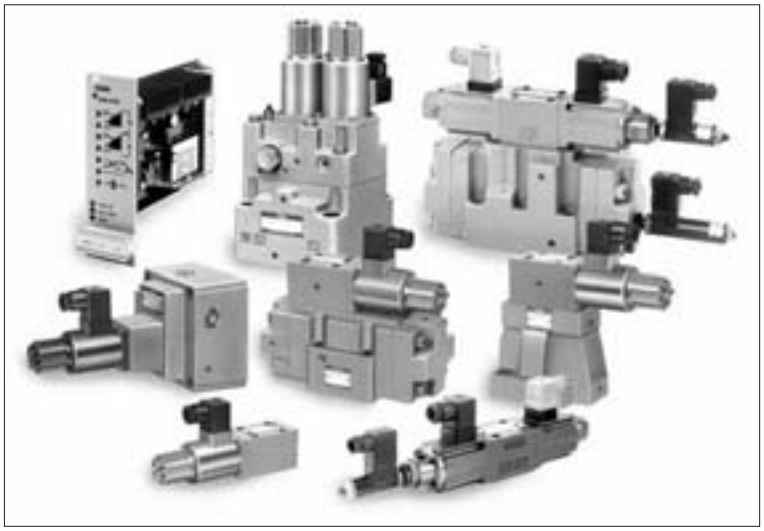
H

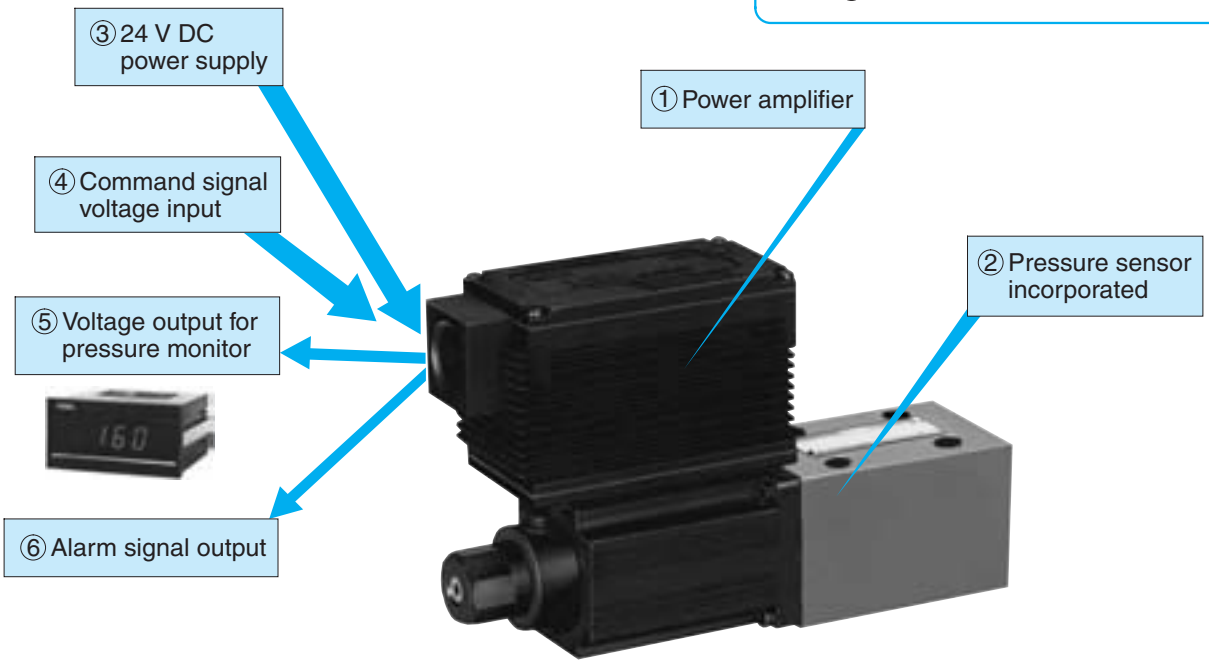
PROPORTIONAL ELECTRO-HYDRAULIC CONTOROLS



High-accuracy, simple, convenient
EH Series realizes your dreams.

Why simple ?

Highly accurate hydraulic control can be obtained only by supplying 24 V DC power ③[★3] and inputting a command signal voltage of 0 to 5 V ④.[★4]



Details of Proportional Electro-hydraulic Relief Valve

Why high-accuracy ?

The power amplifier ①and pressure sensor ②[★1] are integrated in the control valve.
Furthermore, the closed-loop control [★2] design greatly improves the linearity, hysteresis and stability in control pressure.

Why convenient ?

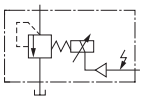
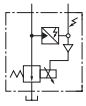
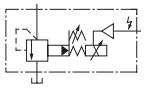
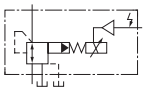
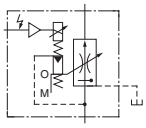
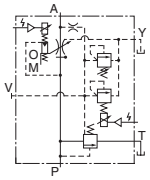
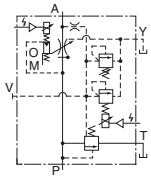
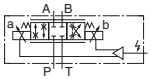
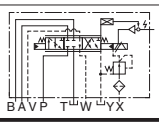
Analog voltages can be output by using the incorporated sensor for monitoring pressure, etc. ⑤[★5].
Pressure can be displayed remotely with the indicators obtainable in the market and also can be transmitted into a computer.

If any trouble arises in the system and the command signal does not match to the output, the alarm signal ⑥ is dispatched.
The trouble, if arises, can be easily detected by monitoring the dispatch of the alarm signal with sequence controller or computer.

★1. The sensor in directional control valves is to monitor the spool position. Valves without sensor are also available in both pressure control valves and directional control valves.
★2. Open-loop types are also available.
★3. EHDFG-04 and 06: ±24V DC power supply is needed.
★4. EHDFG-01, 03, 04 and 06: 0 to ±5V DC command signal is needed.
★5. EHDFG-04 and 06: The spool displacement is shown as a percentage.

EH Series-Hybrid Components

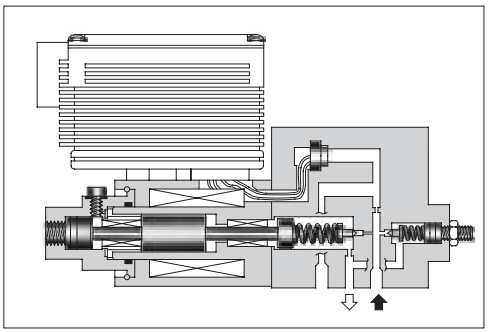
Proportional Electro-Hydraulic Controls

Types	Graphic Symbols	Max. Operating Pressure MPa (PSI)	Maximum Flow U.S.GPM .5 1 2 3 5 10 20 30 50 100 200 / L/min 1 2 3 5 10 20 30 50 100 200 300 500 1000	Page
Pilot Relief Valves		24.5 (3550)	EHDG 01	658
Pressure Control Valves		SB1110: 24.5(3550) SB1190: 7(1020)	SB1110 / SB1190	659
Relief Valves		24.5 (3550)	EHBG 03 06 10	660
Relieving and Reducing Valves		24.5 (3550)	EHRBG 06 10	661
Flow Control (and Check) Valves		03: 20.6 (2990) 06: 24.5 (3550)	EHFG EHFCG 03 06	662
Flow Control and Relief Valves		24.5 (3550)	EHFBG 03 06 10	663
High Flow Series Flow Control and Relief Valves		24.5 (3550)	EHFBG 03 06	664
Directional and Flow Control Valves		24.5 (3550)	EHDFG 01 03	665
High Respones Type Directional and Flow Control Valves		15.7 (2280)	EHDFG 04 06	666

Consult Yuken when detailed material such as dimensions figures is required.

Proportional Electro-Hydraulic Pilot Relief Valves

The valve can be used as a pilot valve of the Proportional Electro-Hydraulic Control Valves.
The valve can also be used as a relief valve for the hydraulic system where a small flow rate and continuous pressure control are required.

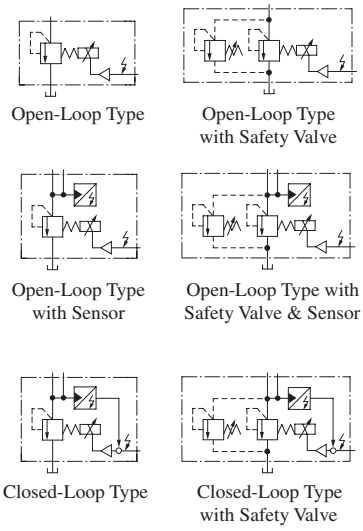


Specifications

Description \ Model Numbers	EHDG-01∗
Max. Operating Pres.	24.5 MPa (3550 PSI)
Max. Flow	2 L/min (.53 U.S.GPM)
Min. Flow	0.3 L/min (.08 U.S.GPM)
Pressure Adjustment Range	Refer to Model Number Designation
Coil Resistance	10 Ω
Hysteresis	3% (1%)★1 or less
Repeatability	1%★2 or less
Frequency Response	B: 10 (27) Hz★1 C: 10 (27) Hz★1 (-90 degree) H: 12 (27) Hz★1
Supply Electric Power	24 V DC (21 to 28 V DC Included Ripple)
Power Input (Max.)	28 W
Input Signal	B: 6.9 MPa (1000 PSI) / 5 V DC C: 15.7 MPa (2275 PSI) / 5 V DC H: 24.5 MPa (3550 PSI) / 5 V DC
Input Impedance	10 kΩ
Alarm Signal Output (Open Collector)	Voltage: Max. 30 V DC Current: Max. 40 mA
Pressure Signal Output	B: 5 V DC / 6.9 MPa (1000 PSI) C: 5 V DC / 15.7 MPa (2275 PSI) H: 5 V DC / 24.5 MPa (3550 PSI)
Ambient Temperature	0 - 50°C (32 - 122°F) (With Circulated Air)

★1. The value in ( ) is for the closed-loop type.
★2. The repeatability of the valve is obtained by having it tested independently on the conditions similar to its original testing.

Graphic Symbols



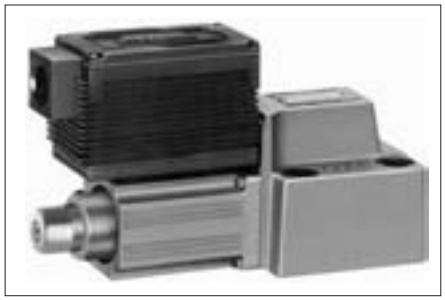
Model Number Designation

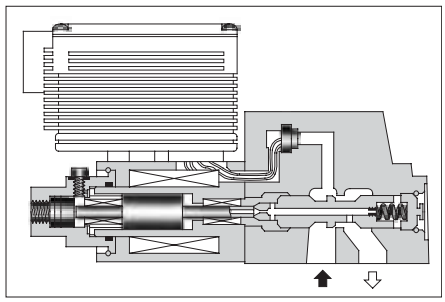
F-	EHD	G	-01	V	-B	-S	-1	-PN	T15	M10	-50
Special Seals	Series Number	Type of Mounting	Valve Size	Applicable Control	Pres. Adj. Range MPa (PSI)	Control Type	Safety Valve	P-Line Orifice	T-Line Orifice	P-B Line Orifice	Design Number
F: Special Seals for Phosphate Ester Type Fluid (Omit if not required)	**EHD**: Proportional Electro-Hydraulic Pilot Relief Valve	**G**: Sub-plate Mounting	**01**	**None**: For general use **V**: Vent Control of Relief Valve (Omit if not required)	**B**: 0.5 - 6.9 (70 - 1000) **C**: 1 - 15.7 (145 - 2275) **H**: 1.2 - 24.5 (175 - 3550)	**None**: Open-Loop **S**: Open-Loop with Sensor **L**: Closed-Loop★1	**None**: Without Safety Valve **1**: With Safety Valve	**PN**: Without Orifice (Standard)	**T15** **T13** **T11** ★2	— **M10**: Standard Orifice	**50**

★1. For closed-loop models, specify applicable control code "V" even though the valve may not be used as vent control of relief valve.
★2. Standard of T-line Orifice.
Pres. Adj. Range B:T15, C:T13, H:T11.

Proportional Electro-Hydraulic Pressure Control Valves

These are closed-loop type pressure control valves controlling the system pressure from low to high in proportion to the input voltage. The stable pressure control is possible even in a small flow rate.



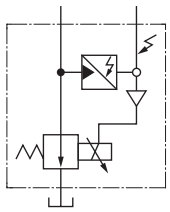


Specifications

Description \ Model Numbers	SB1110	SB1190
Max. Operating Pres.	B: 6.9 MPa (1000 PSI) H: 24.5MPa (3550 PSI)	7.0MPa (1020 PSI)
Max. Flow	30 L /min (7.93 U.S.GPM)	70 L /min (18.49 U.S.GPM)
Min. Flow	B: 0.5 L/min (.13 U.S.GPM) H: 0.5 L/min (.13 U.S.GPM) at 0.2 - 6.9 MPa (29 - 1000 PSI) 1.5 L/min (.40 U.S.GPM) at 6.9 - 15.7 MPa (1000 - 2275 PSI) 3.0 L/min (.79 U.S.GPM) at 15.7 - 24.5 MPa (2275 - 3550 PSI)	1 L /min (.26 U.S.GPM)
Pressure Adjustment Range	Refer to Model Number Designation	
Coil Resistance	10 Ω	
Hysteresis	1 % or less	1.5 % or less
Repeatability	1 % ★1 or less	
Supply Electric Power	24 V DC (21 to 28 V DC Included Ripple)	
Power Input (Max.)	28 W	
Input Signal	B: 6.9 MPa (1000 PSI) / 5 V DC H: 24.5 MPa (3550 PSI) / 5 V DC	7.0 MPa (1020 PSI) / 5 V DC
Input Impedance	10 kΩ	
Alarm Signal Output (Open Collector)	Voltage: Max. 30 V DC Current: Max. 40 mA	
Pressure Signal Output	B: 5 V DC / 6.9 MPa (1000 PSI) H: 5 V DC / 24.5 MPa (3550 PSI)	5 V DC / 7.0 MPa (1020 PSI)
Ambient Temperature	0 - 50˚C (32 - 122˚F) (With Circulated Air)	

★1. The repeatability of the valve is obtained by having it tested independently on the conditions similar to its original testing.

Graphic Symbol



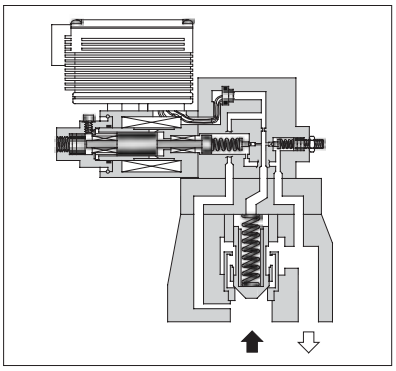
Model Number Designation

F-	SB1110	-B	-20
Special Seals	Series Number	Pres. Adj. Range MPa (PSI)	Design Number
F: Special Seals for Phosphate Ester Type Fluid (Omit if not required)	**SB1110**: Proportional Electro-Hydraulic Pressure Control Valve (3/8, Sub-plate mounting)	**B**: 0.2★- 6.9 (29 - 1000) **H**: 0.2★ - 24.5 (29 - 3550)	**20**
	SB1190: Proportional Electro-Hydraulic Pressure Control Valve (3/4, Sub-plate mounting)	**B**: 0.2★ - 7.0 (29 - 1020)	**10**

★ The minimum adjustable pressure is the value obtained at maximum flow rate.

Proportional Electro-Hydraulic Relief Valves

These valves, consist of a small size but high performance EH series electro-hydraulic proportional pilot relief valve and a low noise type relief valve. The valves control the system pressure proportionally through a controlled input voltage.

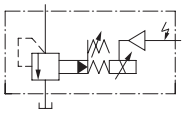


Specifications

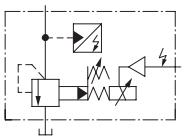
Description \ Model Numbers	EHBG-03	EHBG-06	EHBG-10
Max. Operating Pres.	24.5 MPa (3550 PSI)		
Max. Flow	100 L/min (26.4 U.S.GPM)	200 L/min (52.8 U.S.GPM)	400 L/min (106 U.S.GPM)
Min. Flow	3 L/min (.79 U.S.GPM)	3 L/min (.79 U.S.GPM)	3 L/min (.79 U.S.GPM)
Pressure Adjustment Range	Refer to Model Number Designation		
Coil Resistance	10 Ω		
Hysteresis	2% (1%)★1 or less		
Repeatability	1% ★2 or less		
Frequency Response	C: 10 (22) Hz ★1 H: 10 (25) Hz ★1 (-90 degree)	C: 11 (22) Hz ★1 H: 13 (24.5) Hz ★1 (-90 degree)	C: 7 (10.5) Hz ★1 H: 6 (14) Hz ★1 (-90 degree)
Supply Electric Power	24 V DC (21 to 28 V DC Included Ripple)		
Power Input (Max.)	28 W		
Input Signal	C: 15.7 MPa (2275 PSI) / 5 V DC H: 24.5 MPa (3550 PSI) / 5 V DC (At Max. Flow)		
Input Impedance	10 kΩ		
Alarm Signal Output (Open Collector)	Voltage: Max. 30 V DC Current: Max. 40 mA		
Pressure Signal Output	C: 5 V DC / 15.7 MPa (2275 PSI) H: 5 V DC / 24.5 MPa (3550 PSI)		
Ambient Temperature	0 - 50˚C (32 - 122˚F) (With Circulated Air)		

★1. The value in ( ) is for the closed-loop type.
★2. The repeatability of the valve is obtained by having it tested independently on the conditions similar to its original testing.

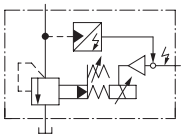
Graphic Symbols



Open-Loop Type



Open-Loop Type with Sensor



Closed-Loop Type

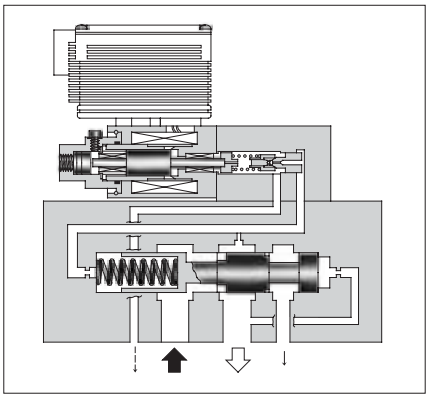
Model Number Designation

F-	EHB	G	-03	-C	-S	-50
Special Seals	Series Number	Type of Mounting	Valve Size	Pres. Adj. Range MPa (PSI)	Control Type	Design Number
F: Special Seals for Phosphate Ester Type Fluid (Omit if not required)	**EHB**: Proportional Electro-Hydraulic Relief Valve	**G**: Sub-plate Mounting	**03**	**C**: 0.6 [0.8]★- 15.7 (85 [115]★- 2275) **H**: 0.6 [0.8]★- 24.5 (85 [115]★- 3550)	**None**: Open-Loop	**50**
			06	**C**: 0.9 [1.0]★- 15.7 (130 [145]★- 2275) **H**: 0.9 [1.0]★- 24.5 (130 [145]★- 3550)	**S**: Open-Loop with Sensor	**50**
			10	**C**: 1.1 [1.4]★- 15.7 (160 [205]★- 2275) **H**: 1.1 [1.4]★- 24.5 (160 [205]★- 3550)	**L**: Closed-Loop	**50**

★Each value of minimum adjustment pressure is of at 50% flow rate of the Max. Flow shown on the Specifications.
The value in [ ] is for the closed-loop type.

Proportional Electro-Hydraulic Relieving and Reducing Valves

These valves consist of a small size but high performance electro-hydraulic proportional pilot relief valve and reducing valve with relief function. The valves control the system pressure proportionally through a controlled input voltage.
Moreover, a good response speed in reducing the pressure even at a large load capacity can be obtained with the relief function of the valves.

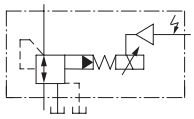


Specifications

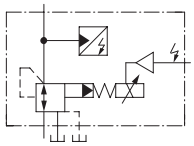
Description \ Model Numbers	EHRBG-06	EHRBG-10
Max. Operating Pres.	24.5 MPa (3550 PSI)	
Max. Flow	100 L/min (26.4 U.S.GPM)	250 L/min (66 U.S.GPM)
Max. Relieving Flow	35 L/min ★1 (9.24 U.S.GPM)	15 L/min ★1 (3.96 U.S.GPM)
Pressure Adjustment Range	Refer to Model Number Designation	
Coil Resistance	10 Ω	
Hysteresis	3% or less	
Repeatability	1% ★2 or less	
Frequency Response	B : 4 Hz C : 3 Hz (-90 degree) H : 3 Hz	
Supply Electric Power	24 V DC (21 to 28 V DC Included Ripple)	
Power Input (Max.)	28 W	
Input Signal	B : 6.9 MPa (1000 PSI) / 5 V DC C : 13.7 MPa (2000 PSI) / 5 V DC H : 20.6 MPa (3000 PSI) / 5 V DC (at Flow Rate Zero)	
Input Impedance	10 kΩ	
Pressure Signal Output	B : 5 V DC / 6.9 MPa (1000 PSI) C : 5 V DC / 13.7 MPa (2000 PSI) H : 5 V DC / 20.6 MPa (3000 PSI)	
Ambient Temperature	0 - 50˚C (32 - 122˚F) (With Circulated Air)	

★1. The figures shown are those obtained where the differential pressure between the secondary pressure port and tank port is 14 MPa (2030 PSI).
★2. The repeatability of the valve is obtained by having it tested independently on the conditions similar to its original testing.

Graphic Symbols



Open-Loop Type



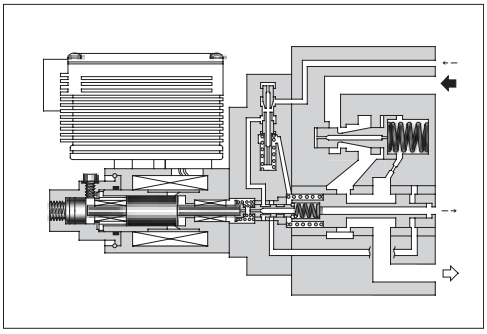
Open-Loop Type with Sensor

Model Number Designation

F-	EHRB	G	-06	-C	-S	-50
Special Seals	Series Number	Type of Mounting	Valve Size	Pres. Adj. Range MPa (PSI)	Control Type	Design Number
F: Special Seals for Phosphate Ester Type Fluid (Omit if not required)	**EHRB**: Proportional Electro-Hydraulic Relieving & Reducing Valve	**G**: Sub-plate Mounting	**06**	**B**: 0.8 - 6.9 (115 - 1000) **C**: 1.2 - 13.7 (175 - 2000) **H**: 1.5 - 20.6 (220 - 3000)	**None**: Open-Loop	**50**
			10	**B**: 0.9 - 6.9 (130 - 1000) **C**: 1.2 - 13.7 (175 - 2000) **H**: 1.5 - 20.6 (220 - 3000)	**S**: Open-Loop with Sensor	**50**

Proportional Electro-Hydraulic Flow Control (and Check) Valves

The system flow rate can be controlled remotely as desired by regulating input voltage. Further, since pressure and temperature compensation functions are provided, the preselected flow rate is not affected by pressure (load) or temperature (fluid viscosity).



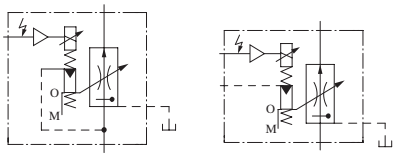
Specifications

Description \ Model Numbers		EHF∗G-03- 60 125	EHF∗G-06-250
Max. Operating Pres. MPa (PSI)		20.6 (3000)	24.5 (3550)
Max. Metred Flow L/min (U.S.GPM)		60: 60 (15.8) 125: 125 (33)	250 (66)
Min. Metred Flow L/min (U.S.GPM)		1 (.26)	2.5 (.66)
Min. Differential Pressure ★1 MPa (PSI)		1.0 (145)	1.0 (145)
Free Flow L/min (U.S.GPM) (Only with Check Valve)		130 (34.3)	280 (73.9)
Pilot Flow L/min (U.S.GPM)	at Normal	0.5 (.13)	1 (.26)
	at Transition	2.6 (.69)	4 (1.06)
Min. Pilot Pressure MPa (PSI)		1.0 (145)	1.5 (215)
Frequency Response		12 Hz (-90 degree)	
Hysteresis		3% or less	
Repeatability		1% ★2 or less	
Coil Resistance		10 Ω	
Supply Electric Power		24 V DC (21 to 28 V DC Included Ripple)	
Power Input (Max.)		28 W	
Input signal		Max. Metred Flow / 5V DC	
Input Impedance		10 kΩ	
Ambient Temperature		0 - 50°C (32 - 122°F) (With Circulated Air)	

★1. Minimum differential pressure means fine pressure compensation at inlet and outlet port.
★2. The repeatability of the valve is obtained by having it tested independently on the conditions similar to its original testing.

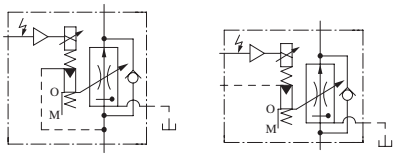
Graphic Symbols

● EHFG



Internal Pilot External Pilot

● EHFCG



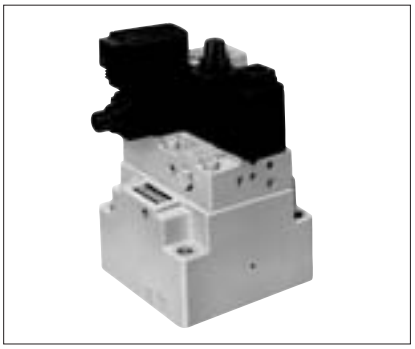
Internal Pilot External Pilot

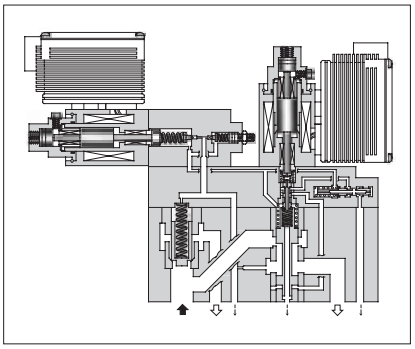
Model Number Designation

F-	EHF	G	-03	-60	-E	-50
Special Seals	Series Number	Type of Mounting	Valve Size	Max. Metred Flow L/min (U.S.GPM)	Pilot Connection	Design Number
F: Special Seals for Phosphate Ester Type Fluid (Omit if not required)	**EHF**: Proportional Electro-Hydraulic Flow Control Valve **EHFC**: Proportional Electro-Hydraulic Flow Control and Check Valve	**G**: Sub-plate Mounting	**03**	**60**: 60 (15.8) **125**: 125 (33)	**None**: Internal Pilot	**50**
			06	**250**: 250 (66)	**E**: External Pilot	**50**

Proportional Electro-Hydraulic Flow Control and Relief Valves

These are proportional electro-hydraulic flow control valves having functions for controlling the direct electric current of metre-in type and for pressure control.
They are energy-saving valves for supplying the minimum pressure and flow required to operate actuators.



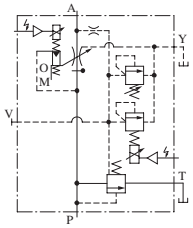


Specifications

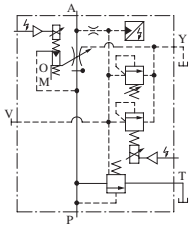
Description \ Model Numbers			EHFBG-03-60 / 125	EHFBG-06-250	EHFBG-10-500
Max. Operating Pressure MPa (PSI)			24.5 (3550)	24.5 (3550)	24.5 (3550)
Max. Flow L/min (U.S.GPM)			60 : 60 (15.8) 125 : 125 (33)	250 (66)	500 (132)
Metred Flow Capacity L/min (U.S.GPM)			60 : 1-60(.26-15.8) 125: 1-125(.26-33)	2.5-250 (.66-66)	5-500 (1.32-132)
Min. Pilot Pressure MPa (PSI)			1.5 (215)	1.5 (215)	1.5 (215)
Pilot Flow L/min (U.S.GPM)		at Normal	1 (.26)	1 (.26)	1 (.26)
		at Transition	3 (.79)	4 (1.06)	6 (1.59)
Differential Pressure MPa (PSI)			0.6 (85)	0.7 (100)	0.9 (130)
Flow Controls	Hysteresis		3% or less		
	Repeatability		1%★ or less		
	Input Signal		Max. Flow / 5 V DC		
	Coil Resistance		10 Ω		
	Supply Electric Power		24 V DC (21 to 28 V DC Included Ripple)		
	Input Impedance		10 kΩ		
	Power Input (Max.)		28 W		
Pressure Controls	Pres. Adj. Range MPa (PSI)	Adj. Range: C	1.2-15.7 (175-2275)	1.4-15.7 (200-2275)	1.5-15.7 (215-2275)
		Adj. Range: H	1.4-24.5 (200-3550)	1.4-24.5 (200-3550)	1.5-24.5 (215-3550)
	Hysteresis		2% or less		
	Repeatability		1%★ or less		
	Coil Resistance		10 Ω		
	Input Signal		Max. Operating Pres. / 5 V DC		
	Supply Electric Power		24 V DC (21 to 28 V DC Included Ripple)		
	Input Impedance		10 kΩ		
	Power Input (Max.)		28 W		
Output Signal			C : 5 V DC / 15.7 MPa (2275 PSI) H : 5 V DC / 24.5 MPa (3550 PSI)		
Ambient Temperature			0 - 50°C (32 - 122°F) (With Circulated Air)		

★The repeatability of the valves is obtained by having it tested independently on the conditions similar to its original testing.

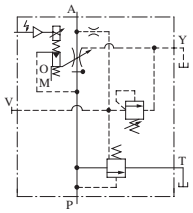
Graphic Symbols



Models with Proportional Pilot Relief Valve



Models with Proportional Pilot Relief Valve and Sensor



Models without Proportional Pilot Relief Valve

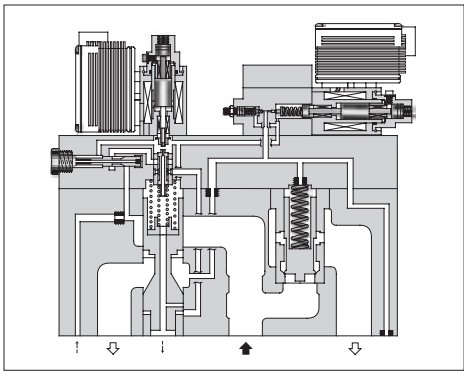
External Pilot Pres. Connection

Model Number Designation

F-	EHFB	G	-03	-60	-C	-E	-S	-50
Special Seals	Series Number	Type of Mounting	Valve Size	Max. Metred Flow L/min (U.S.GPM)	Pilot Relief Valve Pres. Adj. Range	Pilot Connection of Flow Control	Pressure Controls	Design Number
F: Special Seals for Phosphate Ester Type Fluid (Omit if not required)	**EHFB**: Proportional Electro-Hydraulic Flow Control and Relief Valve	**G**: Sub-plate Mounting	**03**	**60**: 60 (15.8) **125**: 125 (33)	**None**: Without Proportional Pilot Relief Valve	**None**: Internal Pilot	**None**: Open-Loop	**50**
			06	**250**: 250 (66)		**E**: External Pilot	**S**: Open-Loop with Sensor	**50**
			10	**500**: 500 (132)	**C, H**: See Specifications			**50**

High Flow Series
Proportional Electro-Hydraulic Flow Control and Relief Valves

This flow control and relief valve is a energy-saving valve that supplies the minimum pressure and flow necessary for actuator drive.
For the High Flow Series, double maximum flow rate [03 size: 125 → 250 L/min (33 → 66 U.S.GPM), 06 size: 250 → 500 L/min (66 → 132 U.S.GPM)] enables a smaller valve size than conventional products; compact-sized devices can be provided.

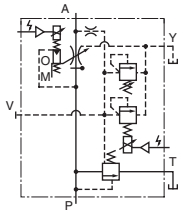


Specifications

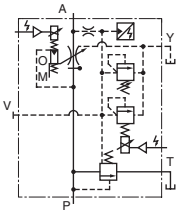
Description \ Model Numbers			EHFBG-03-250	EHFBG-06-500
Max. Operating Pressure MPa (PSI)			24.5 (3550)	24.5 (3550)
Max. Flow L/min (U.S.GPM)			250 (66)	500 (132)
Metred Flow Capacity L/min (U.S.GPM)			2.5-250 (.66-66)	5-500 (1.32-132)
Min. Pilot Pressure MPa (PSI)			1.5 (215)	1.5 (215)
Pilot Flow L/min (U.S.GPM)		at Normal	1 (.26)	1 (.26)
		at Transition	4 (1.06)	6 (1.59)
Differential Pressure MPa (PSI)			0.8 (115)	0.9 (130)
Flow Controls	Hysteresis		3% or less	
	Repeatability		1%★ or less	
	Input Signal		Max. Flow / 5 V DC	
	Coil Resistance		10 Ω	
	Supply Electric Power		24 V DC (21 to 28 V DC Included Ripple)	
	Input Impedance		10 kΩ	
	Power Input (Max.)		28 W	
Pressure Controls	Pres. Adj. Range MPa (PSI)	Adj. Range: C	1.6-15.7 (230-2275)	1.5-15.7 (215-2275)
		Adj. Range: H	1.8-24.5 (260-3550)	1.5-24.5 (215-3550)
	Hysteresis		3% or less	
	Repeatability		1%★ or less	
	Coil Resistance		10 Ω	
	Input Signal		Max. Operating Pres. / 5 V DC	
	Supply Electric Power		24 V DC (21 to 28 V DC Included Ripple)	
	Input Impedance		10 kΩ	
	Power Input (Max.)		28 W	
Output Signal			C : 5 V DC / 15.7 MPa (2275 PSI) H : 5 V DC / 24.5 MPa (3550 PSI)	
Ambient Temperature			0 - 50°C (32 - 122°F) (With Circulated Air)	

★ The repeatability of the valves is obtained by having it tested independently on the conditions similar to its original testing.

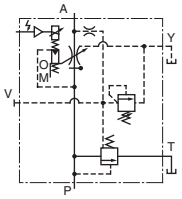
Graphic Symbols



Models with Proportional Pilot Relief Valve



Models with Proportional Pilot Relief Valve and Sensor



Models without Proportional Pilot Relief Valve

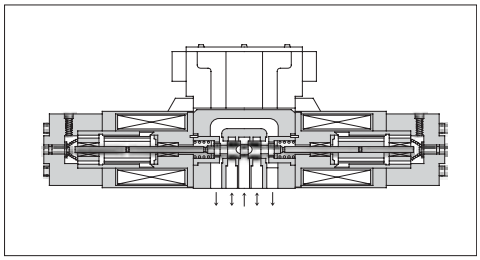
External Pilot Pres. Connection

Model Number Designation

F-	EHFB	G	-03	-250	-C	-E	-S	-50
Special Seals	Series Number	Type of Mounting	Valve Size	Max. Metred Flow L/min (U.S.GPM)	Pilot Relief Valve Pres. Adj. Range	Pilot Connection of Flow Control	Pressure Controls	Design Number
F: Special Seals for Phosphate Ester Type Fluid (Omit if not required)	**EHFB**: Proportional Electro-Hydraulic Flow Control and Relief Valve	**G**: Sub-plate Mounting	**03**	**250**: 125 (66)	**None**: Without Proportional Pilot Relief Valve	**None**: Internal Pilot	**None**: Open-Loop	**50**
			06	**500**: 500 (132)	**C, H** : See Specifications	**E**: External Pilot	**S**: Open-Loop with Sensor	**50**

Proportional Electro-Hydraulic Directional and Flow Control Valves

These valves incorporate two control functions - flow and direction - which simplify the hydraulic circuit composition and therefore the cost of the system is reduced.



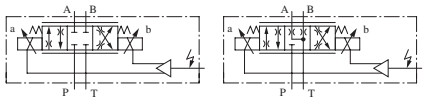
Specifications

Description \ Model Numbers		EHDFG-01	EHDFG-03
Max. Operating Pressure MPa (PSI)		24.5 (3550)	24.5 (3550)
Max. Tank Line Back Pres. MPa (PSI)		7 (1020)	7 (1020)
Rated Flow L/min (U.S.GPM) [Valve ⊿P 6.9 MPa (1000 PSI)]		30 (7.92)	60 (15.9)
Hysteresis		5% or less	
Repeatability		1%★ or less	
Frequency Response		20 Hz (-90 deg.)	17 Hz (-90 deg.)
Coil Resistance		10.5 Ω	8.0 Ω
Supply Electric Power		24 V DC (21 to 28 V DC Included Ripple)	
Input Voltage	By Controlling Variable Resistance (Using of Power from Amp.)	1 - 2 kΩ Volume Range	
	By Controlling Voltage (Using of Power outside Amp.)	0 - –5 V for SOL a 0 - +5 V for SOL b	
Input Impedance		10 kΩ	10 kΩ
Power Input (Max.)		40 W	45 W
Ambient Temperature		0 - 50˚C (32 - 122˚F) (With Circulated Air)	

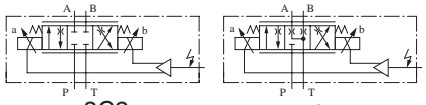
★The repeatability of the valves is obtained by having it tested independently on the conditions similar to its original testing.

Graphic Symbols

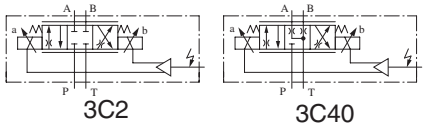
● Metre-in • Metre-out Control



● Metre-out Control



● Metre-in Control



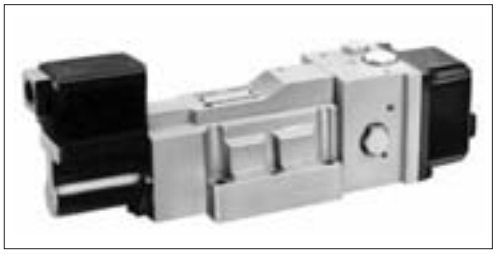
Model Number Designation

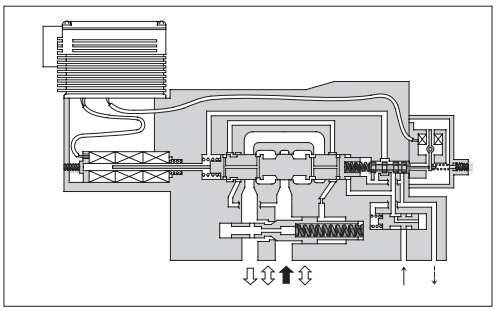
F-	EHDF	G	-01	-30	-3C2	-E	-30
Special Seals	Series Number	Type of Mounting	Valve Size	Rated Flow L/min (U.S.GPM)	Spool Type★	Direction of Flow	Design Number
F: Special Seals for Phosphate Ester Type Fluid (Omit if not required)	**EHDF**: Proportional Electro-Hydraulic Directional and Flow Control Valve	**G**: Sub-plate Mounting	**01**	**30**: 30 (7.92)	**3C2**	**XY** : Metre-in · Metre-out	**30**
			03	**60**: 60 (15.9)	**3C40**	**X** : Metre-in **Y** : Metre-out	**30**

★Spool type shown in the column is for the centre position.

High Response Type Proportional Electro-Hydraulic Directional and Flow Control Valves

These valves pursue the ultimate performance of proportional electro-hydraulic directional & flow control valves and make themselves to have high response features.
The closed-loop is composed in the valve inside by combination of a differential transformer (LVDT) and a power amplifier. Thus, high accuracy and reliability are provided.
In addition to control in the open-loop, these can be used for the closed-loop system as simplified servo valves.





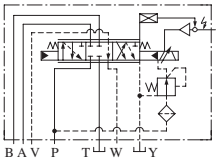
Specifications

Description \ Model Numbers		EHDFG-04	EHDFG-06
Max. Operating Pres. MPa (PSI)		15.7 (2280)	15.7 (2280)
Rated Flow L/min (U.S.GPM) Valve Pres. Difference: 1.5 MPa (215 PSI)		130 (34.3)	280 (73.9)
Min. Required Pilot Pres. MPa (PSI)		1.5 (215)	1.5 (215)
Min. Required Pilot Flow L/min (U.S.GPM)	at Normal	2 (.53)	2 (.53)
	at Transition	6 (1.59)	10 (2.64)
Max. Drain Line Back Pres. MPa (PSI)		0.1 (15)	0.1 (15)
Hysteresis		1% or less	
Repeatability		1%★ or less	
Frequency Response		55 Hz (-90 deg.)	45 Hz (-90 deg.)
Coil Resistance		30 Ω	30 Ω
Supply Electric Power		±24 V DC (±21 to ±28 V DC Included Ripple)	
Input Signal		Rated Flow / ±5 V DC	
Input Impedance		10 kΩ	10 kΩ
Power Input (Max.)		20 W	20 W
Alarm Signal Output (Open Collector)		Voltage: Max. 30 V DC Current: Max. 30 mA	
LVDT Output (Sensor Monitor)		±5 V DC / Rated Travel of Spool	
Ambient Temperature		0 - 50°C (32 - 122°F) (With Circulated Air)	

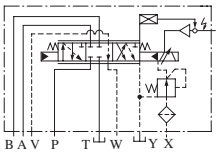
★The repeatability of the valves is obtained by having it tested independently on the conditions similar to its original testing.

Graphic Symbols

● Models without Pressure Compensator Valve

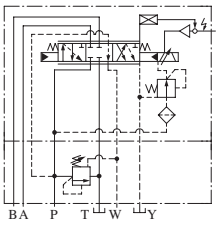


Internal Pilot



External Pilot

● Models with Pressure Compensator Valve



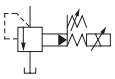
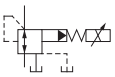
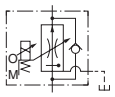
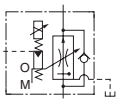
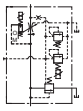
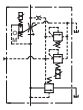
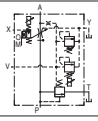
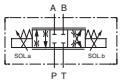
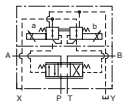
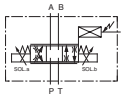
Internal Pilot

Model Number Designation

F-	EHDF	G	-04	-130	-2	-E	-CB	-10
Special Seals	Series Number	Type of Mounting	Valve Size	Rated Flow L/min (U.S.GPM)	Spool Type★	Pilot Connection	Relief Type Pres. Compensator	Design Number
F: Special Seals for Phosphate Ester Type Fluid (Omit if not required)	**EHDF**: Proportional Electro-Hydraulic Directional and Flow Control Valve	**G**: Sub-plate Mounting	**04**	**130**: 130 (34.3)	**2**	**None**: Internal Pilot	**None**: Not Provided	**10**
			06	**280**: 280 (73.9)	**40**	**E**: External Pilot	**CB**: Provided	**10**

★ Spool type shown in the column is for the centre position.

E Series Proportional Electro-Hydraulic Controls

Types	Graphic Symbols	Max. Operating Pressure MPa (PSI)	Maximum Flow U.S.GPM: .5 1 5 10 50 100 200 / L/min: 1 2 3 5 10 20 30 50 100 200 300 500 1000	Page
Pilot Relief Valves		24.5 (3550)	EDG 01	670
Relief Valves		24.5 (3550)	EBG 03 06 10	676
Relieving and Reducing Valves		24.5 (3550)	ERBG 06 10	685
40 Ω Series Flow Control (and Check) Valves		20.6 (3000)	EFG EFCG 02 03 06 10	695
10 Ω Series Flow Control (and Check) Valves		03: 20.6 (3000) 06: 24.5 (3550)	EFG EFCG 03 06	705
40 Ω - 10 Ω Series Flow Control and Relief Valves		24.5 (3550)	EFBG 03 06 10	712
10 Ω - 10 Ω Series Flow Control and Relief Valves		24.5 (3550)	EFBG 03 06 10	722
High Flow Series Flow Control and Relief Valves		24.5 (3550)	EFBG 03 06 10	733
Shockless Type Directional and Flow Control Valves		25 (3630)	EDFG 01	743
Directional and Flow Control Valves		25 (3630)	EDFHG 03 04 06	746
High Respones Type Directional and Flow Control Valves		01/03: 31.5 (4570) 04/06: 35 (5080)	ELDFG 01 03 ELDFHG 04 06	753

Power Amplifiers ..... Page 766
Setting Adjusters ..... Page 789

Hydraulic Fluids

Fluid Types

Any type of hydraulic fluid listed in the table below can be used.

Petroleum Base Oils	Use fluids equivalent to ISO VG 32 or VG 46.
Synthetic Fluids	Use phosphate ester or polyol ester fluids. When phosphate ester fluid is used, prefix "F-" to the model number because the special seals (fluororubber) are required to be used.
Water-containing Fluids	Use water-glycol fluid.

Note: For use with hydraulic fluids other than those listed above, please consult your Yuken representatives in advance.

Recommended Fluid Viscosity and Temperature

Use hydraulic fluids which satisfy the both recommended viscosity and oil temperatures given in the table below.

Name	Viscosity	Temperature
Pilot Relief Valves Relief Valves Reducing and Relieving Valves	15 - 400 mm^2/s (77 - 1800 SSU)	-15 - +70˚C (5 - 160˚F)
Flow Control Valves Flow Control and Check Valves Flow Control and Relief Valves	20 - 200 mm^2/s (98 - 900 SSU)	
Directional and Flow Control Valves	20 - 400 mm^2/s (98 - 1800 SSU)	0 - +60˚C (32 - 140˚F)
Shockless Type Directional and Flow Control Valves High Respones Type Directional and Flow Control Valves (Direct Type)	20 - 200 mm^2/s (98 - 900 SSU)	0 - +60˚C (32 - 140˚F)
High Respones Type Directional and Flow Control Valves (Two Stage Type)	15 - 400 mm^2/s (77 - 1800 SSU)	-15 - +60˚C (5 - 140˚F)

Control of Contamination

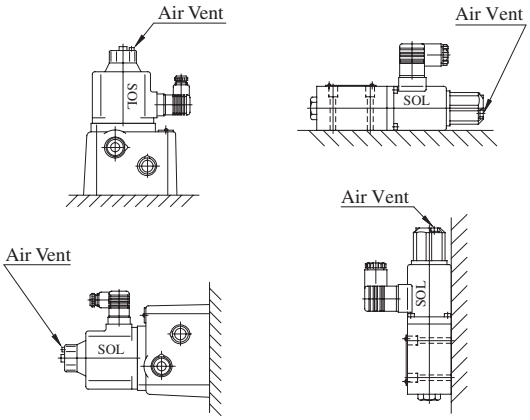
Due caution must be paid to maintaining control over contamination of the hydraulic fluids which may otherwise lead to breakdowns and shorten the life of the valve. Please maintain the degree of contamination within NAS 1638-Grade 11. Use 20 µm or finer line filter.

Instructions

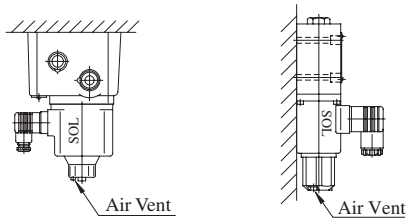
Mounting

Be sure that the air vent faces up.
In addition, if the valve is mounted vertically, the minimum adjustment pressure is 0.2 MPa (29 PSI) or higher.

[Good example]

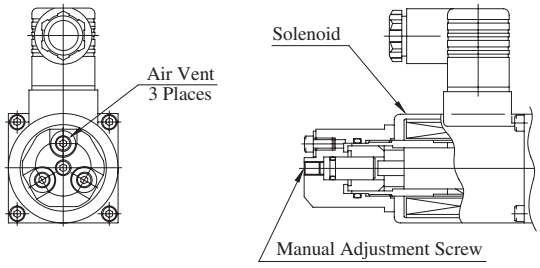


[Bad example]



Air Bleeding

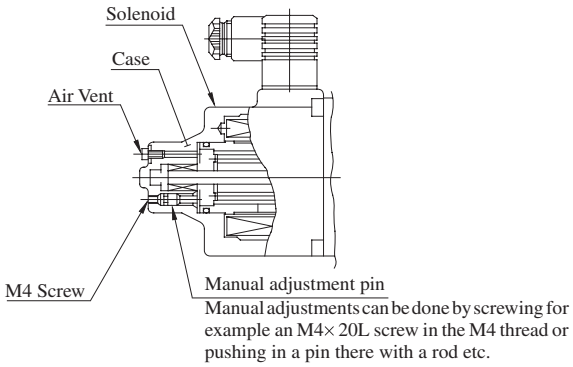
To ensure stable control, bleed the air from solenoid completely and fill its core with oil.
Bleeding can be done by slowly loosening one of the air vents at the end of the solenoid. Choose one of the three air vents which is expected to work most effectively (see the figure to the right).



10 Ω Series Solenoid

Manual Adjustment Screw

When initial adjustments are to be made or when no current is supplied to the valve due to electrical failure or other problem, turn the manual adjustment screw to temporatily set the valve pressure / flow rate. In that case, when turn the manual adjustment screw clockwise, the valve pressure / flow rate increases. Under normal condition, however, this screw must be kept in its original position (see the figure to the right).



40 Ω Series Solenoid

Tank and Drain Piping

The tank-line back pressure and drain back pressure directly affect the minimum adjustment pressure. Therefore, do not connect the tank or drain pipes to other lines, but connect them directly to the reservoir maintaining the back pressure as low as possible. Be sure that the tank and drain pipe ends are immersed in fluid.

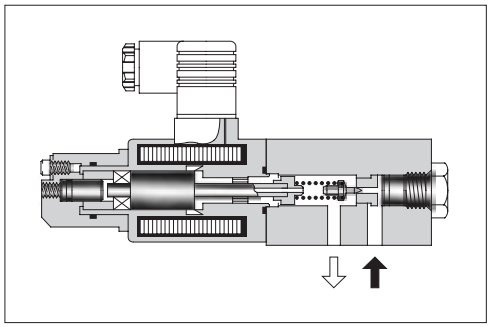
Hysteresis and Repeatability Value Indications

The hysteresis and repeatability values indicated in the specifications for each control valve are determined under the following conditions:

- Hysteresis Value: Obtained when Yuken's applicable power amplifier is used.
- Repeatability Value: Obtained when Yuken's applicable power amplifier is used under the same conditions.

Proportional Electro-Hydraulic Pilot Relief Valves

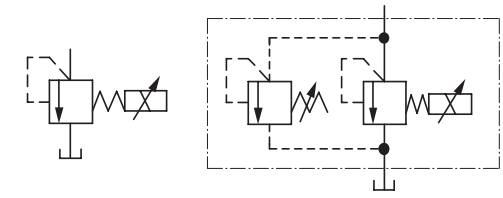
This valve consists of a small DC solenoid and a direct-acting relief valve. It serves as a pilot valve for a low flow rate hydraulic system or a proportional electro-hydraulic control valve and controls the pressure in proportion to the input current. Note that this valve is used in conjunction with the applicable power amplifier.



Specifications

Description \ Model Numbers	EDG-01
Max. Operating Pres.	24.5 MPa (3550 PSI)
Max. Flow	2 L/min (.53 U.S.GPM)
Min. Flow	0.3 L/min (.08 U.S.GPM)
Pressure Adj. Range MPa (PSI)	Refer to Model Number Designation
Rated Current	EDG-01∗-B: 800 mA EDG-01∗-C: 900 mA EDG-01∗-H: 950 mA
Coil Resistance	10 Ω
Hysteresis	3% or less
Repeatability	1% or less
Approx. Mass	2 kg (4.4 lbs.)

Graphic Symbols



Without Safety Valve With Safety Valve

Model Number Designation

F-	ED	G	-01	V	-C	-1	-PN	T13	-51	∗
Special Seals	Series Number	Type of Mounting	Valve Size	Applicable Control ★1	Pressure Adj. Range MPa (PSI)	Safety Valve	P-Line Orifice	T-Line★2 Orifice	Design Number	Design Standards
F: Special Seals for Phosphate Ester Type Fluid (Omit if not required)	**ED**: Proportional Electro-Hydraulic Pilot Relief Valve	**G**: Sub-plate Mounting	**01**	**None**: General use **V**: Vent Control of Relief Valve (Omit if not required)	**B**: 0.5 - 6.9 (70 - 1000) **C**: 1.0 - 15.7 (145 - 2275) **H**: 1.2 - 24.5 (175 - 3550)	**None**: Without Safety Valve **1**: With Safety Valve	**PN**: Without Orifice (Standard)	**T15** **T13** **T11**	**51**	Refer to ★3

★1. When the valve is to be used for vent control purpose, orifice adjustment is required due to piping capacity limitations. Therefore, consult your Yuken representative in advance.
★2. The orifice used as the pilot valve may differ from the standard orifice.
★3. Design Standards: None ..... Japanese Standard "JIS" and European Design Standard
90 ..... N. American Design Standard

Attachment

Mounting Bolts

Four socket head cap screws in the table below are included.

Descriptions	Soc. Hd. Cap Screw
Japanese Standard "JIS" European Design Standard	M5 × 45 Lg.
N. American Design Standard	No. 10 - 24 UNC × 1-3/4 Lg.

Applicable Power Amplifier

For stable performance, it is recommended that Yuken's applicable power amplifiers be used (for details see page 767, 771, 780).

Model Numbers : AME-D-10-∗-20
AME-D2-1010-11
SK1022-∗-∗-11
SK1015-11 (For DC power supply)
AMN-D-10 (For DC power supply)

Sub-plate

Piping Size	Japanese Standard "JIS"		European Design Standard		N. American Design Standard		Approx. Mass kg (lbs.)
	Sub-plate Model Numbers	Thread Size	Sub-plate Model Numbers	Thread Size	Sub-plate Model Numbers	Thread Size	
1/8	DSGM-01-31	Rc 1/8	DSGM-01-3180	1/8 BSP.F	DSGM-01-3190	1/8 NPT	0.8 (1.8)
1/4	DSGM-01X-31	Rc 1/4	DSGM-01X-3180	1/4 BSP.F	DSGM-01X-3190	1/4 NPT	0.8 (1.8)
3/8	DSGM-01Y-31	Rc 3/8	—	—	DSGM-01Y-3190	3/8 NPT	0.8 (1.8)

- Sub-plates are available. Specify the sub-plate model number from the table above. When sub-plates are not used, the mounting surface should have a good machined finish.
- Sub-plates are those for 1/8 solenoid operated directional valves. For dimensoins, see page 356.

Instructions

Tank-Line Back Pressure

Check that the tank line back pressure does not exceed 0.2 MPa (29 PSI).

Vent Control

When the valve is used for vent control of relief valves or others, use the pipes of 6 mm (.24 in.) ID. 300 mm (11.8 in.) or less length for connection.

If the pressure is instable, provide a 1.0 to 1.5 mm (.04 to .06 in.) diameter orifice to the vent port of the relief valves or others.

Circuit Pressure Control

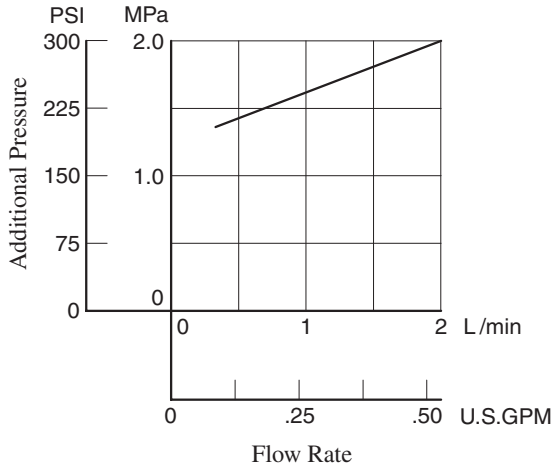
When the pressure in a circuit is directly controlled with this valve, set the trapped oil volume being more than 40 cm^3 (2.44 cu. in.).

Safety Valve Pressure Setting

The pressure of the safety valve at the maximum flow is preset at the value equal to the upper limit of the pressure adjustment range plus 2 MPa (290 PSI).

In case where the upper limit of operating pressure is low or the upper limit of flow rate to be used is different from the specified maximum flow, please adjust and determine the setting pressure of the safety valve at the value calculated from the following formula.

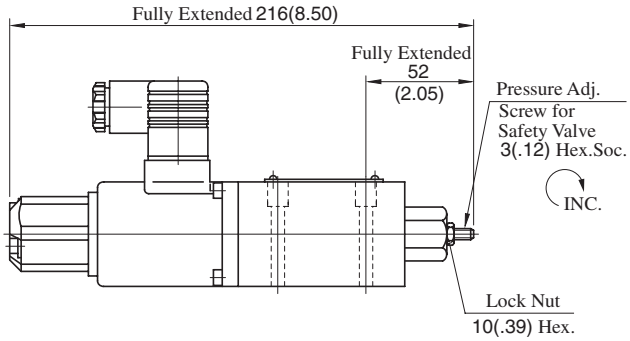
Setting pressure = (Operating pressure upper limit) + (Additional pressure indicated below)



To lower the setting pressure, turn the safety valve pressure adjustment screw anti-clockwise. After adjustment, be sure to tighten the lock nut.

EDG-01∗-∗-1-PNT∗-51/5190

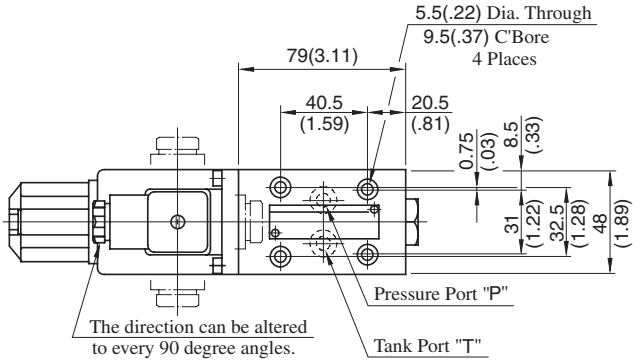
With Safety Valve



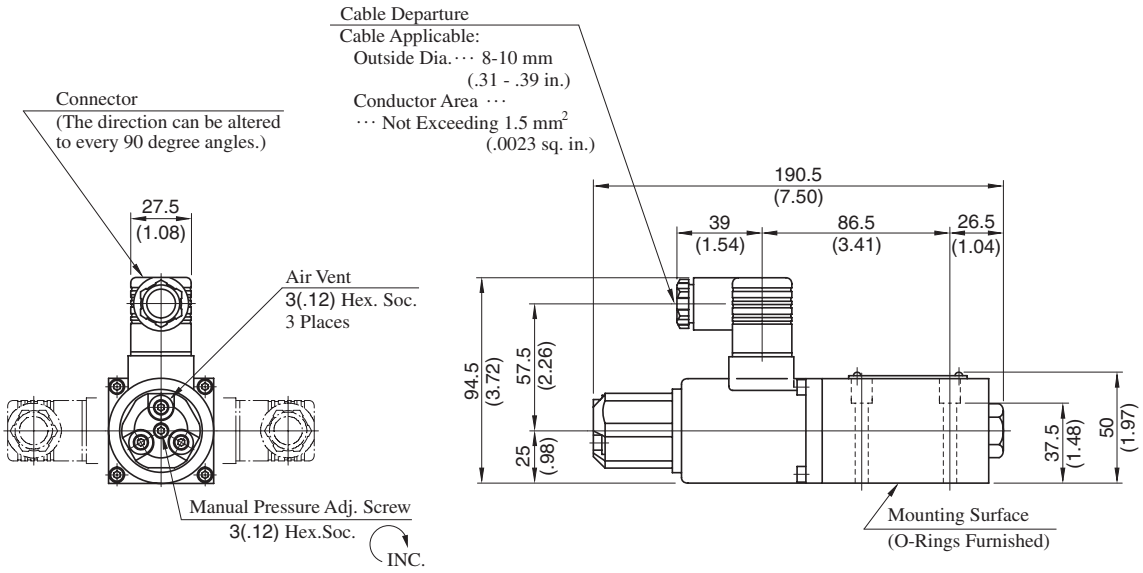
• For other dimensions, refer to the without safety valve.

EDG-01∗-∗-PNT∗-51/5190

Without Safety Valve



DIMENSIONS IN MILLIMETRES (INCHES)

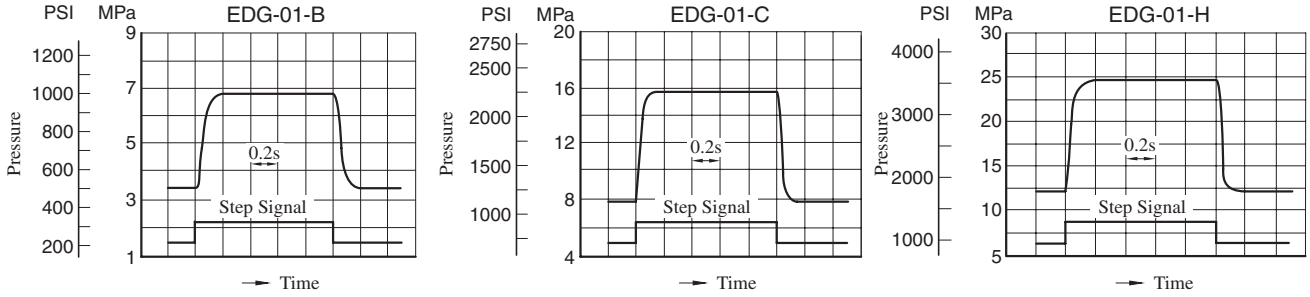


Note: For valve mounting surface dimensions, see the dimensional drawings of sub-plates (P.356) in common use.

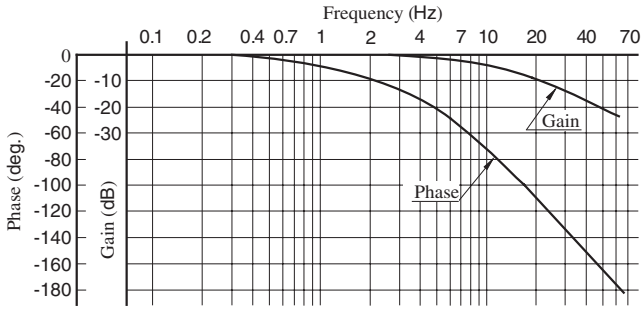
Step Response (Example)

These characteristics have been obtained by measuring on each valve.
Therefore, they may vary according to a hydraulic circuit to be used.

Flow Rate : 2 L/min (.53 U.S. GPM)
Trapped Oil Volume : 40 cm^3(2.44 cu. in.)
Viscocity : 30 mm^2/s (141 SSU)

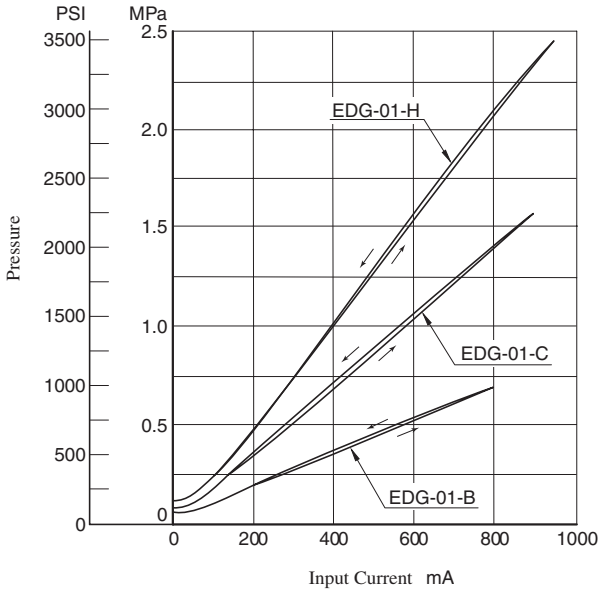


Frequency Response

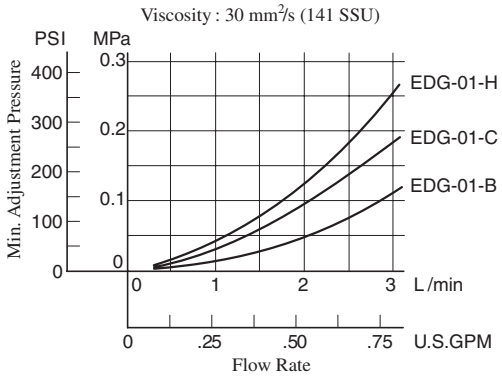


Flow Rate : 2 L/min (.53 U.S. GPM)
Pressure : 7.8 ± 1.6 MPa (1130 ± 230 PSI)
Trapped Oil Volume : 30 cm^3 (1.83 cu. in.)
Viscocity : 30 mm^2/s (141 SSU)

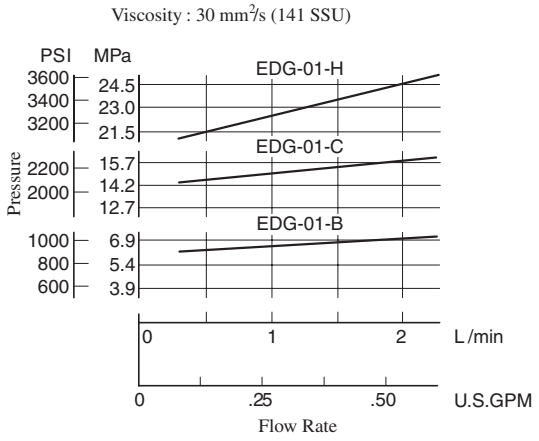
Control Pressure vs. Input Current



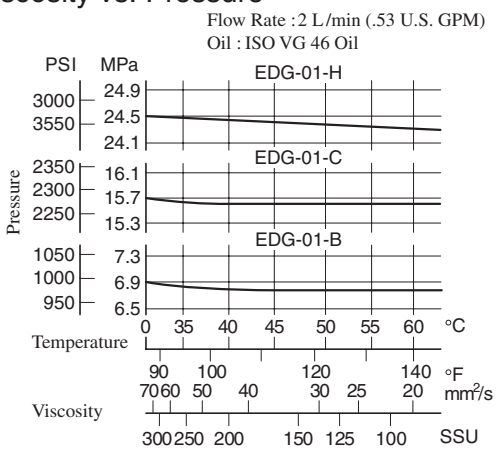
Min. Adjustment Pressure



Flow Rate vs. Pressure



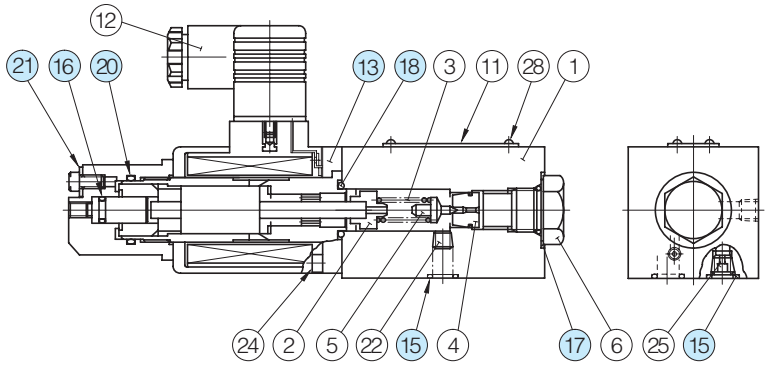
Viscosity vs. Pressure



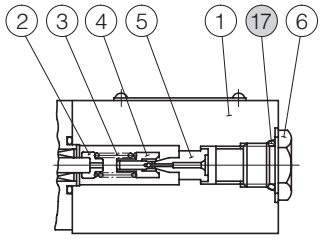
List of Seals and Solenoid Ass'y

Without Safety Valve

EDG-01∗-∗-PNT∗-51/5190
EDG-01V-∗-PNT∗-5103

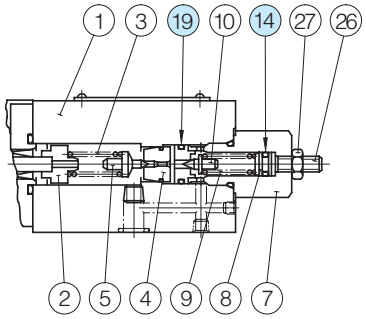


EDG-01-∗-PNT∗-5101



With Safety Valve

EDG-01∗-∗-1-PNT∗-51/5190
EDG-01V-∗-1-P∗T∗-5103/5197



List of Seals

Item	Name of Parts	Part Numbers	Qty.	Remarks
14	O-Ring	SO-NA-P6	1	Included in Seal Kit Kit No.: KS-EDG-01-51
15	O-Ring	SO-NB-P9	2	
16	O-Ring	SO-NB-P7	1	
17	O-Ring	SO-NB-P14	1	
18	O-Ring	SO-NB-P18	1	
19	O-Ring	SO-NB-A013	1	
20	O-Ring	SO-NB-P22	1	
21	Fastener Seal	SG-FCF-4	1	

Note) O-ring (Item 16, 18, 20) and the fastener seal (Item 21) are included in the solenoid assembly.

Solenoid Ass'y

Valve Model Numbers	⑬ Solenoid Ass'y
EDG-01-∗-∗-P∗T∗-51/5190 EDG-01-∗-∗-P∗T∗-5101	E318-Y06M1-28-61
EDG-01V-∗-∗-P∗T∗-51/5190	E318-Y06M1-05-61
EDG-01V-∗-∗-PNT∗-5103	E318-Y06M1-04-61
EDG-01V-∗-1-PNT20-5197	E318-Y06M1-28-61

Note) The connector assembly GDM-211-B-11 (Item 12) is not included in the solenoid assembly.

Interchangeability between Current and New Design

EDG-01 series valve has changed model from 50 to 51 design in line with the solenoid improvement.

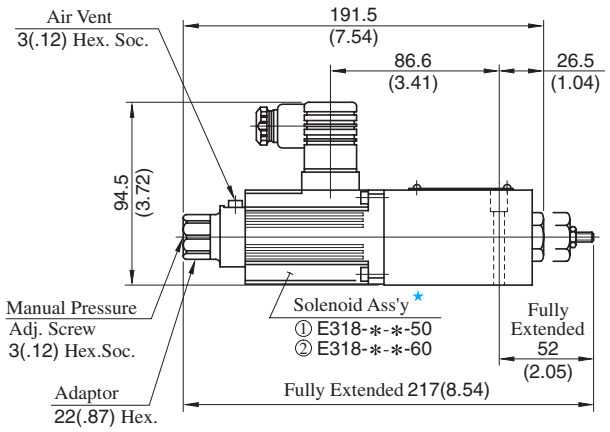
Specifications and Characteristics

No change in specifications and characteristics between current and new design.

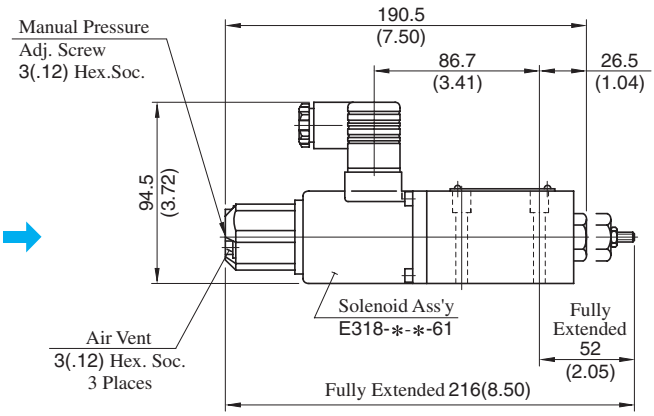
Mounting Interchangeability

There is an interchangeability in the mounting dimensions, however, the outside shape and dimensions are changed as shown below due to solenoid improvement and other modifications.

Current: Design 50



New: Design 51

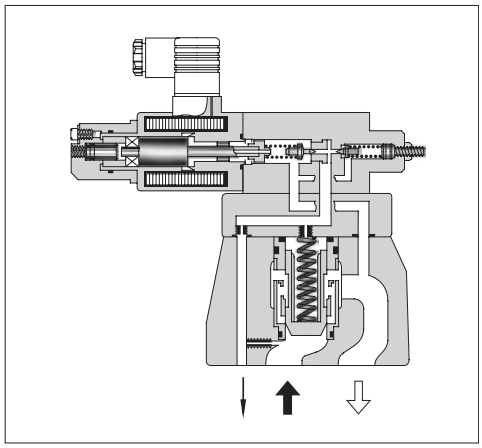


★The solenoid assembly current design comes in two types: ① E318-50 design and ② 60 design. See the figure on the left for an external view of type ① . See the figure on the right for type ② .

DIMENSIONS IN MILLIMETRES (INCHES)

Proportional Electro-Hydraulic Relief Valves

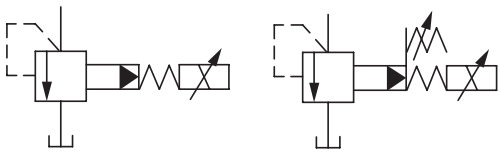
This valve is derived by combining a small, high-performance 1/8 proportional electro-hydraulic pilot relief valve with a specially developed low-noise relief valve.
With this valve, it is possible to regulate the system pressure in proportion to the input current. Note that this valve is used in conjunction with the applicable power amplifier.



Specifications

Description \ Model Numbers	EBG-03	EBG-06	EBG-10
Max. Operating Pres. MPa (PSI)	24.5 (3550)	24.5 (3550)	24.5 (3550)
Max. Flow L/min(U.S.GPM)	100 (26.4)	200 (52.8)	400 (106)
Min. Flow L/min(U.S.GPM)	3 (.79)	3 (.79)	3 (.79)
Pressure Adjustment Range MPa (PSI)	Refer to Model Number Designation		
Rated Current	C : 770 mA H : 820 mA	C : 750 mA H : 800 mA	C : 730 mA H : 780 mA
Coil Resistance	10 Ω	10 Ω	10 Ω
Hysteresis	3% or less	3% or less	3% or less
Repeatability	1% or less	1% or less	1% or less
Approx. Mass kg (lbs.)	5.6 (12.3)	6.3 (13.9)	10 (22)

Graphic Symbols



Without Safety Valve | With Safety Valve

Model Number Designation

F-	EB	G	-03	-C	-T	-51	*
Special Seals	Series Number	Type of Mounting	Valve Size	Pres. Adj. Range MPa (PSI)	Safety Valve	Design Number	Design Standards
F: Special Seals for Phosphate Ester Type Fluid (Omit if not required)	**EB**: Proportional Electro-Hydraulic Relief Valve	**G**: Sub-plate Mounting	**03** **06** **10**	**C**: ∗ [★1] - 15.7 (∗ - 2275) **H**: ∗ [★1] - 24.5 (∗ - 3550)	**None**: With Safety Valve **T**: Without Safety Valve	**51**	Refer to [★2]

★1. Min. adjustment pressure shall be referred to the curves on page 680.
★2. Design Standards: None ..... Japanese Standard "JIS" and European Design Standard
90 ..... N. American Design Standard

Attachment

Mounting Bolts

Valve Model Numbers	Socket Head Cap Screw		
	Japanese Standard "JIS" & European Design Standard	N. American Design Standard	Qty.
EBG-03	M12 × 40 Lg.	1/2 - 13 UNC × 1-1/2 Lg.	4
EBG-06	M16 × 50 Lg.	5/8 - 11 UNC × 2 Lg.	4
EBG-10	M20 × 60 Lg.	3/4 - 10 UNC × 2-1/4 Lg.	4

Applicable Power Amplifiers

For stable performance, it is rrecommended that Yuken's applicable power amplifiers be used (for details see page 767, 771, 780).

Model Numbers : AME-D-10-∗-20
AME-D2-1010-11
SK1022-∗-∗-11
SK1015-11 (For DC power supply)
AMN-D-10 (For DC power supply)

Sub-plate

Valve Model Numbers	Japanese Standard "JIS"		European Design Standard		N. American Design Standard		Approx. Mass kg (lbs)
	Sub-plate Model Numbers	Thread Size	Sub-plate Model Numbers	Thread Size	Sub-plate Model Numbers	Thread Size	
EBG-03	BGM-03-20	Rc 3/8	BGM-03-3080	3/8 BSP.F	BGM-03-2090	3/8 NPT	2.4 (5.3)
	BGM-03X-20	Rc 1/2	BGM-03X-3080	1/2 BSP.F	BGM-03X-2090	1/2 NPT	3.1 (6.8)
EBG-06	BGM-06-20	Rc 3/4	BGM-06-3080	3/4 BSP.F	BGM-06-2090	3/4 NPT	4.7 (10.4)
	BGM-06X-20	Rc 1	BGM-06X-3080	1 BSP.F	BGM-06X-2090	1 NPT	5.7 (12.6)
EBG-10	BGM-10-20	Rc 1-1/4	BGM-10-3080	1-1/4 BSP.F	BGM-10-2090	1-1/4 NPT	8.4 (18.5)
	BGM-10X-20	Rc 1-1/2	BGM-10X-3080	1-1/2 BSP.F	BGM-10X-2090	1-1/2 NPT	10.3 (22.7)

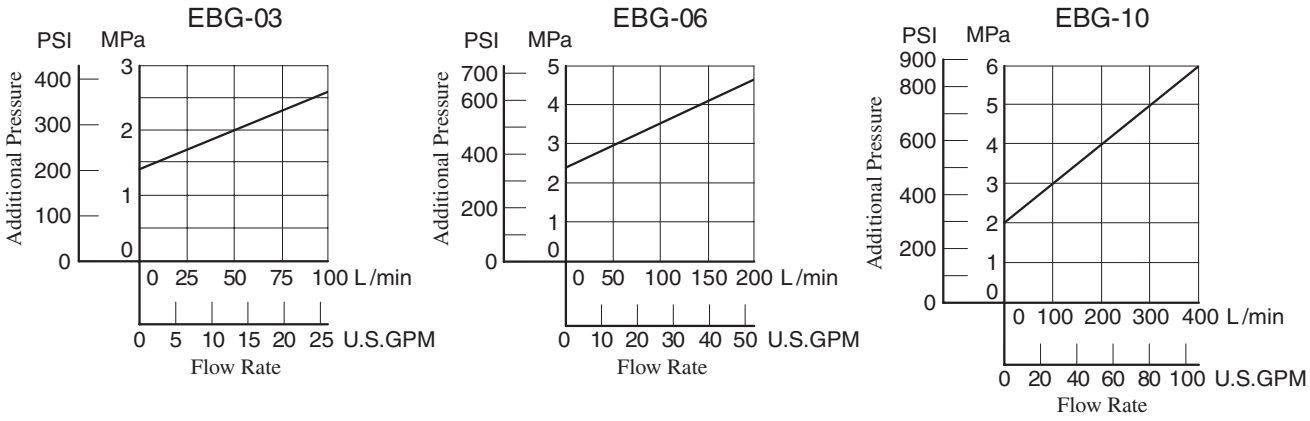
- Sub-plates are available. Specify the sub-plate model number from the table above. When sub-plates are not used, the mounting surface should have a good machined finish.
- Sub-plates are those for pilot operated relief valves. For dimensions, see page 213.

Instructions

Safety Valve

The pressure of the safety valve for EBG-03 is preset at the value equal to the upper limit of the pressure adjustment range plus 2 MPa (290 PSI) subject to a flow rate of 50 L/min (13.2 U.S.GPM).
The same for EBG-06 is preset at the value equal to the upper limit of the pressure adjustment range plus 3.5 MPa (510 PSI) subject to a flow rate of 100 L/min (26.4 U.S.GPM).
The same for EBG-10 is preset at the value equal to the upper limit of the pressure adjustment range plus 4 MPa (580 PSI) subject to a flow rate of 200 L/min (52.8 U.S.GPM).
In case where the upper limit of operating pressure is low or the upper limit of flow rate to be used is different from the specified maximum flow, please adjust and determine the setting pressure of the safety valve at the value calculated from the following formula.

Setting pressure = (Operating pressure upper limit) + (Additional pressure indicated blow)



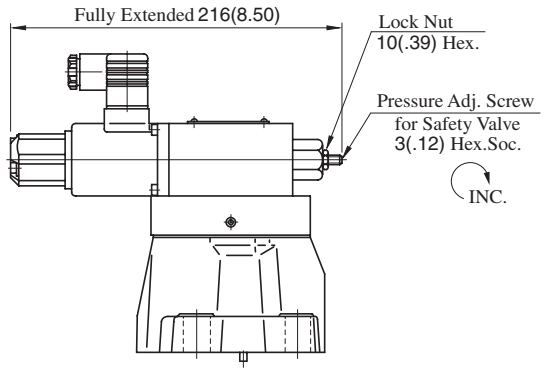
To lower the setting pressure, turn the safety valve pressure adjustment screw anti-clockwise. After adjustment, be sure to tighten the lock nut.

Mounting Surface
EBG-03 : ISO 6264-AR-06-2-A
EBG-06 : ISO 6264-AS-08-2-A

DIMENSIONS IN MILLIMETRES (INCHES)

EBG-$\begin{matrix}03\\06\end{matrix}$-∗-51/5190

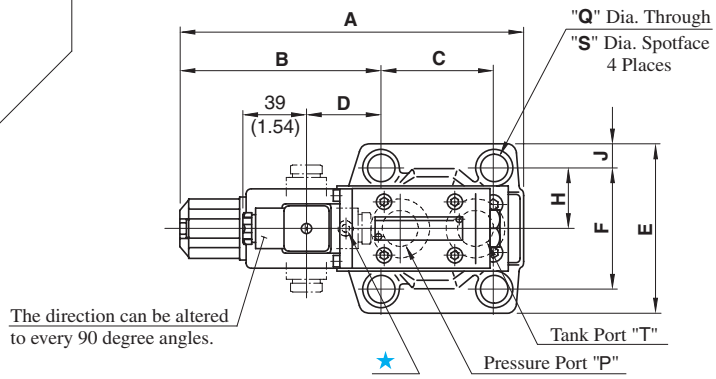
With Safety Valve

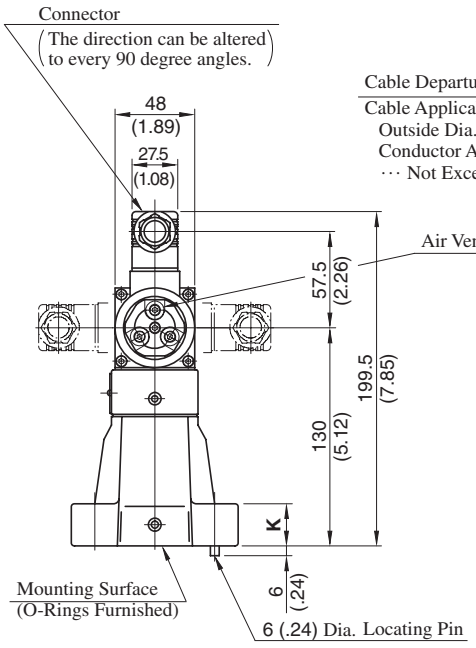


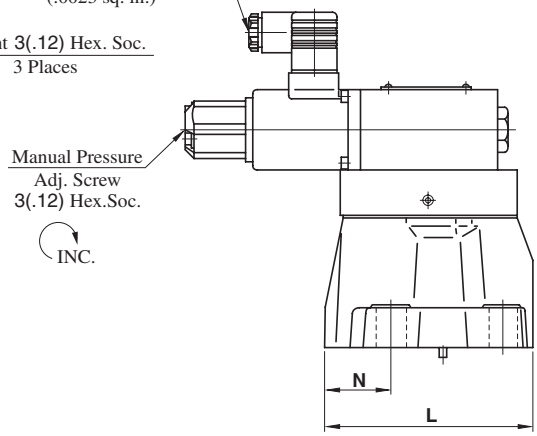
• For other dimensions, refer to the without safety valve.

EBG-$\begin{matrix}03\\06\end{matrix}$-∗-T-51/5190

Without Safety Valve







★ This port is not used. It is provided because of the common use of the body with the low-noise type pilot operated relief valve.
On the sub-plate, plug the port which corresponds to this port.

Model Numbers	Dimensions mm (Inches)												
	A	B	C	D	E	F	H	J	K	L	N	Q	S
EBG-03	197.5 (7.78)	117.6 (4.63)	53.8 (2.12)	40.3 (1.59)	76 (2.99)	53.8 (2.12)	26.9 (1.06)	11.1 (.44)	21.5 (.85)	106 (4.17)	26.1 (1.03)	13.5 (.53)	21 (.83)
EBG-06	205.5 (8.09)	119.5 (4.70)	66.7 (2.63)	42.1 (1.66)	98 (3.86)	70 (2.76)	35 (1.38)	14 (.55)	26 (1.02)	122 (4.80)	36 (1.42)	17.5 (.69)	26 (1.02)

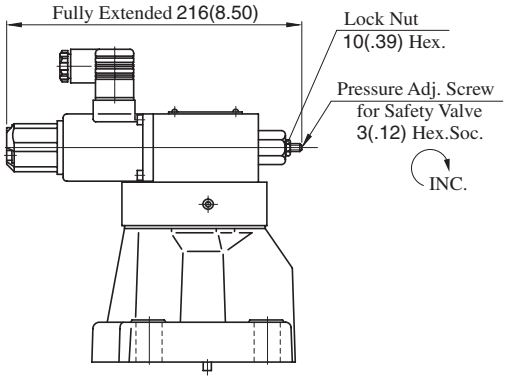
Note: For valve mounting surface dimensions, see the dimensional drawings of sub-plates (p.213) in common use.

Mounting surface:
ISO 6264-AT-10-2-A

DIMENSIONS IN MILLIMETRES (INCHES)

EBG-10-∗-51/5190

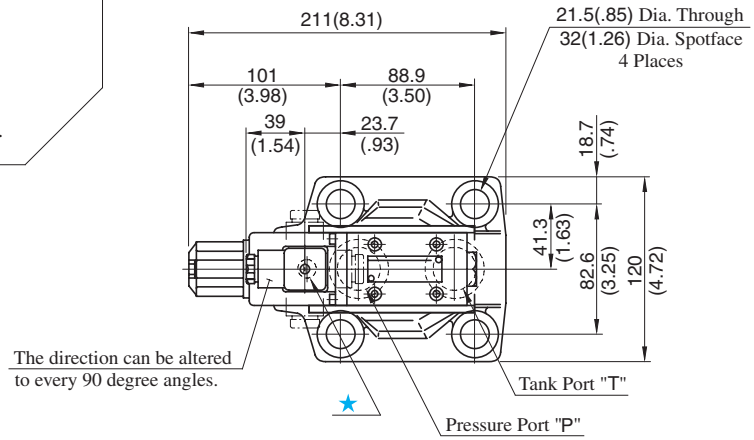
With Safety Valve



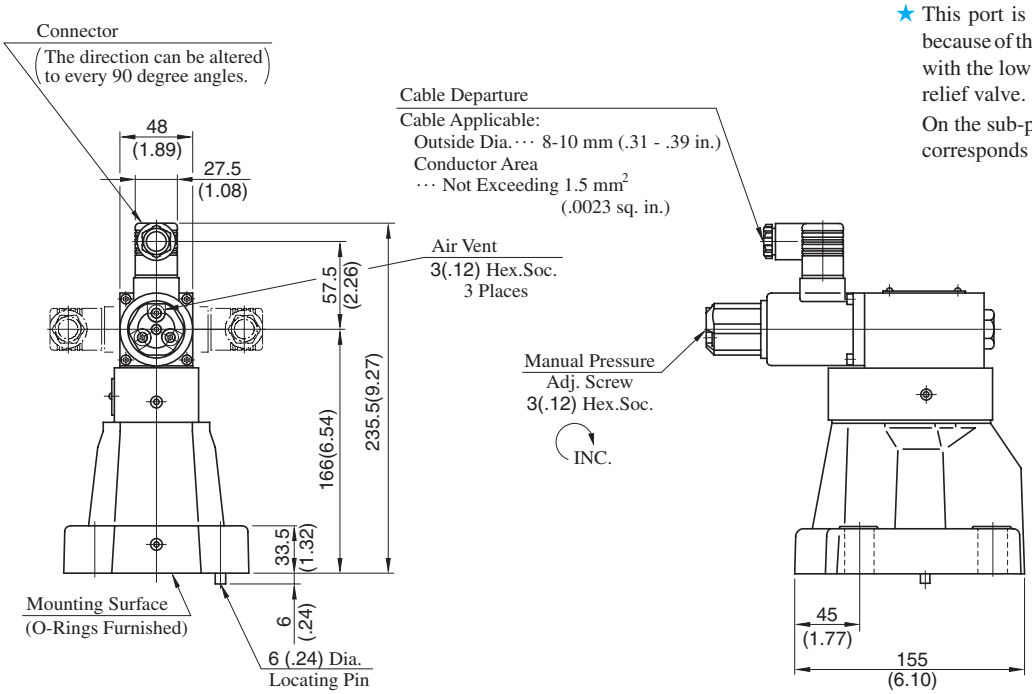
• For other dimensions, refer to the without safety valve.

EBG-10-∗-T-51/5190

Without Safety Valve



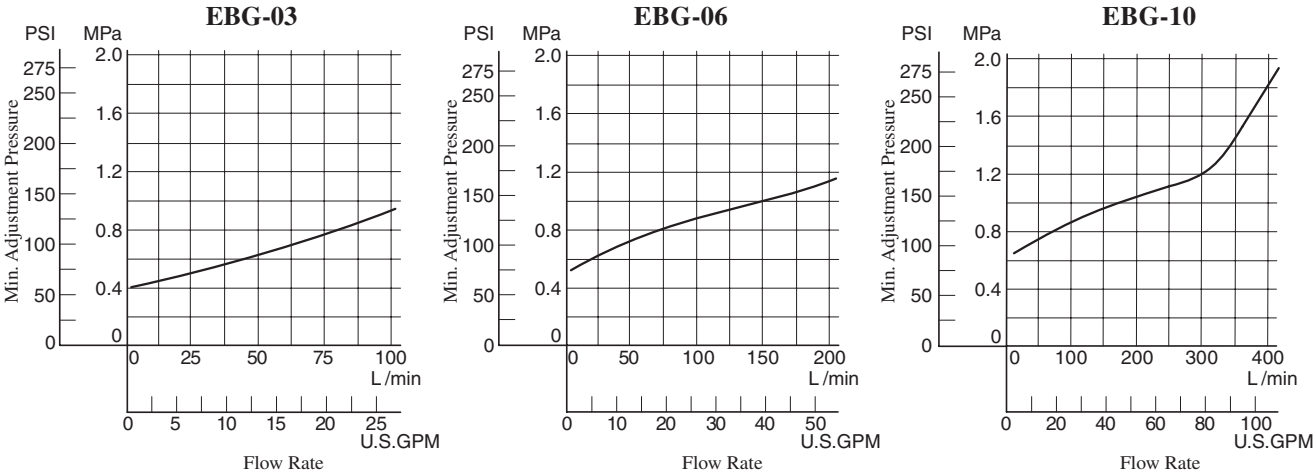
★ This port is not used. It is provided because of the common use of the body with the low-noise type pilot operated relief valve.
On the sub-plate, plug the port which corresponds to this port.



Note: For valve mounting surface dimensions, see the dimensional drawings of sub-plates (p.213) in common use.

Min. Adjustment Pressure

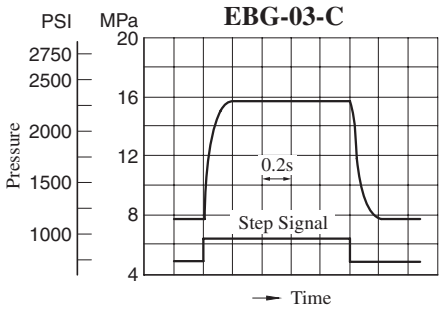
Viscosity : 30 mm²/s (141 SSU)



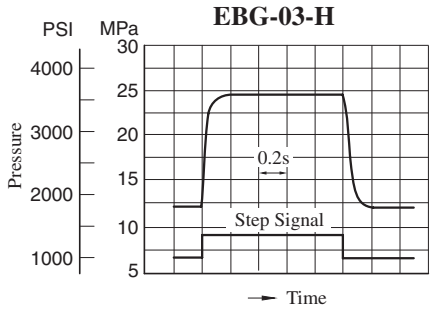
Step Response (Example)

These Characteristics have been obtained by measuring on each valve.
Therefore, they may vary according to a hydraulic circuit to be used.

