“A” Series Variable Displacement Piston Pumps

Features

- High efficiency
Under the conditions of pressure 160 Kgf/cm² and speed 1800 r/min, volumetric efficiency is over 98% and the overall efficiency is over 90%.

“A16” Type performance characteristics

- Accomplishment of energy saving
Because the overall efficiency is high and the cut-off characteristics is sharp, thus the input power may be saved.

Low noise level
In the “A16” pump, the noise level is as low as 57.3dB(A) [At the full cut-off pressure 210 Kgf/cm² with speed 1500 r/min. at one meter horizontally away from pump head cover.]

“A16” Type Noise level characteristics

- Low heat generation
Because of small power loss, it is possible to reduce the rise in oil temperature. Accordingly, capacity of a reservoir can be reduced
Instructions

- **Hydraulic Fluids.**
  Use petroleum base oil such as anti-wear type hydraulic oils or R & O (Rust and oxidation inhibitor) type hydraulic oils (ISO VG 32 or 46) with a viscosity range of 20 to 400 cSt at temperature of 0-60°C both to be satisfied.

- **Control of contamination.**
  Much care should be taken to maintain control over contamination of the operating oil which can otherwise lead to breakdown and shorten the life of the unit. Please maintain the degree of contamination within NAS Grade 10.

  The suction port must be equipped with at least a 100 μm (150mesh) reservoir type filter and the return line must have a line type filter of under 10μm.

- **Mounting**
  When installing the pump the filling port should be positioned upwards.

- **Alignment of Shaft.**
  Employ a flexible coupling whenever possible, and avoid any stress from bending thrust. Maximum permissible misalignment is less than 0.1 mm TIR and maximum permissible misangularity is less than 0.2°.

- **Suction Pressure.**
  Permissible suction pressure at inlet port of the pump is between -0.16 and +0.5 Kg/cm² (-125 mm Hg~+0.5 Kg/cm²). For piping to the suction port, use pipes of the same diameter as that of the specified pipe flange. Make sure that the height of the pump inlet port is within one meter from the oil level in the reservoir.

- **Hints on Piping.**
  When using steel piping for the suction of discharge ports, excessive load from the piping on the pump generates excessive noise. Whenever there is fear of excessive load, please use rubber hoses.

- **Suction Piping.**
  In case the pump is installed above the oil level, the suction piping and suction line filter should be located lower than the pump position to prevent air in the suction line.

- **Drain Piping.**
  Install drain piping according to the chart and ensure that pressure within the pump housing should be maintained at a normal Pressure of less than 1 Kg/cm² and surge pressure of less than 5 Kg/cm².

Length of piping should be less than 1 m, and the pipe end should be submerged in oil.

Recommended Drain Piping Size.
- Fix drain pipe for each side of the pump

<table>
<thead>
<tr>
<th>Model Number</th>
<th>Fitting Size</th>
<th>Inside Dia. Of Pipe</th>
</tr>
</thead>
<tbody>
<tr>
<td>A10,A16,A22</td>
<td>3/8 (Inside dia. 8.5 mm or more)</td>
<td>ø 10 mm</td>
</tr>
<tr>
<td>A37</td>
<td>1/2 (Inside dia. 12 mm or more)</td>
<td>ø 12 mm</td>
</tr>
<tr>
<td>A56,A70</td>
<td>3/4 (Inside dia. 16 mm or more)</td>
<td>ø 19 mm</td>
</tr>
</tbody>
</table>

- **Bleeding Air.**
  It may be necessary to bleed air from pump case and outlet line to remove causes of vibration. An air bleed valve (Model No. ST1004-***-1080) is recommended for this purpose.

- **Starting.**
  Before starting, first time fill the pump case with clean operating oil through the fill port. In order to avoid air blockage, when first starting, adjust the control valves so that the discharged oil from the pump is returned directly to the tank or the actuator moves in a free load.

<table>
<thead>
<tr>
<th>[Volume of Pre-Fill Oil Required]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model Number A Series</td>
</tr>
<tr>
<td>A10</td>
</tr>
<tr>
<td>A16,A22</td>
</tr>
<tr>
<td>A37,A56</td>
</tr>
<tr>
<td>A70</td>
</tr>
<tr>
<td>A90</td>
</tr>
<tr>
<td>A145</td>
</tr>
</tbody>
</table>
Setting Discharge Pressure and Delivery
At the time of despatch, the unit has been preset to the maximum delivery and minimum discharge pressure. Adjust the preset delivery and pressure to meet your system requirements.

- Adjustment of Discharge Pressure
  Turning the adjustment screw clockwise, increases pressure.
  [Pressure adjusted by each one turn of the pressure adjustment screw]

- Adjustment of Delivery
  Turning the delivery adjustment screw clockwise, decreases delivery. Lock the screw after adjustment.
  [The minimum adjustable flow and adjustable volume of each full turn of the delivery adjustment screw]

<table>
<thead>
<tr>
<th>Model Numbers</th>
<th>Adjustment Pressure Kgf/cm²</th>
</tr>
</thead>
<tbody>
<tr>
<td>A10-FR01B</td>
<td>29.6</td>
</tr>
<tr>
<td>A10-FR01C/H</td>
<td>55.1</td>
</tr>
<tr>
<td>A16/A22/A37/A56-※-R-01-B</td>
<td>35.7</td>
</tr>
<tr>
<td>A16/A22/A37/A56-※-R-01-C</td>
<td>66.3</td>
</tr>
<tr>
<td>A16/A37/A56-※-R-01-H</td>
<td>80.6</td>
</tr>
<tr>
<td>A70/A90/A145-※-R01B</td>
<td>23.4</td>
</tr>
<tr>
<td>A70/A90/A145-※-R01C</td>
<td>32.6</td>
</tr>
<tr>
<td>A70/A90/A145-※-R01H</td>
<td>40.8</td>
</tr>
<tr>
<td>A70/A90/A145-※-R01K</td>
<td>47.9</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Model Numbers</th>
<th>Adjustable Volume with each full turn of the adjustment screw cm³/rev.</th>
<th>Minimum adjustable flow cm³/rev.</th>
</tr>
</thead>
<tbody>
<tr>
<td>A10</td>
<td>1.1</td>
<td>2</td>
</tr>
<tr>
<td>A16</td>
<td>1.4</td>
<td>4</td>
</tr>
<tr>
<td>A22</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>A37</td>
<td>2.9</td>
<td>10</td>
</tr>
<tr>
<td>A56</td>
<td>3.9</td>
<td>12</td>
</tr>
<tr>
<td>A70</td>
<td>4.4</td>
<td>30</td>
</tr>
<tr>
<td>A90</td>
<td>4.8</td>
<td>56</td>
</tr>
<tr>
<td>A145</td>
<td>7.2</td>
<td>83</td>
</tr>
<tr>
<td>Control Type</td>
<td>Graphic Symbols</td>
<td>Performance Characteristics</td>
</tr>
<tr>
<td>----------------------------------</td>
<td>-----------------</td>
<td>----------------------------</td>
</tr>
<tr>
<td>“01” Pressure compensator type</td>
<td><img src="image1" alt="Diagram" /></td>
<td><img src="image2" alt="Performance Chart" /></td>
</tr>
<tr>
<td>“02” Solenoid-two pressure control type</td>
<td><img src="image3" alt="Diagram" /></td>
<td><img src="image4" alt="Performance Chart" /></td>
</tr>
<tr>
<td>“03” Pressure compensator with unloading type</td>
<td><img src="image5" alt="Diagram" /></td>
<td><img src="image6" alt="Performance Chart" /></td>
</tr>
<tr>
<td>“04” Proportional electro hydraulic load sensing type</td>
<td><img src="image7" alt="Diagram" /></td>
<td><img src="image8" alt="Performance Chart" /></td>
</tr>
</tbody>
</table>
| “04E” Proportional electro hydraulic pressure & flow control type | ![Diagram](image9) | ![Performance Chart](image10) | This type of control has the pressure sensor and tilt angle sensor in the pump. The pump is used with the external amplifier. Flow and pressure can be controlled in proportion to input voltage by only one control valve. The feature has been greatly improved by electrical feedback of swash plate tilt angle correspond to flow rate and load pressure to control valve.  
• Linearity of input characteristics is excellent and easy to set.  
• Hysteresis is lower, repeatability and reproducibility are fine |
| “05” Two-pressure two-flow control type by system pres. | ![Diagram](image11) | ![Performance Chart](image12) | This type of control is suitable for an application like “presses” where the changeover from rapid advance to feed is required just when the pressing (pressurizing) starts. |

---

“A” Series Variable Displacement Piston Pumps
This pump control is suitable for machining found on machine tool, where machining starts after the changeover from rapid advance, to feed has been made.

