

## LCV-SM SERIES

### PRECISION LOW-FLOW CONTROL VALVE



#### DESCRIPTION

The THINKTANK LCV-SM Series Precision Low-Flow Control Valve is designed for accurate control of low-flow liquid, gas, and steam applications. With a compact body design, interchangeable trim sets, and a wide range of material and connection options, the LCV-SM Series provides reliable performance for demanding industrial, laboratory, pilot plant, and process automation systems. The valve is especially suitable for applications requiring stable regulation, fine flow adjustment, and repeatable control performance in small pipeline sizes.

#### APPLICATION

The LCV-SM Series is suitable for precision flow control applications up to 1 in. / 25.4 mm. Typical applications include chemical injection, laboratory and pilot plant systems, gas flow control, steam regulation, pressure control, additive dosing, sampling systems, and small process lines in petrochemical, pharmaceutical, power, energy, and industrial automation systems. It is designed for applications where standard control valves may be oversized and where accurate low-flow regulation is required.

#### STANDARD FEATURES

- 1 / 4 in. ( 6.4 mm ), 1 / 2 in. ( 12.7 mm ), 3 / 4 ( 19.1 mm ) and 1 in. ( 25.4 mm )
- Interchangeable trim sets
- Threaded bonnet for quick disassembly
- Trim characteristics: Linear, equal percent, quick open or double taper
- TFE chevron packing
- ANSI Class IV shutoff



#### OPTIONAL FEATURES

- Butt and socket weld ends, BSPP, tube connection and others Bonnet
- extensions for temperature extremes
- Bellows packing solutions
- Angle pattern bodies
- Reduced Emissions Kalrez® ( REK ), graphite, spring loaded
- chevron and others
- Exotic alloys for complete valves or trims Stellite trims & soft seats
- ( PTFE & Kel-F ) TiN coating of inner-valve stem and seat
- Purge or leak ports

## CONSTRUCTION

|             |                                                                                                                  |
|-------------|------------------------------------------------------------------------------------------------------------------|
| Body-Bonnet |                                                                                                                  |
| Standard    | 316 / 316L stainless steel, carbon steel ( WCB )                                                                 |
| Optional    | Monel, Alloy 20, Hastelloy C, or ASTM equivalent: DIN 1.4581 / 1.4571.<br>Other materials available upon request |
| Valve Trim  |                                                                                                                  |
| Standard    | 316 / 316L stainless steel                                                                                       |
| Optional    | Monel, alloy 20, Hastelloy C or ASTM equivalent                                                                  |
| Packing     |                                                                                                                  |
| Standard    | TFE chevron V-rings                                                                                              |
| Optional    | Graphite, Reduced Emissions Kalrez ( REK )                                                                       |
| Actuator    |                                                                                                                  |
| Standard    | Die cast aluminum                                                                                                |
| Optional    | 316L stainless steel for 1 / 2" , 3 / 4" and 1" models                                                           |

## ACTUATOR CHOICES

|                  |                                                                                 |
|------------------|---------------------------------------------------------------------------------|
| Standard         | Air to open, fail close / Air to close, fail open                               |
| Optional         | With integral top-mounted positioner                                            |
| Standard Signals | 3 - 15 #, 3 - 27 #, 6 - 30 #                                                    |
| Optional Signals | 3 - 9 #, 9 - 15 #, with positioner                                              |
| Accessories      | Filter regulator, gauges, I / P converter, limit switches, handwheel, solenoids |

## PRESSURE – TEMPERATURE RATINGS FOR VALVE BODY AND BONNET ASSEMBLY

### Excluding Packing and End Connections

The pressure-temperature ratings specified herein are based on the pressure-containing material sections at the body-to-bonnet joint for gasketed screw-in bonnet designs.

When properly applied, the specified torque values ensure joint integrity and prevent failure of pressure-retaining components. These torque values were validated during factory hydrostatic testing at 70 °F ( 21.1 °C ) and maximum body pressure rating, providing reliable sealing performance.

Additional factors, including elevated or cyclic temperatures, low-density process gases, and surface conditions of the gasket sealing areas, may affect sealing performance. Under these conditions, reliable sealing can only be confirmed through testing under actual operating conditions.

These charts are provided for reference only and do not represent an indication of valve functionality or suitability for control applications. Additional selection guides are available to assist in determining the appropriate valve type, bonnet configuration, trim selection, and actuator sizing.

When flanges, fittings, or other pressure-retaining components are added to the valve assembly, the pressure rating of the complete assembly shall be limited to the rating of the lowest-rated component.

