



## *Norbro 75 Series Electric Actuator*



*Experience In Motion*



## Contents

Overview .....	2-3
Sizes 10-23 .....	4-5
Sizes 25-30 .....	6-7
Engineering Specification .....	8
Technical Data .....	9
DataFlo P .....	10
DataFlo C .....	11
Other Optional Features .....	12-15

## 75 Series

*The Flowserve Norbro 75 Series electric actuator basic module for on/off applications - designed to accept a wide range of add-to features for sophisticated control and process requirements.*

The 75 Series electric actuator has been designed to provide positive, automatic operation of valves and other devices requiring between 20° and 330° rotation.

The actuator adds a new dimension of flexibility and dependable safety to positive low cost plant installation and operation.

The outstanding features of the 75 Series actuator have been well proven over many years.

In addition, to satisfy the increasing demand for analog and digital computerised control in the process industry, a growing number of add-to features continue to be developed to optimise the modular design concept of the 75 Series (see pages 12-13).

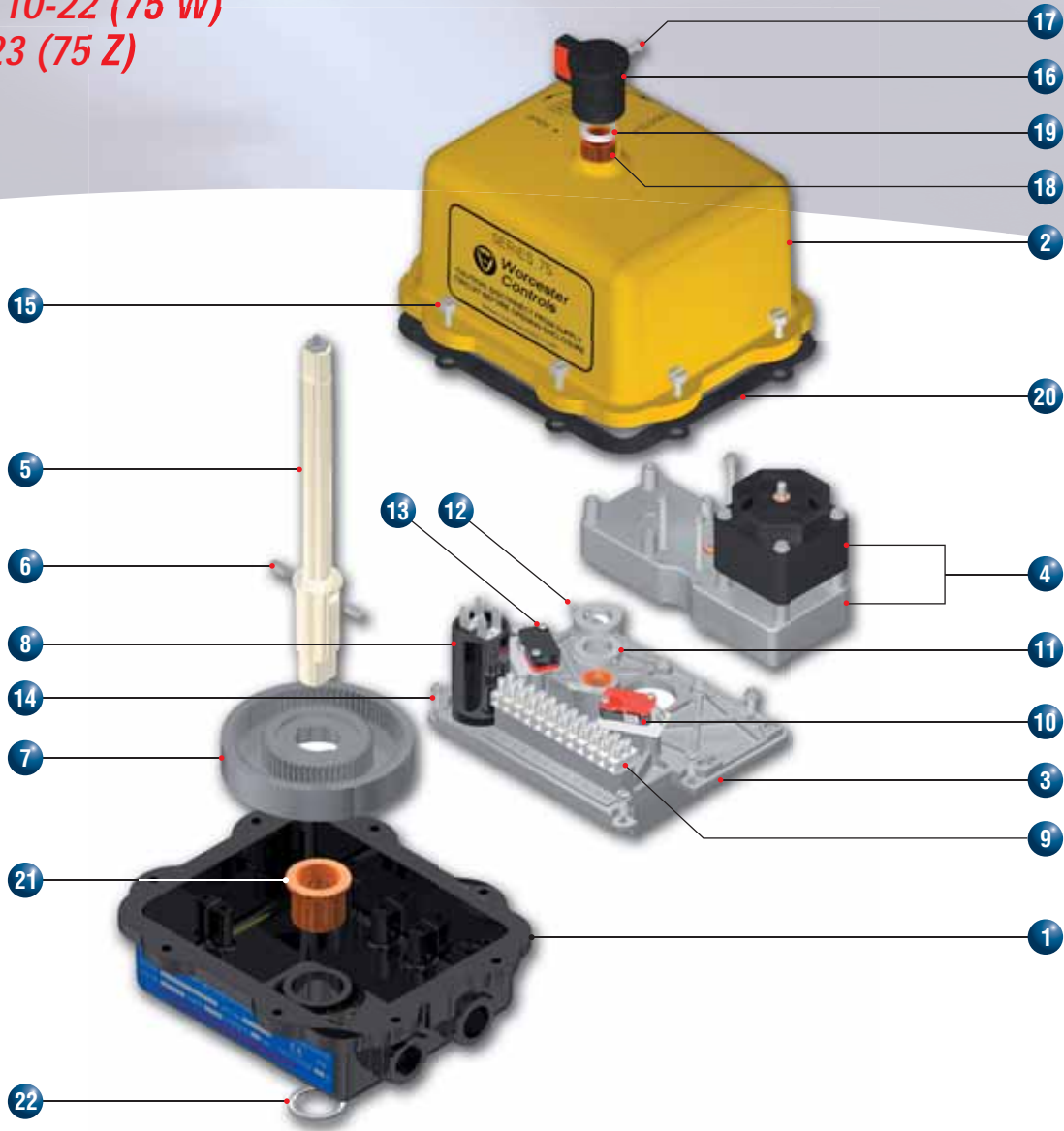
Primary actuator drive is from AC split phase brushless capacitor start/run reversing motor(s) or compact, powerful DC motor(s), driving through a sealed and permanently lubricated gear train. This combines dependable, safe and maintenance-free operation with energy efficient consumption.

Simplicity of design, ease of assembly and rugged construction using light-weight materials with the base and cover finished in a baked epoxy paint, allow the actuator to be fitted in the majority of modern process systems and environments.



