

F



FLOW CONTROL VALVES

F
FLOW CONTROL VALVES

Model [Model No.]	Maximum operating pressure MPa {kgf/cm ² }	Maximum flow rate L/min																Page
		1	5	10	50	100	500	1000										
Flow control valve [SF]	7 {70}	02																F-3
Flow control valve Flow control valve with check valve [JF(C)]	21 {210}	02																F-5
		03																
Compact throttle valve with check valve [TSC]	7 {70}	G01																F-8
		T01																
Throttle valve [ST]	7 {70}	02																F-10
Throttle valve Throttle valve with check valve [HDFT(C)]	21 {210}	03																F-12
		06																
		10																
		16																
Throttle valve with rotary type deceleration valve [SFD]	5 {50}	02																F-16
		03																

Handling

● Hydraulic oil

- Use a petroleum-based hydraulic fluid equivalent to ISO VG32 to 68.
- Operate the unit in an environment where both the following conditions are satisfied: viscosity range from 15 to 400 mm²/s {cSt} and oil temperature from −15 to 70° C.

Note that the optimum viscosity range of the flow control valves is 20 to 150 mm²/s {cSt}.

- Contamination of the hydraulic fluid causes valve trouble and reduces the service life, so pay due attention to controlling contamination and ensure that it goes no higher than NAS contamination class 12.

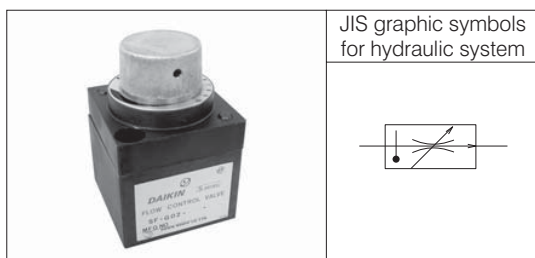
● Installation and maintenance

- There is no restriction on the installation direction.
- Finish the face on which the valve is mounted to a surface roughness of 1.6a or better and a flatness tolerance within 0.01 mm.
- Use an O-ring with a hardness of Hs90 for the valve's gasket unless otherwise specified.
- Connect the piping from the valve to the tank at a point lower than the tank oil level.

● Filters

- Use a line filter with a filtration accuracy of 25 μm or better.

Flow Control Valves (with Pressure/Temperature Compensation Control)



JIS graphic symbols for hydraulic system



Features

- The valves with pressure/temperature compensation control can maintain the set flow rate regardless of changes in the load pressure and fluid temperature.
- Capable of flow rate control from the minimal flow rate of 0.01 L/min.
- Adopts a structure that minimizes occurrences of jumping.

Nomenclature

※ - SF - G 02 - ※ ※ ※ - 15

1

2

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1 Applicable fluid code

No designation: Petroleum-based hydraulic fluid, water-glycol hydraulic fluid
F: Phosphate ester hydraulic fluid

2 Model No.

SF: S series flow control valve

3 Connections

G: Gasket mount type

4 Nominal diameter

02: 1/4

5 Maximum control flow rate

002: 0.2 L/min
006: 0.6 L/min
030: 3 L/min
060: 6 L/min
150: 15 L/min

6 Design No.

(The design No. is subject to change)

Specifications

Model code	Nominal diameter	Maximum operating pressure MPa {kgf/cm ² }	Flow rate adjustment range L/min	Mass kg
SF-G02-002-15	1/4	7 {70}	0.01 to 0.2	0.8
SF-G02-006-15			0.01 to 0.6	
SF-G02-030-15			0.01 to 3	
SF-G02-060-15			0.01 to 6	
SF-G02-150-15			0.01 to 15	

Sub-plate model code

- The sub-plate is not provided with the valve. Order it separately if required by specifying the model code given in the table below.

Model code	Nominal diameter	Connection port diameter	Mass kg
SF-02M	1/4	Rc1/4	0.5

Refer to Page S-7 for the dimensions of the sub-plate.

Accessories

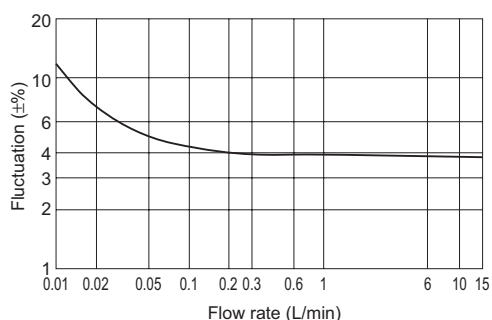
Hexagon socket head cap bolt	Quantity	Tightening torque N·m {kgf·cm}
M6 × 50	2	10 to 12.5 {100 to 125}

