Bray

PNEUMATIC ACTUATOR

SERIES 92/93 Rack & Pinion
Double Acting & Spring Return

The
High
Performance
Company

SERIES 92/93

Styling, strength, compactness, and simplicity of design have been combined to produce the best rotary actuator on the market today. Bray Controls introduces this newest line of high performance, highest quality pneumatic actuators, the Series 92/93.

Engineering excellence and precision manufacturing has produced a modular product line with reduced overall size requirements and economic savings. In addition all Brayline Accessories are fully modular and directly mount to the actuator – providing flexibility and efficiency at reduced cost.

Bray Series 92/93 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 offset loads to the gear and output shaft assembly.

The Series 92/93 actuators were designed primarily for pneumatic operation up to a maximum pressure of 10 bar (140 psig) and for temperature ranges of -40°C (-40°F) to +95°C (+200°F). 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.

The Series 92/93 is completely enclosed and self contained. The many features minimize maintenance and provide safe, simple disassembly and assembly.

The INTEGRAL PORTING (**A**) reduces the cost of external tubing that is also easily damaged. The unique, lubricated ACETAL PISTON GUIDES (**B**) and RINGS (**C**). Both have a very low coefficient of friction and absorb the side thrusts of the pistons. 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 92/93 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.

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

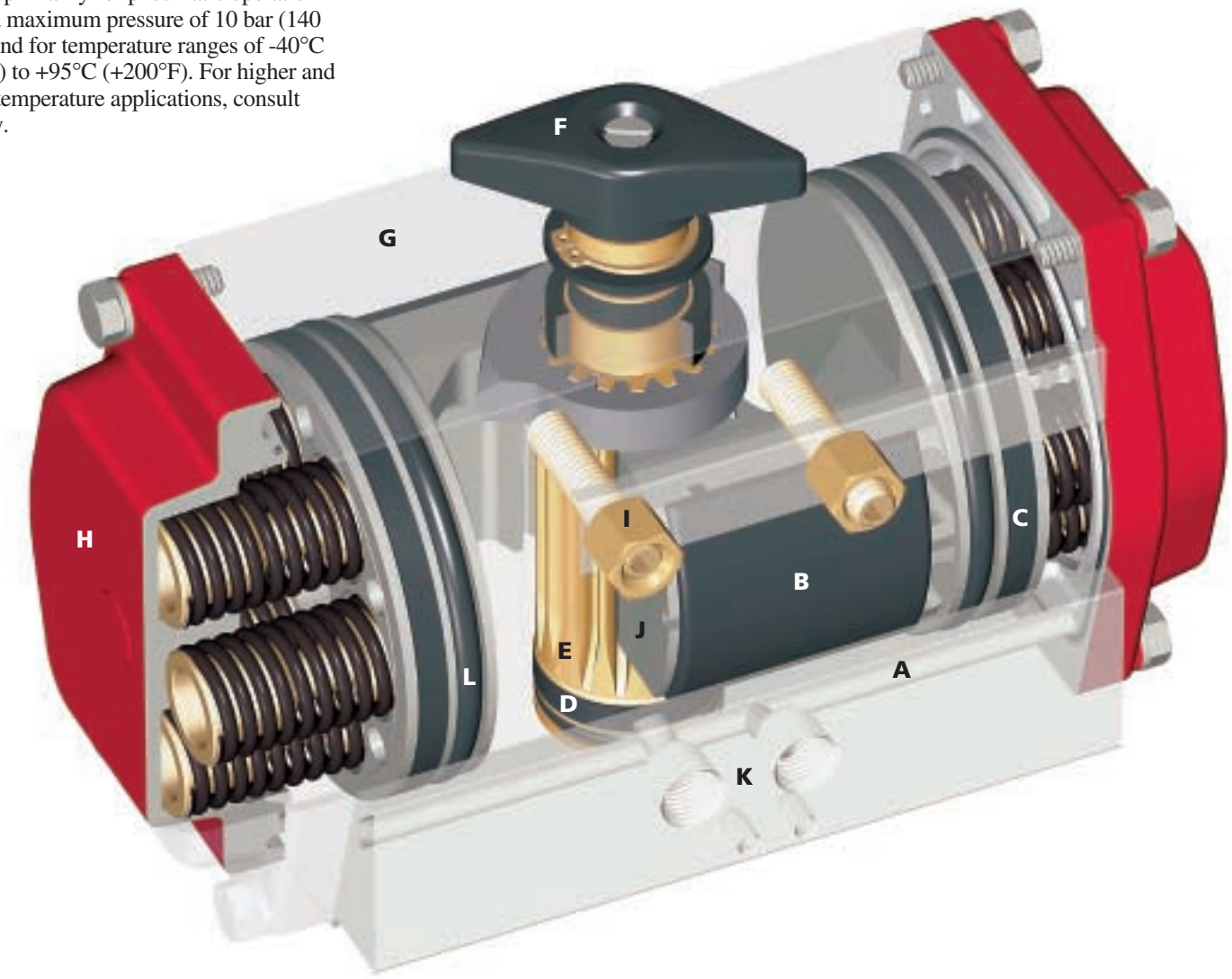
The SHAFT POSITION INDICATOR (**F**) clearly shows open or closed position and is easily removable for MANUAL OVERRIDE FUNCTION of the actuator.

