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 \rightarrow slow feed \rightarrow 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.

MODEL DESIGNATION



- 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 (³/₃ ∀) 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 a 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.
- When connecting the external drain using the Rc thread, specify "-901" (male thread connection) or "-903" (female thread connection) at the end of the external drain code.

Nominal Size	Pressing-down Force (N)
02	154 \times Back pressure (MPa) + 110
03	$250 \times Back \text{ pressure (MPa)} + 125$
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

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
					0.1 to 1	HFD1-PG1K-1M-02
ion	02	7	12	110	0.1 to 2	HFD1-PG2K-1M-02
essu nsat					0.2 to 4	HFD1-PG4K-1M-02
mpe Th					0.1 to 1	HFD1-PG1K-1M-03A
Co	03	7	30	125	0.1 to 2	HFD1-PG2K-1M-03A
					0.2 to 8	HFD1-PG8K-1M-03A
uc	02	7	12	110	0.1 to 1	HFD1-KG1K-1M-02
d sati					0.1 to 2	HFD1-KG2K-1M-02
e an					0.2 to 4	HFD1-KG4K-1M-02
sure	02	7	30	125	0.1 to 2	HFD1-KG2K-1M-03
ith Pres rature C	03	/			0.2 to 8	HFD1-KG8K-1M-03
					0.1 to 1	HFD2-KG1K-1M-04A
N W	04	7	50	180	0.1 to 2	HFD2-KG2K-1M-04A
Ter					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			
						0.1 to 1	HFD1-PG1K-3M-02			
	ion	02		12	110	0.1 to 2	HFD1-PG2K-3M-02			
	essı nsat		7			0.2 to 4	HFD1-PG4K-3M-02			
	mpe	03	7			0.1 to 1	HFD1-PG1K-3M-03A			
	C Ki			30	125	0.1 to 2	HFD1-PG2K-3M-03A			
						0.2 to 8	HFD1-PG8K-3M-03A			
	no	02	7	12	110	0.1 to 1	HFD1-KG1K-3M-02			
on	d sati					0.1 to 2	HFD1-KG2K-3M-02			
	e an pen					0.2 to 4	HFD1-KG4K-3M-02			
	sur			00	405	0.1 to 2	HFD1-KG2K-3M-03			
	Pres Ire (03		30	120	0.2 to 8	HFD1-KG8K-3M-03			
	lith F eratu					0.1 to 1	HFD2-KG1K-3M-04A			
	∧ adm	04	14	50	180	0.1 to 2	HFD2-KG2K-3M-04A			
	Ter					0.4 to 16	HFD2-KG16K-3M-04A			

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JISB 2401-1AP 6 (O-RING)

LOCK SCREW

• HFD1-PG*K-1M-02 FREE POSITION 16.5 PUSHING-DOWN POSITION PUSHING-DOWN LIMIT 18 FLOW ADJUSTING DIAL 25 Ð Æ Ś \odot [₽] 10 ₩22 5 ⊕ 1 27 46 28 4-M 5 C ΟÚΤ ቃ® Ф SPOOL RELATED DRAWING LOCK SCREW 33 **4**6 7 2-JISB 2401-1AP 10 (O-RING) 35 > 62 6 MASS: 1.1 kg 74 • HFD1-PG*K-3M-02 FREE POSITION 16.5 PUSHING-DOWN POSITION PUSHING-DOWN LIMIT 18 FLOW ADJUSTING DIAL 35

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4-M 5

MASS: 1.1 kg



• HFD1-PG*K-1M-03A FREE POSITION / PUSHING-DOWN POSITION 44 , PUSHING-DOWN LIMIT 2-JISB 2401-1AP 14 (O-RING) П 28.5 FLOW ADJUSTING DIAL 6.5 6 0 D 0 IN S <u>۳</u> 28.5 8 4 8 55 4-M6 6 œ 12 SPOOL RELATED DRAWING 20 LOCK SCREW 41 29 68 71.5 11 104 13 141.5 MASS: 3 kg





• HFD1-KG*K-3M-03





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



This is a compound valve built by assembling a throttle valve and a 1-step flow control valve with shut-off valve.

It is used to control the feed operation (rapid feed \rightarrow semi-rapid feed \rightarrow slow feed a rapid return) of machine tools, etc.

FEATURES

- 1. The valve is compactly designed and is appropriate for feed control of single-purpose machine tools and automatics.
- Since the valve incorporates a pressure compensation mechanism, it keeps controlled flow constant regardless of the pressure variation at the IN and OUT ports and the viscosity variation due to temperature change.
- 3. The flow is controlled almost in direct proportion to the division of the flow adjusting dial.

MODEL DESIGNATION



- 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 (³²/_{∀∀∀}) 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 a 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.
- When connecting the external drain using the Rc thread, specify "-901" (male thread connection) or "-903" (female thread connection) at the end of the external drain code.

Nominal Size	Pressing-down Force (N)
03	$250 \times Back \text{ pressure (MPa)} + 125$
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

	Nominal Size	Max. Operating Pressure (MPa)	Free Flow (L/min)	Pressing-down Force (N)	Flow Adjusti (L/r	ment Range nin)	Model
					1st Step Feed	2nd Step 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

	Nominal Size	Max. Operating Pressure (MPa)	Free Flow (L/min)	Pressing-down Force (N)	Flow Adjust (L/r	ment Range nin)	Model
					1st Step Feed	2nd Step 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
		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







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 compensation, a shut off valve and a check valve.

It is used to control the feed operation (rapid feed \rightarrow slow feed \rightarrow 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 \rightarrow 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 (³/_{∀∀∀}) as the valve face.
- The dog section pin (ϕ 9 ±0.1 mm) must have a hardness in the range HRC34 to HRC44.

HFD1-KG2K-1R03

Flow control valve (main valve) — Directional control valve (sub valve)

- Max. operating pressure of master valve
- 1: 7 MPa

MODEL DESIGNATION

- Function category
- K: With pressure and temperature compensation
- Piping method -
- G: Gasket

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Nominal size of main valve
Sub valve operating method
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-KG 2K-1R-03
			1	0.2 to 8	HFD1-KG 8K-1R-03
		50	1.3	0.1 to 1	HFD1-KG 1K-1R-04
				0.2 to 2	HFD1-KG 2K-1R-04
				0.4 to 16	HFD1-KG16K-1R-04



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 compensation, a shut-off valve and a check valve.

It is used to control feed operation (rapid feed \rightarrow semi-rapid feed \rightarrow slow feed a 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. The valve can also be used for light bed feed control since it can control rapid feed \rightarrow 1st step feed \rightarrow 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 (³²/_{∀∀∀}) as the valve face.
- The dog section pin (ϕ 9 ±0.1 mm) must have a hardness in the range HRC34 to HRC44.

HF D F 1 - K G 8 K - 1 R K 1 04



SPECIFICATIONS

MODEL DESIGNATION

Nominal Size	Max. Operating Pressure	Free Flow	Rotating Torque	Flow Adjust (L/i	ment Range min)	Model
	(IVIF d)	(Ľ/ШП)	(11-111)	1st Step Feed	2nd Step 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
		50	1.3	0.2 to 2		HFDF1-KG2K-1R-K1-04
				0.2 to 8		HFDF1-KG8K-1R-K1-04





