



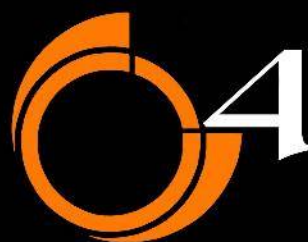
# ELECTRO HYDRAULIC CONTROL VALVES

## H1

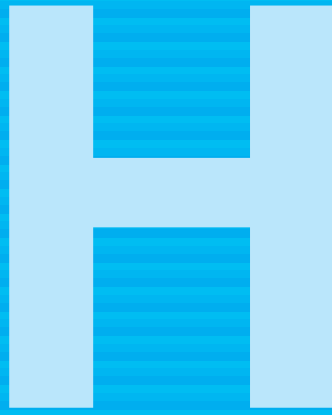
## EH SERIES



油研工業株式会社





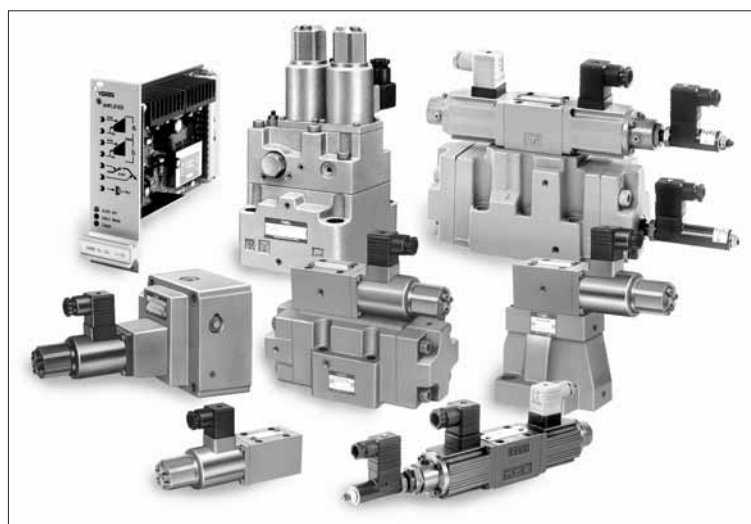


# PROPORTIONAL ELECTRO-HYDRAULIC CONTROLS

- **EE Series-Hybrid Components** .....Page 656  
Proportional Electro-Hydraulic Control Valves



