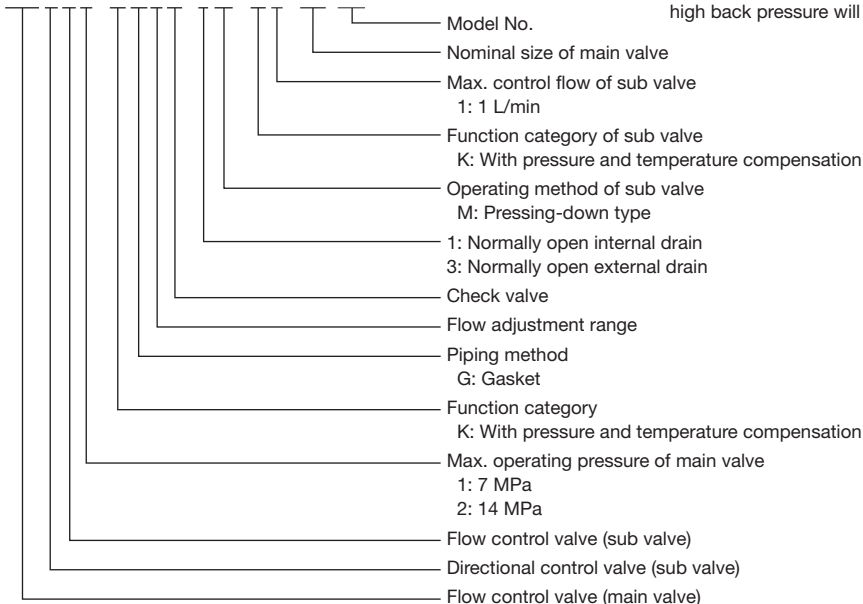
This is a compound valve built by assembling a flow control valve with pressure compensation, a shut off valve and a check valve. It is used to control the feed operation (rapid feed → slow feed → rapid return) of e.g. a machine tool.

■ Features

- The valve is compactly designed and is suitable for feed control of singlepurpose machine tools and automatics.
- Since the valve incorporate a pressure compensation and temperature compensation mechanism, it keeps controlled flow constant regardless of the pressure variation at the IN and OUT port and the viscosity variation due to temperature change.
- 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 $\frac{3.2Z}{\sqrt{R}}$ 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 H_RC48 to H_RC52.
 - 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

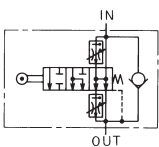
HFDF2-KG8K-1M-K1-04 (A)



Nominal size	Pressing-down force (N)
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".

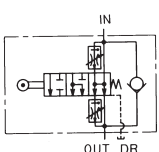
Internal drain type



Internal drain type

Nominal size	Max. operating pressure (MPa)	Free flow (L/min)	Pressing-down force (N)	Flow adjustment range (L/min)		Model
				No. 1 feed	No. 2 feed	
03	7	30	125	0.2 to 2	0.1 to 1	HFDF1-KG2K-1M-K1-03
				0.2 to 8	0.1 to 1	HFDF1-KG8K-1M-K1-03
04	14	50	180	0.2 to 2	0.1 to 1	HFDF2-KG2K-1M-K1-04A
				0.2 to 8	0.1 to 1	HFDF2-KG8K-1M-K1-04A