## LESS PACKING & END CONNECTIONS

| 1/4 in. Maximum Allowable Pressure     |                                                |              |                  |                  |       | Unit: PSI |
|----------------------------------------|------------------------------------------------|--------------|------------------|------------------|-------|-----------|
| Temp                                   | LCV-SM Series Precision Low-Flow Control Valve |              |                  |                  |       |           |
|                                        | 316 S/S                                        | Carbon Steel | Hastelloy B or = | Hastelloy C or = | Monel | Alloy 20  |
| 100° F ( 37.8° C )                     | 5000                                           | 4000         | 5000             | 5000             | 4000  | 5000      |
| 200° F ( 93.3° C )                     | 5000                                           | 3700         | 5000             | 5000             | 4000  | 5000      |
| 300° F ( 148.9° C )                    | 4750                                           | 3500         | 5000             | 5000             | 3880  | 4850      |
| 400° F ( 204.4° C )                    | 4190                                           | 3200         | 5000             | 5000             | 3770  | 4700      |
| 500° F ( 260.0° C )                    | 4000                                           | 2900         | 4900             | 4900             | 3740  | 4500      |
| 600° F ( 315.6° C )                    | 3820                                           | 2600         | 4850             | 4850             | 3740  | 4200      |
| 700° F ( 371.1° C )                    | 3640                                           | 2300         | 4800             | 4800             | 3640  | 3900      |
| 800° F ( 426.7° C )                    | 3580                                           | -            | 4750             | 4750             | 3580  | 3700      |
| 900° F ( 482.2° C )                    | 2840                                           | -            | -                | 4500             | 2280  | 3000      |
| 1000° F ( 537.8° C )                   | 1160                                           | -            | -                | 4000             | 940   | 1500      |
| 1100° F ( 593.3° C )                   | Consult factory for higher temperatures        |              |                  | 3500             | -     | -         |
| 1200° F ( 648.9° C )                   |                                                |              |                  | 3000             | -     | -         |
| Rec. Torque ft lb<br>( + / - 2 ft-lb ) | 37                                             | 37           | 39               | 37               | 31    | 35        |

