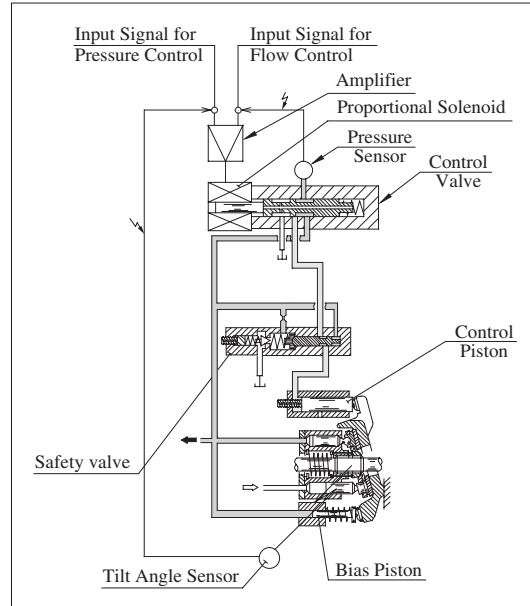
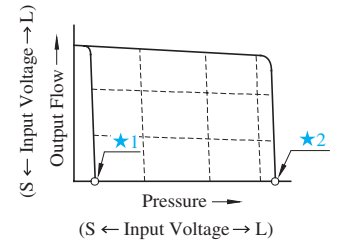


"A" Series Variable Displacement Piston Pumps – Single Pump, "OBE" Type Electro-Hydraulic Proportional Pressure & Flow Control Type

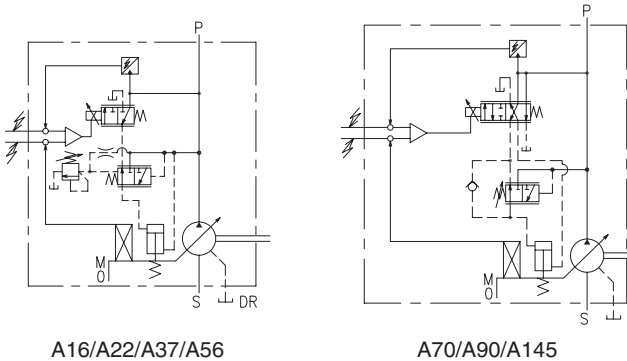


Performance Characteristics



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

Graphic Symbols



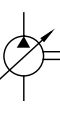
Example of Specified Control Pressure

| Control Pressure Symbol (EX.) | Control Pressure at Input Signal is 5 V | | | |
|-------------------------------|---|-------|------|------|
| | kgf/cm ² | 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 ^{★2} | Design Number | Design Std. |
| A16 (15.8 cm ³ /rev) | F: Flange Mtg. | (Viewed from Shaft End) | 04EH: "OBE" Type Proportional Pressure & Flow Control Type | Specify Control Pressure between 6.9 MPa and Maximum Operating Pressure (Refer to above Table) | — | S: Side Port | 06 | 42 | Refer to ★3 |
| A22 (22.2 cm ³ /rev) | | | | | | | 11 | 42 | |
| A37 (36.9 cm ³ /rev) | | | | | | | 01 | 42 | |
| A56 (56.2 cm ³ /rev) | | | | | | | 02 | 42 | |
| A70 (70.0 cm ³ /rev) | L: Foot Mtg. | R: Clockwise (Normal) ^{★1} | | | (Viewd from Shaft End) R: Right L: Left | S: Side Port | 60 | 60 | |
| A90 (91.0 cm ³ /rev) | | | | | | | 60 | 60 | |
| A145 (145.0 cm ³ /rev) | | | | | | | 60 | 60 | |

- ★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 ³ /rev (cu. in./rev) | 15.8 (.964) | 22.2 (1.355) | 36.9 (2.25) | 56.2 (3.43) | 70.0 (4.27) | 91.0 (5.55) | 145.0 (8.85) |
| Operating Pressure MPa (PSI) | | Rated ^{*2} | 16 (2320) | 16 (2320) | 16 (2320) | 16 (2320) | 25 (3625) | 25 (3625) | 25 (3625) |
| | | Intermittent ^{*1} | 21 (3050) | 16 (2320) | 21 (3050) | 21 (3050) | 28 (4060) | 28 (4060) | 28 (4060) |
| Shaft Speed Range | | r/min | 600 - 1800 | | | | | | |
| Flow Control | Max. Flow ^{*3} | L/min (U.S. GPM) | 28.4 (7.5) | 40.0 (10.6) | 66.4 (17.5) | 101.2 (26.7) | 126.0 (33.3) | 163.0 (43.1) | 261.0 (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 (lbs.) | Flange Mtg. | 20.7 (45.6) | 20.7 (45.6) | 32.2 (71) | 39.2 (86.4) | 64 (141) | 76.5 (169) | 98 (216) |
| | | Foot Mtg. | 22.9 (50.5) | 22.9 (50.5) | 36.5 (80.5) | 43.5 (95.9) | 76 (168) | 97 (214) | 123 (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.