- **E Series** .....Page 667  
Proportional Electro-Hydraulic Controls

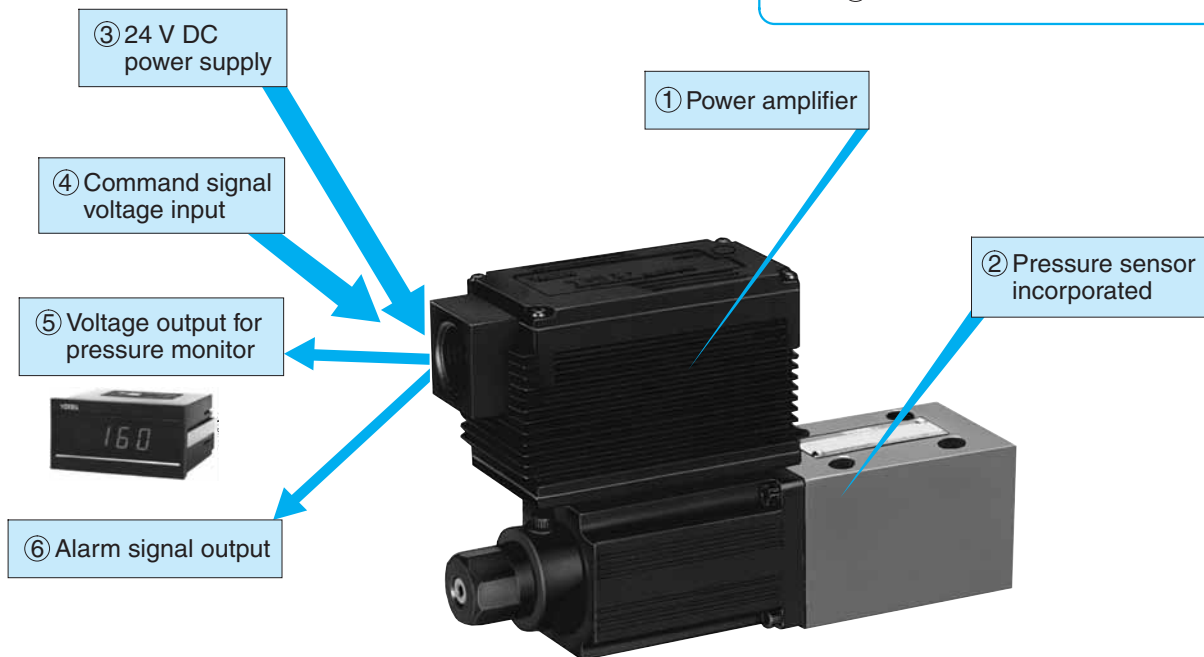


High-accuracy, simple, convenient

**EH** Series realizes your dreams.

### Why simple ?

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



Details of Proportional Electro-hydraulic Relief Valve

### Why high-accuracy ?

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

- ★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:  $\pm 24$  V DC power supply is needed.
- ★4. EHDFG-01, 03, 04 and 06: 0 to  $\pm 5$  V DC command signal is needed.
- ★5. EHDFG-04 and 06: The spool displacement is shown as a percentage.

### Why convenient ?

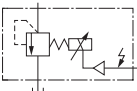
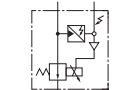
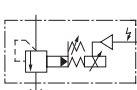
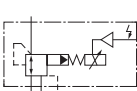
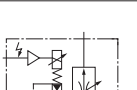
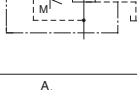
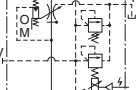
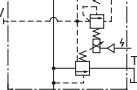
Analog voltages can be output by using the incorporated sensor for monitoring pressure, etc. ⑤<sup>★5</sup>.

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.

# EH Series-Hybrid Components

## Proportional Electro-Hydraulic Controls

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

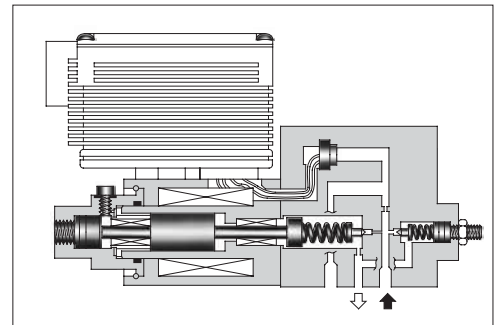
The valve can also be used as a relief valve for the hydraulic system where a small flow rate and continuous pressure control are required.

## Specifications

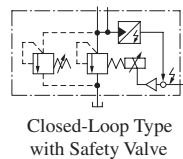
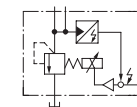
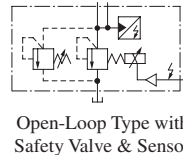
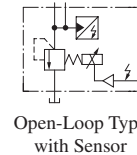
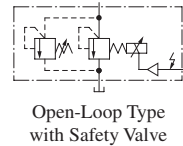
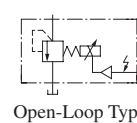
| Model Numbers                        | EHDG-01 *                                                                                                 |
|--------------------------------------|-----------------------------------------------------------------------------------------------------------|
| Description                          |                                                                                                           |
| 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%) * <sup>1</sup> or less                                                                            |
| Repeatability                        | 1% * <sup>2</sup> or less                                                                                 |
| Frequency Response                   | B: 10 (27) Hz * <sup>1</sup><br>C: 10 (27) Hz * <sup>1</sup> (-90 degree)<br>H: 12 (27) Hz * <sup>1</sup> |
| Supply Electric Power                | 24 V DC<br>(21 to 28 V DC Included Ripple)                                                                |
| Power Input (Max.)                   | 28 W                                                                                                      |
| Input Signal                         | B: 6.9 MPa (1000 PSI) / 5 V DC<br>C: 15.7 MPa (2275 PSI) / 5 V DC<br>H: 24.5 MPa (3550 PSI) / 5 V DC      |
| Input Impedance                      | 10 kΩ                                                                                                     |
| Alarm Signal Output (Open Collector) | Voltage: Max. 30 V DC<br>Current: Max. 40 mA                                                              |
| Pressure Signal Output               | B: 5 V DC / 6.9 MPa (1000 PSI)<br>C: 5 V DC / 15.7 MPa (2275 PSI)<br>H: 5 V DC / 24.5 MPa (3550 PSI)      |
| Ambient Temperature                  | 0 - 50°C (32 - 122°F)<br>(With Circulated Air)                                                            |

