NACHI

ELECTRO-HYDRAULIC PROPORTIONAL FLOW CONTROL VALVE

Electro-hydraulic Proportional Flow Control Valve

0.5 to 500ℓ/min
21MPa

ES-G**

OUT

0   M   IN   DR

CES-G**

OUT

0   M   IN   DR
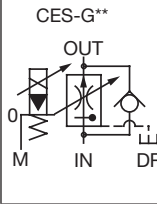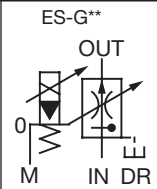
Features

This valve controls actuator speed in response to the size of input current. Pressure and control oil temperature fluctuation has little effect on setting pressure, which enables high-precision speed control. This valve is the perfect choice for actuator acceleration and deceleration control, and remote control.

● Handling

1 Air Bleeding
To enable proper pressure control, loosen the air vent when starting up the pump in order to bleed any air from the pump, and fill the inside of the solenoid with hydraulic operating fluid. The position of the air vent can change by loosening the M4 screw and rotating the cover.

2 Manual Flow Rate Adjusting Screw
For the initial adjustment or when there is no input current to the valve due to an electrical problem or some other reason, the flow rate can be increased by rotating the manual adjustment screw clockwise (rightward). Normally, this adjusting screw should be returned completely to its original position and secured with the lock nut.

3 Drain Port
Make sure that back pressure is no greater than 0.2MPa {2kgf/cm²}, and that his port is connected directly to the fluid tank at a point that is below the oil surface.
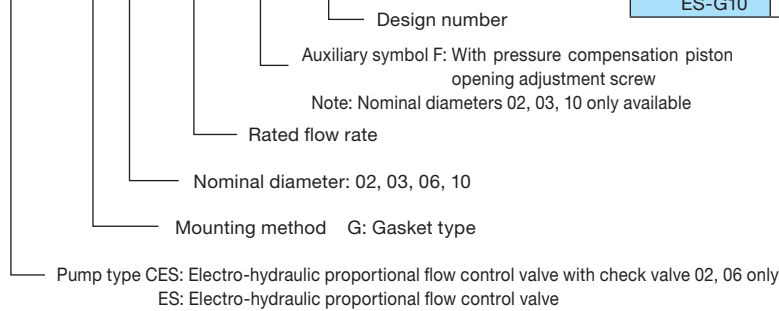
Specifications

Model No. \ Item	(C)ES-G02-10/30-(F)-12	ES-G03-60/125-(F)-12	(C)ES-G06-250-11	ES-G10-500-(F)-11
Maximum Operating Pressure MPa{kgf/cm²}	21{214}	21{214}	21{214}	21{214}
Flow Rate Control Range ℓ/min	0.5 to 10/0.5 to 30	2 to 60/2 to 125	5 to 250	15 to 500
Minimum Allowable Valve Pressure Differential MPa{kgf/cm²}	1.0{10}(Note1)	1.3{13.3}(Note1)	1.5{15.3}(Note1)	2{20.4}(Note1)
Reverse Flow Rate ℓ/min (With check valve only)	50	(125)(Note3)	200	–
Hysteresis %	3 max. (Note 2)	3 max. (Note 2)	3 max. (Note 2)	3 max. (Note 2)
Rated Current mA	800	800	800	800
Coil Resistance Ω	20 (20°C)	20 (20°C)	20 (20°C)	20 (20°C)
Weight kg	8.5	13	25	55

Note) 1. Control valve inlet and outlet pressure differential required to obtain favorable pressure compensation.
2. Value when a Nachi-Fujikoshi special amplifier is used (with dithering).
3. ES-G03 does not have a built-in check valve, but a sub plate with check valve (Model No. MCF-03-D-22) is available for it.

Explanation of model No.

(C)ES – G 02 – 30 – (F) – 12

- Design number
- Auxiliary symbol F: With pressure compensation piston opening adjustment screw
  Note: Nominal diameters 02, 03, 10 only available
- Rated flow rate
- Nominal diameter: 02, 03, 06, 10
- Mounting method G: Gasket type
- Pump type CES: Electro-hydraulic proportional flow control valve with check valve 02, 06 only
  ES: Electro-hydraulic proportional flow control valve

Model No.	Bolt Size	Q'ty	Tightening Torque N·m{kgf·cm}
(C)ES-G02	M 8× 80ℓ	4	20 to 25{ 205 to 255}
ES-G03	M10× 75ℓ	4	45 to 55{ 460 to 560}
(C)ES-G06	M16×140ℓ	4	190 to 235{1940 to 2400}
ES-G10	M20×160ℓ	4	370 to 460{3770 to 4690}

4 Bundled Accessories (Valve Mounting Bolts)

5 The loss coefficient and control valve can cause resonance when there is a great distance between the flow control valve and actuator (when the pipe internal volume is large). Be sure to keep the distance between the flow control valve and actuator as small as possible, and to avoid the use of flexible hose as much as possible.

