YUKEN

# Product News

NO. 10
01E

September 1, 2010

YUKEN KOGYO CO.,LTD.
Public Relations Group
Products Publicity Section
Sales Administration Department
Hamamatsucho Seiwa Bdg., 4-8,
Shibadaimon 1-chome, Minato-ku,
Tokyo 105-0012, Japan
Tel: +81-3-3432-2113 Fax: +81-3-3436-2344

## OBE (On-Board Electronics) Type Direct Operated Linear Servo Valves (Size: 01 & 03)
## LSVG-01-EH-*-**-**-10, LSVG-03EH-*-**-**-10/1006

Release of New Products

We are pleased to announce the release of OBE (on-board electronics) type direct operated linear servo valves.
Based on the design concepts of our high speed linear servo valves (LSVG) and OBE type linear servo valves (LSVHG-*EH), the direct operated servo valves provide "high accuracy, simple operation, and user-friendliness."

## ■Features

### ●High Accuracy

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

### ●High Response

The valves provide higher levels of step and frequency responses, which are typically used as measures of response characteristics; the step response is 3 ms (0 ⇔ 100 %)★, and the frequency response is 260 Hz/- 3 dB (± 25 % amplitude)★ (★: typical values for LSVG-03EH with the Y port (dry type)).

### ●Simple Operation

Just with 24 V DC power supply and command signal input, the valves allow the accurate operation of hydraulic control systems.

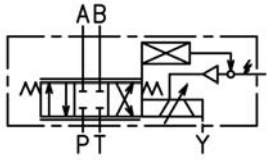
### ●User-friendliness

The on-board amplifier has a fault indicator lamp. If a valve error occurs and causes a deviation between the command signal and the spool position, the lamp indicates the error immediately.

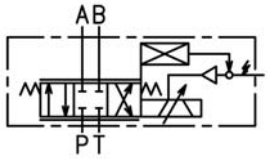
### ●Excellent Contamination Resistance

The simple structure of the direct operated valves and the adoption of a powerful linear motor provide excellent contamination resistance. The permissible level of fluid contamination for these valves is up to NAS class 10.

**JIS Graphic Symbols**




With Y Port (Dry Type)




Without Y Port (Wet Type)

## ■Model Number Designation

| F- | LSVG | - 03 | EH | - 60 | - W | A | - A | 1 | - 10 |
|---|---|---|---|---|---|---|---|---|---|
| Special Seals | Series Number | Valve Size | Amplifier Type | Rated Flow at ΔP = 7 MPa | Drain Port (Y) and Permissible Back Pres. | Fail-Safe Function | Input Signal/Spool Travel Monitoring | Connector Type | Design Number |
| **F:** Special Seals for Phosphate Ester Type Fluid (omit if not required.) | **LSVG:** Direct Operated Linear Servo Valve | **01** | **EH:** OBE Type | **4:** 4 L/min<br>**10:** 10 L/min<br>**20:** 20 L/min<br>**40:** 40 L/min<br>**60:** 60 L/min | **None:** With Y Port (Dry Type) (Permissible Back Pres.: 0.05 MPa)<br>**W:** Without Y Port★ (Wet Type) | **A:** PABT<br>**B:** PBAT<br>**C:** Neutral | **A:** Voltage Signal ± 10 V (P→B→A→T Flow with Positive Input)<br>**B:** Current Signal 4 - 20 mA (P→B→A→T Flow with 12 - 20 mA Input)<br>**C:** Current Signal ± 10 mA (P→B→A→T Flow with Positive Input)<br>**D:** Voltage Signal ± 10 V (P→A→B→T Flow with Positive Input)<br>**E:** Current Signal 4 - 20 mA (P→A→B→T Flow with 12 - 20 mA Input)<br>**F:** Current Signal ± 10 mA (P→A→B→T Flow with Positive Input) | **1:** 6 + PE Pole<br>**2:** 11 + PE Pole<br>- With "Enable" Function<br>- With "Valve Ready" Function<br>- With "Alarm Output" Function | **10** |
| | | **03** | | | | | | | **10**<br>**1006** (Mounting bolt: M6) |

★For the wet type, water-glycol fluids cannot be used.

## ■Specifications

**The values in parentheses in the specification table below are applicable to the models "LSVG-*EH-*-W*-" (wet type).**

| Item \ Model Number | | LSVG-01EH-4-* | LSVG-01EH-10-* | LSVG-01EH-20-* | LSVG-03EH-40-* | LSVG-03EH-60-* |
|---|---|---|---|---|---|---|
| Rated Flow at ΔP = 7 MPa (1) | | 4 L/min | 10 L/min | 20 L/min | 40 L/min | 60 L/min |
| Max. Operating Pres. | | 35 MPa | | | 31.5/35 MPa (2) | |
| Proof Pres. at Return Port | | 21 MPa (7 MPa) | | | 35 MPa (2) (7 MPa) | |
| Drain Port (Y) Permissible Back Pres. (3) | | 0.05 MPa (The valves with the model number "W" have no Y Port.) | | | | |
| Internal Leak | Ps = 14 MPa Viscosity: 32 mm²/s | 0.4 L/min or less | 0.8 L/min or less | 1.2 L/min or less | 1.7 L/min or less | |
| Hysteresis | | 0.1 % or less | | | | |
| Step Response (Typical) (4) | Ps = 14 MPa (0⇔100 %) | 3 (3.5) ms | | | | 4 (4.5) ms |
| Frequency Response (±25 % Amplitude) (Typical) (4) | Gain: -3 dB | 240 (230) Hz | | | 260 (240) Hz | 250 (220) Hz |
| | Phase: -90 ° | 300 (270) Hz | | | 310 (310) Hz | 260 (220) Hz |
| Vibration Proof | | 100 m/s² | | | | |
| Protection | | IP65 | | | | |
| Ambient Temperature | | 0 - +50 °C | | | | |
| Spool Stroke to Stops | | ±0.5 mm | | | | ±0.75 mm |
| Polarity | | See the description about I/O signal characteristics on page 3. | | | | |
| Linear Motor Specification | Current | 1.5 A (Max. 2.2 A) | | | | |
| | Coil Resistance | 7 Ω (at 20 °C) | | | | |
| Approx. Mass | | 4.3 kg | | | 5.2 kg | |
| Electric Connection | | 6 + PE/11 + PE Connector | | | | |

Note (1) Select the valve that meets the valve pressure difference – flow rate relationship within the graphs below, referring to "Range of Flow Control."
(2) For LSVG-03EH-*-**-**-1006 (mounting bolt: M6), the pressure should be 31.5 MPa.
(3) Back pressure at the drain port (Y) should be 0.05 MPa or less and not be a negative pressure.
(4) This value is measured on a per-valve basis; it may differ depending on the actual circuit/operation conditions.

