



Bray®

SERIES 90/91
Double Acting &
Spring Return

PNEUMATIC ACTUATOR

RACK AND PINION

CELEBRATING
20
YEARS

 The
High
Performance
Company

SERIES 90/91

Styling, strength, compactness, and simplicity of design have been combined to produce the best rotary actuator on the market today. Bray Controls is proud to expand this successful line of high performance, highest quality pneumatic actuators, the Series 90/91. We have developed through engineering excellence and precision manufacturing a space saving, modular product line. Many features previously available only as options are built into the Bray Series 90/91.

The Bray space-saving modular product line is completely enclosed and self contained. The many features of the engineered design minimize maintenance and provide safe, simple disassembly and assembly.

The INTEGRAL PORTING (A) reduces the cost of external tubing that is also easily damaged. Offered for the first time to the industry are the unique, lubricated ACETAL PISTON GUIDES (B) and RINGS (C). The acetal piston guides and rings have a very low coefficient of friction and absorb the side thrusts of the pistons. In addition, the piston cylinder walls in the body are honed to a very fine finish thus reducing the overall coefficient of friction. These features extend the life of the actuator and make the Series 90/91 one of the most efficient actuators on the market.

The OUTPUT SHAFT BEARINGS (D) on the top and bottom of the pinion are made of low-friction acetal.



K A

This results in reduced overall size requirements and economic savings. In addition the Brayline Accessories are fully modular and directly mount to the actuator— providing flexibility and efficiency at reduced cost.

Bray Series 90/91 actuators are rack and pinion, opposed-piston actuators available in two versions: double acting for rotation of 90°, 135° and 180°, and spring return for 90° rotation. Their ideal use is actuating butterfly, ball or plug valves, but they can be applied anywhere a rotation of 90°, 135° or 180° is needed. Rotated on low friction acetal bearings, Bray units are well suited to handle

The OUTPUT SHAFT and PINION GEAR (E) are one-piece, manufactured from hardened alloy steel and zinc-plated for corrosion protection.

The SHAFT POSITION INDICATOR (F) clearly shows open or closed position and is easily removable for MANUAL OVERRIDE FUNCTION of the actuator when required.

The BODY (G) is extruded aluminum with anodized corrosion protective coating. The END CAPS (H) are polyester coated for chemical resistance. The coating is generally resistant to dilute aqueous acids, salts, aliphatic hydrocarbons, detergents, petroleum solvents, alcohols, greases and oils.

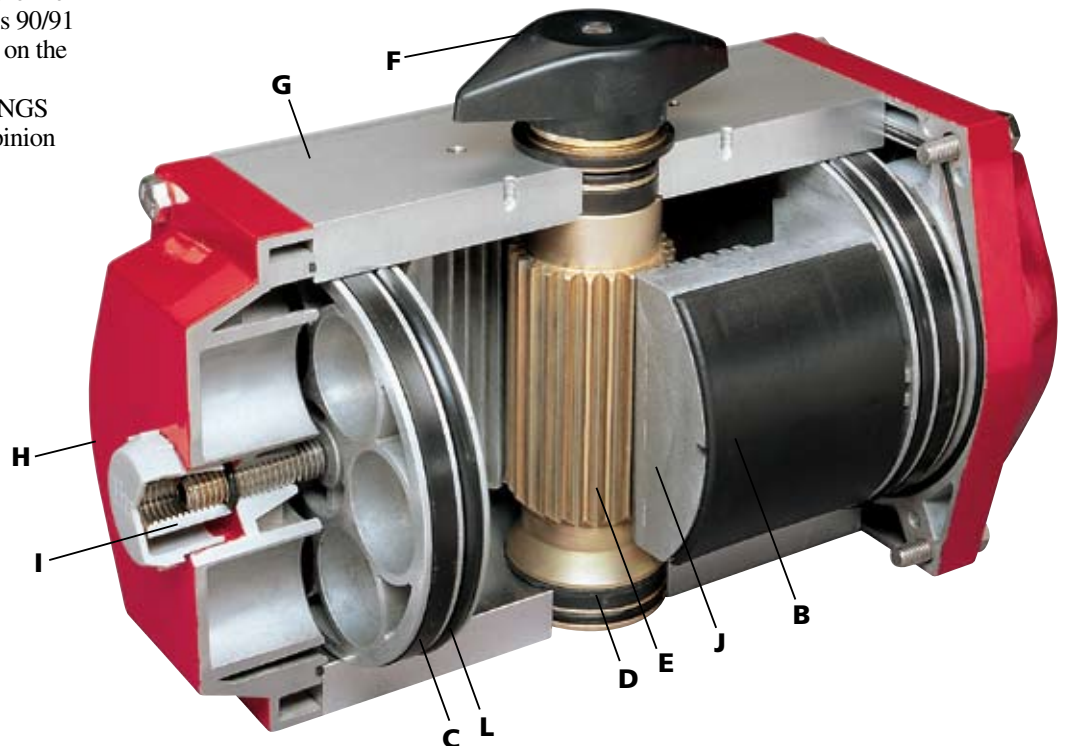
offset loads to the gear and output shaft assembly.