The pump is used in combination with the pilot relief valve or multistage pressure control valve. By controlling the pilot pressure, the full cut-off pressure can be remote-controlled according to the requirements.

- Pump input power can be controlled in accordance with the motor output.
- When the discharge pressure raises, the output flow decreases corresponding to the preset input power.
- The pump can act for function of 2 pumps, low pressure large-flow and high-pressure small-flow. Therefore, the motor capacity can be reduced.

* Control Type “01”, “04” & “04E” are shown in catalogue. Contact yuken for the details of other control type

## Availability of Control Type

Mark “O” in the table below refers to standard model.

<table>
<thead>
<tr>
<th>Model Numbers</th>
<th>Geometric Displacement cm³/rev.</th>
<th>Control Type</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>01</td>
<td>02</td>
</tr>
<tr>
<td>A10</td>
<td>10.0</td>
<td>O</td>
</tr>
<tr>
<td>A16</td>
<td>15.8</td>
<td>O</td>
</tr>
<tr>
<td>A22</td>
<td>22.2</td>
<td>O</td>
</tr>
<tr>
<td>A37</td>
<td>36.9</td>
<td>O</td>
</tr>
<tr>
<td>A56</td>
<td>56.2</td>
<td>O</td>
</tr>
<tr>
<td>A70</td>
<td>70.0</td>
<td>O</td>
</tr>
<tr>
<td>A90</td>
<td>91.0</td>
<td>O</td>
</tr>
<tr>
<td>A145</td>
<td>145.0</td>
<td>O</td>
</tr>
</tbody>
</table>
“A” Series Variable Displacement Piston Pumps-Single Pump, Pressure Compensator Type

Specifications

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Rated ²</td>
<td>Intermittent ¹</td>
<td>Flange Mtg.</td>
</tr>
<tr>
<td>A10-FR01B-12</td>
<td>10.0</td>
<td>2.0</td>
<td>160</td>
<td>210</td>
<td>1800</td>
</tr>
<tr>
<td>A10-FR01C/H-12</td>
<td>10.0</td>
<td>2.0</td>
<td>160</td>
<td>210</td>
<td>1800</td>
</tr>
<tr>
<td>A16-R-01-K-32</td>
<td>15.8</td>
<td>4</td>
<td>160</td>
<td>210</td>
<td>1800</td>
</tr>
<tr>
<td>A22-R-01-K-32</td>
<td>22.2</td>
<td>6</td>
<td>160</td>
<td>210</td>
<td>1800</td>
</tr>
<tr>
<td>A37-R-01-K-32</td>
<td>36.9</td>
<td>10</td>
<td>160</td>
<td>210</td>
<td>1800</td>
</tr>
<tr>
<td>A56-R-01-K-32</td>
<td>56.2</td>
<td>12</td>
<td>160</td>
<td>210</td>
<td>1800</td>
</tr>
<tr>
<td>A70-R01S-60</td>
<td>70.0</td>
<td>30</td>
<td>250</td>
<td>280</td>
<td>1800</td>
</tr>
<tr>
<td>A90-R01S-60</td>
<td>91.0</td>
<td>56</td>
<td>250</td>
<td>280</td>
<td>1800</td>
</tr>
<tr>
<td>A145-R01S-60</td>
<td>145.0</td>
<td>83</td>
<td>250</td>
<td>280</td>
<td>1800</td>
</tr>
</tbody>
</table>

*1 Whenever setting pressure, make sure the full cut off pressure never exceeds the maximum intermittent pressure.

*2 Care should be taken when used at a higher pressure instead of rated pressure, because operating terms may be restricted. For example, if used as per maximum illustrated operating conditions, intermittent time at maximum flow is restricted to under 1/5 of one cycle time and under 6 seconds simultaneously. Conditions may vary according to the actual working pressure and delivery (inclination angle of swash plat). Consult factory or Yuken sales representative for further information.
## Model Number Designation

<table>
<thead>
<tr>
<th>Model Numbers</th>
<th>Series Number</th>
<th>Mounting</th>
<th>Direction of Rotation</th>
<th>Control Type</th>
<th>Pres. Adj. Range Kgf/cm²</th>
<th>Port Position</th>
<th>Shaft Extension</th>
<th>Design Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>A16</td>
<td>(15.8 cm³/rev.)</td>
<td>F: Flange Mounting</td>
<td>(Viewed from shaft end)</td>
<td>01: Pressure Compensator Type</td>
<td>B: 12.2 ~ 71.4, C: 12.2 ~ 163, H: 12.2 ~ 214</td>
<td>None: Axial Port</td>
<td>K: Keyed Shaft</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td></td>
<td>R: Foot Mounting</td>
<td>Clockwise (Normal)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A22</td>
<td>(22.2 cm³/rev.)</td>
<td>F: Flange Mounting</td>
<td>(Viewed from shaft end)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>32</td>
</tr>
<tr>
<td></td>
<td></td>
<td>R: Foot Mounting</td>
<td>Clockwise (Normal)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A37</td>
<td>(36.9 cm³/rev.)</td>
<td>F: Flange Mounting</td>
<td>(Viewed from shaft end)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>32</td>
</tr>
<tr>
<td></td>
<td></td>
<td>R: Foot Mounting</td>
<td>Clockwise (Normal)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A56</td>
<td>(56.2 cm³/rev.)</td>
<td>F: Flange Mounting</td>
<td>(Viewed from shaft end)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>32</td>
</tr>
<tr>
<td></td>
<td></td>
<td>R: Foot Mounting</td>
<td>Clockwise (Normal)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*1 Available to supply pump with anti-clockwise rotation. Consult Yuken for details.

*2 When A10 pump is to be used as the foot mounting, order the mounting bracket kit shown below separately.

Ref. to the page 18 for dimensions of the mounting bracket.

**Note:** The mounting bracket-kit consists of Mounting Bracket, 2 hex. Bolts and 2 Plain Washers.

### Mounting Bracket Kit Numbers

<table>
<thead>
<tr>
<th>Mounting Bracket Kit Numbers</th>
<th>Approx. Mass Kg.</th>
</tr>
</thead>
<tbody>
<tr>
<td>LP-1A-10</td>
<td>2.2</td>
</tr>
</tbody>
</table>

## Pipe Flange Kits.

Pipe flange kits are available. When ordering, specify kit number from the table below.

<table>
<thead>
<tr>
<th>Pump Model Numbers</th>
<th>Port Name</th>
<th>Pipe Flange Kit Numbers.¹</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Threaded Connection</td>
</tr>
<tr>
<td>A16-×R-01</td>
<td>Suction</td>
<td>F5-06-A-1080</td>
</tr>
<tr>
<td></td>
<td>Discharge</td>
<td>F5-06-A-1080</td>
</tr>
<tr>
<td>A22-×R-01</td>
<td>Suction</td>
<td>F5-10-A-1080</td>
</tr>
<tr>
<td></td>
<td>Discharge</td>
<td>F5-10-A-1080</td>
</tr>
<tr>
<td>A37-×R-01</td>
<td>Suction</td>
<td>F5-12-A-1080</td>
</tr>
<tr>
<td></td>
<td>Discharge</td>
<td>F5-08-A-1080</td>
</tr>
<tr>
<td>A56-×R-01</td>
<td>Suction</td>
<td>F5-16-A-1080</td>
</tr>
<tr>
<td></td>
<td>Discharge</td>
<td>F5-10-A-1080</td>
</tr>
</tbody>
</table>

*¹ Details of pipe flange kits are described in EIC-L-1001.
Typical Performance Characteristics of Type “A10” Oil Viscosity 20cSt [ISO VG 32, 50°C]

### Performance Characteristic Curve

![Performance Characteristic Curve Diagram](image)

- **Input Power**
  - Graph showing input power vs. output flow at different pressures.
  - Key: N=1500 r/min.
  - Key: P = Kgf/cm²

- **Output Flow**
  - Graph showing output flow vs. pressure.
  - Key: N=1500 r/min.