## ■Attachment

### ●Mounting Bolts

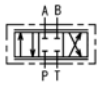
| Model Number | Mounting Bolt | Qty. | Tightening Torque |
|---|---|---|---|
| LSVG-01EH- | Hex. Soc. Head Cap Screw: M5×55L | 4 | 6.0 - 8.0 Nm |
| LSVG-03EH-*-10 | Hex. Soc. Head Cap Screw: M8×65L | 4 | 30.8 - 37.7 Nm |
| LSVG-03EH-*-1006 | Hex. Soc. Head Cap Screw: M6×60L | 4 | 13.0 - 16.0 Nm |

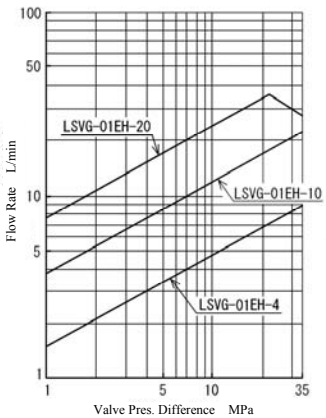
### ●Connector

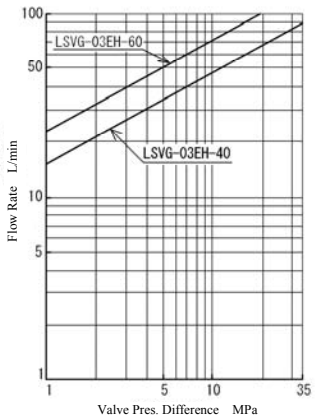
| Model Number | Connector | Qty. | Remarks |
|---|---|---|---|
| LSVG-*EH--*-*-1 | 6 + PE Electrical Plug | 1 | Compatible with EN175201 Part 804 |
| LSVG-*EH--*-*-2 | 11 + PE Electrical Plug | 1 | |

## ■ Range of Flow Control

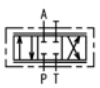
### ●Control Method: 4-Way Valve

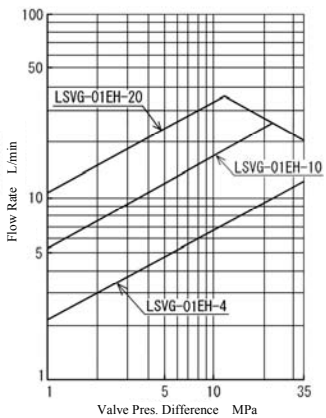


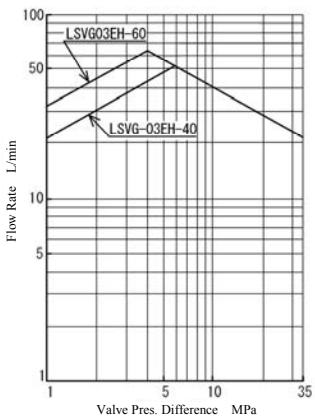




### ●Control Method: 3-Way Valve

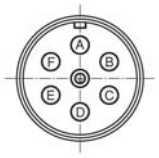


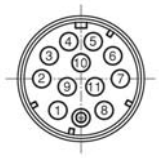
## ■Electrical Specifications

### ●6 + PE Connector



| Pin \ Valve Model | | LSVG–*EH–*-A1<br>LSVG–*EH–*-D1 | LSVG–*EH–*-B1<br>LSVG–*EH–*-E1 | LSVG–*EH–*-C1<br>LSVG–*EH–*-F1 |
|---|---|---|---|---|
| Pin A | Power Supply | 24 V DC (21.6 - 26.4 V DC Included Ripple), 100 VA or more | | |
| Pin B | | 0 V | | |
| Pin C | Signal Common | COM (0 V) | | |
| Pin D | Input (+) (Differential)(1) | 0 - ±10 V<br>Ri = 100 kΩ | 4 - 20 mA<br>Ri = 200 Ω | 0 - ±10 mA<br>Ri = 200 Ω |
| Pin E | Input (-) (Differential)(1) | | | |
| Pin F | Spool Travel Monitoring | 0 - ±10 V<br>$R_L$ ≧ 10 kΩ | 4 - 20 mA<br>$R_L$ = 100 - 500 Ω (2) | 0 - ±10 mA<br>$R_L$ = 100 - 500 Ω (2) |
| Pin ⏚ | Protective Earth | — | | |

### ●11 + PE Connector



| Pin \ Valve Model | | LSVG–*EH–*-A2<br>LSVG–*EH–*-D2 | LSVG–*EH–*-B2<br>LSVG–*EH–*-E2 | LSVG–*EH–*-C2<br>LSVG–*EH–*-F2 |
|---|---|---|---|---|
| Pin 1 | Power Supply | 24 V DC (21.6 - 26.4 V DC Included Ripple), 100 VA or more | | |
| Pin 2 | | 0 V | | |
| Pin 3 | Enable (Servo ON) Input | Input Current = 3 - 5 mA at 4.8 - 28 V DC | | |
| Pin 4 | Input (+) (Differential) (1) | 0 - 10 V<br>Ri = 100 kΩ | 4 - 20 mA<br>Ri = 200 Ω | 0 - ±10 mA<br>Ri = 200 Ω |
| Pin 5 | Input (-) (Differential) (1) | | | |
| Pin 6 | Spool Travel Monitoring | 0 - ±10 V<br>$R_L$ ≧ 10 kΩ | 4 - 20 mA<br>$R_L$ = 100 - 500 Ω (2) | 0 - ±10 mA<br>$R_L$ = 100 - 500 Ω (2) |
| Pin 7 | Signal Common | COM (0 V) | | |
| Pin 8 | Valve Ready Output | OPEN Collector Output Voltage: Max. 30 V, Current: Max. 20 mA | | |
| Pin 9 | — | — | | |
| Pin 10 | — | — | | |
| Pin 11 | Alarm Output | OPEN Collector Output Voltage: Max. 30 V, Current: Max. 20 mA | | |
| Pin ⏚ | Protective Earth | — | | |