Handling

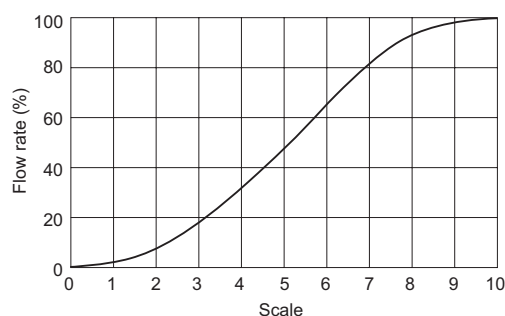
- Use the valve in combination with a line filter with a filtration accuracy of 10 μm or better. When controlling flow rate of 0.02 L/min or less, ensure that the contamination of the hydraulic fluid goes no higher than NAS contamination class 8.
- To ensure good pressure compensation performance, maintain a pressure difference of 1 MPa {10 kgf/cm²} minimum between the inlet and outlet ports.
- When a flow control valve with check valve is required, order SMC-02-05-10 on Page F-19 separately and stack it with the valve.

Performance curves (viscosity: 32 mm²/s {cSt})

Flow rate - Pressure fluctuation characteristics
Pressure difference between inlet and outlet ports:
1 to 7 MPa {10 to 70 kgf/cm²}



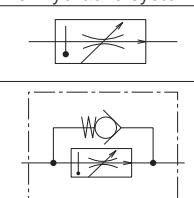
Scale - Flow rate characteristics
Pressure difference between inlet and outlet ports:
3.5 MPa {35 kgf/cm²}



Flow Control Valves and Flow Control Valves with Check Valve (with Pressure/Temperature Compensation Control)



JIS graphic symbols for hydraulic system



Features

- The valves with pressure/temperature compensation control can maintain the set flow rate regardless of changes in the load pressure and fluid temperature.
- Capable of flow control over a wide range from minimal flow rate to high quantity flow rate.
- The four full turns of the flow rate adjusting handle make fine adjustment and resetting easy.
- Options such as a flow rate adjusting handle locking key and jumping prevention structure are available.

Nomenclature

※	-	JF	※	-	G	※	※	-	※	※	※	※	-	※	※	-	※	※
1		2	3		4	5			6	7		8	9					

1 Applicable fluid code

No designation: Petroleum-based hydraulic fluid,
water-glycol hydraulic fluid
F: Phosphate ester hydraulic fluid

2 Model No.

JF: J series flow control valve

3 Check valve code

No designation: Without check valve
C: With check valve

4 Connections

G: Gasket mount type

5 Nominal diameter

02: 1/4
03: 3/8

6 Maximum control flow rate

30: 30 L/min
105: 105 L/min

7 Design No.

(The design No. is subject to change)

15: Basic model JF -G02, JFC-G02
16: Basic model JF -G03
17: Basic model JFC-G03

8 Option code I

No designation: Without flow rate adjusting handle locking key
L: With flow rate adjusting handle locking key

9 Option code II

No designation: Without jumping prevention structure
N: With jumping prevention structure

Specifications

Model code	Nominal diameter	Maximum operating pressure MPa {kgf/cm ² }	Flow rate adjustment range*1 L/min	Free flow L/min	Check valve Cracking pressure MPa {kgf/cm ² }	Mass kg
JF -G02- 30-15	1/4	21 {210}	Up to 30	30	0.035 {0.35}	3.9
JFC -G02- 30-15						
JF -G03-105-16	3/8	21 {210}	Up to 105	105	0.035 {0.35}	8.3
JFC -G03-105-17						

Note: *1 The minimum control flow rate varies depending on the pressure difference between the inlet and outlet ports. See the valve differential pressure - minimum control flow rate characteristics for details.

Sub-plate model code

- The sub-plate is not provided with the valve. Order it separately if required by specifying the model code given in the table below.

Model code	Nominal diameter	Connection port diameter	Mass kg
JF-02M03	1/4	Rc3/8	2.3
JF-02M04		Rc1/2	
JF-03M	3/8	Rc3/8	3.2
JF-03M06		Rc3/4	
JF-03M08		Rc1	4.5

Refer to Page S-7 for the dimensions of the sub-plate.

Accessories

Model No.	Hexagon socket head cap bolt	Quantity	Tightening torque N·m {kgf·cm}
JF (C) -G02	M 8 × 55	4	25 to 30 {250 to 300}
JF (C) -G03	M10 × 80	4	48 to 63 {480 to 630}

Handling

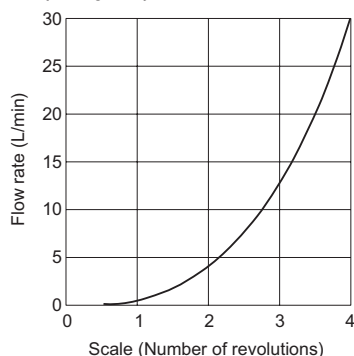
- When controlling a flow rate of 0.2 L/min or less with JF(C)-G02 or 0.5 L/min or less with JF(C)-G03, use the valve in combination with a line filter with a filtration accuracy of 10 μm or better.
- To ensure good pressure compensation performance, maintain a pressure difference of 1 MPa {10 kgf/cm²} minimum between the inlet and outlet ports.
- Seal the O-ring (Part No. 25 in the sectional structural diagram) at the rear of the flow rate adjusting handle with the gasket face.