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

The TRAVEL STOP (**I**) adjusting screws limit the travel of the actuator to specific degrees of rotation in both open and closed directions. The PISTONS (**J**) are die-cast aluminum.

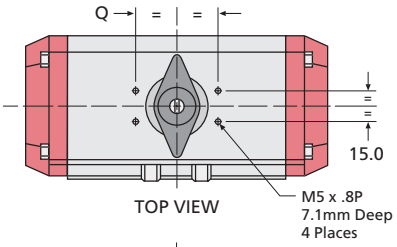
The two PNEUMATIC SUPPLY PORTS (**K**) are G1/8 on size 48 actuators. The other sizes have G1/4 ports. NAMUR interface is standard on all actuator sizes.

All Bray Series 92/93 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.

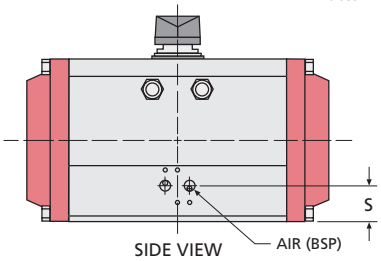


ENGINEERING

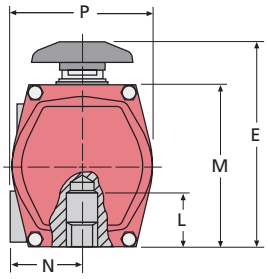
Double Acting/ Spring Return



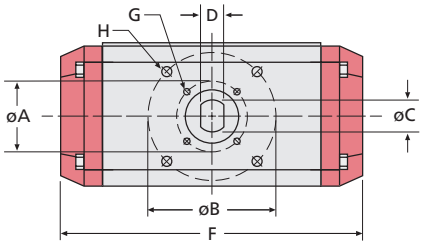
TOP VIEW



SIDE VIEW

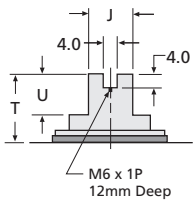


END VIEW

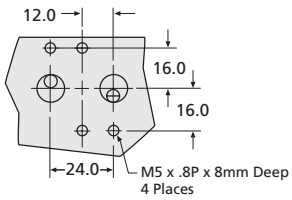


BOTTOM VIEW
ISO 5211 ACTUATOR
MOUNTING PATTERN

NAMUR OUTPUT
SHAFT TOP



NAMUR SOLENOID
MOUNTING



Special Note: Sizes 210 and 255 actuators have endcap travel stops not bi-directional travel stops. Please consult factory for production release date of bi-directional stops for these size S92/93 actuators.