- **Overall Efficiency**
  - Graph showing overall efficiency vs. pressure.
  - Key: N=1500 r/min.

- **Volumetric Efficiency**
  - Graph showing volumetric efficiency vs. pressure.
  - Key: N=1500 r/min.

### Full Cut-off Power

![Full Cut-off Power Diagram](image)

- **Full Cut-off Power**
  - Graph showing full cut-off power vs. full cut-off pressure.
  - Key: N=1500 r/min.
  - Key: P = Kgf/cm²

### Noise Level

![Noise Level Diagram](image)

- **Noise Level**
  - Graph showing noise level vs. pressure.
  - Key: N=1500 r/min.
  - Key: [One meter horizontally away from pump head cover]

### Drain

![Drain Diagram](image)

- **Drain**
  - Graph showing drain vs. pressure.
  - Key: N=1500 r/min.
  - Key: P = Kgf/cm²

---

“A” Series Variable Displacement Piston Pumps

Single pump, Pressure Compensator Type
Typical Performance Characteristics of Type “A16”

Oil Viscosity 20cSt [ISO VG 32, 50°C]

**Performance Characteristic Curve**

- **Efficiency**
  - Volumetric Efficiency
  - Overall Efficiency

- **Output Flow**
  - L/min.

- **Input Power**
  - kW

- **Pressure**
  - Kgf/cm²

- **Input Power**
  - kW
  - N=1500 r/min.

- **Full Cut-off Power**
  - kW
  - Full Cut-off Pressure

- **Full Flow**
  - L/min.

- **Noise Level**
  - dB (A)
  - [One meter horizontally away from pump head cover]

- **Drain**
  - L/min.

“A” Series Variable Displacement Piston Pumps

Single pump, Pressure Compensator Type
Typical Performance Characteristics of Type “A22” Oil Viscosity 20cSt [ISO VG 32, 50°C]

- **Performance Characteristic Curve**

- **Input Power**

- **Full Cut-off Power**

- **Noise Level**
  [One meter horizontally away from pump head cover]

- **Drain**

“A” Series Variable Displacement Piston Pumps
Single pump, Pressure Compensator Type
Typical Performance Characteristics of Type “A37”

Oil Viscosity 20cSt [ISO VG 32, 50°C]

**Performance Characteristic Curve**

Example: At a pressure of 160 Kgf/cm², Flow 45 L/min. & speed 1500 r/min. the shaft input is about 12.6kW. as shown the dotted line in the graph.

**Input Power**

- **N=1500 r/min.**
- **P = Kgf/cm²**
  - 160
  - 140
  - 120
  - 100
  - 80
  - 60
  - 40
  - 20
  - 10

**Full Cut-off Power**

**Noise Level**

[One meter horizontally away from pump head cover]

**Drain**
Typical Performance Characteristics of Type “A56” Oil Viscosity 20cSt [ISO VG 32, 50°C]

- **Performance Characteristic Curve**
  - Example: At a pressure of 160 Kgf/cm², Flow 70 L/min. & speed 1500 r/min. the shaft input is about 20.8kW. as shown the dotted line in the graph.

- **Input Power**
  - N=1500 r/min.

- **Full Cut-off Power**
  - [One meter horizontally away from pump head cover]

- **Drain**
  - N=1500 r/min.
  - A56-   -R-01-C
  - A56-   -R-01-H
  - A56-   -R-01-B

- **Noise Level**
  - P=200
  - P=180
  - P=160
  - P=140
  - P=120
  - P=100
  - P=80
  - P=60
  - P=40
  - P=20
  - P=Kgf/cm²

“A” Series Variable Displacement Piston Pumps
Single pump, Pressure Compensator Type
**Performance Characteristic Curve**

Example: At a pressure of 200 Kgf/cm², Flow 70 L/min. & speed 1500 r/min. the shaft input is about 26kW, as shown the dotted line in the graph.

**Full Cut-off Power**

**Noise Level**

[One meter horizontally away from pump head cover]

**Drain**

---

**Typical Performance Characteristics of Type “A70”**

Oil Viscosity 32cSt [ISO VG 32, 50°C]
Typical Performance Characteristics of Type “A90” Oil Viscosity 32cSt [ISO VG 32, 50°C]

Performance Characteristic Curve

Input Power

Example: At a pressure of 180 Kgf/cm², Flow 110 L/min. & speed 1500 r/min, the shaft input is about 34kW. as shown the dotted line in the graph

Full Cut-off Power

Noise Level

[One meter horizontally away from pump head cover]

Drain

“A” Series Variable Displacement Piston Pumps
Single pump, Pressure Compensator Type
Typical Performance Characteristics of Type “A145”  Oil Viscosity 32cSt [ISO VG 32, 50°C]

- **Performance Characteristic Curve**

- **Input Power**
  Example: At a pressure of 200 Kgf/cm², Flow 180 L/min, & speed 1500 r/min. the shaft input is about 60kW. as shown the dotted line in the graph

- **Full Cut-off Power**

- **Noise Level**
  [One meter horizontally away from pump head cover]

- **Drain**

“A” Series Variable Displacement Piston Pumps
Single pump, Pressure Compensator Type
A10-FR01 C H-12

- Flange Mounting

*1 Install the pump so that the “Filling Port” is at the top.

*2 Use either port of two suction and discharge ports at your option.

*3 As the tightening torques of suction, discharge and drain port fittings, conform to the below.

<table>
<thead>
<tr>
<th>Model Numbers</th>
<th>Suction Port &amp; Discharge Port Torque</th>
<th>Drain Port Torque</th>
</tr>
</thead>
<tbody>
<tr>
<td>A10-FR01B/C/H-12</td>
<td>6.5 ~ 7.5 Kgf-m</td>
<td>4.0 - 5.0 Kgf-m</td>
</tr>
</tbody>
</table>

A10-FR01B-12

- Flange Mounting

"A" Series Variable Displacement Piston Pumps
Single pump, Pressure Compensator Type
**PISTON PUMPS**

**A** Series Variable Displacement Piston Pumps

*Note: For Foot Mounting Type refer page no. 29.*

**“A” Series Variable Displacement Piston Pumps**

**Single pump, Pressure Compensator Type**

---

**A16-F-R-01-S-K-32**

**A22-F-R-01-S-K-32**

**Flange Mounting**

- **Suction Port:** 19 Dia.
- **Discharge Port:** 19 Dia.
- **Flow Adj. Screw:** 17 Hex.
- **Pressure Adj. Screw:** 17 Hex.
- **Lock Nut:** 17 Hex.
- **Drain Port:** Rc 3/8
- **Filling Port:** 22 Hex. Head Plug
- **M10 Thd. x 17 Deep:** 8 Places
- **Fully Extended:** 219
- **Key Width:** 4.79
- **R12:** 106
- **Surface of Suction Port:** 74
- **Surface of Discharge Port:** 74
- **19.05:**
- **19.02:**
- **21.24:**
- **21.08:**
- **82.55:**
- **82.50:**
- **96:**
- **44.5:**

---

**Foot Mounting Type**

*Install the pump so that the “Filling Port” is at the top.*

**View Arrow X**

---

**Side Port**

**DIMENSIONS IN MILLIMETRES**

---
**A37-F-R-01-***-K-32**
- **Flange Mounting**

**A37-F-R-01-***-S-K-32**
- **Flange Mounting**

---

**DIMENSIONS IN MILLIMETRES**

*Install the pump so that the “Filling Port” is at the top.

---

**Foot Mounting type**

Note: For Foot Mounting Type refer page no. 30.

---

“**A**” Series Variable Displacement Piston Pumps
Single pump, Pressure Compensator Type
**A56-F-R-01-***-K-32**

- **Flange Mounting**

**Axial Port Type**

- **Flow Adj. Screw 17 Hex.**
- **Pressure Adj. Screw 17 Hex. (Ind.)**
- **Suction Port 35 Dia.**
- **Discharge Port 32 Dia.**
- **M10 Thd. x 19 deep 8 Places**

**DIMENSIONS IN MILLIMETRES**

*1* Install the pump so that the “Filling Port” is at the top.

*2* Use either port of two drain ports at your options. Keep the remaining ports plugged. Note that the drain port is machined only on the left side, as viewed from the shaft end.

