

**Terminal Unit Valves with Spring Return Actuators
ME-4640, ME-4740, ME-4840 & ME-4940**



Description

ME-4640, ME-4740 ME-4840 and ME-4940 series spring return proportional microprocessor based control valve actuators

There is a number of different types of modulating Spring Return Power Cubes available, which are:-

- ME4640 - Three point floating Spring Return normally up or open
- ME4740 - PWM 0.25-5.0 secs Spring Return normally up or open
- ME4840 - 0-10Vdc, 2-10Vdc or 4-20mA Spring Return normally up or open
- ME4844 - 0-5 or 5-10Vdc Spring Return normally up or open
- ME4940 - 0-10Vdc, 2-10Vdc or 4-20mA Spring Return normally down or closed
- ME4944 - 0-5 or 5-10Vdc Spring Return normally down or closed

They drive 2, 3 or 4 port terminal unit or zone valves for the control of hot water up to 250°F (120°C), chilled water to 35°F (2°C) 50% glycol, and low pressure steam using an EV cartridge.

A 24Vac hysteresis brushless motor is used to position a valve in response to an input signal (on red wire). A quadrature optical system using two LED's, two phototransistors and a rotating flag on the rear of the motor measure the displacement of the valve. 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 50 second re-span operation, the valve is driven fully closed and then fully open. The perceived position outputs (on green wire) as a 1-5V signal to use by others, for monitoring or positioning other devices.

Upon power failure, the motor will be returned to its' starting open or closed position by the valve spring.

Features

The hardware accommodates proportional, time proportional or floating protocols and is configured by jumpers J3 and J4.

An appropriately programmed microprocessor must be installed.

Direct or reverse acting selected by jumper J2.

General Actuator Specifications

Supply: 24Vac +10%/-5%, 60Hz/50Hz

Motor Type: AC hysteresis brushless

Nominal Consumption: 6 Watts (9VA)

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

Typical opening (closing) time: 25 seconds

Signal output: 1-5Vdc +/- .1V impedance 100Kohms.

0V is perceived as loss of power,

1V represents actuator in up position

5V represents actuator in down position

Output force: 28lbs (120N)

Motor jam recovery: if an unexpected stall occurs – i.e. in midrange – the system reverses the motor, backs up, and then again attempts to move to the calculated position

Position feedback (internal): Quadrature optical encoder

Drift: no detectable drift after 100,000 cycles Re-span (standard): after power up as follows: drive to full closed. Reset count to zero. Allow (controlled) spring return to full open, store span count, and then assume set point

Operating modes: proportional, time proportional, floating

Input Protection: inputs will accept 30Vac continuously without damage.

Misconnection (mixing) of the connections to unit will not cause damage

Wiring Connection: 32" PVC or optional Plenum cable

Agency approval: Conforms to CE/ROHS requirements
Class 2 as per UL/CSA



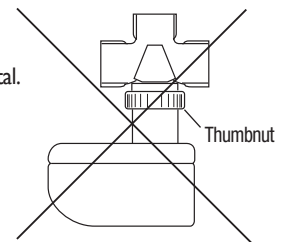
Installation Instructions

All Power Cube ME-4640, ME-4740, ME-4840, ME-4844, ME-4940 and ME-4944 actuators can be installed on all **Spartan Zone valve bodies.**

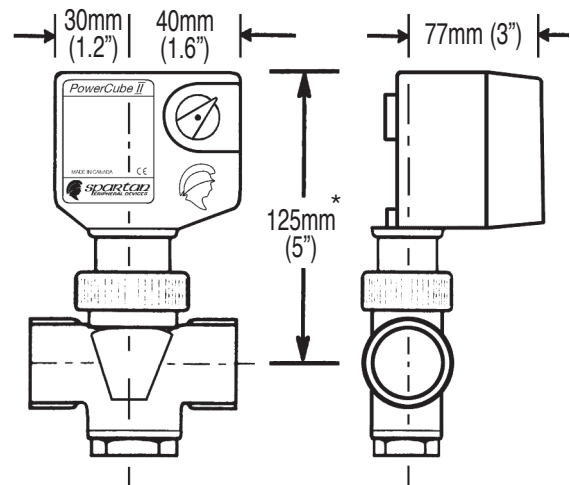
The commercial type valve bodies all utilise low zinc anti-dezincification bronze coupled with long life replaceable and inter-changeable internals from 0.15 to 9.0 Cv (0.13 to 7.75 Kv's).

