

# KUNKLE

## Cast Iron Liquid Relief Valves

### Features

- Bolted bonnet permits easy inspection and servicing without removal from system.
- Quality cast iron body and bonnet, insert and disc are available in either bronze or Stainless Steel (SS) and lapped for optimum performance.
- Springs are steel with plating for corrosion protection.
- High lift, wing-guided disc offers high relieving capacity. Pivot between disc and spring corrects misalignment and compensates for spring side thrust.
- Each Kunkle valve is tested and inspected for pressure setting and leakage.

### Model Descriptions

**Model 91:** Bronze trim, with pressure-tight cap. Suitable for maximum back pressure of 60 psig<sup>1</sup>. Variation "03" for field adjustability.

**Model 218:** Bronze trim, UL and FM approved for fire pump installations. Special design offers minimum set pressure of 60 psig<sup>1</sup>. Easily adjustable with handwheel to 200 psig (175 psig with optional 125# inlet flange).

**Model 228:** Bronze trim, with pressure-tight cap. UL and FM approved for fire pump installations. Suitable for maximum back pressure of 60 psig<sup>1</sup>. Supplied with handwheel.

### Applications

- Fire Pump Service, UL1478 listed and FM approved. (models 218, 228)
- Overpressure relief and protection of pumps, tanks, lines and hydraulic systems.
- Pressure regulation.

#### Note

1. Back pressure increases set pressure on a one to one basis, and reduces capacity. Back pressure in excess of 10% of set pressure is not recommended.



Model 228

### Options

- SS trim. (insert and disc) (variation 02)
- Female x Female NPT connections. (1½" to 4" sizes)
- Inlet and outlet flanges per ANSI B16.1 - 125#. Limited to 175 psig maximum set pressure.
- Epoxy-coated internal body and bonnet. Temperature limit 125°F [52°C].

### Pressure and Temperature Limits<sup>1</sup>

#### Model 91:

5 to 400 psig;  
-20° to 406°F

#### Models 218, 228:

60 to 200 psig;  
-20° to 406°F

Furnished standard with ANSI rated B16.1 - 250# inlet flange and ANSI rated B16.1 - 125# outlet flange.

#### Note

1. For other pressure and temperature limits, consult ANSI B16 cast iron flange standards.

**tyco** Flow Control

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### Parts and Materials

#### Model 91<sup>3, 6</sup> - Non-code, Liquid Relief Valve

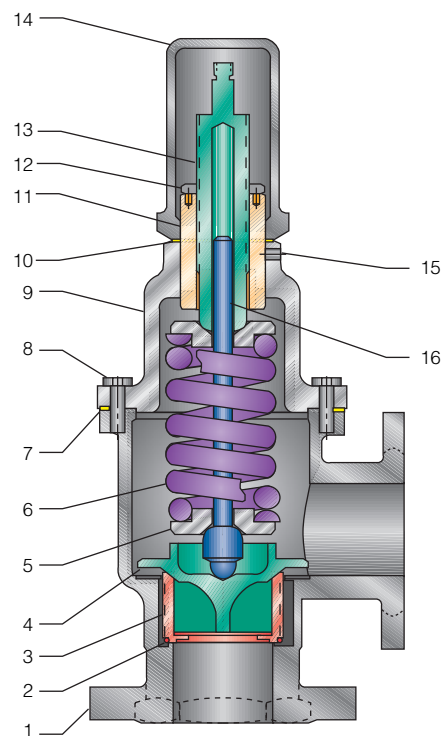
| No. | Part Name                       | Materials                                   |
|-----|---------------------------------|---|
| 1   | Body                            | Iron, A126 Class A or B                     |
| 2   | O-ring                          | BUNA-N                                      |
| 3   | Insert                          | 1   |
| 4   | Disc                            | 1   |
| 5   | Spring Step                     | 2   |
| 6   | Spring                          | Steel, Aluminum Coated                      |
| 7   | Bonnet Gasket                   | Fiber and Nitrile, Klinger C-4400 or C-4401 |
| 8   | Hex Head Cap Screw <sup>3</sup> | Steel, SAE Gr. 5                            |
| 9   | Bonnet                          | Iron, A126 Class A or B                     |
| 10  | Cap Gasket <sup>5</sup>         | Fiber and Nitrile, Klinger C-4400 or C-4401 |
| 11  | Compression Screw Bushing       | Iron, A536 80-55-06                         |
| 12  | Jam Nut                         | 4   |
| 13  | Compression Screw               | 4   |
| 14  | Cap <sup>5</sup>                | Iron, A126 Class A or B                     |
| 15  | Socket Set Screw                | Steel, Commercial                           |
| 16  | Stem                            | 2   |

