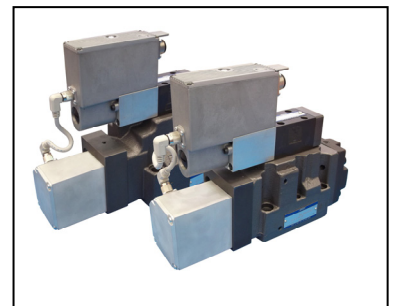




## OBE (On-Board Electronics) Type High Response Proportional Electro-Hydraulic Directional and Flow Control Valves (Two Stage Type) ELDFHG-04EH-280-\*-XY-\*\*-\*\*-10 ELDFHG-06EH-\*-XY-\*\*-\*\*-10

### Release of New Products

We are pleased to announce the release of high flow rate and two stage type valves as an addition to our highly appreciated product series: OBE type direct operated and high response proportional electro-hydraulic directional and flow control valve series.



#### ■ Features

##### ● Simple Operation and User-Friendliness

The addition of OBE to the ELDFHG series valves for simplified wiring offers simple operation and user-friendliness. Only with 24 V DC power supply and command signal input, the valves allow highly accurate and fast operation of hydraulic systems.

##### ● Response Characteristics Equivalent to Simple Servo Valves

A closed loop structure provided by incorporating a differential transformer for spool position detection enables feedback control, achieving high response equivalent to a simple servo valve.

##### ● High Accuracy

The valves have a hysteresis of 0.1% or less, achieving high accuracy equivalent to that of servo valves. The 2% overlap type (spool type: 3C2L) with linear no-load flow characteristics is suitable for position and pressure control in machinery/equipment.

##### ● Safety and Reliability

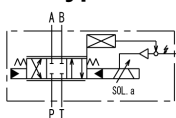
The valves support a fail-safe function to ensure safe operation in the event of electric failure (power failure, power cable disconnection, etc.).

##### ● High flow rate

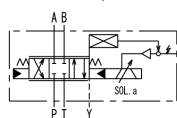
| No. | Series Number | Rated Flow L/min | Measurement Conditions    |
|-----|---------------|------------------|---------------------------|
| 1   | ELDFHG-04EH   | 280              | ΔP = 1 MPa<br>4-Way Valve |
| 2   | ELDFHG-06EH   | 350/500          |                           |

#### ■ JIS Graphic symbols

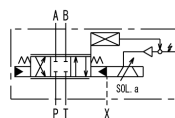
##### ● Spool type “3C2”, “3C2P”, “3C2L”



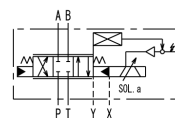
Internal pilot  
Internal drain type



Internal pilot  
External drain type

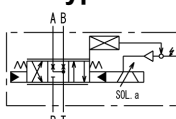


External pilot  
Internal drain type

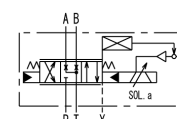


External pilot  
External drain type

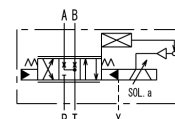
##### ● Spool type “3C40”



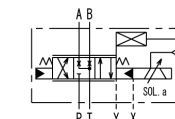
Internal pilot  
Internal drain type



Internal pilot  
External drain type



External pilot  
Internal drain type



External pilot  
External drain type

\* “SOL.a” is for the model 04EH.  
For the model-06EH, it is “SOL.b”

## ■ Specifications

| Model Number   |                           |              | ELDFHG-04EH                           | ELDFHG-06EH-350 | ELDFHG-06EH-500 |
|--|---------------------------|--------------|---------------------------------------|-----------------|-----------------|
| Rated Flow $\Delta P=1$ MPa (4-Way Valve)<br>$\Delta P = 0.5$ MPa per Land                                   | L/min                     |              | 280                                   | 350             | 500             |
| Max. Operating Pressure  | MPa                       |              | 35                                    |                 | 31.5            |
| Proof Pres. at<br>Return Port*1  | External Drain T Port     | MPa          | 31.5                                  | 35              | 25              |
|  | External Drain Y Port     | MPa          | 21                                    |                 |                 |
|  | Internal Drain T & Y Port | MPa          | 21                                    |                 |                 |
| Pilot Pressure*2   | MPa                       | 1.5 to 25    |                                       |                 |                 |
| Pilot Flow Rate*3  | L/min                     |              | 11 or more                            | 12 or more      | 16 or more      |
| Internal Leakage<br>Supply Pressure: 14MPa<br>Pilot Pressure: 14MPa<br>Fluid Viscosity: 32mm <sup>2</sup> /s | Pilot Valve               | L/min        | 1.8 or less                           |                 |                 |
|  | Main Valve<br>L/min       | 3C2          | 0.8 or less                           | 0.9 or less     | 1.0 or less     |
|  |                           | 3C40         | 1.6 or less                           | 1.8 or less     | 1.8 or less     |
|  |                           | 3C2P         | 6.8 or less                           | 7.0 or less     | 8.0 or less     |
|  |                           | 3C2L         | 2.1 or less                           | 2.5 or less     | 2.5 or less     |
| Hysteresis   |                           | 0.1% or less |                                       |                 |                 |
| Step Response (0 <=> 100%) V<br>Pilot Pressure: 14MPa (Typical Rating)*4                                     | ms                        |              | 20                                    | 20              | 22              |
| Frequency Response<br>$\pm 25\%$ Amplitude<br>Pilot Pressure: 14MPa<br>(Typical Rating)*4                    | Phase: -90°               | Hz           | 51                                    | 50              | 45              |
|  | Gain: -3 dB               | Hz           | 56                                    |                 |                 |
| Vibration Proof*5  | m/s <sup>2</sup>          |              | 100                                   |                 |                 |
| Protection   |                           |              | Equivalent to IP65                    |                 |                 |
| Ambient Temperature  | °C                        |              | 0 to +50                              |                 |                 |
| Spool Stroke to Stops  | mm                        |              | $\pm 5$                               | $\pm 5$         | $\pm 7$         |
| Spool End Area   | cm <sup>2</sup>           |              | 7                                     | 8               | 8               |
| Current  | A                         |              | 2 (MAX. 3)                            |                 |                 |
| Coil Resistance at 20 °C   | $\Omega$                  |              | 3                                     |                 |                 |
| Approx. Mass   | kg                        |              | 13                                    | 19              |                 |
| Electric Connection  |                           |              | 6 + PE Connector [EN 175201 Part 804] |                 |                 |

