

---

*Innovators in Control Valve Technology*

## **GENERAL DESCRIPTION FOR AN ME-4240 & ME-4340 PROPORTIONAL MICROPROCESSOR BASED FAIL-LAST POSITION VALVE ACTUATORS**

A capacitor-run brushless synchronous AC motor is used to position a valve in response to an input set point signal either at 2-10Vdc or 10-2Vdc in proportional mode and 0.2 to 5 seconds or 5 to 0.2 seconds in time proportional mode. The displacement of the valve is measured by a quadrature system using an LED, two phototransistors and a rotating flag in the gearbox assembly. A microprocessor is used to access the input signal, monitor and store the position count, determine the count difference and appropriately control the drive to the motor.

At power-up the valve performs a re-span operation, the valve is driven fully closed. The microprocessor stores the end position and the span values. The pulse-counting algorithm is conceived to avoid any uncertainties associated with fringe condition if one or the other phototransistors is partially obscured.

The motor is driven by two triacs and the required phase-shift is provided by a 2.2MF capacitor. The perceived position count is continuously converted to a PWM signal. This exits the microprocessor and outputs as a 1-5Vsignal to use by others, for monitoring or positioning other devices. The stall detecting circuit will switch the power to the motor at the end of the travel.

### **PROPORTIONAL MODE – ME-4340**

The unit receives 2-10V or 10-2Vdc input signal that is converted into 1-5 at microprocessor A/D input. The microprocessor converts this to a pulse count. This count is compared, on an ongoing basis, with the actual position measured by pulsed received from the optical quadrature encoder. The pulse-count difference causes the microprocessor to drive the motor in an appropriate direction. The pulse count is correlated with position by using Span and Zero counts acquired during the ReSpan. When the valve is driven all the way to the end and a stall is detected, on-going pulse count ERROR detection system will update automatically if there is a discrepancy.

### **TIME PROPORTIONAL MODE – ME-4240**

In time proportional versions, the input is pulse, either by the external relay contact or a solid-state device (triac). A resistor Zenner network is connected across the input to assure adequate holding current for the triac (>10Ma). The duration of the signal is timed and converted into a position command on the basis that 0.2 seconds requires fully open and 5 seconds requires fully closed (in normal mode), with 48 intermediate steps. When the input signal changes by more than 0.1 seconds, this time is converted into a target position time count, which is compared to an actual position count. If the difference exceeds 0.1 seconds the valve is driven into the appropriate position. The circuit will accept a new position command while the actuator is in transition, which will override the first.

# SPECIFICATIONS ME-4240 AND ME-4340 – FLP VALVE ACTUATORS

## GENERAL

**Supply:** 24Vac +/- 10%, 60Hz/50Hz

**Motor Type:** Brushless Synchronous

**Nominal Consumption:** 2.5VA

**Ambient operating temperature:** 0-50°C (120°F)

**Typical opening (closing) time:** 60 seconds

**Signal output:** 1-5Vdc, the microprocessor generates a proportional signal to valve position, this signal is available on a green wire.

**Signal output impedance:** 33 K $\Omega$

**Motor jam recovery:** if an unexpected stall occurs – i.e. in midrange – the system makes three, two-second attempts to clear, and then assumes a wait state

**Position feedback (internal):** Quadrature optical encoder (700 pulse resolution typical)

**Drift:** not detectable drift after 250,000 cycles

**Re-span (standard):** after power up, drive to fully closed, and then assume set point

**Operating modes:** proportional, time proportional

**Input Protection:** inputs will accept 30Vac/dc continuously without damage. Misconnection (mixing) of the connections to unit will not cause damage

**Wiring Connection:** Plenum Cable 32”

CE- Approved to EN55022, 55011

Low voltage class 2 24Vac device

*Do not power more than 10 actuators with one transformer*

## PROPORTIONAL (ME-4340)

**Signal input (normal mode):** 2-10Vdc (10V to close) by removing Jumper J1

**Signal input (reverse mode):** 10-2Vdc (10V to open) by installing Jumper J1

**Input Impedance:** 200 K  $\Omega$  – 5mA RMS

**Dead Band:** 0.15V

**Delay:** two seconds before implementing motor direction change

## TIME PROPORTIONAL (ME-4240)

**Signal input (normal mode):** 0.2 seconds to 5 seconds – 5 seconds to close

**Signal input (reverse mode):** 0.2 seconds to 5 seconds – 5 seconds to open (change Jumper J1)

Inputs shorter than .1 second are ignored, inputs longer than 5 seconds (e.g. continuous contact closure) initiate fully closed action after 5 seconds. Other time ranges are available.

**Number of steps:** end-to-end 42

**Input polarity:** Input to 24Vac (+/-10%)

**Input Impedance/current:** 2K  $\Omega$  or 12mA RMS

**Switching:** low energy (gold) dry contacts of solid state (triac)

**Dead Band:** 0.17 second

**Re-span (standard):** after power up

## FEATURES

The hardware accommodates either proportional or time proportional inputs. An appropriate microprocessor must be installed. Normal or reverse acting selected by jumper J1.

4-20mA input: proportional units can be used with such signals if converted to 2-10V by a suitable shunt, 500ohms 1%, 1/2W resistor.

## DEFINITIONS

**Dead band:** if the perceived position difference ( + or -) is less than .IV (-1 second) referred to the signal input, no motor activity is initiated.

**Stall:** assumed if motor is energized but pulsed not detected for 2 seconds