External drain type

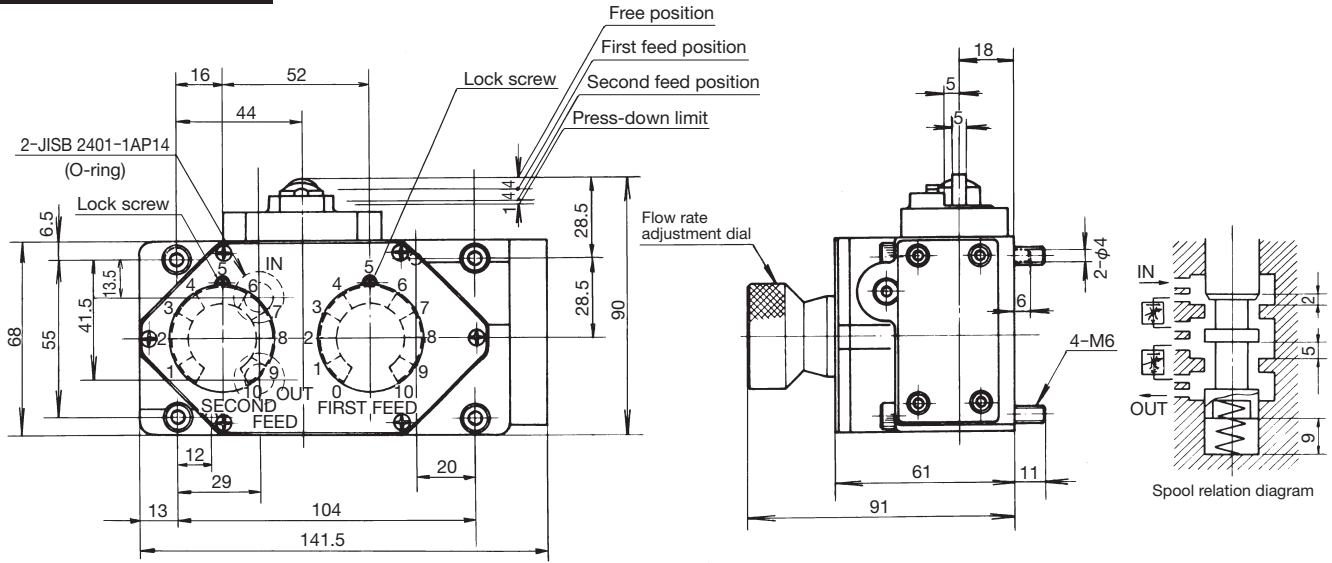


External drain type

Nominal size	Max. operating pressure (MPa)	Free flow (L/min)	Pressing-down force (N)	Flow adjustment range (L/min)		Model
				No. 1 feed	No. 2 feed	
03	7	30	125	0.2 to 2	0.1 to 1	HFDF1-KG2K-3M-K1-03
				0.2 to 8	0.1 to 1	HFDF1-KG8K-3M-K1-03
04	14	50	180	0.2 to 2	0.1 to 1	HFDF2-KG2K-3M-K1-04A
				0.2 to 8	0.1 to 1	HFDF2-KG8K-3M-K1-04A