\*<sup>1</sup>. The value in ( ) is for the closed-loop type.

\*<sup>2</sup>. 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 |
| <b>F:</b> Special Seals for Phosphate Ester Type Fluid (Omit if not required) | <b>EHD:</b> Proportional Electro-Hydraulic Pilot Relief Valve | <b>G:</b> Sub-plate Mounting | <b>01</b>  | <b>None:</b> For general use<br><b>V:</b> Vent Control of Relief Valve (Omit if not required) | <b>B:</b> 0.5 - 6.9 (70 - 1000)<br><b>C:</b> 1 - 15.7 (145 - 2275)<br><b>H:</b> 1.2 - 24.5 (175 - 3550) | <b>None:</b> Open-Loop<br><b>S:</b> Open-Loop with Sensor<br><b>L:</b> Closed-Loop* <sup>1</sup> | <b>None:</b> Without Safety Valve<br><b>1:</b> With Safety Valve | <b>PN:</b> Without Orifice (Standard) | <b>T15</b><br><b>T13</b><br><b>T11</b> * <sup>2</sup> | <b>M10:</b> Standard Orifice | <b>50</b>     |

\*<sup>1</sup>. For closed-loop models, specify applicable control code "V" even though the valve may not be used as vent control of relief valve.

\*<sup>2</sup>. Standard of T-line Orifice.  
Pres. Adj. Range B:T15, C:T13, H:T11.

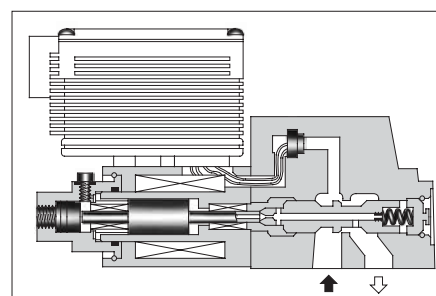
## Proportional Electro-Hydraulic Pressure Control Valves

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.

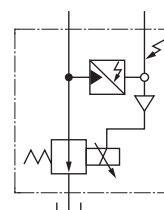
### Specifications

| Model Numbers                        | SB1110                                                                                                                                                                                                                            | SB1190                      |
|--------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|
| Description                          |                                                                                                                                                                                                                                   |                             |
| Max. Operating Pres.                 | B: 6.9 MPa (1000 PSI)<br>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)<br>H: 0.5 L/min (.13 U.S.GPM)<br>at 0.2 - 6.9 MPa (29 - 1000 PSI)<br>1.5 L/min (.40 U.S.GPM)<br>at 6.9 - 15.7 MPa (1000 - 2275 PSI)<br>3.0 L/min (.79 U.S.GPM)<br>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 % <sup>★</sup> 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<br>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<br>Current: Max. 40 mA                                                                                                                                                                                      |                             |
| Pressure Signal Output               | B: 5 V DC / 6.9 MPa (1000 PSI)<br>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) | <b>SB1110:</b><br>Proportional Electro-Hydraulic Pressure Control Valve<br>(3/8, Sub-plate mounting) | <b>B:</b> 0.2 <sup>★</sup> - 6.9 (29 - 1000)<br><b>H:</b> 0.2 <sup>★</sup> - 24.5 (29 - 3550) | <b>20</b>     |
|                                                                        | <b>SB1190:</b><br>Proportional Electro-Hydraulic Pressure Control Valve<br>(3/4, Sub-plate mounting) | <b>B:</b> 0.2 <sup>★</sup> - 7.0 (29 - 1020)                                                  | <b>10</b>     |