Bray Series 90/91 actuators were designed primarily for pneumatic operation up to a maximum pressure of 140 psig (10 Bar) and for temperature ranges of -40°F (-40°C) to +200°F (+95°C). For higher and lower temperature applications, consult factory. All double acting and spring return units are suitable for both on-off and throttling applications. Actuators which can be actuated with other media such as hydraulic oil or water are also available as an option. Please consult Bray factory for further information.

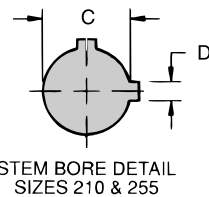
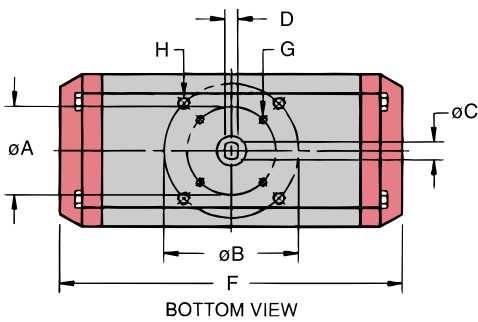
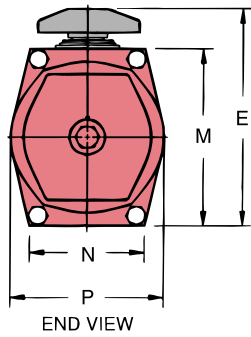
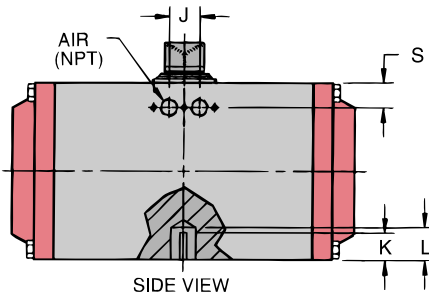
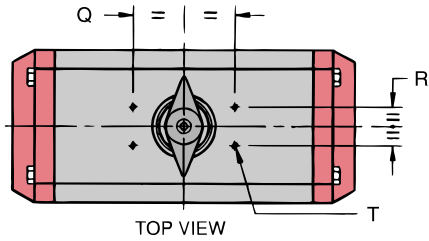
The TRAVEL STOP (I) adjusting screws limit the travel of the actuator to specific degrees of rotation. The PISTONS (J) are die-cast aluminum.

The two PNEUMATIC SUPPLY PORTS (K) are 1/8" NPT on size 92 and smaller actuators. All larger actuators have 1/4" NPT ports. NAMUR interface is available on all actuator sizes.

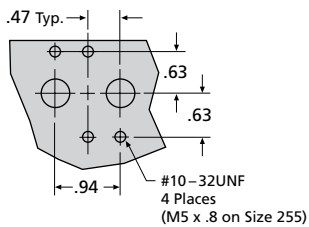
All Bray Series 90/91 actuators have permanently lubricated factory packed bearings and guides. No further lubrication is necessary under normal operating conditions. All seals, including PISTON SEALS (L), are permanently lubricated Buna-N O-rings.