\*1: Pressure at the return port should be the actual supply pressure or less.

\*2: Supply pressure for the pilot valve should be within the range described above and should also be 60% of the actual main valve supply pressure or more.

\*3: Pilot flow is calculated with the above step response time at pilot pressure 14 MPa.





\*4: This value is measured on a per-valve basis under the conditions described above; it may differ depending on the actual circuit and operating conditions.

\*5: There are restrictions on the mounting position. See page 4 for details.

## ■ Details of the valve fail-safe function

With reference to the information given below, select the option for the fail-safe function according to the use of applications.

A separate safety circuit should be provided if the hydraulic actuator must be reliably held or stopped.

| No. | Model Number                   | Fail-Safe Function |  |
|-----|--------------------------------|--------------------|--|
|     |                                | Spool Position     | Function   |
| 1   | ELDFHG-*EH-*-3C2-XY-**-C       | Neutral            | All Ports Blocked   |
| 2   | ELDFHG-*EH-*-3C40-XY-**-C      | Neutral            | A, B, T Connection  |
| 3   | ELDFHG-*EH-*-3C2L/3C2P-XY-**-A | Valve Opening: 10% | PABT Position       |
| 4   | ELDFHG-*EH-*-3C2L/3C2P-XY-**-B | Valve Opening: 10% | PBAT Position       |

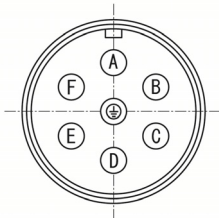
\* The fail-safe function's activation time depends on the electric and hydraulic conditions.

## ■ Model number designation

| ELDFHG  | - 04       | EH                     | - 280  | - 3C2P   | - XY                              | -E  | T   | - C   | -D  | -10           |
|---|------------|------------------------|--|--|-----------------------------------|---|---|---|---|---------------|
| Series Number   | Valve Size | Amplifier Type         | Rated Flow<br>L/min<br>$\Delta P=1$ MPa<br>(4-Way Valve) | Spool Type   | Direction of Flow                 | Pilot Type  | Drain Type  | Fail-Safe Function  | Input Signal/Spool Travel Monitoring  | Design Number |
| <b>ELDFHG:</b><br>Two Stage Type High Response Type Proportional Electro-Hydraulic Directional and Flow Control Valves (Sub-plate Mounting) | <b>04</b>  | <b>EH:</b><br>OBE Type | <b>280:</b> 280  | <b>3C2:</b><br>10% Overlap<br><b>3C40:</b><br>A, B, T Connection                           | <b>XY:</b><br>Meter-In /Meter-Out | <b>None:</b><br>Internal Pilot<br><br><b>E:</b><br>External Pilot | <b>None:</b><br>External Drain<br><br><b>T:</b><br>Internal Drain | C: Neutral  | <b>D:</b> Voltage Signal $\pm 10$ V (PABT Flow with Positive Input)<br><br><b>E:</b> Current Signal 4 to 20 mA (PABT Flow with 12 to 20 mA Input)<br><br><b>F:</b> Current Signal $\pm 10$ mA (PABT Flow with Positive Input) | <b>10</b>     |
|   |            |                        |  | <b>3C2P:</b><br>Zero Lap (Dual Flow Gain)<br><b>3C2L:</b><br>2% Overlap (Linear Flow Gain) |                                   |   |   | A:<br>P→A,B→T Position (Valve Opening: 10%)<br><b>B:</b><br>P→B,A→T Position (Valve Opening: 10%) |   |               |
|   | <b>06</b>  |                        | <b>350:</b> 350<br><b>500:</b> 500                       | <b>3C2:</b><br>10% Overlap<br><b>3C40:</b><br>A, B, T Connection                           |                                   |   |   | C: Neutral  |   |               |
|   |            |                        |  | <b>3C2P:</b><br>Zero Lap (Dual Flow Gain)<br><b>3C2L:</b><br>2% Overlap (Linear Flow Gain) |                                   |   |   | A:<br>P→A,B→T Position (Valve Opening: 10%)<br><b>B:</b><br>P→B,A→T Position (Valve Opening: 10%) |   |               |

\* Phosphate ester type fluids are also supported. When phosphate ester type fluids are used, prefix "F-" to the model number because the special seals (fluororubber) are required to be used.