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

# Proportional Electro-Hydraulic Relief Valves

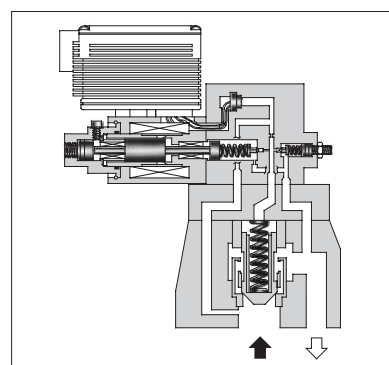
These valves, consist of a small size but high performance EH series electro-hydraulic proportional pilot relief valve and a low noise type relief valve. The valves control the system pressure proportionally through a controlled input voltage.

## Specifications

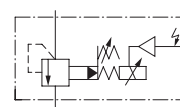
| Model Numbers                           | EHBG-03                                                                           | EHBG-06                                                                      | EHBG-10                                                                    |
|-----------------------------------------|-------------------------------------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

★1. The value in ( ) is for the closed-loop type.

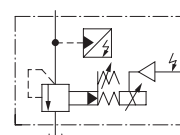
★2. The repeatability of the valve is obtained by having it tested independently on the conditions similar to its original testing.



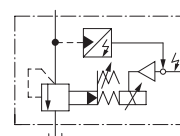
Graphic Symbols



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 |
| <b>F:</b><br>Special Seals for Phosphate Ester Type Fluid (Omit if not required) | <b>EHB:</b><br>Proportional Electro-Hydraulic Relief Valve | <b>G:</b><br>Sub-plate Mounting | <b>03</b>  | <b>C:</b> 0.6 [0.8] <sup>★</sup> - 15.7 (85 [115] <sup>★</sup> - 2275)<br><b>H:</b> 0.6 [0.8] <sup>★</sup> - 24.5 (85 [115] <sup>★</sup> - 3550)   | <b>None:</b><br>Open-Loop       | <b>50</b>     |
|                                                                                  |                                                            |                                 | <b>06</b>  | <b>C:</b> 0.9 [1.0] <sup>★</sup> - 15.7 (130 [145] <sup>★</sup> - 2275)<br><b>H:</b> 0.9 [1.0] <sup>★</sup> - 24.5 (130 [145] <sup>★</sup> - 3550) | <b>S:</b> Open-Loop with Sensor | <b>50</b>     |
|                                                                                  |                                                            |                                 | <b>10</b>  | <b>C:</b> 1.1 [1.4] <sup>★</sup> - 15.7 (160 [205] <sup>★</sup> - 2275)<br><b>H:</b> 1.1 [1.4] <sup>★</sup> - 24.5 (160 [205] <sup>★</sup> - 3550) | <b>L:</b> Closed-Loop           | <b>50</b>     |

★ 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.

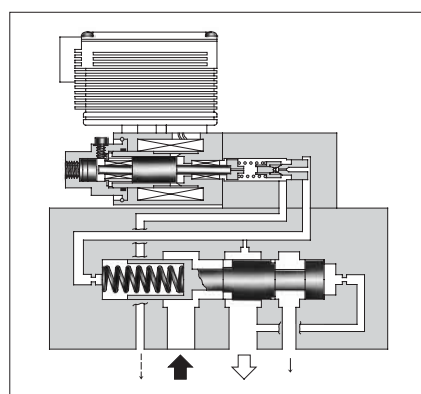
Moreover, a good response speed in reducing the pressure even at a large load capacity can be obtained with the relief function of the valves.

### Specifications

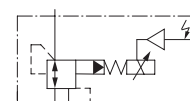
| Model Numbers             | EHRBG-06                                                                                                                    | EHRBG-10                                 |
|---------------------------|-----------------------------------------------------------------------------------------------------------------------------|----------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

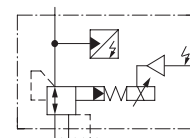
★2. The repeatability of the valve is obtained by having it tested independently on the conditions similar to its original testing.



