Cleanbot 3000 Power Distribution Documentation

BLWRPG092S-24V-4600 Motor Integration with SYS-BLD-120A Driver and Arduino Control

SYS-BLD-120A

[20180507153333_7585.pdf (sys-motor.com)](#)

Anaheim Automation BLWRPG09

[L010398 - BLWRPG09 Product Sheet.pdf (anaheimautomation.com)](#)

Prepared by: Ronald Knight

Date: 09/17/2023

<u>Table of Contents</u>

1. Introduction

Motor Connection to Driver:

First, make sure everything is powered off.

Connect the three motor wires (A, B, C) from the motor to the U, V, W terminals on the BLD120-A driver. These are the motor phases.

Connect the hall sensor wires from the motor to the Hall sensor input on the BLD120-A. There's a 5V, GND, and then hall signals (Hall A, Hall B, Hall C) These will connect to the HU, HV, and HW terminals on the driver.

Powering the Driver:

Connect the power supply to the +V and GND terminals of the driver. Ensure the power supply voltage matches the input voltage specification of the driver. 24V as of this documents making.

Arduino Connection to Driver:

To control the speed and direction of the motor:

Connect a PWM pin from the Arduino (like D9) to the speed control input of the BLD120-A.

Connect one of the Arduino's digital pins (like D8) to the direction control input of the BLD120-A.

Connect the GND of the Arduino to the GND of the BLD120-A to create a common ground reference.

Safety Precautions:

Always ensure that the power is disconnected when making or modifying connections. This will prevent any accidental shorts or damage to the components.

Double-check the wiring before applying power to prevent damage.

Make sure the motor and wheels are secure and won't move unexpectedly when powered on.

Start with a low PWM signal to ensure the motor doesn't spin too fast to avoid runaway bot.

Monitor the red indicator on the SYS-BLD-120A driver. If it flashes, refer to the error codes provided to diagnose any issues.

2. Motor to Driver Connections:

Phase A (Green Wire):

- **Function**: Represents one of the three phases of the brushless motor. It's essential for the motor's rotation.

- **Connection**: Connect the **Green** wire (Phase A) of the motor to the **U** phase terminal of the SYS-BLD-120A driver.

- **Pinout**: Green Wire (Motor) -> U terminal (Driver)

Phase B (Red Wire):

- **Function**: Represents the second phase of the brushless motor.

- **Connection**: Connect the **Red** wire (Phase B) of the motor to the **V** phase terminal of the SYS-BLD-120A driver.

- **Pinout**: Red Wire (Motor) -> V terminal (Driver)

Phase C (Black Wire):

- **Function**: Represents the third phase of the brushless motor.

- **Connection**: Connect the **Black** wire (Phase C) of the motor to the **W** phase terminal of the SYS-BLD-120A driver.

- **Pinout**: Black Wire (Motor) -> W terminal (Driver)

3. Hall Sensor Connections to Driver:

Hall Vc (Yellow Wire):

- **Function**: Provides the voltage reference for the Hall sensors, which are used for rotor position feedback.

- **Connection**: Connect the **Yellow** wire (Hall Vc) of the motor to the **REF+** terminal of the driver.

- **Pinout**: Yellow Wire (Motor) -> REF+ terminal (Driver)

Hall A (Blue Wire):

- **Function**: Sends the signal from one of the three Hall sensors, indicating the rotor's position.

- **Connection**: Connect the **Blue** wire (Hall A) of the motor to the **HU** terminal of the driver.

- **Pinout**: Blue Wire (Motor) -> HU terminal (Driver)

Hall B (Orange Wire):

- **Function**: Sends the signal from the second Hall sensor.

- **Connection**: Connect the **Orange** wire (Hall B) of the motor to the **HV** terminal of the driver.

- **Pinout**: Orange Wire (Motor) -> HV terminal (Driver)

2. **Hall C (Brown Wire)**:

- **Function**: Sends the signal from the third Hall sensor.

- **Connection**: Connect the **Brown** wire (Hall C) of the motor to the **HW** terminal of the driver.