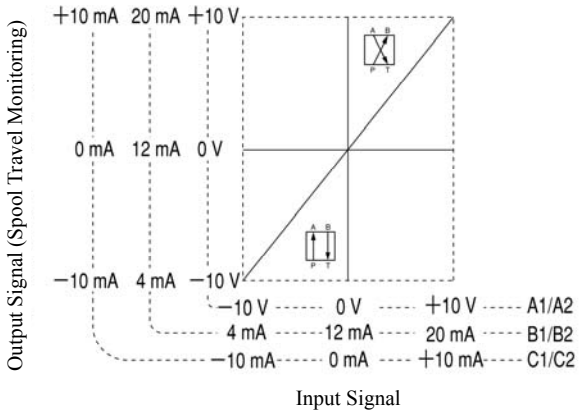
Note

(1) Differential input signals can be used only for the valves with the voltage signal specifications of ± 10 V (LSVG-*EH-*-A*/D*).

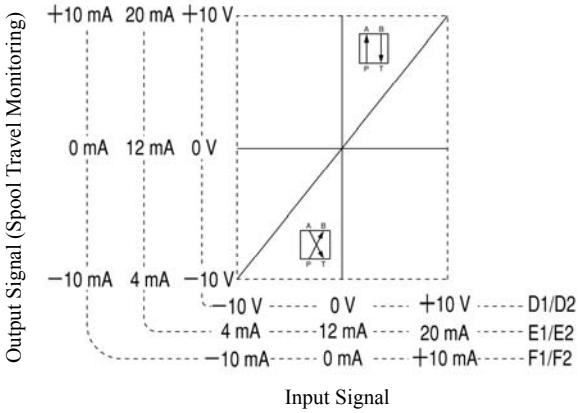
(2) The recommended load resistance is 200 Ω.

## ■I/O Signal Characteristics

• LSVHG-*EH-*-A*/B*/C*

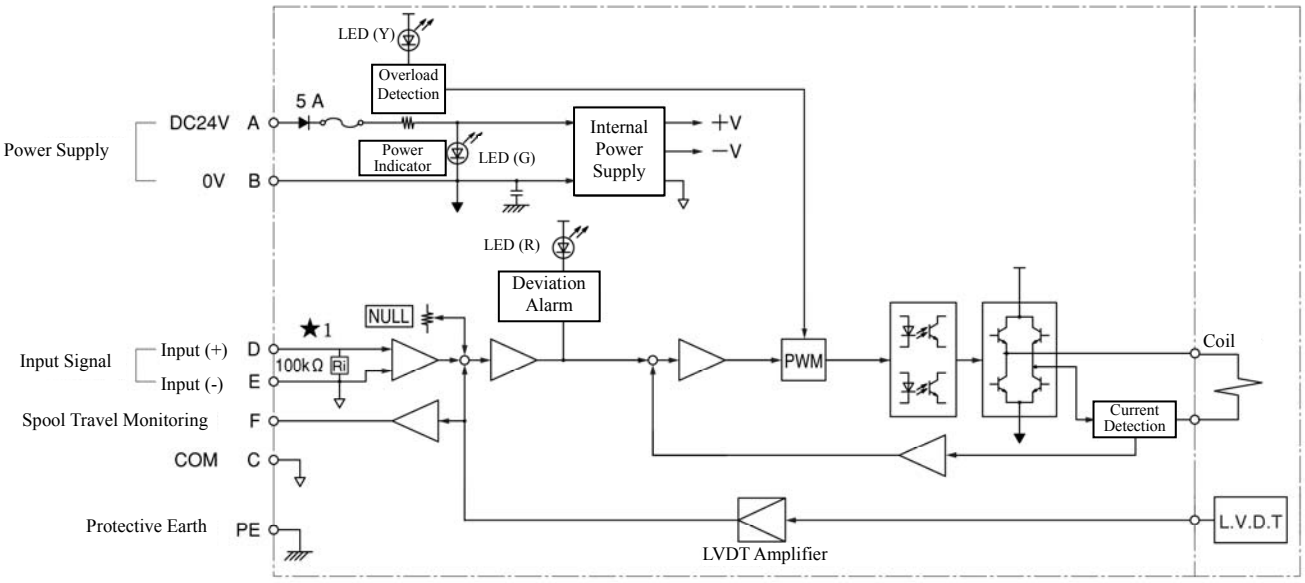



• LSVHG-*EH-*-D*/E*/F*

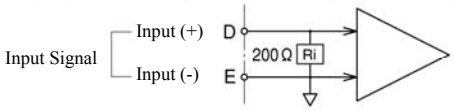


## ■Block Diagram

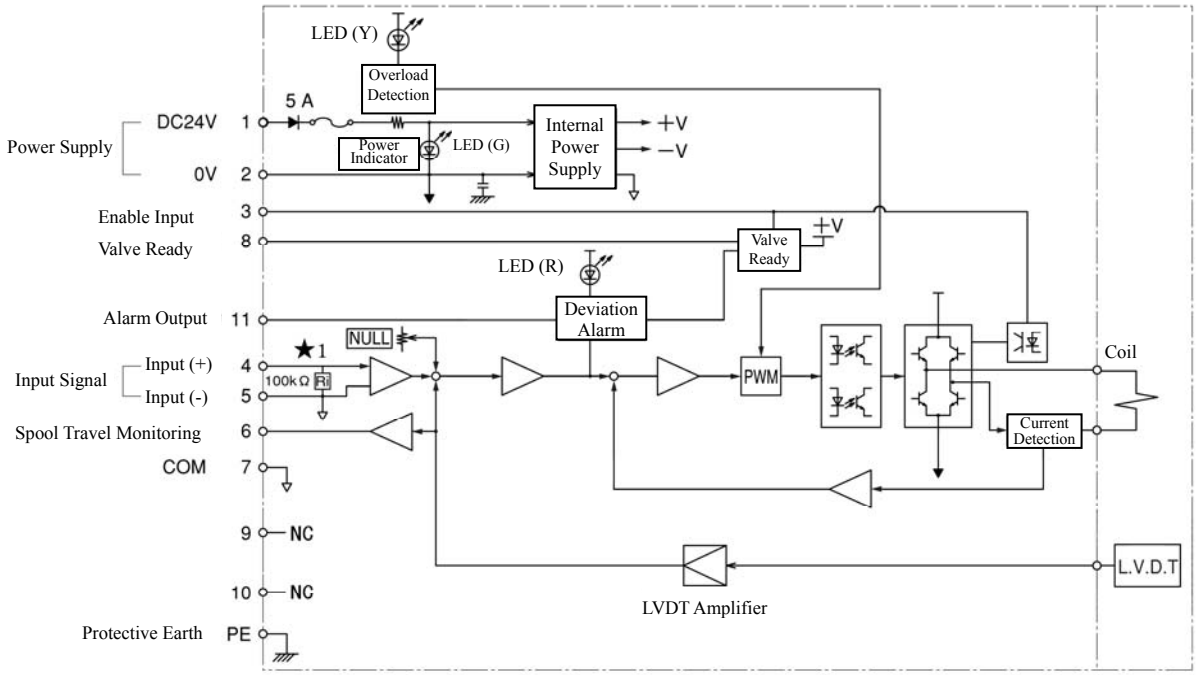
### ● LSVG-*EH-*-**-A1/B1/C1/D1/E1/F1 (6 + PE Connector)



