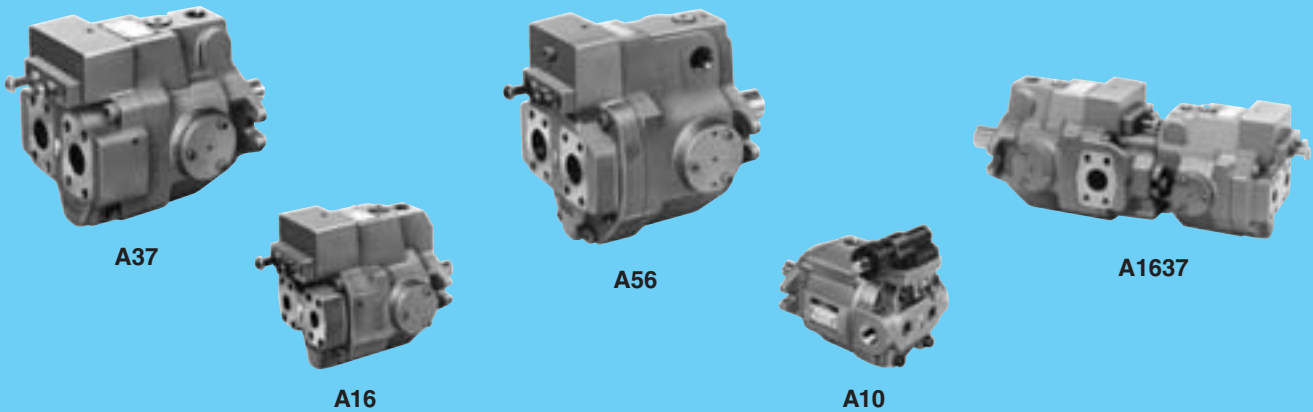


# "A" Series Variable Displacement Piston Pumps



## "A" Series Variable Displacement Piston Pumps

| Pump Type                     | Graphic Symbols | Geometric Displacement |                               | Maximum Operating Pressure<br>MPa (PSI) | Page |
|-------------------------------|-----------------|------------------------|-------------------------------|---|------|
|                               |                 | cm <sup>3</sup> /rev   | cu. in./rev                   |   |      |
| Single Pumps                  |                 |                        |                               |   |      |
|                               |                 | A10                    |                               | 21 (3050)                               | 30   |
|                               |                 | A16                    |                               | 16 (2320)                               |      |
|                               |                 | A22                    |                               | 21 (3050)                               |      |
|                               |                 | A37                    |                               | 28 (4060)                               |      |
|                               |                 | A56                    |                               | 16 (2320)                               |      |
| A70                           |                 |                        |                               |   |      |
| Double Pumps                  |                 | Outboard Pump          | A16 A37 A56                   | 28 (4060)*                              | 113  |
|                               |                 | Inboard Pump           | A16 A37 A56 A70 A90 A145 A220 |   |      |
| Variable / Fixed Double Pumps |                 | Outboard Pump          | PV2R1 PV2R2                   | 28 (4060)*                              | 115  |
|                               |                 | Inboard Pump           | A16 A37 A56 A70 A90 A145 A220 |   |      |

• Various control types are available such as pressure compensator type. Refer to [page 31](#) and [32](#).

★ The maximum operating pressure for each double pump depends on its combination of pumps. Contact us for details.

## Hydraulic Fluids

### Hydraulic Fluids

Use petroleum based oils such as anti-wear type hydraulic oils or R & O (Rust and Oxidation inhibitor) type hydraulic oils equivalent to ISO VG-32 or 46. The recommended viscosity range is from 20 to 400 mm<sup>2</sup>/s (98 to 1800 SSU) and temperature range is from 0 to 60°C (32 to 140°F), both of which have to be satisfied for the use of the above hydraulic oils.

### Control of Contamination

Due caution must be paid to maintaining control over contamination of the operating oil which can otherwise lead to breakdowns 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 (150 mesh) reservoir type filter and the return line must have a line type filter of under 10 μm.

## Instructions

### 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 or thrust.

Maximum permissible misalignment is less than 0.1 mm (.004 inches) TIR and maximum permissible misangular is less than 0.2°.

### Suction Pressure

Permissible suction pressure at inlet port of the pump is between -16.7 and +50 kPa (5 in.Hg Vacuum and 7 PSIG).

For piping to the suction port, use the pipes of the same diameter as that of the specified pipe flange to be used. Make sure that the height of the pump suction port is within one metre (3.3 ft) from the oil level in the reservoir.

### Hints on Piping

When using steel pipes for the suction or discharge ports, excessive load from the piping to 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.

When using steel pipes for the suction or discharge ports, excessive load from the piping to the pump generates excessive noise.

Whenever there is fear of excessive load, please use rubber hoses.

### 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 0.1 MPa (14.5 PSI) and surge pressure of less than 0.5 MPa (72.5 PSI).

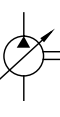
Length of piping should be less than 1 m (3.3 ft.), and the pipe end should be submerged in oil.

[Recommended Drain Piping Size]

| Model                 | Fitting Size                                  |                        | Inside Dia. of Pipe |
|-----------------------|---|------------------------|---------------------|
|                       | Japanese Std. "JIS" & European Design Std.    | N.American Design Std. |                     |
| A10                   | 3/8<br>[Inside Dia. 8.5 mm (.33 in.) or more] | SAE #6                 | 10 mm (.39 in.)     |
| A16, A22              | 3/8<br>[Inside Dia. 8.5 mm (.33 in.) or more] | SAE #8                 |                     |
| A37                   | 1/2<br>[Inside Dia. 10 mm (.47 in.) or more]  | SAE #10                | 12 mm (.47 in.)     |
| A56, A70<br>A90, A145 | 3/4<br>[Inside Dia. 16 mm (.63 in.) or more]  | SAE #12                | 19 mm (.75 in.)     |

### 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 Number ST1004-\*-10\*, [Page 820](#)) is recommended for this purpose.



### Starting

Before first starting, fill pump case with clean operating oil via the filling port.

In order to avoid air blockage when first starting, adjust the control valves so that the discharged oil from the pump is returned direct to the reservoir or the actuator moves in a free load.

[Volume of Pre-fill Oil Required]

| Model   | Volume cm <sup>3</sup> (cu.in.) |
|---------|---------------------------------|
| A10     | 370 (22.6)                      |
| A16/A22 | 600 (36.6)                      |
| A37/A56 | 1200 (73.2)                     |
| A70     | 2100 (128)                      |
| A90     | 2500 (153)                      |
| A145    | 3300 (201)                      |

### Setting Discharge Pressure and Delivery

At the time of shipment, the unit has been preset to 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.

[ Volume adjusted by each full turn of the pressure adjustment screw ]

| Model Numbers            | Adjustment Volume MPa (PSI) |
|--------------------------|-----------------------------|
| A10-FR01B                | 2.9 (420)                   |
| A10-FR01C/H              | 5.4 (780)                   |
| A16/A22/A37/A56-*-R-01-B | 3.5 (510)                   |
| A16/A22/A37/A56-*-R-01-C | 6.5 (940)                   |
| A16/A37/A56-*-R-01-H     | 7.9 (1150)                  |
| A70/A90/A145-*-R01B      | 2.3 (330)                   |
| A70/A90/A145-*-R01C      | 3.2 (460)                   |
| A70/A90/A145-*-R01H      | 4.0 (580)                   |
| A70/A90/A145-*-R01K      | 4.7 (680)                   |

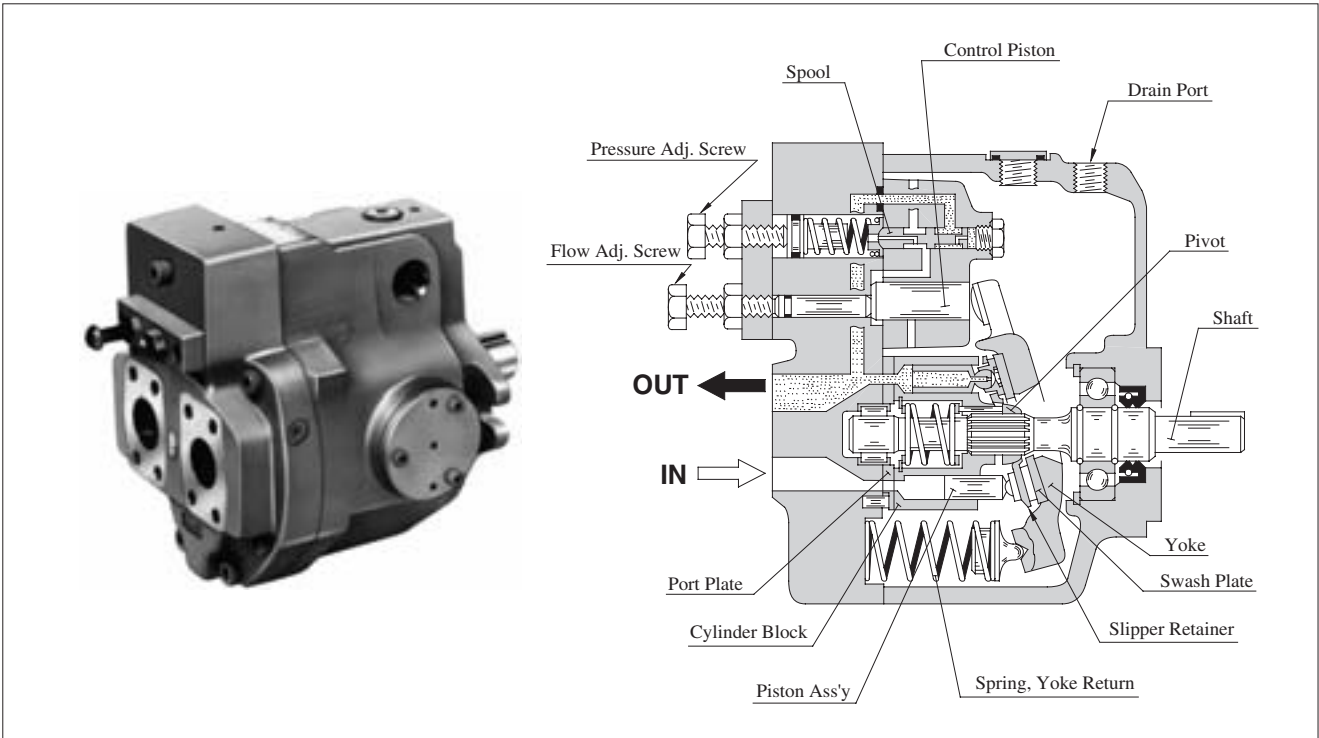
#### Adjustment of Delivery

Turning the flow adjustment screw clockwise, decreases delivery.

[ The minimum adjustable flow and adjustable volume of each full turn of the delivery adjustment screw ]

| Model Numbers | Adjustable volume with each full turn of the adjustment screw cm <sup>3</sup> /rev (cu.in./rev) | Minimum adjustment flow cm <sup>3</sup> /rev (cu.in./rev) |
|---------------|---|---|
| A10           | 1.1 (.067)  | 2.0 (.122)  |
| A16           | 1.4 (.085)  | 4.0 (.244)  |
| A22           | 2.0 (.122)  | 6.0 (.366)  |
| A37           | 2.9 (.177)  | 10 (.610)   |
| A56           | 3.9 (.238)  | 12 (.732)   |
| A70           | 4.4 (.268)  | 30 (1.83)   |
| A90           | 4.8 (.293)  | 56 (3.42)   |
| A145          | 7.2 (.439)  | 83 (5.06)   |

## "A" Series Variable Displacement Piston Pumps



### ■ Features

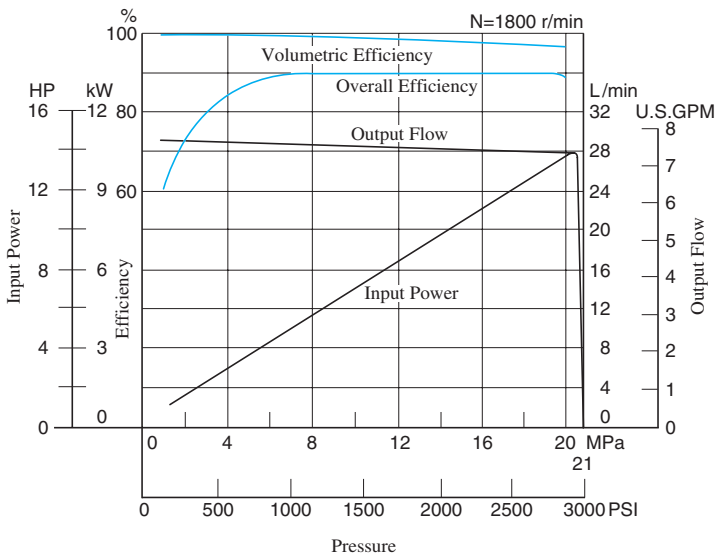
#### ● High efficiency

Under the conditions of pressure 16 MPa (2320 PSI) and speed 1800 r/min, the volumetric efficiency is over 98% and the overall efficiency is over 90%.

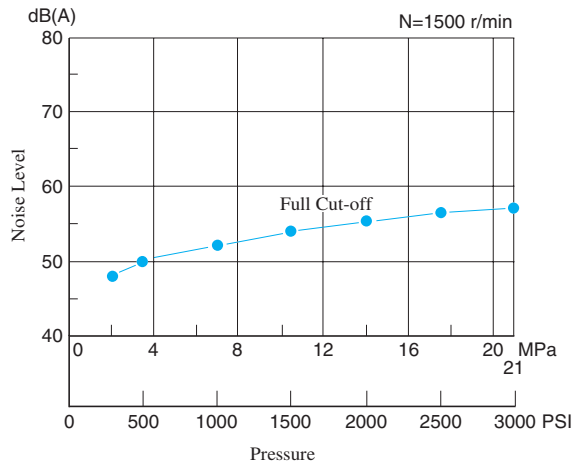
#### ● Low noise level

In the "A16" pump, the noise level is as low as 57.3 dB(A) [at the full cut-off pressure 21 MPa (3050 PSI) with speed 1500 r/min one metre (3.3 ft.) horizontally away from pump head cover.]

"A16" type performance characteristics



"A16" type noise level 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 heat generation

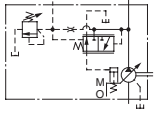
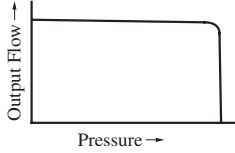
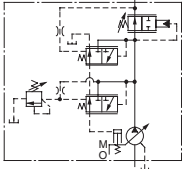
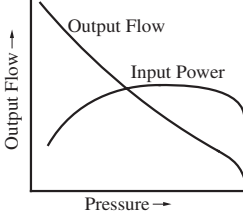
Because of small power loss, it is possible to reduce the rise in oil temperature. Accordingly, capacity of a reservoir can be reduced.



Control Type

| Control Type  | Graphic Symbols | Performance Characteristics | Explanation  | Page |
|---|-----------------|-----------------------------|--|------|
| "01" Pressure Compensator Type  |                 |                             | When the system pressure increases and comes close to the preset cut-off pressure, the pump flow decreases automatically while maintaining the set pressure as it is.  | 33   |
| "02" Solenoid-two Pressure Control Type                                       |                 |                             | This type of control is ideal for an application where the output power of the actuator has to be controlled in two different load pressures while keeping the actuator speed nearly constant.   | 55   |
| "03" Pressure Compensator with Unloading Type                                 |                 |                             | It is suitable for a situation where a long unloading time is required and heat generation and noise have to be kept at their lowest levels. <ul style="list-style-type: none"> <li>The pump can be used in combination with the multistage pressure control valve.</li> </ul>   | 63   |
| "04" Proportional Electro-Hydraulic Load Sensing Type                         |                 |                             | This is an energy-saving type control which regulates the pump flow and load pressure to be at absolute minimum necessary level to operate the actuator. Pump flow rate and cut-off pressure are controlled proportional to the input current to the control device on the pump and the input current is regulated by the specific amplifier.  | 64   |
| "04E" Electro-Hydraulic Proportional Pressure & Flow Control Type             |                 |                             | This type of control has the pressure sensor and tilt angle sensor in the pump. The pump is used with the external amplifier (amplifier is integrated into pump in case of "04EH").  | 74   |
| "04EH" Electro-Hydraulic Proportional Pressure & Flow Control Type (OBE Type) |                 |                             | Flow and pressure can be controlled in proportion to input voltage by only one control valve. The features has been greatly improved by electrical feedback of swash plate tilt angle correspond to flow rate and load pressure to control valve. <ul style="list-style-type: none"> <li>Linearity of input characteristics is excellent and easy to set.</li> <li>Hysteresis is lower, repeatability and reproducibility are fine.</li> </ul> | 86   |
| "05" Two-Pressure Two-Flow Control Type by System Pres.                       |                 |                             | 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.   | —*   |
| "06" Two-Pressure Two-Flow Control Type by Solenoid Valve                     |                 |                             | 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.  | —*   |

**Control Type**

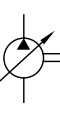
| Control Type   | Graphic Symbols   | Performance Characteristics   | Explanation  | Page |
|--|---|---|--|------|
| "07"<br>Pilot Pressure Control Type Pressure Compensator |  |  | The pump is used in combination with the pilot relief valve or multistage pressure control valve. By controlling the pilot pressure, the full cut-off pressure can be remote-controlled according to your requirements.  | 96   |
| "09"<br>Constant Power Control Type                      |  |  | <ul style="list-style-type: none"> <li>• Pump input power can be controlled in accordance with the motor output.</li> <li>• When the discharge pressure rise, the output flow decreases corresponding to the preset input power.</li> <li>• The pump can act for function of two pumps, low-pressure large-flow and high-pressure small-flow. Therefore, the motor capacity can be reduced.</li> </ul> | 105  |

★ Control type "05" and "06" are not shown in this catalogue. Contact us for the details.

**Availability of Control Type**

Mark "○" in the table below refers to standard model.

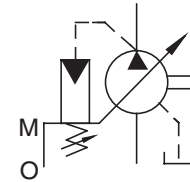
| Model Numbers | Geometric Displacement<br>cm <sup>3</sup> /rev (cu.in./rev) | Control Type |    |    |    |     |      |    |    |    |    |
|---------------|---|--------------|----|----|----|-----|------|----|----|----|----|
|               |   | 01           | 02 | 03 | 04 | 04E | 04EH | 05 | 06 | 07 | 09 |
| A10           | 10.0 (.610)   | ○            |    |    |    |     |      |    |    | ○  |    |
| A16           | 15.8 (.964)   | ○            | ○  | ○  | ○  | ○   | ○    | ○  | ○  | ○  | ○  |
| A22           | 22.2 (1.355)  | ○            | ○  | ○  | ○  | ○   | ○    |    | ○  | ○  |    |
| A37           | 36.9 (2.25)   | ○            | ○  | ○  | ○  | ○   | ○    | ○  | ○  | ○  | ○  |
| A56           | 56.2 (3.43)   | ○            | ○  | ○  | ○  | ○   | ○    | ○  | ○  | ○  | ○  |
| A70           | 70.0 (4.27)   | ○            | ○  | ○  | ○  | ○   | ○    |    | ○  | ○  | ○  |
| A90           | 91.0 (5.55)   | ○            | ○  | ○  | ○  | ○   | ○    |    | ○  | ○  |    |
| A145          | 145 (8.85)  | ○            | ○  | ○  | ○  | ○   | ○    |    | ○  | ○  | ○  |



# "A" Series Variable Displacement Piston Pumps – Single Pump, Pressure Compensator Type



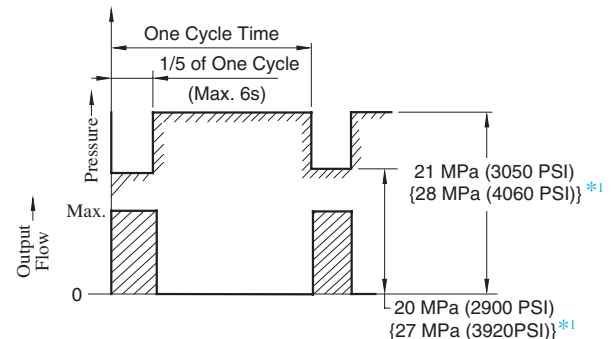
Graphic Symbol



## Specifications

| Model Numbers    | Geometric Displacement<br>cm <sup>3</sup> /rev<br>(cu. in. /rev) | Minimum Adj. Flow<br>cm <sup>3</sup> /rev<br>(cu. in. /rev) | Operating Pressure<br>MPa (PSI) |                            | Shaft Speed Range<br>r/min |      | Approx. Mass<br>kg (lbs.) |             |
|------------------|--|---|---------------------------------|----------------------------|----------------------------|------|---------------------------|-------------|
|                  |  |   | Rated <sup>*2</sup>             | Intermittent <sup>*1</sup> | Max.                       | Min. | Flange Mtg.               | Foot Mtg.   |
| A10-FR01B-12*    | 10.0 (.610)  | 2 (.122)  | 16 (2320)                       | 21 (3050)                  | 1800                       | 600  | 5.1 (11.2)                | —           |
| A10-FR01C/H-12*  |  |   |                                 |                            |                            |      | 8.5 (18.7)                |             |
| A16-*R-01-*K-32* | 15.8 (.964)  | 4 (.244)  | 16 (2320)                       | 21 (3050)                  | 1800                       | 600  | 16.5 (36.4)               | 18.7 (41.2) |
| A22-*R-01-*K-32* | 22.2 (1.355)   | 6 (.366)  | 16 (2320)                       | 16 (2320)                  | 1800                       | 600  | 16.5 (36.4)               | 18.7 (41.2) |
| A37-*R-01-*K-32* | 36.9 (2.25)  | 10 (.610)   | 16 (2320)                       | 21 (3050)                  | 1800                       | 600  | 28.0 (61.7)               | 32.3 (71.2) |
| A56-*R-01-*K-32* | 56.2 (3.43)  | 12 (.732)   | 16 (2320)                       | 21 (3050)                  | 1800                       | 600  | 35.0 (77.2)               | 39.3 (86.7) |
| A70-*R01*S-60*   | 70.0 (4.27)  | 30 (1.83)   | 25 (3630)                       | 28 (4060)                  | 1800                       | 600  | 58.5 (129)                | 70.5 (155)  |
| A90-*R01*S-60*   | 91.0 (5.55)  | 56 (3.42)   | 25 (3630)                       | 28 (4060)                  | 1800                       | 600  | 72.5 (160)                | 93 (205)    |
| A145-*R01*S-60*  | 145 (8.85)   | 83 (5.06)   | 25 (3630)                       | 28 (4060)                  | 1800                       | 600  | 92.5 (204)                | 117.5 (259) |

- ★1. Whenever setting pressure, make sure the full cut-off pressure never exceeds the maximum intermittent pressure.
- ★2. Care should be taken in cases of used at a higher pressure than the 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 six seconds simultaneously. Conditions may vary according to the actual working pressure and delivery (inclination angle of the swash plate). Consult factory or Yuken sales representative for further information.
- ★3. The table above shows specifications for using petroleum based oils. Pumps (customized design) for special fluids are also available. Their operating pressure and maximum shaft speed however differ from the values in the table above depending on the fluid type. Range of operating temperature and viscosities may differ from those of petroleum based oils due to their characteristics.



\*1. Applicable only for "A70/90/145"

## Specifications and Design numbers for Special Fluids

| Type of Fluids       | Pump Series | Operating Pressure<br>MPa (PSI) |                                      | Allowable Maximum Shaft Speed<br>r/min |                      | Temperature Range<br>°C (°F) | Viscosity Range<br>mm <sup>2</sup> /s (SSU) | Design Numbers for Special Fluid<br>(Occasion of Japanese Std. "JIS") <sup>*3</sup> |
|----------------------|-------------|---------------------------------|--------------------------------------|--|----------------------|------------------------------|---|---|
|                      |             | Rated                           | Intermittent                         | Rated                                  | Max.                 |                              |   |   |
| Water-Glycols        | A16 – A56   | 14(2030)                        | 16(2320)<br>{14(2030)} <sup>*1</sup> | 1200                                   | (1800) <sup>*2</sup> | 0 - 50 (32 - 104)            | 20 - 200(98 - 927)                          | 3230  |
|                      | A70 – A145  | 21(3050)                        | 21(3050)                             |  |                      |                              |   | 6030  |
| Phosphate Ester Type | A16 – A56   | 14(2030)                        | 16(2320)<br>{14(2030)} <sup>*1</sup> | 1200                                   | (1800) <sup>*2</sup> | 0 - 60 (32 - 140)            | 20 - 200(98 - 927)                          | 3206  |
|                      | A70 – A145  | 21(3050)                        | 21(3050)                             |  |                      |                              |   | 6006  |
| Polyol Ester Type    | A16 – A56   | 16(2320)                        | 16(2320)                             | 1800                                   | 1800                 | 0 - 60 (32 - 140)            | 20 - 200(98 - 927)                          | 32450   |
|                      | A70 – A145  | 21(3050)                        | 21(3050)                             |  |                      |                              |   | 60450   |

- ★1. The figures in brackets are for A22 type.
- ★2. As the specific gravities of water-glycol fluids and phosphate ester type fluids are higher than one, an overhead reservoir is required when pumps are operated at 1500 r/min or more.
- ★3. For the design numbers of pumps for European Design and North American Design Standards, please contact us.

**Model Number Designation**

| A16                                       | -F                    | -R   | -01                                  | -B   | -S                         | -K                       | -32           | *                      |
|---|-----------------------|--|--------------------------------------|--|----------------------------|--------------------------|---------------|------------------------|
| Series Number                             | Mounting              | Direction of Rotation                      | Control Type                         | Pres. Adj. Range MPa (PSI)   | Port Position              | Shaft Extension          | Design Number | Design Std.            |
| <b>A16</b><br>(15.8 cm <sup>3</sup> /rev) | <b>F:</b> Flange Mtg. | (Viewed from Shaft End)                    | <b>01:</b> Pressure Compensator Type | <b>B:</b> 1.2 - 7 (170 - 1020)<br><b>C:</b> 1.2 - 16 (170 - 2320)<br><b>H:</b> 1.2 - 21 (170 - 3050) | <b>None:</b><br>Axial Port | <b>K:</b><br>Keyed Shaft | <b>32</b>     | Refer to <sup>*2</sup> |
| <b>A22</b><br>(22.2 cm <sup>3</sup> /rev) |                       |  |                                      | <b>B:</b> 1.2 - 7 (170 - 1020)<br><b>C:</b> 1.2 - 16 (170 - 2320)                                    |                            |                          | <b>32</b>     |                        |
| <b>A37</b><br>(36.9 cm <sup>3</sup> /rev) | <b>L:</b> Foot Mtg.   | <b>R:</b> Clockwise (Normal) <sup>*1</sup> |                                      | <b>B:</b> 1.2 - 7 (170 - 1020)<br><b>C:</b> 1.2 - 16 (170 - 2320)<br><b>H:</b> 1.2 - 21 (170 - 3050) | <b>S:</b><br>Side Port     |                          | <b>32</b>     |                        |
| <b>A56</b><br>(56.2 cm <sup>3</sup> /rev) |                       |  |                                      |  |                            |                          | <b>32</b>     |                        |

| A70                                       | -F                                  | R                       | 01                                   | B   | S                   | -60           | *                      |
|---|-------------------------------------|-------------------------|--------------------------------------|---|---------------------|---------------|------------------------|
| Series Number                             | Mounting                            | Direction of Rotation   | Control Type                         | Pres. Adj. Range MPa (PSI)  | Port Position       | Design Number | Design Std.            |
| <b>A10</b><br>(10.0 cm <sup>3</sup> /rev) | <b>F:</b> Flange Mtg. <sup>*3</sup> | (Viewed from Shaft End) | <b>01:</b> Pressure Compensator Type | <b>B:</b> 1.2 - 7 (170 - 1020) <sup>*4</sup><br><b>C:</b> 2.0 - 16 (290 - 2320)<br><b>H:</b> 2.0 - 21 (290 - 3050)                      | —                   | <b>12</b>     | Refer to <sup>*2</sup> |
| <b>A70</b><br>(70.0 cm <sup>3</sup> /rev) | <b>F:</b> Flange Mtg.               |                         |                                      | <b>B:</b> 1.2 - 7 (170 - 1020)<br><b>C:</b> 1.5 - 16 (220 - 2320)<br><b>H:</b> 1.8 - 21 (260 - 3050)<br><b>K:</b> 2.0 - 28 (290 - 4060) | <b>S:</b> Side Port | <b>60</b>     |                        |
| <b>A90</b><br>(91.0 cm <sup>3</sup> /rev) | <b>L:</b> Foot Mtg.                 |                         |                                      | <b>R:</b> Clockwise (Normal) <sup>*1</sup>  |                     | <b>60</b>     |                        |
| <b>A145</b><br>(145 cm <sup>3</sup> /rev) |                                     |                         |                                      |   |                     | <b>60</b>     |                        |

- ★ 1. Available to supply pump with anti-clockwise rotation. Consult Yuken for details.
- ★ 2. Design Standards: None..... Japanese Standard "JIS"  
80 ..... European Design Standard  
950 ..... N. American Design Standard

- ★ 3. When A10 pump is used as the foot Mtg., order the Mtg. Bracket kit shown below separately. Refer to page 24 for dimensions of the Mtg. bracket.  
Note: The mounting bracket kit consists of a mounting bracket, two hex. bolts and two plain washer.

| Mtg. Bracket Kit Numbers | Approx. Mass kg (lbs.) |
|--------------------------|------------------------|
| LP-1A-10                 | 2.2 (4.9)              |

- ★ 4. The pressure adjustment range "B" is not available to the European Design Standard and the N. American Design Standard of "A10".

**Pipe Flange Kits**

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

| Pump Model Numbers     | Name of Port | Pipe Flange Kit Numbers |                      |                                       |  |                                       |  |                                       |
|------------------------|--------------|-------------------------|----------------------|---------------------------------------|--|---------------------------------------|--|---------------------------------------|
|                        |              | Threaded Connection     |                      |                                       | Socket Welding <sup>*1</sup>             |                                       | Butt Welding                             |                                       |
|                        |              | Japanese Std. "JIS"     | European Design Std. | N. American Design Std. <sup>*2</sup> | Japanese Std. "JIS" European Design Std. | N. American Design Std. <sup>*2</sup> | Japanese Std. "JIS" European Design Std. | N. American Design Std. <sup>*2</sup> |
| A16- <sup>*</sup> R-01 | Suction      | F5-06-A-10              | F5-06-A-1080         | —                                     | F5-06-B-10                               | F5-06-B-1090                          | F5-06-C-10                               | F5-06-C-1090                          |
| A22- <sup>*</sup> R-01 | Discharge    | F5-06-A-10              | F5-06-A-1080         | —                                     | F5-06-B-10                               | F5-06-B-1090                          | F5-06-C-10                               | F5-06-C-1090                          |
| A37- <sup>*</sup> R-01 | Suction      | F5-10-A-10              | F5-10-A-1080         | —                                     | F5-10-B-10                               | F5-10-B-1090                          | F5-10-C-10                               | F5-10-C-1090                          |
| A56- <sup>*</sup> R-01 | Discharge    | F5-10-A-10              | F5-10-A-1080         | —                                     | F5-10-B-10                               | F5-10-B-1090                          | F5-10-C-10                               | F5-10-C-1090                          |
| A70- <sup>*</sup> R01  | Suction      | F5-12-A-10              | F5-12-A-1080         | —                                     | F5-12-B-10                               | F5-12-B-1090                          | F5-12-C-10                               | F5-12-C-1090                          |
|                        | Discharge    | F5-08-A-10              | F5-08-A-1080         | —                                     | F5-08-B-10                               | F5-08-B-1090                          | F5-08-C-10                               | F5-08-C-1090                          |
| A90- <sup>*</sup> R01  | Suction      | F5-16-A-10              | F5-16-A-1080         | —                                     | F5-16-B-10                               | F5-16-B-1090                          | F5-16-C-10                               | F5-16-C-1090                          |
| A145- <sup>*</sup> R01 | Discharge    | F5-10-A-10              | F5-10-A-1080         | —                                     | F5-10-B-10                               | F5-10-B-1090                          | F5-10-C-10                               | F5-10-C-1090                          |

- ★ 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. As dimensions of the pipe flange mounting surface are conformed to SAE 4 Bolt Split Flange (Standard Pressure Series), pipe flanges conforming to the SAE Standards can be used.
- Details of the pipe flange kits are shown on page 824.

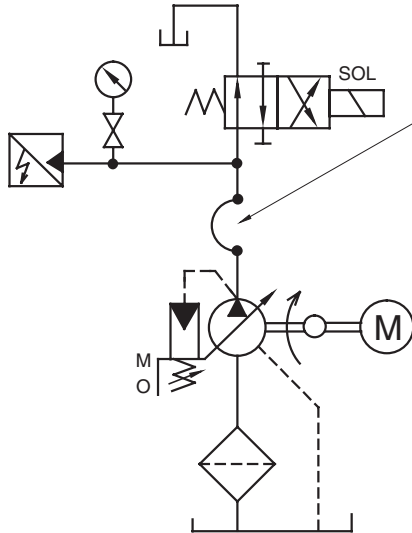




### Response Characteristics Change in Accordance with Circuits and Operating Conditions.

#### Test Circuit and Conditions

##### Circuit



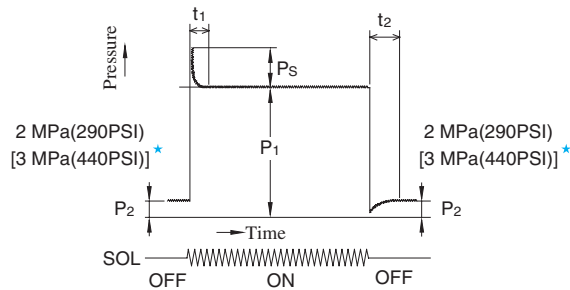
##### Conditions

- Drive Speed : 1500 r/min
- Hydraulic Fluid : ISO VG32 oil
- Oil Temperature : A10-A56: 50 °C (122 °F) [Viscosity 20 mm<sup>2</sup>/s (100 SSU)]  
A70-A145: 40 °C (104 °F) [Viscosity 32 mm<sup>2</sup>/s (150 SSU)]

#### High Pressure Rubber Hose

| Model       | Ruber Hose Size   |
|-------------|---|
| A10         | 1/2" × 800 mm (2.6 ft.)                                     |
| A16<br>A22  | 3/4" × 700 mm (2.3 ft.)                                     |
| A37<br>A56  | 3/4" × 2000 mm (6.6 ft.)                                    |
| A70         | 3/4" × 3500 mm (11.5 ft.)                                   |
| A90<br>A145 | 3/4" × 3000 mm (9.8 ft.)<br>+<br>1-1/4" × 2000 mm (6.6 ft.) |

#### Result of Measurement



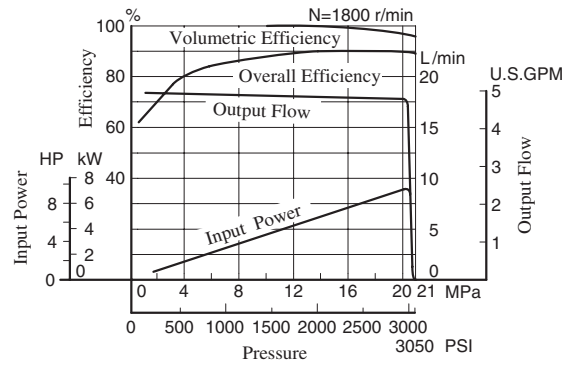
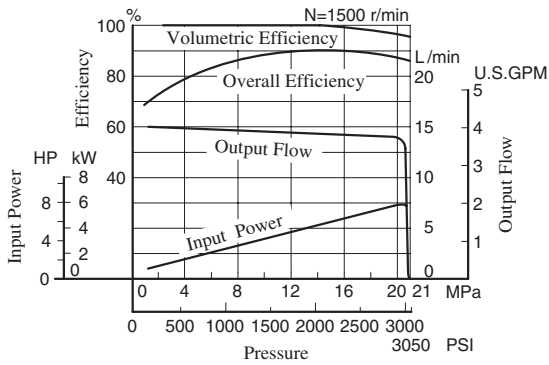
★ Applicable only for "A90/A145"

| Model | Full Cut-off Pressure P <sub>1</sub> MPa (PSI) | Response Time ms |                | Overshoot Pressure P <sub>S</sub> MPa (PSI) |
|-------|--|------------------|----------------|---|
|       |  | t <sub>1</sub>   | t <sub>2</sub> |   |
| A10   | 21 (3050)                                      | 100              | 75             | 2.6 (380)                                   |
| A16   | 16 (2320)                                      | 38*              | 59*            | 3.6 (520)                                   |
| A22   | 16 (2320)                                      | 30*              | 72*            | 5.9 (860)                                   |
| A37   | 16 (2320)                                      | 40*              | 78*            | 7.8 (1130)                                  |
| A56   | 16 (2320)                                      | 38*              | 88*            | 7.6 (1100)                                  |
| A70   | 25 (3630)                                      | 80               | 100            | 7.8 (1130)                                  |
| A90   | 25 (3630)                                      | 90               | 110            | 7.9 (1150)                                  |
| A145  | 25 (3630)                                      | 100              | 150            | 8.8 (1280)                                  |

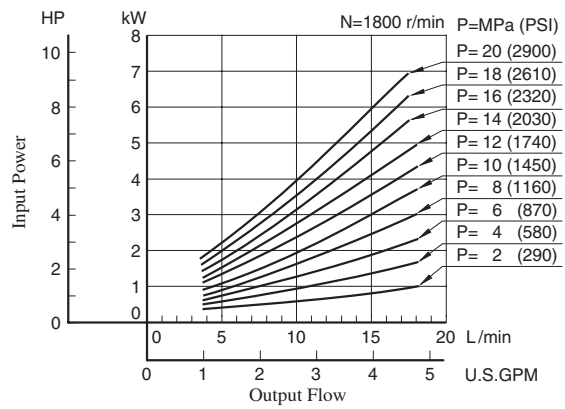
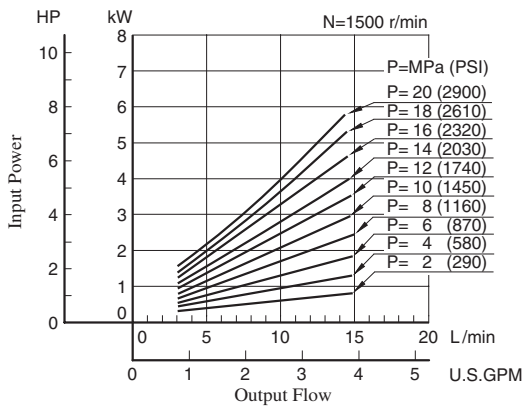
\* Response time except A10, A70, A90 and A145 is measured Yoke travel.

Typical Performance Characteristics of Type "A10" at Viscosity 20 mm<sup>2</sup>/s (100 SSU) [ISO VG32 Oils, 50°C (122°F)]

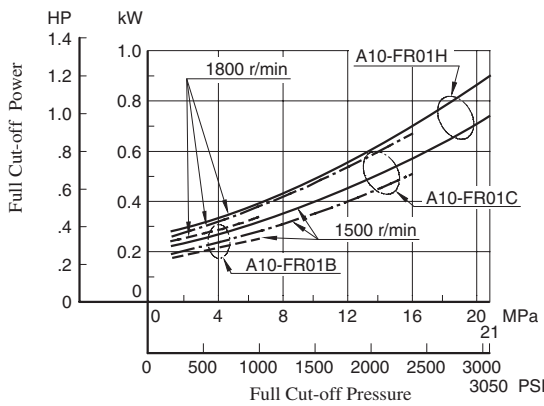
■ Performance Characteristic Curve



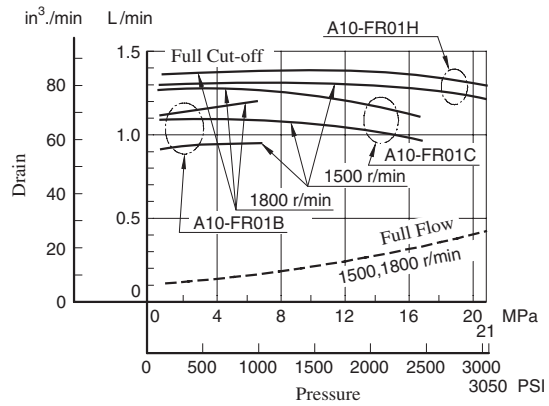
■ Input Power



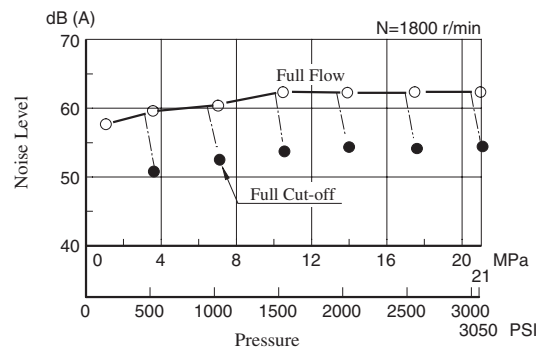
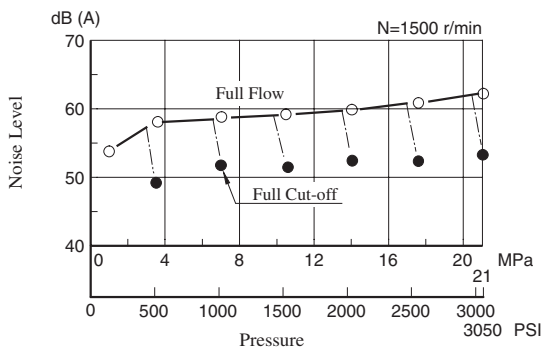
■ Full Cut-off Power

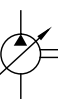


■ Drain



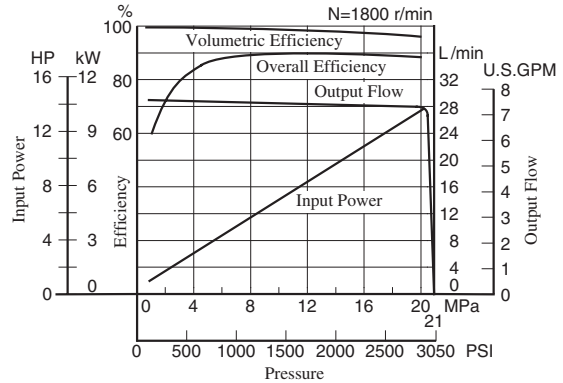
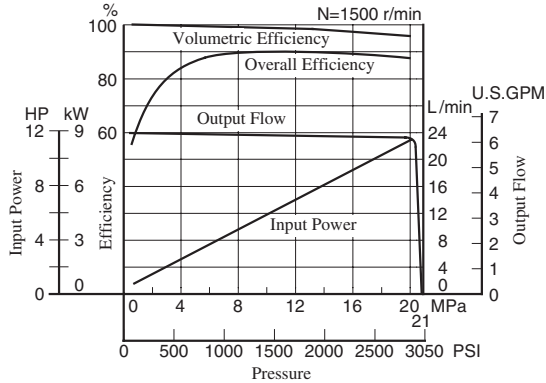
■ Noise Level [One metre (3.3 ft.) horizontally away from pump head cover]





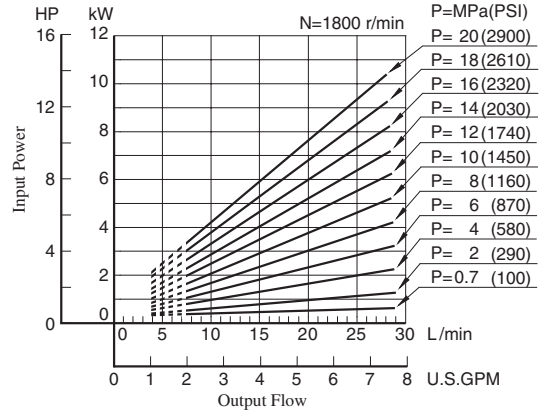
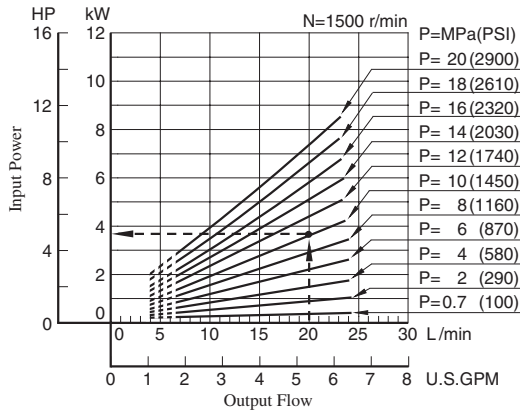
Typical Performance Characteristics of Type "A16" at Viscosity 20 mm<sup>2</sup>/s (100 SSU) [ISO VG32 Oils, 50°C (122°F)]

### Performance Characteristic Curve

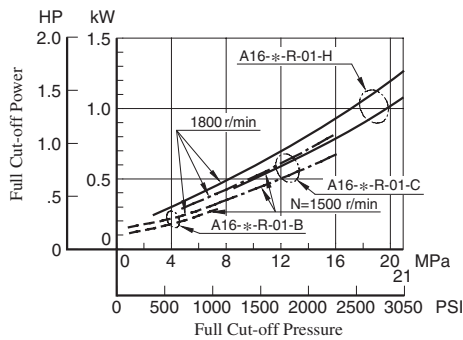


### Input Power

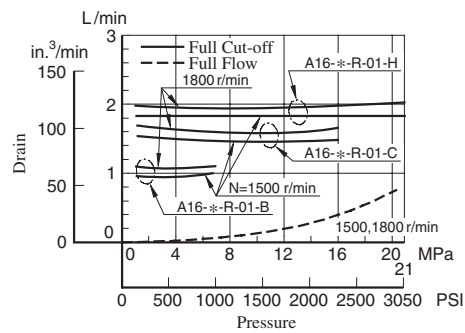
Example: At a pressure of under 10 MPa (1450 PSI), a flow 20 L/min (5.3 U.S.GPM), and rotation 1500 r/min, the axial input becomes about 3.7 kW (5 HP) as shown the dotted line in the graph.



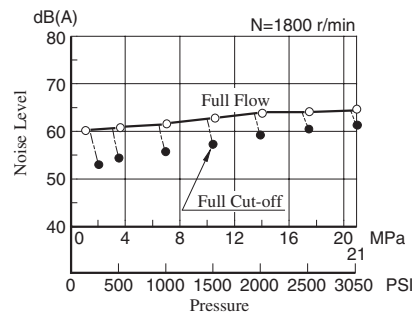
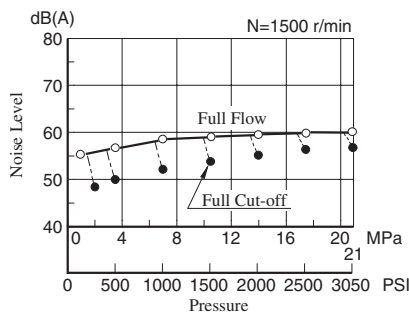
### Full Cut-off Power



### Drain

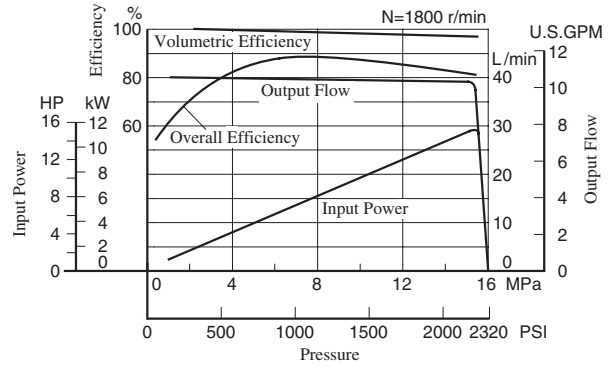
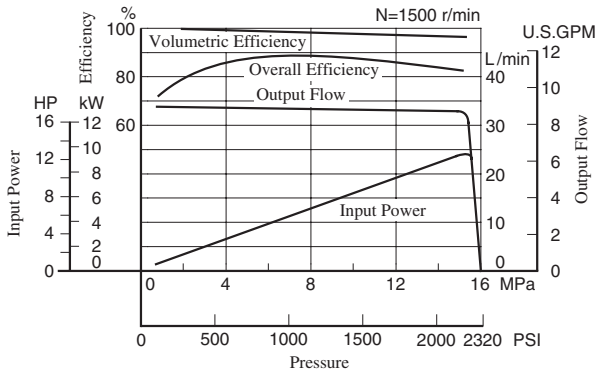


### Noise Level [One metre (3.3 ft.) horizontally away from pump head cover]



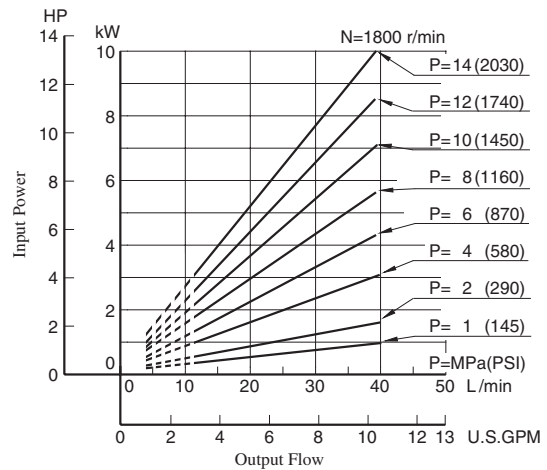
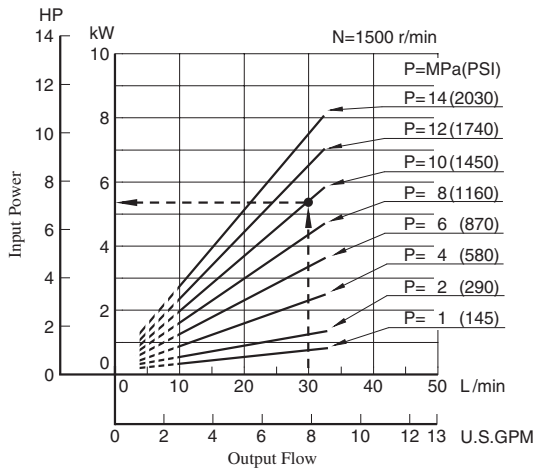
Typical Performance Characteristics of Type "A22" at Viscosity 20 mm<sup>2</sup>/s (100 SSU) [ISO VG32 Oils, 50°C (122°F)]

■ Performance Characteristic Curve

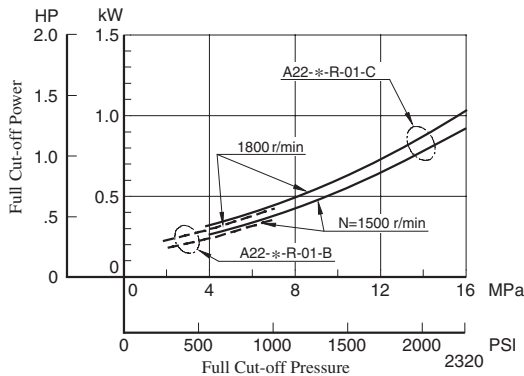


■ Input Power

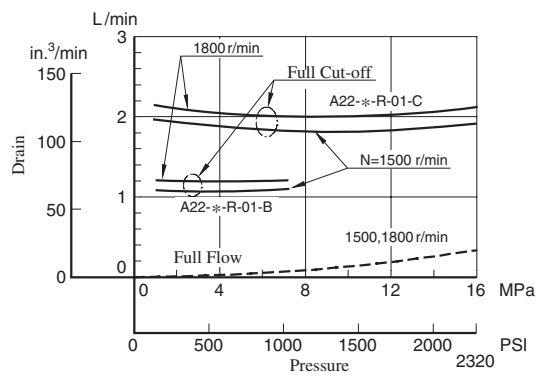
Example: At a pressure of under 10 MPa (1450 PSI), a flow 30 L/min (7.9 U.S.GPM), and rotation 1500 r/min, the axial input becomes about 5.4 kW (7.2 HP) as shown the dotted line in the graph.



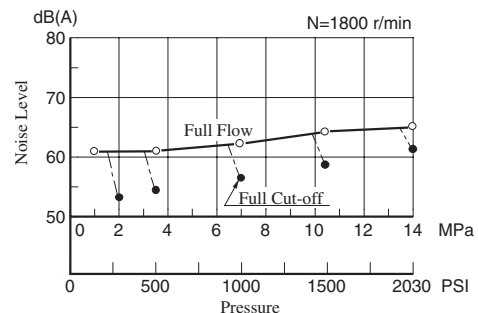
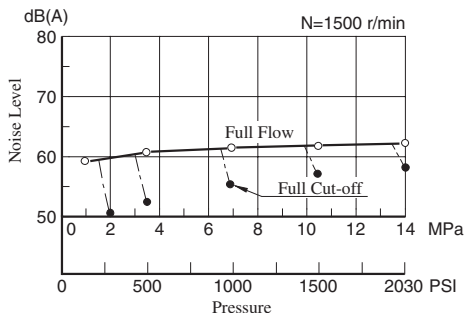
■ Full Cut-off Power

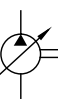


■ Drain



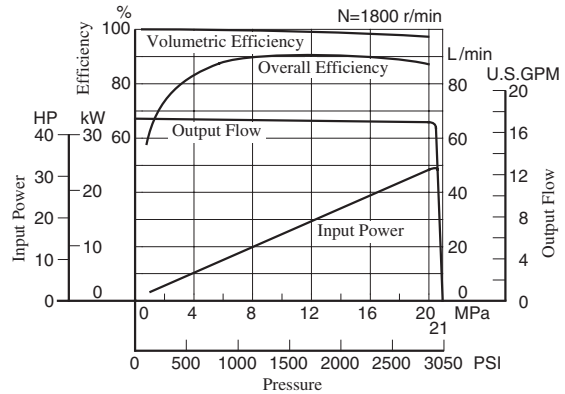
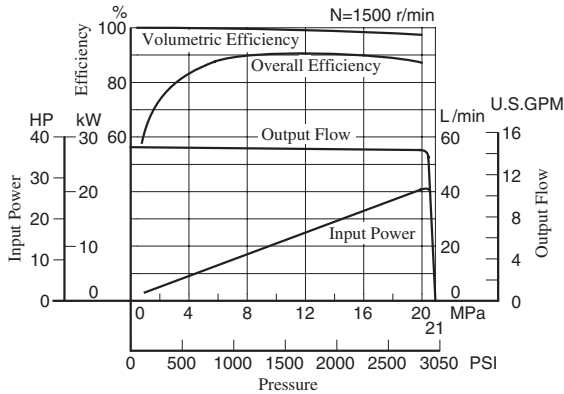
■ Noise Level [One metre (3.3 ft.) horizontally away from pump head cover]





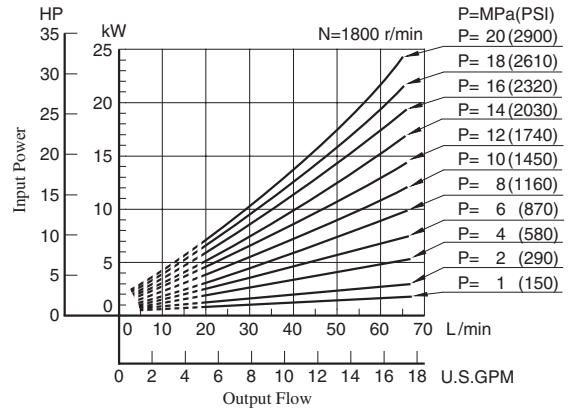
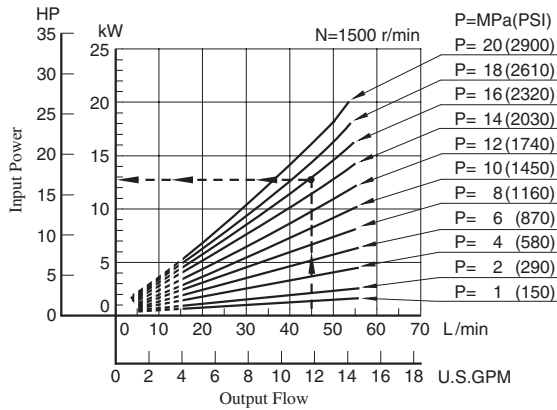
Typical Performance Characteristics of Type "A37" at Viscosity 20 mm<sup>2</sup>/s (100 SSU) [ISO VG32 Oils, 50°C (122°F)]

## Performance Characteristic Curve

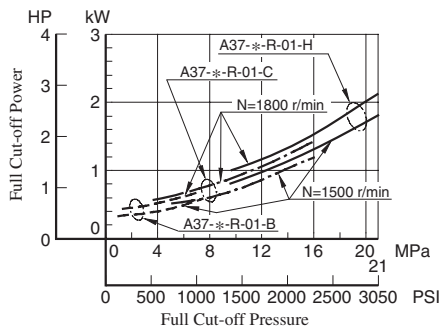


## Input Power

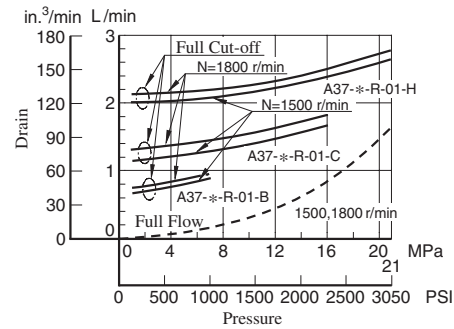
Example: At a pressure of under 16 MPa (2320 PSI), a flow 45 L/min (11.9 U.S.GPM), and rotation 1500 r/min, the axial input becomes about 12.6 kW (16.9 HP) as shown the dotted line in the graph.



