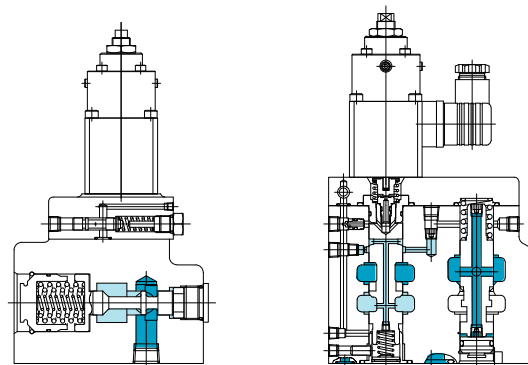


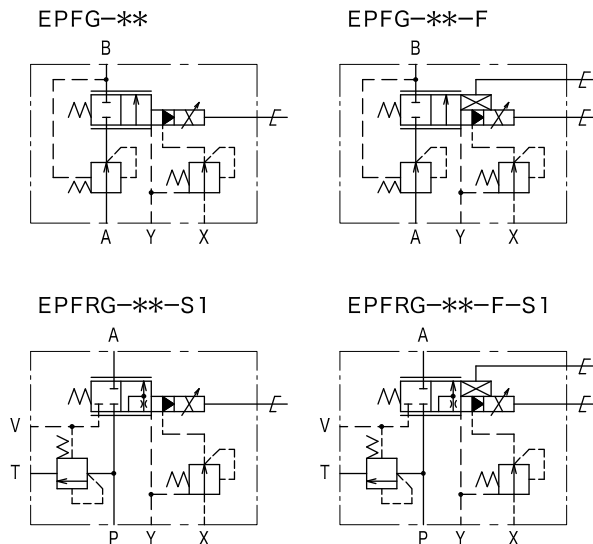
# Proportional flow control valves EPF(R)G



- This flow control valve utilizes a proportional solenoids. A proprietary flow adjustment design is incorporated to allow very precise positioning of the main spool. This flow control valve is pilot operated, and the main

spool is impervious to affects of flow forces and other disturbances. The EPFRG valve utilizes a bypass type pressure compensator load sensing function which contributes to energy saving hydraulic circuits.

## Functional Symbols



Note: EPFRG-06/10 do not have V (vent) ports.

## Model Code

**EPF(R)G - 03 - 130 - (F) - (EX) - 10 - (S1)**

1 2 3 4 5 6 7

- |   |   |
|---|---|
| <ul style="list-style-type: none"> <li>1 Proportional solenoid flow control valve (gasket mounted)<br/>EPFG: with series type pressure compensator<br/>EPFRG: with bypass type pressure compensator</li> <li>2 Size<br/>See 'Specifications'</li> <li>3 Max. controllable flow<br/>See 'Specifications'</li> <li>4 Position sensor<br/>Omit for no position sensor<br/>F: with position sensor</li> </ul> | <ul style="list-style-type: none"> <li>5 Pilot<br/>Omit for internal pilot with reducing valve<br/>EX: external pilot with reducing valve</li> <li>6 Design no.<br/>10: all except EPFRG-06<br/>11: EPFRG-06</li> <li>7 Control code<br/>Omit for EPFG<br/>S1: for EPFRG</li> </ul> |
|---|---|

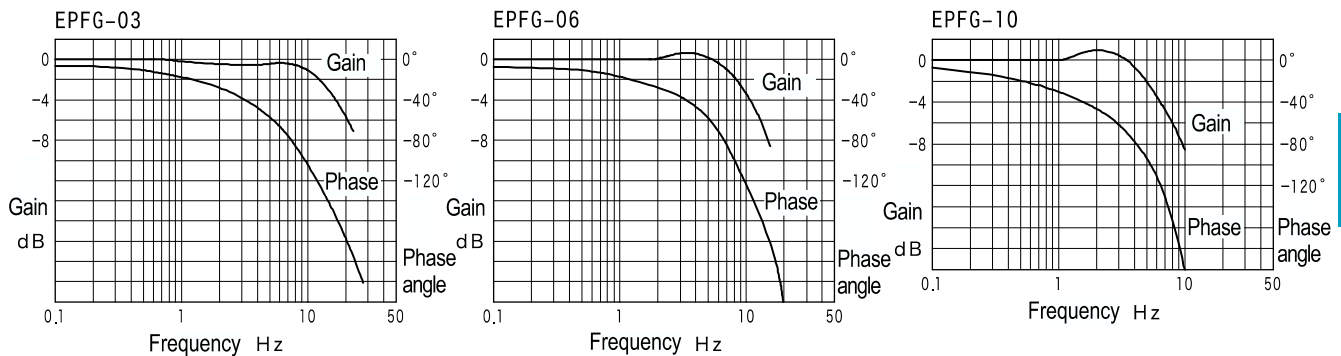
# Specifications

| Model                       | EPFG                 |     |                    |     |      |     | EPFRG                |    |     |     |     |     |     |     |     |      |
|-----------------------------|----------------------|-----|--------------------|-----|------|-----|----------------------|----|-----|-----|-----|-----|-----|-----|-----|------|
|                             | 03                   |     | 06                 |     | 10   |     | 02                   |    | 03  |     | 06  |     | 10  |     |     |      |
| Size                        | 03                   |     | 06                 |     | 10   |     | 02                   |    | 03  |     | 06  |     | 10  |     |     |      |
| Max. operating pressure MPa | 21                   |     |                    |     | 17.5 |     | 21                   |    |     |     |     |     |     |     |     |      |
| Max. control flow code      | 30                   | 65  | 130                | 170 | 250  | 375 | 500                  | 30 | 65  | 130 | 150 | 250 | 290 | 375 | 500 | 1000 |
| Min. control flow L/min     | 0.7                  | 1.0 | 1.3                | 1.7 | 2.5  | 4   | 5                    | 1  | 1.5 | 2   | 2   | 3   | 4   | 5   | 6   | 10   |
| Max. control flow L/min     | 30                   | 65  | 130                | 170 | 250  | 375 | 500                  | 30 | 65  | 130 | 150 | 250 | 290 | 375 | 500 | 1000 |
| Pilot pressure MPa          | 1.5~21               |     |                    |     |      |     |                      |    |     |     |     |     |     |     |     |      |
| Pilot flow L/min            | 1.5                  |     | 1.5                |     | 2.5  |     | 1.5                  |    | 2.0 |     | 2.5 |     | 3   |     |     |      |
| Rated voltage A             | 1                    |     |                    |     |      |     |                      |    |     |     |     |     |     |     |     |      |
| Coil resistance Ω           | 14                   |     |                    |     |      |     |                      |    |     |     |     |     | 15  |     |     |      |
| Dither frequency Hz         | 100~110              |     |                    |     |      |     |                      |    |     |     |     |     |     |     |     |      |
| Dither voltage mA rms       | 42                   |     |                    |     |      |     |                      |    |     |     |     |     | 90  |     |     |      |
| Current control solenoid    | Hysteresis           |     | Less than (Note 1) |     |      |     |                      |    |     |     |     |     |     |     |     |      |
|                             | Repeatability        |     | Less than (Note 3) |     |      |     |                      |    |     |     |     |     |     |     |     |      |
| Position control solenoid   | Hysteresis           |     | Less than (Note 2) |     |      |     |                      |    |     |     |     |     |     |     | —   |      |
|                             | Repeatability        |     | Less than (Note 3) |     |      |     |                      |    |     |     |     |     |     |     | —   |      |
| Pressure compensator        | Series type (Note 5) |     |                    |     |      |     | Bypass type (Note 4) |    |     |     |     |     |     |     |     |      |
| Weight kg                   | 10                   |     | 24                 |     | 50   |     | 10                   |    | 18  |     | 33  |     | 68  |     |     |      |