### 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 |
| <b>F:</b><br>Special Seals for Phosphate Ester Type Fluid (Omit if not required) | <b>EHRB:</b><br>Proportional Electro-Hydraulic Relieving & Reducing Valve | <b>G:</b><br>Sub-plate Mounting | <b>06</b>  | <b>B:</b> 0.8 - 6.9 (115 - 1000)<br><b>C:</b> 1.2 - 13.7 (175 - 2000)<br><b>H:</b> 1.5 - 20.6 (220 - 3000) | <b>None:</b><br>Open-Loop       | <b>50</b>     |
|                                                                                  |                                                                           |                                 | <b>10</b>  | <b>B:</b> 0.9 - 6.9 (130 - 1000)<br><b>C:</b> 1.2 - 13.7 (175 - 2000)<br><b>H:</b> 1.5 - 20.6 (220 - 3000) | <b>S:</b> Open-Loop with Sensor | <b>50</b>     |

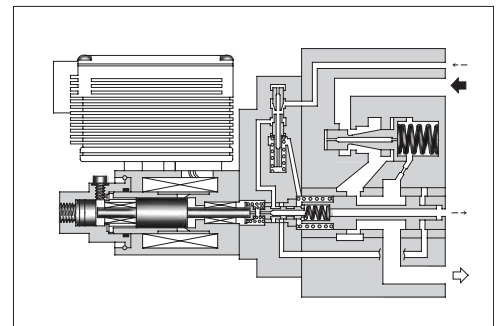
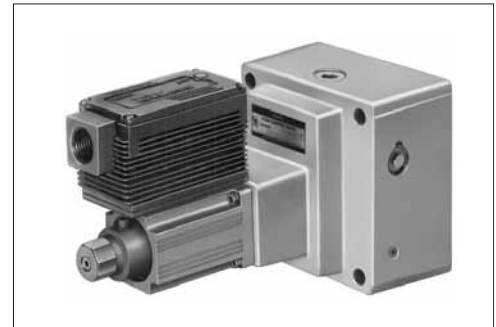
## ■ Proportional Electro-Hydraulic Flow Control (and Check) Valves

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

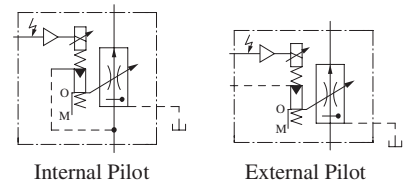
| Model Numbers                                          | EHF*G-03- 60<br>125                            | EHF*G-06-250          |
|--------------------------------------------------------|------------------------------------------------|-----------------------|
| Description                       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

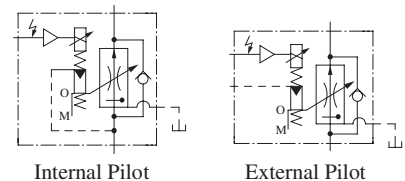


### Graphic Symbols

#### ● EHFG



#### ● EHFCG



### ■ 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 |
| <b>F:</b><br>Special Seals for Phosphate Ester Type Fluid (Omit if not required) | <b>EHF:</b><br>Proportional Electro-Hydraulic Flow Control Valve<br><br><b>EHFC:</b><br>Proportional Electro-Hydraulic Flow Control and Check Valve | <b>G:</b><br>Sub-plate Mounting | <b>03</b>  | <b>60:</b> 60 (15.8)<br><b>125:</b> 125 (33) | <b>None:</b><br>Internal Pilot<br><br><b>E:</b><br>External Pilot | <b>50</b>     |
|                                                                                  |                                                                                                                                                     |                                 | <b>06</b>  | <b>250:</b> 250 (66)                         |                                                                   | <b>50</b>     |