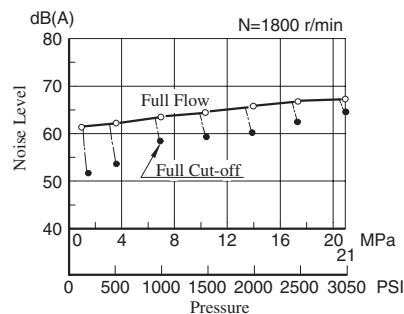
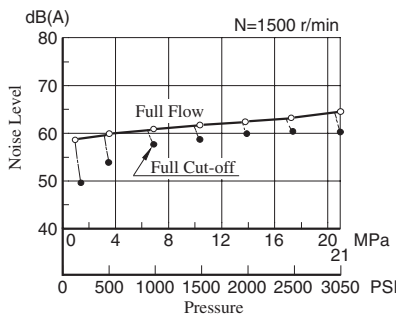
## Full Cut-off Power



## Drain

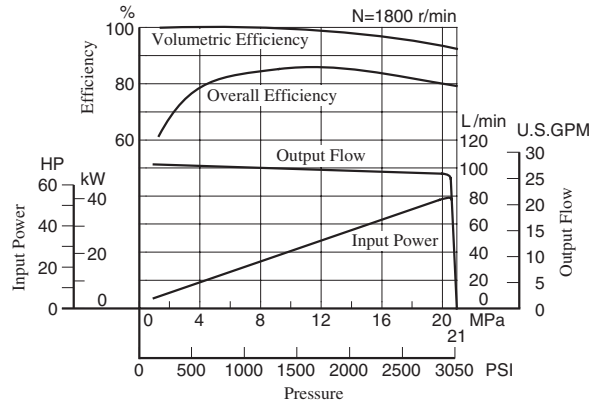
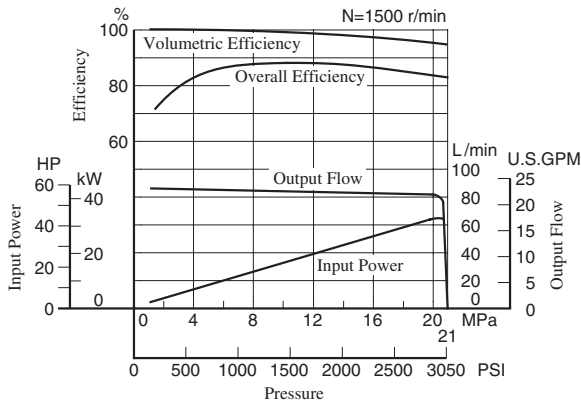


## Noise Level [One metre (3.3 ft.) horizontally away from pump head cover]



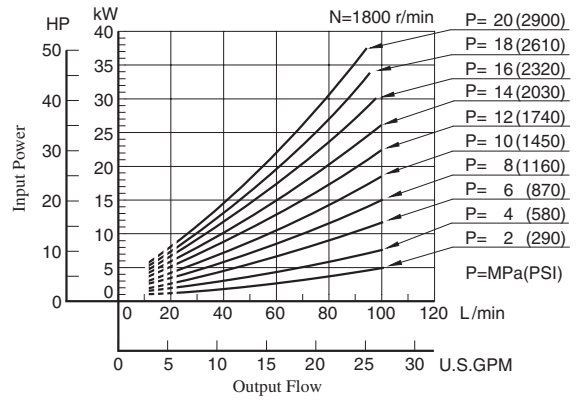
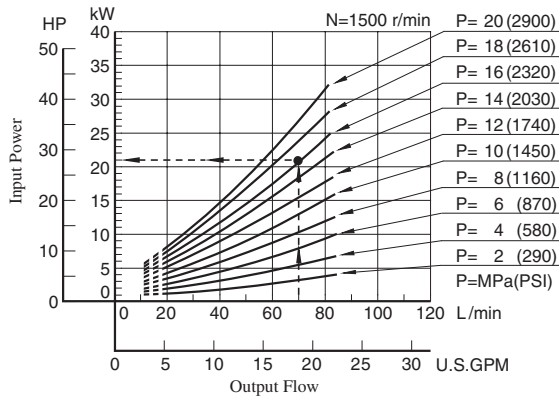
Typical Performance Characteristics of Type "A56" at Viscosity 20 mm<sup>2</sup>/s (100 SSU) [ISO VG32 Oils, 50°C (122°F)]

■ Performance Characteristic Curve

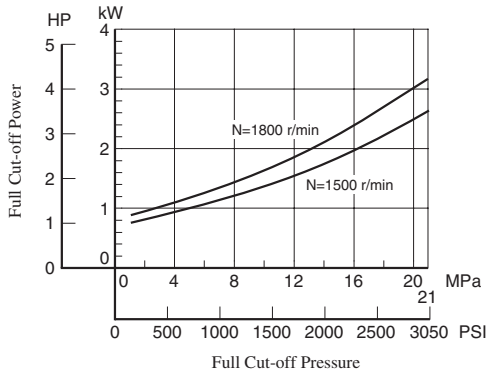


■ Input Power

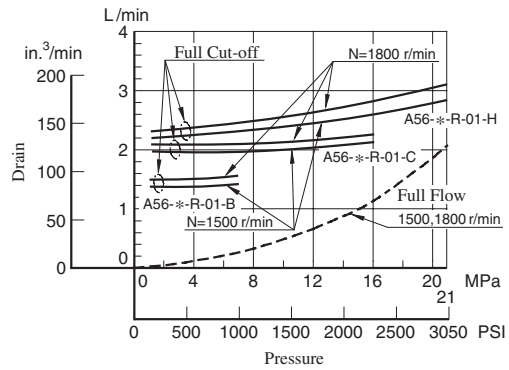
Example: At a pressure of under 16 MPa (2320 PSI), a flow 70 L/min (18.5 U.S.GPM), and rotation 1500 r/min, the axial input becomes about 20.8 kW (27.9 HP) as shown the dotted line in the graph.



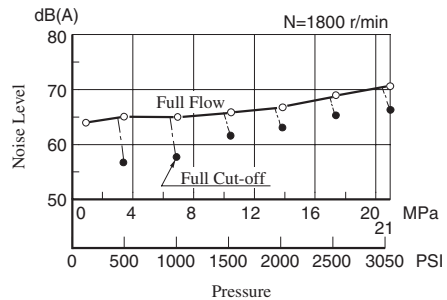
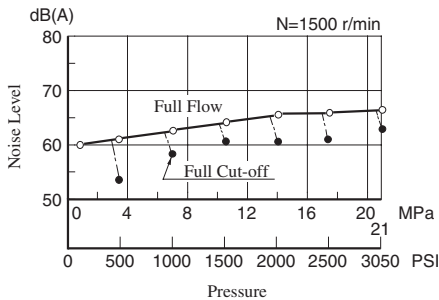
■ Full Cut-off Power

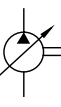


■ Drain



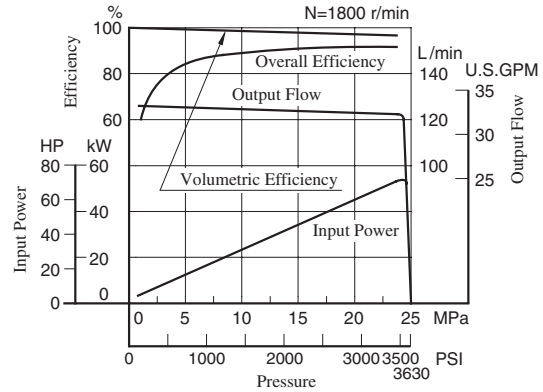
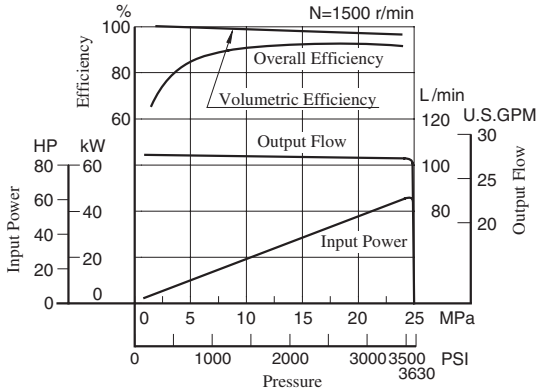
■ Noise Level [One metre (3.3 ft.) horizontally away from pump head cover]





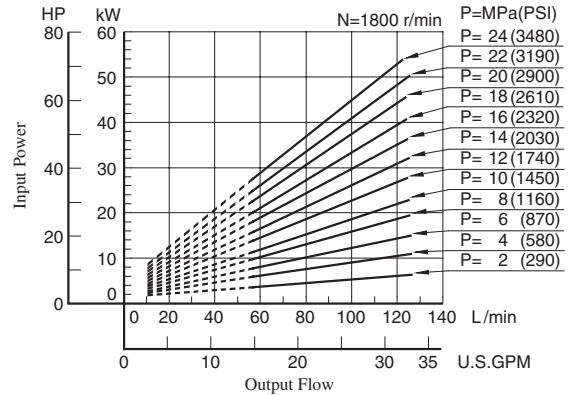
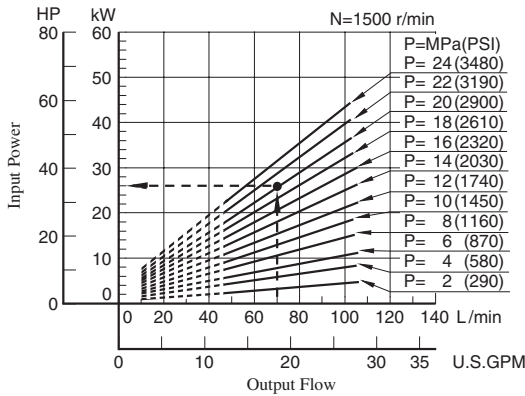
Typical Performance Characteristics of Type "A70" at Viscosity 32 mm<sup>2</sup>/s (150 SSU) [ISO VG32 Oils, 40°C (104°F)]

## Performance Characteristics Curve

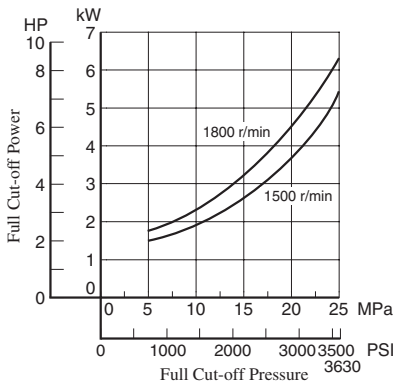


## Input Power

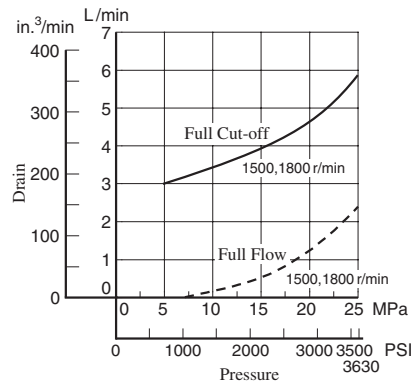
Example: At a pressure of under 20 MPa (2900 PSI), a flow 70 L/min (18.5 U.S.GPM), and rotation 1500 r/min, the axial input becomes about 26 kW (35 HP) as shown the dotted line in the graph.



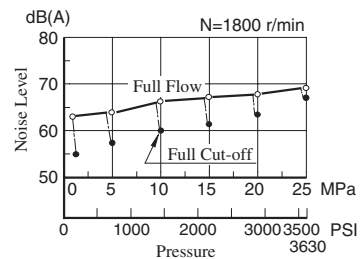
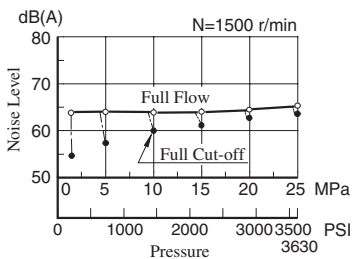
## Full Cut-off Power



## Drain

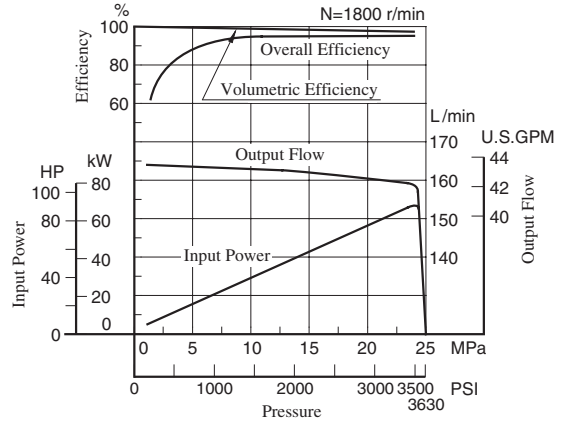
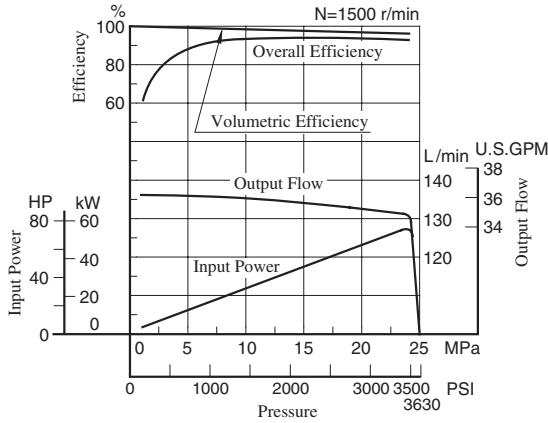


## Noise Level [One metre (3.3 ft.) horizontally away from pump head cover]



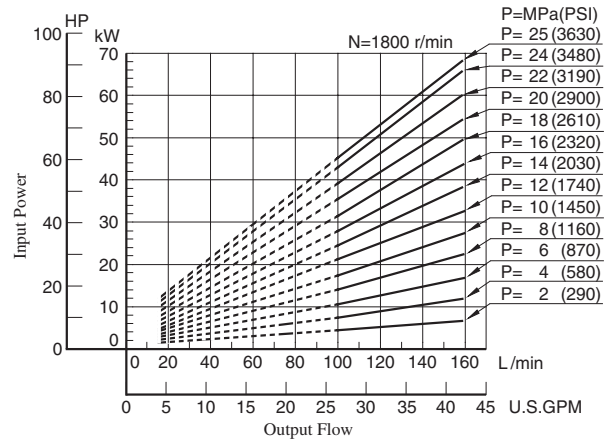
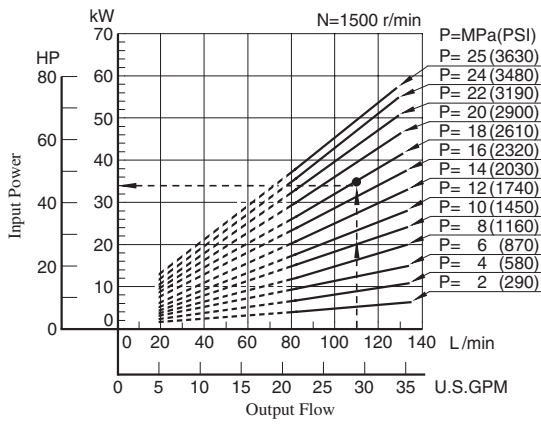
Typical Performance Characteristics of Type "A90" at Viscosity 32 mm<sup>2</sup>/s (150 SSU) [ISO VG32 Oils, 40°C (104°F)]

■ Performance Characteristics Curve

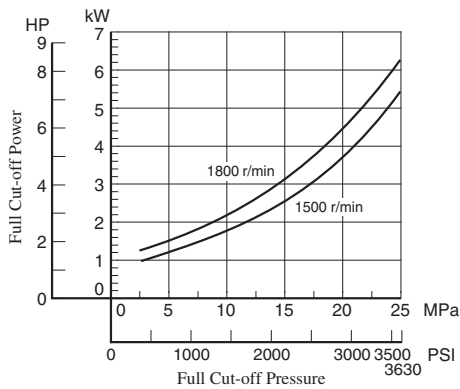


■ Input Power

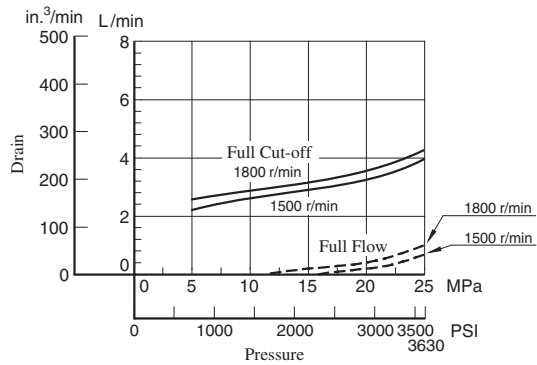
Example: At a pressure of under 18 MPa (2610 PSI), a flow 110 L/min (29.1 U.S.GPM), and rotation 1500 r/min, the axial input becomes about 34 kW (46 HP) as shown the dotted line in the graph.



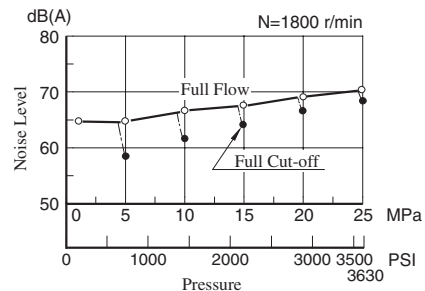
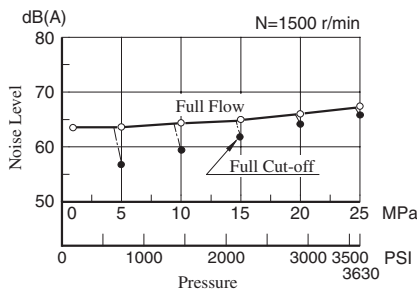
■ Full Cut-off Power



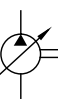
■ Drain



■ Noise Level [One metre (3.3 ft.) horizontally away from pump head cover]

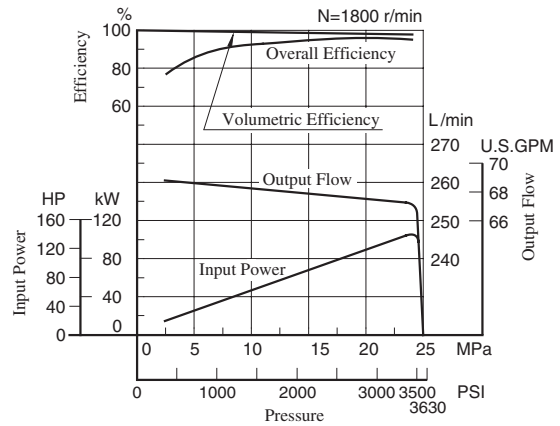
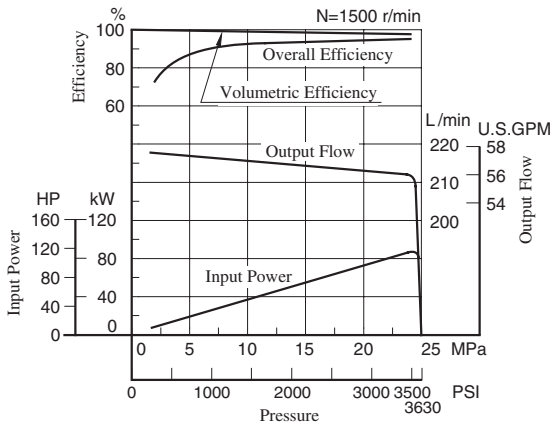






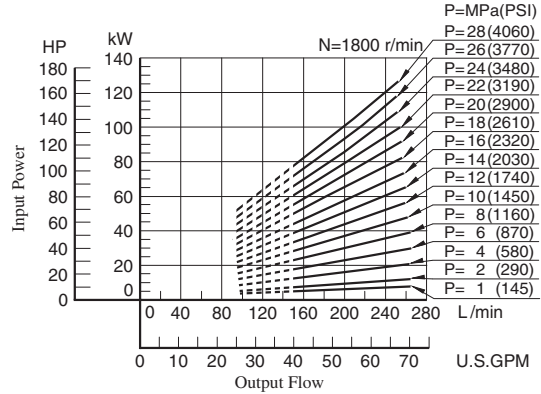
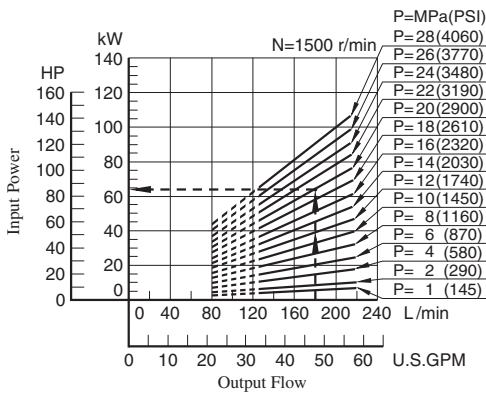
### Typical Performance Characteristics of Type "A145" at Viscosity 32 mm<sup>2</sup>/s (150 SSU) [ISO VG32 Oils, 40°C (104°F)]

#### Performance Characteristics Curve

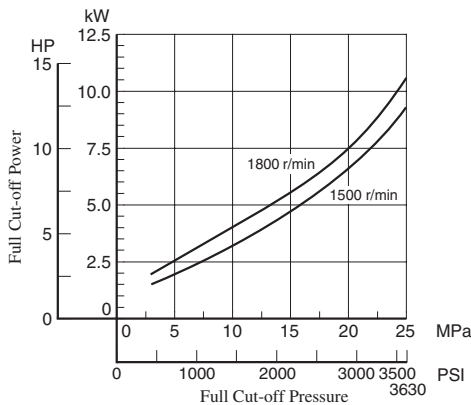


#### Input Power

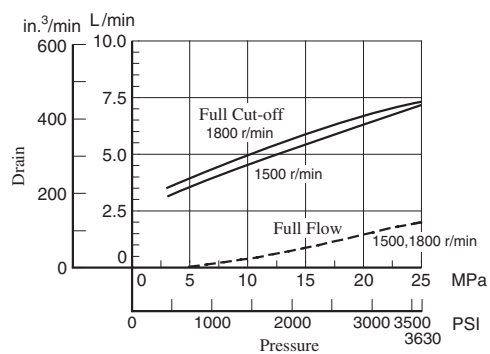
Example: At a pressure of under 20 MPa (2900 PSI), a flow 180 L/min (47.6 U.S.GPM), and rotation 1500 r/min, the axial input becomes about 64 kW (86 HP) as shown the dotted line in the graph.



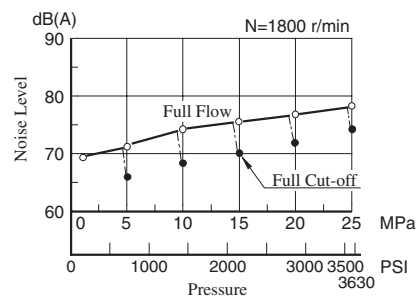
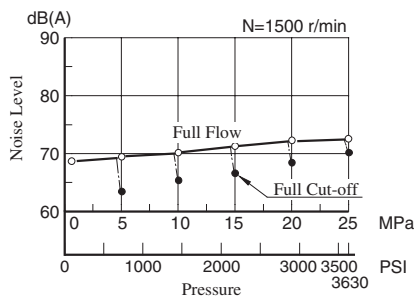
#### Full Cut-off Power



#### Drain



#### Noise Level [One metre (3.3 ft.) horizontally away from pump head cover]

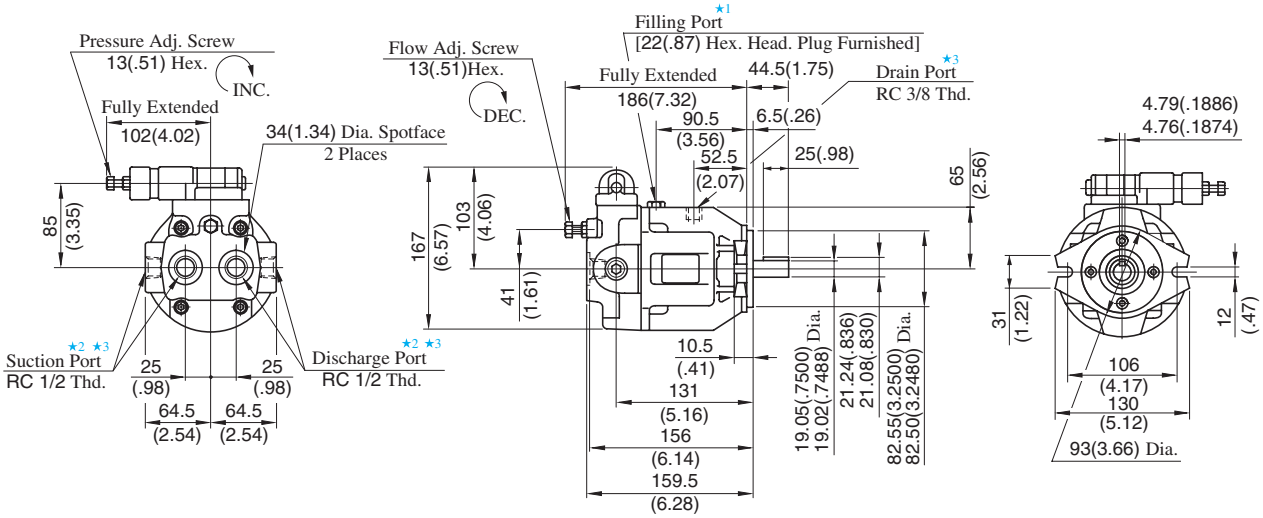


**Flange Mtg.**

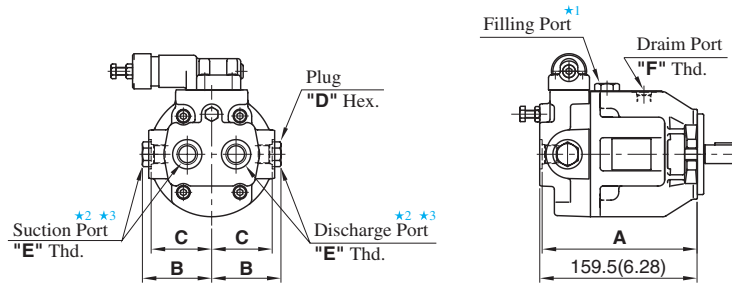
**DIMENSIONS IN MILLIMETRES (INCHES)**

**Pressure Adjustment Range "C" & "H"**

- Japanese Standard "JIS": A10-FR01-C/H-12



- European Design Standard: A10-FR01-C/H-1280
- N. American Design Standard: A10-FR01-C/H-12950

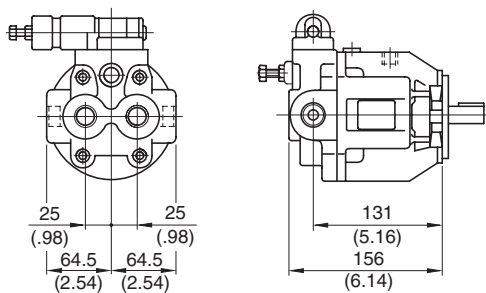


| Model Numbers     | Dimensions mm(Inches) |              |              |              | Thread Size |            |
|-------------------|-----------------------|--------------|--------------|--------------|-------------|------------|
|                   | A                     | B            | C            | D            | E           | F          |
| A10-FR01C/H-1280  | 159<br>(6.25)         | 72<br>(2.83) | 64<br>(2.52) | 27<br>(1.06) | 1/2 BSP. F  | 3/8 BSP. F |
| A10-FR01C/H-12950 | 157<br>(6.18)         | 71<br>(2.80) | 62<br>(2.44) | 22<br>(.87)  | SAE #8      | SAE #6     |

● For other dimensions, refer to Japanese Standard "JIS".

**Pressure Adjustment Range "B"**

- Japanese Standard "JIS": A10-FR01-B-12



● For other dimensions, refer to above Pressure Adj. Range "C" & "H".

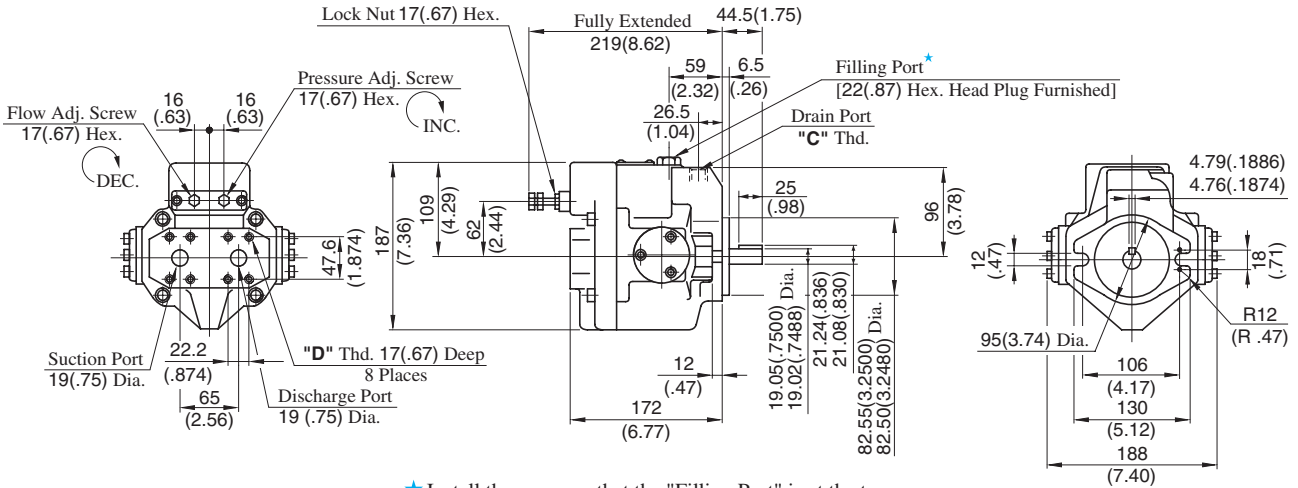
- ★ 1. Install the pump so that the "Filling Port" is at the top.
- ★ 2. Use either port of two suction and discharge ports at your option. Keep the remaining ports plugged.
- ★ 3. As the tightening torques of suction, discharge and drain port fittings, conform to the below.

| Model Numbers     | Tightening Torque Nm(IN. lbs.) |                 |
|-------------------|--------------------------------|-----------------|
|                   | Suction Port & Discharge Port  | Drain Port      |
| A10-FR01B/C/H-12  | 65-75 (575-664)                | 40-50 (354-443) |
| A10-FR01C/H-1280  | 56-62 (496-549)                | 33-36 (292-319) |
| A10-FR01C/H-12950 | 47-51 (363-451)                | 40-50 (354-443) |

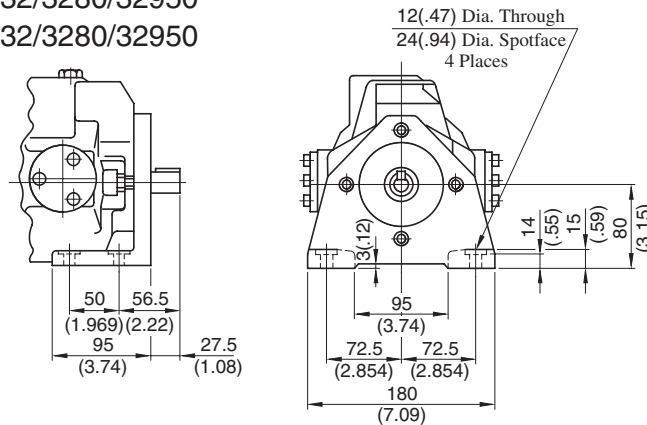
Axial Port Type

Flange Mtg.: A16-F-R-01-\*-K-32/3280/32950  
A22-F-R-01-\*-K-32/3280/32950

| Model Numbers           | "C" Thd.  | "D" Thd.   |
|-------------------------|-----------|------------|
| A16/A22-F-R-01-*-K-32   | Rc 3/8    | M 10       |
| A16/A22-F-R-01-*-K-3280 | 3/8 BSP.F |            |
| A16/A22-F-R-01-*-K-3290 | SAE #8    | 3/8-16 UNC |



Foot Mtg.: A16-L-R-01-\*-K-32/3280/32950  
A22-L-R-01-\*-K-32/3280/32950

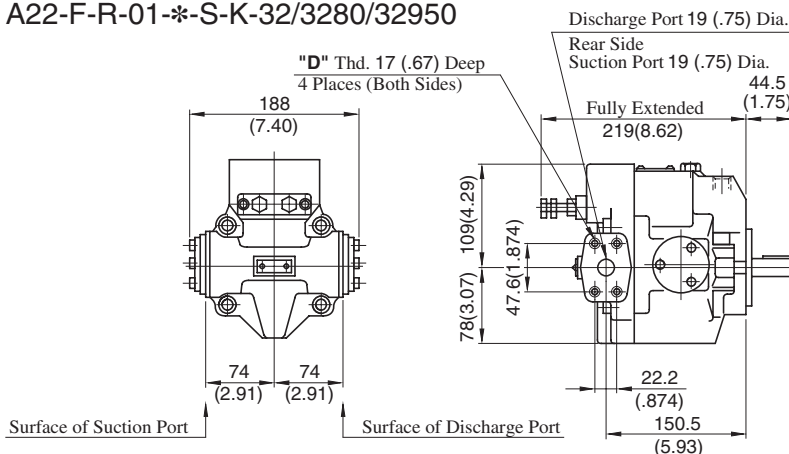


• For other dimensions, refer to "Flange Mtg.".

Side Port Type

DIMENSIONS IN MILLIMETRES (INCHES)

Flange Mtg.: A16-F-R-01-\*-S-K-32/3280/32950  
A22-F-R-01-\*-S-K-32/3280/32950

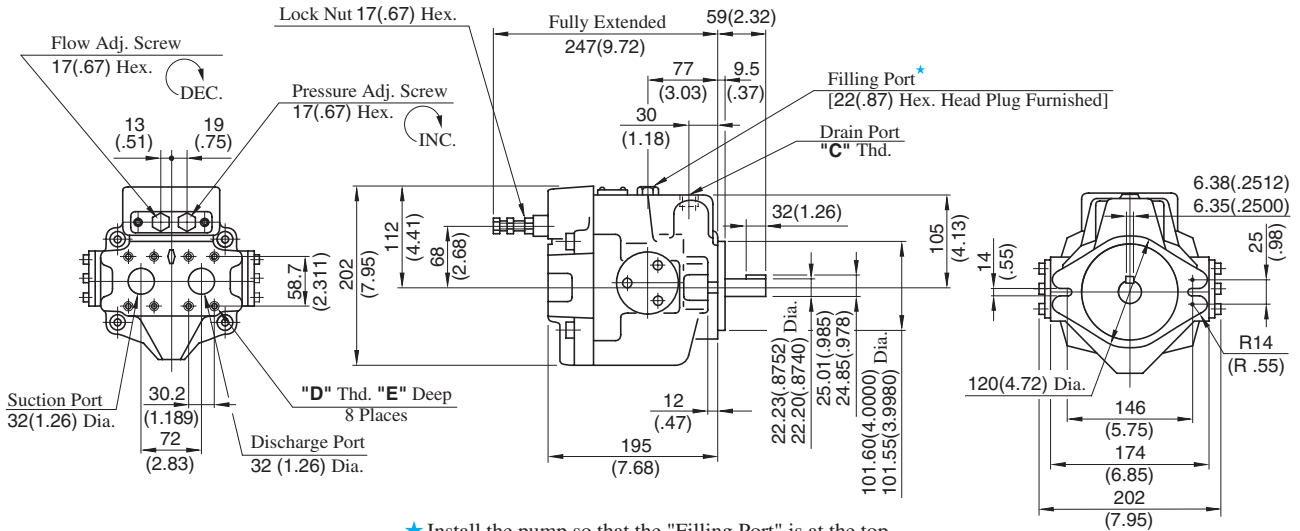


• For other dimensions, refer to "Axial Port Type".  
• Foot Mtg. Type; Mounting bracket is common to that of "Axial Port Type".

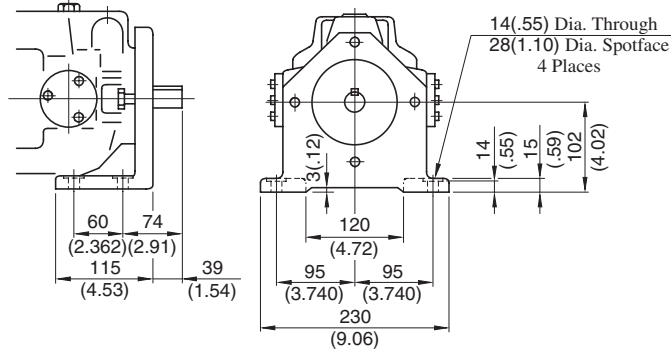
**Axial Port Type**

Flange Mtg.: A37-F-R-01-\*-K-32/3280/32950

| Model Numbers        | "C" Thd.  | "D" Thd.    | E<br>mm (IN.) |
|----------------------|-----------|-------------|---------------|
| A37-F-R-01-*-K-32    | Rc 1/2    | M 10        | 19 (.75)      |
| A37-F-R-01-*-K-3280  | 1/2 BSP.F |             |               |
| A37-F-R-01-*-K-32950 | SAE #10   | 7/16-14 UNC | 20 (.79)      |



Foot Mtg.: A37-L-R-01-\*-K-32/3280/32950

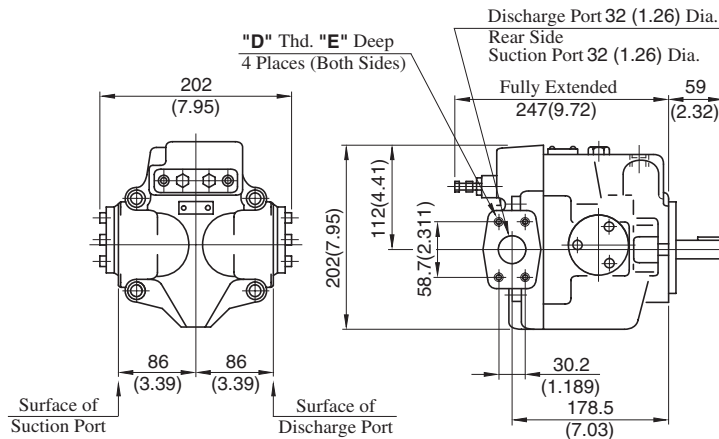


• For other dimensions, refer to "Flange Mtg.".

**Side Port Type**

**DIMENSIONS IN MILLIMETRES (INCHES)**

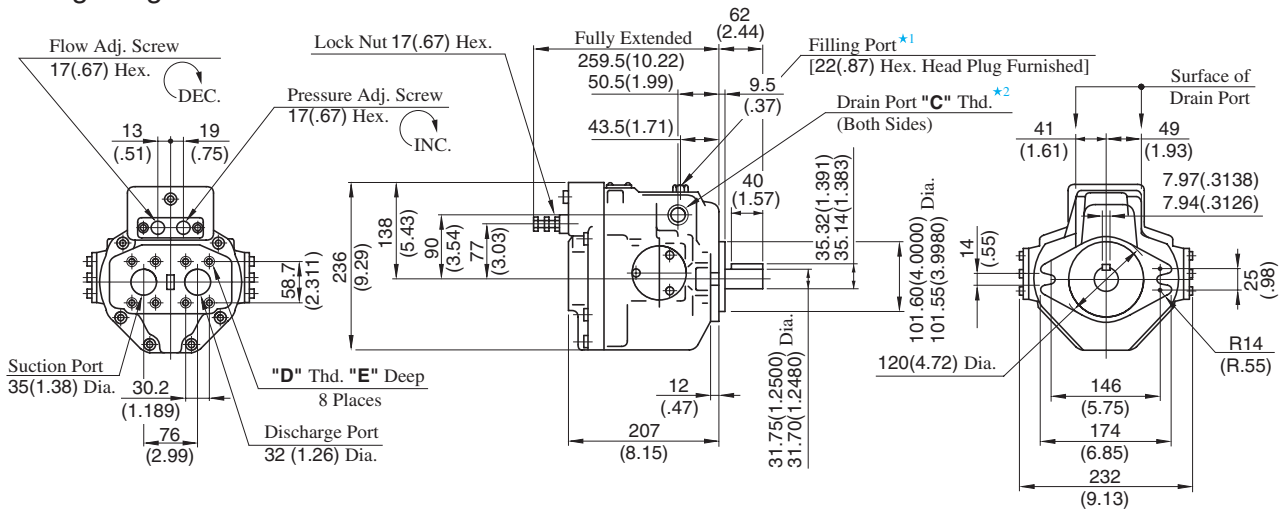
Flange Mtg.: A37-F-R-01-\*-S-K-32/3280/32950



• For other dimensions, refer to "Axial Port Type".  
 • Foot Mtg. Type; Mounting bracket is common to that of "Axial Port Type".

Axial Port Type

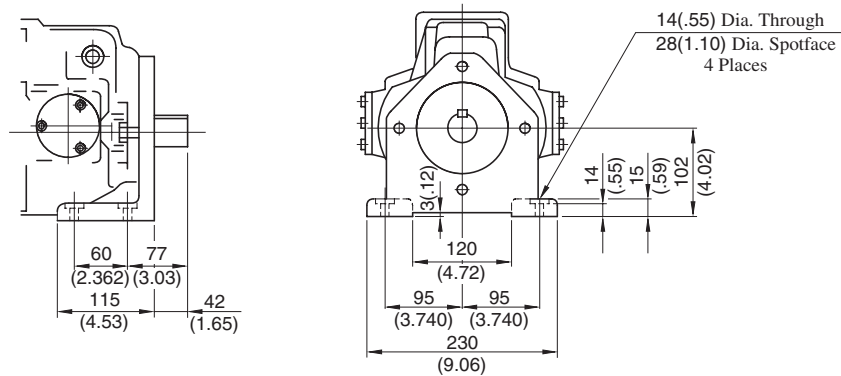
Flange Mtg.: A56-F-R-01-*\**-K-32/3280/32950



| Model Numbers                 | "C" Thd.  | "D" Thd.    | E mm (IN.) |
|-------------------------------|-----------|-------------|------------|
| A56-F-R-01- <i>*</i> -K-32    | Rc 3/4    | M 10        | 19 (.75)   |
| A56-F-R-01- <i>*</i> -K-3280  | 3/4 BSP.F | M 10        | 19 (.75)   |
| A56-F-R-01- <i>*</i> -K-32950 | SAE #12   | 7/16-14 UNC | 20 (.79)   |

- \*1. Install the pump so that the "Filling Port" is at the top.
- \*2. Use either port of the two drain ports at your option. Keep the remaining port plugged.

Foot Mtg.: A56-L-R-01-*\**-K-32/3280/32950

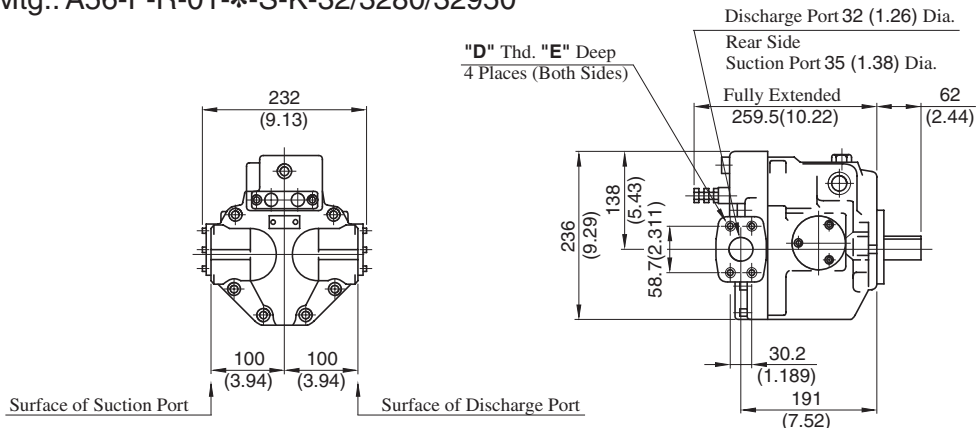


• For other dimensions, refer to "Flange Mtg.".

Side Port Type

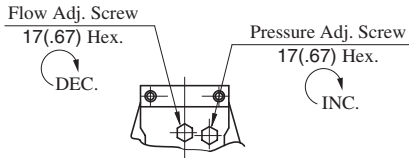
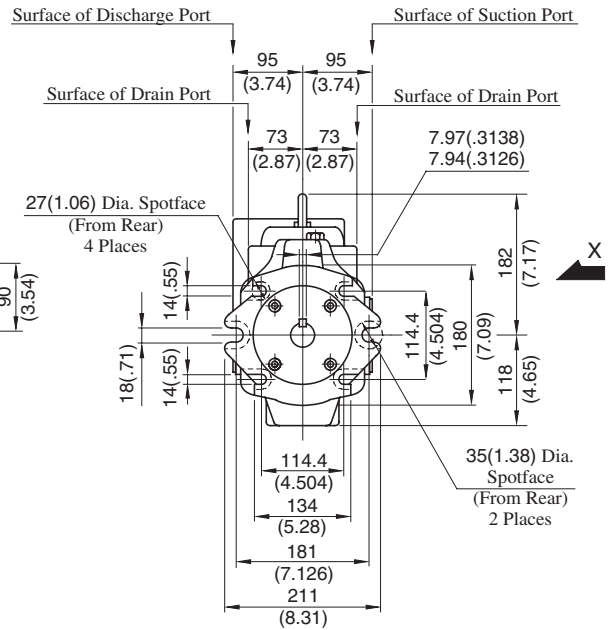
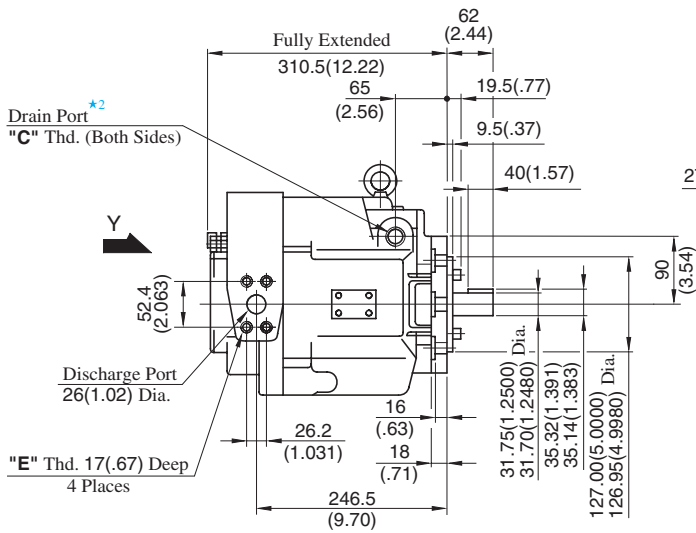
DIMENSIONS IN MILLIMETRES (INCHES)

Flange Mtg.: A56-F-R-01-*\**-S-K-32/3280/32950

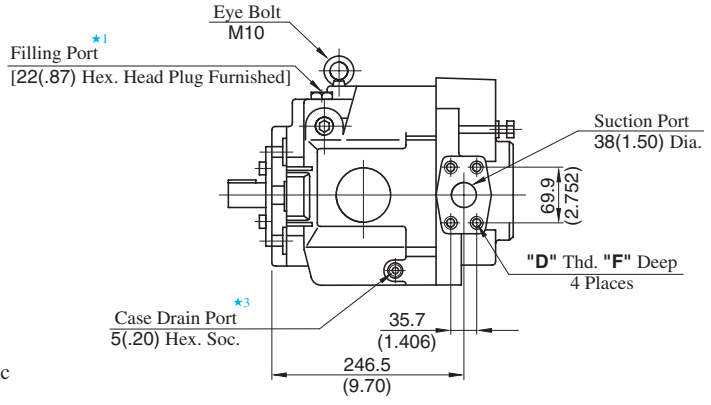


- For other dimensions, refer to "Axial Port Type".
- Foot Mtg. Type; Mounting bracket is common to that of "Axial Port Type".

**Flange Mtg.: A70-FR01\*S-60/6080/60950**



**View Arrow Y**



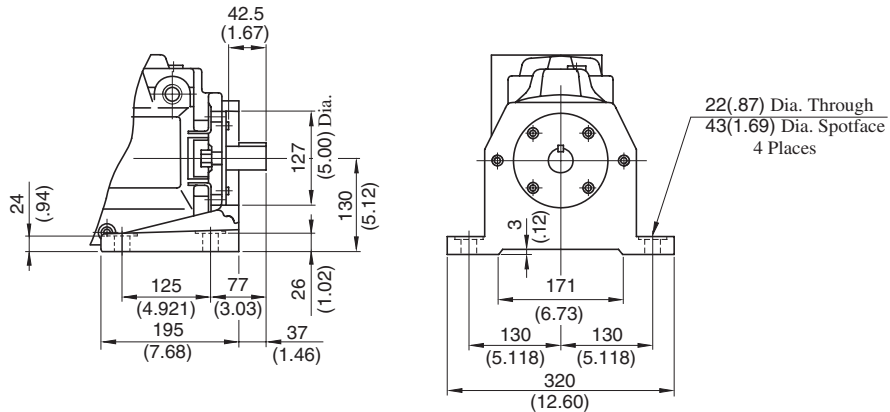
**View Arrow X**

- ★ 1. Install the pump so that the "Filling Port" is at the top.
- ★ 2. Use either port of the two drain ports at your option. Keep the remaining port plugged.
- ★ 3. Case drain port is available for use when draining hydraulic fluid from pump casing.

| Model Numbers    | "C" Thd.  | "D" Thd.   | "E" Thd.   | F<br>mm (IN.) |
|------------------|-----------|------------|------------|---------------|
| A70-FR01*S-60    | Rc 3/4    | M 12       | M 10       | 19 (.75)      |
| A70-FR01*S-6080  | 3/4 BSP.F |            |            |               |
| A70-FR01*S-60950 | SAE #12   | 1/2-13 UNC | 3/8-16 UNC | 21 (.83)      |

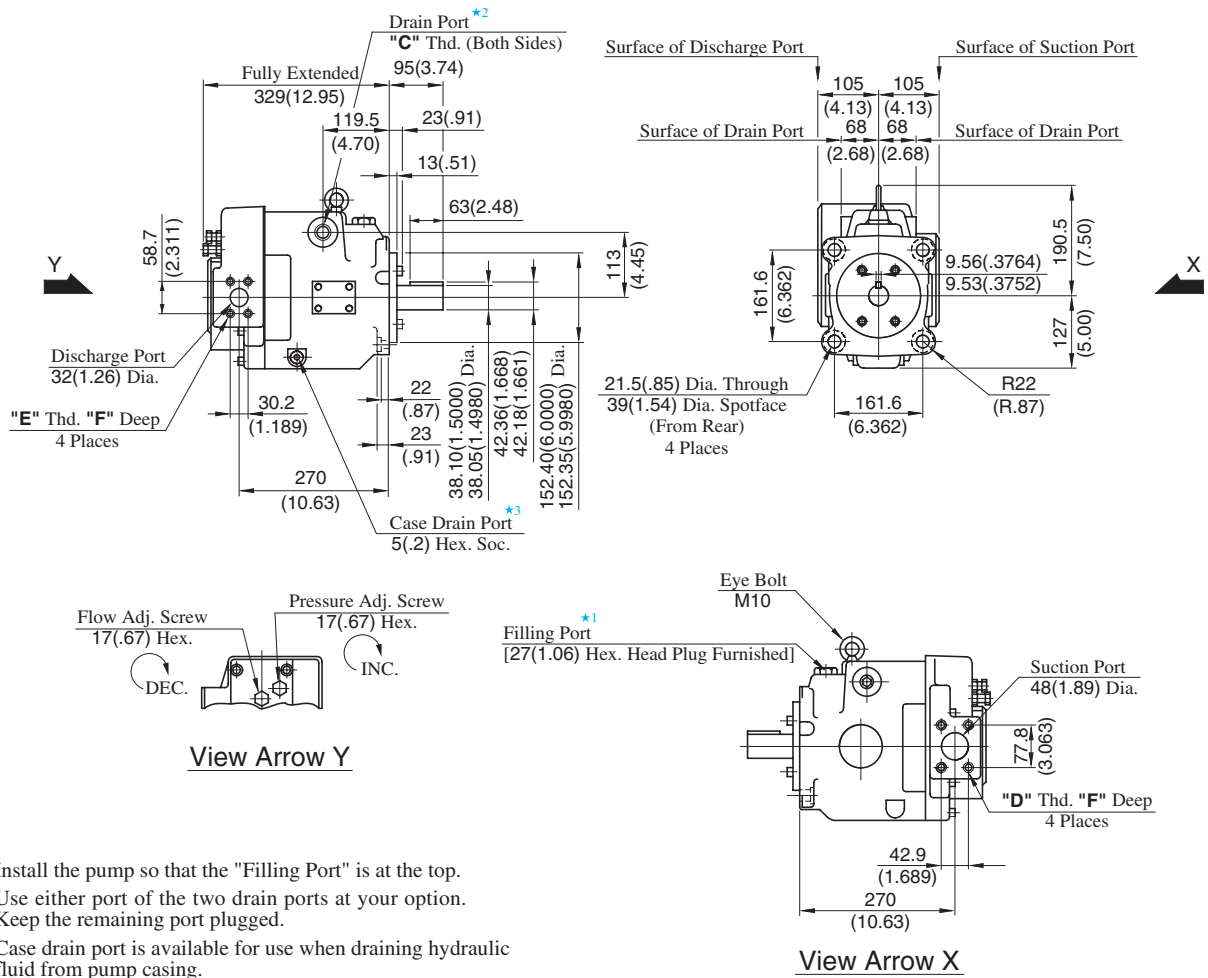
**DIMENSIONS IN MILLIMETRES (INCHES)**

**Foot Mtg.: A70-LR01\*S-60/6080/60950**



• For other dimensions, refer to "Flange Mtg.".