Performance curves (viscosity: 32 mm²/s {cSt})

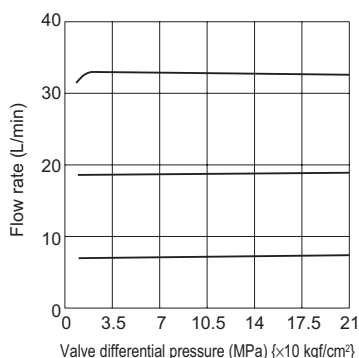
● JF(C)-G02

Scale - Flow rate characteristics

Pressure difference between inlet and outlet ports:
21 MPa {210 kgf/cm²}



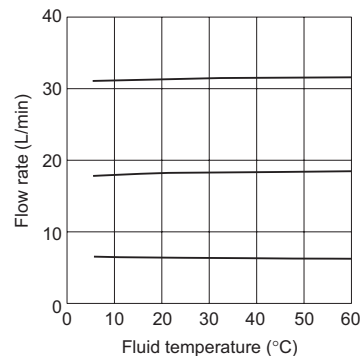
Valve differential pressure -
Flow rate characteristics



Fluid temperature - Flow rate characteristics

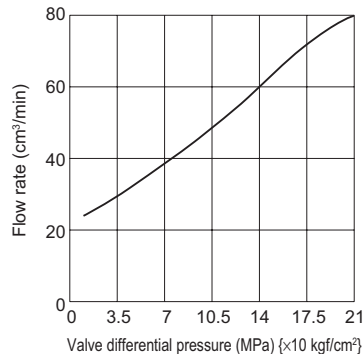
Pressure difference between inlet and outlet ports: 21 MPa {210 kgf/cm²}

Fluid used: equivalent to ISO VG32



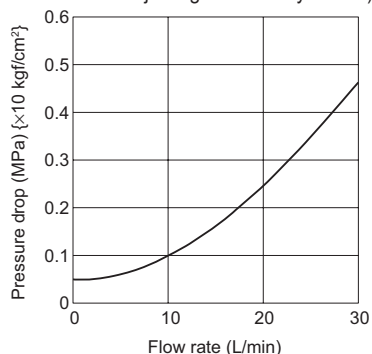
Valve differential pressure -

Minimum control flow rate characteristics



Free Flow pressure drop characteristics

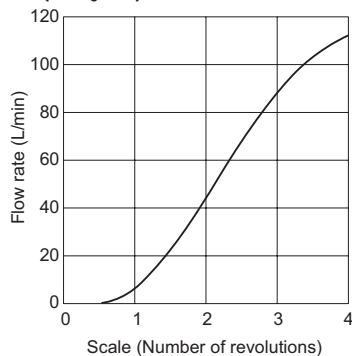
(with the flow rate adjusting section fully closed)



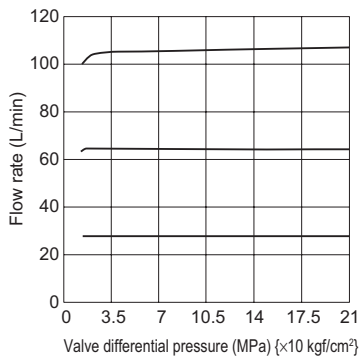
● JF(C)-G03

Scale - Flow rate characteristics

Pressure difference between inlet and outlet ports:
21 MPa {210 kgf/cm²}



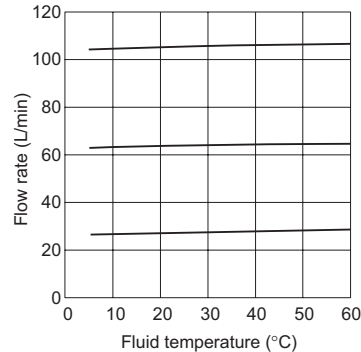
Valve differential pressure -
Flow rate characteristics



Fluid temperature - Flow rate characteristics

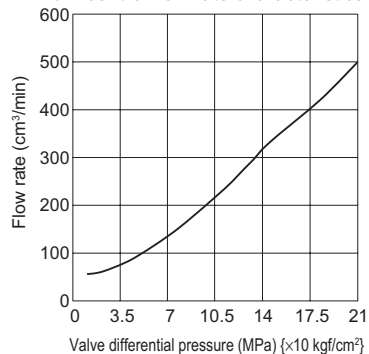
Pressure difference between inlet and outlet ports: 21 MPa {210 kgf/cm²}