Refer to Control Valve Bodies Data Sheet.

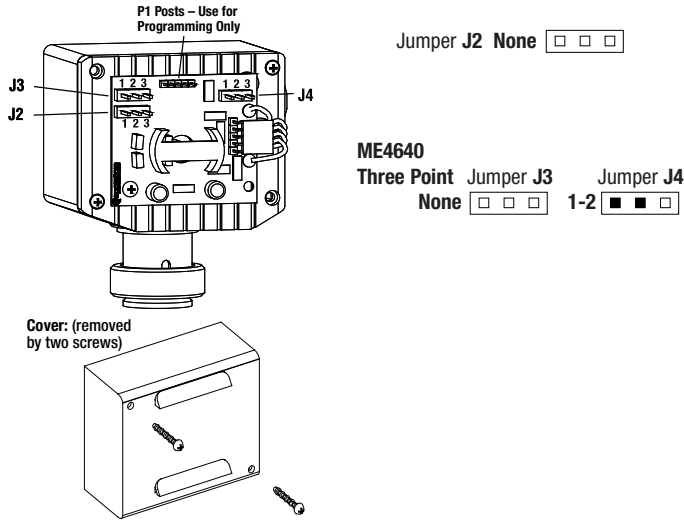
The actuator can be installed vertically, or at any angle not exceeding the horizontal. The Actuator mounting thumbnut is to be hand-tightened only, using tools may result in over-tightening.



Dimensions



ME4640 Three Point Floating Powercube Spring return normally up or open



THREE POINT FLOATING (ME-4640)

Two inputs are used - one for Open and one for Close commands. Both inputs are similarly configured, as described under TP Mode for use with relay contacts or triacs. The input is normally biased low, receives AC line for valid input. The input de-bouncing requires a signal duration of not less than 0.1 seconds to register as valid.

The total range of the valve opening or closing signals is 60 seconds – divided into 30 x 2 second pulses. Input activation is recorded cumulatively and algebraically, until the signal time exceeds 2 seconds (i.e. Open pulses accumulate and Close pulses subtract until a > 2 second time is registered). The motor then steps 1/30th of span (as determined during latest self test ReSpan at power up).

Signal input: 0.1 to 60 seconds in either direction, inputs shorter than 0.1 seconds are ignored

Number of steps: end-to-end 30

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

Input Impedance/current: 2KΩ or 12mA RMS

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

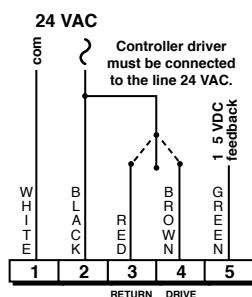
Dead Band: 0.12 seconds

Re-span (standard): after power up

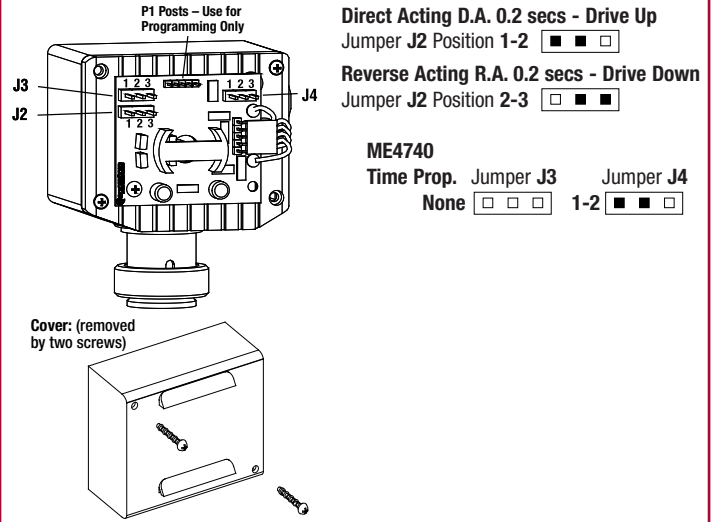
Interlock: if both inputs are energized simultaneously, no movement results