Flange Mtg.: A90-FR01\*S-60/6080/60950

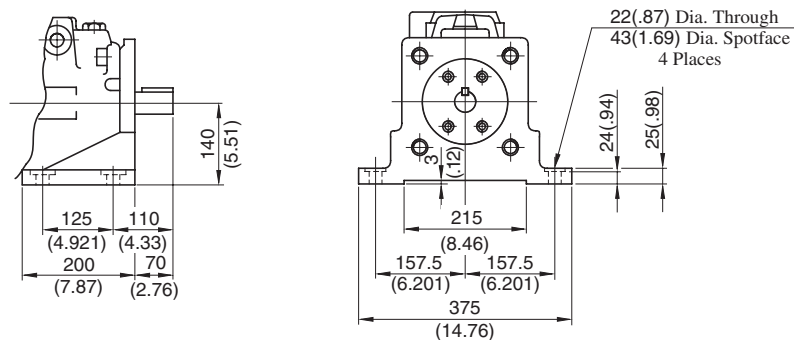


- ★ 1. Install the pump so that the "Filling Port" is at the top.
- ★ 2. Use either port of the two drain ports at your option. Keep the remaining port plugged.
- ★ 3. Case drain port is available for use when draining hydraulic fluid from pump casing.

| Model Numbers    | "C" Thd.  | "D" Thd.   | "E" Thd.    | F<br>mm (IN.) |
|------------------|-----------|------------|-------------|---------------|
| A90-FR01*S-60    | Rc 3/4    | M 12       | M 10        | 19 (.75)      |
| A90-FR01*S-6080  | 3/4 BSP.F |            |             |               |
| A90-FR01*S-60950 | SAE #12   | 1/2-13 UNC | 7/16-14 UNC | 21 (.83)      |

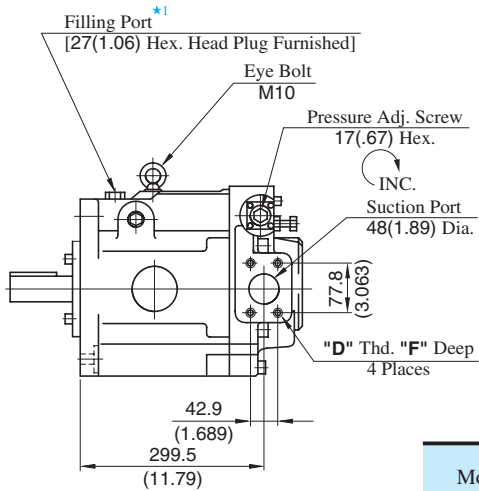
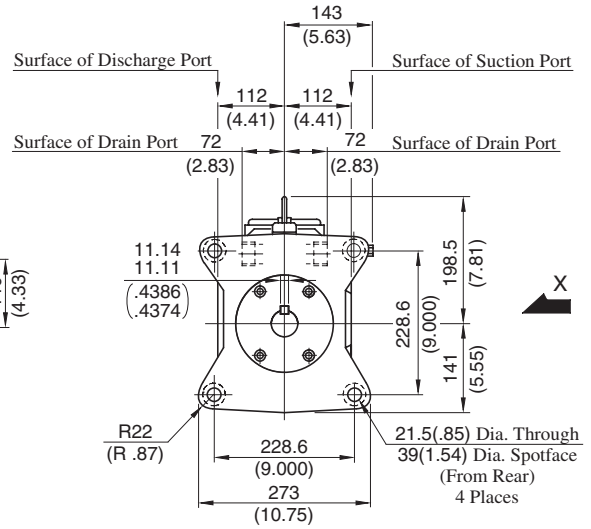
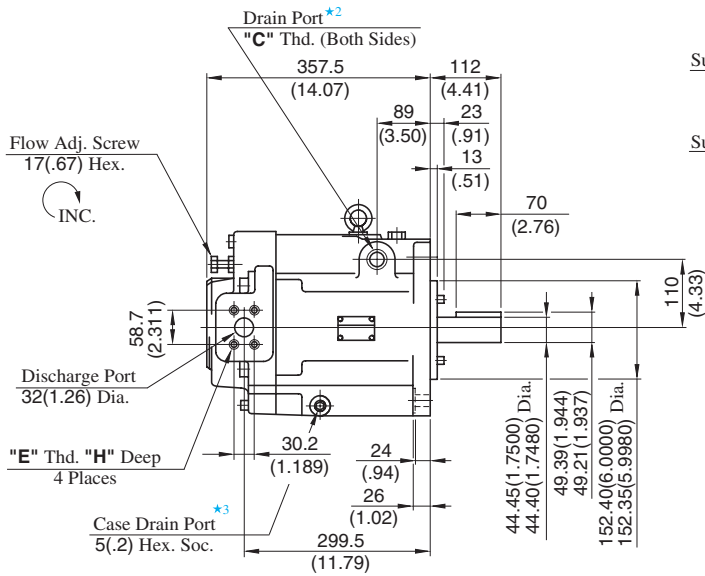
DIMENSIONS IN MILLIMETRES (INCHES)

Foot Mtg.: A90-LR01\*S-60/6080/60950



• For other dimensions, refer to "Flange Mtg.".

**Flange Mtg.: A145-FR01\*S-60/6080/60950**



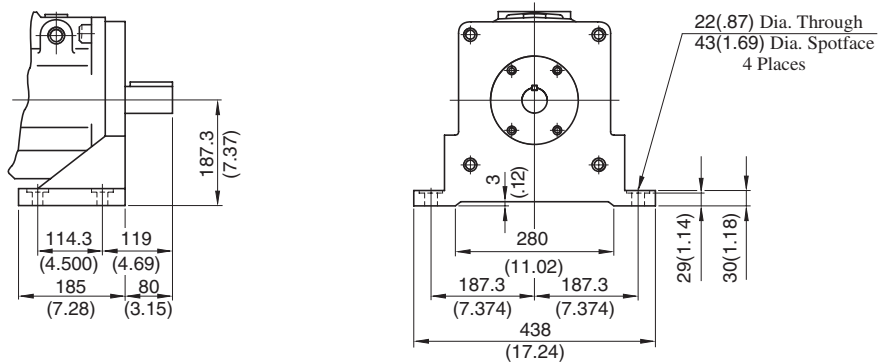
View Arrow X

- ★ 1. Install the pump so that the "Filling Port" is at the top.
- ★ 2. Use either port of the two drain ports at your option. Keep the remaining port plugged.
- ★ 3. Case drain port is available for use when draining hydraulic fluid from pump casing.

| Model Numbers     | "C" Thd.  | "D" Thd.   | "E" Thd.    | Dimensions mm (IN.) |          |
|-------------------|-----------|------------|-------------|---------------------|----------|
|                   |           |            |             | F                   | H        |
| A145-FR01*S-60    | Rc 3/4    |            | M 10        | 19 (.75)            | 19 (.75) |
| A145-FR01*S-6080  | 3/4 BSP.F | M 12       | M 10        |                     |          |
| A145-FR01*S-60950 | SAE #12   | 1/2-13 UNC | 7/16-14 UNC | 21 (.83)            | 20 (.79) |

**DIMENSIONS IN MILLIMETRES (INCHES)**

**Foot Mtg.: A145-LR01\*S-60/6080/60950**

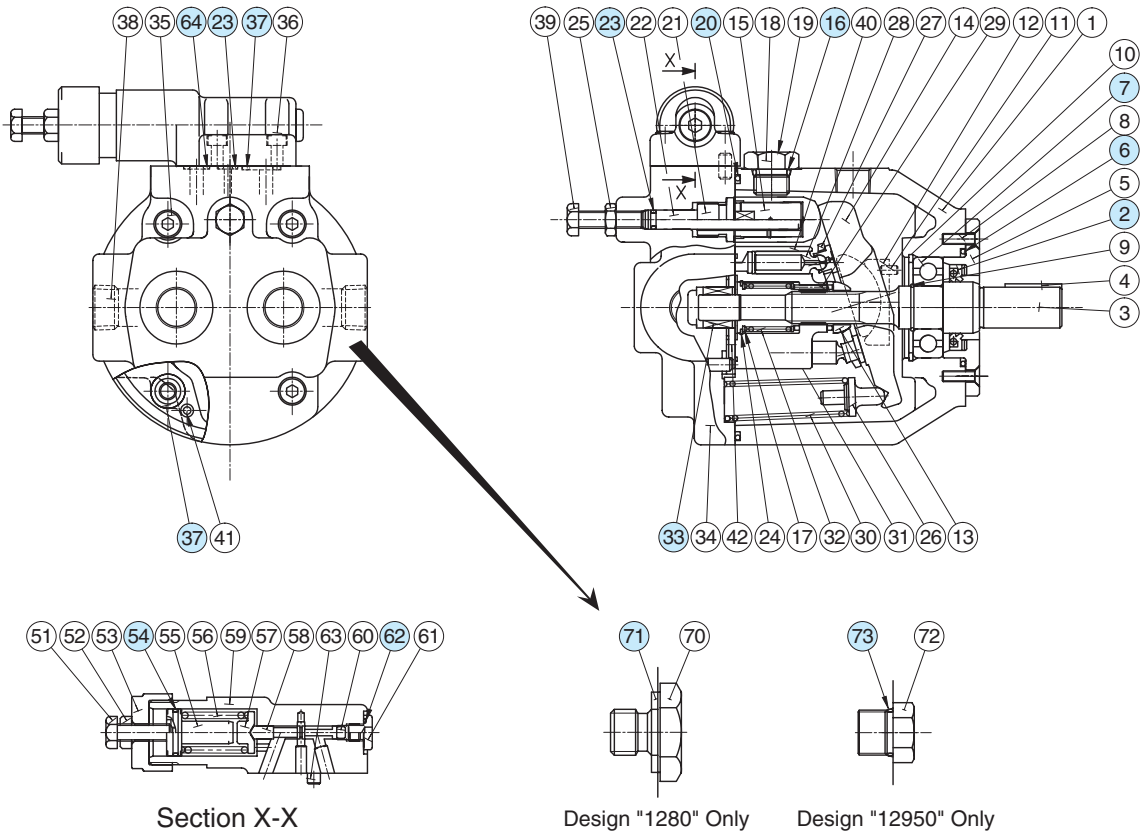


• For other dimensions, refer to "Flange Mtg.".



Spare Parts List

A10-FR01-B-12  
A10-FR01C/H-12/1280/12950



List of Seals & Bearings

| Item | Name of Parts | Part Numbers          | Qty.             |       | Remarks   |
|------|---------------|-----------------------|------------------|-------|---|
|      |               |                       | Pres. Adj. Range |       |   |
|      |               |                       | B                | C & H |   |
| 2*   | Oil Seal      | TCN24408Y             | 1                | 1     |   |
| 6*   | O-Ring        | SO-NA-G50             | 1                | 1     |   |
| 7    | Bearing       | 6204                  | 1                | 1     |   |
| 16*  | O-Ring        | SO-NB-P14             | 1                | 1     |   |
| 20*  | O-Ring        | SO-NB-G120            | 1                | 1     |   |
| 23*  | O-Ring        | SO-NB-P6              | 2                | 2     |   |
| 33   | Bearing       | HMK1215               | 1                | 1     |   |
| 37*  | O-Ring        | SO-NB-P12             | 6                | 5     |   |
| 54*  | O-Ring        | SO-NA-A018            | 1                | 1     |   |
| 62*  | O-Ring        | SO-NB-P10             | 1                | 1     |   |
| 64*  | O-Ring        | SO-NB-P9              | —                | 1     |   |
| 71   | Bonded Seal   | KP-C-04               | —                | 2     | Only for "1280" Design, Not included in Seal Kit  |
| 73   | O-Ring        | AS568-908 (NBR, Hs90) | —                | 2     | Only for "12950" Design, Not included in Seal Kit |

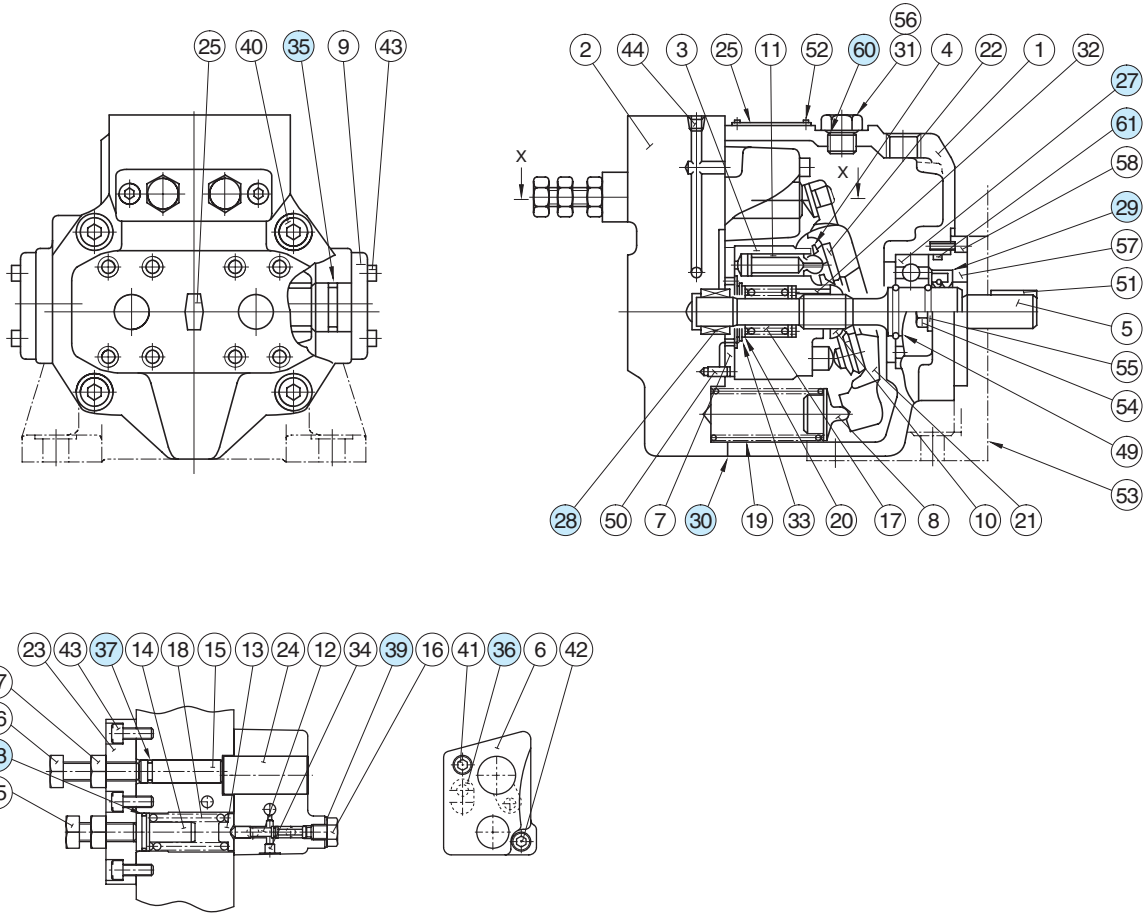
★ When ordering seals, please specify the seal kit number from the table below.

List of Seal Kits

| Pump Model Numbers      | Seal Kit Numbers |
|-------------------------|------------------|
| A10-FR01B-12            | KS-A10-01B-12    |
| A10-FR01C-12/1280/12950 | KS-A10-01H-12    |
| A10-FR01H-12/1280/12950 |                  |

**Spare Parts List**

A16/A22/A37/A56-\*-R-01-\*-K-32/3280/32950



Section X-X

● List of Seals and Bearings

| Item | Name of Parts | Part Numbers    |                     |                 |                 | Qty. |
|------|---------------|-----------------|---------------------|-----------------|-----------------|------|
|      |               | A16-*-R-01      | A22-*-R-01          | A37-*-R-01      | A56-*-R-01      |      |
| 27   | Bearing       | 6305            |                     | 6307            | NUP 207E        | 1    |
| 28   | Bearing       | HMK 1715        | Z30-1303-PK410300-8 | HMK 2025V2      | HMK 2530V2      | 1    |
| 29*  | Oil Seal      | TCN 254511      |                     | TCN 355511      | TCN 355511      | 1    |
| 30*  | Gasket        | 1303-PK211969-1 |                     | 1316-PK211970-9 | 1307-PK211971-7 | 1    |
| 35*  | O-Ring        | SO-NA-G25       |                     | SO-NA-G30       | SO-NA-P36       | 2    |
| 36*  | O-Ring        | SO-NB-P12       |                     | SO-NB-P10A      |                 | 1    |
| 37*  | O-Ring        | SO-NB-P9        |                     |                 |                 | 1    |
| 38*  | O-Ring        | SO-NA-A017      |                     |                 |                 | 1    |
| 39*  | Seal Washer   | W8              |                     |                 |                 | 1    |
| 60*  | O-Ring        | SO-NB-P14       |                     |                 |                 | 1    |
| 61*  | O-Ring        | SO-NA-G55       |                     | SO-NA-G75       |                 | 1    |

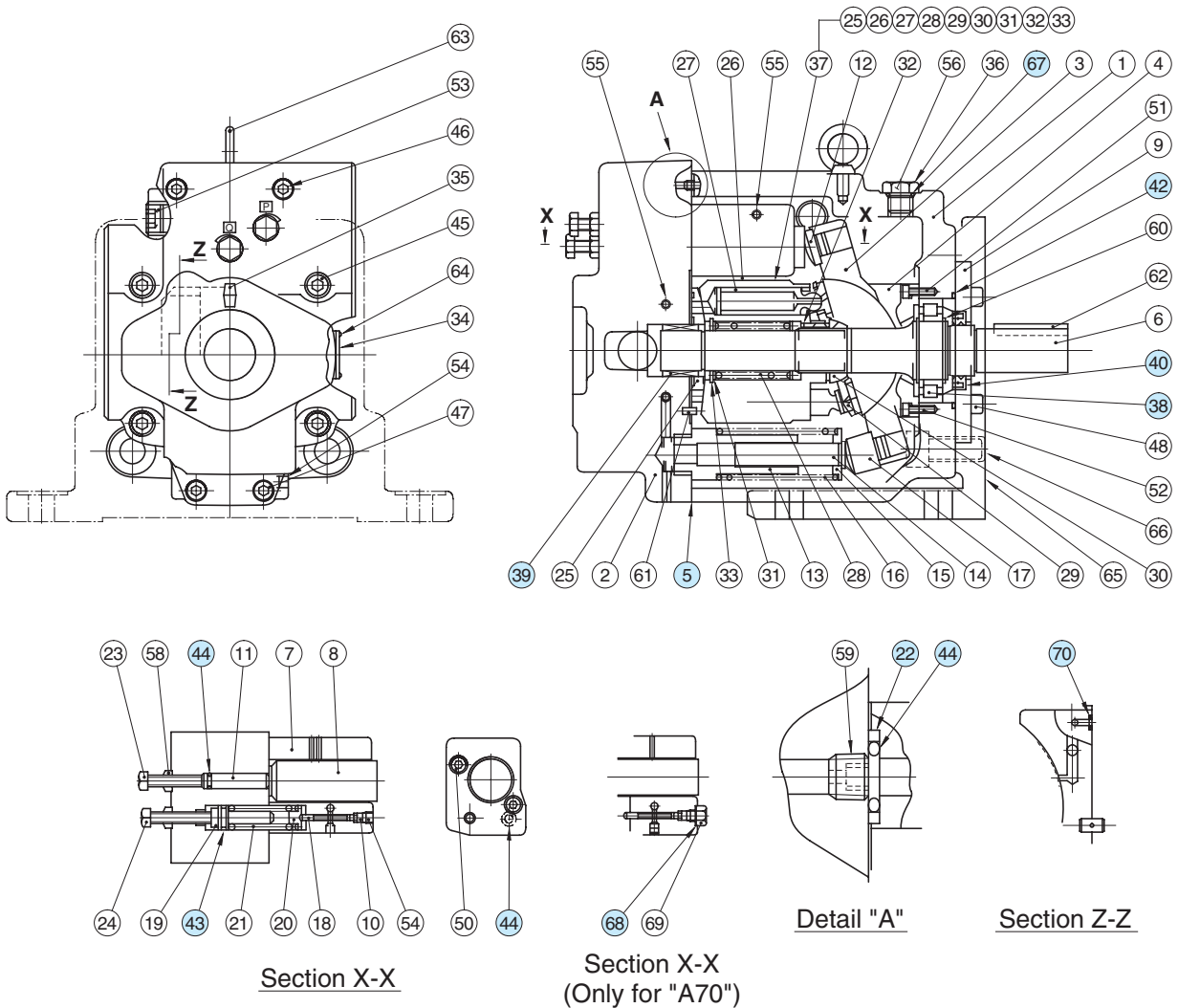
★When ordering seals, please specify the seal kit number from the table below.

● List of Seal Kits

| Pump Model Numbers   | Seal Kit Numbers |
|----------------------|------------------|
| A16-*-R-01-*-K-*-32* | KS-A16-01-32     |
| A22-*-R-01-*-K-*-32* |                  |
| A37-*-R-01-*-K-*-32* | KS-A37-01-32     |
| A56-*-R-01-*-K-*-32* | KS-A56-01-32     |

### Spare Parts List

A70/A90-\*R01\*S-60/6080/60950



#### List of Seals and Bearings

| Item | Name of Parts  | Part Numbers     |                  | Qty. |
|------|----------------|------------------|------------------|------|
|      |                | A70-*R01*S       | A90-*R01*S       |      |
| 5*   | Gasket         | 1314E-PK211972-5 | 1310E-PK211973-3 | 1    |
| 22   | Back Up Ring   | 1310E-PK412440-0 | 1310E-PK412440-0 | 1    |
| 38   | Bearing        | NUP 208EX50      | NUP 210E         | 1    |
| 39   | Needle Bearing | HMK 3030V2       | HMK 3530BV2      | 1    |
| 40*  | Oil Seal       | TCN 355511       | TCN 456812       | 1    |
| 42*  | O-Ring         | SO-FA-G85        | SO-FA-G95        | 1    |
| 43*  | O-Ring         | SO-NA-P18        | SO-NA-P18        | 1    |
| 44*  | O-Ring         | SO-NB-P9         | SO-NB-P9         | 3    |
| 67*  | O-Ring         | SO-NB-P14        | SO-NB-P18        | 1    |
| 68*  | Seal Washer    | W10              | —                | 1    |
| 70*  | O-Ring         | SO-NB-P15        | SO-NB-P5         | 1    |

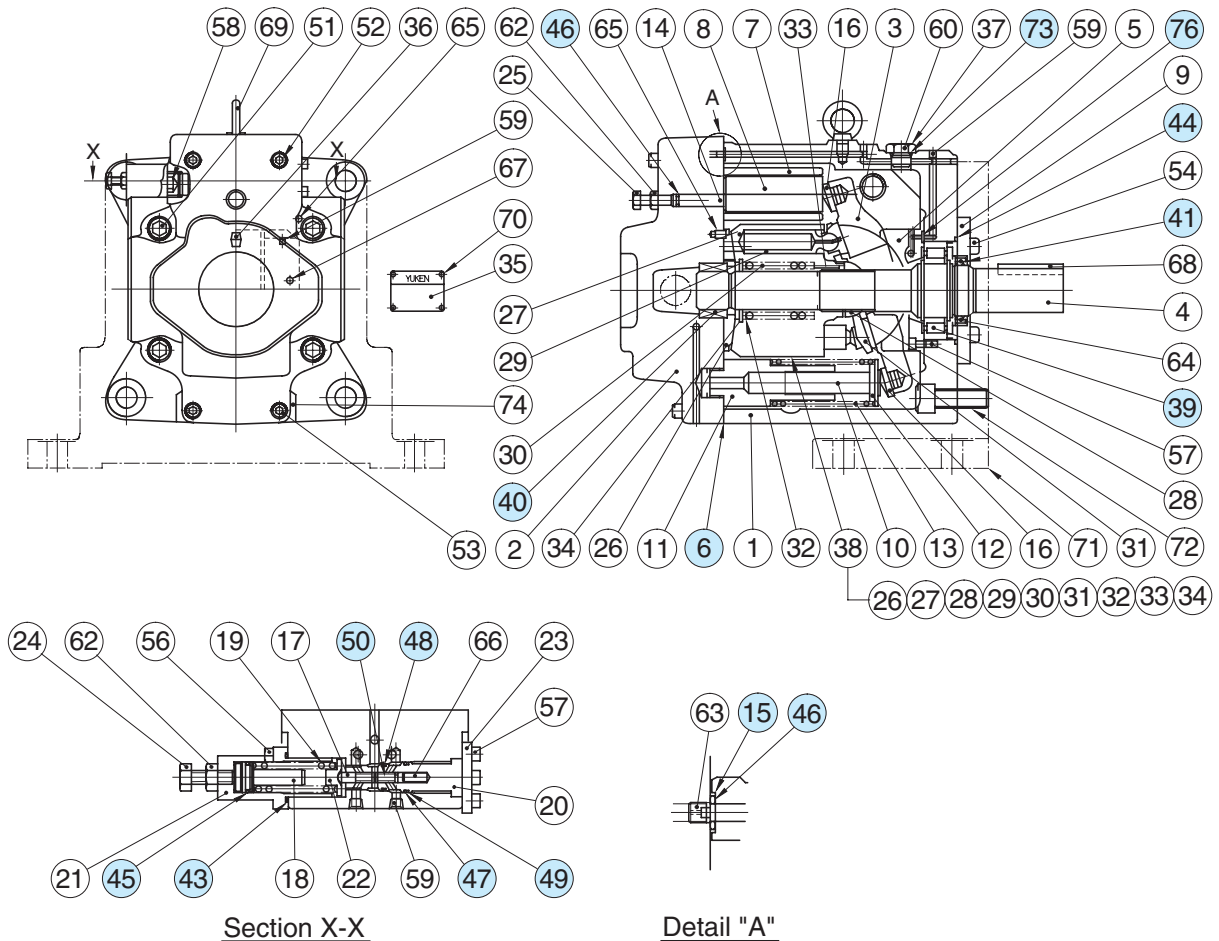
#### List of Seal Kits

| Pump Model Numbers | Seal Kit Numbers |
|--------------------|------------------|
| A70-*R01*S-60*     | KS-A70-01-60     |
| A90-*R01*S-60*     | KS-A90-01-60     |

★ When ordering the seals, please specify the seal kit number from the table left.

**Spare Parts List**

A145-\*R01\*S-60/6080/60950



● List of Seals and Bearings

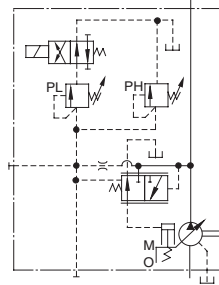
| Item | Name of Parts  | Part Numbers       | Qty. |
|------|----------------|--------------------|------|
| 6*   | Gasket         | 1312-PK211974-1    | 1    |
| 15   | Back Up Ring   | 1310E-PK412440-0   | 1    |
| 39   | Bearing        | NUP 2211ET2        | 1    |
| 40   | Needle Bearing | 8Q-NK38×55×30      | 1    |
| 41*  | Oil Seal       | TCN 507212         | 1    |
| 43*  | O-Ring         | S-31.5 (NBR, Hs70) | 1    |
| 44*  | O-Ring         | SO-FA-G105         | 1    |
| 45*  | O-Ring         | SO-NA-P18          | 1    |
| 46*  | O-Ring         | SO-NB-P9           | 2    |
| 47*  | O-Ring         | SO-NA-A017         | 1    |
| 48*  | O-Ring         | SO-NA-A016         | 1    |
| 49   | Back Up Ring   | For SO-NB-A017     | 1    |
| 50   | Back Up Ring   | For SO-NB-A016     | 1    |
| 73*  | O-Ring         | SO-NB-P18          | 1    |
| 76*  | O-Ring         | SO-NB-P5           | 1    |

★ When ordering seals, please specify the kit number "KS-A145-01-60".

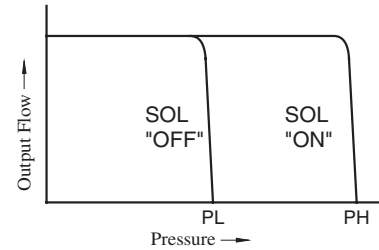


## "A" Series Variable Displacement Piston Pumps – Single Pump, Solenoid Two Pressure Control Type

Graphic Symbol



Performance Characteristics



### Specifications

| Model Numbers     | Geometric Displacement<br>cm <sup>3</sup> /rev<br>(cu. in. /rev) | Minimum Adj. Flow<br>cm <sup>3</sup> /rev<br>(cu. in. /rev) | Operating Pressure<br>MPa (PSI) |                            | Minimum Adj. Pres.<br>MPa (PSI) | Shaft Speed Range<br>r/min |      | Approx. Mass<br>kg (lbs.) |             |
|-------------------|--|---|---------------------------------|----------------------------|---------------------------------|----------------------------|------|---------------------------|-------------|
|                   |  |   | Rated <sup>*2</sup>             | Intermittent <sup>*1</sup> |                                 | Max.                       | Min. | Flange Mtg.               | Foot Mtg.   |
| A16-*R-02-*K*-32* | 15.8 (.964)  | 4 (.244)  | 16 (2320)                       | 21 (3050)                  | 1.2 (170)                       | 1800                       | 600  | 24.5 (54.0)               | 26.7 (58.9) |
| A22-*R-02-*K*-32* | 22.2 (1.355)   | 6 (.366)  | 16 (2320)                       | 16 (2320)                  | 1.2 (170)                       | 1800                       | 600  | 24.5 (54.0)               | 26.7 (58.9) |
| A37-*R-02-*K*-32* | 36.9 (2.25)  | 10 (.61)  | 16 (2320)                       | 21 (3050)                  | 1.2 (170)                       | 1800                       | 600  | 36 (79.4)                 | 40.3 (88.9) |
| A56-*R-02-*K*-32* | 56.2 (3.43)  | 12 (.73)  | 16 (2320)                       | 21 (3050)                  | 1.2 (170)                       | 1800                       | 600  | 43 (94.8)                 | 47.3 (104)  |
| A70-*R02S*-60*    | 70.0 (4.27)  | 30 (1.83)   | 25 (3630)                       | 25 (3630)                  | 2 (290)                         | 1800                       | 600  | 63.5 (140)                | 75.5 (166)  |
| A90-*R02S*-60*    | 91.0 (5.55)  | 56 (3.42)   | 25 (3630)                       | 25 (3630)                  | 2 (290)                         | 1800                       | 600  | 80.5 (178)                | 101 (223)   |
| A145-*R02S*-60*   | 145 (8.85)   | 83 (5.06)   | 25 (3630)                       | 25 (3630)                  | 2 (290)                         | 1800                       | 600  | 97.5 (215)                | 122.5 (270) |

★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 33](#) for the details.

### Solenoid Ratings

Solenoid operated directional valves used on these pumps are YUKEN DSG-01 series (standard type). For detail specifications of solenoid operated directional valves, refer to [page 345](#).

## Model Number Designation

| A16                                | -F                             | -R  | -02                                    | -S                               | -K              | -A100   | -32           | *                      |
|------------------------------------|--------------------------------|---|--|----------------------------------|-----------------|---|---------------|------------------------|
| Series Number                      | Mounting                       | Direction of Rotation   | Control Type                           | Port Position                    | Shaft Extension | Coil Type of Solenoid Valve   | Design Number | Design Std.            |
| A16<br>(15.8 cm <sup>3</sup> /rev) | F: Flange Mtg.<br>L: Foot Mtg. | (Viewed from Shaft End)<br>R: Clockwise <sup>*1</sup><br>(Normal) | 02: Solenoid Two Pressure Control Type | None: Axial Port<br>S: Side Port | K: Keyed Shaft  | AC<br>A100, A120<br>A200, A240<br>DC<br>D12, D24<br>D48<br>R(AC→DC Rectified)<br>R100, R200 | 32            | Refer to <sup>*2</sup> |
| A22<br>(22.2 cm <sup>3</sup> /rev) |                                |   |  |                                  |                 |   | 32            |                        |
| A37<br>(36.9 cm <sup>3</sup> /rev) |                                |   |  |                                  |                 |   | 32            |                        |
| A56<br>(56.2 cm <sup>3</sup> /rev) |                                |   |  |                                  |                 |   | 32            |                        |

| A70                                | -F                             | R   | 02                                     | S             | A100  | -60           | *                      |
|------------------------------------|--------------------------------|---|--|---------------|---|---------------|------------------------|
| Series Number                      | Mounting                       | Direction of Rotation   | Control Type                           | Port Position | Coil Type of Solenoid Valve   | Design Number | Design Std.            |
| A70<br>(70.0 cm <sup>3</sup> /rev) | F: Flange Mtg.<br>L: Foot Mtg. | (Viewed from Shaft End)<br>R: Clockwise <sup>*1</sup><br>(Normal) | 02: Solenoid Two Pressure Control Type | S: Side Port  | AC<br>A100, A120<br>A200, A240<br>DC<br>D12, D24<br>D48<br>R(AC→DC Rectified)<br>R100, R200 | 60            | Refer to <sup>*2</sup> |
| A90<br>(91.0 cm <sup>3</sup> /rev) |                                |   |  |               |   | 60            |                        |
| A145<br>(145 cm <sup>3</sup> /rev) |                                |   |  |               |   | 60            |                        |

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

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

## Performance Characteristics

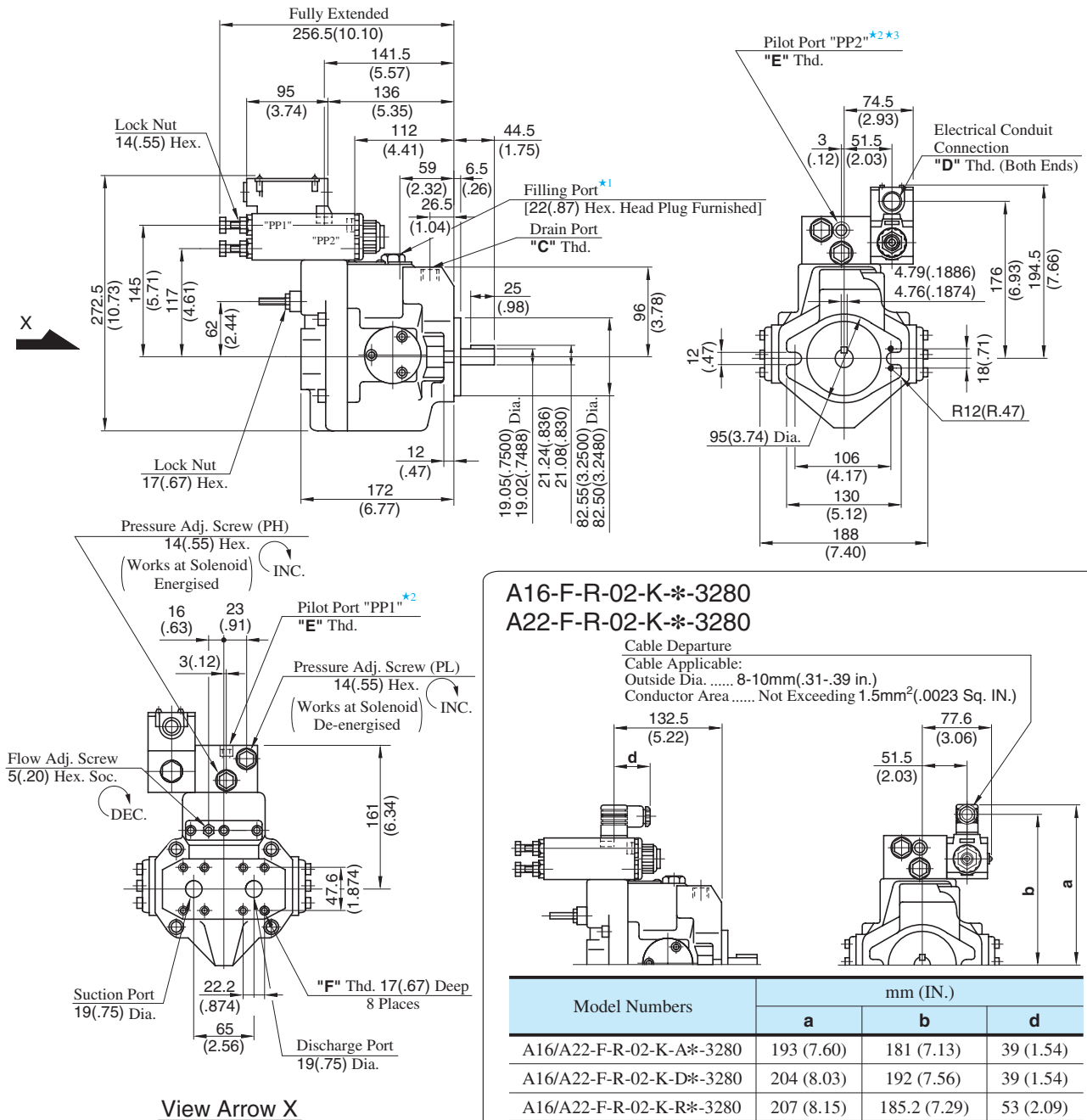
For performance characteristics, refer to models of pressure compensator type on [page 37 to 43](#).

## Pipe Flange Kits

For pipe flange, refer to form of pressure compensator type on [page 34](#).

Axial Port Type

Flange Mtg.: A16-F-R-02-K-\*-32/32950  
A22-F-R-02-K-\*-32/32950



- ★ 1. Install the pump so that the "Filling Port" is at the top.
- ★ 2. The pilot port provided is for connecting a control valve, if multistage pressure control is required.
- ★ 3. The pilot port "PP2" is not provided for N.American Design Standard.

| Model Numbers            | "C" Thd.  | "D" Thd. | "E" Thd.    | "F" Thd. |
|--------------------------|-----------|----------|-------------|----------|
| A16/A22-F-R-02-K-*-32    | Rc 3/8    | G 1/2    | Rc 1/4      | M10      |
| A16/A22-F-R-02-K-*-3280  | 3/8 BSP.F | —        | 1/4 BSP. Tr |          |
| A16/A22-F-R-02-K-*-32950 | SAE #8    | 1/2 NPT  | SAE #4      |          |

DIMENSIONS IN MILLIMETRES (INCHES)

• Side Port Type

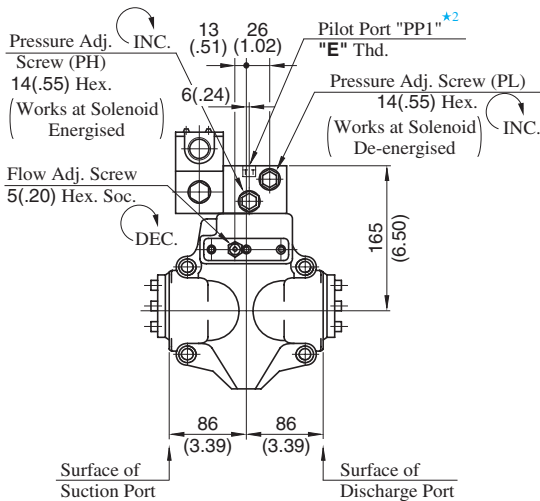
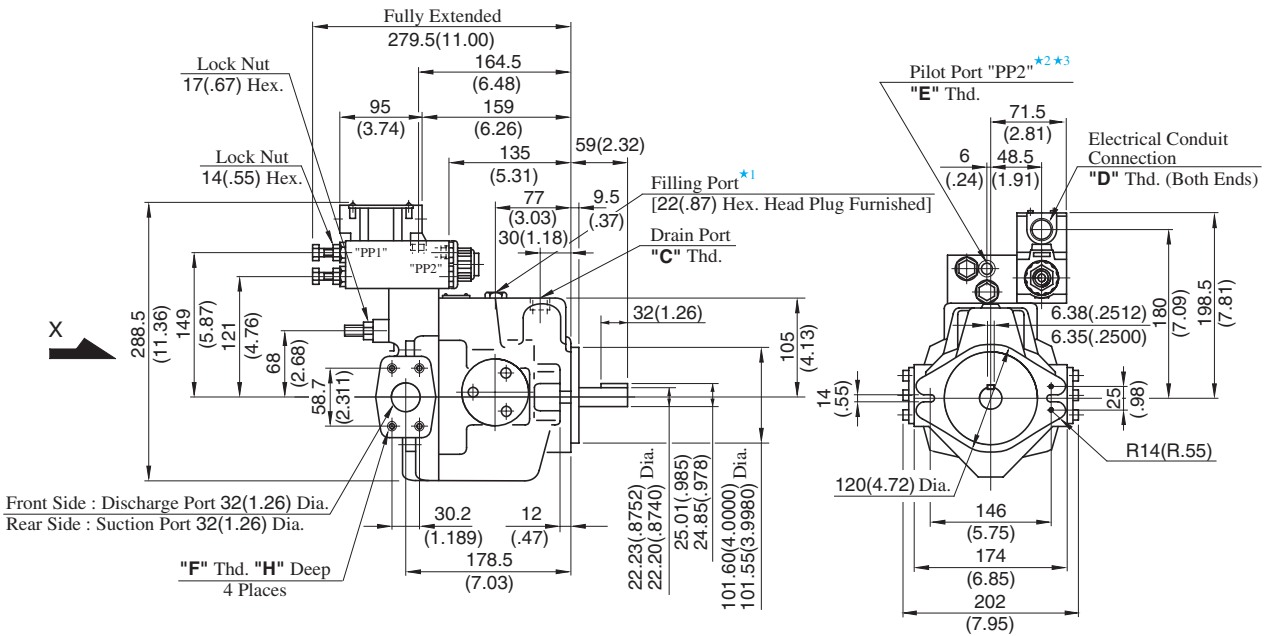
Port mounting dimensions are the same as those of pressure compensator model.  
Refer to page 45 for port mounting dimensions.

• Foot Mounting Type

Mounting bracket is common to that of pressure compensator model.  
Refer to page 45 for the dimensions of mounting bracket.

**Side Port Type**

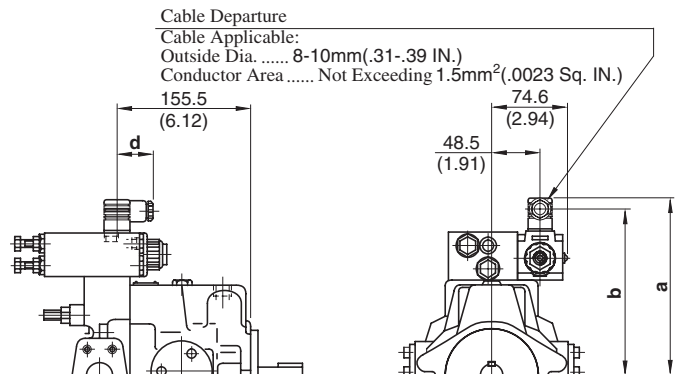
Flange Mtg. : A37-F-R-02-S-K-\*-32/32950



**View Arrow X**

- ★ 1. Install the pump so that the "Filling Port" is at the top.
- ★ 2. The pilot port provided is for connecting a control valve, if multistage pressure control is required.
- ★ 3. The pilot port "PP2" is not provided for N.American Design Standard.

**A37-F-R-02-S-K-\*-3280**



| Model Numbers          | mm (IN.)   |              |           |
|------------------------|------------|--------------|-----------|
|                        | a          | b            | d         |
| A37-F-R-02-S-K-A*-3280 | 197 (7.76) | 185 (7.28)   | 39 (1.54) |
| A37-F-R-02-S-K-D*-3280 | 208 (8.19) | 196 (7.72)   | 39 (1.54) |
| A37-F-R-02-S-K-R*-3280 | 211 (8.31) | 189.2 (7.45) | 53 (2.09) |

• For other dimensions, refer to 32/32950 design.

| Model Numbers          | "C" Thd.  | "D" Thd. | "E" Thd.    | "F" Thd.    | "H" mm (IN.) |
|------------------------|-----------|----------|-------------|-------------|--------------|
| A37-F-R-02-S-K-*-32    | Rc 1/2    | G 1/2    | Rc 1/4      | M10         | 19 (.75)     |
| A37-F-R-02-S-K-*-3280  | 1/2 BSP.F | —        | 1/4 BSP. Tr |             |              |
| A37-F-R-02-S-K-*-32950 | SAE #10   | 1/2 NPT  | SAE #4      | 7/16-14 UNC | 20 (.79)     |

**DIMENSIONS IN MILLIMETRES (INCHES)**

**• Axial Port Type**

Port mounting dimensions are the same as those of pressure compensator model.  
Refer to [page 46](#) for port mounting dimensions.

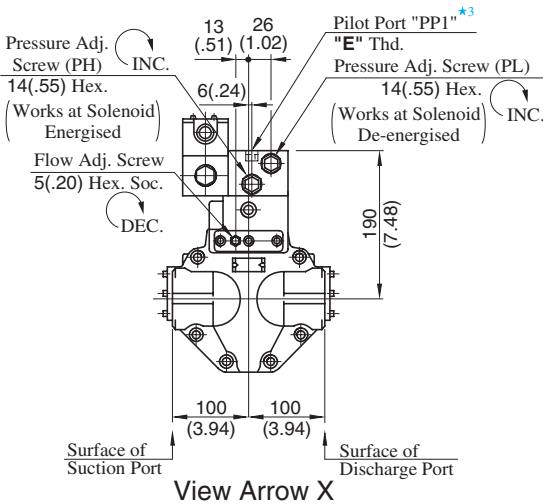
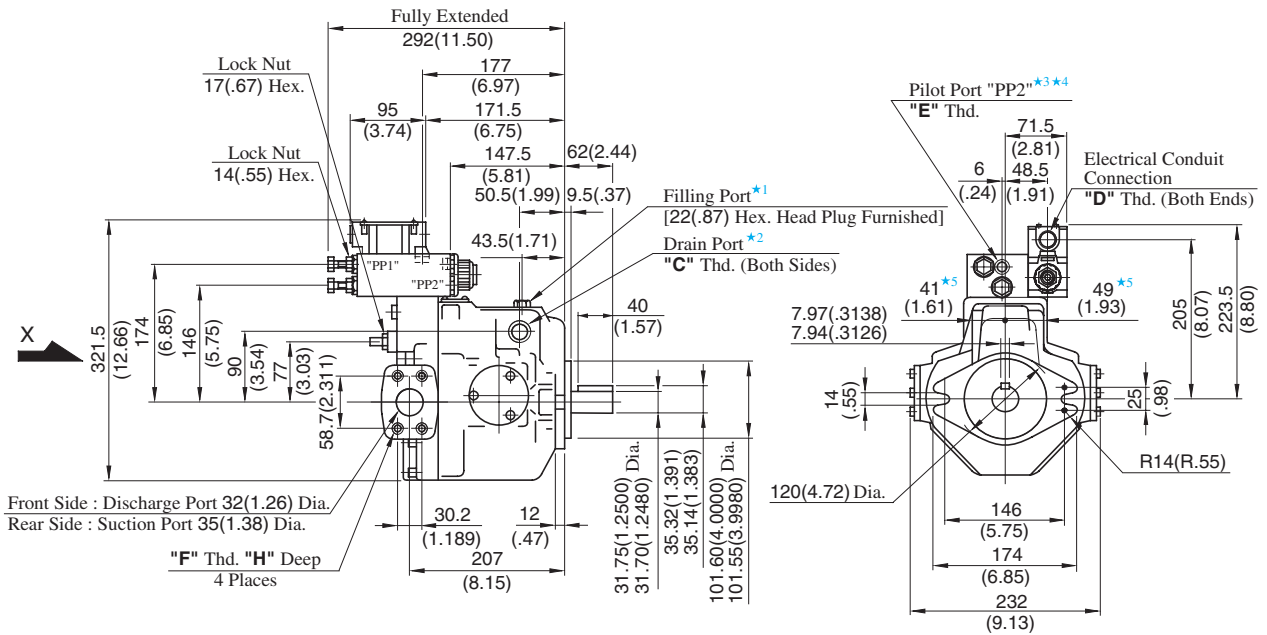
**• Foot Mounting Type**

Mounting bracket is common to that of pressure compensator model.  
Refer to [page 46](#) for the dimensions of mounting bracket.



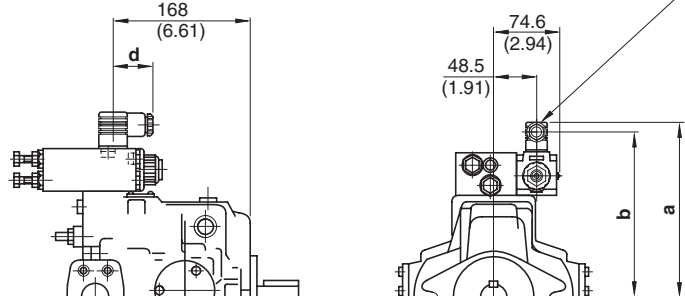
Side Port Type

Flange Mtg.: A56-F-R-02-S-K\*-32/32950



A56-F-R-02-S-K\*-3280

Cable Departure  
Cable Applicable:  
Outside Dia. .... 8-10mm(.31-.39 IN.)  
Conductor Area ..... Not Exceeding 1.5mm<sup>2</sup>(.0023 Sq. IN.)



- ★ 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. The pilot port provided is for connecting a control valve, if multistage pressure control is required.
- ★ 4. The pilot port "PP2" is not provided for N.American Design Standard.
- ★ 5. Dimensions show surface of drain port.

| Model Numbers          | mm (IN.)   |              |           |
|------------------------|------------|--------------|-----------|
|                        | a          | b            | d         |
| A56-F-R-02-S-K-A*-3280 | 222 (8.74) | 210 (8.27)   | 39 (1.54) |
| A56-F-R-02-S-K-D*-3280 | 233 (9.17) | 221 (8.70)   | 39 (1.54) |
| A56-F-R-02-S-K-R*-3280 | 236 (9.29) | 214.2 (8.43) | 53 (2.09) |

• For other dimensions, refer to 32/32950 design.

| Model Numbers         | "C" Thd.  | "D" Thd. | "E" Thd.    | "F" Thd.    | "H" mm (IN.) |
|-----------------------|-----------|----------|-------------|-------------|--------------|
| A56-F-R-02-S-K*-32    | Rc 3/4    | G 1/2    | Rc 1/4      | M10         | 19 (.75)     |
| A56-F-R-02-S-K*-3280  | 3/4 BSP.F | —        | 1/4 BSP. Tr |             |              |
| A56-F-R-02-S-K*-32950 | SAE #12   | 1/2 NPT  | SAE #4      | 7/16-14 UNC | 20 (.79)     |

DIMENSIONS IN MILLIMETRES (INCHES)

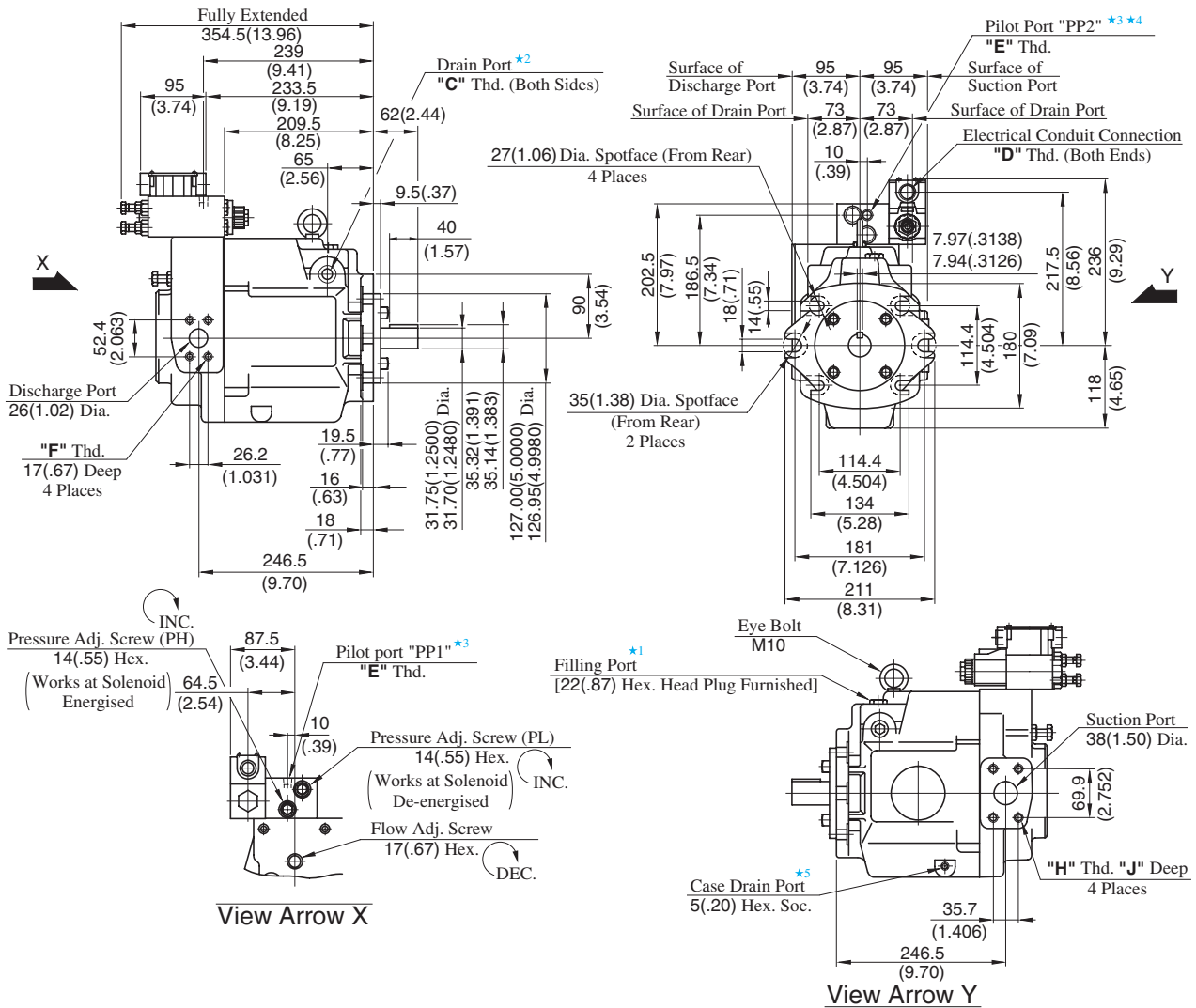
● Axial Port Type

Port mounting dimensions are the same as those of pressure compensator model.  
Refer to page 47 for port mounting dimensions.

● Foot Mounting Type

Mounting bracket is common to that of pressure compensator model.  
Refer to page 47 for the dimensions of mounting bracket.

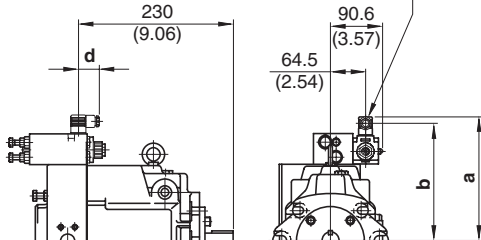
Flange Mtg. : A70-FR02S\*-60/60950



| Model Numbers    | "C" Thd.  | "D" Thd. | "E" Thd.    | "F" Thd.    | "H" Thd.   | "J" mm (IN.) |
|------------------|-----------|----------|-------------|-------------|------------|--------------|
| A70-FR02S*-60    | Rc 3/4    | G 1/2    | Rc 1/4      | M10         | M12        | 19 (.75)     |
| A70-FR02S*-6080  | 3/4 BSP.F | —        | 1/4 BSP. Tr |             |            |              |
| A70-FR02S*-60950 | SAE #12   | 1/2 NPT  | SAE #4      | 7/16-14 UNC | 1/2-13 UNC | 21 (.83)     |

**A70-FR02S\*-6080**

Cable Departure  
Cable Applicable:  
Outside Dia. .... 8-10mm (.31-.39 IN.)  
Conductor Area ..... Not Exceeding 1.5mm<sup>2</sup> (.0023 Sq. IN.)



| Model Numbers    | mm (IN.)   |              |           |
|------------------|------------|--------------|-----------|
|                  | a          | b            | d         |
| A70-FR02SA*-6080 | 235 (9.25) | 223 (8.78)   | 39 (1.54) |
| A70-FR02SD*-6080 | 246 (9.69) | 234 (9.21)   | 39 (1.54) |
| A70-FR02SR*-6080 | 249 (9.80) | 227.2 (8.94) | 53 (2.09) |

• For other dimensions, refer to 60/60950 design.