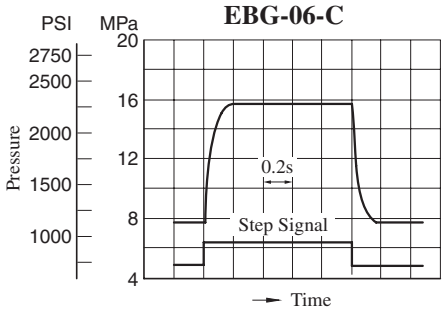
Trapped Oil Volume : 1 L (.264 U.S. Gallons)
Viscosity : 30 mm²/s (141 SSU)



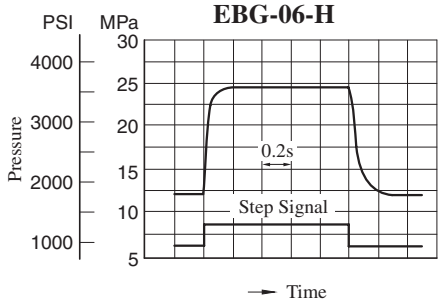
(Flow Rate : 100 L/min, 26.4 U.S.GPM)



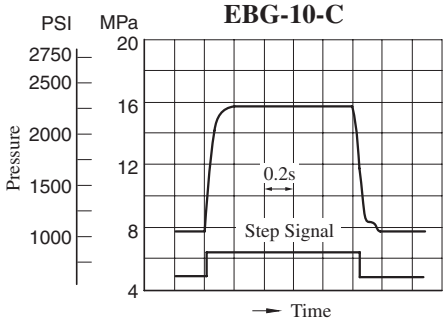
(Flow Rate : 100 L/min, 26.4 U.S.GPM)



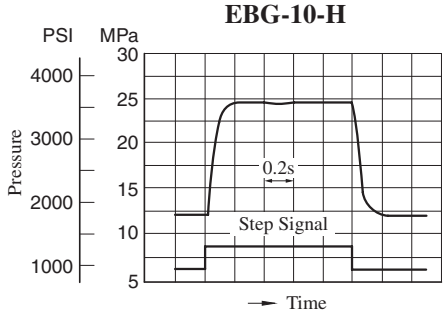
(Flow Rate : 200 L/min, 52.8 U.S.GPM)



(Flow Rate : 200 L/min, 52.8 U.S.GPM)



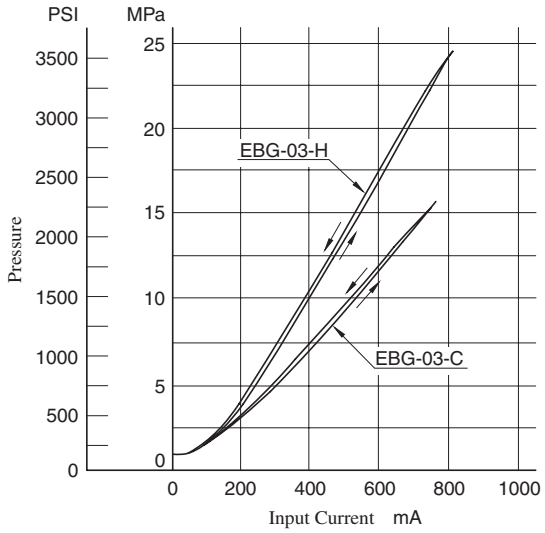
(Flow Rate : 400 L/min, 106 U.S.GPM)



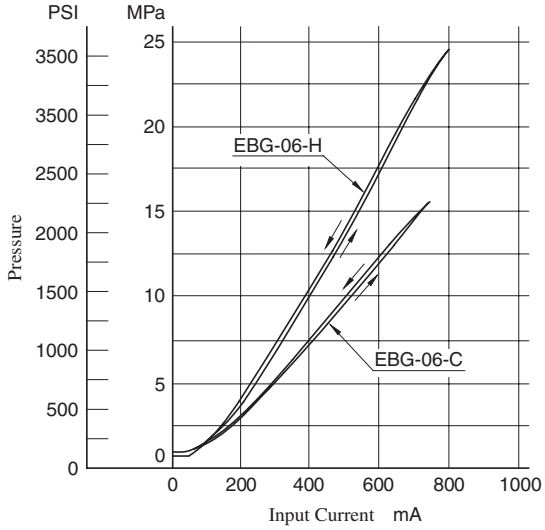
(Flow Rate : 400 L/min, 106 U.S.GPM)

Input Current vs. Pressure

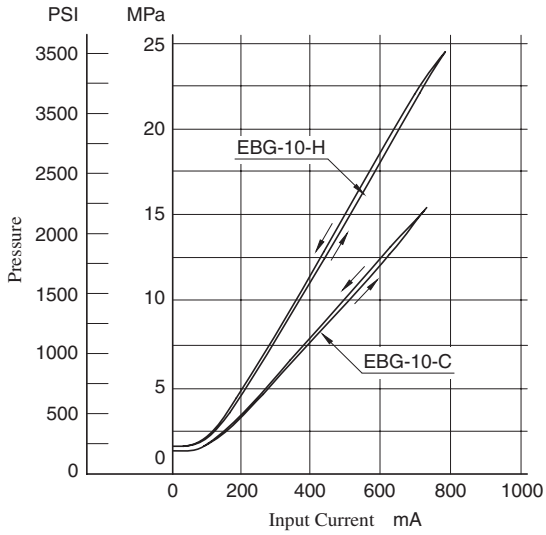
EBG-03



EBG-06



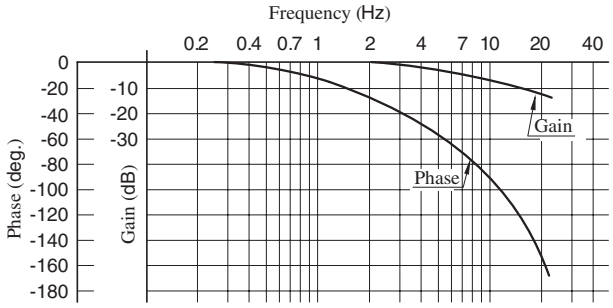
EBG-10



Frequency Response

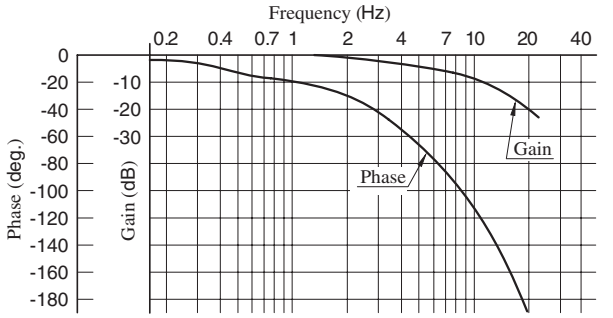
Trapped Oil Volume : 1 L (.264 U.S. Gallons)
Viscocity : 30 mm^2/s (141 SSU)

EBG-03



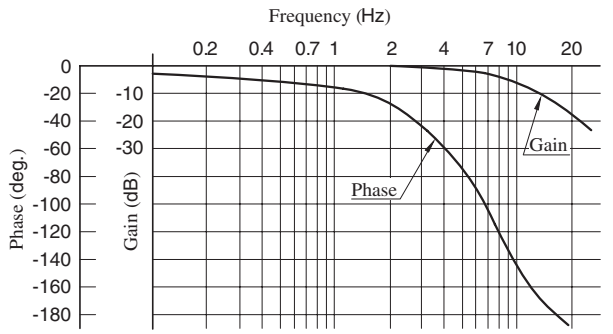
Pressure : 7.8 ± 1.6 MPa
(1130 ± 230 PSI)
Flow Rate : 100 L/min
(26.4 U.S.GPM)

EBG-06



Pressure : 7.8 ± 1.6 MPa
(1130 ± 230 PSI)
Flow Rate : 200 L/min
(52.8 U.S.GPM)

EBG-10

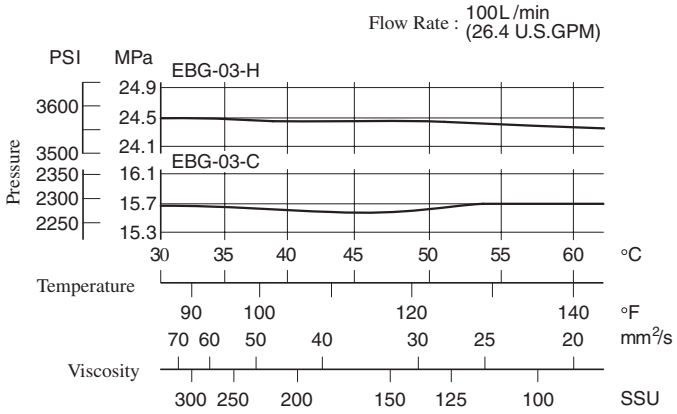


Pressure : 7.8 ± 1.6MPa
(1130 ± 230 PSI)
Flow Rate : 400 L/min
(106 U.S.GPM)

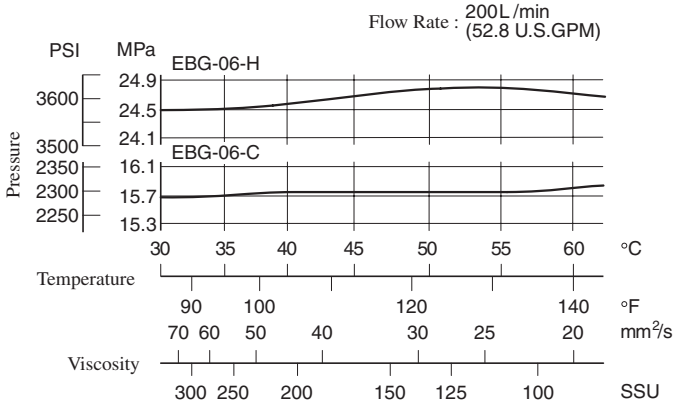
Viscosity vs. Pressure

Oil : ISO VG 46 Oil

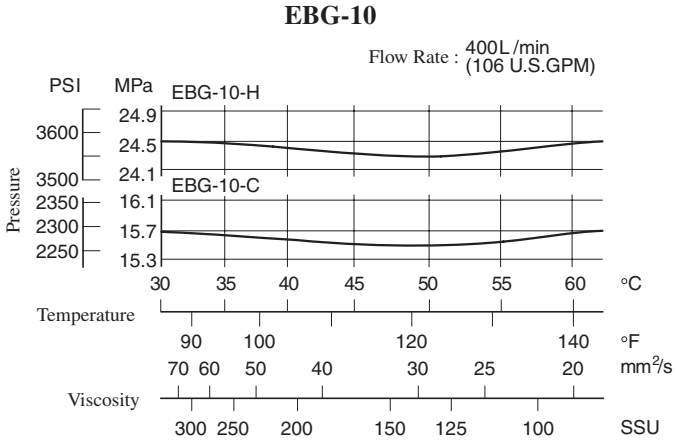
EBG-03



EBG-06



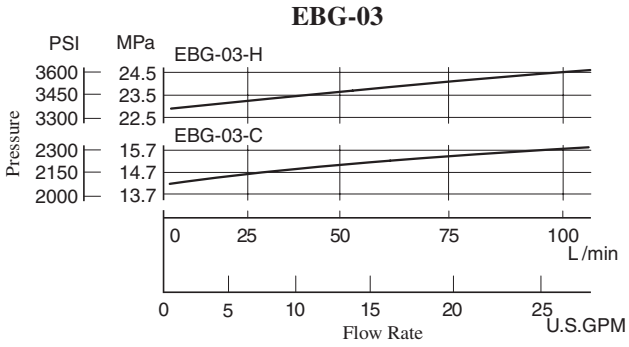
EBG-10



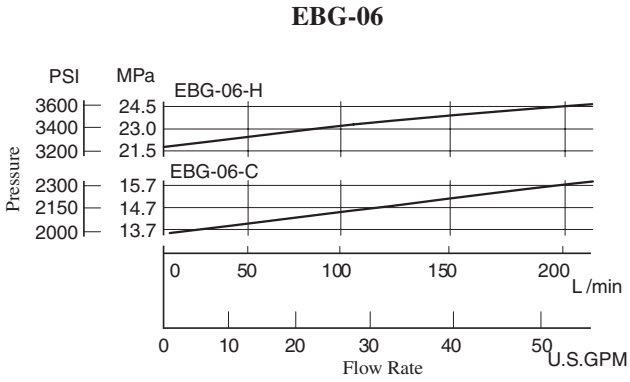
Flow Rate vs. Pressure

Viscosity : 30 mm²/s (141 SSU)

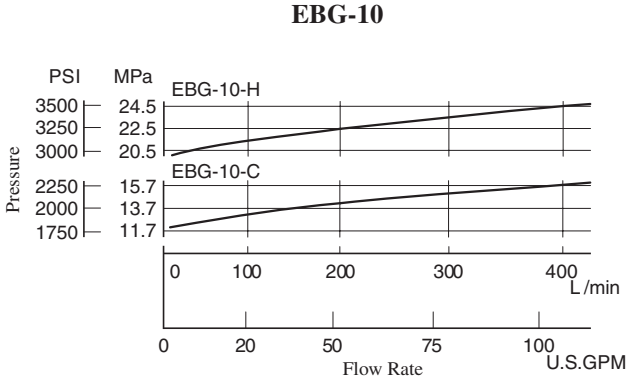
EBG-03



EBG-06

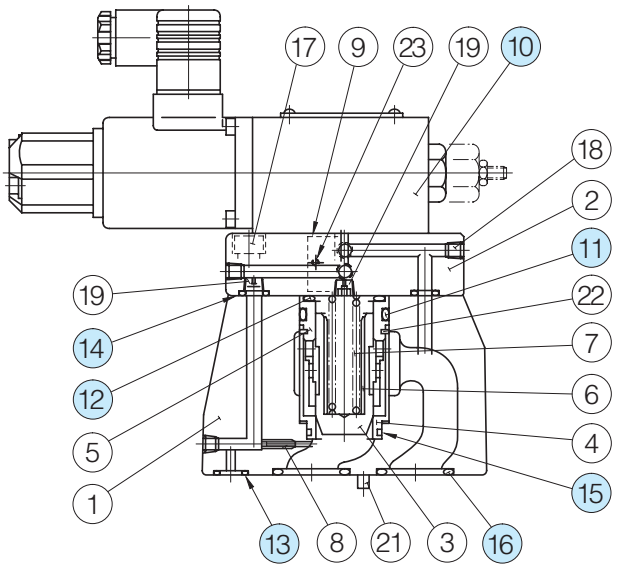


EBG-10



List of Seals and Pilot Valves

EBG-$\frac{03}{06}$-∗-∗-51/5190 (10)



Pilot Valve

Valve Model Numbers	⑩ Pilot Valve Model Numbers
EBG-03-C-51/5190	EDG-01V-C-1-PNT09-51
EBG-03-H-51/5190	EDG-01V-H-1-PNT09-51
EBG-03-C-T-51/5190	EDG-01V-C-PNT09-51
EBG-03-H-T-51/5190	EDG-01V-H-PNT09-51
EBG-06-C-51/5190	EDG-01V-C-1-PNT10-51
EBG-06-H-51/5190	EDG-01V-H-1-PNT10-51
EBG-06-C-T-51/5190	EDG-01V-C-PNT10-51
EBG-06-H-T-51/5190	EDG-01V-H-PNT10-51
EBG-10-C-51/5190	EDG-01V-C-1-PNT11-5103
EBG-10-H-51/5190	EDG-01V-H-1-PNT11-5103
EBG-10-C-T-51/5190	EDG-01V-C-PNT11-5103
EBG-10-H-T-51/5190	EDG-01V-H-PNT11-5103

Note: For the details of pilot valves, refer to "Pilot Relief Valves" on page 674.

List of Seals

Item	Name of Parts	Part Numbers			Qty.
		EBG-03	EBG-06	EBG-10	
11	O-Ring	SO-NB-P32	SO-NB-P32	SO-NB-P42	1
12	O-Ring	SO-NB-P28	SO-NB-P28	SO-NB-P28	1
13	O-Ring	SO-NB-P9	SO-NB-P11	SO-NB-P9	1
14	O-Ring	SO-NB-P9	SO-NB-P9	SO-NB-P9	2
15	O-Ring	SO-NB-A024	SO-NB-A024	SO-NB-A128	1
16	O-Ring	SO-NB-P18	SO-NB-P28	SO-NB-P32	2

Note) When ordering seals, please specify the seal kit number from the table below. In addition to the above O-rings, seals for pilot valve are included in the seal kit. For the details of the pilot valve seals, see page 674.

List of Seal Kit

Model Numbers	Seal Kit Numbers
EBG-03	KS-EBG-03-51
EBG-06	KS-EBG-06-51
EBG-10	KS-EBG-10-51

Interchangeability between Current and New Design

EBG-03/06/10 series valves have changed model from 50 to 51 design in line with the model change of pilot valve (EDG-01).

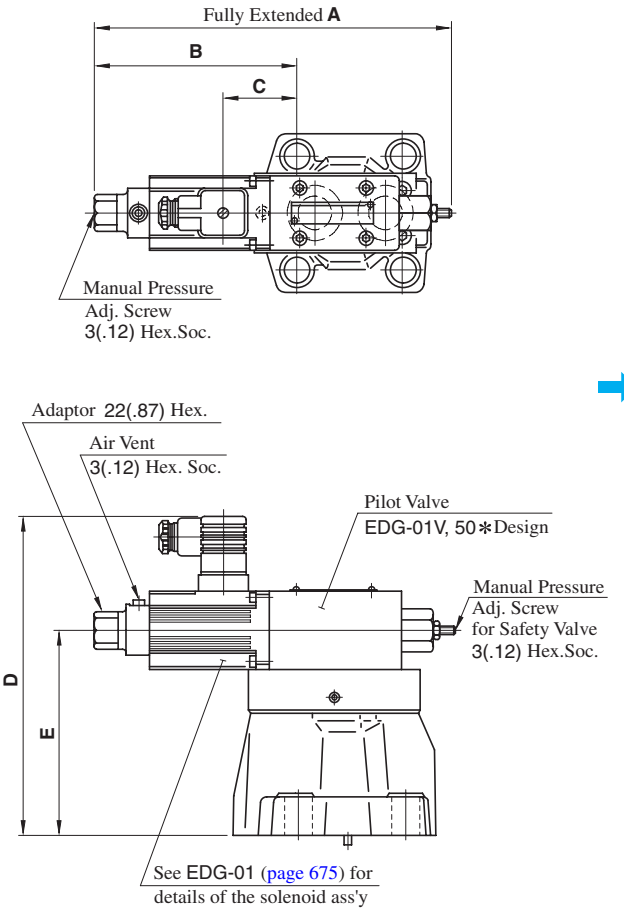
● Specifications and Characteristics

No change in specifications and characteristics between current and new design.

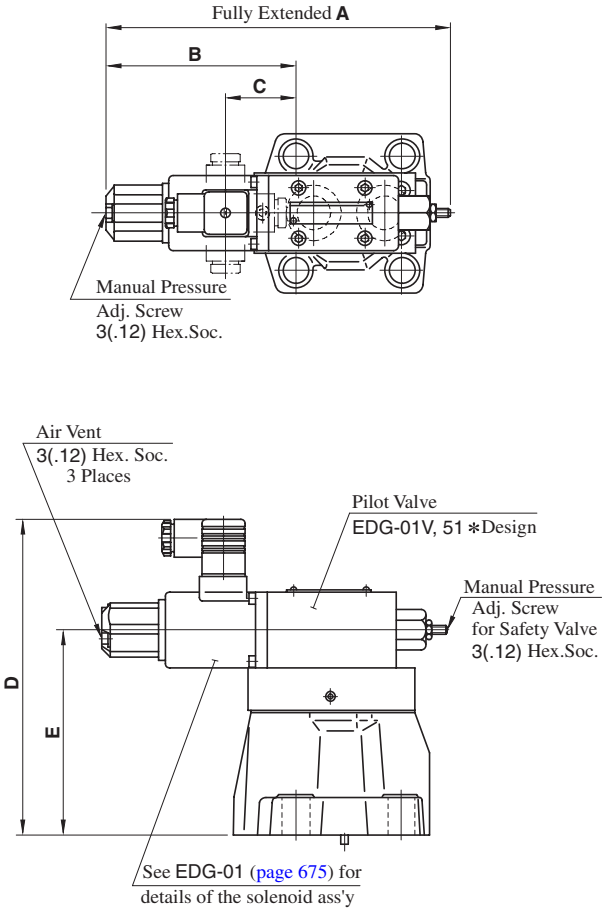
● Mounting Interchangeability

There is an interchangeability in the mounting dimensions, however, the outside shape and dimensions are changed as shown below due to pilot valve improvement and other modifications.

Current: Design 50



New: Design 51

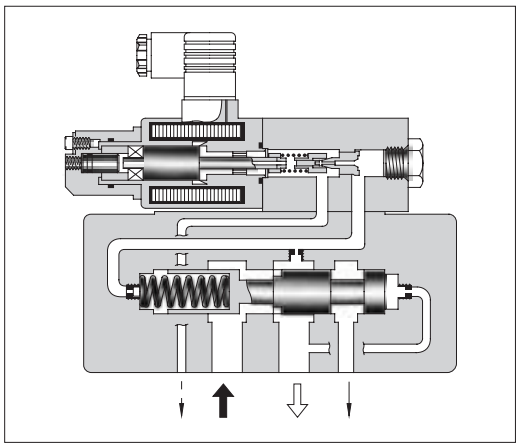


Model Numbers		A	B	C	D	E
Current	EBG-03-∗-∗-50/5090	217 (8.54)	118.6 (4.67)	40.2 (1.58)	199.5 (7.85)	130 (5.12)
New	EBG-03-∗-∗-51/5190	216 (8.50)	117.6 (4.63)	40.2 (1.59)		
Current	EBG-06-∗-∗-50/5090	217 (8.54)	120.5 (4.74)	42.1 (1.66)	199.5 (7.85)	130 (5.12)
New	EBG-06-∗-∗-51/5190	216 (8.50)	119.5 (4.70)	42.1 (1.66)		
Current	EBG-10-∗-∗-50/5090	217 (8.54)	102 (4.02)	23.6 (.93)	235.5 (9.27)	166 (6.54)
New	EBG-10-∗-∗-51/5190	216 (8.50)	101 (3.98)	23.6 (.93)		

DIMENSIONS IN MILLIMETRES (INCHES)

Proportional Electro-Hydraulic Relieving and Reducing Valves

This valve is derived by combining a small, high-performance 1/8 proportional electro-hydraulic pilot relief valve with a relieving and reducing valve.
With this valve, it is possible to regulate the system pressure in proportion to the input current.
Incorporating a relief mechanism, this valve provides a good response speed and the pressure decreases even if the load is large. Note that this valve is used in conjunction with the applicable power amplifier.

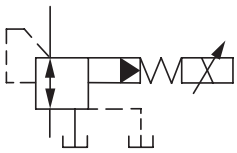


Specifications

Description \ Model Numbers	ERBG-06	ERBG-10
Max. Operating Pres. MPa (PSI)	24.5 (3550)	24.5 (3550)
Max. Flow L/min(U.S.GPM)	100 (26.4)	250 (66)
Max. Relieving Flow L/min(U.S.GPM)	35 (9.24) ★	15 (3.96) ★
Secondary Pres. Adj. Range MPa (PSI)	Refer to Model Number Designation	
Rated Current	B : 800 mA C : 800 mA H : 950 mA	B : 800 mA C : 800 mA H : 950 mA
Coil Resistance	10 Ω	10 Ω
Hysteresis	3% or less	3% or less
Repeatability	1% or less	1% or less
Approx. Mass kg (lbs.)	12 (26.5)	13.5 (29.8)

★ The values shown are those obtained where the differential pressure between the secondary pressure port and tank port is 13.7 MPa (2000 PSI).

Graphic Symbol



Model Number Designation

F-	ERB	G	-06	-C	-51	*
Special Seals	Series Number	Type of Mounting	Valve Size	Secondary Pres. Adj. Range MPa (PSI)	Design Number	Design Standards
F: Special Seals for Phosphate Ester Type Fluid (Omit if not required)	**ERB**: Proportional Electro-Hydraulic Relieving and Reducing Valve	**G**: Sub-plate Mounting	**06**	**B**: 0.8 - 6.9 (115 - 1000) **C**: 1.2 - 13.7 (175 - 2000) **H**: 1.5 - 20.6 (220 - 3000)	**51**	Refer to ★
			10	**B**: 0.9 - 6.9 (130 - 1000) **C**: 1.2 - 13.7 (175 - 2000) **H**: 1.5 - 20.6 (220 - 3000)		

★ Design Standards: None ..... Japanese Standard "JIS" and European Design Standard
90 ..... N. American Design Standard

Attachment

Mounting Bolts

Valve Model Numbers	Socket Head Cap Screw		
	Japanese Standard "JIS" & European Design Standard	N. American Design Standard	Qty.
ERBG-06	M10 × 70 Lg.	3/8 - 16 UNC × 2-3/4 Lg.	4
ERBG-10	M10 × 70 Lg.	3/8 - 16 UNC × 2-3/4 Lg.	6

Applicable Power Amplifier

For stable performance, it is recommended that Yuken's applicable power ampliffiers be used (for details see page 767, 771, 780).

Model Numbers : AME-D-10-∗-20
AME-D2-1010-11
SK1022-∗-∗-11
SK1015-11 (For DC power supply)
AMN-D-10 (For DC power supply)

Sub-plate

Valve Model Numbers	Japanese Standard "JIS"		European Design Standard		N. American Design Standard		Approx. Mass kg (lbs.)
	Sub-plate Model Numbers	Thread Size	Sub-plate Model Numbers	Thread Size	Sub-plate Model Numbers	Thread Size	
ERBG-06	ERBGM-06-20	Rc 3/4	ERBGM-06-2080	3/4 BSP.F	ERBGM-06-2090	3/4 NPT	3.0 (6.6)
ERBG-10	ERBGM-10-10	Rc 1-1/4	ERBGM-10-1080	1-1/4 BSP.F	ERBGM-10-1090	1-1/4 NPT	6.5 (14.3)

- Sub-plates are available. Specify the sub-plate model number from the table above. When sub-plates are not used, the mounting surface should have a good machined finish.

Instructions

Primary Pressure Required for Preselected Pressure

The primary pressure must be 1 MPa (145 PSI) higher than the preselected pressure.

Drain Back Pressure

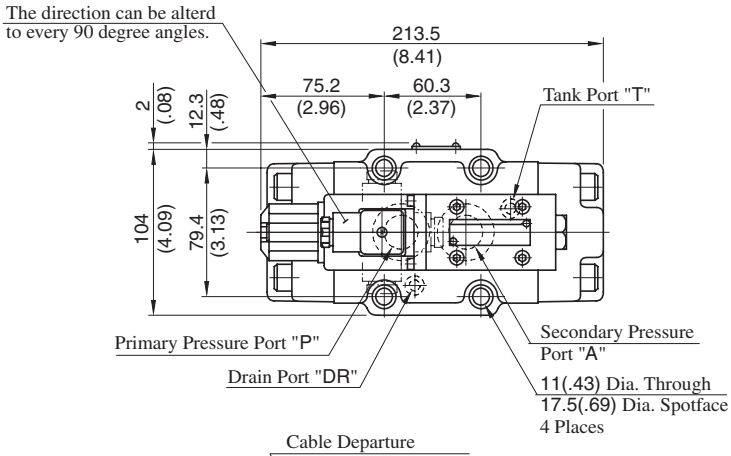
Check that the drain back pressure does not exceed 0.2 MPa (29 PSI).

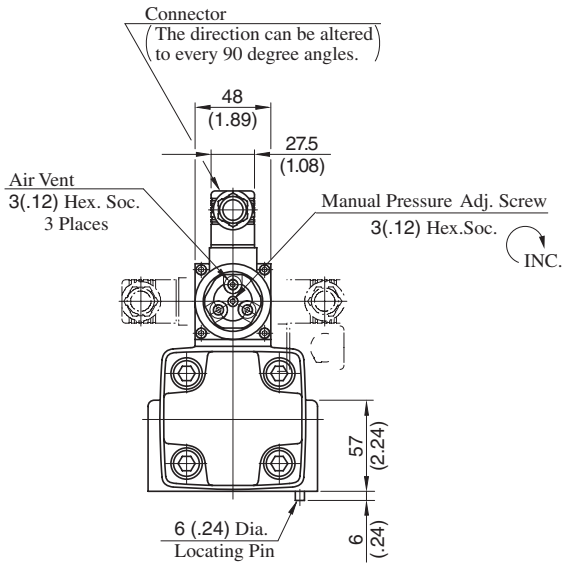
Trapped Oil Volume

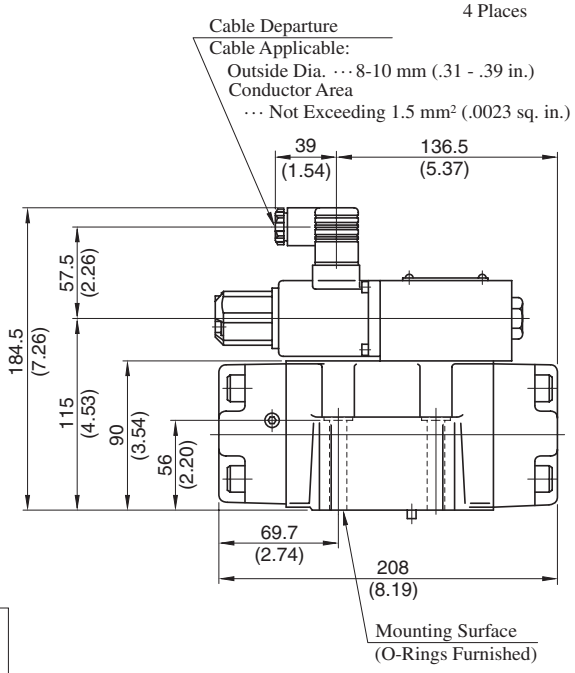
The recommended secondary side trapped oil volume is about 20 liters (5.28 U.S.Gallons). Note that the trapped oil volume must not be lower than 1.4 liters (.37 U.S.Gallons).

ERBG-06-∗-51/5190

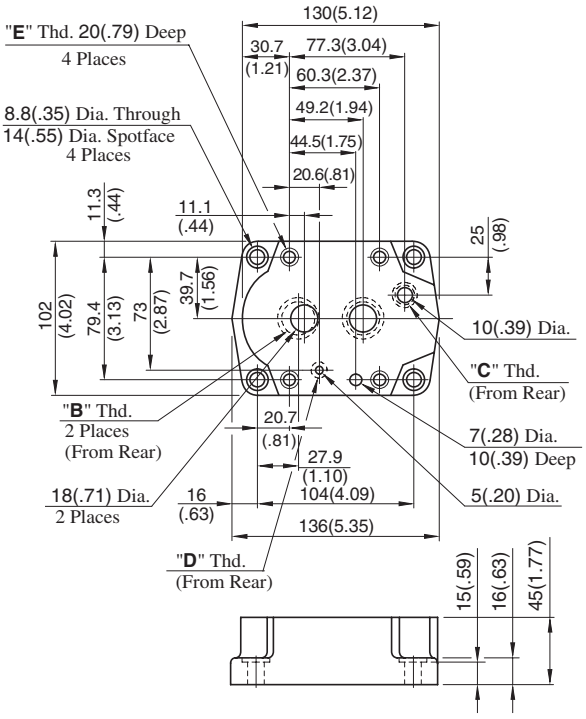
DIMENSIONS IN MILLIMETRES (INCHES)







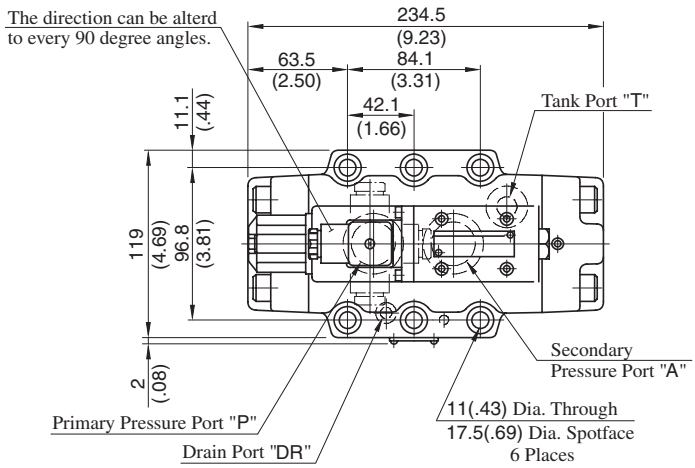
Sub-plate:
ERBGM-06-20/2080/2090

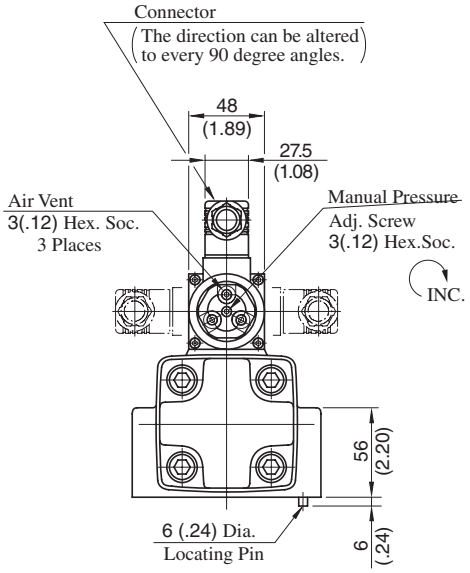


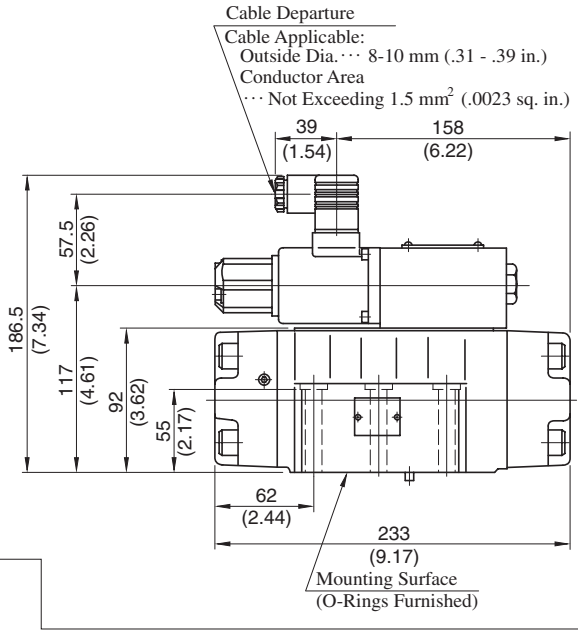
Sub-plate Model Numbers	Thread Size			
	"B" Thd.	"C" Thd.	"D" Thd.	"E" Thd.
ERBGM-06-20	Rc 3/4	Rc 3/8	Rc 1/4	M10
ERBGM-06-2080	3/4 BSP.F	3/8 BSP.F	1/4 BSP.F	
ERBGM-06-2090	3/4 NPT	3/8 NPT	1/4 NPT	3/8-16 UNC

ERBG-10-∗-51/5190

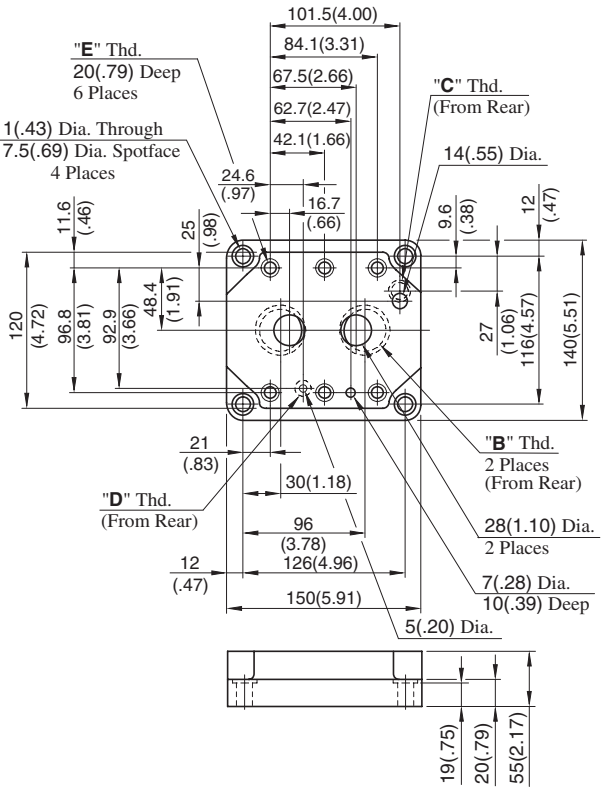
DIMENSIONS IN MILLIMETRES (INCHES)







Sub-plate
ERBGM-10-10/1080/1090



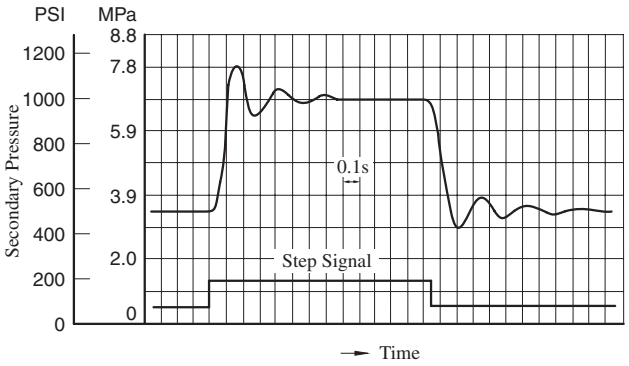
Sub-plate Model Numbers	Thread Size			
	"B" Thd.	"C" Thd.	"D" Thd.	"E" Thd.
ERBGM-10-10	Rc 1-1/4	Rc 3/8	Rc 1/4	M10
ERBGM-10-1080	1-1/4 BSP.F	3/8 BSP.F	1/4 BSP.F	
ERBGM-10-1090	1-1/4 NPT	3/8 NPT	1/4 NPT	3/8-16 UNC

Step Response (Example)

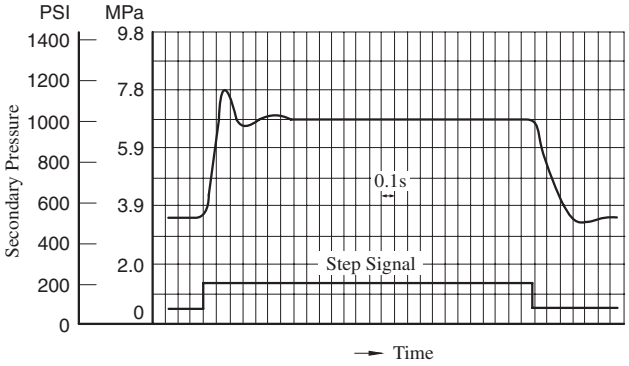
The following step response characteristics are taken when the trapped oil volume is 20 liters (5.28 U.S.Gallons). The step response varies by trapped oil volume.

Primary Pressure : 24.5 MPa (3550 PSI)
Trapped Oil Volume : 20 L (5.28 U.S.Gallons)
Viscocity : 30 mm^2/s (141 SSU)

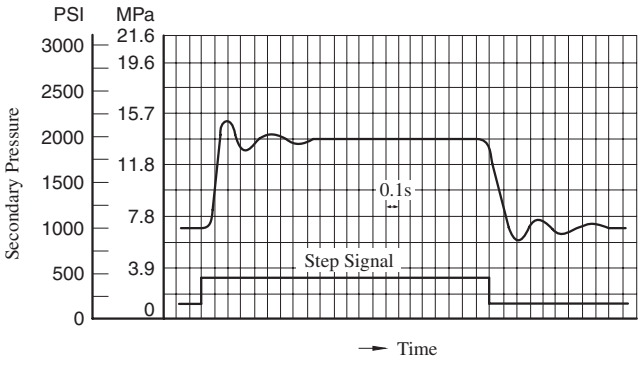
ERBG-06-B



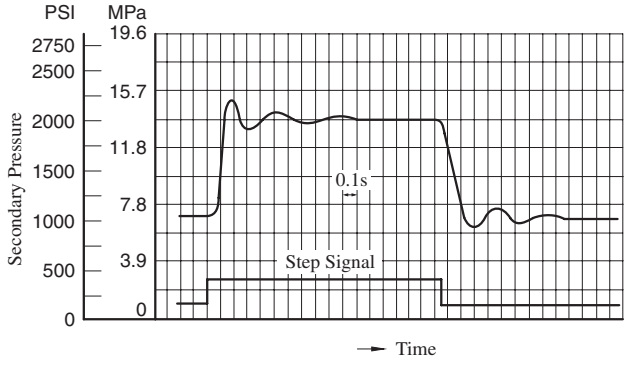
ERBG-10-B



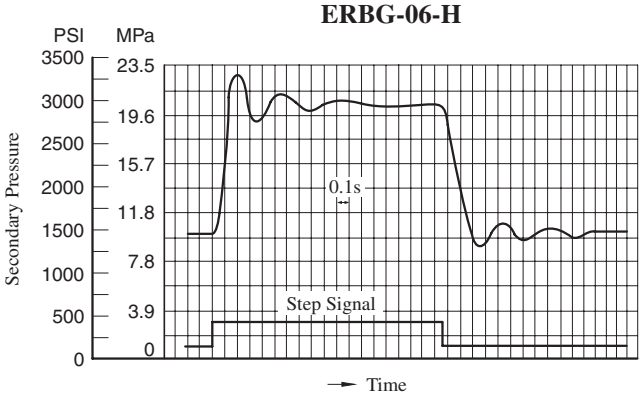
ERBG-06-C



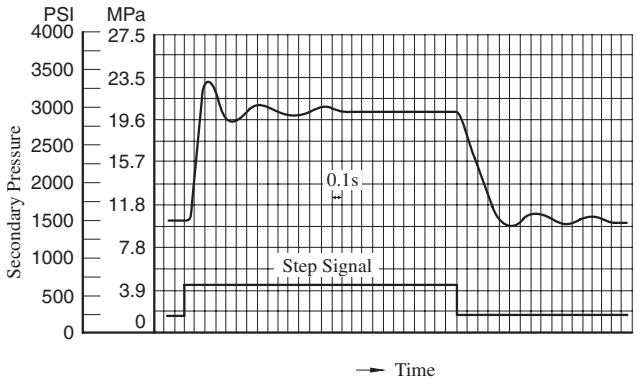
ERBG-10-C



ERBG-06-H



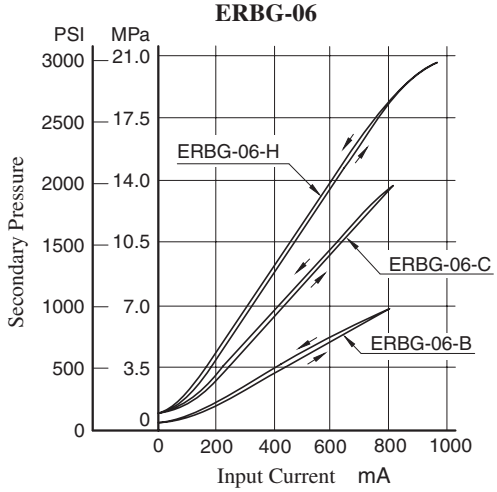
ERBG-10-H



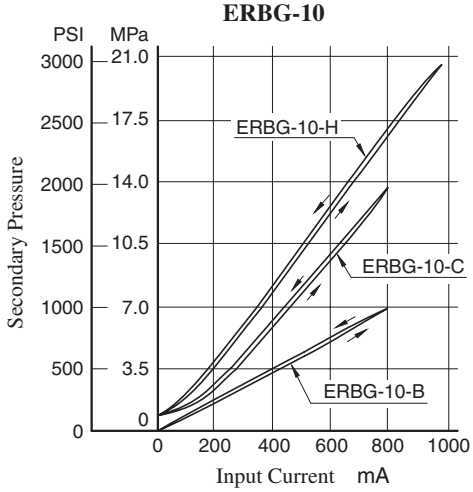
Input Current vs. Secondary Pressure

Primary Pressure : 24.5 MPa (3550 PSI)
Viscocity : 30 mm²/s (141 SSU)

ERBG-06



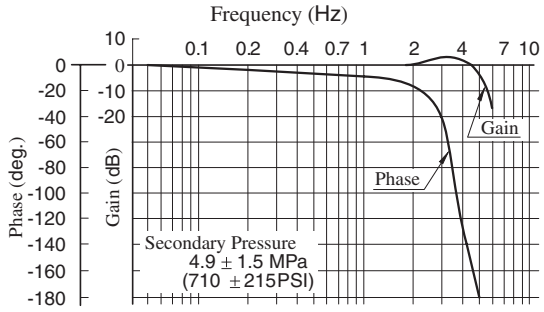
ERBG-10



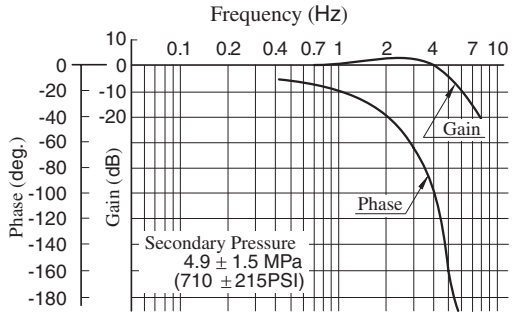
Frequency Response

Primary Pressure : 24.5 MPa (3550 PSI)
Trapped Oil Volume : 20 L (5.28 U.S.Gallons)
Viscocity : 30 mm²/s (141 SSU)

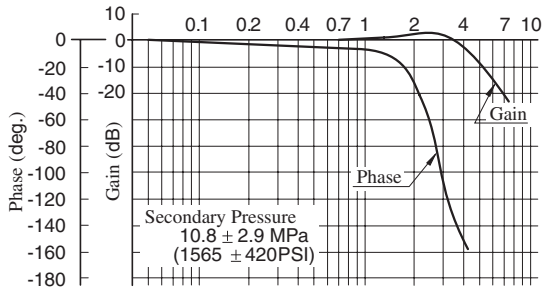
ERBG-06-B



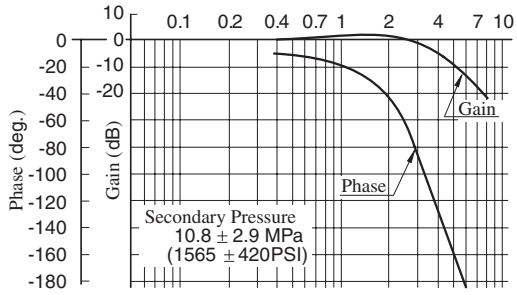
ERBG-10-B



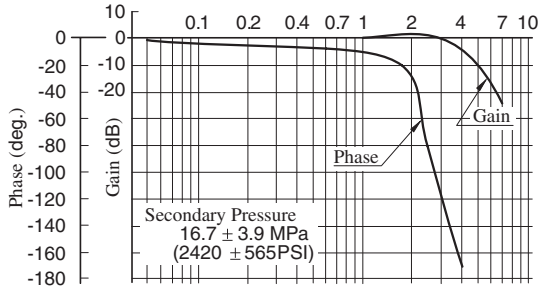
ERBG-06-C



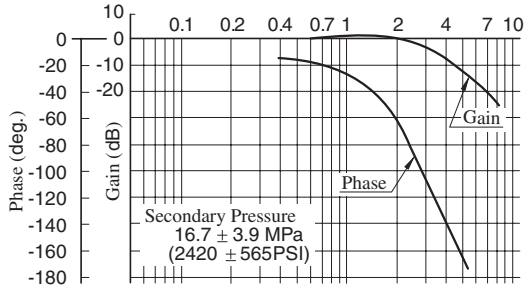
ERBG-10-C



ERBG-06-H



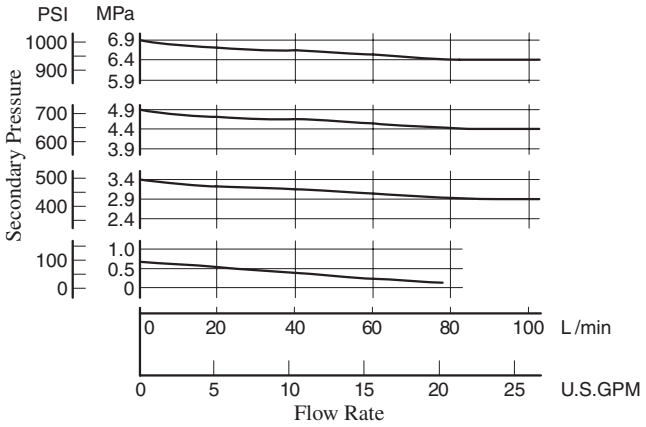
ERBG-10-H



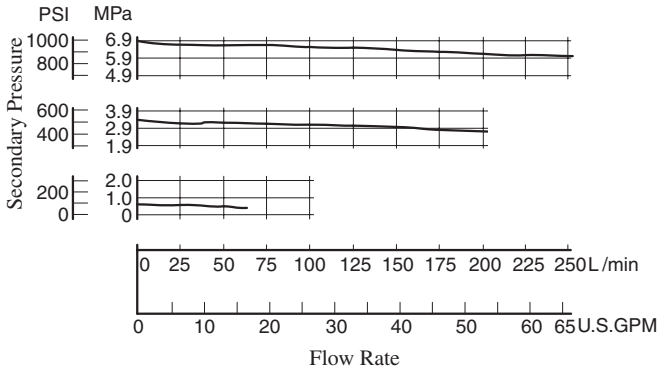
Flow Rate vs. Secondary Pressure

Viscosity : 30 mm²/s (141 SSU)

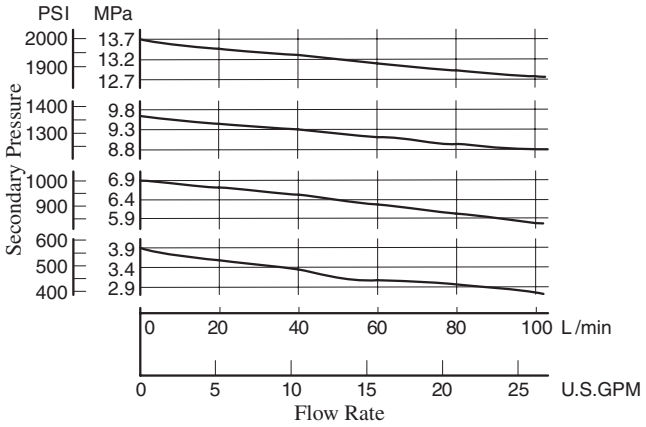
ERBG-06-B



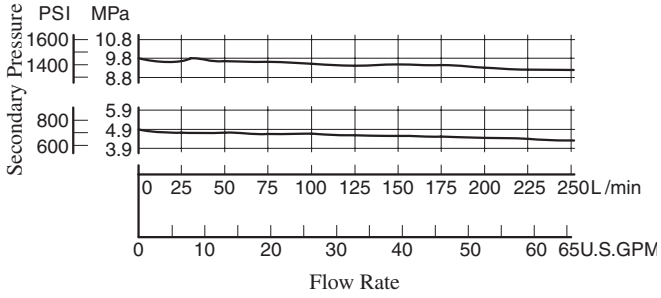
ERBG-10-B



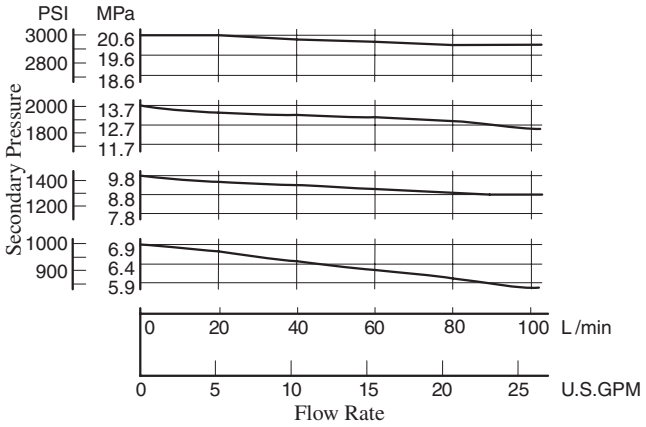
ERBG-06-C



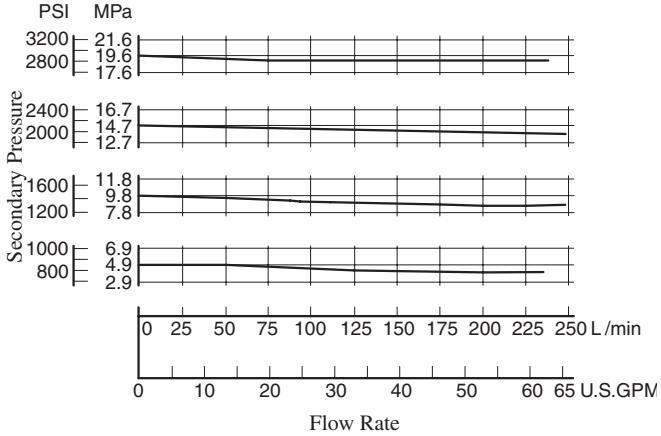
ERBG-10-C



ERBG-06-H



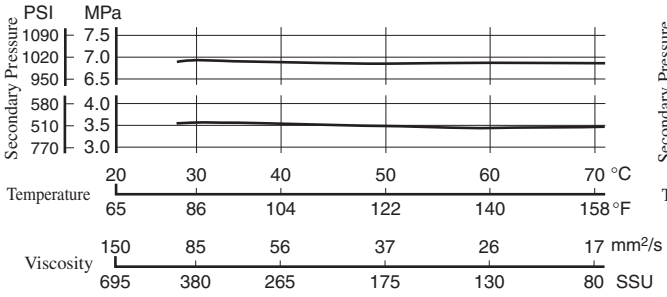
ERBG-10-H



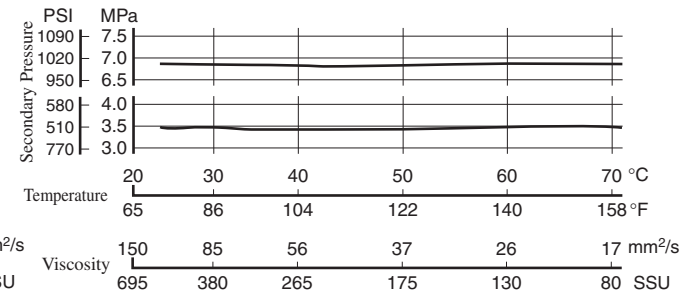
Viscosity vs. Secondary Pressure

Oil: ISO VG32

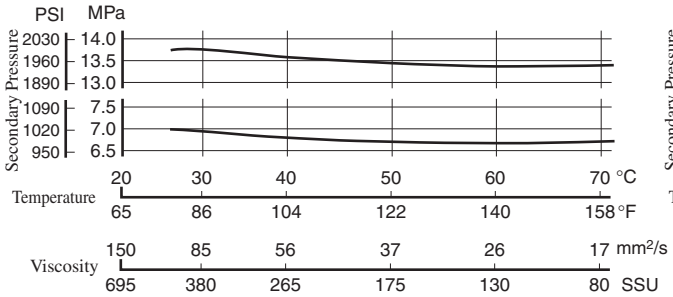
ERBG-06-B



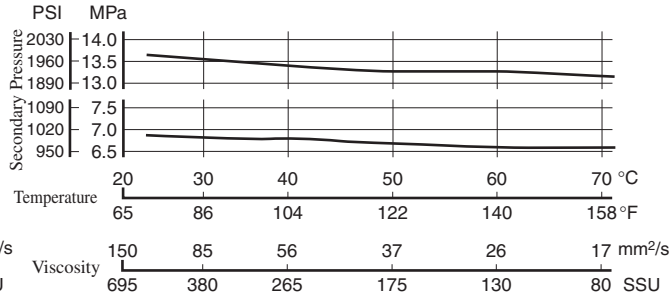
ERBG-10-B



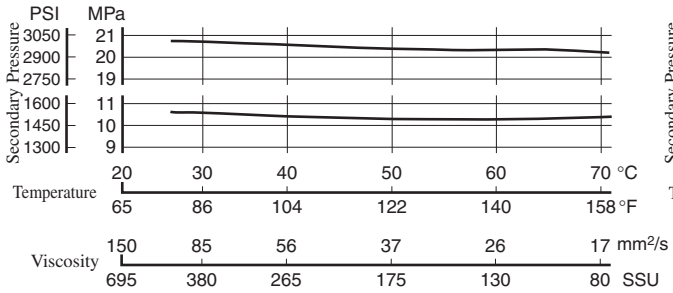
ERBG-06-C



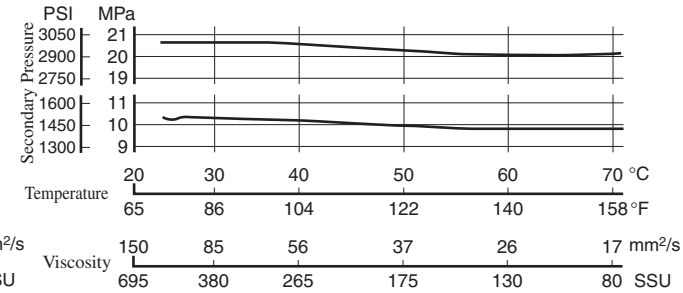
ERBG-10-C



ERBG-06-H

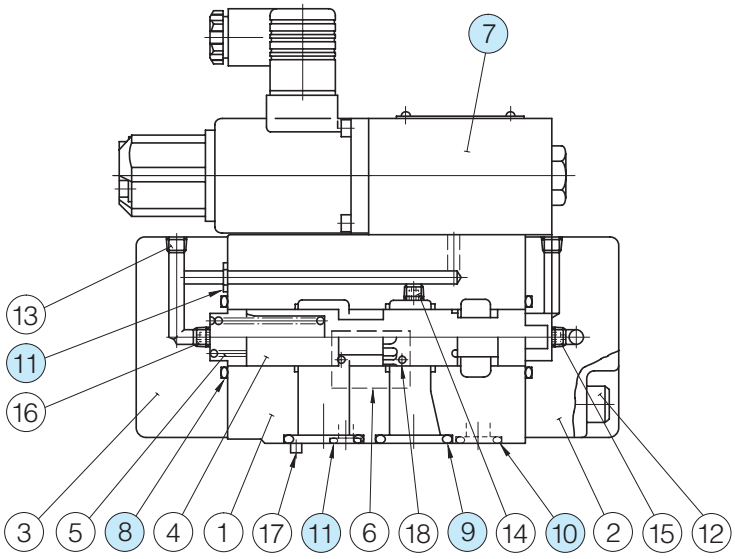


ERBG-10-H



List of Seals and Pilot Valves

ERBG- $\frac{06}{10}$ -∗-51/5190



List of Seals

Item	Name of Parts	Part Numbers		Qty.
		ERBG-06	ERBG-10	
8	O-Ring	SO-NB-G30	SO-NB-P36	2
9	O-Ring	SO-NB-P28	SO-NB-P32	2
10	O-Ring	SO-NB-P14	SO-NB-P18	1
11	O-Ring	SO-NB-P9	SO-NB-P9	3

Note) When ordering seals, please specify the seal kit number from the table below. In addition to the above O-rings, seals for pilot valve are included in the seal kit.
For the details of the pilot valve seals, see page 674.

List of Seal Kits

Valve Model Numbers	Seal Kit Numbers
ERBG-06	KS-ERBG-06-51
ERBG-10	KS-ERBG-10-51

Pilot Valve

Valve Model No.	⑦ Pilot Valve Model Numbers
ERBG-06-B-51/5190	EDG-01-B-PNTN-5101
ERBG-06-C-51/5190	EDG-01-C-PNTN-5101
ERBG-06-H-51/5190	EDG-01-H-PNT15-5101
ERBG-10-B-51/5190	EDG-01-B-PNTN-5101
ERBG-10-C-51/5190	EDG-01-C-PNTN-5101
ERBG-10-H-51/5190	EDG-01-H-PNT15-5101

Note: For the details of pilot valves, refer to "Pilot Relief Valves" on page 674.

Interchangeability between Current and New Design

ERBG-06/10 series valves have changed model from 50 to 51 design in line with the model change of pilot valve (EDG-01).

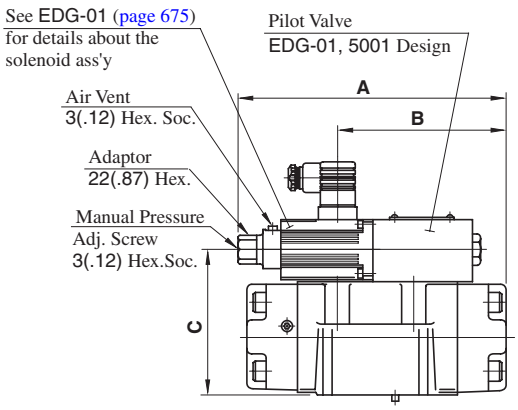
● Specifications and Characteristics

No change in specifications and characteristics between current and new design.

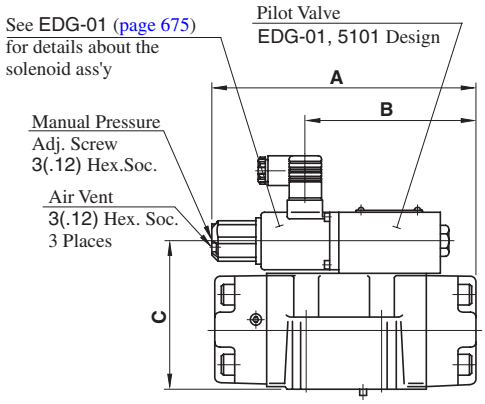
● Mounting Interchangeability

There is an interchangeability in the mounting dimensions, however, the outside shape and dimensions are changed as shown below due to pilot valve improvement and other modifications.

Current: Design 50



New: Design 51

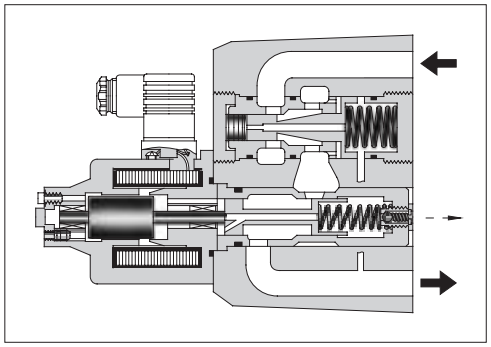


Model Numbers		A	B	C
Current	ERBG-06-∗-50/5090	214.5 (8.44)	136.5 (5.37)	115 (4.53)
New	ERBG-06-∗-51/5190	213.5 (8.41)	136.5 (5.37)	115 (4.53)
Current	ERBG-10-∗-50/5090	235.5 (9.27)	158 (6.22)	117 (4.61)
New	ERBG-10-∗-51/5190	234.5 (9.23)	158 (6.22)	117 (4.61)

DIMENSIONS IN MILLIMETRES (INCHES)

40Ω Series
Proportional Electro-Hydraulic Flow Control (and Check) Valves

Since the preselected flow rate continuously varies in proportion to the current input to the valve, the system flow rate can be remote-controlled as desired by regulating the amplifier current output. Further, since pressure and temperature compensation functions are provided, the preselected flow rate is not affected by pressure (load) or temperature (fluid viscosity).
This valve is ideal for use where actuator startup, stop, and speed changes are to be implemented without producing a shock. Note that this valve is used in conjunction with the applicable power amplifier.

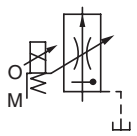


Specifications

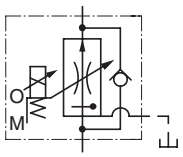
Model No. / Description	EFG EFCG-02-10 EFCG-02-30	EFG EFCG-03-60 EFCG-03-125	EFG EFCG-06-250	EFG EFCG-10-500
Max. Operating Pres. MPa (PSI)	20.6 (3000)	20.6 (3000)	20.6 (3000)	20.6 (3000)
Metred Flow Adjustment Range L/min (U.S.GPM)	10: 0.3-10 (.08-2.6) 30: 0.3-30 (.08-7.9)	60: 2-60 (.53-15.9) 125: 2-125 (.53-33)	3-250 (.79-66)	5-500 (1.32-132)
Min. Differential Pres.★ MPa (PSI)	0.6 (90)	1.0 (145)	1.3 (190)	2.0 (290)
Free Flow (EFCG Models Only.) L/min (U.S.GPM)	40 (10.6)	130 (34.3)	280 (74.0)	550 (145)
Rated Current	600 mA	600 mA	600 mA	700 mA
Coil Resistance	45 Ω	45 Ω	45 Ω	45 Ω
Hysteresis	5% or less	7% or less	7% or less	7% or less
Repeatability	1% or less	1% or less	1% or less	1% or less
Approx. Mass kg (lbs.)	8.2 (18.1)	12.5 (27.6)	25 (55.1)	51 (113)

★Min. pressure difference required between inlet and outlet ports to maintain function as pressure compensator.

Graphic Symbols



EFG-∗



EFCG-∗

Model Number Designation

F-	EFC	G	-02	-10	-31	∗
Special Seals	Series Number	Type of Mounting	Valve Size	Max. Metred Flow L/min (U.S.GPM)	Design Number	Design Standards
F: Special Seals for Phosphate Ester Type Fluid (Omit if not required)	**EF**: Proportional Electro-Hydraulic Flow Control Valve **EFC**: Proportional Electro-Hydraulic Flow Control and Check Valve	**G**: Sub-plate Mounting	**02**	**10**: 10 (2.6) **30**: 30 (7.9)	**31**	Refer to ★
			03	**60**: 60 (15.9) **125**: 125 (33)	**26**	
			06	**250**: 250 (66)	**22**	
			10	**500**: 500 (132)	**11**	

Note: If you are going to use the model with pressure compensator stroke adjustment screw, consult your Yuken representative in advance.
★ Design Standards: None..... Japanese Standard "JIS" and European Design Standard
90 ..... N. American Design Standard

Attachment

Mounting Bolts

Valve Model Numbers	Socket Head Cap Screw		Qty.
	Japanese Std. "JIS" and European Design Std.	N. American Design Std.	
EF∗G-02	M8 × 75 Lg.	5/16-18 UNC × 3 Lg.	4
EF∗G-03	M10 × 100 Lg.	3/8-16 UNC × 4 Lg.	4
EF∗G-06	M16 × 130 Lg.	5/8-11 UNC × 5 Lg.	4
EF∗G-10	M20 × 160 Lg.	3/4-10 UNC × 6-1/2 Lg.	4

Applicable Power Amplifiers

For stable performance, it is recommended that Yuken's applicable power amplifiers be used (for details see page 772).

Model Numbers : AME-D-∗-40
AME-DF-S- ∗-22
AME-T-S- ∗-22

Sub-plate

Valve Model Numbers	Japanese Standard "JIS"		European Design Standard		N. American Design Standard		Approx. Mass kg (lbs.)
	Sub-plate Model Numbers	Thread Size	Sub-plate Model Numbers	Thread Size	Sub-plate Model Numbers	Thread Size	
EFG EFCG-02	EFGM-02X-20	Rc 3/8	EFGM-02X-2080	3/8 BSP.F	EFGM-02X-2090	3/8 NPT	2.3 (5.1)
	EFGM-02Y-20	Rc 1/2	EFGM-02Y-2080	1/2 BSP.F	EFGM-02Y-2090	1/2 NPT	3.1 (6.8)
EFG EFCG-03	EFGM-03Y-20	Rc 3/4	EFGM-03Y-2080	3/4 BSP.F	EFGM-03Y-2090	3/4 NPT	5.7 (12.6)
	EFGM-03Z-20	Rc 1	EFGM-03Z-2080	1 BSP.F	EFGM-03Z-2090	1 NPT	5.6 (12.3)
EFG EFCG-06	EFGM-06X-20	Rc 1	EFGM-06X-2080	1 BSP.F	EFGM-06X-2090	1 NPT	12.5 (27.6)
	EFGM-06Y-20	Rc 1-1/4	EFGM-06Y-2080	1-1/4 BSP.F	EFGM-06Y-2090	1-1/4 NPT	16 (35.3)
EFG EFCG-10	EFGM-10Y-10★	1-1/2, 2 Flange Mounting	EFGM-10Y-1080★	1-1/2, 2 Flange Mounting	EFGM-10Y-1090★	1-1/2, 2 Flange Mounting	37 (81.6)

● Sub-plates are available. Specify the sub-plate model number from the table above. When sub-plates are not used, the mountingsurface should have a good machined finish.

★ When ordering the EFGM-10Y, see Type F3 Pipe Flange Kits on page 821 and order an appropriate pipe flange kit also.

Models with Pressure Compensator Stroke Adjustment Screw

A models with pressure compensator stroke adjustment screw is optionally available to minimize the actuator protrusion (jumping) at startup. For the details, please consult us or your Yuken distributors.

Instructions

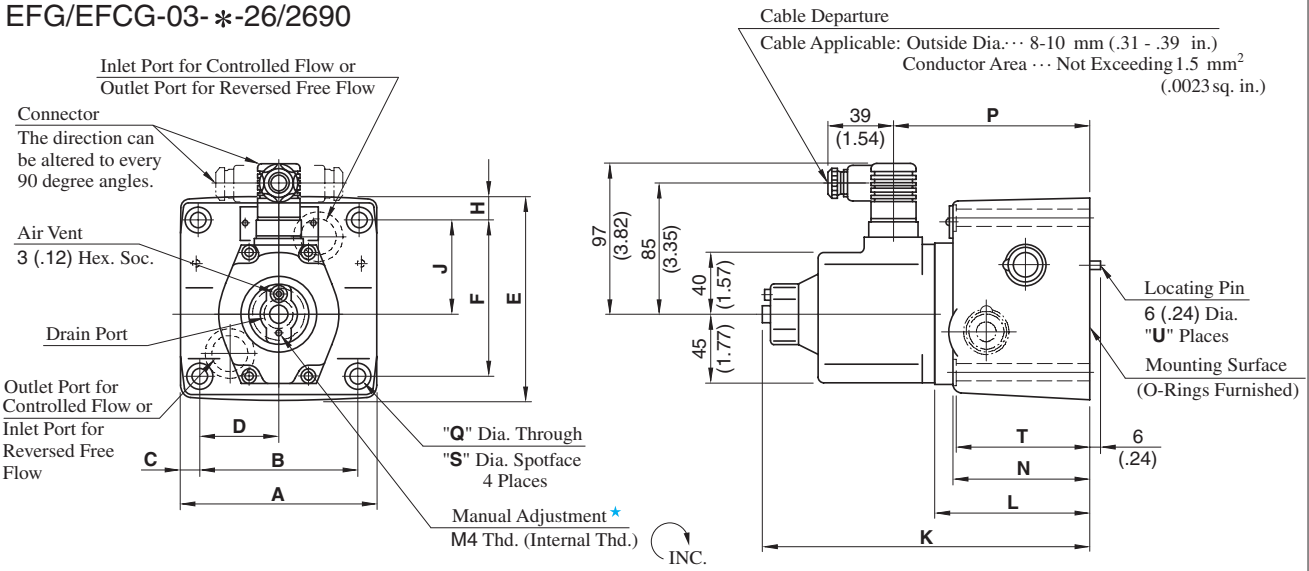
Drain Back Pressure

Check that the drain back pressure does not exceed 0.2 MPa (29 PSI).

Models with Check Valve

A models with check valve makes it possible to obtain a free flow in the direction opposite that of the controlled flow without respect to the input current.

EFG/EFCG-02-∗-31/3190
EFG/EFCG-03-∗-26/2690

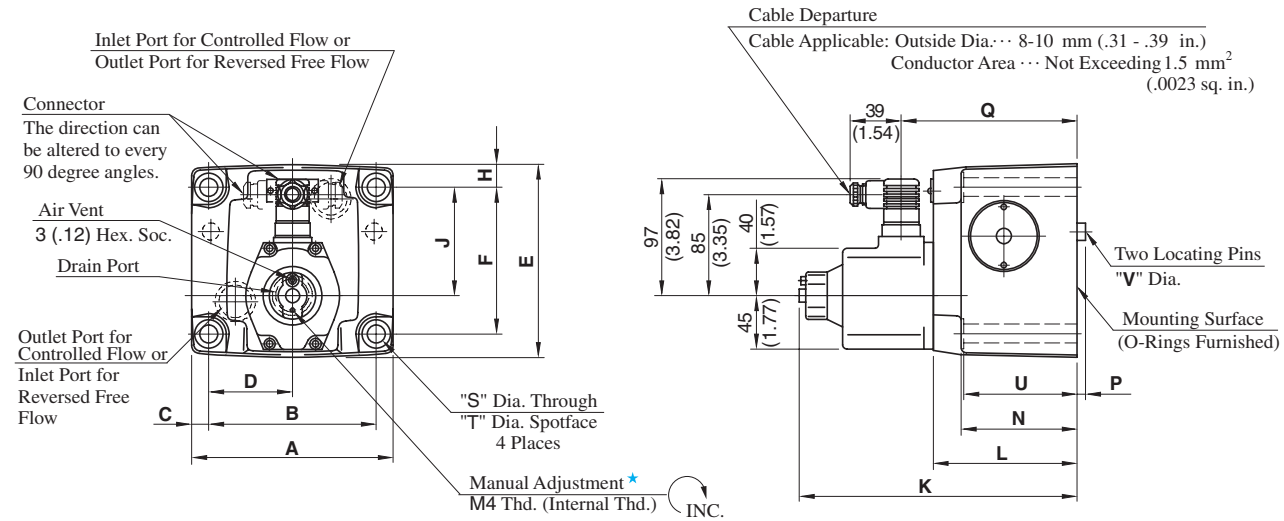


★Manual adjustment can be done by screwing for example an M4×20 L screw in the M4 thread or pushing in a rod etc. there.

Model Numbers	Dimensions mm (Inches)															U
	A	B	C	D	E	F	H	J	K	L	N	P	Q	S	T	
EF∗G-02	96 (3.78)	76.2 (3.00)	9.9 (.39)	38.1 (1.50)	106 (4.17)	82.6 (3.25)	11.7 (.46)	46.3 (1.82)	195 (7.68)	81 (3.19)	66 (2.60)	108 (4.25)	8.8 (.35)	14 (.55)	65 (2.56)	1
EF∗G-03	125 (4.92)	101.6 (4.00)	11.7 (.46)	50.8 (2.00)	130 (5.12)	101.6 (4.00)	14.2 (.56)	61.8 (2.43)	212 (8.35)	98 (3.86)	85 (3.35)	125 (4.92)	11 (.43)	17.5 (.69)	84 (3.31)	2

EFG/EFCG-06-250-22/2290
EFG/EFCG-10-500-11/1190

DIMENSIONS IN MILLIMETRES (INCHES)

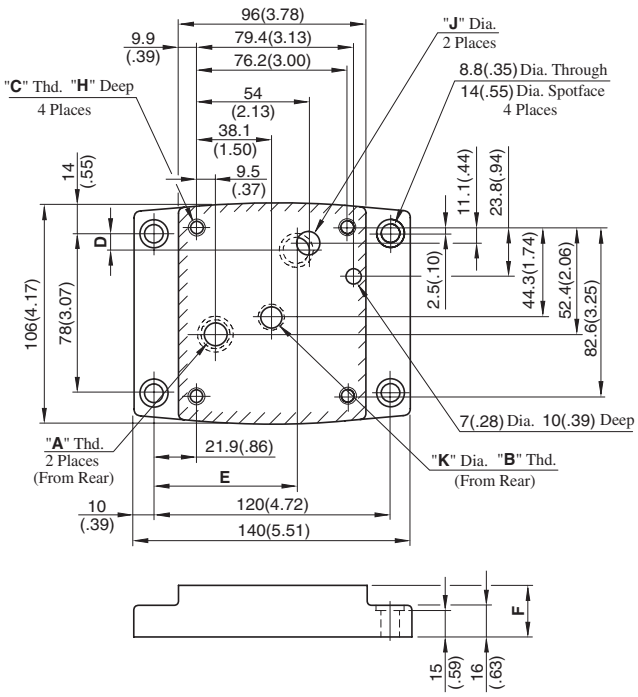


★Manual adjustment can be done by screwing for example an M4×20 L screw in the M4 thread or pushing in a rod etc. there.

Model Numbers	Dimensions mm (Inches)																
	A	B	C	D	E	F	H	J	K	L	N	P	Q	S	T	U	V
EF∗G-06	180 (7.09)	146.1 (5.75)	17 (.67)	73.1 (2.88)	174 (6.85)	133.4 (5.25)	20.3 (.80)	99 (3.90)	244 (9.61)	130 (5.12)	105 (4.13)	7 (.28)	157 (6.18)	17.5 (.69)	26 (1.02)	103.5 (4.07)	16 (.63)
EF∗G-10	244 (9.61)	196.9 (7.75)	23.5 (.93)	98.5 (3.88)	228 (8.98)	177.8 (7.00)	25 (.98)	144.5 (5.69)	274 (10.79)	160 (6.30)	137 (5.93)	10 (.39)	187 (7.36)	21.5 (.85)	32 (1.26)	135 (5.31)	18 (.71)

Sub-plate

EFGM-02X/02Y-20/2080/2090

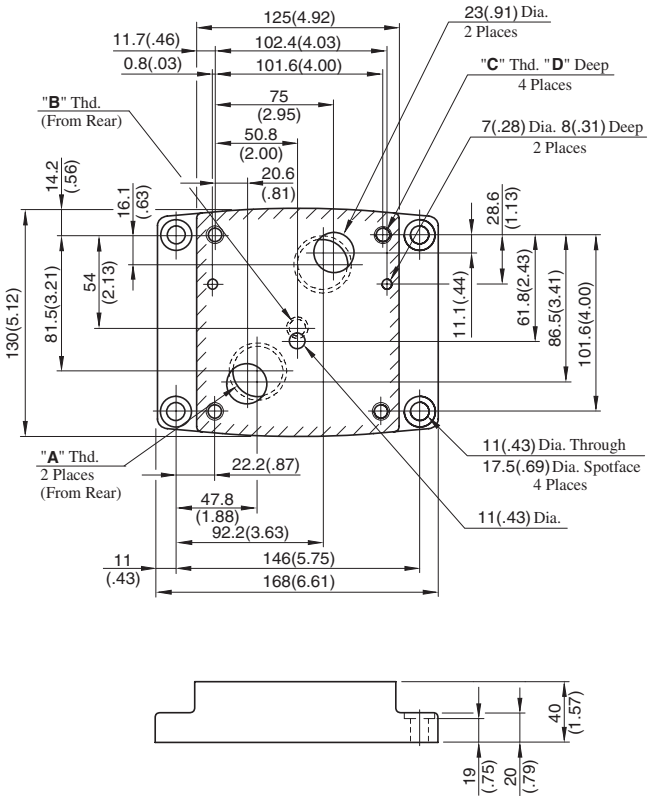


Sub-plate Model Numbers	Thread Size		
	"A" Thd.	"B" Thd.	"C" Thd.
EFGM-02X-20	Rc 3/8	Rc 1/4	M8
EFGM-02Y-20	Rc 1/2		
EFGM-02X-2080	3/8 BSP.F	1/4 BSP.F	
EFGM-02Y-2080	1/2 BSP.F		
EFGM-02X-2090	3/8 NPT	1/4 NPT	5/16-18 UNC
EFGM-02Y-2090	1/2 NPT		

Sub-plate Model Numbers	Dimensions mm (Inches)					
	D	E	F	H	J	K
EFGM-02X-20	8.6 (.34)	75.9 (2.99)	25 (.98)	14 (.55)	14 (.55)	11 (.43)
EFGM-02Y-20	11.5 (.45)	72.9 (2.87)	35 (1.38)			
EFGM-02X-2080	8.6 (.34)	75.9 (2.99)	25 (.98)		15.2 (.60)	11.7 (.46)
EFGM-02Y-2080	11.5 (.45)	72.9 (2.87)	35 (1.38)		15 (.59)	
EFGM-02X-2090	8.6 (.34)	75.9 (2.99)	25 (.98)	18 (.17)	14 (.55)	11 (.43)
EFGM-02Y-2090	11.5 (.45)	72.9 (2.87)	35 (1.38)			

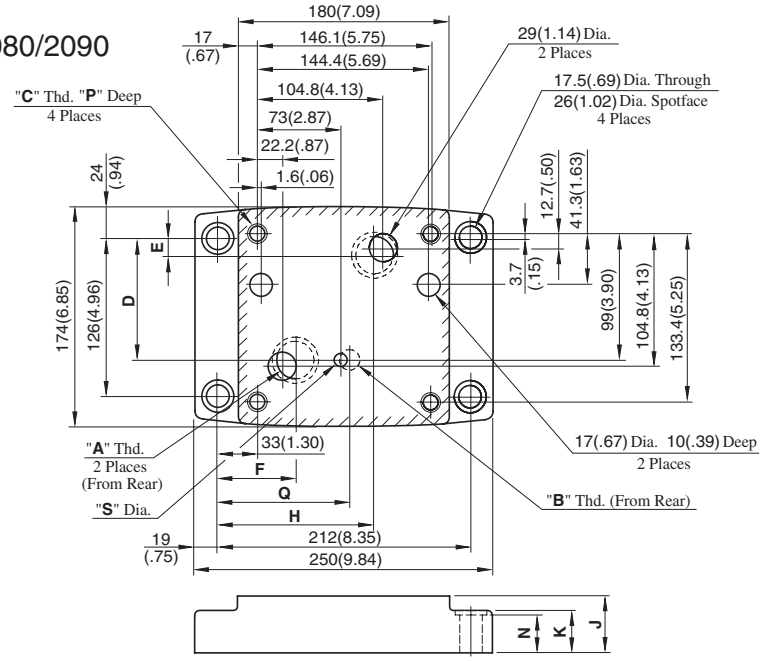
DIMENSIONS IN MILLIMETRES (INCHES)

EFGM-03Y/03Z-20/2080/2090



Sub-plate Model Numbers	Thread Size			D mm(in.)
	"A" Thd.	"B" Thd.	"C" Thd.	
EFGM-03Y-20	Rc 3/4	Rc 1/4	M10	18 (.71)
EFGM-03Z-20	Rc 1			
EFGM-03Y-2080	3/4 BSP.F	1/4 BSP.F		
EFGM-03Z-2080	1 BSP.F			
EFGM-03Y-2090	3/4 NPT	1/4 NPT	3/8-16 UNC	21 (.83)
EFGM-03Z-2090	1 NPT			

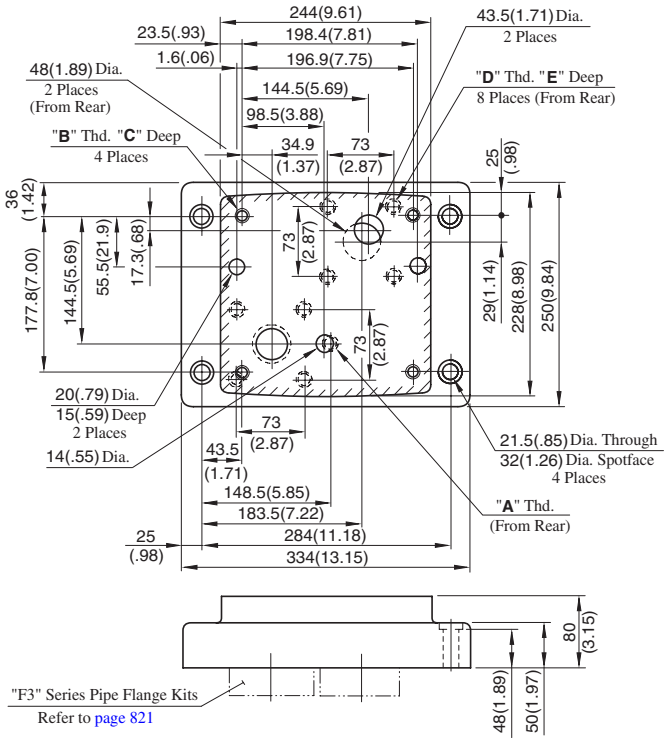
Sub-plate
EFGM-06X/06Y-20/2080/2090



Sub-plate Model Numbers	Thread Size			Dimensions mm (Inches)									
	"A" Thd.	"B" Thd.	"C" Thd.	D	E	F	H	J	K	N	P	Q	S
EFGM-06X-20	Rc 1	Rc 3/8	M16	101.1 (3.98)	14.3 (.56)	55.2 (2.17)	137.8 (5.43)	45 (1.77)	35 (1.38)	34 (1.34)	30 (1.18)	106 (4.17)	14 (.55)
EFGM-06Y-20	Rc 1-1/4			95.3 (3.75)	19.3 (.76)	67 (2.64)	132 (5.20)	60 (2.36)	40 (1.57)	39 (1.54)			
EFGM-06X-2080	1 BSP.F	3/8 BSP.F		101.1 (3.98)	14.3 (.56)	55.2 (2.17)	137.8 (5.43)	45 (1.77)	35 (1.38)	34 (1.34)		116 (4.57)	15.2 (.60)
EFGM-06Y-2080	1-1/4 BSP.F			95.3 (3.75)	19.3 (.76)	67 (2.64)	132 (5.20)	60 (2.36)	40 (1.57)	39 (1.54)			15 (.59)
EFGM-06X-2090	1 NPT	3/8 NPT	5/8-11 UNC	101.1 (3.98)	14.3 (.56)	55.2 (2.17)	137.8 (5.43)	45 (1.77)	35 (1.38)	34 (1.34)	35 (1.38)	106 (4.17)	14 (.55)
EFGM-06Y-2090	1-1/4 NPT			95.3 (3.75)	19.3 (.76)	67 (2.64)	132 (5.20)	60 (2.36)	40 (1.57)	39 (1.54)			

DIMENSIONS IN MILLIMETRES (INCHES)

EFGM-10Y-10/1080/1090



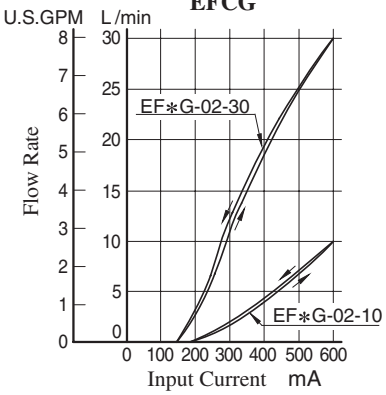
Sub-plate Model Numbers	Thread Size		
	"A" Thd.	"B" Thd.	"D" Thd.
EFGM-10Y-10	Rc 3/8	M20	M16
EFGM-10Y-1080	3/8 BSP.F		
EFGM-10Y-1090	3/8 NPT	3/4-10 UNC	5/8-11 UNC

Sub-plate Model Numbers	mm (Inches)	
	C	E
EFGM-10Y-10	30 (1.18)	30 (1.18)
EFGM-10Y-1080		
EFGM-10Y-1090	34 (1.34)	35 (1.38)

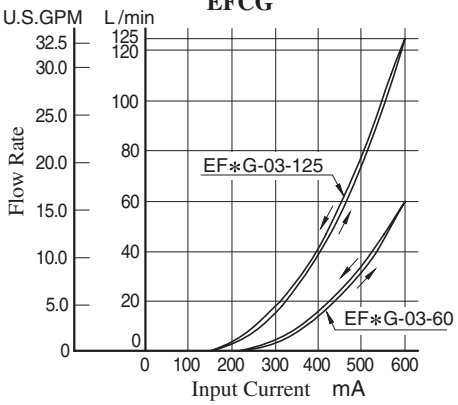
Input Current vs. Flow

Viscosity: 30 mm²/s
(141 SSU)

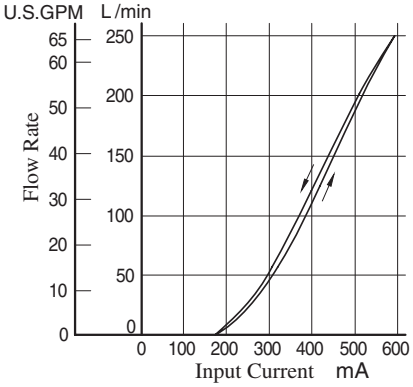
EFG EFCG -02



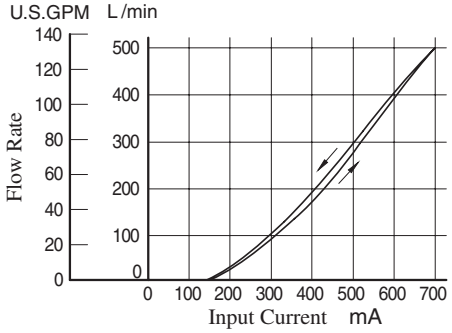
EFG EFCG -03



EFG EFCG -06



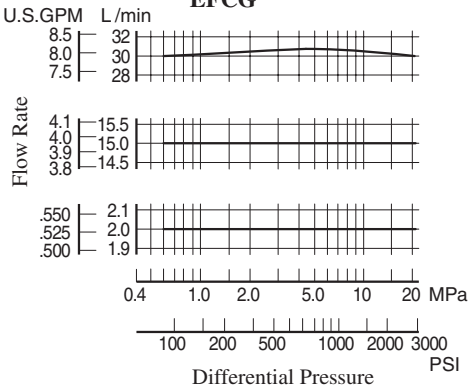
EFG EFCG -10



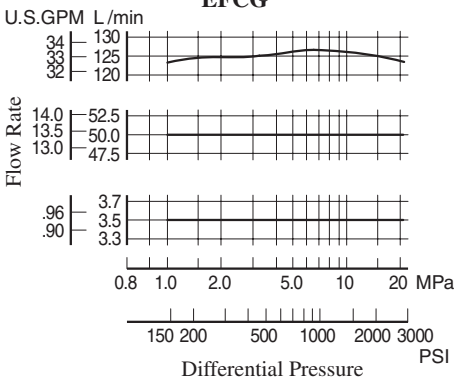
Differential Pressure vs. Metred Flow

Viscosity: 30 mm²/s
(141 SSU)

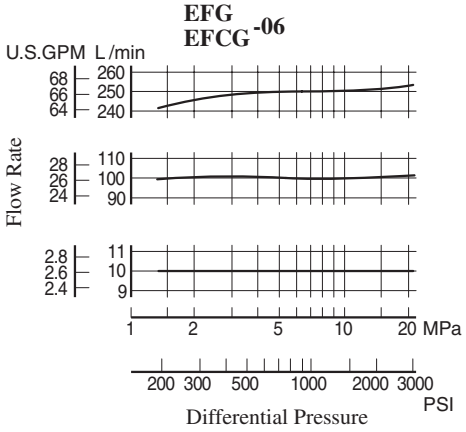
EFG EFCG -02



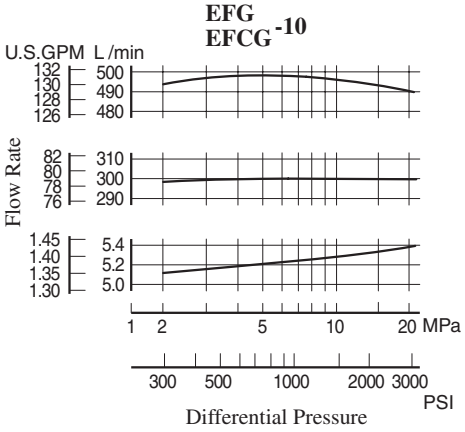
EFG EFCG -03



EFG EFCG -06



EFG EFCG -10

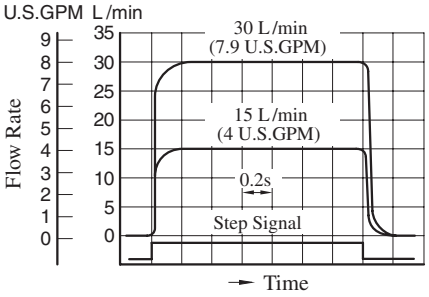


Step Response

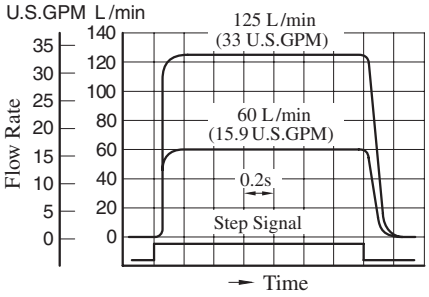
Viscosity: 30 mm²/s (141 SSU)

These characteristics have been obtained by measuring on each valve. Therefore, they may vary according to a hydraulic circuit to be used.

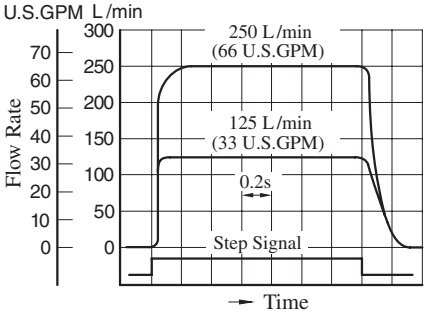
EFG EFCG -02



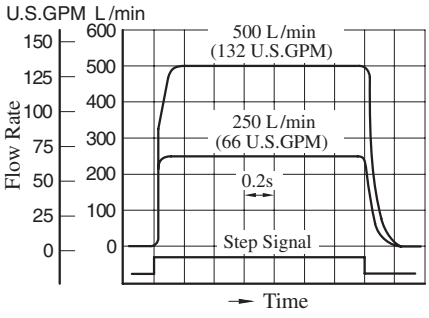
EFG EFCG -03



EFG EFCG -06



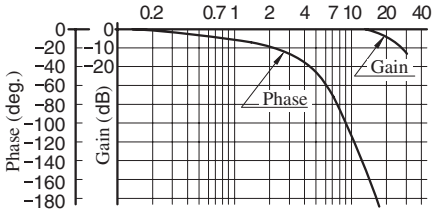
EFG EFCG -10



Frequency Response

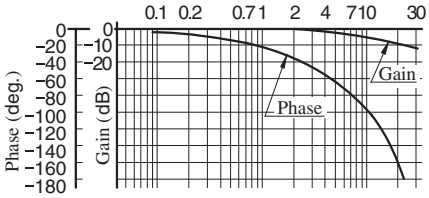
Viscosity: 30 mm²/s (141 SSU)

EFG EFCG -02



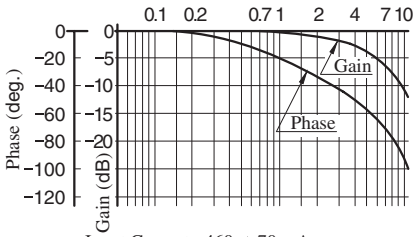
Input Current : 440 ± 100 mA
Pressure : 6.9 MPa (1000 PSI)

EFG EFCG -03



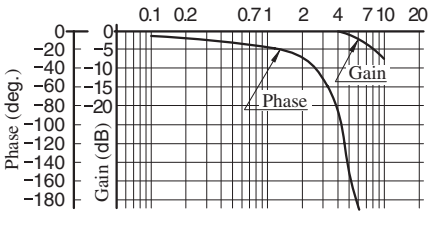
Input Current : 460 ± 70 mA
Pressure : 6.9 MPa (1000 PSI)

EFG EFCG -06



Input Current : 460 ± 70 mA
Pressure : 6.9 MPa (1000 PSI)

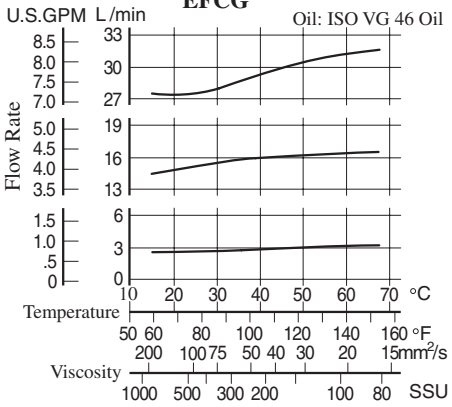
EFG EFCG -10



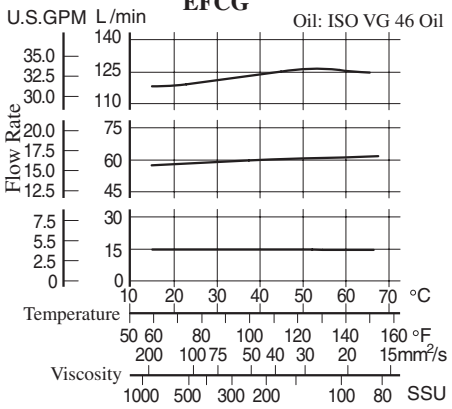
Input Current : 475 ± 125 mA
Pressure : 6.9 MPa (1000 PSI)

Viscosity vs. Flow

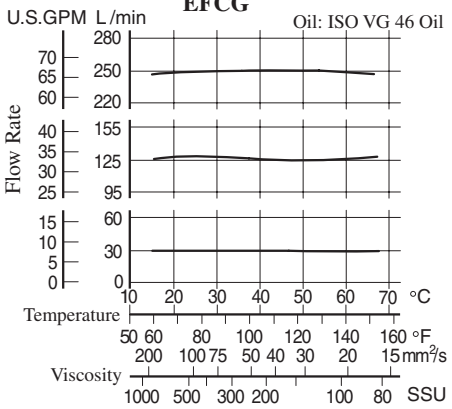
EFG EFCG -02



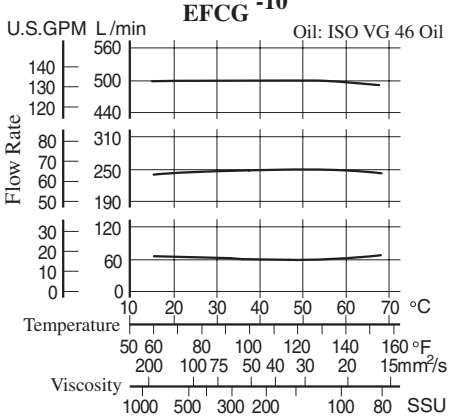
EFG EFCG -03



EFG EFCG -06



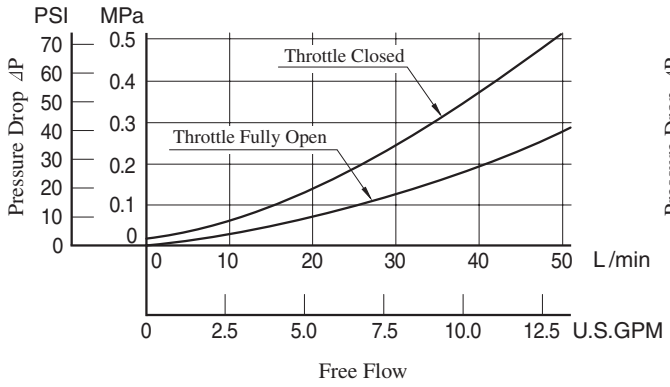
EFG EFCG -10



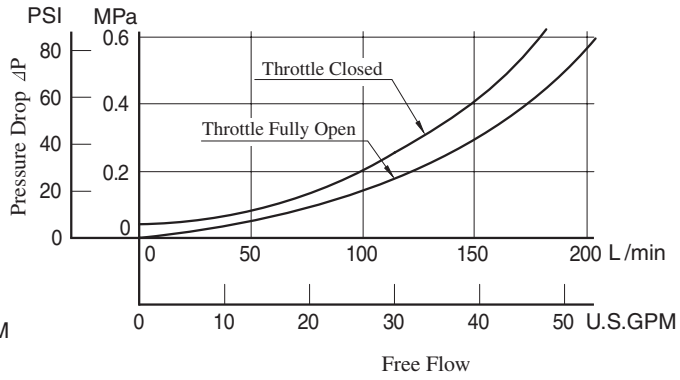
Pressure Drop for Reversed Free Flow (Only for "EFCG" Models)

Oil Viscosity: 35 mm²/s (164 SSU)
Specific Gravity: 0.850

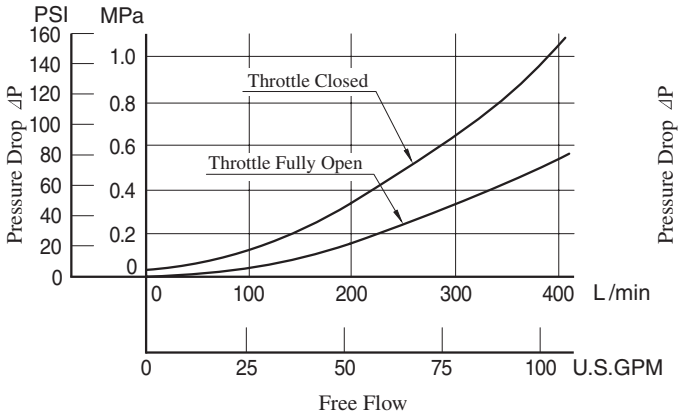
EFCG-02



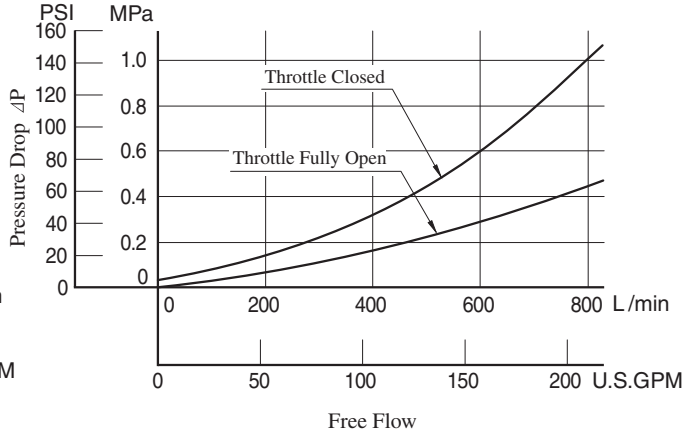
EFCG-03



EFCG-06



EFCG-10



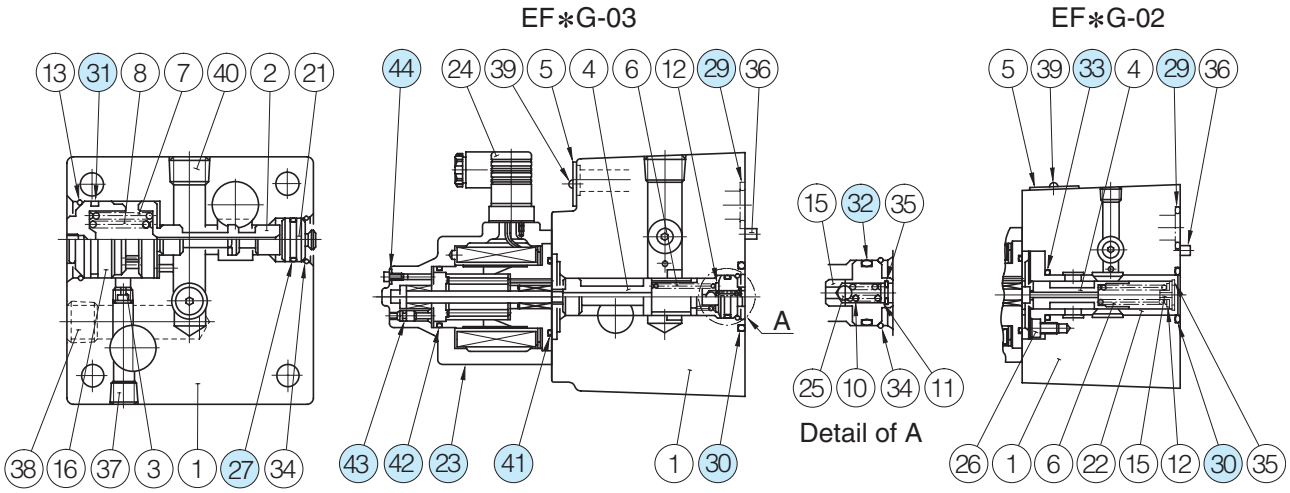
- For any other viscosity, multiply the factors in the table below.