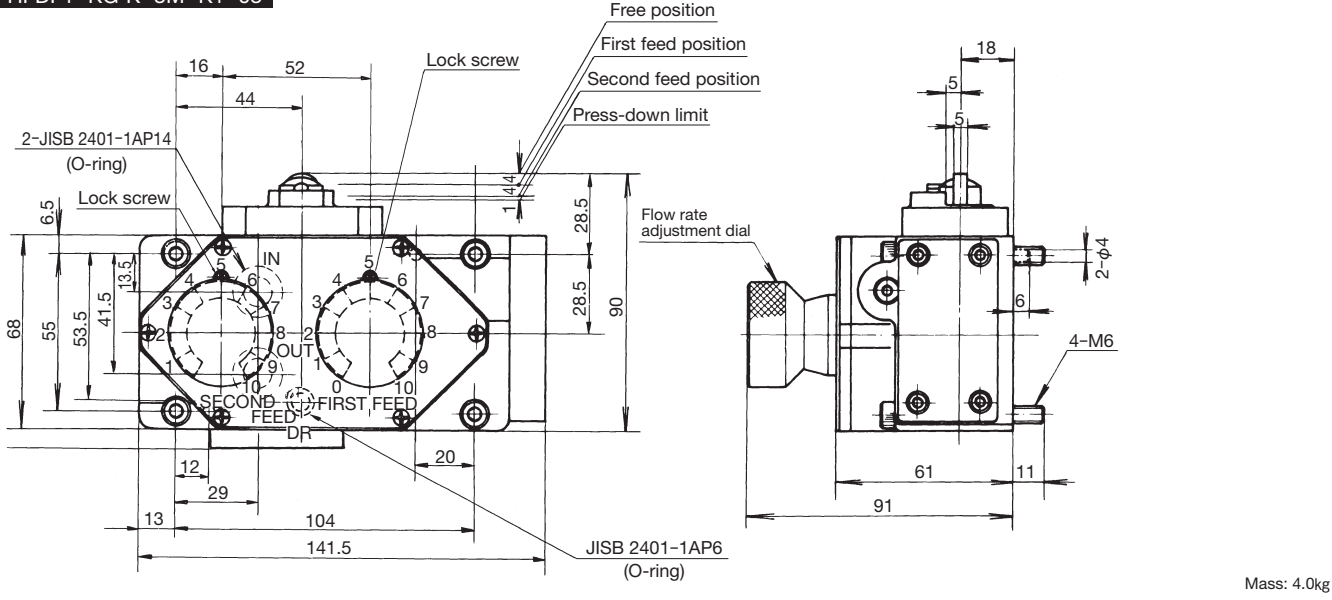
■ Outside dimensions

HFDF1-KG*K-1M-K1-03



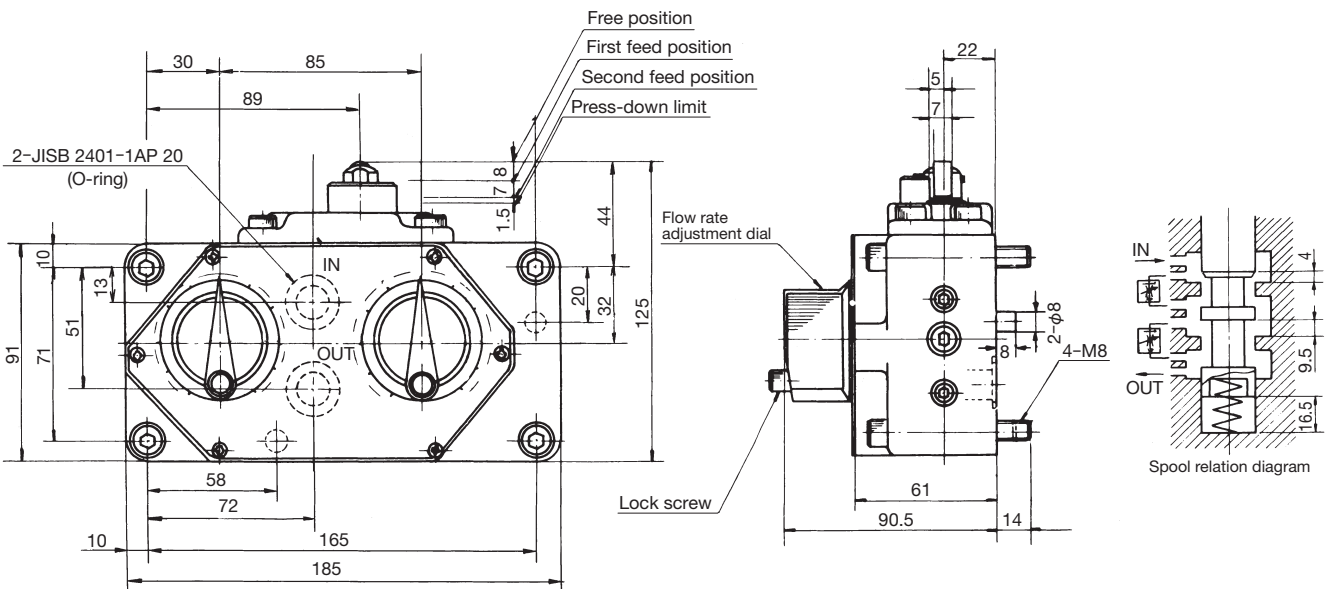
Mass: 4.0kg

HFDF1-KG*K-3M-K1-03



Mass: 4.0kg

HFDF2-KG*K-1M-K1-04A



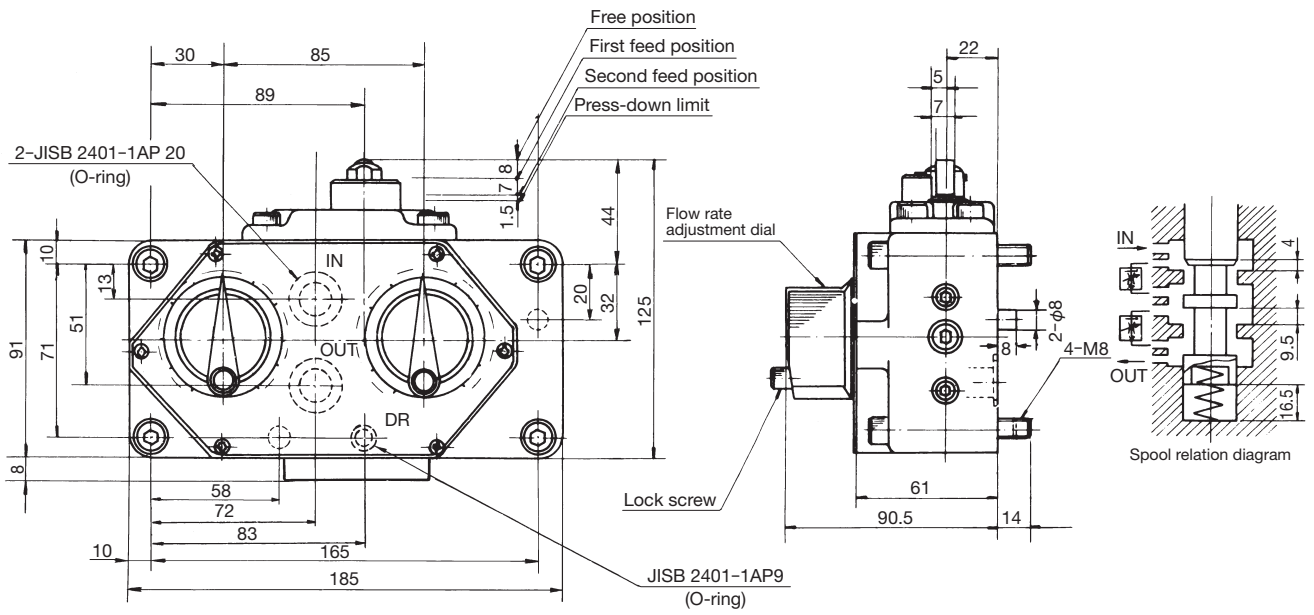
Mass: 8.0kg



FLOW CONTROL VALVES

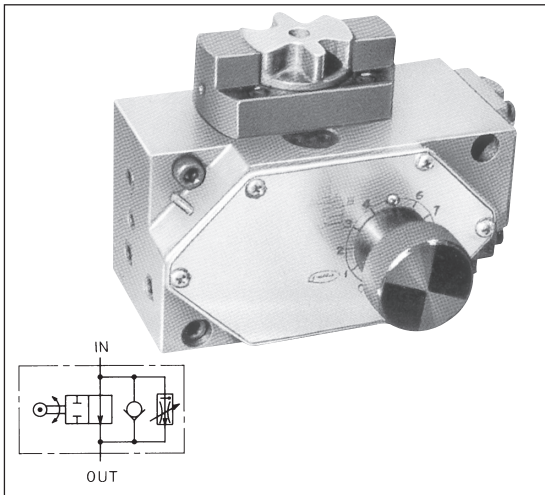
■ Outside dimensions

HFDF2-KG*K-3M-K1-04A



Mass: 8.0kg

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



This is a compound valve built by assembling a flow control valve with pressure and temperature compensation, a shut off valve and a check valve. It is used to control the feed operation (rapid feed → slow feed → rapid return) of machine tools, etc.

■Features

1. The switching mechanism for the shut-off valve has been changed from the conventional spool forcing down type to the spool rotation type.
 2. The dog pressing force can be lightened since the spool rotating force does not change even if the OUT port pressure (back pressure) varies.
 3. This valve can also be used for light bed feed control since it can control rapid feed → 1st step feed simply.
- 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 $\frac{3.2}{\nabla\nabla\nabla}$ as the valve face.
 - The dog section pin ($\phi 9 \pm 0.1$ mm) must have a hardness in the range Hrc34 to Hrc44.