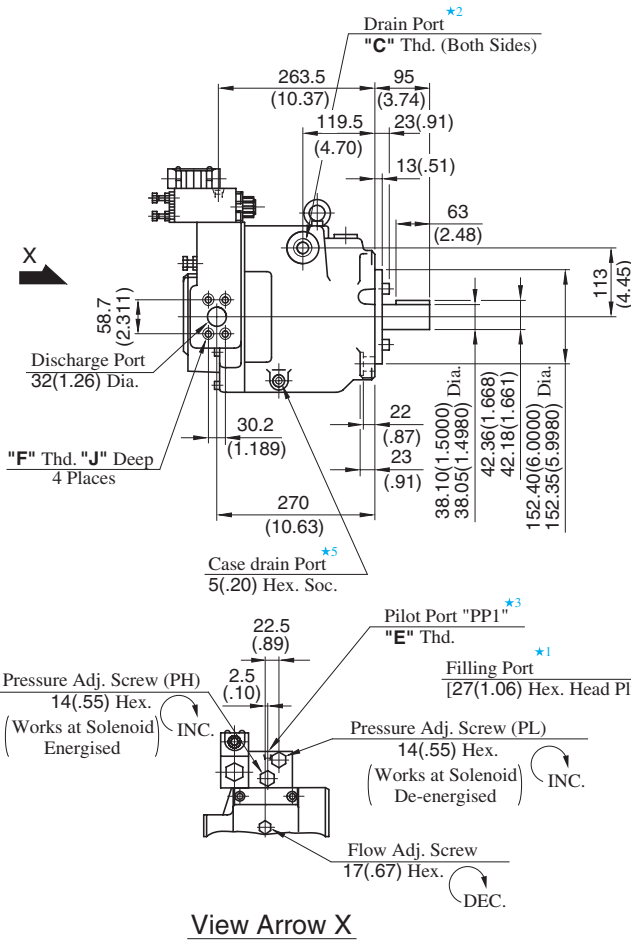
- ★ 1. Install the pump so that the "Filling Port" is at the top.
- ★ 2. Use either port of two drain ports at your option. Keep the remaining port plugged.
- ★ 3. The pilot port provided is for connecting a control valve, if multistage pressure control is required.
- ★ 4. The pilot port "PP2" is not provided for N.American Design Standard.
- ★ 5. Case drain port is available for use when draining hydraulic fluid from pump casing.

**DIMENSIONS IN MILLIMETRES (INCHES)**

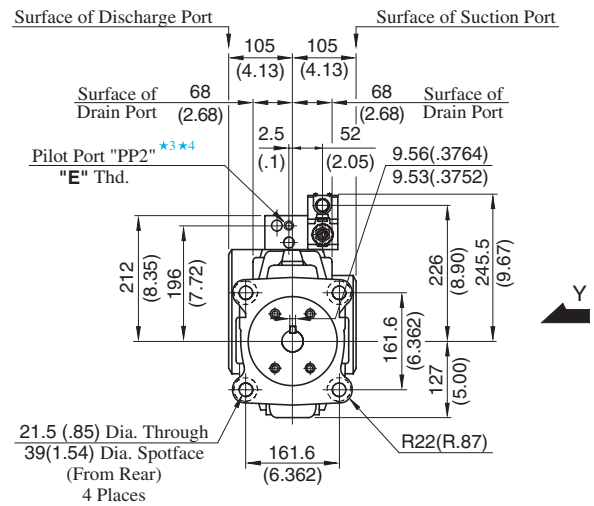
• **Foot Mounting Type**

Mounting bracket is common to that of pressure compensator model. Refer to [page 48](#) for the dimensions of mounting bracket.

Flange Mtg.: A90-FR02S\*-60/60950



View Arrow X

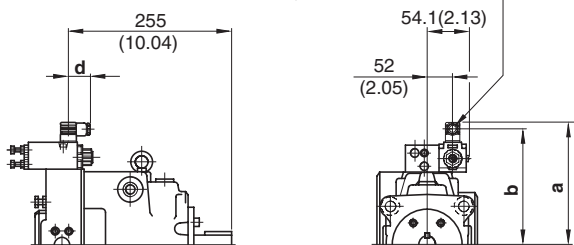


View Arrow Y

| Model Numbers    | "C" Thd.  | "D" Thd. | "E" Thd.    | "F" Thd.    | "H" Thd.   | "J" mm (IN.) | "K" mm (IN.) |
|------------------|-----------|----------|-------------|-------------|------------|--------------|--------------|
| A90-FR02S*-60    | Rc 3/4    | G 1/2    | Rc 1/4      | M10         | M12        | 19 (.75)     | 19 (.75)     |
| A90-FR02S*-6080  | 3/4 BSP.F | —        | 1/4 BSP. Tr |             |            |              |              |
| A90-FR02S*-60950 | SAE #12   | 1/2 NPT  | SAE #4      | 7/16-14 UNC | 1/2-13 UNC | 20 (.79)     | 21 (.83)     |

A90-FR02S\*-6080

Cable Departure  
Cable Applicable:  
Outside Dia. 8-10mm(.31-39 IN.)  
Conductor Area Not Exceeding 1.5mm<sup>2</sup>(.0023 Sq. IN.)



| Model Numbers    | mm (IN.)    |              |           |
|------------------|-------------|--------------|-----------|
|                  | a           | b            | d         |
| A90-02FRSA*-6080 | 244 (9.61)  | 232 (9.13)   | 39 (1.54) |
| A90-02FRSD*-6080 | 255 (10.04) | 243 (9.57)   | 39 (1.54) |
| A90-02FRSR*-6080 | 258 (10.16) | 236.2 (9.30) | 53 (2.09) |

• For other dimensions, refer to 60/60950 design.

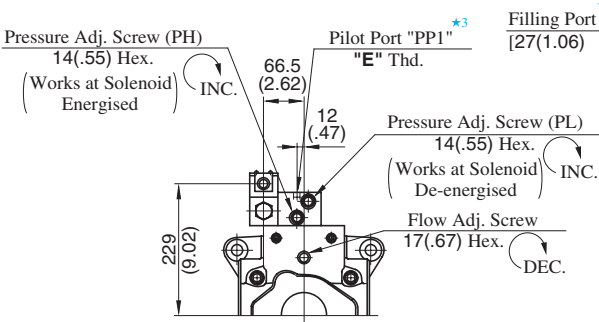
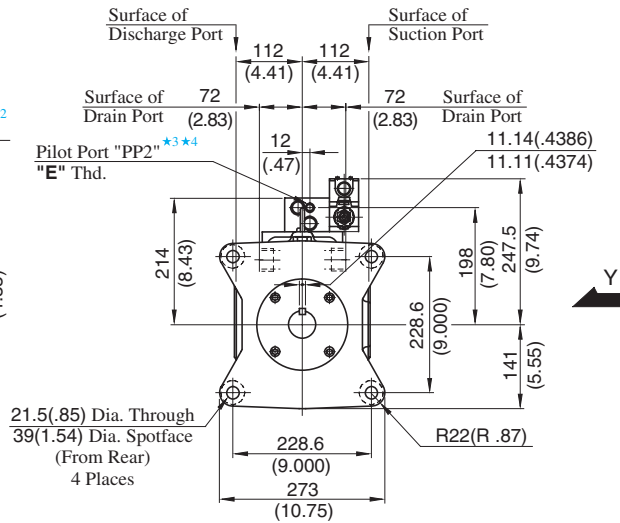
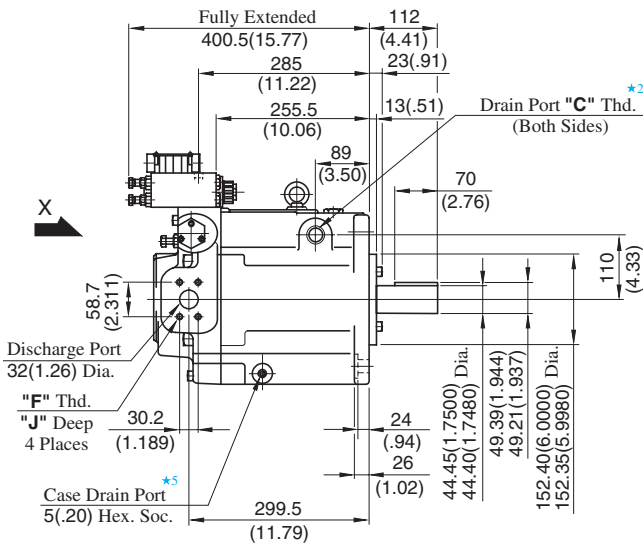
- ★ 1. Install the pump so that the "Filling Port" is at the top.
- ★ 2. Use either port of two drain ports at your option. Keep the remaining port plugged.
- ★ 3. The pilot port provided is for connecting a control valve, if multistage pressure control is required.
- ★ 4. The pilot port "PP2" is not provided for N.American Design Standard.
- ★ 5. Case drain port is available for use when draining hydraulic fluid from pump casing.

DIMENSIONS IN MILLIMETRES (INCHES)

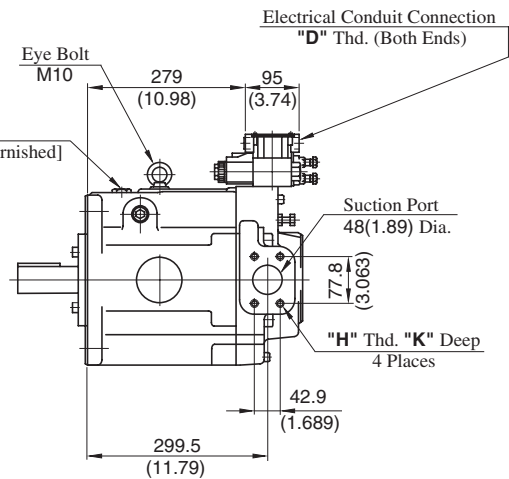
• Foot Mounting Type

Mounting bracket is common to that of pressure compensator model. Refer to page 49 for the dimensions of mounting bracket.

Flange Mtg. : A145-FR02S\*-60/60950



View Arrow X

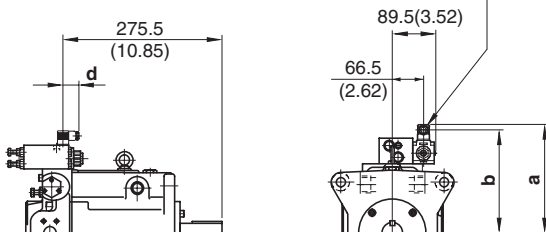


View Arrow Y

| Model Numbers     | "C" Thd.  | "D" Thd. | "E" Thd.    | "F" Thd.    | "H" Thd.   | "J" mm (IN.) | "K" mm (IN.) |
|-------------------|-----------|----------|-------------|-------------|------------|--------------|--------------|
| A145-FR02S*-60    | Rc 3/4    | G 1/2    | Rc 1/4      | M10         | M12        | 19 (.75)     | 19 (.75)     |
| A145-FR02S*-6080  | 3/4 BSP.F | —        | 1/4 BSP. Tr |             |            |              |              |
| A145-FR02S*-60950 | SAE #12   | 1/2 NPT  | SAE #4      | 7/16-14 UNC | 1/2-13 UNC | 20 (.79)     | 21 (.83)     |

A145-FR02S\*-6080

Cable Departure  
Cable Applicable:  
Outside Dia. 8-10mm(.31-.39 IN.)  
Conductor Area Not Exceeding 1.5mm<sup>2</sup>(.0023 Sq. IN.)



| Model Numbers     | mm (IN.)    |              |           |
|-------------------|-------------|--------------|-----------|
|                   | a           | b            | d         |
| A145-FR02SA*-6080 | 246 (9.69)  | 234 (9.21)   | 39 (1.54) |
| A145-FR02SD*-6080 | 257 (10.12) | 245 (9.65)   | 39 (1.54) |
| A145-FR02SR*-6080 | 260 (10.24) | 238.2 (9.38) | 53 (2.09) |

• For other dimensions, refer to 60/60950 design.

- ★ 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. The pilot port provided is for connecting a control valve, if multistage pressure control is required.
- ★ 4. The pilot port "PP2" is not provided for N.American Design Standard.
- ★ 5. Case drain port is available for use when draining hydraulic fluid from pump casing.

**DIMENSIONS IN MILLIMETRES (INCHES)**

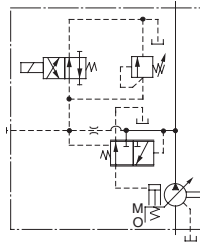
• **Foot Mounting Type**

Mounting bracket is common to that of pressure compensator model. Refer to [page 50](#) for the dimensions of mounting bracket.

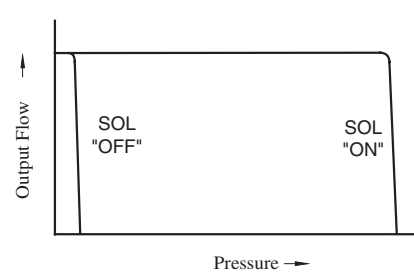


# "A" Series Variable Displacement Piston Pumps – Single Pump, Pressure Compensator with Unloading Type

Graphic Symbol



Performance Characteristics



## Specifications

| Model Numbers        | Geometric Displacement<br>cm <sup>3</sup> /rev<br>(cu. in./rev) | Minimum Adj. Flow<br>cm <sup>3</sup> /rev<br>(cu. in./rev) | Operating Pressure<br>MPa (PSI) |              | Unloading Pressure<br>MPa (PSI) | Shaft Speed Range<br>r/min |      |
|----------------------|---|--|---------------------------------|--------------|---------------------------------|----------------------------|------|
|                      |   |  | Rated                           | Intermittent |                                 | Max.                       | Min. |
| A16-*-R-03-*-K-*-32* | 15.8 (.964)   | 4 (.244)   | 16 (2320)                       | 21 (3050)    | 1.2 (170)                       | 1800                       | 600  |
| A22-*-R-03-*-K-*-32* | 22.2 (1.355)  | 6 (.366)   | 16 (2320)                       | 16 (2320)    | 1.2 (170)                       | 1800                       | 600  |
| A37-*-R-03-*-K-*-32* | 36.9 (2.25)   | 10 (.61)   | 16 (2320)                       | 21 (3050)    | 1.2 (170)                       | 1800                       | 600  |
| A56-*-R-03-*-K-*-32* | 56.2 (3.43)   | 12 (.73)   | 16 (2320)                       | 21 (3050)    | 1.2 (170)                       | 1800                       | 600  |
| A70-*R03S*-60*       | 70.0 (4.27)   | 30 (1.83)  | 25 (3630)                       | 25 (3630)    | 1.2 (170)                       | 1800                       | 600  |
| A90-*R03S*-60*       | 91.0 (5.55)   | 56 (3.42)  | 25 (3630)                       | 25 (3630)    | 1.2 (170)                       | 1800                       | 600  |
| A145-*R03S*-60*      | 145 (8.85)  | 83 (5.06)  | 25 (3630)                       | 25 (3630)    | 1.2 (170)                       | 1800                       | 600  |

## Model Number Designation

| A16                                       | -F                       | -R                      | -03  | -S                         | -K                       | -A100  | -32           | *                      |
|---|--------------------------|-------------------------|--|----------------------------|--------------------------|--|---------------|------------------------|
| Series Number                             | Mounting                 | Direction of Rotation   | Control Type   | Port Position              | Shaft Extension          | Coil Type of Solenoid Valve  | Design Number | Design Std.            |
| <b>A16</b><br>(15.8 cm <sup>3</sup> /rev) | <b>F:</b><br>Flange Mtg. | (Viewed from Shaft End) | <b>03:</b><br>Pressure Compensator with Unloading Type | <b>None:</b><br>Axial Port | <b>K:</b><br>Keyed Shaft | AC<br><b>A100,A120</b><br><b>A200,A240</b><br>DC<br><b>D12,D24</b><br><b>D48</b><br>R(AC→DC Rectified)<br><b>R100,R200</b> | <b>32</b>     | Refer to <sup>*2</sup> |
| <b>A22</b><br>(22.2 cm <sup>3</sup> /rev) |                          |                         |  |                            |                          |  | <b>32</b>     |                        |
| <b>A37</b><br>(36.9 cm <sup>3</sup> /rev) |                          |                         |  |                            |                          |  | <b>32</b>     |                        |
| <b>A56</b><br>(56.2 cm <sup>3</sup> /rev) |                          |                         |  |                            |                          |  | <b>32</b>     |                        |

| A70                                       | -F                       | R                       | 03   | S                      | A100   | -60           | *                      |
|---|--------------------------|-------------------------|--|------------------------|--|---------------|------------------------|
| Series Number                             | Mounting                 | Direction of Rotation   | Control Type   | Port Position          | Coil Type of Solenoid Valve  | Design Number | Design Std.            |
| <b>A70</b><br>(70.0 cm <sup>3</sup> /rev) | <b>F:</b><br>Flange Mtg. | (Viewed from Shaft End) | <b>03:</b><br>Pressure Compensator with Unloading Type | <b>S:</b><br>Side Port | AC<br><b>A100,A120</b><br><b>A200,A240</b><br>DC<br><b>D12,D24</b><br><b>D48</b><br>R(AC→DC Rectified)<br><b>R100,R200</b> | <b>60</b>     | Refer to <sup>*2</sup> |
| <b>A90</b><br>(91.0 cm <sup>3</sup> /rev) |                          |                         |  |                        |  | <b>60</b>     |                        |
| <b>A145</b><br>(145 cm <sup>3</sup> /rev) |                          |                         |  |                        |  | <b>60</b>     |                        |

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

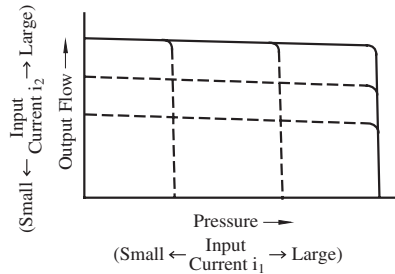
★2. Design Standards: None ..... Japanese Standard "JIS"  
80 ..... European Design Standard  
950 ..... N. American Design Standard

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

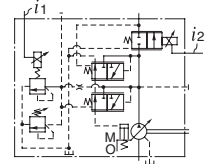
# "A" Series Variable Displacement Piston Pumps – Single Pump, Proportional Electro-Hydraulic Load Sensing Type



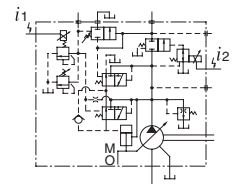
Performance Characteristics



Graphic Symbols



A16/A22/A37/A56



A70/A90/A145

## Model Number Designation

| A56                                       | -F                       | -R   | -04  | -C   | -K                       | -32           | *           |
|---|--------------------------|--|--|--|--------------------------|---------------|-------------|
| Series Number                             | Mounting                 | Direction of Rotation                                    | Control Type   | Pressure Adj. Range MPa (PSI)  | Shaft Extension          | Design Number | Design Std. |
| <b>A16</b><br>(15.8 cm <sup>3</sup> /rev) | <b>F:</b><br>Flange Mtg. | (Viewed from Shaft End)<br><br><b>R:</b><br>Clockwise *1 | <b>04:</b><br>Proportional Electro-Hydraulic Load Sensing Type | <b>B:</b> 1.5 - 6.9 (220 - 1000)<br><b>C:</b> 1.5 - 15.7 (220 - 2280)<br><b>H:</b> 1.5 - 20.6 (220 - 2990) | <b>K:</b><br>Keyed Shaft | <b>32</b>     | Refer to ★2 |
| <b>A22</b><br>(22.2 cm <sup>3</sup> /rev) |                          |  |  | <b>B:</b> 1.5 - 6.9 (220 - 1000)<br><b>C:</b> 1.5 - 15.7 (220 - 2280)                                      |                          | <b>32</b>     |             |
| <b>A37</b><br>(36.9 cm <sup>3</sup> /rev) |                          |  |  | <b>B:</b> 2 - 6.9 (290 - 1000)<br><b>C:</b> 2 - 15.7 (290 - 2280)<br><b>H:</b> 2 - 20.6 (290 - 2990)       |                          | <b>32</b>     |             |
| <b>A56</b><br>(56.2 cm <sup>3</sup> /rev) |                          |  |  | <b>H:</b> 2 - 20.6 (290 - 2990)  |                          | <b>32</b>     |             |

| A70                                       | -F                       | R  | 04   | C  | S                      | -60           | *           |
|---|--------------------------|--|--|--|------------------------|---------------|-------------|
| Series Number                             | Mounting                 | Direction of Rotation                                    | Control Type   | Pressure Adj. Range MPa (PSI)                                      | Port Position          | Design Number | Design Std. |
| <b>A70</b><br>(70.0 cm <sup>3</sup> /rev) | <b>F:</b><br>Flange Mtg. | (Viewed from Shaft End)<br><br><b>R:</b><br>Clockwise *1 | <b>04:</b><br>Proportional Electro-Hydraulic Load Sensing Type | <b>C:</b> 1.5 - 16 (220 - 2320)<br><b>H:</b> 1.5 - 21 (220 - 3050) | <b>S:</b><br>Side Port | <b>60</b>     | Refer to ★2 |
| <b>A90</b><br>(91.0 cm <sup>3</sup> /rev) |                          |  |  |  |                        | <b>60</b>     |             |
| <b>A145</b><br>(145 cm <sup>3</sup> /rev) |                          |  |  |  |                        | <b>60</b>     |             |

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

★2. Design Standards: None ..... Japanese Standard "JIS"  
80 ..... European Design Standard

• Consult Yuken when "N. American Design Standard" is required.



**Pipe Flange Kits**

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

| Pump Model Numbers     | Name of Port | Pipe Flange Kit Numbers |                          |  |  |
|------------------------|--------------|-------------------------|--------------------------|--|--|
|                        |              | Threaded Connection     |                          | Socket Welding <sup>*1</sup>                       | Butt Welding                                       |
|                        |              | Japanese Standard "JIS" | European Design Standard | Japanese Standard "JIS" & European Design Standard | Japanese Standard "JIS" & European Design Standard |
| A16-*R-04<br>A22-*R-04 | Suction      | F5-06-A-10              | F5-06-A-1080             | F5-06-B-10   | F5-06-C-10   |
|                        | Discharge    | —*2                     | —*2                      | —*2  | —*2  |
| A37-*R-04<br>A56-*R-04 | Suction      | F5-10-A-10              | F5-10-A-1080             | F5-10-B-10   | F5-10-C-10   |
|                        | Discharge    | F5-06-A-10              | F5-06-A-1080             | F5-06-B-10   | F5-06-C-10   |
| A70-*R04               | Suction      | F5-12-A-10              | F5-12-A-1080             | F5-12-B-10   | F5-12-C-10   |
|                        | Discharge    | F5-10-A-10              | F5-10-A-1080             | F5-10-B-10   | F5-10-C-10   |
| A90-*R04<br>A145-*R04  | Suction      | F5-16-A-10              | F5-16-A-1080             | F5-16-B-10   | F5-16-C-10   |
|                        | Discharge    | F5-10-A-10              | F5-10-A-1080             | F5-10-B-10   | F5-10-C-10   |

★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.

- Detail of the pipe flange kits are shown on [page 824](#).

**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 positions.

**Position of Cable Departure**

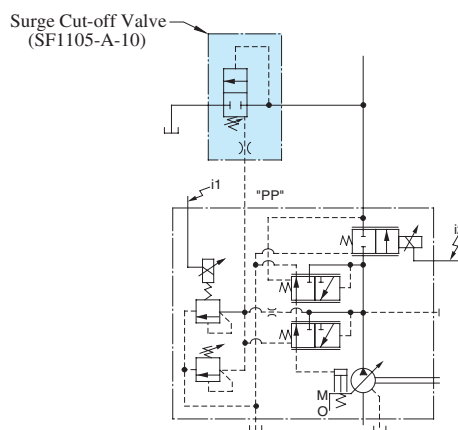
Position of cable departure can be changed. For details, refer to EDG-01 valve on [page 672](#).

**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(.32 in.).

Consult Yuken of detail of surge cut-off valve.



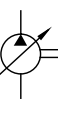
## Specifications

| Descriptions                             |   | Model No.   | A16  | A22                    | A37                    | A56                     | A70                     | A90                     | A145                    |                  |
|--|---|---|--|------------------------|------------------------|-------------------------|-------------------------|-------------------------|-------------------------|------------------|
| Geometric Displacement                   |   | cm <sup>3</sup> /rev<br>(cu. in./rev)                             | 15.8<br>(.964)                               | 22.2<br>(1.355)        | 36.9<br>(2.25)         | 56.2<br>(3.43)          | 70.0<br>(4.27)          | 91.0<br>(5.55)          | 145<br>(8.85)           |                  |
| Operating Pressure<br>MPa (PSI)          |   | Rated <sup>*2</sup>   | 16<br>(2320)                                 | 16<br>(2320)           | 16<br>(2320)           | 16<br>(2320)            | 21<br>(3050)            | 21<br>(3050)            | 21<br>(3050)            |                  |
|  |   | Intermittent <sup>*1</sup>  | 21<br>(3050)                                 | 16<br>(2320)           | 21<br>(3050)           | 21<br>(3050)            | 21<br>(3050)            | 21<br>(3050)            | 21<br>(3050)            |                  |
| Shaft Speed Range<br>r/min               |   | Max.  | 1800   | 1800                   | 1800                   | 1800                    | 1800                    | 1800                    | 1800                    |                  |
|  |   | Min.  | 600  | 600                    | 600                    | 600                     | 600                     | 600                     | 600                     |                  |
| Flow Control                             |   | Flow Adj. Range<br>L/min<br>(U.S. GPM)                            | 1 - 28.4<br>(.26 - 7.5)                      | 1 - 40<br>(.26 - 10.6) | 1 - 66<br>(.26 - 17.4) | 1 - 101<br>(.26 - 26.7) | 1 - 126<br>(.26 - 33.3) | 1 - 163<br>(.26 - 43.1) | 2 - 261<br>(.53 - 69.0) |                  |
|  |   | Min Pres. Required for Flow Adj.<br>MPa<br>(PSI)                  | 1.5<br>(220)                                 | 1.5<br>(220)           | 1.5<br>(220)           | 2.0<br>(290)            | 1.0<br>(145)            | 1.0<br>(145)            | 1.0<br>(145)            |                  |
|  |   | Differential Pres. (Discharge Pres. - Load Pres.)<br>MPa<br>(PSI) | 0.37<br>(55)                                 |                        |                        | 0.22<br>(30)            |                         |                         |                         |                  |
|  |   | Step Response <sup>*5</sup><br>(0 → Max. Flow)<br>ms              | 70   | 80                     | 120                    | 125                     | 100                     | 120                     | 210                     |                  |
|  |   | Hysteresis  | 3% or less <sup>*4</sup>                     |                        |                        |                         |                         |                         |                         |                  |
|  |   | Rated Current<br>mA   | 900  | 700                    | 740                    | 790                     | 820                     | 920                     | 920                     |                  |
|  |   | Coil Resistance<br>[20°C (68°F)]                                  | 10   |                        |                        |                         |                         |                         |                         |                  |
| Pres. Control                            |   | Pres. Adj. Range<br>MPa (PSI)                                     | Refer to Model Number Designation            |                        |                        |                         |                         |                         |                         |                  |
|  |   | Step Response<br>ms   | t <sub>1</sub> <sup>*5</sup>                 | 80                     | 80                     | 50                      | 55                      | 150                     | 150                     | 160              |
|  |   |   | t <sub>2</sub> <sup>*5</sup>                 | 140                    | 90                     | 80                      | 80                      | 80                      | 120                     | 180              |
|  |   | Hysteresis  | 2% or less <sup>*4</sup>                     |                        |                        |                         |                         |                         |                         |                  |
|  |   | Rated Current<br>mA   | (Pres. Adj. Range)<br>B: 770, C: 880, H: 790 |                        |                        |                         |                         | C: 860<br>H: 765        | C: 873<br>H: 765        | C: 875<br>H: 755 |
| Coil Resistance<br>[20°C (68°F)]         | Ω | 10  |  |                        |                        |                         |                         |                         |                         |                  |
| Applicable Amplifier Model <sup>*3</sup> |   | AME-D2-1010-*-10  |  |                        |                        |                         |                         |                         |                         |                  |
| Approx. Mass<br>kg<br>(lbs.)             |   | Flange Mtg.   | 32<br>(70.6)                                 | 32<br>(70.6)           | 38<br>(83.8)           | 45<br>(99.2)            | 72.5<br>(160)           | 88.5<br>(195)           | 109.5<br>(241)          |                  |
|  |   | Foot Mtg.   | 34.2<br>(75.4)                               | 34.2<br>(75.4)         | 43.2<br>(95.3)         | 49.3<br>(109)           | 84.5<br>(186)           | 109<br>(240)            | 134.5<br>(297)          |                  |

- ★ 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 33](#) for the details.
- ★ 3. For detail specifications of power amplifiers, refer to [page 780](#).
- ★ 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.

| Model            | Pres. Step Response              |                                  | Loading Volume                              |
|------------------|----------------------------------|----------------------------------|---|
|                  | t <sub>1</sub>                   | t <sub>2</sub>                   |   |
| A16, A22         | 1.5 → 16 MPa<br>(220 → 2320 PSI) | 16 → 1.5 MPa<br>(2320 → 220 PSI) | High Pressure Hose<br>3/8" × 2 m (6.6 ft)   |
| A37, A56         | 2.0 → 16 MPa<br>(290 → 2320 PSI) | 16 → 2.0 MPa<br>(2320 → 290 PSI) | High Pressure Hose<br>3/4" × 2 m (6.6 ft)   |
| A70, A90<br>A145 | 3.0 → 16 MPa<br>(435 → 2320 PSI) | 16 → 3.0 MPa<br>(2320 → 435 PSI) | High Pressure Hose<br>1-1/4" × 2 m (6.6 ft) |

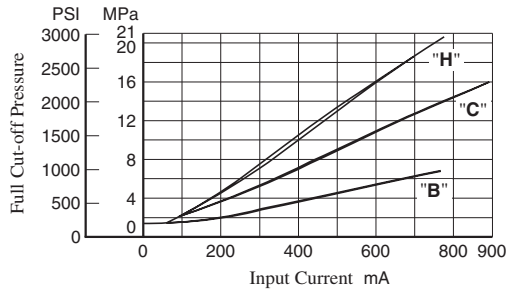




Typical Performance Characteristics at Viscosity 20 mm<sup>2</sup>/s (100 SSU) [ISO VG32 Oils, 50°C (122°F)]

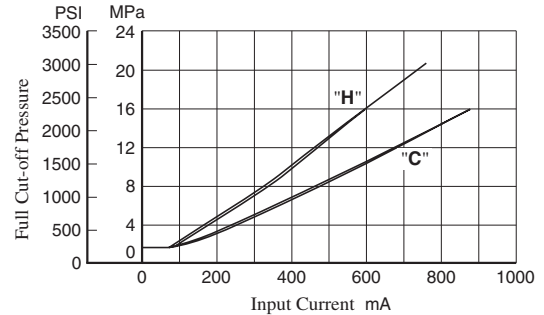
## Full Cut-off Pres. vs. Input Current

### ● A16/A22/A37/A56



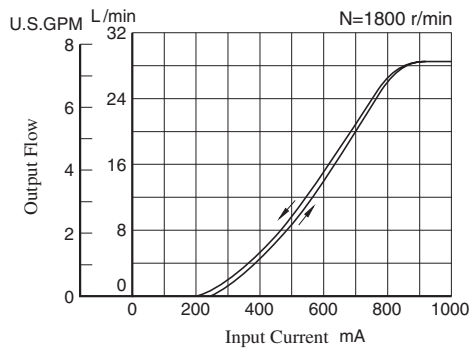
Note: Pressure adjustment range "H" is not available for A22.

### ● A70/A90/A145

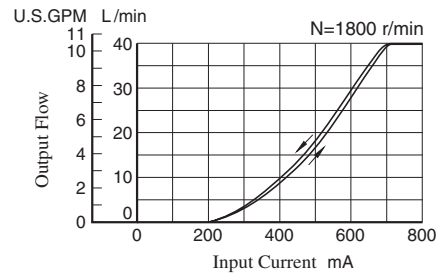


## Output Flow vs. Input Current

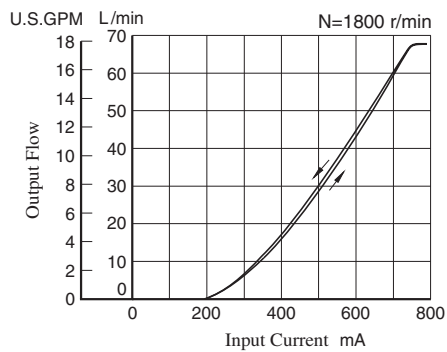
### ● A16



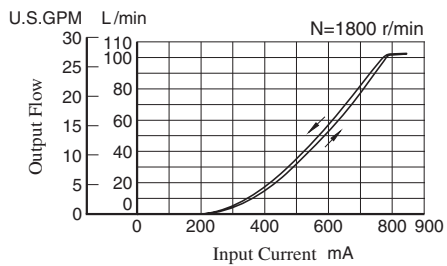
### ● A22



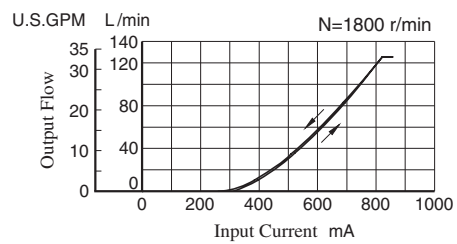
### ● A37



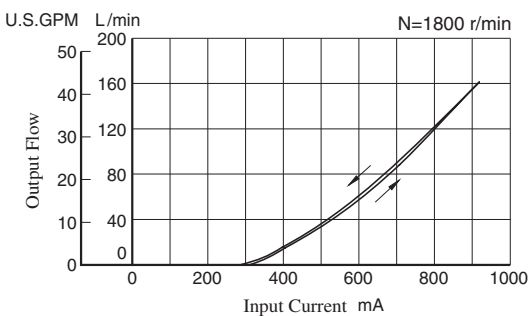
### ● A56



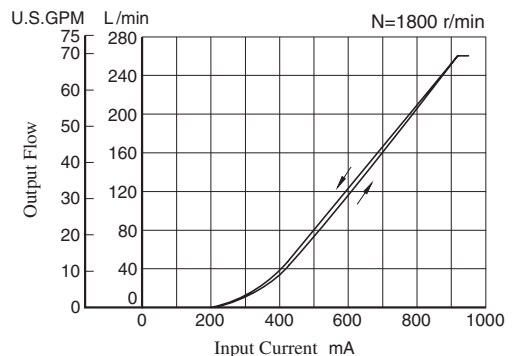
### ● A70



### ● A90

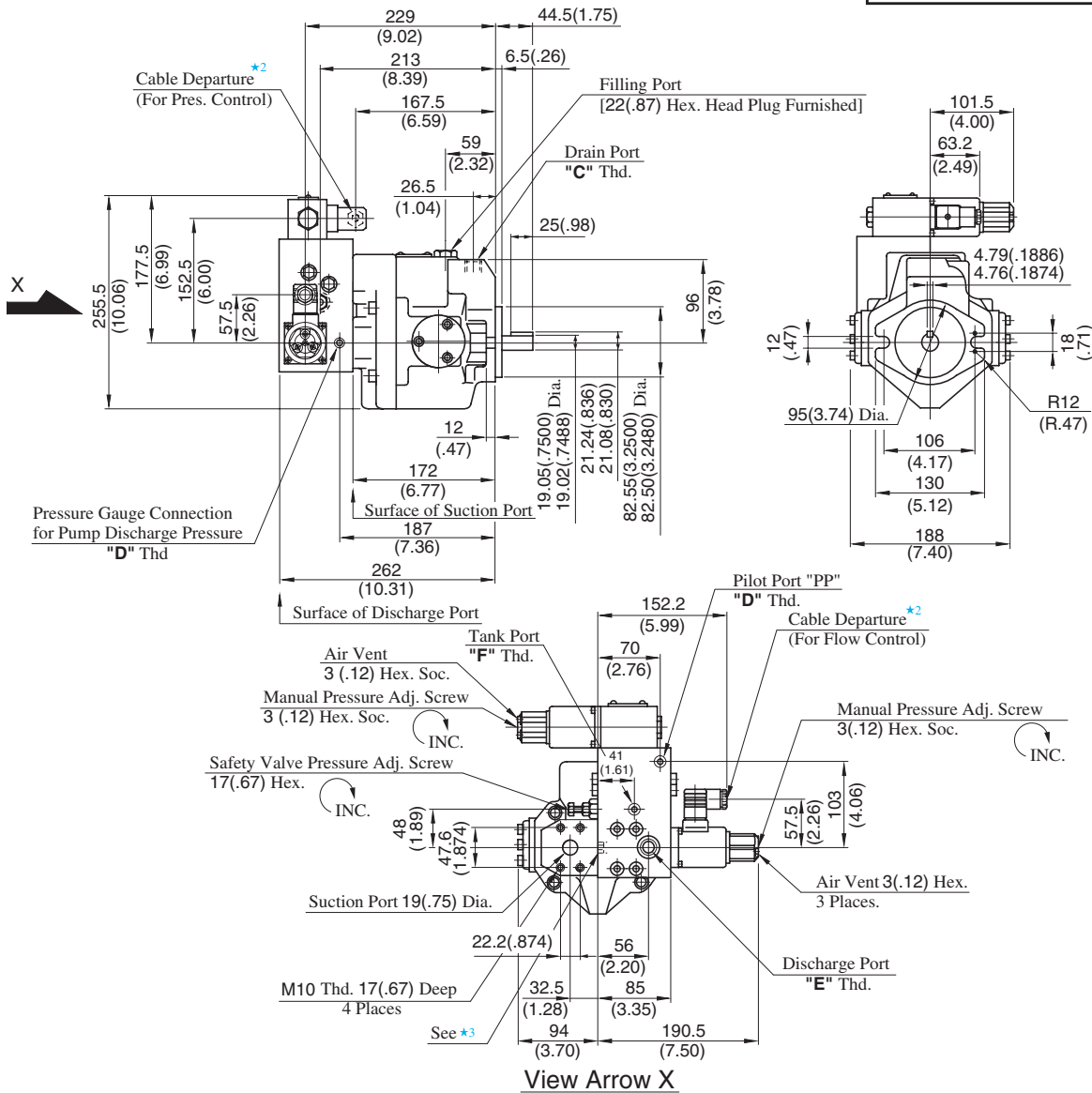


### ● A145



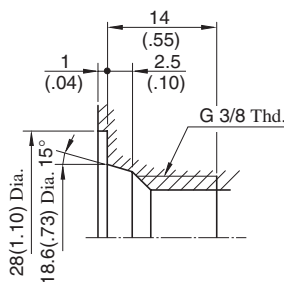
Flange Mtg. : A16-F-R-04-\*-K-32/3280  
A22-F-R-04-\*-K-32/3280

**DIMENSIONS IN MILLIMETRES (INCHES)**



| Model Numbers           | "C" Thd.  | "D" Thd.   | "E" Thd.            | "F" Thd.  |
|-------------------------|-----------|------------|---------------------|-----------|
| A16/A22-F-R-04-*-K-32   | Rc 3/8    | Rc 1/4     | G 3/8 <sup>*1</sup> | Rc 1/4    |
| A16/A22-F-R-04-*-K-3280 | 3/8 BSP.F | 1/4 BSP.Tr | 3/8 BSP.F           | 1/4 BSP.F |

★ 1. Detail of Discharge Port  
[For Japanese Standard]

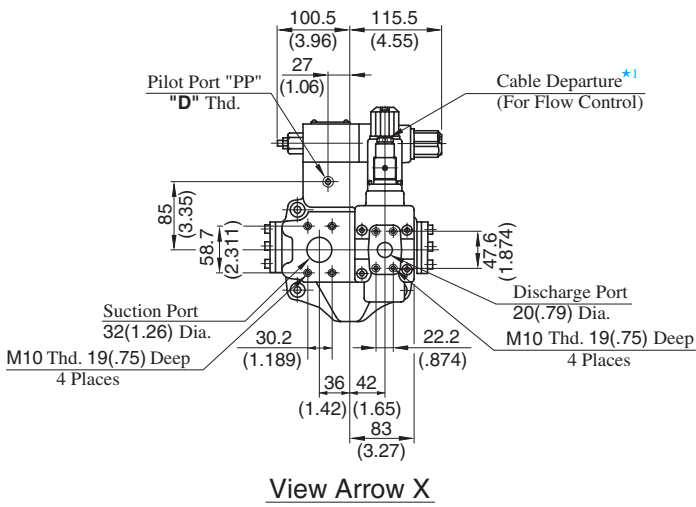
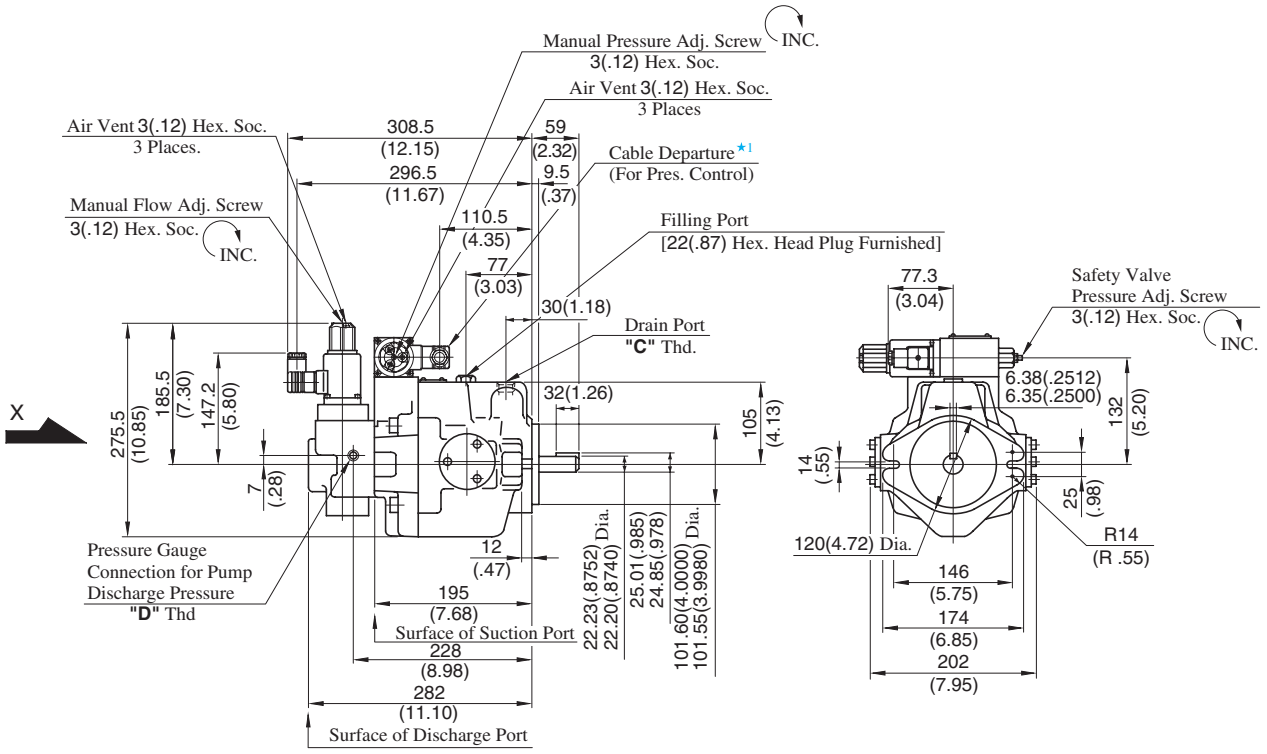


- ★ 2. Cable Applicable:  
Outside Dia.....8-10 mm (.31-.39 IN.)  
Conductor Area.....Not Exceeding 1.5 mm<sup>2</sup> (.0023 Sq. IN.)
- ★ 3. Do not touch the screw because it is adjusted at the time of shipment.

● **Foot Mounting Type**

Mounting bracket is common to that of pressure compensator model.  
Refer to [page 45](#) for the dimensions of mounting bracket.

Flange Mtg. : A37-F-R-04-\*-K-32/3280

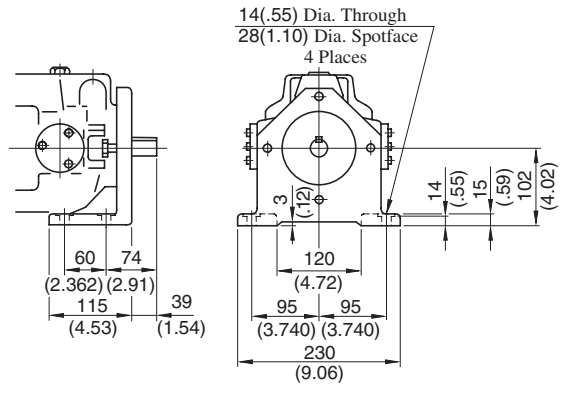


★ 1. Cable Applicable:  
 Outside Dia.....8-10 mm (.31-.39 IN.)  
 Conductor Area.....Not Exceeding 1.5 mm<sup>2</sup> (.0023 Sq. IN.)

| Model Numbers       | "C" Thd.  | "D" Thd.   |
|---------------------|-----------|------------|
| A37-F-R-04-*-K-32   | Rc 1/2    | Rc 1/4     |
| A37-F-R-04-*-K-3280 | 1/2 BSP.F | 1/4 BSP.Tr |

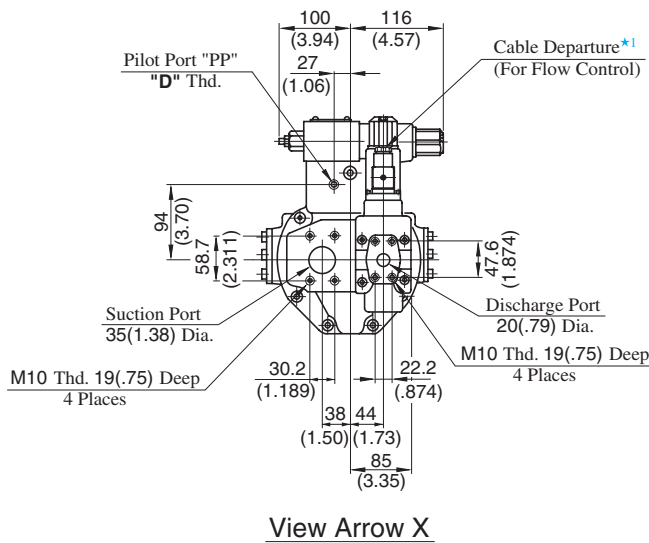
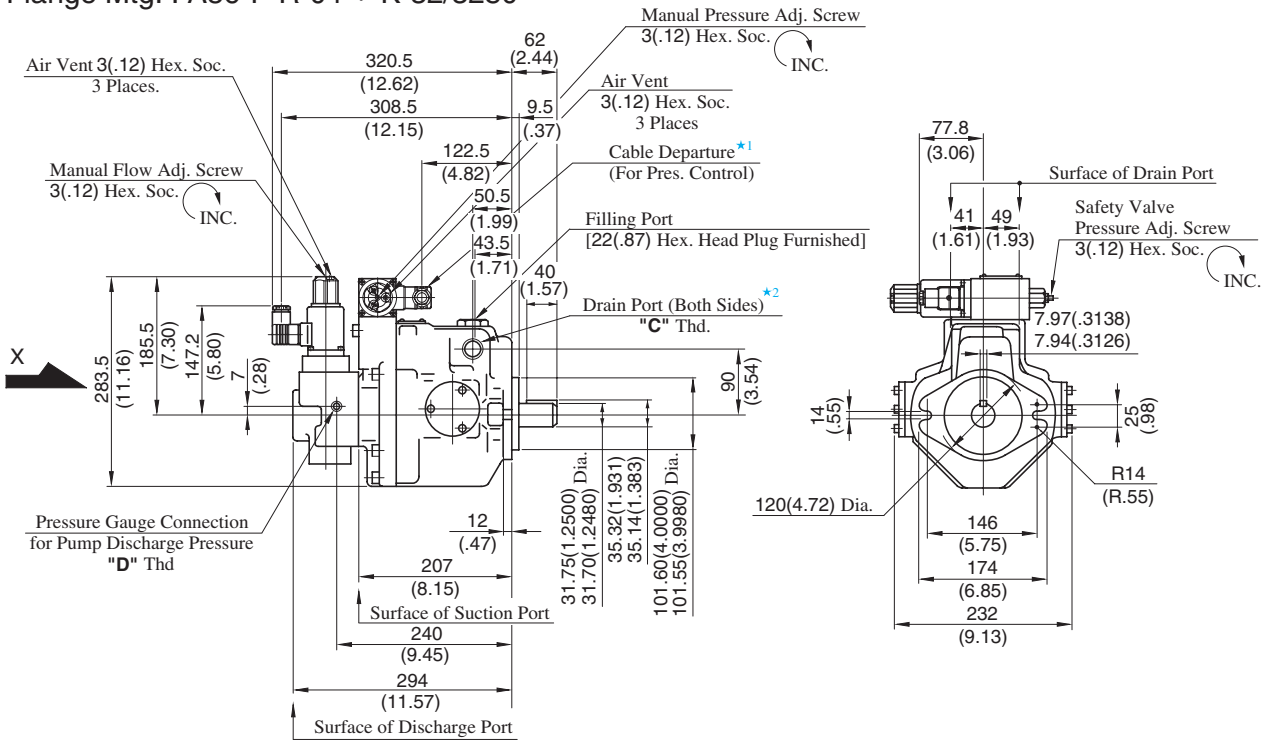
DIMENSIONS IN MILLIMETRES (INCHES)

Foot Mtg. : A37-L-R-04-\*-K-32/3280



• For other dimensions, refer to "Flange Mtg.".

**Flange Mtg. : A56-F-R-04-\*-K-32/3280**

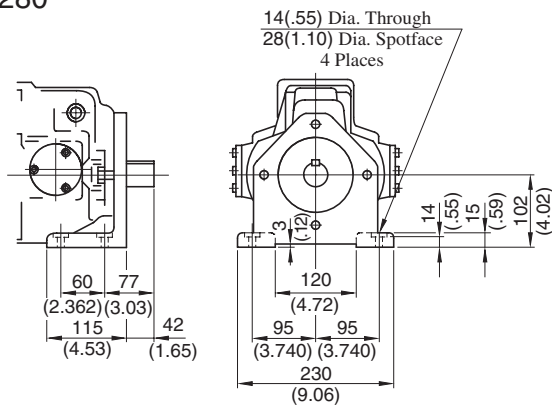


- ★ 1. Cable Applicable:  
Outside Dia.....8-10 mm (.31-.39 IN.)  
Conductor Area.....Not Exceeding 1.5 mm<sup>2</sup> (.0023 Sq. IN.)
- ★ 2. Use either port of two drain ports at your option.  
Keep the remaining port plugged.

| Model Numbers       | "C" Thd.  | "D" Thd.   |
|---------------------|-----------|------------|
| A56-F-R-04-*-K-32   | Rc 3/4    | Rc 1/4     |
| A56-F-R-04-*-K-3280 | 3/4 BSP.F | 1/4 BSP.Tr |

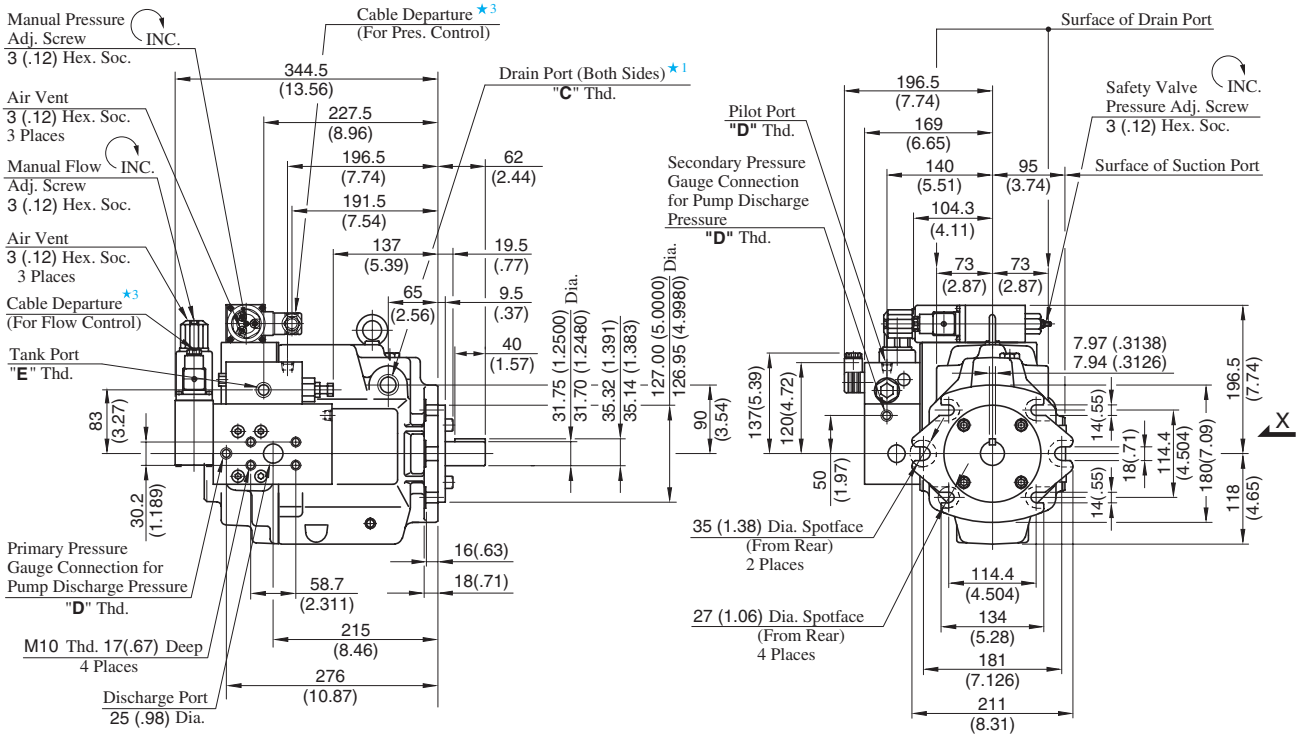
**DIMENSIONS IN MILLIMETRES (INCHES)**

**Foot Mtg. : A56-L-R-04-\*-K-32/3280**



• For other dimensions, refer to "Flange Mtg."