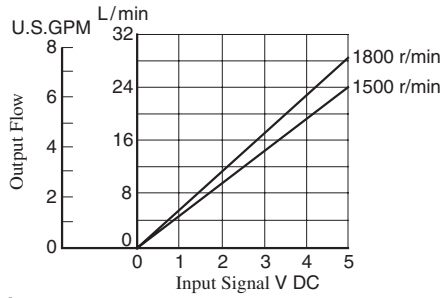
If short plug is used at 60 Hz without making the change, maximum flow increased in proportion to frequency.

Painting on Amp. Box and Solenoid

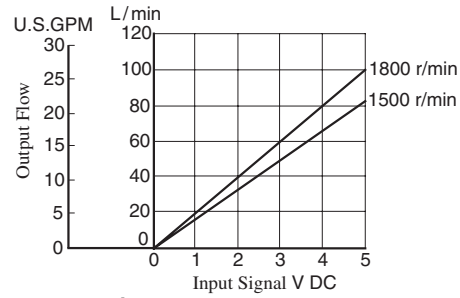
To maintain suitable radiation effect, the amp. box and the solenoid of the control valve should not be painted.

■ Output Flow vs. Input Signal

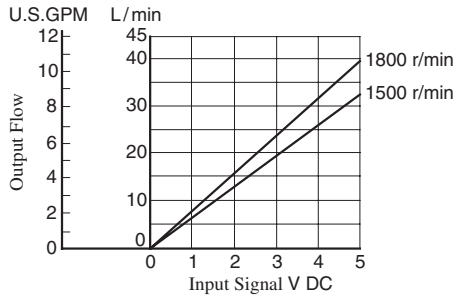
● A16



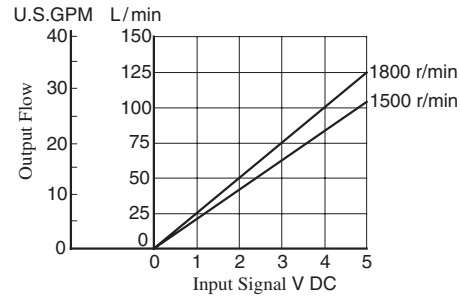
● A56



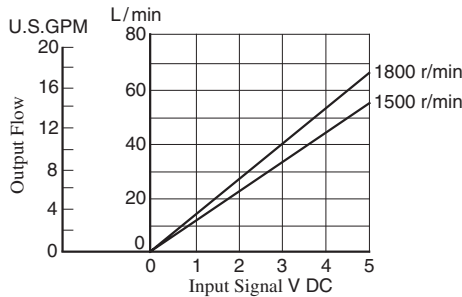
● A22



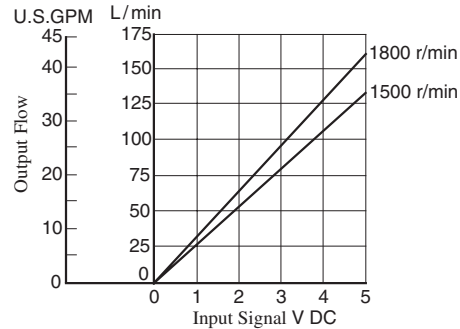
● A70



● A37

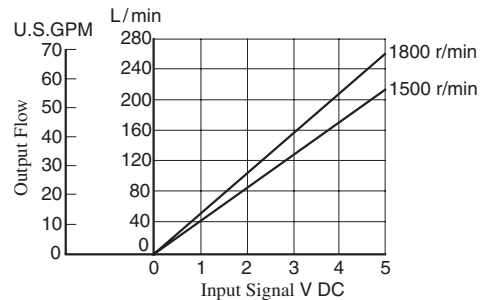


● A90

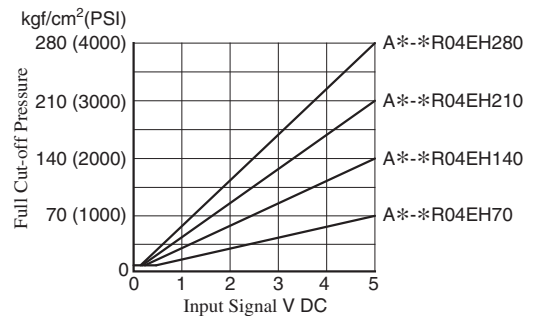
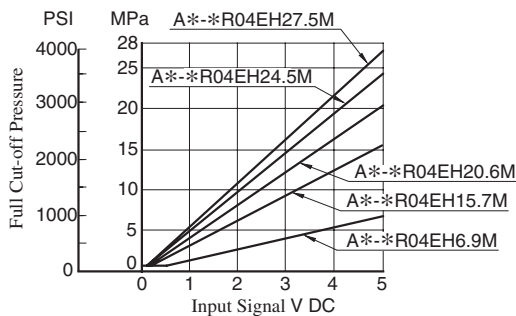


Note: Pump characteristics at 1800 r/min is the same as those at 1500 r/min where frequency is compensated. (Refer to [page 87](#).)