■Description of the model designation

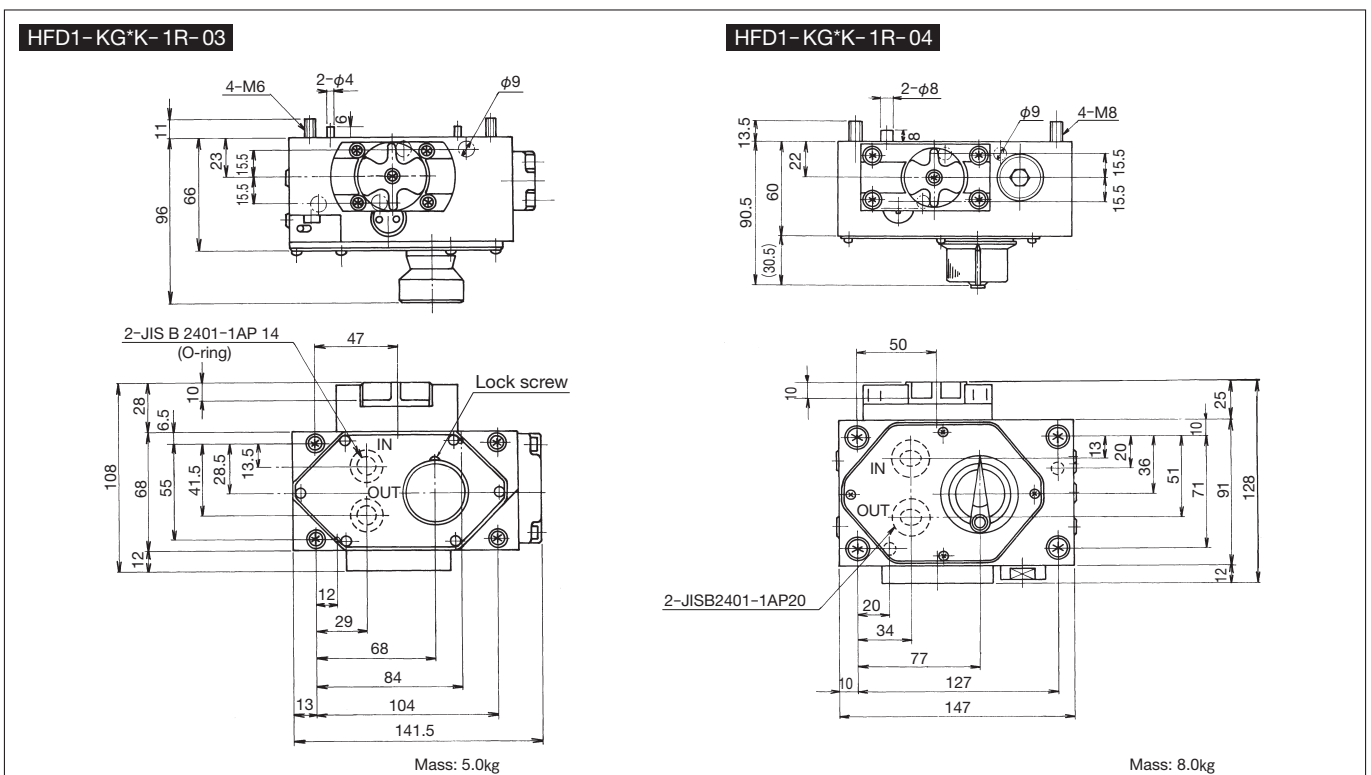
HFD1-KG2K-1R-03

- Flow control valve (main valve)
- Directional control valve (sub valve)
- Max. operating pressure of main valve
1: 7 MPa
- Function category
K: With pressure and temperature compensation
- Piping method
G: Gasket
- Nominal size of main valve
- Operating method of sub valve
R: Rotary type
- 1: Normally open internal drain
- 3: Normally open external drain
- Check valve
- Max. controllable flow of main valve