Viscosity	mm²/s	20	40	60	80	100
	SSU	98	186	278	371	464
Factor		0.87	1.03	1.14	1.23	1.30

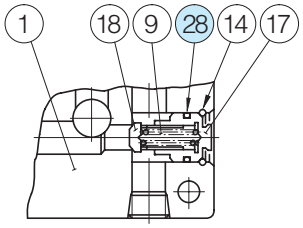
- For any other specific gravity (G'), the pressure drop (⊿P') may be obtained from the formula below.
  ⊿P'=⊿P (G'/0.850)

List of Seals and Solenoid Ass'y

EFG/EFCG-02-∗-31/3190
EFG/EFCG-03-∗-26/2690



With Check Valve (EFCG-02, 03)



List of Seals and Solenoid Ass'y

Item	Name of Parts	Part Numbers		Qty.
		EF∗G-02	EF∗G-03	
23	Solenoid Ass'y	E321-45-20	E321-45-20	1
27	O-Ring	SO-NB-P18	SO-NB-P18	1
28	O-Ring	SO-NB-P10A	SO-NB-P21	1
29	O-Ring	SO-NB-P18	SO-NB-P28	2
30	O-Ring	SO-NB-P22	SO-NB-P31	1
31	O-Ring	SO-NB-G25	SO-NB-G35	1
32	O-Ring	—	SO-NB-P18	1
33	O-Ring	SO-NB-P22	—	1
41	O-Ring	SO-NB-G45	SO-NB-G45	1
42	O-Ring	SO-NB-G35	SO-NB-G35	1
43	O-Ring	SO-NA-P4	SO-NA-P4	1
44	Fastener Seal	SG-FCF-4	SG-FCF-4	1

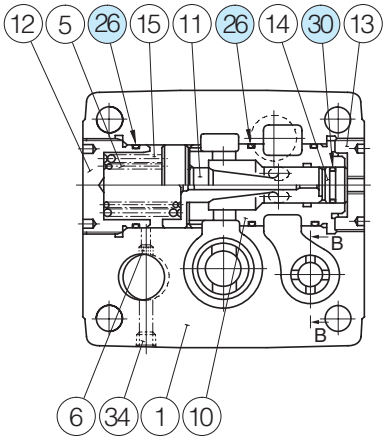
Note 1: O-rings (Item 41, 42, 43) and the fastener seal (Item 44) are included in the solenoid assembly.
2: The connector assembly GDM-211-B-11 (Item 24) is not included in the solenoid assembly.
3: When ordering seals, please specify the seal kit number from the table right.

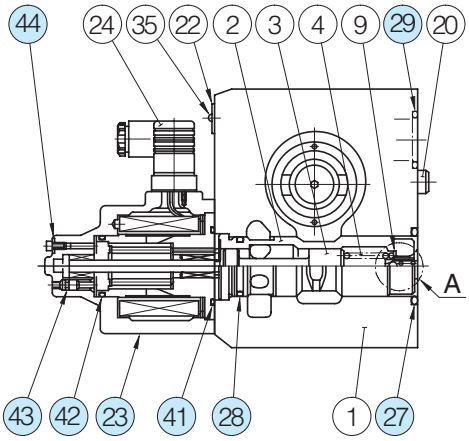
List of Seal Kits

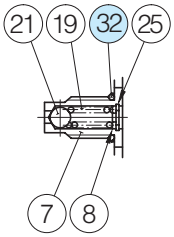
Valve Model Numbers	Seal Kit Numbers
EFG-02-∗-31∗	KS-EFG-02-31
EFCG-02-∗-31∗	KS-EFCG-02-31
EFG-03-∗-26∗	KS-EFG-03-26
EFCG-03-∗-26∗	KS-EFCG-03-26

List of Seals and Solenoid Ass'y

EFG/EFCG-06-250-22/2290
EFG/EFCG-10-500-11/1190

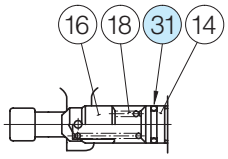






Detail of A

With Check Valve (EFCG-06, 10)



Section B-B

List of Seals and Solenoid Ass'y

Item	Name of Parts	Part Numbers		Qty.
		EF∗G-06	EF∗G-10	
23	Solenoid Ass'y	E321-45-20	E321-45-20	1
26	O-Ring	SO-NB-P50	SO-NB-G75	3
27	O-Ring	SO-NB-P44	SO-NB-G60	1
28	O-Ring	SO-NB-P34	SO-NB-P50	1
29	O-Ring	SO-NB-P32	SO-NB-P48	2
30	O-Ring	SO-NB-P21	SO-NB-P34	1
31	O-Ring	SO-NB-P21	SO-NB-P26	1
32	O-Ring	SO-NA-P10	SO-NA-P10	1
41	O-Ring	SO-NB-G45	SO-NB-G45	1
42	O-Ring	SO-NB-G35	SO-NB-G35	1
43	O-Ring	SO-NA-P4	SO-NA-P4	1
44	Fastener Seal	SG-FCF-4	SG-FCF-4	1

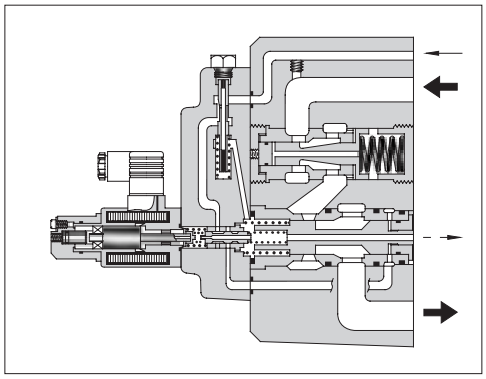
Note1: O-rings (Item 41, 42, 43) and the fastener seal (Item 44) are included in the solenoid assembly.
2: The connector assembly GDM-211-B-11 (Item 24) is not included in the solenoid assembly.
3: When ordering seals, please specify the seal kit number from the table right.

List of Seal Kits

Valve Model Numbers	Seal Kit Numbers
EFG-06-250-22∗	KS-EFG-06-22
EFCG-06-250-22∗	KS-EFCG-06-22
EFG-10-500-11∗	KS-EFG-10-11
EFCG-10-500-11∗	KS-EFCG-10-11

10Ω Series
Proportional Electro-Hydraulic Flow Control (and Check) Valves

Since the preselected flow rate continuously varies in proportion to the current input to the valve, the system flow rate can be remote-controlled as desired by regulating the current output from the amplifier. Further, since the pressure and temperature compensation functions are provided, the preselected flow rate is not be affected by pressure (load) or temperature (fluid viscosity). This valve is ideal for use where actuator startup, stop, and speed changes are to be implemented without producing a shock. Note that this valve is used in conjunction with the applicable power amplifier.

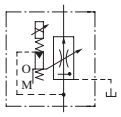
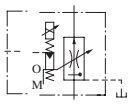
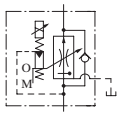
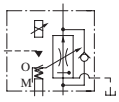


Specifications

Description \ Model No.		EFG / EFCG -03- 60 / 125	EFG / EFCG -06-250
Max. Operating Pressure MPa (PSI)		20.6 (3000)	24.5 (3550)
Metred Flow Adj. Range L/min (U.S.GPM)		60: 1-60 (.26-15.9) 125: 1-125 (.26-33)	2.5-250 (.66-66)
Min. Differential Pressure ★1 MPa (PSI)		1.0 (145)	1.0 (145)
Free Flow (EFCG Models Only) L/min (U.S.GPM)		130 (34.3)	280 (74.0)
Min. Pilot Pressure ★2 MPa (PSI)		1.0 (145)	1.5 (220)
Pilot Flow L/min (U.S.GPM)	at Normal	0.5 (.13)	1 (.26)
	at Transition	2.6 (.69)	4 (1.06)
Rated Current		780 mA	820 mA
Coil Resistance		10 Ω	10 Ω
Hysteresis		3% or less	3% or less
Repeatability		1% or less	1% or less
Approx. Mass kg (lbs.)		10 (22.1)	25 (55.1)

★1. Min pressure difference required between inlet and outlet ports to maintain function as pressure compensator.
★2. The minimum required value for the external pilot type.

Graphic Symbols

Internal Pilot	External Pilot
	
EFG- ∗	EFG- ∗
	
EFCG- ∗	EFCG- ∗

Model Number Designation

F-	EFC	G	-03	-125	-E	-51	∗
Special Seals	Series Number	Type of Mounting	Valve Size	Max. Metred Flow L/min (U.S.GPM)	Pilot Connection	Design Number	Design Standards
F: Special Seals for Phosphate Ester Type Fluid (Omit if not required)	**EF**: Proportional Electro-Hydraulic Flow Control Valve **EFC**: Proportional Electro-Hydraulic Flow Control and Check Valve	**G**: Sub-plate Mounting	**03**	**60**: 60 (15.9) **125**: 125 (33)	**None**: Internal Pilot **E**: External Pilot	**51**	Refer to ★
			06	**250**: 250 (66)		**51**	

★ Design Standards: None..... Japanese Standard "JIS" and European Design Standard
90 ..... N. American Design Standard

Attachment

Mounting bolts

Valve Model Numbers	Socket Head Cap Screw		Qty.
	Japanese Std. "JIS" and European Design Std.	N. American Design Std.	
EF∗G-03	M10 × 80 Lg.	3/8-16 UNC × 3-1/4 Lg.	4
EF∗G-06	M16 × 130 Lg.	5/8-11 UNC × 5 Lg.	4

Applicable Power Amplifiers

For stable performance, it is recommended that Yuken's applicable power amplifiers be used (for details see page 767, 771, 780).

Model Numbers: AME-D-10-∗-20
AME-D2-1010-11
SK1022-∗-∗-11
SK1015-11 (For DC power supply)
AMN-D-10 (For DC power supply)

Sub-plate

Valve Model Numbers	Japanese Standard "JIS"		European Design Standard		N. American Design Standard		Approx. Mass kg (lbs.)
	Sub-plate Model Numbers	Thread Size	Sub-plate Model Numbers	Thread Size	Sub-plate Model Numbers	Thread Size	
EFG EFCG-03	EFGM-03Y-30	Rc 3/4	EFGM-03Y-3080	3/4 BSP.F	EFGM-03Y-3090	3/4 NPT	5.7 (12.6)
	EFGM-03Z-30	Rc 1	EFGM-03Z-3080	1 BSP.F	EFGM-03Z-3090	1 NPT	5.6 (12.3)
EFG EFCG-06	EFGM-06X-30	Rc 1	EFGM-06X-3080	1 BSP.F	EFGM-06X-3090	1 NPT	12.5 (27.6)
	EFGM-06Y-30	Rc 1-1/4	EFGM-06Y-3080	1-1/4 BSP.F	EFGM-06Y-3090	1-1/4 NPT	16 (35.3)

● Sub-plates are available. Specify the sub-plate model number from the tabel above. When sub-ptates are not used, the mounting surface should have a good machined finish.

Instructions

Drain Back Pressure

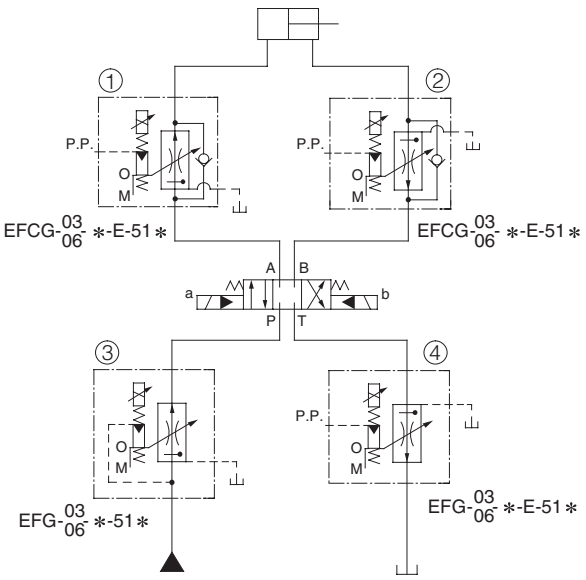
Check that the drain back pressure dose not exceed 0.2 MPa (29 PSI).

Pilot Type Selection

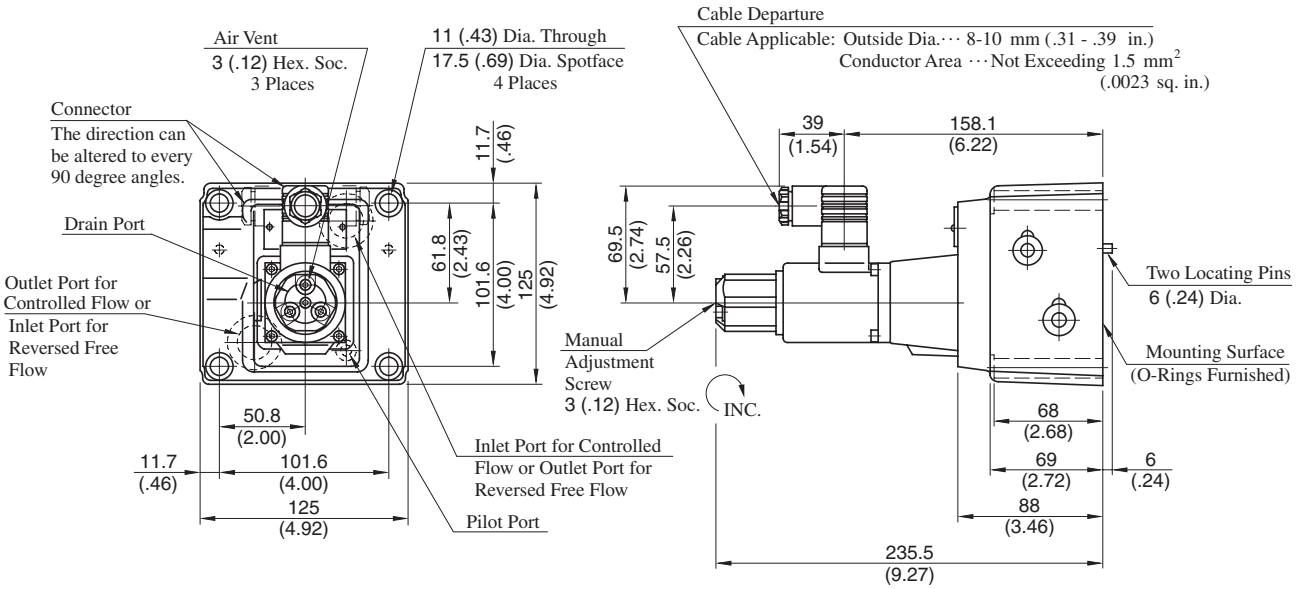
This valve is constructed so as to operate at a pre-determined pilot pressure. For the 03, a pilot pressure of 1 MPa (145 PSI) or higher is required. For the 06, the requied pilot pressure is 1.5 MPa (220 PSI) or higher.
To obtain such a required pilot pressure, select the pilot type according to the circuit examples on the right.

①/②
Use the external pilot type (pilot connection code: E) whether a metre-in or metre-out circuit is employed.
③
Use the internal pilot type (pilot connection code: None)
④
Use the external pilot type (pilot connection code: E)

[Example of Circuit]

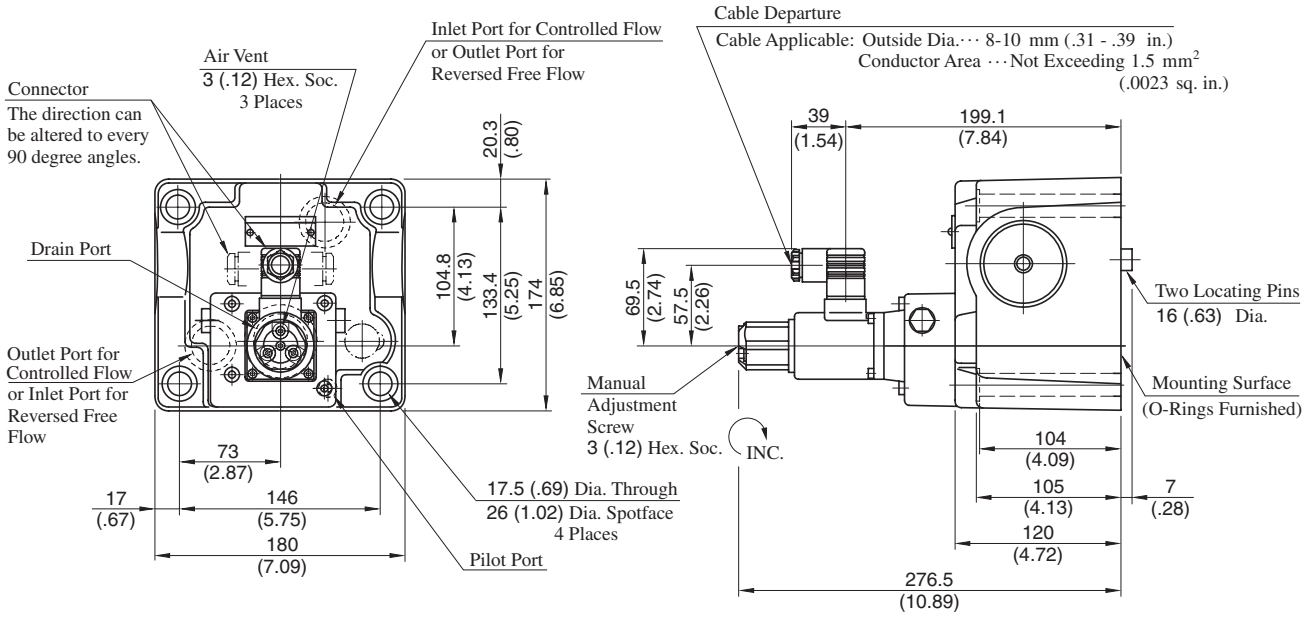


EFG / EFCG -03- 60/125 - ∗ -51/5190



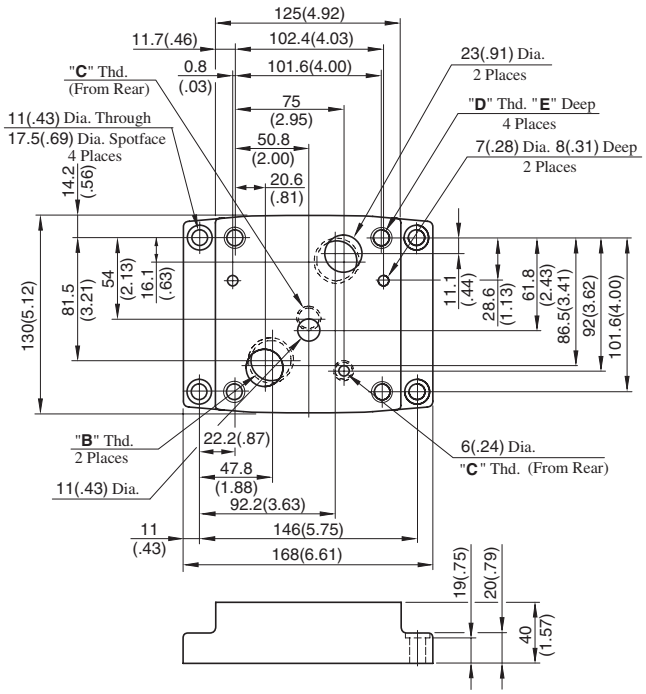
DIMENSIONS IN MILLIMETRES (INCHES)

EFG / EFCG -06-250- ∗ -51/5190



Sub-plate

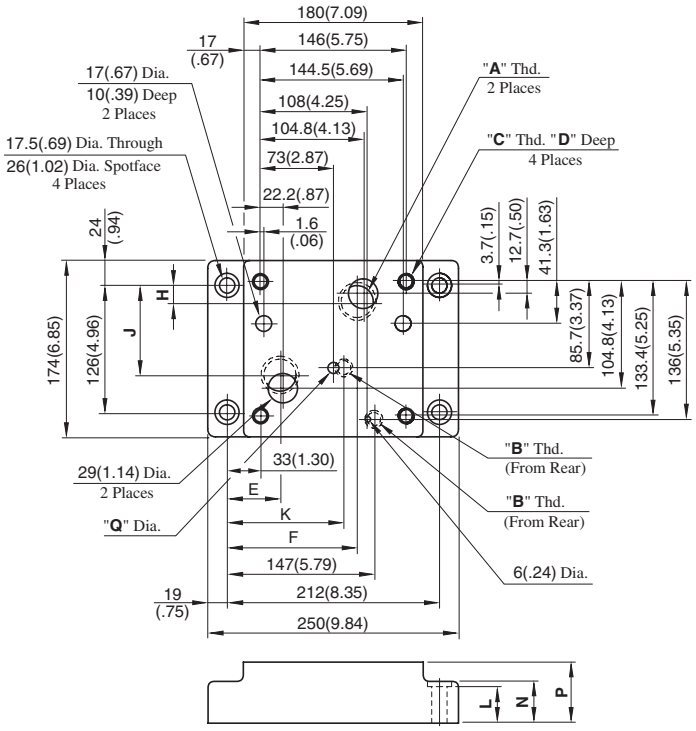
EFGM-03Y, 03Z-30/3080/3090



Sub-plate Model Numbers	Thread Size			E mm(in.)
	"B" Thd.	"C" Thd.	"D" Thd.	
EFGM-03Y-30	Rc 3/4	Rc 1/4	M10	18 (.71)
EFGM-03Z-30	Rc 1			
EFGM-03Y-3080	3/4 BSP.F	1/4 BSP.F		
EFGM-03Z-3080	1 BSP.F			
EFGM-03Y-3090	3/4 NPT	1/4 NPT	3/8-16 UNC	21 (.83)
EFGM-03Z-3090	1 NPT			

DIMENSIONS IN MILLIMETRES (INCHES)

EFGM-06X, 06Y-30/3080/3090



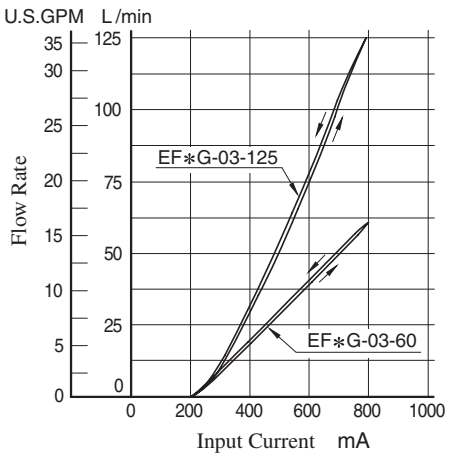
Sub-plate Model Numbers	Thread Size		
	"A" Thd.	"B" Thd.	"C" Thd.
EFGM-06X-30	Rc 1	Rc 3/8	M16
EFGM-06Y-30	Rc 1-1/4		
EFGM-06X-3080	1 BSP.F	3/8 BSP.F	
EFGM-06Y-3080	1-1/4 BSP.F		
EFGM-06X-3090	1 NPT	3/8 NPT	5/8-11 UNC
EFGM-06Y-3090	1-1/4 NPT		

Sub-plate Model Numbers	Dimensions mm (Inches)									
	D	E	F	H	J	K	L	N	P	Q
EFGM-06X-30	30 (1.18)	55.2 (2.17)	137.8 (5.43)	14.3 (.56)	101.1 (3.98)	106 (4.17)	34 (1.34)	35 (1.38)	45 (1.77)	11 (.43)
EFGM-06Y-30		52 (2.05)	132 (5.20)	19.3 (.76)	91.3 (3.59)		39 (1.54)	40 (1.57)	60 (2.36)	
EFGM-06X-3080		55.2 (2.17)	137.8 (5.43)	14.3 (.56)	101.1 (3.98)	116 (4.57)	34 (1.34)	35 (1.38)	45 (1.77)	15.2 (.60)
EFGM-06Y-3080		52 (2.05)	132 (5.20)	19.3 (.76)	91.3 (3.59)		39 (1.54)	40 (1.57)	60 (2.36)	15 (.59)
EFGM-06X-3090	35 (1.38)	55.2 (2.17)	137.8 (5.43)	14.3 (.56)	101.1 (3.98)	106 (4.17)	34 (1.34)	35 (1.38)	45 (1.77)	11 (.43)
EFGM-06Y-3090		52 (2.05)	132 (5.20)	19.3 (.76)	91.3 (3.59)		39 (1.54)	40 (1.57)	60 (2.36)	

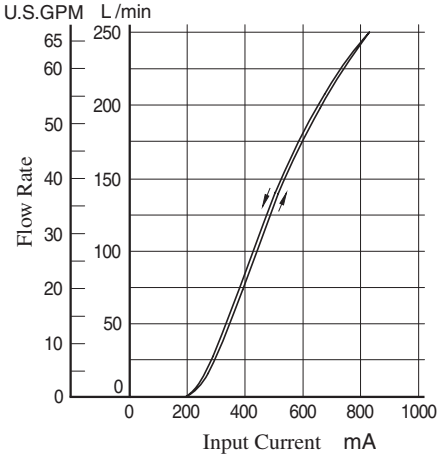
Input Current vs. Flow

Viscosity: 30 mm²/s
(141 SSU)

EFG EFCG -03



EFG EFCG -06

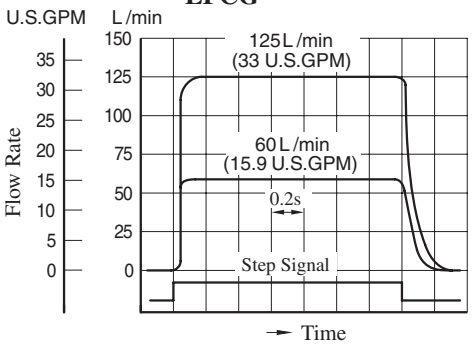


Step Response

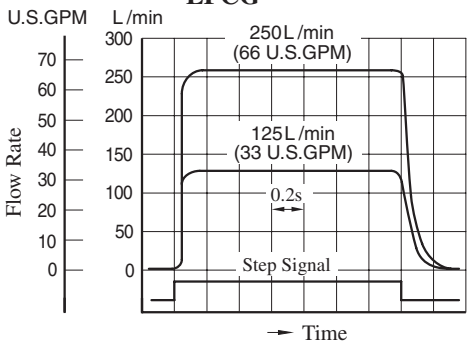
These characteristics have been obtained by measuring on each valve. Therefore , they may vary according to a hydraulic circuit to be used.

Viscosity: 30 mm²/s
(141 SSU)

EFG EFCG -03



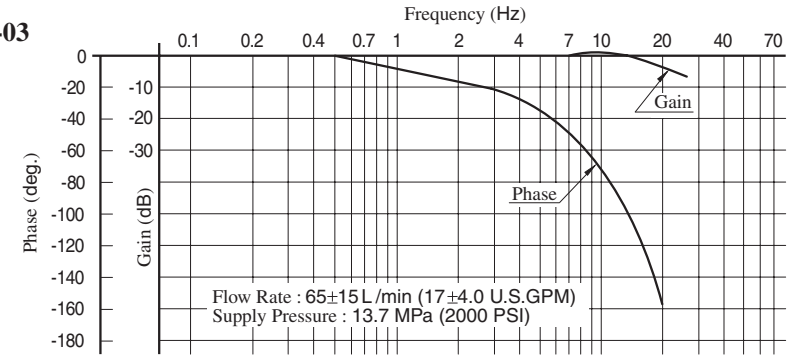
EFG EFCG -06



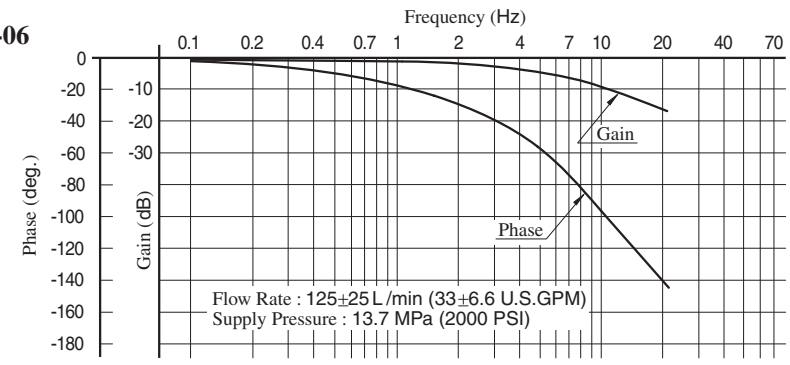
Frequency Response

Viscosity: 30 mm²/s
(141 SSU)

EFG EFCG -03

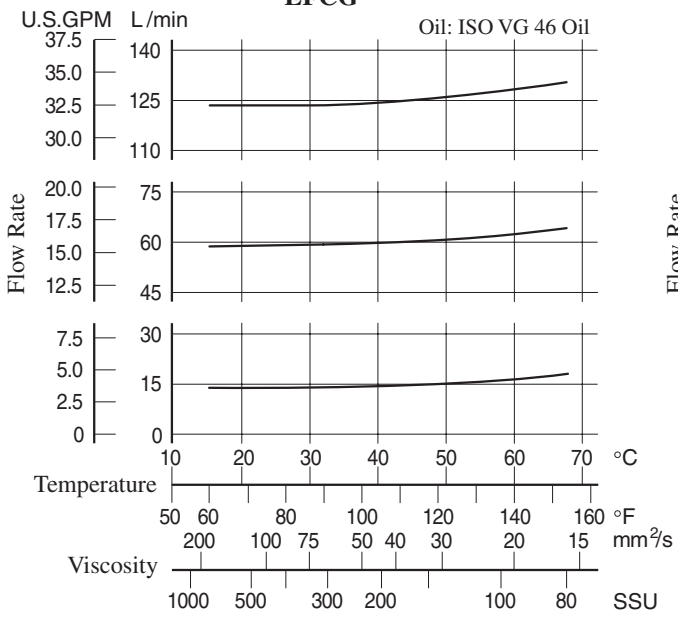


EFG EFCG -06

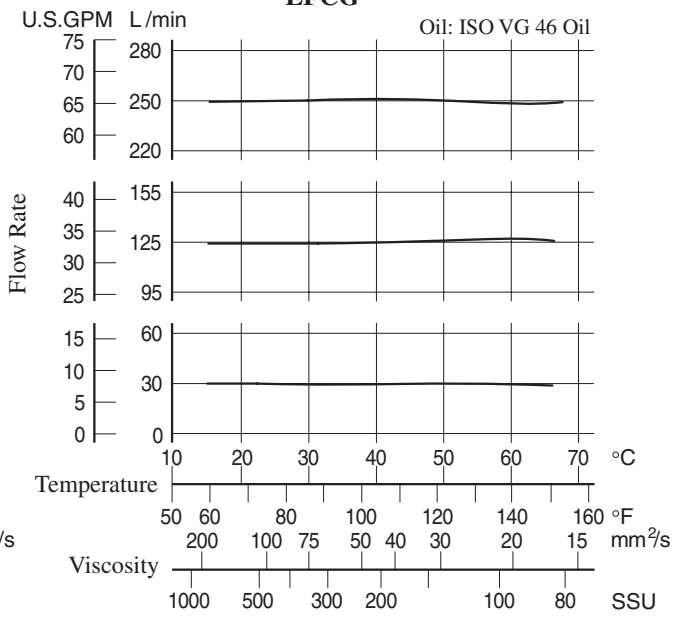


Viscosity vs. Flow

EFG EFCG -03

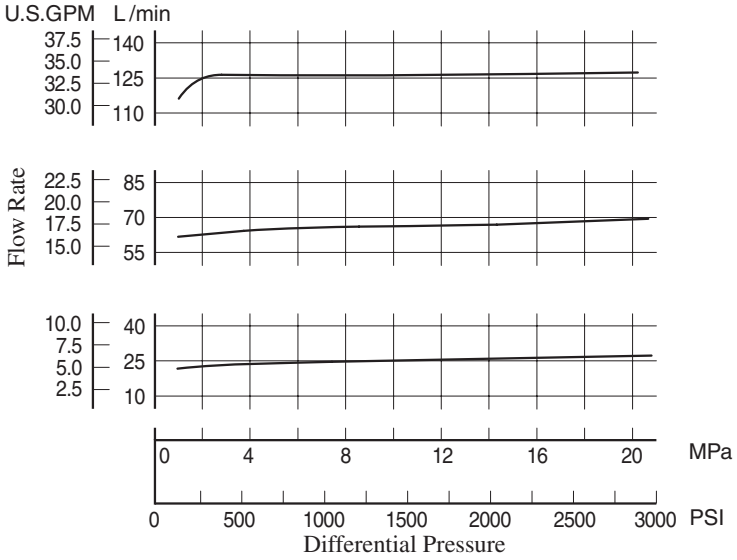


EFG EFCG -06

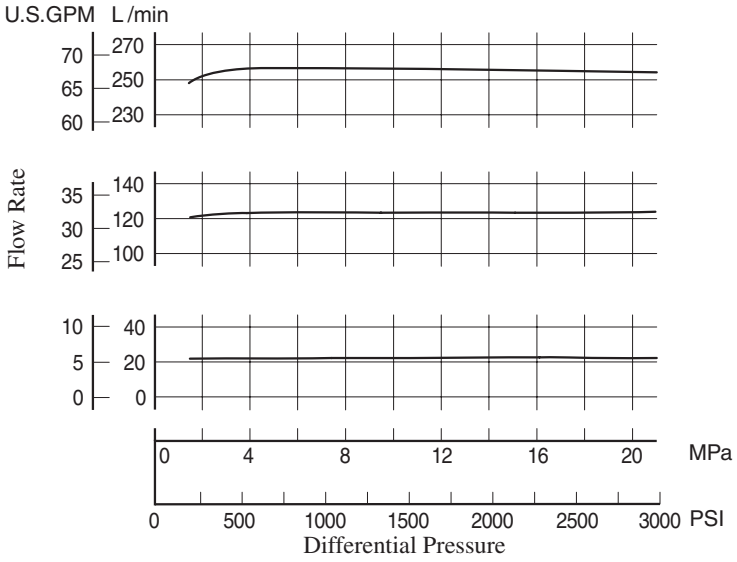


Differential Pressure vs. Metred Flow

EFG EFCG -03

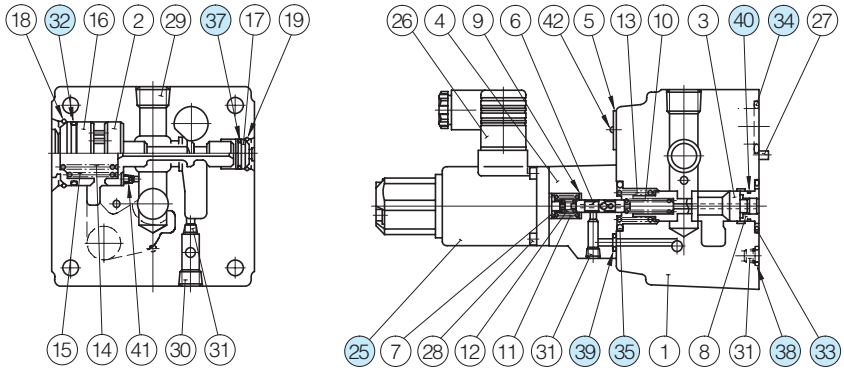


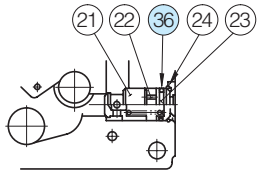
EFG EFCG -06



List of Seals and Solenoid Ass'y

EFG / EFCG-03-∗-∗-51/5190





With Check Valve (EFCG-03)

Note: The connector assembly GDM-211-B-11 (Item 26) is not included in the solenoid assembly.
Note: When ordering seals, please specify the seal kit number from the table right.
In addition to the right o-rings, seals for solenoid ass'y is included in the seal kit.
For the detail of the solenoid ass'y seals, see page 674.

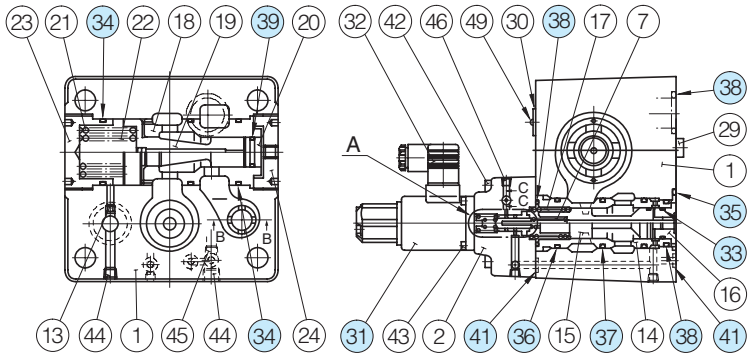
List of Seal Kits

Valve Model Numbers	Seal Kit Numbers
EFG-03-∗-∗-51∗	KS-EFG-03-51
EFCG-03-∗-∗-51∗	KS-EFCG-03-51

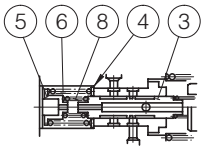
List of Seals and Solenoid Ass'y

Item	Name of Parts	Part Numbers	Qty.
25	Solenoid Ass'y	E318-Y06M1-28-61	1
32	O-Ring	SO-NB-G35	1
33	O-Ring	SO-NB-P28	1
34	O-Ring	SO-NB-P28	2
35	O-Ring	SO-NB-P26	1
36	O-Ring	SO-NB-P16	1
37	O-Ring	SO-NB-P14	1
38	O-Ring	SO-NB-P9	1
39	O-Ring	SO-NB-P6	2
40	O-Ring	SO-NA-A016	1

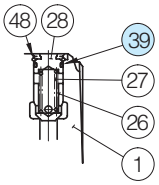
EFG / EFCG-06-250-∗-51/5190



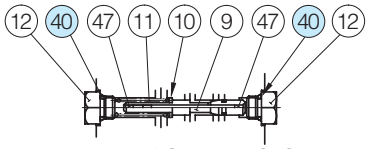
With Check Valve (EFCG-06)



Detail of "A"



Section B-B



Detail of Section C-C

Note: The connector assembly GDM-211-B-11 (Item 32) is not included in the solenoid assembly.
Note: When ordering seals, please specify the seal kit number from the table right.
In addition to the right o-rings, seals for solenoid ass'y is included in the seal kit.
For the detail of the solenoid ass'y seals, see page 674.

List of Seal Kits

Valve Model Numbers	Seal Kit Numbers
EFG-06-250-∗-51∗	KS-EFG-06-51
EFCG-06-250-∗-51∗	KS-EFCG-06-51

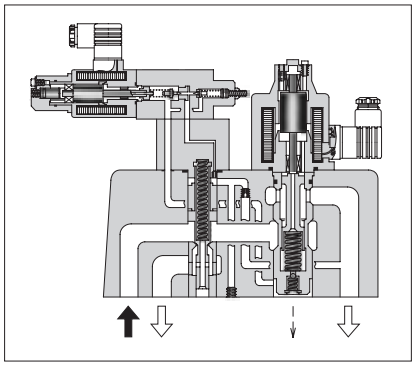
List of Seals and Solenoid Ass'y

Item	Name of Parts	Part Numbers	Qty.
31	Solenoid Ass'y	E318-Y06M1-28-61	1
33	O-Ring	SO-NA-P21	1
34	O-Ring	SO-NB-P50	3
35	O-Ring	SO-NB-P46	1
36	O-Ring	SO-NB-P36	1
37	O-Ring	SO-NB-P34	2
38	O-Ring	SO-NB-P32	4
39	O-Ring	SO-NA-P21	1★
40	O-Ring	SO-NB-P10	2
41	O-Ring	SO-NB-P9	3

★Two O-rings are required for the EFCG.

40Ω–10Ω Series
Proportional Electro-Hydraulic Flow Control and Relief Valves

This flow control and relief valve is an energy-saving valve that supplies the minimum pressure and flow necessary for actuator drive.
Since this valve controls the pump pressure by following the load pressure while keeping the differential pressure minimized, it serves as a low power-consumption energy - saving, metre-in, controlled flow control valve.
Further, since a temperature compensation function is incorporated, this valve provides consistent flow control without respect to the fluid temperature.

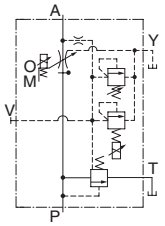


Specifications

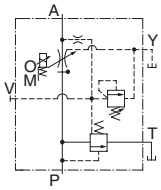
Description \ Model No.		EFBG-03 -125-∗-17∗	EFBG-06 -250-∗-17∗	EFBG-10 -500-∗-17∗
Max. Operating Pressure MPa (PSI)		24.5 (3550)	24.5 (3550)	24.5 (3550)
Max. Flow L/min (U.S.GPM)		125 (33)	250 (66)	500 (132)
Metred Flow Adjustment Range L/min (U.S.GPM)		1-125 (.26-33)	2.5-250 (.66-66)	5-500 (1.32-132)
Flow Controls	Rated Current	600 mA	580 mA	700 mA
	Coil Resistance	45 Ω	45 Ω	45 Ω
	Differential Pressure MPa (PSI)	0.6 (85)	0.7 (100)	0.9 (130)
	Hysteresis	7% or less	7% or less	7% or less
	Repeatability	1% or less	1% or less	1% or less
Pressure Controls ★1	Pres. Adj. Range MPa (PSI) ★2	C: 1.4-13.7 (205-2000) H: 1.4-20.6 (205-3000)	C: 1.5-13.7 (220-2000) H: 1.5-20.6 (220-3000)	C: 1.6-13.7 (230-2000) H: 1.6-20.6 (230-3000)
	Rated Current	C: 750 mA H: 750 mA	C: 690 mA H: 730 mA	C: 690 mA H: 690 mA
	Coil Resistance	10 Ω	10 Ω	10 Ω
	Hysteresis	3% or less	3% or less	3% or less
	Repeatability	1% or less	1% or less	1% or less
Approx. Mass kg (lbs.)		Refer to page 714 to 716		

★1. The specifications for pressure controls are applied to models with proportional pilot relief valve. (Ex. EFBG-03-125-C-17)
★2. The maximum pressure adjustment range of the models without proportional pilot relief valves is 24.5 MPa (3550 PSI).

Graphic Symbols



With Proportional Pilot Relief Valve



Without Proportional Pilot Relief Valve

Model Number Designation

F-	EFB	G	-03	-125	-C	-17	∗
Special Seals	Series Number	Type of Mounting	Valve Size	Max. Metred Flow L/min (U.S.GPM)	Proportional Pilot Relief Valve Pressure Adjustment Range	Design Number	Design Standards
F: Special Seals for Phosphate Ester Type Fluid (Omit if not required)	**EFB**: Proportional Electro-Hydraulic Flow Control and Relief Valve	**G**: Sub-plate Mounting	**03**	**125**: 125 (33)	**C, H**: See Specifications	**17**	Refer to ★
			06	**250**: 250 (66)	**None**: Without Proportional Pilot Relief Valve	**17**	
			10	**500**: 500 (132)		**17**	

★ Design Standards: None ..... Japanese Standard "JIS" and European Design Standard
90 ..... N. American Design Standard

Attachment

Mounting Bolts

Valve Model Numbers	Socket Head Cap Screw		Qty.
	Japanese Std. "JIS" and European Design Std.	N. American Design Std.	
EFBG-03	M10 × 100 Lg.	3/8-16 UNC × 4 Lg.	4
EFBG-06	M16 × 130 Lg.	5/8-11 UNC × 5 Lg.	4
EFBG-10	M20 × 130 Lg.	3/4-10 UNC × 5 Lg.	4

Applicable Power Amplifiers

For stable performance, it is recommended that Yuken's applicable power amplifiers be used (for details see page 772, 778).

Valve Model Numbers	Power Amplifier Model Numbers	
	For Flow Control	For Pres. Control
EFBG-03-125-17/1790 EFBG-06-250-17/1790 EFBG-10-500-17/1790	AME-D-S-∗-40 AME-DF-S-∗-22 AME-T-S-∗-22	—
03 EFBG-06-∗-C/H-17/1790 10	AME-D2-H1-∗-12	

Sub-plate

Valve Model Numbers	Japanese Standard "JIS"		European Design Standard		N. American Design Standard		Approx. Mass kg (lbs.)
	Sub-plate Model Numbers	Thread Size	Sub-plate Model Numbers	Thread Size	Sub-plate Model Numbers	Thread Size	
EFBG-03	EFBGM-03Y-10	Rc 3/4	EFBGM-03Y-1080	3/4 BSP.F	EFBGM-03Y-1090	3/4 NPT	6 (13.2)
	EFBGM-03Z-10	Rc 1	EFBGM-03Z-1080	1 BSP.F	EFBGM-03Z-1090	1 NPT	
EFBG-06	EFBGM-06X-10	Rc 1	EFBGM-06X-1080	1 BSP.F	EFBGM-06X-1090	1 NPT	12.5 (27.6)
	EFBGM-06Y-10	Rc 1-1/4	EFBGM-06Y-1080	1-1/4 BSP.F	EFBGM-06Y-1090	1-1/4 NPT	16 (35.3)
EFBG-10	EFBGM-10Y-10★	1-1/2, 2 Flange Mounting	EFBGM-10Y-1080★	1-1/2, 2 Flange Mounting	EFBGM-10Y-1090★	1-1/2, 2 Flange Mounting	37 (81.6)

- Sub-plates are available. Specify the sub-plate model number from the table above. When sub-plates are not used, the mounting surface should have a good machined finish.

★When ordering the EFBGM-10Y, see Type F3 Pipe Flange Kits on page 821 and order an appropriate pipe flange kit also.

Instructions

Drain Back Pressure

Check that the drain back pressure dose not exceed 0.2 MPa (29 PSI).

When Relief Valve Passing Flow Rate is Low in Pressure Control State

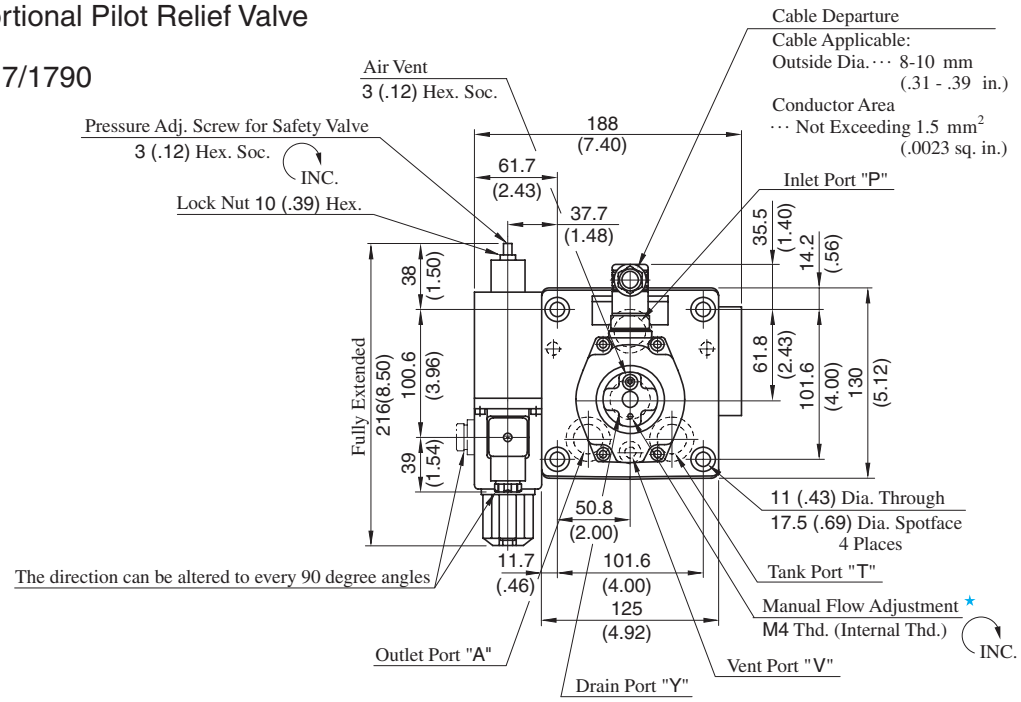
To avoid preselected pressure instability, use a passing flow rate of 10 L/min (2.6 U.S.GPM) or higher for nominal sizes 03 and 06 or 15 L/min (4.0 U.S.GPM) or higher for nominal size 10.
Further, check that the tank-line back pressure does not exceed 0.5 MPa (70 PSI).

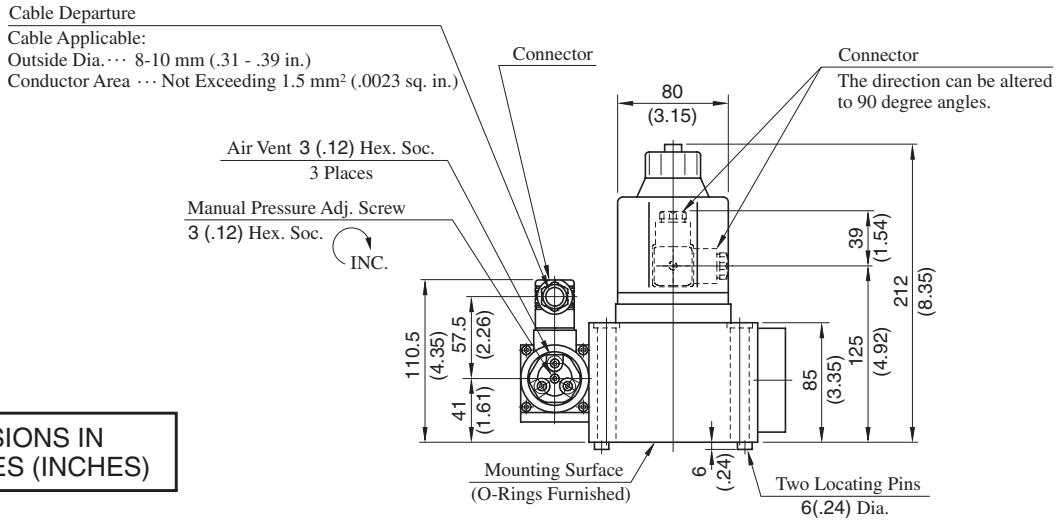
Safety Valve Pressure Setting

The pressure of the safety valve is preset at the value equal to the upper limit of the pressure adjustment range plus 2 MPa (290 PSI). Please adjust the pressure of the valve so preset to meet the pressure to be used actually.
To lower the pressure setting, turn the safety valve pressure adjustment screw anti-clockwise. After adjustment, be sure to tighten the lock nut.

Models with Proportional Pilot Relief Valve

EFBG-03-125-$\frac{C}{H}$-17/1790





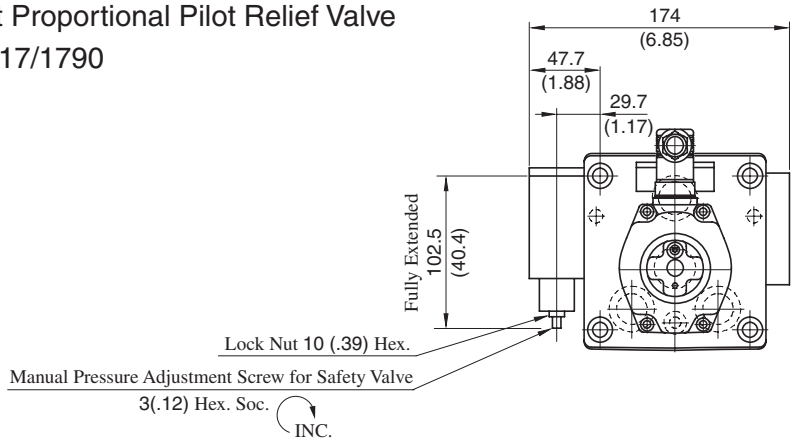
DIMENSIONS IN MILLIMETRES (INCHES)

★ Manual flow adjustment can be done by screwing for example an M4×20L screw in the M4 thread or pushing in a rod etc. there.

Approx. Mass ..... 16 kg (35.3 lbs.)

Models without Proportional Pilot Relief Valve

EFBG-03-125-17/1790

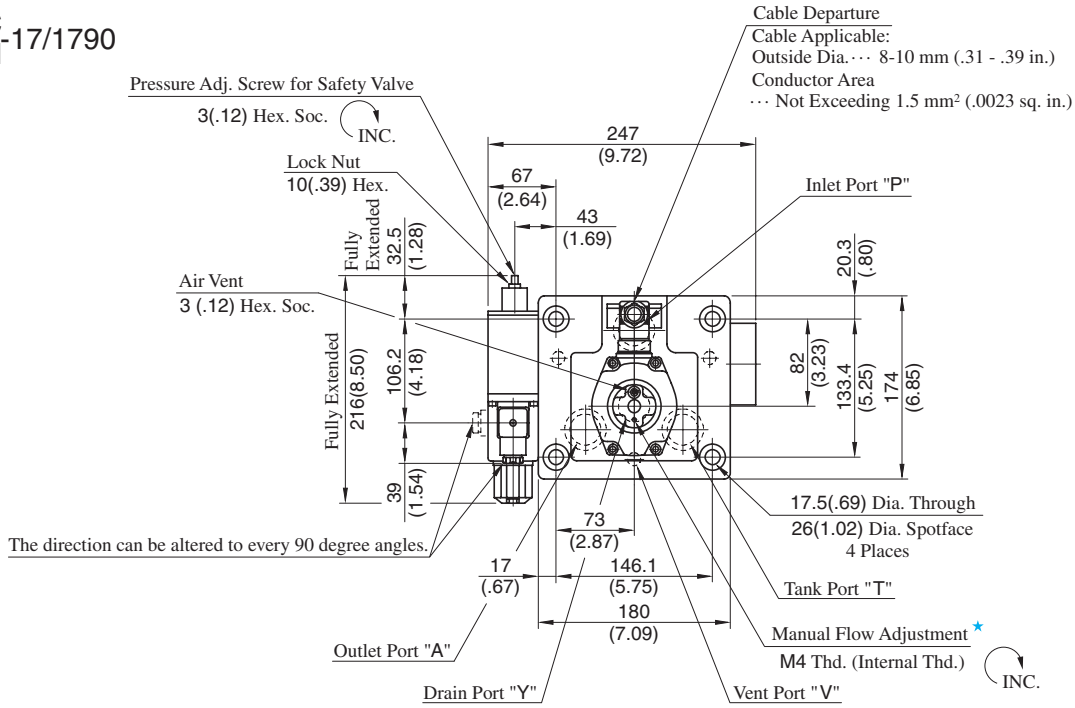


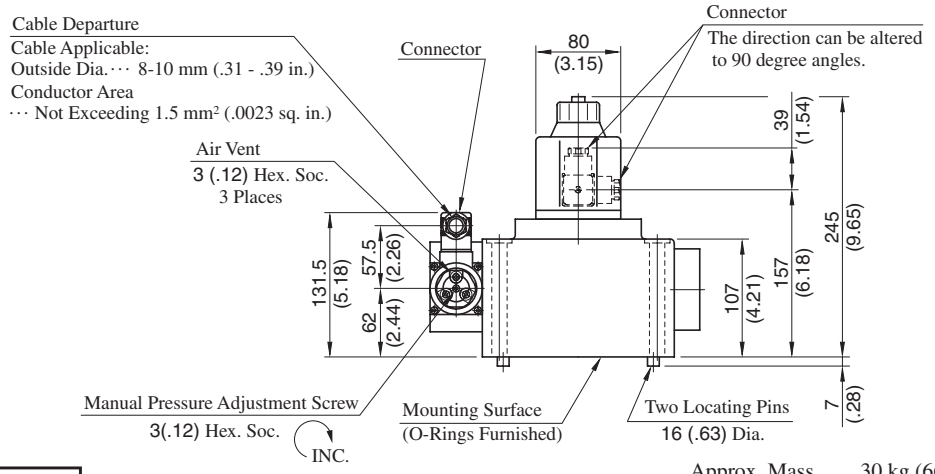
Approx. Mass ..... 14 kg (30.9 lbs.)

• For other dimensions, please refer to the models with proportional pilot relief valve.

Models with Proportional Pilot Relief Valve

EFBG-06-250-$\frac{C}{H}$-17/1790





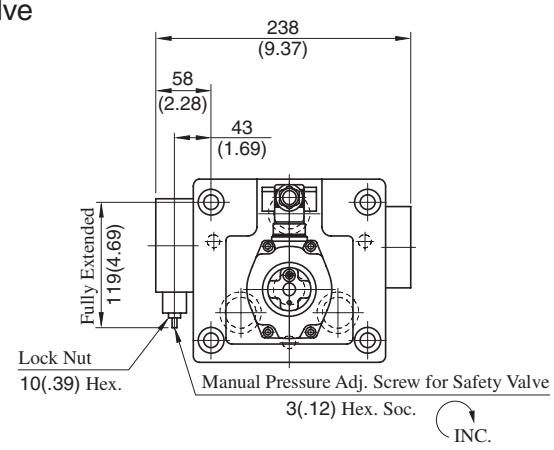
Approx. Mass ..... 30 kg (66.2 lbs.)

DIMENSIONS IN MILLIMETRES (INCHES)

★Manual flow adjustment can be done by screwing for example an M4×20L screw in the M4 thread or pushing in a rod etc. there.

Models without Proportional Pilot Relief Valve

EFBG-06-250-17/1790

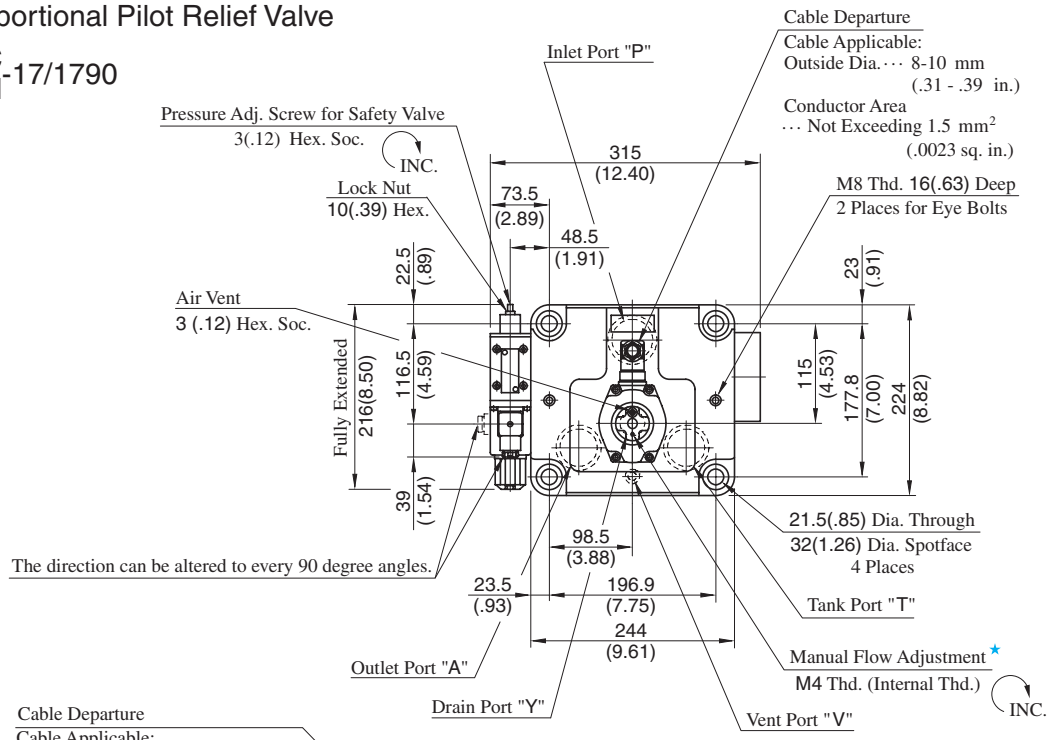


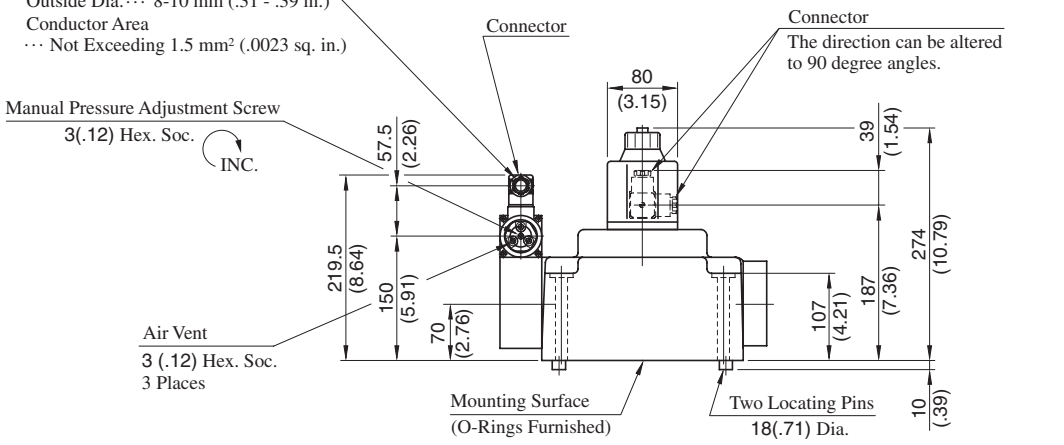
Approx. Mass ..... 28 kg (61.7 lbs.)

● For other dimensions, please refer to the models with Proportional Pilot Relief Valve.

Models with Proportional Pilot Relief Valve

EFBG-10-500-$\frac{C}{H}$-17/1790





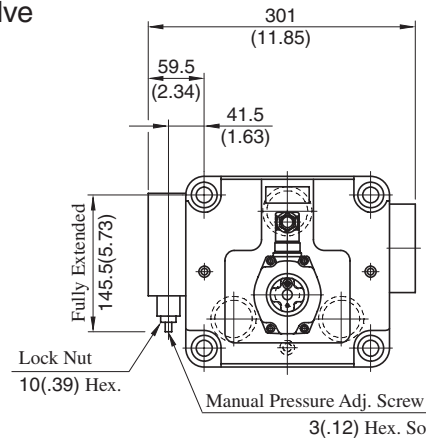
DIMENSIONS IN MILLIMETRES (INCHES)

Approx. Mass ..... 60 kg (132 lbs.)

★ Manual adjustment can be done by screwing for example an M4×20 L screw in the M4 thread or pushing in a rod etc. there.

Models without Proportional Pilot Relief Valve

EFBG-10-500-17/1790

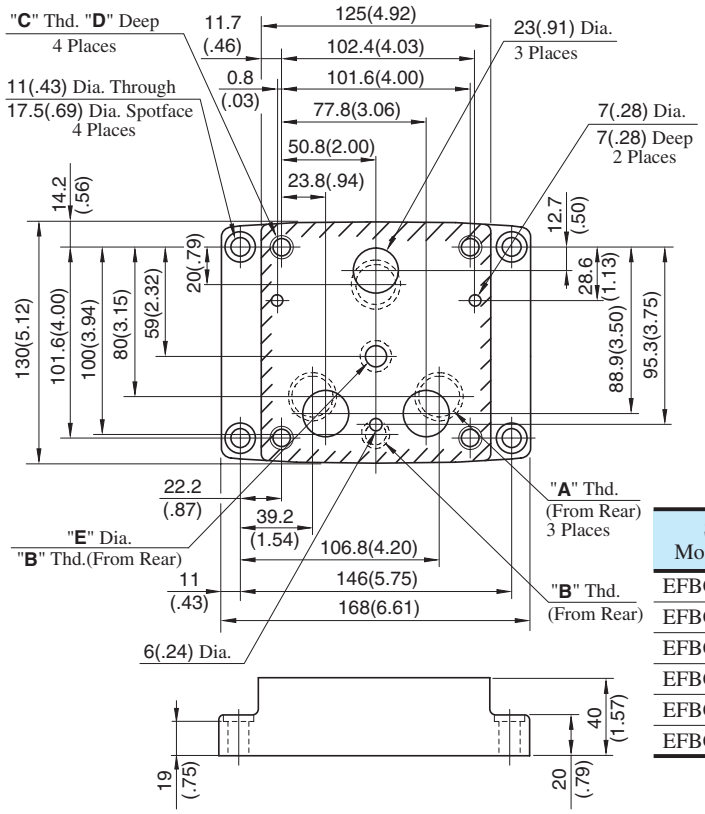


Approx. Mass ..... 58 kg (128 lbs.)

● For other dimensions, please refer to the models with Proportional Pilot Relief Valve.

Sub-plate

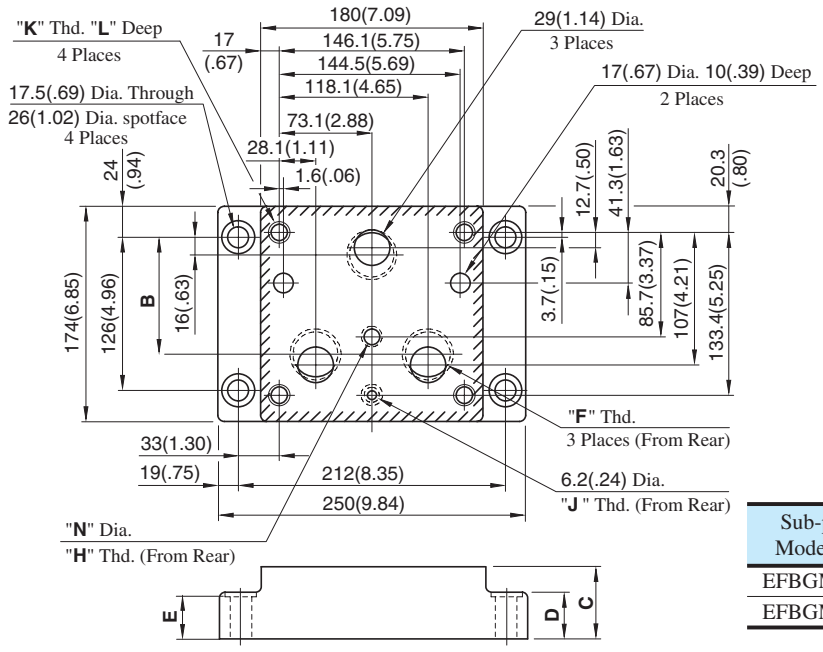
EFBGM-03Y/03Z-10/1080/1090



Sub-plate Model Numbers	Thread Size			mm (in.)	
	"A" Thd.	"B" Thd.	"C" Thd.	D	E
EFBGM-03Y-10	Rc 3/4	Rc 1/4	M10	18 (.71)	11 (.43)
EFBGM-03Z-10	Rc 1				
EFBGM-03Y-1080	3/4 BSP.F	1/4 BSP.F			11.7 (.46)
EFBGM-03Z-1080	1 BSP.F				
EFBGM-03Y-1090	3/4 NPT	1/4 NPT	3/8-16 UNC	21 (.83)	11 (.43)
EFBGM-03Z-1090	1 NPT				

DIMENSIONS IN MILLIMETRES (INCHES)

EFBGM-06X/06Y-10/1080/1090



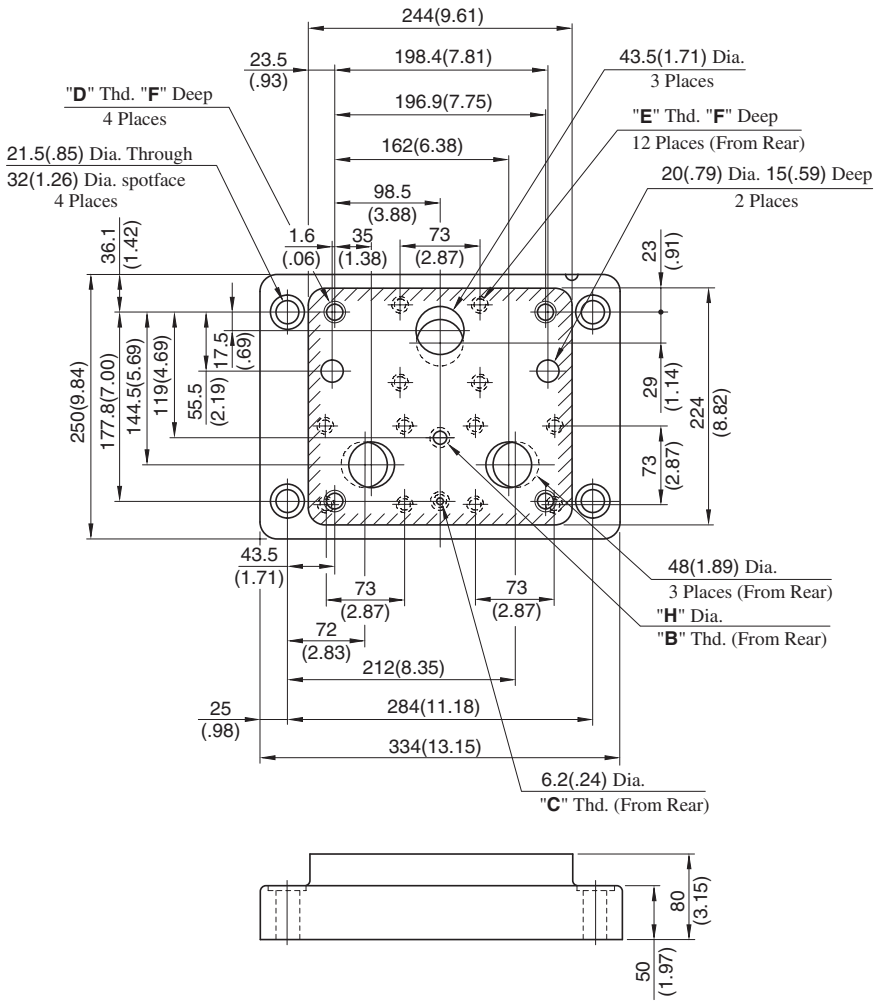
Sub-plate Model No.	Dimensions mm (in.)			
	B	C	D	E
EFBGM-06X	103.3 (4.07)	45 (1.77)	35 (1.38)	34 (1.34)
EFBGM-06Y	95 (3.74)	60 (2.36)	40 (1.54)	39 (1.54)

Sub-plate Model No.	Thread Size				mm (in.)	
	"F" Thd.	"H" Thd.	"J" Thd.	"K" Thd.	L	N
EFBGM-06X-10	Rc 1	Rc 3/8	Rc 1/4	M 16	30 (1.18)	14 (.55)
EFBGM-06Y-10	Rc 1-1/4					
EFBGM-06X-1080	1 BSP.F	3/8 BSP.F	1/4 BSP.F	M 16	30 (1.18)	15.2 (.60)
EFBGM-06Y-1080	1-1/4 BSP.F					
EFBGM-06X-1090	1 NPT	3/8 NPT	1/4 NPT	5/8-11 UNC	35 (1.38)	14 (.55)
EFBGM-06Y-1090	1-1/4 NPT					

Sub-plate

EFBGM-10Y-10/1080/1090

DIMENSIONS IN MILLIMETRES (INCHES)



Sub-plate Model Numbers	Thread Size				mm (in.)	
	"B" Thd.	"C" Thd.	"D" Thd.	"E" Thd.	F	H
EFBGM-10Y-10	Rc 3/8	Rc 1/4	M20	M16	32 (1.26)	14 (.55)
EFBGM-10Y-1080	3/8 BSP.F	1/4 BSP.F				15.2 (.60)
EFBGM-10Y-1090	3/8 NPT	1/4 NPT	3/4-10 UNC	5/8-11 UNC	34 (1.34)	14 (.55)

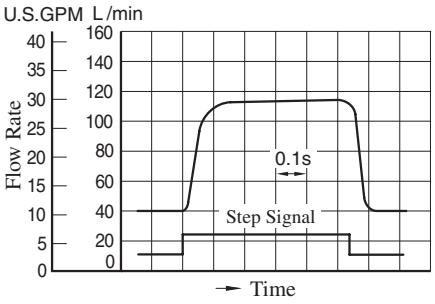
Step Response

These characteristics have been obtained by measuring on each valve.
Therefore, they may vary according to a hydraulic circuit to be used.

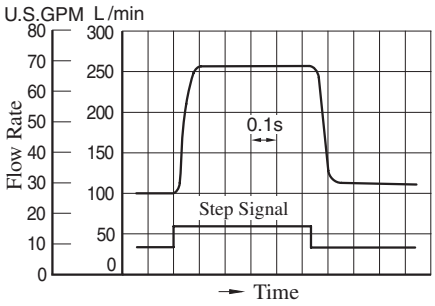
Viscosity: 30 mm²/s (141 SSU)

Flow Controls

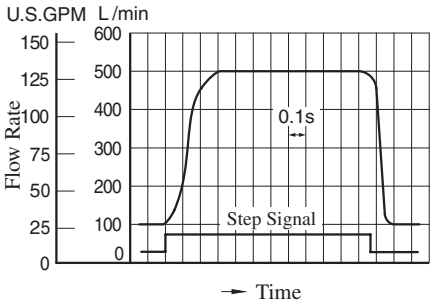
EFBG-03



EFBG-06



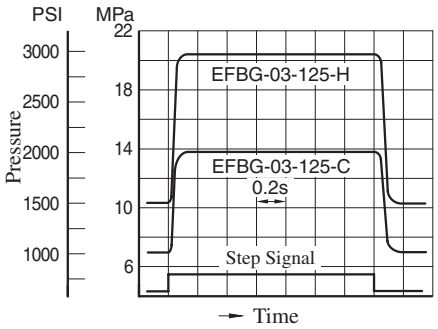
EFBG-10



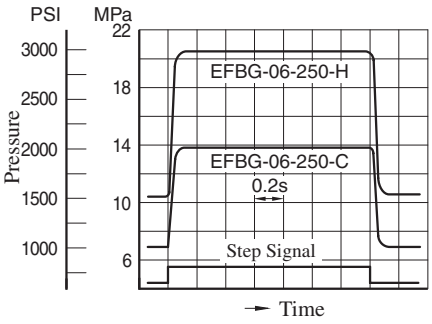
Pressure Controls

Viscosity: 30 mm²/s (141 SSU)

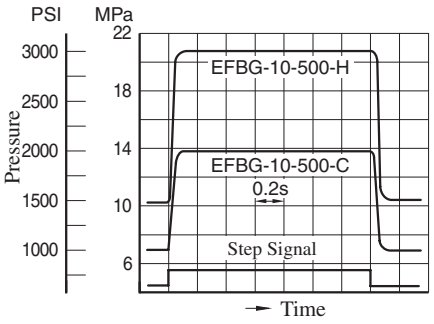
EFBG-03



EFBG-06



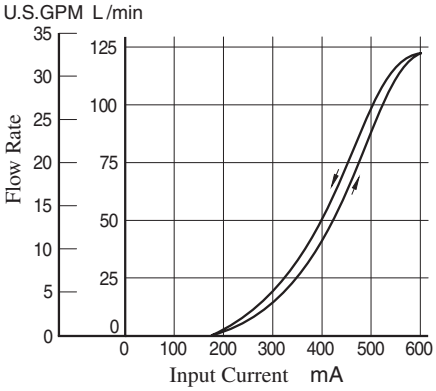
EFBG-10



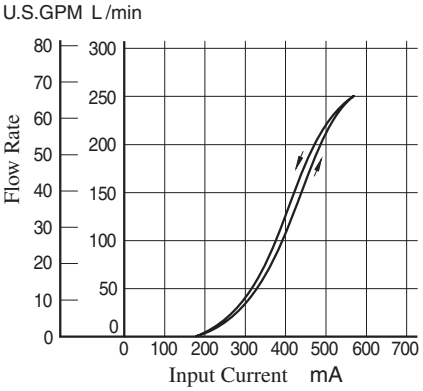
Input Current vs. Flow

Viscosity: 30 mm²/s (141 SSU)

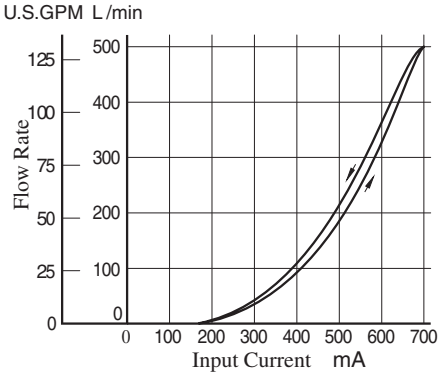
EFBG-03



EFBG-06



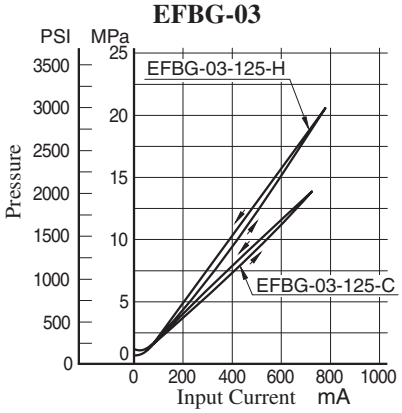
EFBG-10



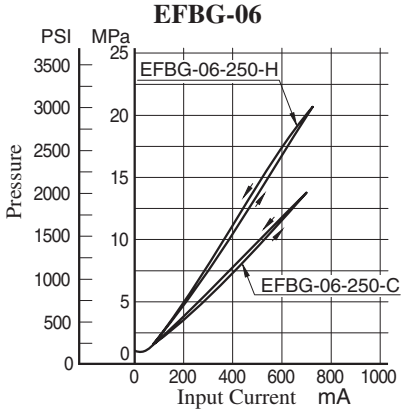
Input Current vs. Pressure

Viscosity: 30 mm²/s (141 SSU)

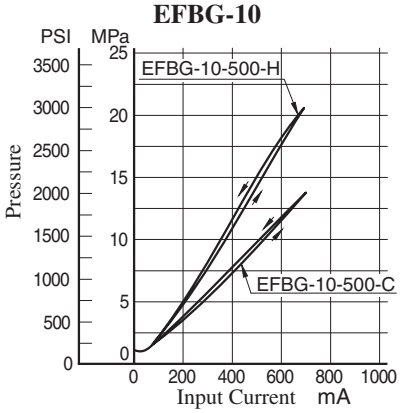
EFBG-03



EFBG-06

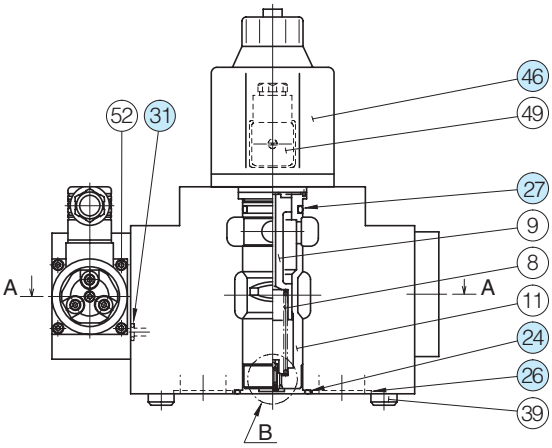


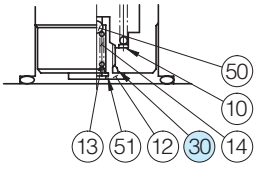
EFBG-10



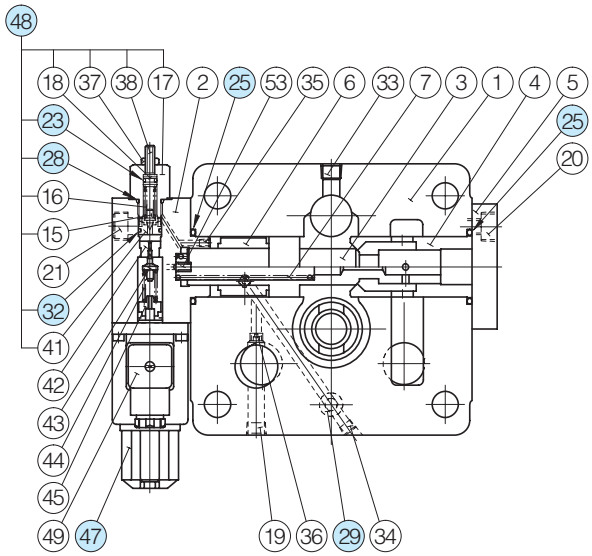
List of Seals, Solenoid Ass'y and Safety Valve

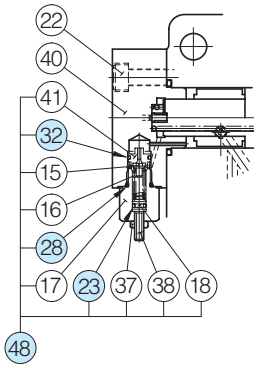
EFBG-03-125-∗-17/1790
EFBG-06-250-∗-17/1790





Detail of "B"





Without Proportional Pilot Relief Valve

Section A-A

List of Seals

Item	Name of Parts	Part Numbers		Qty.
		EFBG-03	EFBG-06	
23	O-Ring	SO-NA-P6	SO-NA-P6	1
24	O-Ring	SO-NB-G30	SO-NB-P44	1
25	O-Ring	SO-NB-P32	SO-NB-P42	2
26	O-Ring	SO-NB-P28	SO-NB-P32	3
27	O-Ring	—	SO-NB-P34	1
28	O-Ring	SO-NB-P14	SO-NB-P14	1
29	O-Ring	SO-NB-P11	SO-NB-P11	1
30	O-Ring	—	SO-NA-P10	1
31	O-Ring	SO-NB-P9	SO-NB-P9	1
32	O-Ring	SO-NB-A013	SO-NB-A013	1

List of Seal Kits

Valve Model Numbers	Seal Kit Numbers
EFBG-03-125-17∗	KS-EFBG-03-17
EFBG-03-125-C/H-17∗	KS-EFBG-03-C-17
EFBG-06-250-17∗	KS-EFBG-06-17
EFBG-06-250-C/H-17∗	KS-EFBG-06-C-17

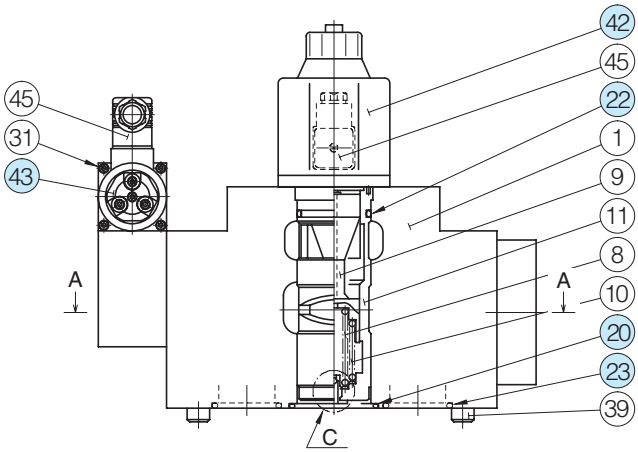
Solenoid Ass'y and Safety valve

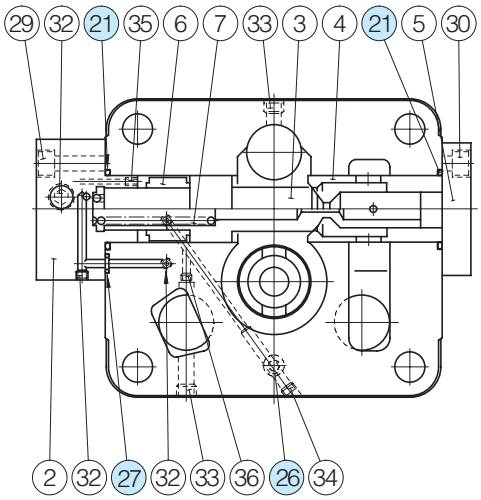
Valve Model Numbers	(47) Solenoid Ass'y Model No.	(46) Solenoid Ass'y Model No.	(48) Safety Valve Model No.
EFBG-03-125-C/H-17/1790	E318-Y06M2-05-61	E321-45-20	SB1094-2002
EFBG-06-250-C/H-17/1790			
EFBG-03-125-17/1790 EFBG-06-250-17/1790	—		

Note: The connector assembly GDM-211-B-11 (Item 49) is not included in the solenoid assembly.
When ordering seals, please specify the seal kit number from the table above.
In addition to the above o-rings, seeals for solenoid ass'y (46) and (47) are included in the seal kit.
For the details of seals for solenoid ass'y (46), see page 704 and for solenoid ass'y (47) see page 674.

List of Seals, Solenoid Ass'y, Pilot Relief Valves and Safety Valve

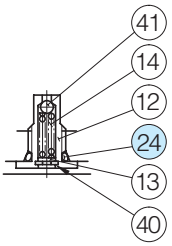
EFBG-10-500-∗-17/1790



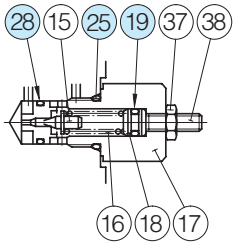


Section A-A

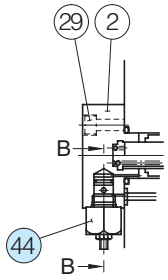
● Detail of Safety Valve (Item 44)



Detail of "C"



Section B-B



Without Proportional Pilot Relief Valve

● List of Seals and Solenoid Ass'y

Item	Name of Parts	Part Numbers	Qty.
19	O-Ring	SO-NA-P6	1
20	O-Ring	SO-NB-G60	1
21	O-Ring	SO-NB-G55	2
22	O-Ring	SO-NB-P50	1
23	O-Ring	SO-NB-P48	3
24	O-Ring	SO-NA-P10	1
25	O-Ring	SO-NB-P14	1
26	O-Ring	SO-NB-P11	1
27	O-Ring	PO-NB-P11	1
28	O-Ring	SO-NB-A013	1
42	Solenoid Ass'y	E321-45-20	1

● List of Seal Kits

Valve Model Numbers	Seal Kit Numbers
EFBG-10-500-17∗	KS-EFBG-10-17
EFBG-10-500-C/H-17∗	KS-EFBG-10-C-17

Note: The connector assembly GDM-211-B-11 (Item 45) is not included in the solenoid assembly.
When ordering seals, please specify the seal kit number from the table right.
In addition to the above o-rings, seals for Pilot Valve and solenoid ass'y are included in the seal kit.

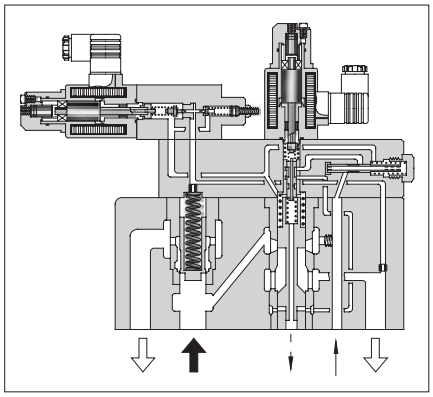
● Pilot Valves and Safety Valve

Valve Model Numbers	㊸ Proportional Pilot Relief Valve Model Numbers	㊹ Safety Valve Model Numbers
EFBG-10-500-17/1790	——	SB1094-2002
EFBG-10-500-C-17/1790	EDG-01V-C-1-P18T17-5103	——
EFBG-10-500-H-17/1790	EDG-01V-H-1-PNT13-5103	——

Note: For the details of seals for solenoid ass'y ㊷, see page 704 and for pilot relief valve ㊸ see page 674.

10Ω–10Ω Series
Proportional Electro-Hydraulic Flow Control and Relief Valves

This flow control and relief valve is an energy-saving valve that supplies the minimum pressure and flow necessary for actuator drive.
Since this valve controls the pump pressure by following the load pressure while keeping the differential pressure minimized, it serves as a low power-consumption energy-saving, metre-in, controlled flow control valve.
Further, since a temperature compensation function is incorporated, this valve provides consistent flow control without respect to the fluid temperature.



Specifications

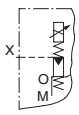
Description \ Model Numbers			EFBG-03 -125-∗-∗-61∗	EFBG-06 -250-∗-∗-61∗	EFBG-10 -500-∗-∗-51∗
Max. Operating Pressure MPa (PSI)			24.5 (3550)	24.5 (3550)	24.5 (3550)
Max. Flow L/min (U.S.GPM)			125 (33)	250 (66)	500 (132)
Metred Flow Adjustment Range L/min (U.S.GPM)			1-125 (.26-33)	2.5-250 (.66-66)	5-500 (1.32-132)
Min. Pilot Pressure MPa (PSI)			1.5 (220)	1.5 (220)	1.5 (220)
Pilot Flow L/min (U.S.GPM)		at Normal	1 (.26)	1 (.26)	1 (.26)
		at Transition	3 (.79)	4 (1.06)	6 (1.59)
Flow Controls	Rated Current		800 mA	750 mA	900 mA
	Coil Resistance		10 Ω	10 Ω	10 Ω
	Differential Pressure MPa (PSI)		0.7 (100)	0.7 (100)	0.9 (130)
	Hysteresis		3% or less	3% or less	3% or less
	Repeatability		1% or less	1% or less	1% or less
Pressure Controls ★1	Pres. Adj. Range MPa (PSI) ★2		C: 1.4-15.7 (200-2275) H: 1.4-24.5 (200-3550)	C: 1.4-15.7 (200-2275) H: 1.4-24.5 (200-3550)	C: 1.5-15.7 (220-2275) H: 1.5-24.5 (220-3550)
	Rated Current		C: 890 mA H: 930 mA	C: 820 mA H: 880 mA	C: 800 mA H: 900 mA
	Coil Resistance		10 Ω	10 Ω	10 Ω
	Hysteresis		3% or less	3% or less	3% or less
	Repeatability		1% or less	1% or less	1% or less
Approx. Mass kg (lbs.)			Refer to page 724 to 726		

★1. The specifications for pressure controls are applied to models with proportional pilot relief valve. (Ex. EFBG-03-125-C-∗-61)
★2. The maximum pressure adjustment range of the models without proportional pilot relief valves is 24.5 MPa (3550 PSI).

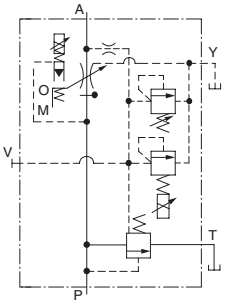
Graphic Symbols

With Proportional Pilot Relief Valve

External Pilot

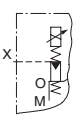


Internal Pilot

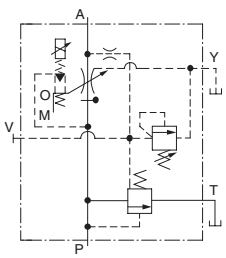


Without Proportional Pilot Relief Valve

External Pilot



Internal Pilot



Model Number Designation

F-	EFB	G	-03	-125	-C	-E	-61	*
Special Seals	Series Number	Type of Mounting	Valve Size	Max. Metred Flow L/min (U.S.GPM)	Proportional Pilot Relief Valve Pressure Adj. Range	Pilot Connection	Design Number	Design Standards
F: Special Seals for Phosphate Ester Type Fluid (Omit if not required)	**EFB**: Proportional Electro-Hydraulic Flow Control and Relief Valve	**G**: Sub-plate Mounting	**03**	**125**: 125 (33)	**C, H**: See Specifications	**None**: Internal Pilot	**61**	Refer to★
			06	**250**: 250 (66)	**None**: Without Proportional Pilot Relief Valve	**E**: External Pilot	**61**	
			10	**500**: 500 (132)			**51**	

★ Design Standards: None ..... Japanese Standard "JIS" and European Design Standard
90 ..... N. American Design Standard

Attachment

Mounting Bolts

Valve Model Numbers	Socket Head Cap Screw		Qty.
	Japanese Std. "JIS" and European Design Std.	N. American Design Std.	
EFBG-03	M10 × 65 Lg.	3/8-16 UNC × 2-1/2 Lg.	4
EFBG-06	M16 × 100 Lg.	5/8-11 UNC × 4 Lg.	4
EFBG-10	M20 × 130 Lg.	3/4-10 UNC × 5 Lg.	4

Applicable Power Amplifiers

For stable performance, it is recommended that Yuken's applicable power amplifiers be used (for details see page 767, 780).