## Proportional Electro-Hydraulic Flow Control and Relief Valves

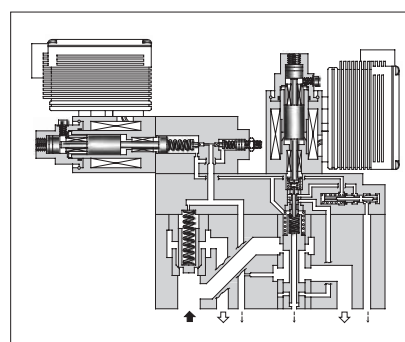
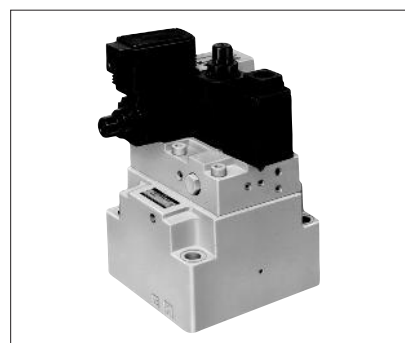
These are proportional electro-hydraulic flow control valves having functions for controlling the direct electric current of metre-in type and for pressure control.

They are energy-saving valves for supplying the minimum pressure and flow required to operate actuators.

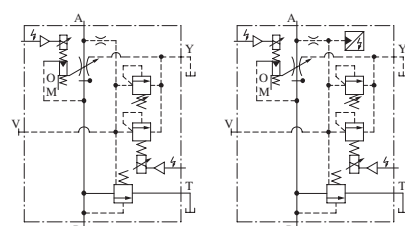
### Specifications

| Model Numbers                     |                       | EHFBG-03- <sup>60</sup> <sub>125</sub>                                 | EHFBG-06-250                               | EHFBG-10-500                               |
|-----------------------------------|-----------------------|------------------------------------------------------------------------|--------------------------------------------|--------------------------------------------|
| Description                       |                       |                                                                        |                                            |                                            |
| Max. Operating Pressure MPa (PSI) |                       | 24.5 (3550)                                                            | 24.5 (3550)                                | 24.5 (3550)                                |
| Max. Flow                         |                       | 60: 60 (15.8)<br>125: 125 (33)                                         | 250 (66)                                   | 500 (132)                                  |
| Metred Flow Capacity              |                       | 60: 1-60(.26-15.8)<br>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                        | 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      | Adj. Range: C 1.2-15.7 (175-2275)<br>Adj. Range: H 1.4-24.5 (200-3550) | 1.4-15.7 (200-2275)<br>1.4-24.5 (200-3550) | 1.5-15.7 (215-2275)<br>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)<br>H : 5 V DC / 24.5 MPa (3550 PSI)   |                                            |                                            |
| Ambient Temperature               |                       | 0 - 50°C (32 - 122°F)<br>(With Circulated Air)                         |                                            |                                            |

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

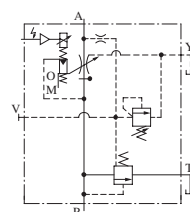


Graphic Symbols



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 |
| <b>F:</b> Special Seals for Phosphate Ester Type Fluid (Omit if not required) | <b>EHFB:</b> Proportional Electro-Hydraulic Flow Control and Relief Valve | <b>G:</b> Sub-plate Mounting | <b>03</b>  | <b>60:</b> 60 (15.8)<br><b>125:</b> 125 (33) | <b>None:</b> Without Proportional Pilot Relief Valve | <b>None:</b> Internal Pilot<br><br><b>E:</b> External Pilot | <b>None:</b> Open-Loop<br><br><b>S:</b> Open-Loop with Sensor | <b>50</b>     |
|                                                                               |                                                                           |                              | <b>06</b>  | <b>250:</b> 250 (66)                         |                                                      |                                                             |                                                               | <b>50</b>     |
|                                                                               |                                                                           |                              | <b>10</b>  | <b>500:</b> 500 (132)                        | <b>C, H:</b> See Specifications                      |                                                             |                                                               | <b>50</b>     |

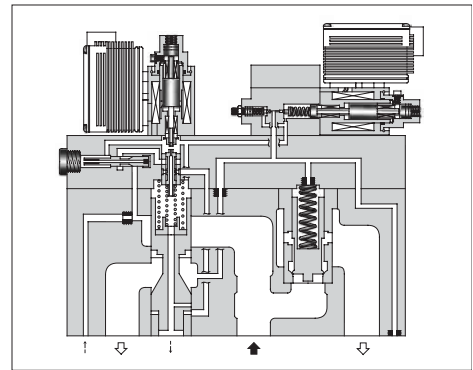
# High Flow Series Proportional Electro-Hydraulic Flow Control and Relief Valves

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.