Fluid used: equivalent to ISO VG32



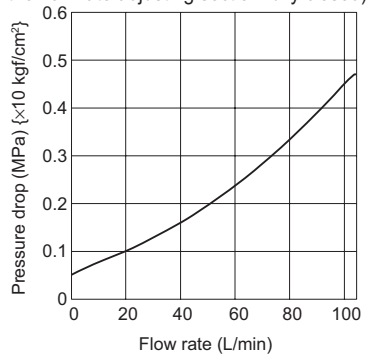
Valve differential pressure -

Minimum control flow rate characteristics

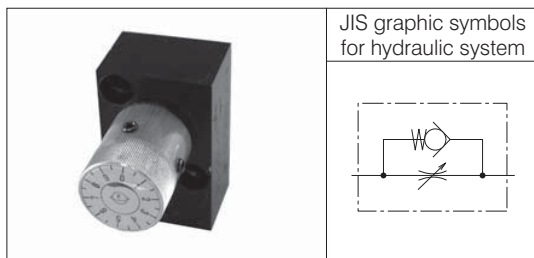


Free flow pressure drop characteristics

(with the flow rate adjusting section fully closed)



Compact Throttle Valve with Check Valve



Features

- The built-in check valve controls the flow in one direction while keeping free flow in the other direction.
- Capable of flow rate control of minimal flow rate to the fully closed state.

Nomenclature

TSC - **※** **01** - **※** **※**

1 2 3 4

1 Model No.

TSC: Compact throttle valve with check valve

2 Connections

G: Gasket mount type

T: Screw connection type

3 Nominal diameter

01: 1/8

4 Design No. (The design No. is subject to change)

No designation: Screw connection type (T) connection

11: Gasket mount type (G) connection

Specifications

Model code	Nominal diameter	Maximum operating pressure MPa {kgf/cm ² }	Maximum control flow rate L/min	Check valve Cracking pressure MPa {kgf/cm ² }	Mass kg
TSC-G01-11	1/8	7 {70}	See the performance curves.	0.1 {1}	0.2
TSC-T01				0.08 {0.8}	0.1

Accessories (gasket mount type)

Hexagon socket head cap bolt	Quantity	Tightening torque N·m {kgf·cm}
M5 × 22	2	5.5 to 7.5 {55 to 75}

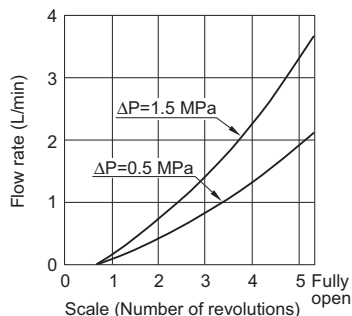
Handling

- Turning the flow rate adjusting handle counterclockwise increases the flow rate. After adjusting the flow rate, tighten the handle locking screw to keep the adjusted position.
- The handle locking screw stops the handle from coming off, so do not loosen it too far.
- There is no special sub-plate provided.

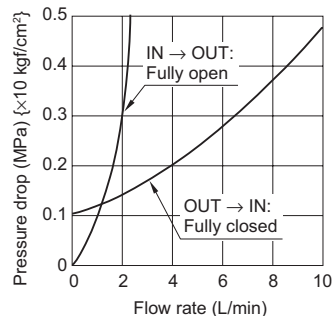
Performance curves (viscosity: 32 mm²/s {cSt})

● TSC-G01

Scale - Flow rate characteristics

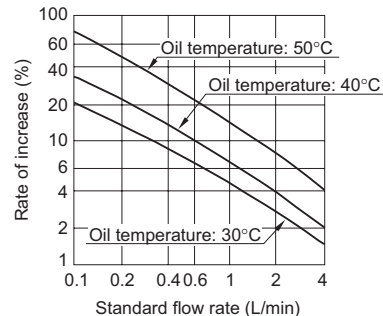


Pressure drop characteristics



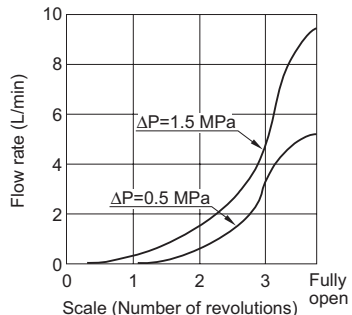
● TSC-※01

Fluid temperature - Flow rate characteristics

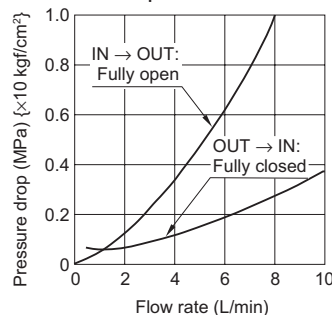


● TSC-T01

Scale - Flow rate characteristics



Pressure drop characteristics



Conditions for the fluid temperature - Flow rate characteristics curve

Oil usable	Equivalent to ISO VG32
Pressure difference between inlet and outlet ports	3 MPa {30 kgf/cm ² }
Standard flow rate	Flow rate at fluid temperature of 20°C

Throttle Valves (with Temperature Compensation Control)



JIS graphic symbols for hydraulic system



Features

- The temperature compensation control maintains the set flow rate regardless of changes in the fluid temperature.
- Adopts a structure that minimizes fluid leakage in the fully closed state.