#### Items Not Shown

|                                |                          |
|--------------------------------|--------------------------|
| Handwheel <sup>5</sup>         | Iron, A126 Class A or B  |
| Handwheel Jam Nut <sup>5</sup> | Steel Plated, Commercial |

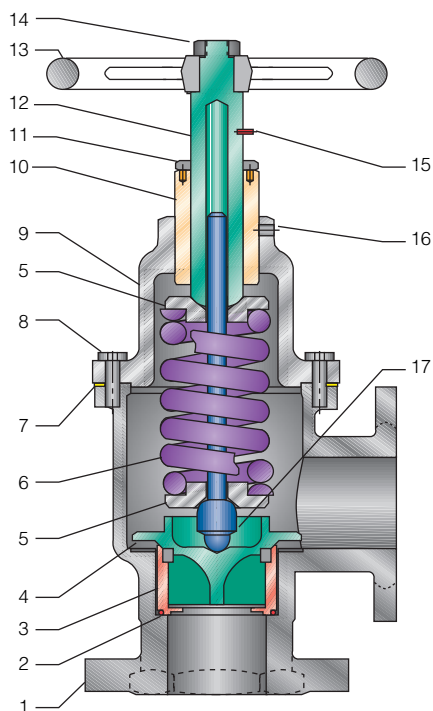
#### Notes

- Disc (item 4) and insert (item 3) material Bronze, B-584 Alloy 84400 or B62, also available in SS, A743 Gr. CF-8, as a package option.
- Material CS with anti-corrosion coating, commercial Gr. or Brass, B16.
- 6 bolts required for 3" and 4" sizes, and 8 bolts required for 6" size.
- Material Brass, B16 or Bronze, B584 casting.
- Handwheel option available, delete cap (item 14) and gasket (item 10).
- Inlet and outlet flanges per ANSI B16.1 250#, inlet flange standard and 125# inlet flange optional. Outlet flange 125#.

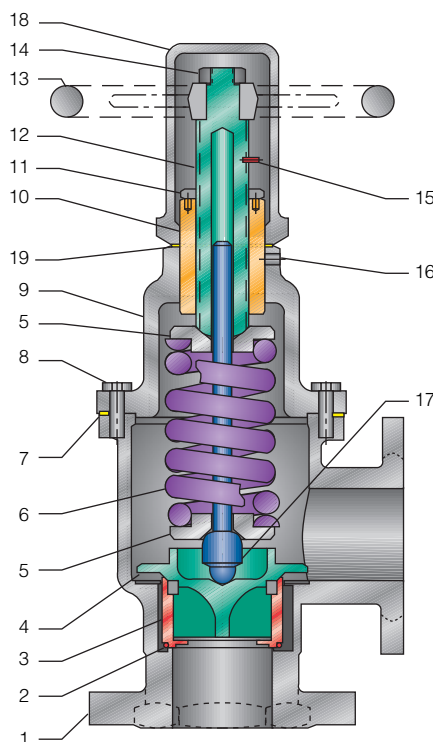


**Model 91**

### Parts and Materials



**Model 218**



**Model 228**

#### Models 218 and 228 - Non-code

| No. | Part Name                                     | Materials                                   |
|-----|---|---|
| 1   | Body <sup>1</sup>                             | Iron, A126 Class A or B                     |
| 2   | O-ring  | BUNA-N                                      |
| 3   | Insert  | <sup>2</sup>                                |
| 4   | Disc  | <sup>2</sup>                                |
| 5   | Spring Step                                   | <sup>3</sup>                                |
| 6   | Spring  | Steel, Aluminum Coated                      |
| 7   | Bonnet Gasket                                 | Fiber and Nitrile, Klinger C-4400 or C-4401 |
| 8   | Hex Head Cap Screw <sup>4</sup>               | Steel, SAE Gr. 5                            |
| 9   | Bonnet  | Iron, A126 Class A or B                     |
| 10  | Compression Screw Bushing                     | Brass, B16                                  |
| 11  | Jam Nut                                       | Brass, B16                                  |
| 12  | Compression Screw                             | <sup>5</sup>                                |
| 13  | Handwheel                                     | Iron, A126 Class A or B                     |
| 14  | Handwheel Locknut                             | Steel Plated, Commercial Gr.                |
| 15  | Spring Pin                                    | Steel, Commercial Gr.                       |
| 16  | Socket Set Screw                              | Steel, Commercial Gr.                       |
| 17  | Stem  | <sup>3</sup>                                |
|     | Compression Screw Locknut Wrench <sup>6</sup> | Steel, A366                                 |
|     | Installation Instruction <sup>6</sup>         | Paper, Commercial Gr.                       |

