

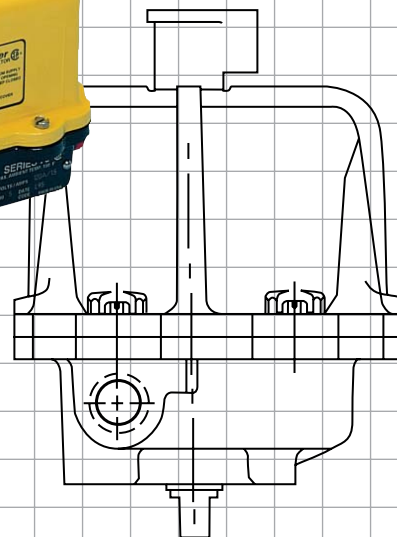


Worcester Actuation Systems

WCABR1014  
(Part PB 730)



AN ISO 9001 REGISTERED COMPANY

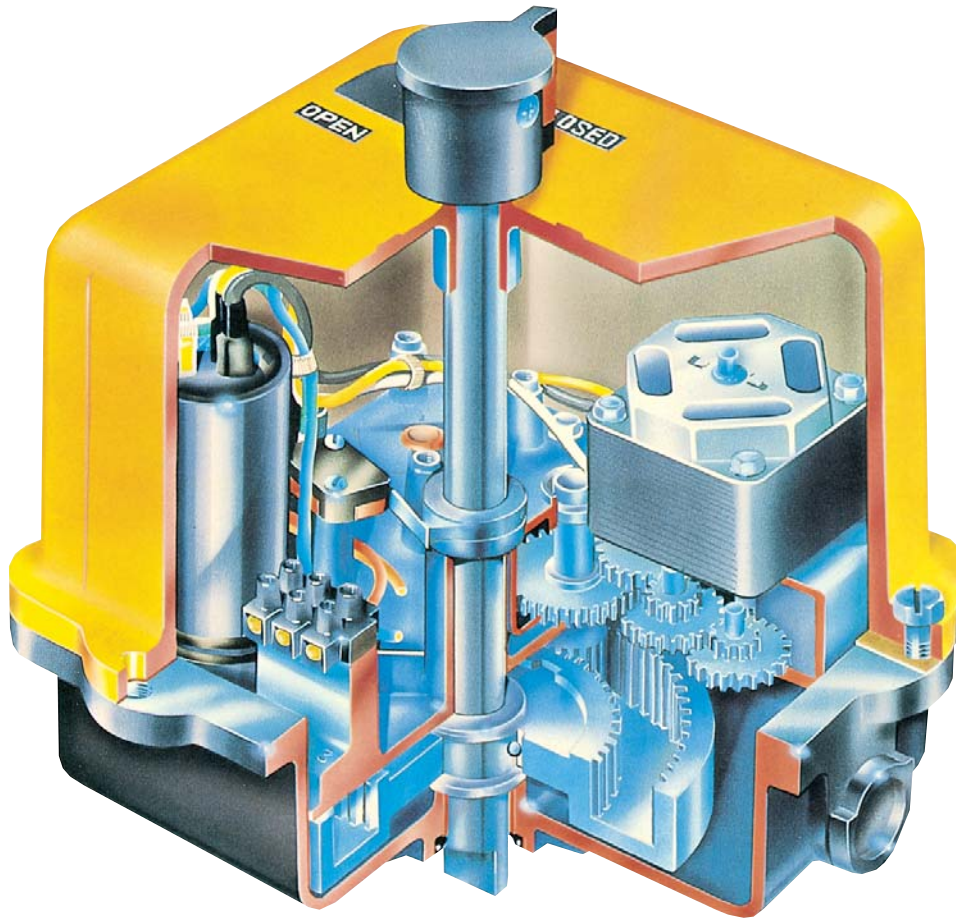


# Series 75 Electric Actuator

Specifically designed for rotary valve applications,  
on/off and modulating

## Worcester Controls Series 75

A time-tested, high-quality state-of-the-art electric actuator for remote control of quarter-turn valves and other rotary devices. Simple, compact and reliable.



Series 75 Electric Actuators from Worcester Actuation Systems add a new dimension of operational dependability and flexibility to modern processes controlled by computers, programmable controllers and other electric control equipment. A multi-function capability permits use of the Series 75 actuator throughout the process for on/off, throttling, variable-cycle and any analog or digital control. One of the most reliable electric actuators on the market, the Series 75 is lightweight, compact and powerful. Its split phase capacitor AC reversing motor or DC motor drives a valve through a sealed, permanently lubricated gear train which offers virtually lifetime maintenance-free dependable operation.