<i>Features</i>	<i>Benefits</i>
<ul style="list-style-type: none"> <li>● Requires 3-wire electrical connection only.</li> </ul>	<ul style="list-style-type: none"> <li>● Neither compressed air nor pneumatic converters required.</li> </ul>
<ul style="list-style-type: none"> <li>● Permanently lubricated gear train.</li> </ul>	<ul style="list-style-type: none"> <li>● Long life/reduced maintenance costs.</li> </ul>
<ul style="list-style-type: none"> <li>● Position indicated as standard.</li> </ul>	<ul style="list-style-type: none"> <li>● Clear visual indication of valve position.</li> </ul>
<ul style="list-style-type: none"> <li>● Manual override as standard. When power is restored, the actuator returns to its original position.</li> </ul>	<ul style="list-style-type: none"> <li>● Allows operation in the event of power failure.</li> </ul>
<ul style="list-style-type: none"> <li>● Wide choice of optional add-to features.</li> </ul>	<ul style="list-style-type: none"> <li>● In-built and designed to satisfy a wide range of modern process demands.</li> </ul>
<ul style="list-style-type: none"> <li>● Internal terminal strip.</li> </ul>	<ul style="list-style-type: none"> <li>● Termination within actuator housing. Independent switched indication unnecessary.</li> </ul>
<ul style="list-style-type: none"> <li>● Male output shaft as standard.</li> </ul>	<ul style="list-style-type: none"> <li>● Low-cost, simplified couplings design.</li> </ul>
<ul style="list-style-type: none"> <li>● Split phase brushless capacitor start/run motors (AC only) with thermal overload protection.</li> </ul>	<ul style="list-style-type: none"> <li>● Compact, powerful and safe energy source with protection against overheating.</li> </ul>
<ul style="list-style-type: none"> <li>● Available with start-up torques from 14 Nm to 280 Nm.</li> </ul>	<ul style="list-style-type: none"> <li>● Choice of 9 sizes provides economical actuator sizing.</li> </ul>

Sizes 10-22 (75 W)  
Size 23 (75 Z)



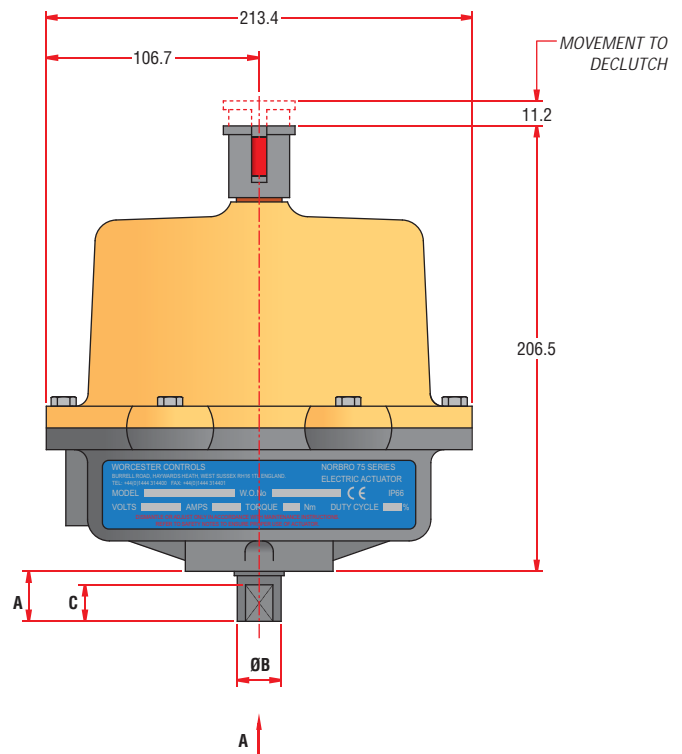
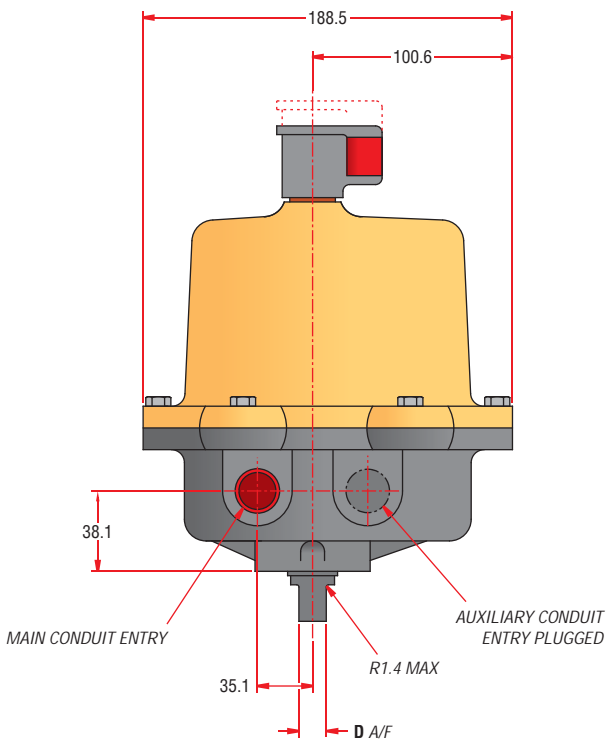
**Parts List / Materials Specification**

Item No.	Description	Qty.	Item No.	Description	Qty.
1	Base Aluminium Epoxy Coated	1	12	Cam Set Screw	2/Cam
2	Cover Aluminium Epoxy Coated	1	13	Limit Set Screw	4
3	Base Plate	1	14	Base Plate Screw	6
4	Motor Module	1	15	Hex Screw	8
5	Output Shaft Mild Steel Corrosion Resistant Coated	1	16	Position Indicator	1
6	Engagement Pin	2	17	Indicator Set Screw	1
7**	Bull Gear	1	18	Cover Bearing	1
8	Capacitor	1	19	Cover Seal	1
9	Terminal Strip	1	20	Gasket	1
10*	Limit Switch	2	21	Base Bearing	2
11*	Limit Switch Cam	2	22	Base Seal	2