SERIES 92/93 DIMENSIONS

SIZE	48	63	83	92	118	127	160*	210	255‡
AIR BSP	G1/8	G1/4	G1/4	G1/4	G1/4	G1/4	G1/4	G1/4	G1/4
A ISO "F"	35 F03	50 F05	50 F05	50 F05	70 F07	70 F07	—	125 F12	165 F16
B ISO "F"	50 F05	70 F07	70 F07	70 F07	125 F12	125 F12	125 F12	165 F16	200 x120 Rect.
C	14	14	19	19	30	30	30	50	64
D	10	10	13	13	22	22	22	12	16
E	99	115	138	147	185	205	238	291	339
F	102	142	188	218	302	313	395	452	678
G	M5 x 6	M6 x 8	M6 x 8	M6 x 8	M8 x 12	M8 x 12	—	M12 x 20	M16 x 2 x 28mm
H	M6 x 6	M8 x 10	M8 x 10	M8 x 10	M12 x 18	M12 x 18	M12 x 20	M16 x 28	M16x2 x 28mm
J	10	10	13	13	28	28	28	28	28
L	33	35	37	37	56	56	56	70	108
M	64	88	108	117	140	161	198	255	302
N	41	44	51	55	64	69	78	108	121
P	56	79	97	106	125	138	173	224	273
Q	40	40	40	40	40	40	65	65	65
S	32	23	23	24	35	35	35	37	38
T	28**	20	20	20	20	20	30	30	30
U	12	12	12	12	12	12	19	19	19

Note: Double Acting and Spring Return actuators have the same overall dimensions. The double acting unit of the size 48 actuator is optionally available with flat end caps with an F dimension of 4.00.
* Dimensions for Size 160A in table. Size 160B (keyed stem version) has C dimension of 35 and D dimension of 10.
‡ Dimensions for Size 255A in table. Size 255B actuator has a C dimension of 76.2 and D dimension of 19. Size 255C has a C dimension of 60 and a D dimension of 18. Size 255D has a C dimension of 75 and a D dimension of 20.
** Size 48 has a T dimension of 20 with use of NAMUR top plate.

Actuator Speeds (Seconds)

SIZE	48	63	83	92	118	127	160	210	255
Open Stroke/ Close Stroke	0.25	0.25	0.25	0.25	0.5	0.5	1.0	2.0	2.75

Times are in seconds, at 5.5 bar with 2 meters tubing, internal diameter approximately 6mm.

Actuator Weights (kgs)

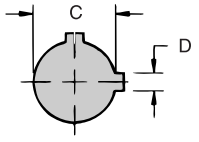
SIZE	48	63	83	92	118	127	160	210	255
Double Acting	.08	1.5	2.8	3.8	7.4	9.5	17.3	29.5	65.3
Spring Return	1.1	1.9	3.6	4.9	9.8	12.4	23.9	43.2	87.4

Weights are in kgs. Spring Return unit weights are with full set of springs per piston.

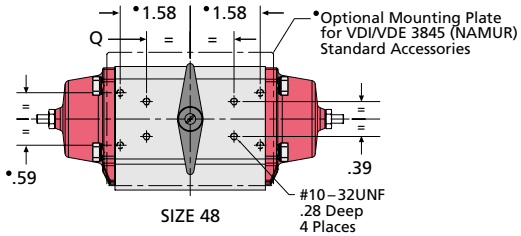
Actuator Volumes (cm^3)

SIZE	48	63	83	92	118	127	160	210	255
Counter-clockwise	93.4	157.3	406.4	570.3	1209.4	1584.6	3072.6	5899.3	12290.3
Clockwise	78.7	219.6	534.2	752.2	1565.0	2143.4	4254.1	7374.2	14748.4

Counter-clockwise: Air volume in cubic centimeters required to push pistons apart, full travel.
Clockwise: Air volume in cubic centimeters required to push pistons together, full travel.



STEM BORE DETAIL
SIZES 210 & 255

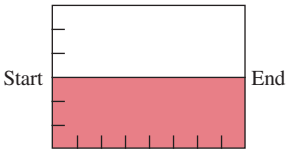


SIZE 48

TORQUE

DOUBLE ACTING TORQUE CURVE

Series 92 – (Air to Air)



The Series 92 Actuator has a constant output torque throughout travel from start to end, clockwise or counterclockwise rotation.

