# CIRCLE SEAL CONTROLS

Available in low, medium, high and extra high pressure models, R6000 right angle relief valves provide users with high accuracy and consistency of cracking and reseat pressures. Furthermore, narrow pressure ranges (cracking pressures) for each model can be factory pre-set according to customer specifications. PED certification and CE marking are standard for all models. All R6000 relief valves are offered with multiple end connections to ensure application versatility.

## Typical Applications

- Beverage dispensing equipment
- Gas pilot plants
- Petrochemical test labs
- Offshore oil platform heating lines
- Pharmaceutical sterilization and packaging systems

## Features & Benefits

### Low Pressure (5 – 550 psig)*

***Zero friction poppets***

- Increases accuracy of cracking pressure and reseat pressure.
- Improves consistency of cracking pressure and reseat pressure.

***Encapsulated Seat Seal***

- Maintains small contact surface area.
- Protects seat from erosion due to flow.

Raised seal lip on poppet minimizes contact with seat, eliminating friction and preventing overstressing of the O-ring

6 pressure spring ranges improve accuracy

Caps and bonnets are pre-drilled for lockwire

Multiple end connections available

### High Pressure (150–6000 psig)

***3 models available:***

- Medium (150–2500 psig)—6 spring ranges improve accuracy
- High (150–5000 psig)—7 spring ranges improve accuracy
- Extra High (5000–6000 psig)—one spring

Delta stem seal design prevents friction which increases accuracy of cracking pressure and reseat pressure.

Balanced poppet design allows cracking pressure to stay the same regardless of backup pressure.

Orifice sizes: 0.082", 0.094", 0.188"

Multiple end connections available.

Optional manual override handle

** Back pressure affects cracking pressure on low pressure version*

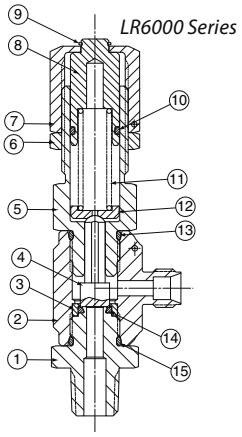
**Circle Seal Controls**
2301 Wardlow Circle • Corona, CA 92880
Phone (951) 270-6200 • Fax (951) 270-6201
www.circlesealcontrols.com

*relief valves*

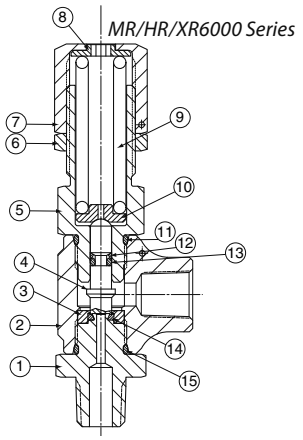
# R6000 Series

## Materials of Construction

| | LR |
|---|---|
| 1 | End |
| 2 | Body |
| 3 | Shroud ring |
| 4 | Poppet |
| 5 | Bonnet |
| 6 | Jam nut |
| 7 | Cap |
| 8 | Spring holder |
| 9 | Retaining ring |
| 10 | O-ring |
| 11 | Spring |
| 12 | Spring equalizer |
| 13 | O-ring |
| 14 | Seat O-ring |
| 15 | O-ring |



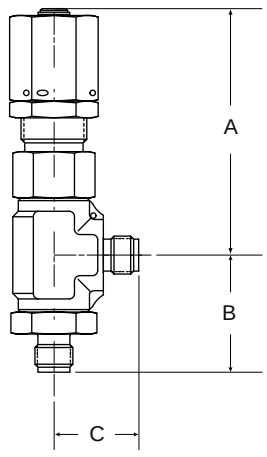

| | MR/HR/XR |
|---|---|
| 1 | End |
| 2 | Body |
| 3 | Shroud ring |
| 4 | Poppet |
| 5 | Bonnet |
| 6 | Jam nut |
| 7 | Cap |
| 8 | Spring holder |
| 9 | Spring |
| 10 | Spring equalizer |
| 11 | O-ring |
| 12 | Delta ring |
| 13 | O-ring |
| 14 | Seat O-ring |
| 15 | O-ring |