Flange Mtg. : A70-FR04\*S-60/6080

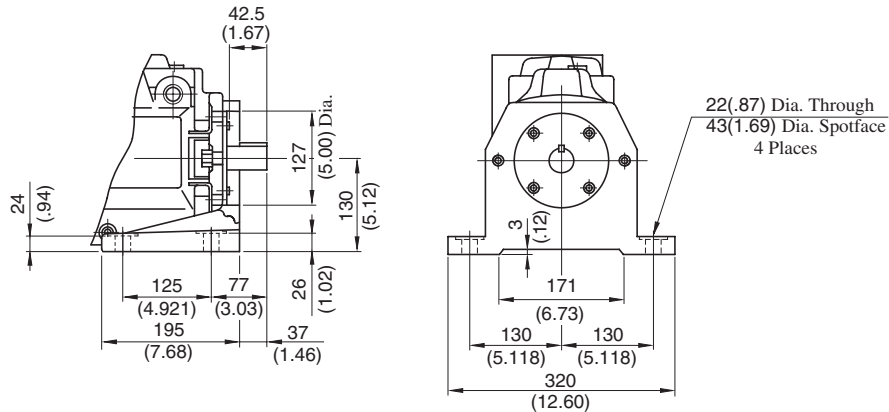


- ★ 1. Use either port of two drain ports at your option. Keep the remaining port plugged.
- ★ 2. Case drain port is available for use when draining hydraulic fluid from pump casing.
- ★ 3. Cable Applicable:  
Outside Dia.....8-10 mm (.31-.39 IN.)  
Conductor Area.....Not Exceeding 1.5 mm<sup>2</sup> (.0023 Sq. IN.)

| Model Numbers   | "C" Thd.  | "D" Thd.    | "E" Thd.   |
|-----------------|-----------|-------------|------------|
| A70-FR04*S-60   | Rc 3/4    | Rc 1/4      | Rc 3/8     |
| A70-FR04*S-6080 | 3/4 BSP.F | 1/4 BSP. Tr | 3/8 BSP. F |

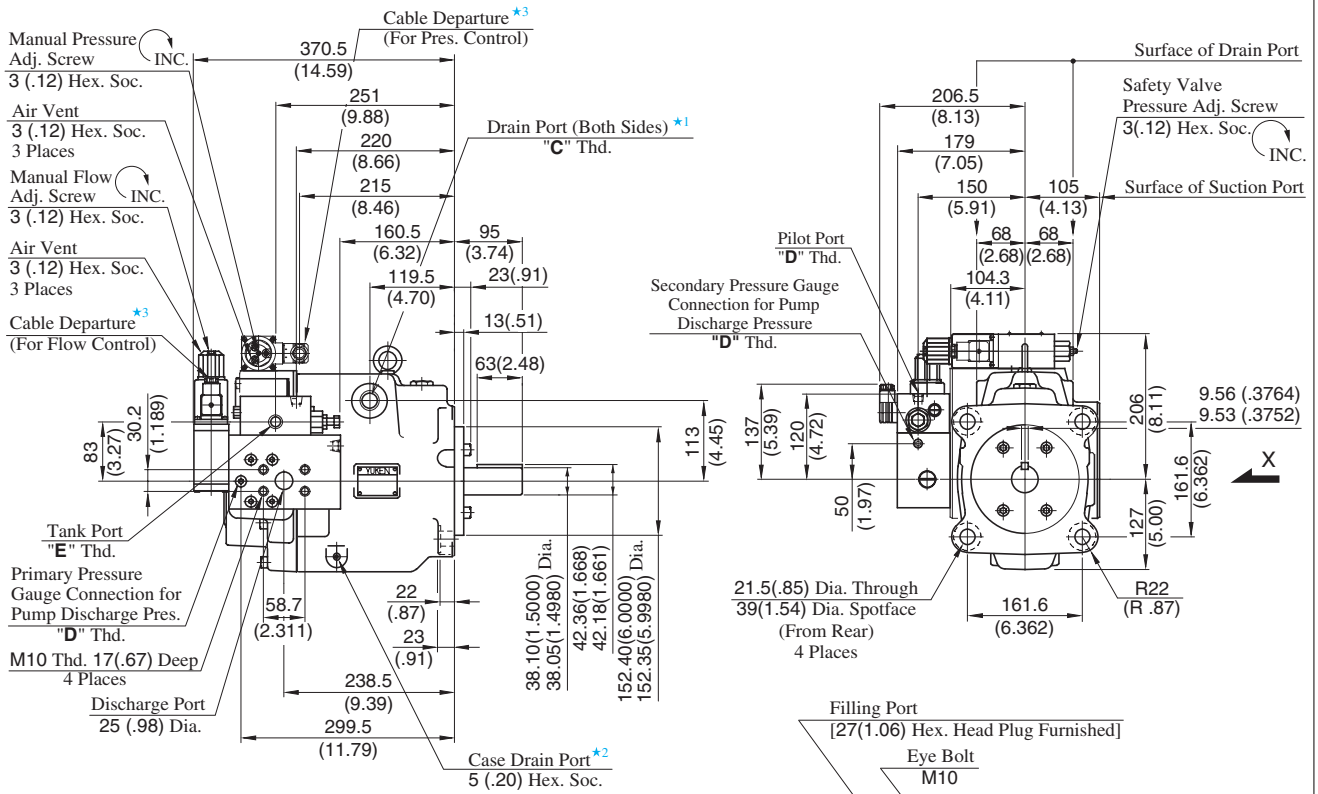
DIMENSIONS IN MILLIMETRES (INCHES)

Foot Mtg.: A70-LR04\*S-60/6080



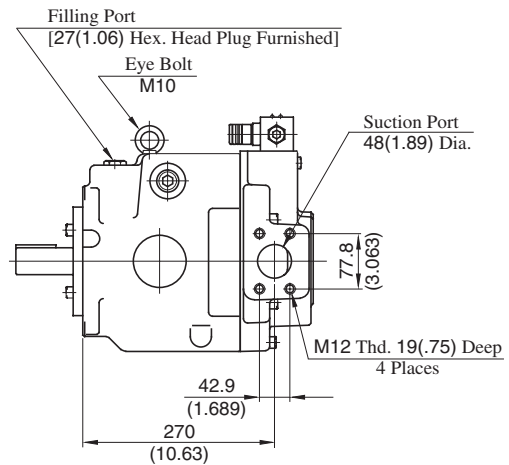
• For other dimensions, refer to "Flange Mtg."

**Flange Mtg. : A90-FR04\*S-60/6080**



- ★ 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 (.31-.39 IN.)  
Conductor Area.....Not Exceeding 1.5 mm<sup>2</sup> (.0023 Sq. IN.)

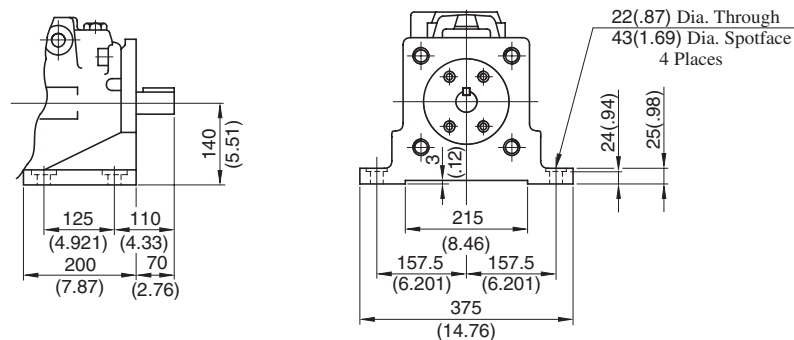
| Model Numbers   | "C" Thd.  | "D" Thd.    | "E" Thd.   |
|-----------------|-----------|-------------|------------|
| A90-FR04*S-60   | Rc 3/4    | Rc 1/4      | Rc 3/8     |
| A90-FR04*S-6080 | 3/4 BSP.F | 1/4 BSP. Tr | 3/8 BSP. F |



**View Arrow X**

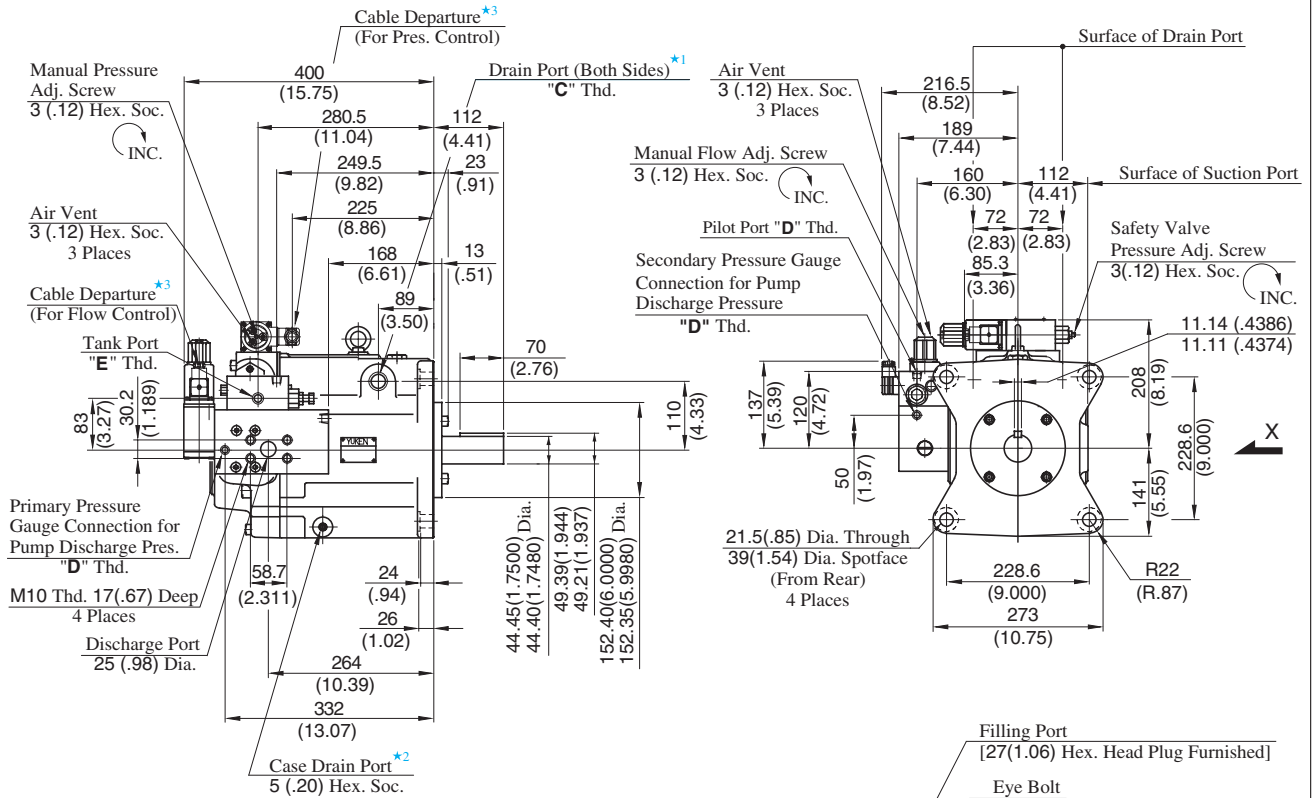
**DIMENSIONS IN MILLIMETRES (INCHES)**

**Foot Mtg.: A90-LR04\*S-60/6080**



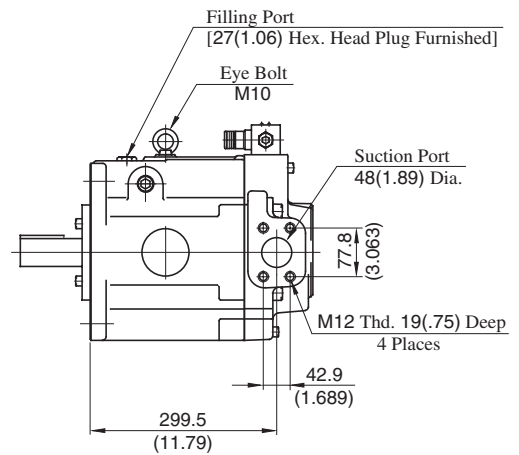
• For other dimensions, refer to "Flange Mtg.".

Flange Mtg. : A145-FR04\*S-60/6080



- ★ 1. Use either port of the 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 (.31-.39 IN.)  
Conductor Area.....Not Exceeding 1.5 mm<sup>2</sup> (.0023 Sq. IN.)

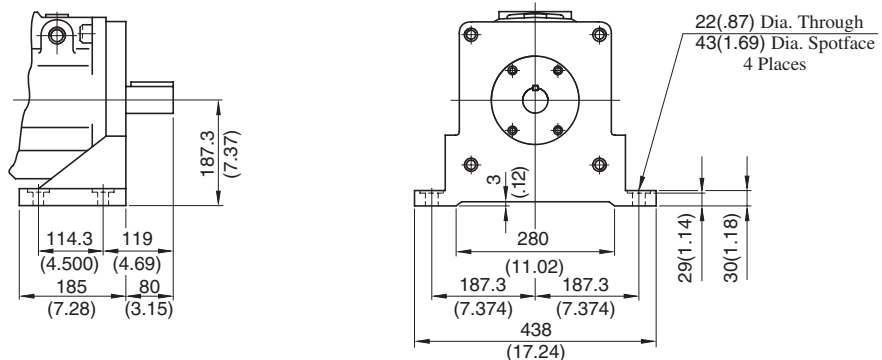
| Model Numbers    | "C" Thd.  | "D" Thd.    | "E" Thd.   |
|------------------|-----------|-------------|------------|
| A145-FR04*S-60   | Rc 3/4    | Rc 1/4      | Rc 3/8     |
| A145-FR04*S-6080 | 3/4 BSP.F | 1/4 BSP. Tr | 3/8 BSP. F |



View Arrow X

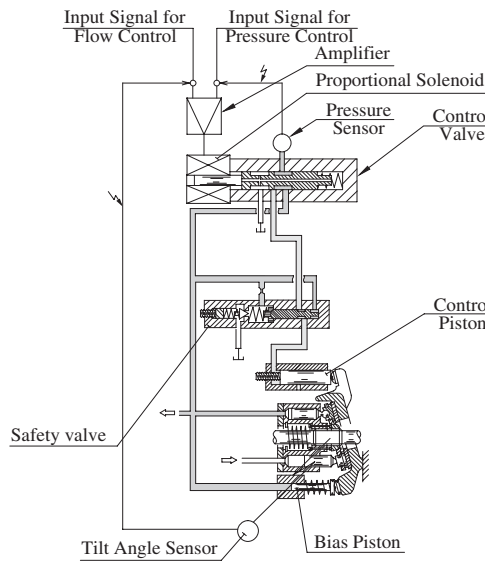
DIMENSIONS IN MILLIMETRES (INCHES)

Foot Mtg.: A145-LR04\*S-60/6080

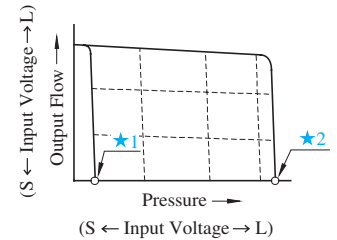


• For other dimensions, refer to "Flange Mtg.".

# "A" Series Variable Displacement Piston Pumps – Single Pump, Electro-Hydraulic Proportional pressure & Flow Control Type

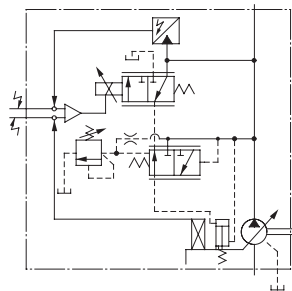


## Performance Characteristics

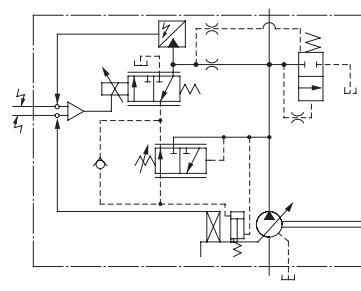


- ★ 1. Unloading pressure when input signal is 0 V.
- ★ 2. Safety valve setting pressure

## Graphic Symbols



A16/A22/A37/A56



A70/A90/A145

## Model Number Designation

| A70   | -F                       | R  | 04E  | 16   | M                              | A  | -60                               | -60           | *                      |
|---|--------------------------|--|--|--|--------------------------------|--|-----------------------------------|---------------|------------------------|
| Series Number                               | Mounting                 | Direction of Rotation                            | Control Type   | Control Pressure at Input Signal is 5 V  | Unit of Control Pressure       | Type of <sup>★2</sup> Outboard Pump                | Compensation Number <sup>★3</sup> | Design Number | Design Std.            |
| <b>A16</b><br>(15.8 cm <sup>3</sup> /rev)   | <b>F:</b><br>Flange Mtg. | (Viewed from Shaft End)                          | <b>04E:</b><br>Proportional Pressure & Flow Control Type | Use the same measure of the control pressure as shown on the right, 6.9 MPa specify within the range of maximum operating pressure | <b>M:</b> MPa<br><b>P:</b> PSI | <b>None</b> <sup>★2</sup>                          | <b>06</b>                         | <b>42</b>     | Refer to <sup>★4</sup> |
| <b>A22</b><br>(22.2 cm <sup>3</sup> /rev)   |                          |  |  |  |                                |  | <b>11</b>                         | <b>42</b>     |                        |
| <b>A37</b><br>(36.9 cm <sup>3</sup> /rev)   |                          |  |  |  |                                |  | <b>01</b>                         | <b>42</b>     |                        |
| <b>A56</b><br>(56.2 cm <sup>3</sup> /rev)   |                          |  |  |  |                                |  | <b>02</b>                         | <b>42</b>     |                        |
| <b>A70</b><br>(70.0 cm <sup>3</sup> /rev)   | <b>L:</b><br>Foot Mtg.   | <b>R:</b><br>Clockwise (Normal)<br><sup>★1</sup> |  |  |                                | <b>A:</b> <sup>★2</sup><br><b>B:</b> <sup>★2</sup> | <b>60</b>                         | <b>60</b>     |                        |
| <b>A90</b><br>(91.0 cm <sup>3</sup> /rev)   |                          |  |  |  |                                |  | <b>60</b>                         | <b>60</b>     |                        |
| <b>A145</b><br>(145.0 cm <sup>3</sup> /rev) |                          |  |  |  |                                |  | <b>60</b>                         | <b>60</b>     |                        |

★ 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: 82.55 mm (3.250 in.) (A16, A22, and PV2R1).

- A70/A90/A145 type (outboard pump connection symbol: **"A"**): spigot diameter: 82.55 mm (3.250 in.) (A16, A22, and PV2R1).

- A70/A90/A145 type (outboard pump connection symbol: **"B"**): spigot diameter: 101.6 mm (4.000 in.) (A37 and PV2R2).

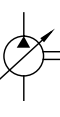
★ 3. Amplifier Compensation Number may differ according to the main machine conditions. Consult Yuken for detail.

★ 4. Design Standards: None ..... Japanese Standard "JIS"

80 ..... European Design Standard

• Consult Yuken when "N. American Design Standard" is required.





## Specifications

| Descriptions                         |                                      | Model Numbers                         | A16   | A22             | A37            | A56             | A70             | A90             | A145            |  |
|--------------------------------------|--------------------------------------|---------------------------------------|---|-----------------|----------------|-----------------|-----------------|-----------------|-----------------|--|
| Geometric Displacement               |                                      | cm <sup>3</sup> /rev<br>(cu. in./rev) | 15.8<br>(.964)                                | 22.2<br>(1.355) | 36.9<br>(2.25) | 56.2<br>(3.43)  | 70.0<br>(4.27)  | 91.0<br>(5.55)  | 145.0<br>(8.85) |  |
| Operating Pressure<br>MPa (PSI)      |                                      | Rated <sup>*2</sup>                   | 16<br>(2320)                                  | 16<br>(2320)    | 16<br>(2320)   | 16<br>(2320)    | 25<br>(3630)    | 25<br>(3630)    | 25<br>(3630)    |  |
|                                      |                                      | Intermittent <sup>*1</sup>            | 21<br>(3050)                                  | 16<br>(2320)    | 21<br>(3050)   | 21<br>(3050)    | 28<br>(4060)    | 28<br>(4060)    | 28<br>(4060)    |  |
| Shaft Speed Range                    |                                      | r/min                                 | 600 - 1800                                    |                 |                |                 |                 |                 |                 |  |
| Flow Control                         | Max. Flow <sup>*3</sup>              | L/min<br>(U.S. GPM)                   | 28.4<br>(7.5)                                 | 40.0<br>(10.6)  | 66.4<br>(17.5) | 101.0<br>(26.7) | 126.0<br>(33.3) | 163.0<br>(43.1) | 261.0<br>(69.0) |  |
|                                      | Min. Pres. Required<br>for Flow Adj. | MPa<br>(PSI)                          | 2.0 (290) <sup>*4</sup>                       |                 |                |                 |                 |                 |                 |  |
|                                      | Hysteresis                           |                                       | 1 % or less                                   |                 |                |                 |                 |                 |                 |  |
|                                      | Repeatability                        |                                       | 1 % or less                                   |                 |                |                 |                 |                 |                 |  |
|                                      | Input Signal                         |                                       | Max. Flow / 5 V DC                            |                 |                |                 |                 |                 |                 |  |
| Pressure Control                     | Min. Adjustment<br>Pressure          | MPa<br>(PSI)                          | 0.7 (100)                                     |                 |                |                 |                 |                 |                 |  |
|                                      | Hysteresis                           |                                       | 1 % or less                                   |                 |                |                 |                 |                 |                 |  |
|                                      | Repeatability                        |                                       | 1 % or less                                   |                 |                |                 |                 |                 |                 |  |
|                                      | Input Signal                         |                                       | Specified Control Pressure / 5 V DC           |                 |                |                 |                 |                 |                 |  |
| Coil Resistance                      |                                      | [@ 20°C (68 °F)]                      | 10  |                 |                |                 |                 |                 |                 |  |
| Input Impedance                      |                                      |                                       | Flow Control : 10 kΩ Pressure Control : 10 kΩ |                 |                |                 |                 |                 |                 |  |
| Supply Electric Power                |                                      |                                       | 24 V DC (21 - 28 V Included Ripple)           |                 |                |                 |                 |                 |                 |  |
| Power Input (Max.)                   |                                      | W                                     | 30  |                 |                |                 |                 |                 |                 |  |
| Output Signal                        | Flow                                 |                                       | 5 V DC/Max. Flow                              |                 |                |                 |                 |                 |                 |  |
|                                      | Pressure                             |                                       | 5 V DC/Specified Control Pressure             |                 |                |                 |                 |                 |                 |  |
| Alarm Signal Output (Open Collector) |                                      |                                       | Voltage : Max. 30 V DC Current : Max. 40 mA   |                 |                |                 |                 |                 |                 |  |
| Ambient Temperature                  |                                      | °C (°F)                               | 0 - 50 (32 - 122) (With Circulated Air)       |                 |                |                 |                 |                 |                 |  |
| Approx. Mass<br>kg (lbs.)            | Flange Mtg.                          |                                       | 20.5<br>(45.2)                                | 20.5<br>(45.2)  | 32.0<br>(70.6) | 39.0<br>(86.0)  | 64.0<br>(141)   | 76.5<br>(169)   | 96.4<br>(213)   |  |
|                                      | Foot Mtg.                            |                                       | 22.7<br>(50.1)                                | 22.7<br>(50.1)  | 36.3<br>(80.0) | 43.3<br>(95.5)  | 76.0<br>(168)   | 97.0<br>(214)   | 121.4<br>(268)  |  |

- ★ 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 33](#) 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 on [page 34](#).

## 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. See the table below for details.

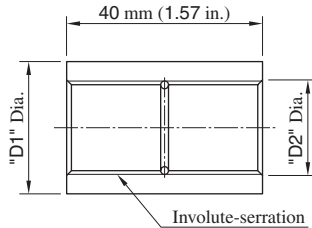
**● Connectable Outboard Pump**

| Outboard Pump Connection Symbol |      | Spigot Diameter for Connecting an Outboard Pump mm (in.) | Connectable Pump* |
|---------------------------------|------|--|-------------------|
| A37/A56                         | None | 82.55 (2.500)  | A16, A22, PV2R1   |
| A70/A90/A145                    | "A"  | 101.6 (4.000)  | A37, PV2R2        |

\* Connectable pumps shafts are involute-serrated design, not the standard parallel key slot design. For details, including pump dimensions and model numbers, consult Yuken.

**● Coupling**

Please use assembly part number when ordering coupling assemblies for shaft connections to outboard pumps.



| Outboard Pump Connection Symbol | Part Number of Coupling Ass'y | Dimensions mm (in.) |            | Serration Size (Nominal Dia. × No. of Teeth × Module) |
|---------------------------------|-------------------------------|---------------------|------------|---|
|                                 |                               | "D1"                | "D2"       |   |
| A37/A56                         | None                          | 27 (1.06)           | 19.5 (.77) | 18.75 × 24 × 0.75                                     |
| A70/A90/A145                    | "A"                           | 36 (1.42)           | 26 (1.02)  | 25 × 24 × 1   |

**● Selecting an Outboard Pump Type**

The maximum torque of outboard pumps is limited by shaft and coupling assembly strength. When determining the outboard pump type, the value of the displacement times the pressure for a particular pump should not exceed the value shown in the table below.

| Pump Model No. | ① Inboard Pump and Outboard Pump (q1 × P1) + (q2 × P2) | ② Outboard Pump q2 × P2                    |                    |
|----------------|--|--|--------------------|
|                |  | Outboard pump connection symbol "None"/"A" | "B"                |
| A37            | 900(7963) and less                                     | 519(4592) and less                         | 935(8272) and less |
| A56            | 1742(15413) and less                                   |  |                    |
| A70            | 2408(21305) and less                                   |  |                    |
| A90            | 4348(38470) and less                                   |  |                    |
| A145           | 4739(41930) and less                                   |  |                    |

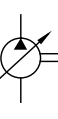
- q1, q2 : Displacement cm<sup>3</sup>/rev (cu.in./rev)
- P1, P2 : Pressure MPa (PSI)
- For selection of the appropriate pump, both values, ① and ②, should be satisfied.

**■ Attachment**

**● Amplifier**

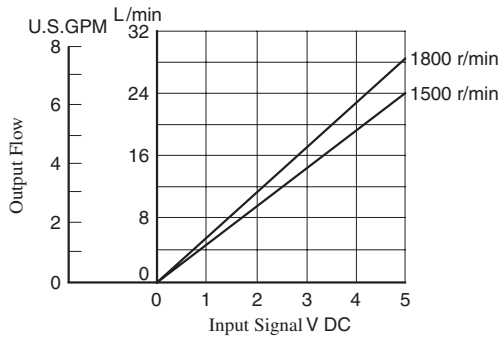
| Pump Model Numbers  | Amplifier Model Numbers | Control Pressure MPa (PSI) |
|---------------------|-------------------------|----------------------------|
| A16-*R04E ★-06-42   | SK1106-★-16-06-10       | - 14.7 ( - 2132)           |
|                     | SK1106-★-16-06-1001     | 14.7 - 19.6 (2132 - 2842)  |
|                     | SK1106-★-16-06-1002     | 19.6 - 21.0 (2842 - 3045)  |
| A22-*R04E ★-11-42   | SK1106-★-22-11-10       | - 14.7 ( - 2132)           |
|                     | SK1106-★-22-11-1001     | 14.7 - 16.0 (2132 - 2320)  |
| A37-*R04E ★-60-42   | SK1106-★-37-60-10       | - 14.7 ( - 2132)           |
|                     | SK1106-★-37-60-1001     | 14.7 - 19.6 (2132 - 2842)  |
|                     | SK1106-★-37-60-1002     | 19.6 - 21.0 (2842 - 3045)  |
| A56-*R04E ★-60-42   | SK1106-★-56-60-10       | - 14.7 ( - 2132)           |
|                     | SK1106-★-56-60-1001     | 14.7 - 19.6 (2132 - 2842)  |
|                     | SK1106-★-56-60-1002     | 19.6 - 21.0 (2842 - 3045)  |
| A70-*R04E ★*-60-60  | SK1106-★-70-60-10       | - 14.7 ( - 2132)           |
|                     | SK1106-★-70-60-1001     | 14.7 - 19.6 (2132 - 2842)  |
|                     | SK1106-★-70-60-1002     | 19.6 - 22.6 (2842 - 3277)  |
| A90-*R04E ★*-60-60  | SK1106-★-70-60-1003     | 22.6 - (3277 - )           |
|                     | SK1106-★-91-60-10       | - 14.7 ( - 2132)           |
|                     | SK1106-★-91-60-1001     | 14.7 - 19.6 (2132 - 2842)  |
| A145-*R04E ★*-60-60 | SK1106-★-91-60-1002     | 19.6 - 22.6 (2842 - 3277)  |
|                     | SK1106-★-91-60-1003     | 22.6 - (3277 - )           |
|                     | SK1106-★-145-60-10      | - 14.7 ( - 2132)           |
| A145-*R04E ★*-60-60 | SK1106-★-145-60-1001    | 14.7 - 19.6 (2132 - 2842)  |
|                     | SK1106-★-145-60-1002    | 19.6 - 22.6 (2842 - 3277)  |
|                     | SK1106-★-145-60-1003    | 22.6 - (3277 - )           |

Note 1. The symbol "★", shown with pump and amplifier model numbers, is the control pressure at input signal of 5 V.  
 2. Cable for pump-amplifier connection is not included. See Page 85 for details on ordering cables.

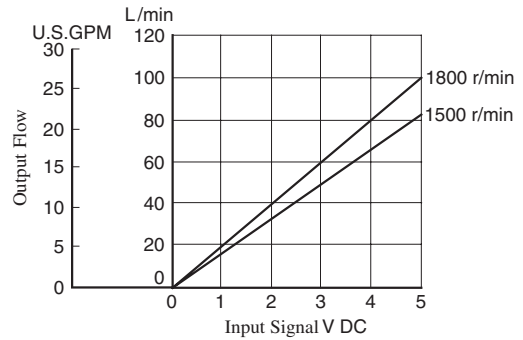


Output Flow vs. Input Signal

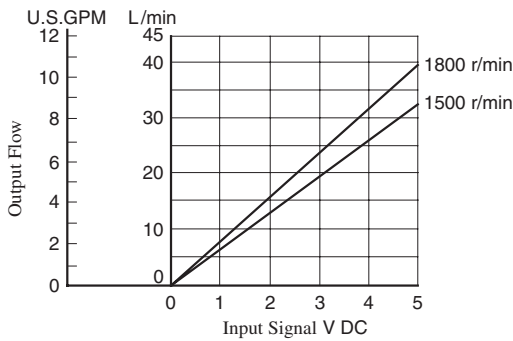
● A16



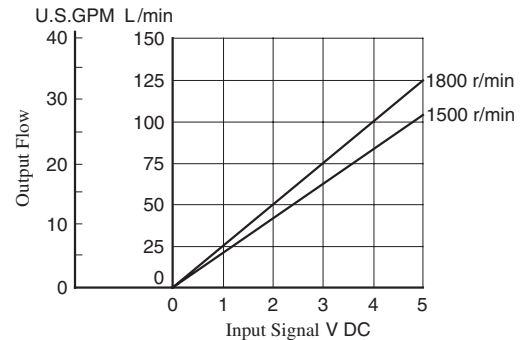
● A56



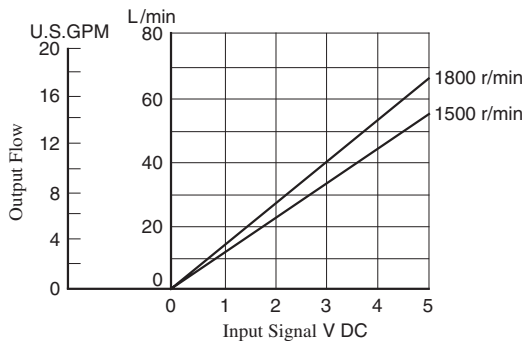
● A22



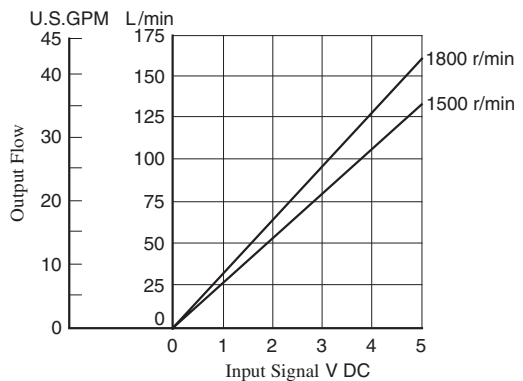
● A70



● A37

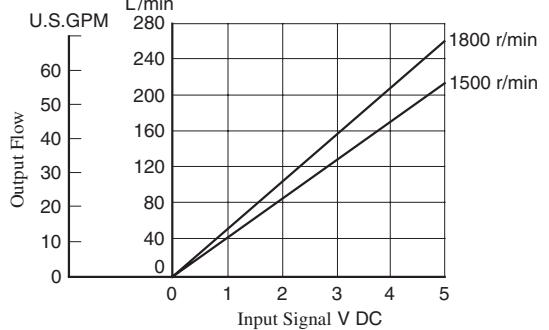


● A90

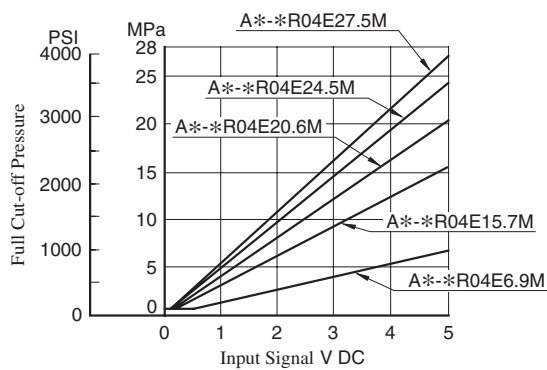


Note: Pump characteristics at 1800 r/min is the same as those at 1500 r/min where frequency is compensated. (Refer to page 75.)

● A145

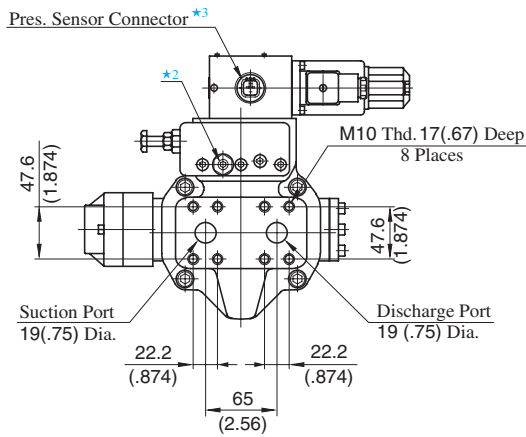
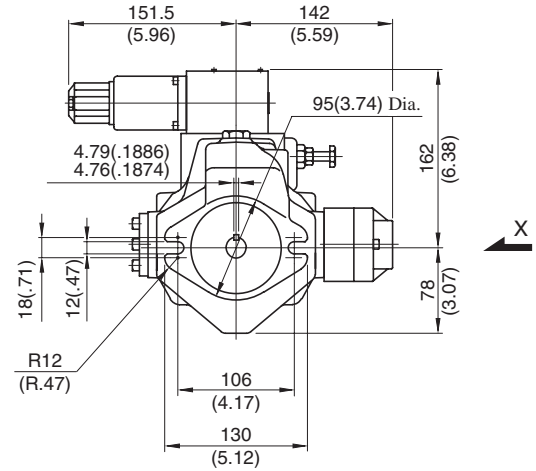
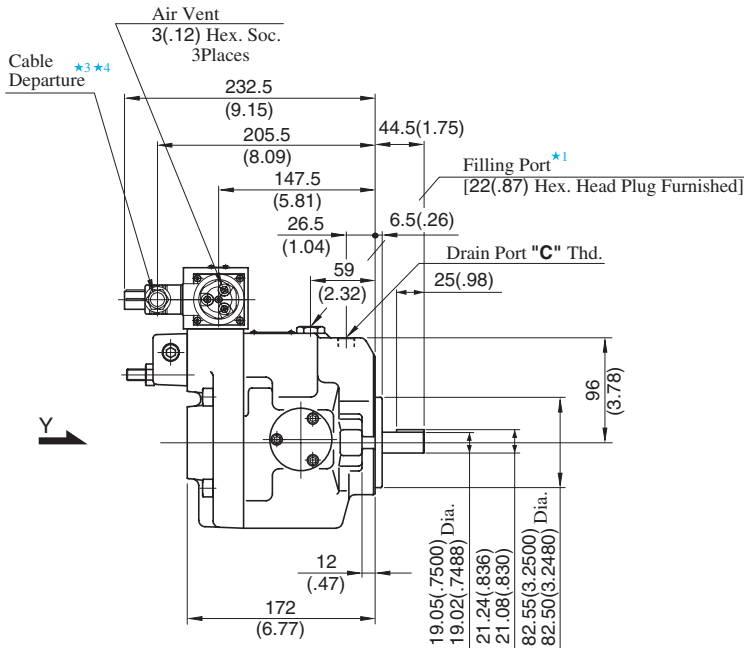


Full Cut-off Pres. vs. Input Signal

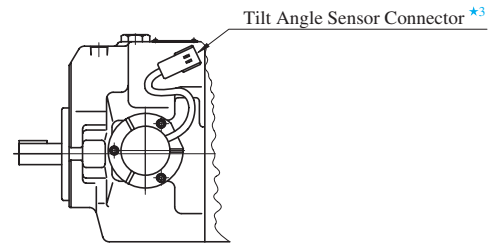


Refer to page 37 to 43 for performance characteristics of pressure compensator type excluding characteristics appeared on this catalogue.

Flange Mtg. : A16-FR04E\*-06-42/4280  
A22-FR04E\*-11-42/4280



View Arrow Y



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 85](#).
- ★ 4. Cable Applicable:  
Outside Dia. .... 8-10mm(.31-.39 IN.)  
Conductor Area..... Not Exceeding 1.5mm<sup>2</sup>(.0023 Sq. IN.)

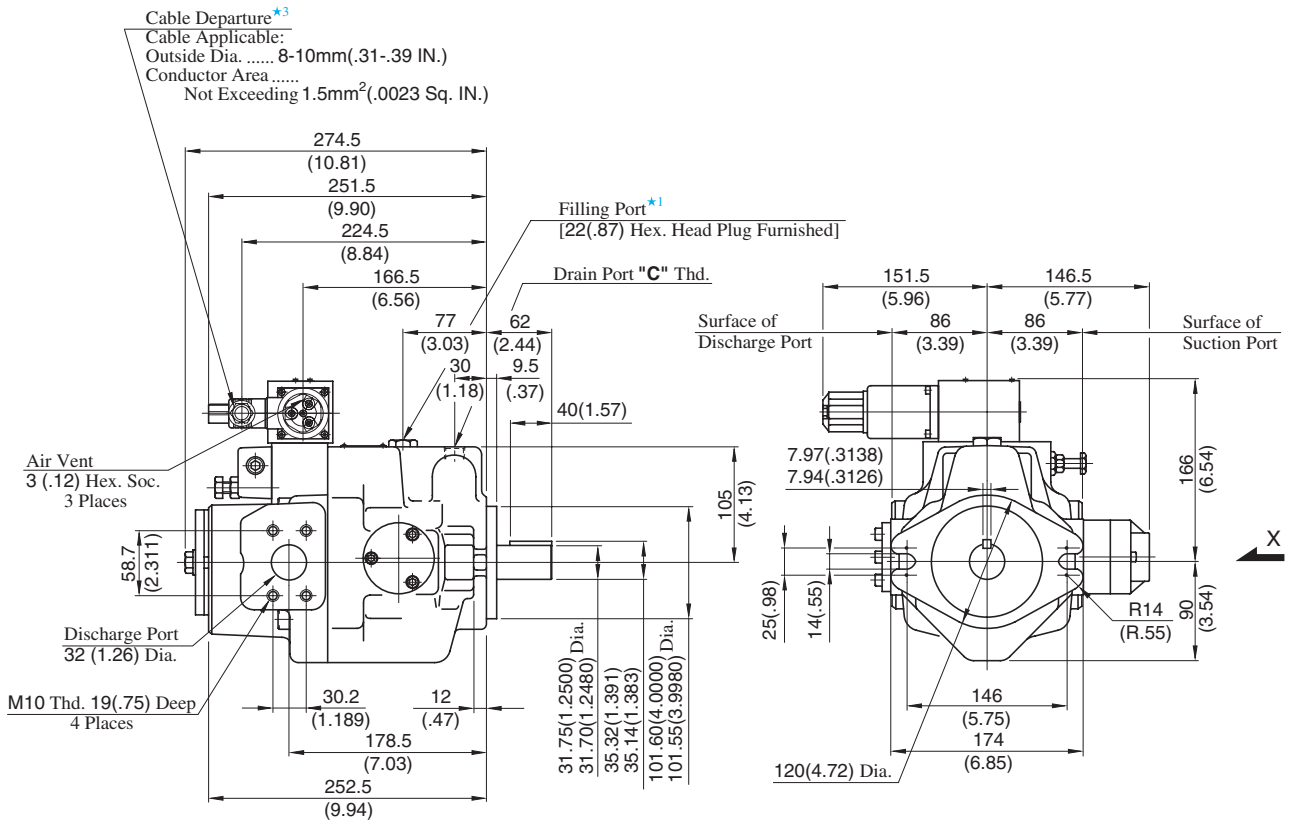
| Model Numbers         | "C" Thd.  |
|-----------------------|-----------|
| A16/A22-FR04E*-*-42   | Rc 3/8    |
| A16/A22-FR04E*-*-4280 | 3/8 BSP.F |

**DIMENSIONS IN  
MILLIMETRES (INCHES)**

● **Foot Mounting Type**

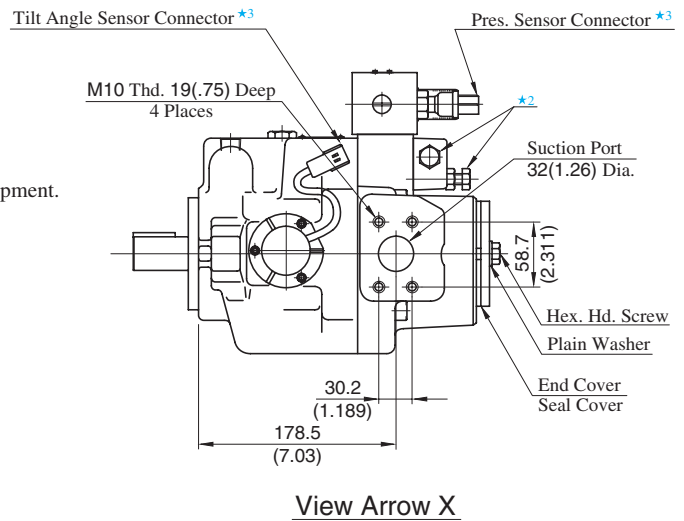
Mounting bracket is common to that of pressure compensator model.  
Refer to [page 45](#) for the dimensions of mounting bracket.

Flange Mtg. : A37-FR04E\*-01-42/4280



- ★ 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 85](#).

| Model Numbers      | "C" Thd.  |
|--------------------|-----------|
| A37-FR04E*-01-42   | Rc 1/2    |
| A37-FR04E*-01-4280 | 1/2 BSP.F |

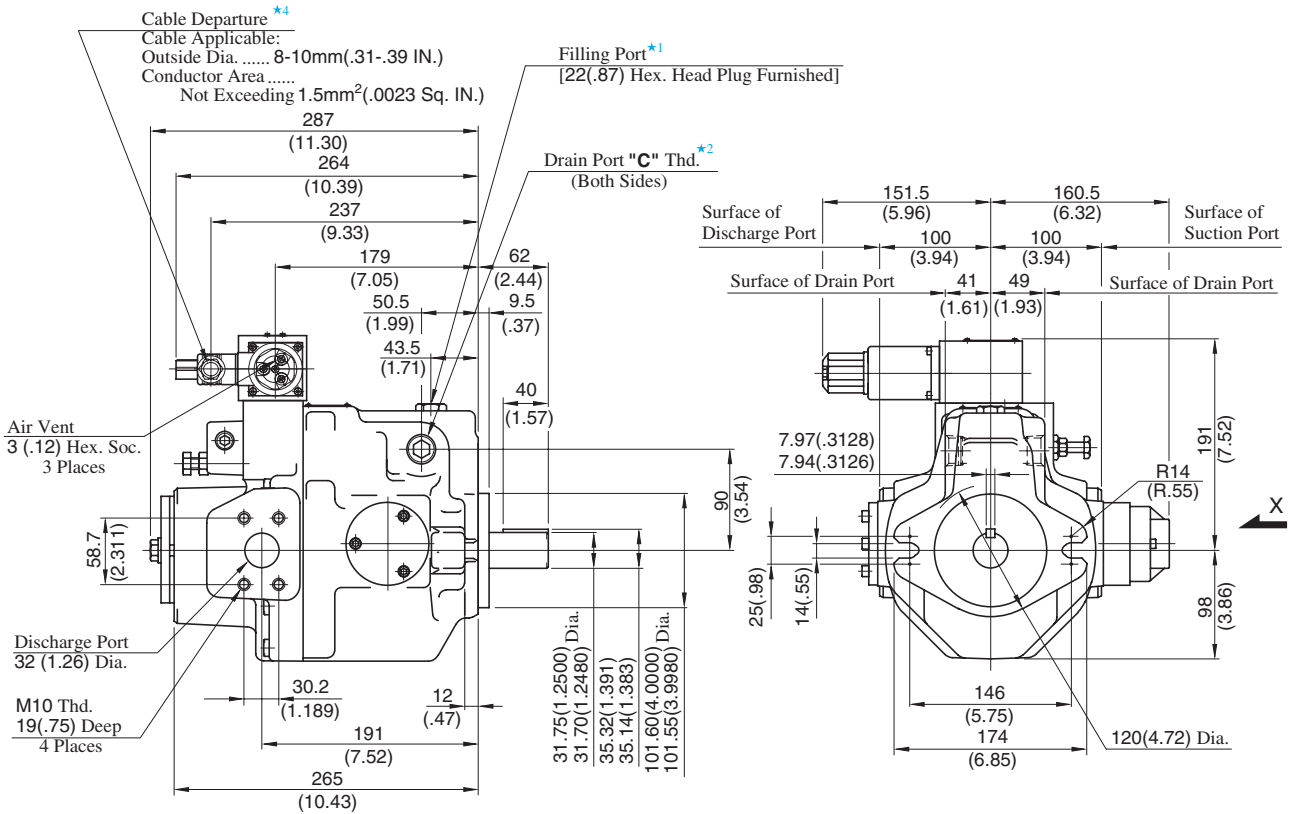


DIMENSIONS IN MILLIMETRES (INCHES)

● Foot Mounting Type

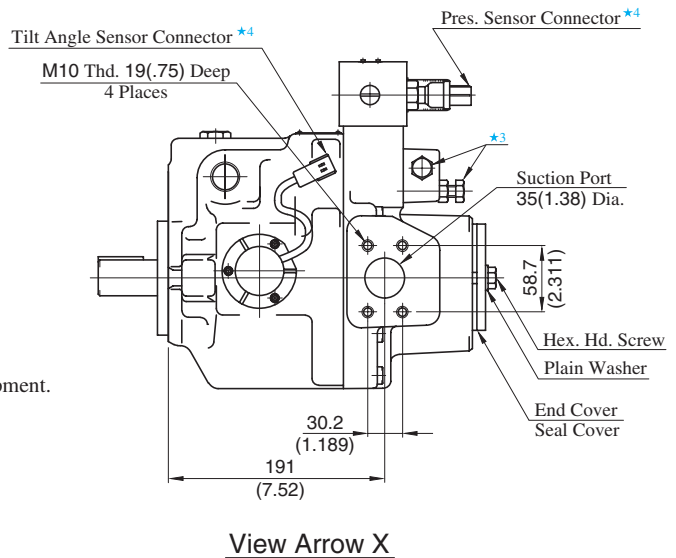
Mounting bracket is common to that of pressure compensator model.  
Refer to [page 46](#) for the dimensions of mounting bracket.

Flange Mtg. : A56-FR04E\*-02-42/4280



- ★ 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 85](#).

| Model Numbers      | "C" Thd.  |
|--------------------|-----------|
| A56-FR04E*-02-42   | Rc 3/4    |
| A56-FR04E*-02-4280 | 3/4 BSP.F |

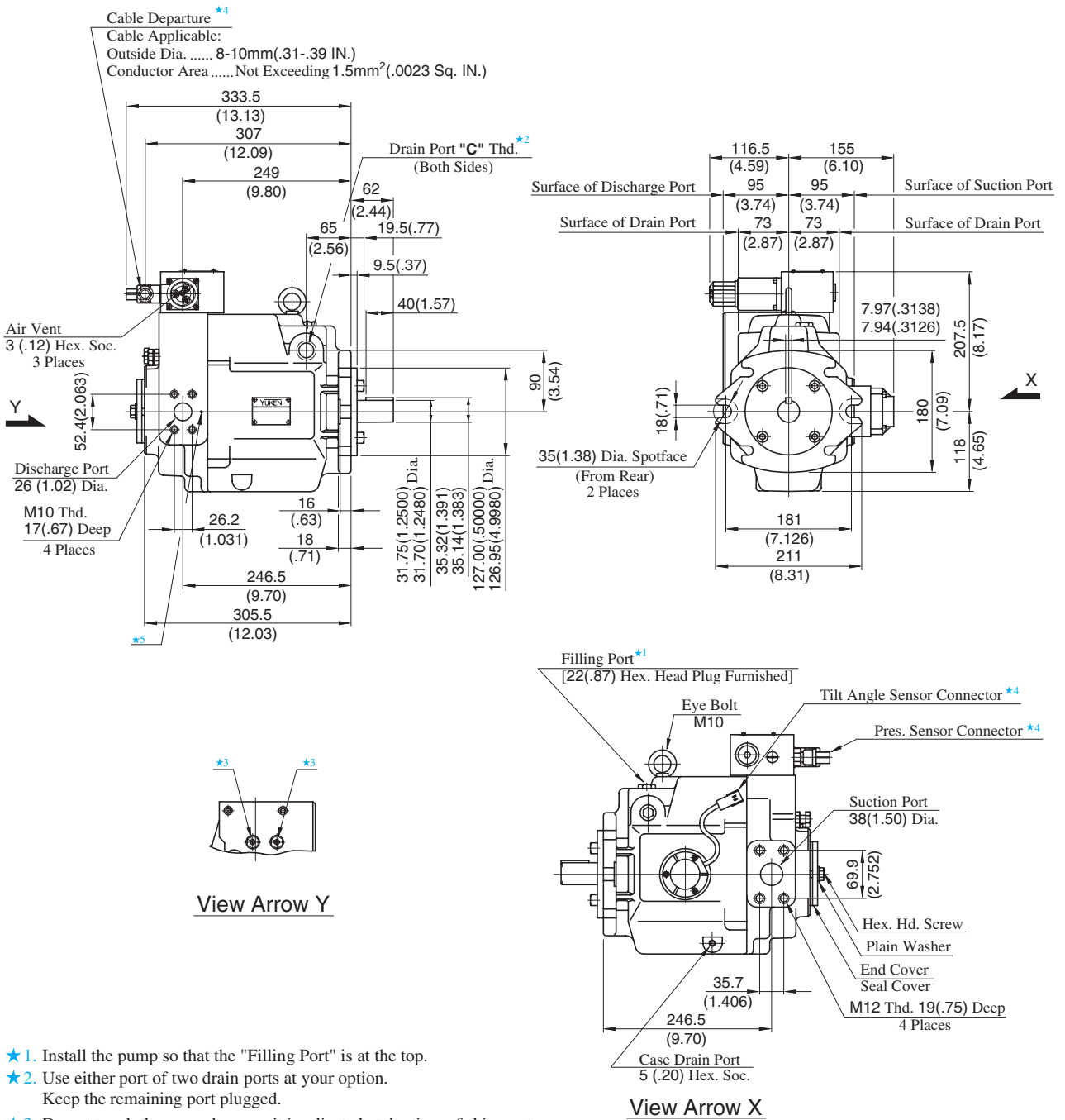


**DIMENSIONS IN MILLIMETRES (INCHES)**

● **Foot Mounting Type**

Mounting bracket is common to that of pressure compensator model.  
 Refer to [page 47](#) for the dimensions of mounting bracket.

Flange Mtg. : A70-FR04E\*\*-60-60/6080



- ★ 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 85](#).
- ★ 5. If you do not use the special sequence valve, plug the port (FP-SC-1/32).

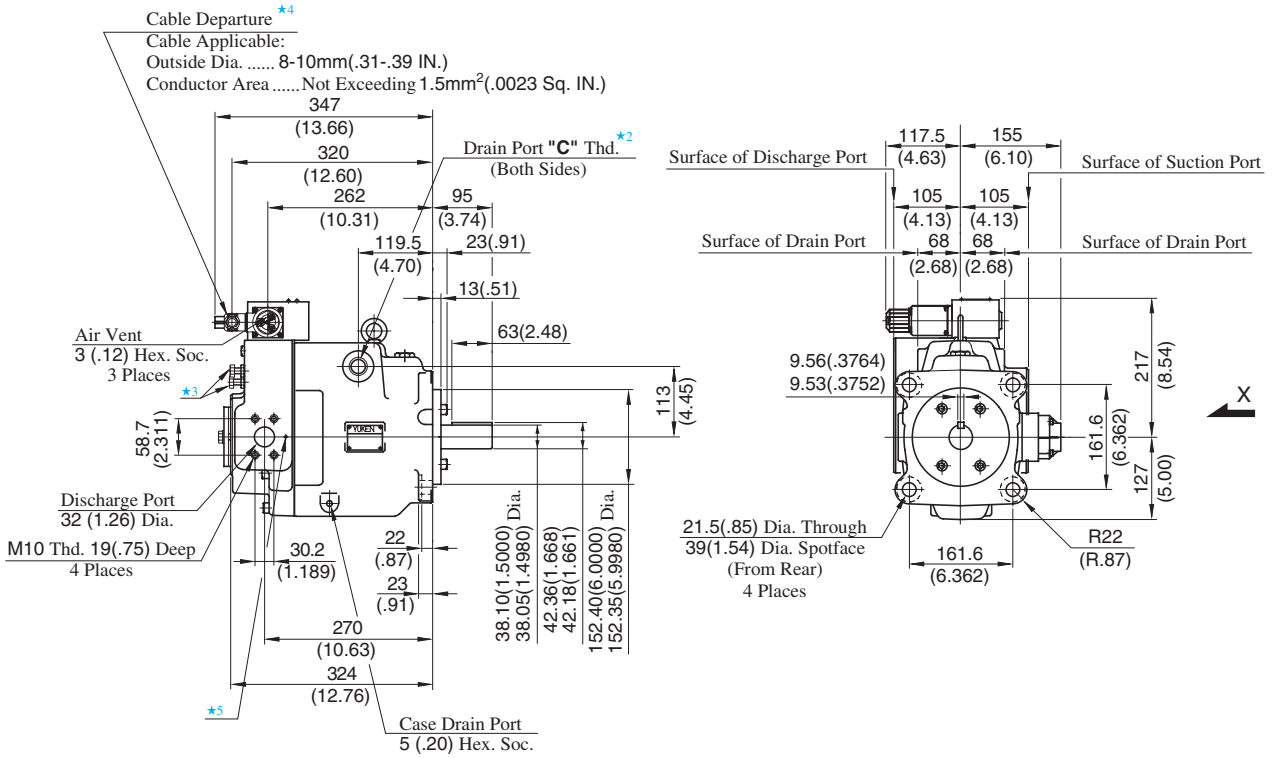
| Model Numbers       | "C" Thd.  |
|---------------------|-----------|
| A70-FR04E**-60-60   | Rc 3/4    |
| A70-FR04E**-60-6080 | 3/4 BSP.F |

DIMENSIONS IN MILLIMETRES (INCHES)

● **Foot Mounting Type**

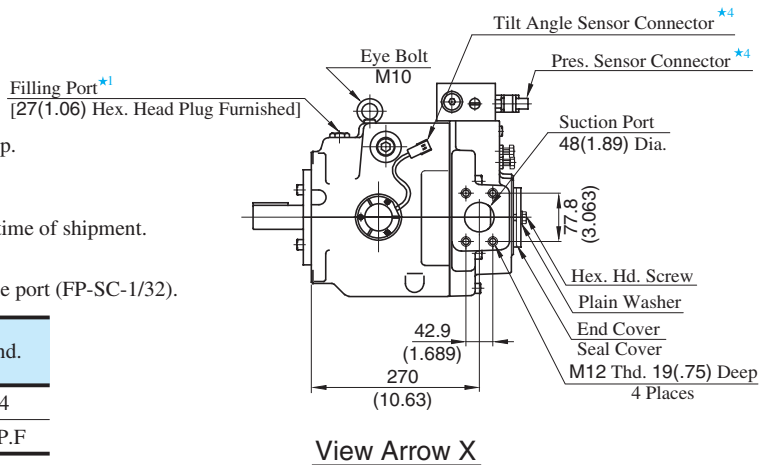
Mounting bracket is common to that of pressure compensator model.  
 Refer to [page 48](#) for the dimensions of mounting bracket.