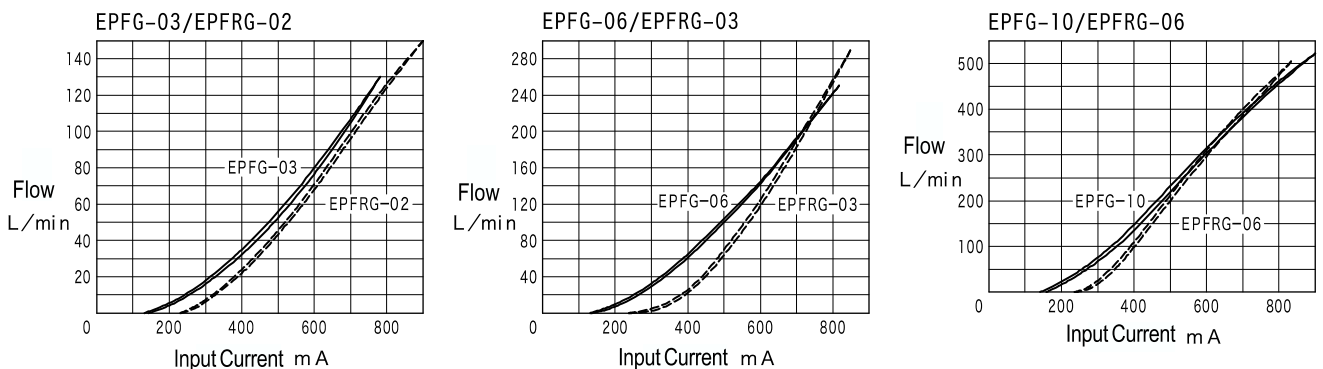
- Note 1: Values when using P-X-14 controller or similar.
- Note 2: Values when using P-Z-14 controller or similar.
- Note 3: Value of valve operating under same working conditions as special controller used.
- Note 4: Capacity of EPFRG-10 pressure compensator is 600 L/min. For flow control above 600 L/min. pressure compensator function will deteriorate if load pressure is below 2 MPa.
- Note 5: For good flow control, maintain valve pressure differential over 1 MPa for 03, over 1.5 MPa for 06, and over 2 MPa for 10 size.

## Performance Curve (at 20mm<sup>2</sup>/s)

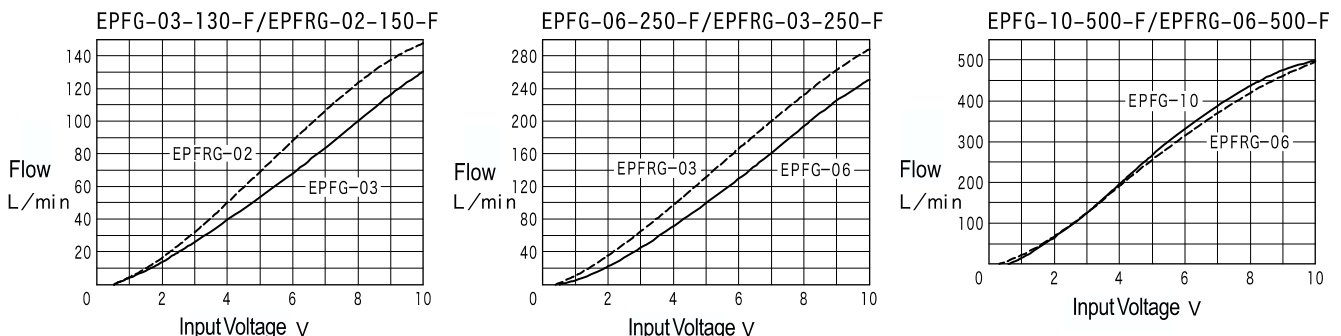
### Frequency Response Characteristics



### Input Current - Flow Characteristics (Example)

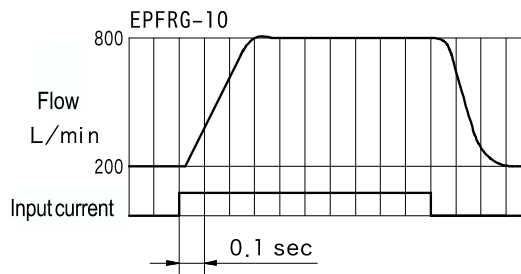
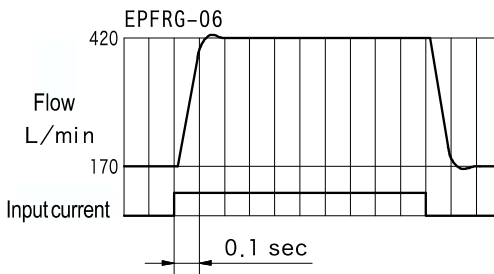
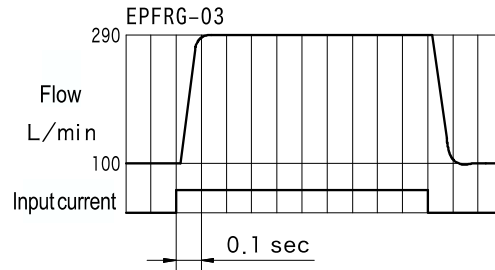
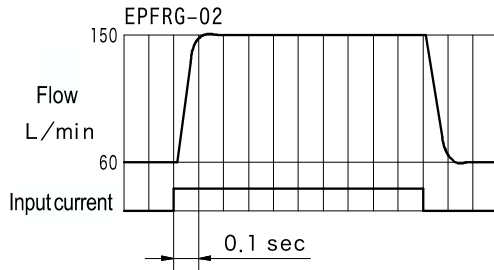


### Input Voltage - Flow Characteristics (Example)



## Performance Curve

Step Response Characteristics (Example)



## Notes on Use

- **Mounting direction**  
Valve can be mounting in any direction. However if valve is mounted on manifold block, if none of the 3 air bleed plugs do not face the ceiling, rotate the proportional solenoid 90° to orient an air bleed plug to the ceiling. Current-flow characteristics may vary slightly (1.5%) according to the mounting direction.
- **Air bleed**  
For stable pressure control, during the initial adjustment, loosening the air bleed plug and bleed air completely out of the valve prior to use.
- **Manual adjustment**  
In case of initial adjustment or during electrical failures, etc., when there is no input electrical current, the manual operation pin can be pushed for inching, etc., flow control.
- **Zero adjustment**  
This is adjusted at factory before shipment. Readjustment is not necessary.
- **Drain piping**  
Allowable back pressure is 0.2 MPa. T port piping should be returned directly to tank, and the end of the pipe should be below the lowest fluid level.