## ■ Electrical specifications

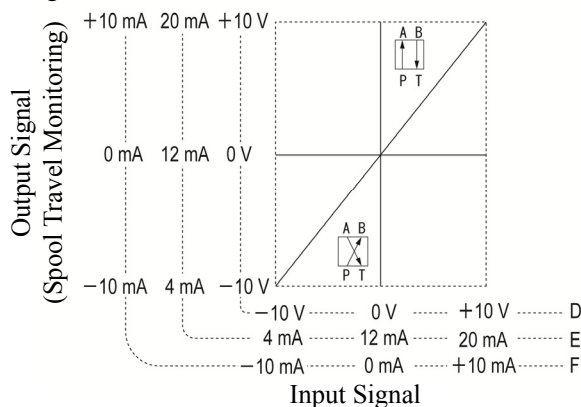


| Input Signal   |                                      | Voltage Signal "D"  | Current Signal "E"                         | Current Signal "F"                               |
|----------------|--------------------------------------|---|--|--|
| Pin A          | Power Supply                         | 24 V DC (21.6 - 26.4 V DC Included Ripple), 75 VA or more |  |  |
| Pin B          |                                      | 0 V   |  |  |
| Pin C          | Signal Common                        | COM (0 V)   |  |  |
| Pin D          | Input (+)(Differential) <sup>2</sup> | 0 - $\pm 10$ V<br>$R_i \geq 50$ k $\Omega$                | 4 - 20 mA<br>$R_i=200$ $\Omega$            | 0 - $\pm 10$ mA<br>$R_i=200$ $\Omega$            |
| Pin E          | Input (-)(Differential) <sup>2</sup> |   |  |  |
| Pin F          | Spool Travel Monitoring              | 0 - $\pm 10$ V<br>$R_L \geq 10$ k $\Omega$                | 4 - 20 mA<br>$R_L=100 - 500$ $\Omega^{*1}$ | 0 - $\pm 10$ mA<br>$R_L=100 - 500$ $\Omega^{*1}$ |
| Pin $\text{⊕}$ | Protective Earth                     | —   |  |  |

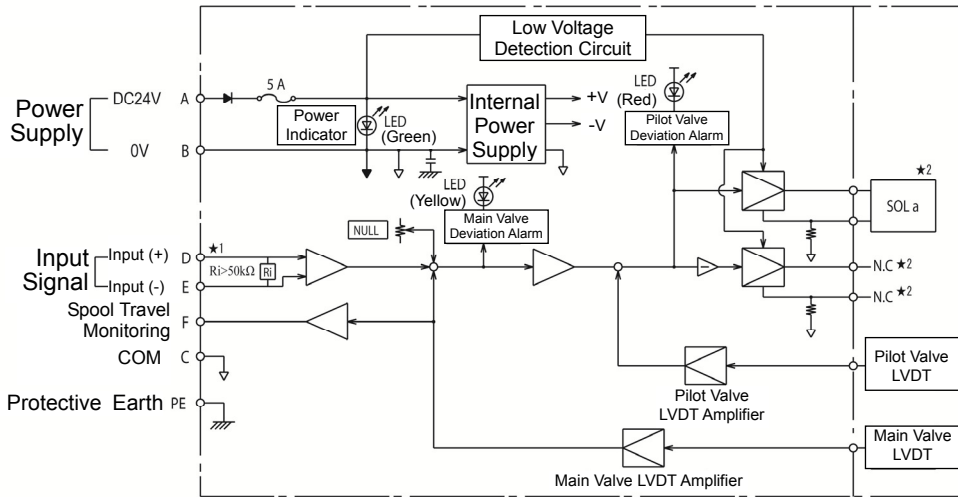
\*1: The recommended load resistance is 200  $\Omega$ .

\*2: Differential input signals can be used only for the valves with the voltage signal specifications of  $\pm 10$ V.

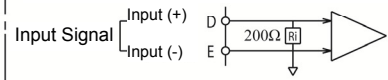
## ● I/O Signal Characteristics



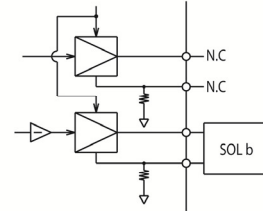
## ■ Block diagram



\*1: The input stage for the current signal "E" and "F" is as follows.



\*2: The solenoid name is for the model ELDFHG-04EH. The name for the model ELDFHG-06EH is as follows.