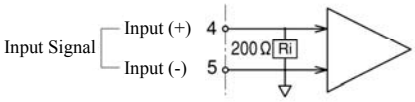

★1. The input stage for the models LSVG-*EH-*-*-B1/C1/E1/F1 (current signal) is as follows.



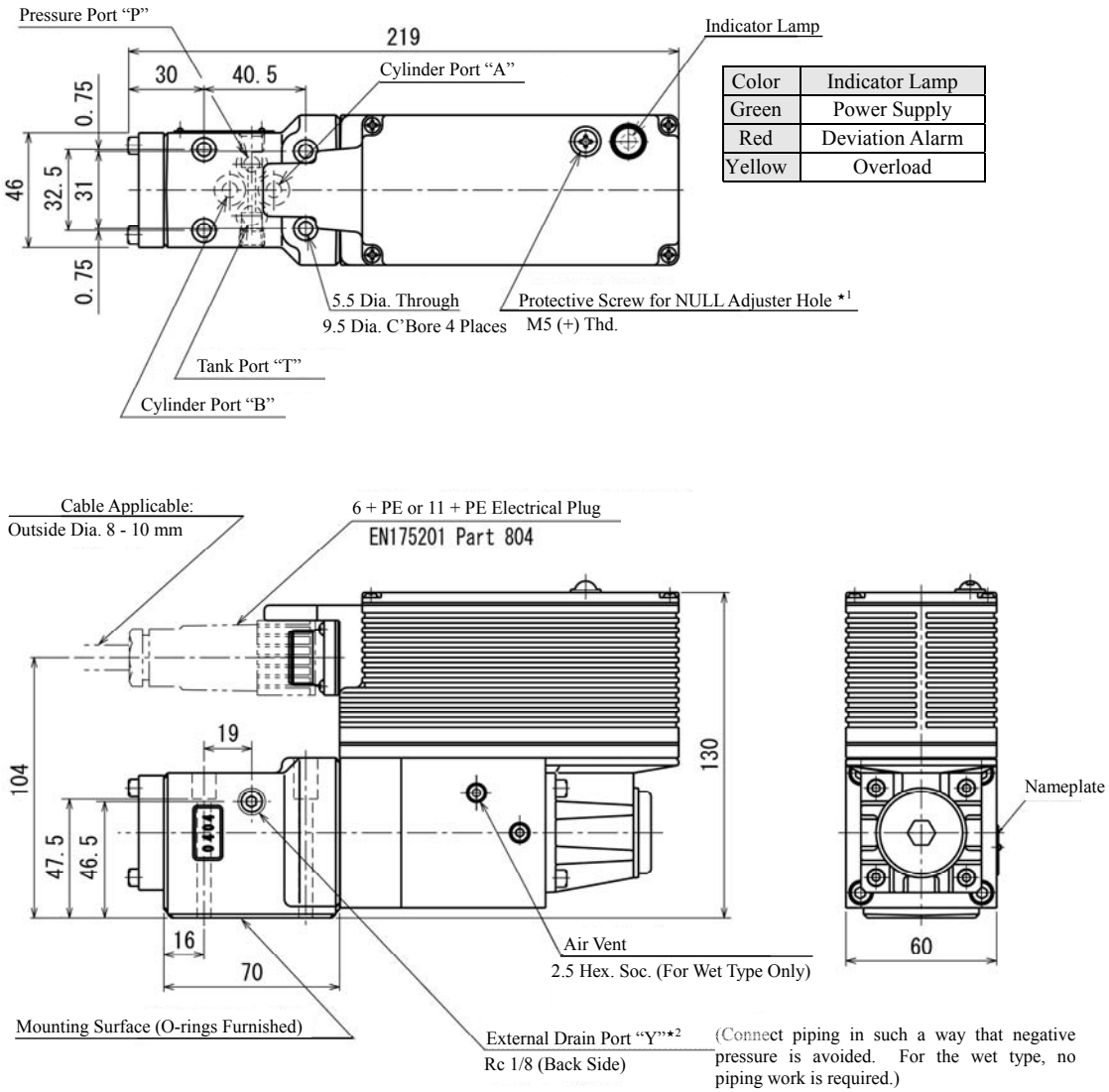

### ● LSVG-*EH-*-**-A2/B2/C2/D2/E2/F2 (11 + PE Connector)




★1. The input stage for the models LSVG-*EH-*-*-B2/C2/E2/F2 (current signal) is as follows.



**LSVG-01EH**




| Color | Indicator Lamp |
|---|---|
| Green | Power Supply |
| Red | Deviation Alarm |
| Yellow | Overload |

★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 external drain port "Y" on the tank port side, which is used for the dry type, is usually plugged. To use the port on the tank port side, remove the hexagon socket head plug (width across flats: 5) from the drain port on the tank port side and plug the drain port on the pressure port side.