- **Valve and actuator piping**  
Care should be paid when the vent line piping is long as the large volume of fluid in the pipes may cause instability(resonation). Piping should be as short as possible.
- For optimum flow control, differential pressure should be below the values shown in the below table.

| Size | Diff. Pressure MPa |
|------|--------------------|
| 03   | 1                  |
| 06   | 1.5                |
| 10   | 2                  |

## Mounting Bolts (JIS B1176, Strength Class 12.9)

| Model    | Hex Socket Bolts |                 | Qty |
|----------|------------------|-----------------|-----|
|          | Metric           | Unified         |     |
| EPFG-03  | M10×60           | 3/8-16UNC×63.5  | 4   |
| EPFG-06  | M16×105          | 5/8-11UNC×101.6 | 4   |
| EPFG-10  | M20×145          | 3/4-10UNC×146.1 | 4   |
| EPFRG-02 | M10×70           | 3/8-16UNC×69.8  | 4   |
| EPFRG-03 | M12×110          | 1/2-13UNC×114.3 | 2   |
|          | M12×90           | 1/2-13UNC×95.2  | 2   |
| EPFRG-06 | M20×150          | —————           | 2   |
|          | M20×110          | —————           | 2   |
| EPFRG-10 | M20×190          | —————           | 2   |
|          | M20×130          | —————           | 2   |

- Mounting bolts must be ordered separately.

- Mounting bolt tightening torque.

EPFG-03, EPFRG-02 : 50~60 N·m

EPFRG-03 : 75~81 N·m

EPFG-06 : 90~110 N·m

EPFRG-06, EPF(R)G-10 : 230~290 N·m

## Subplate

| Model    | Subplate Model | Port Dia. Rc | Thread  |
|----------|----------------|--------------|---------|
| EPFG-03  | EPFGM-03Y-20   | 3/4          | Unified |
|          | EPFGM-03Z-20   | 1            |         |
| EPFG-06  | EPFGM-06X-20   | 1            |         |
|          | EPFGM-06Y-20   | 1-1/4        |         |
|          | EPFGM-06Z-20   | 1-1/2        |         |
| EPFG-10  | TFGTM-10X-10   | 1-1/2        |         |
|          | TFGTM-10Y-10   | 2            |         |
| EPFRG-02 | D-FRGM-02-10   | 3/4          | Metric  |
| EPFRG-03 | D-FRGM-03-10   | 1-1/4        |         |
| EPFRG-06 | D-FRGM-06-10   | 1-1/2        |         |

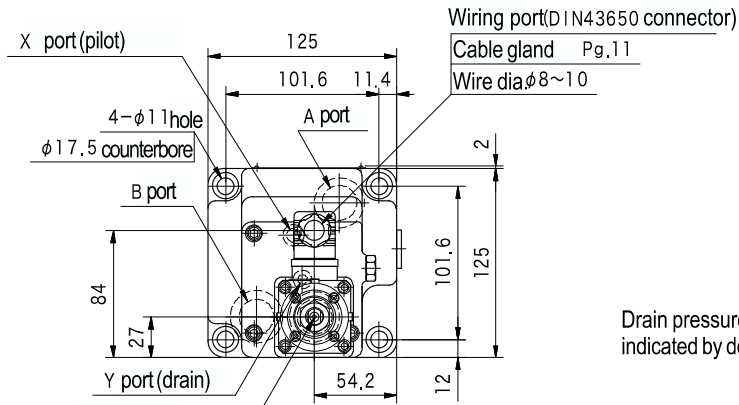
- Subplates must be ordered separately.

- Hex socket bolts for valve mounting are provided (see above table for thread types)

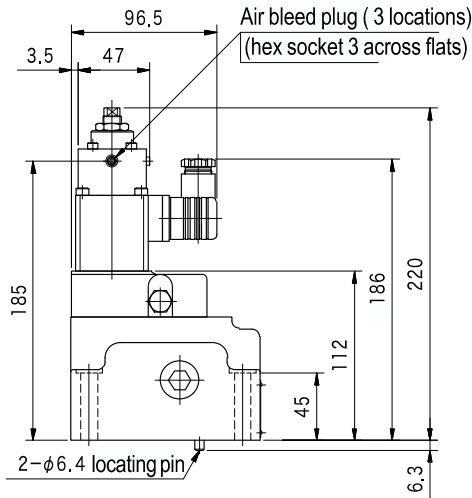
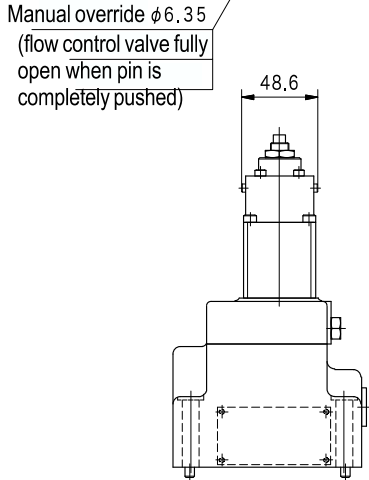
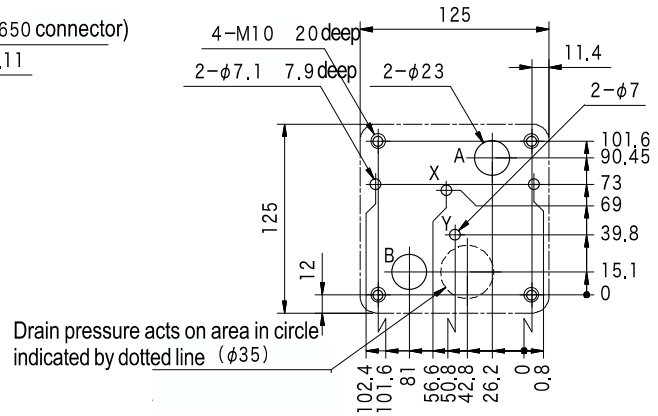
- See page Q9, Q10 for dimensions.

