

Proportional Valves

EPR Series

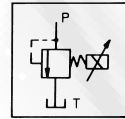
Electro-hydraulic Proportional Pilot Relief Valve (EPR)

This is a direct acting type relief valve based on a balance between the attraction force of a DC solenoid and a hydraulic force.

This valve can be utilized in a small

capacity hydraulic system or connected to the vent-port of a balance piston type pressure control valve to perform continuous control of the pressure in proportion to the input current.

Hydraulic symbol



Specifications

| Item | Model | EPR-G01-※-※※※※-※11 |
|--------------------------|---------------------------|--|
| Rated flow | ℓ/min (gpm) | 1.2 (0.3) |
| Pressure adjusting range | kgf/cm ² (psi) | B: 3 ~ 25 (43 ~ 357) 1: 7 ~ 70 (100 ~ 1000) 2: 10 ~ 140 (143 ~ 2000) 3: 15 ~ 210 (214 ~ 3000) 4: 15 ~ 280 (214 ~ 4000) |
| Rated current | mA | 800 |
| Coil resistance | Ω | 20 (20°C) (68°F) |
| Hysteresis | | 3% or less Note 1). |
| Weight | kgf (lbs) | 1.6 (3.5) |

Note 1). This is the hysteresis value when Nachi amplifier is provided for the valve. (With dither)

Model Code

EPR-G01-2-(※※※※S)-※11

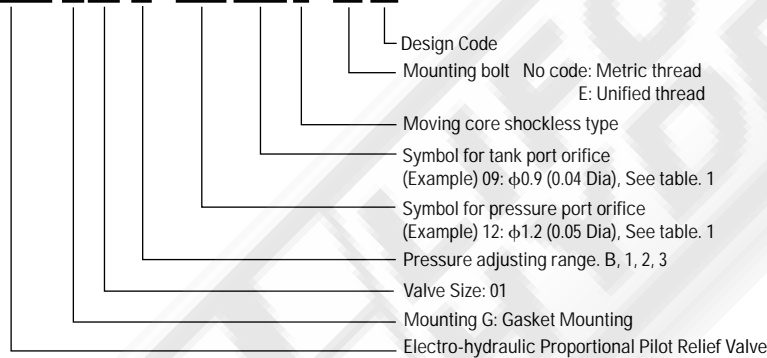


Table 1 Symbol of Pressure port and Tank port orifice

| Symbol | 00 | 08 | 09 | 10 | 11 | 12 | 13 |
|--------------|------|--------------|--------------|--------------|--------------|--------------|--------------|
| Orifice size | None | φ0.8 (0.031) | φ0.9 (0.035) | φ1.0 (0.039) | φ1.1 (0.043) | φ1.2 (0.047) | φ1.3 (0.051) |

Unit = mm (inch)

Note) Standard size is as below.

| Pressure range | Symbol of orifice |
|----------------|-------------------|
| B, 1 type | 0013S |
| 2, 3 type | 0012S |
| 4 type | 1212S |