The Series 75 is available in eight sizes and produces torques to 3000 in-lbs. Housings are designed to TYPE 1 General Purpose, TYPE 4

Watertight, and TYPE 7, Class 1, Division 1 and 2, Group C, D and TYPE 9, Class II, Division 1 and 2, Group E, F, G. A combined location TYPE 4, 4X, 7, 9 enclosure is also available as a "Z" option. A baked polyester finish is the standard coating, but special coatings are available for extreme hazardous-environment applications.

Series 75 actuators may be used on Worcester Controls complete line of ball valves, other quarter-turn valves or devices requiring rotary operators. Moreover, their ability to provide power in both directions through selected arcs from 20° through 300° makes them ideal for control of heating, ventilating and air conditioning duct systems and automatic, remotely operated equipment.

## Options to Fit Your Applications

The Series 75 can be ordered with a variety of options to tailor it to the needs of your application.

**Cycle Length Control** – This speed control feature allows field adjustment of opening and closing cycle times, 19 minutes for 25% duty and 57 minutes for 75% duty actuators.

**Feedback (0-1000 ohm) Potentiometer** – provides a variable resistance to signal the exact position of the output shaft and the valve it is powering.

**Position Indicator Board** – provides a 4-20 mA valve position feedback signal to the control room.

**Heater/Thermostat** – prevents condensation from collecting inside the actuator.

**Condensation Drain Plug** – drains accumulated water.

**180° Center-Off Kit** – provides an extra position for three-way valves and is used for dribble-feed applications in quarter-turn valves.

**Additional Limit Switches** – may be used to operate lights that indicate valve position or to operate other equipment.

**AF-17 Positioner Board** – for control valves positions the actuator based on an input signal of current, voltage or resistance.

**DFP17 DataFlo P™** – is a microprocessor-controlled electronic positioner with software for on-site or remote operation and diagnostics. This new, smart positioner for Series 75 actuator driven control valves is controlled by a 4-20 mA analog signal from a PLC or digitally from a computer.

**DFC17 DataFlo C™** – is a microprocessor based PID single-loop controller that accepts a variety of process inputs. All process parameters are easily programmed through the keypad or via a simple RS-485 computer interface.

**I 75 Low-Current Circuit Interface** – is a solid-state interface/relay between the PC/controller/computer and actuator motor(s). It protects controlling device outputs from destructive feedback. This high-voltage feedback is due to limit switch action, auto transformer effect of unused winding, and capacitor voltage. The unit, as a printed circuit board, is conveniently mounted inside of standard enclosures. Maximum output ratings are 4 A for 120 VAC and 2 A for 240 VAC. Controllers with outputs that have low current ratings cannot be connected to electric actuator motor(s) that require a current greater than the controller rating.

**R 75 Remote Terminal Unit (RTU)** – is an interface for DC powered actuators. This solid-state interface card allows you to control a DC-powered electric actuator by a control signal from the Remote Terminal or any low current system (such as a solar powered system). It is equipped with a field-adjustable current limiting circuit, which will trip the power in case of abnormal conditions (it will reset by reengaging the control signal). Optional contact closure to indicate the tripped condition; 0-5 VDC, 0-1000 ohm position feedback, and end of travel SPDT gold contact switches are available.



**TYPE 4**  
Sizes 10, 12, 15, 20, 22  
(Enclosure Option – W)



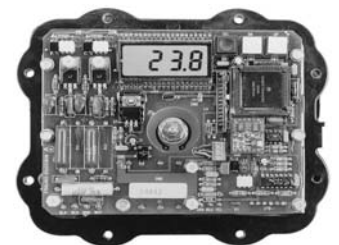
**TYPE 1**  
Sizes 10, 12, 15, 20, 22  
(Enclosure Option – Blank)



**Combined TYPE 4, 4X, 7 & 9**  
Sizes 10, 12, 15, 20, 22, 23  
(Enclosure Option – Z)



**TYPE 7 & 9**  
Sizes 10, 12, 15, 20, 22  
(Enclosure Option – X)



**DFP17 Positioner for Control Valves**



**Combined TYPE 4, 7 & 9**  
Sizes 25, 30  
(Enclosure – Z)

# Specifications

**Sizes:**  
Small: 10, 12, 15, 20, 22, 23  
Large: 25, 30

**Torque:**  
150-3000 in.-lbs.

**Enclosures:**  
TYPE 1 General Purpose  
TYPE 4 Watertight  
TYPE 7, Class I, Division 1, 2, Group C, D  
TYPE 9, Class II, Division 1, 2, Group E, F, G Hazardous Locations  
TYPE 4, 4X, 7, & 9 Combined Locations

**Enclosure Coatings:** Corrosion resistant baked polyester finish standard. Consult Flowserve for special applications.

**Voltages:**  
120 V and 240 VAC, 12 V and 24 VDC

**Connection:**  
Male output shaft (female shaft available on request)

**Gearing:**  
Small: Sealed, permanently lubricated spur gear module driving a final dual-torque bull gear  
Large: Two-stage planetary gear, permanently lubricated self-locking gear train

**Overload Protection:**  
AC only. Thermal overload protector with automatic reset.

**Travel Stop Limit Switches:**  
Two SPDT, all sizes; internal, independent, adjustable. Actuated by cams mounted on drive shaft. Adjustable from 20° to 300°.