# Dimensions

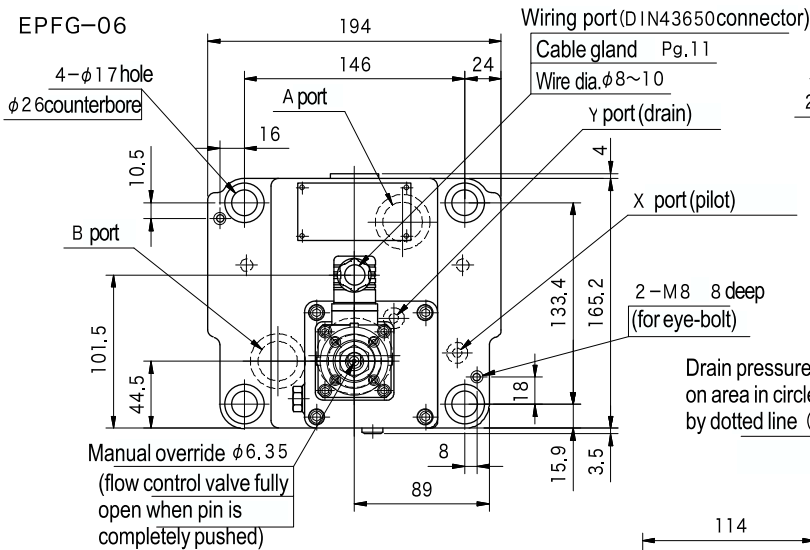
EPFG-03



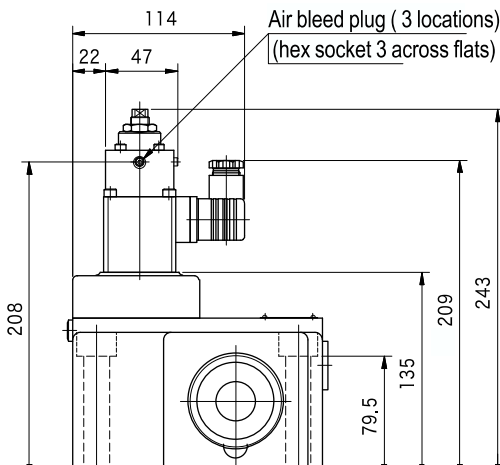
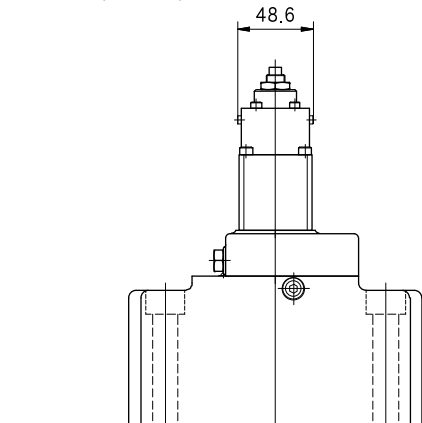
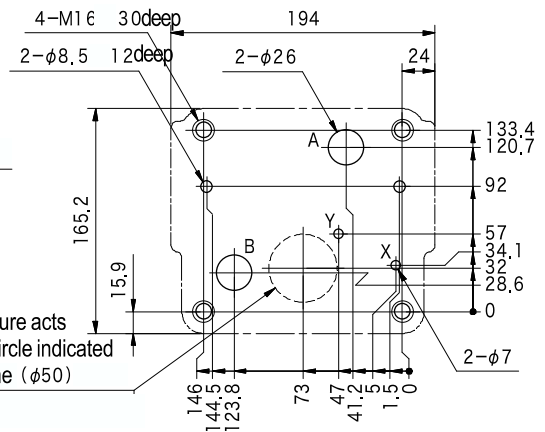
Mounting Dimensions



EPFG-06

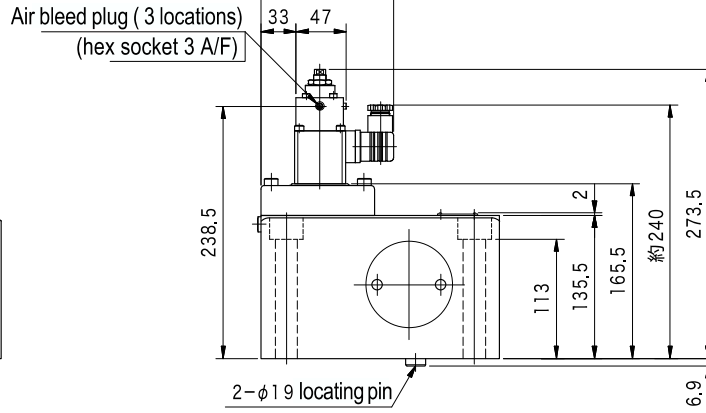
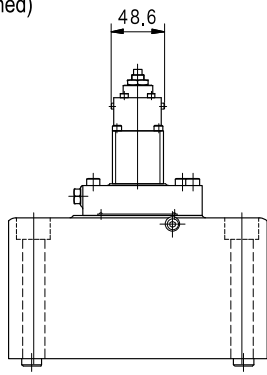
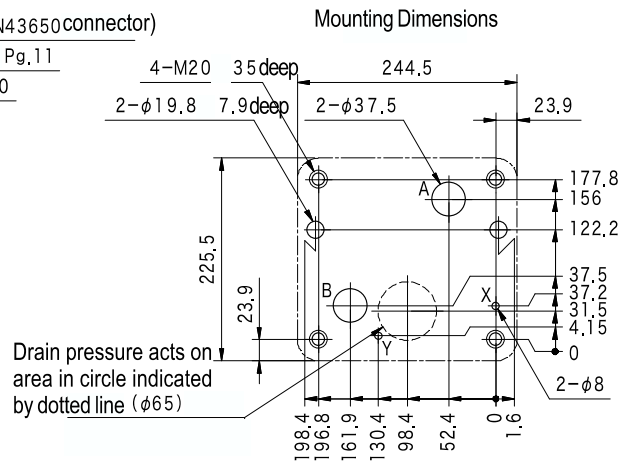
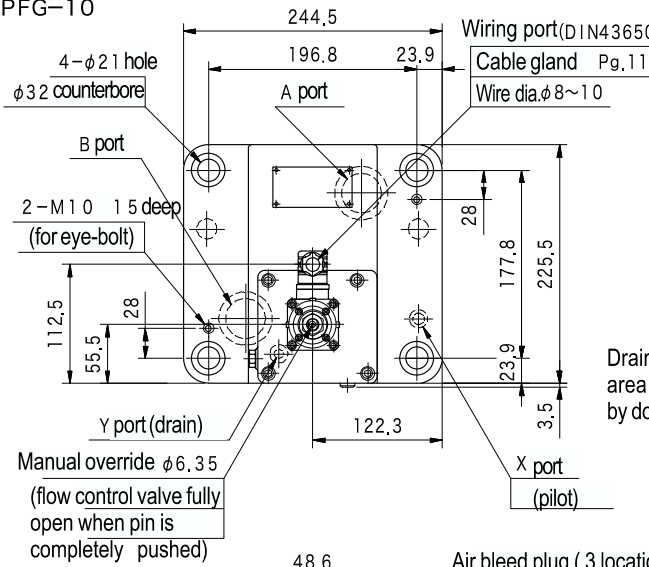


Mounting Dimensions

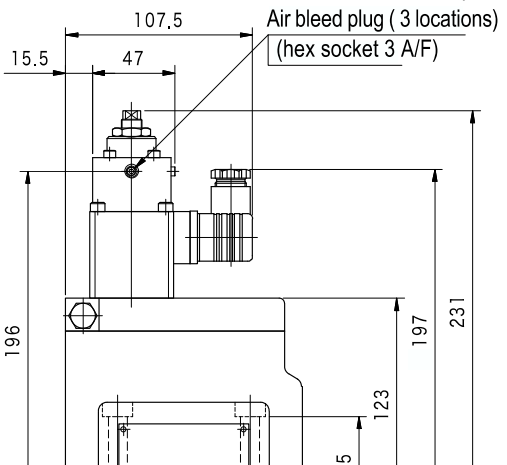
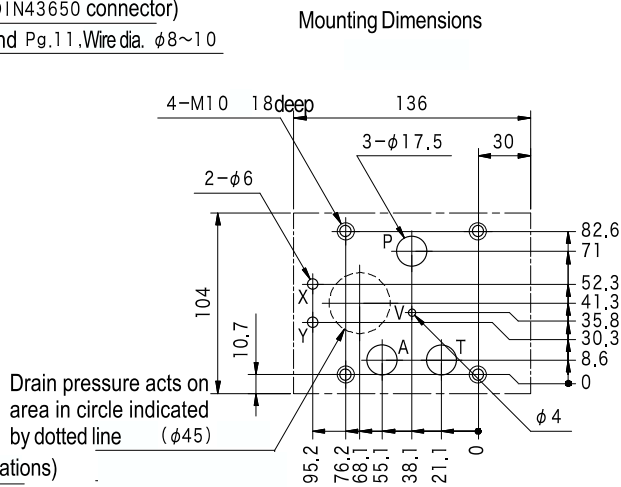
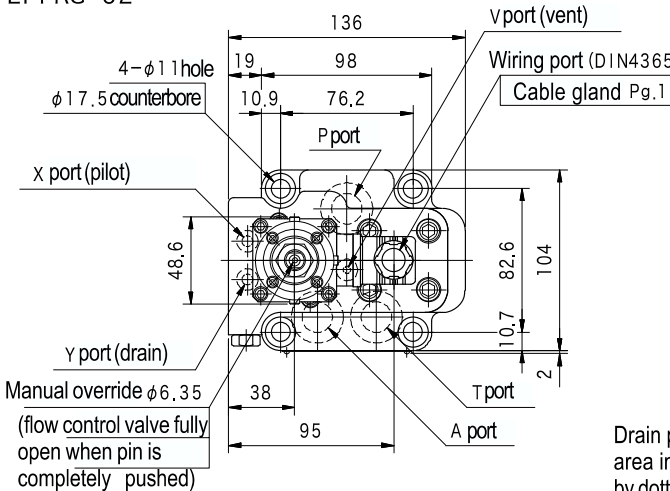