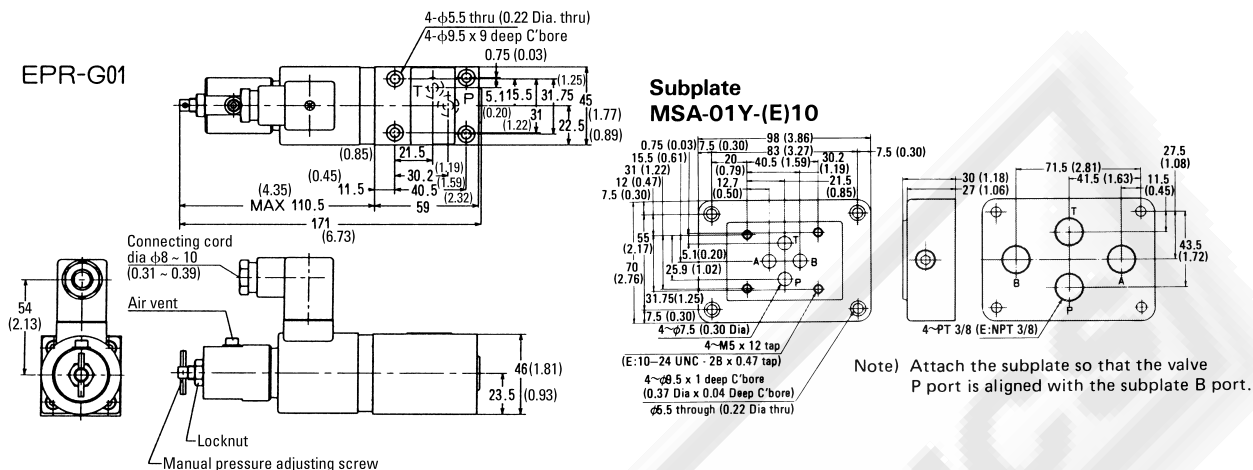
Handling

- Air Bleeding**
Loosen the air vent to bleed the air and fill the solenoid with oil at the start of operation to obtain good pressure control. The position of the air vent can be changed by turning the cover.
- Installation Method**
The minimum pressure will become approximately 2kgf/cm² (29 psi) higher when this valve is attached on a vertical plane.
- Manual Pressure Adjusting Screw**
When there is no input current supplied to the valve as in the case of initial adjustment or due to an electrical fault, the valve pressure can be controlled temporarily by turning the manual adjusting screw. In normal operation, this manual adjusting screw must be retracted completely and fixed with the lock nut.
- Minimum Relief Flow**
Since the setting pressure may become unstable in case of low flow rate, use this valve at a flow rate of 0.3 ℓ/min (0.08 gpm) or more.
- Load Capacity**
When the circuit pressure is to be controlled directly by this valve, the load capacity must be 40cc (2.4 in³) or more.
- Mounting bolts**
M5 x 45 / (E: 10-24 UNC-3Ax1 3/4")
- Subplate**
When a subplate is required, specify the following type in the purchase order. MSA-01Y-※10 (refer to dimensions in the figure below.)
- Oil temperature**
-20°C ~ 70°C (-4°F ~ 158°F)
- Oil viscosity**
12 ~ 400 cSt
15 ~ 60 cSt is recommended.

Proportional Valves

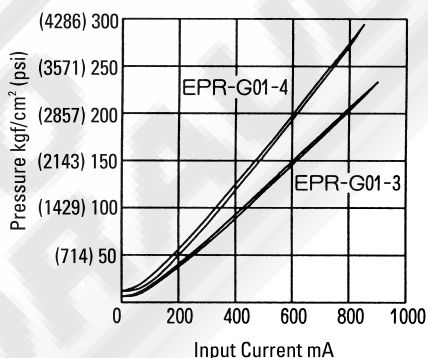
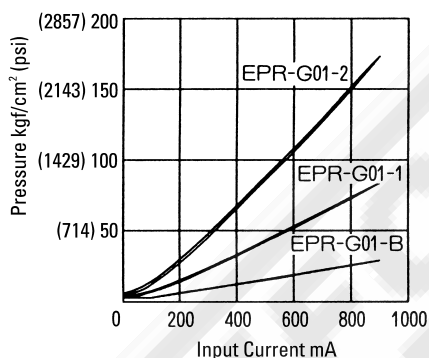
EPR Series

Installation Dimensions mm (inch)



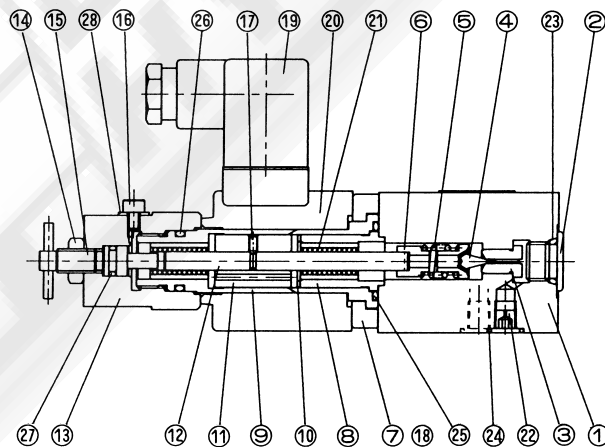
Performance Curve Oil viscosity = 32 cSt