● A145



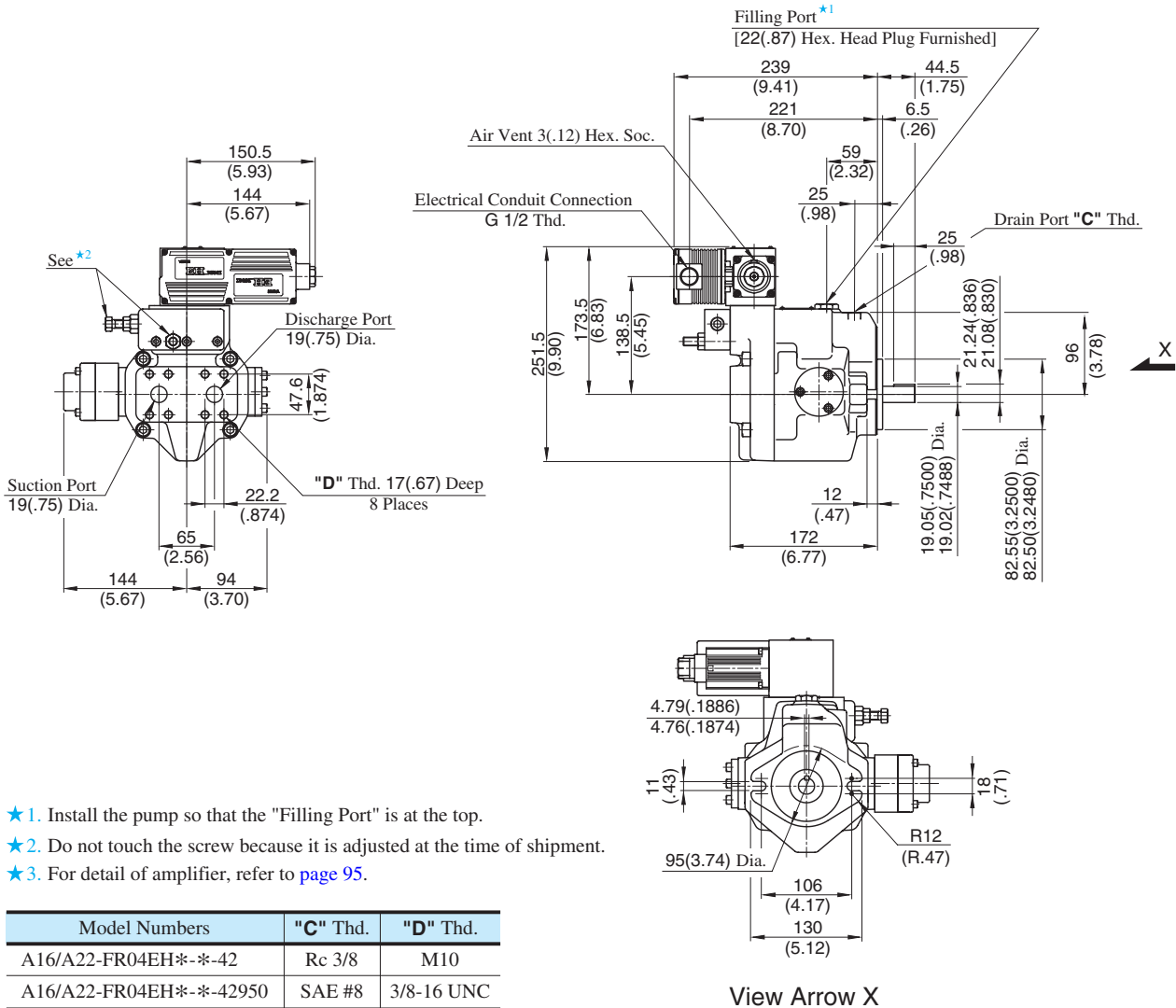
■ Full Cut-off Pres. vs. Input Signal



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

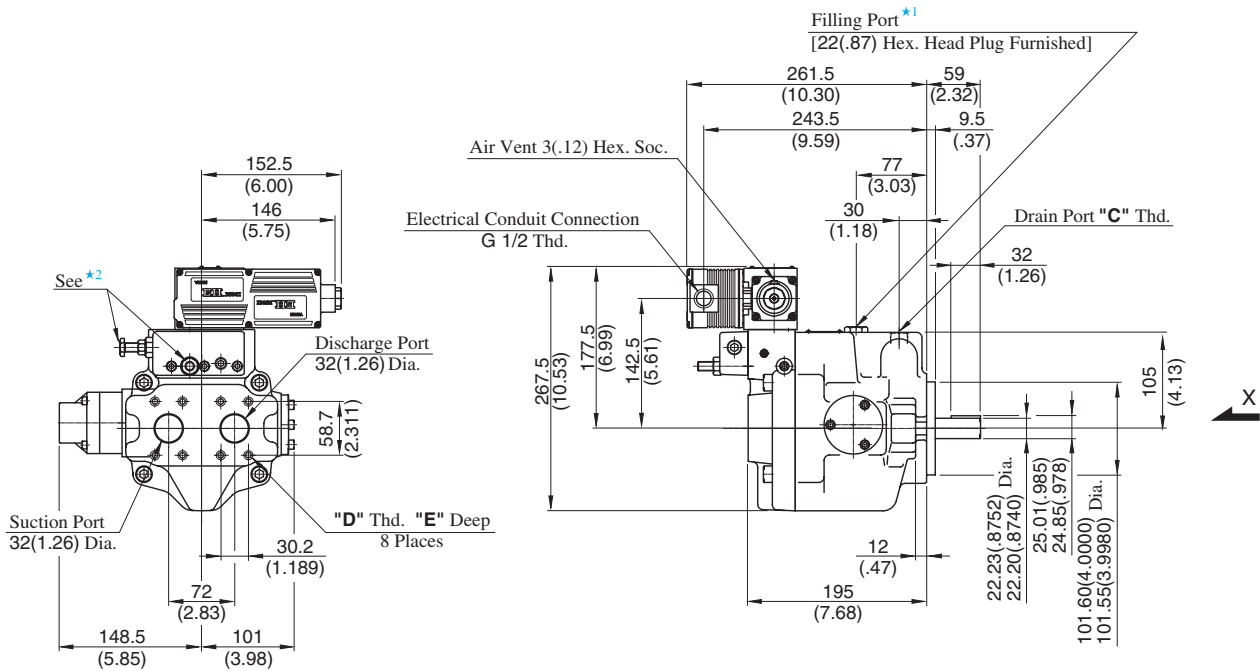
Port mounting dimensions are the same as those of pressure compensator model. Refer to [page 45](#) for port mounting dimensions.

● Foot Mounting Type

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

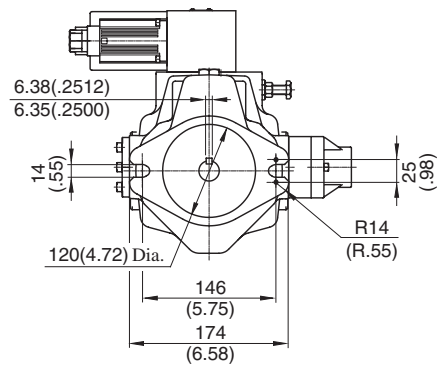
Axial Port Type

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" 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**