\* Two switches are standard with additional switches optional

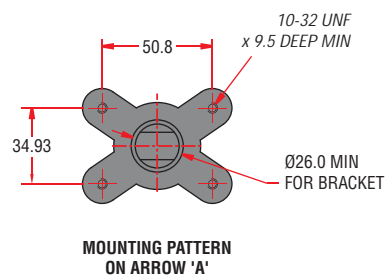
\*\* Size 23 is fitted with a single gear/single speed only

Sizes 10-22 (75 W)  
Size 23 (75 Z)

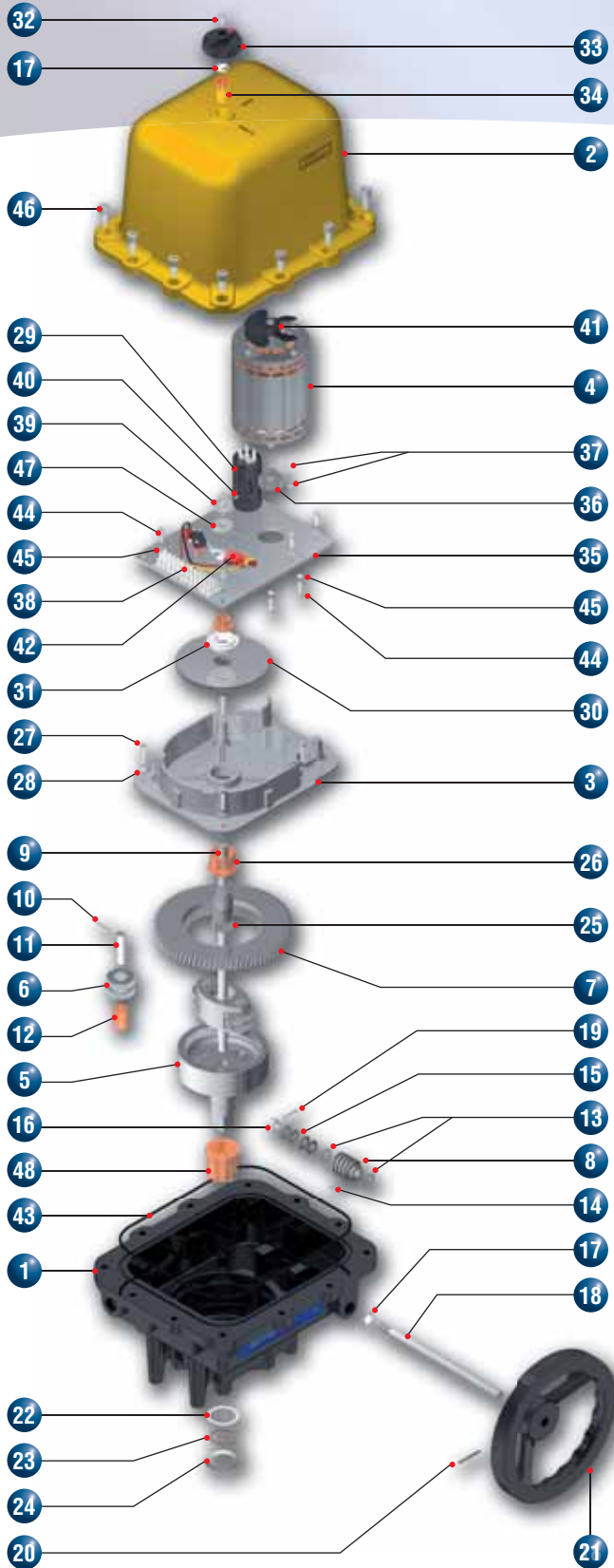


Dimensions

Actuator	A	B	C	D	Conduit Entries
10-75 W 12-75 W	18.54	14.99 14.86	13.59 13.34	9.14 9.02	½ NPT
15-75 W 17-75 W 20-75 W 22-75 W	22.61	20.32 20.19	17.02 16.76	12.70 12.57	½ NPT
23-75 Z	22.61	20.32 20.19	17.02 16.76	12.70 12.57	¾ NPT