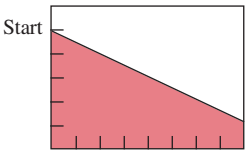
SERIES 92 ACTUATOR TORQUE DATA (Nm)

Double Acting Pneumatic Operated
Torque Output

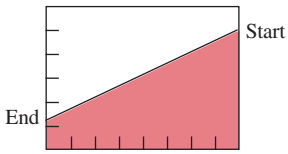
Actuator Size	Air Supply Pressure (bar)				
	3	4	5.5	7	8
48	8.5	12.8	16.9	21.2	25.4
63	16.4	25.0	33.6	42.1	50.7
83	39.7	60.6	81.5	102.4	123.3
92	55.7	85.1	114.5	143.7	173.1
118	119.5	182.5	245.3	308.2	371.2
127	159.3	243.1	327.0	410.8	494.6
160	316.0	482.4	648.8	815.1	981.5
210	653.4	997.2	1341.1	1685.1	2028.9
255	1605.6	2450.8	3295.9	4140.9	4986.0

SINGLE ACTING TORQUE CURVES

Series 93 – (Spring Return)



Counterclockwise (Air Stroke)



Clockwise (Spring Stroke)

SERIES 93 ACTUATOR TORQUE DATA (Nm)

Air Operated, With Spring Return, Torque Output

Actuator Size	No. Springs per Piston	Air Supply Pressure (bar)											
		3		4		5.5		7		8		Spring Stroke	
		Start	End	Start	End	Start	End	Start	End	Start	End	Start	End
48	1	5.8	3.6	10.1	7.9	14.2	12.1	18.5	16.4	22.7	20.6	4.9	2.7
	2/1	4.4	1.1	8.7	5.4	12.9	9.6	17.2	13.9	21.4	18.1	7.3	4.1
	2			7.2	3.1	11.4	7.2	15.7	11.5	19.9	15.7	9.7	5.5
	3/2			5.9	0.6	10.1	4.7	14.3	9.0	18.5	13.2	12.2	6.9
	3					8.77	2.4	13.0	6.7	17.2	10.8	14.6	8.2
63	2	10.3	7.3	18.9	15.9	27.5	24.5	36.0	33.1	44.6	41.7	9.0	6.1
	3	7.2	3.1	15.8	11.6	24.4	20.2	33.0	28.8	41.6	37.4	13.3	9.2
	4			12.8	7.3	21.4	15.9	29.9	24.5	38.5	33.1	17.6	12.2
	5			9.7	3.1	18.3	11.6	26.9	20.2	35.5	28.8	21.9	15.3
	6					15.3	7.3	23.8	15.9	32.4	24.5	26.2	18.3
83	2	23.7	18.9	44.6	39.8	65.5	60.7	86.4	81.6	107.3	102.5	20.8	15.9
	3	17.6	8.6	38.5	29.5	59.4	50.4	80.3	71.3	101.2	92.2	31.1	22.0
	4			31.7	19.9	52.7	40.8	73.6	61.7	94.5	82.6	40.7	28.8
	5			24.9	11.0	45.8	31.9	66.7	52.8	87.6	73.7	49.6	35.7
	6					41.7	20.9	62.6	41.8	83.5	62.7	60.6	39.8
92	2	35.0	26.2	64.4	55.6	93.8	85.0	123.0	114.2	152.4	143.6	29.5	20.7
	3	24.6	11.4	54.0	40.8	83.4	70.2	112.6	99.4	142.0	128.8	44.3	31.1
	4			43.6	26.1	73.0	55.5	102.3	84.7	131.6	114.1	59.0	41.5
	5			33.2	10.6	62.6	40.0	91.9	69.3	121.2	98.6	74.5	51.9
	6					52.2	25.9	81.5	55.1	110.8	84.5	88.6	62.3
118	2	78.2	53.0	141.1	115.9	203.9	178.7	266.9	241.7	329.8	304.6	66.5	41.4
	3	57.5	19.7	120.4	82.6	183.3	145.4	246.2	208.3	309.1	271.3	99.9	62.0
	4			99.8	49.4	162.6	112.2	225.5	175.1	288.5	238.1	133.1	82.7
	5			79.1	16.0	141.9	78.9	204.8	141.8	267.8	204.7	166.4	103.4
	6					121.2	45.6	184.2	108.6	247.1	171.5	199.6	124.1
127	2	99.4	52.5	183.3	136.4	267.1	220.2	350.9	304.0	434.8	387.9	106.8	59.9
	3	0.0	0.0	153.3	82.8	237.2	166.7	321.0	250.5	404.8	334.3	160.3	89.8
	4	0.0	0.0	123.6	29.5	207.4	113.3	291.3	197.2	375.1	281.0	213.7	119.5
	5	0.0	0.0	0.0	0.0	177.2	59.8	261.0	143.6	344.8	227.4	267.2	149.8
	6	0.0	0.0	0.0	0.0	147.1	6.4	230.9	90.3	314.8	174.1	320.5	179.9
160	2	205.5	126.3	371.9	292.7	538.3	459.1	704.6	625.4	871.0	791.8	189.7	110.5
	3	158.1	39.4	324.5	205.9	490.8	372.2	657.1	538.5	823.5	704.9	276.6	158.0
	4			277.0	126.9	443.4	293.2	609.7	459.5	776.1	625.9	355.6	205.4
	5			229.4	39.9	395.7	206.2	562.0	372.5	728.4	538.9	442.6	253.1
	6					356.4	135.1	522.7	301.4	689.1	467.9	513.6	292.4
210	2	433.1	283.4	776.9	627.2	1120.8	971.1	1464.7	1315.0	1808.5	1658.8	370.0	220.3
	3	323.0	98.1	666.8	441.9	1010.8	785.8	1354.7	1129.7	1698.5	1473.5	555.3	330.4
	4			557.0	257.0	900.9	601.0	1244.9	944.9	1588.7	1288.7	740.2	440.2
	5			446.2	72.1	790.1	416.0	1134.0	759.9	1477.8	1103.7	925.1	551.0
	6					680.4	229.5	1024.3	573.4	1368.1	917.2	1111.7	660.7
255	2	1071.9	762.3	1917.0	1607.4	2762.1	2452.6	3607.2	3297.6	4452.3	4142.7	843.3	533.7
	3	805.0	340.6	1650.1	1185.8	2495.3	2030.9	3340.3	2875.9	4185.4	3721.0	1265.0	800.6
	4			1383.3	764.0	2228.4	1609.1	3073.4	2454.1	3918.5	3299.3	1686.8	1067.5
	5			1116.3	342.3	1961.4	1187.5	2806.4	2032.5	3651.6	2877.6	2108.4	1334.5
	6					1694.5	765.8	2539.6	1610.8	3384.7	2456.0	2530.1	1601.3