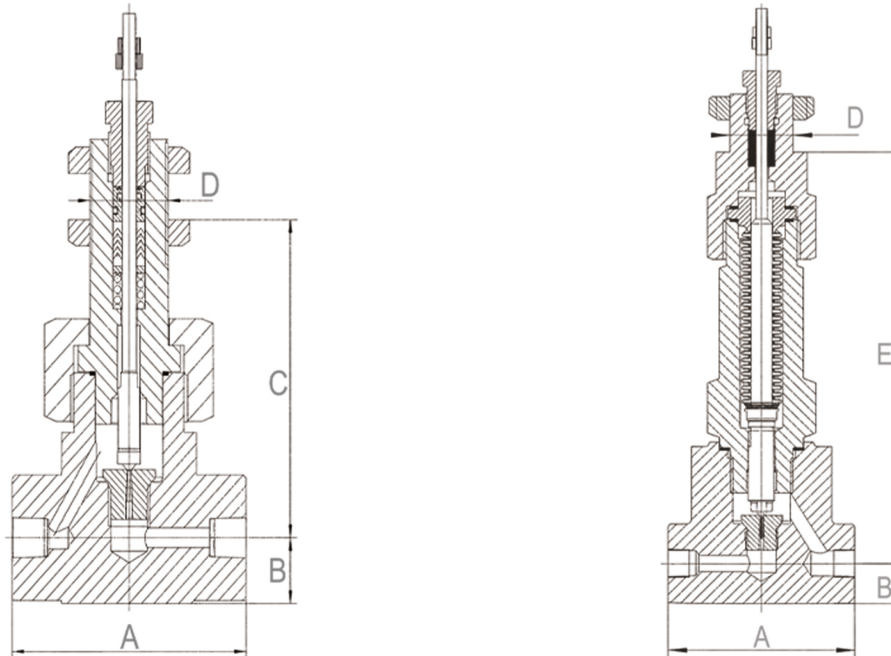


### LESS PACKING & END CONNECTIONS

| 1/2 in. Maximum Allowable Pressure     |                                                |              |                  |                  |       | Unit: PSI |
|----------------------------------------|------------------------------------------------|--------------|------------------|------------------|-------|-----------|
| Temp                                   | LCV-SM Series Precision Low-Flow Control Valve |              |                  |                  |       |           |
|                                        | 316 S/S                                        | Carbon Steel | Hastelloy B or = | Hastelloy C or = | Monel | Alloy 20  |
| 100° F ( 37.8° C )                     | 5000                                           | 4000         | 5000             | 5000             | 4000  | 5000      |
| 200° F ( 93.3° C )                     | 4750                                           | 3800         | 5000             | 5000             | 3780  | 5000      |
| 300° F ( 148.9° C )                    | 4310                                           | 3600         | 5000             | 5000             | 3520  | 4950      |
| 400° F ( 204.4° C )                    | 3860                                           | 3300         | 5000             | 5000             | 3420  | 4850      |
| 500° F ( 260.0° C )                    | 3640                                           | 3100         | 4900             | 4900             | 3390  | 4600      |
| 600° F ( 315.6° C )                    | 3470                                           | 2900         | 4850             | 4870             | 3390  | 4300      |
| 700° F ( 371.1° C )                    | 3310                                           | 2700         | 4800             | 4160             | 3310  | 4200      |
| 800° F ( 426.7° C )                    | 3255                                           | -            | 4750             | 4430             | 2090  | 4000      |
| 900° F ( 482.2° C )                    | 3190                                           | -            | -                | 4200             | 2070  | 3000      |
| 1000° F ( 537.8° C )                   | 1860                                           | -            | -                | 4000             | 850   | 1500      |
| 1100° F ( 593.3° C )                   | Consult factory for higher temperatures        |              |                  | 3400             | -     | -         |
| 1200° F ( 648.9° C )                   |                                                |              |                  | 3000             | -     | -         |
| Rec. Torque ft lb<br>( + / - 2 ft-lb ) | 122                                            | 122          | 131              | 124              | 102   | 117       |

| 3/4 in. and 1 in. Maximum Allowable Pressure        |                                                |      |              | Unit: PSI |  |
|-----------------------------------------------------|------------------------------------------------|------|--------------|-----------|--|
| Temp                                                | LCV-SM Series Precision Low-Flow Control Valve |      |              |           |  |
|                                                     | 316 S/S                                        |      | Carbon Steel |           |  |
| 100° F ( 37.8° C )                                  | 1500                                           | 1500 | 1500         | 1500      |  |
| 200° F ( 93.3° C )                                  | 1450                                           | 1450 | 1350         | 1350      |  |
| 300° F ( 148.9° C )                                 | 1325                                           | 1325 | 1325         | 1325      |  |
| 400° F ( 204.4° C )                                 | 1175                                           | 1175 | 1275         | 1275      |  |
| 500° F ( 260.0° C )                                 | 1100                                           | 1100 | 1200         | 1200      |  |
| 600° F ( 315.6° C )                                 | 1050                                           | 675  | 1100         | 1100      |  |
| 700° F ( 371.1° C )                                 | 840                                            | 250  | 1075         | 1075      |  |
| 800° F ( 426.7° C )                                 | 575                                            | -    | -            | -         |  |
| Torque: 290 ft-lb ( for 3 / 4 in. and 1 in. sizes ) |                                                |      |              |           |  |

## DIMENSIONS



## DIMENSION TABLE

| PS                  | A                     | B                     | C                     | D                    | E                    | Stroke                |
|---------------------|-----------------------|-----------------------|-----------------------|----------------------|----------------------|-----------------------|
| 0.25 in. ( 6.4mm )  | 3.15 in.<br>( 80mm )  | 0.787 in.<br>( 20mm ) | 3.8 in.<br>( 96.5mm ) | 1.06 in.<br>( 27mm ) | 7 in.<br>( 178mm )   | 0.394 in.<br>( 10mm ) |
| 0.50 in. ( 12.7mm ) |                       |                       |                       |                      |                      |                       |
| 0.75 in. ( 19.1mm ) | 3.94 in.<br>( 100mm ) | 1.575 in.<br>( 40mm ) | 4.33 in.<br>( 110mm ) |                      | 7.44in.<br>( 189mm ) |                       |
| 1 in. ( 25.4mm )    |                       |                       |                       |                      |                      |                       |

Dimensions and Cv values are provided for standard LCV-SM Series configurations. Actual dimensions may vary depending on valve size, bonnet type, actuator selection, handwheel, positioner, end connection, and accessory arrangement. Final certified drawings shall be provided after order confirmation.