#### Model 228 Only

|    |                         |                                 |
|----|-------------------------|---------------------------------|
| 18 | Cap <sup>7</sup>        | Iron, A126 Class A or B         |
| 19 | Cap Gasket <sup>7</sup> | Gasket, Klinger Silicone C-4400 |

#### Notes

- Inlet and outlet flanges per ANSI B16.1 250#, inlet flange standard and 125# inlet flange optional. Outlet flange 125#.
- Disc (item 4) and insert (item 3) material Bronze, B-584 Alloy 84400 or B62, also available in SS, A743 Gr. CF-8, as a package option.
- Material CS with anti-corrosion coating, commercial Gr., Brass, B16 or SS, A582 TY 416.
- 6 bolts required for 3" and 4" sizes, and 8 bolts required for 6" size.
- Material Brass, B16 or Bronze, B584 casting (Model 218 only), B584 Alloy 84400 (Model 228 only).
- Not shown on assembly.
- Cap (item 18), Gasket (item 19) and Locknut (item 11) factory installed. Handwheel (item 13) shipped unassembled (Models 218 and 228).

### Specifications

#### Model 91<sup>1</sup>

| Model Number | Valve Size (in) | Connections ANSI Standard |             | Valve Dimensions in |       |        | Min/Max Set Pressure (psig) | Approx. Weight (lb) |
|--------------|-----------------|---------------------------|-------------|---------------------|-------|--------|-----------------------------|---------------------|
|              |                 | Inlet                     | Outlet      | A                   | B     | C      |                             |                     |
| 091A-G       | 1 1/2 x 1 1/2   | Female NPT                | Female NPT  | 4 3/4               | 4 1/4 | 11 7/8 | 5/400                       | 27                  |
| 091H-G       | 1 1/2 x 1 1/2   | 125# Flange               | 125# Flange | 4 3/4               | 4 1/4 | 11 1/4 | 5/175                       | 36                  |
| 091K-G       | 1 1/2 x 1 1/2   | 250# Flange               | 125# Flange | 5                   | 4 3/4 | 11 1/4 | 5/400                       | 36                  |
| 091A-H       | 2 x 2           | Female NPT                | Female NPT  | 4 1/8               | 4 1/8 | 12 3/4 | 5/400                       | 35                  |
| 091H-H       | 2 x 2           | 125# Flange               | 125# Flange | 4 3/4               | 4 5/8 | 12 3/4 | 5/175                       | 47                  |
| 091K-H       | 2 x 2           | 250# Flange               | 125# Flange | 5                   | 4 5/8 | 12 3/4 | 5/400                       | 47                  |
| 091A-J       | 2 1/2 x 2 1/2   | Female NPT                | Female NPT  | 4 1/2               | 4 1/2 | 14 1/4 | 5/400                       | 48                  |
| 091H-J       | 2 1/2 x 2 1/2   | 125# Flange               | 125# Flange | 5 1/4               | 4 3/4 | 14 1/4 | 5/175                       | 65                  |
| 091K-J       | 2 1/2 x 2 1/2   | 250# Flange               | 125# Flange | 5 1/4               | 4 3/4 | 14 1/4 | 5/400                       | 65                  |
| 091A-K       | 3 x 3           | Female NPT                | Female NPT  | 5 7/8               | 5 7/8 | 21     | 5/400                       | 81                  |
| 091H-K       | 3 x 3           | 125# Flange               | 125# Flange | 5 7/8               | 5 7/8 | 21 3/4 | 5/175                       | 98                  |
| 091K-K       | 3 x 3           | 250# Flange               | 125# Flange | 6 1/4               | 5 7/8 | 21 3/4 | 5/400                       | 98                  |
| 091A-M       | 4 x 4           | Female NPT                | Female NPT  | 6 5/8               | 6 1/2 | 26     | 5/400                       | 132                 |
| 091H-M       | 4 x 4           | 125# Flange               | 125# Flange | 6 5/8               | 6 1/2 | 26     | 5/175                       | 170                 |
| 091K-M       | 4 x 4           | 250# Flange               | 125# Flange | 6 5/8               | 6 1/2 | 26     | 5/400                       | 170                 |
| 091H-P       | 6 x 6           | 125# Flange               | 125# Flange | 9 3/8               | 8 1/2 | 31     | 5/175                       | 340                 |
| 091K-P       | 6 x 6           | 250# Flange               | 125# Flange | 9 3/8               | 8 1/2 | 31     | 5/300                       | 340                 |