- **Pinout**: Brown Wire (Motor) -> HW terminal (Driver)

3. **Hall Ground (White Wire)**:

- **Function**: Provides the ground reference for the Hall sensors.

- **Connection**: Connect the **White** wire (Hall Ground) of the motor to the **REF-** terminal of the driver.

- **Pinout**: White Wire (Motor) -> REF- terminal (Driver)

4. Powering the Driver:

- Connect the **positive** terminal from your fuse to the **DC+** terminal of the driver.

- Connect the **negative** terminal of your 24V power supply to the **DC-** terminal of the driver.

- Connect the main **positive** terminal from your fuse box to **positive** terminal of your 24V power supply (Orange wire with ring)

- Connect the **negative** terminal from your fuse box to **negative** terminal of your 24V power supply. (Black wire with ring
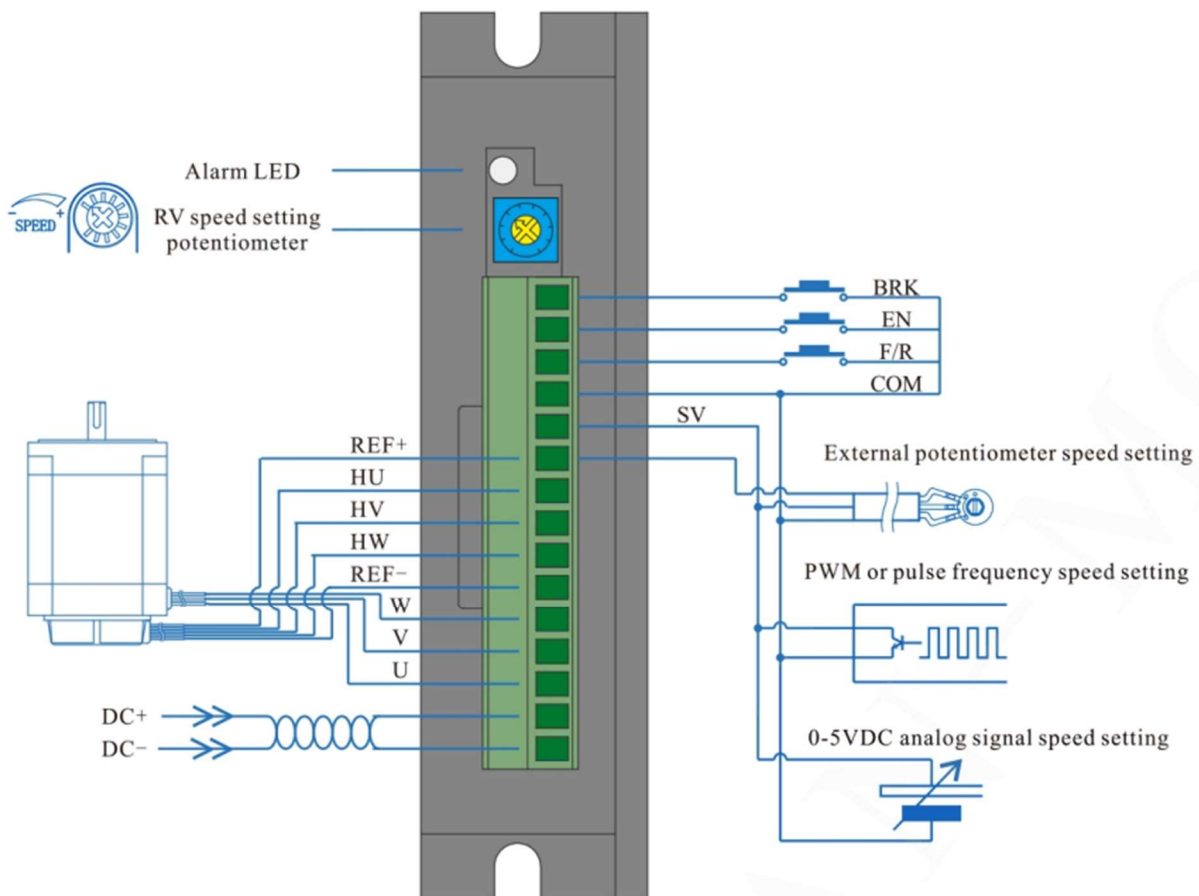
5. Arduino Control:

Direction Control:

- Connect an Arduino digital pin to the **F/R** terminal of the driver. Setting this pin HIGH will make the motor rotate forward, and setting it LOW will make the motor rotate in reverse.

