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SERIES B5950

BLOCK MICRO PROPORTIONAL DRIVER INSTALLATION GUIDE

Set-Up Procedure

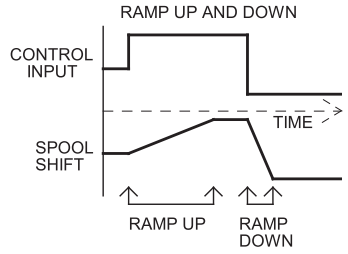
The unit is best adjusted by observing the system response. Coil current can also be used, but coil voltage is not accurate.

Minimum Current & Maximum Current - These two adjustments will vary the minimum and maximum output current limits. The minimum current can be set between 0 - 1.0 A. The maximum current can be set in the range between the minimum current setting and the minimum current setting plus 2 A. The minimum current must be set first as described below. Always adjust the I MIN or I MAX pot until the response starts changing and then adjust to the desired response.

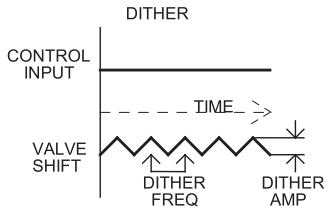
1. Turn the I MAX, I MIN, PWM FREQ and RAMP UP, RAMP DOWN pots 18 turns CCW.
2. Turn on the power supply. The PWR light will come on if the power supply voltage is greater than 9V. The unit will not function correctly if the POWER indicator light is off or blinking.
3. The OUTPUT Indicator light indicates the duty cycle of the voltage to the coil by going from no light, always off, through bright yellow, always on. The intensity of the yellow gives a relative indication of current flow through the coil as an aid to tuning and troubleshooting.
4. Set the control input to minimum, (.4 mA, .1V or etc.). **Minimum Current Adjustment** - Adjust the min current adjuster for a minimum current or to a desired system response. Back up adjuster until system stops responding. Proceed to max current adjuster. The I MIN pot can eliminate the valve's deadband.
5. Adjust the I MAX pot 18 turns CCW. Set the control input to its maximum, (20 mA or 5V or etc.). **Maximum Current Adjustment** - Adjust max current adjuster for a maximum current limit or to a desired system response. The I MAX pot adjusts the maximum valve shift. Do not adjust the unit for more current than is required to fully shift the valve; this reduces the useful range of the control input and may harm the coil.

Note: *To minimize any effect of supply voltage, load resistance or temperature variation, make setup adjustments when these parameters are at the midpoint of the expected operating range for a particular installation. For example, if the expected operating temperature range is 20°C to 60°C make final setup adjustments when system is approximately 40°C. If the supply voltage has a tolerance of 22 to 32 volts, make adjustments when the supply voltage is approximately 27 VDC.*

6. Ramp Up/Ramp Down - Set the **RAMP UP** pot to the desired value by quickly switching the control input from minimum to maximum, while observing the speed of response. Set the **RAMP DOWN** pots the same way, but going from maximum to minimum. Turning the ramp pots CW will increase the ramp time. The ramps slow down the system's response to fast control input changes. Range of ramp up/ramp down time adjustments is 0.1 - 20 sec. Ramp time is linear and is proportional to the step change in the control signal.



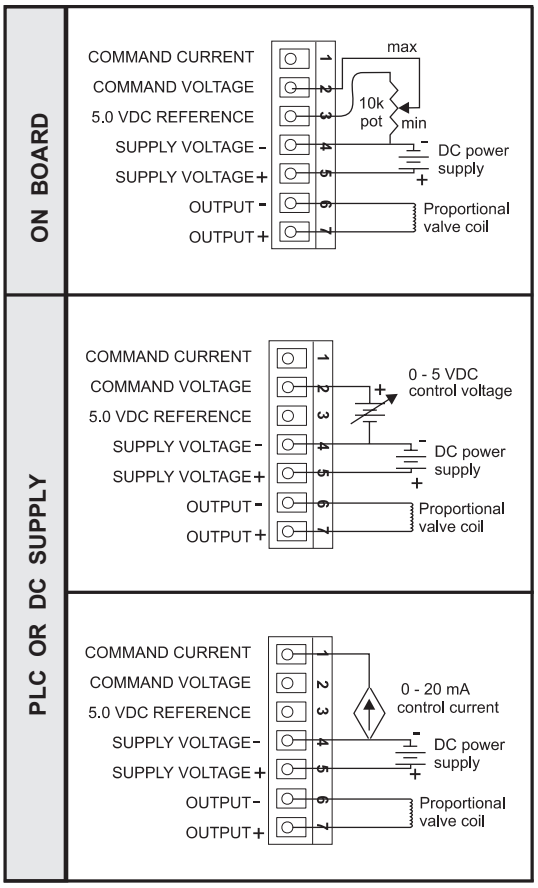
7. **Dither** - The B5950 uses sine wave dithering with control of frequency (30-150 Hz.) and amplitude (0-.5 A. P-P). Sine wave dithering is sophisticated and allows for smooth control. The **Dither Freq** and **Dither Amp** adjustments on the B5950 are left at some intermediate setting for frequency and at maximum amplitude when the units are shipped. Typically a Dither Frequency of approximately 50 Hz. gives satisfactory operation.