SERIES 90/91 DOUBLE ACTING/ SPRING RETURN



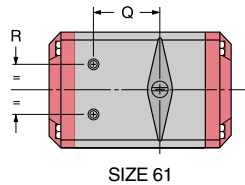
NAMUR SOLENOID MOUNTING
SIZES 118 THROUGH 255



ACTUATOR DIMENSIONS

| SIZE | 61 [†] | 63 | 83 | 92 | 118 | 127 | 160 | 210 | 255 [‡] |
|--------------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|--------------------|
| AIR NPT | 1/8 | 1/8 | 1/8 | 1/8 | 1/4 | 1/4 | 1/4 | 1/4 | 1/4 |
| A ISO *F [†] | 1.97 F 05 | 1.97 F 05 | 1.97 F 05 | 1.97 F 05 | 2.76 F 07 | 2.76 F 07 | — | 4.92 F 12 | 6.50 F 16 |
| B ISO *F [†] | — | 2.76 F 07 | 2.76 F 07 | 2.76 F 07 | 4.92 F 12 | 4.92 F 12 | 4.92 F 12 | 6.50 F 16 | 7.87x4.72 Rect. |
| C | .55 | .55 | .75 | .75 | 1.18 | 1.18 | 1.18 | 1.97 | 2.50 |
| D | .40 | .40 | .51 | .51 | .87 | .87 | .87 | .47 | .62 |
| E | 4.29 | 4.29 | 5.20 | 5.54 | 6.93 | 7.73 | 9.37 | 11.61 | 13.46 |
| F | 4.32 | 5.24 | 7.01 | 8.03 | 11.22 | 11.46 | 14.57 | 17.80 | 26.70 |
| G (UNC) | 1/4-20 x 5/16 | 1/4-20 x 5/16 | 1/4-20 x 5/16 | 1/4-20 x 5/16 | 5/16-18 x 3/8 | 5/16-18 x 3/8 | — | 1/2-13 x 9/16 | 5/8-11 x 3/4 |
| H (UNC) | — | 5/16-18 x 3/8 | 5/16-18 x 3/8 | 5/16-18 x 3/8 | 1/2-13 x 9/16 | 1/2-13 x 9/16 | 1/2-13 x 9/16 | 5/8-11 x 3/4 | 5/8-11 x 3/4 |
| J | .87 | .87 | .87 | .87 | .94 | .94 | .94 | .94 | .94 |
| K | — | — | — | — | — | — | — | 2.76 | 4.25 |
| L | 1.38 | 1.38 | 1.38 | 1.38 | 2.11 | 2.11 | 2.11 | 4.72 | 6.75 |
| M | 3.46 | 3.46 | 4.27 | 4.61 | 5.52 | 6.32 | 7.80 | 10.04 | 11.89 |
| N | 2.36 | 2.36 | 2.57 | 2.76 | 4.15 | 4.07 | 4.33 | 5.32 | 6.30 |
| P | 2.76 | 2.76 | 3.58 | 3.94 | 4.72 | 5.39 | 6.77 | 8.83 | 10.75 |
| Q | 1.58 | 3.15 | 3.15 | 3.15 | 3.15 | 3.15 | 5.12 | 5.12 | 5.12 |
| R | 1.18 | 1.18 | 1.18 | 1.18 | 1.18 | 1.18 | 1.18 | 1.18 | 1.18 |
| S | .57 | .57 | .58 | .56 | .76 | .84 | .84 | 1.04 | 1.06 |
| T (UNF) | No.10-32 x 1/4 | No.10-32 x 1/4 | No.10-32 x 1/4 | No.10-32 x 1/4 | No.10-32 x 1/4 | No.10-32 x 1/4 | No.10-32 x 1/4 | No.10-32 x 1/4 | No.10-32 x 1/4 |

Note: Double Acting (Series 90) and Spring Return (Series 91) actuators have the same overall dimensions.
 * Series 90-61 has only one piston.
 † ISO "F" means mounting flange-drilling pattern.
 ‡ Sizes for Series 90-255A in table. The 90-255B actuator has a C dimension of 3.00 and D dimension of .75.



ACTUATOR SPEEDS

| SIZE | 61 | 63 | 83 | 92 | 118 | 127 | 160 | 210 | 255 |
|------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-------|
| Open Stroke/ Close Stroke | 1/4 | 1/4 | 1/4 | 1/4 | 1/2 | 1/2 | 1 | 2 | 2 3/4 |

Note: Times shown are in seconds at 80 PSIG supply pressure with 6ft of tubing having an internal diameter of approximately 1/4". Bray S90/91 actuation times are very dependent on the flow capacity of their air supply. The use of smaller port solenoids, solenoid manifolds, smaller I.D. air supply tubing and/or extended lengths of tubing can significantly reduce the actuation time and/or initial response to the command signal.