# Dimensions

EPFG-10

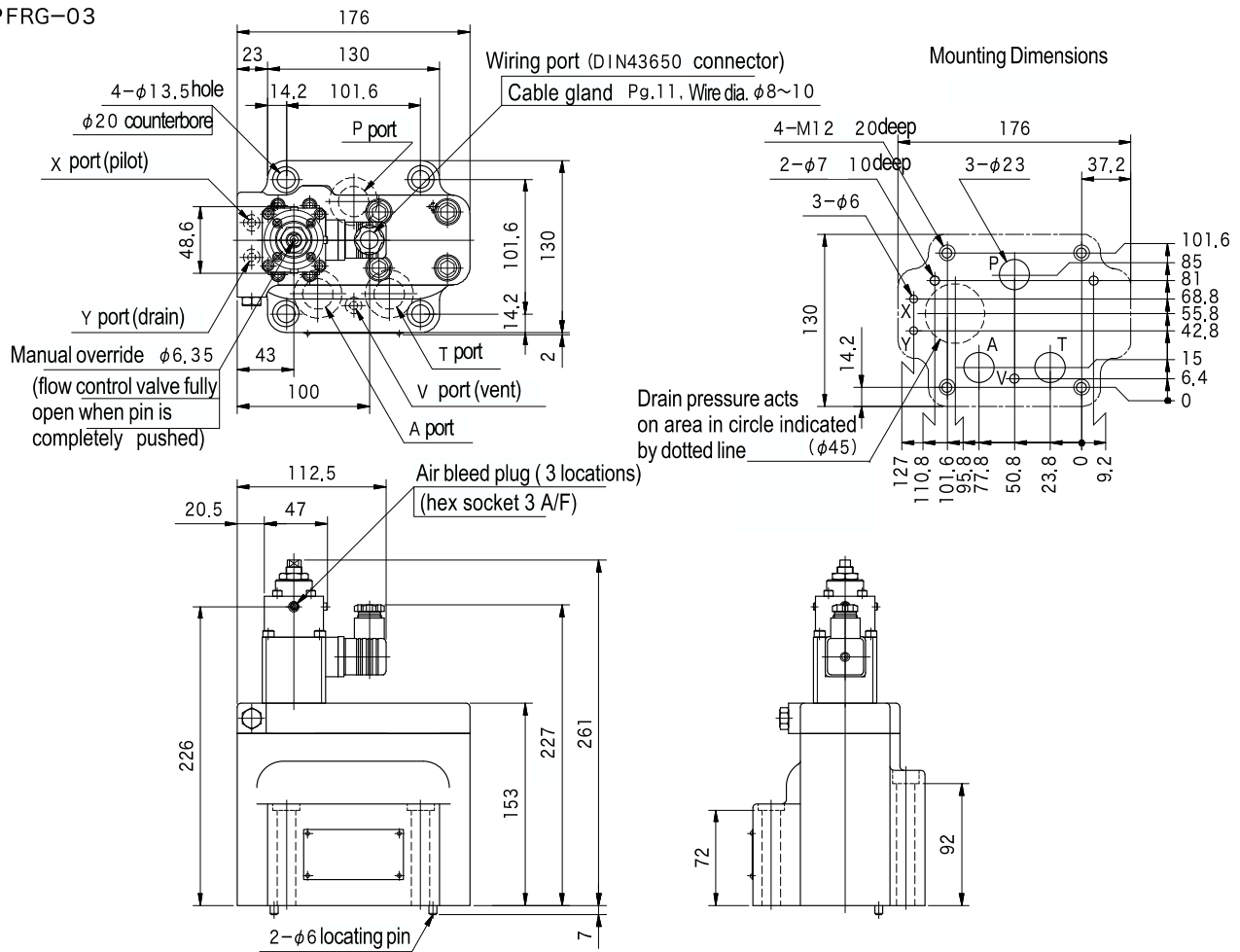


EPFRG-02

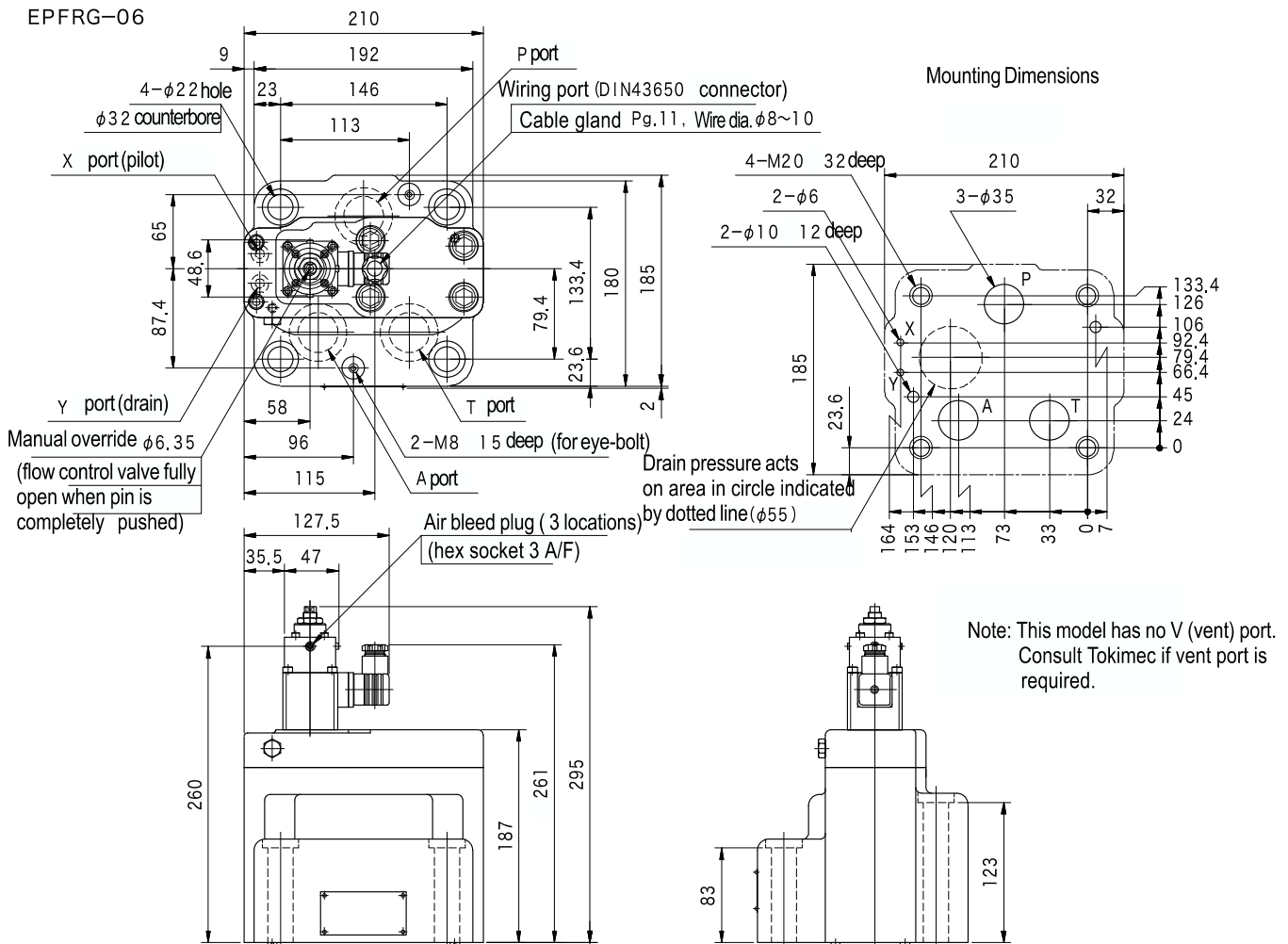


# Dimensions

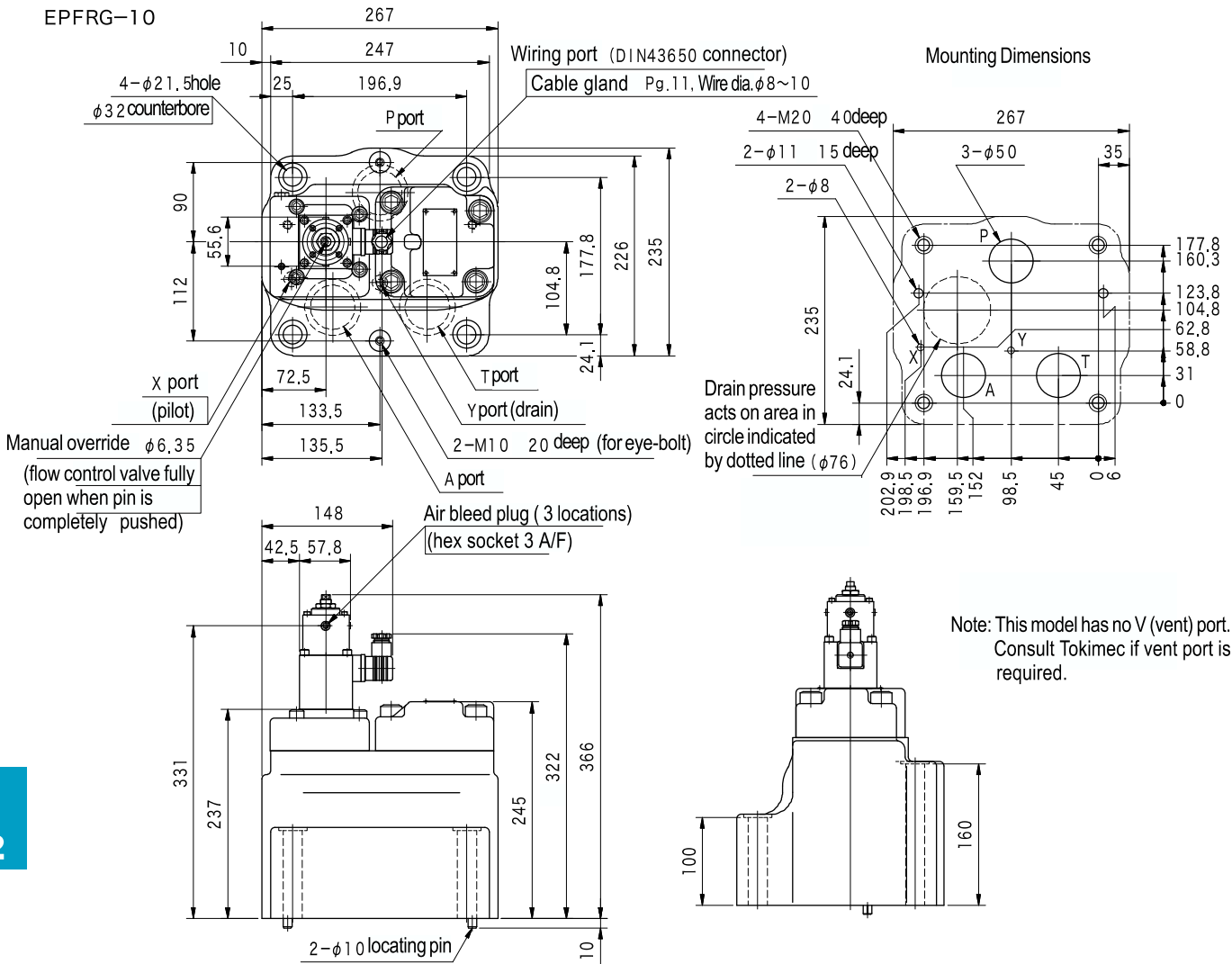
EPFRG-03



EPFRG-06

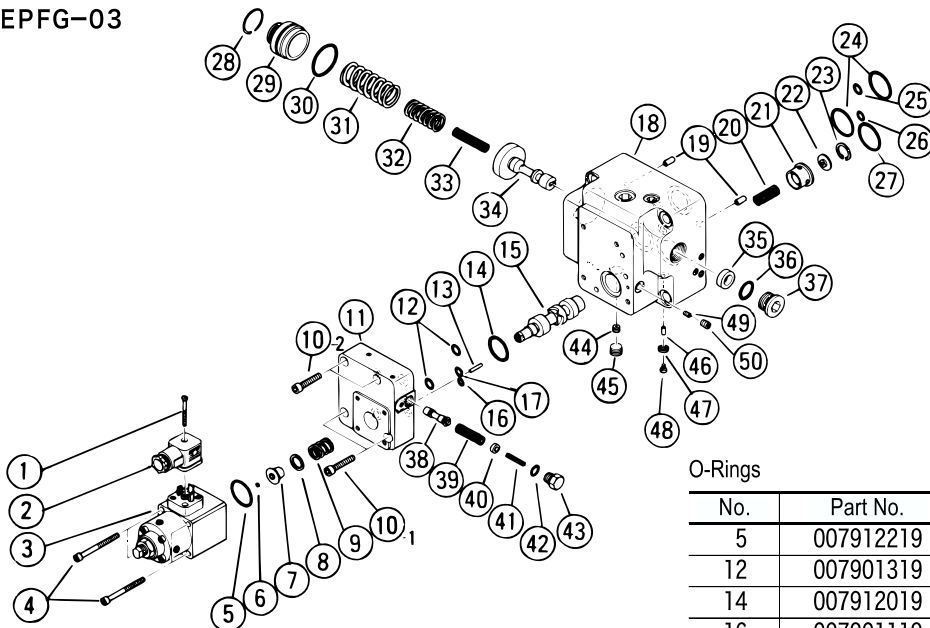


## Dimensions



## Construction

EPFG-03

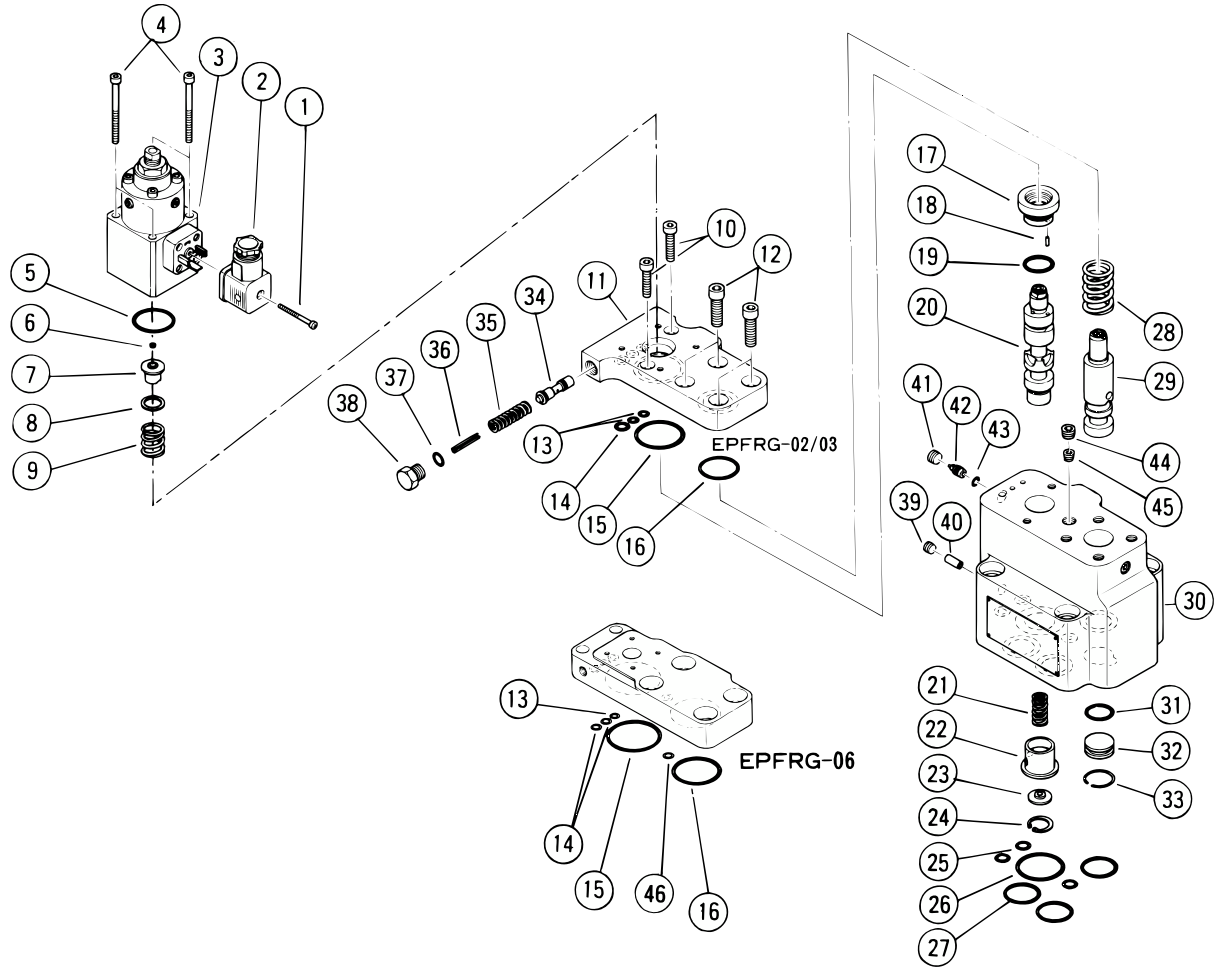


### O-Rings

| No. | Part No.  | Standard              | Qty |
|-----|-----------|-----------------------|-----|
| 5   | 007912219 | AS568-122 (NBR, Hs90) | 1   |
| 12  | 007901319 | AS568-013 (NBR, Hs90) | 2   |
| 14  | 007912019 | AS568-120 (NBR, Hs90) | 1   |
| 16  | 007901119 | AS568-011 (NBR, Hs90) | 2   |
| 17  | 007901219 | AS568-012 (NBR, Hs90) | 1   |
| 24  | 007921519 | AS568-215 (NBR, Hs90) | 2   |
| 25  | 007901319 | AS568-013 (NBR, Hs90) | 1   |