## CV VALUES AND TRIM DATA

| Valve Size                                                                        | Trim Name | Max Cv    | Orifice Dia.       | Orifice Area                                      | Linear ratio | Equal % |
|-----------------------------------------------------------------------------------|-----------|-----------|--------------------|---------------------------------------------------|--------------|---------|
| 1 in. ( 25.4mm )                                                                  | 6.0       | 6.0       | 0.6250 ( 15.9 mm ) | 0.3068 in. <sup>2</sup> ( 197.9 mm <sup>2</sup> ) | 50: 1        | 60: 1   |
|                                                                                   | 5.0       | 5.0       | 0.6250 ( 15.9 mm ) | 0.3068 in. <sup>2</sup> ( 197.9 mm <sup>2</sup> ) | 50: 1        | 60: 1   |
|                                                                                   | 4.5       | 4.5       | 0.5000 ( 12.7 mm ) | 0.1963 in. <sup>2</sup> ( 126.6 mm <sup>2</sup> ) | 50: 1        | 60: 1   |
| 3/4 in. ( 19.1mm )                                                                | 4.0       | 4.0       | 0.5000 ( 12.7 mm ) | 0.1963 in. <sup>2</sup> ( 126.6 mm <sup>2</sup> ) | 50: 1        | 60: 1   |
| 1 in. ( 25.4mm )                                                                  | 3.5       | 3.5       | 0.5000 ( 12.7 mm ) | 0.1963 in. <sup>2</sup> ( 126.6 mm <sup>2</sup> ) | 50: 1        | 60: 1   |
| 1/2 in. ( 12.7mm )<br>3/4 in. ( 19.1mm )<br>1 in. ( 25.4mm )                      | A         | 2.5       | 0.3750 ( 9.5 mm )  | 0.1104 in. <sup>2</sup> ( 71.2 mm <sup>2</sup> )  | 40: 1        | 50: 1   |
|                                                                                   | B         | 2.0       | 0.3750 ( 9.5 mm )  | 0.1104 in. <sup>2</sup> ( 71.2 mm <sup>2</sup> )  | 40: 1        | 50: 1   |
|                                                                                   | C         | 1.25      | 0.2810 ( 7.1 mm )  | 0.0620 in. <sup>2</sup> ( 40.0 mm <sup>2</sup> )  | 40: 1        | 50: 1   |
|                                                                                   | D         | 0.8       | 0.2500 ( 6.4 mm )  | 0.0491 in. <sup>2</sup> ( 31.7 mm <sup>2</sup> )  | 40: 1        | 50: 1   |
|                                                                                   | E         | 0.5       | 0.2500 ( 6.4 mm )  | 0.0491 in. <sup>2</sup> ( 31.7 mm <sup>2</sup> )  | 40: 1        | 50: 1   |
| 1/4 in. ( 6.4mm )<br>1/2 in. ( 12.7mm )<br>3/4 in. ( 19.1mm )<br>1 in. ( 25.4mm ) | F         | 0.32      | 0.1560 ( 3.9 mm )  | 0.0191 in. <sup>2</sup> ( 12.3 mm <sup>2</sup> )  | 30: 1        | 40: 1   |
|                                                                                   | G         | 0.2       | 0.1560 ( 3.9 mm )  | 0.0191 in. <sup>2</sup> ( 12.3 mm <sup>2</sup> )  | 30: 1        | 40: 1   |
|                                                                                   | H         | 0.13      | 0.1560 ( 3.9 mm )  | 0.0191 in. <sup>2</sup> ( 12.3 mm <sup>2</sup> )  | 30: 1        | 40: 1   |
|                                                                                   | I         | 0.08      | 0.1560 ( 3.9 mm )  | 0.0191 in. <sup>2</sup> ( 12.3 mm <sup>2</sup> )  | 30: 1        | 40: 1   |
|                                                                                   | J         | 0.05      | 0.1560 ( 3.9 mm )  | 0.0191 in. <sup>2</sup> ( 12.3 mm <sup>2</sup> )  | 30: 1        | 40: 1   |
|                                                                                   | K         | 0.03      | 0.0860 ( 2.2 mm )  | 0.0058 in. <sup>2</sup> ( 3.7 mm <sup>2</sup> )   | 25: 1        | -       |
|                                                                                   | L         | 0.02      | 0.0860 ( 2.2 mm )  | 0.0058 in. <sup>2</sup> ( 3.7 mm <sup>2</sup> )   | 25: 1        | -       |
|                                                                                   | M         | 0.01      | 0.0860 ( 2.2 mm )  | 0.0058 in. <sup>2</sup> ( 3.7 mm <sup>2</sup> )   | 25: 1        | -       |