**Manual Override:**  
All sizes, TYPE 4, 7 and 9 only. Lift position indicator and turn shaft: Sizes 10,12,15, 20, 22, 23.  
Turn side-mounted handwheel: Sizes 25 and 30.

Actuator Model	Stall Torque in.-lbs.	Start-up Torque in.-lbs.	Voltages		Duty Cycles	90° Time seconds	Current at rated stall torque – amps				Approx. Weight Lbs. (kg.)
			AC	DC			120 VAC	240 VAC	12 VDC	24 VDC	
1075	150	120	120, 240	—	10%	2.5	1.5	.60	—	—	8.20 (3.70)
			120, 240	12, 24	25%	5	.70	.40	1.40	.70	
			120, 240	12, 24	75%	17, 15	.30	.15	.50	.25	
			120	—	100%	17	.25	—	—	—	
1275	225	180	120, 240	—	10%	4	1.5	.60	—	—	8.20 (3.70)
			120, 240	12, 24	25%	8	.70	.40	1.20	.60	
			120, 240	12, 24	75%	27, 25	.30	.15	.50	.25	
			120	—	100%	27	.25	—	—	—	
1575	325	260	120	—	20%	5	.70	—	—	8.50 (3.83)	
2075	600	480	120, 240	—	10%	2.5	2.90	1.30	—	—	9.50 (4.31)
			120, 240	12, 24	25%	5	1.50	.90	5	2.50	
			120, 240	12, 24	75%	17, 15	.70	.30	1.60	.80	
			120	—	100%	27	.50	—	—	—	
2275*	900	720	120, 240	—	10%	4	2.90	1.30	—	—	9.50 (4.31)
			120, 240	12, 24	25%	8	1.50	.90	4.20	2.10	
			120	12, 24	75%	27, 25	.70	.30	1.50	.75	
2375	1200	950	120, 240	12, 24	75%	25	.70	.30	2	1	17.70 (8.04)
2575	1800	1440	120, 240	—	25%	10	2.70	1.30	—	—	48 (21.80)
			120, 240	—	75%	15	2.20	1.20	—	—	
3075	3000	2400	120, 240	—	25%	15	3.50	1.40	—	—	48 (21.80)
			120, 240	—	75%	23	2.20	1.20	—	—	

**Options:**  
All sizes, all enclosures. Cycle Length Control (CLC), dual- or single-feedback potentiometer, 4-20 mA position indicator, heater/thermostat, condensation drain plug (V-53), 180° center-off (three-position), additional limit switches, mechanical brake, I-75 computer interface unit, various duty cycles, positioner, set point controller.

**Temperature Limits (All models):**  
-40°F (with heater and thermostat) to 150°F max. (At elevated temperatures, duty cycle must be derated. Consult Flowserve.)

**Lubrication:**  
Permanently lubricated gear train. Self-lubricated bearings.

**Conduit Connection:**  
One ½" NPT - Two ½" Optional (Size 23 has ¾" NPT)

**Operation:**  
Reversing (bidirectional) for use with quarter-turn valves or rotating equipment to full rotation.

## Actuator Sizing

There are a few terms associated with electric actuators that require definition. **Actuator Start-up Torque** is the amount of torque initially produced by an actuator when starting from rest. Use start-up torque when sizing an electric actuator for a ball valve that is used for either on/off or throttling service. **Actuator Stall Torque** is the amount of torque produced by the actuator just prior to the point where the motor stalls. Do not use stall torque for sizing.

