

## Modulating Ball Valve Technical Questions - Answered.

My supply (from Battery / engine alternator) for RD - BK: nominally 12 volt to 14.4 volt at float charge.

Q1: Control GR - BK (0-10V): Do I have to protect this input from voltages up to 14.4 Volts, by limiting the control voltage to 10 V ?  
**Do not exceed 10.2 volts to Green (0-10v version) as these units are very signal voltage sensitive.**

Q2: Control GR - BK: If GR is at 0 Volts (grounded to negative) with 12-14.4 V on RD, will the valve be open (full flow) or closed (no flow)?

**The valve will close with no input signal. Tests with 14.4V on RED and 0V Green, valve is fully closed, 10v to Green valve fully open.**

Q3: Control GR - BK: For the control range 0 to 10 V, is the valve open in a linear fashion, so that at 5 volts on GR, the Ball Valve is at 45 degrees, or half open?

**Tests with 0-10v series with 5v input signal to Green, valve is 50% open, with 1 volt 10% step changes either way.**

**Less than 1.4V to Green the valve has moved but not enough to allow flow, from 1.5v flow starts. From 9.5 to 10v to Green valve shows very little change.**

Q4: Control GR - BK: If the RD supply (12-14.4 V) is not lost, and the GR input goes 'open circuit', will the valve open / close / or hold its position?

**Valve closes with no input signal GR if power applied Black + Red.**

Q5: Supply RD and GR: The Electrical data shows the holding power requirement at 0.22 Watts: is this all taken into GR, or is this consumed by RD and GR together?

**Holding: Red consumes 11.4mA and Green 0 mA 0 volts.**

**Start moving Red consumes less than 400mA (0.4 Amps) and Green 0.29mA. Green power consumption is linear like a 34K $\Omega$  resistor.**

Q6: as in Q5: (with a 0 - 10 volt control voltage) would the consumed current by GR, ever exceed 20 mA ?

**Green will not consume more than 20mA.**

Q7: Error output YW: diagram shows "LED" connected between RD and YW. Diagram also shows internal relay contacts, (1P on/off): does the LED require rating at 12 - 14.4 volts because internal relay grounds the LED to 0 Volts at 'error'?

**Output error signal is the same as the RD 9-24vDC power supply, so with 12v input you would need a resistor for a 1.2-3v LED.**

Q8: Error output YW: what type(s) of error trigger the error signal?

**Error output signal will trigger if the valve does not move according to input signal, such as valve stuck or motor failure etc.**

For my Modulating control (of temperature of water), the system has a thermal mass, such that variation of temperature is slow, and therefore under normal operation, my control system does not need to determine if the valve held position, requires alteration, more than once every 30 seconds, and then if change is required, it would be no more than 10% of that held position.

So I might have ten steps in the control voltage, which would be steps of one volt. At 30 seconds per decision, the control system could cause it to take (10 x 30) 300 seconds (5 minutes) to go from fully closed to fully open:

**Tests show 7 seconds in total to move from fully close to fully open position.**

Data gives Open to Close 7 seconds and delay 4 secs max. This could mean that the 10% step change in position, could take 11 seconds to complete, from the step alteration of the control voltage.

**Tests show less than 5 seconds, customers say 2.5 to 3.3 second step change and have been able to control a hot and cold-water inlet to mix within 1 degree Celsius on output, which far exceeded all other modulating valves.**

Q9: If after the PWM output shows the alteration has taken effect, and I wished to economise on the 0.22 Watt holding consumption (which I recognise is small) ; what would happen if I simultaneously disconnected the RD and GR inputs (perhaps through a 2P c/o RELAY) until my control system detected a position change was required; would the position be held with both these inputs open circuit?

**Cutting power to GR + RD simultaneously the valve it will not move.**

Q10: Is there a good reason why periodic disconnection (by Relay) of RD and GR would cause damage or excessive wear on the ball valve motor?

**No damage whatsoever, in fact periodic disconnection would probably extend the life of the unit due to reduced movement.**