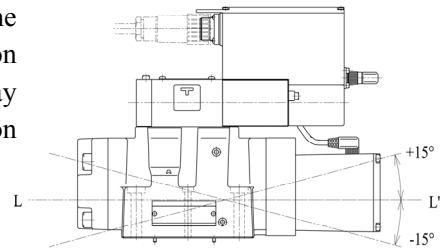
## ■ Accessories

### ● Mounting bolt

| Valve Model Number | Mounting Bolt                           | Qty | Tightening Torque N•m |
|--------------------|---|-----|-----------------------|
| ELDFHG-04EH        | Hexagon Socket Head Cap Screw: M6 × 55L | 2   | 12.9 to 15.9          |
|                    | Hexagon Socket Head Cap Screw: M10×60L  | 4   | 60.6 to 74.1          |
| ELDFHG-06EH        | Hexagon Socket Head Cap Screw: M12×85L  | 6   | 104 to 127            |

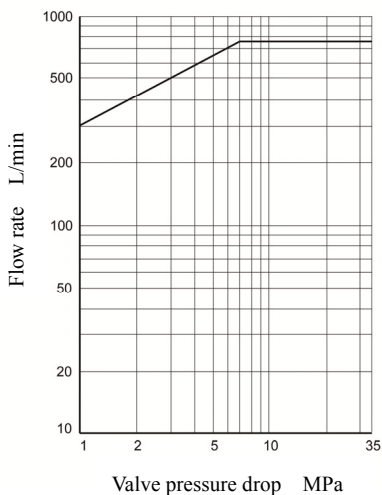
## ■ Mounting position

Mount the valve with the angle of the axis line L-L' within about  $\pm 15^\circ$  from the horizontal plane as shown in the right figure. When the principal vibration direction is consistent with the axial direction of the spool, the spool may malfunction due to external force. Make sure that the principal vibration direction is not consistent with the axial direction of the spool.