6 Sub Plate
See the next page for more information about sub plates.

7 Use an operating fluid that conforms to the both of the following. Oil temperature: –20 to 70°C Kinematic Viscosity: 12 to 400mm²/s. The recommended kinematic viscosity range is 15 to 60mm²/s.

8 Since this valve has a built-in pressure compensation valve, changing of the inertial load (using a high inertial oil motor, etc.) can create the risk of hunching under certain conditions. Contact your sales agent before changing the inertial load.

Note) Use a hex wrench that has a width across flats of 8 to adjust the aperture adjustment screw of nominal diameter 10.
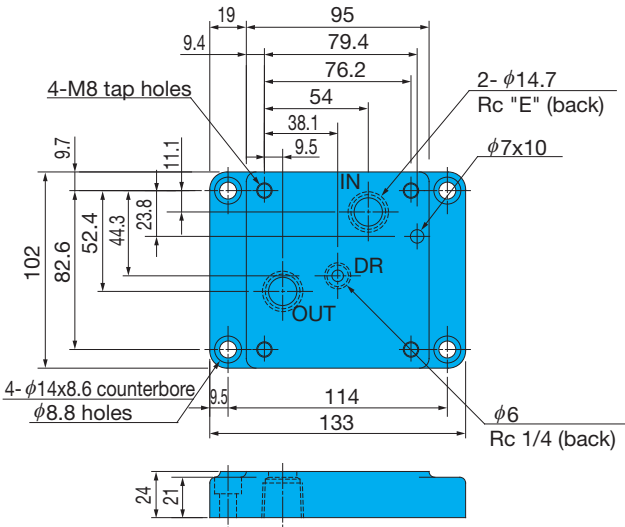
Installation Dimension Drawings
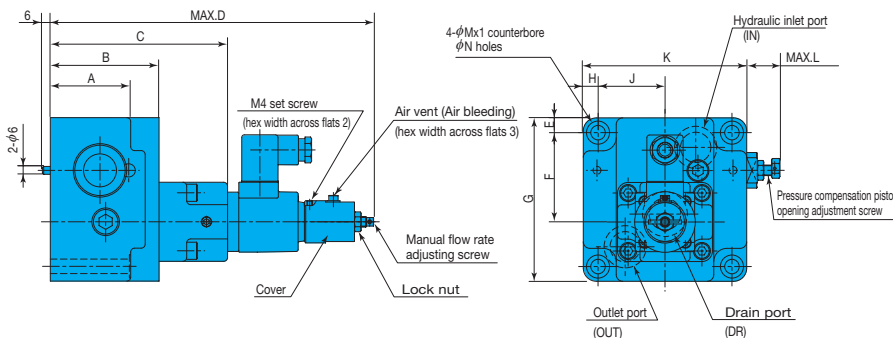
Model No.	A	B	C	D	E	F	G	H	J	K	L	M	N
(C)ES-G02	66	80	132	242.8	9.7	48	102	9.4	38.1	95	22.5	14	8.8
ES-G03	61	82.5	134.5	245.3	11.2	67.8	124	11.2	50.8	124	26	17.5	11
(C)ES-G06	115	130	182	292.8	16.8	104.8	167	17	73	180	–	26	18
ES-G10	137	160	215	326.3	25	148	228	23.5	98.5	244	18	32	22

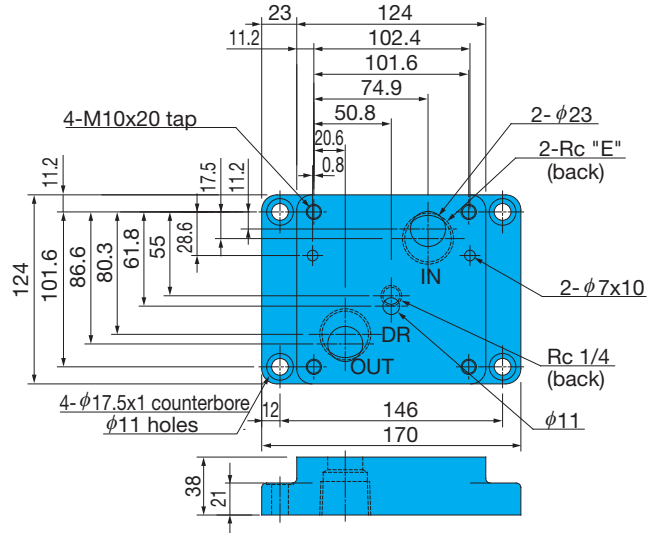· The gasket surface dimensions comply with the ISO standard shown below.
(C) ES-G02…ISO 6263-06-05-0-97
ES-G03…ISO 6263-07-09-0-97
(C) ES-G06…ISO 6263-08-13-0-97
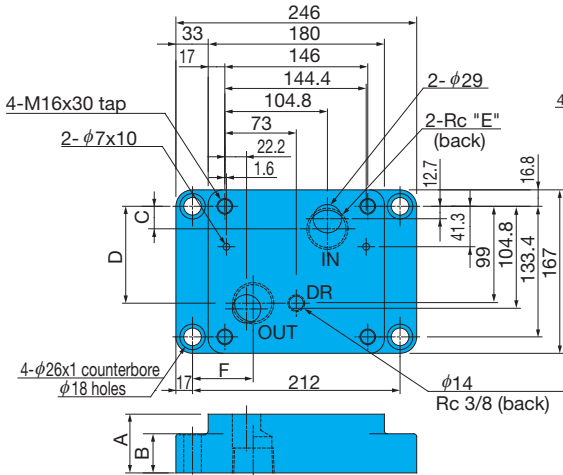
Sub Plate
MES-02*-10