Flange Mtg. : A90-FR04E\*\*60-60/6080



- ★ 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.
- ★ 3. Do not touch the screw because it is adjusted at the time of shipment.
- ★ 4. For cable connection with amplifiers, see [page 85](#).
- ★ 5. If you do not use the special sequence valve, plug the port (FP-SC-1/32).

| Model Numbers      | "C" Thd.  |
|--------------------|-----------|
| A90-FR04E**60-60   | Rc 3/4    |
| A90-FR04E**60-6080 | 3/4 BSP.F |



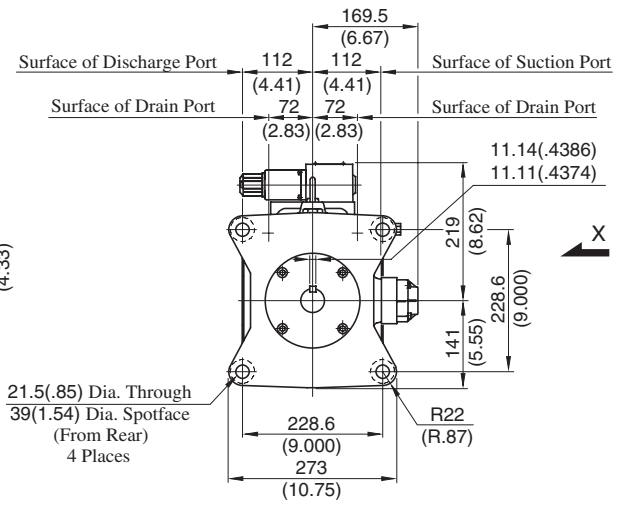
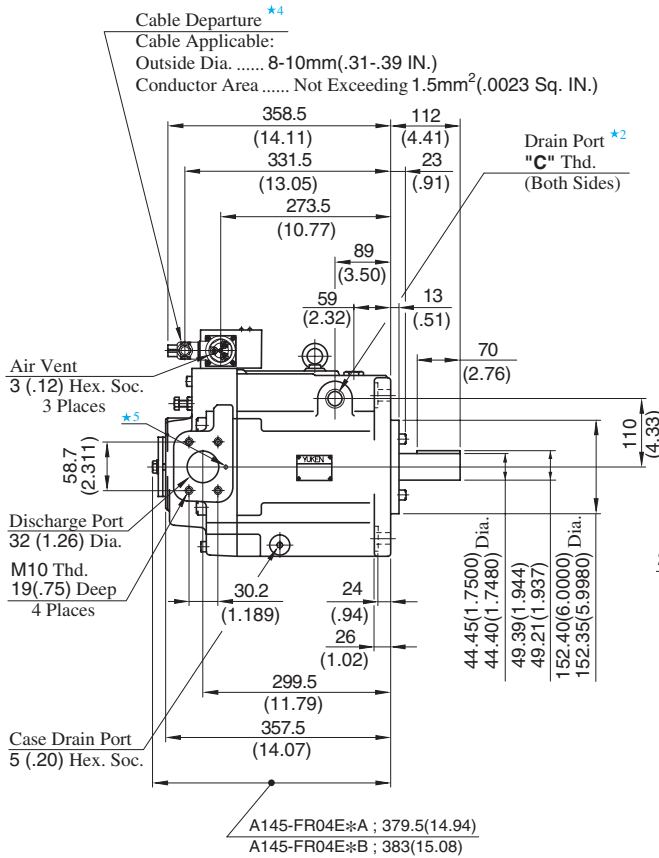
**DIMENSIONS IN MILLIMETRES (INCHES)**

● **Foot Mounting Type**

Mounting bracket is common to that of pressure compensator model.  
 Refer to [page 49](#) for the dimensions of mounting bracket.

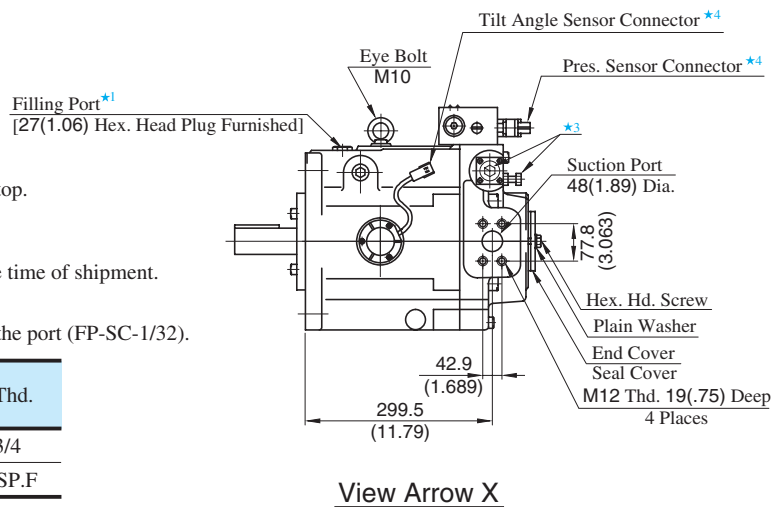


Flange Mtg. : A145-FR04E\*\*\*-60-60/6080



- ★ 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 85](#).
- ★ 5. If you do not use the special sequence valve, plug the port (FP-SC-1/32).

| Model Numbers         | "C" Thd.  |
|-----------------------|-----------|
| A145-FR04E***-60-60   | Rc 3/4    |
| A145-FR04E***-60-6080 | 3/4 BSP.F |



View Arrow X

DIMENSIONS IN MILLIMETRES (INCHES)

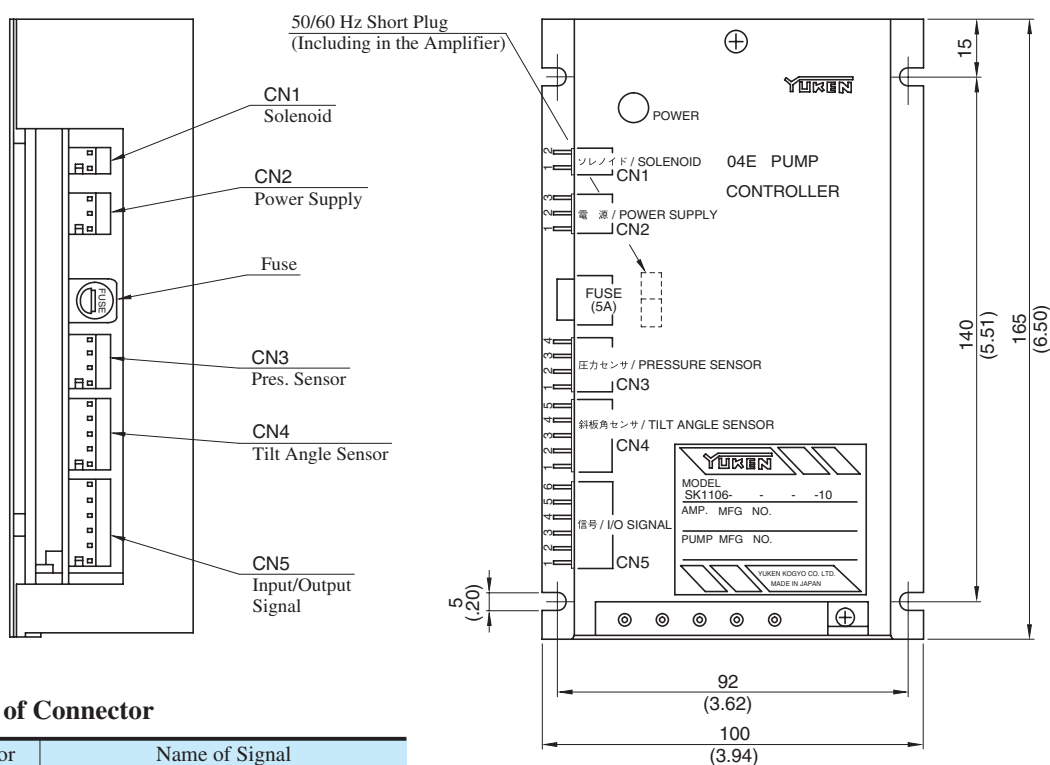
● Foot Mounting Type

Mounting bracket is common to that of pressure compensator model. Refer to [page 50](#) for the dimensions of mounting bracket.

Amplifiers for Electro-Hydraulic Proportional Pressure & Flow Control Type Pumps (SK1106-★-\*-\*-10\*\*)

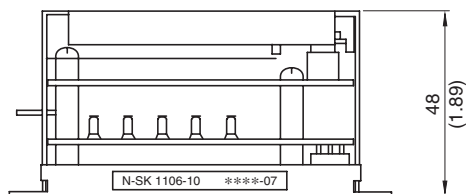
**Specifications**

| Model No.                        | SK1106-★-*-*-10**                            |
|----------------------------------|--|
| Description                      |  |
| Applicable Coil Resistance       | 10 Ω [at 20 °C (68 °F)]                      |
| Input Impedance                  | 10 kΩ (PIN, QIN)                             |
| Power Supply                     | 24 V DC (21 - 28 V Included Ripple)          |
| Power Input (Max.)               | 30 W   |
| Input Signal                     | Max. Flow/5V (QIN), Specified Pres./5V (PIN) |
| Output Signal for Sensor Monitor | 5V/Max. Flow (SMQ), 5V/Specified Pres. (SMP) |
| Ambient Temperature              | 0 - 50 °C (32 - 122 °F)                      |
| Approx. Mass                     | 450 g (1.0 lbs.)                             |



**Detail of Connector**

| Connector               | Name of Signal |  |                         |
|-------------------------|----------------|--|-------------------------|
| CN1 Solenoid            | 1              | Output to pilot valve solenoid         |                         |
|                         | 2              |  |                         |
| CN2 Power Supply        | 1              | 0 [V] (0V )                            |                         |
|                         | 2              | +24 [V] (24V)                          |                         |
|                         | 3              | 0 [V]                                  |                         |
| CN3 Pres. Sensor        | 1              | +5 [V]                                 | Power Supply for Sensor |
|                         | 2              | 0 [V]                                  |                         |
|                         | 3              | Input Signal - Sensor                  |                         |
|                         | 4              | 0 [V]                                  |                         |
| CN4 Tilt Angle Sensor   | 1              | +8 [V]                                 | Power Supply for Sensor |
|                         | 2              | 0 [V]                                  |                         |
|                         | 3              | Input Signal - Sensor                  |                         |
|                         | 4              | 0 [V]                                  |                         |
| CN5 Input/Output Signal | 1              | Input Signal - Flow (Qin)              |                         |
|                         | 2              | Input Signal - Common (COM)            |                         |
|                         | 3              | Input Signal - Pres. (Pin)             |                         |
|                         | 4              | Output Signal - Sensor Monitor P (SMP) |                         |
|                         | 5              | Output Signal - Sensor Monitor Q (SMQ) |                         |
|                         | 6              | 0 [V]                                  |                         |

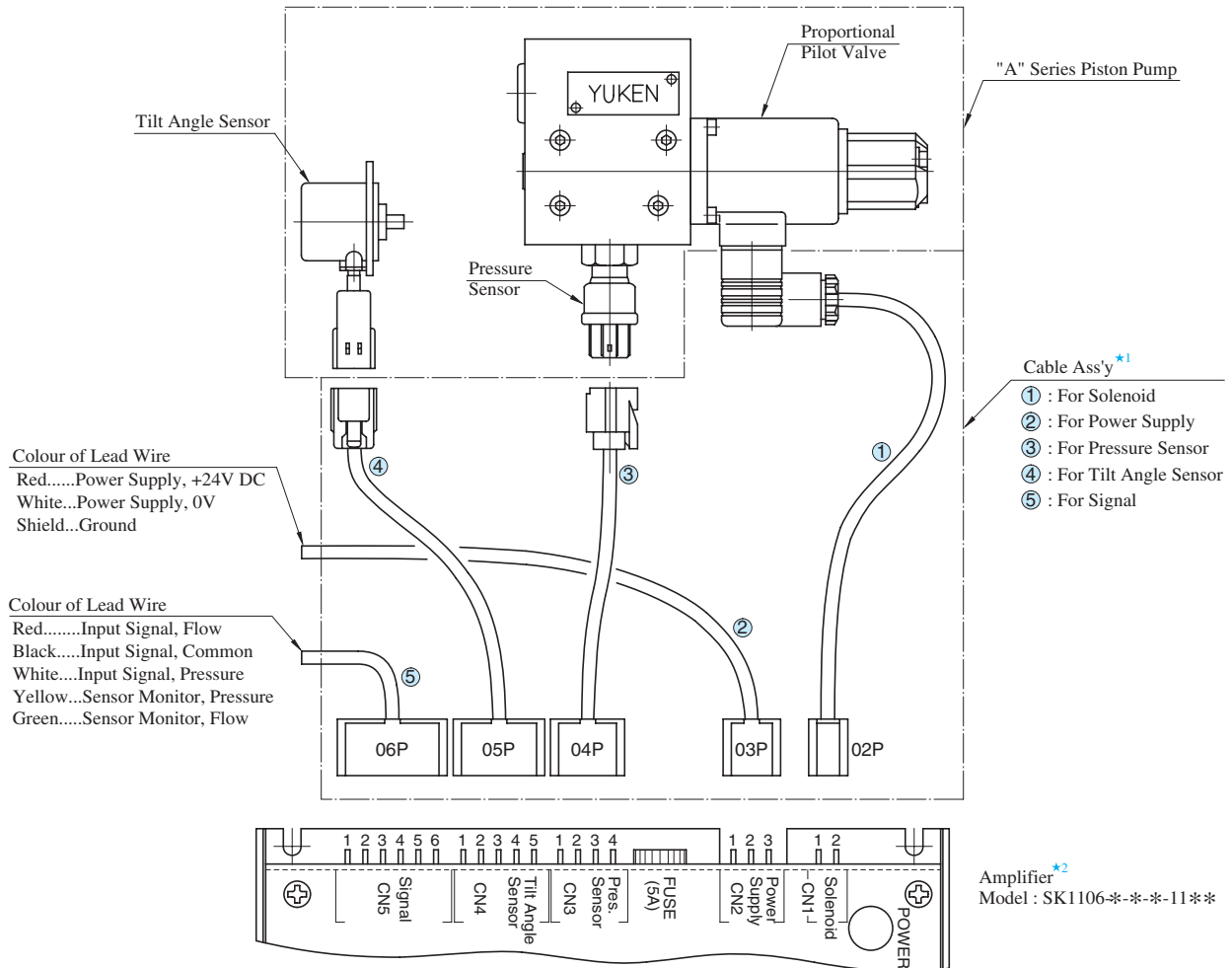


**DIMENSIONS IN MILLIMETRES (INCHES)**

### 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 number described in the below table if required.

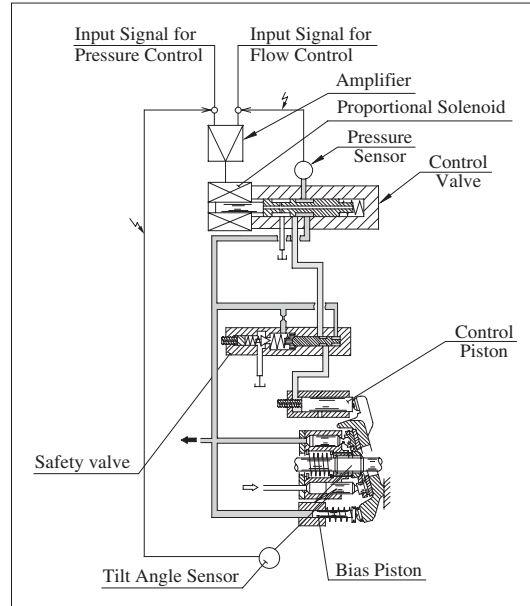
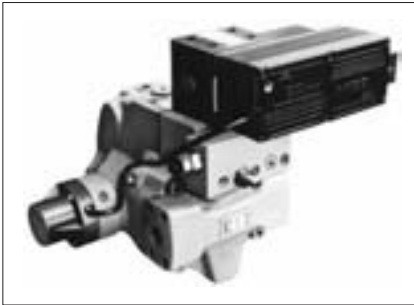


★ 1. Cable assemblies are available. When ordering, specify the cable ass'y model numbers from the table below.

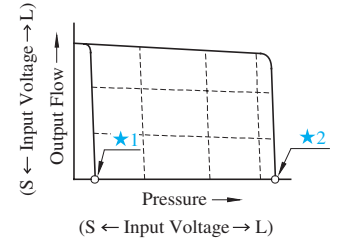
| Name of Cable Ass'y     | Cable Ass'y Model Numbers       |               |                |
|-------------------------|---------------------------------|---------------|----------------|
|                         | Approx. Length of Cable mm(ft.) |               |                |
|                         | 2000 (6.6)                      | 5000 (16.4)   | 10000 (32.8)   |
| ① For Solenoid          | SK1112-S-2-10                   | SK1112-S-5-10 | SK1112-S-10-10 |
| ② For Power Supply      | SK1112-V-2-10                   | SK1112-V-5-10 | SK1112-V-10-10 |
| ③ For Pressure Sensor   | SK1112-P-2-10                   | SK1112-P-5-10 | SK1112-P-10-10 |
| ④ For Tilt Angle Sensor | SK1112-Q-2-10                   | SK1112-Q-5-10 | SK1112-Q-10-10 |
| ⑤ For Signal            | SK1112-C-2-10                   | SK1112-C-5-10 | SK1112-C-10-10 |

★ 2. For the details of amplifier, see the [previous page](#).

# "A" Series Variable Displacement Piston Pumps – Single Pump, "OBE" Type Electro-Hydraulic Proportional Pressure & Flow Control Type

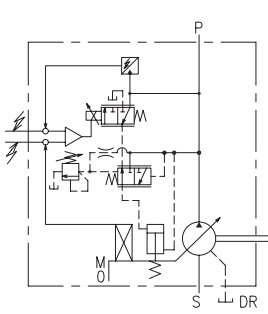


## Performance Characteristics

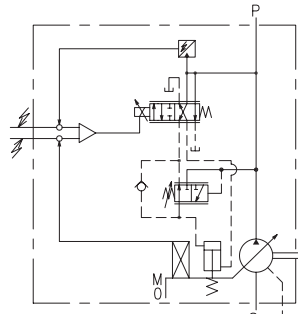


- ★ 1. Unloading pressure when input signal is 0 V.
- ★ 2. Safety valve setting pressure

## Graphic Symbols



A16/A22/A37/A56



A70/A90/A145

## Example of Specified Control Pressure

| Control Pressure Symbol (EX.) | Control Pressure at Input Signal is 5 V |       |      |      |
|-------------------------------|---|-------|------|------|
|                               | kgf/cm <sup>2</sup>                     | MPa   | PSI  |      |
| 70                            | 70                                      | 6.9   | 1000 |      |
| 105                           | 105                                     | 10.3  | 1500 |      |
| 140                           | 140                                     | 13.7  | 2000 |      |
| 175                           | 175                                     | 17.2  | 2500 |      |
| 210                           | 210                                     | 20.6  | 3000 |      |
| —                             | 7M                                      | 71.4  | 7    | 1015 |
| —                             | 16M                                     | 163.2 | 16   | 2320 |
| —                             | 21M                                     | 214.2 | 21   | 3045 |

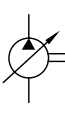
## Model Number Designation

| A16   | -F                          | R  | 04EH   | 70   | R                      | S                      | -06                               | -42           | *           |
|---|-----------------------------|--|--|--|------------------------|------------------------|-----------------------------------|---------------|-------------|
| Series Number                               | Mounting                    | Direction of Rotation                            | Control Type   | Control Pressure at Input Signal is 5 V  | Amplifier Direction    | Port Position          | Compensation Number <sup>★2</sup> | Design Number | Design Std. |
| <b>A16</b><br>(15.8 cm <sup>3</sup> /rev)   | <b>F:</b><br>Flange<br>Mtg. | (Viewed from Shaft End)                          | <b>04EH:</b><br>"OBE" Type Proportional Pressure & Flow Control Type | Specify Control Pressure between 6.9 MPa and Maximum Operating Pressure (Refer to above Table) | —                      | <b>S:</b><br>Side Port | <b>06</b>                         | <b>42</b>     | Refer to ★3 |
| <b>A22</b><br>(22.2 cm <sup>3</sup> /rev)   |                             |  |  |  |                        |                        | <b>11</b>                         | <b>42</b>     |             |
| <b>A37</b><br>(36.9 cm <sup>3</sup> /rev)   |                             |  |  |  |                        |                        | <b>01</b>                         | <b>42</b>     |             |
| <b>A56</b><br>(56.2 cm <sup>3</sup> /rev)   |                             |  |  |  |                        |                        | <b>02</b>                         | <b>42</b>     |             |
| <b>A70</b><br>(70.0 cm <sup>3</sup> /rev)   | <b>L:</b><br>Foot<br>Mtg.   | <b>R:</b><br>Clockwise <sup>★1</sup><br>(Normal) |  |  | (Viewd from Shaft End) | <b>S:</b><br>Side Port | <b>60</b>                         | <b>60</b>     |             |
| <b>A90</b><br>(91.0 cm <sup>3</sup> /rev)   |                             |  |  |  |                        |                        | <b>60</b>                         | <b>60</b>     |             |
| <b>A145</b><br>(145.0 cm <sup>3</sup> /rev) |                             |  |  |  |                        |                        | <b>60</b>                         | <b>60</b>     |             |

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

★ 2. Amplifier Compensation Number may differ according to the main machine conditions. Consult Yuken for detail.

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



Specifications

| Descriptions                         |                                   | Model Numbers                         | A16   | A22             | A37            | A56             | A70             | A90             | A145            |  |
|--------------------------------------|-----------------------------------|---------------------------------------|---|-----------------|----------------|-----------------|-----------------|-----------------|-----------------|--|
| Geometric Displacement               |                                   | cm <sup>3</sup> /rev<br>(cu. in./rev) | 15.8<br>(.964)                              | 22.2<br>(1.355) | 36.9<br>(2.25) | 56.2<br>(3.43)  | 70.0<br>(4.27)  | 91.0<br>(5.55)  | 145.0<br>(8.85) |  |
| Operating Pressure<br>MPa (PSI)      |                                   | Rated <sup>*2</sup>                   | 16<br>(2320)                                | 16<br>(2320)    | 16<br>(2320)   | 16<br>(2320)    | 25<br>(3625)    | 25<br>(3625)    | 25<br>(3625)    |  |
|                                      |                                   | Intermittent <sup>*1</sup>            | 21<br>(3050)                                | 16<br>(2320)    | 21<br>(3050)   | 21<br>(3050)    | 28<br>(4060)    | 28<br>(4060)    | 28<br>(4060)    |  |
| Shaft Speed Range                    |                                   | r/min                                 | 600 - 1800                                  |                 |                |                 |                 |                 |                 |  |
| Flow Control                         | Max. Flow <sup>*3</sup>           | L/min<br>(U.S. GPM)                   | 28.4<br>(7.5)                               | 40.0<br>(10.6)  | 66.4<br>(17.5) | 101.2<br>(26.7) | 126.0<br>(33.3) | 163.0<br>(43.1) | 261.0<br>(69.0) |  |
|                                      | Min. Pres. Required for Flow Adj. | MPa (PSI)                             | 2.0 (290)                                   |                 |                |                 |                 |                 |                 |  |
|                                      | Hysteresis                        |                                       | 1 % or less                                 |                 |                |                 |                 |                 |                 |  |
|                                      | Repeatability                     |                                       | 1 % or less                                 |                 |                |                 |                 |                 |                 |  |
|                                      | Input Signal                      |                                       | Max. Flow / 5 V DC                          |                 |                |                 |                 |                 |                 |  |
| Pressure Control                     | Min. Adjustment Pressure          | MPa (PSI)                             | 0.7 (100)                                   |                 |                |                 |                 |                 |                 |  |
|                                      | Hysteresis                        |                                       | 1 % or less                                 |                 |                |                 |                 |                 |                 |  |
|                                      | Repeatability                     |                                       | 1 % or less                                 |                 |                |                 |                 |                 |                 |  |
|                                      | Input Signal                      |                                       | Specified Control Pressure / 5 V DC         |                 |                |                 |                 |                 |                 |  |
| Coil Resistance                      |                                   | Ω [ @ 20°C (68 °F) ]                  | 10  |                 |                |                 |                 |                 |                 |  |
| Input Impedance                      |                                   |                                       | Flow Control : 10kΩ Pres. Control : 10kΩ    |                 |                |                 |                 |                 |                 |  |
| Supply Electric Power                |                                   |                                       | 24 V DC (21 - 28 V Included Ripple)         |                 |                |                 |                 |                 |                 |  |
| Power Input (Max.)                   |                                   | W                                     | 30  |                 |                |                 |                 |                 |                 |  |
| Output Signal                        | Flow                              |                                       | 5 V DC / Max. Flow                          |                 |                |                 |                 |                 |                 |  |
|                                      | Pressure                          |                                       | 5 V DC / Specified Control Pressure         |                 |                |                 |                 |                 |                 |  |
| Alarm Signal Output (Open Collector) |                                   |                                       | Voltage : Max. 30 V DC Current : Max. 40 mA |                 |                |                 |                 |                 |                 |  |
| Ambient Temperature                  |                                   | °C (°F)                               | 0 - 50 (32 - 122) (With Circulated Air)     |                 |                |                 |                 |                 |                 |  |
| Mass                                 | kg<br>(lbs.)                      | Flange Mtg.                           | 20.7<br>(45.6)                              | 20.7<br>(45.6)  | 32.2<br>(71)   | 39.2<br>(86.4)  | 64<br>(141)     | 76.5<br>(169)   | 98<br>(216)     |  |
|                                      |                                   | Foot Mtg.                             | 22.9<br>(50.5)                              | 22.9<br>(50.5)  | 36.5<br>(80.5) | 43.5<br>(95.9)  | 76<br>(168)     | 97<br>(214)     | 123<br>(271)    |  |

★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 33](#) 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.

Pipe Flange Kits

For Pipe flange, refer to form of pressure compensator type on [page 34](#).

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.

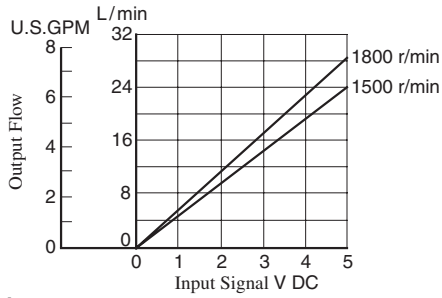
If short plug is used at 60 Hz without making the change, maximum flow increased in proportion to frequency.

Painting on Amp. Box and Solenoid

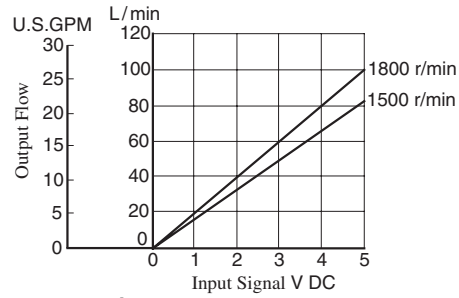
To maintain suitable radiation effect, the amp. box and the solenoid of the control valve should not be painted.

■ Output Flow vs. Input Signal

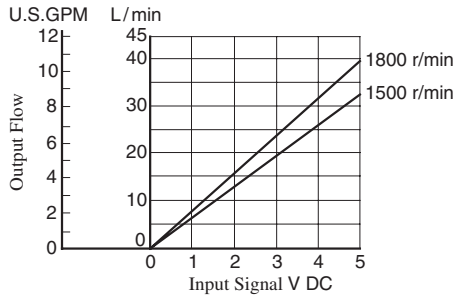
● A16



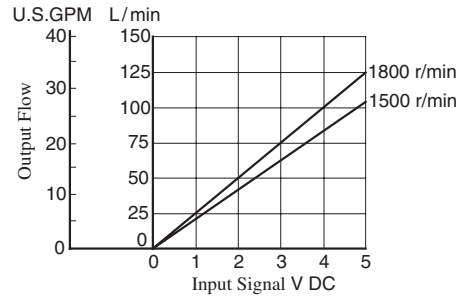
● A56



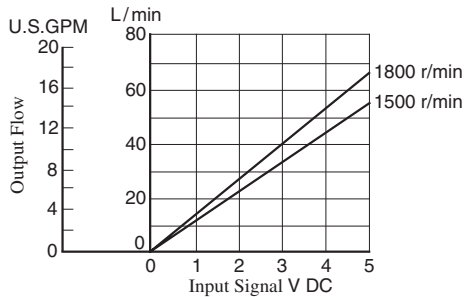
● A22



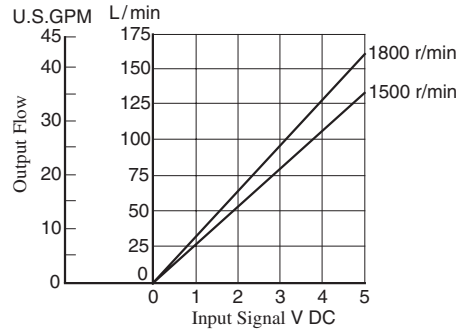
● A70



● A37

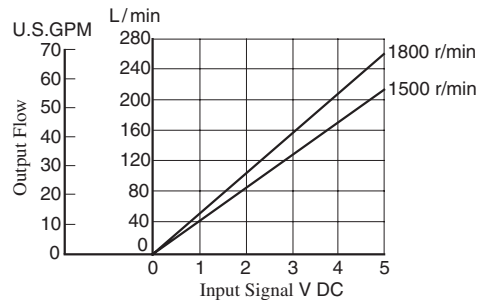


● A90

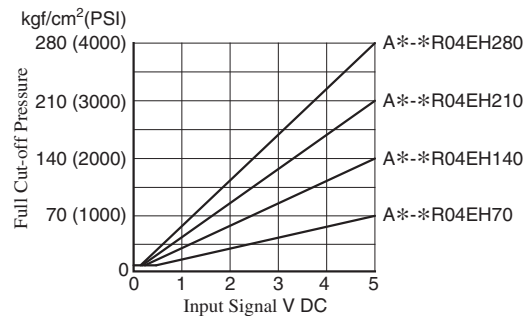
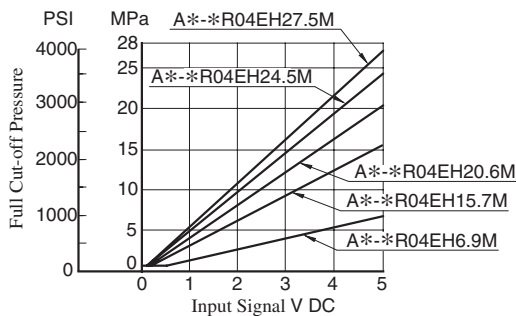


Note: Pump characteristics at 1800 r/min is the same as those at 1500 r/min where frequency is compensated. (Refer to [page 87](#).)

● A145



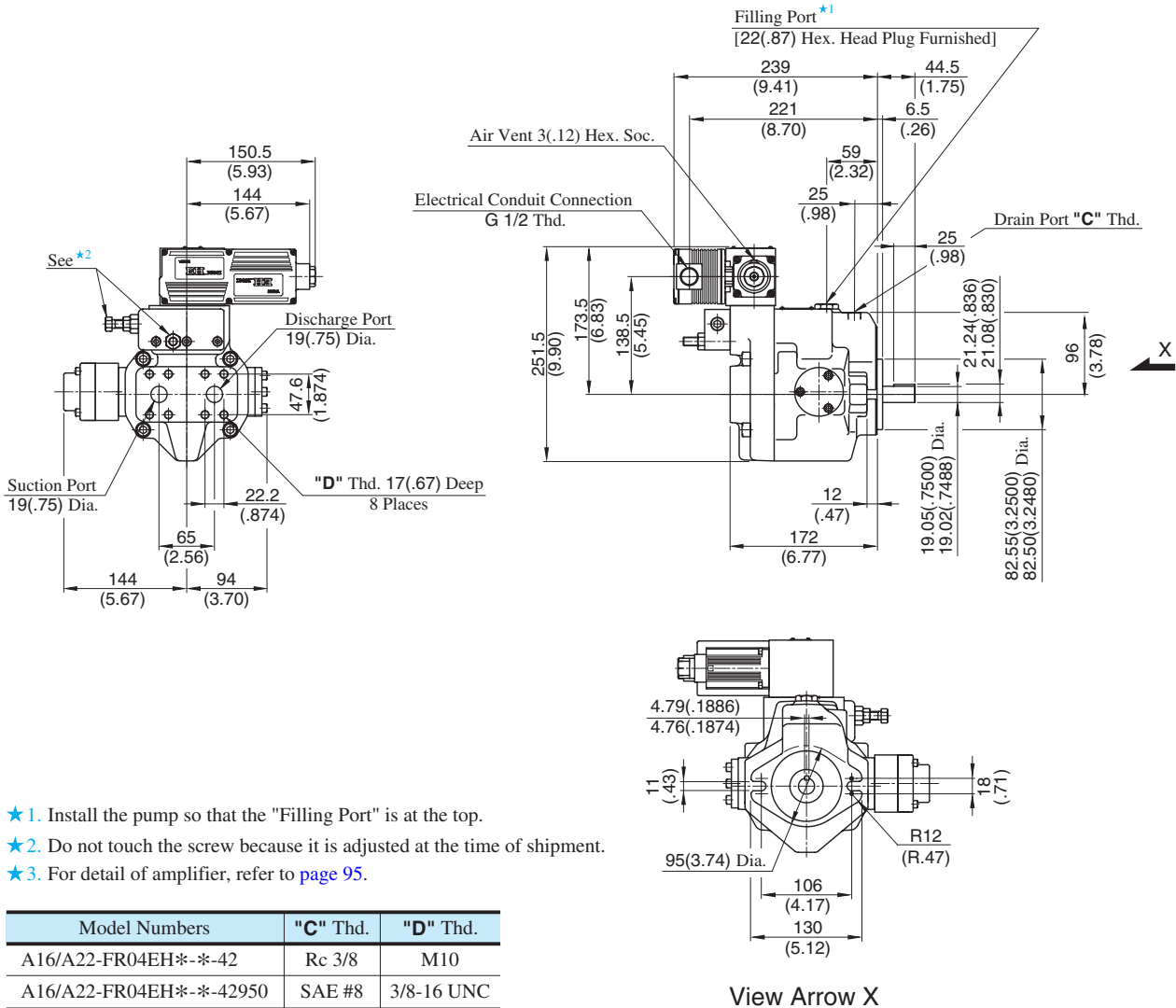
■ Full Cut-off Pres. vs. Input Signal



Refer to [page 37 to 43](#) for performance characteristics of pressure compensator type excluding characteristics appeared on this catalogue.

Axial Port Type

Flange Mtg.: A16-FR04EH\*-\*-42/42950  
A22-FR04EH\*-\*-42/42950



- ★ 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 detail of amplifier, refer to [page 95](#).

| Model Numbers           | "C" Thd. | "D" Thd.   |
|-------------------------|----------|------------|
| A16/A22-FR04EH*-*-42    | Rc 3/8   | M10        |
| A16/A22-FR04EH*-*-42950 | SAE #8   | 3/8-16 UNC |

DIMENSIONS IN MILLIMETRES (INCHES)

● Side Port Type

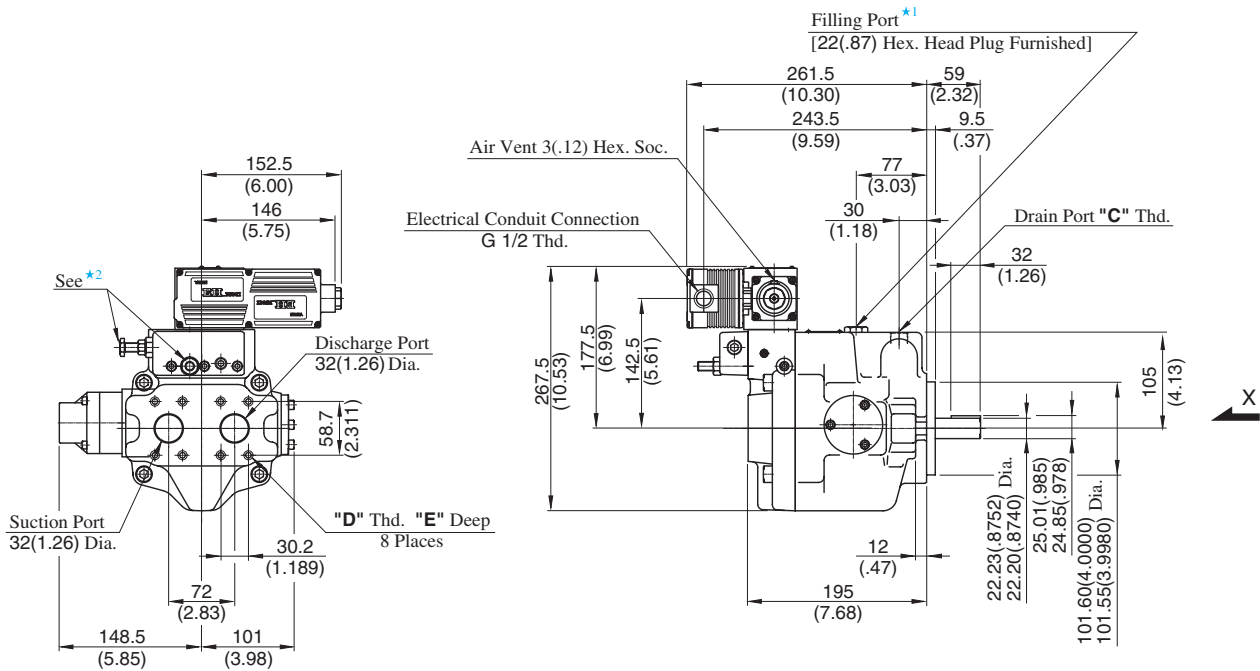
Port mounting dimensions are the same as those of pressure compensator model. Refer to [page 45](#) for port mounting dimensions.

● Foot Mounting Type

Mounting bracket is common to that of pressure compensator model. Refer to [page 45](#) for the dimensions of mounting bracket.

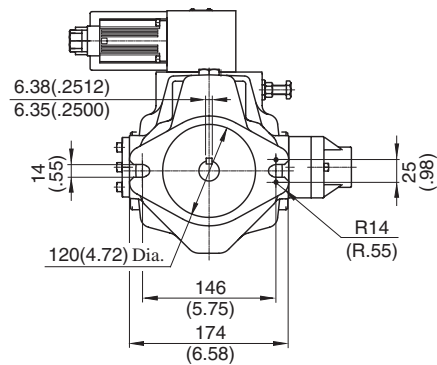
**Axial Port Type**

Flange Mtg.: A37-FR04EH\*-\*-42/42950



- ★ 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 detail of amplifier, refer to [page 95](#).

| Model Numbers       | "C" Thd. | "D" Thd.    | "E"<br>mm (IN.) |
|---------------------|----------|-------------|-----------------|
| A37-FR04EH*-*-42    | Rc 1/2   | M10         | 19 (.75)        |
| A37-FR04EH*-*-42950 | SAE #10  | 7/16-14 UNC | 20 (.79)        |



View Arrow X

DIMENSIONS IN MILLIMETRES (INCHES)

● **Side Port Type**

Port mounting dimensions are the same as those of pressure compensator model. Refer to [page 46](#) for port mounting dimensions.

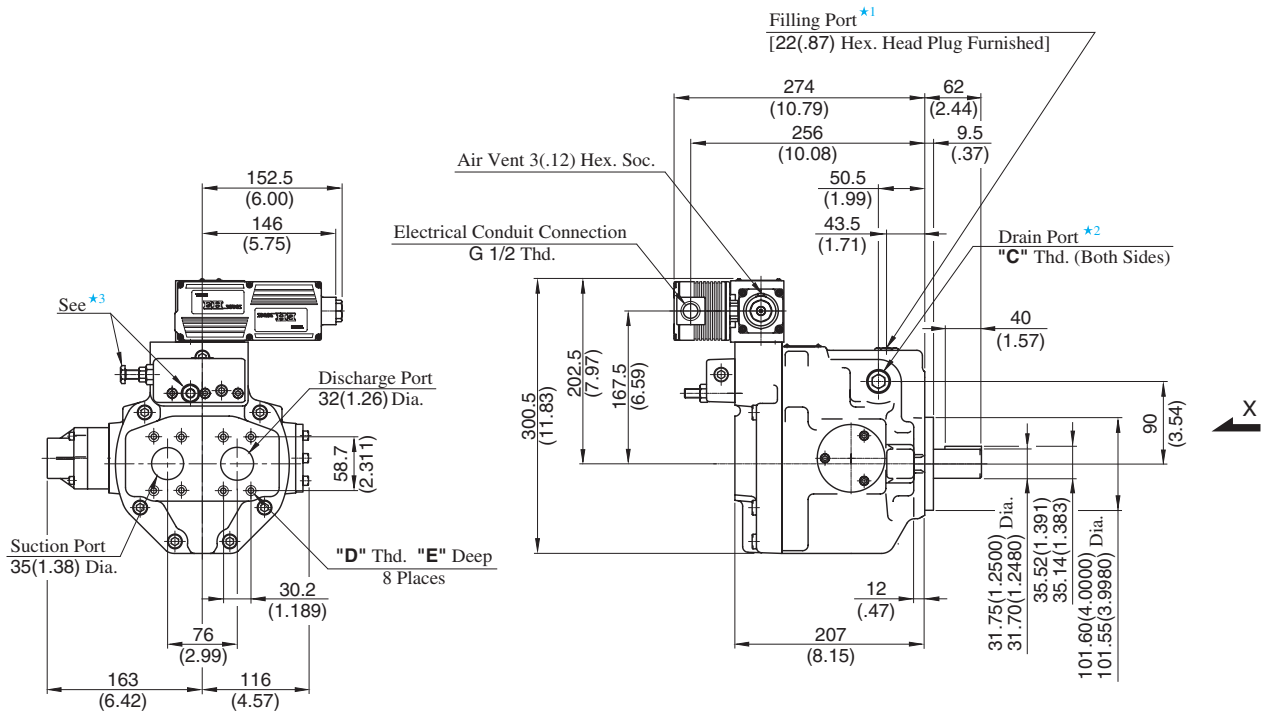
● **Foot Mounting Type**

Mounting bracket is common to that of pressure compensator model. Refer to [page 46](#) for the dimensions of mounting bracket.



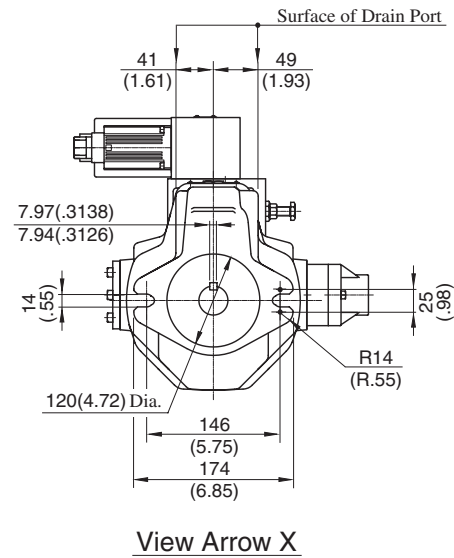
Axial Port Type

Flange Mtg.: A56-FR04EH\*-\*-42/4290



- ★ 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 detail of amplifier, refer to [page 95](#).

| Model Numbers      | "C" Thd. | "D" Thd.    | "E" mm (IN.) |
|--------------------|----------|-------------|--------------|
| A56-FR04EH*-*-42   | Rc 3/4   | M10         | 19 (.75)     |
| A56-FR04EH*-*-4290 | SAE #12  | 7/16-14 UNC | 20 (.79)     |



View Arrow X

DIMENSIONS IN MILLIMETRES (INCHES)

● Side Port Type

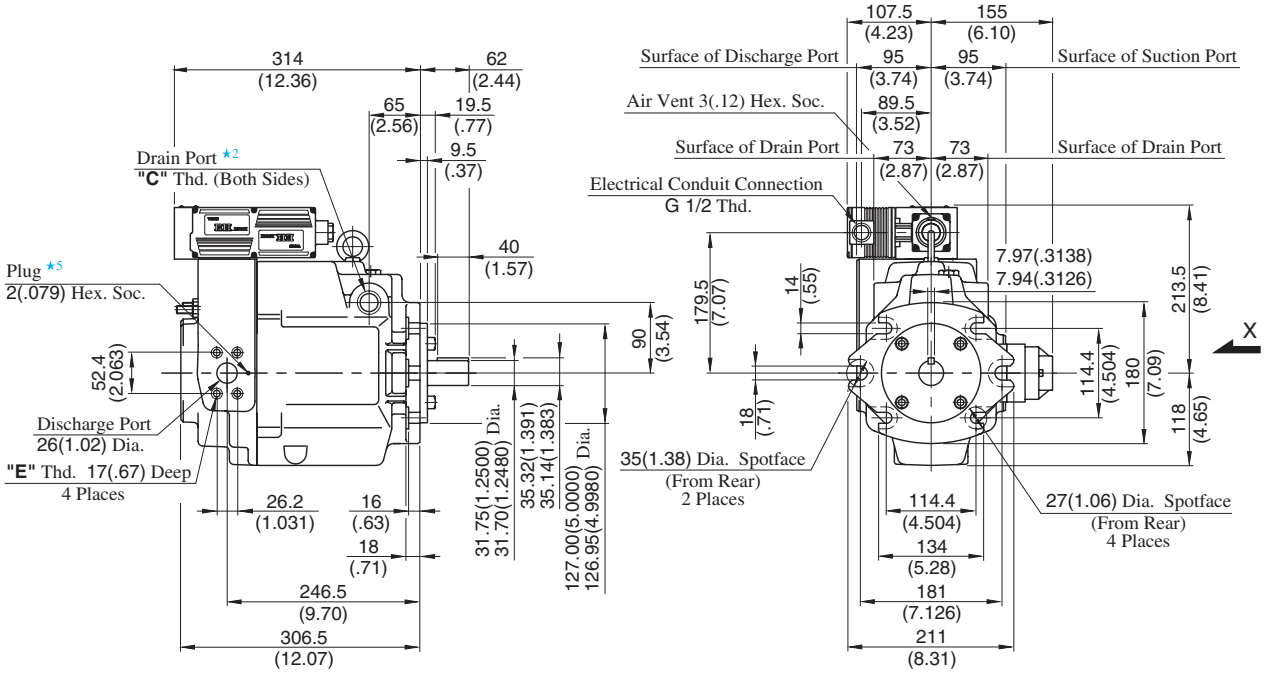
Port mounting dimensions are the same as those of pressure compensator model. Refer to [page 47](#) for port mounting dimensions.

● Foot Mounting Type

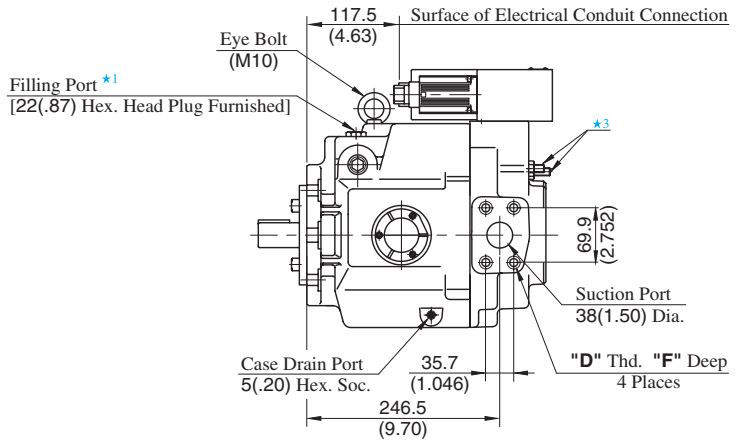
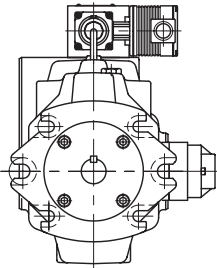
Mounting bracket is common to that of pressure compensator model. Refer to [page 47](#) for the dimensions of mounting bracket.

**Flange Mtg.**

● Amplifier Direction "L" : A70-FR04EH\*LS\*-60/60950



● Amplifier Direction "R" : A70-FR04EH\*RS\*-60/60950



**View Arrow X**

- ★ 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 detail of amplifier, refer to [page 95](#).
- ★ 5. If you use the special sequence valve, remove the plug.

| Model Numbers        | "C" Thd. | "D" Thd.   | "E" Thd.   | Dimensions mm (IN.) |
|----------------------|----------|------------|------------|---------------------|
|                      |          |            |            | F                   |
| A70-FR04EH**S*-60    | Rc 3/4   | M12        | M10        | 19 (.75)            |
| A70-FR04EH**S*-60950 | SAE #12  | 1/2-13 UNC | 3/8-16 UNC | 21 (.83)            |

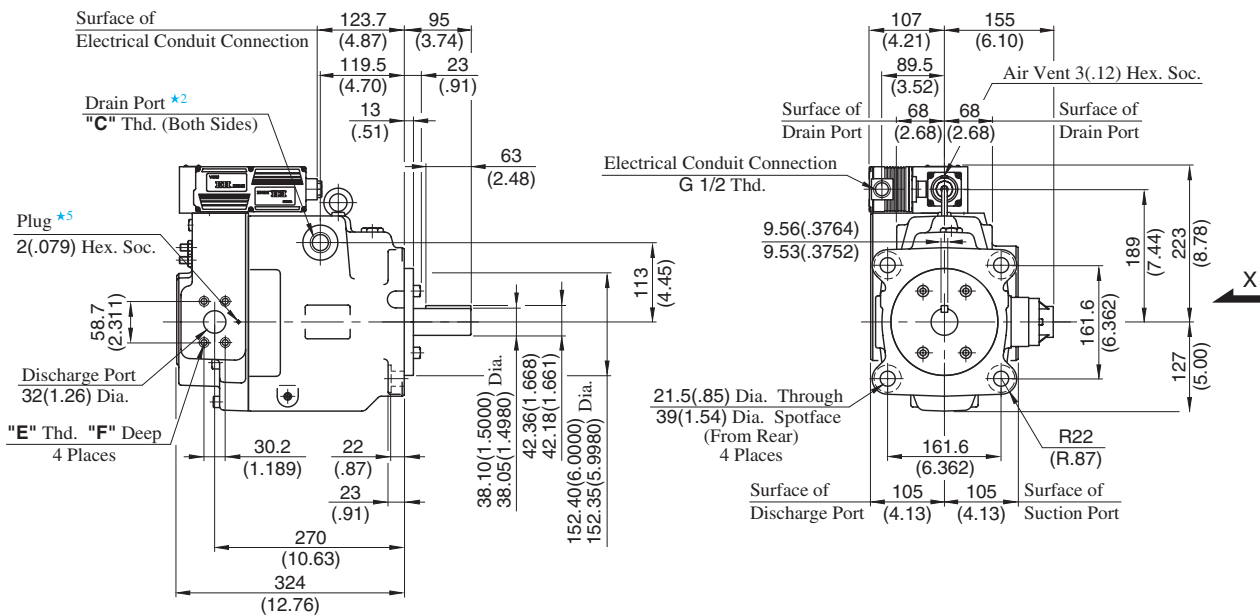
**DIMENSIONS IN MILLIMETRES (INCHES)**

● **Foot Mounting Type**

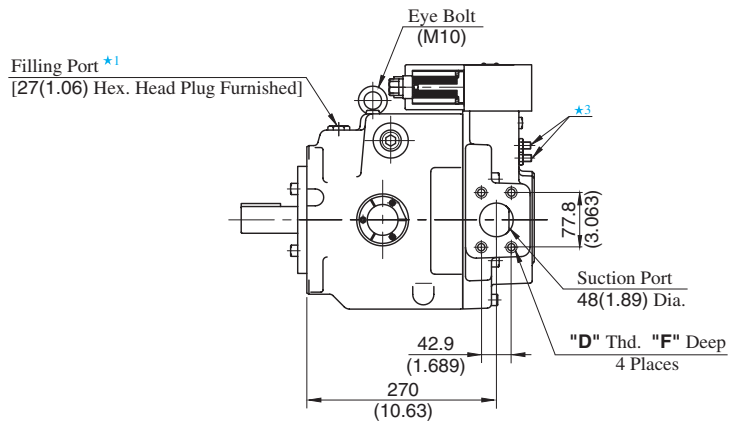
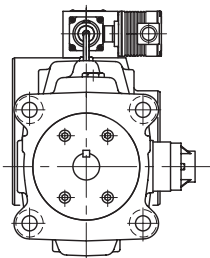
Mounting bracket is common to that of pressure compensator model.  
Refer to [page 48](#) for the dimensions of mounting bracket.

Flange Mtg.

- Amplifier Direction "L" : A90-FR04EH\*LS\*-60/60950



- Amplifier Direction "R" : A90-FR04EH\*RS\*-60/60950



View Arrow X

- ★ 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 detail of amplifier, refer to page 95.
- ★ 5. If you use the special sequence valve, remove the plug.

| Model Numbers        | "C" Thd. | "D" Thd.   | "E" Thd.    | Dimensions mm (IN.) |
|----------------------|----------|------------|-------------|---------------------|
|                      |          |            |             | F                   |
| A90-FR04EH**S*-60    | Rc 3/4   | M12        | M10         | 19 (.75)            |
| A90-FR04EH**S*-60950 | SAE #12  | 1/2-13 UNC | 7/16-14 UNC | 21 (.83)            |

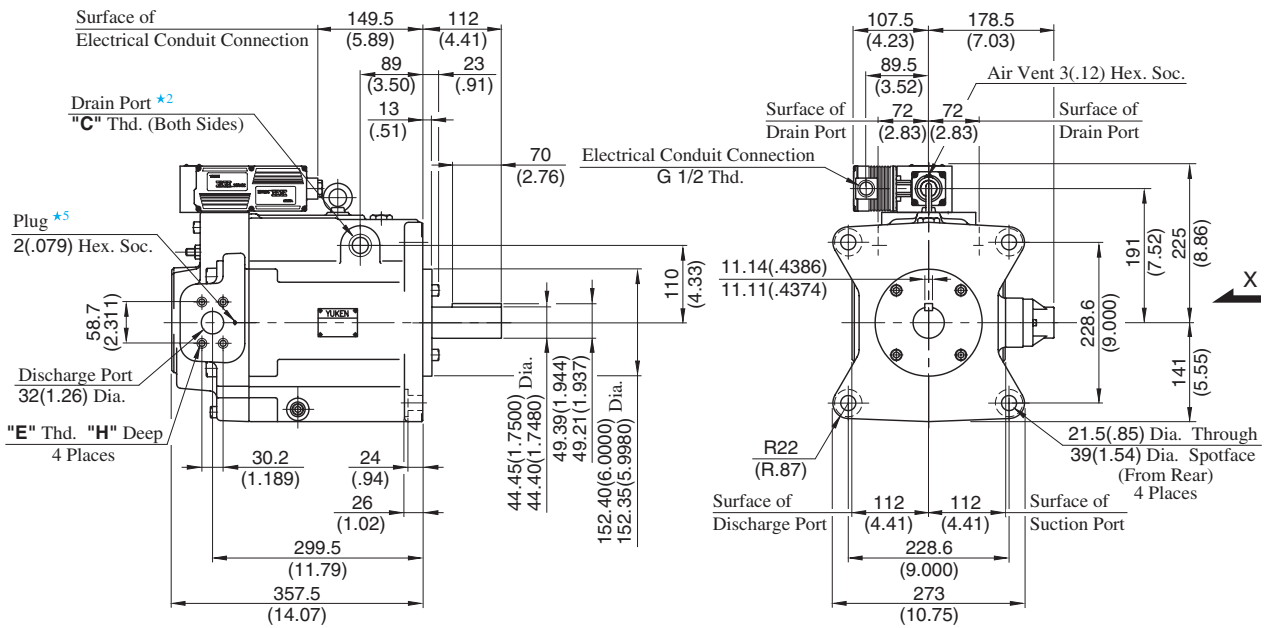
DIMENSIONS IN MILLIMETRES (INCHES)

● Foot Mounting Type

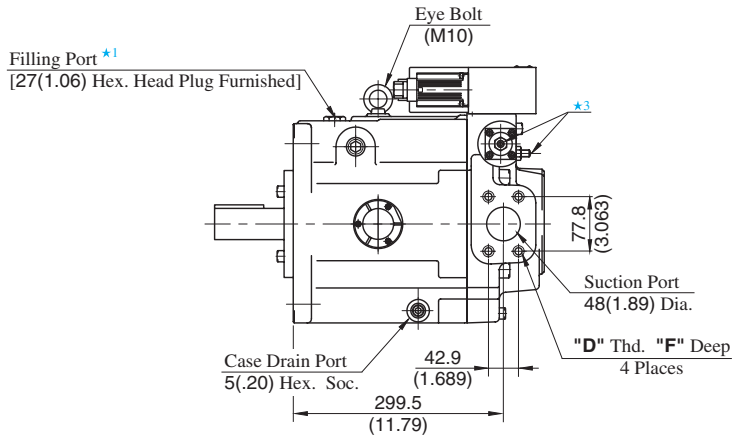
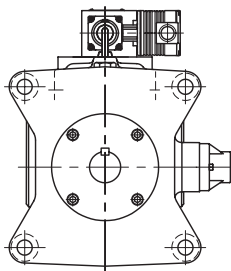
Mounting bracket is common to that of pressure compensator model. Refer to page 49 for the dimensions of mounting bracket.