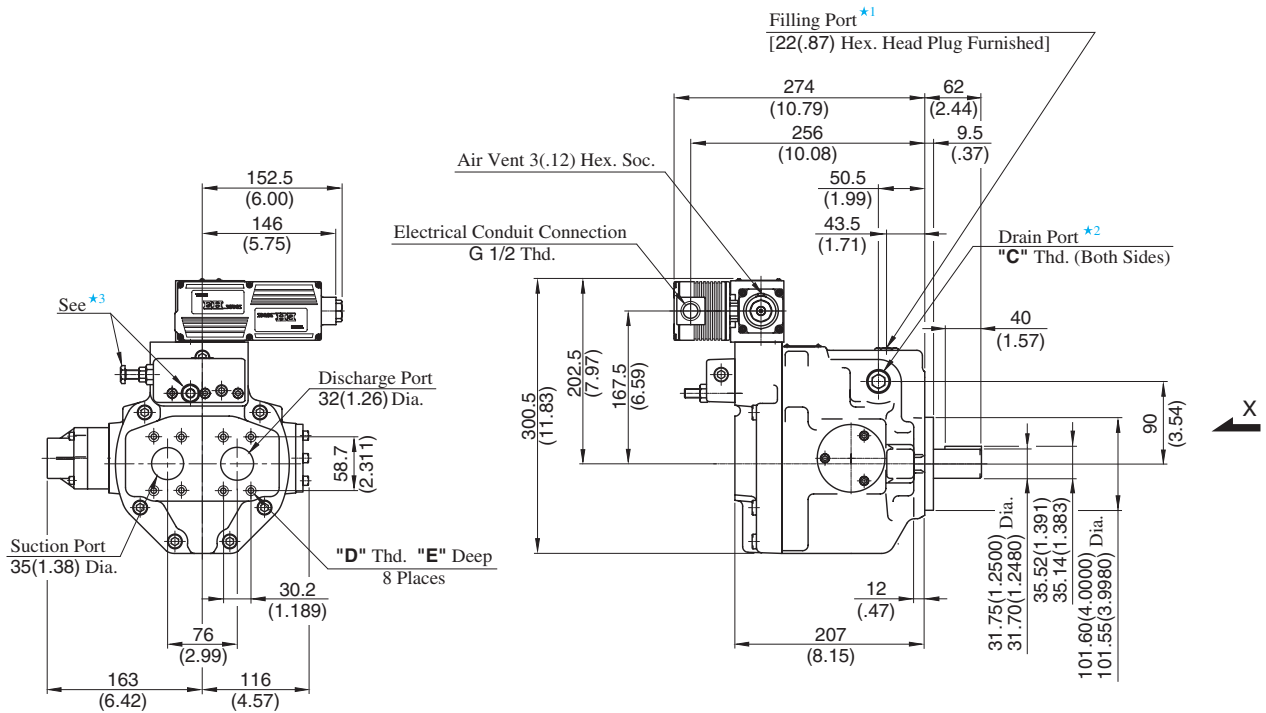
Port mounting dimensions are the same as those of pressure compensator model. Refer to [page 46](#) for port mounting dimensions.