ACTUATOR WEIGHTS

| SIZE | 61 | 63 | 83 | 92 | 118 | 127 | 160 | 210 | 255 |
|-----------|-----|-----|-----|-----|------|------|------|------|-------|
| Series 90 | 2.5 | 3.0 | 5.5 | 7.3 | 15.5 | 19.0 | 35.0 | 65.0 | 144.0 |
| Series 91 | 2.8 | 3.6 | 7.1 | 9.5 | 19.9 | 25.2 | 49.2 | 95.3 | 192.6 |

Weights are in lbs. Series 91 weights are with full set of 6 springs per piston.

ACTUATOR VOLUMES (ins³)

PISTON DISPLACEMENT

| SIZE | 61 | 63 | 83 | 92 | 118 | 127 | 160 | 210 | 255 |
|-------------------|------|------|------|------|------|------|-------|-------|-------|
| Counter-clockwise | 8.34 | 9.35 | 20.5 | 28.9 | 62.0 | 74.2 | 140.6 | 309.5 | 734.1 |
| Clockwise | 5.14 | 5.98 | 13.6 | 20.4 | 47.2 | 58.3 | 115.4 | 239.1 | 574.0 |

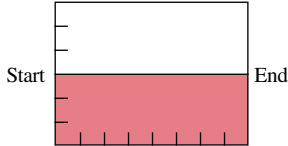
Volume of air in cubic inches required for 90° operation.

Special Note: S90/91, size 61 has been replaced by size 48. S90/91 sizes 48-127 are now offered in the S92/93 Product Line. For S92/93 sizes 160-255 production release date, please contact your Bray Representative.

TORQUE

DOUBLE ACTING TORQUE CURVE

Series 90 – (Air to Air)



The Series 90 Actuator has a constant output torque throughout travel from start to end, clockwise or counterclockwise rotation.

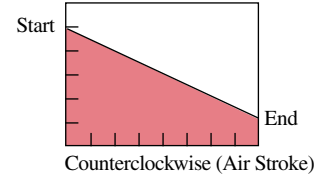
SERIES 90 ACTUATOR TORQUE DATA

Double Acting Pneumatic Operated
Torque Output (Lb.-Ins.)

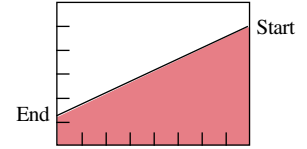
| Actuator Size | Air Supply Pressure (PSIG) | | | | |
|---------------|----------------------------|-------|-------|-------|-------|
| | 40 | 60 | 80 | 100 | 120 |
| 61 | 72 | 110 | 148 | 186 | 224 |
| 63 | 145 | 221 | 297 | 373 | 449 |
| 83 | 351 | 536 | 721 | 906 | 1091 |
| 92 | 493 | 753 | 1013 | 1272 | 1532 |
| 118 | 1058 | 1615 | 2171 | 2728 | 3285 |
| 127 | 1410 | 2152 | 2894 | 3636 | 4378 |
| 160 | 2797 | 4270 | 5742 | 7214 | 8687 |
| 210 | 5783 | 8826 | 11870 | 14914 | 17957 |
| 255 | 14211 | 21691 | 29171 | 36650 | 44130 |

SINGLE ACTING TORQUE CURVES

Series 91 – (Spring Return)



Counterclockwise (Air Stroke)



Clockwise (Spring Stroke)

SERIES 91 ACTUATOR TORQUE DATA Air Operated, With Spring Return, Torque Output (Lb.-Ins.)