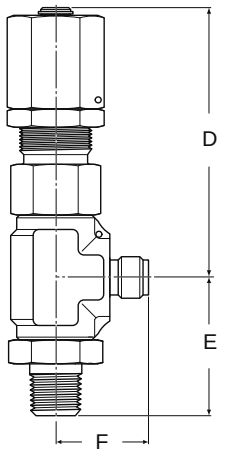


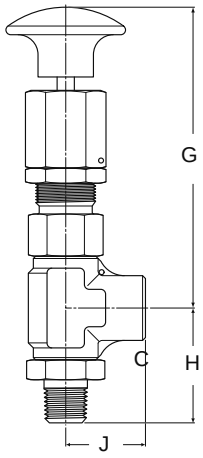

| | Specifications |
|---|---|
| BODY CONSTRUCTION | 316 stainless steel |
| SPRING MATERIAL | 17-7PH CRES |
| SEAL MATERIAL | Neoprene • Viton® • Buna N • EPR • Kalrez® • Silicone (not available for the XR Series) |
| CONNECTION SIZES | ¼˝ |
| ORIFICE SIZE | LR6000, MR6000: 0.188˝<br>HR6000: 0.094″<br>XR6000: 0.082″ |

## Dimensions

| | ¼″ Gyrolok x ¼″ Gyrolok | | | ¼″ Male NPT x ¼″ Gyrolok | | | ¼″ Male NPT x ¼″ Female NPT | | |
|---|---|---|---|---|---|---|---|---|---|
| Model No. | A | B | C | D | E | F | G | H | J |
| LR | 3.10″ max | 1.34″ | 0.97″ | 3.10″ max | 1.44″ | 0.97″ | n/a | 1.44″ | 1.00″ |
| | (7.87cm) | (3.40cm) | (2.39cm) | (7.87cm) | (3.66cm) | (2.39cm) | | (3.66cm) | (2.54cm) |
| MR | 2.94″ max. | 1.34″ | 0.97″ | 2.94″ max. | 1.44″ | 0.97″ | 2.94″ max. | 1.44″ | 1.00″ |
| | (7.47cm) | (3.40cm) | (2.39cm) | (7.47cm) | (3.66cm) | (2.39cm) | (7.47cm) | (3.66cm) | (2.54cm) |
| HR | 2.94″ max. | 1.34″ | 0.97″ | 2.94″ max. | 1.44″ | 0.97″ | 2.94″ max. | 1.44″ | 1.00″ |
| | (7.47cm) | (3.40cm) | (2.39cm) | (7.47cm) | (3.66cm) | (2.39cm) | (7.47cm) | (3.66cm) | (2.54cm) |
| XR | 2.94″ max. | 1.34″ | 0.97″ | 2.94″ max. | 1.44″ | 0.97″ | n/a | 1.44″ | 1.00″ |
| | (7.47cm) | (3.40cm) | (2.39cm) | (7.47cm) | (3.66cm) | (2.39cm) | | (3.66cm) | (2.54cm) |



# R6000 Series

## Operating Pressures

| Pressures | LR6000 | MR6000 | HR6000 | XR6000 |
|---|---|---|---|---|
| Cracking Pressure | 5–550 psig (0–38 bar) | 150–2500 psig (10–172 bar) | 150–5000 psig (10–345 bar) | 5000–6000 psig (345–414 bar) |
| Maximum Operating Pressure | 5–700 psig (0–48 bar) | 150–6000 psig (10–414 bar) | 150–7000 psig (10–482 bar) | 5000–7000 psig (345–482 bar) |
| Proof | 1050 psig (72 bar) | 9000 psig (620 bar) | 9000 psig (620 bar) | 9000 psig (620 bar) |
| Burst | Over 2800 psig (193 bar) | Over 24,000 psig (1652 bar) | Over 24,000 psig (1652 bar) | Over 24,000 psig (1652 bar) |
| Reseat Pressure | 85% min. of CP > 10 psig<br>70% of CP < 10 psig | 85% min. of CP | 85% min. of CP | 85% min. of CP |