● **Foot Mounting Type**

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

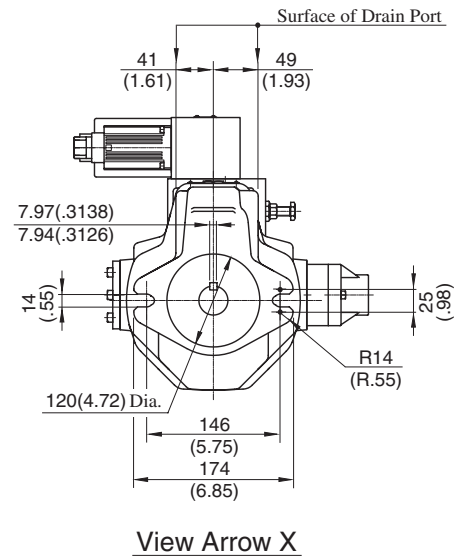
Axial Port Type

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

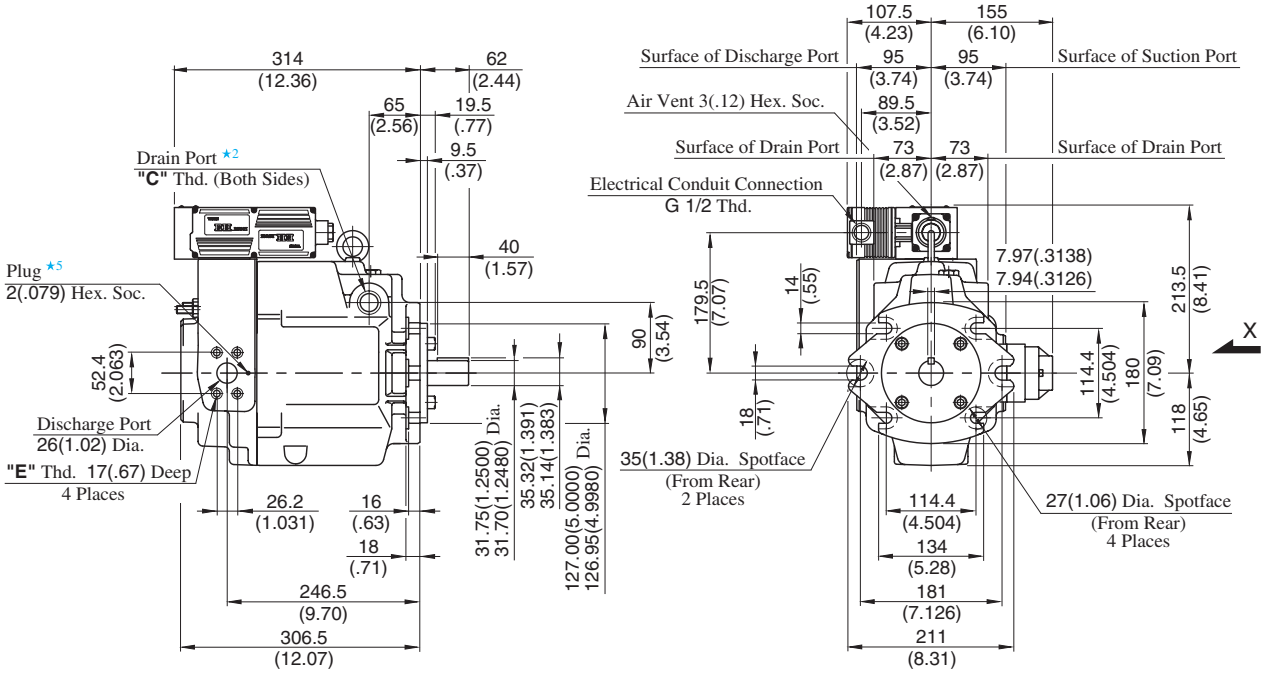
Port mounting dimensions are the same as those of pressure compensator model. Refer to [page 47](#) for port mounting dimensions.

● Foot Mounting Type

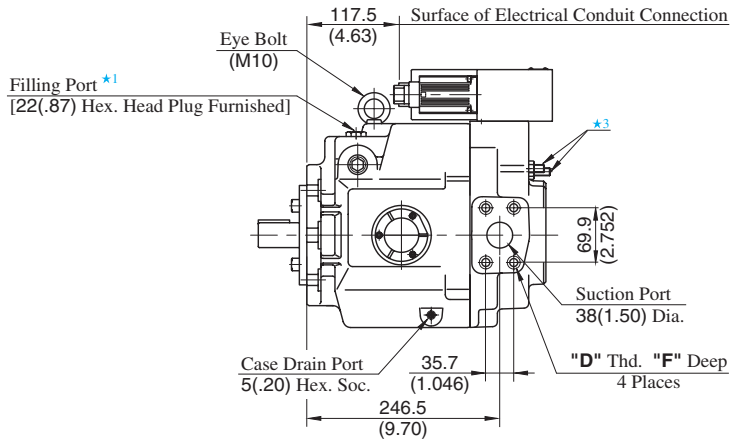
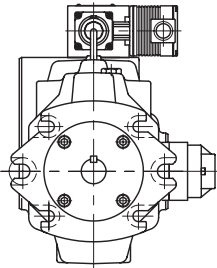
Mounting bracket is common to that of pressure compensator model. Refer to [page 47](#) for the dimensions of mounting bracket.