---

**A56-F-R-01-***-K-32**

- **Flange Mounting**

**Side Port**

- **Discharge Port 32 Dia.**
- **Rear Suction Port 35 Dia.**

**Foot Mounting type**

Note: For Foot Mounting Type refer page no. 31.

---

“A” Series Variable Displacement Piston Pumps

Single pump, Pressure Compensator Type
Install the pump so that the “Filling Port” is at the top.

Use either port of two drain ports at your options. Keep the remaining ports plugged.

Note that the drain port is machined only on the left side, as viewed from the shaft end.

Case drain ports are available for use when draining hydraulic fluid from pump casing.

Foot Mounting type

Note: For Foot Mounting Type refer page no. 32.

“A” Series Variable Displacement Piston Pumps
Single pump, Pressure Compensator Type
Install the pump so that the “Filling Port” is at the top.

Use either port of two drain ports at your options. Keep the remaining ports plugged. Note that the drain port is machined only on the left side, as viewed from the shaft end.

Case drain ports are available for use when draining hydraulic fluid from pump casing.

**Foot Mounting type**

Note: For Foot Mounting Type refer page no. 33.
* 1 Install the pump so that the “Filling Port” is at the top.
* 2 Use either port of two drain ports at your option. Keep the remaining ports plugged. Note that the drain port is machined only on the left side, as viewed from the shaft end.
* 3 Case drain ports are available for use when draining hydraulic fluid from pump casing.

**Foot Mounting type**

Note: For Foot Mounting Type refer page no. 34.
“A” Series Variable Displacement Piston Pumps
Single pump, Pressure Compensator Type

A10-FR01※-12

List of Seals

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Name of Parts</th>
<th>Part Numbers</th>
<th>Qty.</th>
<th>Pres. Adj. Range</th>
<th>B</th>
<th>C &amp; H</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Oil Seal</td>
<td>TCN24408Y</td>
<td>1</td>
<td></td>
<td>1</td>
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</tr>
<tr>
<td>2</td>
<td>O-Ring</td>
<td>SO-NA-G50</td>
<td>1</td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>O-Ring</td>
<td>SO-NA-G120</td>
<td>1</td>
<td></td>
<td>1</td>
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</tr>
<tr>
<td>4</td>
<td>O-Ring</td>
<td>SO-NB-P6</td>
<td>2</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>O-Ring</td>
<td>SO-NB-P14</td>
<td>1</td>
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<td>1</td>
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<tr>
<td>6</td>
<td>O-Ring</td>
<td>SO-NB-P10</td>
<td>1</td>
<td></td>
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</tr>
<tr>
<td>7</td>
<td>O-Ring</td>
<td>SO-NA-A018</td>
<td>1</td>
<td></td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

A16/22/37/56-※-R-01-※-※-K-32

List of Seals

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Name of Parts</th>
<th>Part Numbers</th>
<th>Qty.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Oil Seal</td>
<td>TCN254511</td>
<td>1</td>
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<tr>
<td></td>
<td>Gasket</td>
<td>1303-PK2 11969-1</td>
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<tr>
<td></td>
<td>O-Ring</td>
<td>SO-NA-G25</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>O-Ring</td>
<td>SO-NA-A017</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Seal Washer</td>
<td>W8</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>O-Ring</td>
<td>SO-NA-G55</td>
<td>1</td>
</tr>
</tbody>
</table>

List of Seals Kits

<table>
<thead>
<tr>
<th>Pump Model Numbers</th>
<th>Seal Kit Numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>A16-※-R-01-※-※-K-32</td>
<td>KS-A16-01-32</td>
</tr>
<tr>
<td>A22-※-R-01-※-※-K-32</td>
<td></td>
</tr>
<tr>
<td>A37-※-R-01-※-※-K-32</td>
<td>KS-A37-01-32</td>
</tr>
<tr>
<td>A56-※-R-01-※-※-K-32</td>
<td>KS-A56-01-32</td>
</tr>
</tbody>
</table>

Note: When ordering seals, please specify the seal kit number from the table above.
### A70/90- R01- S-60

#### List of Seals

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Name of Parts</th>
<th>Parts Numbers</th>
<th>Qty.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Gasket</td>
<td>1314E-PK2 11972-5</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Back up Ring</td>
<td>1310E-PK2 12440-0</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>Oil Seal</td>
<td>TCN 355511 TCN 456812</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>O-Ring</td>
<td>SO-FA-G85 SO-FA-G95</td>
<td>1</td>
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<tr>
<td>5</td>
<td>O-Ring</td>
<td>SO-NA-P18</td>
<td>1</td>
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<tr>
<td>6</td>
<td>O-Ring</td>
<td>SO-NB-P9</td>
<td>3</td>
</tr>
<tr>
<td>7</td>
<td>O-Ring</td>
<td>SO-NB-P14 SO-NB-P18</td>
<td>1</td>
</tr>
<tr>
<td>8</td>
<td>Seal Washer</td>
<td>W10</td>
<td>-</td>
</tr>
<tr>
<td>9</td>
<td>O-Ring</td>
<td>SO-NB-P5</td>
<td>1</td>
</tr>
</tbody>
</table>

#### List of Seals Kits

<table>
<thead>
<tr>
<th>Pump Model Numbers</th>
<th>Seal Kit Numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>A70- R01 S-60</td>
<td>KS-A70-01-60</td>
</tr>
<tr>
<td>A90- R01 S-60</td>
<td>KS-A90-01-60</td>
</tr>
</tbody>
</table>

Note: When ordering the seals, please specify the seal kit number from the table above.

### A145- R01 S-60

#### List of Seals

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Name of Parts</th>
<th>Parts Number</th>
<th>Qty.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>O-Ring</td>
<td>S-31.5 (NBR, Hs70)</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>O-Ring</td>
<td>SO-FA-G105</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>O-Ring</td>
<td>SO-NA-P18</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>O-Ring</td>
<td>SO-NB-P9</td>
<td>2</td>
</tr>
<tr>
<td>5</td>
<td>O-Ring</td>
<td>SO-NB-A017</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>O-Ring</td>
<td>SO-NB-A016</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>O-Ring</td>
<td>SO-NB-P18</td>
<td>1</td>
</tr>
<tr>
<td>8</td>
<td>O-Ring</td>
<td>SO-NB-P5</td>
<td>1</td>
</tr>
<tr>
<td>9</td>
<td>Back Up Ring</td>
<td>1301E-PK4 12440-0</td>
<td>1</td>
</tr>
<tr>
<td>10</td>
<td>Back Up Ring</td>
<td>For SO-NB-A017</td>
<td>1</td>
</tr>
<tr>
<td>11</td>
<td>Back Up Ring</td>
<td>For SO-NB-A016</td>
<td>1</td>
</tr>
<tr>
<td>12</td>
<td>Oil Seal</td>
<td>TCN 507212</td>
<td>1</td>
</tr>
<tr>
<td>13</td>
<td>Gasket</td>
<td>1321-PK2 11974-1</td>
<td>1</td>
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</table>

Note: When ordering seals, please specify the seal kit number KS-A145-01-60.
“A” Series Variable Displacement Piston Pumps—Single Pump, Proportional Electro-Hydraulic Load Sensing Type

