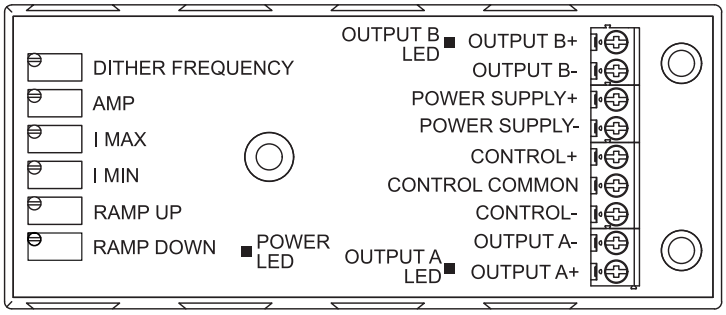
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SERIES B5960
BLOCK DUAL MICRO
PROPORTIONAL DRIVER
INSTALLATION GUIDE

Set-Up Procedure



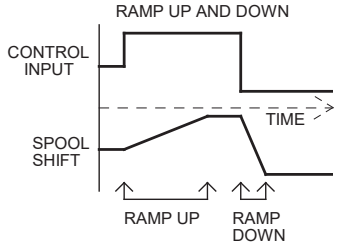
The unit is best adjusted by observing the system response. Coil current can also be used, but coil voltage is not accurate.

Minimum Current & Maximum Current - These two adjustments will vary the minimum and maximum output current limits. The minimum current can be set between 0 - 0.5 A. The maximum current can be set in the range between the minimum current setting and the minimum current setting plus 1 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.

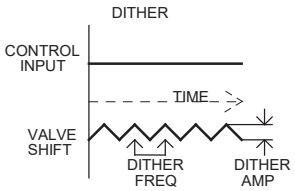
1. Turn the RAMP DOWN, RAMP UP, I MIN, I MAX, DITHER AMP AND DITHER FREQ pots 18 turns CCW.
2. Turn on the power supply. The PWR light will come on if the power supply voltage is greater than 9V. The unit will not function correctly if the POWER indicator light is off or blinking.
3. The OUTPUT A or B LED indicates the duty cycle of the voltage to the coil by going from no light, always off, through bright Red, always on. The intensity of the Red gives a relative indication of current flow through the coil as an aid to tuning and troubleshooting.
4. **Minimum Current Adjustment** -
   Set the control input to minimum (12.0mA +/-1.0mA or +/-1.0V). 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. **Maximum Current Adjustment** -
   Set the control input to maximum (12.0mA +/-8.0mA or +/-10.0V). 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 30 volts, make adjustments when the supply voltage is approximately 26 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. Same for either + or - signals.



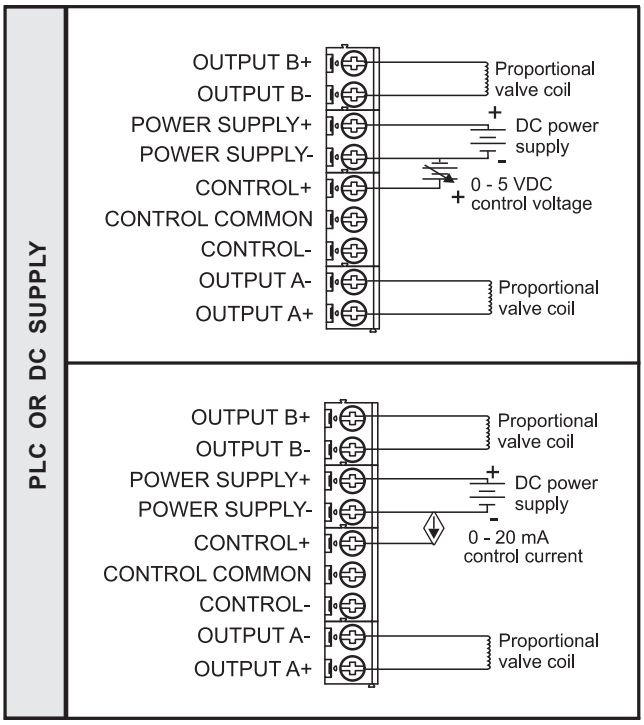
7. **Dither** - uses sine wave dithering with control of frequency (30-150 Hz.) and amplitude (0-0.5 A. peak to peak). Sine wave dithering is sophisticated and allows for smooth control. The **Dither Frequency** and **Dither Amplitude** adjustments are left at some intermediate setting for frequency and 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.
- **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.

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

Technical Data



Output Current @ 25° CT_A	
Continuous	1.5 Amps max.
Peak Pulsed (16ms)	4.7 Amps max.
I min. (+/- 20%)	0 - 0.5 Amps max.
I min. (+/- 20%)	I min. + 1.0 Amps max.
Supply Voltage	9 VDC min. - 32 VDC max.
Supply Current	45 mA max. (no load)
Input Control Signal *(must be specified at time of ordering)*	
Control Voltage	-10 to +10 VDC (300 Ω impedance)
Control Voltage	0 to +10 VDC (300 Ω impedance)
Control Current	0 - 20 mA (100 Ω impedance)
Regulation Δ V	+/- 0.2% / V
Regulation Δ T	+/- 0.1% / °C
Ramping Up/Down Time	0.1 - 20 sec. linear (+/- 0.1% / °C
PWM Frequency	1.2 Hz Fixed
Output Leap to I min.	@ 0.1 V or 0.4 mA control (+/- 15%)
Dithering Frequency	30-150 Hz
Dithering Amplitude	0-500 mA Peak to Peak
Temperature Range	-25° to +85°C
Materials	Housing: ABS Encapsulation: Epoxy

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 30V the card may be damaged.

Check the control input you are using:
- Current loop input: Measure the current into the Input terminal. The difference in current should be at least 8 mA from minimum to maximum. The current must not be negative or more than 20 mA. If a current meter is not available, measure the voltage from the Input terminal to the Signal Common terminal and divide by 174 for an approximate reading.
- Voltage input: The difference in voltage between the Input and Signal Common Terminals should be 10V from minimum to maximum. The voltage must not be less than 0V or more than 10V.

Verify the coil is not shorted:
Disconnect the driver and measure the resistance between the coil terminals. Verify it is correct for the coil being driven.
(10 ohm coil resistance should be verified)

If the valve won't fully shift:
- 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. Best to use shielded wire or twisted pair for input signals.
- 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.