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) |

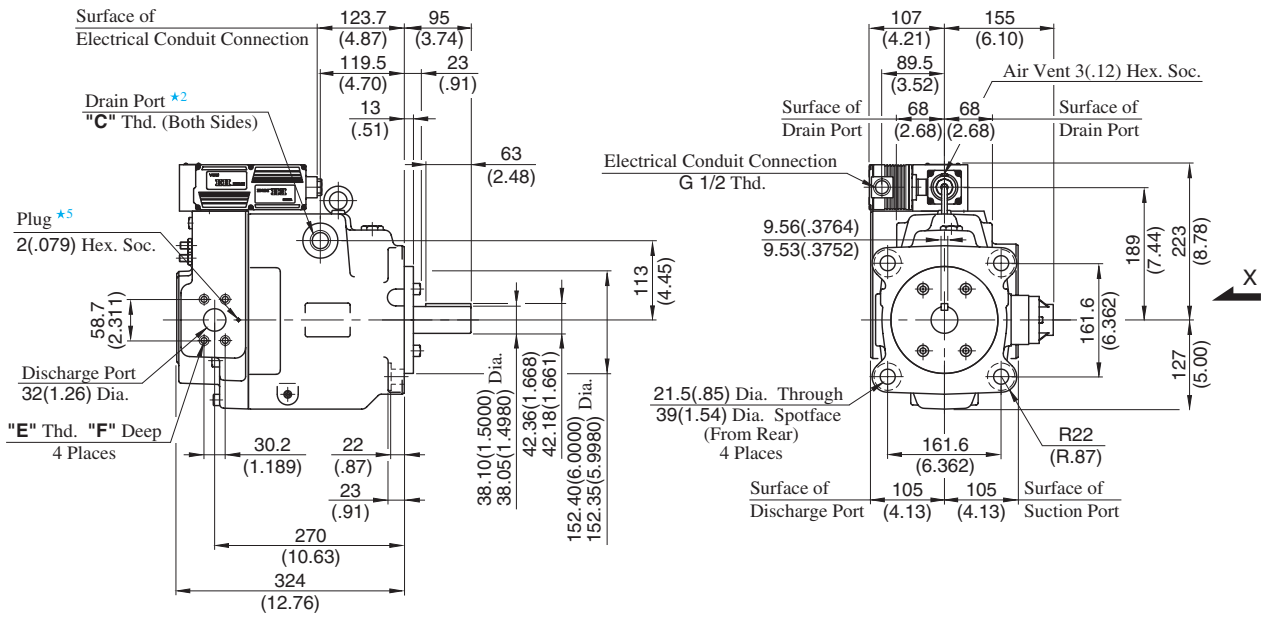
DIMENSIONS IN
MILLIMETRES (INCHES)

● **Foot Mounting Type**

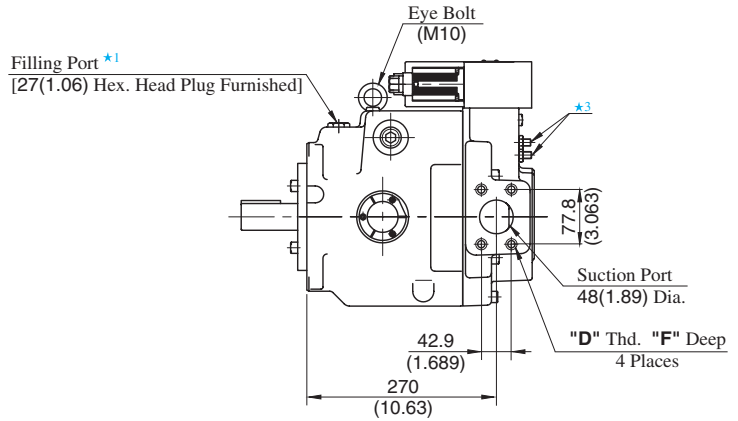
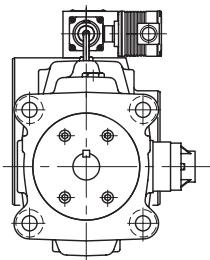
Mounting bracket is common to that of pressure compensator model.
Refer to [page 48](#) for the dimensions of mounting bracket.