Model Number Designation

<table>
<thead>
<tr>
<th>Series Number</th>
<th>Mounting</th>
<th>Direction of Rotation</th>
<th>Control Type</th>
<th>Pressure Adj. Range Kgf/cm²</th>
<th>Shaft Extension</th>
<th>Design Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>A16</td>
<td>F: Flange Mtg.</td>
<td>(Viewed from Shaft End)</td>
<td>04: Proportional Electro-Hydraulic Load Sensing Type</td>
<td>B: 15-69, C: 15-157, H: 15-206</td>
<td>32</td>
<td></td>
</tr>
<tr>
<td></td>
<td>L: Foot Mtg.</td>
<td>R: Clockwise ¹</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A22</td>
<td>F: Flange Mtg.</td>
<td>(Viewed from Shaft End)</td>
<td></td>
<td>B: 15-69, C: 15-157</td>
<td>32</td>
<td></td>
</tr>
<tr>
<td></td>
<td>L: Foot Mtg.</td>
<td>R: Clockwise ¹</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>L: Foot Mtg.</td>
<td>R: Clockwise ¹</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A56</td>
<td>F: Flange Mtg.</td>
<td>(Viewed from Shaft End)</td>
<td></td>
<td></td>
<td>32</td>
<td></td>
</tr>
<tr>
<td></td>
<td>L: Foot Mtg.</td>
<td>R: Clockwise ¹</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A70</td>
<td>F: Flange Mtg.</td>
<td>(Viewed from Shaft End)</td>
<td>04: Proportional Electro-Hydraulic Load Sensing Type</td>
<td>C: 15-160, H: 15-210</td>
<td>60</td>
<td></td>
</tr>
<tr>
<td></td>
<td>L: Foot Mtg.</td>
<td>R: Clockwise ¹</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A90</td>
<td>F: Flange Mtg.</td>
<td>(Viewed from Shaft End)</td>
<td></td>
<td>S: Side Port</td>
<td>60</td>
<td></td>
</tr>
<tr>
<td></td>
<td>L: Foot Mtg.</td>
<td>R: Clockwise ¹</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A145</td>
<td>F: Flange Mtg.</td>
<td>(Viewed from Shaft End)</td>
<td></td>
<td>S: Side Port</td>
<td>60</td>
<td></td>
</tr>
<tr>
<td></td>
<td>L: Foot Mtg.</td>
<td>R: Clockwise ¹</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

¹ Available to supply pump with anti-clockwise rotation. Consult Yuken for details.
Pipe Flange Kits

Pipe flange kits are available.
When ordering, specify the kit number from the table below.

<table>
<thead>
<tr>
<th>Pump Model Numbers</th>
<th>Name of Port</th>
<th>Pipe Flange Kit Numbers.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Threaded Connection</td>
</tr>
<tr>
<td>A16-R-04</td>
<td>Suction</td>
<td>F5-06-A-1080</td>
</tr>
<tr>
<td>A22-R-04</td>
<td>Discharge</td>
<td></td>
</tr>
<tr>
<td>A37-R-04</td>
<td>Suction</td>
<td>F5-10-A-1080</td>
</tr>
<tr>
<td>A56-R-04</td>
<td>Discharge</td>
<td>F5-06-A-1080</td>
</tr>
<tr>
<td>A70-R04</td>
<td>Suction</td>
<td>F5-12-A-1080</td>
</tr>
<tr>
<td>A90-R04</td>
<td>Suction</td>
<td>F5-16-A-1080</td>
</tr>
<tr>
<td>A145-R04</td>
<td>Discharge</td>
<td>F5-10-A-1080</td>
</tr>
</tbody>
</table>

¹ In case of using socket welding flanges, there is a case where the operating pressure should be set lower than the normal because of strength of the flanges. Therefore, please pay cautious attention to the operating pressure when the socket welding flanges are used.

² Discharge port for pump model “A16” and “A22” is available only the threaded connections.

Instructions

• Bleeding Air
In order to get steadily controlled pressure and flow, bleed air by loosening the air vent screw and fill solenoid armature with operating oil.

• Manual Adjustment Screws
Manual adjustment screws may be used for initial running adjustment or in case of electrical failures in order to adjust pressure and flow temporarily. In case of normal use, put the manual adjustment screws back in their preset position.

• Position of Cable Departure
Position of cable departure can be changed. For details, refer to EDG-01 valve in EIC-H-1001.

• Connection of Surge Cut-off Valve to “A” Series Pump (For A16 to A56 Type)
If using surge cut-off valve (SF1105-A-10), connect between pilot port “PP” of this pump and port “PP” of surge cut-off valve as pilot piping (refer to drawing below). Inside diameter of pipe should be more than 8 mm.
Consult Yuken for details of surge cut-off valve.
### Specifications

<table>
<thead>
<tr>
<th>Descriptions</th>
<th>A16</th>
<th>A22</th>
<th>A37</th>
<th>A56</th>
<th>A70</th>
<th>A90</th>
<th>A145</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geometric Displacement cm/rev.</td>
<td>15.8</td>
<td>22.2</td>
<td>36.9</td>
<td>56.2</td>
<td>70.0</td>
<td>91.0</td>
<td>145</td>
</tr>
<tr>
<td>Operating Pres. (Kgf/cm²)</td>
<td>Rated</td>
<td>160</td>
<td>160</td>
<td>160</td>
<td>160</td>
<td>210</td>
<td>210</td>
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<tr>
<td></td>
<td>Intermittent</td>
<td>210</td>
<td>160</td>
<td>210</td>
<td>210</td>
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<tr>
<td>Shaft Speed Range r/min.</td>
<td>Max.</td>
<td>1800</td>
<td>1800</td>
<td>1800</td>
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<tr>
<td></td>
<td>Min.</td>
<td>600</td>
<td>600</td>
<td>600</td>
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#### Flow Control

<table>
<thead>
<tr>
<th></th>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Min. Pres. Required for Flow Adj. Kgf/cm²</td>
<td>15</td>
<td>15</td>
<td>15</td>
<td>20</td>
<td>10</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Differential Pres. Kgf/cm²</td>
<td>3.7</td>
<td>2.2</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Step Response (0→Max. Flow) ms</td>
<td>70</td>
<td>80</td>
<td>120</td>
<td>125</td>
<td>100</td>
<td>120</td>
<td>210</td>
</tr>
<tr>
<td>Hysteresis 3% or less 4</td>
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<td></td>
<td></td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>Rated Current mA</td>
<td>900</td>
<td>700</td>
<td>740</td>
<td>790</td>
<td>820</td>
<td>920</td>
<td>920</td>
</tr>
<tr>
<td>Coil Resistance [20°C]</td>
<td>10</td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

#### Pressure Control

<table>
<thead>
<tr>
<th>Pres. Adj. Range Kgf/cm²</th>
<th>Refer to model Number Designation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step Response ms t₁ ⁵</td>
<td>80</td>
</tr>
<tr>
<td>Step Response ms t₂ ⁵</td>
<td>140</td>
</tr>
<tr>
<td>Hysteresis 2% or less ⁴</td>
<td></td>
</tr>
<tr>
<td>Coil Resistance [20°C]</td>
<td>10</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Applicable Amplifier Model ³</th>
<th>AME-D2-1010-11</th>
</tr>
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</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
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</tr>
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<tbody>
<tr>
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<td>32</td>
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<td></td>
<td>38</td>
<td>45</td>
</tr>
<tr>
<td></td>
<td>45</td>
<td>72.5</td>
</tr>
<tr>
<td></td>
<td>49.3</td>
<td>84.5</td>
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<td>34.2</td>
<td>109</td>
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<td></td>
<td>43.2</td>
<td>109.5</td>
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</table>

<table>
<thead>
<tr>
<th>Model</th>
<th>Pres. Step Response</th>
<th>Loading Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>A16, A22</td>
<td>t₁ = 15 → 160 Kgf/cm² t₂ = 160 → 15 Kgf/cm²</td>
<td>High Pressure Hose 3/8” x 2 m</td>
</tr>
<tr>
<td>A37, A56</td>
<td>t₁ = 20 → 160 Kgf/cm² t₂ = 160 → 20 Kgf/cm²</td>
<td>High Pressure Hose 3/4” x 2 m</td>
</tr>
<tr>
<td>A70, A90, A145</td>
<td>t₁ = 30 → 160 Kgf/cm² t₂ = 160 → 30 Kgf/cm²</td>
<td>High Pressure Hose 1-1/4” x 2 m</td>
</tr>
</tbody>
</table>

*1 Whenever setting pressure, make sure the full cut-off pressure never exceeds the maximum intermittent pressure.
*2 When operating the pump exceeding the rated pressure, operating conditions are restricted. Refer to page no. 6.
*3 For detail specifications of power amplifiers, refer to EIC-H-1008.
*4 The figure mentioned in the above table are those obtained using Yuken’s amplifier.
*5 Step response depends on circuit and operating conditions. Data shown in the table above is an example based on the condition right.
## Full Cut-off Pres. Vs. Input Current

- **A16/A22/A37/A56**

  Kgf/cm²

  ![](chart1.png)

  **Note:** Pressure adjustment range “H” is not available for A22.

## Output Flow vs. Input Current

- **A16**

  L/min.

  ![](chart2.png)

- **A37**

  L/min.

  ![](chart3.png)

- **A56**

  L/min.

