

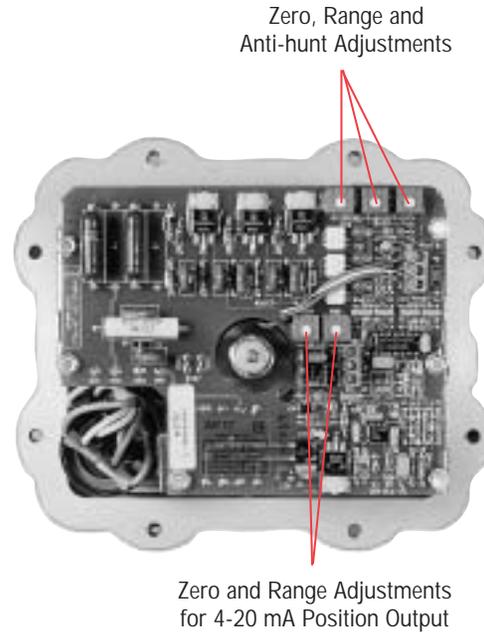
AN ISO 9001 REGISTERED COMPANY

## *Series AF17 Electronic Positioner*

*100% solid state electronic positioner, precisely designed and manufactured by Worcester Controls to provide the most reliable positioning of rotary electric actuators.*

## The Series AF17 Positioner

Powers and Precisely Positions Valves, Dampers and Similar Equipment



### Features and Benefits

- **90° rotation standard** - AF17 Actuators are designed specifically for quarter turn operation - engineered to meet the needs of your application.
- **Other rotations available.**
- **Standard inputs** - 1-5, 4-20, 10-50 milliamps, 135 or 1000 ohm potentiometer, 0-5 & 0-10 volts DC. Other inputs available upon request.
- **Direct or reverse acting** - nothing additional to buy.
- **Zero & span adjustment** - speeds calibration time, lowers maintenance labor costs.
- **All solid state electronic circuitry** - reduces heat, saves energy, gives longer life and higher reliability.
- **Anti-hunting control built in** - facilitates balancing of positioner to dynamic characteristics of the total system. Helps eliminate final control element oscillation.
- **Solid state relays are standard** - provide longer life and higher reliability.
- **Dynamic electronic braking** - stops actuator movement with momentary electric pulse (reverse current brake). Allows quicker and more accurate operation.
- **Electromechanical brake optional** - provides continuous holding when needed, such as on dampers or butterfly valves.
- **"LED" calibration check** - indicator lights verify proper calibration "at-a-glance." Makes calibrating simple and easy.
- **Standard split-range capability.**
- **Bypass for manual operation** - interrupts control signal, provides local manual position control. Consult factory.
- **Position feedback module (optional)** - 4-20 mA output.

### Performance

Positioner Mounted in Typical Actuator Series 75, 15/23 Sec. Cycle Time

<b>Independent Linearity</b> (The maximum deviation of the actual characteristic from a straight line.)	0.5% of span
<b>Resolution</b> (Smallest possible change in valve position.)	0.5% of span (~80 Microamps when moving in the same direction)
<b>Deadband</b> (The maximum range through which the input signal can be varied without initiating a change in output shaft position.) Adjustable via anti-hunt control.	0.4% min. of span
<b>Hysteresis</b> (The maximum difference in output shaft position for a given input signal during full range traverse in each direction.)	0.5% of span
<b>Temperature Limits</b> (Operating Temperature)	*-40°F to 150°F †
<b>Duty Cycle</b>	Specify 75% or 100%
<b>Current Drain</b>	5 watts plus actuator current drain
<b>Characteristic</b> (Input/Output relationship.)	Linear

† For conditions beyond these ratings, consult factory.

\* 32°F and less requires the use of a heater and thermostat.

## Specifications

### AF17 Positioner with Series 75 Actuator

#### Voltages

120 V 50/60 Hz  
240 V 50/60 Hz  
12 VDC  
24 VDC

#### Cycle Time

15 Sec/90° Rotation, 23 Sec/90° Rotation  
(Other speed and rotation options available. Consult factory.)

#### Standard Inputs

1-5 mA DC	0-135 ohm potentiometer	0-5 VDC
4-20 mA DC	0-1000 ohm potentiometer	0-10 VDC
10-50 mA DC		

#### Load Resistance (for AF17)

100 ohms for 10-50 mA signal	800 ohms for 0-5 VDC
220 ohms for 4-20 mA signal	1100 ohms for 0-10 VDC
1000 ohms for 1-5 mA signal	

#### Output Ratings

Peak Voltage on load circuit, at 120 VAC - 800 VAC, and 240 VAC - 800 VAC.  
Maximum Standard Current - 8 A/1 minute. Maximum run current with:  
Resistive load - 5A, Inductive load - 3A.

#### Enclosure Options

TYPE 4 - Watertight\*  
TYPE 7 and TYPE 9 - Hazardous Locations\*  
TYPE 4, 4x, 7, AND 9 Inclusive\*

\*Includes Manual Override/Indicator Knob

#### Adjustments

Zero - 25% of span  
Range - 25% of span  
Anti-hunt Control .25 to 10% of signal

#### Potentiometer - 1000 ohms

A standard, installed potentiometer is for feedback to the positioner circuit board only. If remote valve position monitoring is required, order the optional Dual Potentiometer ("D" in the ordering code). With the dual potentiometer installed, one pot operates with the positioner circuitry, the other is used for external position monitoring. They are independently adjustable.