WIRING DIAGRAM

ME-4640 TRI-STATE (spring return)



ME4740 PWM Modulating Powercube Spring return normally up or open



TIME PROPORTIONAL (ME-4740)

In Time Proportional versions, the input is pulsed - either by external relay contact, or solid state device (triac). A network is connected across the input to assure adequate holding current for the triac (<10Ma).

The duration of this signal is timed, and converted to a position command - on the basis that 0.2 seconds requires fully open, 5 seconds requires fully closed (Normal mode) - with 33 intermediate steps.

This time is converted to a Target Position pulse count, which is compared to the actual position count. If the difference exceeds ~0.12 second, the valve is driven to the appropriate position. The circuit can accept a new position command, received while the valve is in transition, which will override the first.

Jumper J2

Signal input (direct mode):

0.2 seconds to 5 seconds – 5 seconds to close

Signal input (reverse mode):

5 seconds to 0.2 seconds – 5 seconds to open

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 40

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

Input Impedance/current: 2KΩ or 12mA RMS

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

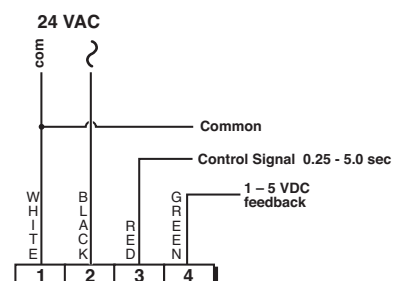
Dead Band: 0.12 seconds

Re-span (standard): after power up

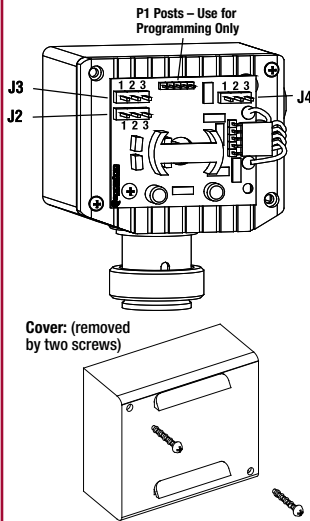
Minimum off cycle: required between pulses 250msecs

WIRING DIAGRAM

ME-4740 PWM CONTROL



ME4840 / ME4844 Modulating Powercube Spring Return up or normally open



Direct Acting D.A. 0/2Vdc - Drive Up
Jumper J2 Position 1-2

Reverse Acting R.A. 0/2Vdc - Drive Down
Jumper J2 Position 2-3

ME4844
0-5Vdc Jumper J3 Jumper J4
Position 1-2

5-10Vdc Jumper J3 Jumper J4
Position 2-3

ME4840
2-10Vdc Jumper J3 Jumper J4
Position 1-2

0-10Vdc Jumper J3 Jumper J4
Position 2-3

ME4840
4-20mA Jumper J3 Jumper J4
Position 1-2 2-3

PROPORTIONAL (ME-4840 and ME4844)

Jumper J2

Signal input (direct mode):

0 or 2Vdc stem up (standard set-up)

Signal input (reverse mode):

0 or 2Vdc stem down, by installing Jumper J2

Jumper J3

Input signal selection 0-10, 2-10Vdc in ME4840, or 0-5 or 5-10Vdc in ME4844

Jumper J4

4 - 20mA (with J3 in a 2-10Vdc position)

Input Impedance: 200 K Ω (0.05mA at 10Vdc)

Dead Band: 0.15V

Delay: two seconds before implementing motor direction change

End Update: When the input signal is within $\sim 0.2V$ of an end value (i.e. 2.2V or 9.8V), the valve is driven until stall is detected.