4-M8 tap holes
2- φ14.7 Rc "E" (back)
φ7x10
IN
DR
OUT
4- φ14x8.6 counterbore φ8.8 holes
φ6 Rc 1/4 (back)

9.4 / 19 / 95 / 79.4 / 76.2 / 54 / 38.1 / 9.5
9.7 / 11.1 / 23.8 / 44.3 / 52.4 / 82.6 / 102
9.5 / 114 / 133
24 / 21

MES-03*-10

4-M10x20 tap
2- φ23
2-Rc "E" (back)
2- φ7x10
IN
DR
OUT
Rc 1/4 (back)
4- φ17.5x1 counterbore φ11 holes
φ11

23 / 124 / 11.2 / 102.4 / 101.6 / 74.9 / 50.8 / 20.6 / 0.8
11.2 / 17.5 / 11.2 / 28.6 / 55 / 61.8 / 80.3 / 86.6 / 101.6 / 124
12 / 146 / 170
38 / 21

Model No.	E
MES-02X-10	3/8
MES-02Y-10	1/2

Model No.	E
MES-03Y-10	3/4
MES-03Z-10	1

MES-06*-10

4-M16x30 tap
2- φ7x10
2- φ29
2-Rc "E" (back)
IN
DR
OUT
4- φ26x1 counterbore φ18 holes
φ14 Rc 3/8 (back)

33 / 246 / 180 / 146 / 144.4 / 104.8 / 73 / 22.2 / 1.6 / 17
12.7 / 16.8 / 41.3 / 99 / 104.8 / 133.4 / 167
17 / F / 212
A / B
C / D

Auxiliary Plate with Check Valve
MCF-03-D-22

4- φ10.5 holes
2- φ7x8
φ6
2- φ23
IN
DR
OUT
2- φ32
2- φ6
φ30
IN
DR
OUT

124 / 2 / 11.2 / 102.4 / 101.6 / 81 / 50.8 / 26.7 / 0.8
11.2 / 28.6 / 61.8 / 86.6 / 101.6 / 124
34 / 6 / 0.8 / 102.4
28.6
2
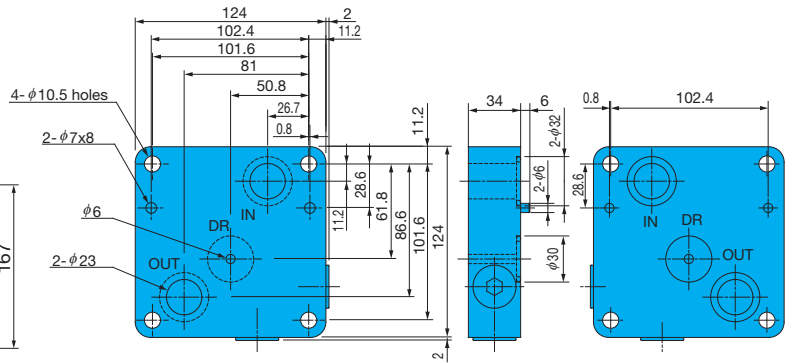
Bundled Items (Mounting Bolts) M10 x 110ℓ (Four)

Model No.	A	B	C	D	E	F
MES-06X-10	45	25	16	104.8	1	55.2
MES-06Y-10	60	40	23	99	1 1/4	62

ES-G10 Mounting Gasket Surface Dimensions

4-M20x30
2- φ7x8 (positioning pin hole)
IN
DR
OUT
2- φ44 φ6

23.5 / 244 / 198.5 / 196.9 / 144.5 / 98.5
1.6 / 35
25 / 18 / 56.1 / 145 / 177.8 / 228
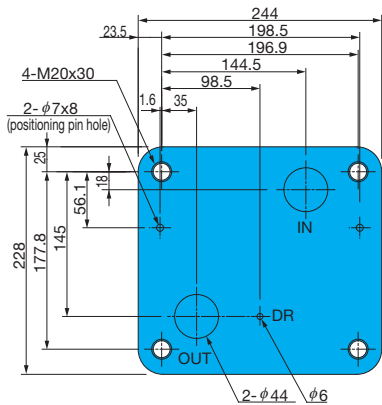
Performance Curves