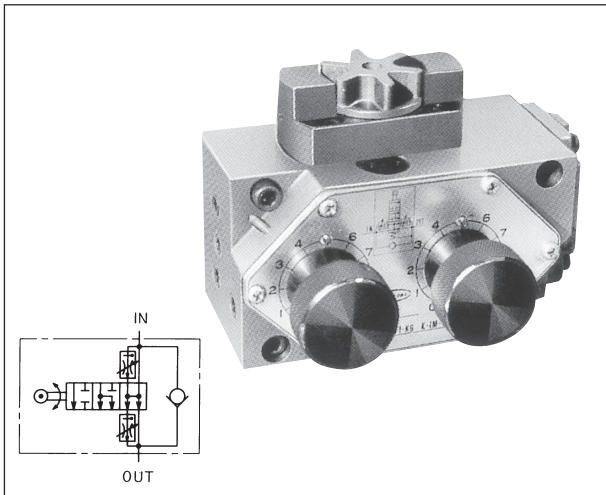
■Specifications

Nominal size	Max. operating pressure (MPa)	Free flow (L/min)	Rotating torque (N·m)	Flow adjustment range (L/min)	Model
03	7	30	1	0.2 to 2	HFD1-KG2K-1R-03
				0.2 to 8	HFD1-KG8K-1R-03
50		1.3	0.1 to 1	HFD1-KG1K-1R-04	
			0.2 to 2	HFD1-KG2K-1R-04	
04				0.4 to 16	HFD1-KG16K-1R-04

■Outside dimensions



2-STEP FLOW CONTROL VALVE WITH ROTARY TYPE SHUT-OFF VALVE (HFDF) (WITH PRESSURE AND TEMPERATURE COMPENSATION)



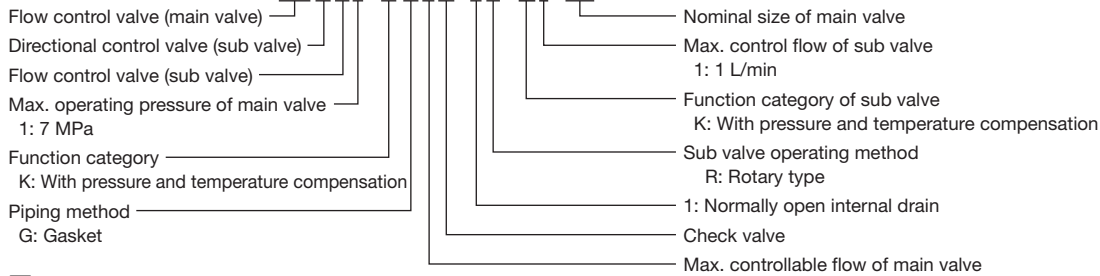
This is a compound valve built by assembling a flow control valve with pressure and temperature compensation, a shut off valve and a check valve. It is used to control the feed operation (rapid feed → slow feed → rapid return) of machine tools, etc.

Features

- The switching mechanism for the shut-off valve has been changed from the conventional spool forcing down type to the spool rotation type.
 - The dog pressing force can be lightened since the spool rotating force does not change even if the OUT port pressure (back pressure) varies.
 - The valve can also be used for light bed feed control since it can control rapid feed → 1st step feed → 2nd step feed simply.
- 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 $\sqrt{3.2}$ as the valve face.
 - The dog section pin ($\phi 9 \pm 0.1$ mm) must have a hardness in the range Hrc34 to Hrc44.

Description of the model designation

HFDF1-KG8K-1R-K1-04



Specifications

Nominal size	Max. operating pressure (MPa)	Free flow (L/min)	Rotating torque (N·m)	Flow adjustment range (L/min)		Model
				No. 1 feed	No. 2 feed	
03	7	30	1	0.2 to 2	0.1 to 1	HFDF1-KG2K-1R-K1-03
				0.2 to 8		HFDF1-KG8K-1R-K1-03
04		50	1.3	0.1 to 2		HFDF1-KG2K-1R-K1-04
				0.2 to 8		HFDF1-KG8K-1R-K1-04

Outside dimensions