Input Current—Pressure Characteristics



Cross Section Drawing

EPR-G01-※-※※※※-※11



| No. | Name of part |
|-----|--------------|
| 1 | Body |
| 2 | Plug |
| 3 | Seat |
| 4 | Poppet |
| 5 | Spring |
| 6 | Retainer |
| 7 | Cover |
| 8 | Stopper |
| 9 | Guide |
| 10 | Shim |
| 11 | Plunger |
| 12 | Rod |
| 13 | Cover |
| 14 | Nut |
| 15 | Screw |
| 16 | Screw |
| 17 | Screw |
| 18 | Screw |
| 19 | Connector |
| 20 | Coil |
| 21 | Ballbush |
| 22 | Orifice |
| 23 | O ring |
| 24 | O ring |
| 25 | O ring |
| 26 | O ring |
| 27 | O ring |
| 28 | Seal |

List of Seals

| No. | Name of part | Number of part | Qty |
|-----|--------------|----------------|-----|
| 23 | O ring | RO-P11-90 | 1 |
| 24 | O ring | RO-P9-90 | 2 |
| 25 | O ring | RO-P22-90 | 1 |
| 26 | O ring | RO-P16-90 | 1 |
| 27 | O ring | RO-P7-90 | 1 |
| 28 | Seal | DS-1-4 | 1 |

Coil = EA64-D2-1A

Proportional Valves

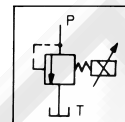
ER Series

Electro-hydraulic Proportional Relief Valve (ER)

This valve is a combination of the electro-hydraulic proportional pilot relief valve (EPR Series) and a balance piston type relief valve and is used to perform pressure control in proportion to the input current.

Since the control pressure is affected very little by changes of flow rate or oil temperature, even complicated pressure (power) control can be performed by an open loop system.

Hydraulic symbol



Specifications

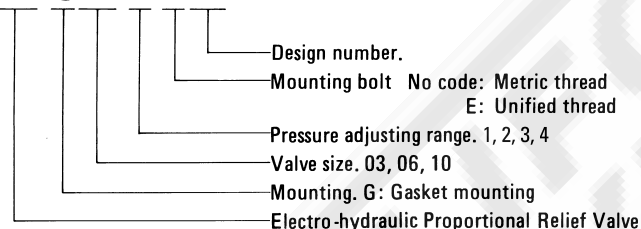
| Item | Model | ER-G03-※-※10 | ER-G06-※-※10 | ER-G10-※-※10 |
|--------------------------|---------------------------|---|--------------|--------------|
| Rated flow | /min (gpm) | 50 (13.2) | 170 (44.9) | 380 (100.4) |
| Pressure adjusting range | kgf/cm ² (psi) | B: 3 ~ 25 (43 ~ 357) Note 1). 1: 7 ~ 70 (100 ~ 1000) 2: 10 ~ 140 (143 ~ 2000) 3: 15 ~ 210 (214 ~ 3000) 4: 15 ~ 250 (214 ~ 3571) | | |
| Rated current | mA | 800 | | |
| Coil resistance | Ω | 20 (20°C) (68°F) | | |
| Hysteresis | | 3% or less Note 2). | | |
| Minimum relief flow | /min (gpm) | 8 (2.1) | 10 (2.6) | 20 (5.3) |
| Weight | kgf (lbs) | 5 (11) | 6.5 (14) | 10.1 (22) |

Note 1). The G03 model only available. But the flow is restricted to 20 l/min (5.3 gpm).