Nomenclature

※ - ST - G 02 - ※ ※ - 10

1 2 3 4 5 6

1 Applicable fluid code

No designation: Petroleum-based hydraulic fluid, water-glycol hydraulic fluid
F: Phosphate ester hydraulic fluid

2 Model No.

ST: S series throttle valve

3 Connections

G: Gasket mount type

4 Nominal diameter

02: 1/4

5 Maximum control flow rate

2: 2 L/min (Pressure difference: 2 MPa {20 kgf/cm²})
10: 10 L/min (Pressure difference: 2 MPa {20 kgf/cm²})

6 Design No.

(The design No. is subject to change)

Specifications

Model code	Nominal diameter	Maximum operating pressure MPa {kgf/cm ² }	Maximum control flow rate*1 L/min	Mass kg
ST-G02- 2-10	1/4	7 {70}	2	0.6
ST-G02-10-10			10	

Note: *1 The maximum control flow rates indicated are the values when the pressure difference between the inlet and outlet ports is 2 MPa {20 kgf/cm²}.

Sub-plate model code

- The sub-plate is not provided with the valve. Order it separately if required by specifying the model code given in the table below.

Model code	Nominal diameter	Connection port diameter	Mass kg
SF-02M	1/4	Rc1/4	0.5

Refer to Page S-7 for the dimensions of the sub-plate.

Accessories

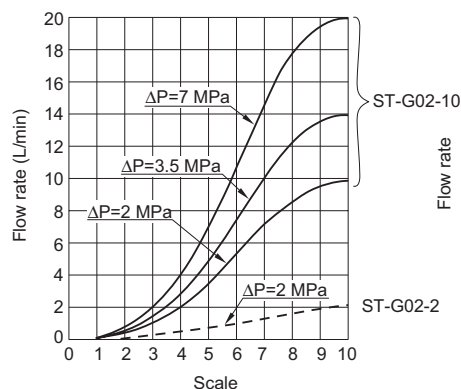
Hexagon socket head cap bolt	Quantity	Tightening torque N·m {kgf·cm}
M6 × 30	2	10 to 12.5 {100 to 125}

Handling

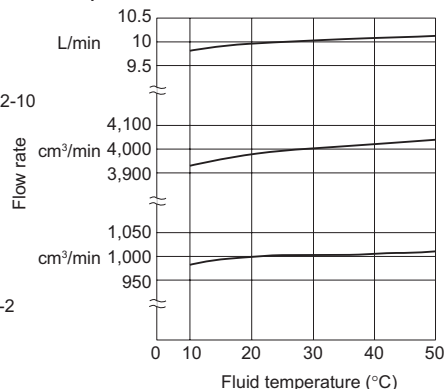
- Use the valve in combination with a line filter with a filtration accuracy of 10 μm or better.
- When a throttle valve with check valve is required, order SMC-02-05-10 on Page F-19 separately and stack it with the valve.

Performance curves (viscosity: 32 mm²/s {cSt})

Scale - Flow rate characteristics



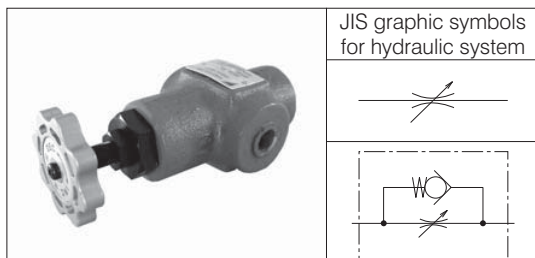
Fluid temperature - Flow rate characteristics



Conditions for the fluid temperature - Flow rate characteristics curve

Oil usable	Equivalent to ISO VG32
Pressure difference between inlet and outlet ports	3.5 MPa {35 kgf/cm ² }

Throttle Valves/Throttle Valves with Check Valve



JIS graphic symbols for hydraulic system

Features

- Well balanced structure for pressure enables easy operation of the handle even at a high pressure.
- The compact design minimizes the installation space.
- Facilitates fine adjustment of the flow rate.

Nomenclature



1 Applicable fluid code

No designation: Petroleum-based hydraulic fluid, water-glycol hydraulic fluid
F: Phosphate ester hydraulic fluid

2 Model No.

HDFT: H series throttle valve

3 Check valve code

No designation: Without check valve
C: With check valve

4 Connections

G: Gasket mount type
T: Screw connection type
F: Flange connection type

5 Nominal diameter

03: $\frac{3}{8}$
06: $\frac{3}{4}$
10: $1\frac{1}{4}$
16: 2

Specifications

Model code	Nominal diameter	Maximum operating pressure MPa {kgf/cm ² }	Maximum control flow rate L/min	Check valve Cracking pressure MPa {kgf/cm ² }	Mass kg
HDFT(C)-G03	3/8	21 {210}	30	0.2 {2}	2.7
HDFT(C)-T03					1.5
HDFT(C)-G06	3/4		75		4.2
HDFT(C)-T06					3.6
HDFT(C)-F06					9.5
HDFT(C)-G10	1 1/4		190	0.15 {1.5}	11
HDFT(C)-T10					9.4
HDFT(C)-F10					11* ¹
HDFT(C)-F16	2		470	0.2 {2}	21* ¹

Note: *¹ The mass of the flange mount type valve includes the mass of the flange and bolts.