Hydraulic Operating Fluid Kinematic Viscosity 32mm²/s

Input Current – Flow Rate Characteristics

(C) ES-G02

(C)ES-G02-30
(C)ES-G02-10

ES-G03

ES-G03-125
ES-G03-60

(C) ES-G06

ES-G10
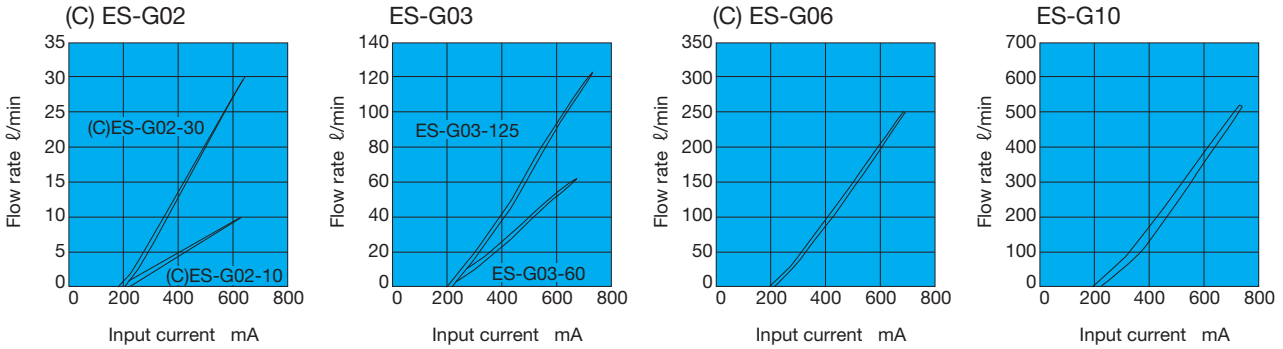
Oil Temperature – Control Flow Rate Characteristics

Supply Pressure   14MPa
Load Pressure   10MPa
Operating Fluid   VG32
Value when a Nachi-Fujikoshi special amplifier is used (with dithering).

Pressure – Control Flow Rate Characteristics

Supply Pressure   21MPa
Operating Fluid   VG32
Oil Temperature   40°C
Value when a Nachi-Fujikoshi special amplifier is used (with dithering).

Part No.	Part Name	Part No.	Part Name
1	Body	17	Pin
2	Cover	18	Spring
3	Piston	19	Spring
4	Sleeve	20	Spring
5	Plug	21	Spring
6	Plug	22	Spring
7	Retainer	23	Spring
8	Sleeve	24	O-ring
9	Spool	25	O-ring
10	Guide	26	O-ring
11	Sleeve	27	O-ring
12	Retainer	28	O-ring
13	Retainer	29	O-ring
14	Sleeve	30	O-ring
15	Piston	31	O-ring
16	Ball	32	Proportional solenoid

Note) Coil model number JD64-D2

Cross-sectional Drawing

ES-G**-*-11 (12)

Manual adjustment section

List of Sealing Parts

Part No.	Part Name	(C) ES-G02		ES-G03		(C) ES-G06		ES-G10	
		Part Number	Q'ty	Part Number	Q'ty	Part Number	Q'ty	Part Number	Q'ty
24	O-ring	NBR-90 P18	2	NBR-90 P26	2	NBR-90 G35	2	NBR-90 P48	2
25	O-ring	NBR-90 P24	1	NBR-90 P28	1	NBR-90 G35	1	NBR-90 P48	1
26	O-ring	–	–	–	–	NBR-90 G35	2	NBR-90 G50	2
27	O-ring	NBR-90 P29	1	NBR-90 P29	1	NBR-90 G45	1	NBR-90 G60	1
28	O-ring	NBR-90 P5	4	NBR-90 P5	4	NBR-90 P8	3	NBR-90 P9	3
29	O-ring	NBR-90 P9	1	NBR-90 P9	1	NBR-90 P9	1	NBR-90 P9	1
30	O-ring	NBR-90 P18	1	NBR-90 P20	1	NBR-90 G55	1	NBR-90 G75	2
31	O-ring	NBR-90 P30	1	NBR-90 P38	1	NBR-90 P50	1	NBR-90 G75	1
Seal Kit Number		JFS-G02		JFS-G03		JFS-G06		JFS-G10	

Note) The materials and hardness of the O-ring conforms with JIS B2401.

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Electro-hydraulic control valve