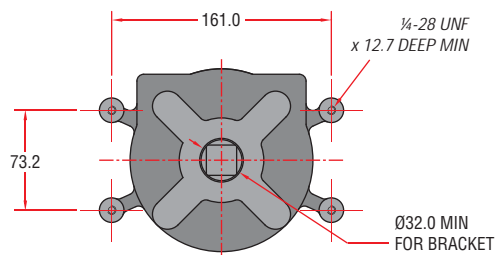
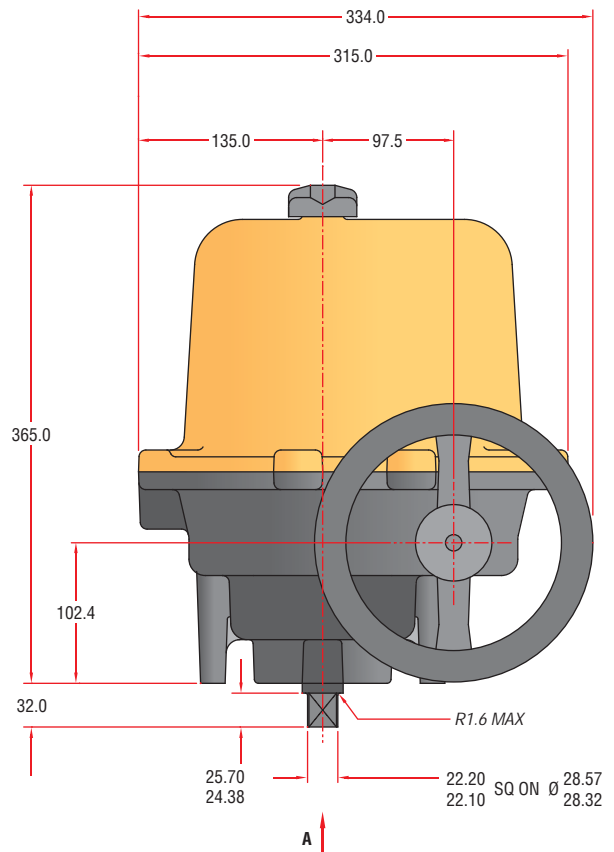
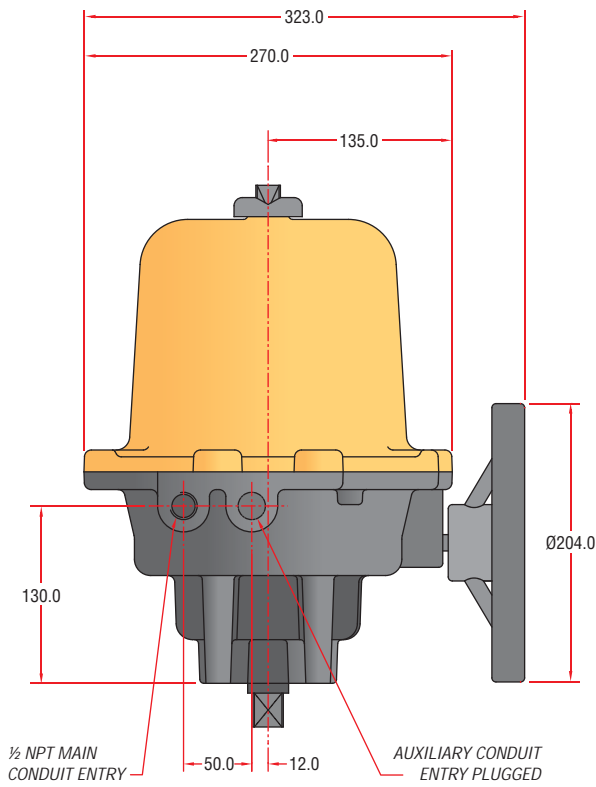
## Sizes 25, 30 (75 Z)



## Parts List / Materials Specification

Item No.	Description	Qty.
1	Base Aluminium Epoxy Coated	1
2	Cover Aluminium Epoxy Coated	1
3	Gear Train Support	1
4	Motor	1
5	Output Shaft Mild Steel Corrosion Resistant Coated	1
6	Planet Gear	2
7	Planetary Gear	1
8	Worm Gear	1
9	Sensing Shaft	1
10	Spring Pin	2
11	Shaft	2
12	Bearing	2
13	Thrust Washer	2
14	Spring Pin	1
15	Belleville Washer	4
16	Nut	1
17	Cover Seal	2
18	Manual Override Shaft	1
19	Cotter Pin	1
20	Spring Pin	1
21	Handwheel, Manual Override	1
22	Thrust Washer	1
23	Circlip	1
24	Base Seal	1
25	Sun Gear	1
26	Bearing	1
27	Cap Screw	4
28	Lock Washer	4
29	Capacitor	1
30	Input Gear	1
31	Nut	1
32	Cap Screw	1
33	Position Indicator	1
34	Cover Bearing	1
35	Motor Support Plate	1
36	Pinion Gear	1
37	Set Screw	2
38	Terminal Strip	1
39	Limit Switch Cam	2
40	Set Screw	4
41	Fan	1
42	Limit Switch	2
43	"O" Ring	1
44	Cap Screw	9
45	Lock Washer	9
46	Cap Screw	12
47	Sensing Shaft Retaining Ring	1
48	Bearing	1

Sizes 25, 30 (75 Z)



MOUNTING PATTERN ON ARROW 'A'



## Engineering Specifications

### Sizes:

Small: 10, 12, 15, 17, 20, 22, 23  
 Large: 25, 30

### Start-up Torque:

14 - 280 Nm

### Enclosure:

W: Waterproof BS EN 60529: 1992 IP66  
 NEMA 4 Watertight  
 Z: Waterproof & Explosion proof BS EN 60529: 1992 IP66  
 NEMA 4, 4X, 7 & 9

### Enclosure Coating:

Corrosion resistant epoxy finish standard.  
 Consult Flowserve Technical Sales for special applications.

### Voltages:

120V & 240V AC; 12V & 24V DC

### Connection:

Male output shaft.

### Gearing:

Small: Sealed, permanently lubricated spur gear module driving a final dual torque bull gear, (single on size 23 only).  
 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; internal, independent, adjustable switches. Actuated by cams mounted on drive shaft. Adjustable from 20°-330°.

### Manual Override:

Small: Lift position indicator and turn shaft,  
 Large: Turn side mounted handwheel.

### Options:

- Cycle Length Control (CLC)
- Dual or single feedback potentiometer
- Heater/thermostat
- 180° Centre off (3 positions)
- Additional limit switches
- Mechanical brake (10 - 23 only)
- DataFlo positioner / DataFlo controller (DFP/DFC)
- Computer interface unit
- Various duty cycles

### Temperature range:

-40°C (with heater/thermostat) to +65°C.

### Lubrication:

Permanently lubricated gear train. Self-lubricated bearings.

### Conduit connection:

Two ½ NPT (Size 23 has two ¾ NPT)

### Operation:

Reversing (bidirectional) for use with quarter turn valves.



