

## Terminal Unit Valves with Spring Return Actuators ME-4640, ME-4740, ME-4840/44 & ME-4940/44

**3 YEAR WARRANTY**  
SPARTAN PERIPHERAL DEVICES

### Description

**ME-4640, ME-4740, ME-4840/44 AND ME-4940/44 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 open or up
- ME4740 - PWM 0.25-5.0 secs Spring Return normally open or up
- ME4840 - 0-10Vdc, 2-10Vdc or 4-20mA Spring Return normally open or up
- ME4844 - 0-5 or 5-10Vdc Spring Return normally open or up
- ME4940 - 0-10Vdc, 2-10Vdc or 4-20mA Spring Return normally closed or down
- ME4944 - 0-5 or 5-10Vdc Spring Return normally closed or down

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.

0 V 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

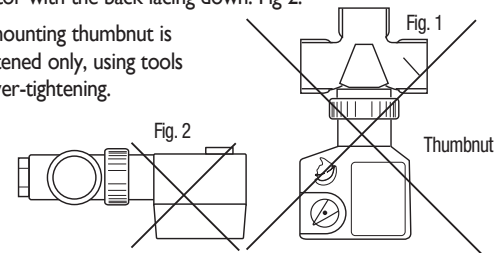
All Power Cube ME-4640, ME-4740, ME-4840, ME-4844, ME-4940 and ME-4944 actuators can be installed on all **Spartan Zone valve bodies.**

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).

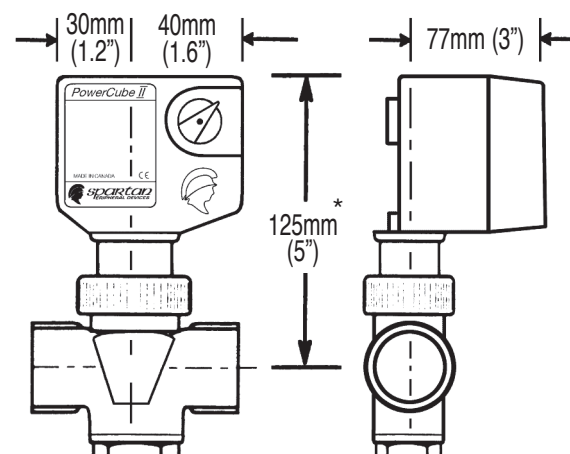
Refer to Control Valve Bodies Data Sheet.

**Important:** The actuator can be installed vertically, or at any angle not exceeding the horizontal. Fig1. Care must also be taken to not install the actuator with the back facing down. Fig 2.

The Actuator mounting thumbnut is to be hand-tightened only, using tools may result in over-tightening.