2). This is the hysteresis value when Nachi amplifier is provided for the valve. (With dither)

Model Code

ER-G03-3-※10



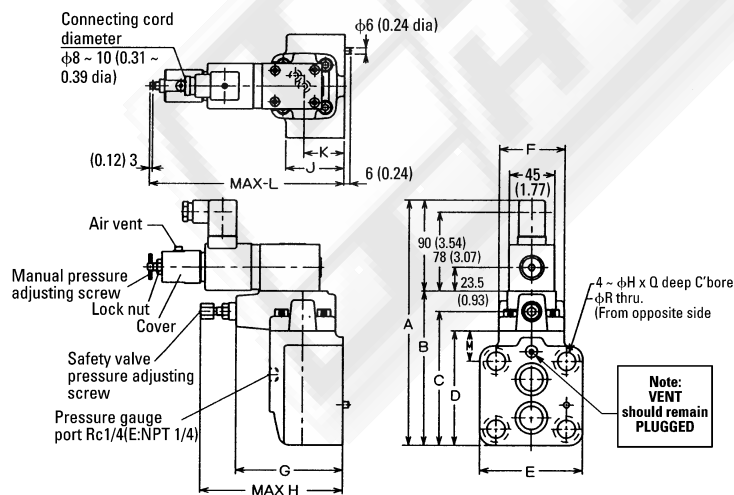
Handling

- Air Bleeding**
Loosen the air vent to bleed the air thoroughly and fill oil in the solenoid at the start of operation to obtain good pressure control.
- Manual Pressure Adjusting Screw**
When there is no input current supplied to the valve as in the case of initial adjustment or due to an electrical fault, the valve pressure can be controlled temporarily by turning the manual adjusting screw. In normal operation, this manual adjust screw must be retracted completely and fixed with the locknut.
- Tank Port Back-Pressure**
Use the valve with a tank port back-pressure which is as low as possible. 2 kgf/cm² (29 psi) or less is recommended.
- Setting Pressure of Safety Valve**
The safety valve is set for a pressure that is 15~20 kgf/cm² (214~286 psi) above the maximum adjusting pressure. Adjust this safety valve setting in accordance with the pressure to be actually used.
- Mounting bolts**

| Model | Bolt Size | Quantity |
|--------|--------------------------------------|----------|
| ER-G03 | M10 x 75/ (E: 3/8-16 UNCx3") | 4 |
| ER-G06 | M16 x 80/ (E: 5/8-11 UNCx3 1/8") | 4 |
| ER-G10 | M20 x 105/ (E: 3/4-10 UNCx4 1/8") | 4 |

- Oil temperature
-20°C ~ 70°C (-4°F ~ 158°F)
- Oil viscosity
12 ~ 400 cSt
15 ~ 60 cSt is recommended.

Installation Dimensions mm (inch)