| Actuator Size | No. Springs per Piston | Air Supply Pressure (PSIG) | | | | | | | | | | | |
|---------------|------------------------|----------------------------|------|-------|-------|-------|-------|-------|-------|-------|-------|---------------|-------|
| | | 40 | | 60 | | 80 | | 100 | | 120 | | Spring Stroke | |
| | | Start | End | Start | End | Start | End | Start | End | Start | End | Start | End |
| 61* | 2 | 45 | 32 | 83 | 70 | 121 | 108 | 159 | 146 | 197 | 184 | 40 | 27 |
| | 3 | 31 | 13 | 69 | 51 | 107 | 89 | 145 | 127 | 183 | 165 | 59 | 41 |
| | 4 | | | 56 | 32 | 94 | 70 | 132 | 108 | 170 | 146 | 78 | 54 |
| | 5 | | | 42 | 13 | 80 | 51 | 118 | 89 | 156 | 127 | 97 | 68 |
| | 6 | | | | | 67 | 32 | 105 | 70 | 143 | 108 | 116 | 81 |
| 63 | 2 | 91 | 65 | 167 | 141 | 243 | 217 | 319 | 293 | 395 | 369 | 80 | 54 |
| | 3 | 64 | 27 | 140 | 103 | 216 | 179 | 292 | 255 | 368 | 331 | 118 | 81 |
| | 4 | | | 113 | 65 | 189 | 141 | 265 | 217 | 341 | 293 | 156 | 108 |
| | 5 | | | 86 | 27 | 162 | 103 | 238 | 179 | 314 | 255 | 194 | 135 |
| | 6 | | | | | 135 | 65 | 211 | 141 | 287 | 217 | 232 | 162 |
| 83 | 2 | 210 | 167 | 395 | 352 | 580 | 537 | 765 | 722 | 950 | 907 | 184 | 141 |
| | 3 | 156 | 76 | 341 | 261 | 526 | 446 | 711 | 631 | 896 | 816 | 275 | 195 |
| | 4 | | | 281 | 176 | 466 | 361 | 651 | 546 | 836 | 731 | 360 | 255 |
| | 5 | | | 220 | 97 | 405 | 282 | 590 | 467 | 775 | 652 | 439 | 316 |
| | 6 | | | | | 369 | 185 | 554 | 370 | 739 | 555 | 536 | 352 |
| 92 | 2 | 310 | 232 | 570 | 492 | 830 | 752 | 1089 | 1011 | 1349 | 1271 | 261 | 183 |
| | 3 | 218 | 101 | 478 | 361 | 738 | 621 | 997 | 880 | 1257 | 1140 | 392 | 275 |
| | 4 | | | 386 | 231 | 646 | 491 | 905 | 750 | 1165 | 1010 | 522 | 367 |
| | 5 | | | 294 | 94 | 554 | 354 | 813 | 613 | 1073 | 873 | 659 | 459 |
| | 6 | | | | | 462 | 229 | 721 | 488 | 981 | 748 | 784 | 551 |
| 118 | 2 | 692 | 469 | 1249 | 1026 | 1805 | 1582 | 2362 | 2139 | 2919 | 2696 | 589 | 366 |
| | 3 | 509 | 174 | 1066 | 731 | 1622 | 1287 | 2179 | 1844 | 2736 | 2401 | 884 | 549 |
| | 4 | | | 883 | 437 | 1439 | 993 | 1996 | 1550 | 2553 | 2107 | 1178 | 732 |
| | 5 | | | 700 | 142 | 1256 | 698 | 1813 | 1255 | 2370 | 1812 | 1473 | 915 |
| | 6 | | | | | 1073 | 404 | 1630 | 961 | 2187 | 1518 | 1767 | 1098 |
| 127 | 2 | 880 | 465 | 1622 | 1207 | 2364 | 1949 | 3106 | 2691 | 3848 | 3433 | 945 | 530 |
| | 3 | | | 1357 | 733 | 2099 | 1475 | 2841 | 2217 | 3583 | 2959 | 1419 | 795 |
| | 4 | | | 1094 | 261 | 1836 | 1003 | 2578 | 1745 | 3320 | 2487 | 1891 | 1058 |
| | 5 | | | | | 1568 | 529 | 2310 | 1271 | 3052 | 2013 | 2365 | 1326 |
| | 6 | | | | | 1302 | 57 | 2044 | 799 | 2786 | 1541 | 2837 | 1592 |
| 160 | 2 | 1819 | 1118 | 3292 | 2591 | 4764 | 4063 | 6236 | 5535 | 7709 | 7008 | 1679 | 978 |
| | 3 | 1399 | 349 | 2872 | 1822 | 4344 | 3294 | 5816 | 4766 | 7289 | 6239 | 2448 | 1398 |
| | 4 | | | 2452 | 1123 | 3924 | 2595 | 5396 | 4067 | 6869 | 5540 | 3147 | 1818 |
| | 5 | | | 2030 | 353 | 3502 | 1825 | 4974 | 3297 | 6447 | 4770 | 3917 | 2240 |
| | 6 | | | | | 3154 | 1196 | 4626 | 2668 | 6099 | 4141 | 4546 | 2588 |
| 210 | 2 | 3833 | 2508 | 6876 | 5551 | 9920 | 8595 | 12964 | 11639 | 16007 | 14682 | 3275 | 1950 |
| | 3 | 2859 | 868 | 5902 | 3911 | 8946 | 6955 | 11990 | 9999 | 15033 | 13042 | 4915 | 2924 |
| | 4 | | | 4930 | 2275 | 7974 | 5319 | 11018 | 8363 | 14061 | 11406 | 6551 | 3896 |
| | 5 | | | 3949 | 638 | 6993 | 3682 | 10037 | 6726 | 13080 | 9769 | 8188 | 4877 |
| | 6 | | | | | 6022 | 2031 | 9066 | 5075 | 12109 | 8118 | 9839 | 5848 |
| 255 | 2 | 9487 | 6747 | 16967 | 14227 | 24447 | 21707 | 31926 | 29186 | 39406 | 36666 | 7464 | 4724 |
| | 3 | 7125 | 3015 | 14605 | 10495 | 22085 | 17975 | 29564 | 25454 | 37044 | 32934 | 11196 | 7086 |
| | 4 | | | 12243 | 6762 | 19723 | 14242 | 27202 | 21721 | 34682 | 29201 | 14929 | 9448 |
| | 5 | | | 9880 | 3030 | 17360 | 10510 | 24839 | 17989 | 32319 | 25469 | 18661 | 11811 |
| | 6 | | | | | 14998 | 6778 | 22477 | 14257 | 29957 | 21737 | 22393 | 14173 |