Valve Model Numbers	Power Amplifier Model Numbers	
	For Flow Control	For Pres. Control
EFBG-03-125(-E)-61/6190 EFBG-06-250(-E)-61/6190 EFBG-10-500(-E)-51/5190	AME-D-10-*-20 AMN-D-10 (For DC Power Supply)	—
EFBG-03-125-C/H(-E)-61/6190 EFBG-06-250-C/H(-E)-61/6190 EFBG-10-500-C/H(-E)-51/5190	AME-D2-1010-11	

Sub-plate

Valve Model Numbers	Japanese Standard "JIS"		European Design Standard		N. American Design Standard		Approx. Mass kg (lbs.)
	Sub-plate Model Numbers	Thread Size	Sub-plate Model Numbers	Thread Size	Sub-plate Model Numbers	Thread Size	
EFBG-03	EFBGM-03Y-20	Rc 3/4	EFBGM-03Y-2080	3/4 BSP.F	EFBGM-03Y-2090	3/4 NPT	6 (13.2)
	EFBGM-03Z-20	Rc 1	EFBGM-03Z-2080	1 BSP.F	EFBGM-03Z-2090	1 NPT	
EFBG-06	EFBGM-06X-20	Rc 1	EFBGM-06X-2080	1 BSP.F	EFBGM-06X-2090	1 NPT	12.5 (27.6)
	EFBGM-06Y-20	Rc 1-1/4	EFBGM-06Y-2080	1-1/4 BSP.F	EFBGM-06Y-2090	1-1/4 NPT	16 (35.3)
EFBG-10	EFBGM-10Y-20★	1-1/2, 2 Flange Mounting	EFBGM-10Y-2080★	1-1/2, 2 Flange Mounting	EFBGM-10Y-2090★	1-1/2, 2 Flange Mounting	37 (81.6)

● Sub-plates are available. Specify the sub-plate model number from the table above. When sub-plates are not used, the mounting surface should have a good machined finish.

★ When ordering the EFBGM-10Y, see Type F3 Pipe Flange Kits on page 821 and order an appropriate pipe flange kit also.

Instructions

Drain Back Pressure

Check that the drain back pressure dose not exceed 0.2 MPa (29 PSI).

When Relief Valve Passing Flow Rate is Low in Pressure Control State

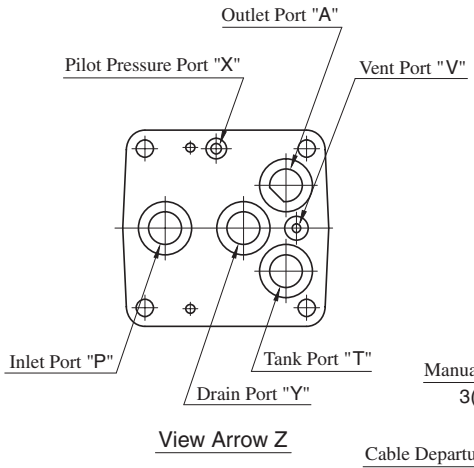
To avoid preselected pressure instability, use a passing flow rate of 15 L/min (4.0 U.S.GPM) or higher. Further, check that the tank-line back pressure dose not exceed 0.5 MPa (70 PSI).

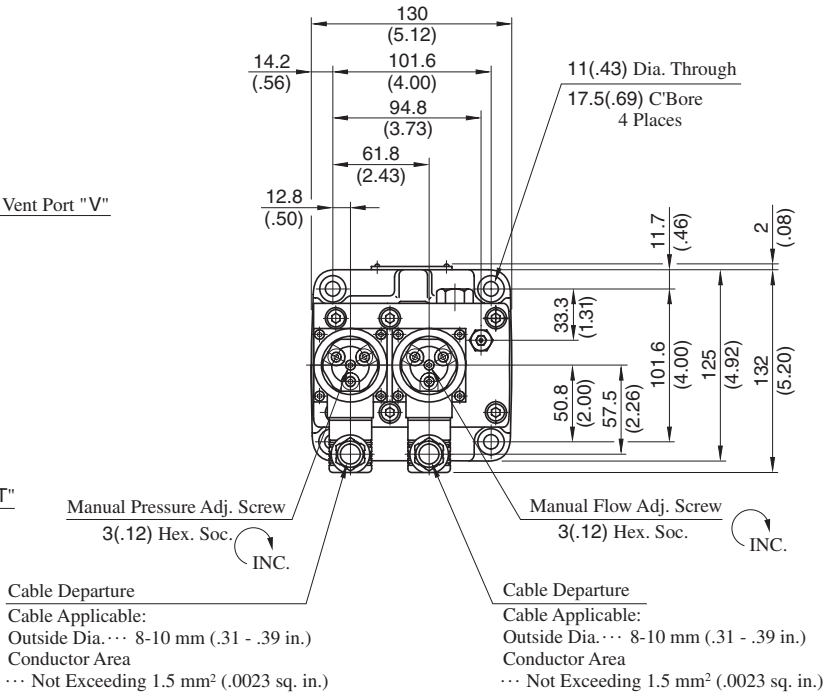
Safety Valve Pressure Setting

The pressure of the saffety valve is preset at the value equal to the upper limit of the pressure adjustment renge plus 2 MPa (290 PSI). Please adjust the pressure of the valve so preset to meet the pressure to be used actually. To lower the pressure setting, turn the safety valve pressure adjustment screw anti-clockwise. After adjustment, be sure to tighten the lock nut.

Models with Proportional Pilot Relief Valve

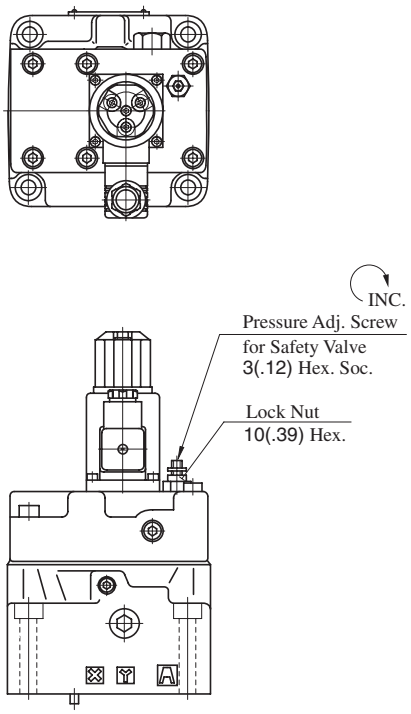
EFBG-03-125-$\frac{C}{H}$(-E)-61/6190

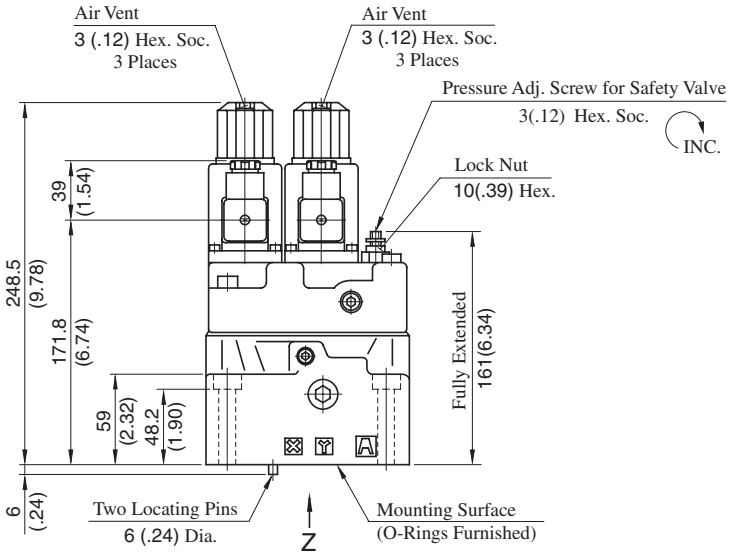




Models without Proportional Pilot Relief Valve

EFBG-03-125(-E)-61/6190





- For other dimensions, please refer to the models with Proportional Pilot Relief Valve.

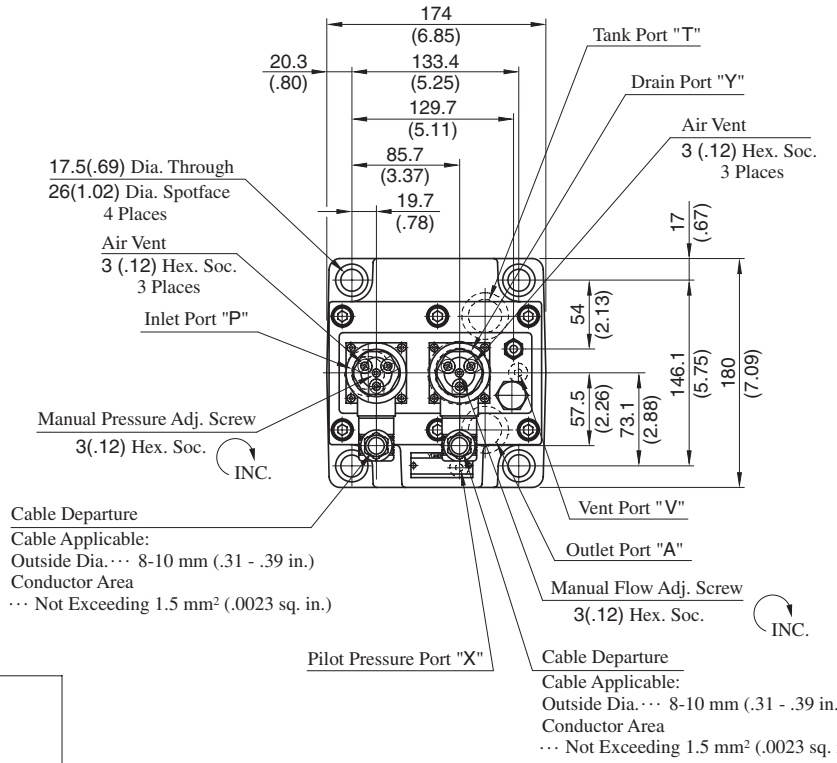
Approx. Mass ..... 13.3 kg (29.3 lbs.)

Approx. Mass ..... 14 kg (30.9 lbs.)

DIMENSIONS IN MILLIMETRES (INCHES)

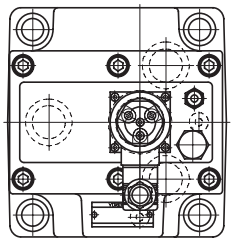
Models with Proportional Pilot Relief Valve

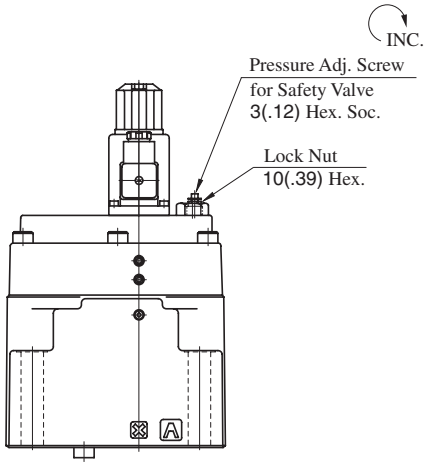
EFBG-06-250-$^{C}_{H}$(-E)-61/6190



Models without Proportional Pilot Relief Valve

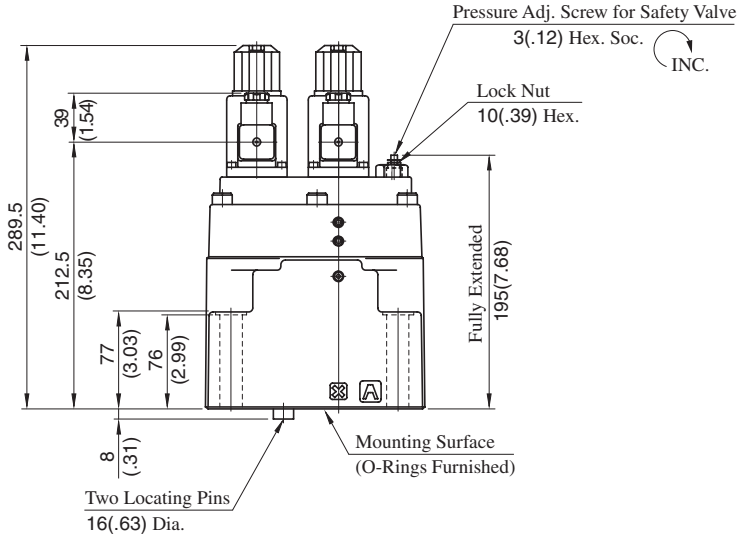
EFBG-06-250(-E)-61/6190





• For other dimensions, please refer to the models with Proportional Pilot Relief Valve.

Approx. Mass ..... 21.3 kg (47.0 lbs.)

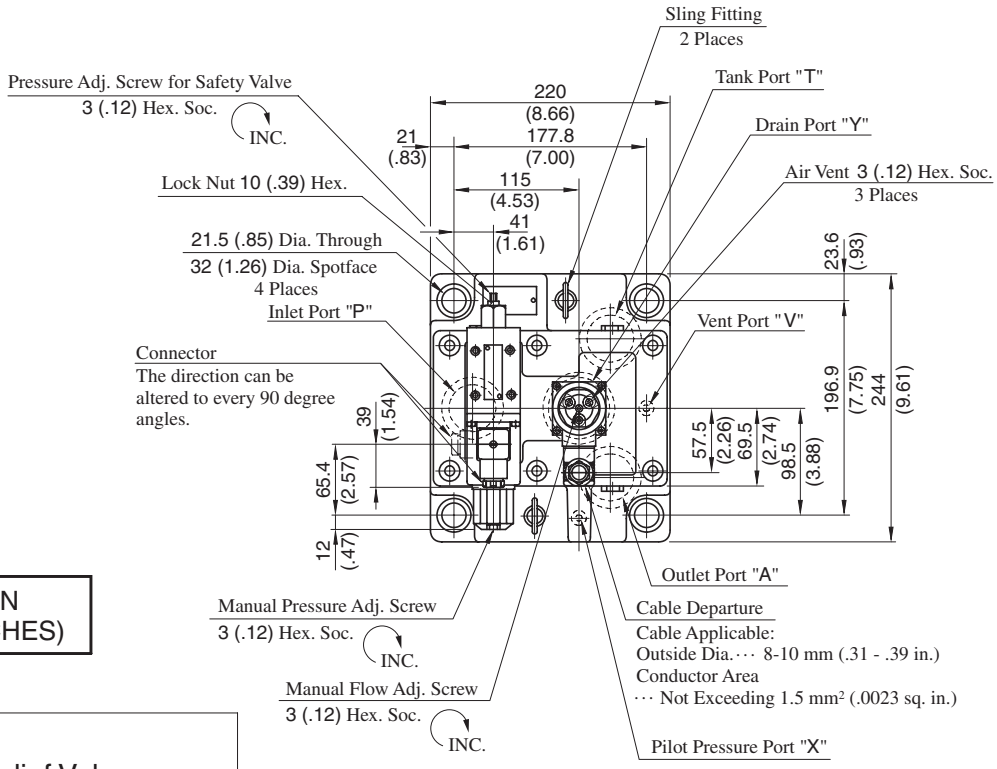


Approx. Mass ..... 22 kg (48.5 lbs.)

DIMENSIONS IN MILLIMETRES (INCHES)

Models with Proportional Pilot Relief Valve

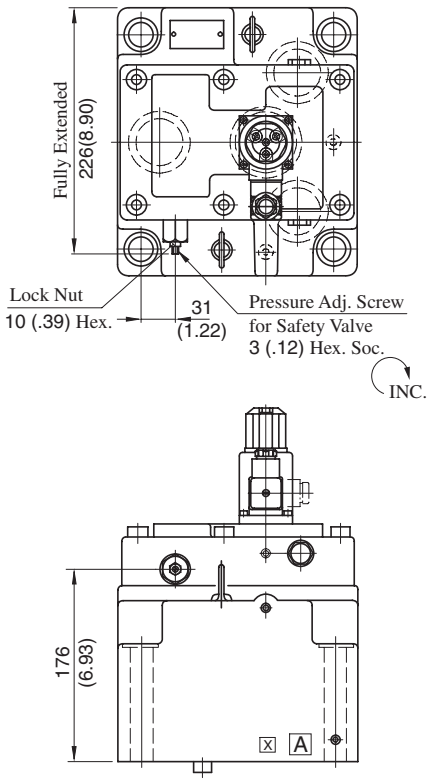
EFBG-10-500-$\frac{C}{H}$(-E)-51/5190

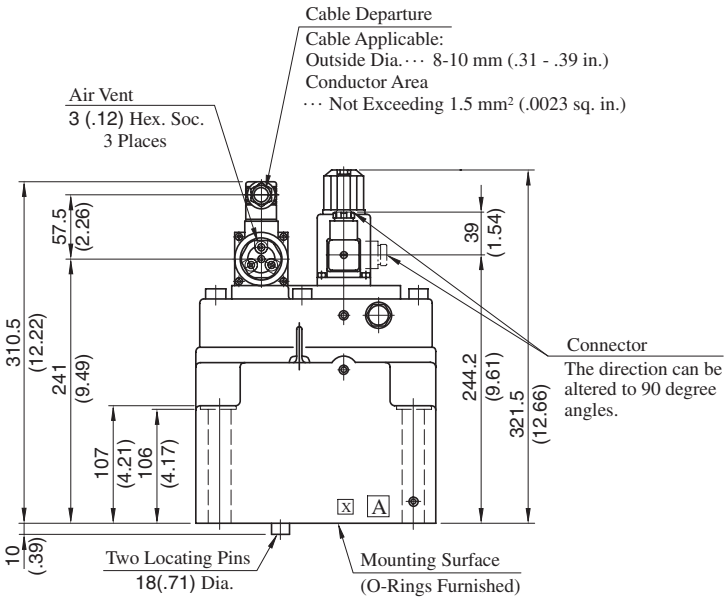


DIMENSIONS IN
MILLIMETRES (INCHES)

Models without Proportional Pilot Relief Valve

EFBG-10-500(-E)-51/5190





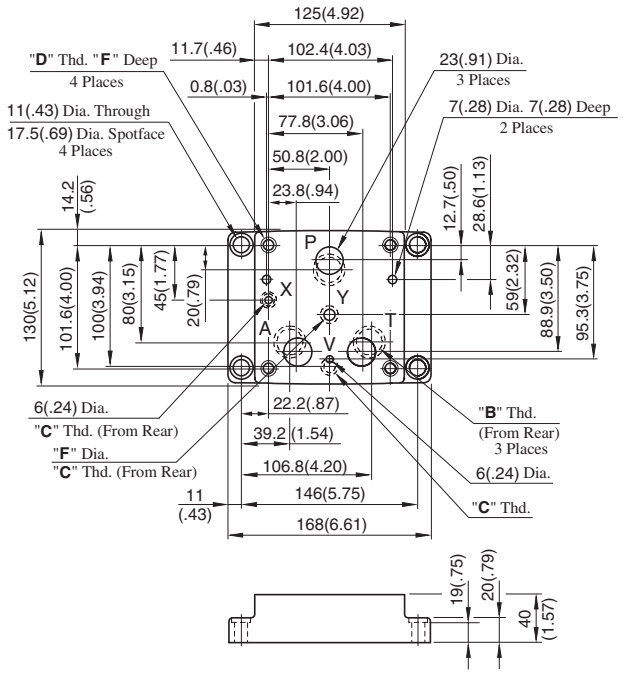
- For other dimensions, please refer to the models with Proportional Pilot Relief Valve.

Approx. Mass ..... 62 kg (137 lbs.)

Approx. Mass ..... 64 kg (141 lbs.)

Sub-plate

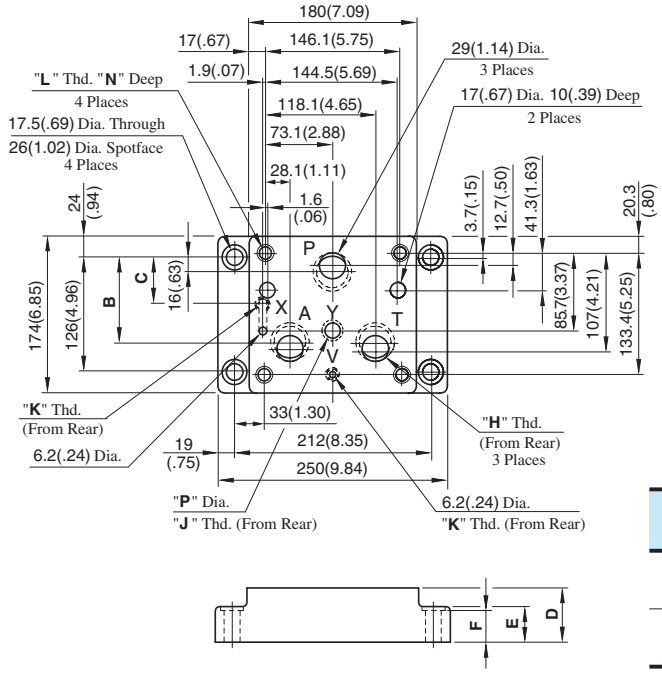
EFBGM-03Y/03Z-20/2080/2090



Sub-plate Model Numbers	Thread Size			mm (in.)	
	"B" Thd.	"C" Thd.	"D" Thd.	E	F
EFBGM-03Y-20	Rc 3/4	Rc 1/4	M10	18 (.71)	11 (.43)
EFBGM-03Z-20	Rc 1				
EFBGM-03Y-2080	3/4 BSP.F	1/4 BSP.F			11.7 (.46)
EFBGM-03Z-2080	1 BSP.F				
EFBGM-03Y-2090	3/4 NPT	1/4 NPT	3/8-16 UNC	21 (.83)	11 (.43)
EFBGM-03Z-2090	1 NPT				

DIMENSIONS IN MILLIMETRES (INCHES)

EFBGM-06X/06Y-20/2080/2090

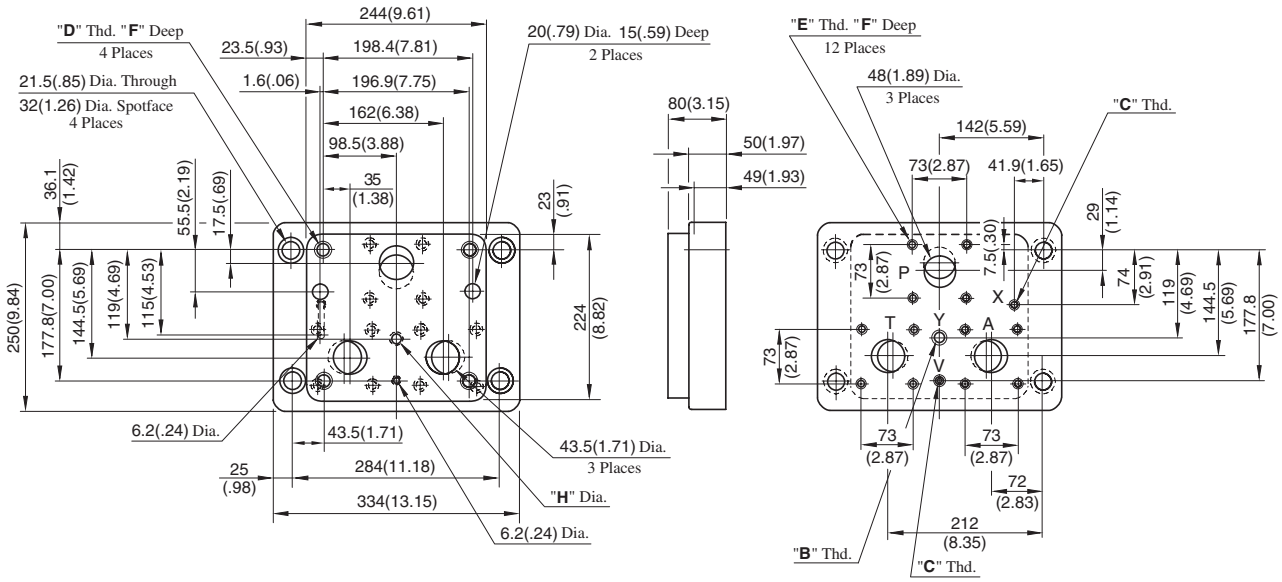


Sub-plate Model Numbers	Dimensions mm (in.)				
	B	C	D	E	F
EFBGM-06X	103.3 (4.07)	63.3 (2.49)	45 (1.77)	35 (1.38)	34 (1.34)
EFBGM-06Y	95 (3.74)	53.3 (2.10)	60 (2.36)	40 (1.57)	39 (1.54)

Sub-plate Model Numbers	Thread Size				mm (in.)	
	"H" Thd.	"J" Thd.	"K" Thd.	"L" Thd.	N	P
EFBGM-06X-20	Rc 1	Rc 3/8	Rc 1/4	M16	30 (1.18)	14 (.55)
EFBGM-06Y-20	Rc 1-1/4					
EFBGM-06X-2080	1 BSP.F	3/8 BSP.F	1/4 BSP.F	M16	30 (1.18)	15.2 (.60)
EFBGM-06Y-2080	1-1/4 BSP.F					
EFBGM-06X-2090	1 NPT	3/8 NPT	1/4 NPT	5/8-11 UNC	35 (1.38)	14 (.55)
EFBGM-06Y-2090	1-1/4 NPT					

EFBGM-10Y-20/2080/2090

DIMENSIONS IN MILLIMETRES (INCHES)



Sub-plate Model Numbers	Thread Size				mm (in.)	
	"**B**" Thd.	"**C**" Thd.	"**D**" Thd.	"**E**" Thd.	**F**	**H**
EFBGM-10Y-20	Rc 3/8	Rc 1/4	M20	M16	32(1.26)	14(.55)
EFBGM-10Y-2080	3/8 BSP.F	1/4 BSP.F				15.2(.60)
EFBGM-10Y-2090	3/8 NPT	1/4 NPT	3/4-10 UNC	5/8-11 UNC	34(1.34)	14(.55)

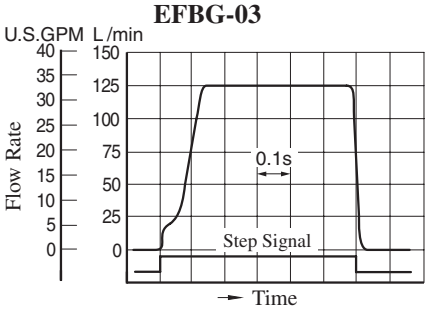
Step Response

These characteristics have been obtained by measuring on each valve. Therefore, they may vary according to a hydraulic circuit to be used.

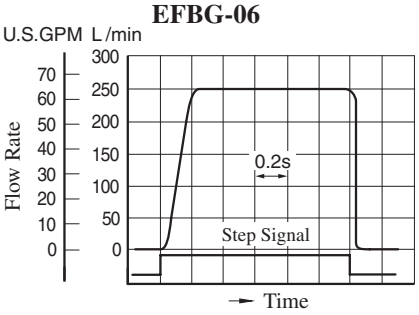
Viscosity: 30 mm²/s (141 SSU)

Flow Controls

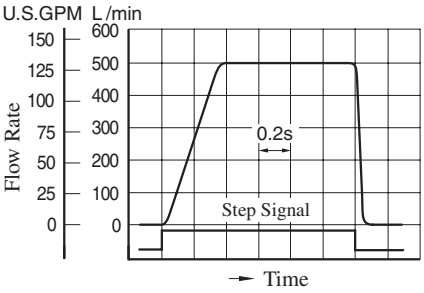
EFBG-03



EFBG-06

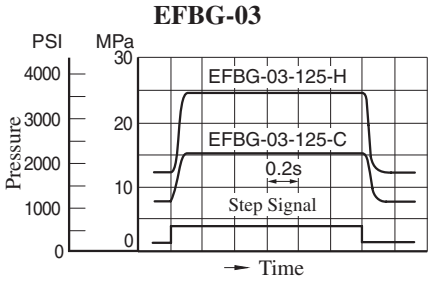


EFBG-10



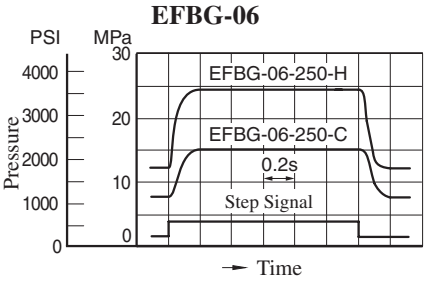
Pressure Controls

EFBG-03



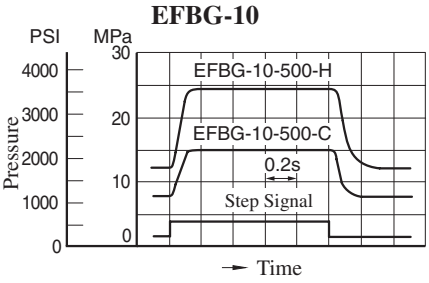
Flow Rate : 125 L/min (33 U.S.GPM)
Trapped Oil Volume : < 1 L (.264 U.S.Gallons)

EFBG-06



Flow Rate : 250 L/min (66 U.S.GPM)
Trapped Oil Volume : < 1 L (.264 U.S.Gallons)

EFBG-10

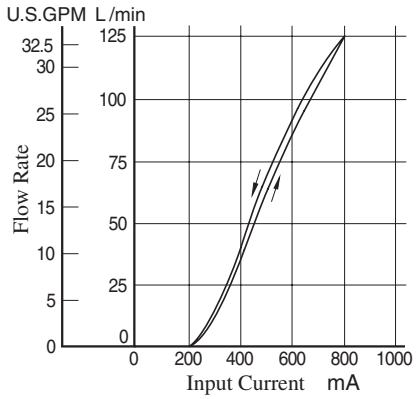


Flow Rate : 500 L/min (132 U.S.GPM)
Trapped Oil Volume : < 1 L (.264 U.S.Gallons)

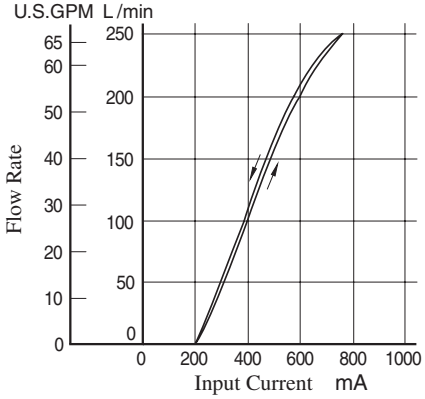
Input Current vs. Flow

Viscosity: 30 mm²/s (141 SSU)

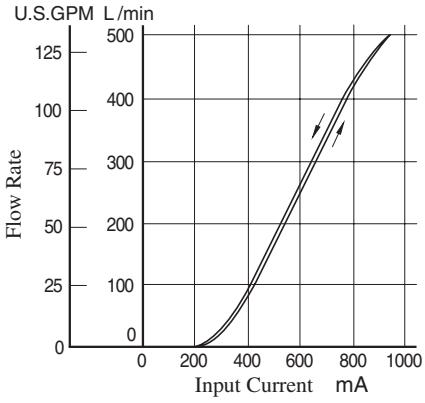
EFBG-03



EFBG-06



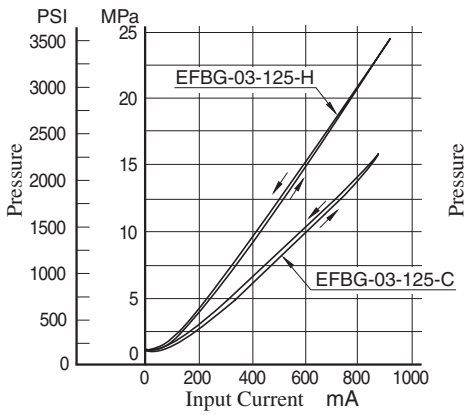
EFBG-10



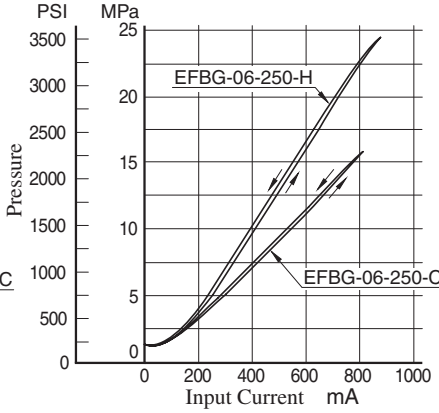
Input Current vs. Pressure

Viscosity: 30 mm²/s (141 SSU)

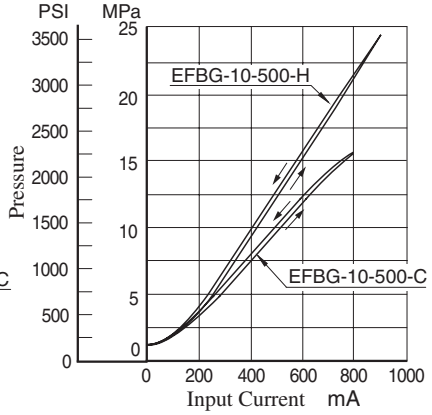
EFBG-03



EFBG-06

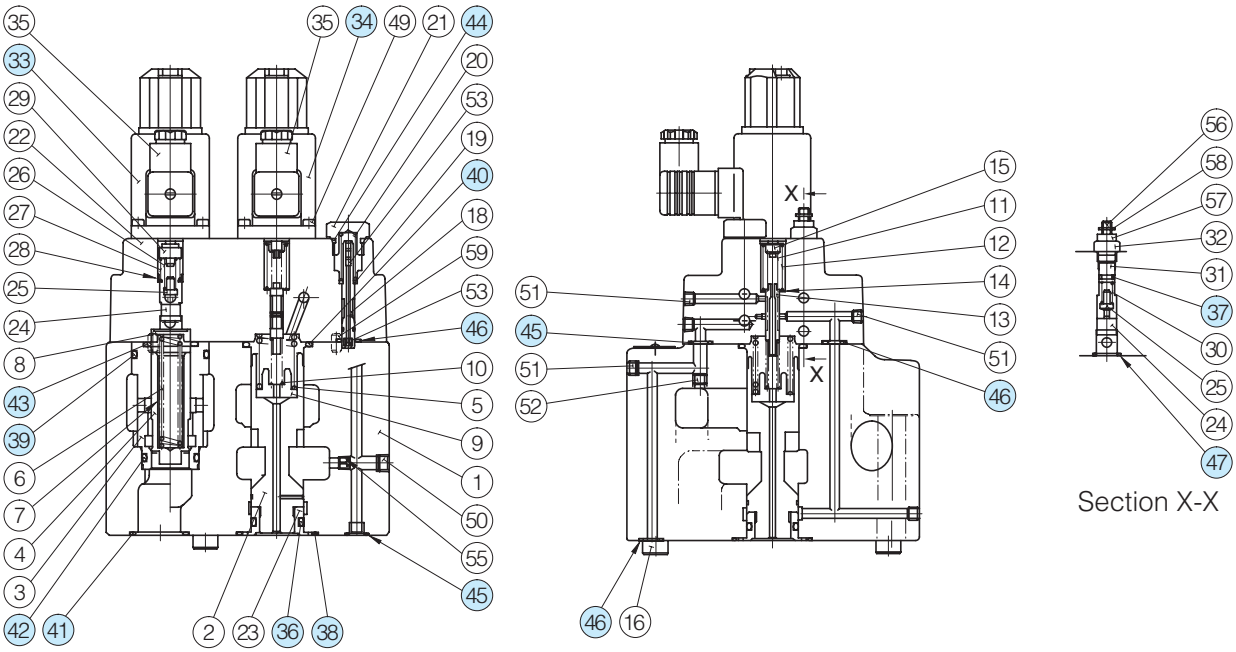


EFBG-10



List of Seals and Solenoid Ass'y

EFBG-03-125-∗-∗-61/6190
EFBG-06-250-∗-∗-61/6190



List of Seals

Item	Name of Parts	EFBG-03		EFBG-06	
		Part Numbers	Qty.	Part Numbers	Qty.
36	O-Ring	SO-NA-A016	1	SO-NA-P26	1
37	O-Ring	SO-NA-P6	1	SO-NA-P6	1
38	O-Ring	SO-NB-P28	1	SO-NB-P44	1
39	O-Ring	SO-NB-P32	1	SO-NB-P42	1
40	O-Ring	SO-NB-P28	1	SO-NB-P36	1
41	O-Ring	SO-NB-P28	3	SO-NB-P32	3
42	O-Ring	SO-NB-G30	1	SO-NB-P30	1
43	O-Ring	SO-NB-P28	1	SO-NB-P28	1
44	O-Ring	SO-NB-P15	1	SO-NB-P15	1
45	O-Ring	SO-NB-P11	2	SO-NB-P11	2
46	O-Ring	SO-NB-P9	5	SO-NB-P11	4
47	O-Ring	SO-NB-A016	1	SO-NB-A016	1

Note: When ordering seals, please specify the seal kit number from the table right.
In addition to the above o-rings, seals for solenoid ass'y are included in the seal kit.
For the details of seals for solenoid ass'y ㉝ and ㉞ see page 674.

List of Seal Kits

Valve Model Numbers	Seal Kit Numbers
EFBG-03-125-61∗	KS-EFBG-03-61
EFBG-03-125-C/H-61∗	KS-EFBG-03-C-61
EFBG-06-250-61∗	KS-EFBG-06-61
EFBG-06-250-C/H-61∗	KS-EFBG-06-C-61

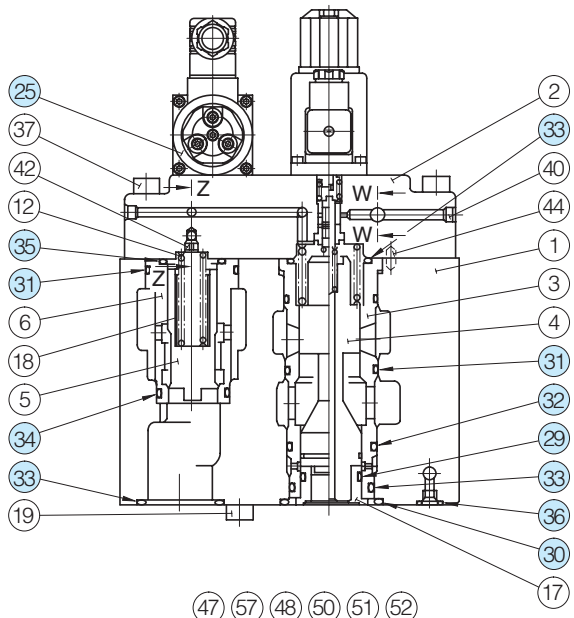
Solenoid Ass'y

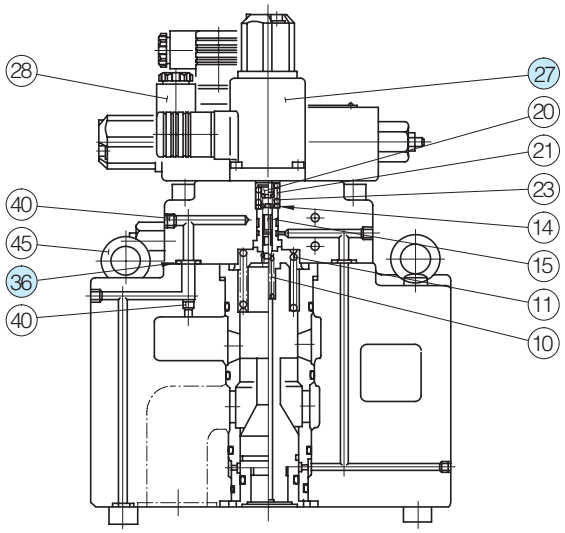
Valve Model Numbers	㉝ Solenoid Ass'y Model Numbers	㉞ Solenoid Ass'y Model Numbers
EFBG-03-125-C/H(-E)-61/6190	E318-Y06M1-04-61	E318-Y06M1-28-61
EFBG-06-250-C/H(-E)-61/6190		
EFBG-03-125(-E)-61/6190 EFBG-06-250(-E)-61/6190	——	

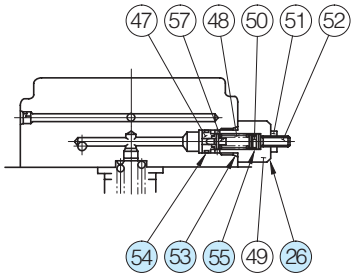
Note: The connector assembly GDM-211-B-11 (Item 35) is not included in the solenoid assembly.

List of Seals, Pilot Valves, Solenoid Ass'y and Safety Valve

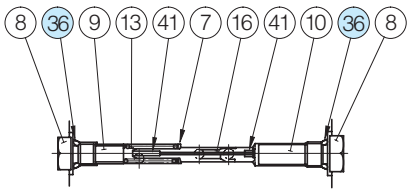
EFBG-10-500-∗-∗-51/5190







Section W-W
(Only for Models without Pilot Relief Valve)



Section Z-Z

List of Seals

Item	Name of Parts	Part Numbers	Qty.	
			Models with Pilot Relief Valve	Models without Pilot Relief Valve
29	O-Ring	SO-NA-P34	1	1
30	O-Ring	SO-NB-G60	1	1
31	O-Ring	SO-NB-G55	3	3
32	O-Ring	SO-NB-P50	1	1
33	O-Ring	SO-NB-P48	5	5
34	O-Ring	SO-NB-P42	1	1
35	O-Ring	SO-NB-P36	1	1
36	O-Ring	SO-NB-P11	8	8
53	O-Ring	SO-NB-P14	—	1
54	O-Ring	SO-NB-A013	—	1
55	O-Ring	SO-NA-P6	—	1

List of Seal Kits

Valve Model Numbers	Seal Kit Numbers
EFBG-10-500-51∗	KS-EFBG-10-51
EFBG-10-500-C/H-51∗	KS-EFBG-10-C-51

Note: When ordering seals, please specify the seal kit number from the table right. In addition to the above o-rings, seals for pilot valve and solenoid ass'y are included in the seal kit.
For the detail of the pilot valve and solenoid ass'y seals, see page 674.

Pilot Valve, Solenoid Ass'y and Safety Valve

Valve Model Numbers	㉕ Pilot Valve Model Numbers	㉗ Solenoid Ass'y Model No.	㉖ Safety Valve Model No.
EFBG-10-500-C(-E)-51/5190	EDG-01V-C-1-PNT12-5103	E318-Y06M1-28-61	——
EFBG-10-500-H(-E)-51/5190	EDG-01V-H-1-PNT12-5103		——
EFBG-10-500(-E)-51/5190	——		SB1094-2002

Note: The connector assembly GDM-211-B-11 (Item 28) is not included in the solenoid assembly.

Interchangeability between Current and New Design

Model changes have been made from 50, 51 to 61 design in the EFBG-03/06 because of changes in the pilot valve building-in method and model changes have been made from 50 to 51 design in the EFBG-10 because of improvement in Solenoid Ass'y.

Specification and Characteristics

No changes in specifications and characteristics between current and new design

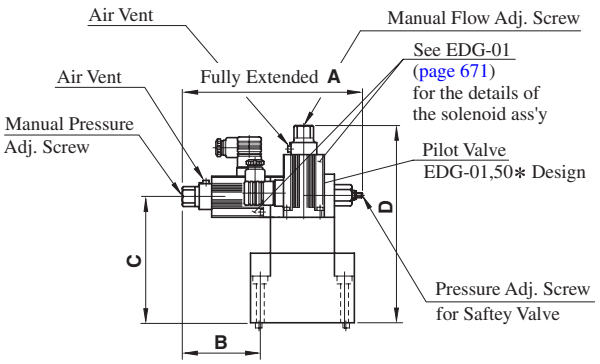
Interchangeability in Installation

- EFBG-03/06

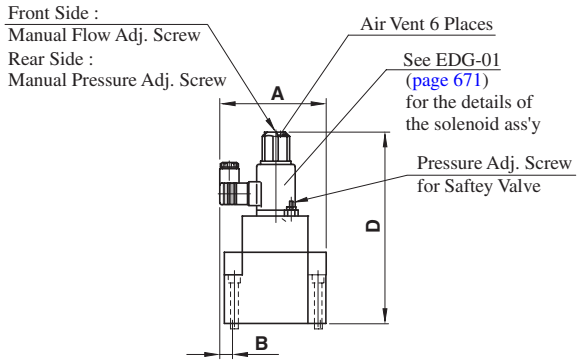
50∗ • 51∗ Design →61∗ Design

The mounting surface are interchangeable. However, the method of building in the pilot valve has been changed, bringing about changes in the appearance shapes and dimensions as shown below.

Current : Design 50 • 51



New : Design 61



Model Numbers	A	B	C	D
(Current) EFBG-03-125-∗-∗-50/5090 51/5190	217 (8.54)	93.2 (3.67)	155 (6.10)	236.5 (9.31)
(New) EFBG-03-125-∗-∗-61/6190	132 (5.20)	18.7 (.74)	—	248.5 (9.78)
(Current) EFBG-06-250-∗-∗-50/5090 51/5190	217 (8.54)	53.3 (2.10)	196 (7.72)	277.5 (10.93)
(New) EFBG-06-250-∗-∗-61/6190	180 (7.09)	—	—	289.5 (11.40)

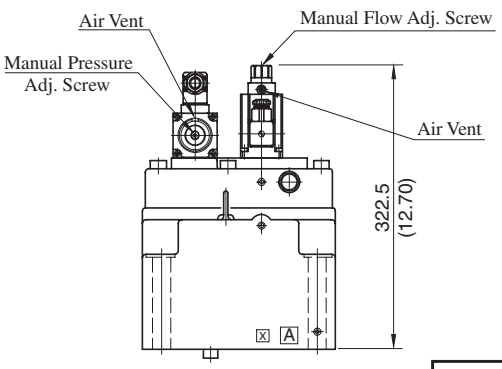
60∗ Design →61∗ Design

The mounting surface are interchangeable. There are no changes in the appearance shapes and dimensions.

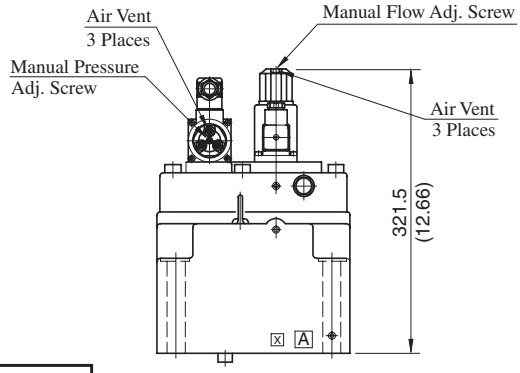
- EFBG-10

Mounting compatibility is provided.
Note that because of improvements made on the solenoids, the overall shapes have been changed as shown below.

Current : Design 50



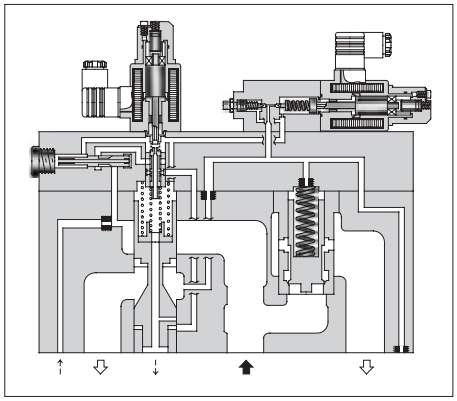
New : Design 51



DIMENSIONS IN MILLIMETRES (INCHES)

High Flow Series Proportional Electro-Hydraulic Flow Control and Relief Valves

This flow control and relief valve is an energy-saving valve that supplies the minimum pressure and flow necessary for actuator drive.
For the High Flow Series, double maximum flow rate [03 size: 125→250 L/min (33.03→66.05 U.S.GPM), 06 size: 250→500 L/min (66.05→132.1 U.S.GPM), 10 size: 500→1000 L/min (132.1→264.2 U.S.GPM)] enables a smaller valve size than conventional products; compact-sized devices can be provided.



Specifications

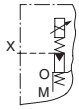
Description \ Model No.		EFBG-03 -250-∗-∗-51∗	EFBG-06 -500-∗-∗-51∗	EFBG-10 -1000-∗-∗-51∗
Max. Operating Pressure MPa (PSI)		24.5 (3550)	24.5 (3550)	24.5 (3550)
Max. Flow L/min (U.S.GPM)		250 (66)	500 (132)	1000 (264)
Metred Flow Adjustment Range L/min (U.S.GPM)		2.5-250 (.66-66)	5-500 (1.32-132)	10-1000 (2.64-264)
Min. Pilot Pressure MPa (PSI)		1.5 (220)	1.5 (220)	1.5 (220)
Pilot Flow L/min (U.S.GPM)	at Normal	1 (.26)	1 (.26)	4.5 (1.19)
	at Transition	4 (1.06)	6 (1.59)	10.0 (2.64)
Flow Controls	Rated Currnt	830 mA	780 mA	830 mA
	Coil Resistance	10 Ω	10 Ω	10 Ω
	Differential Pressure MPa (PSI)	0.8 (115)	0.9 (130)	1.2 (174)
	Hysteresis	3% or less	3% or less	3% or less
	Repeatability	1% or less	1% or less	1% or less
Pressure Controls ★1	Pres. Adj. Range MPa (PSI) ★2	C: 1.6-15.7 (230-2275) H: 1.8-24.5 (260-3550)	C: 1.5-15.7 (220-2275) H: 1.5-24.5 (220-3550)	C: 1.1-15.7 (160-2275) H: 1.1-24.5 (160-3550)
	Rated Current	C: 850 mA H: 870 mA	C: 800 mA H: 900 mA	C: 900 mA H: 950 mA
	Coil Resistance	10 Ω	10 Ω	10 Ω
	Hysteresis	3% or less	3% or less	3% or less
	Repeatability	1% or less	1% or less	1% or less
Approx. Mass kg (lbs.)		Refer to page 735 to 737		

★1. The specifications for pressure controls are applied to models with proportional pilot relief valve. (Ex. EFBG-03-250-C-∗-51)
★2. The maximum pressure adjustment range of the valves without proportional pilot relief valves is 24.5 MPa (3550 PSI).

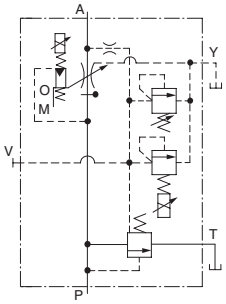
Graphic Symbols

With Proportional Pilot Relief Valve

External Pilot

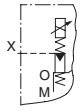


Internal Pilot

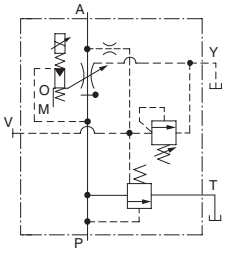


Without Proportional Pilot Relief Valve

External Pilot



Internal Pilot



Model Number Designation

F-	EFB	G	-03	-250	-C	-E	-51	✻
Special Seals	Series Number	Type of Mounting	Valve Size	Max. Metred Flow L/min (U.S.GPM)	Proportional Pilot Relief Valve Pressure Adj. Range	Pilot Connection	Design Number	Design Standards
F: Special Seals for Phosphate Ester Type Fluid (Omit if not required)	**EFB**: Proportional Electro-Hydraulic Flow Control and Relief Valve	**G**: Sub-plate Mounting	**03**	**250**: 250 (66)	**C, H**: See Specifications	**None**: Internal Pilot	**51**	Refer to ★
			06	**500**: 500 (132)	**None**: Without Proportional Pilot Relief Valve	**E**: External Pilot	**51**	
			10	**1000**: 1000 (264)			**51**	

★ Design Standards: None ..... Japanese Standard "JIS" and European Design Standard
90 ..... N. American Design Standard

Attachment

Mounting Bolts

Valve Model Numbers	Socket Head Cap Screw		Qty.
	Japanese Std. "JIS" and European Design Std.	N. American Design Std.	
EFBG-03	M12 × 120 Lg.	1/2-13 UNC × 4-3/4 Lg.	4
EFBG-06	M16 × 120 Lg.	5/8-11 UNC × 4-3/4 Lg.	4
EFBG-10	M20 × 150 Lg.	3/4-10 UNC × 6 Lg.	4

Applicable Power Amplifiers

For stable performance, it is recommended that Yuken's applicable power amplifiers be used (for details see page 767, 771).

Model Numbers	Power Amplifier Model Numbers	
	For Flow Control	For Pres. Control
EFBG-03-250(-E)-51/5190 EFBG-06-500(-E)-51/5190 EFBG-10-1000(-E)-51/5190	AME-D-10-✻-20 AMN-D-10 (For DC power supply)	—
EFBG-03-250-C/H(-E)-51/5190 EFBG-06-500-C/H(-E)-51/5190 EFBG-10-1000-C/H(-E)-51/5190	AME-D2-1010-11	

Instructions

Drain Back Pressure

Check that the drain back pressure dose not exceed 0.2 MPa (29 PSI).

When Relief Valve Passing Flow Rate is Low in Pressure Control State

To avoid preselected pressure instability, use a passing flow rate of 15 L/min (4.0 U.S.GPM) or higher.
Further, check that the tank-line back pressure dose not exceed 0.5 MPa (70 PSI).

Safety Valve Pressure Setting

The pressure of the safety valve is preset at the value equal to the upper limit of the pressure adjustment range plus 2 MPa (290 PSI). Please adjust the pressure of the valve so preset to meet the pressure to be used actually.
To lower the pressure setting, turn the safety valve pressure adjustment screw anti-clockwise. After adjustment, be sure to tighten the lock nut.

Interchangeability in installation with conventional valves (10Ω-10Ω Series)

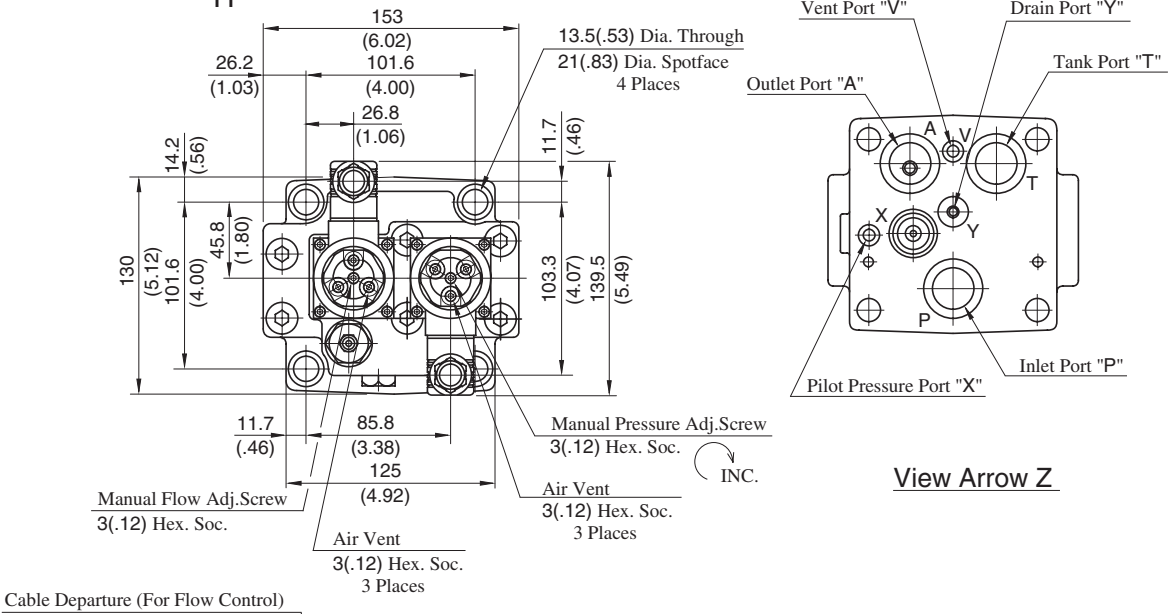
- EFBG-03

There is no interchangeability in installation.

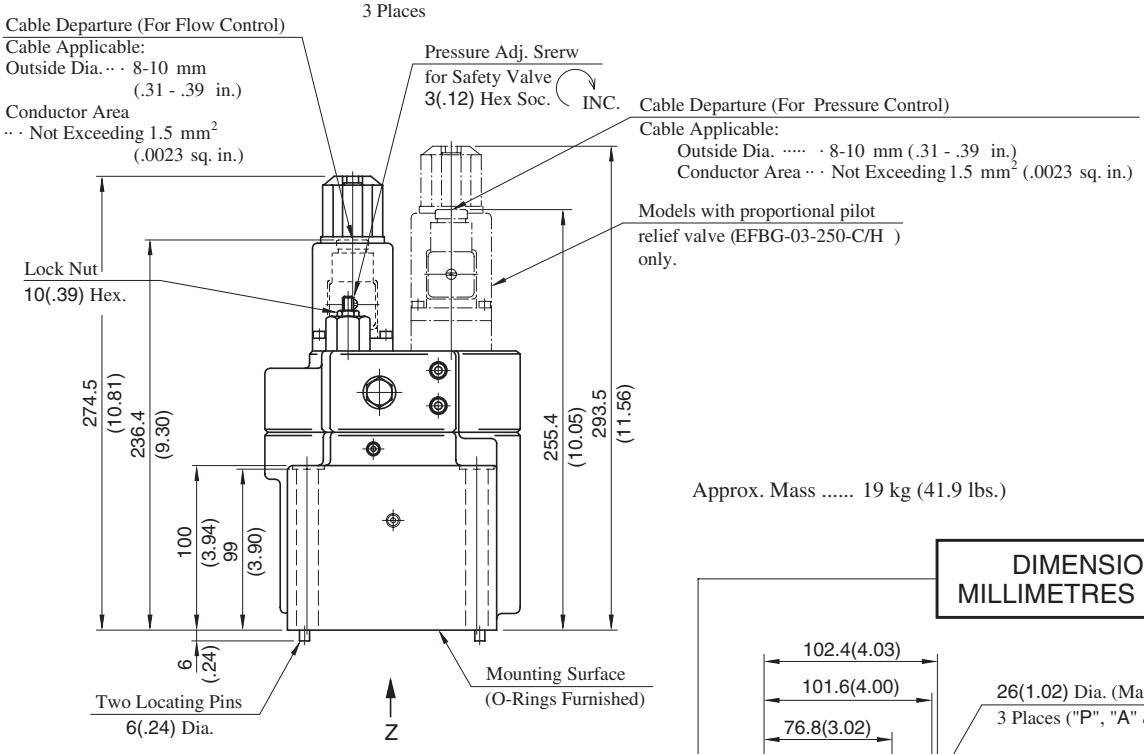
- EFBG-06/10

A product in the high-flow series can be mounted on the conventional mounting surface but no conventional product can be mounted on the mounting surface of the high-flow series.

EFBG-03-250-$\frac{C}{H}$(-E)-51/5190, EFBG-03-250 (-E)-51/5190

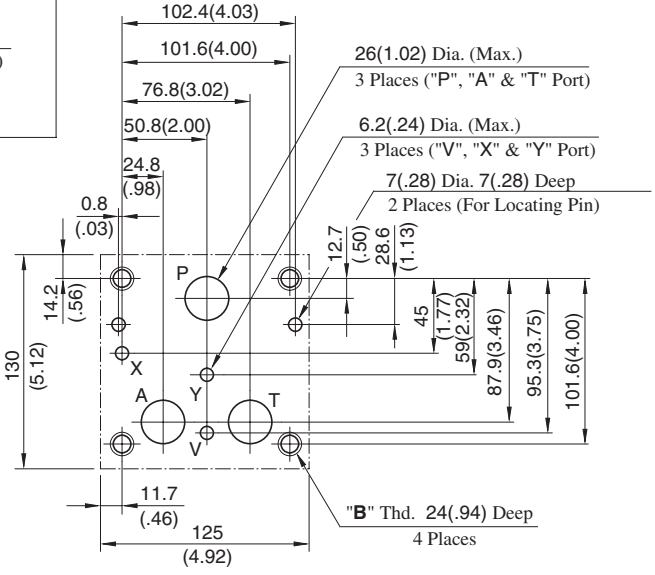


View Arrow Z



Approx. Mass ..... 19 kg (41.9 lbs.)

DIMENSIONS IN MILLIMETRES (INCHES)

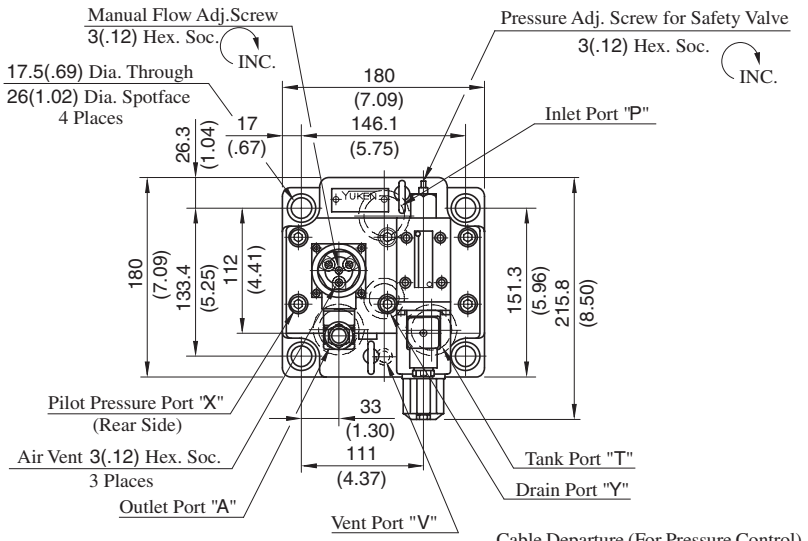


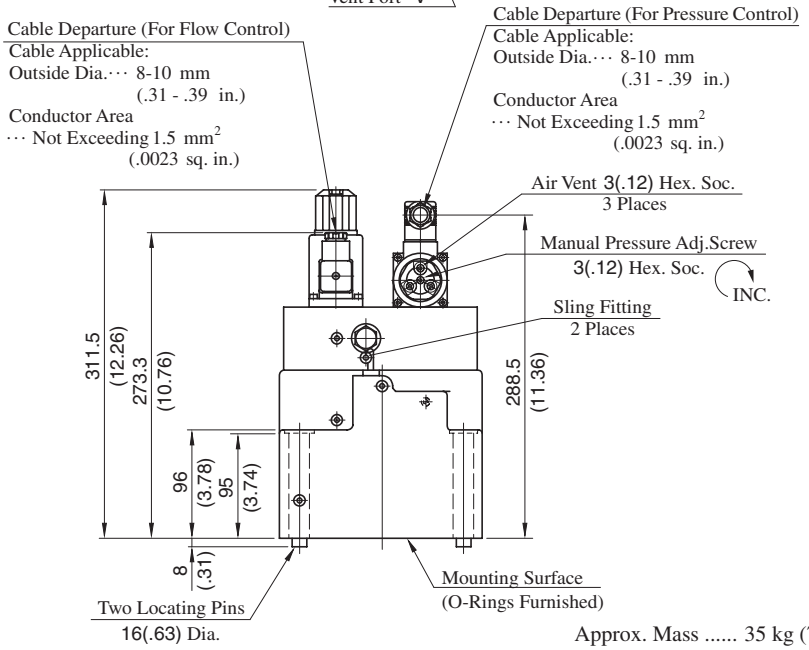
Dimensions of valve mounting surface

Prepare a mounting surface as shown to the right.
Also finish it finely.

Model Numbers	"B" Thd.
EFBG-03-250-∗-∗-51	M12
EFBG-03-250-∗-∗-5190	1/2-13 UNC

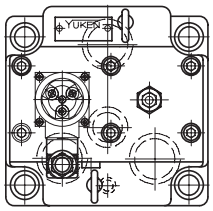
Models with Proportional Pilot Relief Valve
EFBG-06-500-$^{C}_{H}$(-E)-51/5190

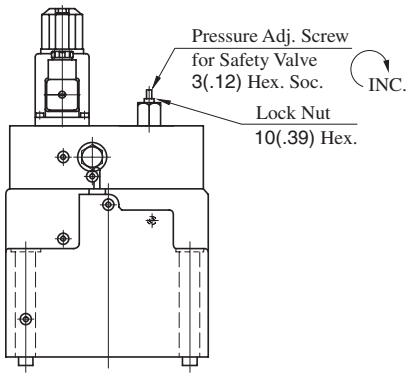




Approx. Mass ..... 35 kg (77.2 lbs.)

Models without Proportional Pilot Relief Valve
EFBG-06-500(-E)-51/5190





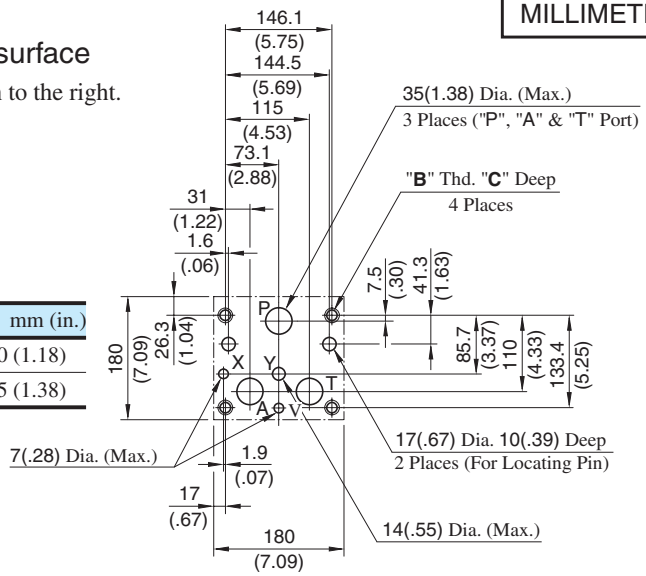
- For other dimensions, please refer to the models with Proportional Pilot Relief Valve.

Approx. Mass ..... 33 kg (72.8 lbs.)

DIMENSIONS IN MILLIMETRES (INCHES)

Dimensions of valve mounting surface

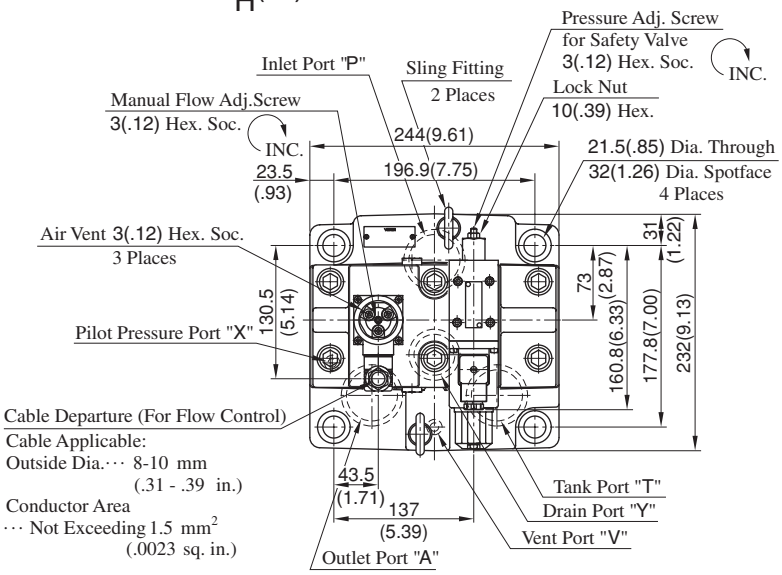
Prepare a mounting surface as shown to the right.
Also finish it finely.

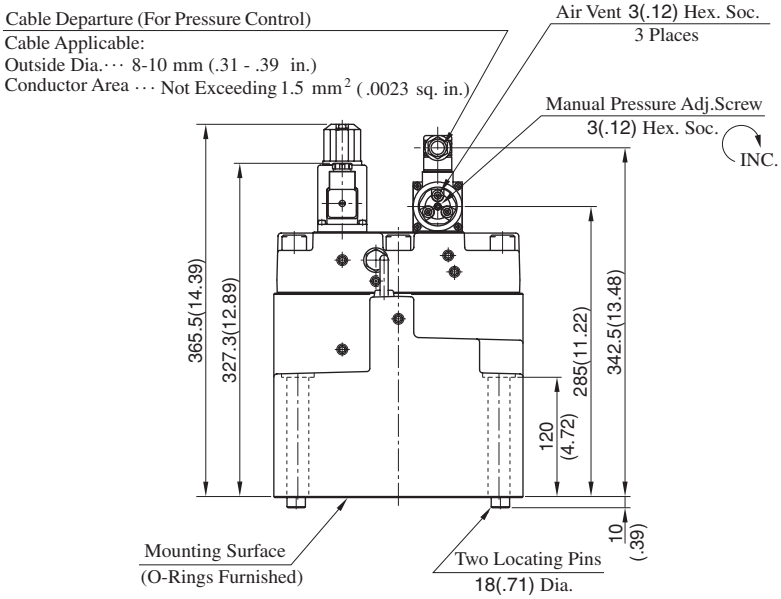


Model Numbers	"B" Thd.	C mm (in.)
EFBG-06-500-∗-∗-51	M16	30 (1.18)
EFBG-06-500-∗-∗-5190	5/8-11 UNC	35 (1.38)

Models with Proportional Pilot Relief Valve

EFBG-10-1000-$^{C}_{H}$(-E)-51/5190

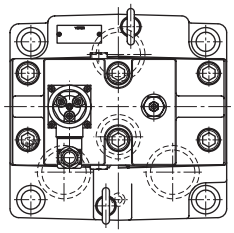


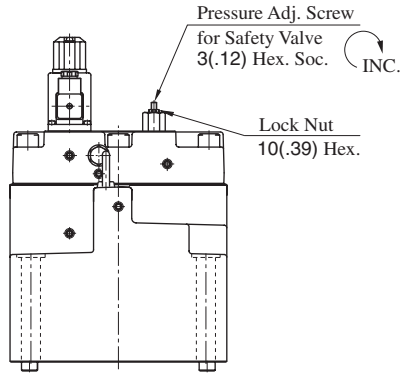


Approx. Mass ..... 76 kg (167.6 lbs.)

Models without Proportional Pilot Relief Valve

EFBG-10-1000(-E)-51/5190





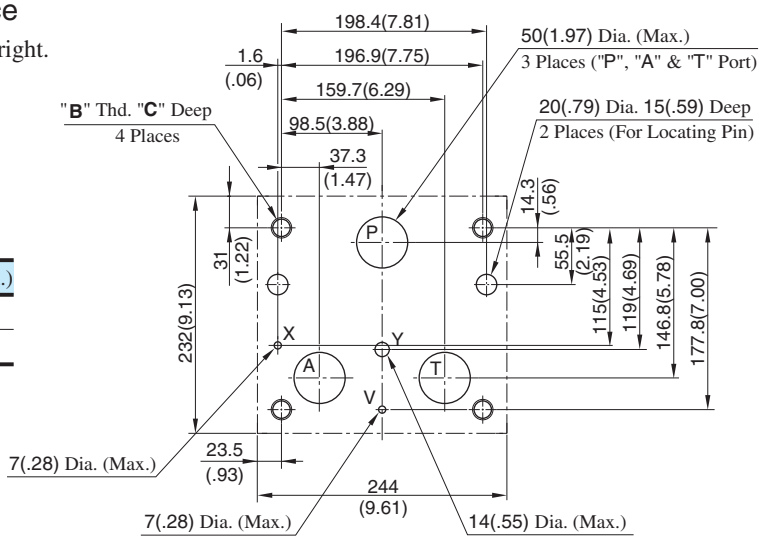
- For other dimensions, please refer to the models with Proportional Pilot Relief Valve.

Approx. Mass ..... 74 kg (163.1 lbs.)

DIMENSIONS IN MILLIMETRES (INCHES)

Dimensions of valve mounting surface

Prepare a mounting surface as shown to the right. Also finish it finely.



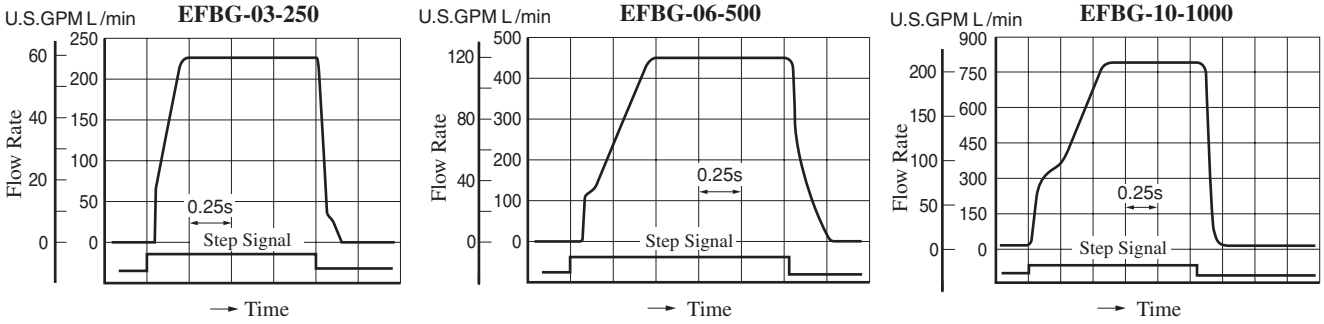
Model Numbers	"B" Thd.	C mm (in.)
EFBG-10-1000-∗-∗-51	M20	32 (1.26)
EFBG-10-1000-∗-∗-5190	3/4-10 UNC	35 (1.38)

Step Response

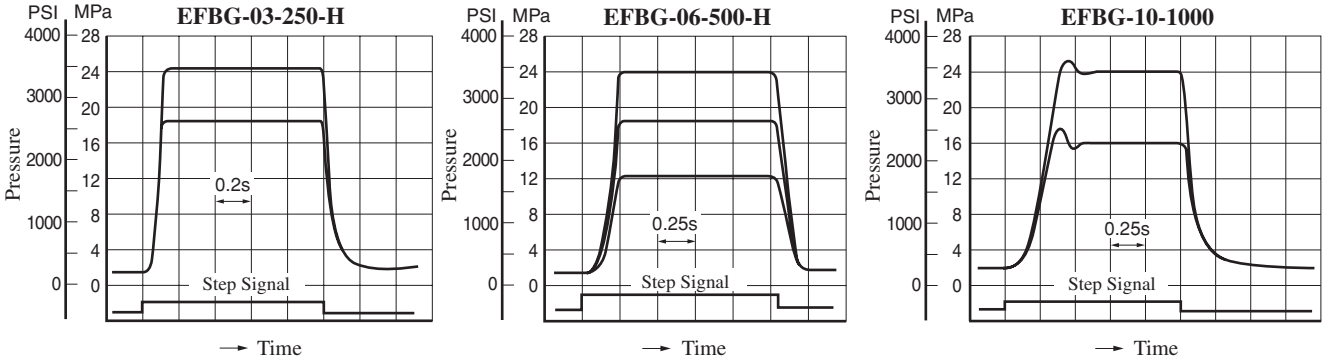
Viscosity: 30mm²/s (141 SSU)

These characteristics have been obtained by measuring on each valve. Therefore , they may vary according to a hydraulic circuit to be used.

Flow Controls

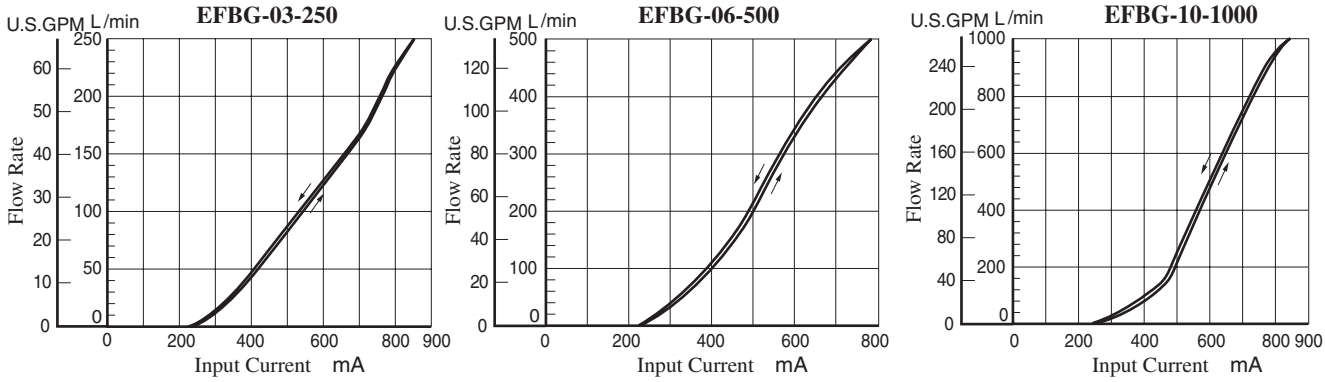


Pressure Controls



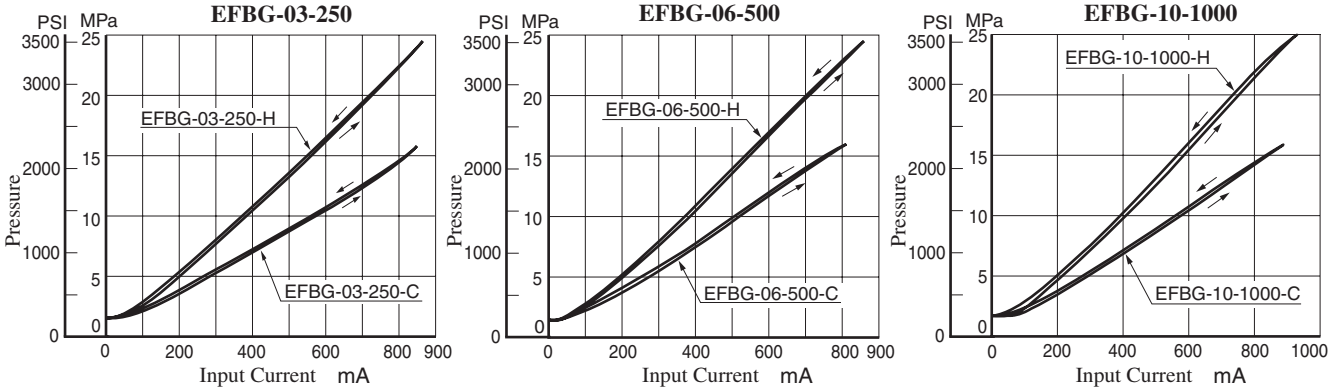
Input Current vs. Flow

Viscosity: 30mm²/s (141 SSU)



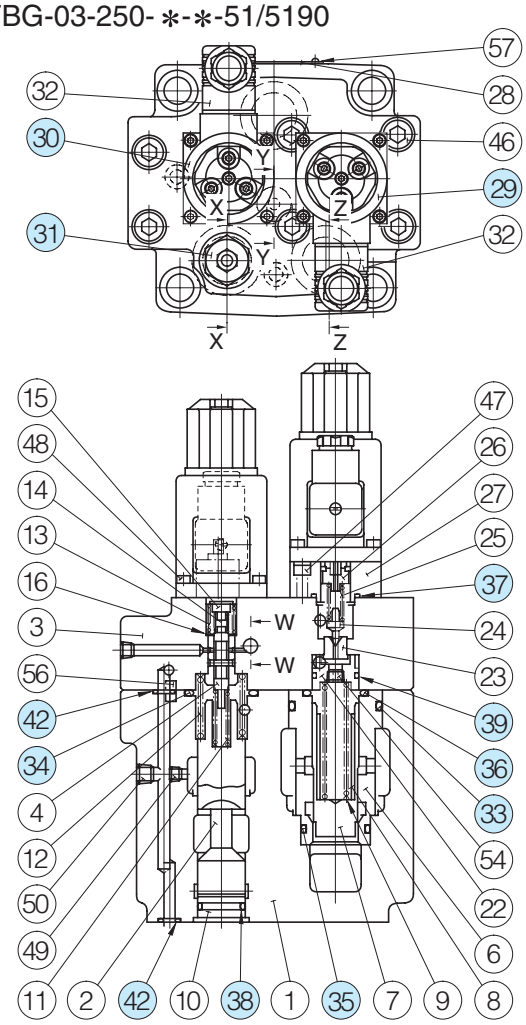
Input Current vs. Pressure

Viscosity: 30mm²/s (141 SSU)

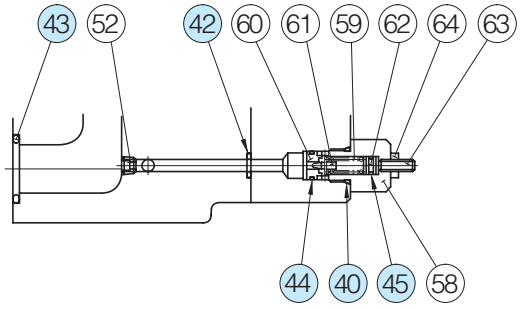


List of Seals, Solenoid Ass'y and Safety Valve

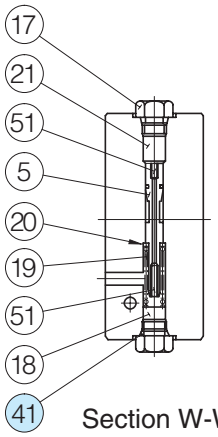
EFBG-03-250-∗-∗-51/5190



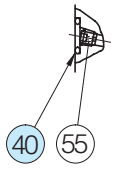
Detail of Safety Valve
(Item 31)



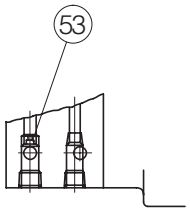
Section X-X



Section W-W



Section Y-Y



Section Z-Z

List of Seals

Item	Name of Parts	Part Numbers	Qty.
33	O-Ring	SO-NB-P42	1
34	O-Ring	SO-NB-P32	1
35	O-Ring	SO-NB-P30	1
36	O-Ring	SO-NB-P28	1
37	O-Ring	SO-NB-P22	1★
38	O-Ring	SO-NB-P21	1
39	O-Ring	SO-NB-P20	1★
40	O-Ring	SO-NB-P14	2
41	O-Ring	SO-NB-P11	2
42	O-Ring	SO-NB-P9	6
43	O-Ring	SO-NB-G30	3
44	O-Ring	SO-NB-A013	1
45	O-Ring	SO-NA-P6	1

★ O-rings, item 37 and 39, are used only with the proportional pilot relief valve (EFBG-03-250-C/H).

Note: When ordering seals, please specify the seal lit number from the table right.
In addition to the above o-rings, seals for solenoid ass'y are included in the seal kit.
For the detail of seals for solenoid ass'y seals, see page 674.

List of Seal Kits

Valve Model Numbers	Seal Kit Numbers
EFBG-03-250-51∗	KS-EFBG-03-250-51
EFBG-03-250-C/H-51∗	KS-EFBG-03-250-C-51

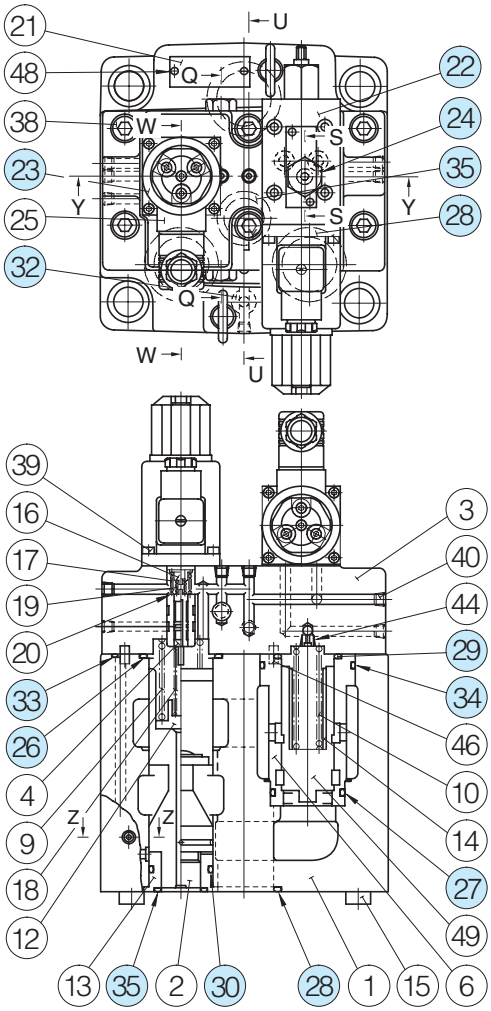
Solenoid Ass'y and Safety Valve

Valve Model Numbers	㉙ Solenoid Ass'y Model No.	㉚ Solenoid Ass'y Model No.	㉛ Safety Valve Model No.
EFBG-03-250-C/H(-E)-51/5190	E318-Y06M1-04-61	E318-Y06M1-28-61	SB1094-2002
EFBG-03-250(-E)-51/5190	——		

Note: The connector assembly GDM-211-B-11 (Item 32) is not included in the solenoid assembly.

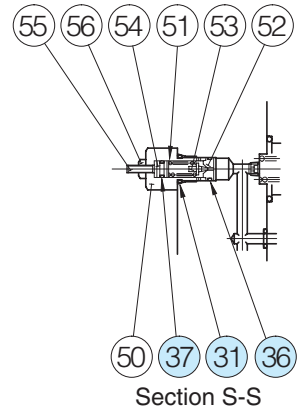
List of Seals, Pilot Valves, Solenoid Ass'y and Safety Valve

EFBG-06-500-∗-∗-51/5190

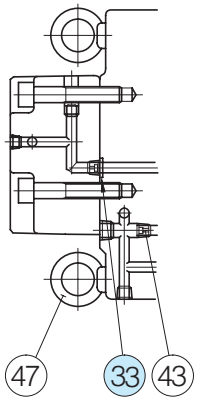


Detail of SafetyValve (Item 24)

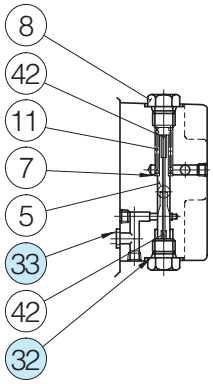
Models Without Pilot Relief Valve : EFBG-06-500(-E)



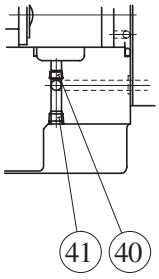
Section S-S



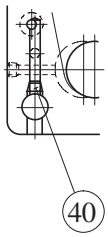
Section U-U



Section Q-Q



Section W-W



Section Z-Z

List of Seals

Item	Name of Parts	Part Numbers	Qty.
26	O-Ring	SO-NB-P46	1
27	O-Ring	SO-NB-P42	1
28	O-Ring	SO-NB-P40	3
29	O-Ring	SO-NB-P36	1
30	O-Ring	SO-NB-P34	1
31	O-Ring	SO-NB-P14	1★
32	O-Ring	SO-NB-P11	4
33	O-Ring	SO-NB-P9	4
34	O-Ring	SO-NB-G55	1
35	O-Ring	SO-NB-G30	2
36	O-Ring	SO-NB-AO13	1★
37	O-Ring	SO-NA-P6	1★

★ O-rings, item 31, 36 and 37, are used only without the proportional pilot relief valve [(EFBG-06-500(-E)].

Note: When ordering seals, please specify the seal lit number from the table right.
In addition to the above o-rings, seals for pilot valve and solenoid ass'y are included in the seal kit.
For the detail of the pilot valve and solenoid ass'y seals, see page 674.

List of Seal Kits

Valve Model Numbers	Seal Kit Numbers
EFBG-06-500-51∗	KS-EFBG-06-500-51
EFBG-06-500-C/H-51∗	KS-EFBG-06-500-C-51

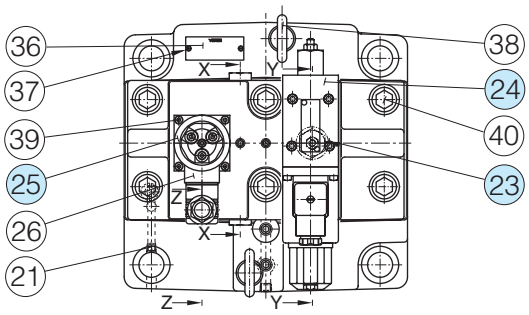
Pilot Valve, Solenoid Ass'y and Sefety Valve

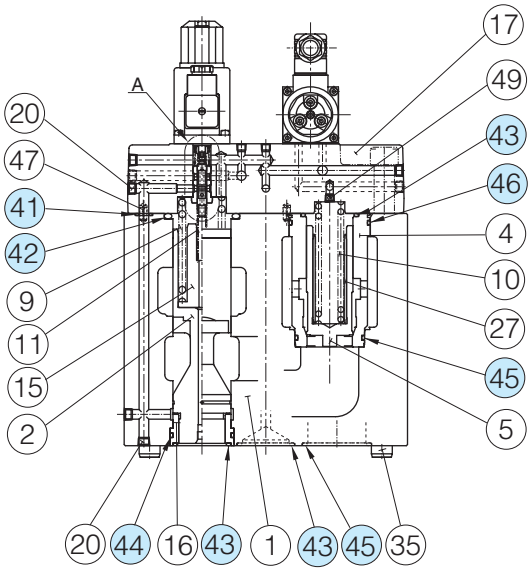
Valve Model Numbers	㉒ Pilot Valve Model Numbers	㉓ Solenoid Ass'y Model No.	㉔ Safety Valve Model No.
EFBG-06-500-C(-E)-51/5190	EDG-01V-C-1-PNT11-5103	E318-Y06M1-28-61	——
EFBG-06-500-H(-E)-51/5190	EDG-01V-H-1-PNT11-5103		——
EFBG-06-500(-E)-51/5190	——		SB1094-2002

Note: The connector assembly GDM-211-B-11 (Item 25) is not included in the solenoid assembly.

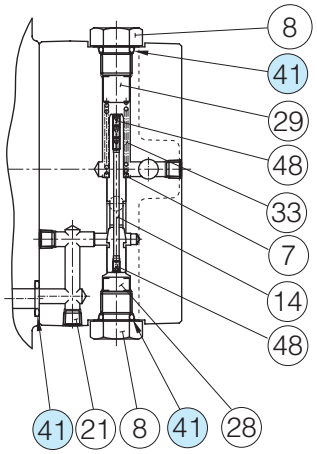
List of Seals, Pilot Valves, Solenoid Ass'y and Safety Valve

EFBG-10-1000-∗-∗-51/5190

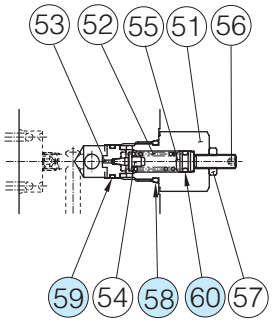




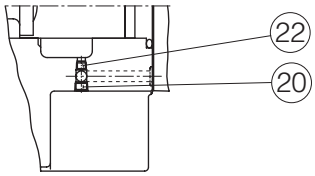
Detail of Safety Valve (Item 23)
Models Without Pilot Relief Valve : EFBG-10-1000(-E)



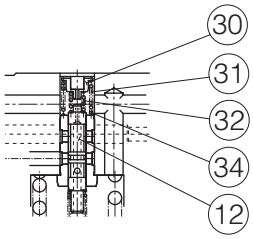
Section X-X



Section Y-Y



Section Z-Z



Detail A

List of Seals

Item	Name of Parts	Part Numbers	Qty.
41	O-Ring	JIS-B 2401-1B-P11	8
42	O-Ring	JIS-B 2401-1B-P55	1
43	O-Ring	JIS-B 2401-1B-G45	3
44	O-Ring	JIS-B 2401-1B-G50	1
45	O-Ring	JIS-B 2401-1B-G55	4
46	O-Ring	JIS-B 2401-1B-G65	1
58	O-Ring	JIS-B 2401-1B-P14	1★
59	O-Ring	AS568-013(NBR, Hs90)	1★
60	O-Ring	JIS-B 2401-1A-P6	1★

★ O-rings, item 58, 59 and 60, are used only without the proportional pilot relief valve [EFBG-10-1000(-E)].

Note: When ordering seals, please specify the seal lit number from the table right. In addition to the above o-rings, seals for pilot valve and solenoid ass'y are included in the seal kit.
For the detail of the pilot valve and solenoid ass'y seals, see page 674.

List of Seal Kits

Valve Model Numbers	Seal Kit Numbers
EFBG-10-1000-51∗	KS-EFBG-10-1000-51
EFBG-10-1000-C/H-51∗	KS-EFBG-10-1000-C-51

Pilot Valve, Solenoid Ass'y and Safety Valve

Valve Model Numbers	㉔ Pilot Valve Model Numbers	㉕ Solenoid Ass'y Model No.	㉓ Safety Valve Model No.
EFBG-10-1000-C(-E)-51/5190	EDG-01V-C-1-PNT20-5197	E318-Y06M1-28-61	——
EFBG-10-1000-H(-E)-51/5190	EDG-01V-H-1-PNT20-5197		——
EFBG-10-1000(-E)-51/5190	——		SB1094-2002

Note: The connector assembly GDM-211-B-11 (Item 25) is not included in the solenoid assembly.

Interchangeability between Current and New Design

EFBG-03/06/10 series valves have changed model from 50 to 51 design in line with the model change of solenoid ass'y.

Specifications and Characteristics

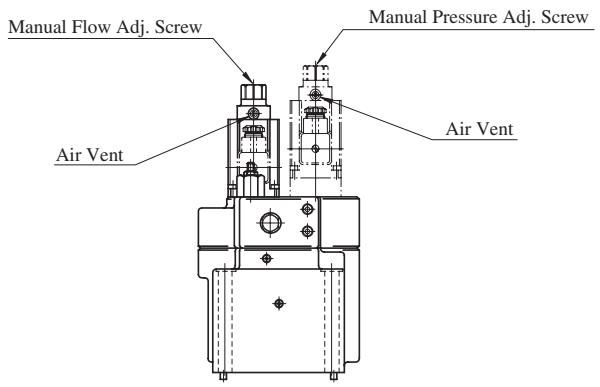
No changes in specifications and characteristics between current and new design.

Mounting Interchangeability

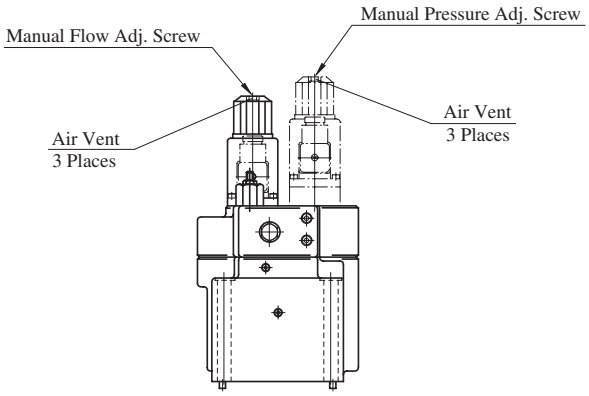
There is an interchangeability in the mounting dimensions between current and new design, however, note that because of improvements made on the solenoids, the overall shapes have been changed as shown below.