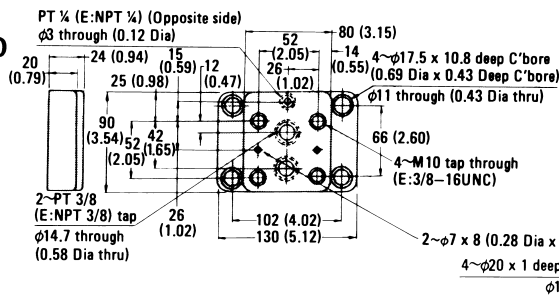


| | A | B | C | D | E | F | G | H | J | K | L | M | N | Q | R |
|--------|-----------------|-----------------|-----------------|-----------------|---------------|--------------|----------------|-----------------|--------------|----------------|---------------|----------------|----------------|----------------|--------------|
| ER-G03 | 242 (9.53) | 152 (5.98) | 112 (4.41) | 89 (3.54) | 79 (3.15) | 68 (2.68) | 98.5 (3.88) | 140.5 (5.33) | 70 (2.76) | 37.5 (1.48) | 195 (7.68) | 25 (0.98) | 17.5 (0.69) | 10.8 (0.43) | 11 (0.43) |
| ER-G06 | 241.5 (9.51) | 151.5 (5.96) | 131.5 (5.18) | 112.5 (4.23) | 102 (4.02) | 65 (2.56) | 106 (4.17) | 141 (5.55) | 58 (2.28) | 40 (1.57) | 193 (7.60) | 29.7 (1.17) | 25 (1.02) | 1 (0.04) | 18 (0.71) |
| ER-G10 | 252.5 (9.94) | 162.5 (6.40) | 143 (5.63) | 120.5 (4.74) | 127 (5.00) | 86 (3.39) | 113 (4.48) | 148 (5.83) | 80 (3.15) | 50 (0.97) | 194 (7.64) | 36.1 (1.42) | 32 (1.26) | 1 (0.04) | 22 (0.87) |

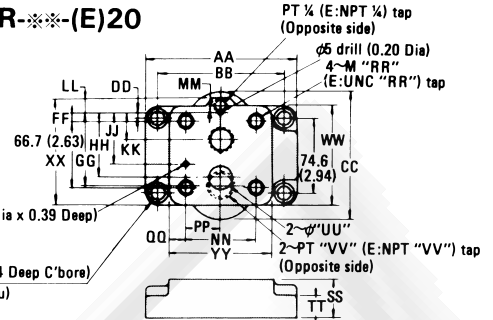
Proportional Valves

ER Series

Subplate MR-03-(E)10



MR-**-*(E)20

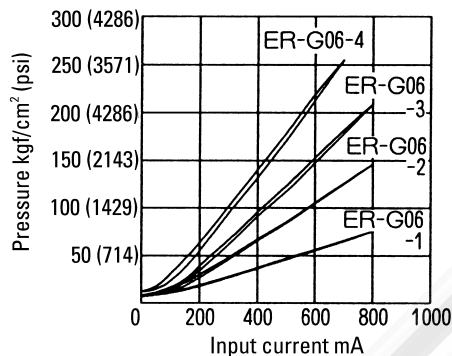


| Model | AA | BB | CC | DD | FF | GG | HH | JJ | KK | LL | M | MM | NN | PP | QQ | RR | SS | TT | UU | VV | W | WW | XX | YY |
|--------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|-------|--------|--------|--------|--------|
| MR-06-(E)20 | 150 | 127 | 125 | 1.6 | 9.5 | 72 | 65 | 52.4 | 27 | 14.2 | 5 | 5 | 69.9 | 34.9 | 16.1 | 16 | 38 | 22 | 22 | 3/4 | 103 | 98.5 | 106.5 | 102 |
| MR-06X-(E)20 | (5.91) | (5.00) | (0.49) | (0.06) | (0.37) | (2.83) | (2.60) | (2.06) | (1.06) | (0.60) | (0.20) | (0.20) | (2.75) | (1.37) | (0.63) | (0.63) | (1.50) | (0.87) | (0.87) | 1 | (4.06) | (3.88) | (4.19) | (4.02) |
| MR-10-(E)20 | 175 | 152.4 | 150 | 9.5 | 15.9 | 87.2 | 74.6 | 66.7 | 30.2 | 9.7 | 10 | 10 | 92.1 | 46.1 | 17.5 | 20 | 55 | 22 | 28.5 | 1 1/4 | 102.5 | 102.5 | 110 | 127 |
| MR-10X-(E)20 | (6.89) | (6.00) | (5.91) | (0.37) | (0.63) | (3.43) | (2.94) | (2.63) | (1.19) | (0.38) | (0.39) | (0.39) | (3.63) | (1.81) | (0.69) | (0.79) | (2.17) | (0.87) | (1.12) | 1 1/2 | (4.04) | (4.04) | (4.33) | (5.00) |