Re-span (standard): after each power up

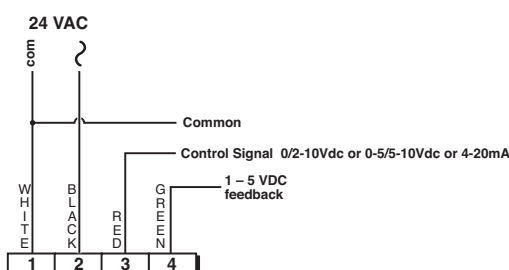
The ME-4840 is factory set to 2-10Vdc, direct acting.

Alternative Control Range Settings

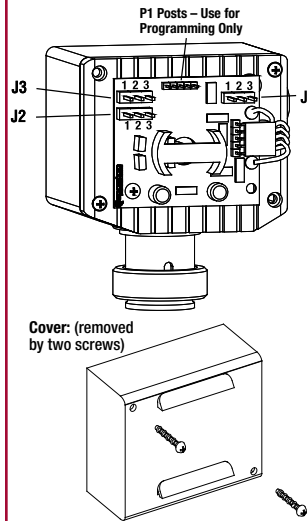
Part No.	Stem Up	Stem Down	Part No.	Stem Up	Stem Down
ME4840	2Vdc	10Vdc	ME4844E	5Vdc	0Vdc
ME4840A	10Vdc	2Vdc	ME4844F	5Vdc	10Vdc
ME4840B	0Vdc	10Vdc	ME4844G	10Vdc	5Vdc
ME4840C	10Vdc	0Vdc	ME4840H	4mA	20mA
ME4844D	0Vdc	5Vdc	ME4840I	20mA	4mA

WIRING DIAGRAM

ME-4840 and ME-4844 Modulating Control



ME4940 / ME4944 Modulating Powercube Spring Return down or normally closed



Direct Acting D.A. 0/2Vdc - Drive Up
Jumper J2 Position 1-2

Reverse Acting R.A. 0/2Vdc - Drive Down
Jumper J2 Position 2-3

ME4944
0-5Vdc Jumper J3 Jumper J4
Position 1-2

5-10Vdc Jumper J3 Jumper J4
Position 2-3

ME4940
2-10Vdc Jumper J3 Jumper J4
Position 1-2

0-10Vdc Jumper J3 Jumper J4
Position 2-3

ME4940
4-20mA Jumper J3 Jumper J4
Position 1-2 2-3

PROPORTIONAL (ME-4940 and ME4944)

Jumper J2

Signal input (direct mode):

0 or 2Vdc stem up (standard set-up)

Signal input (reverse mode):

0 or 2Vdc stem down, by installing Jumper J2

Jumper J3

Input signal selection 0-10, 2-10Vdc in ME4940, or 0-5 or 5-10Vdc in ME4944

Jumper J4

4 - 20mA (with J3 in a 2-10Vdc position)

Input Impedance: 200 K Ω (0.05mA at 10Vdc)

Dead Band: 0.15V

Delay: two seconds before implementing motor direction change

End Update: When the input signal is within $\sim 0.2V$ of an end value (i.e. 2.2V or 9.8V), the valve is driven until stall is detected.

Re-span (standard): after each power up

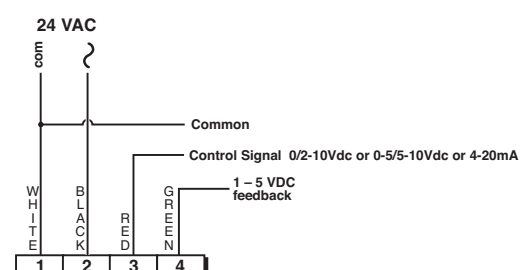
The ME-4940 is factory set to 2-10Vdc, direct acting.