- EFBG-03

Current : Design 50

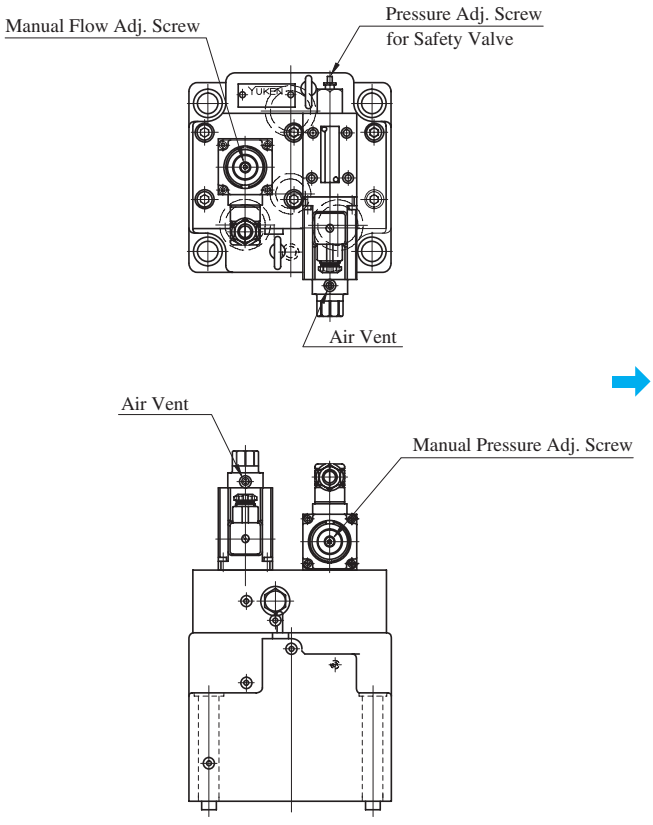


New : Design 51

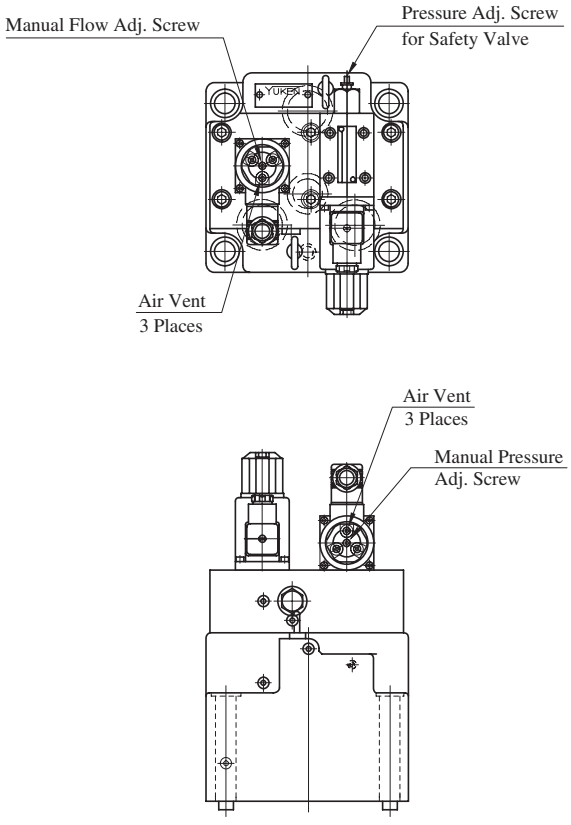


- EFBG-06/10

Current : Design 50



New : Design 51

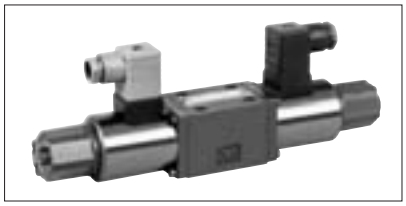


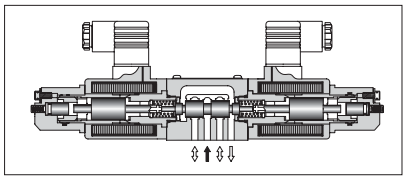
Shockless Type Proportional Electro-Hydraulic Directional and Flow Control Valves

These valves are well accepted by industrial users as shifting time adjustable type shockless valves. By employing the basic design concept of the "G series solenoid operated directional valves", we have been successful developing the shifting time adjustable shockless valves with high performance which makes the speed setting possible at any high speed operation.
In combination with the newly developed digital amplifiers, the further enhancement of maneuverability and repeatability of the valves can be realized.

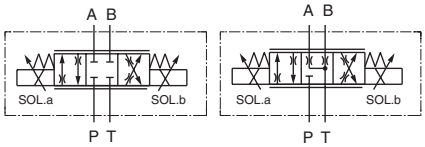
Specifications

Description \ Model No.		EDFG-01
Max. Operating Pressure MPa (PSI)		25 (3630)
Max. Flow L/min (U.S.GPM)		30 (7.9)
Max. Tank Line Back Pressure MPa (PSI)		14 (2030)
Rated Current		1100 mA
Coil Resistance		10.8 Ω
Hysteresis		5% or less
Repeatability		1% or less
Step Response (Typical Rating) (0 ↔ 100%)		100 ms or less
Frequency Response (50% ±25%)	Phase	20 Hz (–90 degree)
	Gain	25 Hz (–3 dB)
Approx. Mass kg (lbs.)		2.4 (5.3)

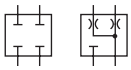




Graphic Symbols



Model Number Designation

F-	EDF	G	-01	-30	-3C2	-XY	-50	*
Special Seals	Series Number	Type of Mounting	Valve Size	Rated Flow L/min (U.S.GPM)	Spool Type	Direction of Flow	Design Number	Design Standards
F: Special Seals for Phosphate Ester Type Fluid (Omit if not required)	**EDF**: Shockless Type Proportional Directional and Flow Control Valve	**G**: Sub-plate Mounting	**01**	**30** (7.9)	**3C2** **3C40** 	**XY**: Metre - In • Metre - Out	**50**	Refer to ★1

★1 Design Standards: None ..... Japanese Standard "JIS" and European Design Standard
90 ..... N. American Design Standard

Attachment

Mounting Bolts

Descriptions	Soc. Hd. Cap Screw	Qty.
Japanese Standard "JIS" European Design Standard	M5 × 45 Lg.	4
N. American Design Standard	No.10 - 24 UNC × 1-3/4 Lg.	4

Applicable Power Amplifier

For stable performance, it is recommended that Yuken's applicable power amplifiers be used (for details see page 782).
Model Numbers: AMN-G/W-10

Sub-plate

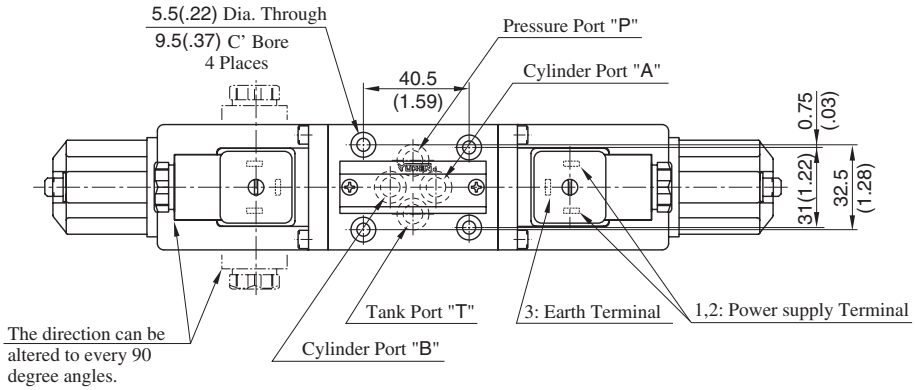
Piping Size	Japanese Standard "JIS"		European Design Standard		N. American Design Standard		Approx. Mass kg (lbs.)
	Sub-plate Model Numbers	Thread Size	Sub-plate Model Numbers	Thread Size	Sub-plate Model Numbers	Thread Size	
1/8	DSGM-01-31	Rc 1/8	DSGM-01-3180	1/8 BSP.F	DSGM-01-3190	1/8 NPT	0.8 (1.8)
1/4	DSGM-01X-31	Rc 1/4	DSGM-01X-3180	1/4 BSP.F	DSGM-01X-3190	1/4 NPT	0.8 (1.8)
3/8	DSGM-01Y-31	Rc 3/8	—	—	DSGM-01Y-3190	3/8 NPT	0.8 (1.8)

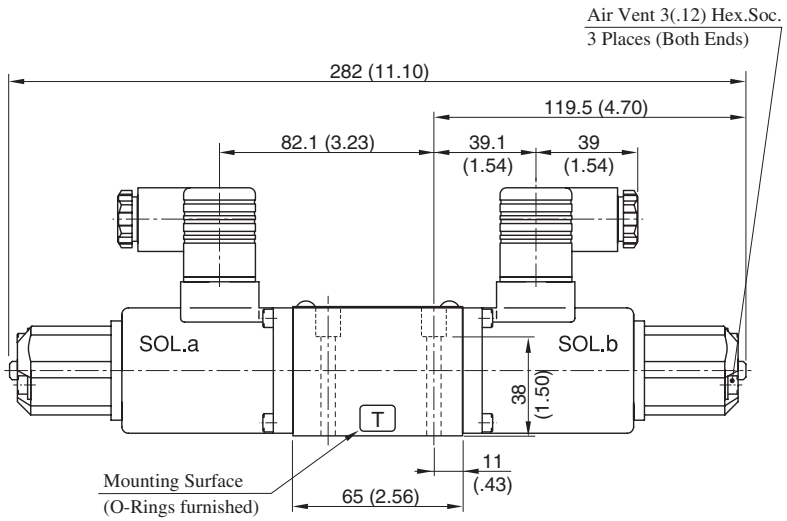
- Sub-plates are available. Specify the sub-plate model number from the table above. When sub-plates are not used, the mounting surface should have a good machined finish.
- Sub-plates are those for 1/8 solenoid operated directional valves. For dimensoins, see page 356.

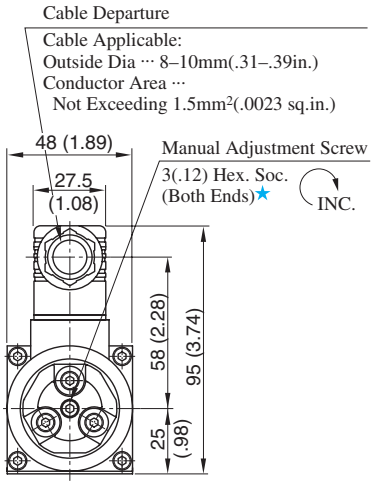
EDFG-01-30-3C∗-XY-50/5090

Mounting Surface
ISO 4401-AB-03-4-A

DIMENSIONS IN MILLIMETRES (INCHES)

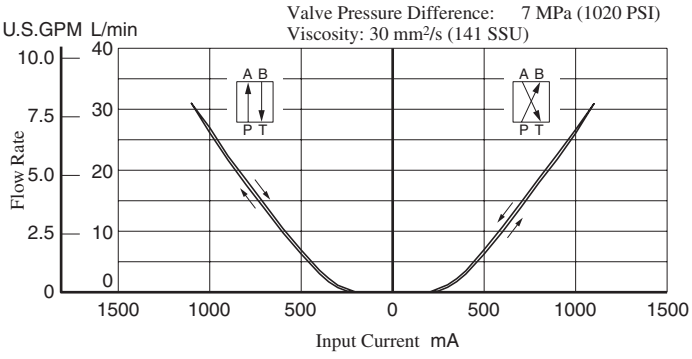




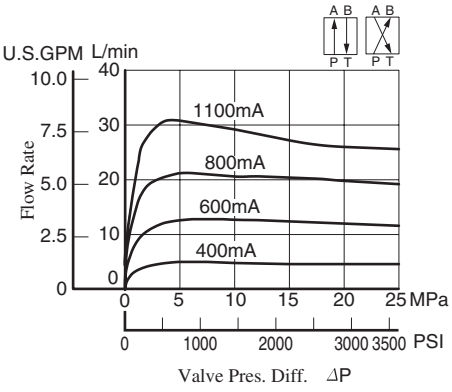


★ Under normal conditions, however, this screw must be kept in its original position.

Input Current vs. Flow

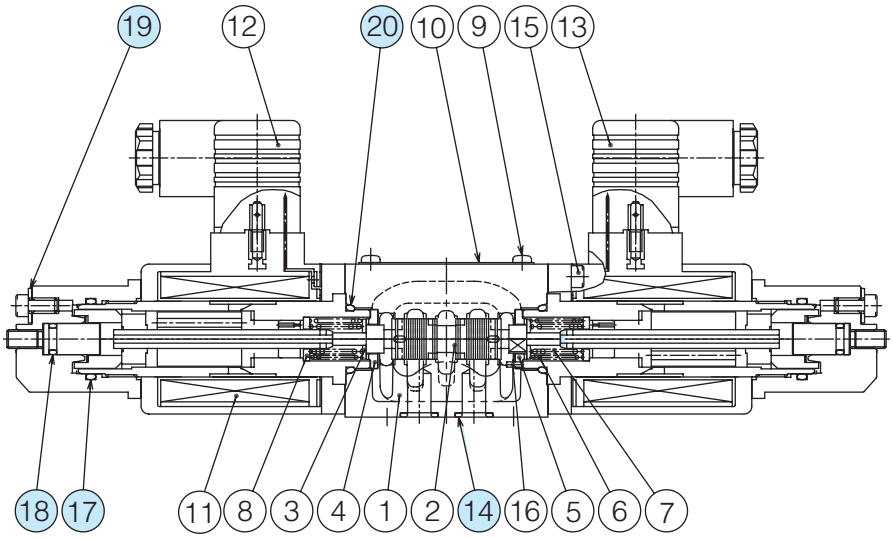


Valve pressure Difference vs. Flow



List of Seals and Solenoid Ass'y

EDFG-01-30-∗-XY-50/5090



List of Seals

Item	Name of Parts	Part Numbers	Qty.	Remarks
14	O-Ring	SO-NB-P9	4	Included in Seal Kit Kit No.: KS-EDFG-01-50
17	O-Ring	SO-NB-P22	2	
18	O-Ring	SO-NB-P7	2	
19	Fastner Seal	SG-FCF-4	6	
20	O-Ring	SO-NB-P18	2	

Note) O-ring (Item 17, 18, 20) and the fastner sael (Item 19) are included in the solenoid assembly.

Solenoid Ass'y

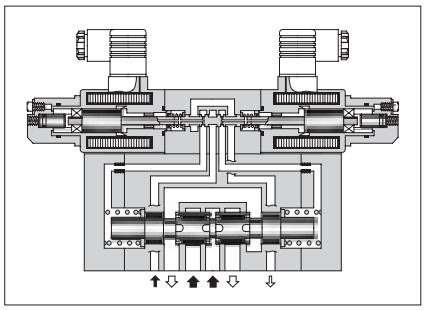
Valve Model Numbers	⑪ Solenoid Ass'y	Qty.
EDFG-01-30-∗-XY-50/5090	E318-Y05M2-28-6103	2

Note) The connector assembley GDM-211-∗-11 (Item 12, 13) is not included in the solenoid assembly.

Proportional Electro-Hydraulic Directional and Flow Control Valves

These valves are double-deck directional and flow control valves employing as their pilot the electro-hydraulic proportional pressure reducing valves with two proportional solenoids. The flow rate can be controlled by changing an input current to the solenoids and the direction of the flow can be controlled by providing the current to either solenoid of the two.

By combining the valves with the power amplifiers specially designed for the valves, the speed control, acceleration, deceleration and directional control can be done with a single valve, which eventually makes the hydraulic circuits simple and contributes the cost of the hydraulic systems.



Specifications

Description \ Model No.		EDFHG-03	EDFHG-04	EDFHG-06
Max. Operating Pressure MPa (PSI)		25 (3630)		
Rated Flow L/min (U.S.GPM) at Valve Pressure Difference: 1.0 MPa (145 PSI)		100 (26.4)	140 (37.0)	280 (74.0)
Pilot Pressure ★1 MPa (PSI)		1.5 - 16 (220 - 2320) ★1		
Pilot Flow L/min (U.S.GPM)	at Normal	1 (.26)	1 (.26)	1 (.26)
	at Transition	3 (.79)	4 (1.06)	6 (1.59)
Max. Tank Line Back Pressure MPa (PSI)		16 (2320)	21 (3050)	21 (3050)
Max. Drain Line Back Pressure MPa (PSI)		3.0 (435) ★2		
Rated Current		800 mA	980 mA	900 mA
Coil Resistance		10 Ω		
Hysteresis		5% or less ★3		
Repeatability		1% or less ★3		
Approx. Mass kg (lbs.)		11 (24.3)	12 (26.5)	15 (33.1)

★1. Take care to keep the difference between the pilot pressure and drain port back pressure consistently greater than 1.5 MPa (220 PSI).

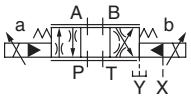
★2. To obtain stable performance, keep the drain port back pressure low and minimize its fluctuations.

★3. The hysteresis and repeatability values indicated in the specifications for each control valve are determined under the following conditions:

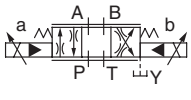
- Hysteresis Value: Obtained when Yuken's applicable power amplifier is used.
- Repeatability Value: Obtained when Yuken's applicable power amplifier is used under the same conditions.

Graphic Symbols

External Pilot Type



Internal Pilot Type



Model Number Designation

F-	EDFH	G	-03	-100	-3C2	-XY	-E	-31	*
Special Seals	Series Number	Type of Mounting	Valve Size	Rated Flow L/min (U.S.GPM)	Spool Type ★1	Direction of Flow	Pilot Connection	Design Number	Design Standards
F: Special Seals for Phosphate Ester Type Fluids (Omit if not required)	**EDFH**: Proportional Electro-Hydraulic Directional and Flow Control Valves	**G**: Sub-Plate Mounting	**03**	**100**: 100 (26.4)	**3C2**  **3C40** 	**XY**: Metre-in • Metre-out	**E**: External Pilot **None**: Internal Pilot	**31**	Refer to ★2
			04	**140**: 140 (37.0)				**31**	
			06	**280**: 280 (74.0)				**31**	

★1. Spool type shown in the column is for the centre position.

★2. Design Standards: None ..... Japanese Standard "JIS" and European Design Standard
90 ..... N. American Design Standard

Attachment

Mounting Bolts

Model Numbers	Socket Head Cap Screw			
	Japanese Standard "JIS" European Design Standard	N. American Design Standard	Qty.	Tightening Torque Nm (in. lbs.)
EDFHG-03	M6 × 35 Lg.	1/4-20 UNC × 1-1/2 Lg.	4	12 - 15 (106 - 133)
EDFHG-04	M6 × 45 Lg. M10 × 50 Lg.	1/4-20 UNC × 1-3/4 Lg. 3/8-16 UNC × 2 Lg.	2 4	12 - 15 (106 - 133) 58 - 72 (513 - 637)
EDFHG-06	M12 × 60 Lg.	1/2-13 UNC × 2-1/2 Lg.	6	100 - 123 (885 - 1089)

Sub-plates

Valve Model Numbers	Japanese Standard "JIS"			European Design Standard			N. American Design Standard		
	Sub-plate Model Numbers	Thread Size	Approx. Mass kg (lbs.)	Sub-plate Model Numbers	Thread Size	Approx. Mass kg (lbs.)	Sub-plate Model Numbers	Thread Size	Approx. Mass kg (lbs.)
EDFHG-03	DHGM-03Y-10	Rc 3/4	4.7 (10.4)	DHGM-03Y-1080	3/4 BSP.F	4.7 (10.4)	DHGM-03Y-1090	3/4 NPT	4.7 (10.4)
EDFHG-04	DHGM-04-20 DHGM-04X-20	Rc 1/2 Rc 3/4	4.4 (9.7) 4.1 (9.0)	DHGM-04-2080 DHGM-04X-2080	1/2 BSP.F 3/4 BSP.F	4.4 (9.7) 4.1 (9.0)	DHGM-04-2090 DHGM-04X-2090	1/2 NPT 3/4 NPT	4.4 (9.7) 4.1 (9.0)
EDFHG-06	DHGM-06-50 DHGM-06X-50	Rc 3/4 Rc 1	7.4 (16.3) 7.4 (16.3)	DHGM-06-5080 DHGM-06X-5080	3/4 BSP.F 1 BSP.F	8.5 (18.7) 8.5 (18.7)	DHGM-06-5090 DHGM-06X-5090	3/4 NPT 1 NPT	7.4 (16.3) 7.4 (16.3)

- Sub-plates are available. Specify the sub-plate model number from the table above. When sub-plates are not used, the mounting surface should have a good machined finish.
- Sub-plates are those for solenoid controlled pilot operated directional valves. For dimensions, see page 401 and 402.

Applicable Power Amplifiers

For stable performance, it is recommended that Yuken's applicable power amplifiers be used (for details see page 784).
Model Numbers: SK1091-D24-10

Instructions

- **Manual Adjustment**

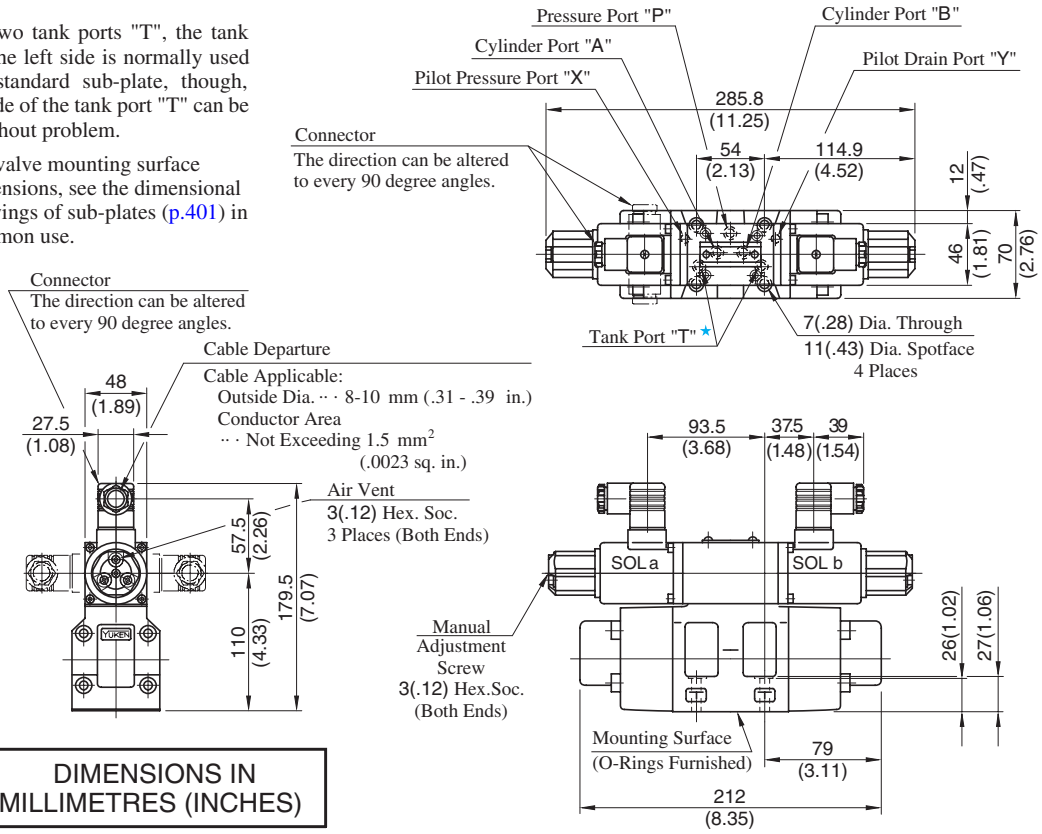
In the event of an electric fault or emergency, a manual shift can be made by screwing in the manual adjustment screw. Take care, however, that this manual shift has no flows adjusting function.
For this operation, set the pilot pressure (or P-port pressure on an internal-pilot model) below 7 MPa (1020 PSI).
After operation, be sure to return the manual adjustment screw completely to the original position.

EDFHG-03-100-3C∗-XY-∗-31/3190

Mounting Surface: Main port ... Conform to ISO 4401-AC-05-4-A.
Pilot/drain ports ... Conform to ISO.

★Of the two tank ports "T", the tank port in the left side is normally used in our standard sub-plate, though, either side of the tank port "T" can be used without problem.

Note: For valve mounting surface dimensions, see the dimensional drawings of sub-plates (p.401) in common use.



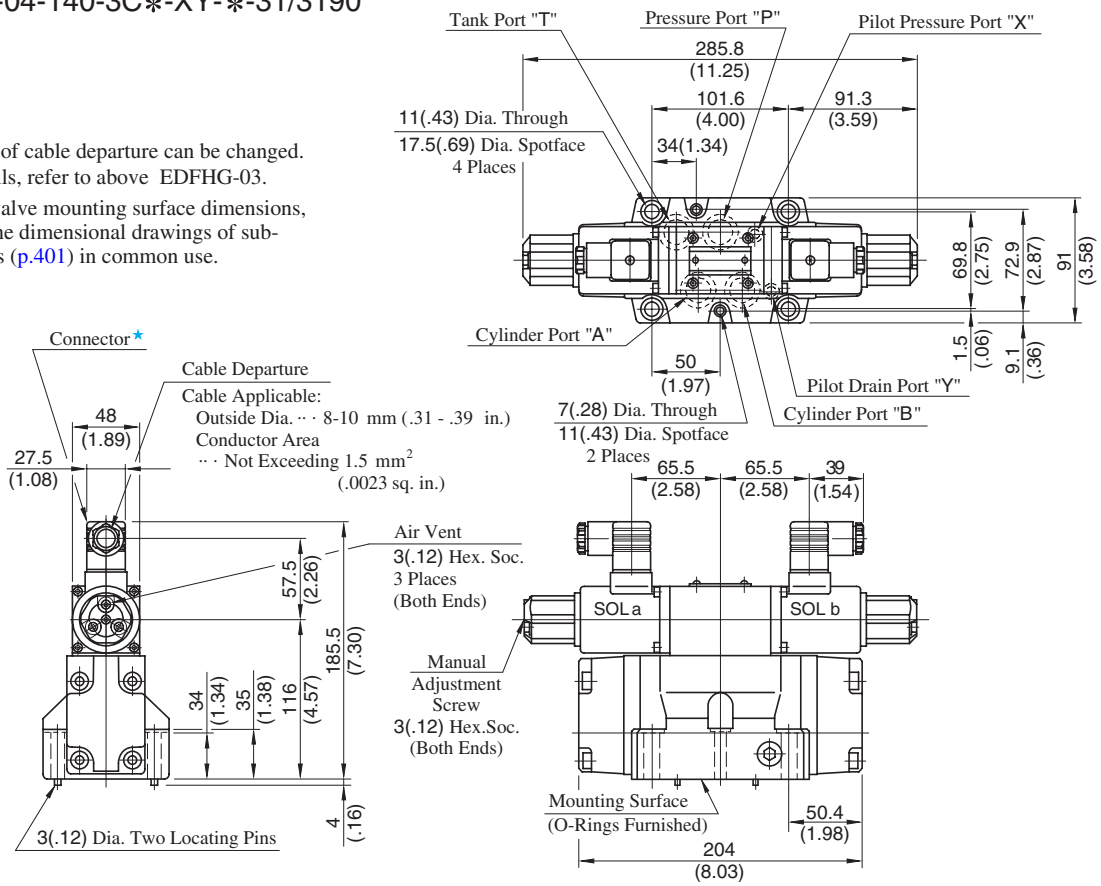
DIMENSIONS IN MILLIMETRES (INCHES)

Mounting surface: Conform to ISO4401-AD-07-4-A.

EDFHG-04-140-3C∗-XY-∗-31/3190

★ Position of cable departure can be changed. For details, refer to above EDFHG-03.

Note: For valve mounting surface dimensions, see the dimensional drawings of sub-plates (p.401) in common use.

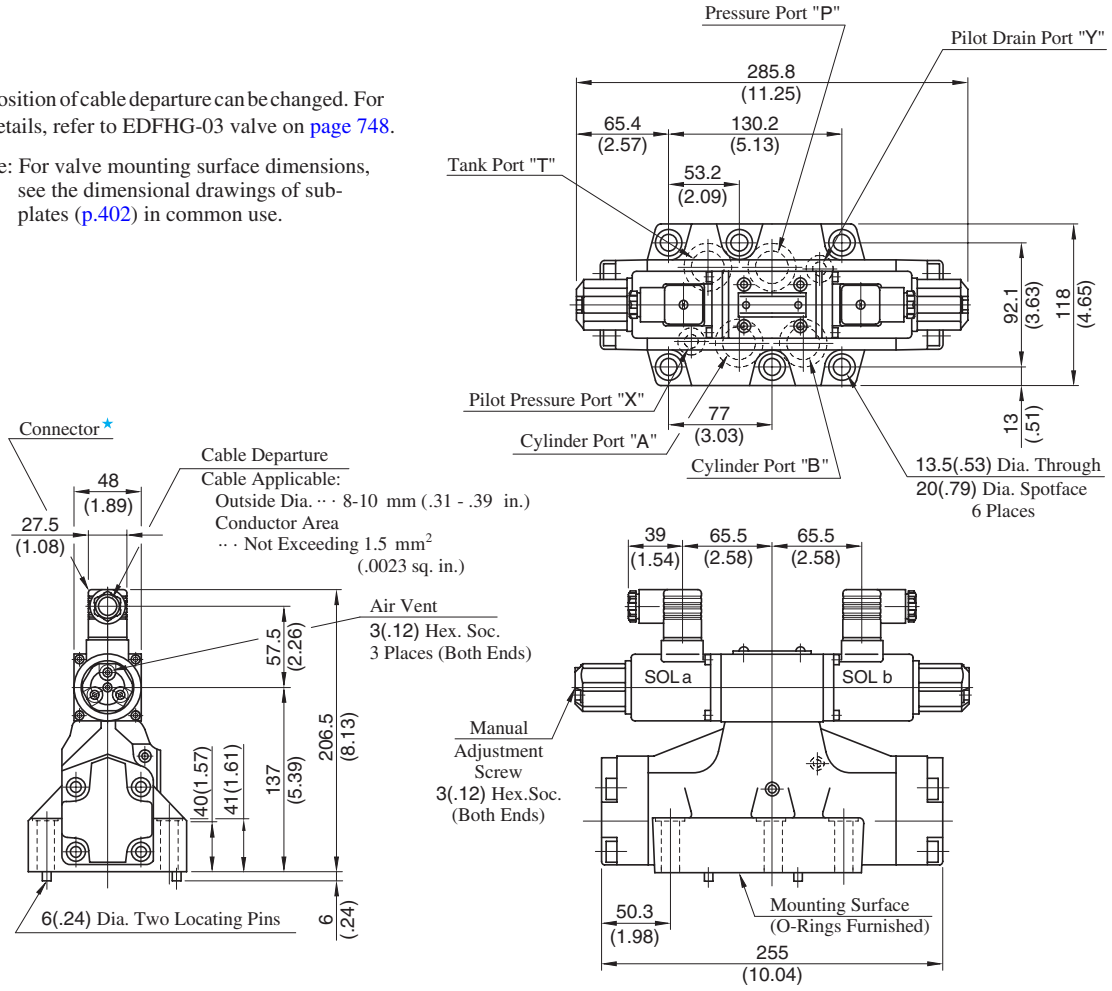


EDFHG-06-280-3C∗-XY-∗-31/3190

Mounting surface: Conform to ISO4401-AE-08-4-A.

★Position of cable departure can be changed. For details, refer to EDFHG-03 valve on page 748.

Note: For valve mounting surface dimensions, see the dimensional drawings of sub-plates (p.402) in common use.



DIMENSIONS IN MILLIMETRES (INCHES)

Interchangeability between Current and New Design

Specifications and Characteristics

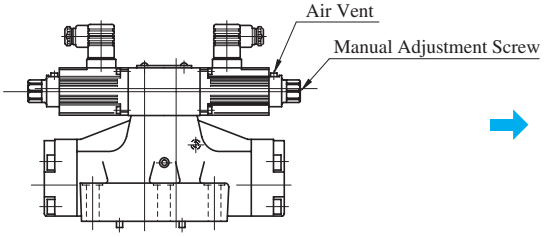
No changes in specifications and characteristics between current and new design.

Mounting Interchangeability

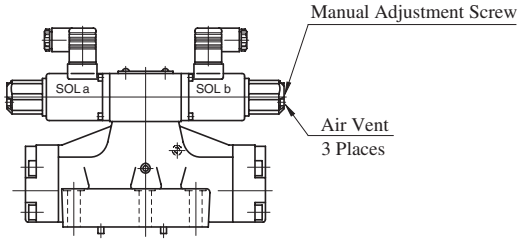
The mounting surface are interchangeable.

Note that because of improvements made on the solenoids, the overall shapes have been changed as shown below.

Current: Design 30

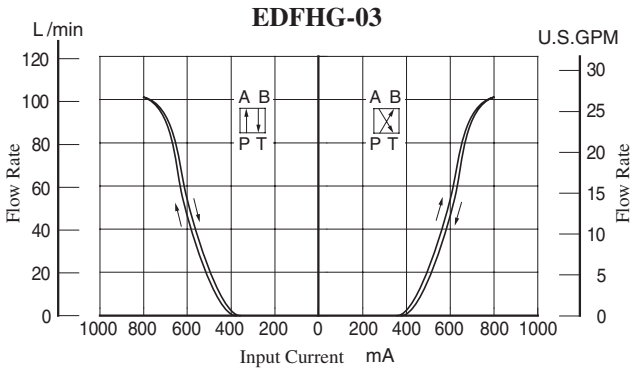


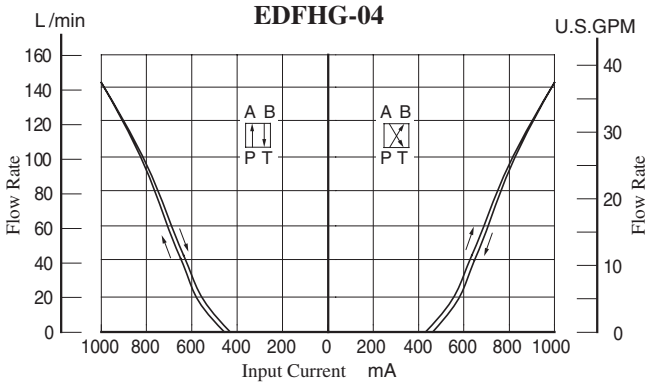
New: Design 31

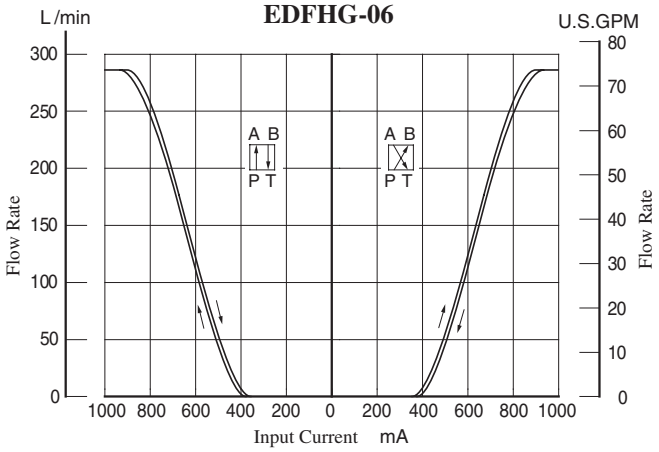


Input Current vs. Flow

Viscosity : 30 mm²/s (141 SSU)
Valve Pres. Difference : P→A (B), B (A) →T 1 MPa (145 PSI)

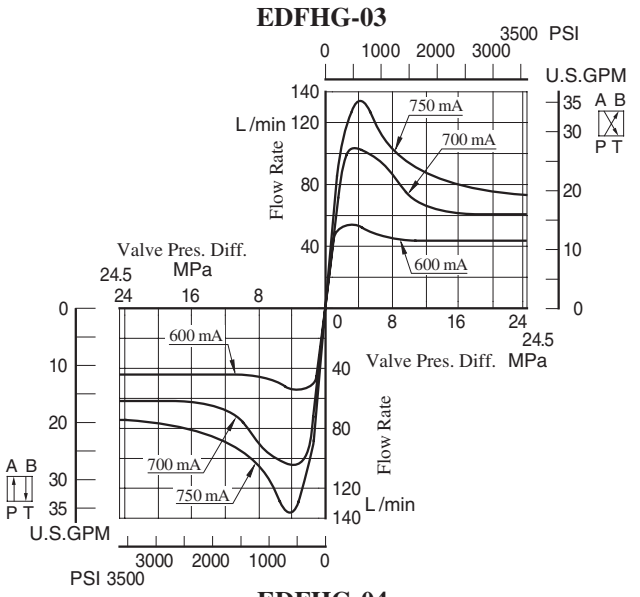


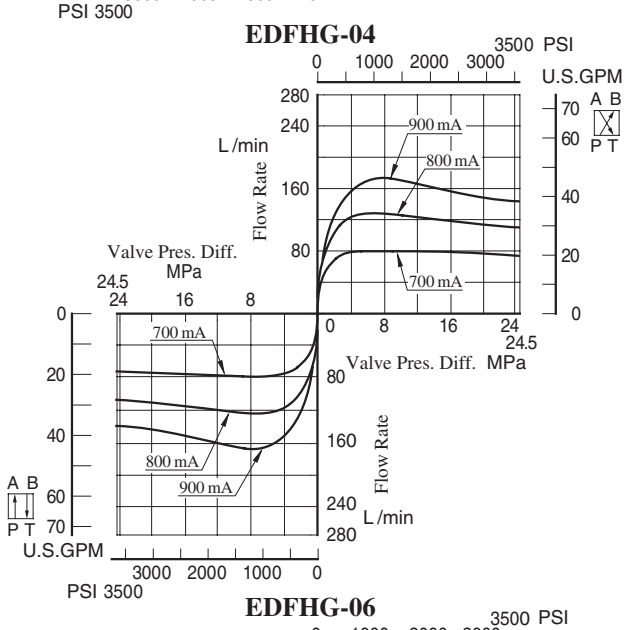


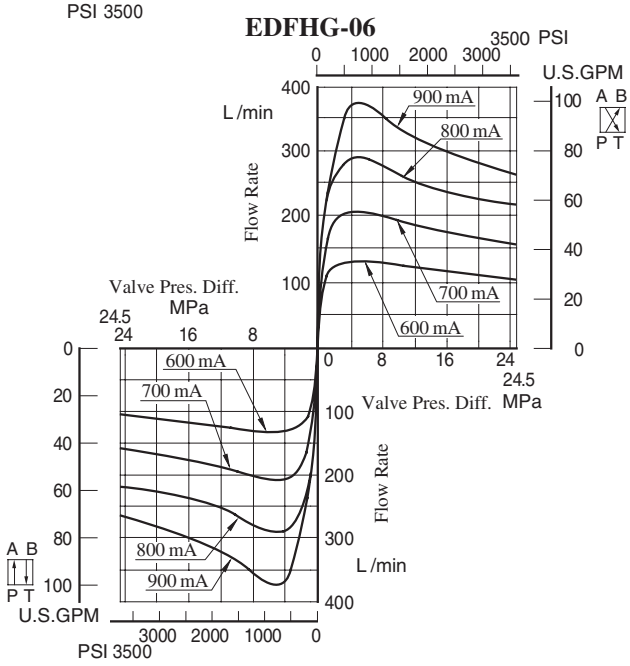


Valve Pressure Difference vs. Flow

Viscosity : 30 mm²/s (141 SSU)

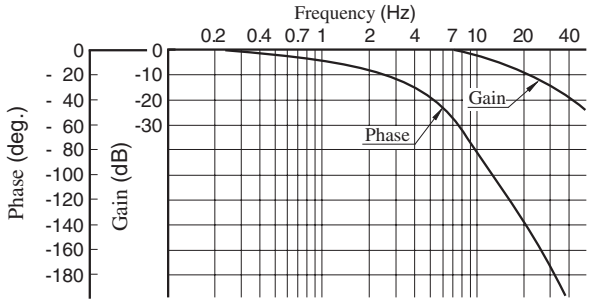






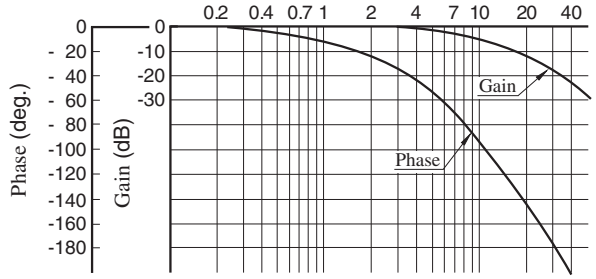
Frequency Response

EDFHG-03



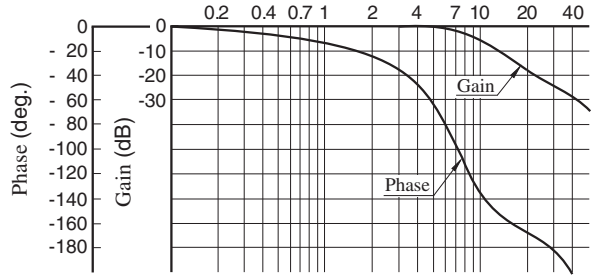
Model Number : EDFHG-03-100-3C2-E-31
Viscosity : 30 mm²/s(141 SSU)
Pilot Pressure : 15.7 MPa(2280 PSI)
Travel of Spool : ±10% of Maximum Stroke

EDFHG-04



Model Number : EDFHG-04-140-3C2-E-31
Viscosity : 30 mm²/s(141 SSU)
Pilot Pressure : 15.7 MPa(2280 PSI)
Travel of Spool : ±10% of Maximum Stroke

EDFHG-06



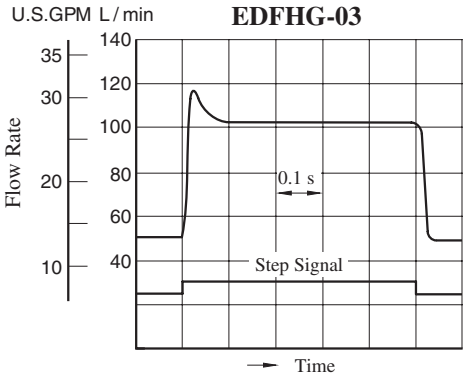
Model Number : EDFHG-06-280-3C2-E-31
Viscosity : 30 mm²/s(141 SSU)
Pilot Pressure : 15.7 MPa(2280 PSI)
Travel of Spool : ±10% of Maximum Stroke

Step Response

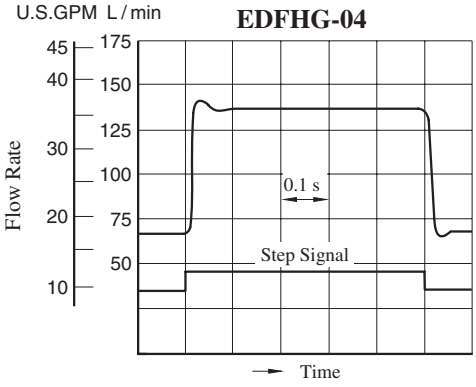
These characteristics have been obtained by measuring on each valve. Therefore, they may vary according to a hydraulic circuit to be used.

Viscosity : 30 mm²/s(141 SSU)
Supply Pressure : 15.7 MPa(2280 PSI)

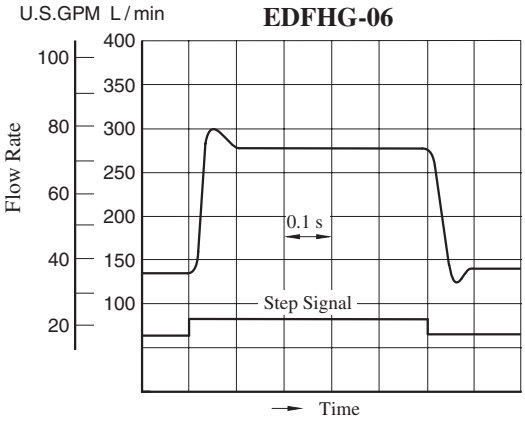
EDFHG-03



EDFHG-04

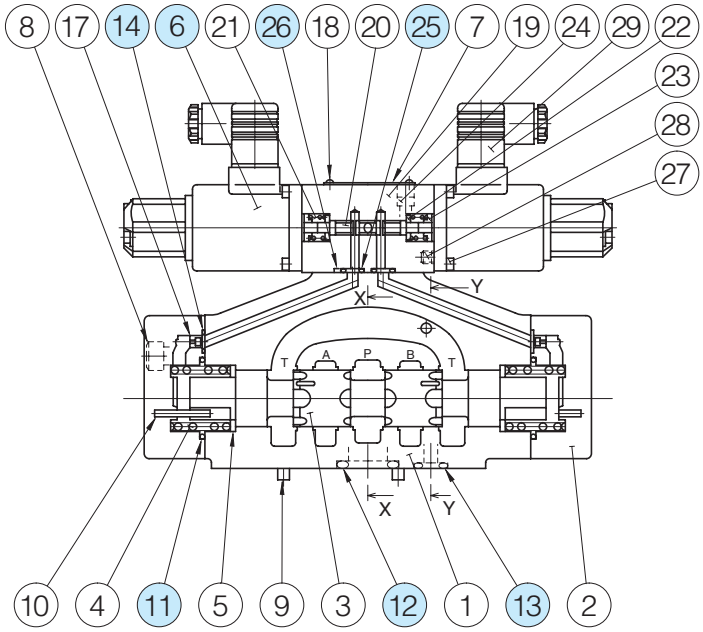


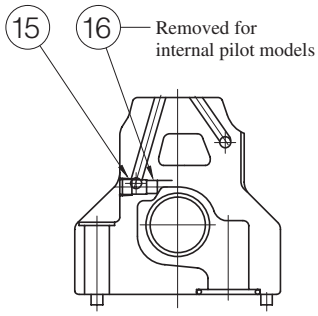
EDFHG-06



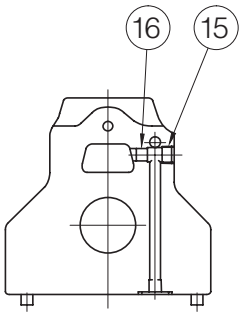
List of Seals and Solenoid Ass'y

EDFHG-03-100-3C∗-XY-∗-31/3190
EDFHG-04-140-3C∗-XY-∗-31/3190
EDFHG-06-280-3C∗-XY-∗-31/3190





Section X-X



Section Y-Y

List of Seals and Solenoid Ass'y

Item	Name of Parts	EDFHG-03		EDFHG-04		EDFHG-06	
		Part Numbers	Qty.	Part Numbers	Qty.	Part Numbers	Qty.
6	Solenoid Ass'y	E318-Y06M1-28-61	2	E318-Y06M1-28-61	2	E318-Y06M1-28-61	2
11	O-Ring	SO-NB-P28	2	SO-NB-P34	2	SO-NB-P40	2
12	O-Ring	SO-NB-A014	5	SO-NB-P22	4	SO-NB-P30	4
13	O-Ring	SO-NB-P9	2	SO-NB-P9	2	SO-NB-P14	2
14	O-Ring	SO-NB-P9	6	SO-NB-P9	2	SO-NB-P10	2
25	O-Ring	SO-NB-P9	4	SO-NB-P9	4	SO-NB-P9	4
26	O-Ring	SO-NB-P4	2	SO-NB-P4	2	SO-NB-P4	2

Note: The GDM-211-B-11 connector assembly (Item 29) is not included in the solenoid assembly.
When ordering seals, please specify the seal kit number from the table below. In addition to the above o-rings, seals for solenoid ass'y are included in the seal kit.
For the detail of the solenoid ass'y o-rings, see page 674.

List of Seal Kits

Valve Model Numbers	Seal Kit Numbers
EDFHG-03	KS-EDFHG-03-31
EDFHG-04	KS-EDFHG-04-31
EDFHG-06	KS-EDFHG-06-31

High Response Type Proportional Electro-Hydraulic Directional and Flow Control Valves

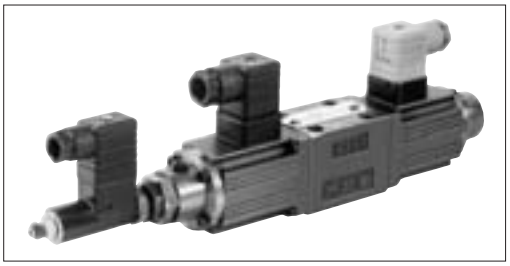
High response, high precision and high reliability are achieved be a combination of a compact and powerful solenoid and a spool-position-detection LVDT.
Direct type ELDFG-01/03 and two stage type ELDFG-04/06 (which use the ELDFG-01 as a pilot) are available.

Direct Operated Type Directional and Flow Control Valves

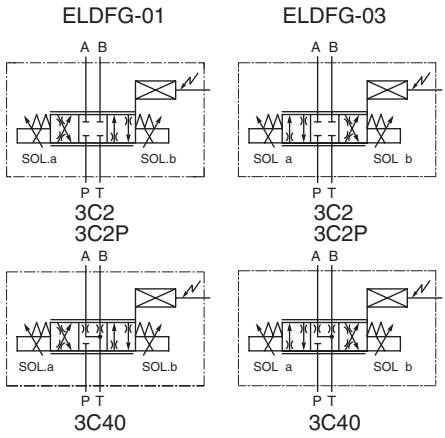
This product can be interchanged with the simpliffied servo valve to perform position control and pressure control.
Compared to nozzle flapper type servo valve, this product has excellent contamination-related problems.

Specifications

Description \ Model No.		ELDFG-01	ELDFG-03
Max. Operating Pressure MPa (PSI)		31.5 (4570)	
Max. Tank Line Back Pressure MPa (PSI)		21 (3050)	
Rated Flow L/min (U.S.GPM) Valve Pres. Diff. : 1.5 MPa (220 PSI)		10: 10 (2.6) 20: 20 (5.3) 35: 35 (9.2)	40: 40 (10.6) 80: 80 (21.1)
Hysteresis		0.5% or less	
Repeatability		0.5% or less	
Step Response (Typical Rating)	0 → 100%	30 ms	3C2, 3C40: 29 ms 3C2P: 25 ms
	100 → 0%	38 ms	3C2, 3C40: 26 ms 3C2P: 23 ms
Frequency Response (0 ±25 %V)	Phase -90 degree	48 Hz	3C2, 3C40: 36 Hz 3C2P: 41 Hz
	Gain -3 dB	52 Hz	3C2, 3C40: 35 Hz 3C2P: 38 Hz
Rated Current		Max. 2.5 A	Max. 3 A
Coil Resistance [20°C (68°F)]		3.9 Ω	3 Ω
Power Input		Max. 25 W	Max. 27 W
Approx. Mass kg (lbs.)		3.2 (7.1)	7.5 (16.5)



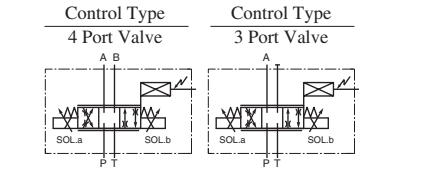
Graphic Symbols

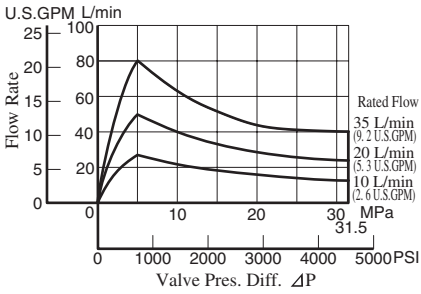


Range of Flow Control

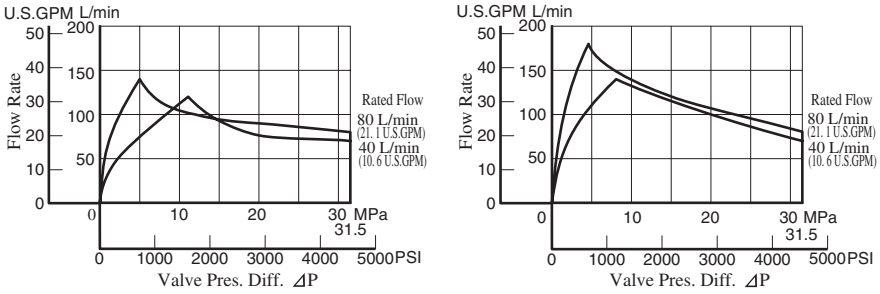
See “Valve Pres. Difference vs. Flow Rate” below charactristics for the appropriate range.

ELDFG-01



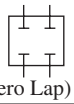


ELDFG-03



★ Valve pressure difference “⊿P” is reference by follows. In addition, “P”, “A”, “B”, “T”, are pressure of each port.
4 Port Valve: ⊿P = [(P–A) + (B–T)] or [(P–B) + (A–T)]
3 Port Valve: ⊿P = (P–A) or (A–T)

Model Number Designation

F-	ELDF	G	-01	-35	-3C2	-XY	-10	✻
Special Seals	Series Number	Type of Mounting	Valve Size	Rated Flow L/min (U.S.GPM)	Spool Type	Direction of Flow	Design Number	Design Standards
F: Special Seals for Phosphate Ester Type Fluid (Omit if not required)	**ELDF**: High Response (Direct) Type Proportional Electro -Hydraulic Directional and Flow Control Valves	**G**: Sub-plate Mounting	**01**	**10**: 10 (2.6) **20**: 20 (5.3) **35**: 35 (9.2)	**3C2**  **3C40**  **3C2P**  (Zero Lap)	**XY**: Metre-In · Metre-Out	**10**	Refer to ★
			03	**40**: 40 (10.6) **80**: 80 (21.1)			**10**	

★ Design Standards: None ..... Japanese Standard "JIS" and European Design Standard
90 ..... N. American Design Standard

Attachment

Mounting Bolts

Four socket head cap screws in the table below are included.

Model No.	Descriptions	Soc. Hd. Cap Screw (4 pcs.)	Tightening Torque
ELDFG-01	Japanese Standard "JIS" European Design Standard	M5 × 45 Lg.	5 - 7 Nm (43 - 60 in. lbs.) [Applicable to working pressure more than 25 MPa (3630 PSI): 6 - 7 Nm (52 - 60 in. lbs.)]
	N. American Design Standard	No. 10-24 UNC × 1-3/4 Lg.	
ELDFG-03	Japanese Standard "JIS" European Design Standard	M6 × 35 Lg.	12 - 15 Nm (106 - 133 in. lbs.)
	N. American Design Standard	1/4-20 UNC × 1-1/2 Lg.	

Sub-plate

Valve Model Numbers	Piping Size	Japanese Standard "JIS"		European Design Standard		N. American Design Standard		Approx. Mass kg (lbs.)
		Sub-plate Model Numbers	Thread Size	Sub-plate Model Numbers	Thread Size	Sub-plate Model Numbers	Thread Size	
ELDFG-01	1/8	DSGM-01-31	Rc 1/8	DSGM-01-3180	1/8 BSP.F	DSGM-01-3190	1/8 NPT	0.8 (1.8)
	1/4	DSGM-01X-31	Rc 1/4	DSGM-01X-3180	1/4 BSP.F	DSGM-01X-3190	1/4 NPT	0.8 (1.8)
	3/8	DSGM-01Y-31	Rc 3/8	—	—	DSGM-01Y-3190	3/8 NPT	0.8 (1.8)
ELDFG-03	3/8	DSGM-03-40	Rc 3/8	DSGM-03-2180	3/8 BSP.F	DSGM-03-2190	3/8 NPT	3.0 (6.6)
	1/2	DSGM-03X-40	Rc 1/2	DSGM-03X-2180	1/2 BSP.F	DSGM-03X-2190	1/2 NPT	3.0 (6.6)
	3/4	DSGM-03Y-40	Rc 3/4	DSGM-03Y-2180	3/4 BSP.F	DSGM-03Y-2190	3/4 NPT	4.7 (10.4)

- Sub-plates are available. Specify the sub-plate model number from the table above.
  When sub-plates are not used, the mounting surface should have a good machined finish.
- The Sub-plates are those for 1/8 and 3/8 solenoid operated directional valves. For dimensions,
  see page 356 and 373.

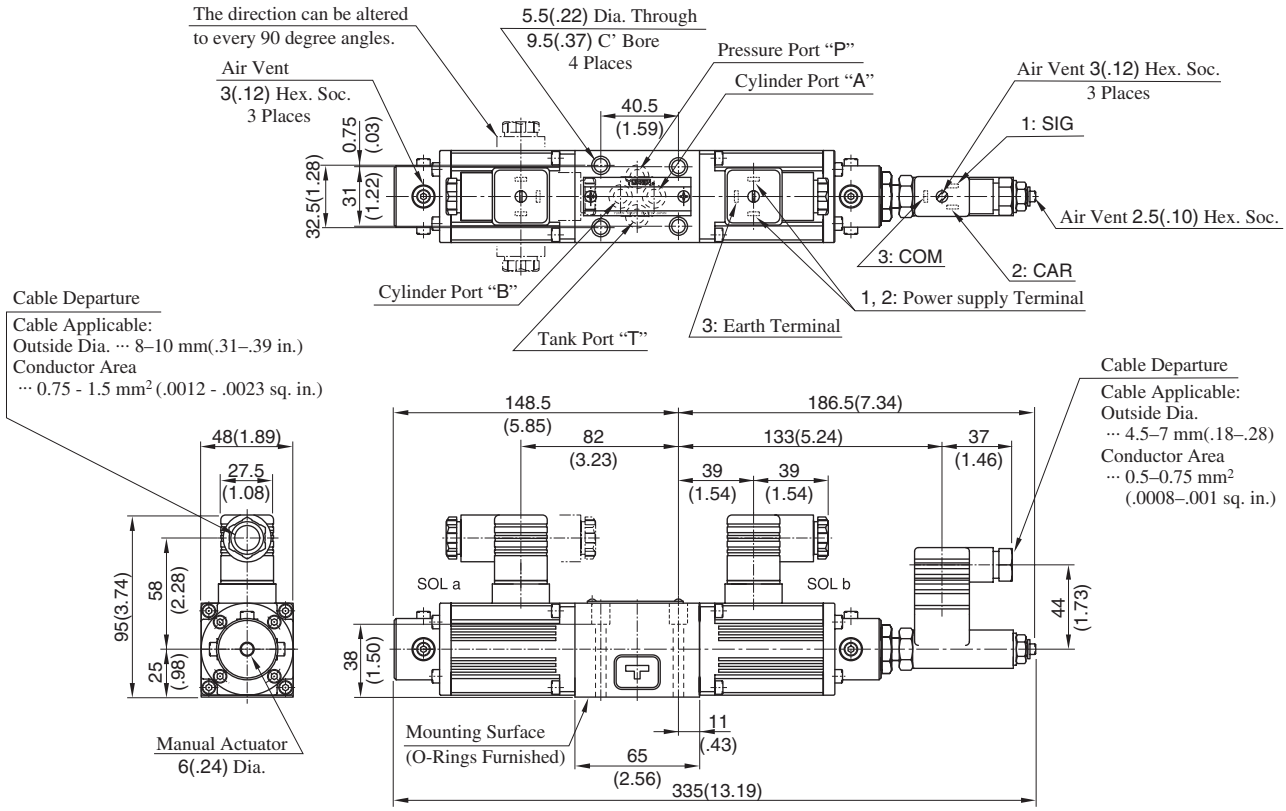
Applicable Power Amplifiers

For stable performance, it is recommended that Yuken's applicable power amplifiers be used (for details see page 786).

Valve Model Numbers	Power Amplifier Model Numbers
ELDFG-01-✻-$\begin{matrix}3C2\\3C40\end{matrix}$	AMN-L-01-1-10
ELDFG-01-✻-3C2P	AMN-L-01-3-2P-10
ELDFG-03-✻-$\begin{matrix}3C2\\3C40\end{matrix}$	AMB-EL-03-1-10
ELDFG-03-✻-3C2P	AMB-EL-03-2P-1-10

ELDFG-01-∗-∗-XY-10/1090

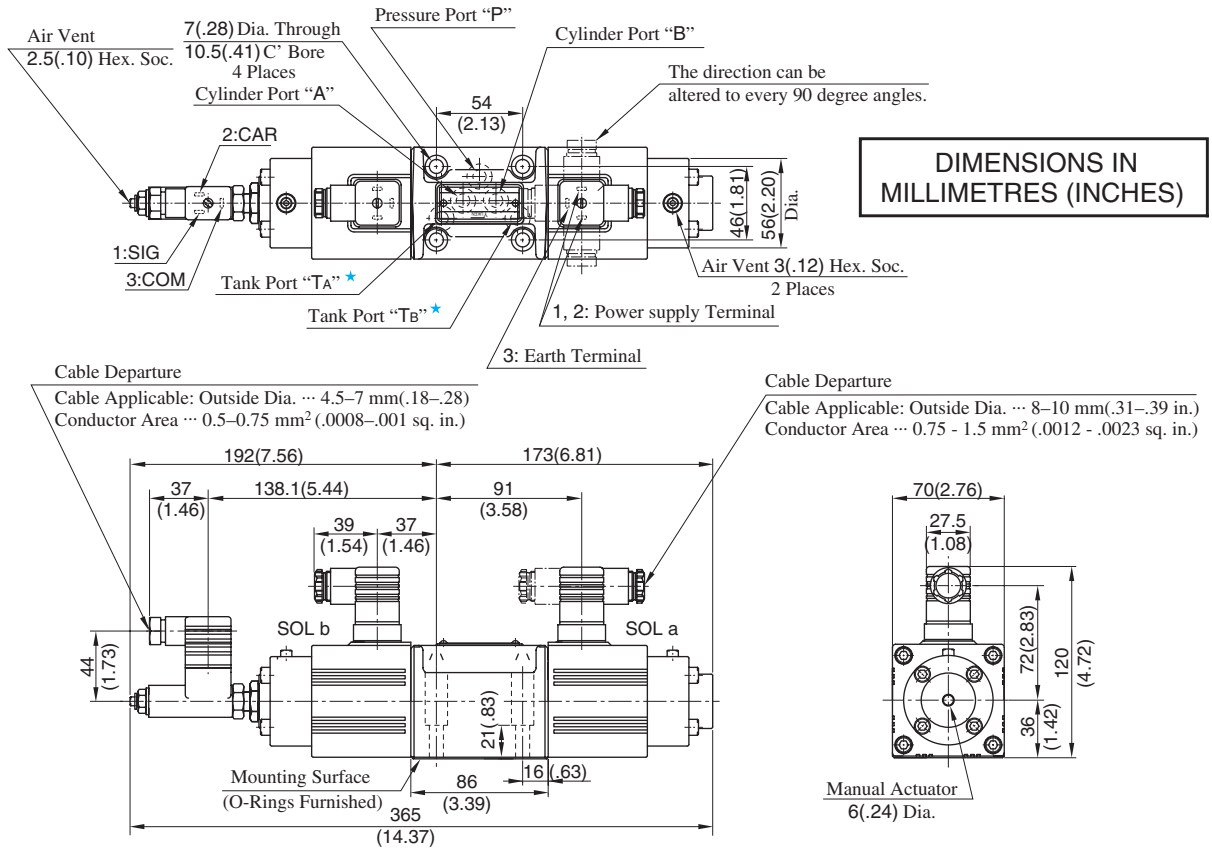
Mounting surface: Conform to ISO4401-AB-03-4-A.



Note: For valve mounting surface dimensions, see the dimensional drawings of sub-plates (p.356) in common use.

ELDFG-03-∗-∗-XY-10/1090

Mounting surface: Conform to ISO4401-AC-05-4-A.

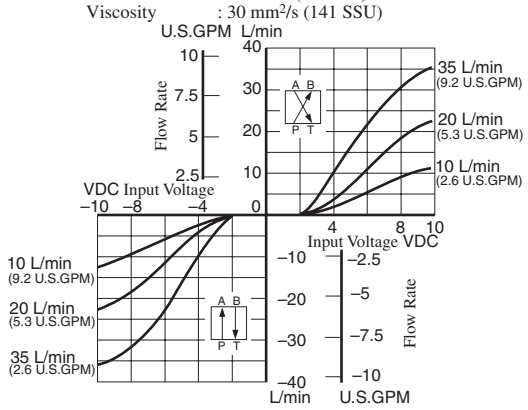


Note: For valve mounting surface dimensions, see the dimensional drawings of sub-plates (p.373) in common use.

Input Voltage vs. Flow Rate

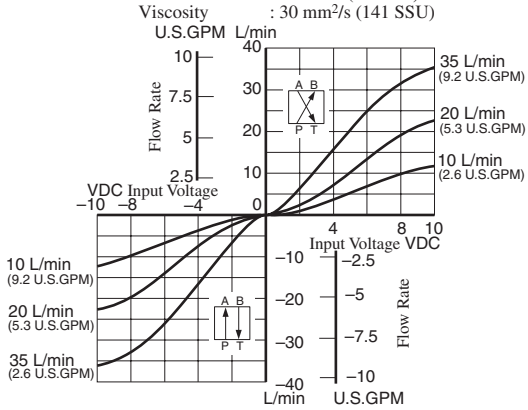
ELDFG–01–∗–3C2/3C40

Valve Pres. Diff. : 1.2 MPa (174 PSI)
Viscosity : 30 mm²/s (141 SSU)



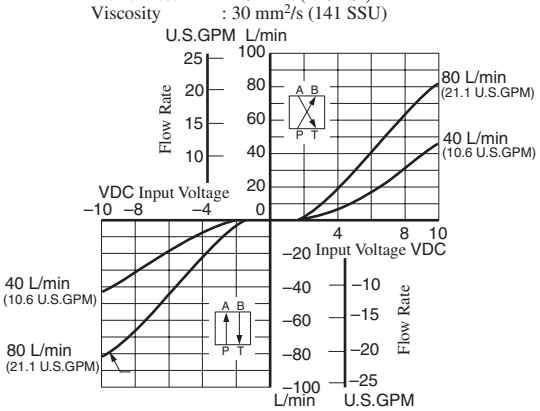
ELDFG–01–∗ –3C2P

Valve Pres. Diff. : 1.2 MPa (174 PSI)
Viscosity : 30 mm²/s (141 SSU)



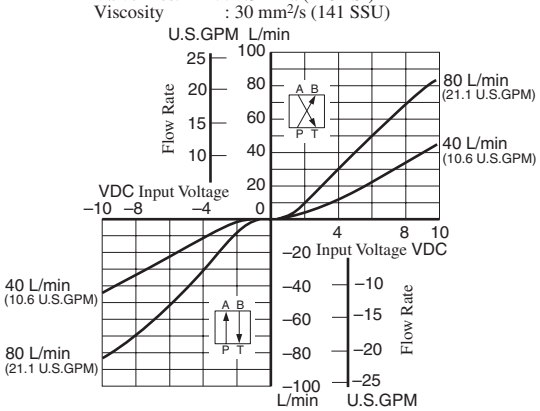
ELDFG–03–∗–3C2/3C40

Valve Pres. Diff. : 1.5 MPa (218 PSI)
Viscosity : 30 mm²/s (141 SSU)



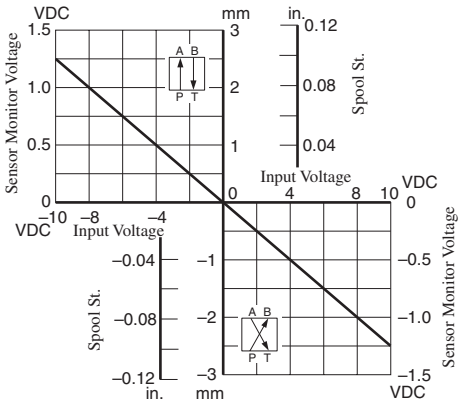
ELDFG–03–∗–3C2P

Valve Pres. Diff. : 1.5 MPa (218 PSI)
Viscosity : 30 mm²/s (141 SSU)

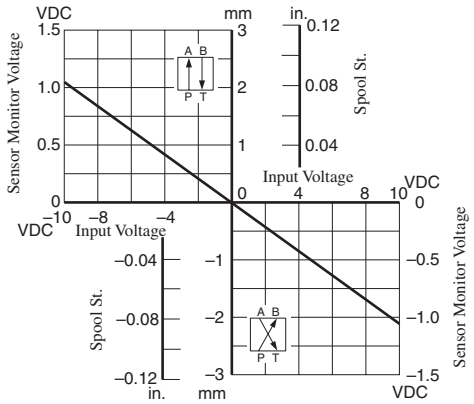


Input Voltage vs. Spool St.

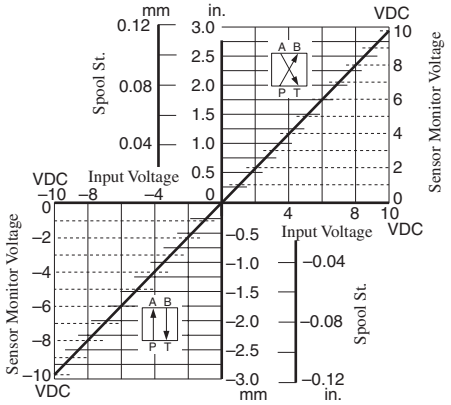
ELDFG–01–∗–3C2/3C40



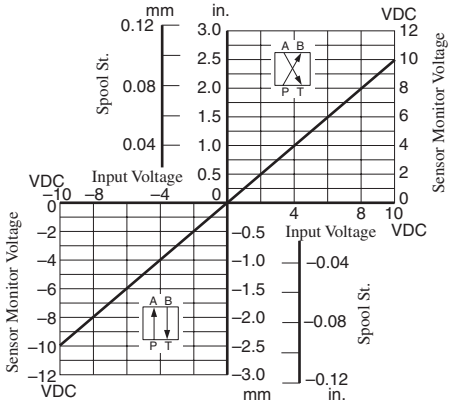
ELDFG–01–∗–3C2P



ELDFG–03–∗–3C2/3C40



ELDFG–03–∗–3C2P



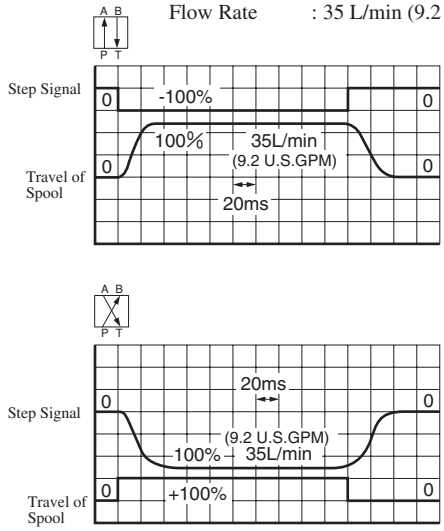
Step Response (Example)

Viscosity : 30 mm²/s (140 SSU)

The values were measured on independent valves. They vary by circuit.

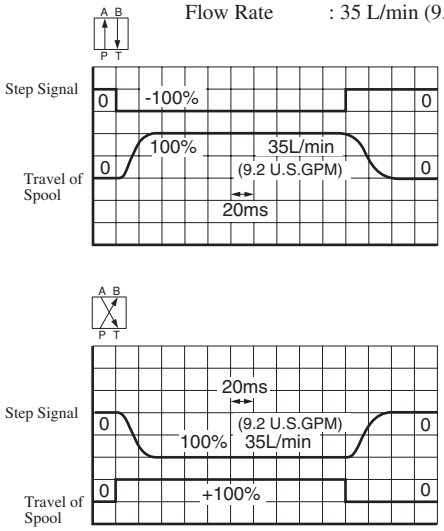
ELDFG-01-35-3C2/3C40

Supply Pressure : 2 MPa (290 PSI)
Flow Rate : 35 L/min (9.2 U.S.GPM)



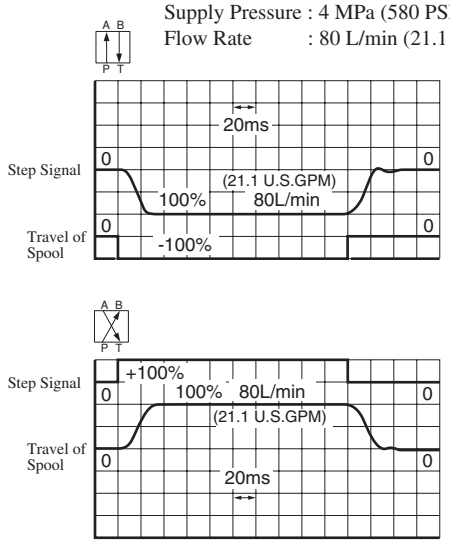
ELDFG-01-35-3C2P

Supply Pressure : 2 MPa (290 PSI)
Flow Rate : 35 L/min (9.2 U.S.GPM)



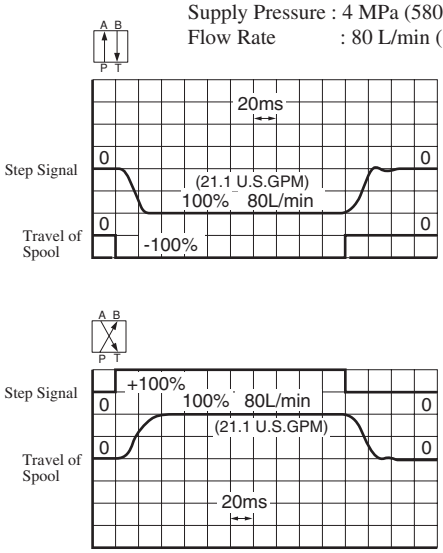
ELDFG-03-80-3C2/3C40

Supply Pressure : 4 MPa (580 PSI)
Flow Rate : 80 L/min (21.1 U.S.GPM)



ELDFG-03-80-3C2P

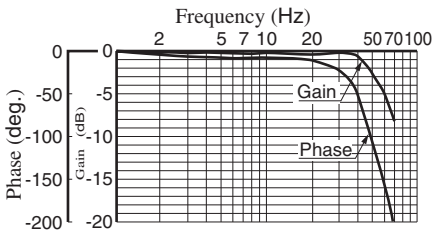
Supply Pressure : 4 MPa (580 PSI)
Flow Rate : 80 L/min (21.1 U.S.GPM)



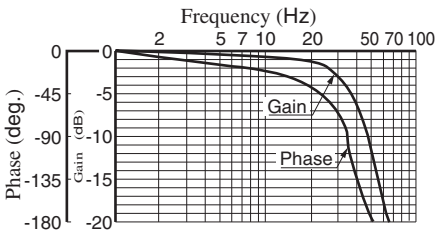
Frequency Response

Input Signal : 0 ±25 %V
Primary Pressure : 14 PMa (2030 PSI)
Viscosity : 30 mm²/s (140 SSU)

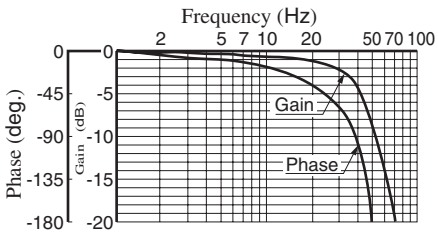
ELDFG-01-35-3C2/3C40/3C2P



ELDFG-03-80-3C2/3C40

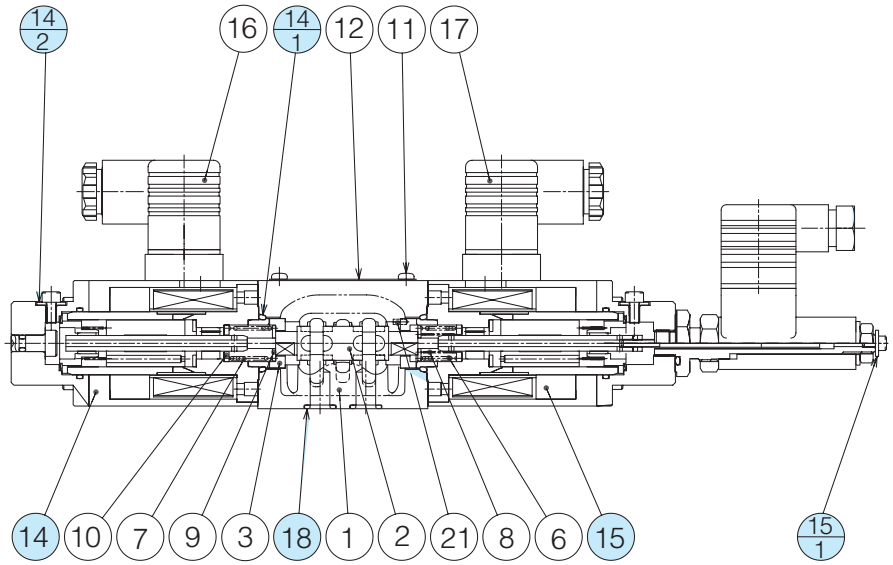


ELDFG-03-80-3C2P



List of Seals and Solenoid Ass'y

ELDFG-01-∗-∗-XY-10/1090



List of Seals

Item	Name of Parts	Part Numbers	Qty.	Remarks
14-1	O-Ring	SO-NB-P18	2	Included in Seal Kit Kit No.: KS-ELDFG-01-10
14-2	Fastner Seal	SG-FCF-4	2	
15-1	Fastner Seal	TK280152-0	1	
18	O-Ring	SO-NB-P9	4	

Note) O-ring (Item 14-1) and the fastner sael (Item 14-2, 15-1) are included in the solenoid assembly.

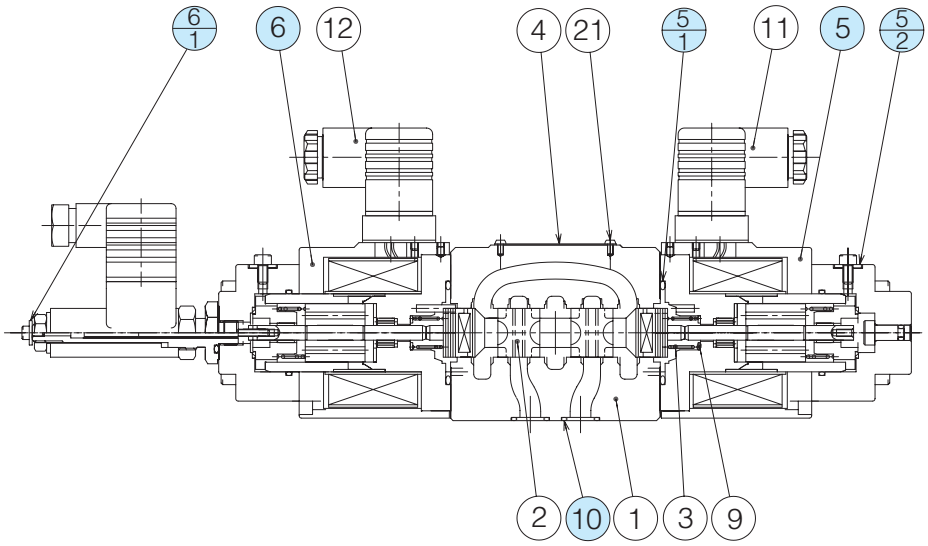
Solenoid Ass'y

Valve Model Numbers	Item	Solenoid Ass'y	Qty.
ELDFG-01-∗-∗-XY-10/1090	14	E318-Y06M2-14-5007	1
	15	E318-Y06M2-14-L-5007	1

Note) The connector assembley GDM-211-∗-11 (Item 16, 17) is not included in the solenoid assembly.

List of Seals and Solenoid Ass'y

ELDFG-03-∗-∗-XY-10/1090



List of Seals

Item	Name of Parts	Part Numbers	Qty.	Remarks
5-1	O-Ring	SO-NB-A128	2	Included in Seal Kit Kit No.: KS-ELDFG-03-10
5-2	Fastner Seal	SG-FCF-4	2	
6-1	Fastner Seal	TK280152-0	1	
10	O-Ring	SO-NB-A014	4	

Note) O-ring (Item 5-1) and the fastener sael (Item 5-2, 6-1) are included in the solenoid assembly.

Solenoid Ass'y

Valve Model Numbers	Item	Solenoid Ass'y	Qty.
ELDFG-03-∗-∗-XY-10/1090	5	E324-Y12M2-28-10	1
	6	E324-Y12M2-28-L-10	1

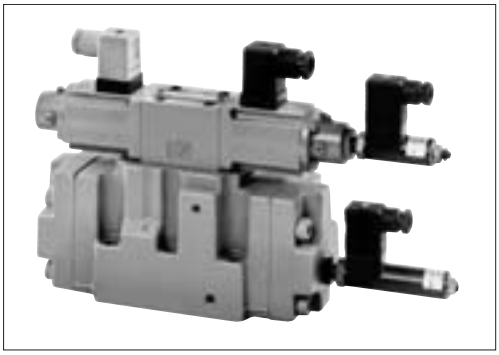
Note) The connector assembley GDM-211-∗-11 (Item 11, 12) is not included in the solenoid assembly.

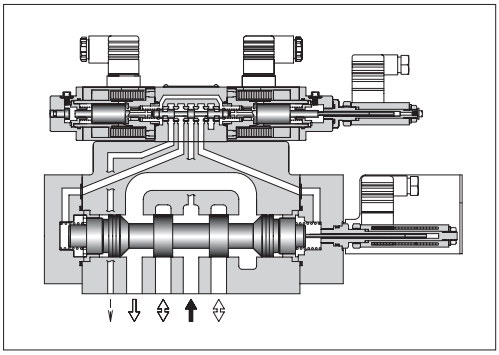
Two Stage Type Directional and Flow Control Valves

Specifications

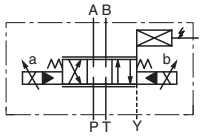
Description \ Model No.	ELDFHG-04	ELDFHG-06
Rated Flow L/min (U.S.GPM) Valve Pres. Diff. : 1 MPa (145 PSI)	280 (74.0)	350: 350 (92.5) 500: 500 (132.1)
Max. Operating Pressure MPa (PSI)	35 (5080)	350: 35 (5080) 500: 31.5 (4570)
Proof Pressure at Return Port ★1 (External Drain) MPa (PSI)	"T" Port : 31.5 (4570) "Y" Port : 21 (3050)	350 "T" Port : 35 (5080) "Y" Port : 21 (3050) 500 "T" Port : 25 (3630) "Y" Port : 21 (3050)
Proof Pressure at Return Port (Internal Drain) MPa (PSI)	21 (3050)	
Pilot Pressure ★2 MPa (PSI)	1.5–31.5 (218 – 4570)	
Pilot Flow ★3	16 L/min or more	350: 16 L/min or more 500: 19 L/min or more
Null Leakge★4 Ps=14 MPa (2030 PSI), Pp=14 MPa (2030 PSI)	3C2: 3 L/min or less 3C2P: 10 L/min or less	3C40: 4 L/min or less
Step Response (Typical Rating) (0↔100%) Pp=14 MPa (2030 PSI)	13 ms	350: 15 ms 500: 18 ms
Frequency Response (0±25%V, Phase) Pp=14 MPa (2030 PSI)	46 Hz (–90 degree)	350: 66 Hz 500: 39 Hz (–90 degree)
Water - Proofness	IP64	
Operating Temperature Range	–15 – +60 °C (5–140°F)	
Spool Type	3C2:  3C2P: (Zero Rap)  3C40: 	
Approxmate Spool Stroke to Stops	±5 mm (± .20 in.)	350: ±5 mm (± .20 in.) 500: ±7 mm (± .28 in.)
Main Spool End Area cm² (sq. in.)	7.1 (1.10)	8 (1.24)
Rated Current	Max. 2.5 A	
Coil Resistance [20 °C (68 °F)]	3.9 Ω	
Approx. Mass kg (lbs.)	10 (22.0)	350: 18 (39.7) 500: 19 (41.9)

★1. Return pressure should be less than the actual supply pressure.
★2. Pilot pressure should be between 1.5 MPa (218 PSI) and 3.5 MPa (508 PSI), and should exceed 60% of the actual supply pressure to main valve.
★3. Pilot flow is calculated with the above step response time at pilot pressure 14 MPa (2030 PSI).
★4. Added up leakage of main and pilot spools are stated.

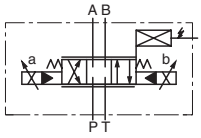




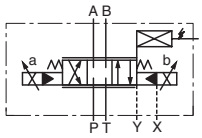
Graphic Symbols



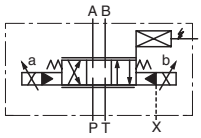
Internal Pilot / External Drain Type



Internal Pilot / Internal Drain Type

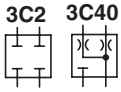
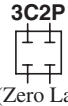


External Pilot / External Drain Type



External Pilot / Internal Drain Type

Model Number Designation

F-	ELDFH	G	-04	-280	-3C2P	-XY	-E	T	-10	*
Special Seals	Series Number	Type of Mounting	Valve Size	Rated Flow L/min (U.S.GPM)	Spool Type	Direction of Flow	Pilot Connection	Drain Connection	Design Number	Design Standards
F: Special Seals for Phosphate Ester Type Fluids (Omit if not required)	**ELDFH**: High Response (Two Stage) Type Proportional Electro-Hydraulic Directional and Flow Control Valves	**G**: Sub-Plate Mounting	**04**	**280**: 280(74.0)	3C2 3C40  3C2P  (Zero Lap)	**XY** : Metre-in • Metre-out	**None**: Internal Pilot **E**: External Pilot	**None**: External Drain **T**: External Drain	**10**	Refer to ★1
			06	**350**: 350(92.5) **500**: 500(132.1)					**10**	

★1. Design Standards: None ..... Japanese Standard "JIS" and European Design Standard
90 ..... N. American Design Standard

Applicable Power Amplifiers

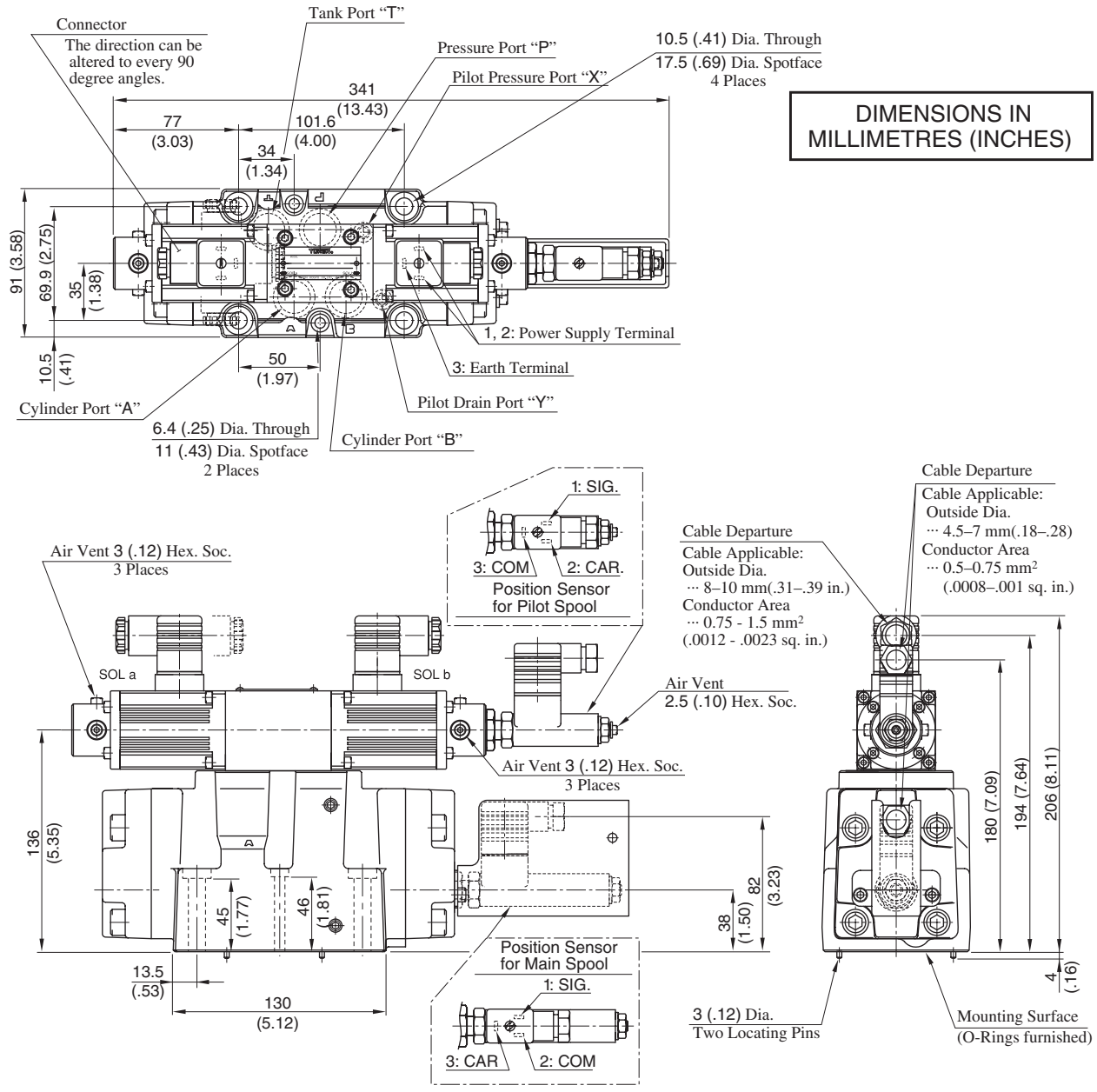
For stable performance, it is recommended that Yuken's applicable power amplifiers be used (for details see page 786).
Model Numbers: AMB-EL-∗-∗-∗-10

Attachment

Mounting Bolts

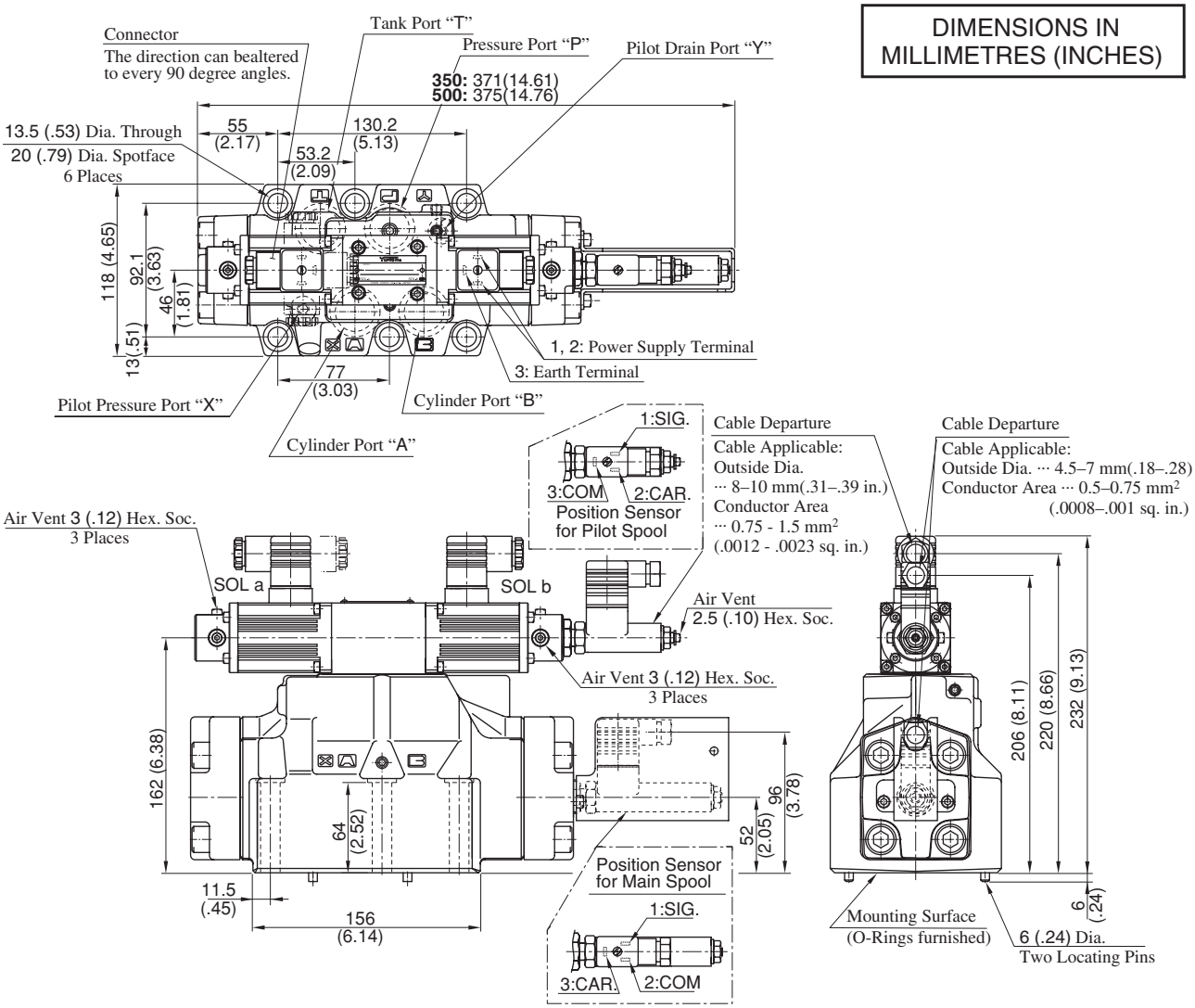
Model Numbers	Socket Head Cap Screw			
	Japanese Standard "JIS" European Design Standard	N. American Design Standard	Qty.	Tightening Torque Nm (in. lbs.)
ELDFHG-04	M6 × 55 Lg.	1/4-20 UNC × 2-1/4 Lg.	2	12 - 15 (106 - 133)
	M10 × 60 Lg.	3/8-16 UNC × 2-1/2 Lg.	4	58 - 72 (513 - 637)
ELDFHG-06	M12 × 85 Lg.	1/2-13 UNC × 3-1/2 Lg.	6	100 - 123 (885 - 1089)

ELDFHG-04-280-∗-XY-∗-∗-10/1090



ELDFHG-06-∗-∗-XY-∗-∗-10/1090

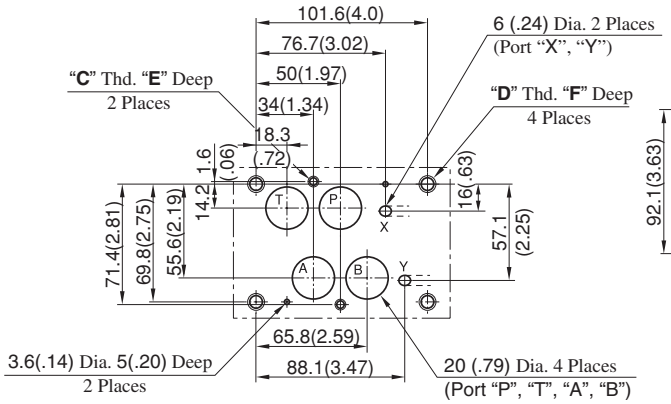
DIMENSIONS IN MILLIMETRES (INCHES)



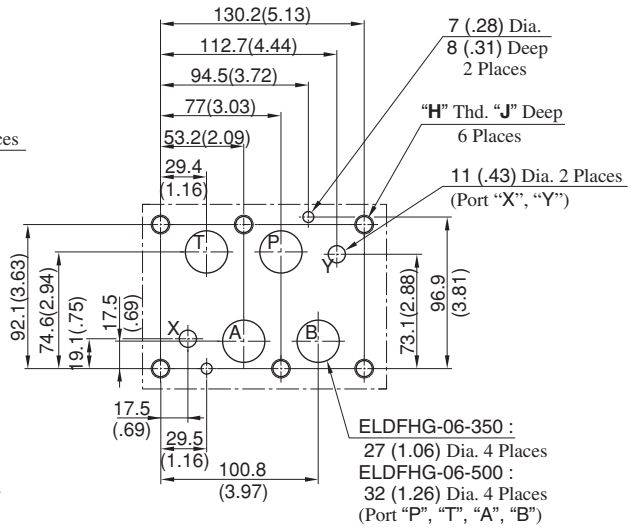
Dimensions of valve mounting surface

Prepare a mounting surface as shown to the below.
Also finish it finely.