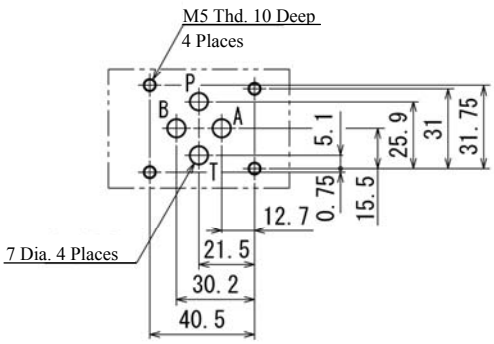
## ●O-rings for the Ports

AS568-012 (NBR, Hs 90): 4 pieces

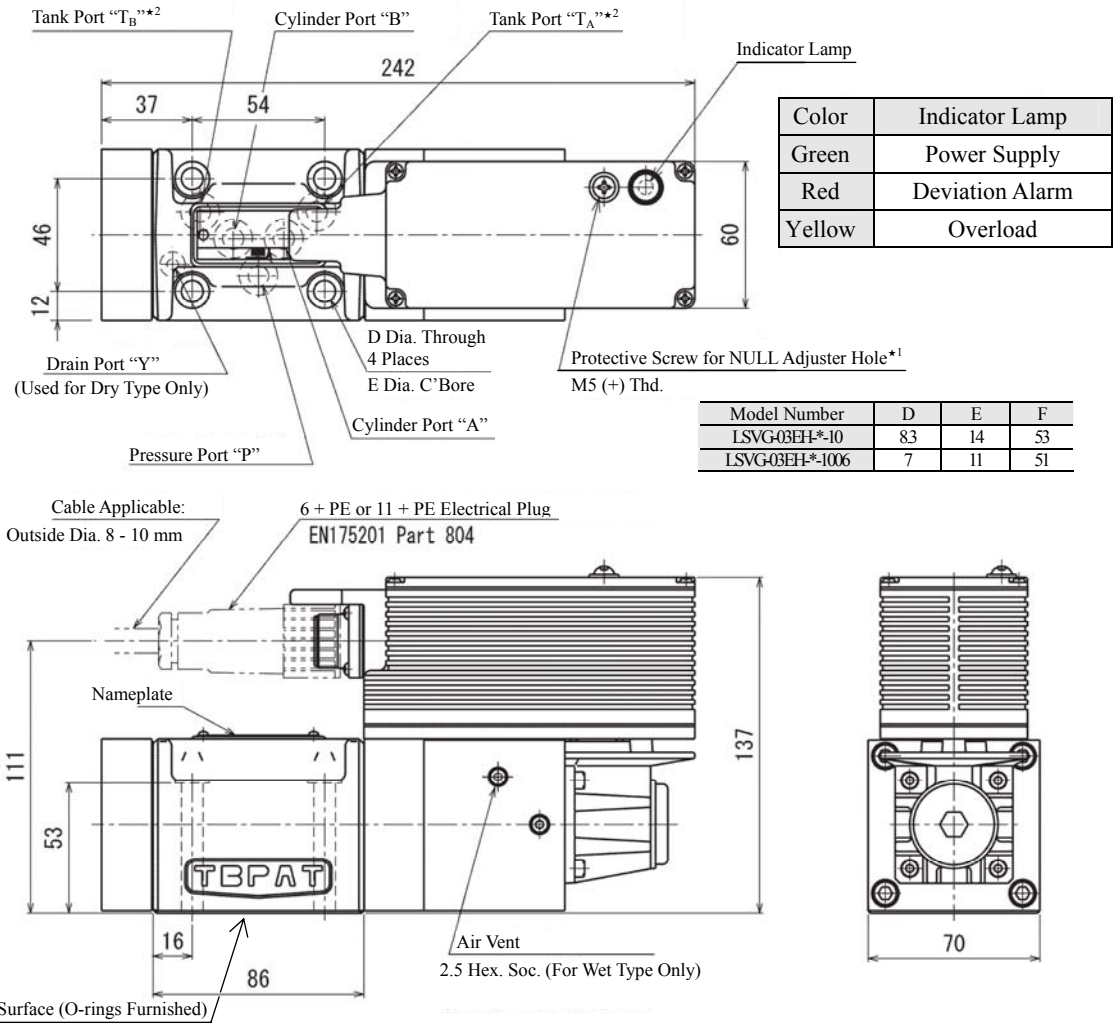
O-rings made of fluorinated rubber are required to use phosphate ester type fluids.

## ●Dimensions of Mounting Surface

Prepare the mounting surface as shown below. Basically, the dimensions of the mounting surface conform to ISO 4401-03-02-0-94 (ISO 4401-AB-03-4-A-80). The mounting surface should have a good machined finish, e.g. surface roughness of 6-S.



**LSVG-03EH**




| Color | Indicator Lamp |
|---|---|
| Green | Power Supply |
| Red | Deviation Alarm |
| Yellow | Overload |

| Model Number | D | E | F |
|---|---|---|---|
| LSVG-03EH-*-10 | 83 | 14 | 53 |
| LSVG-03EH-*-1006 | 7 | 11 | 51 |

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

## ●O-rings for the Ports

| Port | O-ring Size | Qty. |
|---|---|---|
| P, A, B, T | AS568-014 (NBR Hs90) | 5 |
| Y | JIS B2401-1B-P7 | 1 |

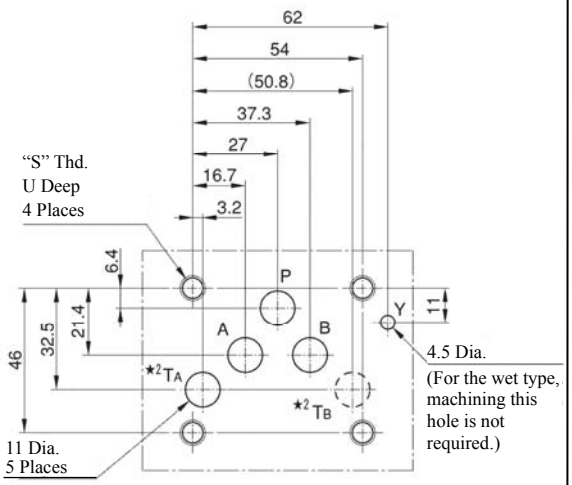
O-rings made of fluorinated rubber are required to use phosphate ester type fluids.