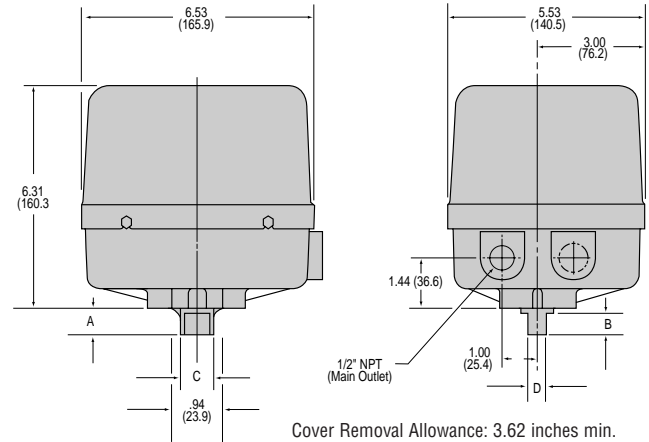
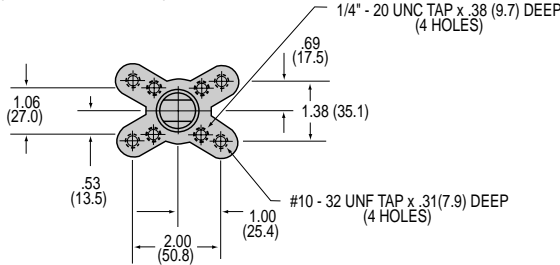
### OVERCURRENT PROTECTION WARNING!

Where overcurrent protection is used in the actuator power circuit, it is recommended that the protection rating not be less than the values listed in the table:

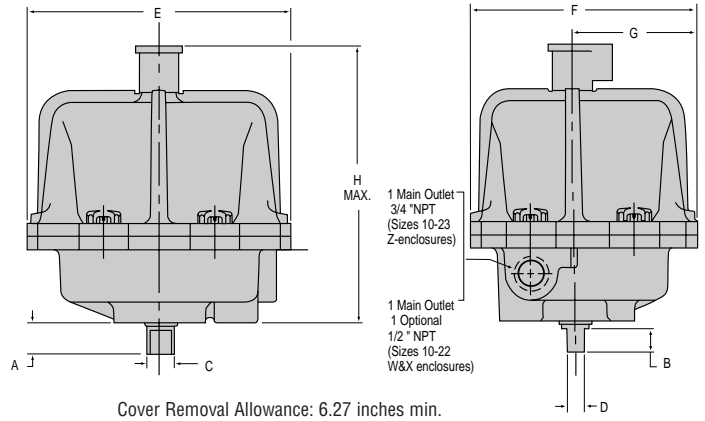
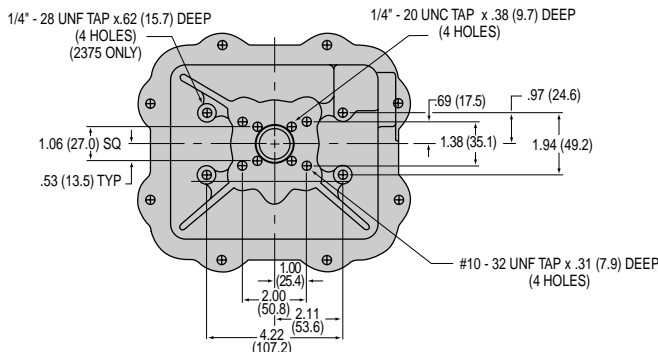
Actuator Size	Voltage	Protection Rating
10-23	120 VAC	5 amps
25/30	120 VAC	10 amps
10-23	240 VAC	3 amps
25/30	240 VAC	5 amps
10-23	12 VDC	10 amps
10-23	24 VDC	5 amps

## Dimensions inches (mm)

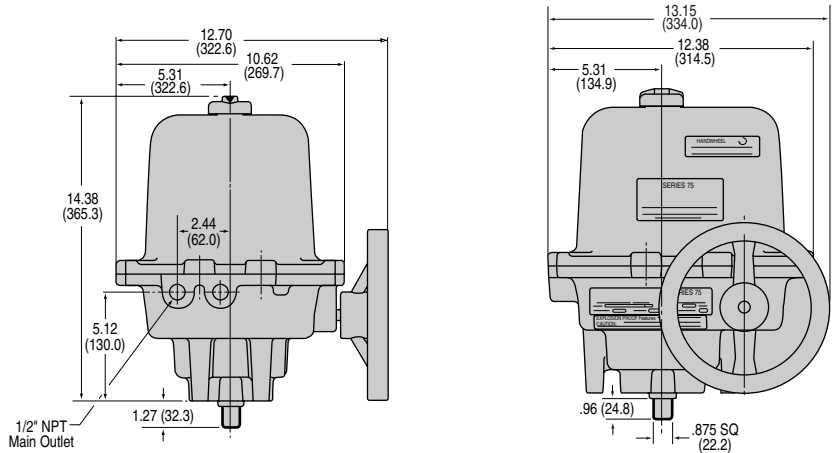
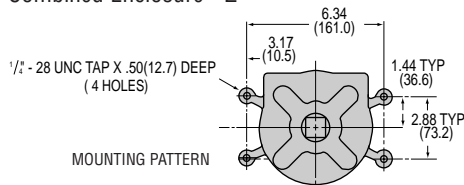
Sizes 10, 12, 15, 20, 22  
TYPE 1 (General Purpose)