|                                                                                   | N         | 0.006     | 0.0860 ( 2.2 mm )  | 0.0058 in. <sup>2</sup> ( 3.7mm <sup>2</sup> )    | 25: 1        | -       |
| 1/4 in. ( 6.4mm )<br>1/2 in. ( 12.7mm )                                           | O         | 0.003     | 0.0860 ( 2.2 mm )  | 0.0058 in. <sup>2</sup> ( 3.7mm <sup>2</sup> )    | 25: 1        | -       |
|                                                                                   | P1        | 0.002     | 0.0625 ( 1.6 mm )  | 0.0031 in. <sup>2</sup> ( 2.0 mm <sup>2</sup> )   | 15: 1        | -       |
|                                                                                   | P2        | 0.0013    | 0.0625 ( 1.6 mm )  | 0.0031 in. <sup>2</sup> ( 2.0 mm <sup>2</sup> )   | 15: 1        | -       |
|                                                                                   | P3        | 0.001     | 0.0625 ( 1.6 mm )  | 0.0031 in. <sup>2</sup> ( 2.0 mm <sup>2</sup> )   | 15: 1        | -       |
|                                                                                   | P4        | 0.0006    | 0.0625 ( 1.6mm )   | 0.0031 in. <sup>2</sup> ( 2.0 mm <sup>2</sup> )   | 15: 1        | -       |
|                                                                                   | P5        | 0.0004    | 0.0625 ( 1.6mm )   | 0.0031 in. <sup>2</sup> ( 2.0 mm <sup>2</sup> )   | 15: 1        | -       |
|                                                                                   | P6        | 0.00027   | 0.0625 ( 1.6 mm )  | 0.0031 in. <sup>2</sup> ( 2.0 mm <sup>2</sup> )   | 15: 1        | -       |
|                                                                                   | P7        | 0.00018   | 0.0625 ( 1.6 mm )  | 0.0031 in. <sup>2</sup> ( 2.0 mm <sup>2</sup> )   | 15: 1        | -       |
|                                                                                   | P8        | 0.00012   | 0.0625 ( 1.6 mm )  | 0.0031 in. <sup>2</sup> ( 2.0 mm <sup>2</sup> )   | 15: 1        | -       |
| 1/4 in. ( 6.4mm )                                                                 | P9        | 0.00008   | 0.0625 ( 1.6 mm )  | 0.0031 in. <sup>2</sup> ( 2.0 mm <sup>2</sup> )   | 15: 1        | -       |
|                                                                                   | P10       | 0.00005   | 0.0420 ( 1.1 mm )  | 0.0014 in. <sup>2</sup> ( 0.9 mm <sup>2</sup> )   | 15: 1        | -       |
|                                                                                   | P11       | 0.000036  | 0.0420 ( 1.1 mm )  | 0.0014 in. <sup>2</sup> ( 0.9 mm <sup>2</sup> )   | 15: 1        | -       |
|                                                                                   | P12       | 0.000024  | 0.0420 ( 1.1 mm )  | 0.0014 in. <sup>2</sup> ( 0.9 mm <sup>2</sup> )   | 15: 1        | -       |
|                                                                                   | P13       | 0.000016  | 0.0420 ( 1.1 mm )  | 0.0014 in. <sup>2</sup> ( 0.9 mm <sup>2</sup> )   | 15: 1        | -       |
|                                                                                   | P14       | 0.00001   | 0.0420 ( 1.1 mm )  | 0.0014 in. <sup>2</sup> ( 0.9 mm <sup>2</sup> )   | 15: 1        | -       |
|                                                                                   | P15       | 0.000006  | 0.0420 ( 1.1 mm )  | 0.0014 in. <sup>2</sup> ( 0.9 mm <sup>2</sup> )   | 15: 1        | -       |
|                                                                                   | P16       | 0.000004  | 0.0420 ( 1.1 mm )  | 0.0014 in. <sup>2</sup> ( 0.9 mm <sup>2</sup> )   | 15: 1        | -       |
|                                                                                   | P17       | 0.0000027 | 0.0420 ( 1.1 mm )  | 0.0014 in. <sup>2</sup> ( 0.9 mm <sup>2</sup> )   | 15: 1        | -       |
|                                                                                   | P18       | 0.0000018 | 0.0420 ( 1.1 mm )  | 0.0014 in. <sup>2</sup> ( 0.9 mm <sup>2</sup> )   | 15: 1        | -       |