Alternative Control Range Settings

Part No.	Stem Up	Stem Down	Part No.	Stem Up	Stem Down
ME4940	2Vdc	10Vdc	ME4944E	5Vdc	0Vdc
ME4940A	10Vdc	2Vdc	ME4944F	5Vdc	10Vdc
ME4940B	0Vdc	10Vdc	ME4944G	10Vdc	5Vdc
ME4940C	10Vdc	0Vdc	ME4940H	4mA	20mA
ME4944D	0Vdc	5Vdc	ME4940I	20mA	4mA

WIRING DIAGRAM

ME-4940 and ME-4944 Modulating Control



Control Valve Assemblies with Power Cube Actuators
ME4640, ME4740, ME4840, ME4940

Valve Body	Description	Size	*Cartridge CV/KV selection	Actuator ME4640	Actuator ME4740	Actuator ME4840	Actuator ME4940	EP Cartridge Max. Close-off PSI / Bar	EB Cartridge Max. Close-off PSI / Bar
V240 - 2 way valve body - Union connection both ports									
V240-12X	2 Unions in-line - Select 1/2" or 3/4"	BC-0.15,0.25		VE240-BCXX-4640	VE240-BCXX-4740	VE240-BCXX-4840/44	VE240-BCXX-4940/44	60 / 4.0	-
V240-34X	unions, solder S or threaded N	(EP or EB)-1.0,1.5,2.0,2.5,3.5		VE240-EP/EBXX-4640	VE240-EPXX-4740	VE240-EPXX-4840/44	VE240-EPXX-4940/44	35 / 2.4	100 / 6.8
V241 - 2 way valve body - female port in, X union connection port out									
V241-12	Single Union Straight	1/2"	BC-0.15,0.25	VE241-12-BCXX-4640	VE241-12-BCXX-4740	VE241-12-BCXX-4840/44	VE241-12-BCXX-4940/44	60 / 4.0	-
V241-12	Female port in	1/2"	(EP or EB)-0.50,1.0,1.5,2.0,2.5,3.5	VE241-12-EPXX-4640	VE241-12-EP/EBXX-4740	VE241-12-EP/EBXX-4840/44	VE241-12-EP/EBXX-4940/44	35 / 2.4	100 / 6.8
V241-34	Male union out	3/4"	(EP or EB)-1.0,1.5,2.0,2.5,3.5,4.5	VE241-34-EP/EBXX-4640	VE241-34-EP/EBXX-4740	VE241-34-EP/EBXX-4840/44	VE241-34-EP/EBXX-4940/44	35 / 2.4	100 / 6.8
V243 - 2 way valve body - female port in, X female port out									
V243-12	Female by Female Port	1/2"	BC-0.15,0.25	VE243-12-BCXX-4640	VE243-12-BCXX-4740	VE243-12-BCXX-4840/44	VE243-12-BCXX-4940/44	60 / 4.0	-
V243-12	Straight	1/2"	(EP or EB)-0.50,1.0,1.5,2.0,2.5,3.5	VE243-12-EP/EBXX-4640	VE243-12-EP/EBXX-4740	VE243-12-EP/EBXX-4840/44	VE243-12-EP/EBXX-4940/44	35 / 2.4	100 / 6.8
V243-34		3/4"	(EP or EB)-1.0,1.5,2.0,2.5,3.5,4.5	VE243-34-EP/EBXX-4640	VE243-34-EP/EBXX-4740	VE243-34-EP/EBXX-4840/44	VE243-34-EP/EBXX-4940/44	35 / 2.4	100 / 6.8
V243-10		1"	EB-6.0,6.4,8.0,9.0	VE243-10-EBXX-4640	VE243-10-EBXX-4740	VE243-10-EBXX-4840/44	VE243-10-EBXX-4940/44	60 / 4.0	100 / 6.8
V245 - 2 way valve body - female port in, X female port out									