## Technical Data

Actuator Model	Stall Torque Nm	Start-up Torque Nm	Voltages		Duty Cycles	90° Time Seconds	Locked Rotor Current Amps				Approx Weight Kg
			VAC	VDC			120VAC	240VAC	12VDC	24VDC	
1075 2	17.3	13.8	120,240	-	8%	3	1.6	0.6	-	-	8.2
1075			120,240	-	20%	6	0.7	0.4	-	-	
1075 4			120,240	-	60%	21	4	0.15	-	-	
1075			-	12,24	25%	6	-	-	3.4	2.0	
1275 2	25.9	20.7	120,240	-	8%	5	1.6	0.6	-	-	8.2
1275			120,240	-	20%	9	0.7	0.4	-	-	
1275 4			120,240	-	60%	31	0.4	0.15	-	-	
1275			-	12,24	25%	9	-	-	3.4	2.0	
1575 2	34.5	27.6	120,240	-	8%	3	1.6	0.6	-	-	8.2
1575			120,240	-	20%	6	0.7	0.4	-	-	
1575 4			120,240	-	60%	21	0.4	0.15	-	-	
1775 2	51.8	41.5	120,240	-	8%	5	1.6	0.6	-	-	8.2
1775			120,240	-	20%	9	0.7	0.4	-	-	
1775 4			120,240	-	60%	31	0.4	0.15	-	-	
2075 2	69	55.3	120,240	-	8%	3	3.0	1.4	-	-	9.5
2075			120,240	-	20%	6	1.5	0.9	-	-	
2075 4			120,240	-	60%	21	0.75	0.35	-	-	
2075			-	12,24	25%	6	-	-	6.8	4.0	
2275 2	103.5	82.9	120,240	-	8%	5	3.0	1.4	-	-	9.5
2275			120,240	-	20%	9	1.5	0.9	-	-	
2275 4			120,240	-	60%	31	0.75	.35	-	-	
2275			-	12,24	25%	9	-	-	6.8	4.0	
2375 4	136	107.4	120,240	12,24	60%	31	0.75	-	2.0	1.0	17.7
2575	207	165.6	120,240	-	20%	12	3.35	1.6	-	-	48.0
2575 4			120,240	-	60%	18	3.1	1.5	-	-	
3075	345	276	120,240	-	20%	18	3.9	1.7	-	-	48.0
3075 4			120,240	-	60%	28	3.1	1.5	-	-	

### Notes:

- To ensure correct actuator sizing, obtain actual valve torque from the manufacturers.
- Start-Up torque should be used when sizing ball valve actuators.
- Cycle times are approximate.
- Duty Cycle**  
The duty cycle percentage figure relates to the actuator 90° running time as a percentage of the running plus rest time (for motor cooling). To ensure correct operation, the percentage duty cycle values must always be worked to, particularly when repeated cycling is required.

- Example** 20% - 6 seconds running time with 24 seconds rests  
 $(6 \div 30 = 20\%)$   
 60% - 21 seconds running time with 14 seconds rests  
 $(21 \div 35 = 60\%)$
- For modulating applications 60% duty cycle motors are strongly recommended.
  - On DC voltages use filtered electrical supply for maximum life.
  - Figures for AC actuators at 50Hz. 60Hz will differ - contact Flowserve Technical Sales.

**Actuator Sizing** Refer to Actuator Sizing Chart.



## DataFlo P

*An electronic positioner with a built-in microcontroller for precise process control.*

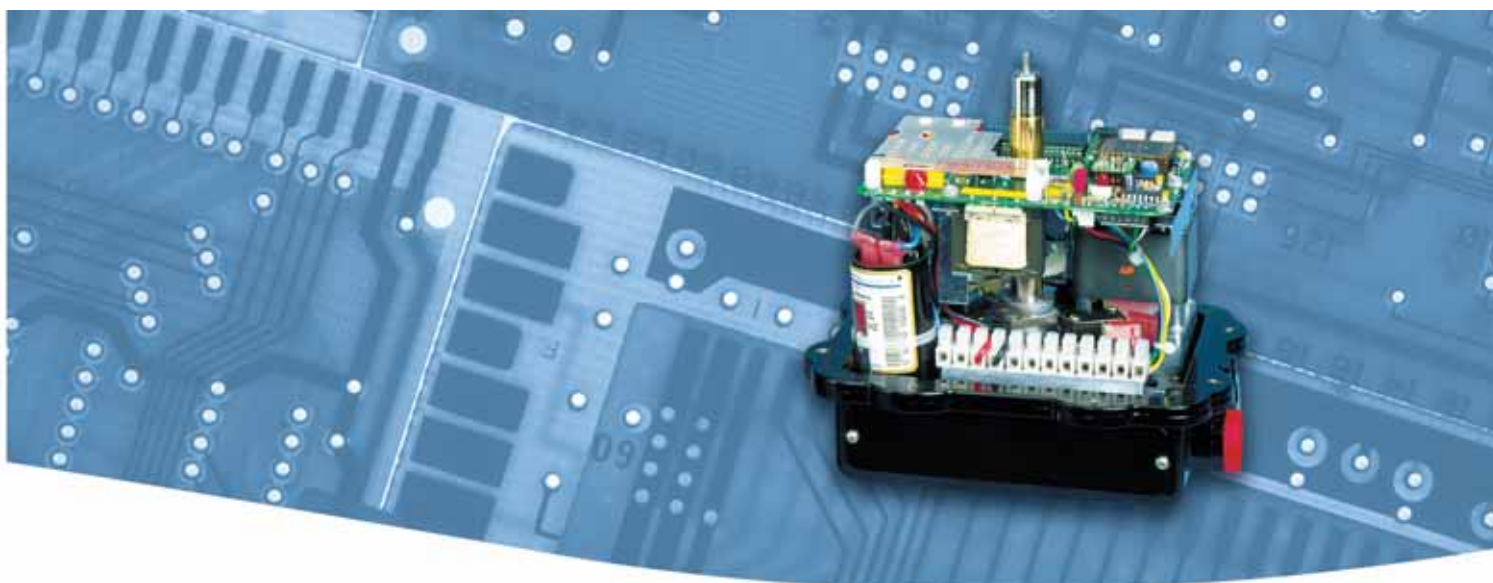
The DataFlo P positioner, controlled by either a 4-20 mA analog signal from a PLC or digitally from a computer, gives calibration, monitoring and diagnostics both on-site or from a control room computer. DataFlo P turns the final control element into an efficient digital communications platform.