**Flange Mtg.**

● Amplifier Direction "L" : A145-FR04EH\*LS\*-60/60950



● Amplifier Direction "R" : A145-FR04EH\*RS\*-60/60950



View Arrow X

- ★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 detail of amplifier, refer to [page 95](#).
- ★5. If you use the special sequence valve, remove the plug.

| Model Numbers         | "C" Thd. | "D" Thd.   | "E" Thd.    | Dimensions mm (IN.) |          |
|-----------------------|----------|------------|-------------|---------------------|----------|
|                       |          |            |             | F                   | H        |
| A145-FR04EH**S*-60    | Rc 3/4   | M12        | M10         | 19 (.75)            | 19 (.75) |
| A145-FR04EH**S*-60950 | SAE #12  | 1/2-13 UNC | 7/16-14 UNC | 21 (.83)            | 20 (.79) |

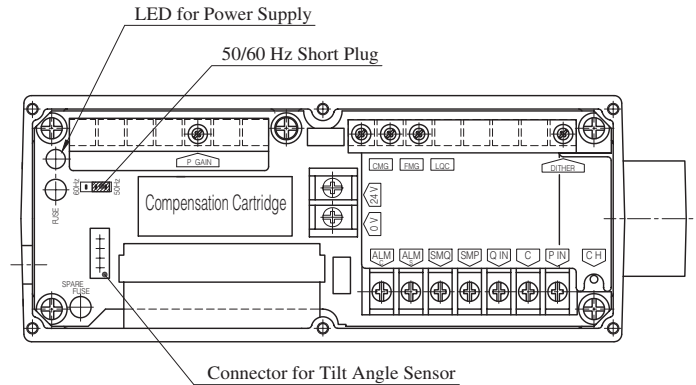
DIMENSIONS IN  
MILLIMETRES (INCHES)

● Foot Mounting Type

Mounting bracket is common to that of pressure compensator model.  
Refer to [page 50](#) for the dimensions of mounting bracket.



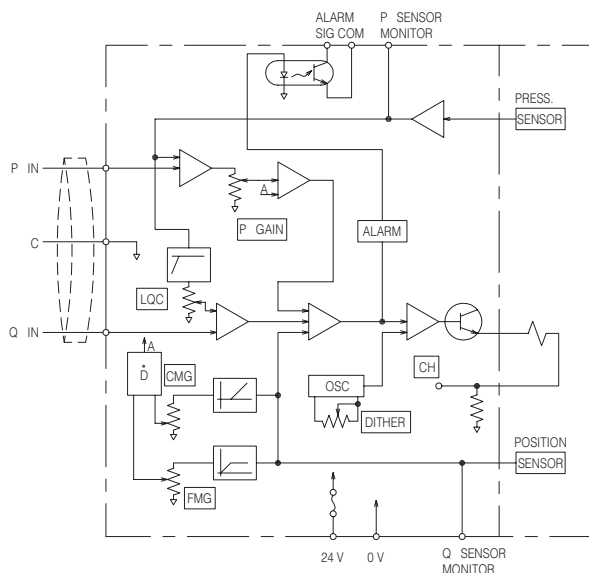
- Detail of Amplifier
- Connecting Terminal



| Terminal | Name                              |
|----------|-----------------------------------|
| P IN     | Input Signal, Pressure (+)        |
| C        | Input Signal (COM)                |
| Q IN     | Input Signal, Flow (+)            |
| SMP      | Sensor Monitor Output, Pressure   |
| SMQ      | Sensor Monitor Output, Tilt Angle |
| 0 V      | Power Supply                      |
| 24 V     |                                   |
| ALM S    | Alarm Output                      |
| ALM C    | Alarm Output (COM)                |
| CH       | Output Current Check (to COM)     |

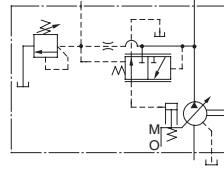
- Note 1. For "SENSOR MONITOR" terminal, external instruments should have input impedance of more than 10 kΩ.
2. For "CH" terminal, external instruments should have input impedance of more than 10 kΩ.
3. Volume adjustment of "DITHER", "GAIN", "CMG", "FMG" and "LQC" is made at the time of shipment. Adjustment at the customer is not required.
4. Use shielded cable for "Input" connection. The ground of the shielded cable must be connected to input signal side.

- Circuit Schematic

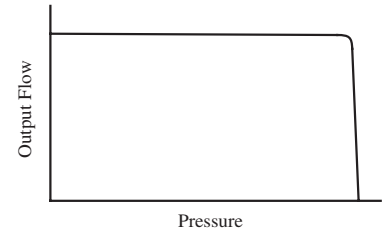


# "A" Series Variable Displacement Piston Pumps – Single Pump, Pilot Pressure Control Type Pressure Compensator

Graphic Symbol



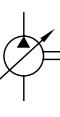
Performance Characteristics



## Specifications

| Model Numbers      | Geometric Displacement<br>cm <sup>3</sup> /rev<br>(cu. in. /rev) | Minimum Adj. Flow<br>cm <sup>3</sup> /rev<br>(cu. in. /rev) | Operating Pressure<br>MPa (PSI) |                            | Minimum Adj. Pres.<br>MPa (PSI) | Shaft Speed Range<br>r/min |      | Approx. Mass<br>kg (lbs.) |                |
|--------------------|--|---|---------------------------------|----------------------------|---------------------------------|----------------------------|------|---------------------------|----------------|
|                    |  |   | Rated <sup>★2</sup>             | Intermittent <sup>★1</sup> |                                 | Max.                       | Min. | Flange Mtg.               | Foot Mtg.      |
| A10-FR07-12*       | 10.0<br>(.610)   | 2<br>(.122)   | 16<br>(2320)                    | 21<br>(3050)               | 2.0<br>(290)                    | 1800                       | 600  | 8.5<br>(18.7)             | 10.7<br>(23.6) |
| A16-*-R-07-*-K-32* | 15.8<br>(.964)   | 4<br>(.244)   | 16<br>(2320)                    | 21<br>(3050)               | 1.2<br>(175)                    | 1800                       | 600  | 21<br>(46.3)              | 23.2<br>(51.2) |
| A22-*-R-07-*-K-32* | 22.2<br>(1.355)  | 6<br>(.366)   | 16<br>(2320)                    | 16<br>(2320)               | 1.2<br>(175)                    | 1800                       | 600  | 21<br>(46.3)              | 23.2<br>(51.2) |
| A37-*-R-07-*-K-32* | 36.9<br>(2.25)   | 10<br>(.610)  | 16<br>(2320)                    | 21<br>(3050)               | 1.2<br>(175)                    | 1800                       | 600  | 29<br>(63.9)              | 33.3<br>(73.4) |
| A56-*-R-07-*-K-32* | 56.2<br>(3.43)   | 12<br>(.732)  | 16<br>(2320)                    | 21<br>(3050)               | 1.2<br>(175)                    | 1800                       | 600  | 36<br>(79.4)              | 40.3<br>(88.9) |
| A70-*R07S-60*      | 70.0<br>(4.27)   | 30<br>(1.83)  | 25<br>(3630)                    | 25<br>(3630)               | 2<br>(290)                      | 1800                       | 600  | 60.3<br>(133)             | 72.3<br>(159)  |
| A90-*R07S-60*      | 91.0<br>(5.55)   | 56<br>(3.42)  | 25<br>(3630)                    | 25<br>(3630)               | 2<br>(290)                      | 1800                       | 600  | 77.5<br>(171)             | 98<br>(216)    |
| A145-*R07S-60*     | 145<br>(8.85)  | 83<br>(5.06)  | 25<br>(3630)                    | 25<br>(3630)               | 2<br>(290)                      | 1800                       | 600  | 94<br>(207)               | 119<br>(262)   |

- ★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 33](#) for the details.



Model Number Designation

| A16                                       | -F                       | -R   | -07   | -S                         | -K                       | -32           | *                      |
|---|--------------------------|--|---|----------------------------|--------------------------|---------------|------------------------|
| Series Number                             | Mounting                 | Direction of Rotation                            | Control Type  | Port Position              | Shaft Extension          | Design Number | Design Std.            |
| <b>A16</b><br>(15.8 cm <sup>3</sup> /rev) | <b>F:</b><br>Flange Mtg. | (Viewed from)<br>Shaft End                       | <b>07:</b><br>Pilot Pressure<br>Control Type<br>Pressure<br>Compensator | <b>None:</b><br>Axial Port | <b>K:</b><br>Keyed Shaft | <b>32</b>     | Refer to <sup>*3</sup> |
| <b>A22</b><br>(22.2 cm <sup>3</sup> /rev) |                          |  |   |                            |                          | <b>32</b>     |                        |
| <b>A37</b><br>(36.9 cm <sup>3</sup> /rev) | <b>L:</b><br>Foot Mtg.   | <b>R:</b><br>Clockwise <sup>*1</sup><br>(Normal) |   |                            |                          | <b>32</b>     |                        |
| <b>A56</b><br>(56.2 cm <sup>3</sup> /rev) |                          |  |   |                            |                          | <b>32</b>     |                        |

| A70                                       | -F                                     | R                          | 07  | S             | -60  | *                      |
|---|--|----------------------------|---|---------------|--|------------------------|
| Series Number                             | Mounting                               | Direction of Rotation      | Control Type  | Port Position | Design Number                                    | Design Std.            |
| <b>A10</b><br>(10.0 cm <sup>3</sup> /rev) | <b>F:</b><br>Flange Mtg. <sup>*2</sup> | (Viewed from)<br>Shaft End | <b>07:</b><br>Pilot Pressure<br>Control Type<br>Pressure<br>Compensator | —             | <b>12</b>  | Refer to <sup>*3</sup> |
| <b>A70</b><br>(70.0 cm <sup>3</sup> /rev) | <b>F:</b><br>Flange Mtg.               |                            |   |               | <b>R:</b><br>Clockwise <sup>*1</sup><br>(Normal) |                        |
| <b>A90</b><br>(91.0 cm <sup>3</sup> /rev) |  | <b>60</b>                  |   |               |  |                        |
| <b>A145</b><br>(145 cm <sup>3</sup> /rev) |  | <b>L:</b><br>Foot Mtg.     |   | <b>60</b>     |  |                        |

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

★2. When A10 pump is used as the foot Mtg., order the Mtg. Bracket kit shown below separately. Refer to page 24 for dimensions of the Mtg. bracket.

| Mtg. Bracket Kit Numbers | Approx. Mass kg (lbs.) |
|--------------------------|------------------------|
| LP-1A-10                 | 2.2 (4.9)              |

Note: The mounting bracket kit consists of a mounting bracket, 2 hex. bolts and 2 plain washer.

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

Performance Characteristics

For performance characteristics, refer to models of pressure compensator type on page 36 to 43.

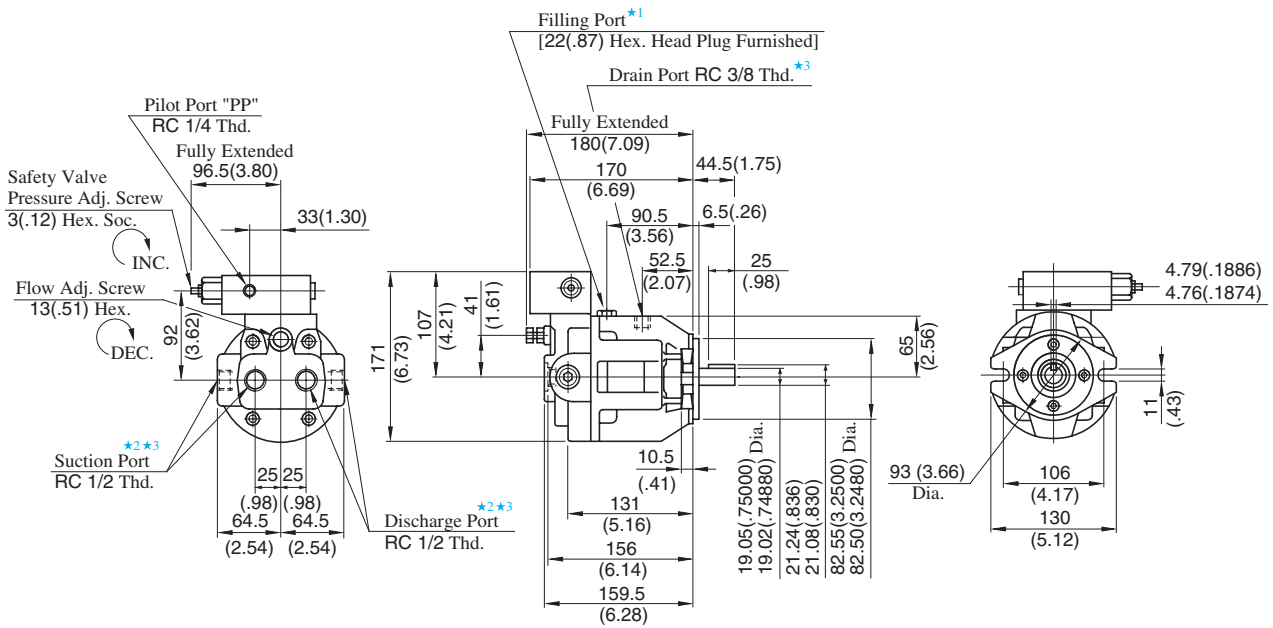
Pipe Flange Kit

For pipe flange, refer to form of pressure compensator type on page 34.

Flange Mtg.

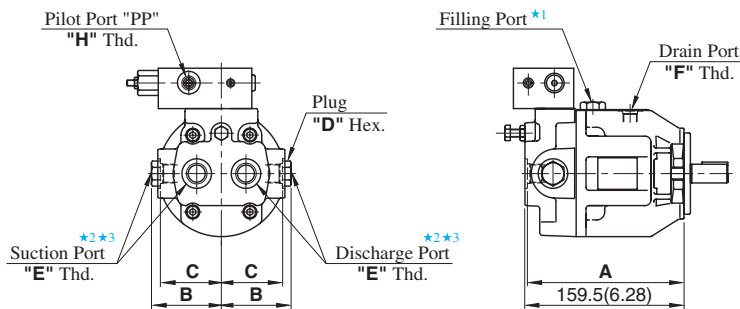
**DIMENSIONS IN MILLIMETRES (INCHES)**

● Japanese Standard "JIS" : A10-FR07-12



● European Design Standard : A10-FR07-1280

● N. American Design Standard : A10-FR07-12950



| Model Numbers  | Dimensions mm (IN.) |              |              |              | Thread Size |            |             |
|----------------|---------------------|--------------|--------------|--------------|-------------|------------|-------------|
|                | A                   | B            | C            | D            | E           | F          | h           |
| A10-FR07-1280  | 159<br>(6.26)       | 72<br>(2.83) | 64<br>(2.52) | 22<br>(.87)  | 1/2 BSP. F  | 3/8 BSP. F | 1/4 BSP. Tr |
| A10-FR07-12950 | 157<br>(6.18)       | 71<br>(2.80) | 62<br>(2.44) | 27<br>(1.06) | SAE #8      | SAE #6     | SAE #4      |

● For other dimensions, refer to Japanese Standard "JIS".

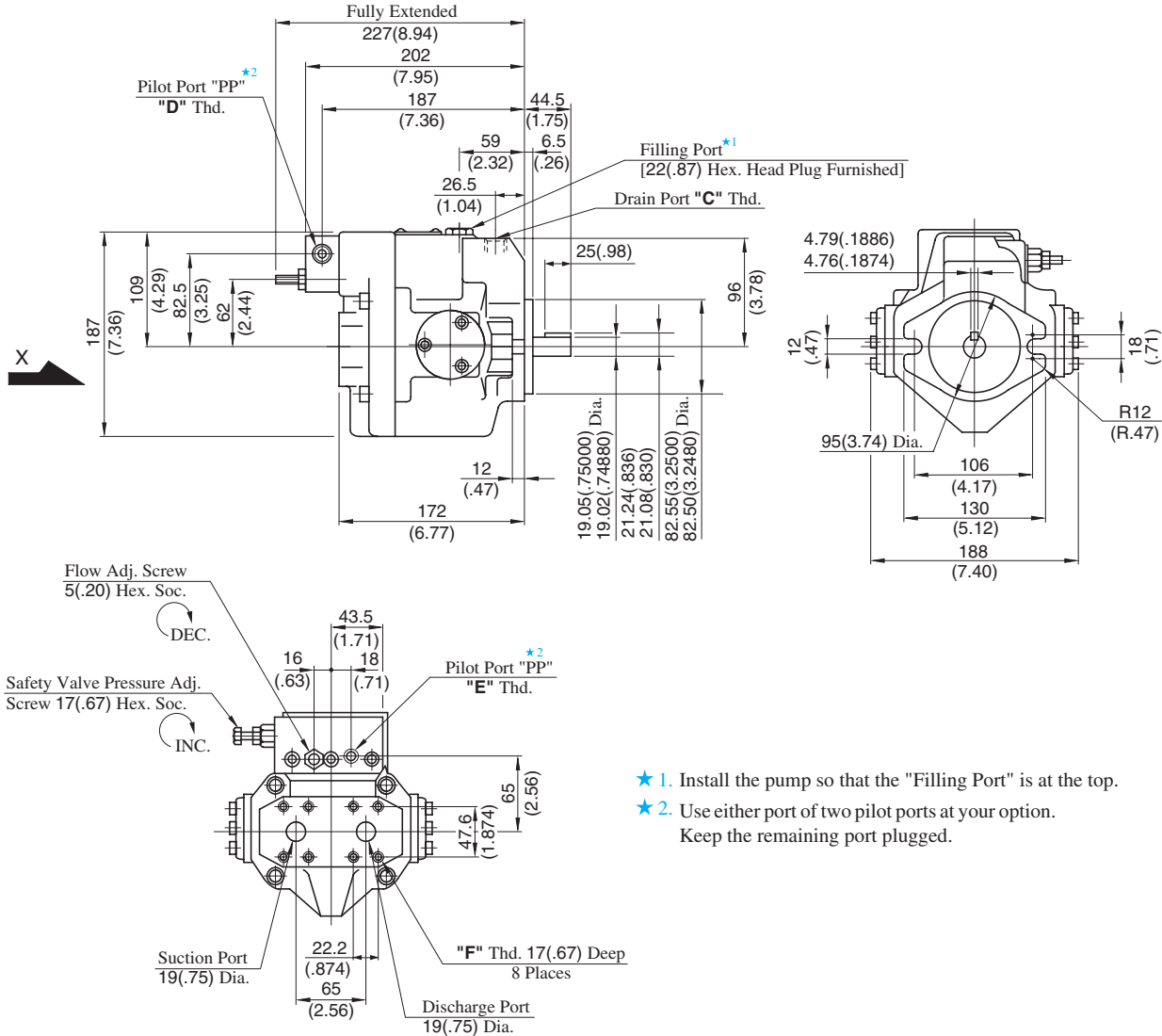
- ★1. Install the pump so that the "Filling Port" is at the top.
- ★2. Use either port of two suction and discharge ports at your option. Keep the remaining ports plugged.
- ★3. As the tightening torques of suction, discharge and drain port fittings, conform to the below.

| Model Numbers  | Tightening Torque Nm (IN. lbs.) |                 |
|----------------|---------------------------------|-----------------|
|                | Suction Port & Discharge Port   | Drain Port      |
| A70-FR07-12    | 65-75 (575-664)                 | 40-50 (354-443) |
| A70-FR07-1280  | 56-62 (496-549)                 | 33-36 (292-319) |
| A70-FR07-12950 | 47-51 (416-451)                 | 40-50 (354-443) |



Axial Port Type

Flange Mtg. : A16-F-R-07-K-32/3280/32950  
A22-F-R-07-K-32/3280/32950



- ★ 1. Install the pump so that the "Filling Port" is at the top.
- ★ 2. Use either port of two pilot ports at your option. Keep the remaining port plugged.

View Arrow X

| Model Numbers          | "C" Thd.   | "D" Thd.   | "E" Thd.    | "F" Thd.   |
|------------------------|------------|------------|-------------|------------|
| A16/A22-F-R-07-K-32    | Rc 3/8     | Rc 3/8     | Rc 1/4      | M10        |
| A16/A22-F-R-07-K-3280  | 3/8 BSP. F | 3/8 BSP. F | 1/4 BSP. Tr |            |
| A16/A22-F-R-07-K-32950 | SAE #8     | SAE #6     | SAE #4      | 3/8-16 UNC |

DIMENSIONS IN MILLIMETRES (INCHES)

● Axial Port Type

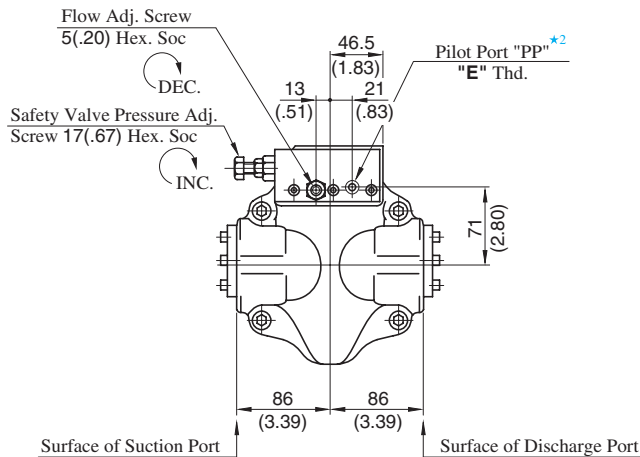
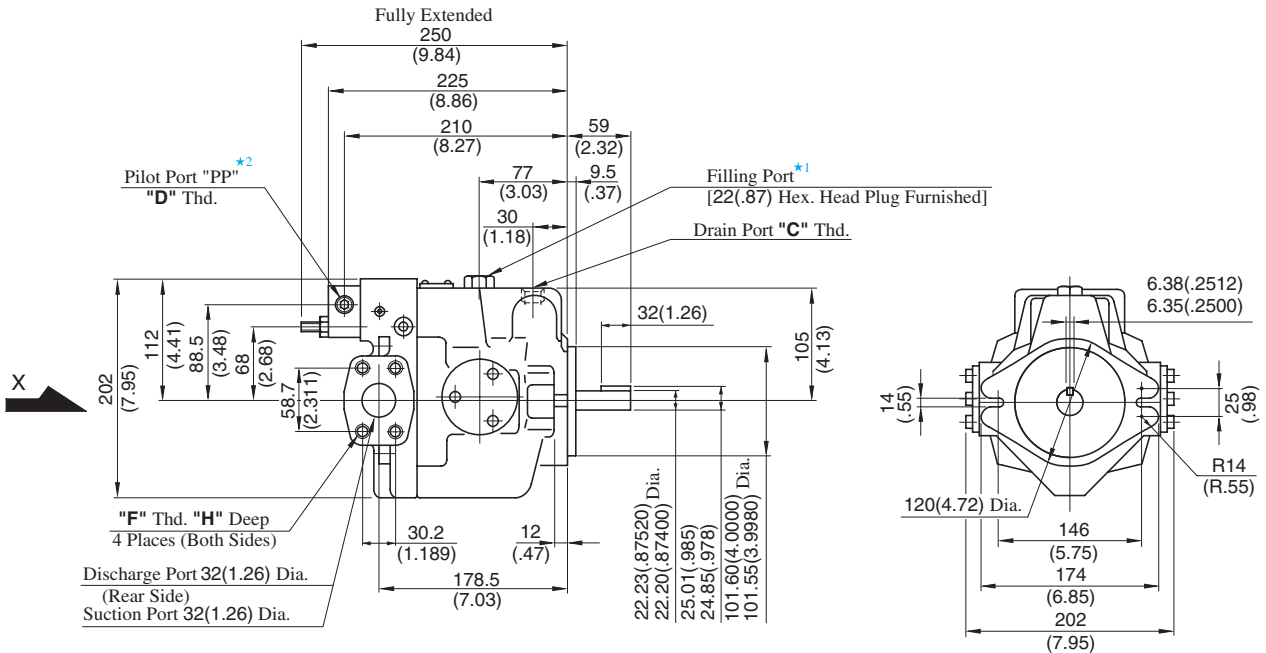
Port mounting dimensions are the same as those of pressure compensator model. Refer to page 45 for port mounting dimensions.

● Foot Mounting Type

Mounting bracket is common to that of pressure compensator model. Refer to page 45 for the dimensions of mounting bracket.

**Side Port Type**

Flange Mtg. : A37-F-R-07-S-K-32/3280/32950



**View Arrow X**

- ★ 1. Install the pump so that the "Filling Port" is at the top.
- ★ 2. Use either port of two pilot ports at your option. Keep the remaining port plugged.

| Model Numbers        | "C" Thd.  | "D" Thd.  | "E" Thd.    | "F" Thd.    | "H" mm (IN.) |
|----------------------|-----------|-----------|-------------|-------------|--------------|
| A37-F-R-07-S-K-32    | Rc 1/2    | Rc 3/8    | Rc 1/4      | M10         | 19 (.75)     |
| A37-F-R-07-S-K-3280  | 1/2 BSP.F | 3/8 BSP.F | 1/4 BSP. Tr |             |              |
| A37-F-R-07-S-K-32950 | SAE #10   | SAE #6    | SAE #4      | 7/16-14 UNC | 20 (.79)     |

**DIMENSIONS IN MILLIMETRES (INCHES)**

● **Axial Port Type**

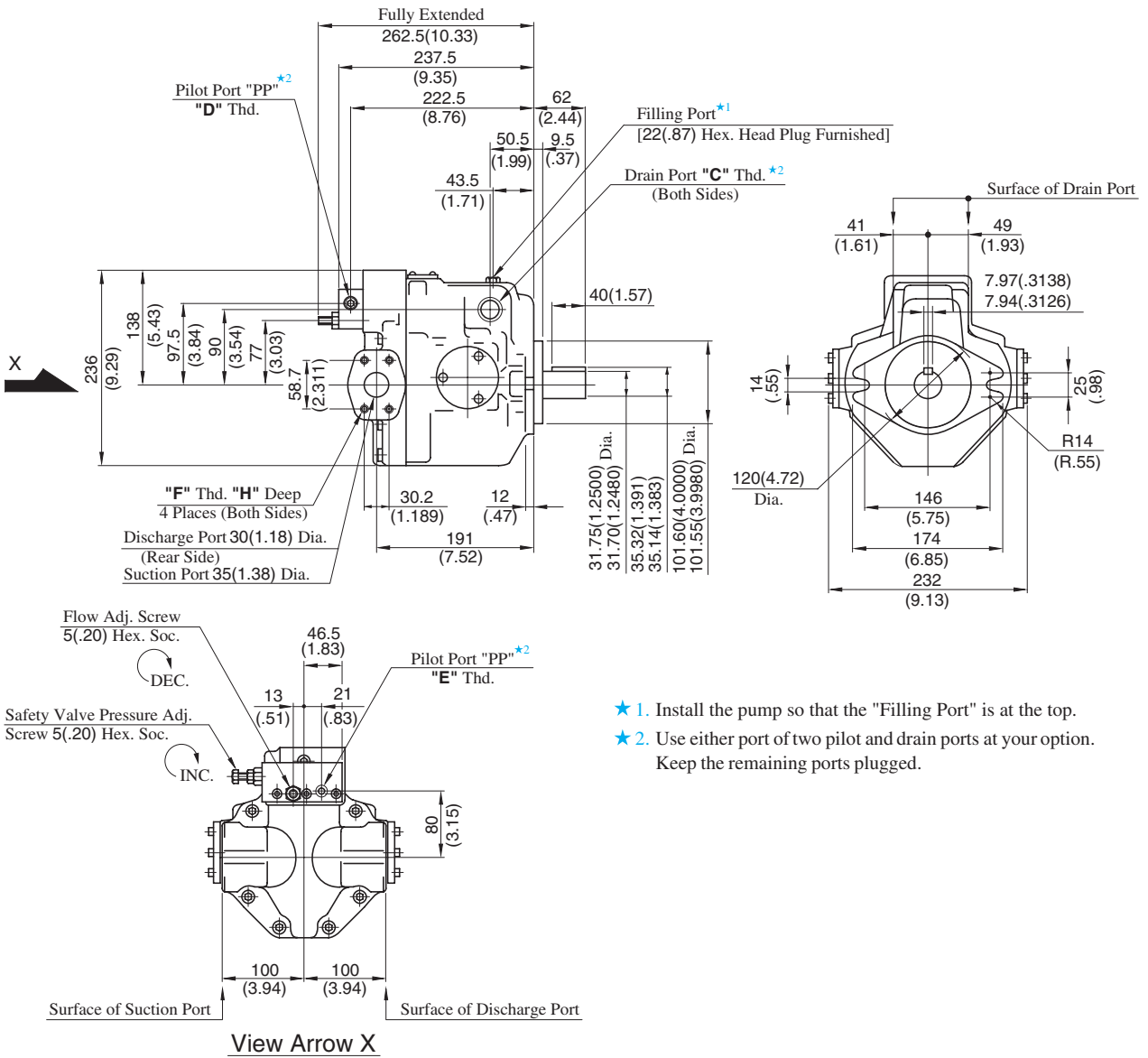
Port mounting dimensions are the same as those of pressure compensator model. Refer to [page 46](#) for port mounting dimensions.

● **Foot Mounting Type**

Mounting bracket is common to that of pressure compensator model. Refer to [page 46](#) for the dimensions of mounting bracket.

Side Port Type

Flange Mtg. : A56-F-R-07-S-K-32/3280/32950



- \* 1. Install the pump so that the "Filling Port" is at the top.
- \* 2. Use either port of two pilot and drain ports at your option. Keep the remaining ports plugged.

| Model Numbers        | "C" Thd.  | "D" Thd.  | "E" Thd.    | "F" Thd.    | "H" mm (IN.) |
|----------------------|-----------|-----------|-------------|-------------|--------------|
| A56-F-R-07-S-K-32    | Rc 3/4    | Rc 3/8    | Rc 1/4      | M10         | 19 (.75)     |
| A56-F-R-07-S-K-3280  | 3/4 BSP.F | 3/8 BSP.F | 1/4 BSP. Tr |             |              |
| A56-F-R-07-S-K-32950 | SAE #12   | SAE #6    | SAE #4      | 7/16-14 UNC | 20 (.79)     |

DIMENSIONS IN MILLIMETRES (INCHES)

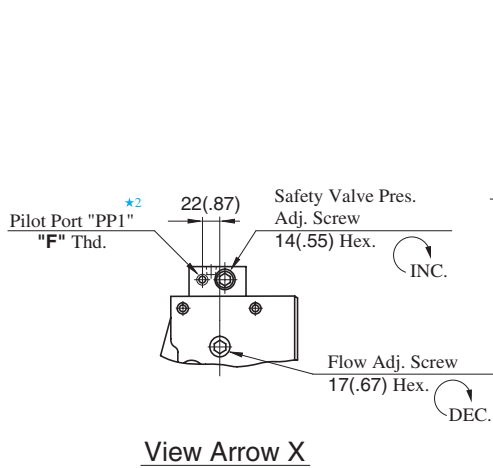
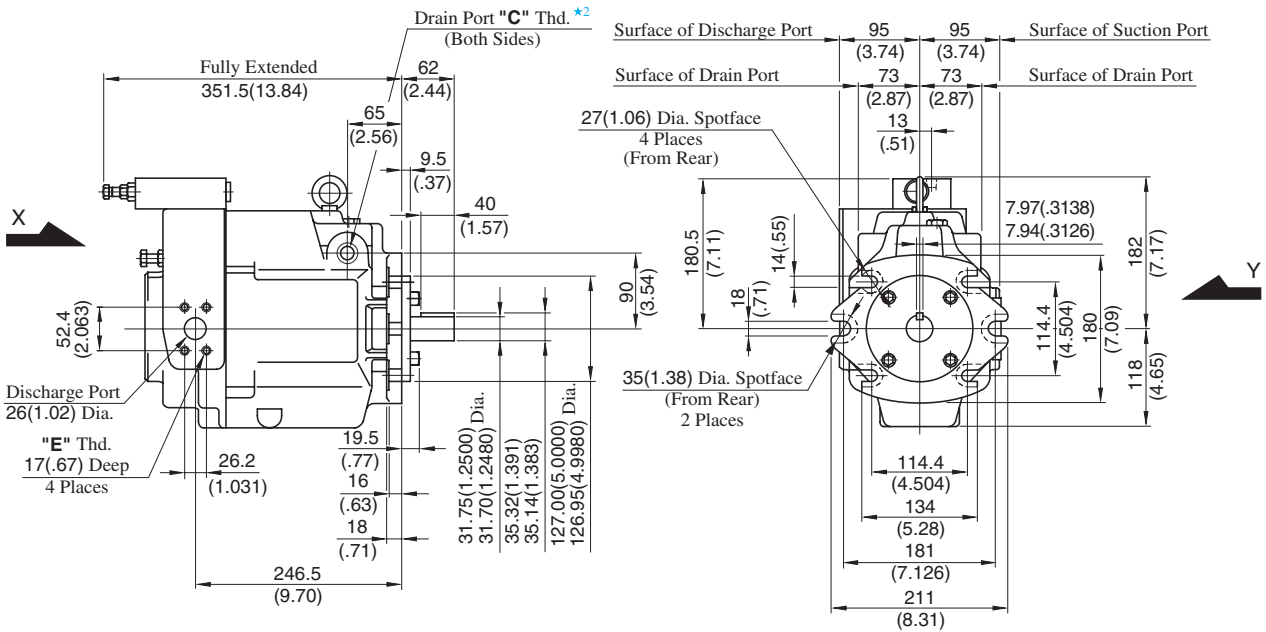
● Axial Port Type

Port mounting dimensions are the same as those of pressure compensator model. Refer to page 47 for port mounting dimensions.

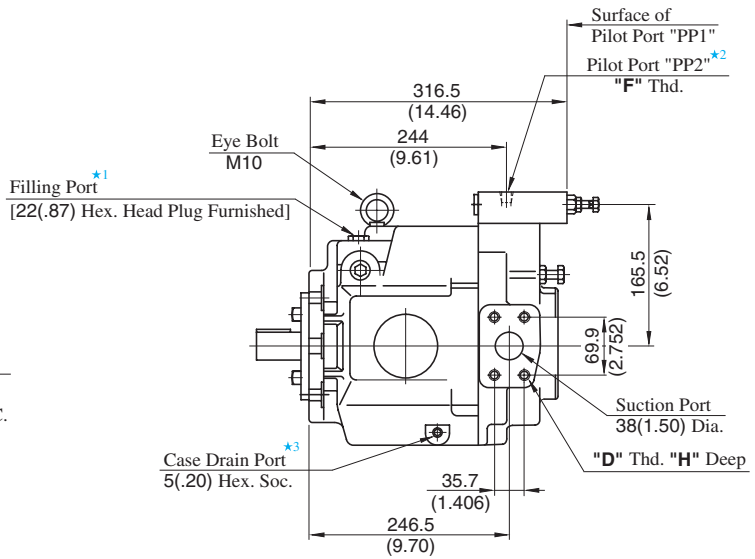
● Foot Mounting Type

Mounting bracket is common to that of pressure compensator model. Refer to page 47 for the dimensions of mounting bracket.

Flange Mtg. : A70-FR07S-60/6080/60950



View Arrow X



View Arrow Y

- ★ 1. Install the pump so that the "Filling Port" is at the top.
- ★ 2. Use either port of two pilot and drain ports at your option. Keep the remaining ports plugged.
- ★ 3. Case drain port is available for use when draining hydraulic fluid from pump casing.

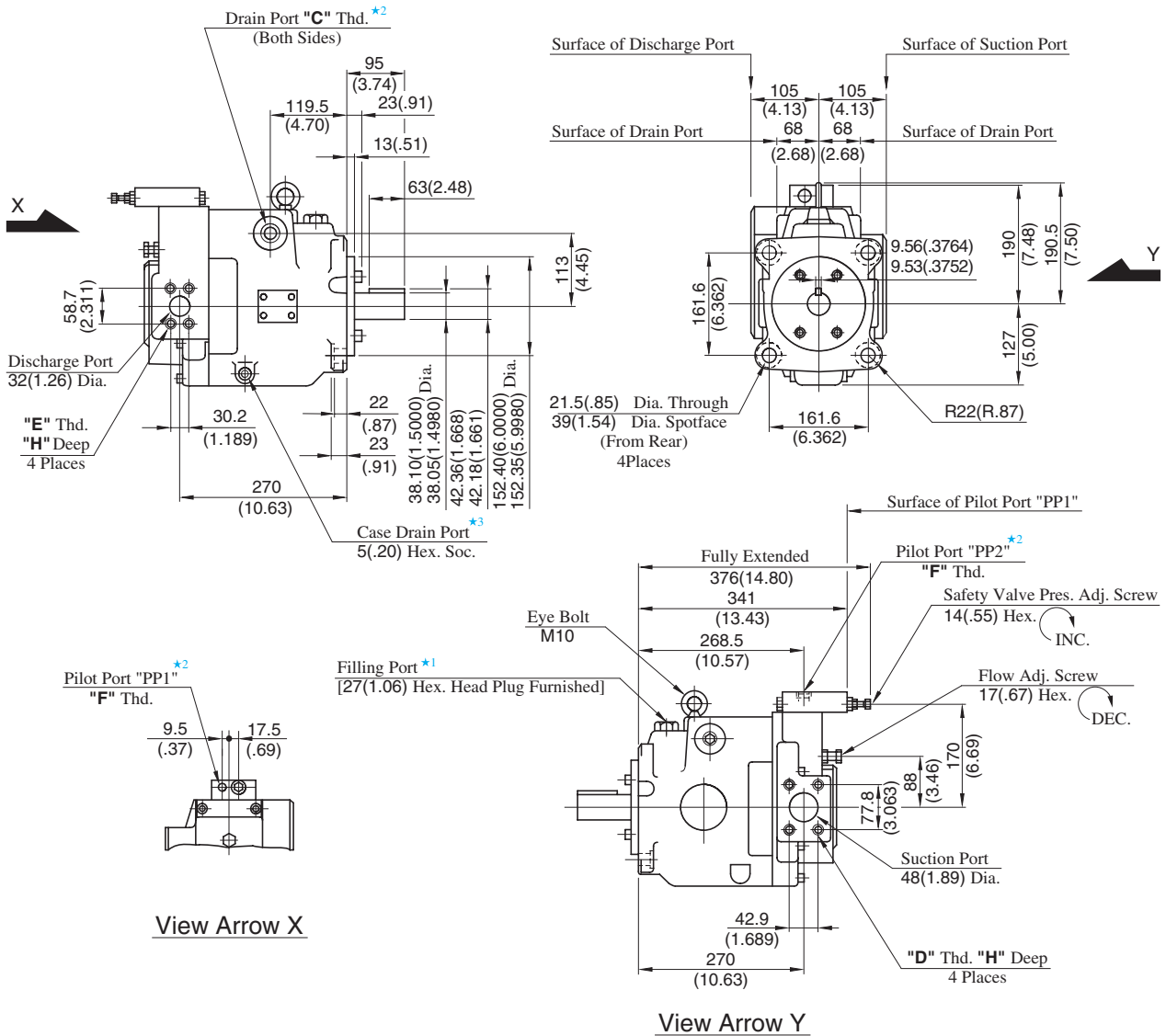
| Model Numbers   | "C" Thd.  | "D" Thd.   | "E" Thd.   | "F" Thd.    | "H" mm (IN.) |
|-----------------|-----------|------------|------------|-------------|--------------|
| A70-FR07S-60    | Rc 3/4    | M12        | M10        | Rc 1/4      | 19 (.75)     |
| A70-FR07S-6080  | 3/4 BSP.F |            |            | 1/4 BSP. Tr |              |
| A70-FR07S-60950 | SAE #12   | 1/2-13 UNC | 3/8-16 UNC | SAE #4      | 21 (.83)     |

DIMENSIONS IN MILLIMETRES (INCHES)

● **Foot Mounting Type**

Mounting bracket is common to that of pressure compensator model. Refer to [page 48](#) for the dimensions of mounting bracket.

Flange Mtg. : A90-FR07S-60/6080/60950



- ★ 1. Install the pump so that the "Filling Port" is at the top.
- ★ 2. Use either port of two pilot and drain ports at your option. Keep the remaining ports plugged.
- ★ 3. Case drain port is available for use when draining hydraulic fluid from pump casing.

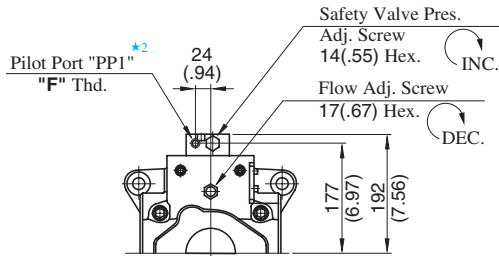
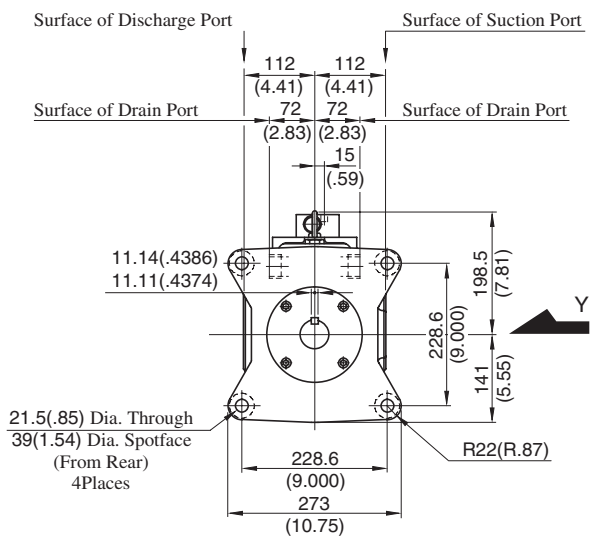
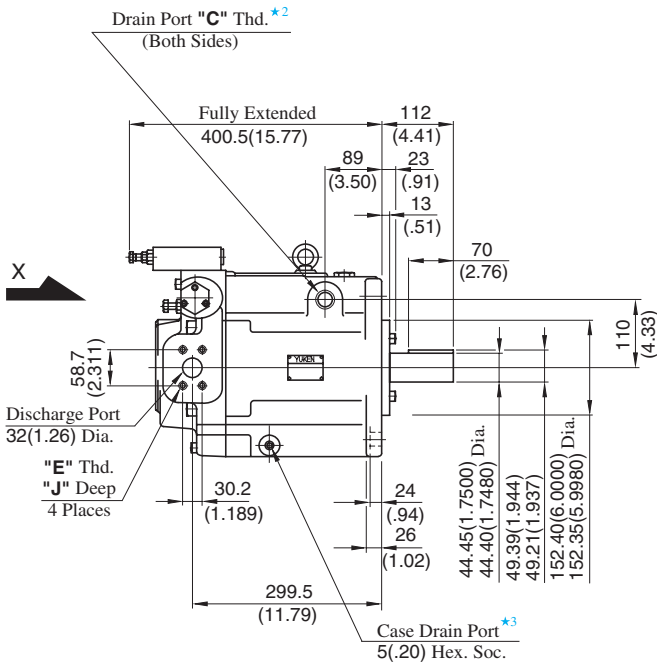
| Model Numbers   | "C" Thd.  | "D" Thd.   | "E" Thd.    | "F" Thd.    | H mm (IN.) |
|-----------------|-----------|------------|-------------|-------------|------------|
| A90-FR07S-60    | Rc 3/4    | M12        | M10         | Rc 1/4      | 19 (.75)   |
| A90-FR07S-6080  | 3/4 BSP.F |            |             | 1/4 BSP. Tr |            |
| A90-FR07S-60950 | SAE #12   | 1/2-13 UNC | 7/16-14 UNC | SAE #4      | 21 (.83)   |

DIMENSIONS IN MILLIMETRES (INCHES)

● **Foot Mounting Type**

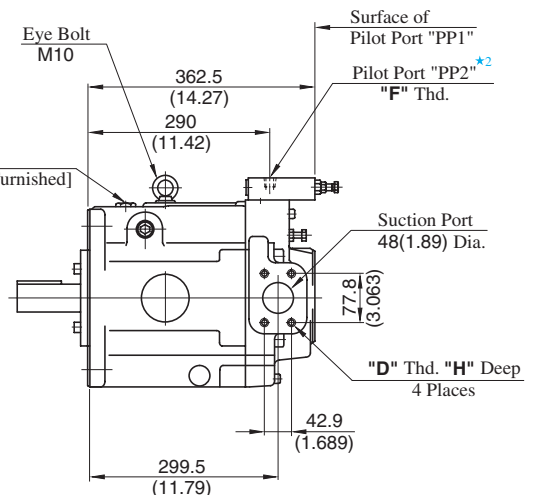
Mounting bracket is common to that of pressure compensator model. Refer to page 49 for the dimensions of mounting bracket.

Flange Mtg. : A145-FR07S-60/6080/60950



View Arrow X

Filling Port \*1  
[27(1.06) Hex. Head Plug Furnished]



View Arrow Y

- ★ 1. Install the pump so that the "Filling Port" is at the top.
- ★ 2. Use either port of two pilot and drain ports at your option.  
Keep the remaining ports plugged.
- ★ 3. Case drain port is available for use when draining hydraulic fluid from pump casing.

| Model Numbers    | "C" Thd.  | "D" Thd.   | "E" Thd.    | "F" Thd.    | H mm (IN.) | J mm (IN.) |
|------------------|-----------|------------|-------------|-------------|------------|------------|
| A145-FR07S-60    | Rc 3/4    | M12        | M10         | Rc 1/4      | 19 (.75)   | 19 (.75)   |
| A145-FR07S-6080  | 3/4 BSP.F |            |             | 1/4 BSP. Tr |            |            |
| A145-FR07S-60950 | SAE #12   | 1/2-13 UNC | 7/16-14 UNC | SAE #4      | 21 (.83)   | 20 (.79)   |

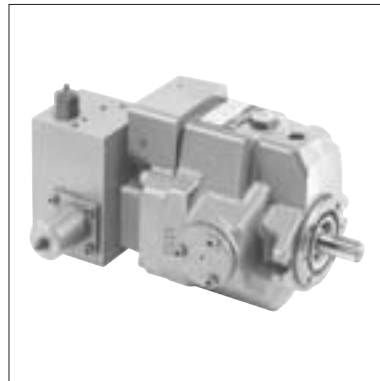
DIMENSIONS IN MILLIMETRES (INCHES)

● Foot Mounting Type

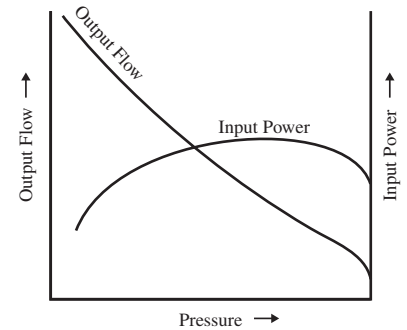
Mounting bracket is common to that of pressure compensator model.  
Refer to page 50 for the dimensions of mounting bracket.



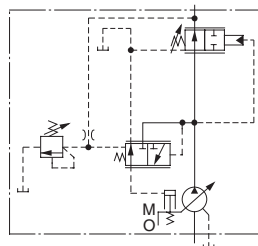
# "A" Series Variable Displacement Piston Pumps – Single Pump, Constant Power Control Type



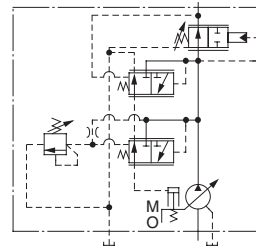
## Performance Characteristics



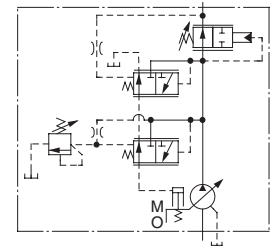
## Graphic Symbols



A16



A37/A56



A70/A145

## Specifications

| Model Numbers      | Geometric Displacement<br>cm <sup>3</sup> /rev<br>(cu. in. /rev) | Minimum Adj. Flow<br>cm <sup>3</sup> /rev<br>(cu. in. /rev) | Operating Pres.<br>MPa (PSI) | Shaft Speed Range<br>r/min |      | Approx. Mass<br>kg (lbs.) |             |
|--------------------|--|---|------------------------------|----------------------------|------|---------------------------|-------------|
|                    |  |   | Max.                         | Max.                       | Min. | Flange Mtg.               | Foot Mtg.   |
| A16-*-R-09-*-K-32* | 15.8 (.964)  | —   | 21 (3050) <sup>★1</sup>      | 1800                       | 600  | 29.0 (63.9)               | 31.2 (68.8) |
| A37-*-R-09-*-K-32* | 36.9 (2.25)  | —   | 21 (3050) <sup>★1</sup>      | 1800                       | 600  | 37.0 (81.6)               | 41.3 (91.1) |
| A56-*-R-09-*-K-32* | 56.2 (3.43)  | —   | 21 (3050) <sup>★1</sup>      | 1800                       | 600  | 44.0 (97.0)               | 48.3 (107)  |
| A70-*R09*S-60*     | 70.0 (4.27)  | 30 (.295)   | 25 (3630)                    | 1800                       | 600  | 72.8 (161)                | 84.8 (187)  |
| A145-*R09*S-60*    | 145 (8.85)   | 83 (5.06)   | 25 (3630)                    | 1800                       | 600  | 110 (243)                 | 135 (298)   |

★1. Maximum Operating Pressure of A16/A37/A56 varies according to Input Power Setting. See Model Number Designation for details.

★2. Minimum Adjustment Flow of A70/A145 is absolutely minimum flow that can be adjusted with Flow Adjustment Screw.

A90 type pump (91 cm<sup>3</sup>/rev) is available. Ask Yuken for Details.

## Model Number Designation

### ● A16/A37/A56

| A16                                       | -F                    | -R                             | -09                                    | -A                        |                                   | -16M                          | -K                    | -32           | *           |                                   |
|---|-----------------------|--------------------------------|--|---------------------------|-----------------------------------|-------------------------------|-----------------------|---------------|-------------|-----------------------------------|
| Series Number                             | Mounting              | Direction of Rotation          | Control Type                           | Input Power Setting       |                                   | Specify Control Pres.*2       | Shaft Extension       | Design Number | Design Std. |                                   |
| <b>A16</b><br>(15.8 cm <sup>3</sup> /rev) | <b>F:</b> Flange Mtg. | (Viewed from Shaft End)        | <b>09:</b> Constant Power Control Type | <b>A:</b> 3.7 kW (5 HP)   | <b>E:</b> 2.2 kW (3 HP)           | <b>7M:</b> 7 MPa (1020 PSI)   | <b>K:</b> Keyed Shaft | <b>32</b>     | Refer to ★3 |                                   |
| <b>B:</b> 5.5 kW (7.5 HP)                 |                       |                                |  | <b>F:</b> 1.5 kW (2 HP)   | <b>10.5M:</b> 10.5 MPa (1520 PSI) |                               |                       |               |             |                                   |
| <b>A:</b> 3.7 kW (5 HP)                   |                       |                                |  | <b>C:</b> 7.5 kW (10 HP)  |                                   |                               |                       |               |             | <b>14M:</b> 14 MPa (2030 PSI)     |
| <b>A37</b><br>(36.9 cm <sup>3</sup> /rev) | <b>L:</b> Foot Mtg.   | <b>R:</b> Clockwise*1 (Normal) | <b>09:</b> Constant Power Control Type | <b>B:</b> 5.5 kW (7.5 HP) | <b>D:</b> 11 kW (15 HP)           | <b>16M:</b> 16 MPa (2320 PSI) | <b>K:</b> Keyed Shaft | <b>32</b>     | Refer to ★3 |                                   |
| <b>A56</b><br>(56.2 cm <sup>3</sup> /rev) |                       |                                |  | <b>A:</b> 3.7 kW (5 HP)   | <b>E:</b> 15 kW (20 HP)           |                               |                       |               |             | <b>17.5M:</b> 17.5 MPa (2540 PSI) |
|   |                       |                                |  | <b>B:</b> 5.5 kW (7.5 HP) | <b>F:</b> 18.5 kW (25 HP)         |                               |                       |               |             |                                   |
|   |                       |                                |  | <b>C:</b> 7.5 kW (10 HP)  | <b>G:</b> 22 kW (30 HP)           |                               |                       |               |             |                                   |
|   |                       |                                |  | <b>D:</b> 11 kW (15 HP)   |                                   |                               |                       |               |             |                                   |

### ● A70/A145

| A70                                       | -F                    | R                       | 09                                     | A                         |                                | S                   | -60           | *           |  |                           |                         |
|---|-----------------------|-------------------------|--|---------------------------|--------------------------------|---------------------|---------------|-------------|--|---------------------------|-------------------------|
| Series Number                             | Mounting              | Direction of Rotation   | Control Type                           | Input Power Setting       |                                | Direction of Port   | Design Number | Design Std. |  |                           |                         |
| <b>A70</b><br>(70 cm <sup>3</sup> /rev)   | <b>F:</b> Flange Mtg. | (Viewed from Shaft End) | <b>09:</b> Constant Power Control Type | <b>A:</b> 15 kW (20 HP)   | <b>E:</b> 22 kW (30 HP)        | <b>S:</b> Side Port | <b>60</b>     | Refer to ★3 |  |                           |                         |
| <b>A145</b><br>(145 cm <sup>3</sup> /rev) |                       |                         |  | <b>L:</b> Foot Mtg.       | <b>R:</b> Clockwise*1 (Normal) |                     |               |             | <b>09:</b> Constant Power Control Type | <b>B:</b> 18.5 kW (25 HP) | <b>F:</b> 30 kW (40 HP) |
|   |                       |                         |  |                           |                                |                     |               |             |  | <b>A:</b> 15 kW (20 HP)   | <b>E:</b> 37 kW (50 HP) |
|   |                       |                         |  | <b>B:</b> 18.5 kW (20 HP) | <b>F:</b> 45 kW (60 HP)        |                     |               |             |  |                           |                         |
|   |                       |                         |  | <b>C:</b> 22 kW (30 HP)   | <b>G:</b> 55 kW (75 HP)        |                     |               |             |  |                           |                         |
|   |                       |                         |  | <b>D:</b> 30 kW (40 HP)   | <b>H:</b> 75 kW (100 HP)       |                     |               |             |  |                           |                         |

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

★2. Specify control pressure of A16/A37/A56 with lower than Maximum Operating Pressure depending on Input Power Setting.

| Model | Maximum Operating Pressure MPa (PSI) |               |               |                 |                |               |               |                 |               |
|-------|--------------------------------------|---------------|---------------|-----------------|----------------|---------------|---------------|-----------------|---------------|
|       | 1.5 kW (2 HP)                        | 2.2 kW (3 HP) | 3.7 kW (5 HP) | 5.5 kW (7.5 HP) | 7.5 kW (10 HP) | 11 kW (15 HP) | 15 kW (20 HP) | 18.5 kW (25 HP) | 22 kW (30 HP) |
| A16   | 10.5 (1520)                          | 16 (2320)     | 21 (3050)     | 21 (3050)       | —              | —             | —             | —               | —             |
| A37   | —                                    | —             | 16 (2320)     | 21 (3050)       | 21 (3050)      | 21 (3050)     | —             | —               | —             |
| A56   | —                                    | —             | 10.5 (1520)   | 14 (2030)       | 17.5 (2540)    | 21 (3050)     | 21 (3050)     | 21 (3050)       | 21 (3050)     |

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

## Pipe Flange Kits

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

| Pump Model Numbers | Name of Port | Pipe Flange Kit Numbers |                      |                             |  |                             |  |                             |
|--------------------|--------------|-------------------------|----------------------|-----------------------------|--|-----------------------------|--|-----------------------------|
|                    |              | Threaded Connection     |                      |                             | Socket Welding*1                           |                             | Butt Welding                               |                             |
|                    |              | Japanese Std. "JIS"     | European Design Std. | N. American Design Standard | Japanese Std. "JIS" & European Design Std. | N. American Design Standard | Japanese Std. "JIS" & European Design Std. | N. American Design Standard |
| A16-*-R-09         | Suction      | F5-06-A-10              | F5-06-A-1080         | —                           | F5-06-B-10                                 | F5-06-B-1090                | F5-06-C-10                                 | F5-06-C-1090                |
|                    | Discharge    | —*2                     | —*2                  | —*2                         | —*2  | —*2                         | —*2  | —*2                         |
| A37-*-R-09         | Suction      | F5-10-A-10              | F5-10-A-1080         | —                           | F5-10-B-10                                 | F5-10-B-1090                | F5-10-C-10                                 | F5-10-C-1090                |
| A56-*-R-09         | Discharge    | F5-06-A-10              | F5-06-A-1080         | —                           | F5-06-B-10                                 | F5-06-B-1090                | F5-06-C-10                                 | F5-06-C-1090                |
| A70-*-R-09         | Suction      | F5-12-A-10              | F5-12-A-1080         | —                           | F5-12-B-10                                 | F5-12-B-1090                | F5-12-C-10                                 | F5-12-C-1090                |
|                    | Discharge    | F5-08-A-10              | F5-08-A-1080         | —                           | F5-08-B-10                                 | F5-08-B-1090                | F5-08-C-10                                 | F5-08-C-1090                |
| A145-*-R-09        | Suction      | F5-16-A-10              | F5-16-A-1080         | —                           | F5-16-B-10                                 | F5-16-B-1090                | F5-16-C-10                                 | F5-16-C-1090                |
|                    | Discharge    | F5-10-A-10              | F5-10-A-1080         | —                           | F5-10-B-10                                 | F5-10-B-1090                | F5-10-C-10                                 | F5-10-C-1090                |

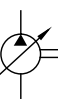
★1. In case of using socket welding flanges, there is a case where the operating pressure should be set lower than the normal because of strength of hat flanges. Therefore, please pay cautious attention to the operating pressure when the socket welding flanges are used.