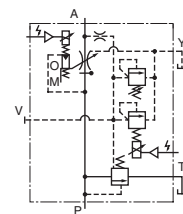
## Specifications

| Model Numbers                        |                            |               | EHFBG-03-250                                                         | EHFBG-06-500        |
|--------------------------------------|----------------------------|---------------|----------------------------------------------------------------------|---------------------|
| Description                          |                            |               |                                                                      |                     |
| 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)<br>H : 5 V DC / 24.5 MPa (3550 PSI) |                     |
| Ambient Temperature                  |                            |               | 0 - 50°C (32 - 122°F) (With Circulated Air)                          |                     |

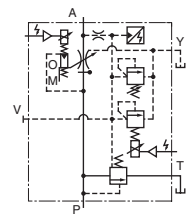
★ The repeatability of the valves is obtained by having it tested independently on the conditions similar to its original testing.



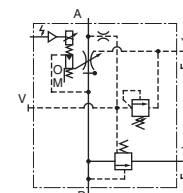
## Graphic Symbols



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 |
| <b>F:</b> Special Seals for Phosphate Ester Type Fluid (Omit if not required) | <b>EHFB:</b> Proportional Electro-Hydraulic Flow Control and Relief Valve | <b>G:</b> Sub-plate Mounting | <b>03</b>  | <b>250:</b> 125 (66)             | <b>None:</b> Without Proportional Pilot Relief Valve | <b>None:</b> Internal Pilot      | <b>None:</b> Open-Loop          | <b>50</b>     |
|                                                                               |                                                                           |                              | <b>06</b>  | <b>500:</b> 500 (132)            | <b>C, H:</b> See Specifications                      | <b>E:</b> External Pilot         | <b>S:</b> Open-Loop with Sensor | <b>50</b>     |

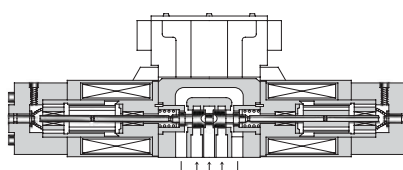
## Proportional Electro-Hydraulic Directional and Flow Control Valves

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

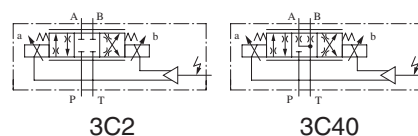
| Model Numbers             |                                                                  | EHDFG-01                                       | EHDFG-03         |
|---------------------------|------------------------------------------------------------------|------------------------------------------------|------------------|
| Description               |                                                                  |                                                |                  |
| 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)<br>[Valve $\Delta P$ 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 $\Omega$                                  | 8.0 $\Omega$     |
| Supply Electric Power     |                                                                  | 24 V DC<br>(21 to 28 V DC Included Ripple)     |                  |
| Input Voltage             | By Controlling Variable Resistance<br>(Using of Power from Amp.) | 1 - 2 k $\Omega$ Volume Range                  |                  |
|                           | By Controlling Voltage<br>(Using of Power outside Amp.)          | 0 - -5 V for SOL a<br>0 - +5 V for SOL b       |                  |
| Input Impedance           |                                                                  | 10 k $\Omega$                                  | 10 k $\Omega$    |
| Power Input (Max.)        |                                                                  | 40 W                                           | 45 W             |
| Ambient Temperature       |                                                                  | 0 - 50°C (32 - 122°F)<br>(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