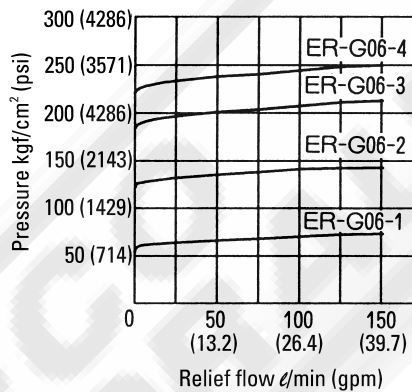
Performance Curve

Oil viscosity = 32 cSt

Input Current—Pressure characteristics

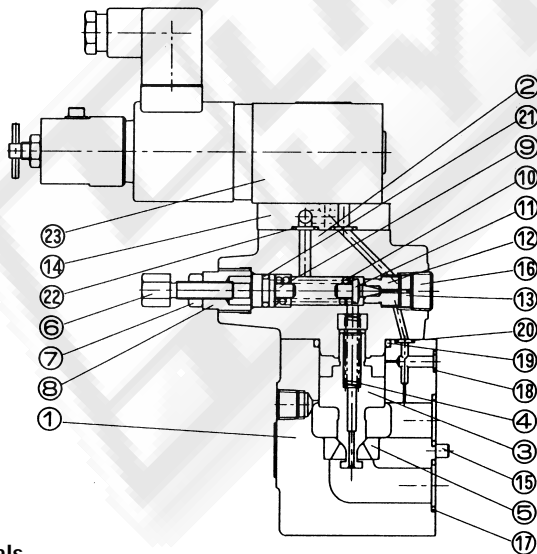


Pressure Override Characteristics



Cross Section Drawing

ER-G**-*(E)10

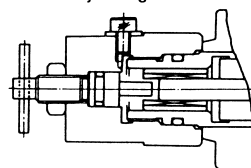


Combination with EPR valve

| Model | EPR valve model |
|-------------|--------------------|
| ER-G03-B-10 | EPR-G01-B-0011S-11 |
| ER-G03-1-10 | 1-0011S-11 |
| ER-G03-2-10 | 2-0009S-11 |
| ER-G03-3-10 | 3-0009S-11 |
| ER-G03-4-10 | 4-1212S-11 |
| ER-G06-1-10 | EPR-G01-1-0010S-11 |
| ER-G06-2-10 | 2-0010S-11 |
| ER-G06-3-10 | 3-0009S-11 |
| ER-G06-4-10 | 4-1212S-11 |
| ER-G10-1-10 | EPR-G01-1-0000-11 |
| ER-G10-2-10 | 2-0000-11 |
| ER-G10-3-10 | 3-0000-11 |
| ER-G10-4-10 | 4-1212S-11 |

| No. | Name of part |
|-----|--------------------|
| 1 | Body |
| 2 | Cover |
| 3 | Piston |
| 4 | Spring |
| 5 | Seat |
| 6 | Screw |
| 7 | Nut |
| 8 | Retainer |
| 9 | Guide |
| 10 | Spring |
| 11 | Poppet |
| 12 | Seat |
| 13 | Collar |
| 14 | Plate |
| 15 | Pin |
| 16 | Plug |
| 17 | O ring |
| 18 | O ring |
| 19 | O ring |
| 20 | O ring |
| 21 | O ring |
| 22 | O ring |
| 23 | Pilot relief valve |

Manual pressure adjusting section



List of Seals

| No. | Name of part | Model / Number of part | | | Qty |
|-----|--------------|------------------------|------------------|------------------|-----|
| | | ER-G03-**-*(E)10 | ER-G06-**-*(E)10 | ER-G10-**-*(E)10 | |
| 17 | O ring | RO-P20-90 | RO-P26-90 | RO-P35-90 | 2 |
| 18 | O ring | RO-P7-90 | RO-P9-90 | RO-P9-90 | 1 |
| 19 | O ring | RO-G30-90 | RO-G30-90 | RO-G40-90 | 1 |
| 20 | O ring | RO-P6-90 | RO-P6-90 | RO-P7-90 | 1 |
| 21 | O ring | RO-P11-90 | RO-P11-90 | RO-P11-90 | 1 |
| 22 | O ring | RO-P9-90 | — | — | 2 |

Coil = EA64-D2-1A