TRAVEL STOP Two independent adjusting screws are located on the center of the output shaft to precisely limit the travel of the actuator to specific degrees of rotation. The travel stops permit bidirec-tional adjustment of actuator movement in both the open and closed positions.

SPRING RETURN Bray's Series 93 spring return models employ a unique cartridge system. 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. The actuator can be disassembled and assembled without cumbersome equipment or danger to the installer due to springs releasing. 40, 60, 80, and 100 psi services are standard, optional ratings are available.

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 IP65 (NEMA 4, 4X), Intrinsically Safe EEx ia IIC (ATEX compliant) and Explosion proof EExd IIC (ATEX compliant) (NEMA 4,4X,7,9) housings are standard. Other coils available upon request. IP65 DIN connector (PG9), M20 and 1/2" NPT connections are offered with both single and dual coils. The air supply connection is G1/4. 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 IP65 (NEMA 4,4X).

SERIES 52 VALVE STATUS MONITOR

The Bray 2N1 ProxSensor provides 2 inductive proximity sensors in 1 self-contained, fully sealed, compact enclosure. The 2 sensors are completely encapsulated with epoxy resin in a nylon enclosure for superior moisture, chemical and corrosion protection. Features include LED indicators, high visibility pointer for local position indication, non-magnetic target and multi-pin electrical cable connector. The Series 52 mounts directly to Bray actuators or can be mounted to signal valve position of manually operated valves. AC, DC and NAMUR intrinsically safe versions are available. AC Sensor units operate on 20-250 VAC with a maximum load current of 500mA. DC Sensor units operate on 10-65VDC with a maximum load current of 200mA.