*Size 61 has only one piston.

TRAVEL STOP The travel stop adjustment is a built-in feature of the Bray product line. Adjusting screws are located in both end caps to precisely adjust the travel of the actuator to specific degrees of rotation. The travel stop permits field readjusting of actuator movement to open or closed positions.



SPRING RETURN Bray's Series 91 spring return models employ a unique cartridge system. The spring cartridges offer our customers safety, simplicity and reduced space requirements. The unit's primary design advantages are:

- 1) The actuator was designed to save both space and cost. The housing length of the spring return unit is the same as the double acting unit. Converting from double acting to spring return actuation is just a matter of removing the end caps and adding the unique spring cartridges.
- 2) The spring cartridges provide for complete safety of handling. The actuator can be disassembled and assembled without cumbersome equipment or danger to the installer due to springs releasing.
- 3) The standard spring cartridge system is available for 40, 60, 80, and 100 psi services. For other psi requirements, consult factory.



DIRECT MOUNTING Bray actuators comply with ISO 5211 dimensions and mount directly to Bray valves without using external linkages. Field installation is simple, misalignment is minimized and contamination buildup between valve and actuator is reduced. Bray can provide linkage for mounting actuators to other devices requiring 90° to 180° rotation.

BrayLINE

ACCESSORIES

SERIES 63 3-WAY AND 4-WAY SOLENOID VALVE

For electrical operation of pneumatic actuator on-off functions, Bray Series 63 solenoids are direct-mounted to the actuator by NAMUR interface. The pilot operated spool control valve is convertible from 3-Way (3/2) to 4-Way (5/2). Both watertight (NEMA 4, 4X) and explosion proof (NEMA 4, 4X, 7, 9) housings are standard. NPT and

IP65 DIN connections are offered with both single and dual coils. The air supply connection is 1/4" NPT and the electrical connection is 1/2" NPT. A manual override screw is located on the top of the valve body. Stainless Steel housings, digital Bus solenoids and a Series 55 speed control that allows independent control in both directions of travel are also available.