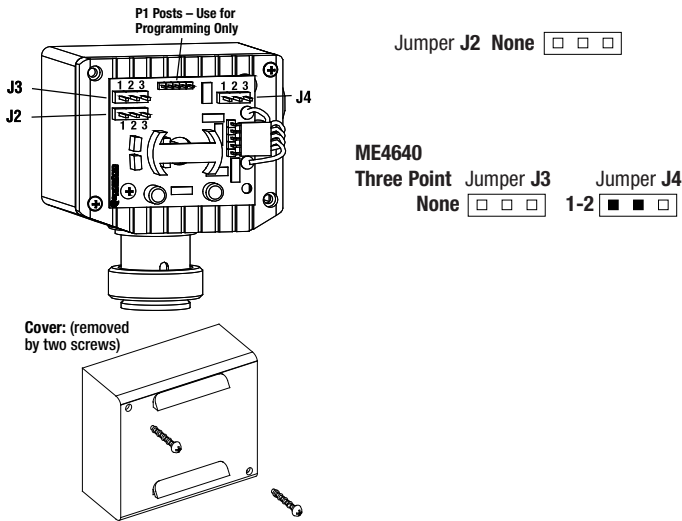


### Dimensions



## 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)

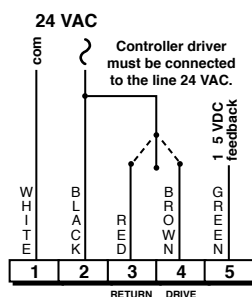
**Dead Band:** 0.12 seconds

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

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

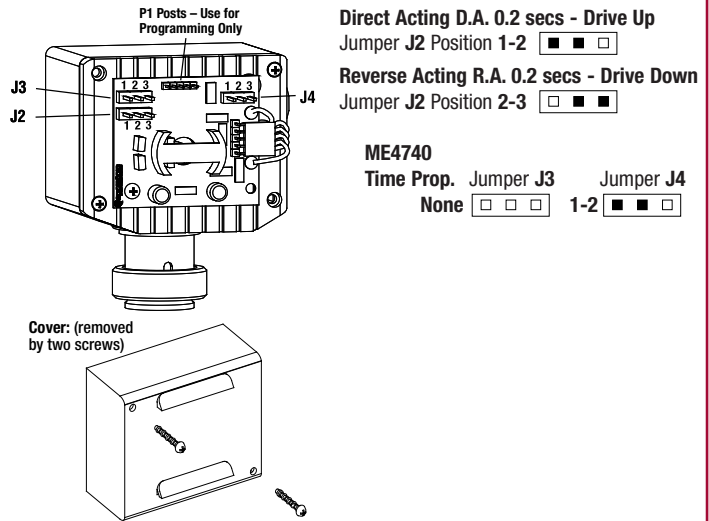
### WIRING DIAGRAM

#### 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)

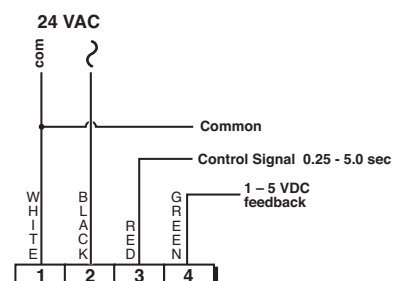
**Dead Band:** 0.12 seconds

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

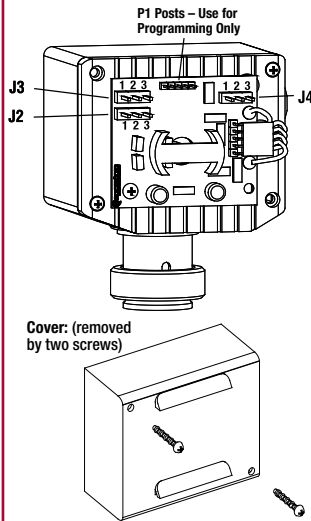
**Minimum off cycle:** required between pulses 250msecs

### 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 ☒ ☒ ☐ None ☐ ☐ ☐

5-10Vdc Jumper J3 Jumper J4  
Position 2-3 ☐ ☒ ☒ None ☐ ☐ ☐

**ME4840**  
2-10Vdc Jumper J3 Jumper J4  
Position 1-2 ☒ ☒ ☐ None ☐ ☐ ☐

0-10Vdc Jumper J3 Jumper J4  
Position 2-3 ☐ ☒ ☒ None ☐ ☐ ☐

**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 $\Omega$  (0.05mA at 10Vdc)

**Dead Band:** 0.15V

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

**End Update:** When the input signal is within ~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

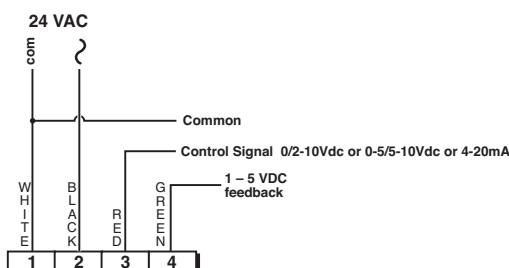
**The ME-4840 is factory set to 2-10Vdc, direct acting.**