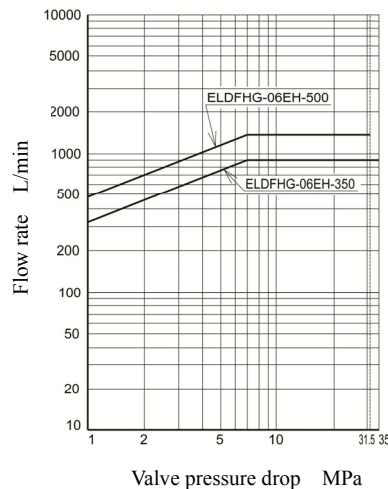


## ■ Range of fail-safe function

ELDFHG-04EH

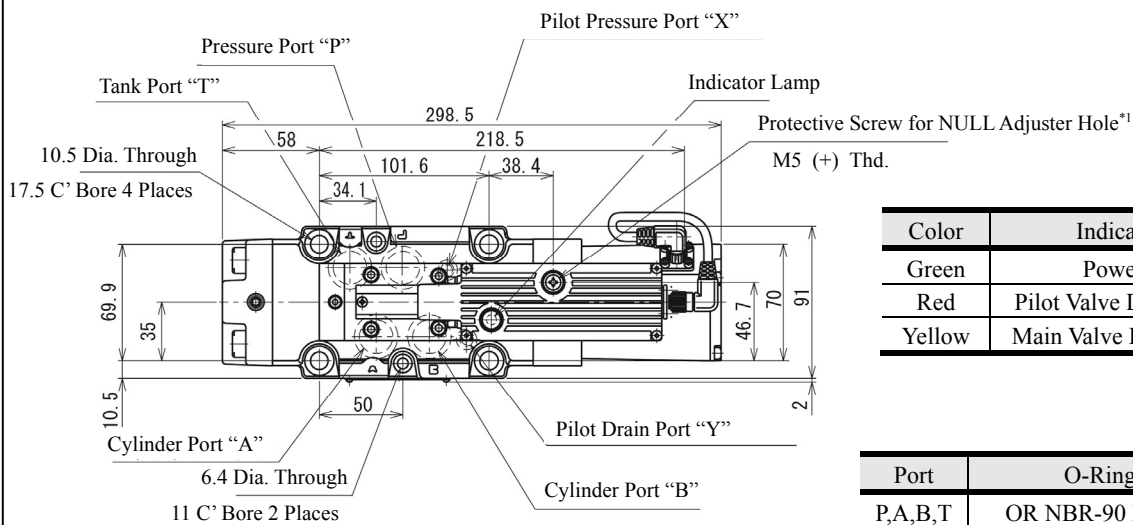


ELDFHG-06EH



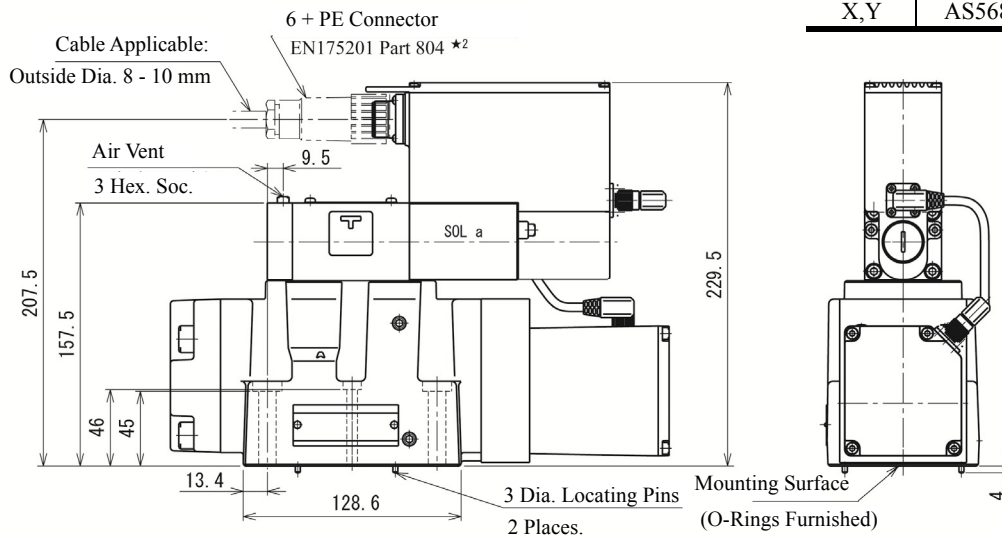
## ELDFHG-04EH-280-\*-XY-\*\*-\*\*-10

Mounting Surface: Conforming to ISO 4401-07-06-0-94



| Color  | Indicator Lamp              |
|--------|-----------------------------|
| Green  | Power Supply                |
| Red    | Pilot Valve Deviation Alarm |
| Yellow | Main Valve Deviation Alarm  |

| Port    | O-Ring            | Qty |
|---------|-------------------|-----|
| P,A,B,T | OR NBR-90 P22-N   | 4   |
| X,Y     | AS568-012(NBR-90) | 2   |



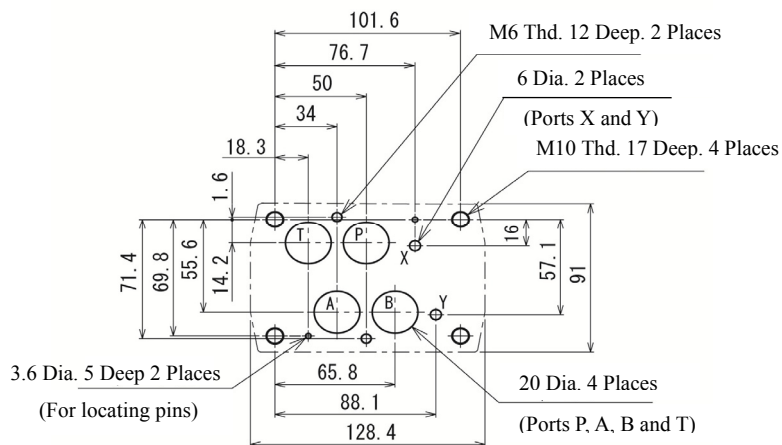
\*1. For NULL adjustment, remove the protective screw and turn the trimmer behind the screw. After adjustment, be sure to attach the protective screw.

\*2. The 6 + PE connector is not included with the valve. Prepare it separately.  
YUKEN parts number: TK290457-1

### • Dimensions of mounting surface

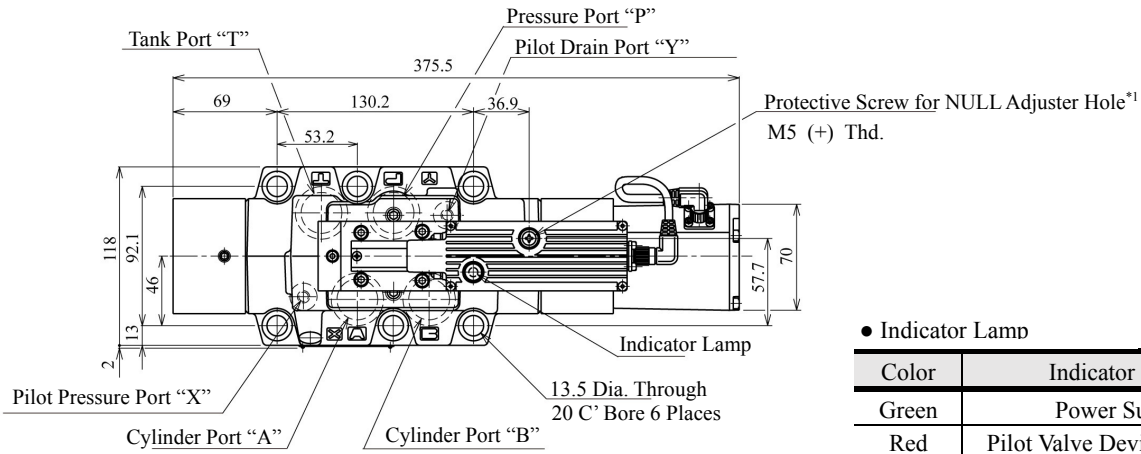
Prepare the mounting surface as shown below.

The mounting surface should have a good machined finish, e.g. surface roughness of 6-S.