  ![](chart4.png)

- **A70**

  L/min.

  ![](chart5.png)

- **A90**

  L/min.

  ![](chart6.png)

- **A145**

  L/min.

  ![](chart7.png)

  **“A” Series Variable Displacement Piston Pumps**

  **Single Pump, Proportional Electro-Hydraulic Load Sensing Type**
**A16-F-R-04-**-**K-32**

**A22-F-R-04-**-**K-32**

- **Flange Mounting**

  - **Pressure Gauge Connection**
    - for Pump Discharge Pressure
    - Rc 1/4 Thd.
  - **Surface of Discharge Port**
  - **Surface of Suction Port**
  - **Tank Port**
    - Rc 1/4 Thd.
  - **Air Vent**
    - 3 Hex. Soc.
  - **Manual Pressure Adj. Screw**
    - 3 Hex. Soc.
  - **Suction Port**
    - M10 Thd. x17 Deep
    - 4 Places
  - **Pilot Port “PP”**
    - Rc 1/4 Thd.
  - **Cable Departure**
    - (For Flow Control)
  - **Discharge Port**
    - G 3/8 Thd.
  - **Filling Port**
    - 22 Hex. Head Plug Furnished
  - **Drain Port**
    - Rc 3/8 Thd.
  - **Safety Valve Pressure Adj. Screw**
    - 17 Hex.
  - **Air Vent**
    - 3 Hex. Soc.
  - **Manual Pressure Adj. Screw**
    - 3 Hex. Soc.

---

**Foot Mounting type**

- **View Arrow X**

* 1 **Detail of Discharge Port**
  - [For Japanese Standard]

* 2 **Cable Applicable**:
  - Outside Dia. …… 8-10 mm.
  - Conductor Area …… Not Exceeding 1.5 mm².

* 3 **Do not touch the screw because it is adjusted at the time of shipment.**

---

**Note:** For other dimensions, refer to “Flange Mtg.”

**“A” Series Variable Displacement Piston Pumps**

Single Pump, Proportional Electro-Hydraulic Load Sensing Type
**A37-F-R-04-(#)K-32**

- **Flange Mounting**

**Foot Mounting type**

Mounting Bracket is common to that of pressure compensator model.

---

**“A” Series Variable Displacement Piston Pumps**

Single Pump, Proportional Electro-Hydraulic Load Sensing Type
**A56-F-R-04-**

- **Flange Mounting**

  - Manual Pressure Screw
  - Air Vent
  - Manual Flow Adj. Screw
  - Pressure Gauge Connection
  - Cable Departure
  - Filling Port
  - Drain Port
  - Pilot Port
  - Surface of Suction Port
  - Surface of Discharge Port
  - View Arrow X

**A56-L-R-04-**

- **Foot Mounting type**

Note: For other dimensions, refer to “Flange Mtg.”

---

“A” Series Variable Displacement Piston Pumps

Single Pump, Proportional Electro-Hydraulic Load Sensing Type
**A70-FR04 S-60**

- Flange Mounting

- **Air Vent**
  3 Hex. Soc.
  3 Places
- **Manual Flow Adj.Screw**
  3 Hex. Soc.
- **Cable Departure**
  3 Hex. Soc.
- **Air Vent**
  3 Hex. Soc.
  3 Places
- **Tank Port**
  Rc 3/8 Thd.
- **Cable Departure**
  (For Flow Control)
  3 Hex. Soc.
- **Primary Pressure Gauge Connection For Pump Discharge Pressure**
  Rc 1/4 Thd.
- **M10 Thd. x 17 Deep**
  4 Places

- **Discharge Port**
  25 Dia

- **Manual Pressure Adj.screw**
  3 Hex. Soc.

- **Cable Departure**
  (For Pres. Control)
  3 Hex. Soc.

- **Drain Port**
  (Both Sides)
  Rc 3/4 Thd.

- **1** Use either port of two drain ports at your option. Keep the remaining port plugged.
- **2** Case drain port is available for use when draining hydraulic fluid from pump casing.
- **3** Cable Applicable:
  - Outside Dia. …… 8-10 mm.
  - Conductor Area …… Not Exceeding 1.5 mm².

---

**A70-LR04 S-60**

- Foot Mounting type

- **Filling Port**
  22 Hex. Head plug
  Furnished
- **Eye Bolt**
  M10

- **Suction Port**
  38 Dia.

- **22 Dia. x Thru.**
  43 Dia. Spotface
  4 Places

---

**“A” Series Variable Displacement Piston Pumps**

**Single Pump, Proportional Electro-Hydraulic Load Sensing Type**

---

**DIMENSIONS IN MILLIMETRES**

---

Note: For other dimensions, refer to “Flange Mtg.”
**A90-FR04\*S-60**

**Flange Mounting**

- Use either port of two drain ports at your option. Keep the remaining port plugged.
- Case drain port is available for use when draining hydraulic fluid from pump casing.
- Cable Applicable:
  - Outside Dia. ...... 8-10 mm.
  - Conductor Area ...... Not Exceeding 1.5 mm².

---

**A90-LR04\*S-60**

**Foot Mounting**

Note: For other dimensions, refer to “Flange Mtg.”

---

“A” Series Variable Displacement Piston Pumps

Single Pump, Proportional Electro-Hydraulic Load Sensing Type
A145-FR04※S-60

- Flange Mounting

* 1 Use either port of two drain ports at your option. Keep the remaining port plugged.

* 2 Case drain ports are available for use when draining hydraulic fluid from pump casing.

* 3 Cable Applicable:
   Outside Dia. …… 8-10 mm.
   Conductor Area …… Not Exceeding 1.5 mm².

A145-LR04※S-60

- Foot Mounting type

Note: For other dimensions, refer to “Flange Mtg.”

“A” Series Variable Displacement Piston Pumps
Single Pump, Proportional Electro-Hydraulic Load Sensing Type
“A” Series Variable Displacement Piston Pumps - Single Pump, Electro-Hydraulic Proportional Pressure & Flow Control Type

1. Available to supply pump with anti-clockwise rotation. Consult Yuken for details.

2. These pumps, except A16 and A22 types, can be connected to outboard pumps.

- A37/A56 type (outboard pump connection symbol: None): spigot diameter: 82.55mm (A16, A22, and PV2R1).
- A70/A90/A145 type (outboard pump connection symbol: “A”): spigot diameter: 82.55mm (A16, A22, and PV2R1).
- A70/A90/A145 type (outboard pump connection symbol: “B”): spigot diameter: 101.6mm (A37 and PV2R2).

3. Amplifier Compensation Number may differ according to the main machine condition. Consult Yuken for details.

Model Number Designation

<table>
<thead>
<tr>
<th>Series Number</th>
<th>Mounting</th>
<th>Direction of Rotation</th>
<th>Control Type</th>
<th>Control Press. at Input Signal is 5 V</th>
<th>Unit of Control Pressure</th>
<th>Type of Outboard Pump</th>
<th>Compensation Number</th>
<th>Design Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>A70</td>
<td>-F</td>
<td>R</td>
<td>04E</td>
<td></td>
<td>M: MPa</td>
<td></td>
<td>None</td>
<td>06 42</td>
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<tr>
<td>(15.8 cm³/rev.)</td>
<td>Flange Mtg.</td>
<td>(Viewed from Shaft End)</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
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<td>(22.2 cm³/rev.)</td>
<td></td>
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<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A37</td>
<td>(36.9 cm³/rev.)</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A56</td>
<td>(56.2 cm³/rev.)</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>A70</td>
<td>(70.0 cm³/rev.)</td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>A90</td>
<td>(91.0 cm³/rev.)</td>
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</tr>
<tr>
<td>A145</td>
<td>(145.0 cm³/rev.)</td>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*1 Available to supply pump with anti-clockwise rotation. Consult Yuken for details.

*2 These pumps, except A16 and A22 types, can be connected to outboard pumps.

- A37/A56 type (outboard pump connection symbol: None): spigot diameter: 82.55mm (A16, A22, and PV2R1).
- A70/A90/A145 type (outboard pump connection symbol: “A”): spigot diameter: 82.55mm (A16, A22, and PV2R1).
- A70/A90/A145 type (outboard pump connection symbol: “B”): spigot diameter: 101.6mm (A37 and PV2R2).