## Cv Ratings

| Cracking Pressure | $C_v$ LR6000 0.188″ | | $C_v$ MR6000 0.188″ | | $C_v$ HR6000 0.094″ | | $C_v$ XR6000 0.082″ | |
|---|---|---|---|---|---|---|---|---|
| PSIG | Air | Water | Air | Water | Air | Water | Air | Water |
| 5 | 0.63 | 0.47 | — | — | — | — | — | — |
| 25 | 0.63 | 0.47 | — | — | — | — | — | — |
| 26 | 0.64 | 0.43 | — | — | — | — | — | — |
| 80 | 0.64 | 0.43 | — | — | — | — | — | — |
| 81 | 0.4 | 0.31 | — | — | — | — | — | — |
| 150 | 0.4 | 0.31 | — | — | — | — | — | — |
| 151 | 0.42 | 0.26 | 0.79 | 0.59 | 0.25 | 0.16 | — | — |
| 250 | 0.42 | 0.26 | 0.79 | 0.59 | 0.25 | 0.16 | — | — |
| 251 | 0.3 | 0.19 | 0.79 | 0.59 | 0.25 | 0.16 | — | — |
| 350 | 0.3 | 0.19 | 0.79 | 0.59 | 0.25 | 0.16 | — | — |
| 351 | 0.35 | 0.18 | 0.61 | 0.59 | 0.27 | 0.16 | — | — |
| 550 | 0.35 | 0.18 | 0.61 | 0.59 | 0.27 | 0.16 | — | — |
| 650 | — | — | 0.61 | 0.59 | 0.27 | 0.16 | — | — |
| 651 | — | — | 0.38 | 0.29 | 0.27 | 0.16 | — | — |
| 700 | — | — | 0.38 | 0.29 | 0.27 | 0.16 | — | — |
| 701 | — | — | 0.38 | 0.29 | 0.2 | 0.16 | — | — |
| 1001 | — | — | 0.37 | 0.20 | 0.2 | 0.14 | — | — |
| 1300 | — | — | 0.37 | 0.20 | 0.2 | 0.14 | — | — |
| 1301 | — | — | 0.37 | 0.20 | 0.21 | 0.14 | — | — |
| 1500 | — | — | 0.37 | 0.20 | 0.21 | 0.13 | — | — |
| 1501 | — | — | 0.28 | 0.14 | 0.21 | 0.13 | — | — |
| 2000 | — | — | 0.28 | 0.14 | 0.21 | 0.13 | — | — |
| 2001 | — | — | 0.24 | 0.10 | 0.19 | 0.13 | — | — |
| 2500 | — | — | 0.24 | 0.10 | 0.19 | 0.13 | — | — |
| 3000 | — | — | — | — | 0.19 | 0.13 | — | — |
| 3001 | — | — | — | — | 0.15 | 0.07 | — | — |
| 4000 | — | — | — | — | 0.15 | 0.07 | — | — |
| 5000 | — | — | — | — | — | — | 0.15 | 0.009 |
| 6000 | — | — | — | — | — | — | 0.12 | 0.006 |