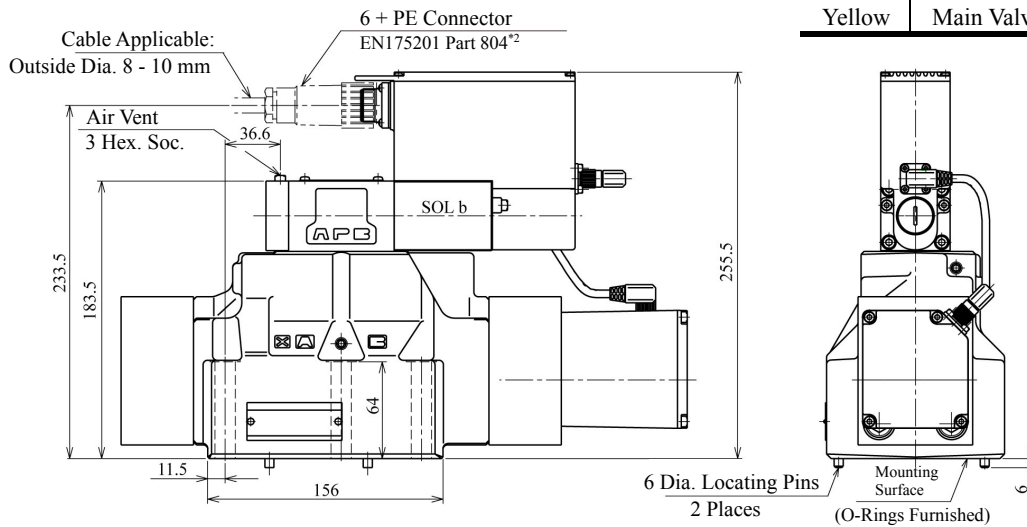
**ELDFHG-06EH-350/500-※-XY-※※-※-※-10**

**Mounting Surface: Conforming to ISO 4401-08-07-0-94**



● Indicator Lamp

| Color  | Indicator Lamp              |
|--------|-----------------------------|
| Green  | Power Supply                |
| Red    | Pilot Valve Deviation Alarm |
| Yellow | Main Valve Deviation Alarm  |



● O-Ring

| Port    | Model Number        | O-Ring            | Qty |
|---------|---------------------|-------------------|-----|
| P,A,B,T | ELDFHG-06EH-350     | AS568-123(NBR-90) | 4   |
|         | ELDFHG-06EH-500     | AS568-126(NBR-90) | 4   |
| X,Y     | ELDFHG-06EH-350/500 | OR NBR-90 P14-N   | 2   |

\*1. For NULL adjustment, remove the protective screw and turn the trimmer behind the screw.

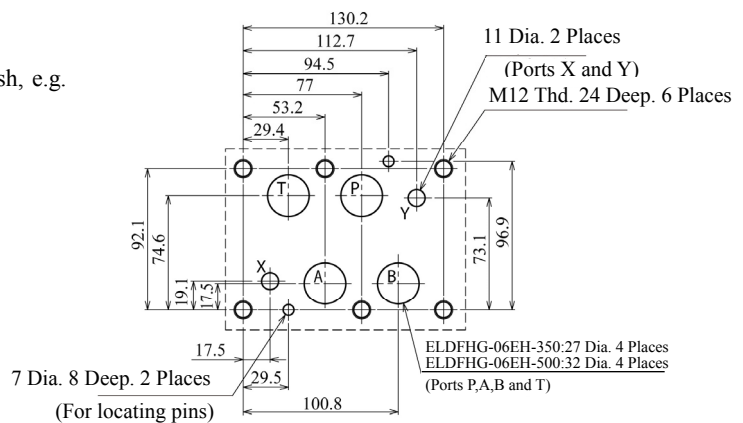
After adjustment, be sure to attach the protective screw.

\*2. The 6 + PE connector is not included with the valve. Prepare it separately.

YUKEN parts number: TK290457-1

● Dimensions of mounting surface

Prepare the mounting surface as shown in the right figure  
The mounting surface should have a good machined finish, e.g. surface roughness of 6-S.



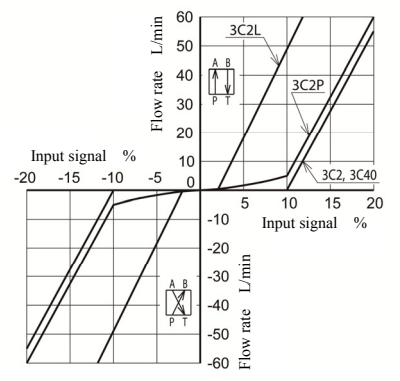
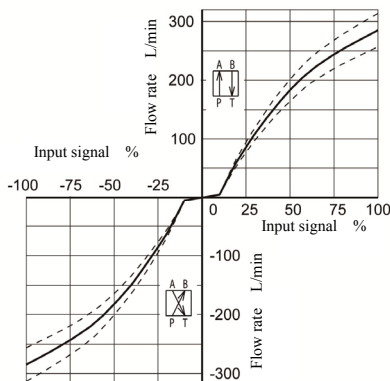
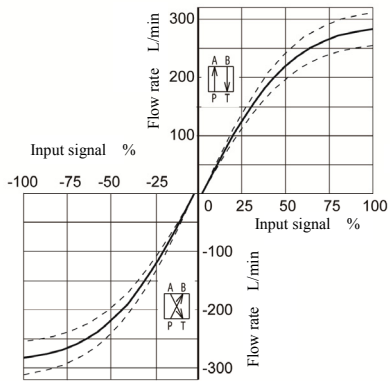
## ■ No-load flow characteristics

