VALCOR SCIENTIFIC

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POWER & TEMPERATURE EFFECTS

Background

Valves are subjected to a wide spectrum of temperatures, an accumulation of fluid, ambient and power conditions.

Although our valve design allows for continuous duty cycling, solenoids require more power to energize than to remain energized or *hold,* resulting in the solenoid coils getting hot when energized repeatedly in short time intervals at the rated voltage.

Even at cooler ambient temperatures, the inherent nature of Teflon is such that it can 'COLD-FLOW', potentially causing valve body distortion and loose retaining screws.

Cause / Effect

Heat generated in the solenoid from the on-off cycling is transferred to all parts of the valve, including the Teflon body; the different expansion rates of the Teflon (which is higher than that of the other materials), steel and stainless steel, cause *misfits* between the parts, ranging from micro (no problem) to macro. This can cause defective operation, most commonly detected as internal leakage between the seal and seat.

Sometimes as the heat is taken away, the Teflon body goes back to its original dimensions, and sometimes, permanent deformation occurs. Retaining screws may also become loose.

Remedy

Under such circumstances, we recommend heat-sinking the solenoid portion of the valve. Aluminum heat sinks can be attached onto the top of the solenoid or the solenoid can be mounted onto the chassis of the instrument to dissipate heat.

Another often-used method, and one that we prefer, is to power the valves on and then go down to what is called a 'HOLDING VOLTAGE'. Assume a 12VDC valve is energized with an unregulated voltage (approximately +25% of rated voltage). Once applied, the valve changes state. As soon as this occurs, go to a voltage of between one-quarter to one-third of the rated voltage (3 to 4VDC).

Note that the valve is designed to maintain its energized position, even at this low voltage, due to its efficient coil design and characteristics. The valve will then run *cool*.

Attached drawing UKSP9810 shows just one such simple R-C circuit with a Resistor and Capacitor in parallel with each other and this R-C is connected to one leg of the flying leads of the valve. The R-C is minimal in cost, and provides the benefits of eliminating unnecessary replacements and preventing heat transfer to the media. Please note, the method shown is only one of many that could be used; **do no use PWM, as vibration can damage the valve seats.**

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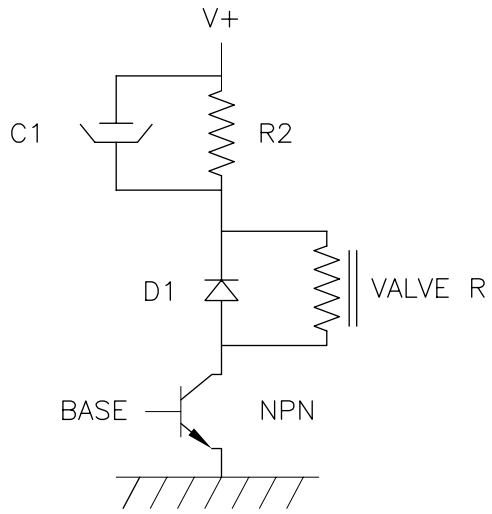

VOLTAGE DROPPER

NOTE: The semiconductor can be replaced by a suitable relay.

TABLE OF R–C VALUES FOR EACH COIL VOLTAGE					
COIL TYPE VALVE SERIES	VDC VOLTS	TIME SECONDS	R VALVE OHMS	2R OHMS	C uFARADS
P61	6	0.015	28	52	1154
	9		60	120	500
	12		127	254	232
	15		288	576	104
	24		500	1000	60
P25	6	0.025	23	46	2174
	9		53	106	944
	12		90	180	556
	15		137	274	364
	18		160	320	312
	24		345	690	144
	115		5200	10400	10
P60	12	0.030	34	68	1764
	15		80	160	750
	24		140	280	428
	115		2650	5300	22
P48	12	0.040	20	40	4000
	24		78	156	1026
	115		1919	3838	42