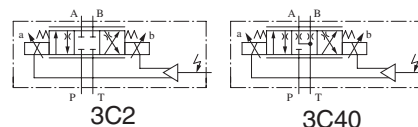
#### ● Metre-in • Metre-out Control



3C2

3C40

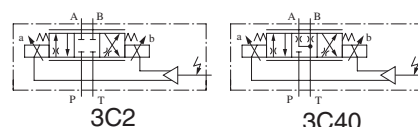
#### ● Metre-out Control



3C2

3C40

#### ● Metre-in Control



3C2

3C40

### Model Number Designation

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

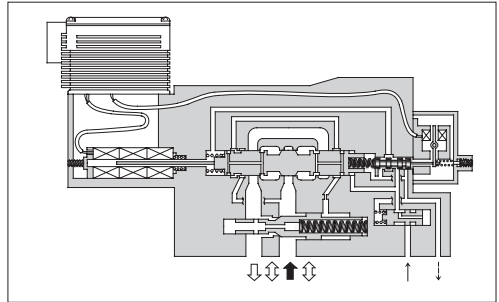
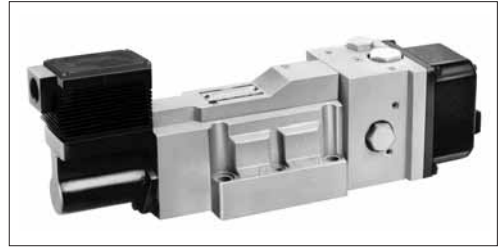
★ Spool type shown in the column is for the centre position.

# 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

| Model Numbers                             |                 | EHDFG-04                                       | EHDFG-06         |
|-------------------------------------------|-----------------|------------------------------------------------|------------------|
| Description                               |                 |                                                |                  |
| Max. Operating Pres.                      | MPa (PSI)       | 15.7 (2280)                                    | 15.7 (2280)      |
| Rated Flow                                | L/min (U.S.GPM) | 130 (34.3)                                     | 280 (73.9)       |
| Valve Pres. Difference: 1.5 MPa (215 PSI) |                 |                                                |                  |
| Min. Required Pilot Pres.                 | MPa (PSI)       | 1.5 (215)                                      | 1.5 (215)        |
| Min. Required Pilot Flow                  | 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<br>(±21 to ±28 V DC Included Ripple)  |                  |
| Input Signal                              |                 | Rated Flow / ±5 V DC                           |                  |
| Input Impedance                           |                 | 10 k Ω                                         | 10 k Ω           |
| Power Input (Max.)                        |                 | 20 W                                           | 20 W             |
| Alarm Signal Output (Open Collector)      |                 | Voltage: Max. 30 V DC<br>Current: Max. 30 mA   |                  |
| LVDT Output (Sensor Monitor)              |                 | ±5 V DC / Rated Travel of Spool                |                  |
| Ambient Temperature                       |                 | 0 - 50°C (32 - 122°F)<br>(With Circulated Air) |                  |

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

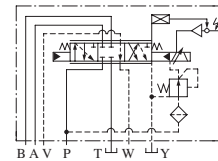
## Model Number Designation

| 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 |
| <b>F:</b><br>Special Seals for Phosphate Ester Type Fluid (Omit if not required) | <b>EHDF:</b><br>Proportional Electro-Hydraulic Directional and Flow Control Valve | <b>G:</b><br>Sub-plate Mounting | <b>04</b>  | <b>130:</b> 130 (34.3)     | <b>2</b>    | <b>None:</b><br>Internal Pilot | <b>None:</b><br>Not Provided  | <b>10</b>     |
|                                                                                  |                                                                                   |                                 | <b>06</b>  | <b>280:</b> 280 (73.9)     |             | <b>E:</b><br>External Pilot    | <b>CB:</b><br>Provided        | <b>10</b>     |

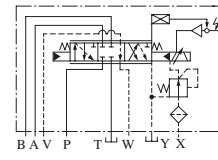
★ Spool type shown in the column is for the centre position.

## Graphic Symbols

### Models without Pressure Compensator Valve

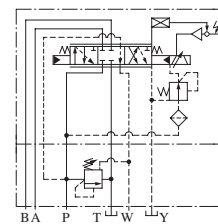


Internal Pilot



External Pilot

### Models with Pressure Compensator Valve



Internal Pilot





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