VALVE STATUS MONITOR

SERIES 50 The Series 50 signals actuator and valve position to local and remote stations. The compact valve status monitor mounts directly to the top of the actuator. Features include finger-touch control cams, captive cover bolts, local position indicator and two conduit entries for easy wiring. Rated for 15 amps at 125 or 250 volts AC, the Series 50 is provided with internal travel switches that are prewired to a terminal block. Standard switches are two single pole double throw (SPDT) micro switches. Available switch options are 4 micro switches, 2 proximity switches, 2 pneumatic switches or potentiometer for continuous read out. The housing is available in waterproof (NEMA 4, 4X) or explosion proof (NEMA 4, 4X, 7, 9).



SERIES 52 VALVE STATUS MONITOR

The Bray 2N1 ProxSensor provides 2 proximity sensors in 1 self-contained, fully sealed, compact enclosure. The sensors are completely encapsulated with epoxy resin in a polymer enclosure for superior moisture, chemical and corrosion protection. AC, DC, Intrinsically Safe and BUS Network versions are offered. Features include LED indicators, high visibility pointer for local position indication, non-magnetic targets and multi-pin electrical cable connector. A Valve Position Display is available as an option. AC Sensor units operate on 20-250 VAC with a maximum load current of 500mA. DC Sensor units operate on 10-30VDC with a maximum load current of 200mA. BUS Network powered units with solenoid drive are AS-i, DeviceNet and PROFIBUS DP.



SERIES 6A ELECTRO-PNEUMATIC POSITIONERS

Series 6A intelligent electro-pneumatic positioners offer precise, microprocessor driven flow control and advanced communication combined with the lowest air consumption on the market. For use with either double or single acting actuators, Series 6A positioners can accept an analog 4-20 mA, HART, Foundation Fieldbus or Profibus PA input signal. Features include an LCD display, keypad, auto calibration and adaptive control. Both waterproof (NEMA 4, 4X) and explosion proof (NEMA 4, 4X, 7, 9) housings are available.

Brayline Accessories and Bray Actuators both comply with VDI/VDE 3845 (NAMUR recommendations).

SPECIFICATIONS

SPACE SAVING MODULAR PRODUCT LINE

The actuator shall be pneumatically operated and must travel a minimum of 90° in each direction and must be able to overtravel at 3% in each direction past 90°. The actuator shall be totally enclosed and contained in a single enclosure, with no external moving parts. All pneumatic passage ways must be integral to the actuator housing so as to eliminate the need for external tubing. Actuator shall be rack and pinion design, and the output torque shall be linear throughout travel. Actuator shall be provided with pistons that have acetal piston guides and rings thus greatly extending the life of the actuator and reducing friction to the minimum. Actuator must be supplied with end of travel adjustments integral with the actuator end caps. The actuator shall be provided with mechanical visual position indicator, and the indicator must be able to be removed easily thus exposing the output shaft for use of manually overriding the actuator when needed. The output shaft and pinion must be of one piece and must be manufactured out of hardened alloy

steel and zinc plated for corrosion protection.

Actuator shall be able to mount in any position without loss of performance. The actuator shall bolt directly to Bray valve mounting flange without need for any brackets.

Actuator housing shall be anodized aluminum and all external fasteners shall be carbon steel, zinc plated. Springs shall be spring steel, coated for corrosion protection. All seals shall be Buna-N and bearings made of lubricated acetal resin.

The actuator shall be factory lubricated. Actuator design must have smooth housing lines so it will self-drain. The actuator shall be factory tested to ensure proper operation.

STANDARD MATERIALS

- Body: Extruded aluminum alloy, anodized
- End Caps: Die cast aluminum alloy with corrosion resistant polyester coating
- Pistons: Die cast aluminum alloy
- Output Shaft/Pinion: Carbon steel, zinc plated (yellow)
- Shaft Bearings: Acetal
- Piston Guides: Acetal
- Fasteners: Stainless steel
- Springs: Spring steel, protective coating
- O-Ring Seals: Buna-N
- Options: Polyester coated body exterior
Electroless Nickel plated body exterior
Hard Anodized body exterior
Stainless steel pinion

SPRING RETURN – MODULAR DESIGN

The Spring Return System for fail-safe services must be installed in the same housing as the double acting actuator, with no additional housing extensions required, therefore saving weight and space. The spring system must be supplied as a self-contained spring cartridge system. This is a safety feature that ensures disassembly of the actuator without danger of spring release when end caps are removed. Actuator shall be Bray Series 90 or 91 or approved equal.