Sub-plate model code

- The sub-plate is not provided with the valve. Order it separately if required by specifying the model code given in the table below.

Model code	Nominal diameter	Connection port diameter	Mass kg
HDFT-03M	$\frac{3}{8}$	Rc $\frac{3}{8}$	1.7
HDFT-06M	$\frac{3}{4}$	Rc $\frac{3}{4}$	3
HDFT-10M	$1\frac{1}{4}$	Rc $1\frac{1}{4}$	8

Refer to Page S-7 for the dimensions of the sub-plate.

Accessories

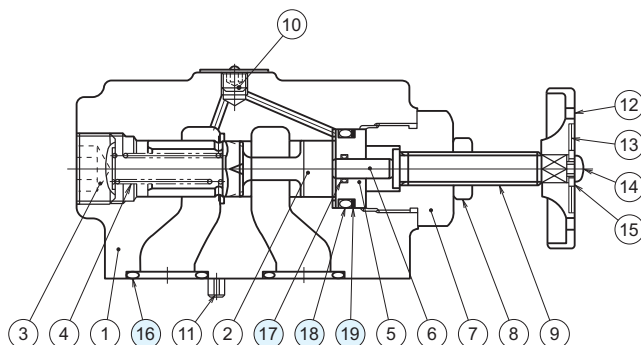
Connections	Model No.	Hexagon socket head cap bolt	Quantity	Tightening torque Nm {kgfcm}
Gasket mount type	HDFT(C)-G03	M10 × 70	4	48 to 63 {480 to 630}
	HDFT(C)-G06	M10 × 80	4	48 to 63 {480 to 630}
	HDFT(C)-G10	M12 × 45	6	92 to 122 {920 to 1220}
Flange connection type	Flange (JIS B 2291 SSA), O-ring, mounting bolts.			

Handling

- The flow rate will not be zero even when the flow rate adjusting handle is fully tightened due to the spool type configuration.
- The throttle valves can control the flow in both directions. However, with throttle valves with check valve, the flow in the reverse direction will be free flow.

Sectional structural diagram

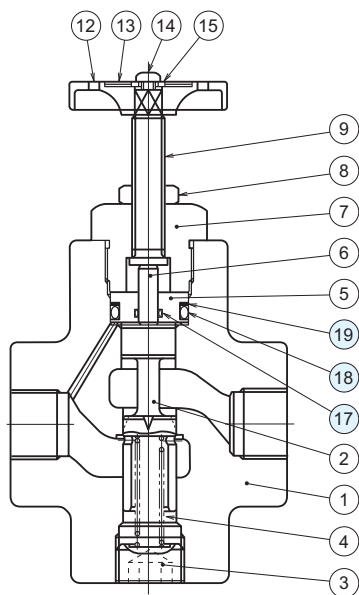
HDFT(C)-G**



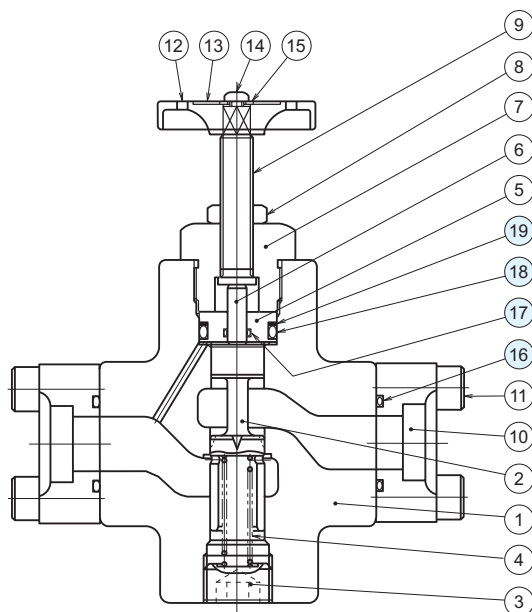
Sealing part table

Part No.	Name	Quantity	Part specifications		
			HDFT(C)-G03	HDFT(C)-G06	HDFT(C)-G10
16	O-ring	2	JIS B 2401 1B P18	JIS B 2401 1B G25	JIS B 2401 1B G35
17	O-ring	1	JIS B 2401 1B P5	JIS B 2401 1B P7	JIS B 2401 1B P8
18	O-ring	1	JIS B 2401 1B P20	JIS B 2401 1B P22.4	JIS B 2401 1B P36
19	Backup ring	1	JIS B 2407 Spiral P20	JIS B 2407 Spiral P22.4	JIS B 2407 Spiral P36