● ELDFHG-04



● ELDFHG-06



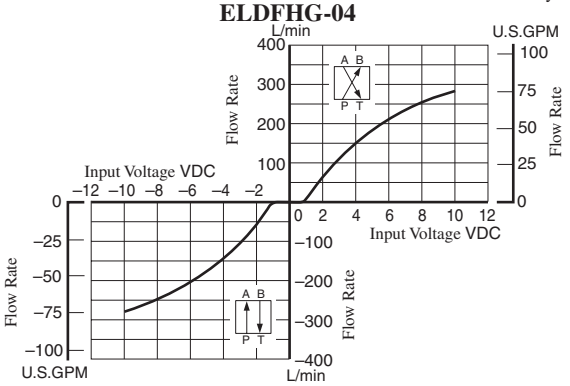
Model Numbers	"C" Thd.	"D" Thd.	"E" mm (in.)	F mm (in.)
ELDFHG-04-∗-∗-∗-∗-∗-10	M6	M10	12 (.47)	17 (.67)
ELDFHG-04-∗-∗-∗-∗-∗-1090	1/4-20 UNC	3/8-16 UNC	14 (.55)	20 (.79)

Model Numbers	"H" Thd.	J mm (in.)
ELDFHG-06-∗-∗-∗-∗-∗-10	M12	24 (.94)
ELDFHG-06-∗-∗-∗-∗-∗-1090	1/2-13 UNC	28 (1.10)

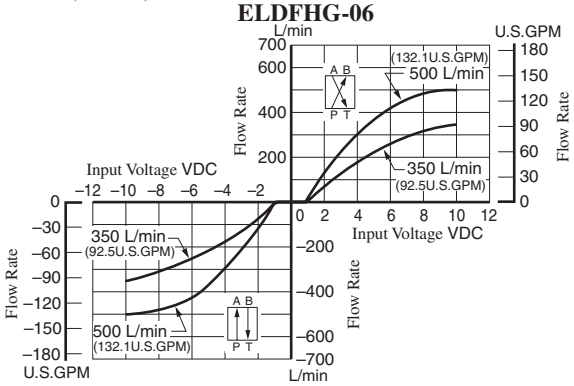
Input Voltage vs. Flow Rate

Valve Pres. Diff. : 1 MPa (145 PSI)
Viscosity : 30 mm²/s (141 SSU)

ELDFHG-04



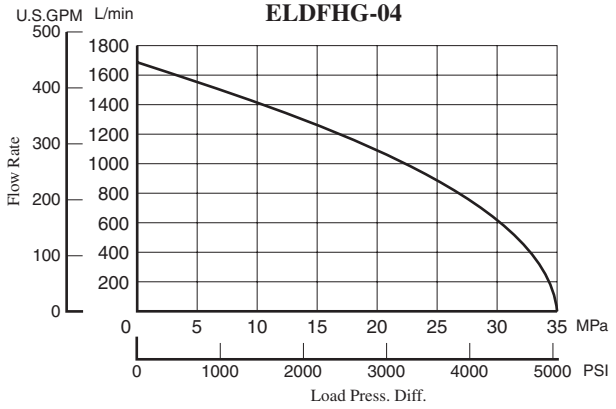
ELDFHG-06



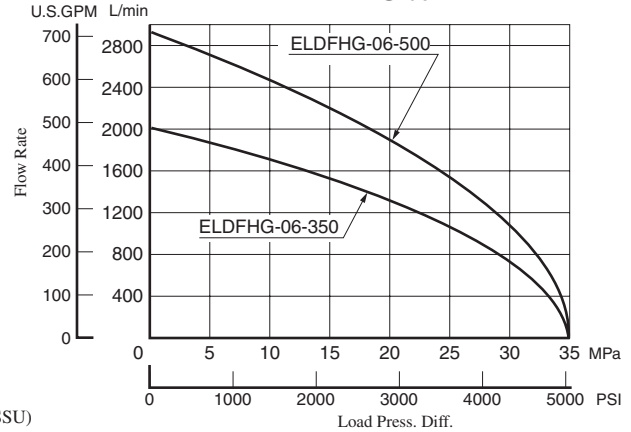
Load Flow Characteristics

Viscosity : 30 mm²/s (141 SSU)

ELDFHG-04



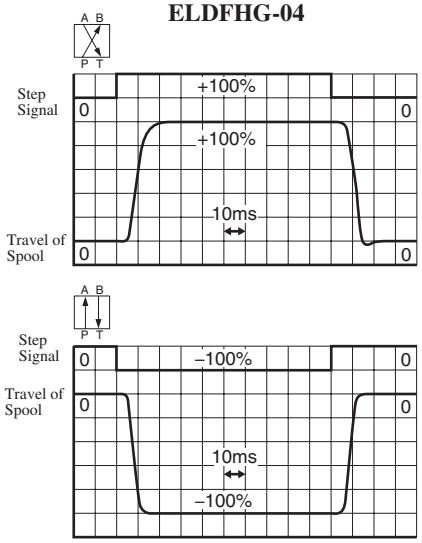
ELDFHG-06



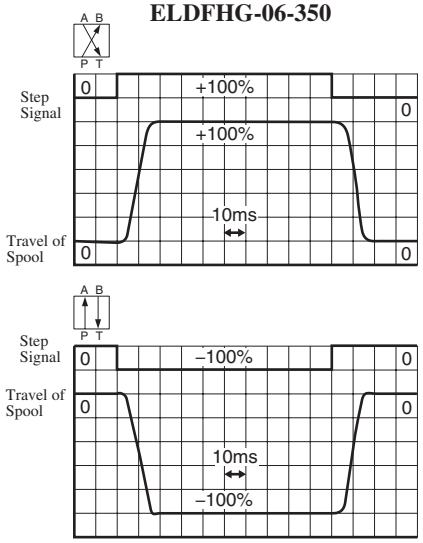
Step Response (Example)

Viscosity : 30 mm²/s (141 SSU)

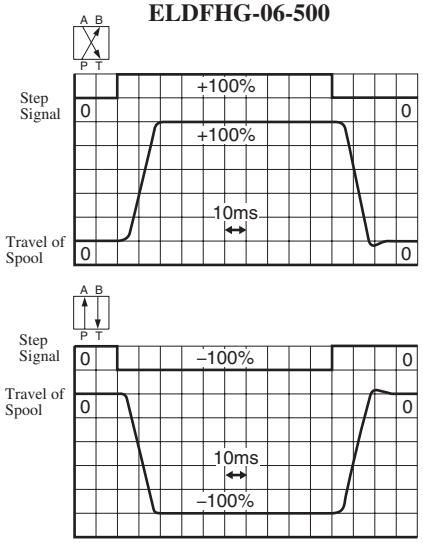
ELDFHG-04



ELDFHG-06-350



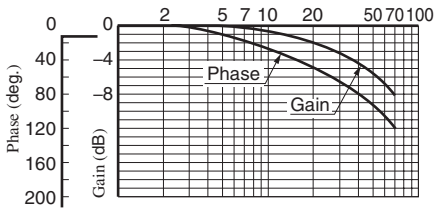
ELDFHG-06-500



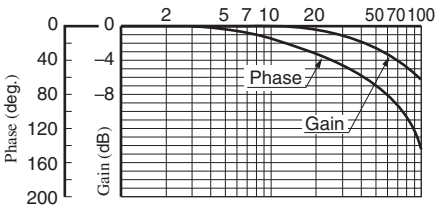
Frequency Response

Input Signal : 0 ±25 %
Hydrauric Circuit : Port A/B Closed
Supply and Pilot Pressure : 14 PMa (2030 PSI)
Viscosity : 30 mm²/s (140 SSU)

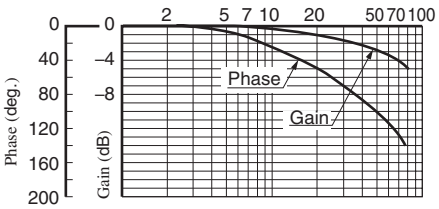
ELDFHG-04



ELDFHG-06-350

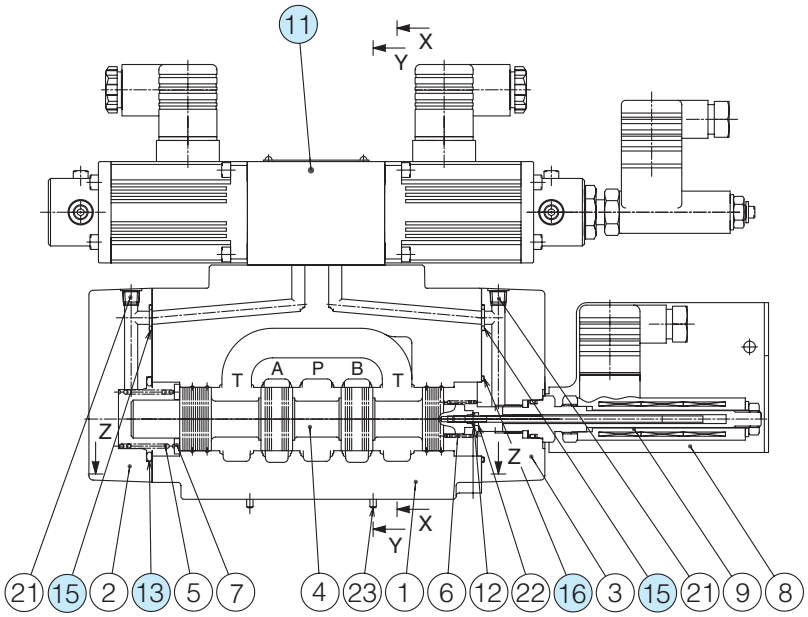


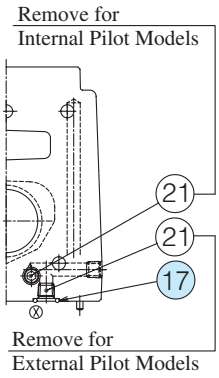
ELDFHG-06-500



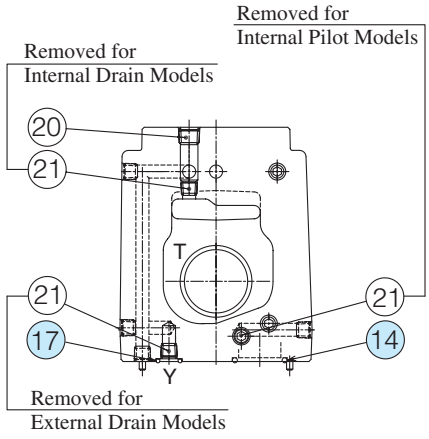
List of Seals and Pilot Valve

ELDFHG-04-280-∗-XY-∗∗-10/1090

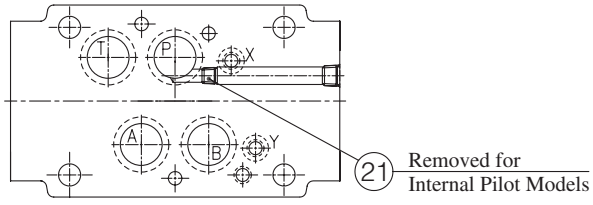




Section Y-Y



Section X-X



Section Z-Z

List of Seals

Item	Name of Parts	Part Numbers	Qty.	Remarks
13	O-Ring	SO-NB-P39	1	Included in Seal Kit Kit No.: KS-ELDFHG-01-10
14	O-Ring	SO-NB-P22	4	
15	O-Ring	SO-NB-P9	2	
16	O-Ring	SO-NB-A029	1	
17	O-Ring	SO-NB-A012	2	

Pilot Valve

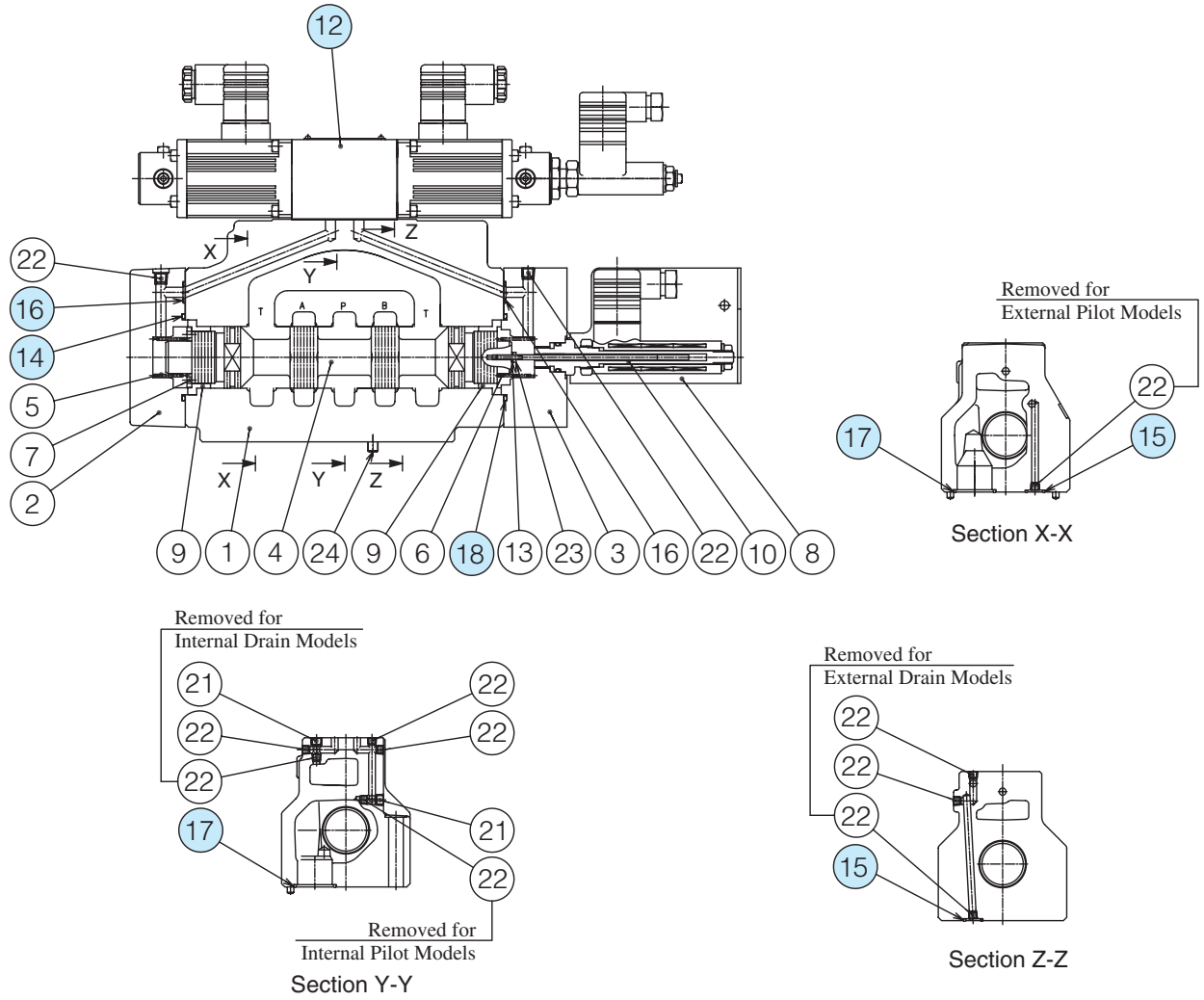
Valve Model No.	⑪ Pilot Valve Model No.
ELDFHG-04	ELDFG-01-30-3C2P-XY-1004

Note) See ELDFG-01-∗-∗-XY-10/1090 on page 758 for the corresponding seal and solenoid assembly for the pilot valve.

Note: When ordering seals, pease specify the seal kit number from the table above. In addition to the above o-rings, seals for pilot valve are included in the seal kit. For the detail of the pilot valve seals, see page 758.

List of Seals and Pilot Valve

ELDFHG-06-∗-∗-XY-∗∗-10/1090



List of Seals

Item	Name of Parts	Part Numbers		Qty.
		ELDFHG-06-350	ELDFHG-06-500	
14	O-Ring	SO-NB-P40	SO-NB-A135	1
15	O-Ring	SO-NB-P14		2
16	O-Ring	SO-NB-P10		2
17	O-Ring	SO-NB-A123	SO-NB-A126	4
18	O-Ring	SO-NB-A030	SO-NB-A135	1

Note: When ordering seals, pease specify the seal kit number from the table above. In addition to the above o-rings, seals for pilot valve are included in the seal kit. For the detail of the pilot valve seals, see page 758.

Seal Kit Numbers

Valve Model Numbers	Seal Kit Numbers
ELDFHG-06-350-∗-XY-∗∗-10/1090	KS-ELDFHG-06-350-10
ELDFHG-06-500-∗-XY-∗∗-10/1090	KS-ELDFHG-06-500-10

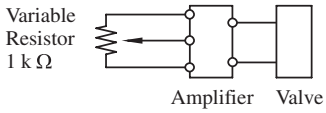
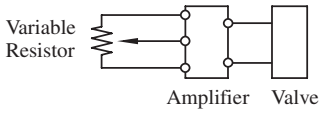
Pilot Valve

Valve Model No.	⑫ Pilot Valve Model No.
ELDFHG-06	ELDFG-01-30-3C2P-XY-1006

Note) See ELDFG-01-∗-∗-XY-10/1090 on page 758 for the corresponding seal and solenoid assembly for the pilot valve.

Power Amplifiers / Setting Adjusters For Proportional Electro-Hydraulic Control Valves

These are power amplifiers to be used exclusively to operate the electro-hydraulic proportional valves. Various type and models on available for a variety of applications.

Type	Model Numbers	Applicable to Control Valve	Function
DC Input	AME-D-10-∗-20	Pressure or Flow Control (For 10 Ω Sol.)	By giving the command of DC voltage (0 –10 V) to the amplifier, current in proportion to that voltage will flow into the solenoid of the control valve in order to control pressure or flow rate. An external setting unit which makes the command voltage of 0 –10 V and a DC power supply (or a function generator) are necessary, but if a variable resistor for external setting is only one, the internal power supply for amplifier can be used. 
	AME-D-40-∗-40	Flow Control (For 40 Ω Sol.)	
	AME-D2-H1-∗-12	Flow Control and Relief (For 40Ω -10Ω Sol.)	
	AME-D2-1010-∗-11	Flow Control and Relief (For 10Ω -10Ω Sol.)	
DC Input-Feedback	SK1022-∗-∗-11	Pressure or Flow Control (For 10 Ω Sol.)	Basically, this is a DC input type with a feedback operating unit. This is for high-accuracy control and used to feedback the pressure or flow rate converted to electric signals.
	AME-DF-S-∗-22	Flow Control (For 40 Ω Sol.)	
Slow Up-Down	AME-T-S-∗-22	Flow Control (For 40 Ω Sol.)	A slow up-down signal generator and the functions of a DC input type are incorporated. This is used to control the pressure or flow rate by slow up-down pattern and the command signals are given by relay contacts, limit switches, timer contacts, etc.
DC Input For DC Power 24 V DC	SK1015-11 AMN-D-10 AMN-W-10	Pressure or Flow Control (For 10 Ω Sol.)	An amplifier which is operated by a battery power supply (24 V). By giving the command of DC voltage to the amplifier, current in proportion to that voltage will flow in the solenoid of the control valve in order to control pressure or flow rate. An external setting unit which makes the command voltage and a DC power supply (or a function generator) are necessary, but if a variable resistor for external setting is only one, the internal power supply for amplifier can be used.  SK1015 amplifier can be used in automobile construction machine.
	SK1091-D24-10	Directional and Flow Control	
DC Input with Minor Feedback	AMN-L-01-∗-∗-10	High Response Type Directional and Flow Control	An amplifier which is operated by a battery power supply (24V). This is for high-response, high-accuracy control and used to feedback the pressure or flow rate converted to electric signals.
	AMB-EL-∗-∗-∗-∗-10		
Shockless	AMN-G-10	Shockless Directional and Flow Control	Outputs shockless patterns, low speed (Level 1) high-speed (Level 2) low speed (Level 3). Shockless speed control is enabled just by providing SOL a and SOL b only contact signals in the same control mode as the mode for the "G" series of shifting time adjustable type shockless valves.

Instructions

- The power amplifiers should be kept away from hot and humid conditions which may deteriorate some components of the power amplifiers. They also should be installed in the clean and dry place where the vibration is minimal.
  Please avoid to install the power amplifiers in the complete enclosure or get them enclosed totally as they need to radiate the heat from semiconductors or ICs inside.
- Please use shielded wires for input signal transmission to prevent the amplifiers from any interference such as noise from outside.

Power Amplifiers For 10Ω Series Control Valves

These power amplifiers are used to drive the 10Ω series proportional electro-hydraulic pressure or flow control valves.

Model Number Designation

AME	-D	-10	-100	-20
Series Number	Type of Function	Coil Resistance of Valve	Power Supply	Design Number
AME	**D**: DC Input Type	**10**: 10 Ω	**100**: 100 V AC **200**: 200 V AC	**20**

SK1022	-A	-100	-11
Series Number	Type of Function	Power Supply	Design Number
SK1022: DC Input-Feedback Type	**A**: Polarity of Feedback Voltage...(–) **B**: Polarity of Feedback Voltage...(+)	**100**: 100 V AC **200**: 200/220 V AC	**11**
SK1015: DC Input Type for DC Power Supply	———	———★	**11**

★Use with 24 V DC since this is for a battery power supply.

Applicable to Valve

Name of Valve	Model Numbers
Pilot Relief Valves	EDG-01∗
Relief Valves	EBG-03 EBG-06 EBG-10
Relieving and Reducing Valves	ERBG-06 ERBG-10
10 Ω Series Flow Control Valves	EFG-03/06 EFCG-03/06 (51 Design)
Flow Control and Relief Valves	EFBG-03 EFBG-06 EFBG-10

Specifications

Description \ Model No.	AME-D-10-∗-20	SK1022-A-∗-11	SK1022-B-∗-11	SK1015-11
Type of Fuction	DC Input Type	DC Input Feedback Type	DC Input Feedback Type	DC Input Type
Max. Output Current	1 A (10 Ω Solenoid)	1 A (10Ω Solenoid)	1 A (10Ω Solenoid)	0.9 A (10Ω Solenoid)
Max. Input Voltage	+ 10 V DC	+ 10 V DC	+ 10 V DC	+ 10 V DC
Feedback Voltage	—	0 to –10V	0 to +10V	—
Input Impedance	10 kΩ	50 kΩ	50 kΩ	50 kΩ
Max. Gain	1 A / 5 V	1 A / 0.5 V	1 A / 0.5 V	0.9 A / 5 V
Dither	Variable	Fix	Fix	Fix
Temperature Drift (Max.)	0.2 mA /°C	0.2 mA /°C	0.2 mA /°C	1 mA /°C
Power Supply	100 V AC, 200 V AC (50/60 Hz)★	100 V AC, 200/220 V AC ±10% (50/60 Hz)		22-30 V DC
Power Input (Max.)	55 VA	45 VA	45 VA	25 VA
Ambient Temperature	0-50°C (32-122°F)	0-50°C (32-122°F)	0-50°C (32-122°F)	0-50°C (32-122°F)
External Setting Resistance	1 kΩ	1 kΩ	1 kΩ	10 kΩ
Mass	2.1 kg (4.6 lbs.)	4.5 kg (9.9 lbs.)	4.5 kg (9.9 lbs.)	0.4 kg (.88 lbs.)

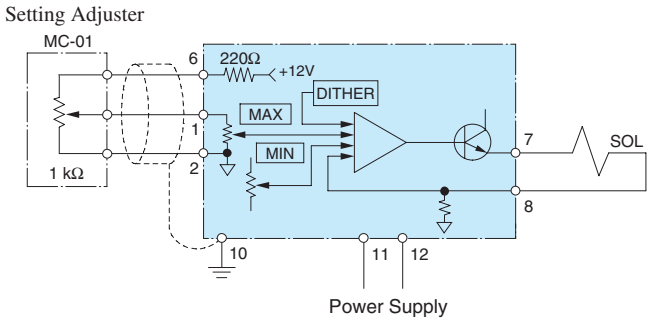
★Serviceable Range; 100 VAC can be used from 90 to 132 VAC, 200 VAC can be used from 180 to 264 VAC.

Instructions

Power supply for the setting adjuster can be provided from this power amplifier, but for only one.
However, please use the variable resistor or potentiometre of which impedance is 1 kΩ (in case of madel SK1015, use 10 kΩ) for the setting adjuster.

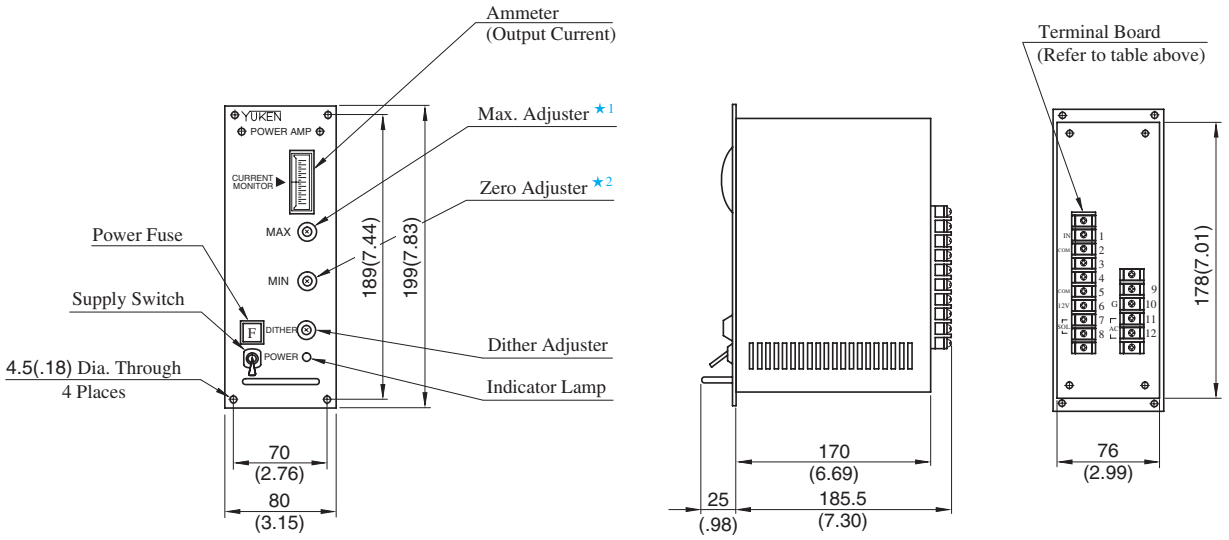
AME-D-10-∗-20

[Example Diagram]



Detail of Terminal Board

Terminal Number	Name	
1	Input Signal	IN
2	Input Signal	COM
3	—	
4	—	
5	Input Signal	COM
6	Internal Power Supply	+12 V
7	Output to Valve Solenoid	SOL
8		
9	—	
10	Ground	G
11	Power Supply 100/200 VAC	
12		

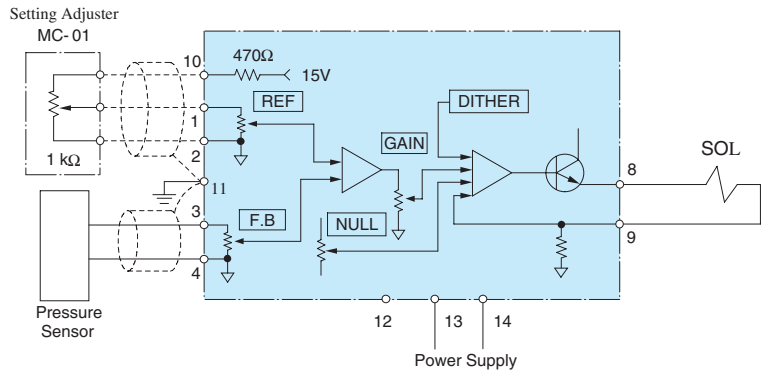


★1. Adjustment of upper limit of usable range
★2. Adjustment of lower limit of usable range

DIMENSIONS IN MILLIMETRES (INCHES)

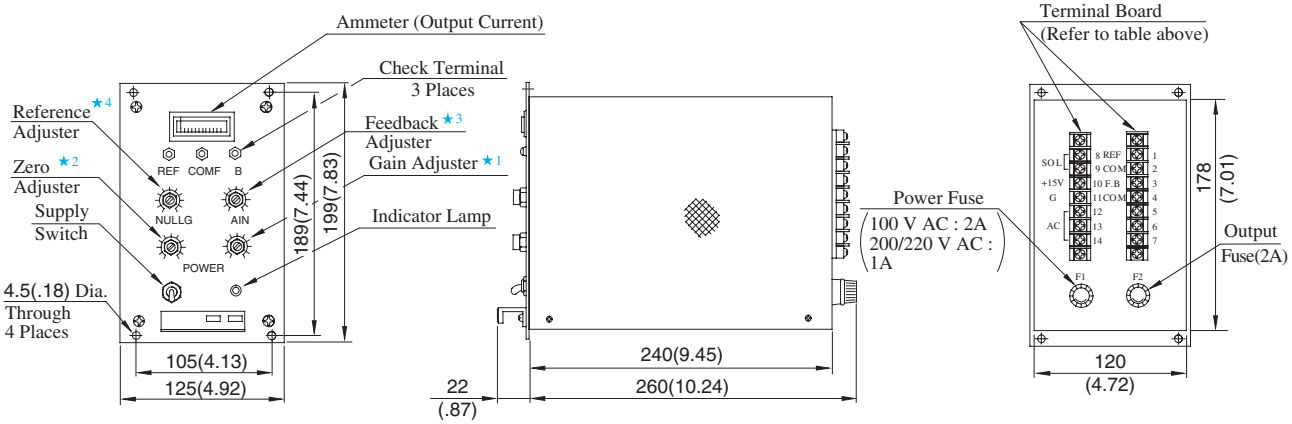
SK1022-$\frac{A}{B}$-∗-11

[Example Diagram]



Detail of Terminal Board

Terminal Number	Name	
1	Input Signal	REF
2	Input Signal	COM
3	Feedback Signal	F.B
4	Feedback Signal	COM
5	—	
6	—	
7	—	
8	Output to Valve Solenoid	SOL
9		
10	Power Supply for Setting Adjuster (10 V at 1 kΩ)	+15V
11	Ground	G
12	Power Supply 100 V AC, 200V AC : 13, 14 220 V AC : 12, 14	
13		
14		

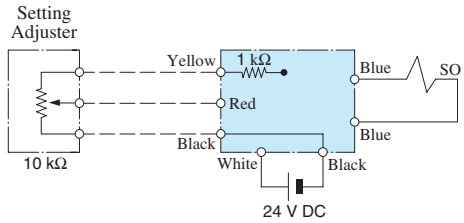


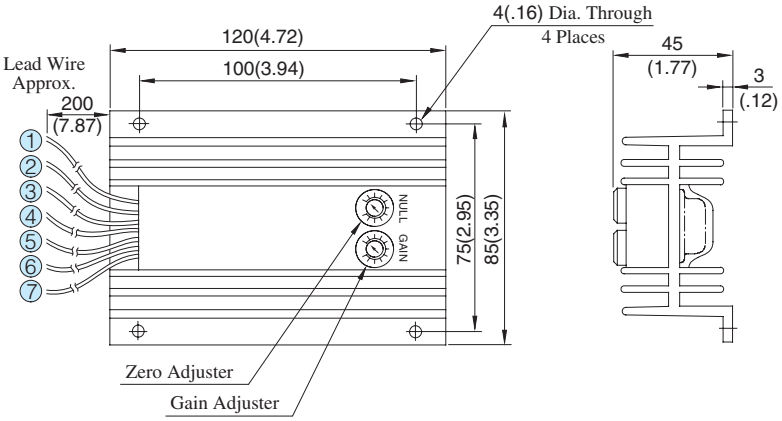
★1. Adjustment of upper limit of usable range
★2. Adjustment of lower limit of usable range
★3. Adjustment of feedback voltage ratio
★4. Adjustment of input voltage ratio

DIMENSIONS IN MILLIMETRES (INCHES)

SK1015-11

[Example Diagram]





Lead Wire Detail

① White.....Plus of 24 V DC
② Black.....Zero of 24 V DC
③ Blue.....
④ Blue..... } Output to Valve Solenoid
⑤ Yellow.....15 V Power Supply for Setting Adjuster (10 V at 10 kΩ)
⑥ Red.....Input Signal
⑦ Black.....Zero of Input Signal

DIMENSIONS IN MILLIMETRES (INCHES)

Instructions

Supply Switch

The power amplifier has no power supply switch.
As soon as it is connected to a power supply, it comes to be alive. Provide a power switch externally.

Compact Power Amplifiers For 10Ω Series Control Valves

Compact power amplifiers for 10Ω proportional solenoids. The power supply is 24 V DC. It uses a new circuitry to be slow to heat.

Model Number Designation

AMN	-D	-10
Series Number	Type of Function	Design Number
AMN	**D**: DC Input Type	**10**

Specifications

Description \ Model No.	AMN-D-10
Type of Function	DC Input Type
Max. Output Current	1 A (10Ω Solenoid)
Power Input (Max.)	+ 10 V DC
Input Impedance	10 kΩ
Max. Gain	1 A / 5 V
Dither	Variable
Temperature Drift (Max.)	0.2 mA /°C
Power Supply	24 V DC (20 - 30 V DC)
Max. Input Power	25 W
Ambient Temperature	0 - 50°C (32 - 122°F)
External Setting Resistance	1 kΩ
Approx. Mass	0.2 kg (.44 lbs.)

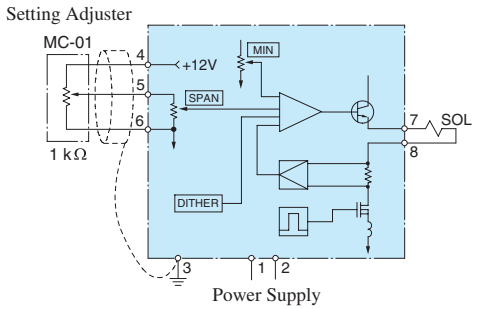
Applicable to Valve

Name of Valve	Model Numbers
Pilot Relief Valves	EDG-01∗
Relief Valves	EBG-03 EBG-06 EBG-10
Relieving and Reducing Valves	ERBG-06 ERBG-10
10Ω Series Flow Control Valves	EFG-03/06 EFCG-03/06 (51 Design)
10Ω-10Ω Series High Flow Series Flow Control and Relief Valves	EFBG-03 EFBG-06 EFBG-10

AMN-D-10

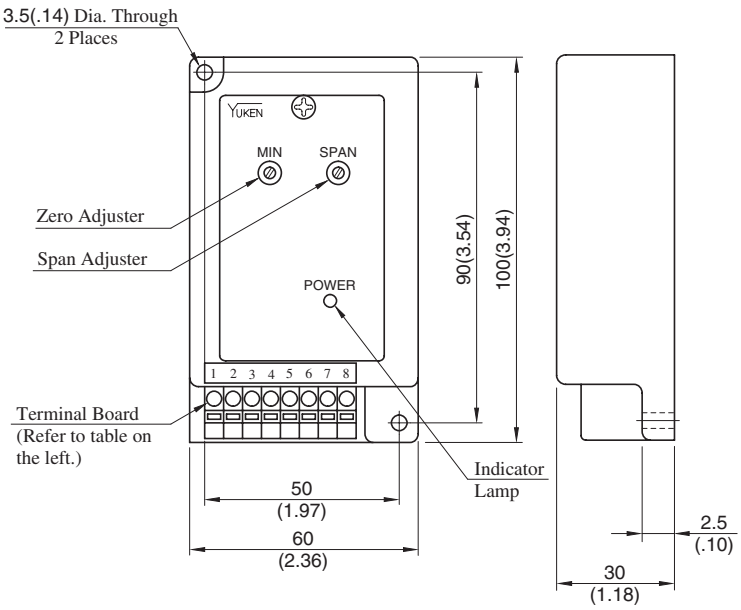
DIMENSIONS IN MILLIMETRES (INCHES)

[Example Diagram]



Detail of Terminal Board

Terminal Number	Name	
1	Power Supply	+24 V
2	Power Supply	0 V
3	Ground	G
4	Internal Power Supply	+12 V
5	Input Signal	IN
6	Input Signal	COM
7	Output to Valve Solenoid	SOL
8		



H Power Amplifiers

Power Amplifiers For 40Ω Series Flow Control Valves

These power amplifiers are used to drive the 40Ω series proportional electro-hydraulic flow control valves.

Model Number Designation

AME	-D	-40	-100	-40
Series Number	Type of Function	Coil Resistance of Valve	Power Supply	Design Number
AME	**D**: DC Input Type	**40**: 40 Ω	**100**: 100 V AC **200**: 200 V AC	40

AME	-DF	-S	-100	-22
Series Number	Type of Function	Type of Mounting	Power Supply	Design Number
AME	**DF**: DC Input Feedback Type	**S**: Panel Mounting Type	**100**: 100 V AC	22
	T: Slow Up Down Type		**200**: 200/220 V AC	22

Applicable to Valve

Name of Valve	Model Numbers
40 Ω Series Flow Control Valves	EFG EFCG -02 (31 Design)
	EFG EFCG -03 (26 Design)
	EFG EFCG -06 (22 Design)
	EFG EFCG -10 (11 Design)

Specifications

Description \ Model No.	AME-D-40-∗-40	AME-DF-S-∗-22	AME-T-S-∗-22
Type of Fuction	DC Input Type	DC Input Feedback Type	Slow Up Down Type
Max. Output Current	0.8 A (40 Ω Solenoid)	0.8 A (40 Ω Solenoid)	0.8 A (40 Ω Solenoid)
Max. Input Voltage	+ 10 V DC	+ 10 V DC	—
Feedback Voltage	—	0 to –10 V	—
Input Impedance	10 kΩ	50 kΩ	—
Slow Up Down Range	—	—	0.05 – 1 s/100 mA
Max. Gain	0.8 A / 5 V	0.8 A / 5 V	—
Dither	Fix	Fix	Fix
Temperature Drift (Max.)	0.2 mA /°C	0.2 mA /°C	0.2 mA /°C
Power Supply	100 V AC, 200/220 V AC ±10% (50/60 Hz)		
Power Input (Max.)	70 VA	90 VA	90 VA
Ambient Temperature	0–50°C (32–122°F)	0 – 50°C (32 – 122°F)	0 – 50°C (32 – 122°F)
External Setting Resistance	1 kΩ	1 kΩ	—
Approx. Mass	2.8 kg (6.2 lbs.)	4.5 kg (9.9 lbs.)	4.5 kg (9.9 lbs.)

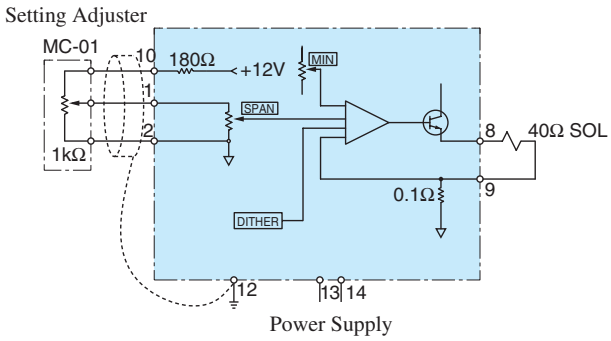
Instructions

- **Power supply of the outside setting adjuster**

When DC input type (AME-D-40) or DC input-feedback type (AME-DF-S) power amplifier is used, power supply for the setting adjuster can be provided from this power amplifier, but for only one. However, please use the variable resistor or potentiometre of which impedance is 1 kΩ for the setting adjuster.

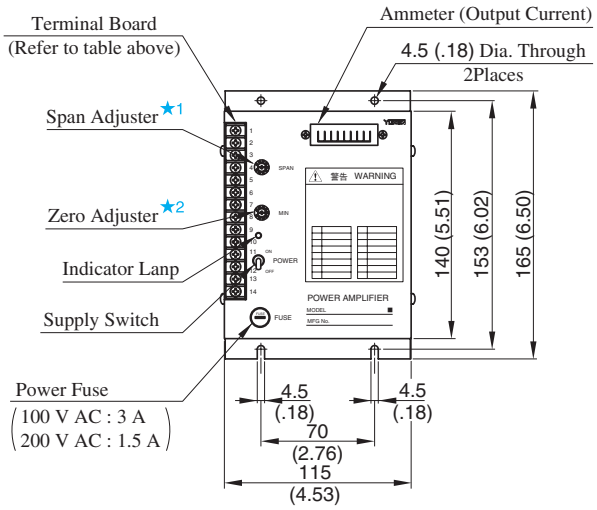
AME-D-40-∗-40

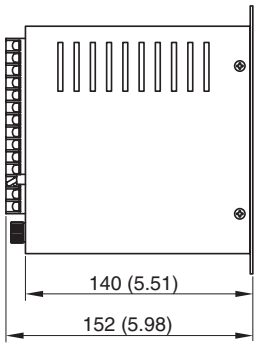
[Example Diagram]



● Detail of Terminal Board

Terminal Number	Name	
1	Input Signal	IN
2	Input Signal	COM
3	—	
4	—	
5	Internal Power Supply	–5V
6	Feedback Signal	MFB
7		COM
8	Output to Valve Solenoid	SOL
9		
10	Internal Power Supply	+12V
11	—	
12	Frame Ground	FG
13	Power Supply	VAC
14		VAC



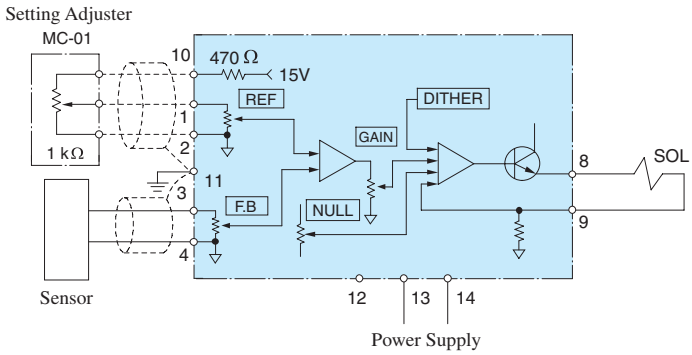


★1. Adjustment of upper limit of usable range
★2. Adjustment of lower limit of usable range

DIMENSIONS IN MILLIMETRES (INCHES)

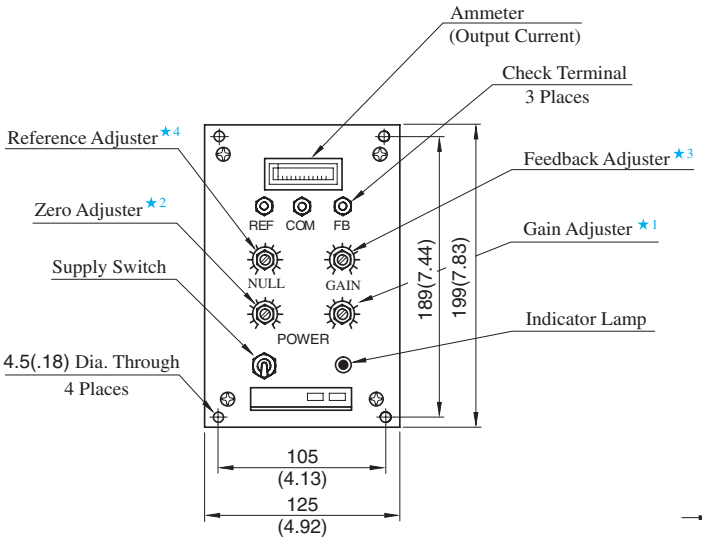
AME-DF-S-∗-22

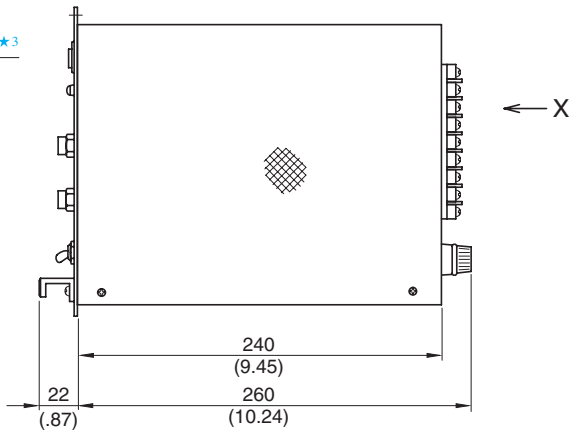
[Example Diagram]



● Detail of Terminal Board

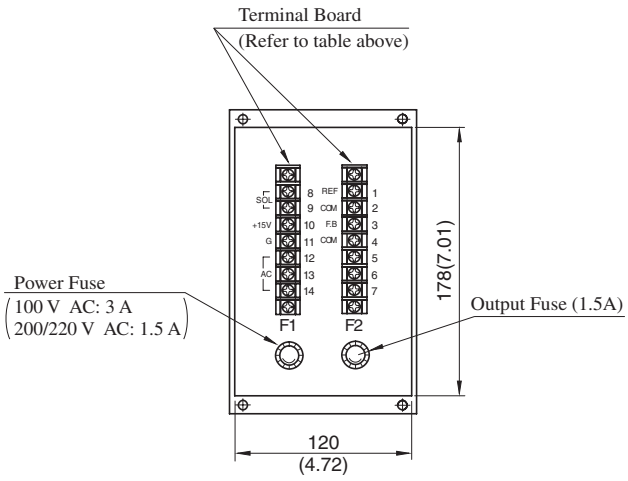
Terminal Number	Name	
1	Input Signal	REF
2	Input Signal	COM
3	Feedback Signal	F.B
4	Feedback Signal	COM
5	—	
6	—	
7	—	
8	Output to Valve Solenoid	SOL
9		
10	Power Supply for Setting Adjuster (10 V at 1 kΩ)	+15 V
11	Ground	G
12	Power Supply 100 V AC, 200 V AC: 13, 14 220 V AC: 12, 14	
13		
14		





★1. Adjustment of upper limit of usable range
★2. Adjustment of lower limit of usable range
★3. Adjustment of feedback voltage ratio
★4. Adjustment of input voltage ratio

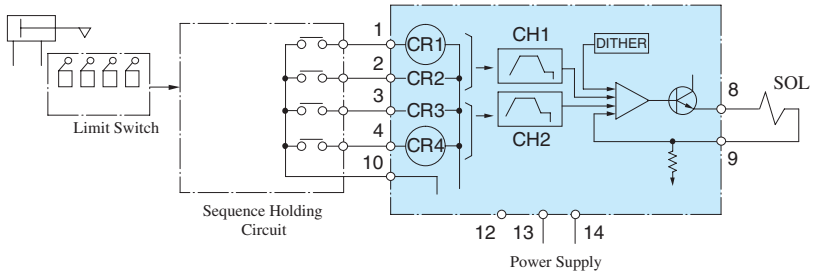
DIMENSIONS IN MILLIMETRES (INCHES)



View Arrow X

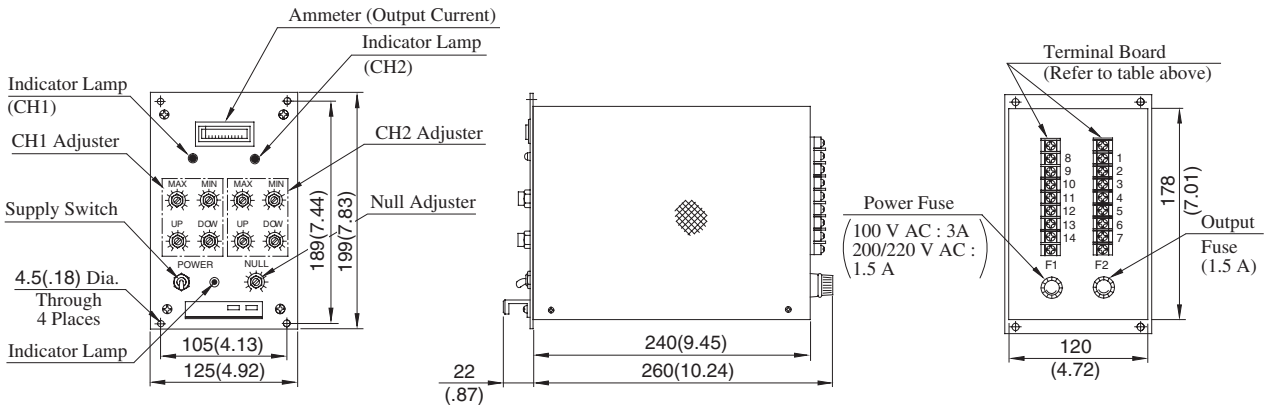
AME-T-S-∗-22

[Example Diagram]

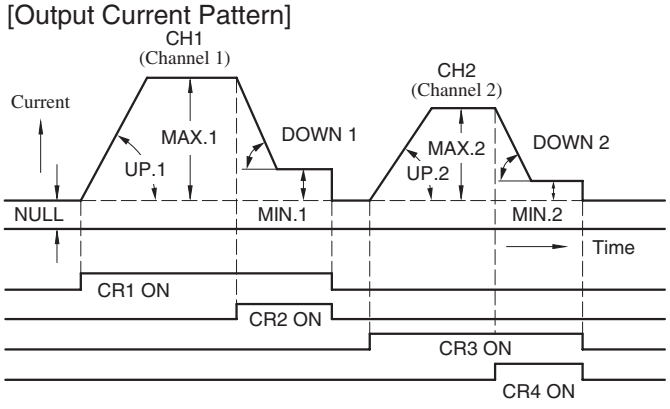


● Detail of Terminal Board

Trminal Number	Name	
1	Input Command	CR1
2	Input Command	CR2
3	Input Command	CR3
4	Input Command	CR4
5	—	
6	—	
7	—	
8	Output to Valve Solenoid	SOL
9		
10	Input Command	CR. COM
11	Ground	G
12	Power Supply 100 V AC, 200 V AC: 13, 14 220 V AC: 12, 14	
13		
14		



[Output Current Pattern]



DIMENSIONS IN MILLIMETRES (INCHES)

Note: 1. CR1 to CR4: Relays in the power amplifier.
The output patterns CH1 and CH2 can not be obtained simultaneously nor can they be transmitted halfway to another pattern.
2. The words such as MAX, MIN, UP and DOWN show the volume adjustment of the power amplifier.

How to Calculate Accelerating and Decelerating Time (Example)

Question: Wish to accelerate and decelerate the actuator in between 5 L/min (1.32 U.S. GPM) and 25 L/min (6.6 U.S. GPM) in the use of proportional flow control valve model EFG-02-30-31∗.
In such case, what are the manimum and minimun time adjustable for the acceleration and deceleration?

Answer: The input current for EFG-02-30-31∗ at the flow rate of 5 L/min (1.32 U.S. GPM) and 25 L/min (6.6 U.S. GPM) can be obtained respectively from the chart below. The chart shows:

Input current at 5 L/min (1.32 U.S. GPM) 300 mA
Input current at 25 L/min (6.6 U.S. GPM) 520 mA

Then, the difference between the above two can be obtained with the following formula:

520 mA – 300 mA = 220 mA

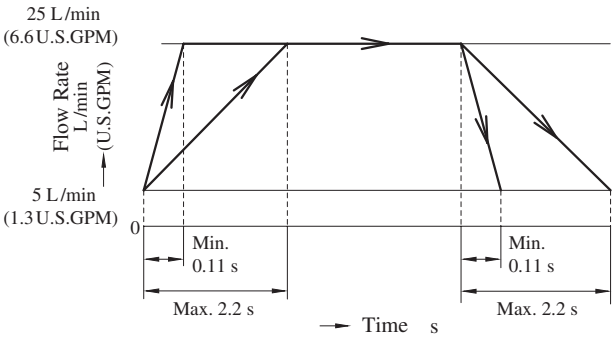
While, the speecification for the model AME-T-S shows the amplifier's gradient for acceleration or deceleration as being between 0.05 s/100 mA and 1.0 s/100 mA (which means that the minimum time is 0.05 second and the maximum time is 1.0 second for every 100 mA variation).
Therefore, the minimum and maximum adjustable time can be obtained as follows:

$$\frac{220\ mA}{100\ mA} \times 0.05 \text{ second} = 0.11 \text{ second (Minimum)}$$

$$\frac{220\ mA}{100\ mA} \times 1.0 \text{ second} = 2.2 \text{ second (Maximum)}$$

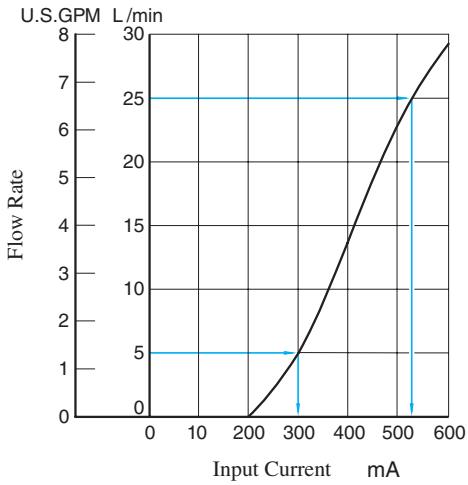
The result above are as illustrated on the below.

[Flow Pattern]



[Input Current vs. Flow]

EFG-02



Interchangeability in Installation Current and New Design

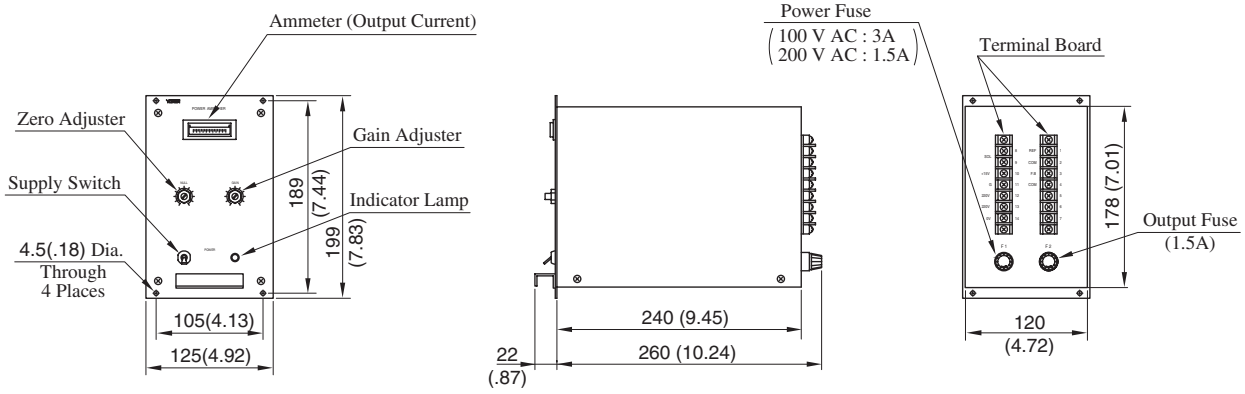
Specification

Electricity consumption is different by Current and New Design.
The other specifications remain unchanged.

Electricity Consumption	
Current : 32 Design	New : 40 Design
90 VA	70 VA

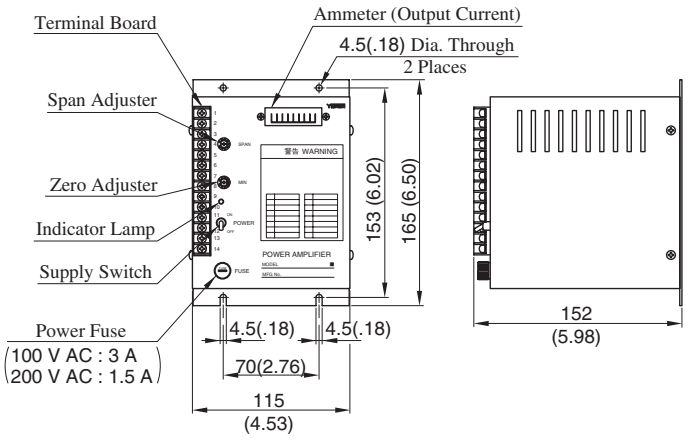
Installation Interchangeability : None

AME-D-S-∗-32



DIMENSIONS IN MILLIMETRES (INCHES)

AME-D-40-∗-40



Power Amplifiers For 40Ω - 10Ω Series Control Valves

These power amplifiers are specially designed to combine and incorporate the functions of pressure control (10Ω solenoid) and flow control (40Ω solenoid) into one and can be used for the proportional electro-hydraulic flow control and relief valves of which model numbers are as shown below.

Model Number Designation

AME	-D2	-H1	-100	-12
Series Number	Type of Function	Type of Mounting	Power Supply	Design Number
AME	**D2**: DC Input Type	**H1**: Wall Tapestry Type	**100**: 100 V AC **200**: 200/220 V AC	**12**

Applicable to Valve

Name of Valve	Model Numbers
40Ω - 10Ω Series Flow Control and Relief Valve	EFBG-03-125-C/H-17∗ EFBG-06-250-C/H-17∗ EFBG-10-500-C/H-17∗

Specifications

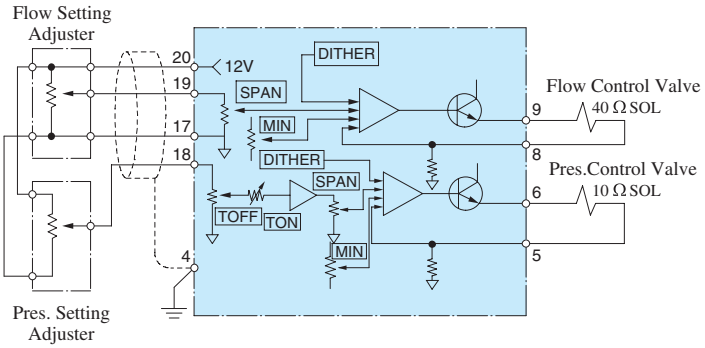
Model No. / Description	AME-D2-H1-∗-12	
	Flow Controls (40Ω Solenoid)	Pressure Controls (10Ω Solenoid)
Type of Function	DC Input Type	DC Input Type
Max. Output Current	0.8 A (40Ω Solenoid)	1 A (10Ω Solenoid)
Max. Input Voltage	+10 V DC	+10 V DC
Input Impedance	10 kΩ	10 kΩ
Max. Gain	0.8 A / 5 V	1 A / 5 V
Dither	Fix	Fix
Temperature Drift (Max.)	0.2 mA /°C	0.2 mA /°C
Power Supply	100 V AC, 200/220 V AC ± 10% (50/60 Hz)	
Power Input (Max.)	130 VA	
Ambient Temperature	0-50°C (32-122°F)	
External Setting Resistance	1 kΩ	1 kΩ
Approx. Mass	5.6 kg (12.3 lbs.)	

Instructions

Power supply for the setting adjuster up to two set can be provided from this power amplifier. However, please use the variable resistor or potentiometre of which impedance is 1 kΩ for the setting adjuster.

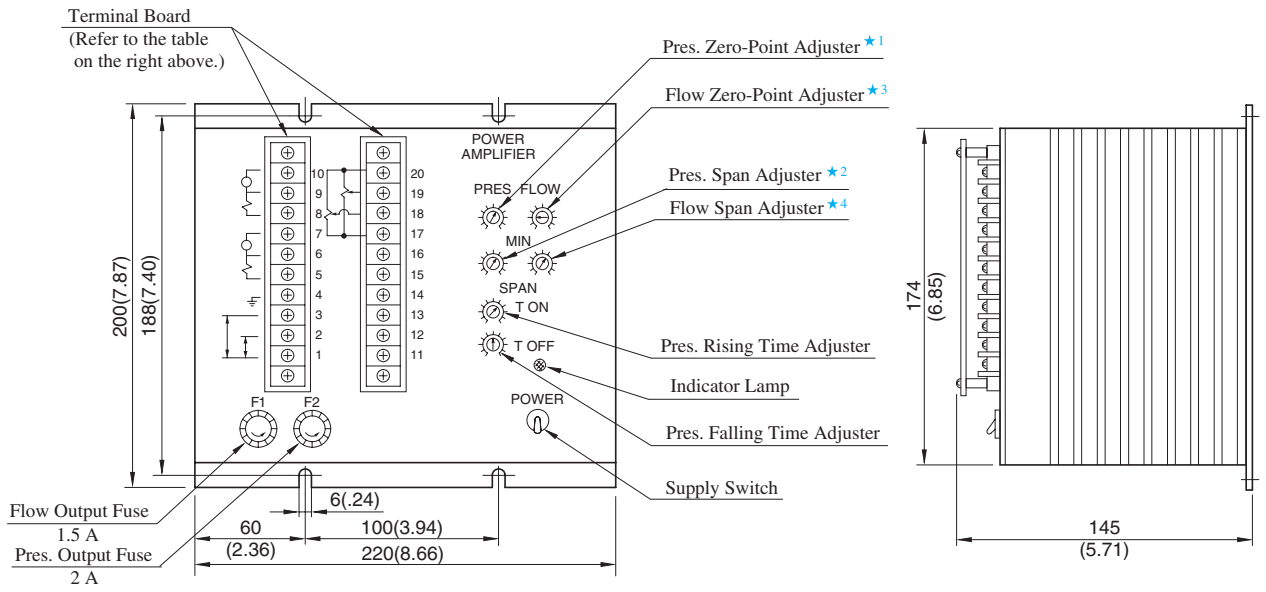
AME-D2-H1-∗-12

[Example Diagram]



● Detail of Terminal Board

Terminal Number	Name	
1	Power Supply 100 V AC, 200 V AC: 1, 2 220 V AC: 1, 3	
2		
3		
4	Ground	G
5	Output to Pressure Control Valve (10 Ω) Solenoid	PR. SOL
6		
7	Ammeter	
8	Output to Flow Control Valve (40 Ω) Solenoid	FL. SOL
9		
10	Ammeter	
11	Common	COM
12	—	
13	—	
14	-12 V OUT	-12 V
15	Common	COM
16	+12 V OUT	+12 V
17	Common	COM
18	Input Signal for PRES.	PR.IN
19	Input Signal for FLOW	FL.IN
20	+12 V OUT	+12 V



★1. Minimum Pressure Setting
★2. Variable Pressure Range Setting
★3. Minimum Flow Setting
★4. Variable Flow Range Setting

DIMENSIONS IN MILLIMETRES (INCHES)

Power Amplifiers For 10Ω - 10Ω Series Control Valves

These power amplifiers can drive two solenoid of 10Ω load simultaneously or separately, and the control can be done in the same way even though the object is separated by pressure system and flow rate system. Although the display of control unit on the front panel is PRESS and FLOW , they are exactly the same circuit, so there is no distinction between the two system when used.

Model Number Designation

AME	-D2	-1010	-11
Series Number	Type of Function	Coil Resistance of Valve	Design Number
AME	**D2**: DC Input Type	**1010**: 10 Ω × 2	11

Specifications

Model No. / Description	AME-D2-1010-11
Type of Function	DC Input Type
Max. Output Current	1 A (10Ω Solenoid)
Max. Input Voltage	+ 10 V DC
Input Impedance	10 kΩ
Max. Gain	1 A / 5 V
Dither	Variable 100-300 mA
Temperature Drift (Max.)	0.2 mA /°C
Power Supply	85 - 264 VAC
Power Input (Max.)	120 VA
Ambient Temperature	0-50°C (32-122°F)
External Setting Resistance	1 kΩ
Approx. Mass	4.3 kg (9.5 lbs.)

Applicable to Valve

Name of Valve	Model Numbers
Pilot Relief Valves	EDG-01∗
Relief Valves	EBG-03 EBG-06 EBG-10
Relieving and Reducing Valves	ERBG-06 ERBG-10
10Ω Series Flow Control Valves	EFG-03/06 EFCG-03/06
10Ω-10Ω Series High Flow Series Flow Control and Relief Valves	EFBG-03 EFBG-06 EFBG-10

Applicable to Piston Pump

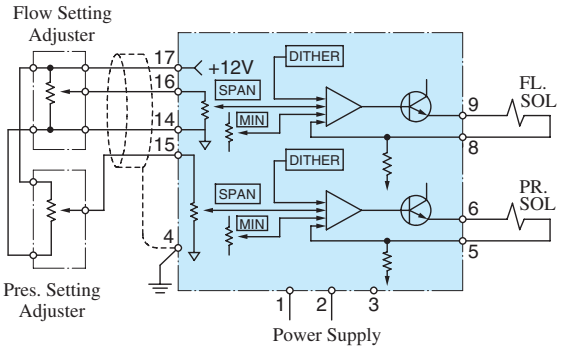
Name of Pump	Model Numbers
"A" Series Variable Displacement Piston Pump (Proportional Electro-Hydraulic Load Sensing Type)	A16-∗-R-04 A22-∗-R-04 A37-∗-R-04 A56-∗-R-04 A70-∗R04 A90-∗R04 A145-∗R04 Also, double pumps combined with the models listed above and fixed displacement vane pumps.

Instructions

Power supply for the setting adjuster up to two set can be provided from this power amplifier. However, please use the variable resistor or potentiometre of which impedance is 1 kΩ for the setting adjuster.

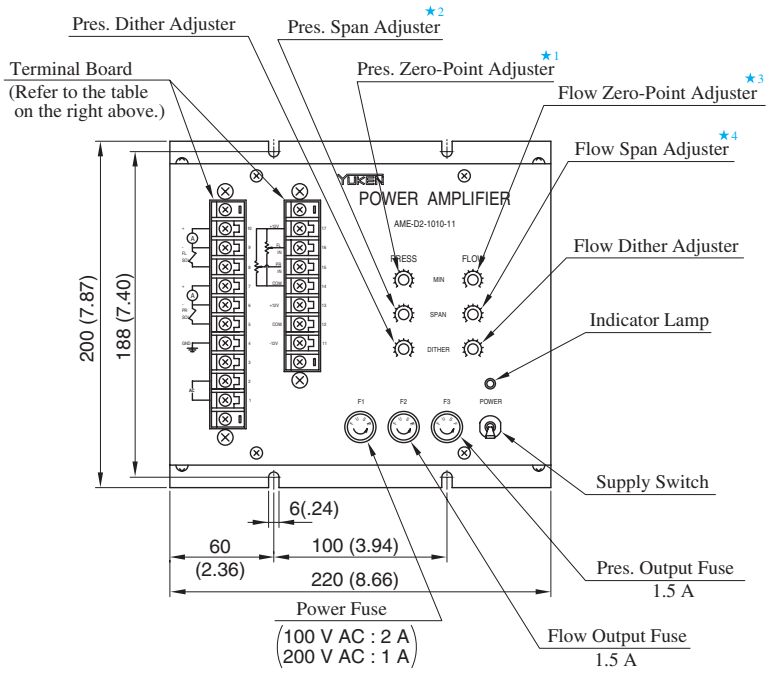
AME-D2-1010-11

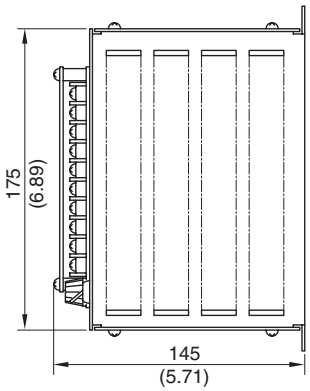
[Example Diagram]



Detail of Terminal Board

Terminal Number	Name	
1	Power Supply 85 - 264 VAC	
2		
3	———	
4	Ground	G
5	Output to Pressure Control Valve Solenoid	PR. SOL
6		
7	Ammeter	
8	Output to Flow Control Valve Solenoid	FL. SOL
9		
10	Ammeter	
11	-12 V OUT	-12 V
12	Common	COM
13	+12 V OUT	+12 V
14	Common	COM
15	Input Signal for PRES.	PR.IN
16	Input Signal for FLOW	FL.IN
17	+12 V OUT	+12 V





★1. Minimum Pressure Setting
★2. Variable Pressure Range Setting
★3. Minimum Flow Setting
★4. Variable Flow Range Setting

DIMENSIONS IN MILLIMETRES (INCHES)

Power Amplifiers
For Shockless Type Directional and Flow Control Valves

These power amplifiers are used to drive the shockless type proportional and flow control valves.

Model Number Designation

AMN	-G	-10
Series Number	Type of Function	Design Number
AMN	G: Shockless Directional and Flow Control Type	10
	W: DC Input Type	10

Applicable to Valve

Name of Valve	Model Numbers
Shockless Type Proportional Directional and flow Control Valves	EDFG-01

Specifications

Description \ Model Numbers		AMN-G-10	AMN-W-10
Max. Output Current		1.3 A (10 Ω Solenoid)	
Setting Resolution		0 – 99 % (1 % Units)	—
Number of Preselection Pattern		SOLa : 3 Patterns SOLb : 3 Patterns	—
Sequence Input	Input Current	10 mA/24 V	—
	Voltage Range	10 – 28 V	—
Maximum Input Voltage		—	–10 V DC : SOLa +10 V DC : SOLb
Input Impedance		—	10 kΩ
Maximum Gain		—	1.3 A/–5 V : SOLa 1.3 A/+5 V : SOLb
Dither		Variable (Internal)	
Slope Adjustment Range		0 – 99 %/Max. slope time	—
Maximum Slope Time		1 – 99 s	—
Delay Time Adjustment Range		—	0.1 – 3 s
Temperature Drift		0.2 mA /°C	
Power Supply		24 V DC (Power Supply Range : 20 – 30 V)	
Power Input		25 W	
Ambient Temperature		0 – 50°C (32 – 122°F)	
Ambient Humidity		90 % RH or less	
Approx. Mass		0.2 kg (.4 lbs.)	

Instructions

- **Power supply of the outside setting adjuster**

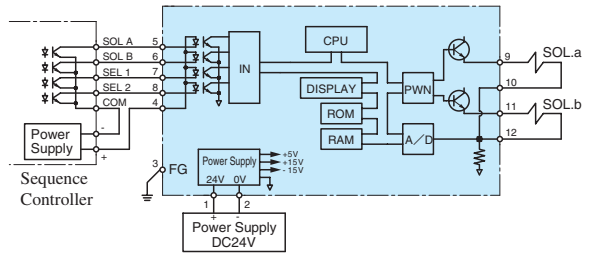
  When DC input type (AMN-W) power amplifier is used, power supply for the setting adjuster can be provided from this power amplifier, but for only one. However, please use the variable resistor or potentiometre of which impedance is 1 kΩ for the setting adjuster.

- **Supply Switch**

  The power amplifier has no power supply switch. As soon as it is connected to a power supply, it comes to be alive. Provide a power switch externally.

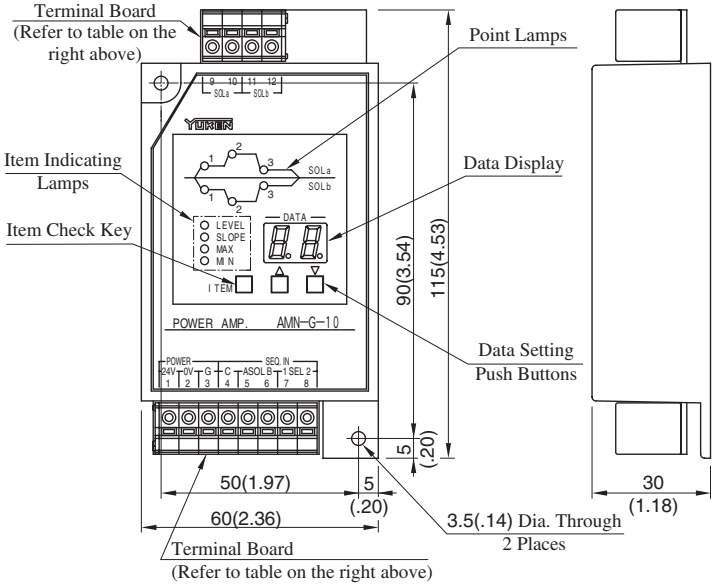
AMN-G-10

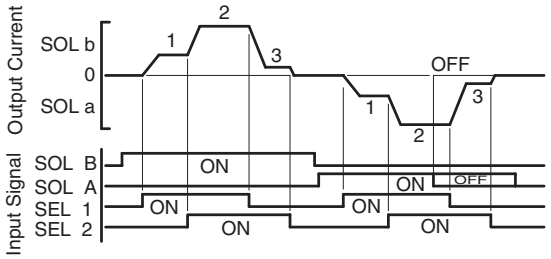
[Example Diagram]



Detail of Terminal Board

Terminal Number	Name		Terminal Number	Name	
1	Power Supply	+24V	7	Sequence Input	SEL 1
2	Power Supply	0V	8	Sequence Input	SEL 2
3	Ground	G	9	Output to Valve Solenoid	SOL a
4	Sequence Input	IN COM	10		
5	Sequence Input	SOL A	11	Output to Valve Solenoid	SOL b
6	Sequence Input	SOL B	12		

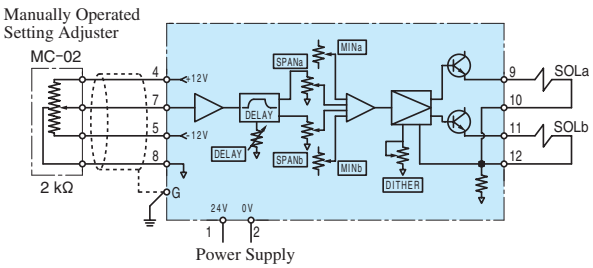




DIMENSIONS IN MILLIMETRES (INCHES)

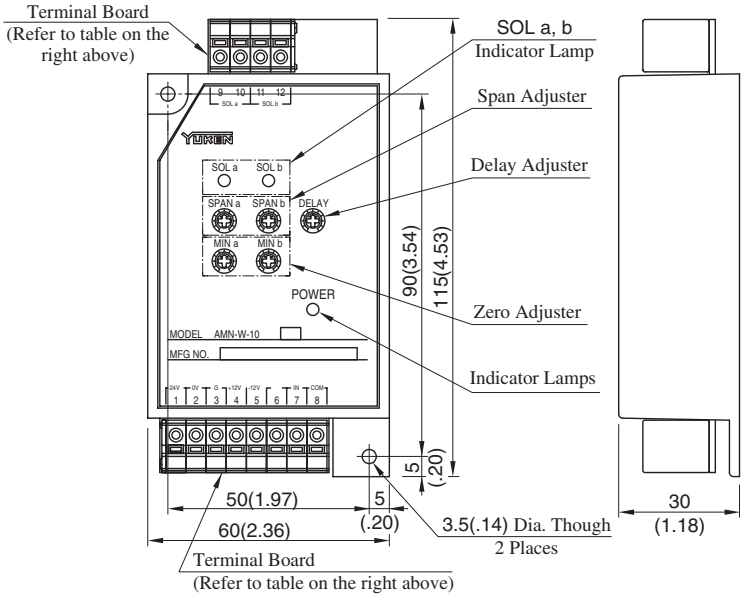
AMN-W-10

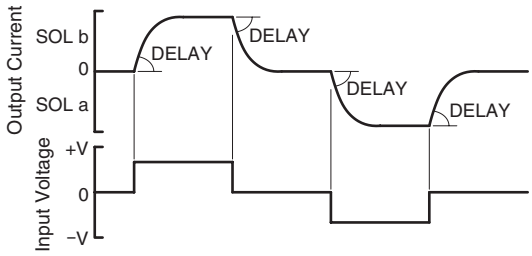
[Example Diagram]



Detail of Terminal Board

Terminal Number	Name		Terminal Number	Name	
1	Power Supply	+24V	7	Input Signal	IN
2	Power Supply	0V	8	Input Signal	COM
3	Ground	G	9	Output to Valve Solenoid	SOL a
4	Internal Power Supply	+12V	10		
5	Internal Power Supply	−12V	11	Output to Valve Solenoid	SOL b
6		———	12		





DIMENSIONS IN MILLIMETRES (INCHES)

H Power Amplifiers

Power Amplifiers For Directional and Flow Control Valves

These power amplifiers are used to drive the proportional electro-hydraulic directional and flow control valves.

Model Number Designation

SK1091	-D24	-10
Series Number	Power Supply	Design Number
SK1091	**D24**: 24 V DC	**10**

Applicable to Valve

Name of Valve	Model Numbers
Directional and Flow Control Valve	EDFHG- 03 04 06

Specifications

Description \ Model No.	SK1091-D24-10
Max. Output Current	1 A (10Ω Solenoid)
Max. Input Voltage	–10 V DC for SOL a +10 V DC for SOL b
Input Impedance	10 kΩ
Max. Gain	1 A / ±5 V
Dither	Variable
Delay Time Adjustment Range	0.15-3 s
Temperature Drift (Max.)	0.2 mA /˚C
Power Supply	24 V DC (21-28 V Included Ripple)
Required Current	1.5 A or more
Power Input (Max.)	25 W
Ambient Temperature	0-50˚C (32-122˚F)
Ambient Humidity	90%RH or less
External Setting Resistance	2 kΩ
Approx. Mass	1.0 kg (2.2 lbs.)

Instructions

- **Power Supply for the Setting Adjuster**

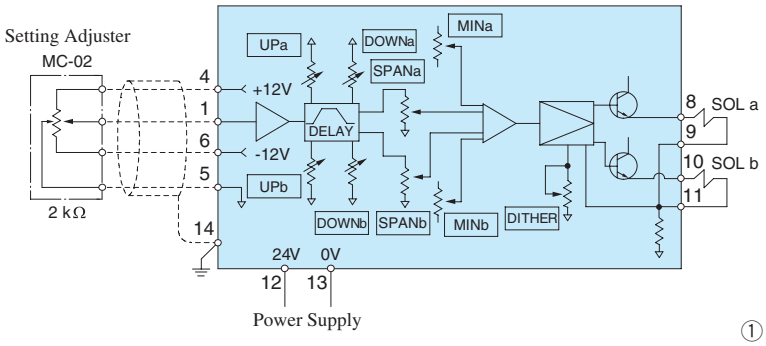
  Power supply for the setting adjuster can be provided from this power amplifier, but for only one. However, please use the variable resistor or potentiometre of which impedance is 2 kΩ for the setting adjuster.

- **Power Switch**

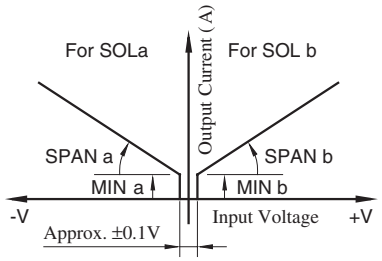
  The power amplifier has no power supply switch. As soon as it is connected to a power supply, it comes to be alive. Provide a power switch externally.

SK1091-D24-10

[Example Diagram]

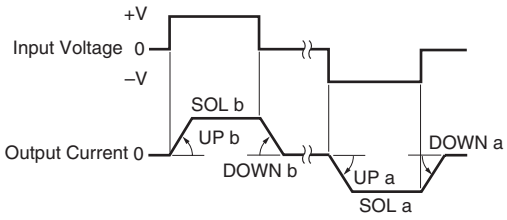


[Input-Output Characteristics]

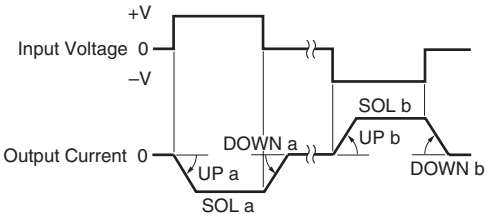


[Delay Function]

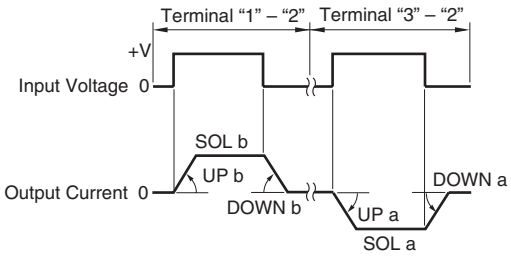
① In case “1” and “2” Input signal terminals are used.



② In case “3” and “2” Input signal terminals are used.



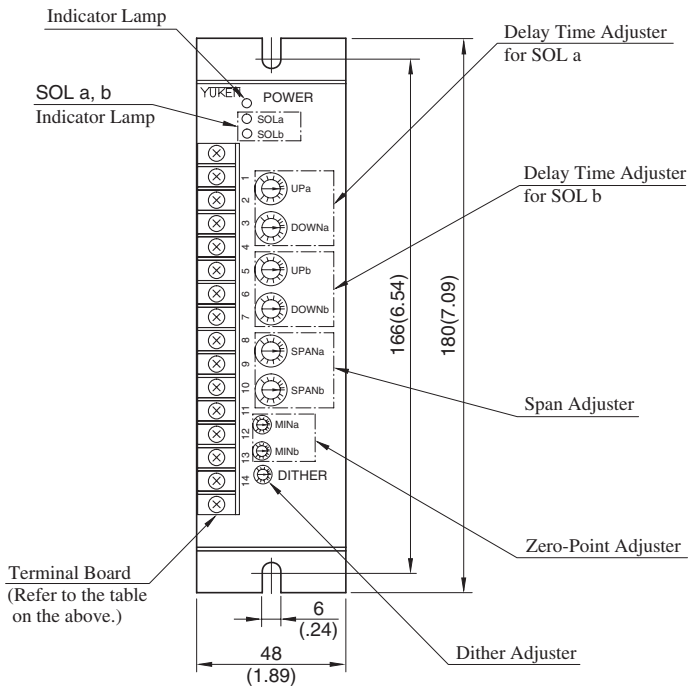
③ In case “1” , “2” and “3” Input signal terminals are used.

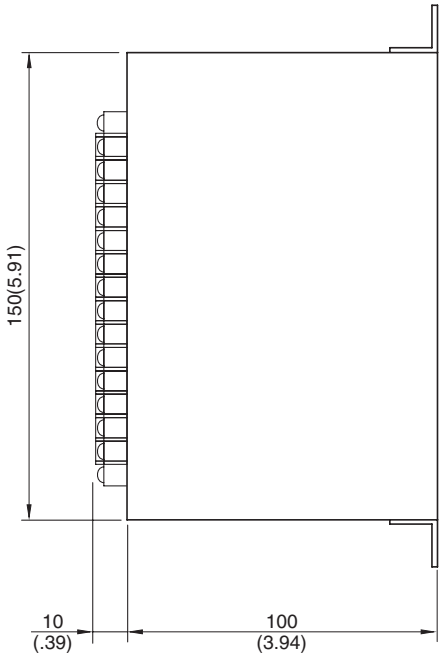


● Detail of Terminal Board

Terminal Number	Name	
1	Input Signal	IN★
2	Input Signal	COM
3	Input Signal	IN★
4	Power Supply for Setting Adjuster	+12V
5	Power Supply for Setting Adjuster	COM
6	Power Supply for Setting Adjuster	–12V
7	—	
8	Output to Valve Solenoid	SOL a
9		
10	Output to Valve Solenoid	SOL b
11		
12	Power Supply	24 V
13	Power Supply	0 V
14	Frame Ground	FG

★ Three (3) usages are available as shown ① to ③ of “Delay Function” at right hand side for Input signal terminal (IN).





H Power Amplifiers

Power Amplifiers
For High Response Type Directional and Flow Control Valves

These power amplifiers are used to drive the high response type proportional electro-hydraulic directional and flow control valves.
A compact AMN-L model and a euro card type AMB-EL model are available.
The single height [3U: 100 × 160 mm (3.94 × 6.30 in.)] is employed for the euro card size of the AMB-EL model.

AMN-L

AMB-EL

Model Number Designation

AMN-L

AMN	-L	-01	-3	-2P	-10
Series Number	Type of Function	Size of Applicable Valve	Compensation	Applicable Spool Type	Desigen Number
AMN	**L**: DC Input Type Directional and Flow Control with Miner feedback	**01**: 01 Size	**1**: Type 1	**None**: 3C2, 3C40	**10**
			3: Type 3	**2P**: 3C2P	

AMB-EL

AMB	-EL	-03	-2P	-1	-10
Series Number	Type of Function	Size of Applicable Valve	Applicable Spool Type	Compensation	Desigen Number
AMB	**EL**: DC Input Type Directional and Flow Control with Miner feedback	**01**: 01 Size	**None**: 3C2, 3C40 **2P**: 3C2P	★1	**10**
		03: 03 Size		**1**: For flow rate 40/80 L/min (10.6/21.1 U.S.GPM)	
		04: 04 Size		**2**: For flow rate 280 L/min (74.0 U.S.GPM)	
		06: 06 Size		**3**: For flow rate 350 L/min(92.5 U.S.GPM) **4**: For flow rate 500 L/min(132 U.S.GPM)	

Please refer to us for ★1.

Specifications

Description \ Model Numbers	AMN-L-01-1	AMN-L-01-3-2P	AMB-EL-01	AMB-EL-03	AMB-EL-04	AMB-EL-06
Max. Output Current	2.5 A (3.9 Ω Solenoid)		2.5 A (3.9 Ω Solenoid)	3.0 A (3 Ω Solenoid)	2.5 A (3.9 Ω Solenoid)	
Max. Input Voltage	+10 V DC: P→B→A→T –10 V DC: P→A→B→T		±10 V / ±5 V			
Input Impedance	10 kΩ or more		100 kΩ (50 kΩ in single-end mode)			
Slope-off input	Terminal Number 13-14 Short	——	4 – 28 V			
Slope Adjust Time	0.03 – 5 s	——	0.05 – 5 s (Slope Adjustment function is not available with "AMB-EL-∗-2P"			
Monitor Voltage	±1.5 V / ±3 mm st.		±10 V / rated st.			
Alarm	Open Collector (30 V DC, 10 mA Max.)		Open Collector (30 V DC, 10 mA Max.)			
Supply Voltage Rage	24 V DC (20 – 30 V DC)		24 V DC (21 – 28 V DC)			
Power Input	75 W		30 W	40 W	30 W	
Ambient Temperature	0 – 50 °C (32 – 122 °F)		0 – 50 °C (32 – 122 °F)			
Ambient Humidity	90 % RH or less		85 % RH or less			
Connector	——		DIN 41612 – F32			
Approx. Mass	0.3 kg (.66 lbs.)		0.28 kg (.62 lbs.)		0.34 kg (.75 lbs.)	

Applicable to Valve

Power Amplifiers Model Numbers	Valve Model Numbers
AMN-L	ELDFG-01
AMB-EL	ELDFG-01/03 ELDFHG-04/06

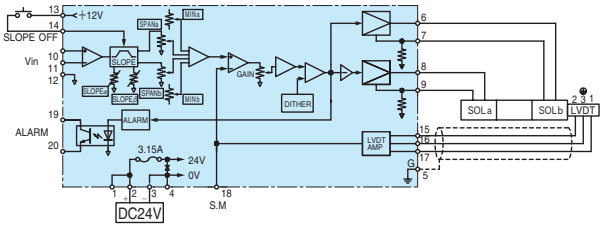
Instructions

Power Switch

The power amplifier has no power supply switch. As soon as it is connected to a power supply, it comes to be alive.
Provide a power switch externally.

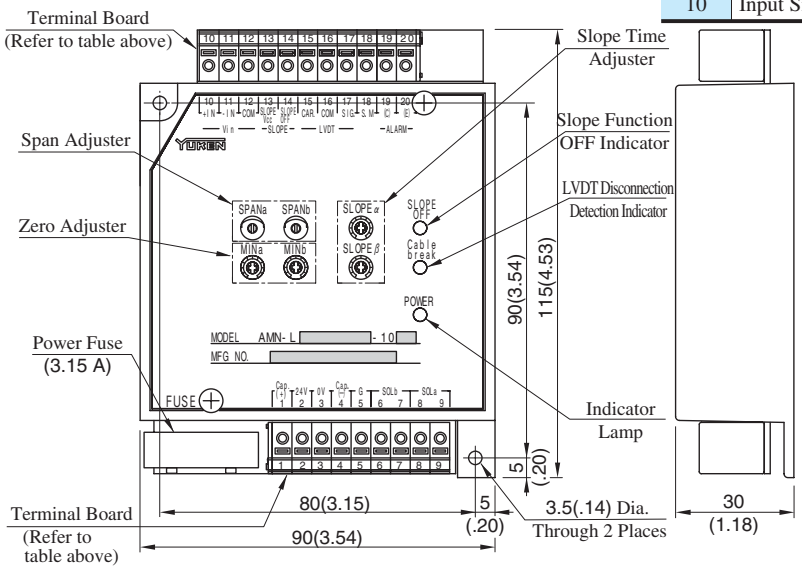
AMN-L-01-1-10

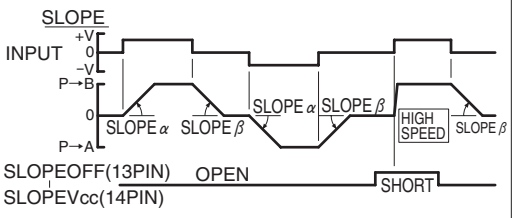
[Example Diagram]



Detail of Terminal Board

Terminal Number	Name		Terminal Number	Name	
1	Power Supply	CAPACITOR(+)	11	Input Signal	–IN
2	Power Supply	+24V	12	Input Signal	COM
3	Power Supply	0V	13	Slope Control ON/OFF Terminal	SLOPE Vcc
4	Power Supply	CAPACITOR(–)	14	Slope Control ON/OFF Terminal	SLOPE OFF
5	Frame Ground	G	15	LVDT Terminal	CAR.
6	Output to Valve Solenoid	SOL b	16	LVDT Terminal	COM
7			17	LVDT Terminal	SIG.
8	Output to Valve Solenoid	SOL a	18	Sensor Moniter Output	S.M
9			19	Alarm Output	ALM(C)
10	Input Signal	+IN	20	Alarm Output	ALM(E)

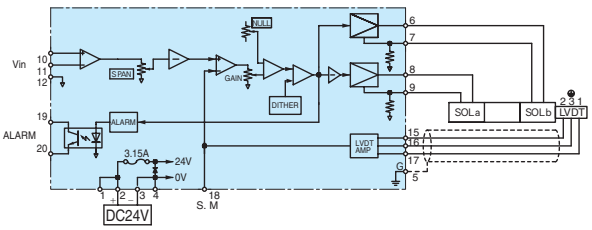




DIMENSIONS IN MILLIMETRES (INCHES)

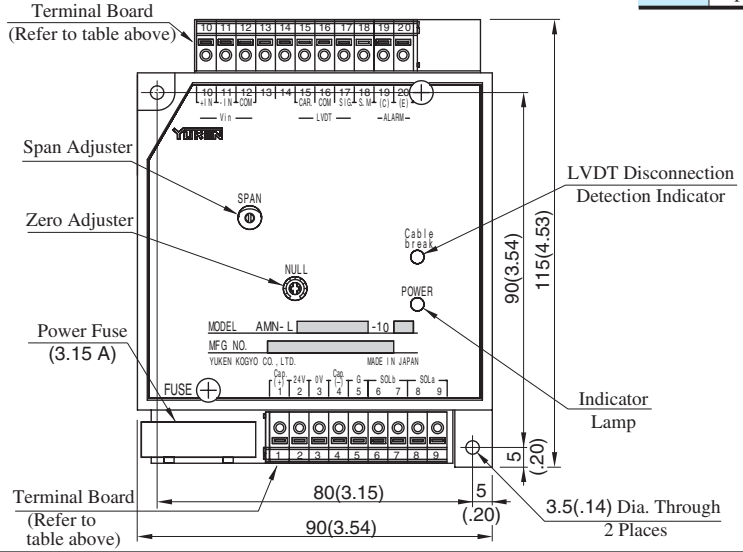
AMN-L-01-3-2P-10

[Example Diagram]



Detail of Terminal Board

Terminal Number	Name		Terminal Number	Name	
1	Power Supply	CAPACITOR(+)	11	Input Signal	–IN
2	Power Supply	+24V	12	Input Signal	COM
3	Power Supply	0V	13	———	
4	Power Supply	CAPACITOR(–)	14	———	
5	Frame Ground	G	15	LVDT Terminal	CAR.
6	Output to Valve Solenoid	SOL b	16	LVDT Terminal	COM
7			17	LVDT Terminal	SIG.
8	Output to Valve Solenoid	SOL a	18	Sensor Moniter Output	S.M
9			19	Alarm Output	ALM(C)
10	Input Signal	+IN	20	Alarm Output	ALM(E)



DIMENSIONS IN MILLIMETRES (INCHES)

H Power Amplifiers

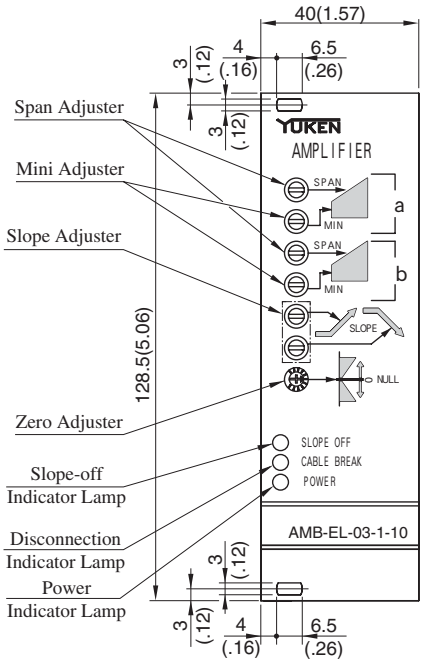
AMB-EL-∗-∗-∗-10

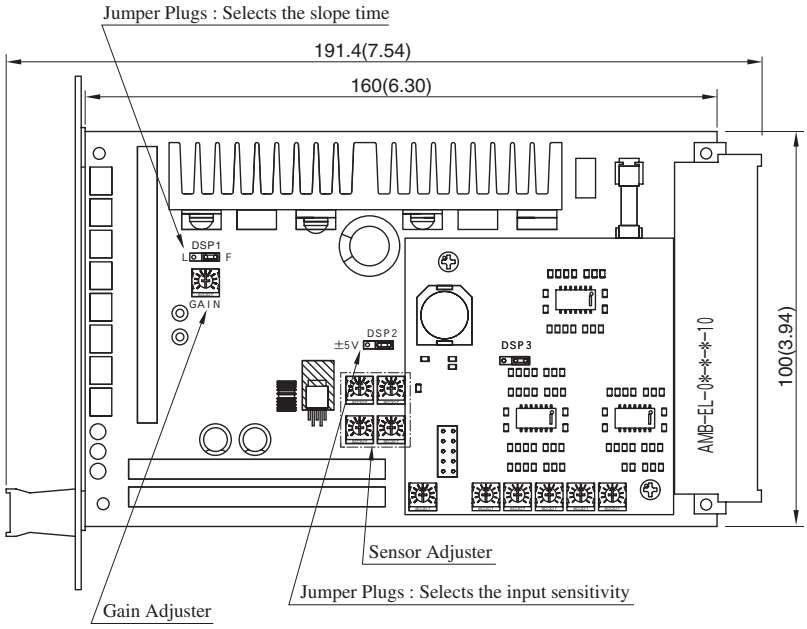
This power amplifier requires connector cards for connection. A connector card attached model is also available.
Please ask for details if interested.

Pin Connections and Functions

Pin Number	Name		Pin Number	Name	
b02	Power Supply	0V	z02	sol a(+)	
b04	Power Supply	0V	z04	sol a(–)	
b06	sol b(+)		z06	———	
b08	sol b(–)		z08	———	
b10	———		z10	Command Input	(+)
b12	———		z12	Command Input	(–)
b14	COM		z14		
b16	Power Supply	+24V	z16	COM (No.2)	Conected to main valve sensor. See "Snsor Connecton"
b18	Power Supply	+24V	z18	Carrier (No.3)	
b20	Slope Off		z20	Signal (No.1)	
b22	COM (No.3)	Conected to pilot valve sensor. See "Snsor Connecton"	z22	———	
b24	Signal (No.1)		z24	Alarm Output	(–)
b26	Carrier (No.2)		z26	Alarm Output	(+)
b28	Output	24V	z28	Stroke Monitor Signal	(P)
b30	Output	24V	z30	Stroke Monitor Signal	(S)
b32	FG		z32	———	

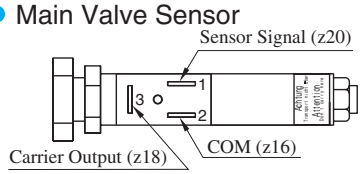
DIMENSIONS IN MILLIMETRES (INCHES)



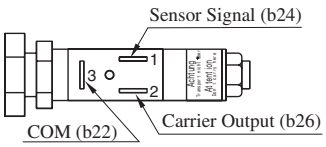


Sensor Connection

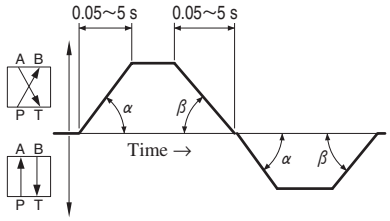
Main Valve Sensor



Pilot Valve Sensor

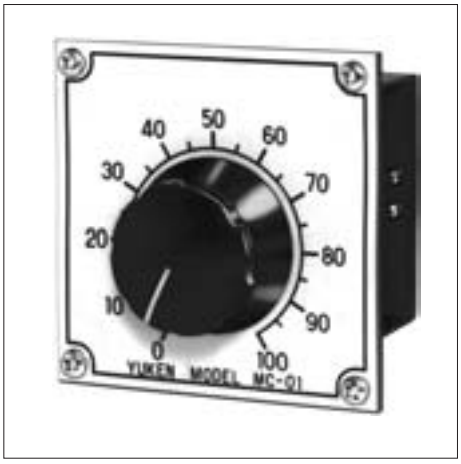


Lamp Pattern



Setting Adjusters

The setting adjuster supplies the command signal voltage to the power amplifier. Since the setting adjuster is closely related to actual machine operating procedure, the user generally provides this device. Yuken makes the following standard setting adjusters for general use and designs and manufactures special setting adjusters to order.