- <Conditions>
- Valve pressure difference: 1 MPa (4-Way Valve/Pressure difference per land: 0.5 MPa)
  - Viscosity: 30 mm<sup>2</sup>/s

**ELDFHG-04EH-280-3C2L**

**ELDFHG-04EH-280-3C2/3C40/3C2P**

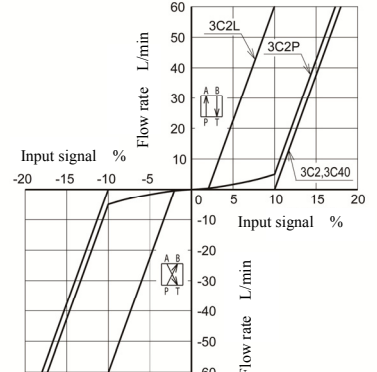
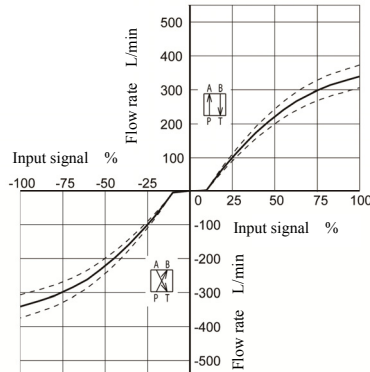
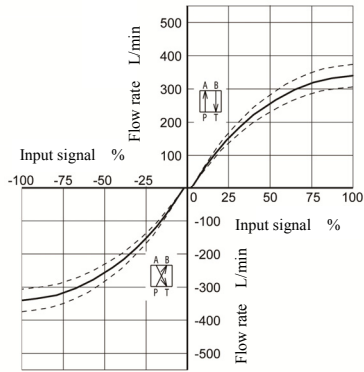
Around Null Position  
Input Signal -20↔+20%



**ELDFHG-06EH-350-3C2L**

**ELDFHG-06EH-350-3C2/3C40/3C2P**

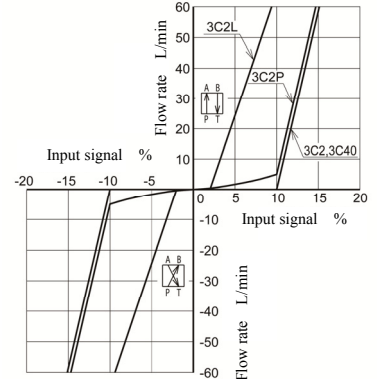
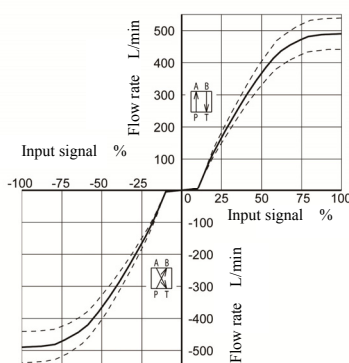
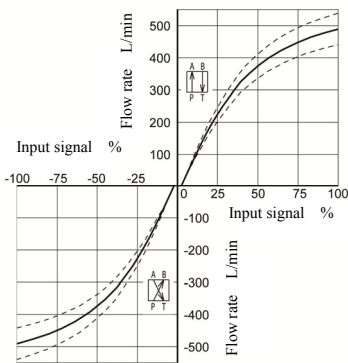
Around Null Position  
Input Signal -20↔+20%



**ELDFHG-06EH-500-3C2L**

**ELDFHG-06EH-500-3C2/3C40/3C2P**

Around Null Position  
Input Signal -20↔+20%

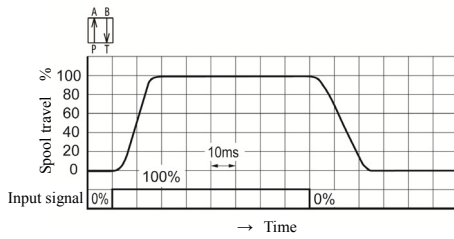


## ■ Step response (example)

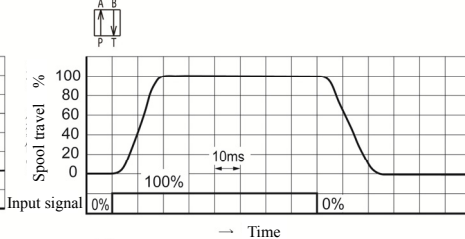
- <Conditions>
- Hydraulic Circuit: Port A/B Closed
  - Supply pressure and Pilot pressure: 14 MPa
  - Input signal: 0⇔100%
  - Viscosity: 30 mm<sup>2</sup>/s

This value is measured on a per valve basis; the actual step response may differ depending on the actual circuit.