# R6000 Series

## *Pressure/Temperature Ratings*

### Low Pressure

| Valve No. | Seal Material | Temperature °F (°C) | Pressure Range psig (bar) |
|---|---|---|---|
| LR6033 | Neoprene | -40° to +300° (-40° to +149°) | Up to 25 (Up to 1.7)<br>26–350 (1.8–24.1)<br>351–550 (24.2–37.9) |
| LR6032 | Viton® | -20° to +400° (-29° to +204°) | Up to 25 (Up to 1.7)<br>26–350 (1.8–24.1)<br>351–550 (24.2–37.9) |
| LR6077 | Buna-N | -65° to +275° (-54° to +135°) | Up to 25 (Up to 1.7)<br>26–350 (1.8–24.1)<br>351–550 (24.2–37.9) |
| LR6062 | Ethylene Propylene | -65° to +300° (-54° to +149°) | Up to 25 (Up to 1.7)<br>26–350 (1.8–24.1)<br>351–550 (24.2–37.9) |
| LR6065 | Kalrez® | -40° to +550° (-40° to +288°) | Up to 25 (Up to 1.7)<br>26–350 (1.8–24.1)<br>351–550 (24.2–37.9) |
| LR6024 | Silicone | -70° to +450° (-57° to +232°) | Up to 25 (Up to 1.7)<br>26–350 (1.8–24.1)<br>351–550 (24.2–37.9) |

### Medium Pressure

| Valve No. | Seal Material | Temperature °F (°C) | Pressure Range psig (bar) |
|---|---|---|---|
| MR6033 | Neoprene | -40° to +300° (-40° to +149°) | 150–350 (10.3–24.1)<br>351–2500 (24.2–172.4) |
| MR6032 | Viton® | -20° to +400° (-29° to +204°) | 150–350 (10.3–24.1)<br>351–2500 (24.2–172.4) |
| MR6077 | Buna-N | -65° to +275° (-54° to +135°) | 150–350 (10.3–24.1)<br>351–2500 (24.2–172.4) |
| MR6062 | Ethylene Propylene | -65° to +300° (-54° to +149°) | 150–350 (10.3–24.1)<br>351–2500 (24.2–172.4) |
| MR6065 | Kalrez® | -40° to +550° (-40° to +288°) | 150–350 (10.3–24.1)<br>351–2500 (24.2–172.4) |
| MR6024 | Silicone | -70° to +450° (-57° to +232°) | 150–350 (10.3–24.1) |

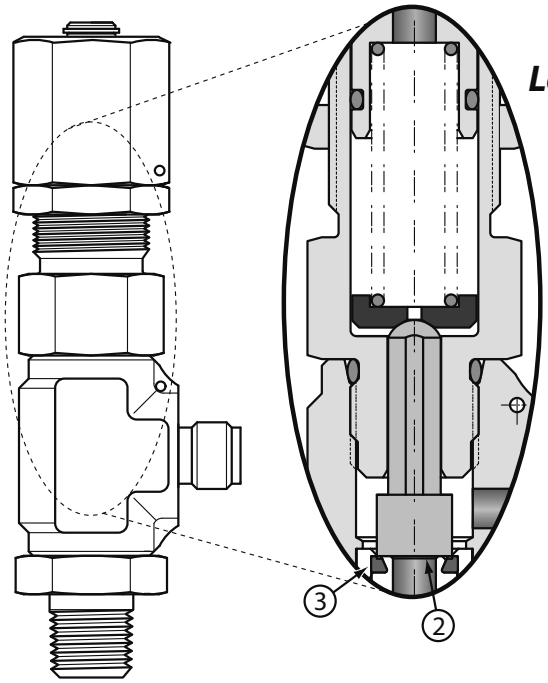
### High Pressure

| Valve No. | Seal Material | Temperature °F (°C) | Pressure Range psig (bar) |
|---|---|---|---|
| HR6033 | Neoprene | -40° to +300° (-40° to +149°) | 150–300 (10.3 to 20.7)<br>301–5000 (20.8 to 344.8) |
| HR6032 | Viton® | -20° to +400° (-29° to +204°) | 150–300 (10.3 to 20.7)<br>301–5000 (20.8 to 344.8) |
| HR6077 | Buna-N | -65° to +275° (-54° to +135°) | 150–300 (10.3 to 20.7)<br>301–5000 (20.8 to 344.8) |
| HR6062 | Ethylene Propylene | -65° to +300° (-54° to +149°) | 150–300 (10.3 to 20.7)<br>301–5000 (20.8 to 344.8) |
| HR6065 | Kalrez® | -40° to +550° (-40° to +288°) | 150–300 (10.3 to 20.7)<br>301–5000 (20.8 to 344.8) |
| HR6024 | Silicone | -70° to +450° (-57° to +232°) | 150–300 (10.3 to 20.7) |