#### Options Available with AF17

Extra Limit Switches (2)  
Heater/Thermostat  
Mechanical Brake - for butterfly valve and damper applications  
Direct or Reverse Acting  
Dual Potentiometer (for remote position monitoring)  
Position Feedback 4-20 mA Output (requires dual potentiometer)

## Theory of Operation

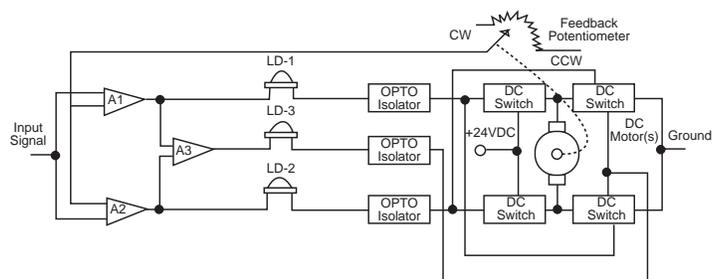
The AF17 Positioner is a unique circuit board specifically designed to provide accurate and reliable position control.

The operation of the AF17 is based on the comparison of 2 voltages — one derived from the input signal and the other from the feedback potentiometer driven by the actuator shaft.

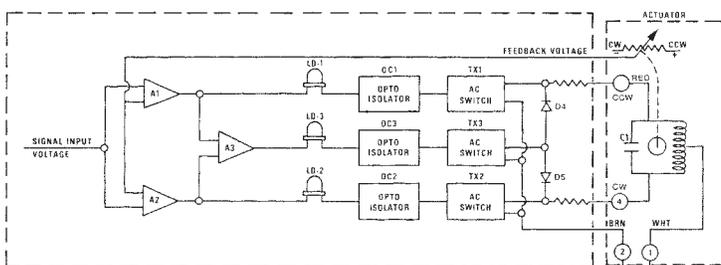
- The signal input voltage is derived from an input signal conversion circuit (not shown) that changes the milliamperere or resistance input signals to voltage.
- The signal is then compared with the voltage from the feedback potentiometer located beneath the circuit board.

- Both voltages — from the input signal and the feedback potentiometer — are fed to the two comparison amplifiers A1 and A2 (as shown in diagram below) which have been calibrated to provide the correct action. If the voltages are equal, both amplifiers will be in the "off" state and the actuator motor will not be energized.
- If there is a difference between the two voltages, either amplifier will be "on". The actuator motor will then be energized, turning the actuator shaft and the feedback potentiometer until the potentiometer's output voltage is the same as the signal input voltage. This turns the amplifier "off" and de-energizes the actuator motor.

AF17 DC Positioner and Actuator Block Diagram



AF17 DC Positioner and Actuator Block Diagram



## HOW TO ORDER

### Series AF17 Electric Positioners

20	AF		17	4		120A
Positioner Size	Product Series	Variations	Product Number	Range	Mode of Operation	Voltage
20 - 10-2375 Actuator 30 - 25-3075 Actuator	AF	Blank- Single Potentiometer ‡ D - Dual Potentiometer 4 - 4-20 mA Position Output	17	1 - 1-5 mA input 4 - 4-20 mA input 10 - 10-50 mA input 13 - 135 ohm input 1K - 1000 ohm input 5V - 0-5 VDC input XV - 0-10 VDC input	Blank - Direct Acting R - Reverse Acting	120A - 120VAC 50/60 Hz 240A- 240VAC 50/60 Hz† 12D - 12VDC†† 24D - 24VDC†† †If using 240 VAC for AF17, actuator order code must have an "A" after the actuator size (Example: 20A)

NOTE: Code above depicts Size 20 AF17, 4-20 mA input, direct acting 120V 60 Hz operation.  
‡Dual Potentiometer must be ordered if independent feedback potentiometer is required.

### Series 75 Electric Actuators

20	H	75	7	XM1	120A
Actuator Size	Variations	Product Series	Duty Cycle*	Standard Options	Voltage
10 12 15 20 22 23 25 30	†A - AF17 240 VAC only H - Heater/Thermostat M - Mechanical Brake §R - AF17 12/24 VDC only  ††If 240 VAC board is ordered an "A" must appear after the actuator size.	75	5 - 100% Duty Cycle Available on sizes 10,12, 20 AC units only §4 -75% Duty Cycle Available on all AC sizes; sizes 10, 12, 20, 22, 23 DC	Must use: W - TYPE 4 X - TYPE 7, 9 or Z - TYPE 4, 4x, 7, 9  **Additional Options: M1 - One extra auxiliary limit switch (SPDT) with cam M2 - Two extra auxiliary limit switches (SPDT) with cams	120A - 120VAC 50/60 Hz 240A - 240VAC 50/60 Hz 12D - 12VDC†† 24D - 24VDC††

NOTE: Code above depicts Size 20 Series 75 Actuator with Heater/Thermostat, for Hazardous Environment with One Auxiliary Limit Switch and 120 V 60 Hz.  
\*When using electric actuators for modulating applications, extended or continuous duty cycle motors must be selected.  
§ "R" and "4" must be used in the Actuator Code when DC AF17 positioner is ordered.  
†† 12-24 VDC not available in sizes 2575 and 3075 as standard.  
\*\*Order auxiliary limit switches for DC actuators with DC positioners through custom products. 15 size actuators are available as 120VAC only.

Due to continuous development of our product range, we reserve the right to alter the dimensions and information contained in this leaflet as required.

**Caution: Ball valves can retain pressurized media in the body cavity when closed. Use care when disassembling. Always open valve to relieve pressure prior to disassembly.**

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