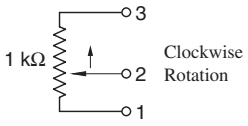


Type	Model Number	Function
Manually Operated Setting Adjuster	MC-01	This is the simplest setting adjuster, consisting of a trimmer (1 kΩ) and a dial.
	MC-02	Consisting of a centre-tapped trimmer (1 kΩ - 1 kΩ) and a dial, this setting adjuster is ideal for a servo system.
6-point Setting Adjuster	AMC-V6-S-✻-10	Six trimmers are incorporated, so it is possible to set six points.
Multifunction Slope Controller	AMC-T-20	This multifunction slope controller generates any desired two-channel analog voltage patttern outputs. It can also be used with slope-proportional and time-proportional systems.
Slope Controller	AMN-T-10	Slope and output can be set optionally 4-bit signal.

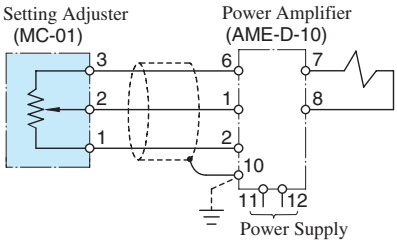
Manually Operated Setting Adjuster

MC-01

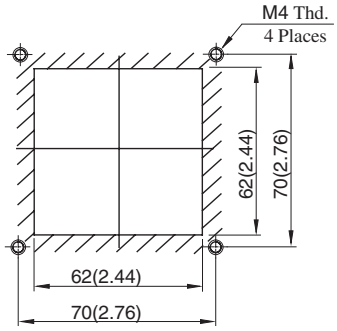
[Electric Circuit]

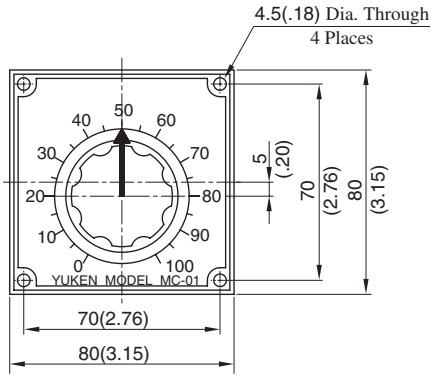


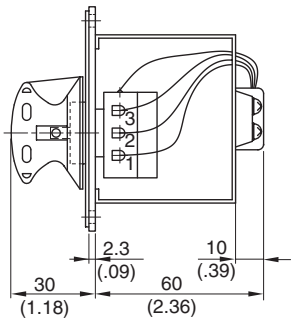
[Example Diagram]

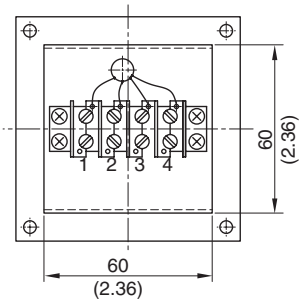


[Mounting Panel]









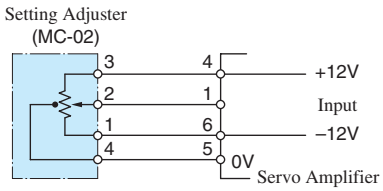
DIMENSIONS IN MILLIMETRES (INCHES)

MC-02

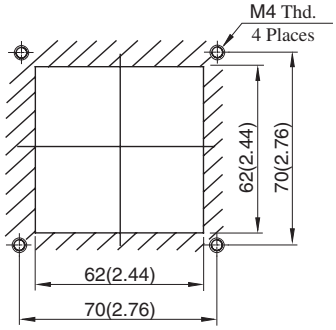
[How to Use]

This setting adjuster is for using positive and negative voltages to the right and left of the zero point. Most suitable for servo systems. Please contact us for usage details.

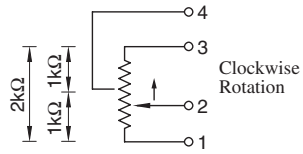
[Example Diagram]

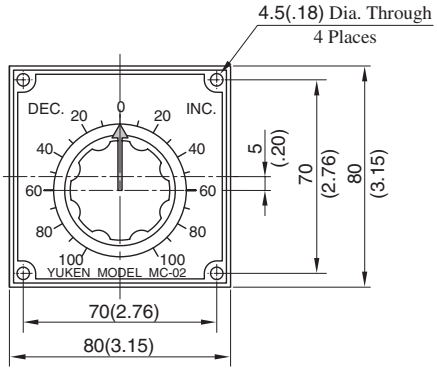


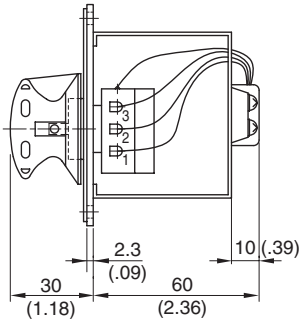
[Mounting Panel]

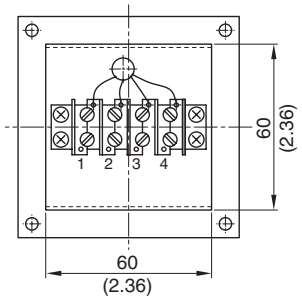


[Electric Circuit]









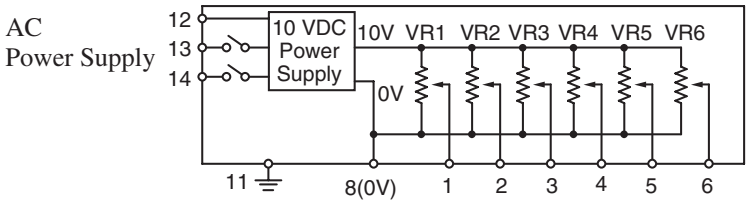
DIMENSIONS IN MILLIMETRES (INCHES)

6-Point Setting Adjuster

AMC-V6-S-∗-10

Power Supply
100 ..... 100 VAC
200 ..... 200 VAC
220 ..... 220 VAC

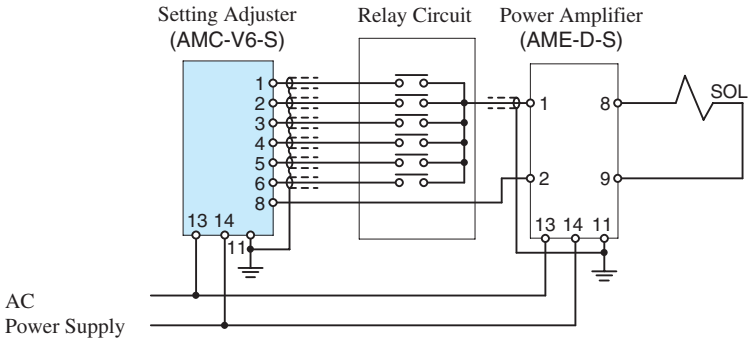
[Electric Circuit]

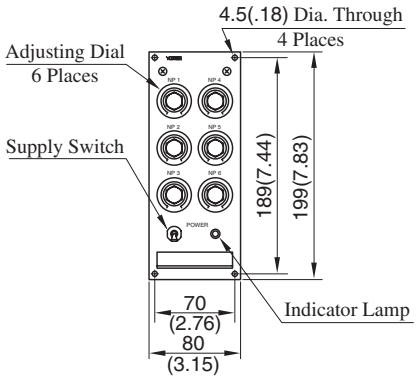


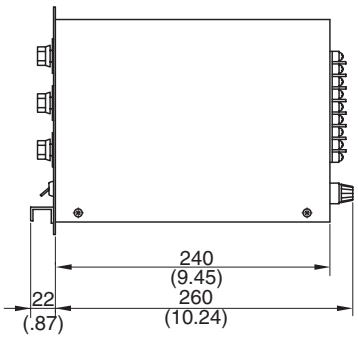
● Detail of Terminal Board

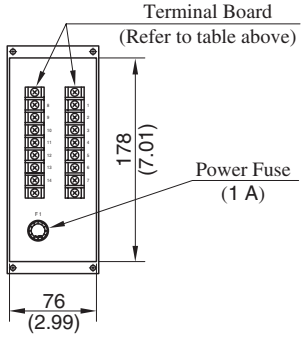
Terminal Number	Name
1	1 OUT (VR1)
2	2 OUT (VR2)
3	3 OUT (VR3)
4	4 OUT (VR4)
5	5 OUT (VR5)
6	6 OUT (VR6)
7	—
8	0V COM
9	—
10	—
11	Ground G
12	Power Supply
13	85 – 265 VAC
14	

[Example Diagram]









DIMENSIONS IN MILLIMETRES (INCHES)

H Setting Adjusters

Multifunction Slope Controllers

This controller can generate any desired two-channel analog voltage pattern outputs and can be used with slope-constant and time-constant systems. Although two-channel outputs can be used independently, this controller can also be used as a setting adjuster for the EH Series variable piston pumps.

Model Number Designation

AMC	-T	-20
Series Number	Type of Function	Design Number
AMC: Setting Adjuster	**T**: Acceleration/deceleration signal type (Slope Controller)	**20**

Specifications

Model No. / Description	AMC-T-20
Number of Output Channels	2 channels (A, B)
Maximum Output Range	0 - +5 V ★, 0 - ±5 V, 0 - +10 V, 0 - ±10 V (The settings are DIP switch selectable)
Two Categories of Slopes	Slope-constant ★ With a level change, the slope will not change (but arrival time changes.) Time-constant With a level change, the time will not change (but the slope changes.) } (to be selected by DIP switch)
Acceleration/Deceleration Signal Type	4 Types Polygonal Line Signal★ : 1 Type Curve Compensation Signal : 3 Types (to be selected by DIP switch)
Max. Slope Time	5 s★, 20 s, 50 s, 100 s (The settings are DIP switch selectable)
Setting Resolution	The level and slope settings are variable in 0.1% units from 0 to ±99.9%
Control Mode Number of Preselected Patterns	Mode 1, 4-bit binary code input, 15 patterns Mode 2, 6-bit binary code input, 63 patterns Mode 3, Timer control, 9 patterns (4 variations)
Stop Mode (Applicable Only for Control Mode 1)	ON : The stop mode is to retain the state of controller output at the instant an external input signal is interrupted. When the external signal is input again, the operation is resumed from the retained state. OFF★ : When external input signal is interrupted, function goes back to the initial setting (Pattern No.0).
Control Input Signal	Current input type, 10 mA /bit max. Usable as a voltage input type (voltage range: 8 to 48V DC) Photocoupler insulation input
Control Output Signal	Output from transister open collector Max. 30V, 50 mA
Data Save	EEP-ROM (Battery not needed)
Power Supply	100/200 V AC, 50/60 Hz (85-260 V AC)
Power Input	10 VA or less
Ambient Temperature	0-50˚C (32-122˚F)
Ambient Humidity	85%RH or less (Bedewing must be avoided)
Approx. Mass	1 kg (2.2 lbs.)

Note: ★ Indicates preset conditions.

Instructions

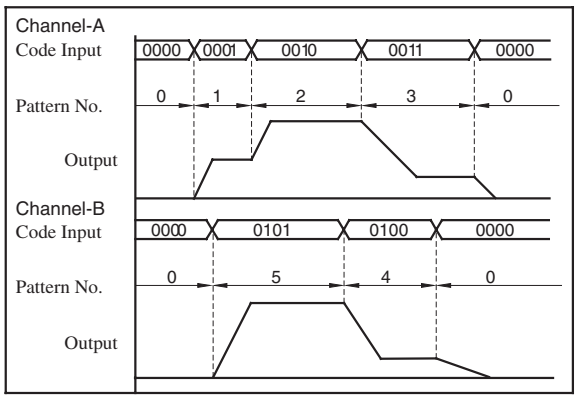
- Since this controller incorporates a micro computer, do subject it to undue electrical noise.

Control Modes

One among the following three types of control modes can be chosen by changing DIP swicth.

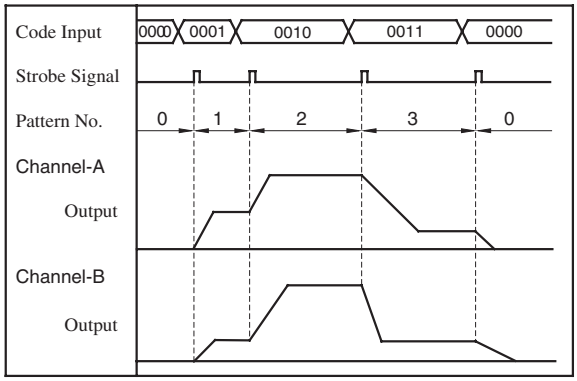
Control Mode 1

Channels A and B generate optional slopes independently each other.



Control Mode 2

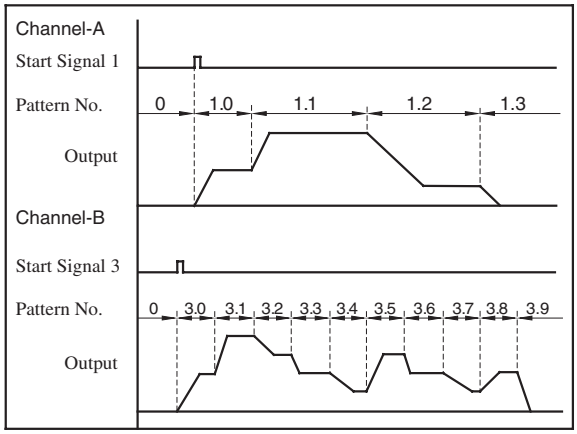
A slope is generated by a strobe signal (signal for change to next signal). Channels A and B operate synchronously.



Control Mode 3

The internal timer is activated by a start signal, causing the slopes to be generated successively in memory.

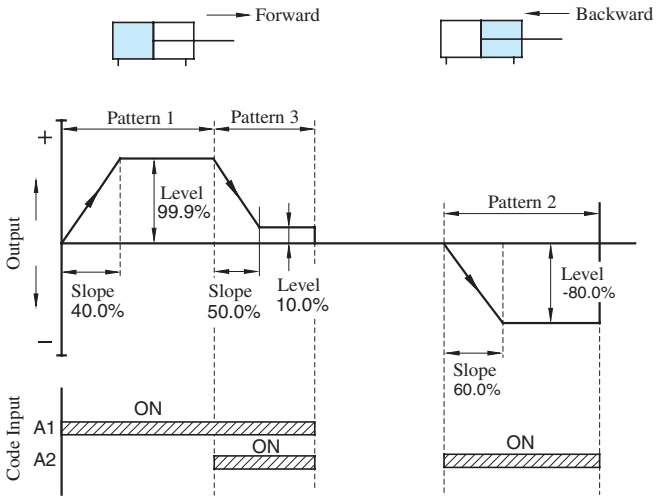
Channels A and B operate independently.



Setting Example

Control Mode 1 Channel - A

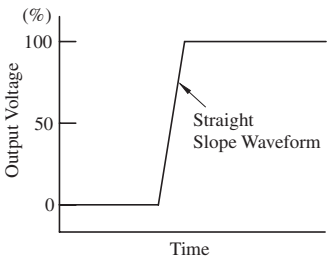
Code Input				Pattern No.	Setting %		Remarks
A8	A4	A2	A1		Level	Slope	
OFF	OFF	OFF	OFF	0	0	0	Stop
OFF	OFF	OFF	(ON)	1	99.9	40.0	Cylinder forward acceleration
OFF	OFF	(ON)	OFF	2	-80.0	60.0	Cylinder backward acceleration
OFF	OFF	(ON)	(ON)	3	10.0	50.0	Cylinder forward deceleration
(ON)	(ON)	(ON)	(ON)	15	10.0	10.0	



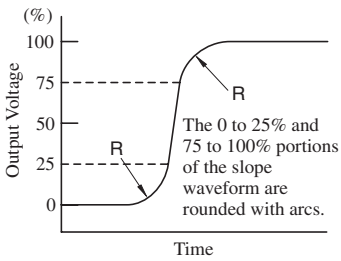
Slope Type

One among the follwing four types can be chosen by changing DIP switch.

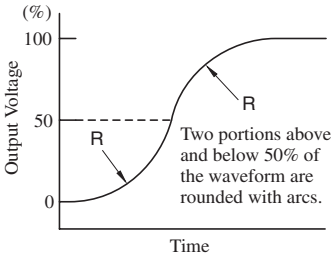
Type 1



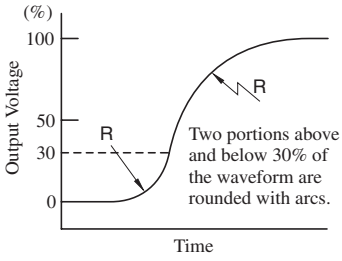
Type 2



Type 3

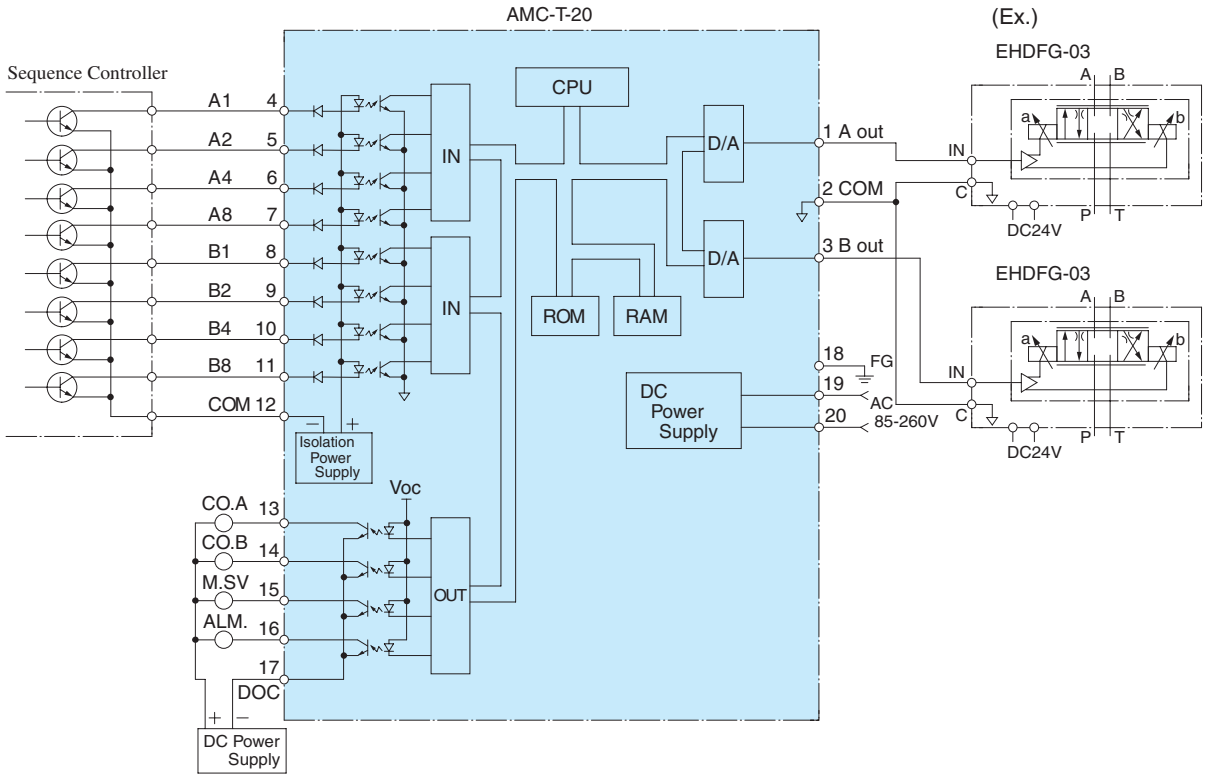


Type 4



AMC-T-20

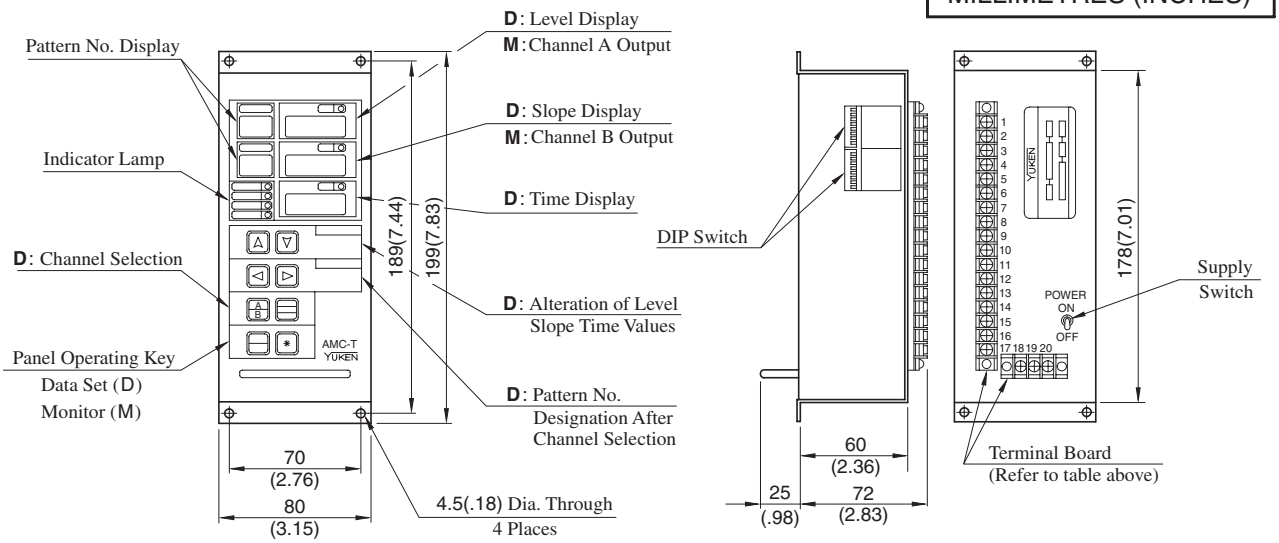
[Example Diagram]



Detail of Terminal Board

Terminal Number	Name		Terminal Number	Name	
1	Channel A Output	A out	11	Code Input	B8
2	Common	COM	12	Code Input Common	DCOM
3	Channel B Output	B out	13	Coincidental Output Signal with "A"	CO.A
4	Code Input	A1	14	Coincidental Output Signal with "B"	CO.B
5	Code Input	A2	15	Data Save Signal	M.SV
6	Code Input	A4	16	Alarm Signal Output	ALM.
7	Code Input	A8	17	Output Common	DOC
8	Code Input	B1	18	Frame Ground	FG
9	Code Input	B2	19	Power Supply	AC
10	Code Input	B4	20		

DIMENSIONS IN MILLIMETRES (INCHES)



Interchangeability between Current and New Design

Specifications

Specifications unchanged unless specified below.

Description \ Model No.	New : AMC-T-20	Current : AMC-T-10
Control Output Signal	Output from transister open collector Max. 30 V, 50 mA	Output from transister open collector Max. 30 V, 10 mA
Slope Types	4 Types Polygonal Line Signal : 1 Type Curve Compensation Signal : 3 Types (to be selected by DIP switch)	1 Type : Polygonal Line Signal
Stop Mode (Applicable only for Control Mode 1)	ON, OFF	——
Data Save	EEP-ROM Battery not needed	Battery Required
Approx. Mass	1 kg (2.2 lbs.)	1.8 kg (4.0 lbs.)

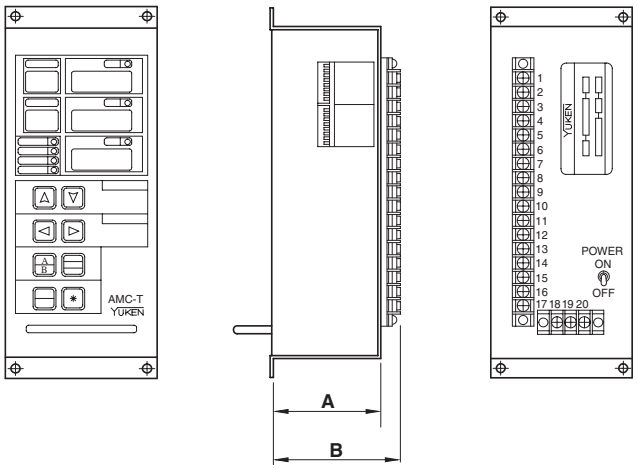
Terminal

The following are differences between current and new.

Terminal Number	Name		Remarks
	New : Design 20	Current : Design 10	
13	Coincidental Output Signal with "A" "CO.A"	Coincidental Output Signal with "A" "DO1"	Abbreviation of the terminals are changed, though functionally the same.
14	Coincidental Output Signal with "B" "CO.B"	Coincidental Output Signal with "B" "DO2"	
15	Data Save Signal "M.SV"	——	Added new functions.
16	Alarm Signal Output "ALM."	——	

Interchangeability in Installation

There is an interchangeability in installation, although depths (dimensions "**A**" and "**B**") are different.



Model Numbers		mm (Inches) A	mm (Inches) B
Current	AMC-T-10	185 (7.28)	200 (7.87)
New	AMC-T-20	60 (2.36)	72 (2.83)

Slope Controllers

This slope controller is considerably smaller and lighter compared to conventional slope controllers.
4-bit switching signals allow the pattern output of given levels and acceleration/deceleration times. One-touch disconnection is supported. The mass and the volume have been reduced to one-fifth and one-fourth, respectively.

Model Number Designation

AMN	-T	-10
Series Number	Type of Function	Design Number
AMN	T : Slope Controller	10

Specifications

Description \ Model Numbers	AMN-T-10
Number of Output Channels	1 channel
Maximum Output Range	0 – +5 V (Factory Preset) 0 – +10 V ±5 V ±10 V
Maximum Slope Time	● Slope-constant type: ★1 1-9999 s/Max. Output signal (Factory Setting, 5 s) ● Time-constant type: ★2 1–9999 s (Can be set in 1 second increments)
Acceleration/Deceleration Signal Type ★3	Polygonal Line Signal: 1 Type (Factory Setting) Curve Compensation Signal: 3 Type
Setting Resolution	The level and slope setting are variable in 0.1 % units from 0 to ±99.9%
Number of Preselected Patterns	4-bit binary code input 15 patterns
Sequence Input	Input Current: 10 mA/24 V Voltage Range: 10 – 28 V
Sequence Output	Load Current: Max. 50 mA Supply Voltage: Max. 32 V
Power Supply Voltage	24 VDC (20 – 30 VDC)
Power Input	3 W
Ambient Temperature	0 – 50 °C (32 – 122 °F)
Ambient Humidity	90 % RH or less
Approx. Mass	0.2 kg (.44 lbs)

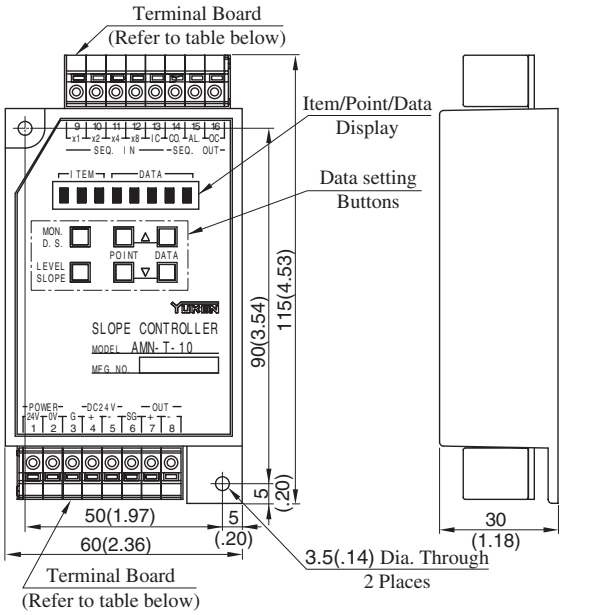
★1. A fixed slope means that the slope endpoint time changes while the slope gradient remains unchanged when the level is changed.
★2. A fixed time means that the slope endpoint time remains unchanged when the level is changed.
★3. The same slope types as those for the multifunction slope controller are supported. See page 789 for details.

Instructions

● Since this controller incorporates a micro computer, do subject it to undue electrical noise.

AMN-T-10

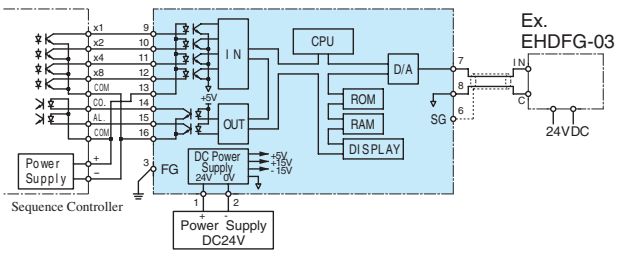
DIMENSIONS IN MILLIMETRES (INCHES)



Detail of Terminal Board

Terminal Number	Name		Terminal Number	Name	
1	Power Supply	+24V	9	Sequence Input	×1
2	Power Supply	0V	10	Sequence Input	×2
3	Frame Ground	G	11	Sequence Input	×4
4	Internal Power Supply	+24V	12	Sequence Input	×8
5	Internal Power Supply	0V	13	Sequence Input	IN COM
6	Signal Ground	SG	14	Sequence Output	COL N.
7	Output Signal	+	15	Sequence Output	ALARM
8	Output Signal	–	16	Sequence Output	OUT COM

[Example Diagram]



SERVO VALVES

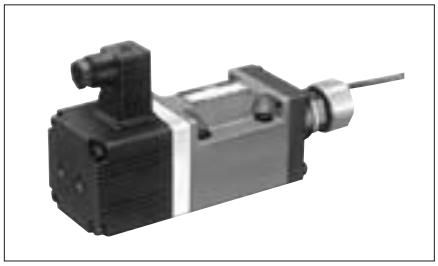
Valve Type	Graphic Symbols	Maximum Operating Pressure MPa (PSI)	Maximum Flow U.S.GPM: .5 1 2 5 10 20 50 100 200 500 / L/min: 1 2 3 5 10 20 30 50 100 200 300 500 1000 2000	Page
Direct Type High Speed Linear Servo Valves		35 (5080)	LSVG-03 4 10 20 40 60	798
Two Stage Type High Speed Linear Servo Valves		35 (5080)	LSVHG-04 750	800
		35 (5080)	LSVHG-06 900	
		31.5 (4570)	LSVHG-06 1300	
		31.5 (4570)	LSVHG-10 1500	
Linear Servo Amplifier	———	——	———	802
OBE Type Linear Servo Valves		31.5 (4570)	LSVHG-03EH 230 270	803
		35 (5080)	LSVHG-04EH 750	
		35 (5080)	LSVHG-06EH 900	
		31.5 (4570)	LSVHG-06EH 1300	

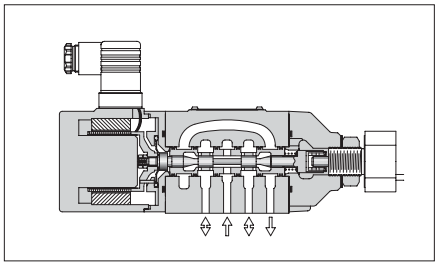
Consult Yuken when detailed material such as dimensions figures is reqired.

High Speed Linear Servo Valves

High-speed linear servo valves have outstanding features of high response and exceptional contamination resistance. These features are achieved by the compact and powerful linear motor which directly drives the spool and gives electric feedback of the spool position. These valves have garnered an excellent reputation since their launch by Yuken in 2001. Direct type LSVG-03 and two stage type LSVHG-04/06/10(which use the LSVG-03 as a pilot) are available.

Direct Type High Speed Linear Servo Valves





- **High accuracy**

  These valves have a low hysteresis of 0.1 % or less, achieving high accuracy. They allow the main unit to operate with much higher repeatability.

- **High response characteristics**

  The valves provide significantly high levels of step and frequency responses, which are typically used as measures of response characteristics; the step response is 2 ms (0⇔100 %)*, and the frequency response is 450 Hz/- 90° (± 25 % amplitude)*. Thus, the valves ensure that the main unit can achieve unprecedented high response.
  (*: Representative values)

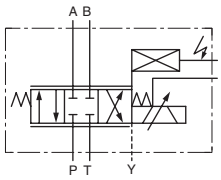
- **Excellent vibration-proof characteristics**

  With a simple structure, the valves offer high vibration resistance.

- **Excellent contamination resistance**

  The valves are also featured by excellent contamination resistance since they have a simple structure that directly connects the linear motor moving coil, the spool, and the position sensor. Compared to conventional servo valves for which the permissible contamination level is up to NAS 1638 class 7, the direct type linear servo valves can accept the contamination level of up to NAS 1638 class 10. These valves can contribute to greatly reducing the cost of fluid management.

Graphic Symbol



Model Number Deignation

F-	LSVG	-03	-40	-R	-10
Special Seals	Series Number	Valve Size	Rated Flow @ΔP = 7 MPa (@ΔP = 1020 PSI)	Cable Departure Direction	Design Number
F Special Seals for Phosphate Ester Type Fluid (Omit if not required).	**LSVG:** Direct Type High Speed Linear Servo Valves	**03**	**4**= 4 L/min (1.06 U. S. GPM) **10**=10 L/min (2.64 U. S. GPM) **20**=20 L/min (5.28 U. S. GPM) **40**=40 L/min (10.57 U. S. GPM) **60**=60 L/min (15.85 U. S. GPM)	(Viewed from the linear motor side) **None:** Upper (Standard) **R:** Right **L:** Left	**10**

Specifications

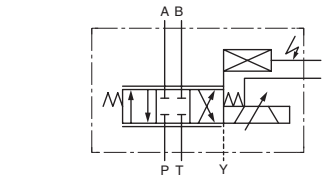
The specifications below are for use with a 48 VDC type exclusive amplifier; for use with a 24 VDC type amplifier, see the values in parentheses { }.

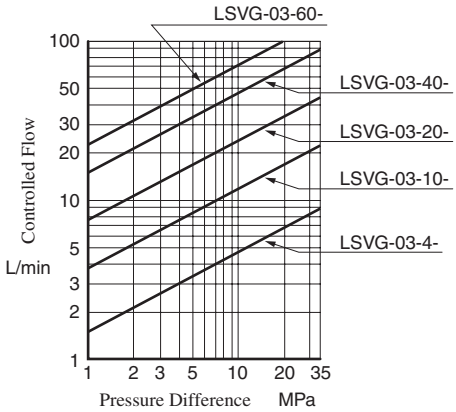
Description \ Model Numbers		LSVG-03-4/10/20/40	LSVG-03-60
Rated Flow @ΔP = 7 MPa (1020 PSI) (1)		4, 10, 20, 40 L/min (1.06, 2.64, 5.28, 10.57 U. S. GPM)	60 L/min (15.85 U. S. GPM)
Max. Operating Pressure		35 MPa (5080 PSI)	
Proof Pres. at Return Port		35 MPa (5080 PSI)	
Drain Port (Y) Permissible Back Pres. (2)		0.05 MPa (7 PSI)	
Null Leakage @Ps = 14 MPa (2030 PSI) 32 mm²/s (150 SSU)		1.7 L/min (.45 U.S. GPM) or less	
Hysteresis		0.1 % or less	
Step Response (0⇔100 %, Typical) (3)		2 ms {3 ms}	3 ms {4 ms}
Frequency Response (± 25 % Amplitude, Typical) (3)	Gain: - 3 dB	350 Hz {300 Hz}	330 Hz {240 Hz}
	Phase: - 90°	450 Hz {370 Hz}	410 Hz {330 Hz}
Vibration Proof (4)		Frequency: 10 - 60 Hz, Amplitude: 4 mm (.157 in.), Acceleration: 7.8 - 282 m/s² (25.6 to 925 ft./s²) Frequency: 61 - 2000 Hz, Amplitude: 4 - 0.0038 mm (.157 - .00015 in.), Acceleration: 294 m/s² (965 ft./s²)	
Protection		IP 64	
Ambient Temperature		- 15 to + 60 °C (5 to 140°F)	
Spool Type		Neutral / Zero Lap	
Spool Stroke to Stops		± 0.5 mm (± .0197 inches)	± 7.5 mm (± .0295 inches)
Linear Motor Specification	Current	2 A [Max. 6 A]	
	Coil Resistance	4.5 Ω [at 20 °C (68 °F)]	
Mass		5 kg (11.0 lbs.)	
Applicable Servo Amplifier		AMLS-A-D*-*-10	AMLS-B-D*-*-10

Note: (1) Use the valves so that the relationship between the valve pressure difference and the flow rate, as specified below in "Range of Flow Control" is met.
(2) Back pressure at the drain port (Y) should be 0.05 MPa (7 PSI) or less and not be a negative pressure.
(3) This value is measured for each valve; it may differ depending on the actual circuit.
(4) There are restrictions on the mounting position; consult Yuken for details.

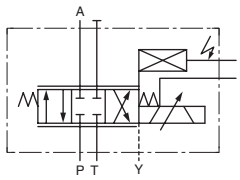
Range of Flow Control

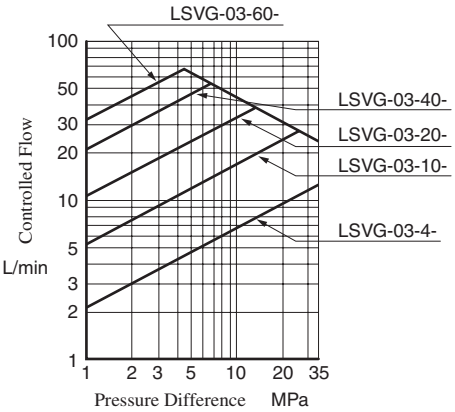
Control Method: 4-Way Valve





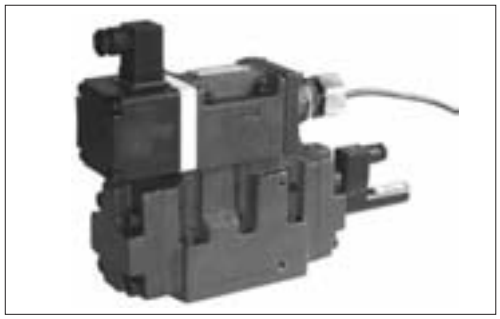
Control Method: 3-Way Valve

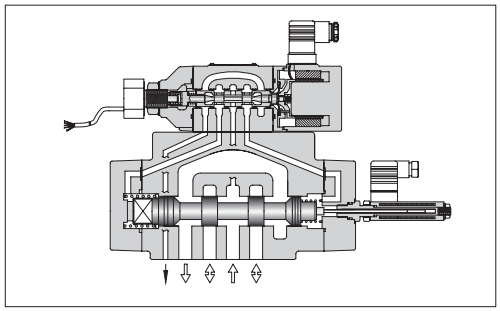




Two Stage Type High Speed Linear Servo Valves

Two stage type linear servo valves are a type of high-flow servo valve that has a direct type high-speed linear servo valve in its pilot stage to drive the main spool.
These valves control the positions of the pilot and main spools with electrical feedback, achieving high accuracy and response.





● High flow

The valves consist of two stages to provide a high flow rate [Rated flow at ΔP = 7 MPa (1020 PSI): 750 to 1500 L/min (198 to 396 U.S.GPM)].

● High accuracy

The valves have a low hysteresis of 0.1 % or less, achieving high accuracy. They allow the main unit to operate with much higher repeatability.

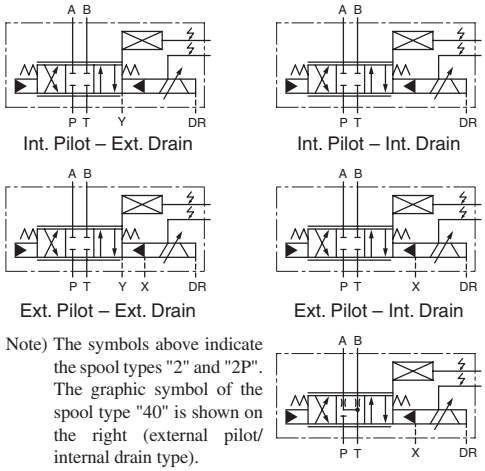
● High response characteristics

The valves provide significantly high levels of step and frequency responses, which are typically used as measures of response characteristics; the step response is 8 ms (0⇔100 %), and the frequency response is 100 Hz/- 90° (± 25 % amplitude) (Representative values for LSVHG-10-1500). Thus, the valves ensure the achievement of unprecedented high response.

● Excellent contamination resistance

As is the case with the direct type linear servo valves, the permissible level of fluid contamination for these valves is up to NAS 1638 class 10.

Graphic Symbols



Note) The symbols above indicate the spool types "2" and "2P". The graphic symbol of the spool type "40" is shown on the right (external pilot/ internal drain type).

Model Number Deignation

F-	LSVHG	-06	-900	-2P	-E	T	-R	-10
Special Seals	Series Number	Valve Size	Rated Flow @ΔP = 7 MPa (@ΔP = 1020 PSI)	Spool Type	Pilot Connection	Drain Connection	Cable Departure Direction	Design Number
F: Special Seals for Phosphate Ester Type Fluid (Omit if not required).	**LSVHG:** Two Stage Type High Speed Linear Servo Valves	**04**	**750:** 750 L/min (198 U. S. GPM)	**2:** 10 % Overlap  **40:** Open Centre A, B & T  **2P:** Zero Lap  (Dual Flow Gain)	**None:** Internal Pilot **E:** External Pilot	**None:** External Pilot **T:** Internal Pilot	(Viewed from the linear motor side) **None:** Upper (Standard) **R:** Right **L:** Left	**10**
		06	**900:** 900 L/min (238 U. S. GPM) **1300:** 1300 L/min (343 U. S. GPM)					**10**
		10	**1500:** 1500 L/min (396 U. S. GPM)					**10**

Specifications

The specifications below are for use with a DC 48 V type exclusive amplifier; for use with a DC 24 V type amplifier, see the values in parentheses { }.

Description \ Model Numbers				LSVHG-04-750	LSVHG-06-900	LSVHG-06-1300	LSVHG-10-1500
Rated Flow	ΔP = 7 MPa (1020 PSI) (4-Way Valve)			750 L/min {198 U. S. GPM}	900 L/min {238 U. S. GPM}	1300 L/min {343 U. S. GPM}	1500 L/min {396 U. S. GPM}
	ΔP = 0.5 MPa (73 PSI) (Per Land)			283 L/min {74.8 U. S. GPM}	340 L/min {89.8 U. S. GPM}	490 L/min {129 U. S. GPM}	600 L/min {159 U. S. GPM}
Max. Operating Pressure				35 MPa (5080 PSI)	35 MPa (5080 PSI)	31.5 MPa (4570 PSI)	31.5 MPa (4570 PSI)
Proof Pres. at Return Port	External Drain			31.5 MPa (4570 PSI)	35 MPa (5080 PSI)	25 MPa (3630 PSI)	21 MPa (3050 PSI)
	Internal Drain (1)						
Drain Port (DR Port) Permissible Back Pressure (2)				0.05 MPa (7 PSI)			
Pilot Pressure (3)				1.5 - 35 MPa (220 - 5080 PSI)			1.5 - 25 MPa (220 - 3630 PSI)
Pilot Flow Rate (4) L/min (U. S. GPM)				27 (7.1) or more {22 (5.8)} or more	30 (7.9) or more {24 (6.3)} or more	34 (9.0) or more {27 (7.1)} or more	30 (7.9) or more {30 (7.9)} or more
Max. Leakage Ps = Pp = 14 MPa (2030 PSI) @ Visocity: 32 mm²/s (150 SSU)	Pilot Valve			1.7 L/min (.45 U.S. GPM)			
	Main Valve	Spool Type	- 2 -	0.8 L/min (.21 U. S. GPM)	0.9 L/min (.24 U. S. GPM)	1 L/min (.26 U. S. GPM)	3 L/min (.79 U. S. GPM)
			- 40 -	1.6 L/min (.42 U. S. GPM)	1.8 L/min (.48 U. S. GPM)	2 L/min (.53 U. S. GPM)	6 L/min (1.59 U. S. GPM)
			- 2P -	6.8 L/min (1.80 U. S. GPM)	7 L/min (1.85 U. S. GPM)	8 L/min (2.11 U. S. GPM)	10 L/min (2.64 U. S. GPM)
Hysteresis				0.1 % or less			
Step Response (0⇔100 %, Typical) (5)				8 ms {10 ms}	8 ms {10 ms}	10 ms {13 ms}	8 ms {8 ms}
Frequency Response (± 25 % Amplitude, Typical) (5)	Gain: - 3 dB			150 Hz {140 Hz}	160 Hz {130 Hz}	150 Hz {110 Hz}	160 Hz {150 Hz}
	Phase: - 90°			110 Hz {100 Hz}	105 Hz {100 Hz}	100 Hz {100 Hz}	100 Hz {100 Hz}
Vibration Proof (6)				Frequency: 10 - 60 Hz, Amplitude: 4 mm (.157 in.), Acceleration: 7.8 - 282 m/s² (25.6 to 925 ft./s²) Frequency: 61 - 2000 Hz, Amplitude: 4 - 0.0038 mm (.157 - .00015 in.), Acceleration: 294 m/s² (965 ft./s²)			
Protection				IP 64			
Ambient Temperature				- 15 to + 60 °C (5 to 140°F)			
Spool Stroke to Stops				± 5 mm (± .197 in.)	± 5 mm (± .197 in.)	± 7 mm (± .276 in.)	± 5 mm (± .197 in.)
Spool End Area				7.1 cm² (.011 Sq. in.)	8 cm² (.012 Sq. in.)	8 cm² (.012 Sq. in.)	8 cm² (.012 Sq. in.)
Linear Motor Specification	Current			2 A [Max. 6 A]			
	Coil Resistance			4.5 Ω [at 20 °C (68 °F)]			
Mass				12 kg (26.5 lbs.)	20 kg (44.1 lbs.)	21 kg (46.3 lbs.)	54 kg (119 lbs.)
Applicable Servo Amplifier				AMLS-C2-D*-*-10	AMLS-C-D*-*-10	AMLS-D-D*-*-10	AMLS-C-D*-*-10

Note: (1) Pressure at the return port should be at actual supply pressure or less.
(2) Back pressure at the drain port should be 0.05 MPa (7 PSI) or less and not be a negative pressure.
(3) Supply pressure for the pilot valve should be 1.5 to 35 MPa (220 to 5080 PSI) {1.5 to 25 MPa (220 to 3630 PSI) for LSVHG-10} and should also be 60 % of actual supply pressure or more.
(4) The pilot flow is calculated based on 14 MPa (2030 PSI) of pilot pressure and the above step response.
(5) This value is measured for each valve based on 14 MPa (2030 PSI) of pilot pressure; it may differ depending on the actual circuit/operation conditions.
(6) There are restrictions on the mounting position; consult Yuken for details.

Linear Servo Amplifier

This amplifier is used to drive LSVG/LSVHG series high speed linear servo valves. With an optimal design for the servo valves, the amplifier can maximize the valve performance.

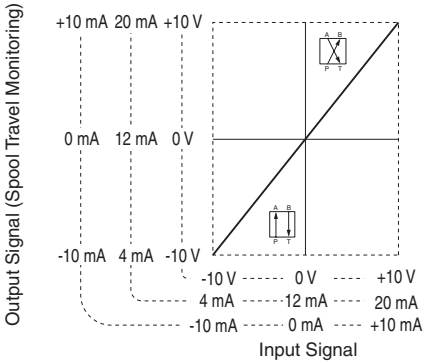
Specifications

Description \ Model Numbers	AMLS-∗-D48-∗-10	AMLS-∗-D24-∗-10
Power Supply	DC 48 V ± 2.4 V (200 VA or more)	DC 24 V ± 1.2 V (75 VA or more)
Rated Output Current	Continuous ± 2 A (4 A Peak)	Continuous ± 2 A (3 A Peak)
Input / Output Signal	Output Signal = Spool Travel Monitoring	
AMLS-∗-D48/D24-A1-	Voltage Signal ± 10 V (Ri = 100 kΩ, R_L ≧ 10 kΩ)	
AMLS-∗-D48/D24-B1-	Current Signal 4 - 20 mA (Ri = 200 Ω, R_L ≧ 100 - 500 kΩ)	
AMLS-∗-D48/D24-C1-	Current Signal ± 10 mA (Ri = 200 Ω, R_L ≧ 100 - 500 kΩ)	
Control Input / Output Signal	a) Servo "ON" Input/Alarm Reset Input: Photocoupler Input Voltage: + 15 VDC to + 28 V, Input Impedance: 2.2 kΩ b) Overcurrent Output (Curr.AL.)/Deviation Alarm Output (CRTL.AL.): Photocoupler Output Voltage: Max. 50 VDC, Current: Max. 30 mA	
Ambient Temperature	0 - 50 °C (32 – 122°F)	
Ambient Humidity	20 - 90 %RH (No Condensation)	
Mass	1.8 kg (4.0 lbs.)	

Model Number Deignation

AMLS	-A	-D48	-A1	-10
Series Number	Applicabele Valve Type	Supply Voltage	Input Signal/Spool Travel Monitoring	Design Number
AMLS: Linear Servo Amplifier	**A:** LSVG-03-4/10/20/40 **B:** LSVG-03-60 **C:** LSVHG-06-900 & LSVHG-10-1500 **C2:** LSVHG-04-750 **D:** LSVHG-06-1300	**D48:** 48 VDC **D24:** 24 VDC	**A1:** Voltage Signal ± 10 V **B1:** Current Signal 4 to 20 mA **C1:** Current Signal ± 10 mA	**10**

I/O Signal Characteristics



OBE (On-Board Electronics) Type Linear Servo Valves

On-board electronics type linear servo valves have been developed based on high-speed linear servo valves, but with a focus on downsizing the pilot valve. The integration of the exclusive amplifier and the linear servo valve create a high performance valve in a compact package which greatly improves user-friendliness.

● High accurate, simple and convenient — Ideal on-board electronics type linear servo valves

Convenient

Fault diagnosis is esy to conduct with the alarm indication when the command signal and the spool position differ due to abnormality in the system.

Colour	Description of Alarm Indicator
Green	Indication of power supply (Normal operation)
Red	Deviation alarm for the pilot vlve
Yellow	Deviation alarm for the main vlve

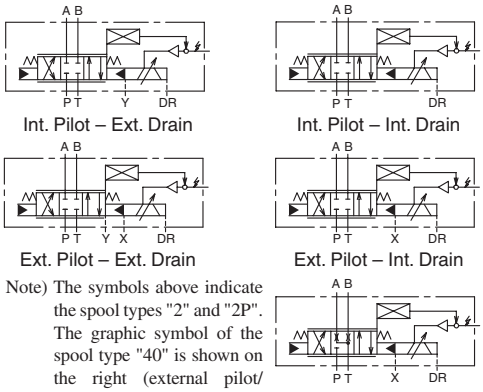
High Accuracy

Closed loop control by the combination of the position sensors for the polot valve and the main valve in the compact amplifiers ensures excellent linearity, hysteresis and stability on control.

Simple

Highly accurate hydraulic control can be obtained only by supplying 24 V DC power and inputting a command signal.

Graphic Symbols



Note) The symbols above indicate the spool types "2" and "2P". The graphic symbol of the spool type "40" is shown on the right (external pilot/ internal drain type).

Model Number Deignation

F-	LSVHG	-06	EH	-900	-2P	-E	T	-A	1	-20
Special Seals	Series Number	Valve Size	Amp. Type	Rated Flow @ΔP = 7 MPa (@ΔP = 1020 PSI)	Spool Type	Pilot Connection	Drain Connection	Input Signal/Spool Travel Monitoring	Connector Type	Design Number
F: Special Seals for Phosphate Ester Type Fluid (Omit if not required).	**LSVHG:** Two Stage Type Linear Servo Valves	**03**	**EH:** OBE Type	**230:** 230 L/min (60.8 U. S. GPM)	**2L:** 2 % Overlap (Linear Flow Gain)	**None:** Internal Pilot **E:** External Pilot	**None:** External Drain **T:** Internal Drain	**A:** Voltage Signal ± 10 V **B:** Current Signal 4 to 20 mA **C:** Current Signal ± 10 mA	**1:** 6 + PE Pole **2:** 11 + PE Pole	**20**
		04		**270:** 270 L/min (71.3 U. S. GPM)	**2:** 10 % Overlap					**20**
		06		**750:** 750 L/min (198 U. S. GPM)	**40:** Open Centre A, B & T					**20**
				900: 900 L/min (238 U. S. GPM)	**2P:** Zero Lap					
				1300: 1300 L/min (343 U. S. GPM)	(Dual Flow Gain)					

Specifications

Description \ Model Numbers				LSVHG-03EH -230-2L	LSVHG-03EH -270-*	LSVHG-04EH -750-*	LSVHG-06EH -900-*	LSVHG-06EH -1300-*
Rated Flow	ΔP = 7 MPa (1020 PSI) (4-Way Valve)			230 L/min {60.8 U. S. GPM}	270 L/min {71.3 U. S. GPM}	750 L/min {198 U. S. GPM}	900 L/min {238 U. S. GPM}	1300 L/min {343 U. S. GPM}
	ΔP = 0.5 MPa (73 PSI) (Per Land)			87 L/min {23 U. S. GPM}	102 L/min {26.9 U. S. GPM}	283 L/min {74.8 U. S. GPM}	340 L/min {89.8 U. S. GPM}	490 L/min {129 U. S. GPM}
Max. Operating Pressure				31.5 MPa [5] (4570 PSI)		35 MPa (5080 PSI)	35 MPa (5080 PSI)	31.5 MPa (4570 PSI)
Proof Pres. at Return Port [1]	External Drain	Port "T"		21 MPa [5] (3050 PSI)		31.5 MPa (4570 PSI)	35 MPa (5080 PSI)	25 MPa (3630 PSI)
		Port "Y"		21 MPa [5] (3050 PSI)		21 MPa (3050 PSI)		
	Internal Drain	Port "T" & "Y"		21 MPa [5] (3050 PSI)		21 MPa (3050 PSI)		
Drain Port (DR Port) Permissible Back Pressure. [2]				0.05 MPa (7 PSI)				
Pilot Pressure [3]				1.5 - 21 MPa (220 - 3050 PSI)				
Pilot Flow Rate [4] L/min (U. S. GPM)				9 (2.4) or more		20 (5.3) or more	22 (5.8) or more	23 (6.1) or more
Max. Leakage Ps = Pp = 14 MPa (2030 PSI) @ Visocity: 32 mm²/s (150 SSU)	Pilot Valve			0.8 L/min (.21 U.S. GPM)		1.2 L/min (.32 U.S. GPM)		
	Main Valve	Spool Type	- 2L -	1.6 L/min (.42 U. S. GPM)	—	—	—	—
			- 2 -	—	0.5 L/min (.13 U. S. GPM)	0.8 L/min (.21 U. S. GPM)	0.9 L/min (.24 U. S. GPM)	1 L/min (.26 U. S. GPM)
			- 40 -	—	1 L/min (.26 U. S. GPM)	1.6 L/min (.42 U. S. GPM)	1.8 L/min (.48 U. S. GPM)	2 L/min (.53 U. S. GPM)
			- 2P -	—	5.6 L/min (1.48 U. S. GPM)	6.8 L/min (1.8 U. S. GPM)	7 L/min (1.85 U. S. GPM)	8 L/min (2.11 U. S. GPM)
Hysteresis				0.1 % or less				
Step Response (0⇔100 %, Typical) [6]				8 ms	7 ms	11 ms	11 ms	15 ms
Frequency Response (± 25 % Amplitude, Typical) [6]	Gain: - 3 dB			120 Hz	125 Hz	100 Hz	100 Hz	75 Hz
	Phase: - 90°			110 Hz	110 Hz	90 Hz	90 Hz	70 Hz
Vibration Proof [7]				100 m/s²				
Protection				IP 65				
Ambient Temperature				0 to + 50 °C (32 to 122 °F)				
Spool Stroke to Stops				± 4 mm (± .157 in.)	± 3.5 mm (± .138 in.)	± 5 mm (± .197 in.)	± 5 mm (± .197 in.)	± 7 mm (± .276 in.)
Spool End Area				3 cm² (.0047 Sq. in.)		7 cm² (.010 Sq. in.)	8 cm² (.012 Sq. in.)	8 cm² (.012 Sq. in.)
Linear Motor Specification	Current			Max. 2.1 A				
	Coil Resistance			9.6 Ω [at 20 °C (68 °F)]				
Mass				8.5 kg (18.7 lbs.)		14 kg (30.9 lbs.)	20 kg (44.1 lbs.)	20 kg (44.1 lbs.)
Electric Connection				6 + PE / 11 + PE Connector				

Note: (1) Pressure at the return port should be at actual supply pressure or less.
(2) Back pressure at the drain port should be 0.05 MPa (7 PSI) or less and not be a negative pressure.
(3) Supply pressure for the pilot valve should be 1.5 to 21 MPa (220 to 3050 PSI) and should also be 60 % of actual supply pressure or more.
(4) The pilot flow is calculated based on 14 MPa (2030 PSI) of pilot pressure and the above step response.
(5) To use the external pilot types with supply pressure of 21 MPa (3050 PSI) or more, pressure at the port T/Y should be 7 MPa (1020 PSI) or less.
(6) This value is measured for each valve based on 14 MPa (2030 PSI) of pilot pressure; it may differ depending on the actual circuit/operation conditions.
(7) There are restrictions on the mounting position; refer to the instructions for use.

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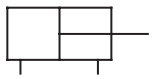
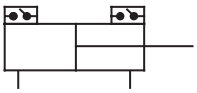
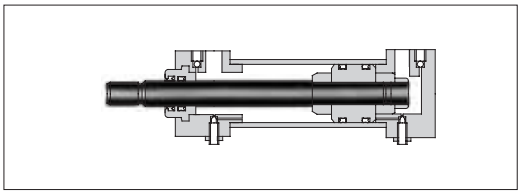
ACTUATORS

Hydraulic Cylinders

Cylinder Type		Nominal Pressure MPa (PSI)	Cylinder Bore mm (Inches)	Page
Standard Type 	CJT-35	3.5 (510)	32 - 160 (1.26 - 6.30)	806
	CJT-70	7 (1020)	32 - 250 (1.26 - 9.84)	
	CJT-140	14 (2030)	32 - 250 (1.26 - 9.84)	
	CJT-210	21 (3050)	40 - 160 (1.57 - 6.30)	
Switch Set Type 	CJT-35L	3.5 (510)	32 - 80 (1.26 - 3.15)	
	CJT-70L	7 (1020)	32 - 125 (1.26 - 4.92)	
	CJT-140L	14 (2030)	32 - 125 (1.26 - 4.92)	

"CJT" Series Hydraulic Cylinders

YUKEN's "CJT" Series Hydraulic Cylinders are provided with many mounting types so that they can be used for wide use of general purpose industrial machines such as machine tools.
Moreover, Switch-Set "CJT" Series Hydraulic Cylinders with a proximity switch which facilitates detecting a position with a slide proximity switch on the cylinder body is also available.



- Various mounting types.
- Excellent ability in low speed and high-precision operation.
- Gentle stop characteristics obtained with a smooth cushion effect.

Specifications

Description		Standard Type				Switch Set Type		
		CJT35	CJT70	CJT140	CJT210	CJT35L	CJT70L	CJT140L
Cylinder Bore	mm (In.)	Refer to the "Cylinder Bore Selection Chart"						
Nominal Pressure	MPa (PSI)	3.5 (510)	7 (1020)	14 (2030)	21 (3050)	3.5 (510)	7 (1020)	14 (2030)
Min. Operating Pressure	MPa (PSI)	Less than 0.1 (14.5)	Less than 0.3 (43.5)	Less than 0.3 (43.5)	Less than 0.3 (43.5)	Less than 0.1 (14.5)	Less than 0.3 (43.5)	Less than 0.3 (43.5)
Operating Speed	mm/s (In./s)	8 - 300 (.31 - 11.8)	8 - 400 ★1 (.31 - 15.7)		8 - 300 (.31 - 11.8)	8 - 300 (.31 - 11.8)	8 - 400 ★1 (.31 - 15.7)	
Max. Stroke ★2	mm (In.)	1800 (70.9)	2000 (78.7)			1600 (63.0)	2000 (78.7)	

★1. Max. Operating Speed is varied according to the Cylinder Bore.

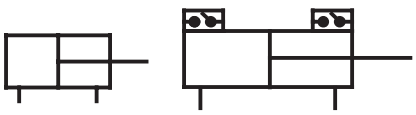
★2. Max. Stroke may be varied according to the Cylinder Bore. It also may be limited to lower value according to buckling strength. For details, consult Yuken.

Cylinder Bore Selection Chart

Cylinder Bore mm(In.)	Standard Type				Switch Set Type		
	CJT 35	CJT 70	CJT 140	CJT 210	CJT 35L	CJT 70L	CJT 140L
32 (1.26)	○	○	○		○	○	○
40 (1.57)	○	○	○	○	○	○	○
50 (1.97)	○	○	○	○	○	○	○
63 (2.48)	○	○	○	○	○	○	○
80 (3.15)	○	○	○	○	○	○	○
100 (3.94)	○	○	○	○		○	○
125 (4.92)	○	○	○	○		○	○
140 (5.51)		○	○	○			
150 (5.91)		○	○				
160 (6.30)	○	○	○	○			
180 (7.09)		○	○				
200 (7.87)		○	○				
220 (8.66)		○	○				
250 (9.84)		○	○				

★The mark ○ in above chart show selectable Cylinder Bore.

Graphic Symbols



Consult Yuken when detailed material such as dimensions figures is required.

Model Number Designation

Standard Type

(Ex.) CJT70 - LA 32 C 100 B - A B D - ∗ - 20

Max. Operating Pres.
35: 3.5 MPa (510 PSI)
70: 7 MPa (1020 PSI)
140: 14 MPa (2030 PSI)
210: 21 MPa (3050 PSI)

Mounting
(Refer to the following page)

Cylinder Bore (mm)

Rod Type
A: Ultra Heavy Duty Type (CJT 70/140)
B: Heavy Duty Type (CJT70/140/210)
C: Standard Type (CJT70/140)
S: Special Type (CJT35)

Stroke (mm)

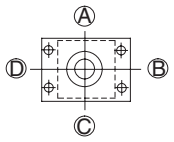
Location of Cushion
B: Both Sides
R: Rod Side
H: Head Side
N: No Cushion

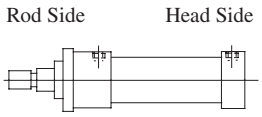
Port Position
A: Upward

Cushion Valve Position
B: Right
N: No Cushion Valve

Air Vent Position
D: Left

Options
(Consult YUKEN when options is required.)





Switch Set Type

Composition of basic model code is the same as of the above mentioned standard type. However the following underlined marks shall be added.

(Ex.) CJT70L - LA32C100B - ABD - ∗ X1 2 - 20

Switch Set Type

Options
(Consult Yuken when options is required.)

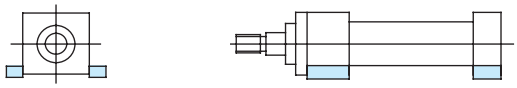
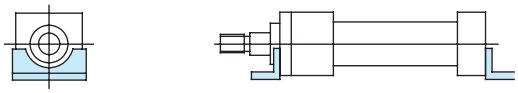
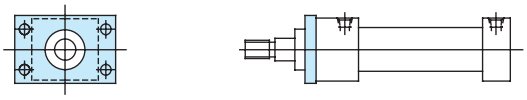
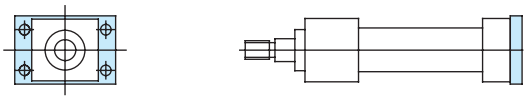
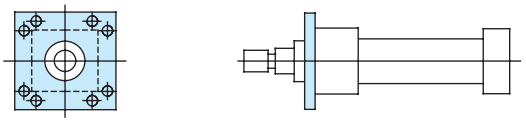
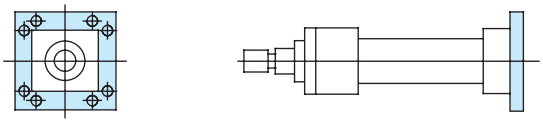
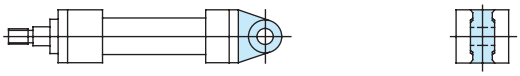
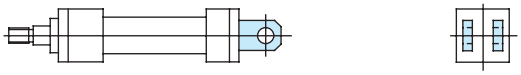
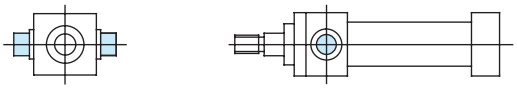
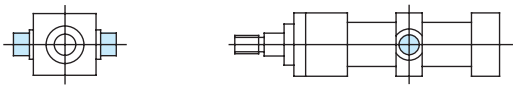
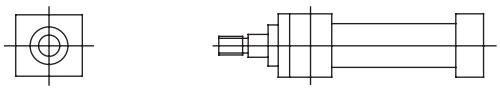
Type of Switch (Refer to Table below)
X1, Y1: Lead Wire, 1.5m (4.9 ft.)
X5, Y5: Lead Wire, 5m (16.4 ft.)
XA, XB: Plug-in Connector

Number of Switch
1: 1 Pc.
2: 2 Pcs.
3: 3 Pcs.

Specification of Switch

Switch Type		Load Voltage Range	Load Current Range	Maximum Switching Capacity	Allowable Length of Wire	Indication Light
Contact Switch	X1, X5 (Lead Wire)	5- 120 V AC 5- 30 V DC	5- 20 mA (AC) 5- 40 mA (DC)	2 VA (AC) 1.5 W (DC)	10 m (AC) 100 m (DC)	Light Emitting Diode (Red colour lights when switch is "ON".)
	XA (Plug-in Connector)	5- 120 V AC	5- 20 mA (AC)	2 VA (AC)	10 m	
	XB (Plug-in Connector)	5- 30 V DC	5- 40 mA (DC)	1.5 W (DC)	100 m	
Contactless Switch	Y1, Y5 (Lead Wire)	5- 30 V DC	5- 40 mA (DC)	—	10 m	

Mounting

Symbol	Name	Illustration of Mounting Type	CJT35 CJT35L	CJT70 CJT70L	CJT140 CJT140L	CJT210
LA	Foot Mounting Side Lugs		○	○	○	○
LB	Foot Mounting Side End Angles		○	○	○	
FA	Rod Rectangular Flange		○	○		○
FE				○	○	
FY				○	○	
FB	Head Rectangular Flange		○	○		○
FF				○	○	
FC	Rod Square Flange			○	○	
FD	Head Square Flange			○	○	
CA	Cap Detachable Eye		○	○	○	○
CB	Cap Detachable Clevis		○	○	○	
TA	Rod Trunnion		○	○	○	
TC	Intermediate Trunnion		○	○	○	○
SD	Basic Type		○	○	○	○

● The mark ○ in above chart show selectable Mounting Types.

K

Standard Hydraulic Power Units
Power Packages

Energy-Saving Hydraulic Units and Controllers

Energy-Saving Control System for Hydraulic Units (Energy-Saving Controller)

Page 811

Equipped with the variable displacement vane pump <YM-e Pack>

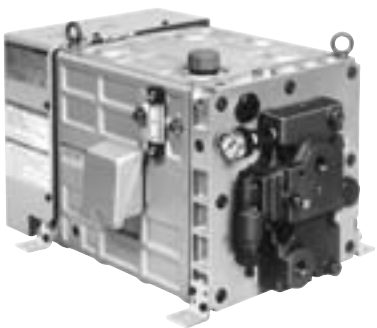
Page 812

Equipped with the variable displacement piston pump <YA-e Pack>

Page 813

Standard Hydraulic Power Units

Space-Saving & Low Noise <YF Pack>



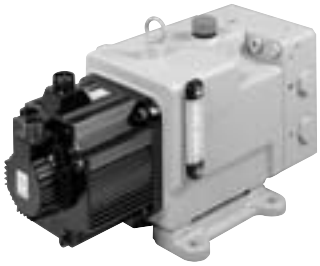
Page 814

Low Noise & Small Type <YP Pack>

Page 815

AC Servo Motor Driven Hydraulic Pump Control System

Intelligent Hydraulic Servo Drive Pack



Page 816

Energy-Saving Hydraulic Units and Controllers

Substantial energy saving of hydraulic units has been achieved by the inverter drive.

Hydraulic units equipped with variable displacement pumps feature greater energy-saving than those with fixed displacement pumps. Yuken's energy-saving hydraulic units and controllers utilize rotational frequency control with an inverter. This innovative configuration solves the problem of efficiency losses suffered by induction motors operating at light loads and ensures significant energy savings.

Efficiency Characteristics of Induction Motor
- At Rated Output: Maximum Efficiency
- At Light-load: Significant Efficiency loss

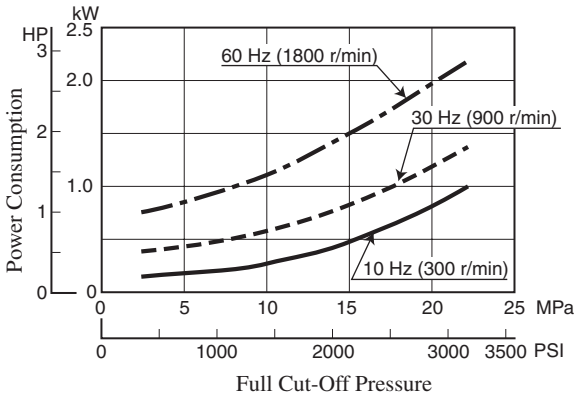
Rotational frequency control is effective for reducing power loss.

Extensive energy saving is possible by detecting a load pressure with the pressure sensor and keeping the motor rotation at the optimum level required for pressure holding. Based on the concept above, the following three different types of inverter-driven system and packages have been developed.

- **Energy-saving control system for hydraulic units (Energy saving controller)**
  For modification of existing hydraulic units to energy-saving type
- **Equipped with the variable displacement vane pump <YM-e Pack>**
- **Equipped with the variable displacement piston pump <YA-e Pack>**

- Example of reduction of power consumption with rotational frequency control

Combination of the A37 piston pump and 7.5 kW (10 HP) motor



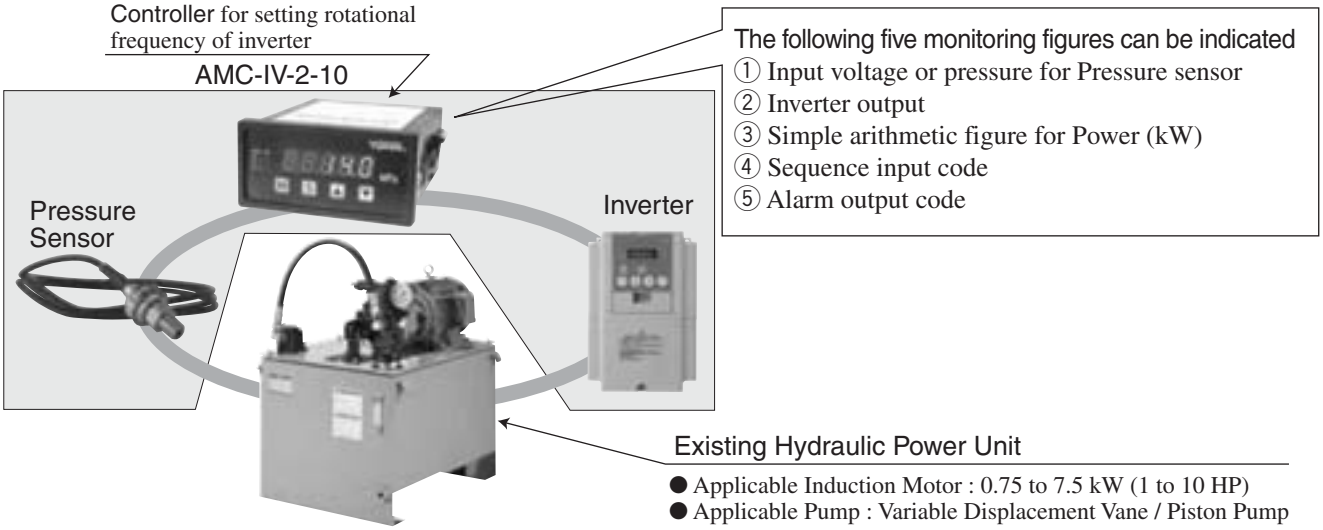
Features of YUKEN energy-saving units / controllers

- **Extremely easy operation and maintenance**
  Adjustment and maintenance works are very easy as basically the conventional power unit is used.
- **Significant reduction of power consumption**
  With rotational frequency control, more than 40% of power consumption at pressure holding is possible compared to conventional hydraulic units.
- **Low Noise**
  Especially the noise level at the full-cutoff is reduced.
- **Discharge volume can be set to a certain volume at 50/60 Hz.**
  Regardless the power supply frequency, the rotation speed at the maximum discharge volume can be set by the inverter within the range from 1500 to 1800 r/min.
- **Continuous operation is possible even at breakdown of the pressure sensor or the inverter.**
  Operation at a certain rotation speed is possible even without receiving a signal from the pressure sensor due to breaking of wire or malfunction of the pressure sensor. Incase of malfunction of the inverter itself, the same operation mentioned above is possible by reconnecting of the primary power supply to the electric motor.

Energy-Saving Control System for Hydraulic Units (Energy-Saving Controller)

Energy-saving effect can be obtained by adding the controller, the pressure sensor, and the inverter to an existing unit and carrying out simple adjustment.

System Configuration

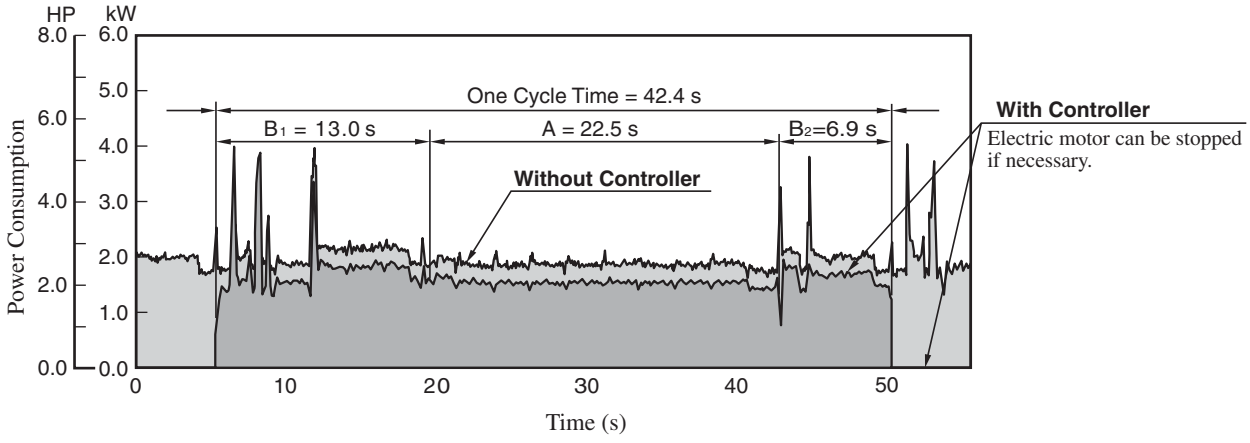


Specifications

Model	Output Voltage for Inverter	Input Voltage for Pressure Sensor	Power Supply for Pressure Sensor	Voltage for Power Source	Power Consumption	Ambient Temperature
AMC-IV-2-10	Select one of the following voltage (0 to +5 V, +1 to +5 V, +0.5 to 4.5 V)		+5 V	AC 100/200 V	Less than 6 VA	0 to 50ºC (32 to 112ºF)

Example of Reduction Rate of Power Consumption

(Machining line for auto parts)



Symbol	Status	Average of Power Consumption		
		Without Controller	With Controller	Reduction Rate
A	Standby	1.80 kW (2.41 HP)	1.47 kW (1.97 HP)	Approx. 18%
$B_1 + B_2$	Actual Work	2.01 kW (2.70 HP)	1.69 kW (2.27 HP)	Approx. 16%

Consult Yuken when detailed material such as dimensions figures is required.

Energy-Saving Hydraulic Units – Equipped with Vane Pump <YM-e Pack>

Energy-saving unit equipped with the high performance variable displacement vane pump.

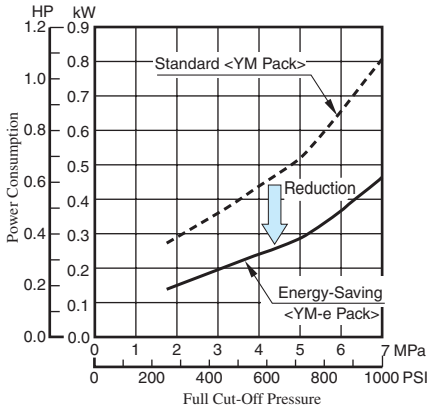
Specifications

Model Numbers	Max. Operating Pressure MPa (PSI)	Setting Range of Rotation Speed at Max. Discharge r/min	Mass (Does not included hydraulic fluid) kg (lbs.)
E–YM8–A–2–∗–30	3.5 (510)	1500 – 1800	0.75 kW: 43 (94.8) 1.5 kW: 49 (108) 2.2 kW: 56 (123)
E–YM8–B–2–∗–30	7.0 (1020)		
E–YM16–A–2–∗–30	3.5 (510)		
E–YM16–A–2–∗–30	7.0 (1020)		

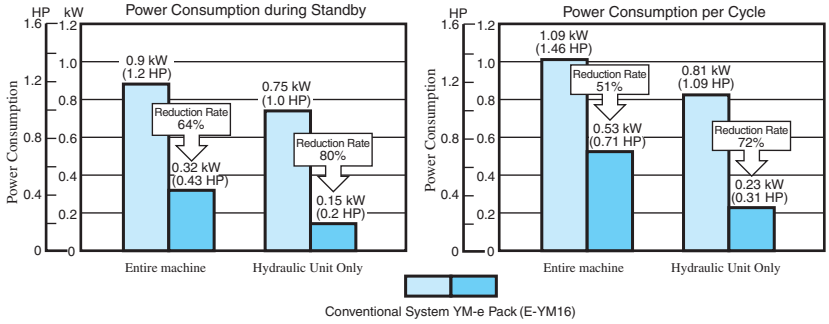
Model Number Designation

E–YM	8	–A	–2	–0.75	-30
Series Number	Geometric Displacement	Pressure Adj. Range	Reservoir Capacity	Electric Motor	Design Number
E–YM: Compact Energy-Saving Hydraulic Unit YM-e Pack	8: 8.6 cm³/rev (.525 cu.in./rev)	A: 1.75–3.5 MPa (255–510 PSI) B: 3.5–7.0 MPa (510–1020 PSI)	2: 20 L (5.3 Gal.)	0.75: 0.75 kW (1 HP) × 4P 1.5: 1.5 kW (2 HP) × 4P	30
	16: 15.6 cm³/rev (.952 cu.in./rev)	A: 1.75–3.5 MPa (255–510 PSI)	2: 20 L (5.3 Gal.)	0.75: 0.75 kW (1 HP) × 4P 1.5: 1.5 kW (2 HP) × 4P	
		B: 3.5–7.0 MPa (510–1020 PSI)		1.5: 1.5 kW (2 HP) × 4P 2.2: 2.2 kW (3 HP) × 4P	

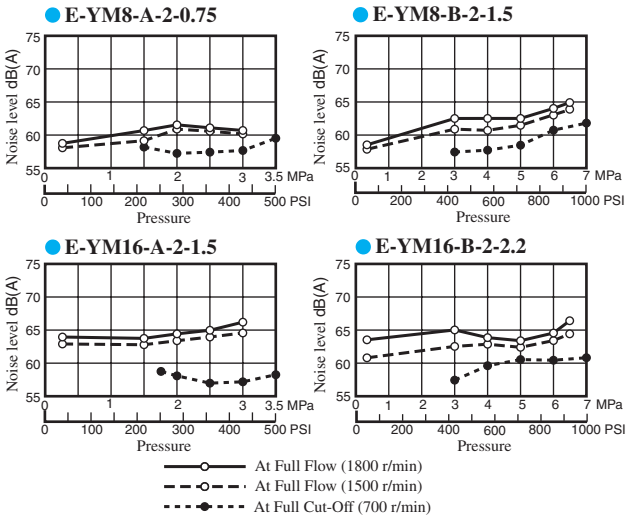
Power Consumption at Full Cut-Off Pressure



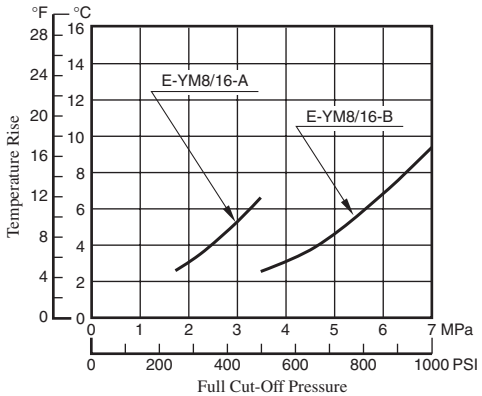
Example of Power Consumption of Grinding Machine



Noise Characteristics (Example) [Measurement Point: 1 m (3.3 ft.) horizontally away]



Characteristics of Oil Temperature Increase in the Reservoir (At 700 r/min)



Consult Yuken when detailed material such as dimensions figures is required.

Energy-Saving Hydraulic Units – Equipped with Piston Pump <YA-e Pack>

Energy-saving units equipped with the high efficiency, high performance AR/A series variable displacement piston pumps.

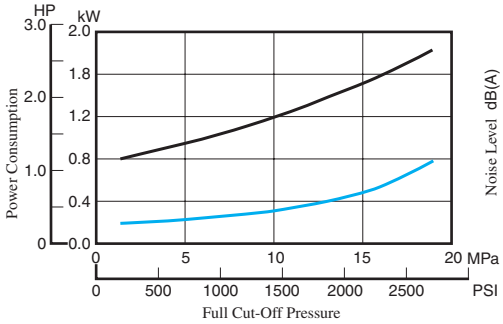
Specifications

Model Numbers	Max. Operating Pressure MPa (PSI)	Reservoir Capacity L (Gal.)	Setting Range of Rotation Speed at Max. Discharge r/min
E–YA10–B–6–∗–41	7 (1020)	60 (15.9)	1500 – 1800
E–YA10–C–6–∗–41	16 (2320)		
E–YA10–C–10–∗–41	16 (2320)	100 (26.4)	
E–YA16–B–6–∗–41	7 (1020)	60 (15.9)	
E–YA16–B–10–∗–41	7 (1020)	100 (26.4)	
E–YA16–C–6–∗–41	16 (2320)	60 (15.9)	
E–YA16–C–10–∗–41	16 (2320)	100 (26.4)	
E–YA22–B–6–∗–41	7 (1020)	60 (15.9)	
E–YA22–B–10–∗–41	7 (1020)	100 (26.4)	
E–YA22–C–10–∗–41	16 (2320)		
E–YA37–B–10–3.7–41	7 (1020)	100 (26.4)	
E–YA37–B–16–∗–41	7 (1020)	160 (26.4)	

Model Number Designation

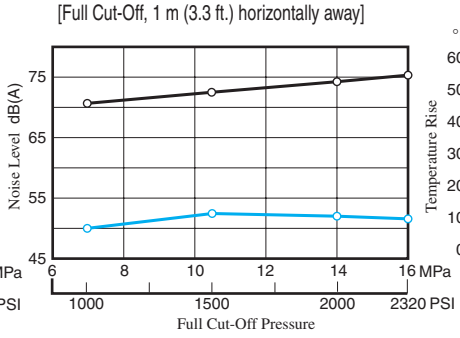
E–YA	10	–B	–6	–2.2	–41
Series Number	Geometric Displacement	Pressure Adj. Range	Reservoir Capacity	Electric Motor	Design Number
E–YA: Energy-Saving Hydraulic Unit YA-e Pack	10: 10.0 cm³/rev (.610 cu.in./rev)	B: 1.2– 7 MPa (170–1020 PSI)	6: 60 L (15.9 Gal.)	2.2: 2.2kW (3 HP) × 4P	41
		C: 2.0– 16 MPa (290–2320 PSI)	10: 100 L (26.4 Gal.)	2.2: 2.2kW (3 HP) × 4P 3.7: 3.7kW (5 HP) × 4P	
	16: 15.8 cm³/rev (.964 cu.in./rev)	B: 1.2– 7 MPa (170–1020 PSI)	6: 60 L (15.9 Gal.)	2.2: 2.2kW (3 HP) × 4P 3.7:3.7kW (5 HP) × 4P	
			10: 100 L (26.4 Gal.)	2.2: 2.2kW (3 HP) × 4P	
		C: 2.0–16 MPa (290–2320 PSI)	10: 100 L (26.4 Gal.)	3.7: 3.7kW (5 HP) × 4P 5.5: 5.5kW (7.4 HP) × 4P 7.5: 7.5kW (10 HP) × 4P	
	22: 22.2 cm³/rev (1.355 cu.in./rev)	B: 1.2– 7 MPa (170–1020 PSI)	6: 60 L (15.9 Gal.) 10: 100 L (26.4 Gal.)	2.2: 2.2kW (3 HP) × 4P 3.7: 3.7kW (5 HP) × 4P	
		C: 2.0–16 MPa (290–2320 PSI)	10: 100 L (26.4 Gal.)	5.5: 5.5kW (7.4 HP) × 4P 7.5: 7.5kW (10 HP) × 4P	
	37: 36.9 cm³/rev (2.25 cu.in./rev)	B: 1.2– 7 MPa (170–1020 PSI)	10: 100 L (26.4 Gal.)	3.7: 3.7kW (5 HP) × 4P	
			16: 160 L (42.3 Gal.)	5.5: 5.5kW (7.4 HP) × 4P 7.5: 7.5kW (10 HP) × 4P	

Power Consumption at Full Cut-Off Pressure

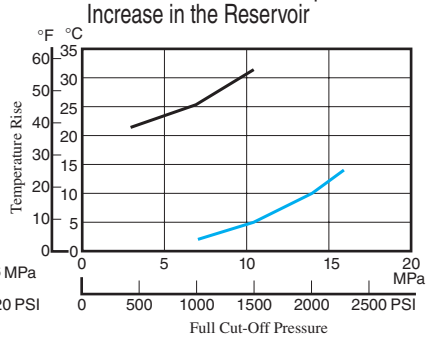


Noise Characteristics

[Full Cut-Off, 1 m (3.3 ft.) horizontally away]



Characteristics of Oil Temperature Increase in the Reservoir



: Standard Type <YA37, 3.7kW, 1800 r/min>
: Energy-Saving Type <E-YA37, 3.7kW, 300 r/min>

Consult Yuken when detailed material such as dimensions figures is required.

Space-Saving & Low Noise Type Hydraulic Power Units <YF Pack>

The Keywords are Cubic Structure

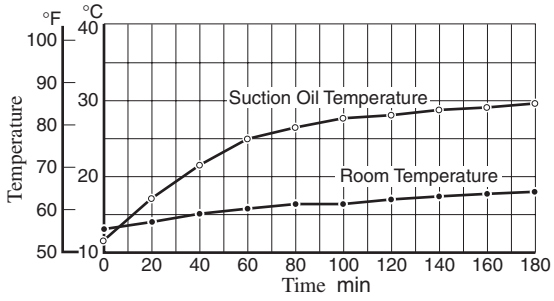
YF PACK are cubic integrated construction of Piston Pump, Electric Motor and Reservoir etc. Each function module linked directly together has allowed us to realize our pipeless concept which means no oil leakage.

Energy-Saving & Low Oil Temperature Rise

YF PACK save 10% of their energy consumption compared to YP pack. Improving cooling capacity reduced thermal radiation. Machines, in which YF PACK can be built, are free from heat distortion.

Temperature Rise

- Model Number: YF16-B-1-2.2-H-20
- Frequency: 50 Hz
- Pressure: Full-cut off at 7 MPa (1020 PSI), Continuous

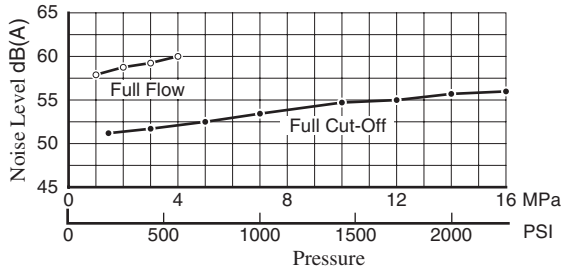


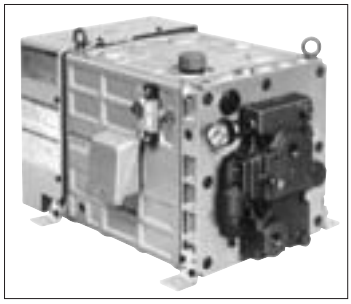
Noise Level 53 dB (A) & Low Vibration

We made the best of our hydraulic technology to take low noise and vibration. YUKEN has achieved noise level 53 dB (A).

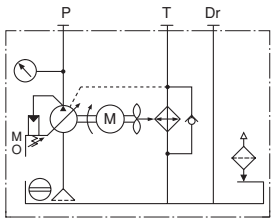
Noise Level

- Model Number: YF16 - C - 1 - 1.5 - H - 20
- One metre (3.3 ft.) horizontally away from YF Pack (average of five directions)
- Viscosity: 32 mm²/s (150 SSU) [ISO VG 32 Oils, 40 °C (104 °F)]
- Frequency: 50 Hz (1500 r/min)





Graphic Symbol



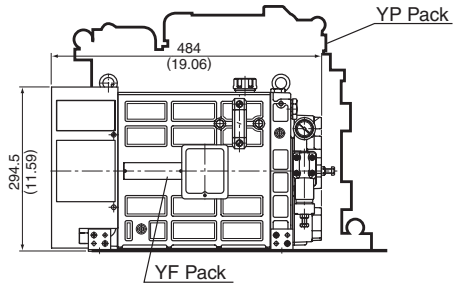
Options

You may have 10 options choosing various accessories: -size 005/01 base blocks (one station – three stations), thermo-sensor, pressure switch etc.

Set up Space Halved (compared to YP pack)

Smaller size and lighter weight of our unique cubic structure make YF PACK easy to build in various machines.

- **Volume Reduced 50 % (Compared to YP Pack)**
- **Mass Reduced 30 % (Compared to YP Pack)**



Model Number Designation

YF10 - B - 1 - 1.5 - H - ✻✻ - ✻ - 20✻

① ② ③ ④ ⑤⑥ ⑦ ⑧

① Geometric Displacement
② Pressure Adjustment Range
③ Reservoir Capacity
④ Electric Motor
} Refer to Specifications

⑤ Base Block Size……5:005, 1:01
⑥ No. of Base Block Stations
1: 1 Station, 2: 2 Stations, 3: 3 Stations
} None: Without Base Block

⑦ Options
M: Magnet Filter, L: Level Sensor
P: Pressure Sensor, T: Thermo Sensor
} Omit of not Required

⑧ Design Standards
None: Japanese Standard "JIS"
950: N. American Design Standard

Specifications

Model Numbers	Geometric Displacement cm³/rev (cu.in.³/rev)	Pressure Adjustment Range MPa (PSI)	Reservoir Capacity L (Gal.)	Electric Motor (4 Poles), 200 V AC (50 Hz) 200/220 V AC (60 Hz)	Approx. Mass kg (lbs.)
YF10–B–1–0.75–H–✻✻–20✻	10.0 (.610)	1.2– 7 (170–1020)	10 (2.6)	0.75 kW (1 HP)	44 (97)
YF10–B–1–1.5–H–✻✻–20✻		1.2– 7 (170–1020)		1.5 kW (2 HP)	49 (108)
YF10–C–1–1.5–H–✻✻–20✻		2.0–16 (290–2320)		1.5 kW (2 HP)	49 (108)
YF16–B–1–1.5–H–✻✻–20✻	15.8 (.964)	1.2– 7 (170–1020)	10 (2.6)	1.5 kW (2 HP)	49 (108)
YF16–B–1–2.2–H–✻✻–20✻				2.2 kW (3 HP)	51 (112)
YF16–B–2U–2.2–H–✻✻–20✻			20 (5.3)	2.2 kW (3 HP)	57 (126)
YF16–B–2S–2.2–H–✻✻–20✻				2.2 kW (3 HP)	57 (126)
YF16–C–1–1.5–H–✻✻–20✻	15.8 (.964)	1.2–16 (170–2320)	10 (2.6)	1.5 kW (2 HP)	49 (108)
YF16–C–1–2.2–H–✻✻–20✻				2.2 kW (3 HP)	51 (112)
YF16–C–2U–2.2–H–✻✻–20✻			20 (5.3)	2.2 kW (3 HP)	57 (126)
YF16–C–2S–2.2–H–✻✻–20✻				2.2 kW (3 HP)	57 (126)

Consult Yuken when detailed material such as dimensions figures is required.

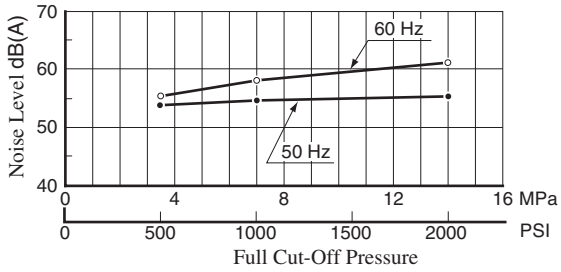
Low Noise & Small Type Hydraulic Power Unit <YP Pack>

Quiet-Low Vibration

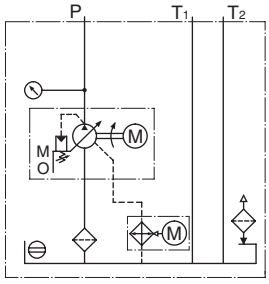
Equipped with low-noise PAL pump and drain cooler. Also, low noise and vibration levels have been achieved by effectively arraying the components to control vibration.

Noise Level

- Model Number: YP16-C-2-2.2-22
- One metre (3.3 ft.) horizontally away from YP Pack



Graphic Symbol



Compact

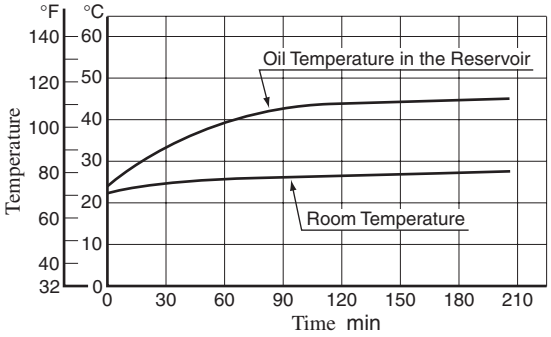
YP pack is well designed to be compact by uprighting the PAL pump and reducing the reservoir size with added drain cooler. It saves floor space for installation.