★2. Discharge port for pump model "A16" is available only the threaded connections.

★3. As dimensions of the pipe flange mounting surface are conformed to SAE 4 Bolt Split Flange (Standard Pressure Series), pipe flanges conforming to the SAE Standards can be used.

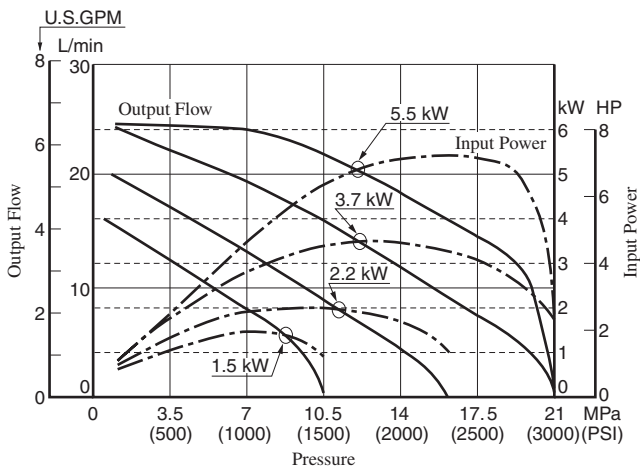
● Detail of the pipe flange kits are shown on page 824.



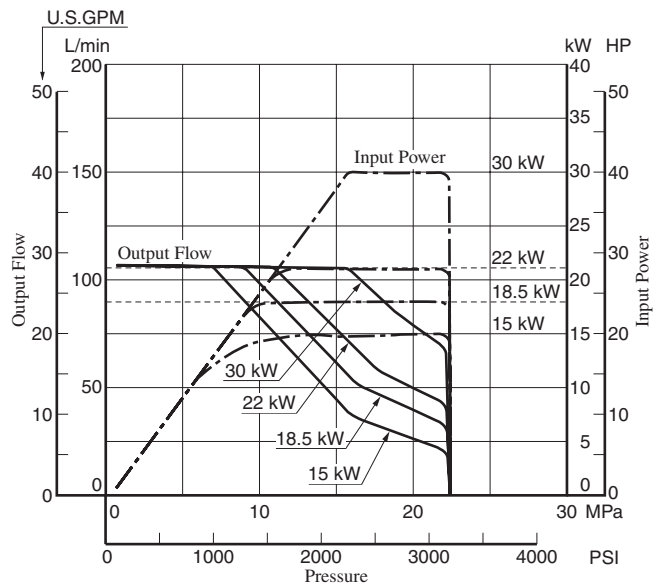


Typical Performance Characteristics at 1500 r/min

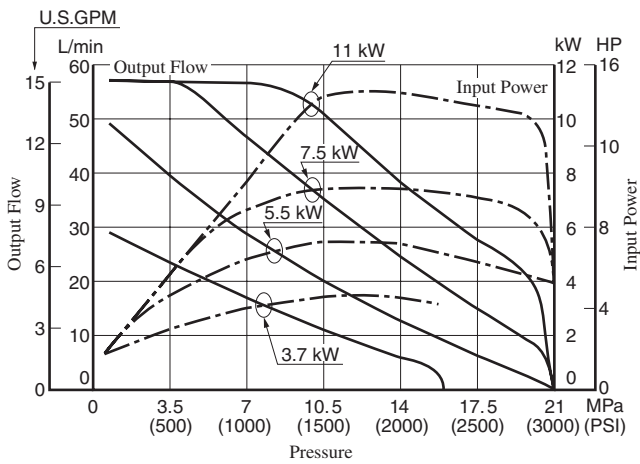
A16



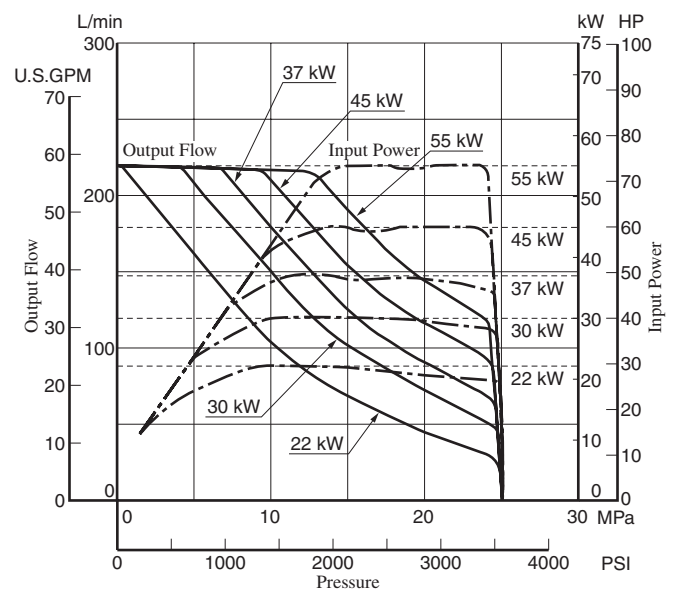
A70



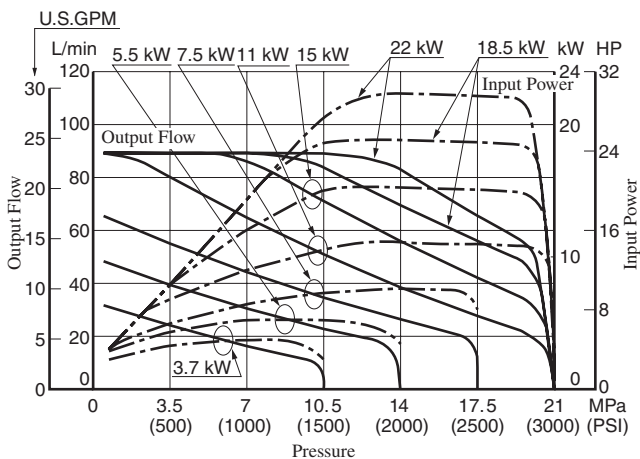
A37



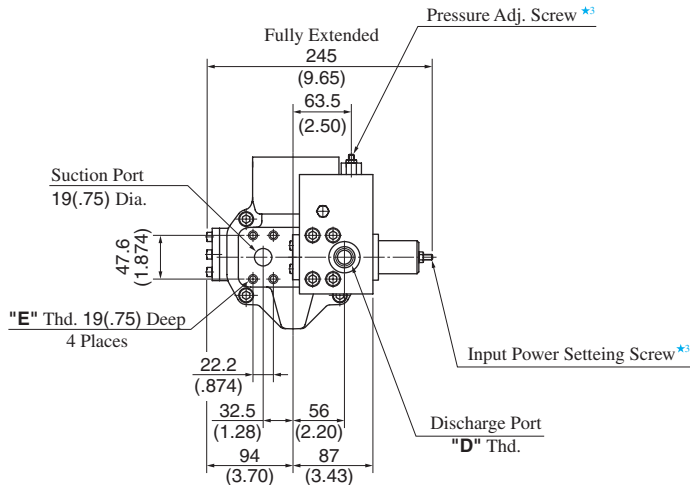
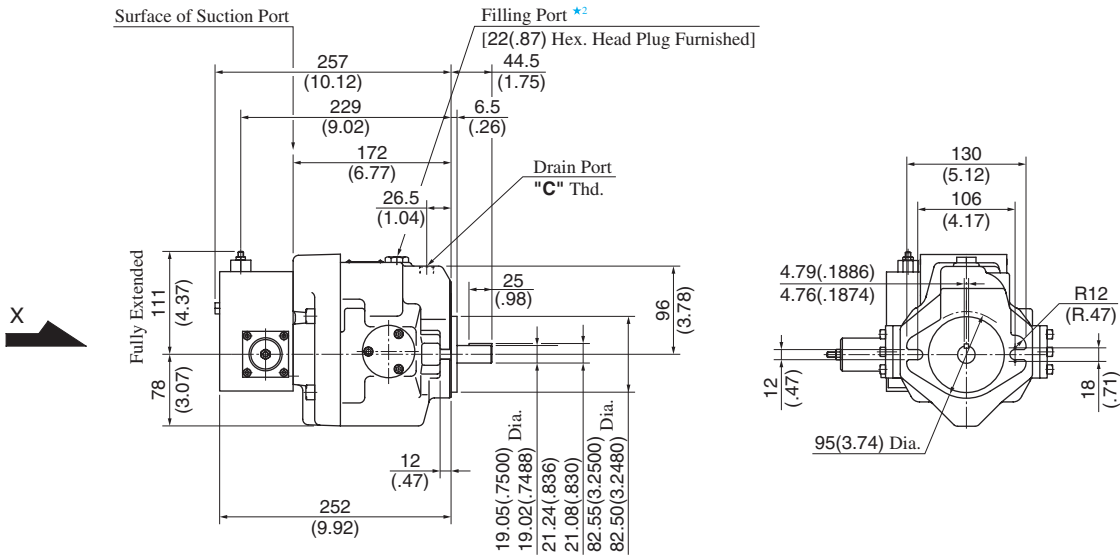
A145



A56



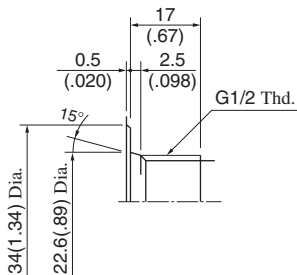
Flange Mtg. : A16-F-R-09-\*-K-32/3280/32950



View Arrow X

| Model Numbers        | "C" Thd.  | "D" Thd.  | "E" Thd.   |
|----------------------|-----------|-----------|------------|
| A16-F-R-09-*-K-32    | Rc 3/8    | G 1/2 *1  | M10        |
| A16-F-R-09-*-K-3280  | 3/8 BSP.F | 1/2 BSP.F |            |
| A16-F-R-09-*-K-32950 | SAE #8    | SAE #8    | 3/8-16 UNC |

★ 1. Detail of Discharge Port  
[For Japanese Standard]



★ 2. Install the pump so that the "Filling Port" is at the top.

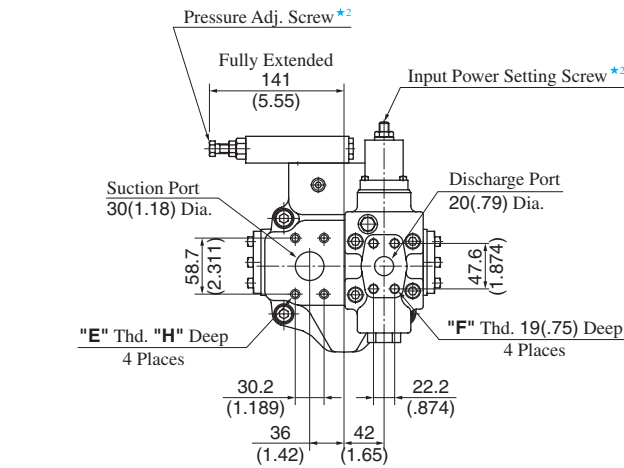
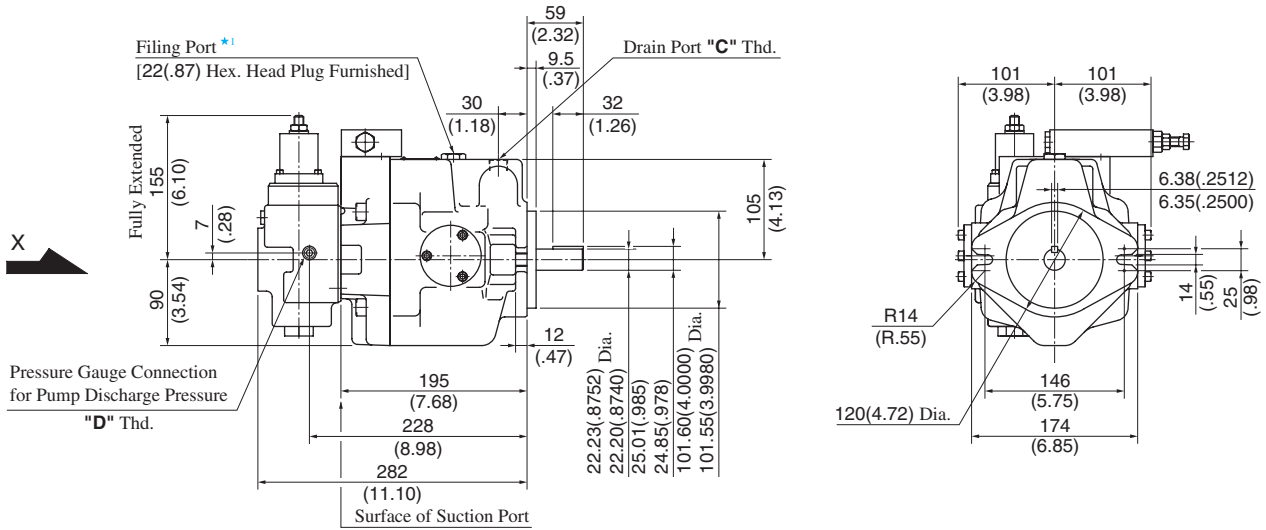
★ 3. Do not touch the screw because it is adjusted at the time of shipment.

**DIMENSIONS IN  
MILLIMETRES (INCHES)**

● **Foot Mounting Type**

Mounting bracket is common to that of pressure compensator model.  
Refer to [page 45](#) for the dimensions of mounting bracket.

Flange Mtg. : A37-F-R-09-\*-K-32/3280/32950



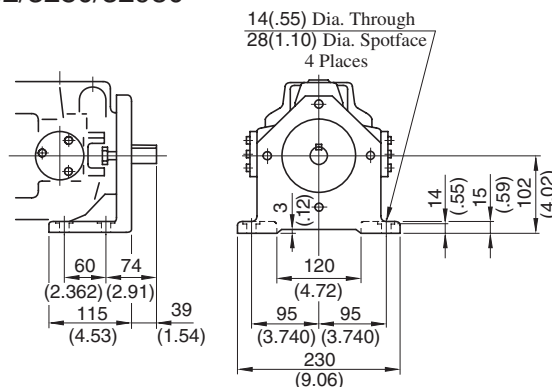
View Arrow X

- ★ 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.

| Model Numbers        | "C" Thd.  | "D" Thd.   | "E" Thd.    | "F" Thd.   | "H" mm (IN.) |
|----------------------|-----------|------------|-------------|------------|--------------|
| A37-F-R-09-*-K-32    | Rc 1/2    | Rc 1/4     | M10         | M10        | 19 (.75)     |
| A37-F-R-09-*-K-3280  | 1/2 BSP.F | 1/4 BSP.Tr |             |            |              |
| A37-F-R-09-*-K-32950 | SAE #10   | SAE #4     | 7/16-14 UNC | 3/8-16 UNC | 20 (.79)     |

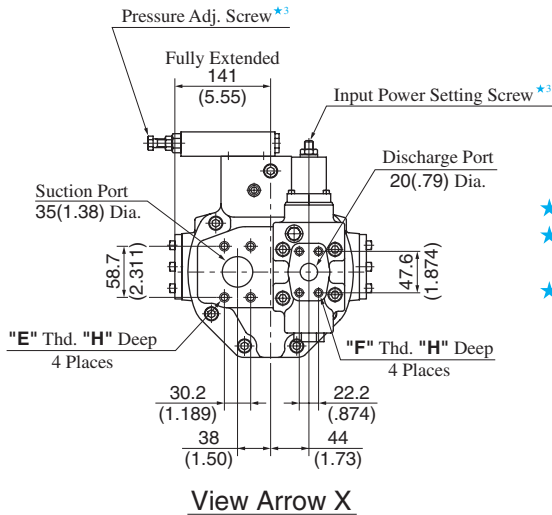
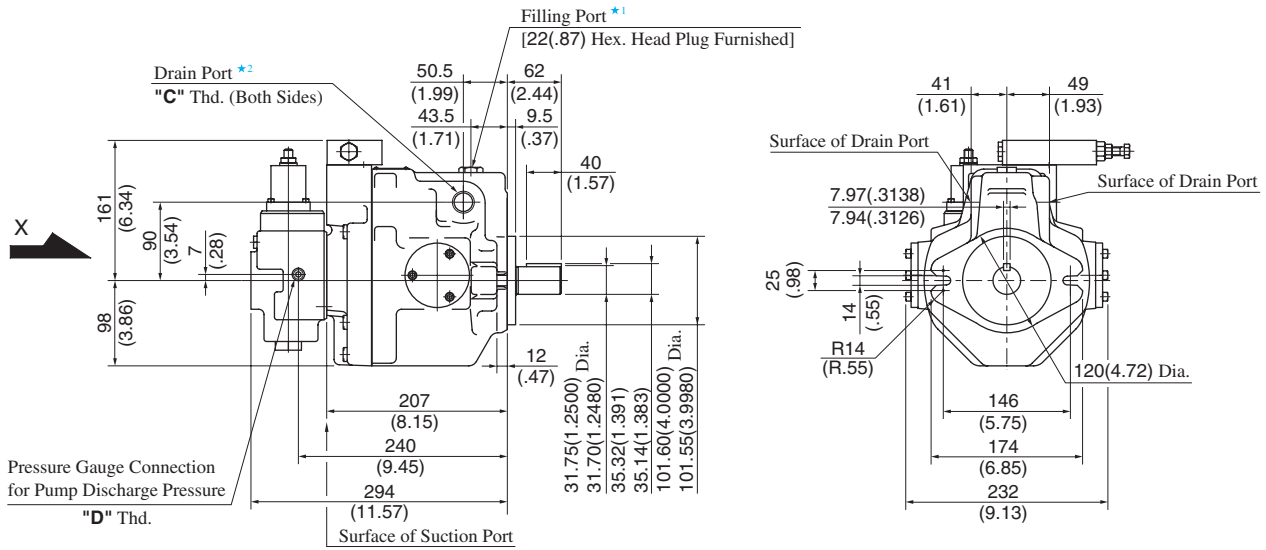
DIMENSIONS IN MILLIMETRES (INCHES)

Foot Mtg. : A37-L-R-09-\*-K-32/3280/32950



• For other dimensions, refer to "Flange Mtg.".

Flange Mtg. : A56-F-R-09-\*-K-32/3280/32950

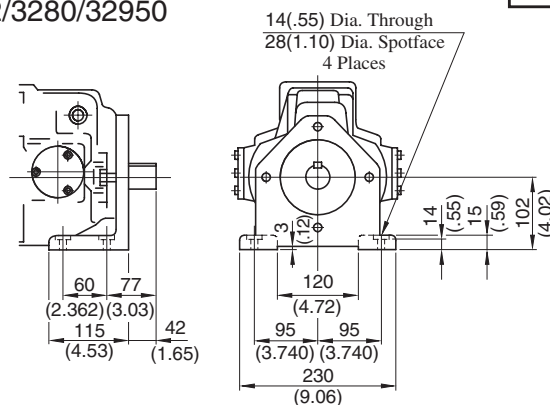


- ★ 1. Install the pump so that the "Filling Port" is at the top.
- ★ 2. Use either port of two drain ports at your option. Keep the remaining port plugged.
- ★ 3. Do not touch the screw because it is adjusted at the time of shipment.

| Model Numbers        | "C" Thd.  | "D" Thd.   | "E" Thd.    | "F" Thd.   | "H" mm (IN.) |
|----------------------|-----------|------------|-------------|------------|--------------|
| A56-F-R-09-*-K-32    | Rc 3/4    | Rc 1/4     | M10         | M10        | 19 (.75)     |
| A56-F-R-09-*-K-3280  | 3/4 BSP.F | 1/4 BSP.Tr |             |            |              |
| A56-F-R-09-*-K-32950 | SAE #12   | SAE #4     | 7/16-14 UNC | 3/8-16 UNC | 20 (.79)     |

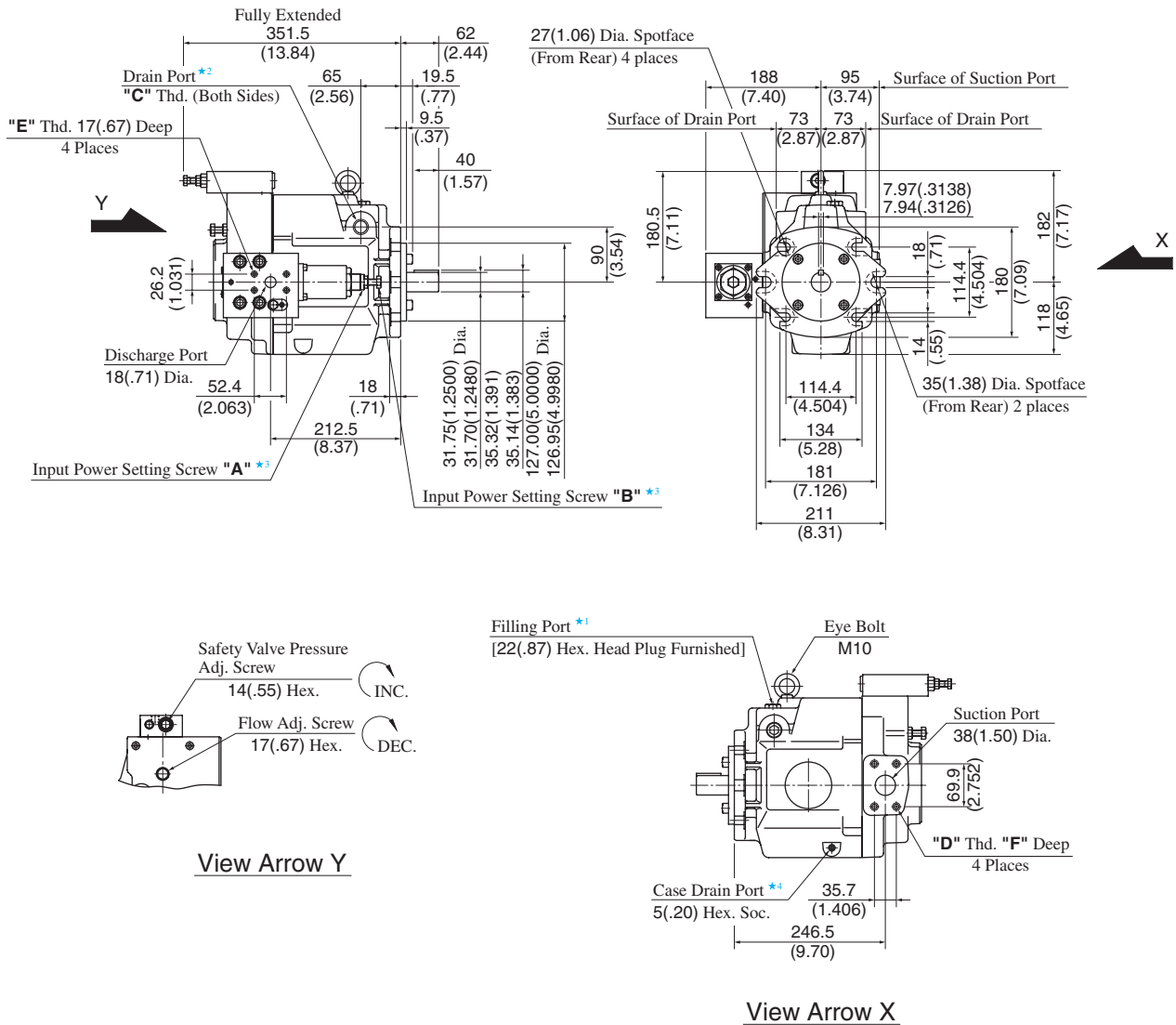
**DIMENSIONS IN MILLIMETRES (INCHES)**

Foot Mtg. : A56-L-R-09-\*-K-32/3280/32950



• For other dimensions, refer to "Flange Mtg.".

Flange Mtg. : A70-FR09\*S-60/6080/60950



- ★ 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. Case drain port is available for use when draining hydraulic fluid from pump casing.

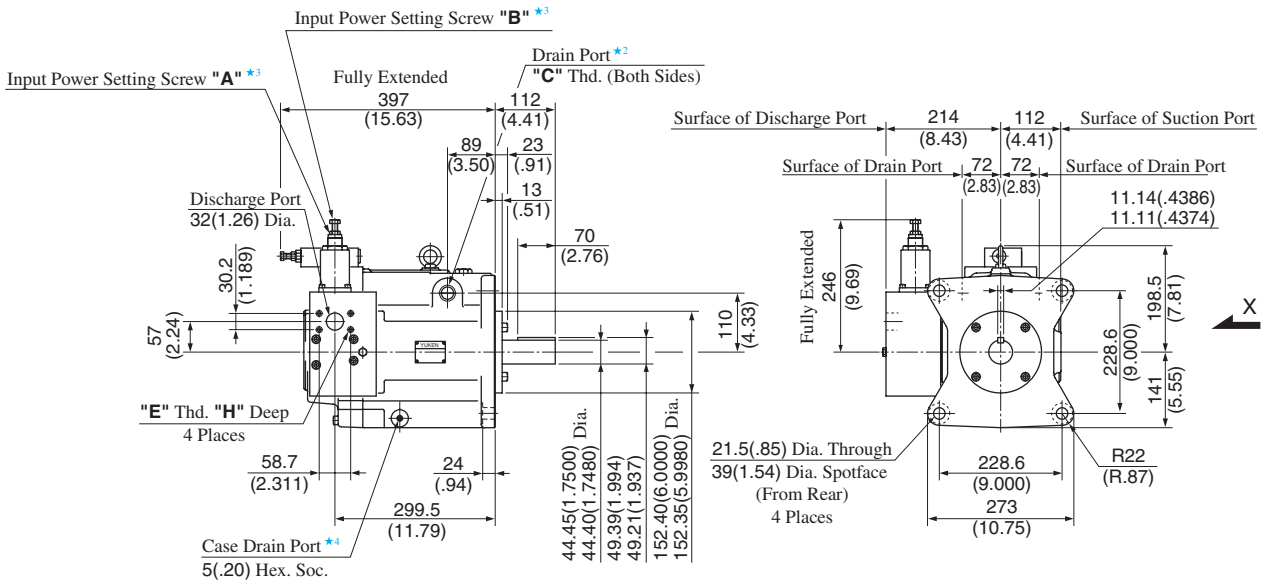
| Model Numbers    | "C" Thd.  | "D" Thd.   | "E" Thd.   | F mm (IN.) |
|------------------|-----------|------------|------------|------------|
| A70-FR09*S-60    | Rc 3/4    | M12        | M10        | 19 (.75)   |
| A70-FR09*S-6080  | 3/4 BSP.F |            |            |            |
| A70-FR09*S-60950 | SAE #12   | 1/2-13 UNC | 3/8-16 UNC | 21 (.83)   |

DIMENSIONS IN MILLIMETRES (INCHES)

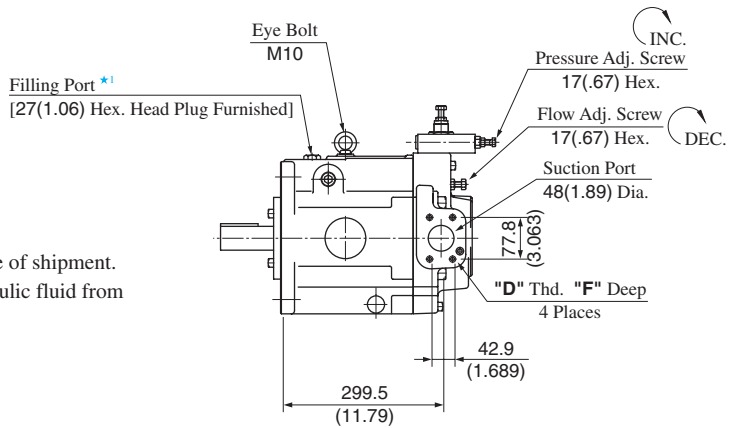
● Foot Mounting Type

Mounting bracket is common to that of pressure compensator model. Refer to page 48 for the dimensions of mounting bracket.

Flange Mtg. : A145-FR09\*S-60/6080/60950



- ★ 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. Case drain port is available for use when draining hydraulic fluid from pump casing.



View Arrow X

| Model Numbers     | "C" Thd.  | "D" Thd.   | "E" Thd.    | F mm (IN.) | H mm (IN.) |
|-------------------|-----------|------------|-------------|------------|------------|
| A145-FR09*S-60    | Rc 3/4    | M12        | M10         | 19 (.75)   | 19 (.75)   |
| A145-FR09*S-6080  | 3/4 BSP.F |            |             |            |            |
| A145-FR09*S-60950 | SAE #12   | 1/2-13 UNC | 7/16-14 UNC | 21 (.83)   | 20 (.79)   |

**DIMENSIONS IN MILLIMETRES (INCHES)**

● **Foot Mounting Type**

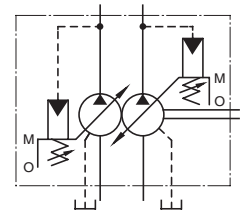
Mounting bracket is common to that of pressure compensator model. Refer to [page 50](#) for the dimensions of mounting bracket.



# "A" Series Variable Displacement Piston Pumps – Double Pumps, Pressure Compensator Type



Graphic Symbol



## Specifications

| Model Numbers        |               | Geometric Displacement<br>cm <sup>3</sup> /rev<br>(cu.in./rev) | Min. Adj. Flow<br>cm <sup>3</sup> /rev<br>(cu.in./rev) | Operating Pressure<br>MPa (PSI) |              | Shaft Speed Range<br>r/min |      | Approx. Mass<br>kg (lbs.) |             |
|----------------------|---------------|--|--|---------------------------------|--------------|----------------------------|------|---------------------------|-------------|
|                      |               |  |  | Rated                           | Intermittent | Max.                       | Min. | Flange Mtg.               | Foot Mtg.   |
| A1616-∗R01∗01∗∗K-32∗ | Outboard Pump | 15.8 (.964)  | 4 (.244)   | 16 (2320)                       | 21 (3050)    | 1800                       | 600  | 35.5 (98.3)               | 37.7 (83.1) |
|                      | Inboard Pump  | 15.8 (.964)  | 4 (.244)   | 16 (2320)                       | 21 (3050)    |                            |      |                           |             |
| A1622-∗R01∗01∗∗K-32∗ | Outboard Pump | 15.8 (.964)  | 4 (.244)   | 16 (2320)                       | 21 (3050)    | 1800                       | 600  | 35.5 (98.3)               | 37.7 (83.1) |
|                      | Inboard Pump  | 22.2 (1.355)   | 6 (.366)   | 16 (2320)                       | 16 (2320)    |                            |      |                           |             |
| A2222-∗R01∗01∗∗K-32∗ | Outboard Pump | 22.2 (1.355)   | 6 (.366)   | 16 (2320)                       | 16 (2320)    | 1800                       | 600  | 35.5 (98.3)               | 37.7 (83.1) |
|                      | Inboard Pump  | 22.2 (1.355)   | 6 (.366)   | 16 (2320)                       | 16 (2320)    |                            |      |                           |             |
| A1637-∗R01∗01∗∗K-32∗ | Outboard Pump | 15.8 (.964)  | 4 (.244)   | 16 (2320)                       | 21 (3050)    | 1800                       | 600  | 50 (110)                  | 54.3 (120)  |
|                      | Inboard Pump  | 36.9 (2.25)  | 10 (.610)  | 16 (2320)                       | 21 (3050)    |                            |      |                           |             |
| A2237-∗R01∗01∗∗K-32∗ | Outboard Pump | 22.2 (1.355)   | 6 (.366)   | 16 (2320)                       | 16 (2320)    | 1800                       | 600  | 50 (110)                  | 54.3 (120)  |
|                      | Inboard Pump  | 36.9 (2.25)  | 10 (.610)  | 16 (2320)                       | 21 (3050)    |                            |      |                           |             |
| A1656-∗R01∗01∗∗K-32∗ | Outboard Pump | 15.8 (.964)  | 4 (.244)   | 16 (2320)                       | 21 (3050)    | 1800                       | 600  | 54.5 (120)                | 58.8 (130)  |
|                      | Inboard Pump  | 56.2 (3.43)  | 12 (.732)  | 16 (2320)                       | 21 (3050)    |                            |      |                           |             |
| A2256-∗R01∗01∗∗K-32∗ | Outboard Pump | 22.2 (1.355)   | 6 (.366)   | 16 (2320)                       | 16 (2320)    | 1800                       | 600  | 54.5 (120)                | 58.8 (130)  |
|                      | Inboard Pump  | 56.2 (3.43)  | 12 (.732)  | 16 (2320)                       | 21 (3050)    |                            |      |                           |             |
| A1670-∗R01∗01∗∗-60∗  | Outboard Pump | 15.8 (.964)  | 4 (.244)   | 16 (2320)                       | 21 (3050)    | 1800                       | 600  | 77.5 (171)                | 89.5 (197)  |
|                      | Inboard Pump  | 70.0 (4.27)  | 30 (1.831)   | 25 (3630)                       | 28 (4060)    |                            |      |                           |             |
| A2270-∗R01∗01∗∗-60∗  | Outboard Pump | 22.2 (1.355)   | 6 (.366)   | 16 (2320)                       | 16 (2320)    | 1800                       | 600  | 77.5 (171)                | 89.5 (197)  |
|                      | Inboard Pump  | 70.0 (4.27)  | 30 (1.831)   | 25 (3630)                       | 28 (4060)    |                            |      |                           |             |
| A3770-∗R01∗01∗∗-60∗  | Outboard Pump | 36.9 (2.25)  | 10 (.610)  | 16 (2320)                       | 21 (3050)    | 1800                       | 600  | 86.5 (191)                | 98.5 (217)  |
|                      | Inboard Pump  | 70.0 (4.27)  | 30 (1.831)   | 25 (3630)                       | 28 (4060)    |                            |      |                           |             |
| A1690-∗R01∗01∗∗-60∗  | Outboard Pump | 15.8 (.964)  | 4 (.244)   | 16 (2320)                       | 21 (3050)    | 1800                       | 600  | 88 (194)                  | 108.5 (239) |
|                      | Inboard Pump  | 91.0 (5.55)  | 56 (3.42)  | 25 (3630)                       | 28 (4060)    |                            |      |                           |             |
| A2290-∗R01∗01∗∗-60∗  | Outboard Pump | 22.2 (1.355)   | 6 (.366)   | 16 (2320)                       | 16 (2320)    | 1800                       | 600  | 88 (194)                  | 108.5 (239) |
|                      | Inboard Pump  | 91.0 (5.55)  | 56 (3.42)  | 25 (3630)                       | 28 (4060)    |                            |      |                           |             |
| A3790-∗R01∗01∗∗-60∗  | Outboard Pump | 36.9 (2.25)  | 10 (.610)  | 16 (2320)                       | 21 (3050)    | 1800                       | 600  | 100.5 (222)               | 121 (267)   |
|                      | Inboard Pump  | 91.0 (5.55)  | 56 (3.42)  | 25 (3630)                       | 28 (4060)    |                            |      |                           |             |
| A5690-∗R01∗01∗∗-60∗  | Outboard Pump | 56.2 (3.43)  | 12 (.732)  | 16 (2320)                       | 21 (3050)    | 1800                       | 600  | 107.5 (237)               | 128 (282)   |
|                      | Inboard Pump  | 91.0 (5.55)  | 56 (3.42)  | 25 (3630)                       | 28 (4060)    |                            |      |                           |             |
| A16145-∗R01∗01∗∗-60∗ | Outboard Pump | 15.8 (.964)  | 4 (.244)   | 16 (2320)                       | 21 (3050)    | 1800                       | 600  | 109 (240)                 | 134 (295)   |
|                      | Inboard Pump  | 145 (8.85)   | 83 (5.06)  | 25 (3630)                       | 28 (4060)    |                            |      |                           |             |
| A22145-∗R01∗01∗∗-60∗ | Outboard Pump | 22.2 (1.355)   | 6 (.366)   | 16 (2320)                       | 16 (2320)    | 1800                       | 600  | 109 (240)                 | 134 (295)   |
|                      | Inboard Pump  | 145 (8.85)   | 83 (5.06)  | 25 (3630)                       | 28 (4060)    |                            |      |                           |             |
| A37145-∗R01∗01∗∗-60∗ | Outboard Pump | 36.9 (2.25)  | 10 (.610)  | 16 (2320)                       | 21 (3050)    | 1800                       | 600  | 121.5 (268)               | 146.5 (323) |
|                      | Inboard Pump  | 145 (8.85)   | 83 (5.06)  | 25 (3630)                       | 28 (4060)    |                            |      |                           |             |
| A56145-∗R01∗01∗∗-60∗ | Outboard Pump | 56.2 (3.43)  | 12 (.732)  | 16 (2320)                       | 21 (3050)    | 1800                       | 600  | 128.5 (283)               | 153.5 (338) |
|                      | Inboard Pump  | 145 (8.85)   | 83 (5.06)  | 25 (3630)                       | 28 (4060)    |                            |      |                           |             |

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

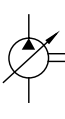
**Model Number Designation**

| A1637                                     | -F   | R                     | Outboard Pump |  | Inboard Pump (Driven End) |  | S                              | K               | -32                         | *           |                               |                               |    |  |                  |  |                   |    |
|---|--|-----------------------|---------------|--|---------------------------|--|--------------------------------|-----------------|-----------------------------|-------------|-------------------------------|-------------------------------|----|--|------------------|--|-------------------|----|
|   |  |                       | 01            | C  | 01                        | C  |                                |                 |                             |             |                               |                               |    |  |                  |  |                   |    |
| Series Number                             | Mounting   | Direction of Rotation | Control Type  | Pres. Adj. Range MPa(PaSI)   | Control Type              | Pres. Adj. Range MPa(PaSI)   | Port Position of Outboard Pump | Shaft Extension | Design Number               | Design Std. |                               |                               |    |  |                  |  |                   |    |
| A1616<br>(15.8/15.8 cm <sup>3</sup> /rev) |  | Viewed from Shaft End | 01            | B: 1.2- 7 (170-1020)<br>C: 1.2-16 (170-2320)<br>H: 1.2-21 (170-3050) | 01                        | B: 1.2- 7 (170-1020)<br>C: 1.2-16 (170-2320)<br>H: 1.2-21 (170-3050) |                                |                 | 32                          | Refer to ★2 |                               |                               |    |  |                  |  |                   |    |
| A1622<br>(15.8/22.2 cm <sup>3</sup> /rev) |  |                       |               |  |                           | B: 1.2- 7 (170-1020)<br>C: 1.2-16 (170-2320)                         |                                |                 |                             |             | K: Keyed Shaft                |                               |    |  |                  |  |                   |    |
| A2222<br>(22.2/22.2 cm <sup>3</sup> /rev) |  |                       |               |  |                           | B: 1.2- 7 (170-1020)<br>C: 1.2-16 (170-2320)                         |                                |                 |                             |             |                               |                               |    |  |                  |  |                   |    |
| A1637<br>(15.8/36.9 cm <sup>3</sup> /rev) |  |                       |               |  |                           | B: 1.2- 7 (170-1020)<br>C: 1.2-16 (170-2320)<br>H: 1.2-21 (170-3050) |                                |                 |                             |             |                               |                               |    |  |                  |  |                   |    |
| A2237<br>(22.2/36.9 cm <sup>3</sup> /rev) |  |                       |               |  |                           | B: 1.2- 7 (170-1020)<br>C: 1.2-16 (170-2320)                         |                                |                 |                             |             |                               |                               |    |  |                  |  |                   |    |
| A1656<br>(15.8/56.2 cm <sup>3</sup> /rev) |  |                       |               |  |                           | B: 1.2- 7 (170-1020)<br>C: 1.2-16 (170-2320)<br>H: 1.2-21 (170-3050) |                                |                 |                             |             |                               |                               |    |  |                  |  |                   |    |
| A2256<br>(22.2/56.2 cm <sup>3</sup> /rev) |  |                       |               |  |                           | B: 1.2- 7 (170-1020)<br>C: 1.2-16 (170-2320)                         |                                |                 |                             |             |                               |                               |    |  |                  |  |                   |    |
| A1670<br>(15.8/70.0 cm <sup>3</sup> /rev) |  |                       |               |  |                           | B: 1.2- 7 (170-1020)<br>C: 1.2-16 (170-2320)<br>H: 1.2-21 (170-3050) |                                |                 | S: Side Port                |             |                               | 60                            |    |  |                  |  |                   |    |
| A2270<br>(22.2/70.0 cm <sup>3</sup> /rev) |  |                       |               |  |                           | B: 1.2- 7 (170-1020)<br>C: 1.2-16 (170-2320)                         |                                |                 |                             |             |                               |                               |    |  |                  |  |                   |    |
| A3770<br>(36.9/70.0 cm <sup>3</sup> /rev) |  |                       |               |  |                           | B: 1.2- 7 (170-1020)<br>C: 1.2-16 (170-2320)<br>H: 1.2-21 (170-3050) |                                |                 |                             |             |                               |                               |    |  |                  |  |                   |    |
| A1690<br>(15.8/91.0 cm <sup>3</sup> /rev) |  |                       |               |  |                           | L: Foot Mtg.   |                                |                 | R: ★1<br>Clockwise (Normal) |             | 01: Pressure Compensator Type | 01: Pressure Compensator Type | 01 | B: 1.2- 7 (170-1020)<br>C: 1.2-16 (170-2320)<br>H: 1.2-21 (170-3050)                         | None: Axial Port |  | 60                |    |
| A2290<br>(22.2/91.0 cm <sup>3</sup> /rev) |  |                       |               |  |                           |  |                                |                 |                             |             |                               |                               |    | B: 1.2- 7 (170-1020)<br>C: 1.2-16 (170-2320)   |                  |  |                   |    |
| A3790<br>(36.9/91.0 cm <sup>3</sup> /rev) |  |                       |               |  |                           |  |                                |                 |                             |             |                               |                               |    | B: 1.2- 7 (170-1020)<br>C: 1.2-16 (170-2320)<br>H: 1.8-21 (260-3050)<br>K: 2.0-28 (290-4060) |                  |  |                   |    |
| A5690<br>(56.2/91.0 cm <sup>3</sup> /rev) |  |                       |               |  |                           |  |                                |                 |                             |             |                               |                               |    | B: 1.2- 7 (170-1020)<br>C: 1.2-16 (170-2320)<br>H: 1.2-21 (170-3050)                         |                  |  | None: Keyed Shaft | 60 |
| A16145<br>(15.8/145 cm <sup>3</sup> /rev) |  |                       |               |  |                           |  |                                |                 |                             |             |                               |                               |    | B: 1.2- 7 (170-1020)<br>C: 1.2-16 (170-2320)   |                  |  |                   |    |
| A22145<br>(22.2/145 cm <sup>3</sup> /rev) | B: 1.2- 7 (170-1020)<br>C: 1.2-16 (170-2320)                         |                       |               |  |                           |  |                                |                 |                             |             |                               |                               |    |  |                  |  |                   |    |
| A37145<br>(36.9/145 cm <sup>3</sup> /rev) | B: 1.2- 7 (170-1020)<br>C: 1.2-16 (170-2320)<br>H: 1.2-21 (170-3050) |                       |               |  |                           |  |                                |                 |                             |             |                               |                               |    |  |                  |  |                   |    |
| A56145<br>(56.2/145 cm <sup>3</sup> /rev) |  |                       | 60            |  |                           |  |                                |                 |                             |             |                               |                               |    |  |                  |  |                   |    |

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

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

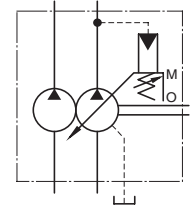




## "A" Series Piston Pumps – Variable / Fixed Double Pumps



Graphic Symbol



### Model Number Designation

| A16R1         | -F                             | R  | Inboard Pump (Driven End)     |   | Outboard Pump                                |                         |                       | K               | -32           | *           |
|---------------|--------------------------------|--|-------------------------------|---|--|-------------------------|-----------------------|-----------------|---------------|-------------|
|               |                                |  | 01                            | B   | -23  | A                       | A                     |                 |               |             |
| Series Number | Mounting                       | Direction of Rotation                                  | Control Type                  | Pres. Adj. Range MPa(PSI)   | Nominal Displacement cm <sup>3</sup> /rev    | Discharge Port Position | Suction Port Position | Shaft Extension | Design Number | Design Std. |
| A16R1         | F: Flange Mtg.<br>L: Foot Mtg. | (Viewed from Shaft End)<br>R: *1<br>Clockwise (Normal) | 01: Pressure Compensator Type | B: 1.2 - 7 (170 - 1020)<br>C: 1.2 - 16 (170 - 2320)<br>H: 1.2 - 21 (170 - 3050)                             | 6, 8<br>10, 12<br>14, 17<br>19, 23<br>25, 31 | A: Up                   | A: Up                 | K: Keyed Shaft  | 32            | Refer to *2 |
| A22R1         |                                |  |                               | B: 1.2 - 7 (170 - 1020)<br>C: 1.2 - 16 (170 - 2320)   |  |                         |                       |                 | 32            |             |
| A37R1         |                                |  |                               | B: 1.2 - 7 (170 - 1020)<br>C: 1.2 - 16 (170 - 2320)<br>H: 1.2 - 21 (170 - 3050)                             |  |                         |                       |                 | 32            |             |
| A56R1         |                                |  |                               | B: 1.2 - 7 (170 - 1020)<br>C: 1.5 - 16 (220 - 2320)<br>H: 1.8 - 21 (260 - 3050)<br>K: 2.0 - 28 (290 - 4060) |  |                         |                       |                 | 32            |             |
| A70R1         |                                |  |                               | B: 1.2 - 7 (170 - 1020)<br>C: 1.5 - 16 (220 - 2320)<br>H: 1.8 - 21 (260 - 3050)<br>K: 2.0 - 28 (290 - 4060) |  |                         |                       |                 | 60            |             |
| A90R1         |                                |  |                               | B: 1.2 - 7 (170 - 1020)<br>C: 1.5 - 16 (220 - 2320)<br>H: 1.8 - 21 (260 - 3050)<br>K: 2.0 - 28 (290 - 4060) |  |                         |                       |                 | 60            |             |
| A145R1        |                                |  |                               | B: 1.2 - 7 (170 - 1020)<br>C: 1.5 - 16 (220 - 2320)<br>H: 1.8 - 21 (260 - 3050)<br>K: 2.0 - 28 (290 - 4060) |  |                         |                       |                 | 60            |             |
| A70R2         |                                |  |                               | B: 1.2 - 7 (170 - 1020)<br>C: 1.5 - 16 (220 - 2320)<br>H: 1.8 - 21 (260 - 3050)<br>K: 2.0 - 28 (290 - 4060) |  |                         |                       |                 | 60            |             |
| A90R2         |                                |  |                               | B: 1.2 - 7 (170 - 1020)<br>C: 1.5 - 16 (220 - 2320)<br>H: 1.8 - 21 (260 - 3050)<br>K: 2.0 - 28 (290 - 4060) |  |                         |                       |                 | 60            |             |
| A145R2        |                                |  |                               | B: 1.2 - 7 (170 - 1020)<br>C: 1.5 - 16 (220 - 2320)<br>H: 1.8 - 21 (260 - 3050)<br>K: 2.0 - 28 (290 - 4060) |  |                         |                       |                 | 60            |             |

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

\*2. Design Standards: None ..... Japanese Standard "JIS"  
80 ..... European Design Standard  
950 ..... N. American Design Standard

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

## Specifications

| Model Numbers        | Geometric Displacement<br>cm <sup>3</sup> /rev<br>(cu.in./rev) | Operating Pressure<br>MPa (PSI) |              | Shaft Speed<br>Range<br>r/min |      | Approx. Mass<br>kg (lbs.) |                |
|----------------------|--|---------------------------------|--------------|-------------------------------|------|---------------------------|----------------|
|                      |  | Rated                           | Intermittent | Max.                          | Min. | Flange<br>Mtg.            | Foot<br>Mtg.   |
| A16R1-*R01*-*AAK-32* | Outboard Pump  | Refer to the following table    |              | 1800                          | 750  | 28.8<br>(63.5)            | 31.0<br>(68.4) |
|                      | Inboard Pump   | 15.8 (.964)                     | 16 (2320)    |                               |      |                           |                |
| A22R1-*R01*-*AAK-32* | Outboard Pump  | Refer to the following table    |              | 1800                          | 750  | 28.8<br>(63.5)            | 31.0<br>(68.4) |
|                      | Inboard Pump   | 22.2 (1.355)                    | 16 (2320)    |                               |      |                           |                |
| A37R1-*R01*-*AAK-32* | Outboard Pump  | Refer to the following table    |              | 1800                          | 750  | 39<br>(86.0)              | 43.3<br>(95.5) |
|                      | Inboard Pump   | 36.9 (2.25)                     | 16 (2320)    |                               |      |                           |                |
| A56R1-*R01*-*AAK-32* | Outboard Pump  | Refer to the following table    |              | 1800                          | 750  | 47<br>(104)               | 51.3<br>(113)  |
|                      | Inboard Pump   | 56.2 (3.43)                     | 16 (2320)    |                               |      |                           |                |
| A70R1-*R01*-*AA-60*  | Outboard Pump  | Refer to the following table    |              | 1800                          | 750  | 66<br>(146)               | 78<br>(172)    |
|                      | Inboard Pump   | 70.0 (4.27)                     | 25 (3630)    |                               |      |                           |                |
| A90R1-*R01*-*AA-60*  | Outboard Pump  | Refer to the following table    |              | 1800                          | 750  | 82<br>(181)               | 105<br>(232)   |
|                      | Inboard Pump   | 91.0 (5.55)                     | 25 (3630)    |                               |      |                           |                |
| A145R1-*R01*-*AA-60* | Outboard Pump  | Refer to the following table    |              | 1800                          | 750  | 102<br>(225)              | 129<br>(284)   |
|                      | Inboard Pump   | 145 (8.85)                      | 25 (3630)    |                               |      |                           |                |
| A70R2-*R01*-*AA-60*  | Outboard Pump  | Refer to the following table    |              | 1800                          | 600  | 72.5<br>(160)             | 84.5<br>(186)  |
|                      | Inboard Pump   | 70.0 (4.27)                     | 25 (3630)    |                               |      |                           |                |
| A90R2-*R01*-*AA-60*  | Outboard Pump  | Refer to the following table    |              | 1800                          | 600  | 91.5<br>(202)             | 112<br>(247)   |
|                      | Inboard Pump   | 91.0 (5.55)                     | 25 (3630)    |                               |      |                           |                |
| A145R2-*R01*-*AA-60* | Outboard Pump  | Refer to the following table    |              | 1800                          | 600  | 112<br>(247)              | 137<br>(302)   |
|                      | Inboard Pump   | 145 (8.85)                      | 25 (3630)    |                               |      |                           |                |

### ● Geometric Displacement and Max. Pressure of Outboard Pump

| Model Numbers | Geometric Displacement<br>cm <sup>3</sup> /rev<br>(cu.in./rev) | Max Pres. MPa (PSI) |               |
|---------------|--|---------------------|---------------|
|               |  | Anti-Wear<br>Type   | R & O<br>Type |
| A*R1-*R01*-6  | 5.8 (.354)   | 21<br>(3050)        | 16<br>(2320)  |
| A*R1-*R01*-8  | 8.0 (.488)   |                     |               |
| A*R1-*R01*-10 | 9.4 (.574)   |                     |               |
| A*R1-*R01*-12 | 12.2 (.744)  |                     |               |
| A*R1-*R01*-14 | 13.7 (.836)  |                     |               |
| A*R1-*R01*-17 | 16.6 (1.013)   |                     |               |
| A*R1-*R01*-19 | 18.6 (1.135)   |                     |               |
| A*R1-*R01*-23 | 22.7 (1.385)   | 17.5 (2540)         |               |
| A*R1-*R01*-25 | 25.3 (1.544)   | 15 (2180)           | 15 (2180)     |
| A*R1-*R01*-31 | 31.0 (1.892)   | 12 (1740)           | 12 (1740)     |
| A*R2-*R01*-26 | 26.6 (1.623)   | 21<br>(3050)        | 14<br>(2030)  |
| A*R2-*R01*-33 | 33.3 (2.03)  |                     |               |
| A*R2-*R01*-41 | 41.3 (2.52)  |                     |               |
| A*R2-*R01*-47 | 47.2 (2.88)  |                     |               |
| A*R2-*R01*-53 | 52.5 (3.20)  |                     |               |
| A*R2-*R01*-59 | 58.2 (3.55)  |                     |               |
| A*R2-*R01*-65 | 64.7 (3.95)  |                     |               |