Sizes 10, 12, 15, 20, 22, 23  
TYPE 4 (Watertight) Enclosure - W,  
TYPE 7 & 9 (Hazardous Locations) Enclosure - X,  
TYPE 4, 7 & 9 (Combined) Enclosure - Z (shown)



Sizes 25, 30  
TYPE 4 (Watertight) and  
TYPE 7 & 9 (Hazardous Locations)  
Combined Enclosure - Z



### Type 1, Sizes 10, 12, 15, 20, 22

DIMENSIONS INCHES (mm)				
Size	A	B	C	D
10, 12	.74 (18.80)	.53 (13.50)	.59 (15)	.36 (9.14)
15, 20, 22	.90 (22.86)	.66 (16.80)	.80 (20.32)	.50 (12.70)

### All other types and sizes

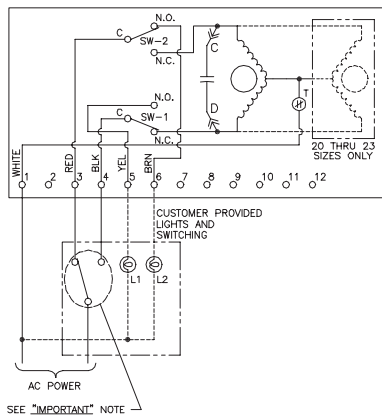
DIMENSIONS									
Size	Enclosure	A	B	C	D	E	F	G	H
10, 12	W	.74 (18.80)	.53 (13.50)	.59 (15.00)	.36 (9.14)	7.80 (198.10)	6.75 (171.50)	3.61 (91.70)	8.50 (215.9)
	X	.74 (18.80)	.53 (13.50)	.59 (15.00)	.36 (9.14)	7.80 (198.10)	6.75 (171.50)	3.61 (91.70)	8.50 (215.9)
15, 20, 22	W	.90 (22.86)	.66 (16.80)	.80 (20.32)	.50 (12.70)	7.80 (198.10)	6.75 (171.50)	3.61 (91.70)	8.50 (215.9)
	X	.90 (22.86)	.66 (16.80)	.80 (20.32)	.50 (12.70)	7.80 (198.10)	6.75 (171.50)	3.61 (91.70)	8.50 (215.9)
15-23	Z	.90 (22.86)	.66 (16.80)	.80 (20.32)	.50 (12.70)	8.45 (214.60)	7.45 (189.20)	3.97 (100.90)	9.68 (245.90)
10-23	Z	.74 (18.80)	.53 (13.50)	.59 (15.00)	.36 (9.14)	8.45 (214.60)	7.45 (189.20)	3.97 (100.90)	9.68 (245.90)

## Wiring Diagrams

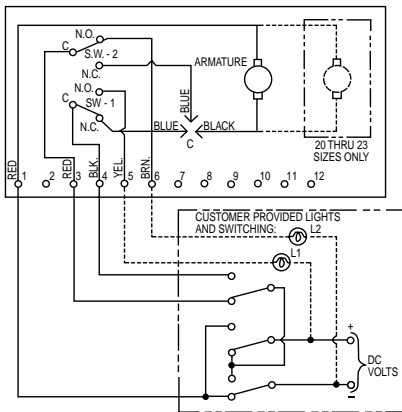
### IMPORTANT!

EACH ACTUATOR SHOULD BE ELECTRICAL-  
LY POWERED THROUGH ITS OWN  
INDIVIDUAL SINGLE-POLE SWITCH CON-  
TACTS TO ISOLATE THE UNUSED WINDING.

**NOTE:** ACTUATOR SHOWN IN COUNTER-  
CLOCKWISE EXTREME OF TRAVEL, OR  
"OPEN" POSITION.



Sizes 10-30 AC Power

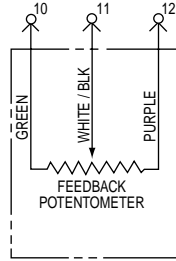


Sizes 10-23 DC Power

**NOTE:** AC and DC wiring diagrams shown  
are for W, X and Z enclosures only. DC  
wiring diagram shown is for size 10, 20 and  
23 actuators. For size 12 and 22 actuators,  
the red/black motor leads are reversed.