Low Fluid Temperature Rise

Standard equipment, built-in drain cooler and radiator fins, reduce the fluid temperature rise ratio. Good solution for heat distortion.

Temperature Rise

- Model Number: YP16-B-1-2.2-20
- Frequency: 50 Hz
- Pressure: Full-cut off at 7 MPa (1020 PSI), Continuous



Model Number Designation

YP10 - B - 1 - 1.5 - 22
① ② ③ ④

① Geometric Displacement
(Refer to Specifications)
② Pressure Adjustment Range
B: 1.2 – 7 MPa (170 – 1020 PSI)
C: 1.2 – 16 MPa (170 – 2320 PSI)
[YP10 Only
C: 2.0 – 16 MPa (290 – 2320 PSI)]
③ Reservoir Capacity
(Refer to Specifications)
④ Electric Motor
(Refer to Specifications)

Line Up

YP packs offer nine different models in variety. Eight kinds of optional YP pack are available such as YP pack with control circuit consists of modular & solenoid operated directional valve.

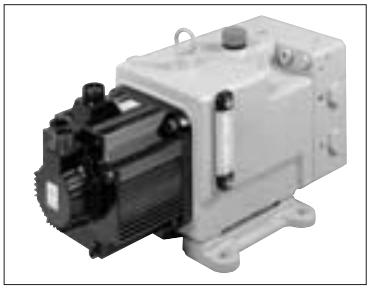
Specifications

Model Numbers	Geometric Displacement cm³/rev (cu.in.³/rev)	Pressure Adjustment Range MPa (PSI)	Reservoir Capacity L (Gal.)	Electric Motor (4 Poles), 200 V AC (50 Hz) 200/220 V AC (60 Hz)	Approx. Mass kg (lbs.)
YP10–B–1–0.75–22	10.0 (.610)	Refer to Model Number Designation	10 (2.6)	0.75 kW (1 HP)	58 (128)
YP10–✻–1–1.5–22				1.5 kW (2 HP)	68 (150)
YP16–✻–1–1.5–22	15.8 (.964)	Refer to Model Number Designation	10 (2.6)	1.5 kW (2 HP)	68 (150)
YP16–✻–1–2.2–22				2.2 kW (3 HP)	78 (172)
YP16–✻–2–2.2–22			20 (5.3)	2.2 kW (3 HP)	78 (172)
YP22–✻–2–2.2–22	22.2 (1.355)	Refer to Model Number Designation	20 (5.3)	2.2 kW (3 HP)	78 (172)
YP22–✻–3–3.7–22			30 (7.9)	3.7 kW (5 HP)	105 (234)
YP37–✻–3–3.7–22	36.9 (2.25)	Refer to Model Number Designation	30 (7.9)	3.7 kW (5 HP)	145 (320)
YP37–✻–3–5.5–22				5.5 kW (7.4 HP)	145 (320)

Consult Yuken when detailed material such as dimensions figures is required.

AC Servo Motor Driven Hydraulic Pump Control System

Intelligent Hydraulic Servo Drive Pack



The IH (intelligent hydraulic) servo drive pack is a compact energy-saving and low-noise hydraulic device which is combined as one with the AC servo motor, piston pump, reservoir and hydraulic control circuit. This combination can control the number of revolutions of the servo motor and adjust the discharge and pressure of the pump. This device can be combined with the sensor – equipped cylinder and dedicated controller to facilitate the configuration of a position, speed and pressure control system.

Energy Saving

The operation at the number of revolutions meeting the machine requirements (flow rate and pressure) reduces useless power losses and provides energy savings.

Low Noise

During pressure control, the pump rotation compensating for the internal leakage of oil pressure provides low revolutions with almost no noise.
During flow control, the number of revolutions meeting the machine requirements ensures lower noise generation than conventional devices.

Compactness

A substantial reduction in heat generation enables the operation with a minimum amount of fluid oil for cylinder operation in addition something extra oil. This results in a combination of the servo motor, piston pump, reservoir and hydraulic control circuit in one, providing energy savings.
Incorporation into an integral part of the machine is also possible.

Digital Control

Software control of the dedicated controller allows a system to have a great deal of versatility because of making use of a CPU. Digital control parameter setting facilitates to operate the system and its maintenance, furthermore the analog input/output ports provide as standard for user interface.

Specifications

Model Numbers	Geometric Displacement of Pump cm³/rev (cu. in./rev)	Maximum Shaft Speed r/min	Thrust Output and Cylinder bore	Reservoir Capacity cm³ (cu. in.)	Oil Level Variations cm³ (cu. in.)
YSD1–✻–09 YSD1–✻–13	6 (.366) 10 (.610)	2000 Note) It may vary according to AC servo motor output and operating pressure.	20 – 30 kN (45 – 67.4 lbs.) Cyl. Bore 63 mm (2.48 in.)	2500 (152.6)	1500 (91.5)
YSD2–✻–18 YSD2–✻–29 YSD2–✻–44	6 (.366) 10 (.610) 16 (.976)		50 – 60 kN (112 – 135 lbs.) Cyl. Bore 80 mm (3.15 in.)	4200 (256.3)	2500 (152.6)
YSD3–✻–55 YSD3–✻–75	10 (.610) 16 (.976) 30 (1.831)		100 kN (225 lbs.) Cyl. Bore 100 mm (3.94 in.)	5800 (353.9)	3500 (213.6)

AC Servo Motor Output and Operating Pressure (for reference)

Continuous Operating Short Time Operating

Model Numbers	AC Servo Motor		Geometric Displacement cm³/rev (cu. in./rev)	Max. Operating Pres. MPa (PSI)					
	Output kW (HP)	Rated Torque Nm (in. lbs.)		3.5 (510)	7.0 (1020)	10.5 (1525)	14.0 (2030)	17.5 (2540)	21.0 (3.50)
YSD1–✻–09	0.85 (1.14)	5.39 (44.7)	6 (.366)						
			10 (.610)						
YSD1–✻–13	1.3 (1.74)	8.34 (73.8)	6 (.366)						
			10 (.610)						
YSD2–✻–18	1.8 (2.4)	11.5 (101.8)	6 (.366)						
			10 (.610)						
			16 (.976)						
YSD2–✻–29	2.9 (3.9)	18.6 (165)	10 (.610)						
			16 (.976)						
YSD2–✻–44	4.4 (5.9)	28.4 (251)	10 (.610)						
			16 (.976)						
YSD3–✻–55	5.5 (7.4)	35 (310)	16 (.976)						
			30 (1.831)						
YSD3–✻–75	7.5 (10.1)	48 (425)	16 (.976)						
			30 (1.831)						

Note: The above table is guidance for model selection. It is required to take operating condition of hydraulic power unit such as cycle time in consideration when selecting the AC servo motor. Please contact us for more details.

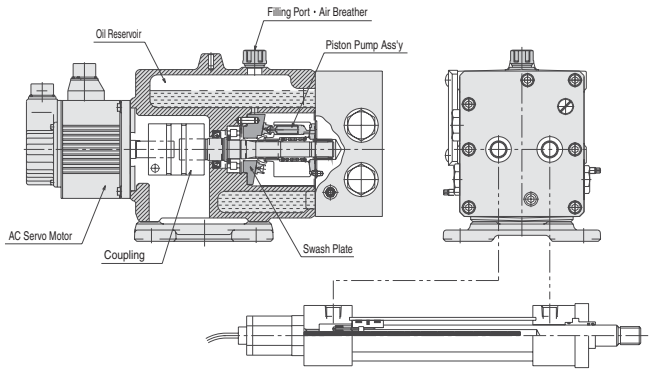
Model Number Designation

YSD3	- F	- 55	A	55	- 16	- H	R	- B	A	B	R	- 20	✻
Series No.	Mtg. Type	Servo Motor Output	Direction of Servo Motor Connection	Servo Pack	Geometric Displacement of Pump cm³/rev (cu. in./rev)	Relief Valve Setting Pres. MPa (PSI)	Location of Pressure Sensor	Location of Counter-balance Valve	Setting Pres. of Head Side Counter-balance Valve MPa (PSI)	Setting Pres. of Rod Side Counter-balance Valve MPa (PSI)	Location of Shut-off Valve	Design Number	Design Std.
YSD1	**F:** Flange Mtg. **B:** Foot Mtg.	**N1:** Without Servo Motor (for 0.85 kW) **N2:** Without Servo Motor (for 1.3 kW) **09:** 0.85 kW (1.14 HP) **13:** 1.3 kW (1.74 HP)	(Viewed from the Motor End) **A:** Upwards **B:** Downwards **R:** Right **L:** Left **None:** Without Servo Motor	**N:** Without Servo Pack **09:** 0.85 kW (1.14 HP) **13:** 1.3 kW (1.74 HP)	**6:** 6 (.366) **10:** 10 (.610)	**B:** 9.5 (1380) **C:** 18.5 (2680)	**H:** Head Side **R:** Rod Side **B:** Both Sides **None:** Without pressure Sensor	—	—	—	—	**10**	Refer to ★
YSD2		**N:** Without Servo Motor **18:** 1.8 kW (2.4 HP) **29:** 2.9 kW (3.9 HP) **44:** 4.4 kW (5.9 HP)		**N:** Without Servo Pack **18:** 1.8 kW (2.4 HP) **29:** 2.9 kW (3.9 HP) **44:** 4.4 kW (5.9 HP)	**6:** 6 (.366) **10:** 10 (.610) **16:** 16 (.976)	**B:** 9.5 (1380) **C:** 18.5 (2680) **H:** 23.5 (3410)		**H:** Head Side **R:** Rod Side **B:** Both Sides **None:** Without Counter-balance Valve	**B:** * - 7 (* - 1020) **None:** Without Head Side Counter-balance Valve **N:** * - 1.8 (* - 260) **A:** 1.8 - 3.5 (260 - 510) **B:** 3.5 - 7 (510 - 1020) **None:** Without Head Side Counter-balance Valve	**B:** * - 7 (* - 1020) **None:** Without Rod Side Counter-balance Valve **N:** * - 1.8 (* - 260) **A:** 1.8 - 3.5 (260 - 510) **B:** 3.5 - 7 (510 - 1020) **None:** Without Rod Side Counter-balance Valve	**H:** Head Side **R:** Rod Side **B:** Both Sides **None:** Without Shut-off Valve	**20**	
YSD3		**N:** Without Servo Motor **55:** 5.5 kW (7.4 HP) **75:** 7.5 kW (10.1 HP)		**N:** Without Servo Pack **55:** 5.5 kW (7.4 HP) **75:** 7.5 kW (10.1 HP)	**10:** 10 (.610) **16:** 16 (.976) **30:** 30 (1.831)							**20**	

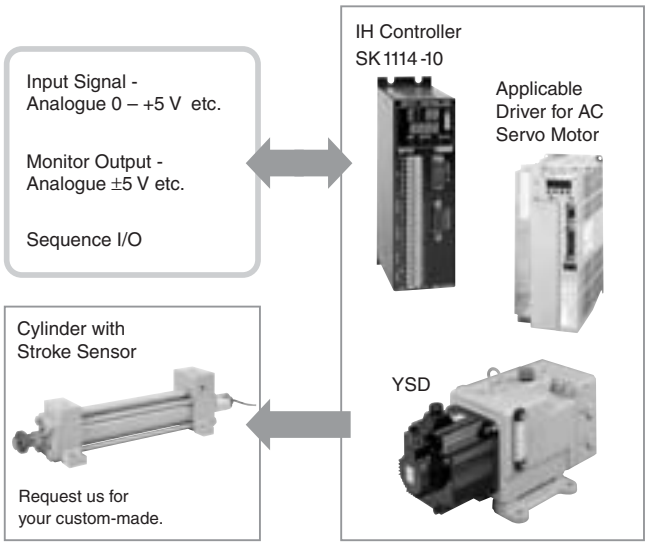
★. Design Standards: None ..... Japanese Standard "JIS"
80 ..... European Design Standard
950 ..... N. American Design Standard

Structure

The IH Servo Drive Pack pump is a bidirectional revolution piston pump which offers high performance in a wide range of very low to high revolutions. The hydraulic control circuit simply consists of safety valves and self priming valve, without a control valve in the pump discharge line and the series line between cylinders. The reservoir is made compact by using space around the pump. With the oil supply port of hydraulic fluid doubling as an air breather and the side-mounted oil level gauge, the pump is well equipped as a hydraulic driving force.



System Configuration



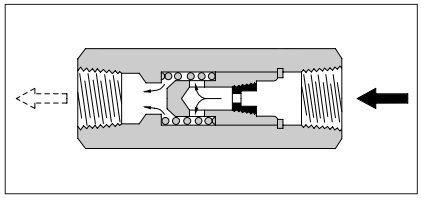
Consult Yuken when detailed material such as dimensions figures is required.

L

ACCESSORIES & OTHERS

Air Bleed Valves

These air bleed valves are designed to use, at the start-up of the pumps, to bleed off the air enclosed in the suction line or the other lines in the system.



Specifications

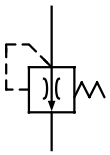
Model Numbers	Max. Operating Pressure MPa (PSI)	Reseating Pressure MPa (PSI)	Cracking Pressure MPa (PSI)	Flow Rate to Reseating L/min (U.S.GPM)	Range of Usage to Pump Output Flow	Approx. Mass kg (lbs.)
ST1004-5-10∗	25 (3630)	0.15 (22)	0.34 (49)	5 (1.32)	For 20 to 75 L/min (5.28 to 19.8 U.S.GPM)	0.2 (.44)
ST1004-10-10∗				10 (2.64)	For Over 75 L/min (19.8 U.S.GPM)	

Model Number Designation

ST1004	-5	-10	∗
Series Number	Flow Rate to Reseating	Design Number	Design Standards
ST1004: Air Bleed Valve	**5:** 5 L/min (1.32 U.S.GPM) **10:** 10 L/min (2.64 U.S.GPM)	**10**	**None:** Japanese Standard "JIS" **80:** European Design Standard **90:** N. American Design Standard

Instructions

Graphic Symbol



When the valve is used to bleed off the air from the pump, connect the inlet port of the valve to the discharge port of the pump as close as possible. When removing the air from the pipes, install the valve at the highest position of the system. In either case , the outlet port of the valve must be connected to the tank, the end of which is located below the oil level in the reservoir.

Hydraulic Fluids

- **Type of Hydraulic Fluids**

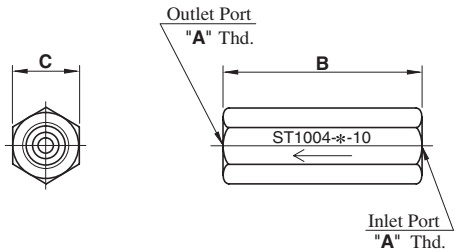
Petroleum Base Oils .....Use R & O (Rust and Oxidation inhibitor) type oils or anti-wear type oils (equivalent to ISO VG-32 or 46)
Synthetic Fluids .....Use phosphate ester type fluid or polyol ester type fluids.
Water Containing Fluids ..Use water glycol type fluids or water in oil emulsion type fluids.
Other Special Fluids .....Consult factory for information.

- **Recommended viscosity and Oil Temperatures**

Viscosity ranging between 15 and 400 mm^2 /s (77 and 1800 SSU).
Oil temperatures between -15 and +70°C (5 and 160°F)
Use hydraulic fluids which satisfy the recommended viscosity and oil temperatures given above.

- **Filtration Recommended**...25 microns or less.

ST1004-∗-10/1080/1090



Model Numbers	"A" Thd.	mm (Inches)	
		B	C
ST1004-∗-10	Rc 3/8	70 (2.76)	24 (.94)
ST1004-∗-1080	3/8 BSP.F	82 (3.23)	27 (1.06)
ST1004-∗-1090	3/8 NPT	70 (2.76)	24 (.94)

DIMENSIONS IN MILLIMETRES (INCHES)

"F3" Series Pipe Flange Kits

Specifications

- **Max. Operating Pressure**...25 MPa (3630 PSI)

Socket Welding

Threaded Connection

Model Number Designation

F-	F3	-03W	-A	-N	-11	*
Material of Seal	Series Number	Flange Size	Type of Pipe Connection	O-Ring & Bolts	Design Number	Design ★ Standards
None: Standard NBR (Buna N) Seal **F:** FPM (Viton) Seal (For Synthetic fluids)	F3	**03W, 03, 06V 06W, 06, 10W 10, 16W, 16 24W, 24**	**A:** Pipe Socket Welding **C:** Block Type	**None:** With O-Ring and Mounting Bolts **N:** No O-Ring and Mounting Bolts	11	**None:** Japanese Standard "JIS" & European Design Standard
		03W, 03, 06W 06, 10W, 10 16W, 16, 24W 24				**90:** N. American Design Standard
		03W, 03, 06V 06W, 06, 10W 10, 16W, 16 24W, 24	**B:** Threaded Connection	**None:** With O-Ring and Mounting Bolts **N:** No O-Ring and Mounting Bolts	11	**None:** Japanese Standard "JIS"
		03W, 03, 06W 06, 10W, 10 16W, 16, 24W 24				**80:** European Design Standard **90:** N. American Design Standard

★ Three different design standards are available as shown blow. Select the suitable design standard to your requirement.

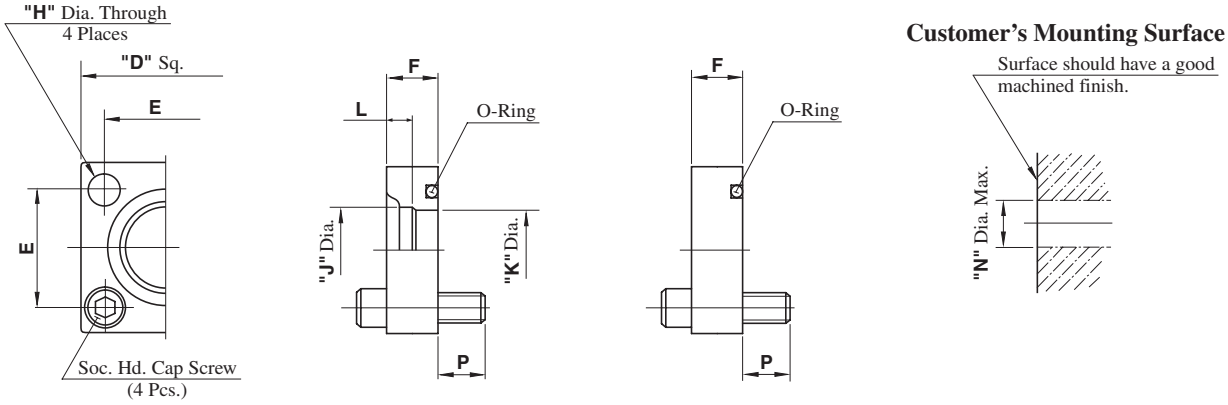
Type of Pipe Connection	Design Standard	Pipe Thread	Mounting Bolt (Socket Head Cap Screw)
Pipe Socket Welding Block Type	Japanese Standard "JIS" & European Design Standard	—	Metric Thd.
	N. American Design Standard	—	Unified Thd.
Threaded Connection	Japanese Standard "JIS"	Rc	Metric Thd.
	European Design Standard	BSP.F	Metric Thd.
	N. American Design Standard	NPT	Unified Thd.

Pipe Socket Welding

F3-∗-A∗-11/1190

Block Type

F3-∗-C∗-11/1190



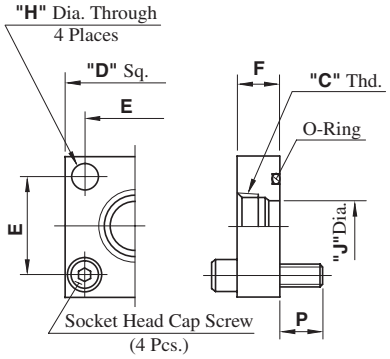
Kit Numbers	Piping Size	Dimensions mm (Inches)									O-Ring	Socket Head Cap Screw	Approx.★ Mass kg (lbs.)
		D	E	F	H	J	K	L	N	P			
F3-03W-∗-11	1/4	54 (2.13)	36 (1.42)	21 (.83)	11 (.43)	14.3 (.56)	11 (.43)	8 (.31)	15 (.59)	14 (.55)	SO-NB-G25	M10 × 35 Lg.	0.5 (1.1)
F3-03W-∗-1190										17.1 (.67)		3/8-16UNC × 1-1/2 Lg.	
F3-03-∗-11	3/8					17.8 (.70)	12.5 (.49)	9 (.35)		14 (.55)		M10 × 35 Lg.	
F3-03-∗-1190										17.1 (.67)		3/8-16UNC × 1-1/2 Lg.	
F3-06V-∗-11	3/8	58 (2.28)	40 (1.57)	21 (.83)	11 (.43)	17.8 (.70)	12.5 (.49)	9 (.35)	20 (.79)	14 (.55)	SO-NB-G30	M10 × 35 Lg.	0.8 (1.8)
F3-06W-∗-11	1/2					22.2 (.87)	16 (.63)	11 (.43)		14 (.55)		M10 × 35 Lg.	
F3-06W-∗-1190										17.1 (.67)		3/8-16UNC × 1-1/2 Lg.	
F3-06-∗-11	3/4					27.7 (1.09)	20 (.79)	12 (.47)		14 (.55)		M10 × 35 Lg.	
F3-06-∗-1190										17.1 (.67)		3/8-16UNC × 1-1/2 Lg.	
F3-10W-∗-11	1	76 (2.99)	56 (2.20)	27 (1.06)	13.5 (.53)	34.5 (1.36)	25 (.98)	14 (.55)	31.5 (1.24)	18 (.71)	SO-NB-G40	M12 × 45 Lg.	1.4 (3.1)
F3-10W-∗-1190										17.5 (.69)		1/2-13UNC × 1-3/4 Lg.	
F3-10-∗-11	1-1/4					43.2 (1.70)	31.5 (1.24)	16 (.63)		18 (.71)		M12 × 45 Lg.	
F3-10-∗-1190										17.5 (.69)		1/2-13UNC × 1-3/4 Lg.	
F3-16W-∗-11	1-1/2	100 (3.94)	73 (2.87)	35 (1.38)	17.5 (.69)	49.1 (1.93)	37.5 (1.48)	18 (.71)	50 (1.97)	25 (.98)	SO-NB-G60	M16 × 60 Lg.	2.7 (6.0)
F3-16W-∗-1190										22.1 (.87)		8/5-11UNC × 2-1/4 Lg.	
F3-16-∗-11	2					61.1 (2.41)	47.5 (1.87)	20 (.79)		25 (.98)		M16 × 60 Lg.	
F3-16-∗-1190										22.1 (.87)		8/5-11UNC × 2-1/4 Lg.	
F3-24W-∗-11	2-1/2	140 (5.51)	103 (4.06)	44 (1.73)	24 (.94)	77.1 (3.04)	60 (2.36)	22 (.87)	75 (2.95)	36 (1.42)	SO-NB-G85	M22 × 80 Lg.	5.8 (12.8)
F3-24W-∗-1190										38.6 (1.52)		7/8-9UNC × 3-1/4 Lg.	
F3-24-∗-11	3					90.0 (3.54)	71 (2.80)	25 (.98)		36 (1.42)		M22 × 80 Lg.	
F3-24-∗-1190										38.6 (1.52)		7/8-9UNC × 3-1/4 Lg.	

★ Approx. mass is the value including socket head cap screws (4 Pcs.).

Threaded Connection

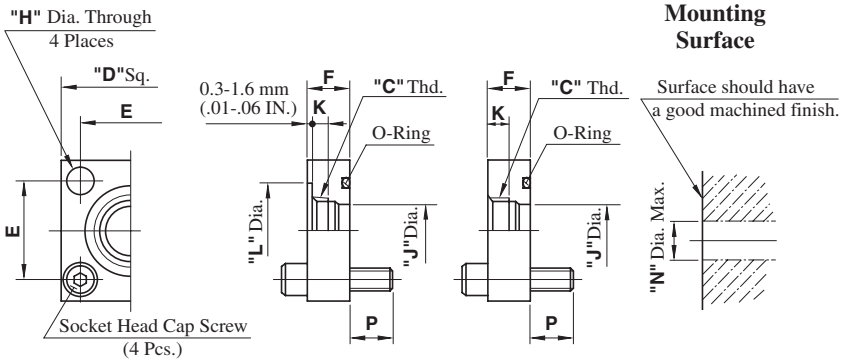
Japanese Standard "JIS" & N. American Design Standard

F3-∗-B∗-11/1190



European Design Standard

F3-∗-B∗-1180



Piping Size: 03W to 10

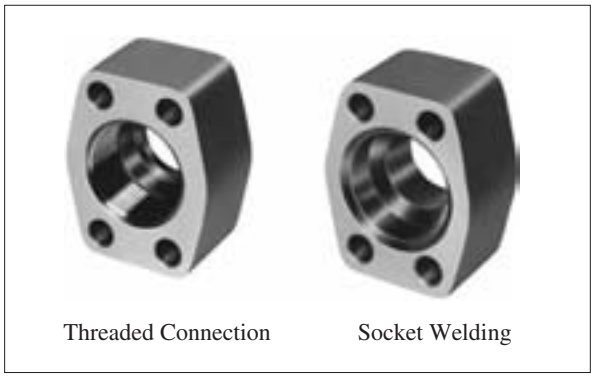
Piping Size: 16W to 24

Kit Numbers	Piping Size "C" Thd.	Dimensions mm (Inches) D	E	F	H	J	K	L	N	P	O-Ring	Socket Head Cap Screw	Approx.★ Mass kg (lbs.)
F3-03W-B∗-11	Rc 1/4	54 (2.13)	36 (1.42)	21 (.83)	11 (.43)	11 (.43)	—	—	15 (.59)	14 (.55)	SO-NB-G25	M10 × 35 Lg.	0.5 (1.1)
F3-03W-B∗-1180	1/4 BSP.F					11.5 (.45)	12 (.47)	21 (.83)					
F3-03W-B∗-1190	1/4 NPT					11 (.43)	—	—		17.1 (.67)		3/8-16UNC × 1-1/2 Lg.	
F3-03-B∗-11	Rc 3/8					14 (.55)	—	—		14 (.55)		M10 × 35 Lg.	
F3-03-B∗-1180	3/8 BSP.F					15 (.59)	14 (.55)	24.3 (.96)					
F3-03-B∗-1190	3/8 NPT					14 (.55)	—	—		17.1 (.67)		3/8-16UNC × 1-1/2 Lg.	
F3-06V-B∗-11	Rc3/8	58 (2.28)	40 (1.57)	21 (.83)	11 (.43)	14 (.55)	—	—	20 (.79)	14 (.55)	SO-NB-G30	M10 × 35 Lg.	0.8 (1.8)
F3-06W-B∗-11	Rc 1/2					17.5 (69)	—	—		14 (.55)		M10 × 35 Lg.	
F3-06W-B∗-1180	1/2 BSP.F					19 (.75)	17 (.67)	29 (1.14)					
F3-06W-B∗-1190	1/2 NPT					17.5 (.69)	—	—		17.1 (.67)		3/8-16UNC × 1-1/2 Lg.	
F3-06-B∗-11	Rc 3/4			27 (1.06)		23 (.91)	—	—		13 (.51)		M10 × 40 Lg.	
F3-06-B∗-1180	3/4 BSP.F					24.5 (.96)	20 (.79)	35.5 (1.40)					
F3-06-B∗-1190	3/4 NPT					23 (.91)	—	—		17.5 (.69)		3/8-16UNC × 1-3/4 Lg.	
F3-10W-B∗-11	Rc 1	76 (2.99)	56 (2.20)	27 (1.06)	13.5 (.53)	29 (1.14)	—	—	31.5 (1.24)	18 (.71)	SO-NB-G40	M12 × 45 Lg.	1.4 (3.1)
F3-10W-B∗-1180	1 BSP.F					30.5 (1.20)	21 (.83)	43.5 (1.71)					
F3-10W-B∗-1190	1 NPT					29 (1.14)	—	—		17.5 (.69)		1/2-13UNC × 1-3/4 Lg.	
F3-10-B∗-11	Rc 1-1/4			35 (1.38)		31.5 (1.24)	—	—		15 (.59)		M12 × 50 Lg.	
F3-10-B∗-1180	1-1/4 BSP.F						22 (.87)	53 (2.09)					
F3-10-B∗-1190	1-1/4 NPT						—	—		15.8 (.62)		1/2-13UNC × 2 Lg.	
F3-16W-B∗-11	Rc 1-1/2	100 (3.94)	73 (2.87)	35 (1.28)	17.5 (.69)	43.5 (1.71)	—	—	50 (1.97)	25 (.98)	SO-NB-G60	M16 × 60 Lg.	2.7 (6.0)
F3-16W-B∗-1180	1-1/2 BSP.F					45 (1.77)	22 (.87)	—					
F3-16W-B∗-1190	1-1/2 NPT					43.5 (1.71)	—	—		28.5 (1.12)		5/8-11UNC × 2-1/2 Lg.	
F3-16-B∗-11	Rc 2			39 (1.54)		47.5 (1.87)	—	—		21 (.83)		M16 × 60 Lg.	
F3-16-B∗-1180	2 BSP.F						22 (.87)	—					
F3-16-B∗-1190	2 NPT						—	—		24.5 (.96)		5/8-11UNC × 2-1/2 Lg.	
F3-24W-B∗-11	Rc 2-1/2	140 (5.51)	103 (4.06)	44 (1.73)	24 (.94)	70 (2.76)	—	—	75 (2.95)	36 (1.42)	SO-NB-G85	M22 × 80 Lg.	5.8 (12.8)
F3-24W-B∗-1180	2-1/2 BSP.F					72.5 (2.85)	20 (.79)	—					
F3-24W-B∗-1190	2-1/2 NPT					70 (2.76)	—	—		38.6 (1.52)		7/8-9UNC × 3-1/4 Lg.	
F3-24-B∗-11	Rc 3			49 (1.93)		71 (2.80)	—	—		31 (1.22)		M22 × 80 Lg.	
F3-24-B∗-1180	3 BSP.F						20 (.79)	—					
F3-24-B∗-1190	3 NPT						—	—		33.6 (1.32)		7/8-9UNC × 3-1/4 Lg.	

★ Approx. Mass is the value including socket head cap screws (4 Pcs.).

"F5" Series Pipe Flange Kits

The dimensions of the flange mounting surface are based upon SAE 4 Bolt Split Flange (Standard Pressure Series).



Threaded Connection　　Socket Welding

Specifications

Max. Operating Pressure

Maximum operation pressure varies with the type of pipe connection or flange size. Refer to the applicable installation drawings.

Model Number Designation

F-	F5	-06	-A	-10	*
Material of Seal	Series Number	Flange Size	Type of Pipe Connection	Design Number	Design Standards★
None: Standard NBR (Buna N) Seal	**F5**	**04W, 04, 06X 06, 08, 08W,10 12, 16, 16W, 20 24, 28, 32**	**A:** Threaded Connection	**10**	**None:** Japanese Standard "JIS"
		04, 06, 08 10, 12, 16 20			**80:** European Design Standard
		04W, 04, 06 08, 10, 12 16, 16W, 20 24, 28, 32			**90:** N. American Design Standard
F: FPM (Viton) Seal (For Synthetic Fluids)		**04W, 04, 06X 06, 08, 08W,10 12, 16, 16W, 20 24, 28, 32**	**B:** Socket Welding	**10**	**None:** Japanese Standard "JIS" & European Design Standard
		04W, 04, 06 08, 10, 12 16, 16W, 20,24 28, 32			**90:** N. American Design Standard
		04, 06, 08 10, 12, 16 20	**C:** Butt Welding	**10**	**None:** Japanese Standard "JIS" & European Design Standard **90:** N. American Design Standard

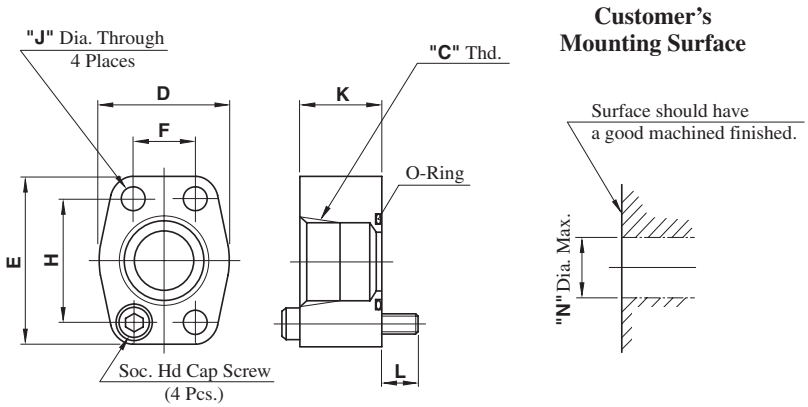
★ Three different design standards are available as shown below. Select the suitable design standard to your requirement.

Type of Pipe Connection	Design Standard	Pipe Thread	Mounting Bolt (Socket Head Cap Screw)
Threaded Connection	Japanese Standard "JIS"	Rc	Metric Thd.
	European Design Standard	BSP.F	Metric Thd.
	N. American Design Standard	NPT	Unified Thd.
Pipe Socket Welding Butt Welding	Japanese Standard "JIS" & European Design Standard	—	Metric Thd.
	N. American Design Standard	—	Unified Thd.

Threaded Connection

Japanese Standard "JIS" : F5-∗-A-10

N. American Design Standard : F5-∗-A-1090



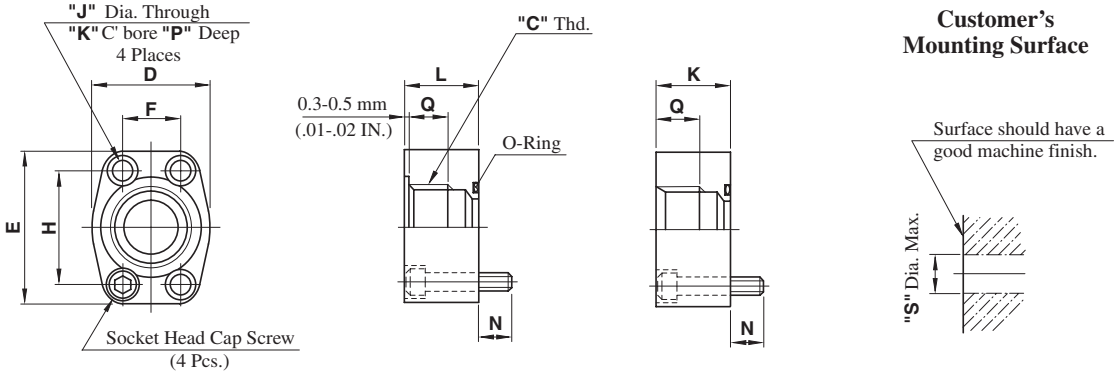
Kit Numbers	Piping Size "C" Thd.	Dimensions mm (Inches) D	E	F	H	J	K	L	N	Socket Head Cap Screw (4 Pcs.)	O-Ring	Max. Operating Pressure MPa (PSI)	Approx. Mass ★1 kg (lbs.)	Recommended ★2 Tightening Torque (Tolerance ±10%) Nm (IN.lbs.)
F5-04W-A-10	Rc 3/8	40 (1.57)	54 (2.13)	17.5 (.689)	38.1 (1.500)	8.8 (.346)	30 (1.18)	10 (.39)	13 (.51)	M8 × 40 Lg.	SO-NB-P22	28 (4060)	0.5 (1.1)	35 (310)
F5-04-A-10	Rc 1/2													
F5-04W-A-1090	3/8 NPT							14.5 (.57)		5/16-18UNC × 1-3/4 Lg.				
F5-04-A-1090	1/2 NPT													
F5-06X-A-10	Rc 3/4	48 (1.89)	65 (2.56)	22.2 (.874)	47.6 (1.874)	8.8 (.346)	30 (1.18)	15 (.59)	19 (.75)	M8 × 45 Lg.	SO-NB-G30	28 (4060)	0.7 (1.5)	35 (310)
F5-06-A-10						11 (.433)				M10 × 45 Lg.				68.5 (606)
F5-06-A-1090	3/4 NPT							14.5 (.57)		3/8-16UNC × 1-3/4 Lg.				
F5-08W-A-10	Rc 3/4	55 (2.17)	70 (2.76)	26.2 (1.031)	52.4 (2.063)	11 (.433)	30 (1.18)	15 (.59)	26 (1.02)	M10 × 45 Lg.	SO-NB-G35	28 (4060)	0.9 (2.0)	68.5 (606)
F5-08-A-10	Rc 1													
F5-08-A-1090	1 NPT							14.5 (.57)		3/8-16UNC × 1-3/4 Lg.				
F5-10-A-10	Rc 1-1/4	64 (2.52)	80 (3.15)	30.2 (1.189)	58.7 (2.311)	11 (.433)	38 (1.50)	17 (.67)	32 (1.26)	M10 × 55 Lg.	SO-NB-G40	28 (4060)	1.2 (2.6)	68.5 (606)
F5-10-A-1090	1-1/4 NPT					12 (.472)		19.2 (.76)		7/16-14UNC × 2-1/4 Lg.				
F5-12-A-10	Rc 1-1/2	72 (2.83)	94 (3.70)	35.7 (1.406)	69.9 (2.752)	13.5 (.531)	38 (1.50)	17 (.67)	38 (1.50)	M12 × 55 Lg.	SO-NB-G50	21 (3050)	1.5 (3.3)	118 (1044)
F5-12-A-1090	1-1/2 NPT							19.2 (.76)		1/2-13UNC × 2-1/4 Lg.				
F5-16W-A-10	Rc 1-1/2	85 (3.35)	102 (4.02)	42.9 (1.689)	77.8 (3.063)	13.5 (.531)	38 (1.50)	17 (.67)	48 (1.89)	M12 × 55 Lg.	SO-NB-G60	21 (3050)	1.8 (4.0)	118 (1044)
F5-16-A-10	Rc 2								51 (2.01)		SO-NB-G65	17.5 (2540)	1.7 (3.8)	
F5-16W-A-1090	1-1/2 NPT							19.2 (.76)	48 (1.89)	1/2-13UNC × 2-1/4 Lg.	SO-NB-G60	21 (3050)	1.8 (4.0)	
F5-16-A-1090	2 NPT								51 (2.01)		SO-NB-G65	17.5 (2540)	1.7 (3.8)	
F5-20-A-10	Rc 2-1/2	102 (4.02)	114 (4.49)	50.8 (2.000)	88.9 (3.500)	13.5 (.531)	48 (1.89)	17 (.67)	63 (2.48)	M12 × 65 Lg.	SO-NB-G75	17.5 (2540)	2.0 (4.4)	118 (1044)
F5-20-A-1090	2-1/2 NPT							21.8 (.86)		1/2-13UNC × 2-3/4 Lg.				
F5-24-A-10	Rc 3	116 (4.57)	135 (5.31)	61.9 (2.437)	106.4 (4.189)	17.5 (.689)	53 (2.09)	17 (.67)	76 (2.99)	M16 × 70 Lg.	SO-NB-G85	3.5 (510)	2.7 (6.0)	287 (2540)
F5-24-A-1090	3 NPT							19.2 (.76)		5/8-11UNC x 2-3/4 Lg.				
F5-28-A-10	Rc 3-1/2	134 (5.28)	153 (6.02)	69.9 (2.752)	120.7 (4.752)			17 (.67)	88 (3.46)	M16 × 70 Lg.	SO-NB-G100		3.4 (7.5)	
F5-28-A-1090	3-1/2 NPT							19.2 (.76)		5/8-11UNC x 2-3/4 Lg.				
F5-32-A-10	Rc 4	150 (5.91)	162 (6.38)	77.8 (3.068)	130.2 (5.126)			17 (.67)	101 (3.98)	M16 × 70 Lg.	SO-NB-G115		3.7 (8.2)	
F5-32-A-1090	4 NPT							19.2 (.76)		5/8-11UNC x 2-3/4 Lg.				

★1. Approx. mass is the value including socket head cap screws (4 Pcs.).

★2. The values of recommended tightening torque are for socket head cap screws and apply to when these flanges are used for pressure line.

Threaded Connection

European Design Standard
F5-∗-A-1180



Piping Size:
1/2 to 1-1/2

Piping Size:
2 & 2-1/2

Kit Numbers	Piping Size "C" Thd.	Dimensions mm (Inches)											Socket Head Cap Screw (4 Pcs.)	O-Ring	Max. Operating Pressure MPa (PSI)	★ Approx. Mass kg (lbs.)
		D	E	F	H	J	K	L	N	P	Q	S				
F5-04-A-1080	1/2 BSP.F	40 (1.57)	59 (2.32)	17.5 (.689)	38.1 (1.500)	8.8 (.346)	14 (.55)	31 (1.22)	12.6 (.50)	8.6 (.34)	17 (.67)	15 (.59)	M8 × 35 Lg.	SO-NB-P22	28 (4060)	0.5 (1.1)
F5-06-A-1080	3/4 BSP.F	48 (1.89)	72 (2.83)	22.2 (.874)	47.6 (1.874)	11 (.433)	17.5 (.69)	31 (1.22)	14.8 (.58)	10.8 (.43)	20 (.79)	19 (.75)	M10 × 35 Lg.	SO-NB-G30	28 (4060)	0.7 (1.5)
F5-08-A-1080	1 BSP.F	55 (2.17)	77 (3.03)	26.2 (1.031)	52.4 (2.063)	11 (.433)	17.5 (.69)	31 (1.22)	14.8 (.58)	10.8 (.43)	21 (.83)	25 (.98)	M10 × 35 Lg.	SO-NB-G35	28 (4060)	0.9 (2.0)
F5-10-A-1080	1-1/4 BSP.F	64 (2.52)	83 (3.27)	30.2 (1.189)	58.7 (2.311)	11 (.433)	17.5 (.69)	39 (1.54)	16.8 (.66)	10.8 (.43)	22 (.87)	32 (1.26)	M10 × 45 Lg.	SO-NB-G40	28 (4060)	1.2 (2.6)
F5-12-A-1080	1-1/2 BSP.F	72 (2.83)	99 (3.90)	35.7 (1.406)	69.9 (2.752)	13.5 (.531)	21 (.83)	41 (1.61)	17.5 (.69)	13.5 (.53)	22 (.87)	38 (1.50)	M12 × 45 Lg.	SO-NB-G50	21 (3050)	1.6 (3.5)
F5-16-A-1080	2 BSP.F	85 (3.35)	107 (4.21)	42.9 (1.689)	77.8 (3.063)	13.5 (.531)	21 (.83)	41 (1.61)	17.5 (.69)	13.5 (.53)	31 (1.22)	50 (1.97)	M12 × 45 Lg.	SO-NB-G65	17.5 (2540)	1.8 (4.0)
F5-20-A-1080	2-1/2 BSP.F	102 (4.02)	118 (4.65)	50.8 (2.000)	88.9 (3.500)	13.5 (.531)	21 (.83)	46 (1.81)	17.5 (.69)	13.5 (.53)	31 (1.22)	63 (2.48)	M12 × 50 Lg.	SO-NB-G75	17.5 (2540)	1.9 (4.2)

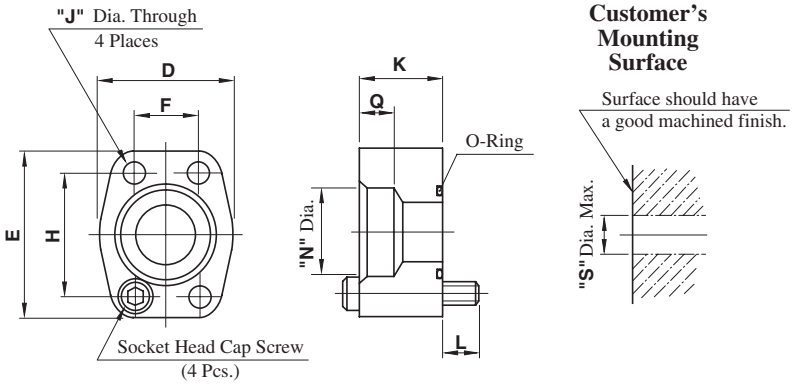
★ Approx. mass is the value including socket head cap screws (4 Pcs.).

● Recommended Tightening Torque For Socket Head Cap Screw

Kit Numbers	Tightening Torque	
	Recommendation Nm (IN.lbs.)	Tolerance
F5-04-A-1080	35 (310)	±10%
F5-06-A-1080	68.5 (606)	
F5-08-A-1080		
F5-10-A-1080		
F5-12-A-1080	118 (1044)	
F5-16-A-1080		
F5-20-A-1080		

Note: The values of tightening torque above apply to when these flanges are used for pressure line.

Socket Welding
Japanese Standard "JIS" &
European Design Standard : F5- ∗-B-10
N. American Design Standard : F5- ∗-B-1090



●Recommended Tightening Torque For Socket Head Cap Screw

Kit Numbers	Tightening Torque	
	Recommendation Nm (IN.lbs.)	Tolerance
F5-04W-B F5-04-B F5-06X-B	35 (310)	±10%
F5-06-B F5-08W-B F5-08-B F5-10-B	68.5 (660)	
F5-12-B F5-16W-B F5-16-B F5-20-B	118 (1044)	
F5-24-B F5-28-B F5-32-B	287 (2540)	

Note: The values of tightening torque above apply to when these flanges are used for pressure line.

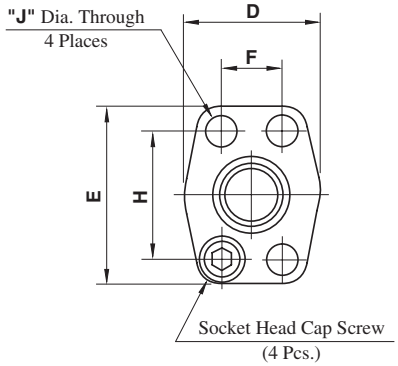
Kit Numbers	Piping Size	Dimensions mm (Inches)										Socket Head Cap Screw (4 Pcs.)	O-Ring	Max. Operating Pressure MPa(PSI)	Approx.★ Mass kg (lbs.)
		D	E	F	H	J	K	L	N	Q	S				
F5-04W-B-10	3/8	40 (1.57)	54 (2.13)	17.5 (.689)	38.1 (1.500)	8.8 (.346)	30 (1.18)	10 (.39)	17.8 (.701)	9 (.35)	13 (.51)	M8 × 40 Lg.	SO-NB-P22	28 (4060)	0.5 (1.1)
F5-04W-B-1090								14.5 (.57)				5/16-18UNC × 1-3/4 Lg.			
F5-04-B-10	1/2							10 (.39)	22.2 (.874)	11 (.43)		M8 × 40 Lg.			
F5-04-B-1090								14.5 (.57)				5/16-18UNC × 1-3/4 Lg.			
F5-06X-B-10	3/4	48 (1.89)	65 (2.56)	22.2 (.874)	47.6 (1.874)	8.8 (.346)	30 (1.18)	15 (.59)	27.7 (1.091)	12 (.47)	19 (.75)	M8 × 45 Lg.	SO-NB-G30	28 (4060)	0.7 (1.5)
F5-06-B-10						11 (.433)						M10 × 45 Lg.		14 (2030)	
F5-06-B-1090								14.5 (.57)				3/8-16UNC × 1-3/4 Lg.			
F5-08W-B-10	3/4	55 (2.17)	70 (2.76)	26.2 (1.031)	52.4 (2.063)	11 (.433)	30 (1.18)	15 (.59)	27.7 (1.091)	12 (.47)	26 (1.02)	M10 × 45 Lg.	SO-NB-G35	28 (4060)	0.9 (2.0)
F5-08-B-10	1								34.5 (1.358)	14 (.55)				14 (2030)	
F5-08-B-1090								14.5 (.57)				3/8-16UNC × 1-3/4 Lg.			
F5-10-B-10	1-1/4	64 (2.52)	80 (3.15)	30.2 (1.189)	58.7 (2.311)	11 (.433)	38 (1.50)	17 (.67)	43.2 (1.701)	16 (.63)	32 (1.26)	M10 × 55 Lg.	SO-NB-G40	14 (2030)	1.2 (2.7)
F5-10-B-1090						12 (.472)		19.2 (.76)				7/16-14UNC × 2-1/4 Lg.			
F5-12-B-10	1-1/2	72 (2.83)	94 (3.70)	35.7 (1.406)	69.9 (2.752)	13.5 (.531)	38 (1.50)	17 (.67)	49.1 (1.933)	18 (.71)	38 (1.50)	M12 × 55 Lg.	SO-NB-G50	14 (2030)	1.5 (3.3)
F5-12-B-1090								19.2 (.76)				1/2-13UNC × 2-1/4 Lg.			
F5-16W-B-10	1-1/2	85 (3.35)	102 (4.02)	42.9 (1.689)	77.8 (3.063)	13.5 (.531)	38 (1.50)	17 (.67)	49.1 (1.933)	18 (.71)	48 (1.89)	M12 × 55 Lg.	SO-NB-G60	21 (3050)	1.8 (3.7)
F5-16W-B-1090								19.2 (.76)				1/2-13UNC × 2-1/4 Lg.			
F5-16-B-10	2							17 (.67)	61.1 (2.406)	20 (.79)	51 (2.01)	M12 × 55 Lg.	SO-NB-G65	10.5 (1520)	1.7 (3.8)
F5-16-B-1090								19.2 (.76)				1/2-13UNC × 2-1/4 Lg.			
F5-20-B-10	2-1/2	102 (4.02)	114 (4.49)	50.8 (2.000)	88.9 (3.500)	13.5 (.531)	48 (1.89)	17 (.67)	77.1 (3.035)	22 (.87)	63 (2.48)	M12 × 65 Lg.	SO-NB-G75	7 (1020)	2.0 (4.4)
F5-20-B-1090								21.8 (.86)				1/2-13UNC × 2-3/4 Lg.			
F5-24-B-10	3	116 (4.57)	135 (5.31)	61.9 (2.437)	106.4 (4.189)	17.5 (.689)	38 (1.50)	17 (.67)	90.0 (3.543)	25 (.98)	76 (2.99)	M16 × 55 Lg.	SO-NB-G85	3.5 (510)	2.7 (6.0)
F5-24-B-1090								19.2 (.76)				5/8-11UNC × 2-1/4 Lg.			
F5-28-B-10	3-1/2	134 (5.28)	153 (6.02)	69.9 (2.752)	120.7 (4.752)	17.5 (.689)	38 (1.50)	17 (.67)	102.8 (4.047)	28 (1.10)	88 (3.46)	M16 × 55 Lg.	SO-NB-G100	3.5 (510)	3.4 (7.5)
F5-28-B-1090								19.2 (.76)				5/8-11UNC × 2-1/4 Lg.			
F5-32-B-10	4	150 (5.91)	162 (6.38)	77.8 (2.063)	130.2 (5.126)	17.5 (.689)	38 (1.50)	17 (.67)	115.5 (4.547)	31.5 (1.24)	101 (3.98)	M16 × 55 Lg.	SO-NB-G115	3.5 (510)	3.7 (8.2)
F5-32-B-1090								19.2 (.76)				5/8-11UNC × 2-1/4 Lg.			

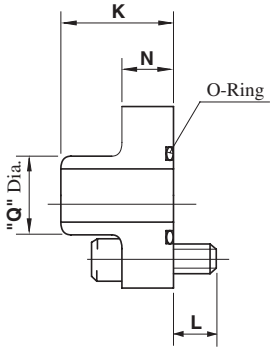
★ Approx. mass is the value including socket head cap screws (4 Pcs.).

Butt Welding

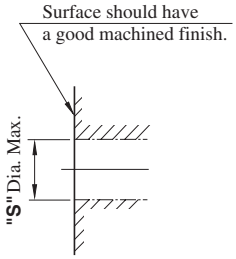
Japanese Standard "JIS" & European Design Standard : F5-∗-C-10

N. American Design Standard : F5-∗-C-1090





Customer's Mounting Surface



Kit Numbers	Piping Size	Dimensions mm (Inches) D	E	F	H	J	K	L	N	Q	S	Socket Head Cap Screw (4 Pcs.)	O-Ring	Max. Operating Pressure MPa (PSI)	Approx. ★ Mass kg (lbs.)
F5-04-C-10	1/2	40 (1.57)	54 (2.13)	17.5 (.689)	38.1 (1.500)	8.8 (.346)	39 (1.54)	13 (.51)	17 (.67)	21.7 (.85)	13 (.51)	M8 × 30 Lg.	SO-NB-P22	28 (4060)	0.25 (.6)
F5-04-C-1090								14.8 (.58)				5/16-18UNC × 1-1/4 Lg.			
F5-06-C-10	3/4	48 (1.89)	65 (2.56)	22.2 (.874)	47.6 (1.874)	11 (.433)	41 (1.61)	16 (.63)	19 (.75)	27.2 (1.07)	19 (.75)	M10 × 35 Lg.	SO-NB-G30	28 (4060)	0.35 (.8)
F5-06-C-1090								19.1 (.75)				3/8-16UNC × 1-1/2 Lg.			
F5-08-C-10	1	55 (2.17)	70 (2.76)	26.2 (1.031)	52.4 (2.063)	11 (.433)	42 (1.65)	16 (.63)	19 (.75)	34 (1.34)	26 (1.02)	M10 × 35 Lg.	SO-NB-G35	28 (4060)	0.45 (1.0)
F5-08-C-1090								19.1 (.75)				3/8-16UNC × 1-1/2 Lg.			
F5-10-C-10	1-1/4	64 (2.52)	80 (3.15)	30.2 (1.189)	58.7 (2.311)	11 (.433)	44 (1.73)	16 (.63)	19 (.75)	42.7 (1.68)	32 (1.26)	M10 × 35 Lg.	SO-NB-G40	28 (4060)	0.63 (1.4)
F5-10-C-1090						12 (.472)		19.1 (.75)				7/16-14UNC × 1-1/2 Lg.			
F5-12-C-10	1-1/2	72 (2.83)	94 (3.70)	35.7 (1.406)	69.9 (2.752)	13.5 (.531)	50 (1.97)	18 (.71)	22 (.87)	48.6 (1.91)	38 (1.50)	M12 × 40 Lg.	SO-NB-G50	21 (3050)	1.3 (2.9)
F5-12-C-1090								16.1 (.63)				1/2-13UNC × 1-1/2 Lg.			
F5-16-C-10	2	85 (3.35)	102 (4.02)	42.9 (1.689)	77.8 (3.063)	13.5 (.531)	50 (1.97)	18 (.71)	22 (.87)	60.5 (2.38)	51 (2.01)	M12 × 40 Lg.	SO-NB-G65	17.5 (2540)	1.3 (2.9)
F5-16-C-1090								16.1 (.63)				1/2-13UNC × 1-1/2 Lg.			
F5-20-C-10	2-1/2	102 (4.02)	114 (4.49)	50.8 (2.000)	88.9 (3.500)	13.5 (.531)	50 (1.97)	20 (.79)	25 (.98)	76.3 (3.00)	63 (2.48)	M12 × 45 Lg.	SO-NB-G75	14 (2030)	1.4 (3.1)
F5-20-C-1090								19.5 (.77)				1/2-13UNC × 1-3/4 Lg.			

★ Approx. mass is the value including socket head cap screws (4 Pcs.).

Recommended Tightening Torque For Socket Head Cap Screw

Kit Numbers	Tightening Torque	
	Recommendation Nm (IN.lbs.)	Tolerance
F5-04-C	35 (310)	±10%
F5-06-C F5-08-C F5-10-C	68.5 (660)	
F5-12-C F5-16-C F5-20-C	118 (1044)	

Note: The values of tightening torque above apply to when these flanges are used for pressure line.

"F6" Series Pipe Flange Kits

The dimensions of the flange mounting surface are based upon SAE 4 Bolt Split Flange (High Pressure Series).

Threaded Connection　　Socket Welding

Specifications

Model Numbers	Max. Operating Pressure MPa (PSI)	Remarks
F6-⁎-A-⁎-10/1080/1090	31 (4500)	Threaded Connection
F6-⁎-B-⁎-10/1090	42 (6090)	Pipe Socket Welding

Model Number Designation

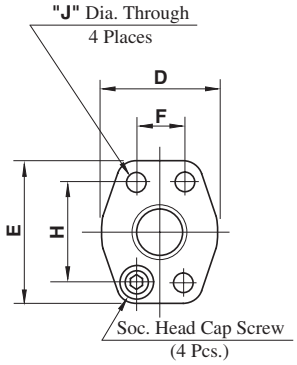
F-	F6	-06	-A	-M	-10	⁎
Material of Seal	Series Number	Flange Size	Type of Pipe Connection	Type of Mounting Bolt	Design Number	Design ★ Standards
None: Standard NBR (Buna N) Seal	**F6**	**04W, 04 06W, 06 08W, 08 10W, 10 12W, 12**	**A:** Threaded Connection	**M:** Metric Thd.	**10**	**None:** Japanese Standard "JIS"
		04W, 04 06W, 06 08W, 08 10W, 10 12W, 12		**M:** Metric Thd.		**80:** European Design Standard
		04W, 04 06W, 06 08W, 08 10W, 10 12W, 12		**U:** Unified Thd.		**90:** N. American Design Standard
F: FPM (Viton) Seal (For Synthetic Fluids)		**04W, 04 06W, 06 08W, 08 10W, 10 12W, 12**	**B:** Pipe Socket Welding	**M:** Metric Thd.	**10**	**None:** Japanese Standard "JIS" & European Design Standard
		04W, 04 06W, 06 08W, 08 10W, 10 12W, 12		**U:** Unified Thd.		**90:** N. American Design Standard

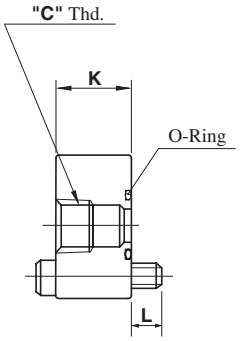
★ Three different design standards are available as shown below. Select the suitable design standard to your requirement.

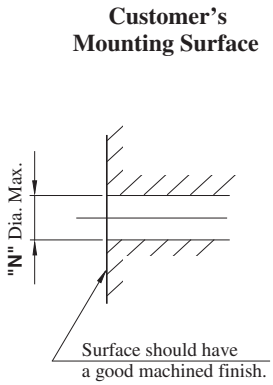
Type of Pipe Connection	Design Standard	Pipe Thread	Mounting Bolt (Socket Head Cap Screw)
Threaded Connection	Japanese Standard "JIS"	Rc	Metric Thd.
	European Design Standard	BSP.F	Metric Thd.
	N. American Design Standard	NPT	Unified Thd.
Pipe Socket Welding	Japanese Standard "JIS" & European Design Standard	—	Metric Thd.
	N. American Design Standard	—	Unified Thd.

Threaded Connection

Japanese Standard "JIS" : F6-∗-A-M-10
N. American Design Standard : F6-∗-A-U-1090







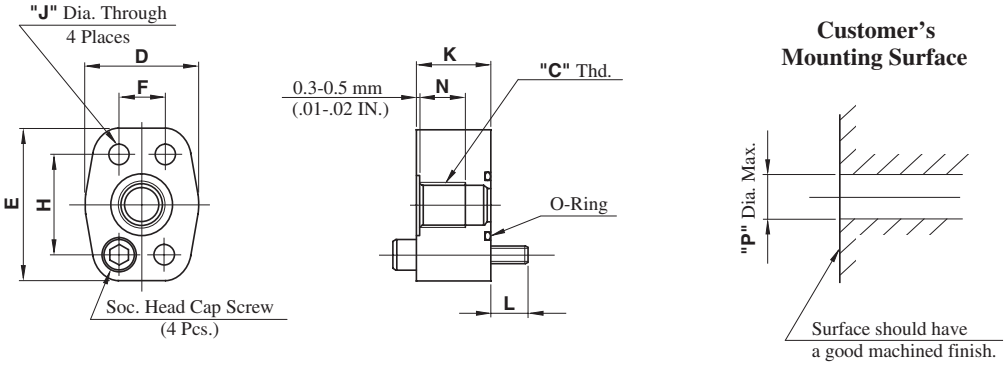
Kit Numbers	Piping Size "C" Thd.	Dimensions mm (Inches) D	E	F	H	J	K	L	N	Socket Head Cap Screw (4 Pcs.)	O-Ring	Approx. Mass ★1 kg (lbs.)	Recommended Tightening Torque ★2 (Tolerance ±10%) Nm (IN.lbs.)
F6-04W-A-M-10	Rc 3/8	48 (1.89)	56.5 (2.22)	18.2 (.717)	40.5 (1.594)	8.8 (.346)	28 (1.10)	12 (.47)	15 (.59)	M8 × 40 Lg	SO-NB-P22	0.4 (.9)	35 (310)
F6-04-A-M-10	Rc 1/2												
F6-04W-A-U-1090	3/8 NPT						26 (1.02)	12.1 (.48)		5/16-18UNC× 1-1/2 Lg			
F6-04-A-U-1090	1/2 NPT												
F6-06W-A-M-10	Rc 1/2	57.5 (2.26)	77.5 (3.05)	23.8 (.937)	50.8 (2.000)	11 (.433)	30 (1.18)	15 (.59)	21 (.83)	M10 × 45 Lg	SO-NB-G30	0.9 (2.0)	68.5 (606)
F6-06-A-M-10	Rc 3/4												
F6-06W-A-U-1090	1/2 NPT							14.5 (.57)		3/8-16UNC× 1-3/4 Lg			
F6-06-A-U-1090	3/4 NPT												
F6-08W-A-M-10	Rc 3/4	65 (2.56)	81 (3.19)	27.8 (1.094)	57.2 (2.252)	13.5 (.531)	30 (1.18)	15 (.59)	26 (1.02)	M12 × 45 Lg.	SO-NB-G35	1.1 (2.4)	118 (1044)
F6-08-A-M-10	Rc 1						34 (1.34)	16 (.63)		M12 × 50 Lg.			
F6-08W-A-U-1090	3/4 NPT						26.5 (1.04)	18 (.71)		7/16-14UNC × 1-3/4 Lg.			
F6-08-A-U-1090	1 NPT						34 (1.34)	16.8 (.66)		7/16-14UNC × 2 Lg.			
F6-10W-A-M-10	Rc 1	72 (2.83)	95 (3.74)	31.8 (1.252)	66.7 (2.626)	13.5 (.531)	34 (1.34)	16 (.63)	34 (1.34)	M12 × 50 Lg.	SO-NB-G40	1.3 (2.9)	118 (1044)
F6-10-A-M-10	Rc 1-1/4						39 (1.54)			M12 × 55 Lg.			
F6-10W-A-U-1090	1 NPT						34 (1.34)	16.8 (.66)		1/2-13UNC × 2 Lg.			
F6-10-A-U-1090	1-1/4 NPT						39 (1.54)	18.2 (.72)		1/2-13UNC × 2-1/4 Lg.			
F6-12W-A-M-10	Rc 1-1/4	90 (3.54)	113 (4.45)	36.5 (1.437)	79.4 (3.126)	17.5 (.689)	34 (1.34)	21 (.83)	44 (1.73)	M16 × 55 Lg.	SO-NB-G50	1.5 (3.3)	287 (2540)
F6-12-A-M-10	Rc 1-1/2						39 (1.54)			M16 × 60 Lg.			
F6-12W-A-U-1090	1-1/4 NPT						34 (1.34)	23.2 (.91)		5/8-11UNC × 2-1/4 Lg.			
F6-12-A-U-1090	1-1/2 NPT						39 (1.54)	24.5 (.96)		5/8-11UNC × 2-1/2 Lg.			

★1. Approx. mass is the value including socket head cap screws (4 Pcs.).

★2. The values of recommended tightening torque are for socket head cap screws.

■ Threaded Connection

European Design Standard : F6-∗-A-M-1080



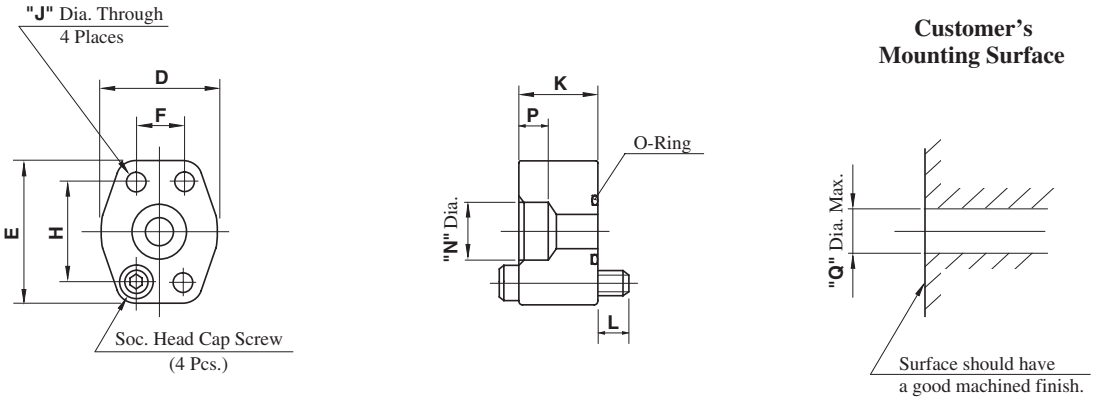
Kit Numbers	Piping Size "C" Thd.	Dimensions mm (Inches) D	E	F	H	J	K	L	N	P	Socket Head Cap Screw (4 Pcs.)	O-Ring	★1 Approx. Mass kg (lbs.)	★2 Recommended Tightening Torque (Tolerance ±10%) Nm (IN.lbs.)
F6-04W-A-M-1080	3/8 BSP.F	48 (1.89)	56.5 (2.22)	18.2 (.717)	40.5 (1.594)	8.8 (.346)	28 (1.10)	12 (.47)	14 (.55)	15 (.59)	M8 × 40 Lg.	SO-NB-P22	0.4 (.9)	35 (310)
F6-04-A-M-1080	1/2 BSP.F								17 (.67)					
F6-06W-A-M-1080	1/2 BSP.F	57.5 (2.26)	77.5 (3.05)	23.8 (.937)	50.8 (2.000)	11 (.433)	30 (1.18)	15 (.59)	17 (.67)	21 (.83)	M10 × 45 Lg.	SO-NB-G30	0.9 (2.0)	68.5 (606)
F6-06-A-M-1080	3/4 BSP.F								20 (.79)					
F6-08W-A-M-1080	3/4 BSP.F	65 (2.56)	81 (3.19)	27.8 (1.094)	57.2 (2.252)	13.5 (.531)	30 (1.18)	15 (.59)	20 (.79)	26 (1.02)	M12 × 45 Lg.	SO-NB-G35	1.1 (2.4)	118 (1044)
F6-08-A-M-1080	1 BSP.F						34 (1.34)	16 (.63)	21 (.83)		M12 × 50 Lg.			
F6-10W-A-M-1080	1 BSP.F	72 (2.83)	95 (3.74)	31.8 (1.252)	66.7 (2.626)	13.5 (.531)	34 (1.34)	16 (.63)	21 (.83)	34 (1.34)	M12 × 50 Lg.	SO-NB-G40	1.3 (2.9)	118 (1044)
F6-10-A-M-1080	1-1/4 BSP.F						39 (1.54)		22 (.87)		M12 × 55 Lg.			
F6-12W-A-M-1080	1-1/4 BSP.F	90 (3.54)	113 (4.45)	36.5 (1.437)	79.4 (3.126)	17.5 (.689)	34 (1.34)	21 (.83)	22 (.87)	44 (1.73)	M16 × 55 Lg.	SO-NB-G50	1.5 (3.3)	287 (2540)
F6-12-A-M-1080	1-1/2 BSP.F						39 (1.54)				M16 × 60 Lg.			

★1. Approx. mass is the value including socket head cap screws (4 Pcs.).
★2. The values of recommended tightening torque are for socket head cap screw.

■ Socket Welding

Japanese Standard "JIS" & European Design Standard : F6-∗-B-M-10

N. American Design Standard : F6-∗-B-U-1090



Kit Numbers	Piping Size	Dimensions mm (Inches) D	E	F	H	J	K	L	N	P	Q	Socket Head Cap Screw (4 Pcs.)	O-Ring	Approx. Mass ★1 kg (lbs.)	Recommended Tightening Torque ★2 (Tolerance ±10%) Nm (IN.lbs.)
F6-04W-B-M-10	3/8	48 (1.89)	56.5 (2.22)	18.2 (.717)	40.5 (1.594)	8.8 (.346)	28 (1.10)	12 (.47)	17.8 (.701)	9 (.35)	15 (.59)	M8 × 40 Lg.	SO-NB-P22	0.4 (.9)	35 (310)
F6-04W-B-U-1090							26 (1.02)	12.1 (.48)				5/16-18UN C × 1-1/2 Lg.			
F6-04-B-M-10	1/2						28 (1.10)	12 (.47)	22.2 (.874)	11 (.43)		M8 × 40 Lg.			
F6-04-B-U-1090							26 (1.02)	12.1 (.48)				5/16-18UN C × 1-1/2 Lg.			
F6-06W-B-M-10	1/2	57.5 (2.26)	77.5 (3.05)	23.8 (.937)	50.8 (2.000)	11 (.433)	30 (1.18)	15 (.59)	22.2 (.874)	11 (.43)	21 (.83)	M10 × 45 Lg.	SO-NB-G30	0.9 (2.0)	68.5 (606)
F6-06W-B-U-1090								14.5 (.57)				3/8-16UNC × 1-3/4 Lg.			
F6-06-B-M-10	3/4							15 (.59)	27.7 (1.091)	12 (.47)		M10 × 45 Lg.			
F6-06-B-U-1090								14.5 (.57)				3/8-16UNC × 1-3/4 Lg.			
F6-08W-B-M-10	3/4	65 (2.56)	81 (3.19)	27.8 (1.094)	57.2 (2.252)	13.5 (.531)	30 (1.18)	15 (.59)	27.7 (1.091)	12 (.47)	26 (1.02)	M12 × 45 Lg.	SO-NB-G35	1.1 (2.4)	118 (1044)
F6-08W-B-U-1090							26.5 (1.04)	18 (.71)				7/16-14UNC × 1-3/4 Lg.			
F6-08-B-M-10	1						30 (1.18)	15 (.59)	34.5 (1.358)	14 (.55)		M12 × 45 Lg.			
F6-08-B-U-1090							26.5 (1.04)	18 (.71)				7/16-14UNC × 1-3/4 Lg.			
F6-10W-B-M-10	1	72 (2.83)	95 (3.74)	31.8 (1.252)	66.7 (2.626)	13.5 (.531)	34 (1.34)	16 (.63)	34.5 (1.358)	14 (.55)	34 (1.34)	M12 × 50 Lg.	SO-NB-G40	1.3 (2.9)	118 (1044)
F6-10W-B-U-1090								16.8 (.66)				1/2-13UNC × 2 Lg.			
F6-10-B-M-10	1-1/4							16 (.63)	43.2 (1.701)	16 (.63)		M12 × 50 Lg.			
F6-10-B-U-1090								16.8 (.66)				1/2-13UNC × 2 Lg.			
F6-12W-B-M-10	1-1/4	90 (3.54)	113 (4.45)	36.5 (1.437)	79.4 (3.126)	17.5 (.689)	34 (1.34)	21 (.83)	43.2 (1.701)	16 (.63)	44 (1.73)	M16 × 55 Lg.	SO-NB-G50	1.5 (3.3)	287 (2540)
F6-12W-B-U-1090								23.2 (.91)				5/8-11UNC × 2-1/4 Lg.			
F6-12-B-M-10	1-1/2							21 (.83)	49.1 (1.933)	18 (.71)		M16 × 55 Lg.			
F6-12-B-U-1090								23.2 (.91)				5/8-11UNC × 2-1/4 Lg.			

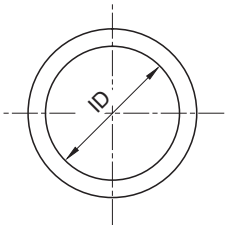
★1. Approx. mass is the value including socket head cap screws (4 Pcs.).

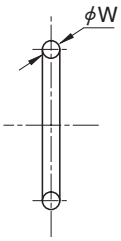
★2. The values of recommended tightening torque are for socket head cap screws.

Size of O-Ring

(Conformed to "JIS B 2401")

SO-NA/NB-P∗ SO-NA/NB-G∗
SO-FA/FB-P∗ SO-FA/FB-G∗





O-ring Symbol

SO – N A – P 90

- Size
- Classification by use
  - **P**: For Moving (Packing)
  - **G**: For Fixing (Gasket)
- Durometer
  - **A**: A70
  - **B**: A90
- Material
  - **N**: Nitrile Rubber (NBR)
  - **F**: Fluororubber (FPM)
- O-Ring

SO-NA/NB-P∗ SO-FA/FB-P∗		
Size Number	Dimensions mm (Inches) ID	W
P 3	2.8 (.110)	1.9 (.075)
P 4	3.8 (.150)	
P 5	4.8 (.189)	
P 6	5.8 (.228)	
P 7	6.8 (.268)	
P 8	7.8 (.307)	
P 9	8.8 (.346)	
P 10	9.8 (.386)	
P 10A	9.8 (.386)	2.4 (.094)
P 11	10.8 (.425)	
P 11.2	11.0 (.433)	
P 12	11.8 (.465)	
P 12.5	12.3 (.484)	
P 14	13.8 (.543)	
P 15	14.8 (.583)	
P 16	15.8 (.622)	
P 18	17.8 (.701)	
P 20	19.8 (.780)	
P 21	20.8 (.819)	
P 22	21.8 (.858)	
P 22A	21.7 (.854)	3.5 (.138)
P 22.4	22.1 (.870)	
P 24	23.7 (.933)	
P 25	24.7 (.972)	
P 25.5	25.2 (.992)	
P 26	25.7 (1.012)	
P 28	27.7 (1.091)	
P 29	28.7 (1.130)	
P 29.5	29.2 (1.150)	
P 30	29.7 (1.169)	
P 31	30.7 (1.209)	
P 31.5	31.2 (1.228)	
P 32	31.7 (1.248)	
P 34	33.7 (1.327)	
P 35	34.7 (1.366)	
P 35.5	35.2 (1.386)	
P 36	35.7 (1.406)	
P 38	37.7 (1.484)	
P 39	38.7 (1.524)	
P 40	39.7 (1.563)	
P 41	40.7 (1.602)	
P 42	41.7 (1.642)	
P 44	43.7 (1.720)	
P 45	44.7 (1.760)	
P 46	45.7 (1.799)	
P 48	47.7 (1.878)	
P 49	48.7 (1.917)	
P 50	49.7 (1.957)	
P 48A	47.6 (1.874)	5.7 (.224)
P 50A	49.6 (1.953)	
P 52	51.6 (2.031)	
P 53	52.6 (2.071)	
P 55	54.6 (2.150)	
P 56	55.6 (2.189)	
P 58	57.6 (2.268)	
P 60	59.6 (2.346)	
P 62	61.6 (2.425)	
P 63	62.6 (2.465)	
P 65	64.6 (2.543)	
P 67	66.6 (2.622)	
P 70	69.6 (2.740)	
P 71	70.6 (2.780)	
P 75	74.6 (2.937)	
P 80	79.6 (3.134)	
P 85	84.6 (3.331)	

SO-NA/NB-P∗ SO-FA/FB-P∗		
Size Number	Dimensions mm (Inches) ID	W
P 90	89.6 (3.528)	5.7 (.224)
P 95	94.6 (3.724)	
P100	99.6 (3.921)	
P102	101.6 (4.000)	
P105	104.6 (4.118)	
P110	109.6 (4.315)	
P112	111.6 (4.394)	
P115	114.6 (4.512)	
P120	119.6 (4.709)	
P125	124.6 (4.906)	
P130	129.6 (5.102)	
P132	131.6 (5.181)	
P135	134.6 (5.299)	
P140	139.6 (5.496)	
P145	144.6 (5.693)	
P150	149.6 (5.890)	
P150A	149.5 (5.886)	8.4 (.331)
P155	154.5 (6.083)	
P160	159.5 (6.280)	
P165	164.5 (6.476)	
P170	169.5 (6.673)	
P175	174.5 (6.870)	
P180	179.5 (7.067)	
P185	184.5 (7.264)	
P190	189.5 (7.461)	
P195	194.5 (7.657)	
P200	199.5 (7.854)	
P205	204.5 (8.051)	
P209	208.5 (8.209)	
P210	209.5 (8.248)	
P215	214.5 (8.445)	
P220	219.5 (8.642)	
P225	224.5 (8.839)	
P230	229.5 (9.035)	
P235	234.5 (9.232)	
P240	239.5 (9.429)	
P245	244.5 (9.626)	
P250	249.5 (9.823)	
P255	254.5 (10.020)	
P260	259.5 (10.217)	
P265	264.5 (10.413)	
P270	269.5 (10.610)	
P275	274.5 (10.807)	
P280	279.5 (11.004)	
P285	284.5 (11.201)	
P290	289.5 (11.398)	
P295	294.5 (11.594)	
P300	299.5 (11.791)	
P315	314.5 (12.382)	
P320	319.5 (12.579)	
P335	334.5 (13.169)	
P340	339.5 (13.366)	
P355	354.5 (13.957)	
P360	359.5 (14.154)	
P375	374.5 (14.744)	
P385	384.5 (15.138)	
P400	399.5 (15.728)	

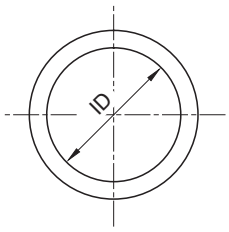
SO-NA/NB-G∗ SO-FA/FB-G∗		
Size Number	Dimensions mm (Inches) ID	W
G 25	24.4 (.961)	3.1 (.122)
G 30	29.4 (1.157)	
G 35	34.4 (1.354)	
G 40	39.4 (1.551)	
G 45	44.4 (1.748)	
G 50	49.4 (1.945)	
G 55	54.4 (2.142)	
G 60	59.4 (2.339)	
G 65	64.4 (2.535)	
G 70	69.4 (2.732)	
G 75	74.4 (2.929)	
G 80	79.4 (3.126)	
G 85	84.4 (3.323)	
G 90	89.4 (3.520)	
G 95	94.4 (3.717)	
G100	99.4 (3.913)	
G105	104.4 (4.110)	
G110	109.4 (4.307)	
G115	114.4 (4.504)	
G120	119.4 (4.701)	
G125	124.4 (4.898)	
G130	129.4 (5.094)	
G135	134.4 (5.291)	
G140	139.4 (5.488)	
G145	144.4 (5.685)	
G150	149.3 (5.878)	5.7 (.224)
G155	154.3 (6.075)	
G160	159.3 (6.272)	
G165	164.3 (6.469)	
G170	169.3 (6.665)	
G175	174.3 (6.862)	
G180	179.3 (7.059)	
G185	184.3 (7.256)	
G190	189.3 (7.453)	
G195	194.3 (7.650)	
G200	199.3 (7.846)	
G210	209.3 (8.240)	
G220	219.3 (8.634)	
G230	229.3 (9.028)	
G240	239.3 (9.421)	
G250	249.3 (9.815)	
G260	259.3 (10.209)	
G270	269.3 (10.602)	
G280	279.3 (10.996)	
G290	289.3 (11.390)	
G300	299.3 (11.783)	

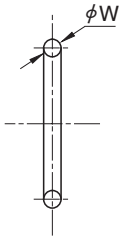
Size of O-Ring

(Conformed to "AS568A")

SO-NA/NB-A∗ SO-FA/FB-A∗

Data Sheet





O-ring Symbol

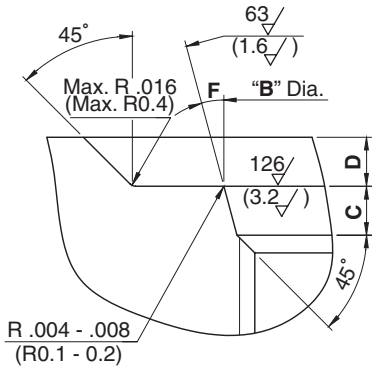
SO – N A – A 012

- Size
- **A**: Conformed to “AS568A”
- Durometer
  - **A**: A70
  - **B**: A90
- Material
  - **N**: Nitrile Rubber (NBR)
  - **F**: Fluororubber (FPM)
- O-Ring

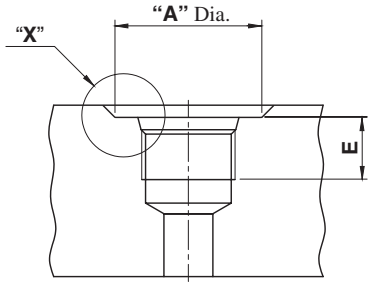
SO-NA/NB-A∗ SO-FA/FB-A∗						
Size Number	Dimensions mm (Inches)					
	ID		W			
A006	2.90	(.114)				
A007	3.68	(.145)				
A008	4.47	(.176)				
A009	5.28	(.208)				
A010	6.07	(.239)				
A011	7.65	(.301)				
A012	9.25	(.364)				
A013	10.82	(.426)				
A014	12.42	(.489)				
A015	14.00	(.551)				
A016	15.60	(.614)				
A017	17.17	(.676)				
A018	18.77	(.739)				
A019	20.35	(.801)				
A020	21.95	(.864)				
A021	23.52	(.926)				
A022	25.12	(.989)				
A023	26.70	(1.051)				
A024	28.30	(1.114)				
A025	29.87	(1.176)				
A026	31.47	(1.239)				
A027	33.05	(1.301)	1.78	(.070)		
A028	34.65	(1.364)				
A029	37.82	(1.489)				
A030	41.00	(1.614)				
A031	44.17	(1.739)				
A032	47.35	(1.864)				
A033	50.52	(1.989)				
A034	53.70	(2.114)				
A035	56.87	(2.239)				
A036	60.05	(2.364)				
A037	63.22	(2.489)				
A038	66.40	(2.614)				
A039	69.57	(2.739)				
A040	72.75	(2.864)				
A041	75.92	(2.989)				
A042	82.27	(3.239)				
A043	88.62	(3.489)				
A044	94.97	(3.739)				
A045	101.32	(3.989)				
A046	107.67	(4.239)				
A047	114.02	(4.489)				
A048	120.37	(4.739)				
A049	126.72	(4.989)				
A050	133.07	(5.239)				
A110	9.19	(.362)				
A111	10.77	(.424)				
A112	12.37	(.487)				
A113	13.94	(.549)				
A114	15.54	(.612)				
A115	17.12	(.674)				
A116	18.72	(.737)				
A117	20.29	(.799)				
A118	21.89	(.862)				
A119	23.47	(.924)				
A120	25.07	(.987)				
A121	26.64	(1.049)				
A122	28.24	(1.112)	2.62	(.103)		
A123	29.82	(1.174)				
A124	31.42	(1.237)				
A125	32.99	(1.299)				
A126	34.59	(1.362)				
A127	36.17	(1.424)				
A128	37.77	(1.487)				
A129	39.34	(1.549)				
A130	40.94	(1.612)				
A131	42.52	(1.674)				
A132	44.12	(1.737)				
A133	45.69	(1.799)				
A134	47.29	(1.862)				

SO-NA/NB-A∗ SO-FA/FB-A∗						
Size Number	Dimensions mm (Inches)					
	ID		W			
A135	48.90	(1.925)				
A136	50.47	(1.987)				
A137	52.07	(2.050)				
A138	53.64	(2.112)				
A139	55.24	(2.175)				
A140	56.82	(2.237)				
A141	58.42	(2.300)				
A142	59.99	(2.362)				
A143	61.60	(2.425)				
A144	63.17	(2.487)				
A145	64.77	(2.550)				
A146	66.34	(2.612)				
A147	67.94	(2.675)				
A148	69.52	(2.737)				
A149	71.12	(2.800)				
A150	72.69	(2.862)				
A151	75.87	(2.987)				
A152	82.22	(3.237)				
A153	88.57	(3.487)				
A154	94.92	(3.737)				
A155	101.27	(3.987)	2.62	(.103)		
A156	107.62	(4.237)				
A157	113.97	(4.487)				
A158	120.32	(4.737)				
A159	126.67	(4.987)				
A160	133.02	(5.237)				
A161	139.37	(5.487)				
A162	145.72	(5.737)				
A163	152.07	(5.987)				
A164	158.42	(6.237)				
A165	164.77	(6.487)				
A166	171.12	(6.737)				
A167	177.47	(6.987)				
A168	183.82	(7.237)				
A169	190.17	(7.487)				
A170	196.52	(7.737)				
A171	202.87	(7.987)				
A172	209.22	(8.237)				
A173	215.57	(8.487)				
A174	221.92	(8.737)				
A175	228.27	(8.987)				
A176	234.62	(9.237)				
A177	240.97	(9.487)				
A178	247.32	(9.737)				
A210	18.64	(.734)				
A211	20.22	(.796)				
A212	21.82	(.859)				
A213	23.39	(.921)				
A214	24.99	(.984)				
A215	26.57	(1.046)				
A216	28.17	(1.109)				
A217	29.74	(1.171)				
A218	31.34	(1.234)				
A219	32.92	(1.296)	3.53	(.139)		
A220	34.52	(1.359)				
A221	36.09	(1.421)				
A222	37.69	(1.484)				
A223	40.87	(1.609)				
A224	44.04	(1.734)				
A225	47.22	(1.859)				
A226	50.39	(1.984)				
A227	53.57	(2.109)				
A228	56.74	(2.234)				
A229	59.92	(2.359)				

SO-NA/NB-A∗ SO-FA/FB-A∗						
Size Number	Dimensions mm (Inches)					
	ID		W			
A230	63.09	(2.484)				
A231	66.27	(2.609)				
A232	69.44	(2.734)				
A233	72.62	(2.859)				
A234	75.79	(2.984)				
A235	78.97	(3.109)				
A236	82.14	(3.234)				
A237	85.32	(3.359)				
A238	88.49	(3.484)				
A239	91.67	(3.609)				
A240	94.84	(3.734)				
A241	98.02	(3.859)				
A242	101.19	(3.984)				
A243	104.37	(4.109)				
A244	107.54	(4.234)				
A245	110.72	(4.359)				
A246	113.89	(4.484)				
A247	117.07	(4.609)				
A248	120.24	(4.734)				
A249	123.42	(4.859)				
A250	126.59	(4.984)				
A251	129.77	(5.109)	3.53	(.139)		
A252	132.94	(5.234)				
A253	136.12	(5.359)				
A254	139.29	(5.484)				
A255	142.47	(5.609)				
A256	145.64	(5.734)				
A257	148.82	(5.859)				
A258	151.99	(5.984)				
A259	158.34	(6.234)				
A260	164.69	(6.484)				
A261	171.04	(6.734)				
A262	177.39	(6.984)				
A263	183.74	(7.234)				
A264	190.09	(7.484)				
A265	196.44	(7.734)				
A266	202.79	(7.984)				
A267	209.14	(8.234)				
A268	215.49	(8.484)				
A269	221.84	(8.734)				
A270	228.19	(8.984)				
A271	234.54	(9.234)				
A272	240.89	(9.484)				
A273	247.24	(9.734)				
A274	253.59	(9.984)				
A901	4.70	(.185)	1.42	(.056)		
A902	6.07	(.239)	1.63	(.064)		
A903	7.64	(.301)	1.63	(.064)		
A904	8.92	(.351)	1.83	(.072)		
A905	10.52	(.414)	1.83	(.072)		
A906	11.89	(.468)	1.98	(.078)		
A907	13.46	(.530)	2.08	(.082)		
A908	16.36	(.644)	2.21	(.087)		
A909	17.93	(.706)	2.46	(.097)		
A910	19.18	(.755)	2.46	(.097)		
A911	21.92	(.863)				
A912	23.47	(.924)				
A913	25.04	(.986)				
A914	26.59	(1.047)	2.95	(.116)		
A916	29.74	(1.171)				
A918	34.42	(1.355)				
A920	37.46	(1.475)				
A924	43.69	(1.720)	3.00	(.118)		
A928	53.09	(2.090)				
A932	59.36	(2.337)				



Detail "**X**"



DIMENSIONS IN INCHES (MILLIMETRES)

Nominal Tube OD		Thread Size	Dimensions Inch (mm)						O-Ring Size (Hs 90)
Dash Size	Inch		A★ (Min.)	B ±.002 (±0.05)	C +.015 0 (+0.4 0)	D (Max.)	E (Min.)	F ±1°	
-2	1/8	5/16-24 UNF-2B	.669 (17)	.360 (9.15)	.075 (1.9)	.063 (1.6)	.394 (10)	12	AS568-902
-3	3/16	3/8-24 UNF-2B	.748 (19)	.423 (10.75)	.075 (1.9)	.063 (1.6)	.394 (10)	12	AS568-903
-4	1/4	7/16-20 UNF-2B	.827 (21)	.490 (12.45)	.094 (2.4)	.063 (1.6)	.453 (11.5)	12	AS568-904
-5	5/16	1/2-20 UNF-2B	.906 (23)	.553 (14.05)	.094 (2.4)	.063 (1.6)	.453 (11.5)	12	AS568-905
-6	3/8	9/16-18 UNF-2B	.984 (25)	.618 (15.7)	.098 (2.5)	.063 (1.6)	.453 (11.5)	12	AS568-906
-8	1/2	3/4-16 UNF-2B	1.181 (30)	.813 (20.65)	.098 (2.5)	.095 (2.4)	.500 (12.7)	15	AS568-908
-10	5/8	7/8-14 UNF-2B	1.339 (34)	.945 (24)	.098 (2.5)	.095 (2.4)	.563 (14. 3)	15	AS568-910
-12	3/4	1-1/16-12 UN-2B	1.614 (41)	1.150 (29.2)	.130 (3.3)	.095 (2.4)	.657 (16.7)	15	AS568-912
-14	7/8	1-3/16-12 UN-2B	1.772 (45)	1.276 (32.4)	.130 (3.3)	.095 (2.4)	.748 (19)	15	AS568-914
-16	1	1- 5/16-12 UN-2B	1.929 (49)	1.400 (35.55)	.130 (3.3)	.126 (3.2)	.748 (19)	15	AS568-916
-20	1-1/4	1- 5/8-12 UN-2B	2.283 (58)	1.715 (43.55)	.130 (3.3)	.126 (3.2)	.748 (19)	15	AS568-920
-24	1-1/2	1-7/8-12 UN-2B	2.559 (65)	1.965 (49.9)	.130 (3.3)	.126 (3.2)	.748 (19)	15	AS568-924
-32	2	2-1/2-12 UN-2B	3.465 (88)	2.589 (65.75)	.130 (3.3)	.126 (3.2)	.748 (19)	15	AS568-932

★ If face of boss is on a machined surface, dimensions "A" and "D" need not apply as long as corner radius R .0004 - .0008 inches (R 0.1 - 0.2 mm) is maintained.

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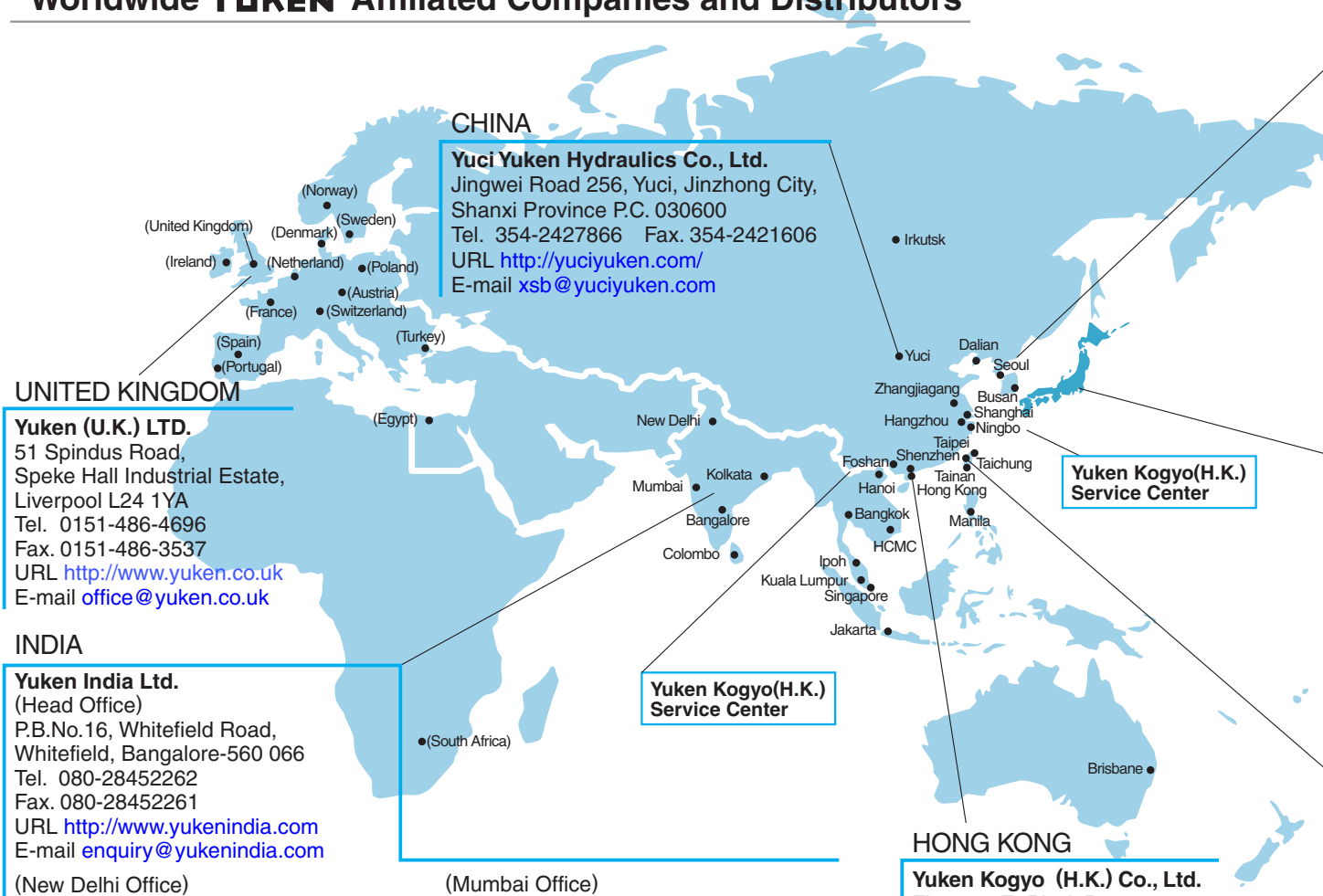

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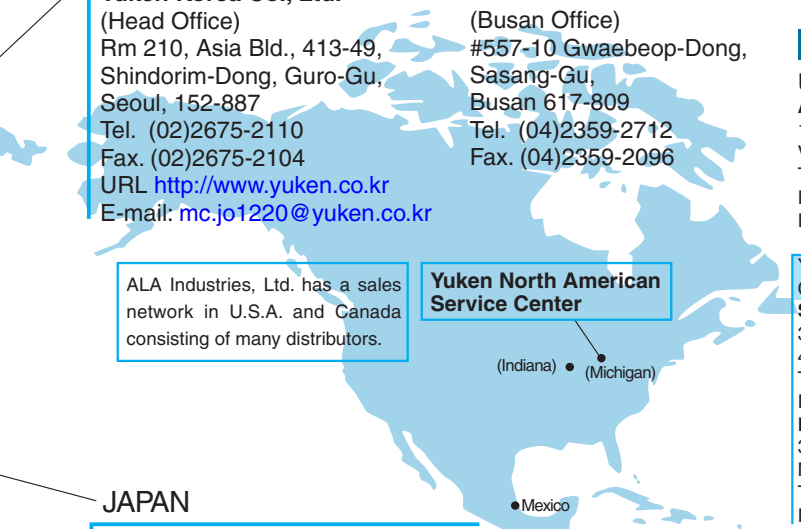

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