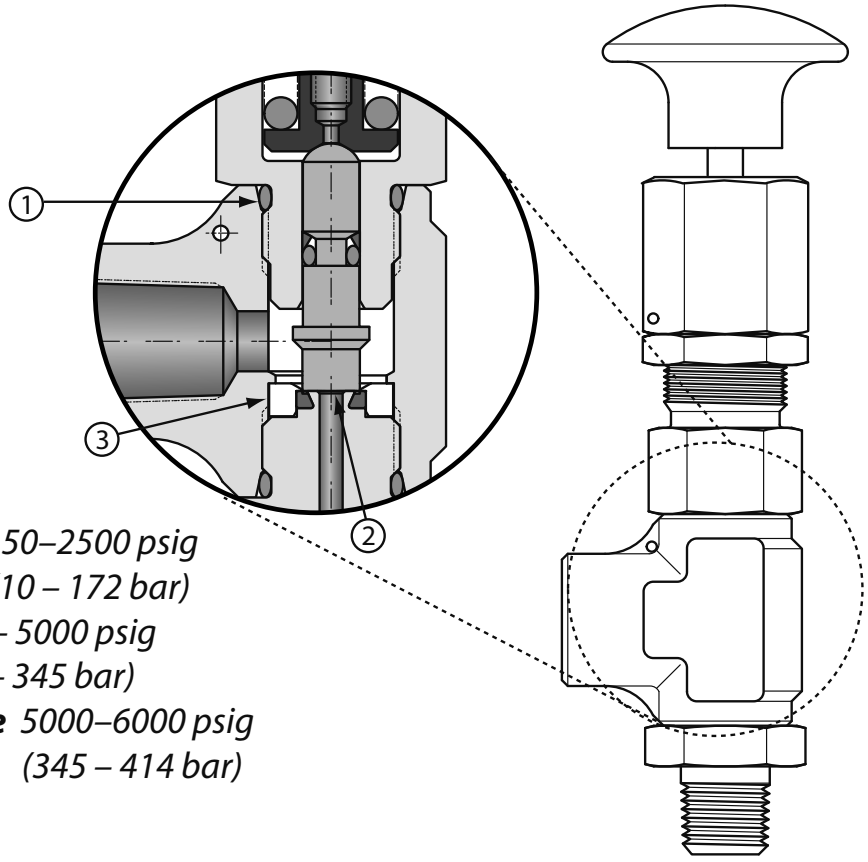
### Extra High Pressure

| Valve No. | Seal Material | Temperature °F (°C) | Pressure Range psig (bar) |
|---|---|---|---|
| XR6033 | Neoprene | -40° to +300° (-40° to +149°) | 5000–6000 (344.8–413.8) |
| XR6032 | Viton® | -20° to +400° (-29° to +204°) | 5000–6000 (344.8–413.8) |
| XR6077 | Buna-N | -65° to +275° (-54° to +135°) | 5000–6000 (344.8–413.8) |
| XR6062 | Ethylene Propylene | -65° to +300° (-54° to +149°) | 5000–6000 (344.8–413.8) |
| XR6065 | Kalrez® | -40° to +550° (-40° to +288°) | 5000–6000 (344.8–413.8) |

# R6000 Series




***Low Pressure*** *5–550 psig (0-38 bar)*




***Medium Pressure*** *150–2500 psig (10 – 172 bar)*

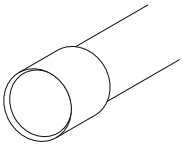
***High Pressure*** *150 – 5000 psig (10 – 345 bar)*