*3-button Keypad for on-site calibration and functional set-up*

### Features & Benefits

- Digital communication
- Diagnostics
- Selectable input signals
- Onboard or remote set-up and calibration
- Power-on delay and selectable position
- DOS compatible set-up software
- Adjustable deadband feature
- Single source control solution
- Selectable fail position upon loss of control signal
- User programmable speed control
- Security code access
- Unit address selection
- Push-button or remote programming for direct or reverse acting operation (no product re-wiring)
- Split range capability
- Programmable electronic travel stops
- Programmable response curves: standard linear and 1:25 or 1:50 equal percentage or up to 4 user defined 21 point curves
- Programmable modulating limits for improved valve porting and seat life
- Push-button restoration of factory defaults
- Selectable baud rate 1200 bps to 38K bps for onboard microcontroller



## DataFlo C

A PID controller with Auto-Tune *inside* the Final Control Element.

DataFlo C is a fresh approach to PID control. The integration of a PID (Proportional Integral Derivative) single loop controller into an electric actuator makes DataFlo C unique, bringing control to the point of use.

The robust, compact package simplifies wiring requirements by directly accepting RTD (Resistance Temperature Detector), analogue or thermocouple process inputs.

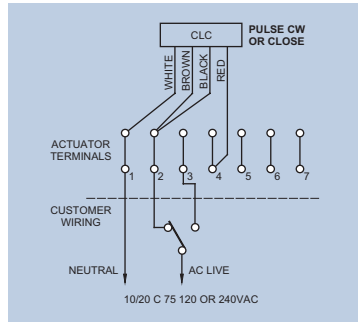
All the control parameters are easily programmed through the local keypad or via a simple RS-485 computer interface. The DataFlo C control valve package is quickly and easily tuned to the process loop utilising the onboard Auto Tune facility.



### Features & Benefits

- Robust valve, actuator and integral PID controller package
- Complete autotuning of PID algorithm
- Total control of process parameters either locally or via RS-485 computer network
- Push-button programming for direct or reverse acting operation
- Adjustable deadband and operating parameters
- Single source control solution
- Controlled by onboard microprocessor
- Push-button set-point and process signal calibration
- Fail-safe action on set-point or instrumentation failure
- Invalid feedback potentiometer signal
- Fully programmable controller
- Total integration within the actuator package
- High resolution and performance
- Monitors highest/lowest process values
- Security code protection of controller
- Unit address selection
- Push-button restoration of factory defaults
- Selectable baud rates 1200 bps to 38K bps for onboard microcontroller

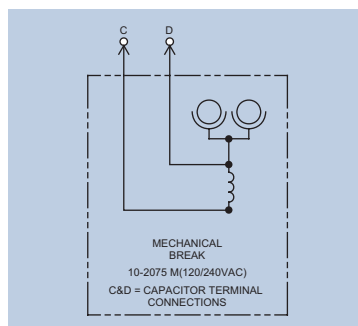
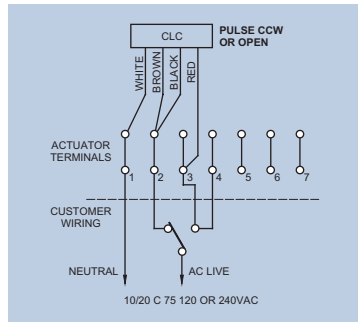
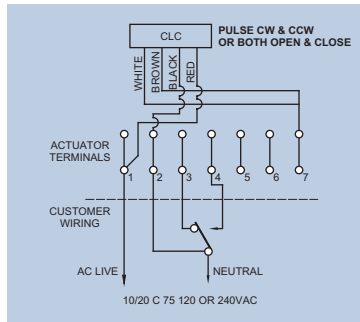
## Other Optional Features



### Cycle Length Control (CLC)

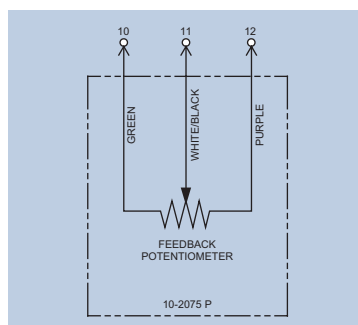
A compact, modular add-to unit used for prevention of pipeline shock, which can damage the piping system and is normally caused by fast operation of valves on steam or hydraulic services. Suitable for either 120 or 240 VAC supply, the CLC unit allows field adjustable increase in the cycle-time up to 10 minutes per stroke.

For consistent, positive operation where long cycle times are required, it is recommended that a mechanical brake is fitted in addition to the CLC.