| 26  | 007901219 | AS568-012 (NBR, Hs90) | 1   |
| 27  | 007912319 | AS568-123 (NBR, Hs90) | 1   |
| 30  | 007902819 | AS568-028 (NBR, Hs90) | 1   |

# Construction

EPFRG-02/03/06



## O-Rings

### EPFRG-02

| No. | Part No.  | Standard              | Qty |
|-----|-----------|-----------------------|-----|
| 5   | 007912219 | AS568-122 (NBR, Hs90) | 1   |
| 13  | 007901019 | AS568-010 (NBR, Hs90) | 2   |
| 14  | 007901119 | AS568-011 (NBR, Hs90) | 1   |
| 15  | 007912519 | AS568-125 (NBR, Hs90) | 1   |
| 16  | 007912019 | AS568-120 (NBR, Hs90) | 1   |
| 19  | 007901819 | AS568-018 (NBR, Hs90) | 1   |
| 25  | 007901219 | AS568-012 (NBR, Hs90) | 3   |
| 26  | 007912319 | AS568-123 (NBR, Hs90) | 1   |
| 27  | 007921319 | AS568-213 (NBR, Hs90) | 3   |
| 31  | 007911519 | AS568-115 (NBR, Hs90) | 1   |
| 37  | 007901219 | AS568-012 (NBR, Hs90) | 1   |
| 43  | 007900719 | AS568-007 (NBR, Hs90) | 1   |

### EPFRG-03

| No. | Part No.  | Standard              | Qty |
|-----|-----------|-----------------------|-----|
| 5   | 007912219 | AS568-122 (NBR, Hs90) | 1   |
| 13  | 007901019 | AS568-010 (NBR, Hs90) | 2   |
| 14  | 007901119 | AS568-011 (NBR, Hs90) | 1   |
| 15  | 007913119 | AS568-131 (NBR, Hs90) | 1   |
| 16  | 007912719 | AS568-127 (NBR, Hs90) | 1   |
| 19  | 007912119 | AS568-121 (NBR, Hs90) | 1   |
| 25  | 007901219 | AS568-012 (NBR, Hs90) | 3   |
| 26  | 007912919 | AS568-129 (NBR, Hs90) | 1   |
| 27  | 007921719 | AS568-217 (NBR, Hs90) | 3   |
| 31  | 007912119 | AS568-121 (NBR, Hs90) | 1   |
| 37  | 007901219 | AS568-012 (NBR, Hs90) | 1   |
| 43  | 007900719 | AS568-007 (NBR, Hs90) | 1   |