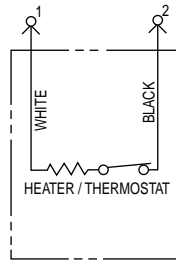
## Design Options

### Feedback Potentiometer



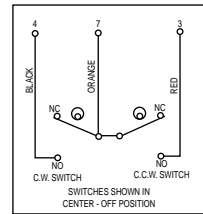
A feedback  
potentiometer is  
used when remote  
indication is desired.  
Potentiometers are  
available in  
1000 ohms.

### Heater/Thermostat



A heater/thermostat  
kit for cold ambient  
temperatures or  
humid environments  
uses a 15-watt  
heater and a ther-  
mostat set to close  
at temperatures  
below 70°F ambient.

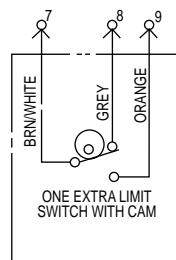
### 180° Center-off (three positions)



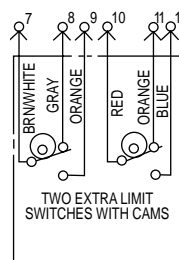
Used with three-  
way valves or  
similar products  
requiring a mid-  
position stop  
capability for  
shutoff. May be  
adjusted for travel  
other than 180°.

**NOTE:** A three-position  
switch is required for  
operation.

### Limit Switches



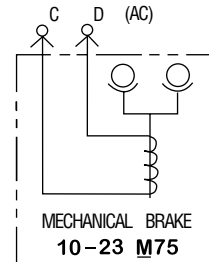
One Limit Switch



Two Limit Switches

May be mounted to either operate lights,  
indicate valve position, or operate other  
equipment such as pumps, compres-  
sors, mixers, etc.

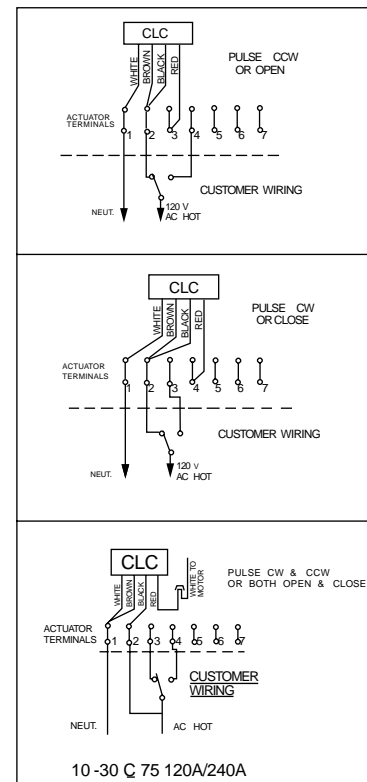
### Mechanical Brake



A mechanical brake is  
used for all butterfly  
valve applications or  
when the actuator  
must be stopped  
instantaneously and  
securely. (Used on  
10-23 sizes only.)  
Available for AC  
actuators only.

**NOTE:** A 2" CPT valve should not be sized with  
an electric actuator smaller than 2275, and a  
mechanical brake must be ordered.

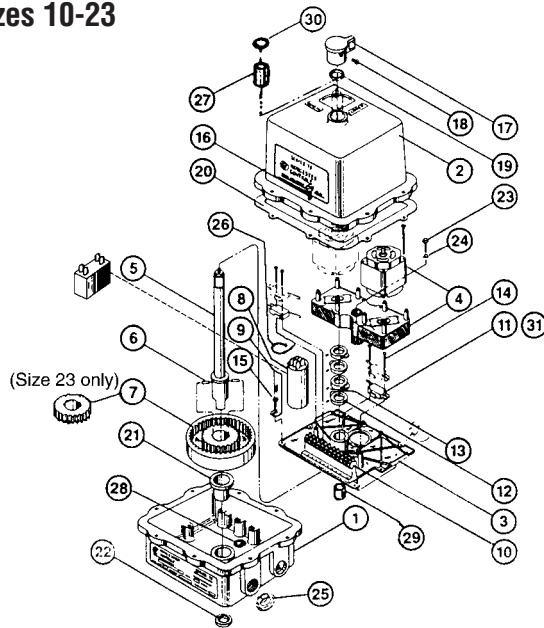
### Cycle Length Control (CLC)