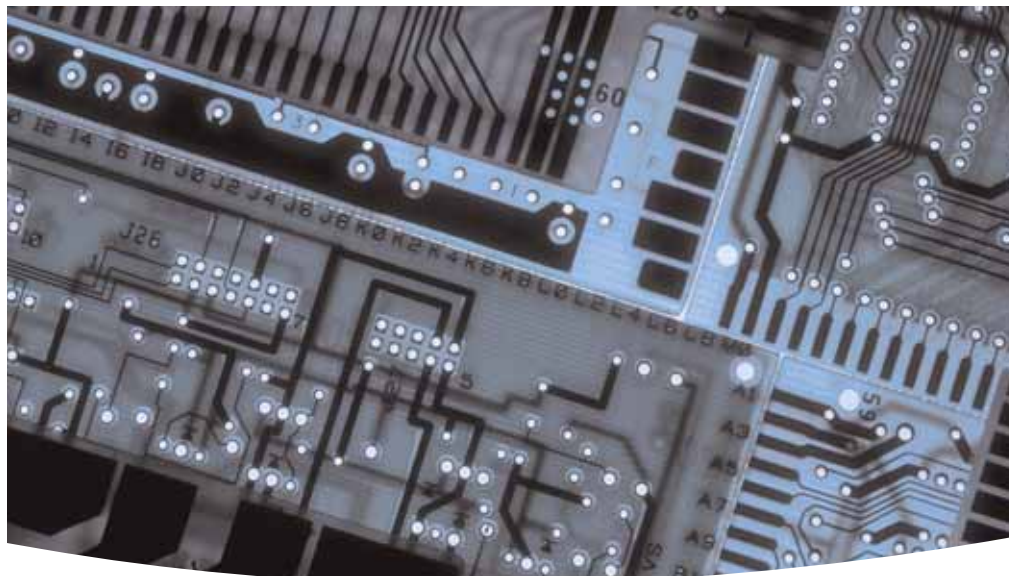
### Mechanical Brake

Designed primarily for butterfly valve applications, the electromechanical brake eliminates hunting due to back-run of the actuator shaft caused by dynamic torque or seat resilience. Also used when positive, instantaneous stop action is required.



### Feedback Potentiometer

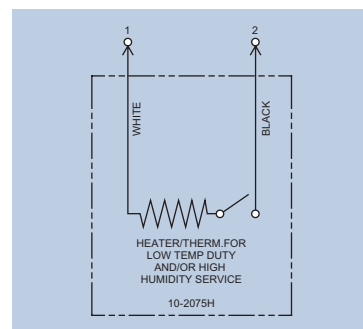
For accurate shaft position indication via a 1000Ω potentiometer. Applications include positional control and remote position indication. Twin potentiometer capability is available where both are required. Consult Flowserve Technical Sales for further details.



### Heater/Thermostat

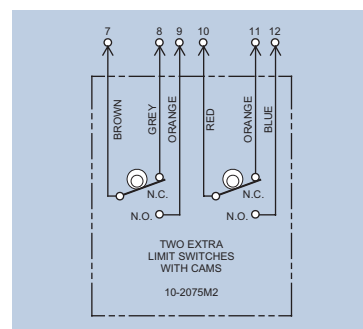
Maintains the actuator internals at an ideal operating temperature whilst preventing condensation which could lead to electrical malfunction.

Recommended for applications in cold ambient temperatures or humid environments.



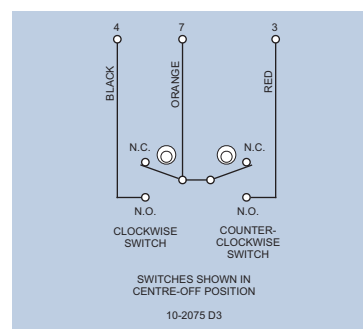
### Additional Switches

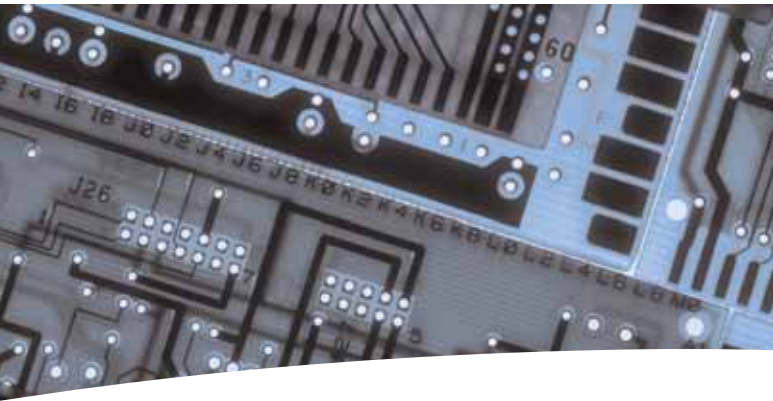
Up to two additional, volt-free switches can be fitted, fully adjustable for operating position but normally used for end-of-stroke position indication.



### 180° Centre-off

Provides 3-position stop capability, ideal for diverter valves with centre-off position and 180° travel.