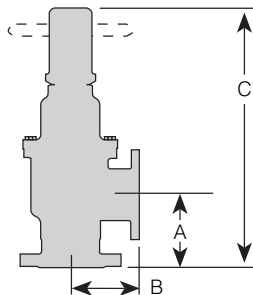
#### Models 218 and 228<sup>1</sup>

| Model Number        | Valve Size (in) | Connections ANSI Standard |             | Valve Dimensions in |       |         |         | Min/Max Set Pressure (psig) | Approx. Weight (lb) |
|---------------------|-----------------|---------------------------|-------------|---------------------|-------|---------|---------|-----------------------------|---------------------|
|                     |                 | Inlet                     | Outlet      | A                   | B     | C (218) | C (228) |                             |                     |
| 2*8A-K <sup>2</sup> | 3 x 3           | Female NPT                | Female NPT  | 6 1/8               | 5 7/8 | 20 5/8  | 21 5/8  | 60/200                      | 85                  |
| 2*8H-K <sup>2</sup> | 3 x 3           | 125# Flange               | 125# Flange | 6 1/8               | 5 7/8 | 20 5/8  | 21 5/8  | 60/175                      | 110                 |
| 2*8K-K <sup>2</sup> | 3 x 3           | 250# Flange               | 125# Flange | 6 1/8               | 5 7/8 | 20 5/8  | 21 5/8  | 60/200                      | 110                 |
| 2*8A-M <sup>2</sup> | 4 x 4           | Female NPT                | Female NPT  | 6 5/8               | 6 1/2 | 25      | 26      | 60/200                      | 143                 |
| 2*8H-M <sup>2</sup> | 4 x 4           | 125# Flange               | 125# Flange | 6 5/8               | 6 1/2 | 25      | 26      | 60/175                      | 185                 |
| 2*8K-M <sup>2</sup> | 4 x 4           | 250# Flange               | 125# Flange | 6 5/8               | 6 1/2 | 25      | 26      | 60/200                      | 185                 |
| 2*8H-P <sup>2</sup> | 6 x 6           | 125# Flange               | 125# Flange | 9 3/8               | 8 1/2 | 30      | 31      | 60/175                      | 350                 |
| 2*8K-P <sup>2</sup> | 6 x 6           | 250# Flange               | 125# Flange | 9 3/8               | 8 1/2 | 30      | 31      | 60/200                      | 350                 |

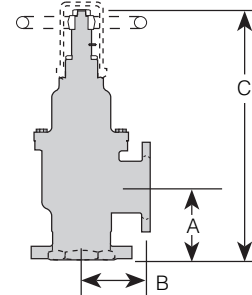
Dimensions are for reference only.

#### Notes

1. Temperature limits -20°F to 406°F.
2. Replace asterisk with desired model number. Data applicable to models 218, 228.



Model 91



Models 218, 228

### Capacities

#### Liquid Overpressure Factors

To determine capacities at other than 25% overpressure/accumulation, multiply capacity shown by:

10% Acc. = 0.6

15% Acc. = 0.8

20% Acc. = 0.9

#### Models 218, 228 Capacities

| UL/FM Size, in | Certified Capacities <sup>1</sup> GPM |
|----------------|---------------------------------------|
| 3 x 3          | 500                                   |
| 4 x 4          | 1000                                  |
| 6 x 6          | 2000                                  |