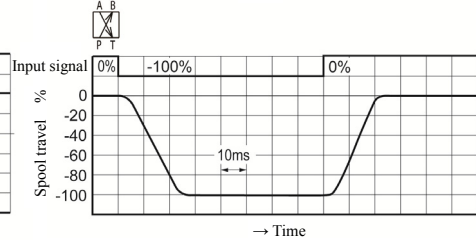
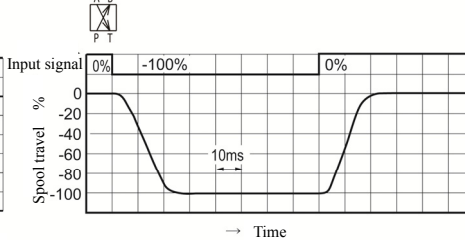
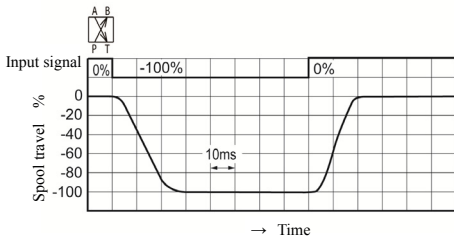
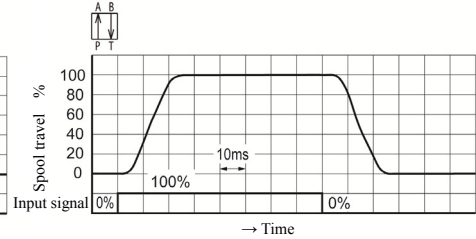
**ELDFHG-04EH**



**ELDFHG-06EH-350**



**ELDFHG-06EH-500**

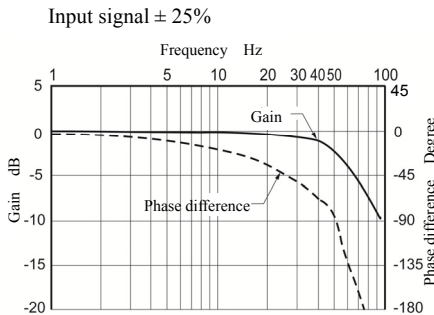


## ■ Frequency response (example)

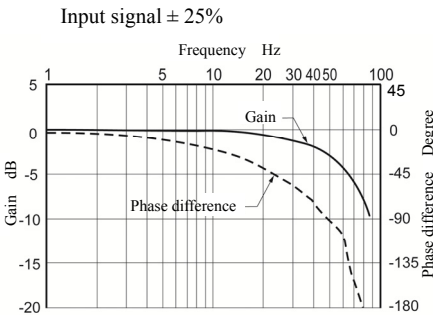
- <Conditions>
- Hydraulic Circuit: Port A/B Closed
  - Supply pressure and Pilot pressure: 14 MPa
  - Viscosity: 30 mm<sup>2</sup>/s

This value is measured on a per valve basis; the actual frequency response may differ depending on the actual circuit.

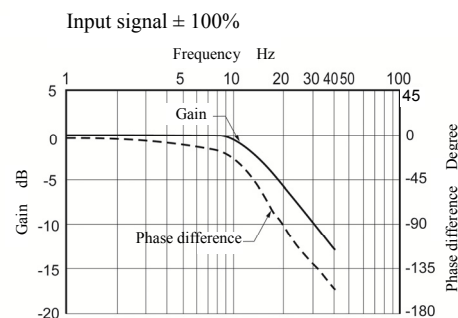
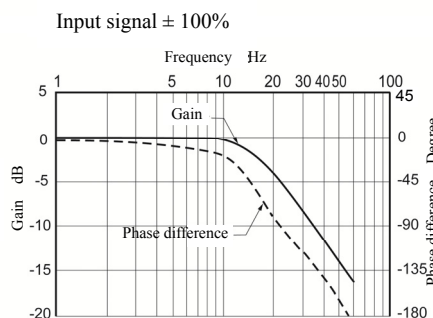
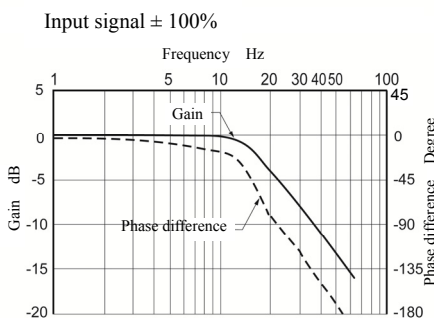
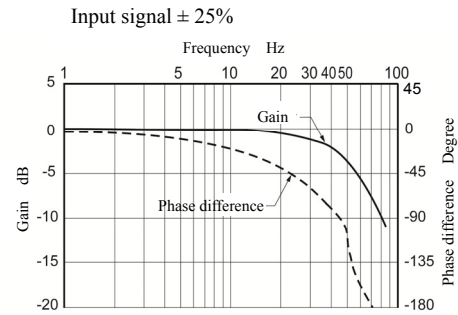
**ELDFHG-04EH**



**ELDFHG-06EH-350**



**ELDFHG-06EH-500**



## ■ Application

Injection molding machines, machine tools, wood processing machines, simulators, etc.

## ■ Product Release

August 2015 (released)

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