HDFT(C)-T**



HDFT(C)-F**



Sealing part table

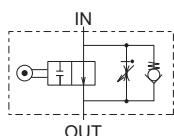
Part No.	Name	Quantity	Part specifications		
			HDFT(C)-T03	HDFT(C)-T06	HDFT(C)-T10
17	O-ring	1	JIS B 2401 1B P5	JIS B 2401 1B P7	JIS B 2401 1B P8
18	O-ring	1	JIS B 2401 1B P20	JIS B 2401 1B P22.4	JIS B 2401 1B P36
19	Backup ring	1	JIS B 2407 Spiral P20	JIS B 2407 Spiral P22.4	JIS B 2407 Spiral P36

Part No.	Name	Quantity	Part specifications		
			HDFT(C)-F06	HDFT(C)-F10	HDFT(C)-F16
16	O-ring	2	JIS B 2401 1B G30	JIS B 2401 1B G40	JIS B 2401 1B G60
17	O-ring	1	JIS B 2401 1B P7	JIS B 2401 1B P8	JIS B 2401 1B P8
18	O-ring	1	JIS B 2401 1B P22.4	JIS B 2401 1B P36	JIS B 2401 1B P48
19	Backup ring	1	JIS B 2407 Spiral P22.4	JIS B 2407 Spiral P36	JIS B 2407 Spiral P48

Throttle Valve with Rotary Type Deceleration Valve (with Temperature Compensation Control)



JIS graphic symbols for hydraulic system



Features

- The temperature compensation control maintains the set flow rate regardless of changes in the fluid temperature.
- Available in a variety of configurations according to the moving direction of the table and piping direction.
- Capable of controlling the sequence: rapid forward → slow forward → rapid return.

Nomenclature

※ - SFD - ※ ※ ※ ※ - 10

1 2 3 4 5 6

1 Applicable fluid code

No designation: Petroleum-based hydraulic fluid,
water-glycol hydraulic fluid
F: Phosphate ester hydraulic fluid

2 Model No.

SFD: S series throttle valve with deceleration valve

3 Connections

G: Gasket mount type
T: Screw connection type

4 Nominal diameter

02: 1/4
03: 3/8 <Applicable to connection type G only>

5 Deceleration operation type

R: Counterclockwise (leftward) rotation to close the rotary valve
L: Clockwise (rightward) rotation to close the rotary valve

6 Design No.

(The design No. is subject to change)

Specifications

Model code	Nominal diameter	Maximum operating pressure MPa {kgf/cm ² }	Free flow L/min	Flow rate adjustment range*1 L/min	Check valve Cracking pressure MPa {kgf/cm ² }	Mass kg
SFD-※02※-10	1/4	5 {50}	12	0.1 to 22	0.1 {1}	1.5
SFD-G03※-10	3/8		30	0.1 to 3.5		2.3

Note: *1 The flow rate adjustment range indicated are the values when the pressure difference between the inlet and outlet ports is 2 MPa {20 kgf/cm²}.

Accessories (gasket mount type)

Model No.	Hexagon socket head cap bolt	Quantity	Tightening torque N·m {kgf·cm}
SFD-G02	M5 × 40	4	5.5 to 7.5 {55 to 75}
SFD-G03	M6 × 50	4	10 to 12.5 {100 to 125}

Handling

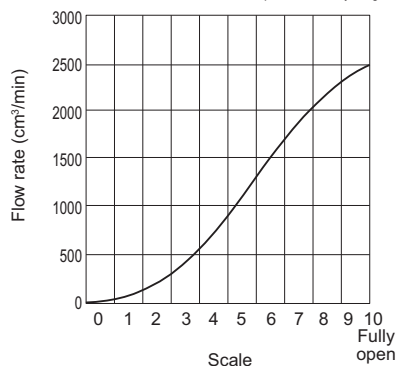
- Use the valve in combination with a line filter with a filtration accuracy of 10 μm or better.
- SFD-※02 is equipped with the check valve locking structure. Lock the check valve to throttle the flow in both directions: IN → OUT and OUT → IN. To lock the check valve, loosen the lock nut and fully screw in the spring support (part No. 4 in the sectional structural diagram), then retighten the lock nut.
- The spring support is normally set at a rotational position where it is loosened by one full turn from the fully tightened position.