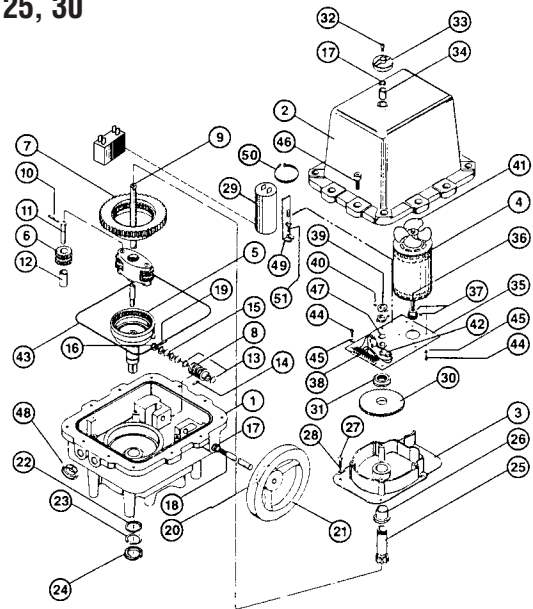
Prevents destructive pipeline shock caused by  
fast opening or closing valves on steam or  
hydraulic service. The CLC units allow field  
adjustment of the standard actuator's cycle  
time up to approximately 19 minutes for 25%  
duty and 57 minutes for 75% duty actuators.

**Additional Options Available. Consult Flowserve.**

Sizes 10-23



Sizes 25, 30



Sizes 10-23

Item	Qty.	Description	Material	Item	Qty.	Description	Material
1	1	Base	Aluminum Casting	16	4	Hex Screw (GP)	Steel
2	1	Cover	Aluminum Casting	17	1	Position Indicator (W,X,Z)	Molded Phenolic
3	1	Base Plate	Zinc Casting	18	1	Indicator Set Screw (W,X,Z)	Steel
4	1	Motor Module	Zinc Casting	19	1	Seal (W,X,Z)	Reinforced Rubber
5	1	Output Shaft	Steel	20	1	Gasket (W only)	Neoprene
6	2	Gear Drive Pin	Steel	20	1	Flange Seal (Z only)	Buna N
7	1	Bull Gear	Steel	21	1	Bearing	Bronze
8	1	Capacitor (w/Fiber Washer if Required)	Phenolic Encapsulated	22	1	Seal	Reinforced Nitrile
9	1	Capacitor Bracket	Steel	23	4	Screw	Steel
10	1	Terminal Strip	Polyethylene Based Material	24	4	Lock Washer	Steel
11	2	Limit Switch	Phenolic Encapsulated	25	1	Conduit Plug	Polyethylene
12	2	Limit Switch Cam	Zinc Casting	26	1	Capacitor Tie	Plastic
13	1/Cam	Cam Set Screw	Steel	27	1	Bearing (W, X, Z)	Bronze
14	4	Limit Switch Screw	Steel	28	1	Roller Bearing (size 23 only)	Steel
15	6	Base Plate Screw	Steel	29	1	Bearing, Base Plate	Nylon
16	8	Hex Screw (W,X,Z)	Stainless Steel	30	1	O-Ring (W, X, Z)	Buna
				31	2	Insulator (not shown)	Nylon

Sizes 25, 30

Item	Qty.	Description	Material	Item	Qty.	Description	Material
1	1	Base	Aluminum	28	4	Lock Washer	Steel
2	1	Cover	Aluminum	29	1	Capacitor (w/Fiber Washer if Required)	Phenolic Encapsulated
3	1	Gear Train Support	Aluminum	30	1	Input Gear	Steel
4	1	Motor		31	1	Nut	Steel
5	1	Output Gear	Steel Casting	32	1	Cap Screw	Steel
6	2	Planet Gear	Hardened Steel	33	1	Position Indicator	Aluminum
7	1	Planetary Gear	Ductile Iron	34	1	Bushing	Bronze
8	1	Worm Gear	Steel	35	1	Motor Support Plate	Aluminum
9	1	Sensing Shaft	Steel	36	1	Gear, Pinion	Steel
10	2	Pin, Spring	Steel	37	2	Set Screw	Steel
11	2	Shaft	Hardened Steel	38	1	Terminal Strip	Polyethylene Based Material
12	2	Bushing	Bronze	39	2	Limit Switch Cam	Zinc Casting
13	2	Thrust Washer	Steel	40	1/Cam	Cam Set Screw	Steel
14	1	Pin, Spring	Steel	41	1	Fan	Plastic
15	4	Belleville Washer	Steel	42	2	Limit Switches	Phenolic Encapsulated
16	1	Nut	Steel	43	1	O-Ring	Buna
17	2	Seal	Rubber, Steel	44	9	Cap Screw	Steel
18	1	Manual Override Shaft	Steel	45	9	Lock Washer	Steel
19	1	Pin, Cotter	Steel	46	12	Cap Screw	Steel
20	1	Pin, Spring	Steel	47	1	Sensing Shaft Ret. Ring	Steel
21	1	Handwheel, Manual Override	Aluminum	48	1	Conduit Plug	Polyethylene
22	1	Thrust Washer	Steel	49	1	Capacitor Bracket	Steel
23	1	Tru-arc Ring	Steel	50	1	Capacitor Tie	Plastic
24	1	Seal	Rubber, Steel	51	1	Capacitor Bracket Screw	Steel
25	1	Sun Gear	Steel				
26	1	Bushing	Bronze				
27	4	Cap Screw	Steel				