- **Stiction** can keep the valve from moving for small control input changes, and then move too far when the control input changes enough to unstick it.
- **Hysteresis** can cause the valve shift to be much different for the same control input depending on whether the control had last changed up or down.
- **Dither** is a rapid, small movement of the valve about the set point. It is intended to keep the valve moving to avoid stiction, and to move far enough to cancel out hysteresis, while being small and fast enough not to be noticed by the system. These goals can conflict. Stiction and hysteresis can make controlling the valve erratic and unpredictable. Use just enough dither to fix the problem. Too much dither can cause pulsing in the system.
- **Reference Voltage** - A regulated 5.0 VDC voltage is available for on site command voltage. Use of a 10K - 100K potentiometer connected from the 5.0 VDC Reference to Supply Voltage (-) is recommended.
- **Output** is current regulated and will remain constant at the level set by the input command signal. Variations in supply voltage and load resistance have little effect as long as these values satisfy the equality stated below.

$$\text{Max. Required Currents} < \frac{\text{Min. Supply Voltage}}{\text{Max. Load Resistance}}$$

Technical Data



Parameter	All Versions
Supply Voltage	9.0V DC min. - 32 VDC max.
Supply Current	45 mA max. (no load)
Input Control Signal	
*Control Voltage	0 - 5 VDC (300 K Ω impedance)
Control Current:	0 - 20 mA (100 Ω impedance)
Ramping Up/Down Time	0.1 - 20 sec. linear (+/- 0.1% / °C)
PWM Frequency	1.2 KHz fixed
Output Leap to I min.	@ 0.1 V or 0.4 mA control (+/- 15%)
Dithering Frequency	30 -150 Hz
Dithering Aplitude	0 - 500 mA peak to peak
Voltage Reference	5.0V +/- 5% regulated
Operating Temp.	-25 to 85° C

Parameter	High Resolution Version	High Output Version
Output Current @ 25° C T_A		
Continuous	1.5 Amps max.	3.0 Amps max.
Peak Pulsed (16ms)	4.7 Amps max.	17.0 Amps max.
I min. (+/- 20%)	0 - 0.5 Amps max.	0 - 1.0 Amps max.
I max. (+/- 20%)	I min. + 1.0 Amps max.	I min. + 2.0 Amps max.
Regulation ΔV	+/- 0.2% / V	
Regulation ΔT	+/- 0.1% / °C	

Trouble Shooting

If the set up procedure does not achieve the desired results, double check the wiring and perform the following tests.

Check the power input:
The card will not function correctly unless the PWR- to PWR+ voltage is at least 9V. If this voltage is more than 32V the card may be damaged.

Check the control input you are using:
- Pot input: Measure the wiper voltage between the Command Voltage (VOLT) and PWR- terminals. With a 10 K ohm pot, the wiper will go from 0 (minimum current) to 5V. The voltage must not be less than 0 V or more than 6V.
- Current loop input: Measure the current into the Command Current (CUR) terminal. The difference in current should be at least 10 mA from minimum to maximum. The current must not be negative or more 20 mA. If a current meter is not available, measure the voltage from the CUR terminal to the PWR- terminal and divide by 100 for an approximate reading.
- Voltage input: The difference in voltage between the Command Voltage (VOLT) and PWR- terminals should be greater than 5V from minimum to maximum. The voltage must not be less than 0V or more than +5V.
- Note: Only one control input may be hooked up at a time.

Verify the coil is not shorted:
Disconnect the wires going to the coil terminals and measure the resistance between the wires. Verify it is correct for the coil being driven.

Check the card at full on and full off:
Do not try the full on test if the power supply is 50% higher than the coil's rated voltage. Temporarily disconnect all wires from the VOLT and CUR inputs. To test the card at full on, turn the I MAX and I MIN pots 18 turns CW and temporarily connect the VOLT and REF terminals. Measure the voltage across the COIL – and COIL+ terminals and across the PWR- and PWR+ terminals. The voltage difference should be no more than one volt if the card is operating correctly. To check the card at full off, disconnect the VOLT and CUR terminals and turn the I MAX pot 18 turns CW and the I MIN pot 18 turns CCW. The COIL- to COIL+ voltage should be zero.

If the valve won't fully shift:
- If the card passes the "full on test" above, the problem is in the system. Measure the power supply voltage at the power supply or battery and the voltage across the coil's terminals. Compare these readings to the values taken at the card. If there is excessive voltage drop in any of those wires, they should be shortened or replaced by bigger wires. Bad frame ground connections can cause large voltage drops.
- As the coil heats up, it increases its resistance. Most coils will still be able to draw sufficient current to fully shift the valve if their rated voltage is supplied to the card and the card causes less than one-volt drop. When this is not the case, you must use a coil rated for less voltage or increase the power supply voltage. The card will have no trouble driving a 12V coil from a 24V supply. You will need a new card if the new coil draws more current than the card is rated for.

If the valve shift is erratic:
- See the set up procedure section for the effects of stiction and hysteresis. Adjust the dither amplitude to see if it improves the problem.
- Electrical interference on the control lines can also cause erratic behavior if it is strong enough. Try changing the routing of the control wires to see if the problem changes.
- Power supply interference or brown outs can also cause erratic behavior. Test for this by running the card off it's own fully charged battery.