SERVICE DATA:

Actuators shall be designed for pneumatic operation up to a maximum pressure of 140 PSIG (10 Bar) and for temperature ranges of -40°F (-40°C) to +200°F (+95°C). Filtered air is recommended but not required. All double acting and spring return units shall be suitable for both on-off and throttling applications. Optional units shall be able to operate with other media such as hydraulic oil or water, consult factory for further information.

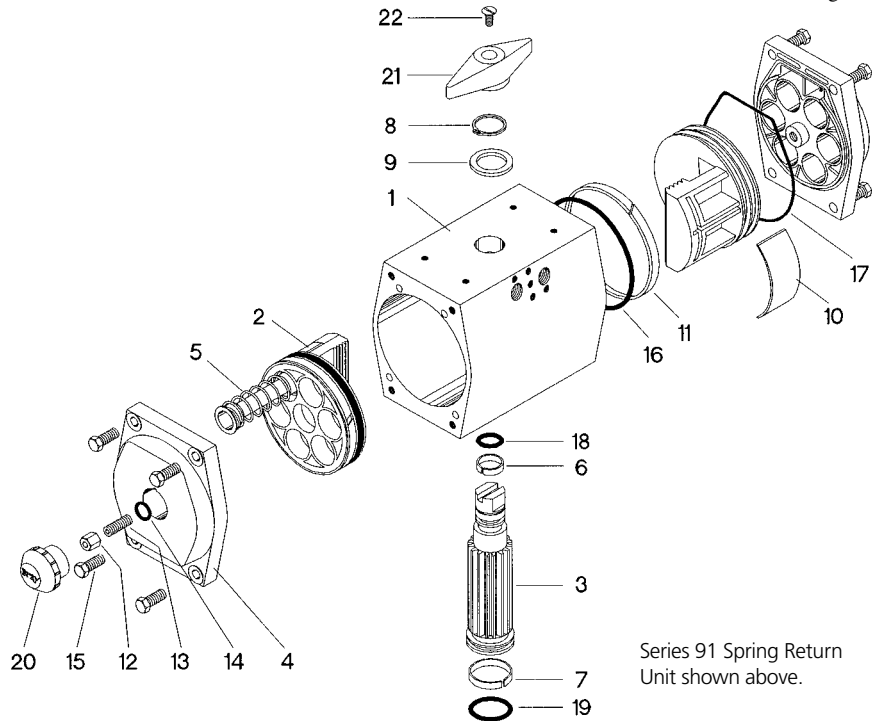
OPTIONAL EQUIPMENT

See Bray brochure #1010 for Solenoid, brochure #1011 for Pneumatic and Electro-Pneumatic Positioners and brochures #1012 and #1015 for Valve Status Monitors.

ACTUATOR COMPONENTS

| Item No. | Qty. | Description |
|----------|---------|-----------------------------|
| 1 | 1 | Body |
| 2 | 2 | Piston |
| 3 | 1 | Pinion |
| 4 | 2 | End Cap |
| 5* | 12 max. | Spring Cartridge Assembly |
| 6 | 1 | Upper Bearing |
| 7 | 1 | Lower Bearing |
| 8 | 1 | Retaining Ring |
| 9 | 1 | Nylon Washer |
| 10 | 2 | Acetal-Bearing Pad |
| 11 | 2 | Acetal-Guide Ring |
| 12 | 2 | Stop Nut |
| 13 | 2 | Travel Adjusting Screw Stop |
| 14 | 2 | O-Ring-Travel Stop |
| 15 | 8 | Hex Head Cap Screw |
| 16 | 2 | O-Ring-Piston |
| 17 | 2 | O-Ring-End Cap |
| 18 | 1 | O-Ring-Shaft-Top |
| 19 | 1 | O-Ring-Shaft-Bottom |
| 20 | 2 | Dust Cap |
| 21 | 1 | Indicator Pointer |
| 22 | 1 | Indicator Pointer Screw |

*Not included in Series 90 Double Acting.



Series 91 Spring Return Unit shown above.

DISTRIBUTOR



All statements, technical information, and recommendations in this bulletin are for general use only. Consult Bray representatives or factory for the specific requirements and material selection for your intended application. The right to change or modify product design or product without prior notice is reserved.

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Bray CONTROLS

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