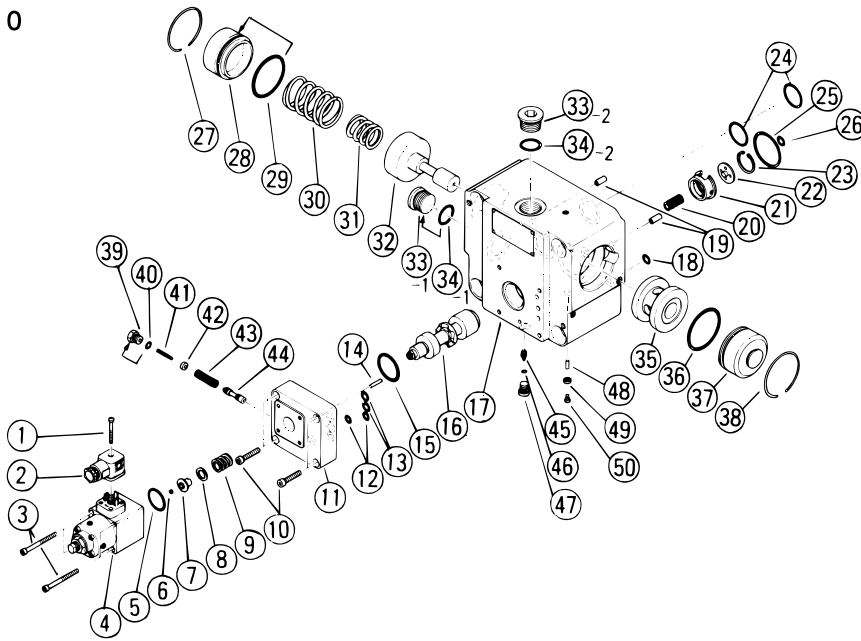
### EPFRG-06

| No. | Part No.  | Standard              | Qty |
|-----|-----------|-----------------------|-----|
| 5   | 007912219 | AS568-122 (NBR, Hs90) | 1   |
| 13  | 007901119 | AS568-011 (NBR, Hs90) | 1   |
| 14  | 007901219 | AS568-012 (NBR, Hs90) | 2   |
| 15  | 007913919 | AS568-139 (NBR, Hs90) | 1   |
| 16  | 007922819 | AS568-228 (NBR, Hs90) | 1   |
| 19  | 007912919 | AS568-129 (NBR, Hs90) | 1   |
| 25  | 007911119 | AS568-111 (NBR, Hs90) | 2   |
| 26  | 008050619 | JIS B 2401 1B-G50     | 1   |
| 27  | 007922419 | AS568-224 (NBR, Hs90) | 3   |
| 31  | 007912919 | AS568-129 (NBR, Hs90) | 1   |
| 37  | 007901219 | AS568-012 (NBR, Hs90) | 1   |



# Construction

EPFG-06/10



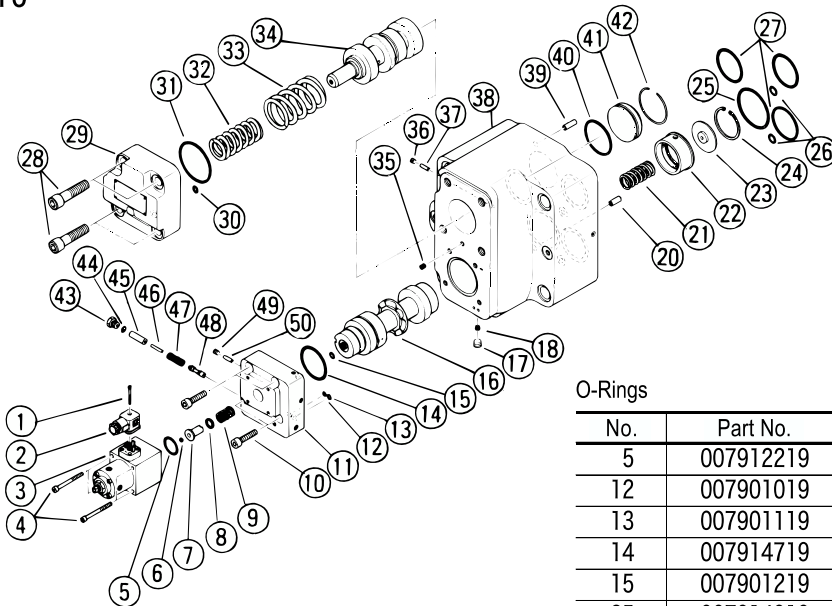
O-Rings  
EPFG-06

| No. | Part No.  | Standard              | Qty |
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| 5   | 007912219 | AS568-122 (NBR, Hs90) | 1   |
| 12  | 007901219 | AS568-012 (NBR, Hs90) | 2   |
| 13  | 007901319 | AS568-013 (NBR, Hs90) | 2   |
| 15  | 007912619 | AS568-126 (NBR, Hs90) | 1   |
| 18  | 007901319 | AS568-013 (NBR, Hs90) | 1   |
| 24  | 007921719 | AS568-217 (NBR, Hs90) | 2   |
| 25  | 007913319 | AS568-133 (NBR, Hs90) | 1   |
| 26  | 007901319 | AS568-013 (NBR, Hs90) | 1   |
| 29  | 007922619 | AS568-226 (NBR, Hs90) | 1   |
| 34  | 007991219 | AS568-912 (NBR, Hs90) | 2   |
| 36  | 007922719 | AS568-227 (NBR, Hs90) | 1   |
| 40  | 007901219 | AS568-012 (NBR, Hs90) | 1   |
| 46  | 007900717 | AS568-007 (NBR, Hs70) | 1   |

EPFG-10

| No. | Part No.  | Standard              | Qty |
|-----|-----------|-----------------------|-----|
| 5   | 007912219 | AS568-122 (NBR, Hs90) | 1   |
| 12  | 007901219 | AS568-012 (NBR, Hs90) | 2   |
| 13  | 007901319 | AS568-013 (NBR, Hs90) | 2   |
| 15  | 007913719 | AS568-137 (NBR, Hs90) | 1   |
| 18  | 007911219 | AS568-112 (NBR, Hs90) | 1   |
| 24  | 007922419 | AS568-224 (NBR, Hs90) | 2   |
| 25  | 007914119 | AS568-141 (NBR, Hs90) | 1   |
| 26  | 007911219 | AS568-112 (NBR, Hs90) | 1   |
| 29  | 007923219 | AS568-232 (NBR, Hs90) | 1   |
| 34  | 007921819 | AS568-218 (NBR, Hs90) | 2   |
| 36  | 007923419 | AS568-234 (NBR, Hs90) | 1   |
| 40  | 007901219 | AS568-012 (NBR, Hs90) | 1   |

EPFRG-10



O-Rings

| No. | Part No.  | Standard              | Qty |
|-----|-----------|-----------------------|-----|
| 5   | 007912219 | AS568-122 (NBR, Hs90) | 1   |
| 12  | 007901019 | AS568-010 (NBR, Hs90) | 1   |
| 13  | 007901119 | AS568-011 (NBR, Hs90) | 1   |
| 14  | 007914719 | AS568-147 (NBR, Hs90) | 1   |
| 15  | 007901219 | AS568-012 (NBR, Hs90) | 1   |
| 25  | 007914919 | AS568-149 (NBR, Hs90) | 1   |
| 26  | 007911219 | AS568-112 (NBR, Hs90) | 2   |
| 27  | 007922819 | AS568-228 (NBR, Hs90) | 3   |
| 30  | 007901319 | AS568-013 (NBR, Hs90) | 1   |
| 31  | 007923219 | AS568-232 (NBR, Hs90) | 1   |
| 40  | 007901219 | AS568-012 (NBR, Hs90) | 1   |