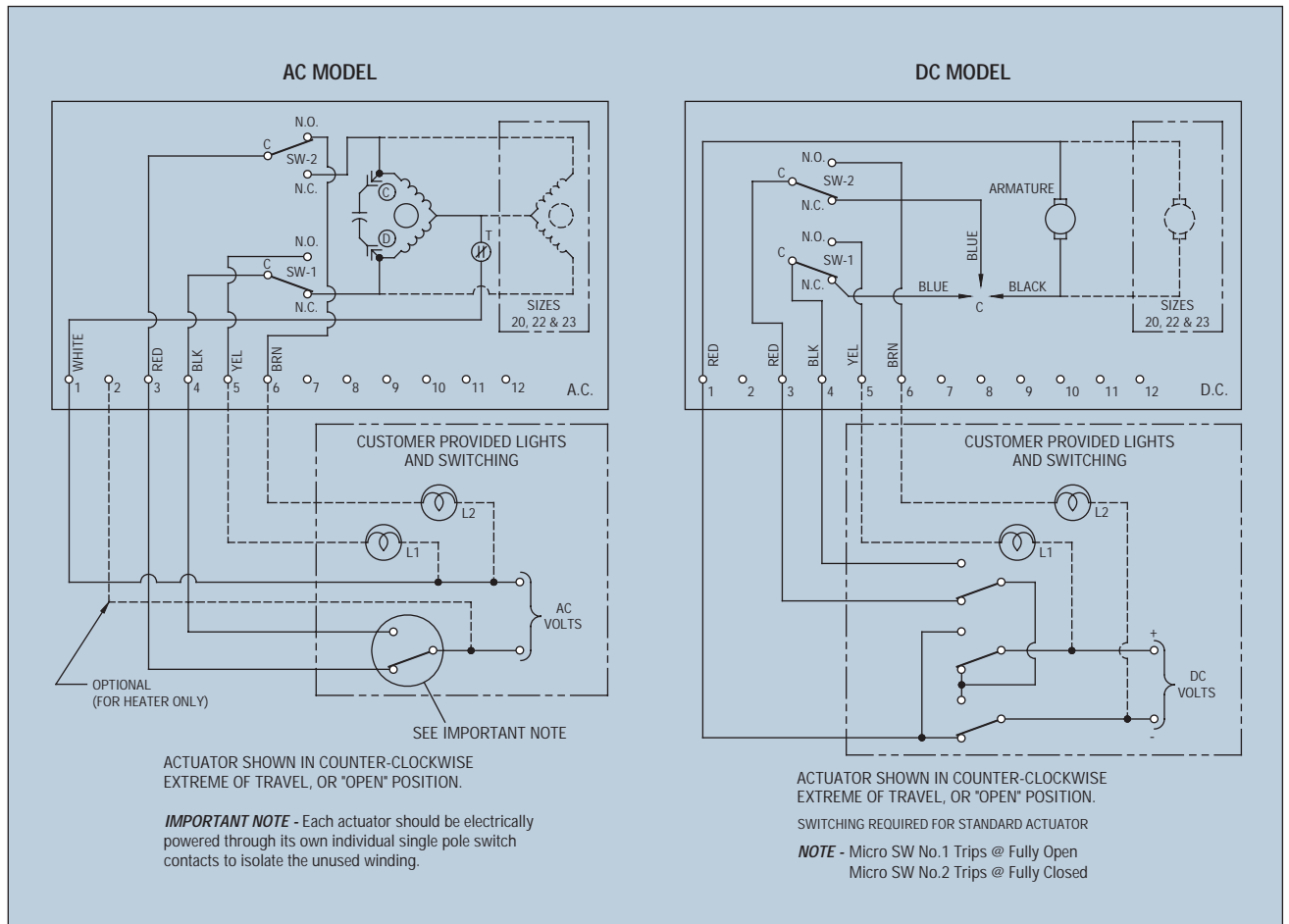


## Ingress Protection

**Water-tight & Dust-tight to:**

- BS EN 60529: 1992, IP 66 Protection Class - U.K. / Europe
- NEMA 4 - U.S.A. and Canada

## Wiring Diagram





## Other Norbro Products

Since the mid-Sixties the Norbro name has been recognised as the leading pneumatic actuator for industry. As proof of this, Norbro pneumatic actuators can be found in a range of applications as diverse as the petrochemical industry, food and beverage, steel production, pharmaceuticals and plastics manufacturing.

### Series 40R [1]

From the very beginning Norbro has been dedicated to providing high performance actuators which combine reliability, long life and ease of maintenance with operational safety and a modular design concept which allows simple attachment of a variety of ancillaries to match customer requirements.

With the latest design of the Norbro Series 40R, all of these factors add up to providing you with the finest quarter turn pneumatic actuator available today.

### Series 33 [2]

Norbro's Series 33 180° actuator is derived from the world-renowned 40R pneumatic actuator and has been designed to complement the Worcester Series 18/19 multi-way ball valve and can also be used on any other valves requiring up to 180° rotation.

### J Switch [3]

Norbro's unique end-mounted J-Switch enclosure is suitable for any standard 40R actuator (except size 05). Not available with limit stop version. Can be supplied as a factory assembled and tested actuator/switch package

### Series 72 Electri-Safe [4]

Norbro's patented Series 72 Electri-Safe actuator is a powerful, compact and economical means of electrically actuating valves in your process while meeting your safety requirements.

Electri-Safe is an electro-hydraulic actuator that operates like a spring-return pneumatic actuator. You get the same speed and reliability you are used to with pneumatic actuators, but far more cost effectively.

### Series 61 [5]

The Norbro 61 brings new levels of control to batch/filling operations. It has been designed specifically to provide rapid, repeatable and highly accurate filling control for all weigh/measuring processes. The 61 is suitable for applications in either fully automatic or manual systems, and can be used with any quarter turn valve.



**Flowserve Flow Control (UK) Ltd.**

Worcester Controls  
Burrell Road, Haywards Heath  
West Sussex RH16 1TL  
United Kingdom  
Telephone: +44 (0)1444 314400  
Telefax: +44 (0)1444 314401  
Email: [wwukinfo@flowserve.com](mailto:wwukinfo@flowserve.com)

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visit [www.flowserve.com](http://www.flowserve.com) or call USA 1 800 225 6989



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