Performance curves (viscosity: 32 mm²/s {cSt})

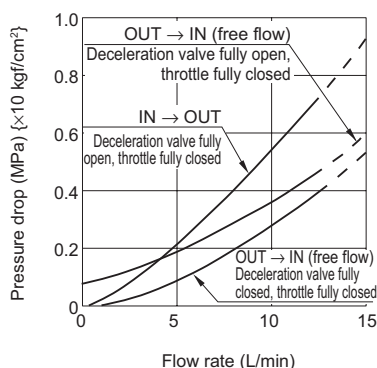
● SFD-※02

Scale - Flow rate characteristics

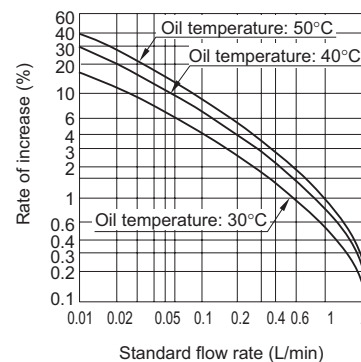
Pressure difference between inlet and outlet ports: 2 MPa {20 kgf/cm²}



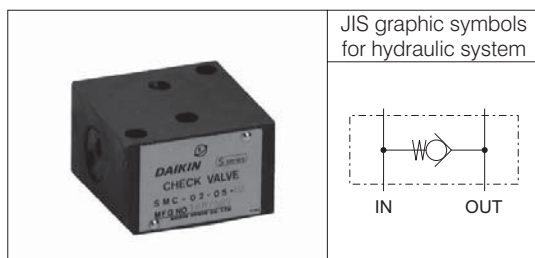
Pressure drop characteristics



Fluid temperature - Flow rate characteristics



Check Valve (for SF-G02, ST-G02)



Features

- These check valves are for flow control valve SF-G02 and throttle valve ST-G02 to be stacked below SF-G02 or ST-G02.

Nomenclature

※	-	SMC	-	02	-	05	-	10
1		2		3		4		5

1 Applicable fluid code

No designation: Petroleum-based hydraulic fluid, water-glycol hydraulic fluid

F: Phosphate ester hydraulic fluid

2 Model No.

SMC: Check valve for S series flow control valve

3 Nominal diameter

02: ¼

4 Cracking pressure code

05: 0.05 MPa {0.5 kgf/cm²}

5 Design No.

(The design No. is subject to change)

Specifications

Model code	Nominal diameter	Maximum operating pressure MPa {kgf/cm ² }	Maximum flow rate L/min	Cracking pressure MPa {kgf/cm ² }	Mass kg
SMC-02-05-10	¼	7 {70}	30	0.05 {0.5}	0.5

Handling

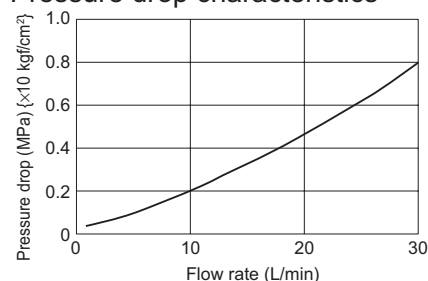
- Mounting bolts are not provided with the valve. Use the bolts indicated below.

Stack valve model	Hexagon socket head cap screws	Quantity	Tightening torque N·m {kgf·cm}
SF-G02	M6 × 80	2	10 to 12.5 {100 to 125}
ST-G02	M6 × 60	2	10 to 12.5 {100 to 125}

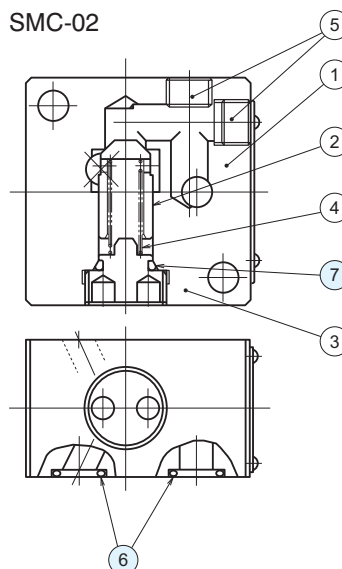
- Order SF-02M separately as the sub-plate. Refer to Page S-7 for the dimensions of the sub-plate.

Performance curves (viscosity: 32 mm²/s {cSt})

Pressure drop characteristics



Sectional structural diagram



Sealing part table

Part No.	Name	Quantity	Part specifications
6	O-ring	2	JIS B 2401 1B P9
7	O-ring	1	JIS B 2401 1B P10

Flow Control Valve with Digital Handle



Features

- Digitally displays the rotational position of the pressure adjusting handle.
- Extremely convenient in applications where frequent pressure adjustment is required

Specifications

Scale change per revolution	Handle turning torque N·m {kgf·cm}	Mass kg
100	0.4 {4} maximum	0.4

Nomenclature

● Flow control valve

※ - JF ※ - G ※※ - ※※※ - ※※ ※ D ※

1 2 3 4 5 6 7 9 10 11

● Throttle valve

※ - HDFT ※ - ※ ※※ D ※

1 2 3 4 5 10 11

10 Option code

D: With digital handle

11 Direction of the digital handle

U: Digital scale oriented upward
D: Digital scale oriented downward
R: Digital scale oriented leftward
L: Digital scale oriented rightward

Note: With JF(C)-G※※, it is not possible to select the specifications with the digital handle if specifications with the flow rate adjustment handle locking key (option code: L) are selected.

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