## ●Dimensions of Mounting Surface

Prepare the mounting surface as shown on the right. Basically, the dimensions of the mounting surface conform to ISO 4401-AC-05-4-B-84, but the specifications for the valve mounting screws and the drain port "Y" (for the dry type) are different from the ISO standard as listed below.

| | ISO4401-AC-05-4-B-84<br>ISO 4401-05-04-0-94 | LSVG-03EH-*-10<br>Mounting Surface | LSVG-03EH-*-1006<br>Mounting Surface |
|---|---|---|---|
| Valve Mounting Screw | M6 | M8 | M6 |
| Drain Port "Y" (For Dry Type) | Without "Y" Port | With "Y" Port | With "Y" Port |

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



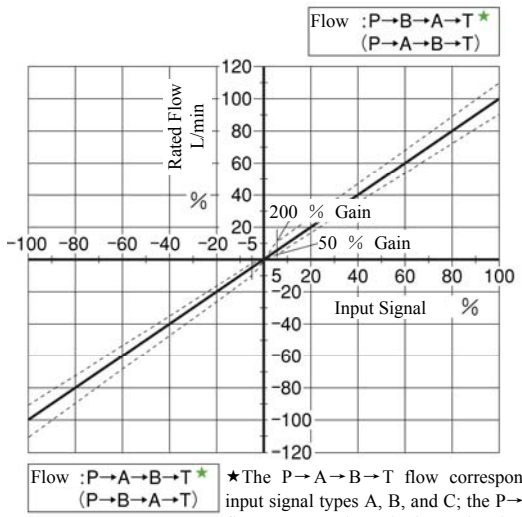

★2. There are two tank ports "$T_A$" and "$T_B$."
Note that the port "$T_A$" may be used alone.

| Model Number | S | U |
|---|---|---|
| LSVG-03EH-※-10 | M8 | 17 |
| LSVG-03EH-※-1006 | M6 | 13 |

## Characteristics of LSVG-01EH-4/10/20 (Fluid Viscosity: 30 mm²/s)

### ■No-Load Flow Characteristics

<Conditions> ● Valve Pres. Difference: 7 MPa

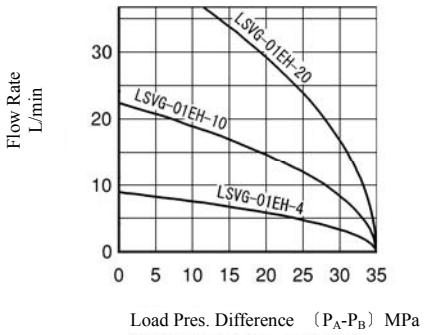



★The P→A→B→T flow corresponds to the input signal types A, B, and C; the P→B→A→T flow corresponds to the input signal types D, E, and F.

### ■Load Flow Characteristics

<Conditions> ● Input Signal: 100 %

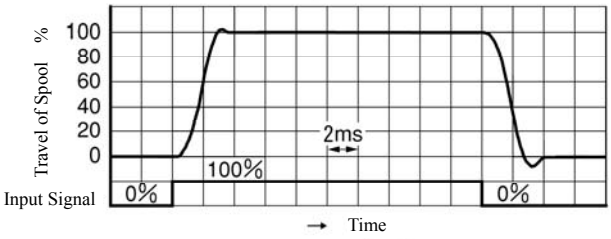
Note) Tolerance for Load Flow: ± 10 %



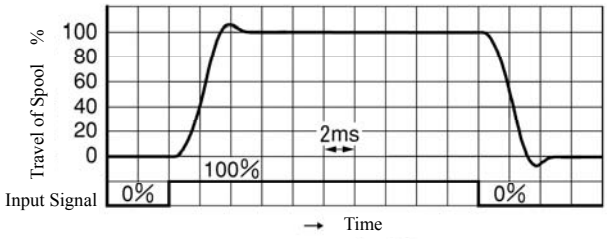

### ■Step Response

<Conditions> ● Input Signal: 0 ⇔ 100 % ● Supply Pressure: 14 MPa

●LSVG-01EH-4/10/20-*-*-10 (Dry Type)




●LSVG-01EH-4/10/20-W*-*-10 (Wet Type)

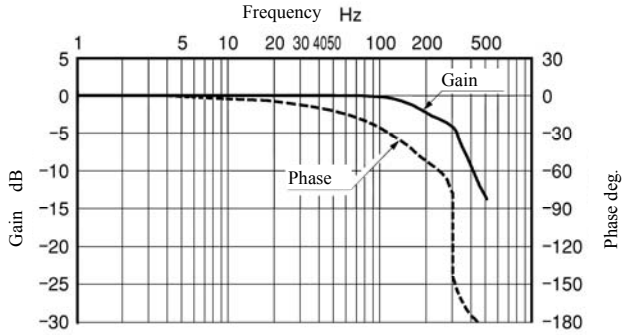



### ■Frequency Response

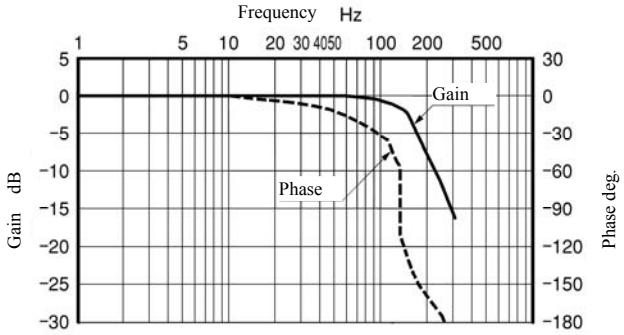
<Conditions> ● Hydraulic Circuit: Port A/B Closed ● Supply Pressure: 14 MPa

●LSVG-01EH-4/10/20-*-*-10 (Dry Type)

Input Signal:±25%

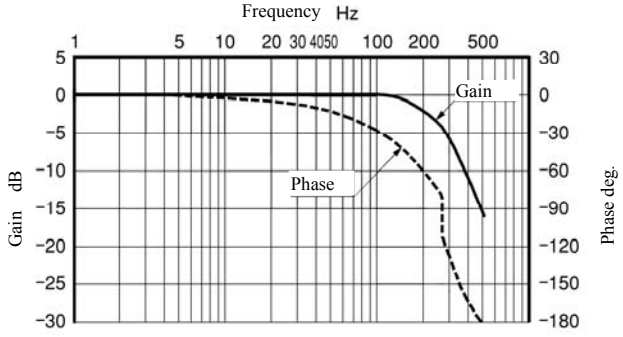



Input Signal ± 100 %

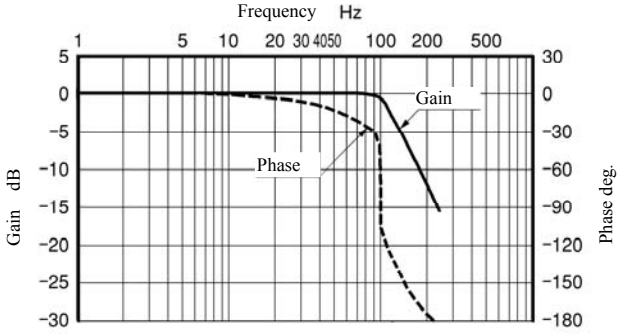



●LSVG-01EH-4/10/20-W*-*-10 (Wet Type)