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) |

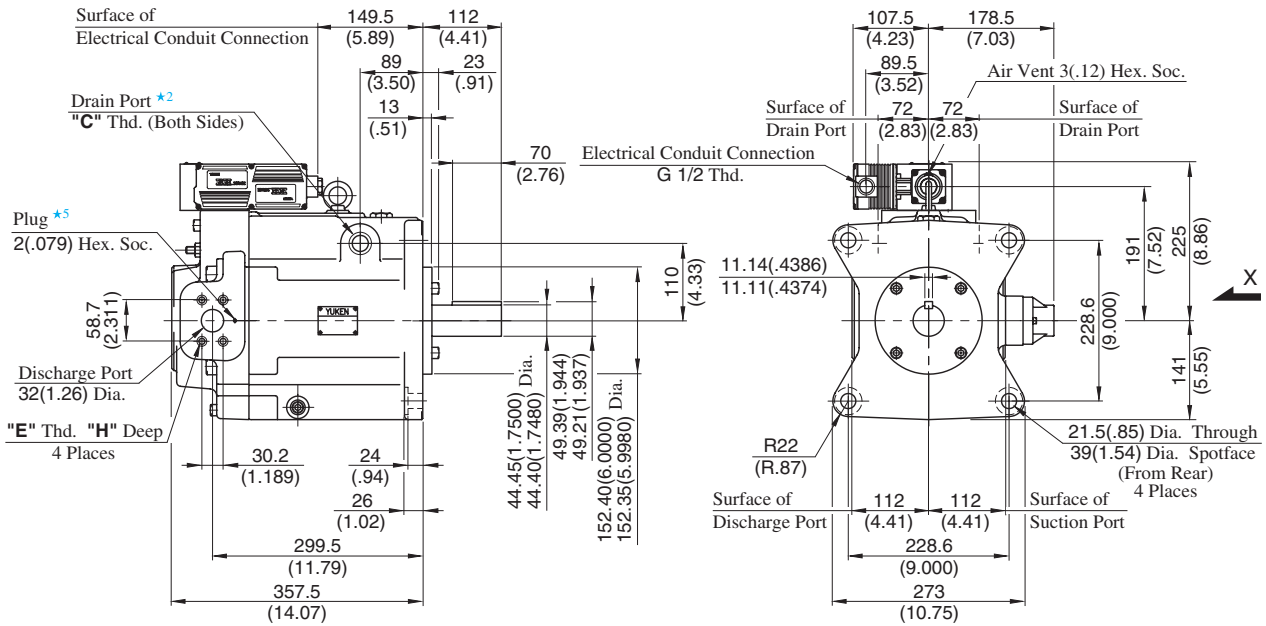
DIMENSIONS IN MILLIMETRES (INCHES)

● Foot Mounting Type

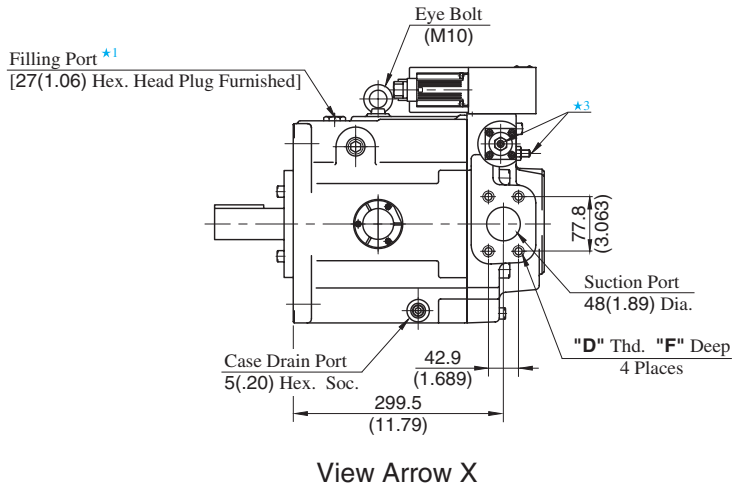
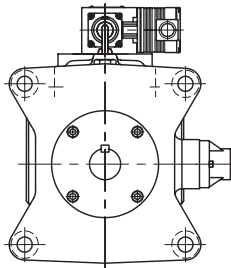
Mounting bracket is common to that of pressure compensator model. Refer to page 49 for the dimensions of mounting bracket.

Flange Mtg.

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



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



- ★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.

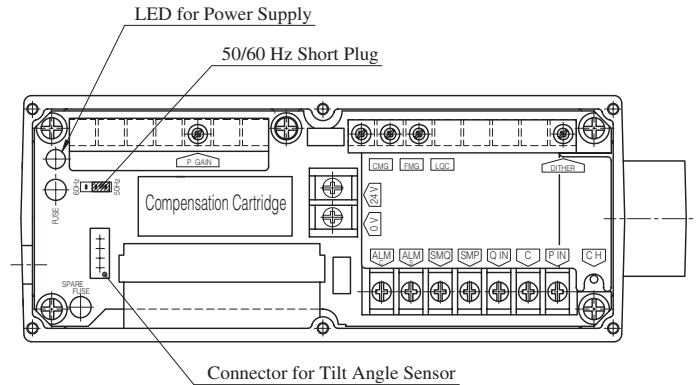
| Model Numbers | "C" Thd. | "D" Thd. | "E" Thd. | Dimensions mm (IN.) | |
|-----------------------|----------|------------|-------------|---------------------|----------|
| | | | | F | H |
| A145-FR04EH**S*-60 | Rc 3/4 | M12 | M10 | 19 (.75) | 19 (.75) |
| A145-FR04EH**S*-60950 | SAE #12 | 1/2-13 UNC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