Alternative Control Range Settings

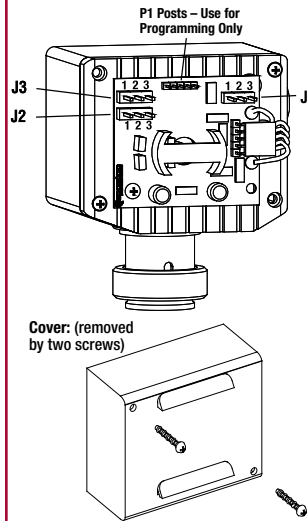
Part No.	Stem Up	Stem Down	Part No.	Stem Up	Stem Down
ME4840	2Vdc	10Vdc	ME4844E	5Vdc	0Vdc
ME4840A	10Vdc	2Vdc	ME4844F	5Vdc	10Vdc
ME4840B	0Vdc	10Vdc	ME4844G	10Vdc	5Vdc
ME4840C	10Vdc	0Vdc	ME4840H	4mA	20mA
ME4844D	0Vdc	5Vdc	ME4840I	20mA	4mA

### 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 ☒ ☒ ☐ None ☐ ☐ ☐

5-10Vdc Jumper J3 Jumper J4  
Position 2-3 ☐ ☒ ☒ None ☐ ☐ ☐

**ME4940**  
2-10Vdc Jumper J3 Jumper J4  
Position 1-2 ☒ ☒ ☐ None ☐ ☐ ☐

0-10Vdc Jumper J3 Jumper J4  
Position 2-3 ☐ ☒ ☒ None ☐ ☐ ☐

**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 $\Omega$  (0.05mA at 10Vdc)

**Dead Band:** 0.15V

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

**End Update:** When the input signal is within ~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

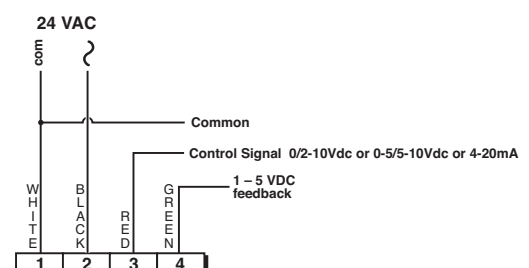
**The ME-4940 is factory set to 2-10Vdc, direct acting.**

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 ME4844	Actuator ME4940 Actuator ME4944	EP Cartridge Max. Close-off PSI / Bar	EB Cartridge Max. Close-off PSI / Bar
<b>V240 - 2 way Straight valve body - union connection both ports</b>									
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)-0.50,1.0,1.5,2.0,2.5,3.5	VE240-EP/EBXX-4640	VE240-EPXX-4740	VE240-EPXX-4840/44	VE240-EPXX-4940/44	35 / 2.4	100 / 6.8
<b>V241 - 2 way Straight valve body - threaded female port in, X union connection port out</b>									
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	Female port in	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
V241-10	Male union out	1"	EB-6.0,6.4,8.0,9.0	VE241-10-EBXX-4640	VE241-10-EBXX-4740	VE241-10-EBXX-4840/44	VE241-10-EP/EBXX-4940/44	-	100 / 6.8
<b>V243 - 2 way Straight valve body - threaded female port in, X threaded female port out</b>									
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
<b>V245 - 2 way Straight valve body - solder female port in, X solder female port out</b>									
V245-12	For 5/8" copper pipe	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	For 5/8" copper pipe	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	For 7/8" copper pipe	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
<b>V260 - 2 way Angle valve body - double union OR V261 - 2 way angle valve body - threaded female port in, union connection port out</b>									
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
V261-10		1"	EB-6.0,6.4,8.0,9.0	VE261-10-EBXX-4640	VE261-10-EBXX-4740	VE261-10-EBXX-4840/44	VE26X-10-EP/EBXX-4940/44	-	100 / 6.8
<b>V320 - 3 way Diverging valve body - unions on all three ports</b>									
V320-12X	3 Way Diverging - 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	-
<b>V321 - 3 way Mixing valve body - unions on all three ports</b>									
V321-12-EM3.5	Sel 1/2" or 3/4" unions S or N	1/2", 3/4"	3.5	VE321-12-EM3.5-4640	VE321-12-EM3.5-4740	VE321-12-EM3.5-4840/44	VE321-12-EM3.5-4940/44	50 / 3.4	-
<b>V323 - 3 way Diverging valve body - thread female all ports</b>									
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	-
<b>V325 - 3 way Diverging valve body - direct solder</b>									
V325-12	For 5/8" copper pipe	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	For 7/8" copper pipe	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.