Input Signal ± 25 %



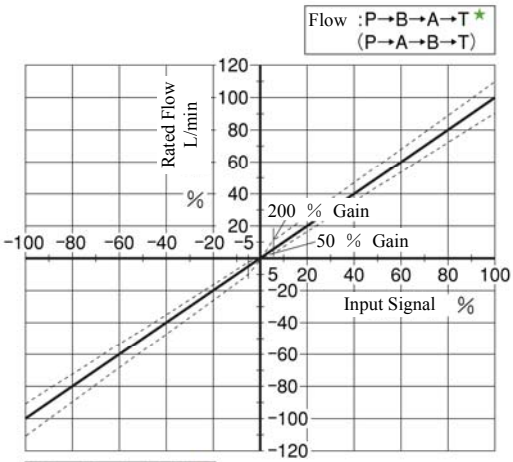

Input Signal ± 100 %



## Characteristics of LSVG-03EH-40/60 (Fluid Viscosity: 30 $mm^2/s$)

### ■No-Load Flow Characteristics

<Conditions> ● Valve Pres. Difference: 7 MPa

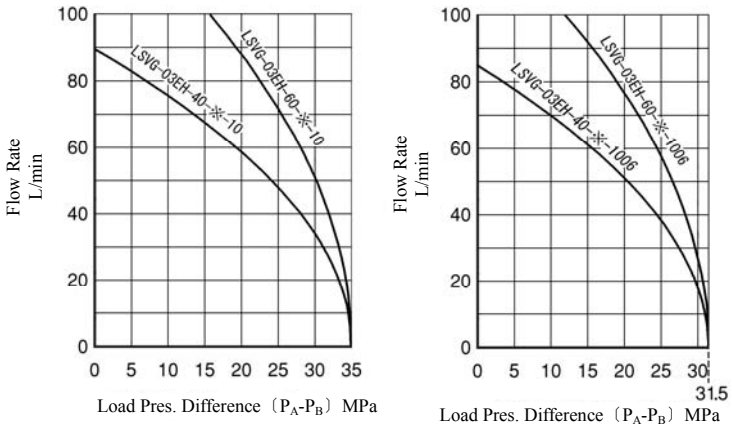



★ The P→A→B→T flow corresponds to the input signal types A, B, and C; the P→B→A→T flow corresponds to the input signal types D, E, and F.

### ■Load Flow Characteristics

<Conditions> ● Input Signal: 100 %

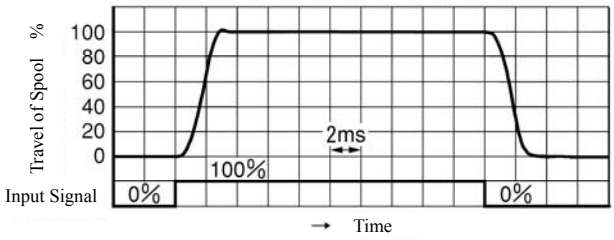
Note) Tolerance for Load Flow: ± 10 %



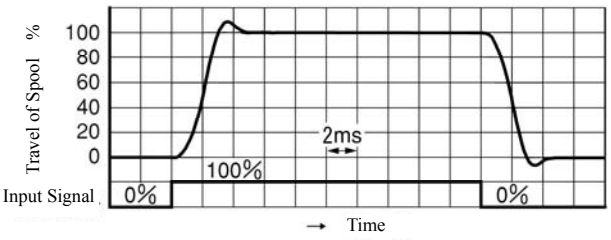

### ■Step Response

<Conditions> ● Input Signal: 0 ⇔ 100 % ● Supply Pressure: 14 MPa

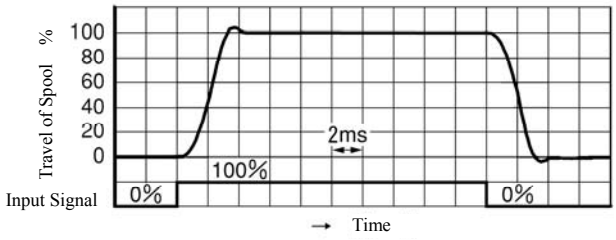
**●LSVG-03EH-40-*-*-10 (Dry Type)**



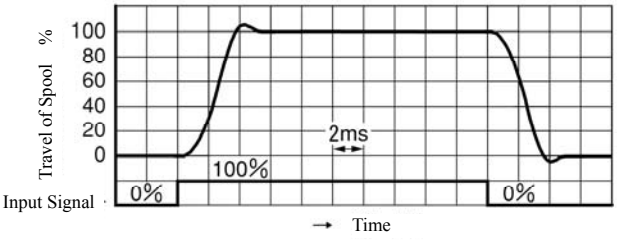

**●LSVG-03EH-40-W*-*-10 (Wet Type)**




**●LSVG-03EH-60-*-*-10 (Dry Type)**




**●LSVG-03EH-60-W*-*-10 (Wet Type)**

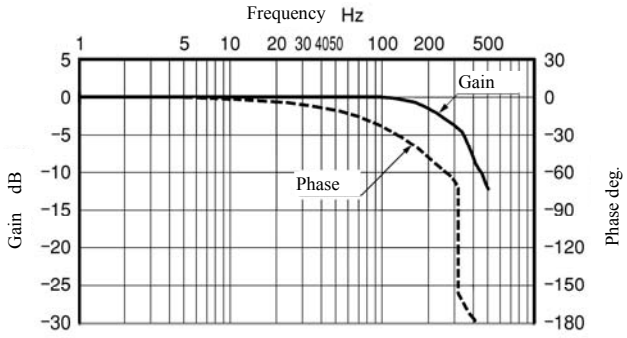


## ■Frequency Response

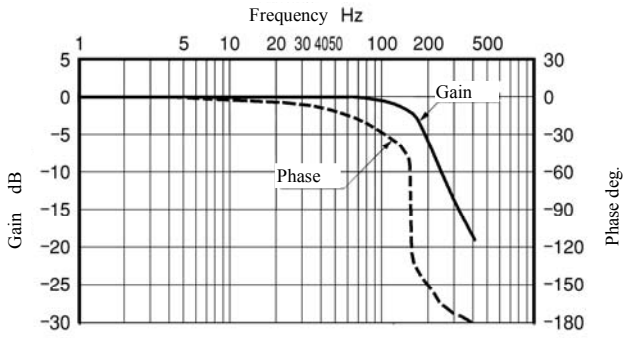
<Conditions> ● Hydraulic Circuit: Port A/B Closed ● Supply Pressure: 14 MPa