SERIES 67 ELECTRO-PNEUMATIC & PNEUMATIC POSITIONERS

The Bray Series 67 positioners feature a modular design that allows the units and accessories to be freely combined. For use with either double or single acting actuators, they provide direct or reverse operating modes and zero and range adjustments can be set separately. The electro-pneumatic analog positioner accepts either a 0-20 mADC or 4-20 mADC input signal. Advanced microprocessor controlled Digital Analog and *Bus*Smart Intelligent electro-pneumatic positioners are offered for digital control.

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 two independent travel stop adjustments, the 0° and 90° travel positions have travel adjustments of +5° to –5° (see Diagram A below). 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
Travel Stop:	Alloy Steel
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 92 or 93 or approved equal.

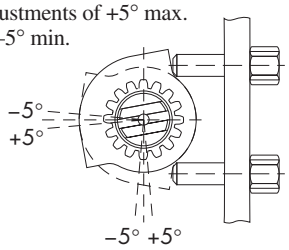
SERVICE DATA:

Actuators shall be designed for pneumatic operation up to a maximum pressure of 10 Bar (140 PSIG) and for temperature ranges of -40°C (-40°F) to +95°C (+200°F). 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 #1030 for Solenoid, brochures #1011 and #1029 for Pneumatic and Electro-Pneumatic Positioners and brochures #1012 and #1015 for Valve Status Monitors.

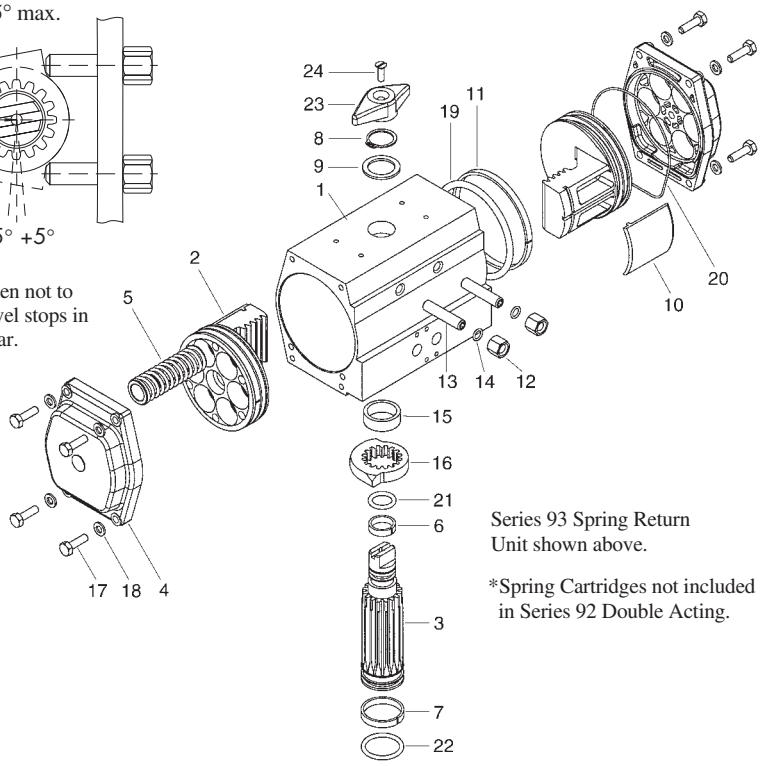
Diagram A Travel Stop Adjustments
The 0° and 90° travel positions have travel adjustments of +5° max. to –5° min.



Caution:
Care should be taken not to over adjust the travel stops in too far or out too far.

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	1	Acetal Spacer
16	1	Travel Stop
17	8	Hex Head Cap Screw
18	8	Washer
19	2	O-Ring–Piston
20	2	O-Ring–End Cap
21	1	O-Ring–Shaft-Top
22	1	O-Ring–Shaft-Bottom
23	1	Indicator Pointer
24	1	Indicator Pointer Screw



Series 93 Spring Return Unit shown above.

*Spring Cartridges not included in Series 92 Double Acting.

DISTRIBUTOR

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