V245-12	Direct solder body	1/2"	BC-0.15,0.25	VE245-12-BCXX-4640	VE245-12-BCXX-4740	VE245-12-BCXX-4840/44	VE245-12-BCXX-4940/44	60 / 4.0	-
V245-12		1/2"	(EP or EB)-0.50,1.0,1.5,2.0,2.5,3.5	VE245-12-EP/EBXX-4640	VE245-12-EP/EBXX-4740	VE245-12-EP/EBXX-4840/44	VE245-12-EP/EBXX-4940/44	35 / 2.4	100 / 6.8
V245-34		3/4"	(EP or EB)-1.0,1.5,2.0,2.5,3.5,4.5	VE245-34-EP/EBXX-4640	VE245-34-EP/EBXX-4740	VE245-34-EP/EBXX-4840/44	VE245-34-EP/EBXX-4940/44	35 / 2.4	100 / 6.8
V260 - 2 way angle valve body - double union OR V261 - 2 way angle valve body - single union									
V260/V261-12	Angle body	1/2"	(EP or EB)-0.50,1.0,1.5,2.0,2.5,3.5	VE26X-12-EP/EBXX-4640	VE26X-12-EP/EBXX-4740	VE26X-12-EP/EBXX-4840/44	VE26X-12-EP/EBXX-4940/44	35 / 2.4	100 / 6.8
V260/V261-34	Single or Double Union	3/4"	(EP or EB)-1.0,1.5,2.0,2.5,3.5,4.5	VE26X-34-EP/EBXX-4640	VE26X-34-EP/EBXX-4740	VE26X-34-EP/EBXX-4840/44	VE26X-34-EP/EBXX-4940/44	35 / 2.4	100 / 6.8
V320 - 3 way diverting valve body - unions on all three ports									
V320-12X	3 Way Diverting - Select 1/2" or 3/4"		ED1.0,2.0,3.0,3.5	VE320-12-EDXX-4640	VE320-12-EDXX-4740	VE320-12-EDXX-4840/44	VE320-12-EDXX-4940/44	50 / 3.4	-
V320-34X	unions, solder S or threaded N		ED1.0,2.0,3.0,3.5	VE320-34-EDXX-4640	VE320-34-EDXX-4740	VE320-34-EDXX-4840/44	VE320-34-EDXX-4940/44	50 / 3.4	-
V345-34			CV5.5	VE345-34-5-5-4640	VE345-34-5-5-4740	VE345-34-5-5-4840/44	VE345-34-5-5-4940/44	50 / 3.4	-
V345-10			CV5.5	VE345-10-5-5-4640	VE345-10-5-5-4740	VE345-10-5-5-4840/44	VE345-10-5-5-4940/44	50 / 3.4	-
V323 - 3 way diverting valve body - Female thread all ports									
V323-12	Female thread	1/2"	ED1.0,2.0,3.0	VE323-12-EDXX-4640	VE323-12-EDXX-4740	VE323-12-EDXX-4840/44	VE323-12-EDXX-4940/44	50 / 3.4	-
V325 - 3 way diverting valve body - direct solder									
V325-12	3 Way Diverting	1/2"	ED1.0,2.0,3.0,3.5	VE325-12-EDXX-4640	VE325-12-EDXX-4740	VE325-12-EDXX-4840/44	VE325-12-EDXX-4940/44	50 / 3.4	-
V325-34	Direct Solder	3/4"	ED1.0,2.0,3.0,3.5	VE325-34-EDXX-4640	VE325-34-EDXX-4740	VE325-34-EDXX-4840/44	VE325-34-EDXX-4940/44	50 / 3.4	-

*Select CV from available cartridges and replace XX with CV value in complete part number of the assembly. †Maximum differential pressure to prevent water noise.

Spartan Peripheral Devices telephone: (450) 424-6067 • fax: (450) 424-6071 • email: info@spartan-pd.com • website: www.spartan-pd.com