●LSVG-03EH-40-*-*-10 (Dry Type)

Input Signal ± 25 %

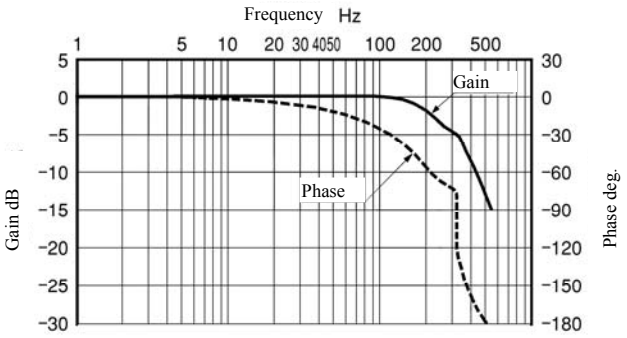



Input Signal ± 100 %

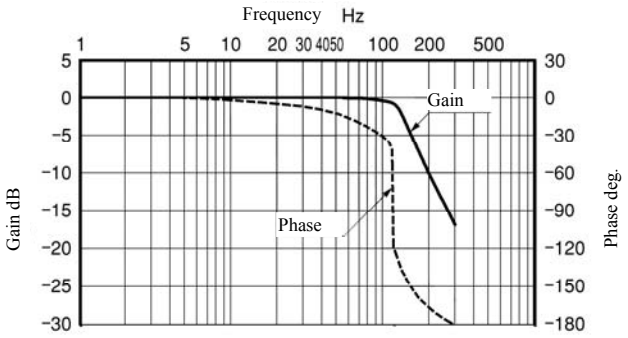



●LSVG-03EH-40-W*-*-10 (Wet Type)

Input Signal ± 25 %

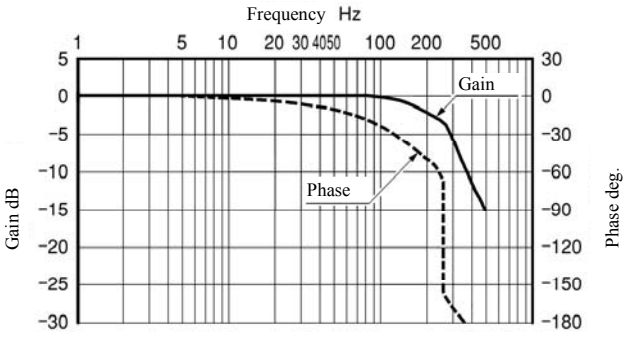



Input Signal ± 100 %

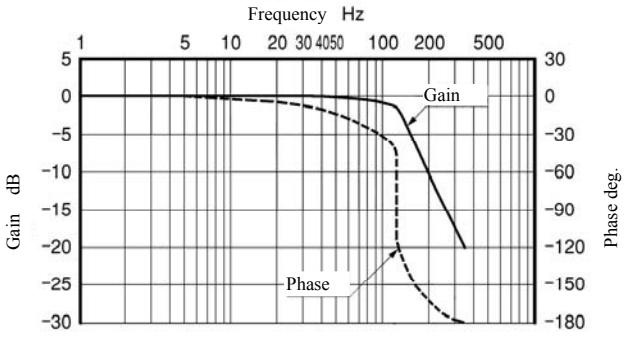



●LSVG-03EH-60-*-*-10 (Dry Type)

Input Signal ± 25 %

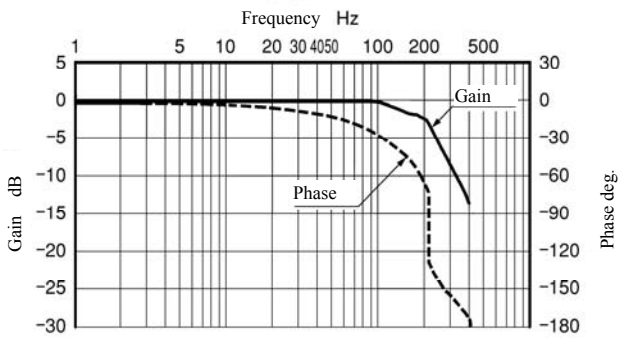



Input Signal ± 100 %

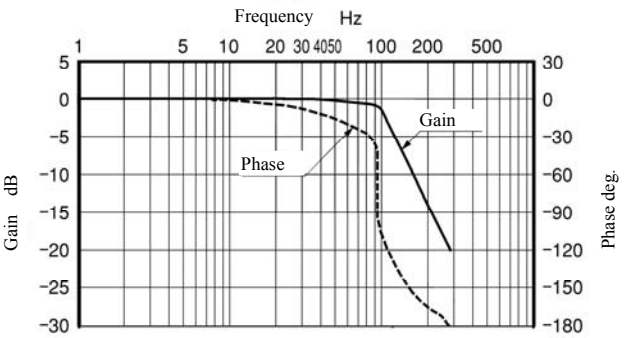



●LSVG-03EH-60-W*-*-10 (Wet Type)

Input Signal ± 25 %




Input Signal ± 100 %



[Application]

Systems requiring high response speed, including high speed injection molding machines, various testing equipment, and steel mill equipment.

[Product Release]

We will start accepting orders for the products in June 2010.

YUKEN KOGYO CO.,LTD.

**Contact**

**International Sales Department**

4-4-34, Kamitsuchidana-Naka, Ayase, Kanagawa,
Kanagawa 252-1113, Japan
Tel: +81-467-77-3111 Fax: +81-467-77-3115
e-mail: int.bd@yuken.co.jp Internet: www.yuken.co.jp