# How to Order

Actuator Size	Options	Actuator Series	Duty Cycle	Enclosures	Secondary Options	Voltage	Option Operation	STD Variations
10 12 15* 20 22 23* 25 30	<b>Blank</b> - No special service options <b>A</b> - AF17 or DRC17 or DFP17/DFC 17 (240 VAC) Positioner/Controller** <b>B</b> - For DFP17/DFC17 (DC only) *** ** <b>††C</b> - CLC Module for cycle length control <b>D</b> - Feedback Dual Potentiometer <b>H</b> - Heater and thermostat for low-temperature and high-humidity applications <b>I</b> - I-75 Interface Relay Unit (120/240 VAC only) <b>M</b> - Mechanical Brake (AC Only) <b>P</b> - Feedback Single Potentiometer <b>R</b> - Remote terminal relay board or AF17 Positioner (DC only)*** ** <b>4</b> - Position Indicator <b>9</b> - Cross-line mount	75	<b>2</b> - 10% duty cycle Sizes 10, 12, 20, 22 only. <b>Blank</b> - 25% duty cycle <b>4</b> - 75% duty cycle <b>5</b> - 100% duty cycle. Sizes 10, 12, 20 only. (120 AC)	<b>Blank</b> - General purpose TYPE 1. Sizes 10, 12, 15, 20, 22 <b>W</b> - Watertight TYPE 4. Sizes 10, 12, 15, 20, 22 <b>X</b> - Hazardous Locations TYPE 7, Class 1, Div. 1, Group C, D TYPE 9, Class 2, Div. 1, Group E, F, G Sizes 10, 12, 15, 20, 22 <b>Z</b> - Combined Locations TYPE 4, 4X, 7, 9 Sizes 10, 12, 15, 20, 22, 23, 25, 30	<b>Blank</b> - No additional switches <b>M1</b> - One additional switch <b>M2</b> - Two additional switches <b>D2</b> - 180° operation for 180° directional valves <b>D3</b> - Center off for 180° operation	<b>120A</b> - 120 VAC - 60 Hz† <b>240A</b> - 240 VAC 60 Hz† <b>12D</b> - 12 VDC <b>24D</b> - 24 VDC	<b>CLC</b> <b>Blank</b> - Counter-clockwise (open) and clockwise (closed) <b>C</b> - Clockwise (closed) <b>O</b> - Counter-clockwise (open)  <b>I75</b> I-75 Input Voltage Signal: <b>5V</b> - 5 VDC <b>XV</b> - 10 VDC <b>XX</b> - 24 VDC <b>15</b> - 120 VAC	<b>Blank</b> - No variation <b>V49</b> - Anodized and painted cover and base <b>V53</b> - Condensation Drain <b>V65</b> - CE Marking Declaration of Conformity for Electric Actuator European Orders

\*1575 can only be ordered with a 20% duty 120 VAC motor. The 2375 can only be ordered with a 75% duty motor.

†† Specify operation in Option Operation column for CLC.

† 120 and 240 VAC actuators will operate on 50 Hz. Torque will remain the same, cycle time will increase by a factor of 1.2 and duty cycle will be reduced by a factor of approximately 20%.

\*\*These options must be ordered as a separate item in addition to being specified in the actuator code.

\*\*\*Can only be ordered with a 75% duty motor.

**NOTE:** TYPE 7, 9, (X) UL approved units are available on request. TYPE 4, 7, 9, (X, W, Z) are furnished CSA Approved.

Due to continuous development of our product range, we reserve the right to alter the product specifications contained in this brochure as required.

Flowserve Corporation has established industry leadership in the design and manufacture of its products. When properly selected, this Flowserve product is designed to perform its intended function safely during its useful life. However, the purchaser or user of Flowserve products should be aware that Flowserve products might be used in numerous applications under a wide variety of industrial service conditions. Although Flowserve can (and often does) provide general guidelines, it cannot provide specific data and warnings for all possible applications. The purchaser/user must therefore assume the ultimate responsibility for the proper sizing and selection, installation, operation, and maintenance of Flowserve products. The purchaser/user should read and understand the Installation Operation Maintenance (IOM) instructions included with the product, and train its employees and contractors in the safe use of Flowserve products in connection with the specific application.

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For more information about Flowserve Corporation, contact [www.flowserve.com](http://www.flowserve.com) or call USA 1-800-225-6989.

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