*3 Amplifier Compensation Number may differ according to the main machine condition. Consult Yuken for details.
## Specifications

<table>
<thead>
<tr>
<th>Descriptions</th>
<th>Model Numbers</th>
<th>A16</th>
<th>A22</th>
<th>A37</th>
<th>A56</th>
<th>A70</th>
<th>A90</th>
<th>A145</th>
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</thead>
<tbody>
<tr>
<td>Geometric Displacement</td>
<td></td>
<td>15.8</td>
<td>22.2</td>
<td>36.9</td>
<td>56.2</td>
<td>70.0</td>
<td>91.0</td>
<td>145.0</td>
</tr>
<tr>
<td>Operating Pres. (Kgf/cm²)</td>
<td>Rated²</td>
<td>160</td>
<td>160</td>
<td>160</td>
<td>160</td>
<td>250</td>
<td>250</td>
<td>250</td>
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<tr>
<td></td>
<td>Intermittent¹</td>
<td>210</td>
<td>160</td>
<td>210</td>
<td>210</td>
<td>280</td>
<td>280</td>
<td>280</td>
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<tr>
<td>Shaft Speed Range</td>
<td>r/min.</td>
<td>600 - 1800</td>
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<td></td>
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</tr>
<tr>
<td>Flow Control</td>
<td>Max. Flow³</td>
<td>28.4</td>
<td>40.0</td>
<td>66.4</td>
<td>101.0</td>
<td>126.0</td>
<td>163.0</td>
<td>261.0</td>
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<td></td>
<td>Min. Pres. Required for Flow Adj.</td>
<td>20⁴</td>
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<td>Repeatability</td>
<td>1% or less</td>
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<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td>Input Signal</td>
<td>Max. Flow / 5 V DC</td>
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<td>Pressure Control</td>
<td>Min. Adj. Pressure</td>
<td>7</td>
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<tr>
<td></td>
<td>Hysteresis</td>
<td>1% or less</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td>Repeatability</td>
<td>1% or less</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Input Signal</td>
<td>Specified Control Pressure / 5 V DC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Coil Resistance</td>
<td>[@ 20°C]</td>
<td>10</td>
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<tr>
<td>Input Impedance</td>
<td>Flow Control : 10 kΩ</td>
<td>Pres. Control : 10 kΩ</td>
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<td></td>
<td></td>
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<td></td>
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<tr>
<td>Supply Electric Power</td>
<td>24 V DC (21 – 28 V Included Ripple)</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Power Input (Max.)</td>
<td>W</td>
<td>30</td>
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<tr>
<td>Output Signal</td>
<td>Flow</td>
<td>5 V DC/Max. Flow</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td>Pressure</td>
<td>5 V DC/Specified Control Pressure</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alarm Signal Output (Open Collector)</td>
<td>Voltage: Max. 30 V DC Current: Max. 40mA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Ambient Temperature</td>
<td>°C</td>
<td>0 - 50 (With Circulated Air)</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Approx. Mass</td>
<td>Flange Mtg.</td>
<td>20.5</td>
<td>20.5</td>
<td>32.0</td>
<td>39.0</td>
<td>64.0</td>
<td>76.5</td>
<td>96.4</td>
</tr>
<tr>
<td></td>
<td>Foot Mtg.</td>
<td>22.7</td>
<td>22.7</td>
<td>36.3</td>
<td>43.3</td>
<td>76.0</td>
<td>97.0</td>
<td>121.4</td>
</tr>
</tbody>
</table>

*1 Whenever setting pressure, make sure the full cut-off pressure never exceeds the maximum intermittent pressure.

*2 When operating pump exceeding the rated pressure, operating conditions are restricted. Refer to page 6 on Catalogue No. EIC-A-1002 for the details.

*3 Maximum flow differs to shaft speed. The value listed above indicates shaft speed of 1800 r/min. For other shaft speed calculate by the ratio of shaft speed.

*4 To secure the required minimum pressure, special sequence valves are available, to be directly installed at the discharge port of the pump. Consult Yuken for details.

## Pipe Flange Kits

For pipe flange, refer to form of pressure compensator type in page no.7 on Catalogue No. EIC-A-1002.

## Instructions

- **Input Signal**
  - The pump is on unload condition when the pump is operated without input signal voltage.

- **Electric Source**
  - Always turn off electric source whenever the connector for swash plate tilt angle sensor is removed.

- **Compensation of pump Maximum Regulated Flow at Frequency**
  - If the same maximum flow is required at 50 Hz or 60 Hz, connect short plug in the amplifier to 60 Hz at the place where supplied frequency is 60 Hz. At this condition, maximum flow comes to the same value at 50 Hz.
  - If short plug is used at 60 Hz without making the change, maximum flow increased in proportion to frequency.

- **Painting on AMP. BOX and Solenoid**
  - To maintain suitable radiation effect, the amp. box and the solenoid of the control valve should not be painted.

## Outboard Pumps

A37 to A145 type pumps, except A16 and A22, can be used as double pumps, by connecting an outboard pump on the cover side. For details consult YUKEN.
Note: Pump characteristics at 1800 r/min. is the same as those 1500 r/min. where frequency is compensated.

[Refer to page 32 of catalogue EIC-A-1002]

Refer to page 8 to 15 for performance characteristics of pressure compensator type excluding characteristics appeared on this catalogue.
**PISTON PUMPS**

- **A16-FR04E-06-42**
- **A22-FR04E-11-42**

### Flange Mounting

- **Air Vent**: 3 Hex. Soc. 3 Places
- **Filling Port**: 22 Hex. Head Plug Furnished
- **Drain Port**: Rc 3/8 Thd.
- **Cable Departure**:
- **Filling Port**: 22 Hex. Head Plug Furnished
- **R12**: 95 Dia.

**DIMENSIONS IN MILLIMETRES**

- **X**: 151.5 142 78 130 106 95 Dia.
- **Y**: 147.5 205.5 44.5 25 59 26.5 6.5 10.0 Dia. 21.1 Dia. 21.08 Dia. 8.55 Dia. 8.55 Dia.
- **Tilt Angle**: 22.2
- **Sensor Connector**:

---

**Foot Mounting type**

Note: For Foot Mounting Type refer page no. 29.

---

"A" Series Variable Displacement Piston Pumps Single Pump, Electro-Hydraulic Proportional Pressure & Flow Control Type
**A37-FR04E***-01-42

* Flange Mounting

- Cable Departure \(^3\)
- Cable Applicable:
  - Outside Dia.....8-10mm
  - Conductor Area.....Not Exceeding 1.5 mm\(^2\)

- Filling Port \(^1\)
  - 22 Hex. Head Plug Furnished

- Air Vent
  - 3 Hex. Soc. 3 Places

- Discharge Port 32 Dia.
  - M10 Thd. x 19 Deep 4 Places

- Surface of Discharge Port

- Drain Port
  - Rc 1/2 Thd.

- Tilt Angle \(^3\)

- Pres. Sensor Connector

- End Cover
  - Seal Cover
  - Hex. Hd. Screw

- M10 Thd. x 19 Deep 4 Places

- View Arrow X

*1 Install the pump so that the “Filling Port” is at the top.
*2 Do not touch the screw because it is adjusted at the time of shipment.
*3 For cable connection with amplifiers, see page 44.

**Foot Mounting type**

Note: For Foot Mounting Type refer page no. 30.
**A56-FR04E ※-02-42**

- **Flange Mounting**
  - **Cable Departure**
    - Outside Dia......8-10mm
  - **Cable Applicable:**
    - Conductor Area......Not Exceeding 1.5 mm²
  - **Air Vent**
    - 3 Hex. Soc. 3 Places
  - **Filling Port**
    - [22 Hex. Head Plug Furnished]
  - **Drain Port**
    - RC 3/4 Thd. (Both Sides)
  - **Surface of Discharge Port**
  - **Surface of Drain Port**
  - **Discharge Port** 32 Dia.
  - **M10 Thd. x 19 Deep 4 Places**

- **Foot Mounting type**
  - Note: For Foot Mounting Type refer page no. 31.

---

* 1 Install the pump so that the “Filling Port” is at the top.
* 2 Use either port of two drain ports at your option. Keep the remaining port plugged.
* 3 Do not touch the screw because it is adjusted at the time of shipment.
* 4 For cable connection with amplifiers, see page 44.