#### Note

1. Rated at 100 psig set pressure and 25% accumulation 125 psig.

#### Non-code Liquid - 25% Accumulation (GPM) – Model 91 Only

| Set Pressure (psig) | Inlet Size |     |        |      |      |      |
|---------------------|------------|-----|--------|------|------|------|
|                     | 1 1/2"     | 2"  | 2 1/2" | 3"   | 4"   | 6"   |
| 5                   | 31         | 56  | 87     | 125  | 224  | 447  |
| 10                  | 44         | 79  | 123    | 177  | 316  | 632  |
| 20                  | 63         | 111 | 174    | 250  | 447  | 894  |
| 30                  | 77         | 136 | 213    | 307  | 548  | 1095 |
| 40                  | 88         | 157 | 246    | 354  | 633  | 1265 |
| 50                  | 99         | 176 | 275    | 396  | 707  | 1414 |
| 60                  | 108        | 193 | 301    | 434  | 775  | 1549 |
| 70                  | 117        | 208 | 325    | 468  | 837  | 1673 |
| 80                  | 125        | 223 | 348    | 501  | 895  | 1789 |
| 90                  | 133        | 236 | 369    | 531  | 949  | 1897 |
| 100                 | 140        | 249 | 389    | 560  | 1000 | 2000 |
| 110                 | 147        | 261 | 408    | 587  | 1049 | 2097 |
| 120                 | 153        | 273 | 426    | 613  | 1096 | 2191 |
| 130                 | 159        | 284 | 443    | 638  | 1140 | 2280 |
| 140                 | 165        | 295 | 460    | 663  | 1183 | 2366 |
| 150                 | 171        | 305 | 476    | 686  | 1225 | 2449 |
| 160                 | 177        | 315 | 492    | 708  | 1265 | 2530 |
| 170                 | 182        | 325 | 507    | 730  | 1304 | 2607 |
| 180                 | 188        | 334 | 522    | 751  | 1342 | 2683 |
| 190                 | 193        | 343 | 536    | 772  | 1379 | 2757 |
| 200                 | 198        | 352 | 550    | 792  | 1414 | 2828 |
| 210                 | 203        | 361 | 563    | 811  | 1449 | 2898 |
| 220                 | 207        | 369 | 577    | 831  | 1483 | 2966 |
| 230                 | 212        | 378 | 590    | 849  | 1517 | 3033 |
| 240                 | 217        | 386 | 602    | 867  | 1549 | 3098 |
| 250                 | 221        | 394 | 615    | 885  | 1581 | 3162 |
| 260                 | 225        | 401 | 627    | 903  | 1613 | 3225 |
| 270                 | 230        | 409 | 639    | 920  | 1643 | 3286 |
| 280                 | 234        | 417 | 650    | 937  | 1673 | 3346 |
| 290                 | 238        | 424 | 662    | 954  | 1703 | 3406 |
| 300                 | 242        | 431 | 673    | 970  | 1732 | 3464 |
| 310                 | 246        | 438 | 684    | 986  | 1761 | —    |
| 320                 | 250        | 445 | 695    | 1002 | 1789 | —    |
| 330                 | 254        | 452 | 706    | 1017 | 1817 | —    |
| 340                 | 258        | 459 | 717    | 1033 | 1844 | —    |
| 350                 | 261        | 466 | 727    | 1048 | 1871 | —    |
| 360                 | 265        | 472 | 738    | 1062 | 1898 | —    |
| 370                 | 269        | 479 | 748    | 1077 | 1924 | —    |
| 380                 | 272        | 485 | 758    | 1092 | 1950 | —    |
| 390                 | 276        | 492 | 768    | 1106 | 1975 | —    |
| 400                 | 280        | 498 | 777    | 1120 | 2000 | —    |

# Kunkle Safety and Relief Products

Models 91, 218 and 228

## Model Number/Order Guide

| Model Number Position | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
|-----------------------|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|
|-----------------------|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|

|         |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|---------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Example | 0 | 9 | 1 | K | — | M | 0 | 1 | A | M | S | 0 | 4 | 0 | 0 |
|---------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

### Model

091  
218  
228

### Connection Model

A - Female x Female NPT  
H - 125# Flange x 125# Flange  
K - 250# Flange x 125# Flange

### Inlet Size

G - 1½"  
H - 2"  
J - 2½"  
K - 3"  
M - 4"  
P - 6"

### Variation (01 to 99)

01 - Catalog standard  
02 - SS seat and disc  
03 - Model 91 w/handwheel (K, M and P inlet only)  
21 - Viton® O-ring  
22 - Viton® O-ring with SS seat and disc

### Design Revision

Indicates non-interchangeable revision.  
Current Design at Revision "A".

### Valve Service

M - Liquid

### Spring Material

C - Aluminum Painted, ASTM A231 Steel (G, H, J inlet sizes only)  
S - Aluminum Painted, ASTM A229 Steel (K, M, P inlet sizes only)

### Set Pressure

0005 - 5 psig  
0400 - 400 psig

## KUNKLE

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Black Mountain, North Carolina 28711-2549  
Facility Phone: 1-828-669-3700

[www.kunklevalve.com](http://www.kunklevalve.com)

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