***Extra High Pressure*** *5000–6000 psig (345 – 414 bar)*

## Features

① **O-ring & Delta backup ring**

② **Raised seal lip**



③ **Fully encapsulated seat seal**

# R6000 Series

## Crack Pressure Range

Select appropriate spring code

| LR6000 Low Pressure | |
|---|---|
| Spring Code | Range in PSIG (BAR) |
| A | 5–25 (0–2) |
| B | 26–80 (2–6) |
| C | 81–150 (6–10) |
| D | 151–250 (10–17) |
| E | 251–350 (17–24) |
| F | 351–550 (24–38) |

| MR6000 Medium Pressure | |
|---|---|
| Spring Code | Range in PSIG (BAR) |
| B | 150–350 (10–24) |
| C | 351–650 (24–45) |
| D | 651–1000 (45–69) |
| E | 1001–1500 (69–103) |
| F | 1501–2000 (104–138) |
| G | 2001–2500 (138–172) |

| HR6000 High Pressure | |
|---|---|
| Spring Code | Range in PSIG (BAR) |
| A | 150–300 (10–21) |
| B | 301–700 (21–48) |
| C | 701–1300 (48–90) |
| D | 1301–2000 (90–138) |
| E | 2001–3000 (138–207) |
| F | 3001–4000 (207–276) |
| G | 4001–5000 (276–345) |

| XR6000 Extra High Pressure | |
|---|---|
| Spring Code | Range in PSIG (BAR) |
| A | 5000–6000 (345–414) |

## How to Order

**LR60 24 – 2MP – A C M – * * * ***

### BASIC MODEL NUMBER

- **LR60** Low pressure *5–550 psig (0-38 bar)*
- **MR60** Medium pressure *150–2500 psig (10-172 bar)*
- **HR60** High pressure *150–5000 psig (10-276 bar)*
- **XR60** Extra high pressure *5000–6000 psig (345-414 bar)*

### SEAL MATERIAL

- **24** Silicone*
- **32** Viton®
- **33** Neoprene
- **62** Ethylene propylene
- **65** Kalrez®
- **77** Buna-N

### MANUAL OVERRIDE

(optional, not available for LR or XR series)
MR series only available up to 350 psig (24 bar).
HR series only available up to 700 psig (48 bar) .

CIRCLE SEAL CONTROLS, INC.

### SPRING CODE

See *Crack Pressure Range* table above

### PORT SIZE

| | Inlet | Outlet |
|---|---|---|
| **2MP** | ¼″ male NPT | ¼″ female NPT |
| **2M4G** | ¼″ male NPT | ¼″ Gyrolok® |
| **4G** | ¼″ Gyrolok® | ¼″ Gyrolok® |
| **2RT** | ¼″ male BSPT | ¼″ female BSPT |
| **6Z** | 6mm Gyrolok® | 6mm Gyrolok® |
| **8Z** | 8mm Gyrolok® | 8mm Gyrolok® |
| **12Z** | 12mm Gyrolok® | 12mm Gyrolok® |

R6000 valves are CE 0035 / PED approved

* Silicone seals are not available for XR series.
* Silicone seals for MR series only available up to 350 psig (spring code B)
* Silicone seals for HR series only available up to 300 psig (spring code A)

**** Customer can request a specific cracking pressure when ordering. To specify, add the cracking pressure as -PSIG (not BAR) after the M for Manual Override (if no override, add value after "C"). Otherwise, the factory sets the valve at the nominal midpoint of the cracking pressure range selected. Valves with specific cracking pressure come standard with factory installed lockwire.

## R6000 Service Kits

LR Kit includes: end seat-to-body O-ring, bonnet-to-body O-ring, and bonnet seal O-ring.

MR/HR/XR Kit includes: end seat-to-body O-ring, bonnet-to-body O-ring, seat O-ring, and Delta seal. Replacement of Delta seal requires use of installation tool and resizing tool. Consult factory for details.

To Order, add K to front of valve part number (example: KLR6024-2MP-AC).

## For Your Safety

It is solely the responsibility of the system designer and user to select products suitable for their specific application requirements and to ensure proper installation, operation, and maintenance of these products. Material compatibility, product ratings and application details should be considered in the selection. Improper selection or use of products described herein can cause personal injury or property damage.