---

**“A” Series Variable Displacement Piston Pumps Single Pump, Proportional Electro-Hydraulic Pressure & Flow Control Type**
**A70-FR04E-60-60**

- **Flange Mounting**

  - Cable Departure *4
  - Cable Applicable:
    - Outside Dia. .... 8~10 mm
    - Conductor Area .... Not Exceeding 1.5 mm²

- **Foot Mounting type**

  Note: For Foot Mounting Type refer page no. 32.

---

**“A” Series Variable Displacement Piston Pumps Single Pump, Proportional Electro-Hydraulic Pressure & Flow Control Type**
**A90-FR04E※※-60-60**

**Flange Mounting**

- Install the pump so that the “Filling Port” is at the top.
- Use either port of two drain ports at your option. Keep the remaining port plugged.
- Do not touch the screw because it is adjusted at the time of shipment.
- For cable connection with amplifiers, see page 44.
- If you do not use the special sequence valve, plug the port (FP-SC-1/32)

**Foot Mounting type**

Note: For Foot Mounting Type refer page no. 33.
**A145-FR04E※※-60-60**

- **Flange Mounting**

  - Cable Departure \(^4\)
  - Cable Applicable:
    - Outside Dia. .... 8~10 mm
    - Conductor Area .... Not Exceeding 1.5 mm\(^2\)
  - Drain Port \(^2\)
    - Rc 3/4 Thd. (Both Side)
  - Air Vent
    - 3 Hex. Soc.
    - 3 Places
  - Discharge Port
    - 32 Dia.
    - M10 Thd. x 19 Deep
    - 4 Places
  - Case Drain port
    - 5 Hex. Soc.
  - Filling Port \(^1\)
    - 27 Hex. Head Plug
  - Surface of Discharge Port
  - Surface of Drain Port
  - 11.14 Key
  - 11.11 Width
  - 21.5 Dia. x Thru.
  - 39 Dia. x Spotface
  - 4 Places
  - (From Rear)
  - 44.45 Dia.
  - 44.40 Dia.
  - 49.39 Dia.
  - 49.21 Dia.
  - 152.40 Dia.
  - 152.35 Dia.
  - 110 Dia.
  - A145-FR04E ※A : 379.5
  - A145-FR04E ※B : 383
  - Tilt Angle \(^4\)
  - Pres. Sensor Connector
  - Suction Port
  - 48 Dia.
  - Plain Washer
  - Hex. Hd. Screw
  - End Cover
  - Seal Cover
  - M12 Thd. x 19 Deep
  - 4 Places

  **View Arrow X**

- **Foot Mounting type**

  Note: For Foot Mounting Type refer page no. 34.

---

1. Install the pump so that the “Filling Port” is at the top.
2. Use either port of two drain ports at your option. Keep the remaining port plugged.
3. Do not touch the screw because it is adjusted at the time of shipment.
4. For cable connection with amplifiers, see page 44.
5. If you do not use the special sequence valve, plug the port (FP-SC-1/32)
Cable Connection between Pump and Amplifier

The cable connections between the proportional pilot valve and the sensor of the pump and the attached amplifier (SK1106) are shown below. The cable assemblies are not included in the pump assembly. Purchase separately with model numbers described in the below table, if required.

*1 Cable assemblies are available. When ordering, specify the cable ass’y model numbers from the table below.

<table>
<thead>
<tr>
<th>Name of Cable Ass’y</th>
<th>Cable Ass’y Model Numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Approx. Length of Cable mm</td>
</tr>
<tr>
<td>1 For Solenoid</td>
<td>SK1112-S-2-10</td>
</tr>
<tr>
<td>2 For Power Supply</td>
<td>SK1112-V-2-10</td>
</tr>
<tr>
<td>3 For Pressure Sensor</td>
<td>SK1112-P-2-10</td>
</tr>
<tr>
<td>4 For Tilt Angle Sensor</td>
<td>SK1112-Q-2-10</td>
</tr>
<tr>
<td>5 For Signal</td>
<td>SK1112-C-2-10</td>
</tr>
</tbody>
</table>

*2 For the details of amplifier, see the following page.

“A” Series Variable Displacement Piston Pumps Single Pump, Electro-Hydraulic Proportional Pressure & Flow Control Type
Specifications

<table>
<thead>
<tr>
<th>Description</th>
<th>Model No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applicable Coil Resistance</td>
<td>SK1106-★-☆-☆-☆-10</td>
</tr>
<tr>
<td>Input Impedance</td>
<td>10 kΩ (PIN, QIN)</td>
</tr>
<tr>
<td>Power Supply</td>
<td>24 VDC (21-28 V Included Ripple)</td>
</tr>
<tr>
<td>Power Input (Max.)</td>
<td>30 W</td>
</tr>
<tr>
<td>Input Signal</td>
<td>Max. Flow/5V (QIN), Specified Pres./5V (PIN)</td>
</tr>
<tr>
<td>Output Signal for sensor monitor</td>
<td>5V/Max. Flow (SMQ), 5V/Specified Pres. (SMP)</td>
</tr>
<tr>
<td>Ambient Temperature</td>
<td>0 - 50°C</td>
</tr>
<tr>
<td>Approximate Mass.</td>
<td>450 g</td>
</tr>
</tbody>
</table>

List of Amplifier Model No.

<table>
<thead>
<tr>
<th>Pump Model Number</th>
<th>Amplifier Model Numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>A16★R04E-06-42</td>
<td>SK1106★-16-06-10</td>
</tr>
<tr>
<td>A22★R04E-11-42</td>
<td>SK1106★-22-11-10</td>
</tr>
<tr>
<td>A37★R04E-01-42</td>
<td>SK1106★-37-01-10</td>
</tr>
<tr>
<td>A56★R04E-02-42</td>
<td>SK1106★-56-02-10</td>
</tr>
<tr>
<td>A70★R04E-☆-60-60</td>
<td>SK1106★-70-60-10</td>
</tr>
<tr>
<td>A90★R04E-☆-60-60</td>
<td>SK1106★-91-60-10</td>
</tr>
<tr>
<td>A145★R04E-☆-60-60</td>
<td>SK1106★-145-60-10</td>
</tr>
</tbody>
</table>

Note: The symbol “★” shown with pump and amplifier model numbers, is the control pressure at input signal of 5 V.

Detail of Connector

<table>
<thead>
<tr>
<th>Connector</th>
<th>Name Of Signal</th>
</tr>
</thead>
<tbody>
<tr>
<td>CN1 Solenoid</td>
<td>1 0 [V] Output to pilot valve solenoid</td>
</tr>
<tr>
<td>2</td>
<td>(24V)</td>
</tr>
<tr>
<td>CN2 Power Supply</td>
<td>1 +24 [V] (PIN)</td>
</tr>
<tr>
<td>2</td>
<td>0 [V]</td>
</tr>
<tr>
<td>3</td>
<td></td>
</tr>
<tr>
<td>CN3 Pres. Sensor</td>
<td>1 +5 [V] Power supply for sensor</td>
</tr>
<tr>
<td>2</td>
<td>0 [V]</td>
</tr>
<tr>
<td>3</td>
<td>Input Signal- Sensor</td>
</tr>
<tr>
<td>4</td>
<td>0 [V]</td>
</tr>
<tr>
<td>CN4 Tilt Angle Sensor</td>
<td>1 +8 [V] Power supply for sensor</td>
</tr>
<tr>
<td>2</td>
<td>0 [V]</td>
</tr>
<tr>
<td>3</td>
<td>Input Signal- Sensor</td>
</tr>
<tr>
<td>4</td>
<td>0 [V]</td>
</tr>
<tr>
<td>5</td>
<td>----</td>
</tr>
<tr>
<td>CN5 Input/output Signal</td>
<td>1 Input Signal-Flow (Qin)</td>
</tr>
<tr>
<td>2</td>
<td>Input Signal-Common (COM)</td>
</tr>
<tr>
<td>3</td>
<td>Input Signal-Pres. (Pin)</td>
</tr>
<tr>
<td>4</td>
<td>Output Signal-Sensor Monitor P (SMP)</td>
</tr>
<tr>
<td>5</td>
<td>Output Signal-Sensor Monitor Q(SMQ)</td>
</tr>
<tr>
<td>6</td>
<td>0 [V]</td>
</tr>
</tbody>
</table>