Start/Stop Control:

- Connect another Arduino digital pin to the **EN** terminal of the driver. Setting this pin HIGH or disconnecting it will make the motor stop, and setting it LOW will make the motor run.

Speed Control:

- Use a PWM signal from the Arduino to control the speed. Connect the output of the PWM pin from the Arduino to the **SV** terminal of the driver

6. Potentiometers on the SYS-BLD-120A Driver:

Potentiometers are variable resistors that can be adjusted to control certain parameters. On the SYS-BLD-120A driver, there are specific potentiometers that allow you to adjust the behavior of the motor.

ACC/DEC Potentiometer:

- **Function:** This potentiometer sets the acceleration and deceleration times for the motor.

- **Adjustment:**

    - Rotate the ACC/DEC potentiometer clockwise to increase the acceleration/deceleration time.

    - Rotate it counterclockwise to decrease the acceleration/deceleration time.

- **Recommended Setting:** The setting range is between 0.3 - 15 seconds. Currently we have it set to minimum acceleration time to enable snappier response.

P-sV Potentiometer:

- **Function:** This potentiometer is used to set the peak output current. When the load suddenly increases, the output current is limited to the set value, which can reduce the motor speed and protect the motor from damage.

- **Adjustment:**

  - Rotate the P-sV potentiometer to set the desired peak current.

- **Recommended Setting:** The error between setting the peak output current and the actual output current is about ±10%. For safety reasons, adjust the peak output current appropriately. If the load remains high for more than 3 seconds, the driver will stop working. After 5 seconds, the restart function will initiate. Once we have determined the exact amperage draw for both motors, we can have this set appropriately.

RV Potentiometer (Internal Speed Potentiometer):

- **Function:** This potentiometer allows you to manually adjust the speed of the motor.

- **Adjustment:**

  - Rotate the RV potentiometer clockwise to increase the motor's speed.

  - Rotate it counterclockwise to decrease the motor's speed.

  - Rotate it all the way counterclockwise to enable external PWM control.

- **Recommended Setting:** currently we are using an external control method (Arduino) for speed control, rotate the RV potentiometer counterclockwise to its max position. Otherwise, for quick testing, adjust it based on the desired speed for your application.

7. Possible Errors and Troubleshooting:

1. **Overvoltage Alarm**:

   - **Indicator**: Red light flashes 2 times.

   - **Possible Cause**: The bus voltage is too high.

   - **Solution**: Check the power supply to ensure it's providing the correct voltage. Ensure that you are using a 24V power supply as recommended for the motor.

2. **Power Tube Over-current Alarm**:

   - **Indicator**: Red light flashes 3 times.

   - **Possible Cause**: A short or the model of the motor might be incorrect or incompatible.

   - **Solution**: Check wiring and ensure that the motor and driver models are compatible.

3. **Overcurrent Alarm**:

   - **Indicator**: Red light flashes 4 times.

   - **Possible Cause**: The peak current setting might be too low, or the motor parameters are not set correctly. Another possibility is that the acceleration time is too short.

- **Solution**: Check the P-sv settings and adjust if necessary. Increase the acceleration time.

4. **Undervoltage Alarm**:

   - **Indicator**: Red light flashes 5 times.

   - **Possible Cause**: The power supply voltage is too low or doesn't meet the required conditions.

   - **Solution**: Check the power supply voltage. Ensure that the power supply meets conditions greater than 1.5 times the motor power.

5. **Hall Alarm**:

   - **Indicator**: Red light flashes 6 times.

   - **Possible Cause**: The motor wiring might be loose or disconnected.

   - **Solution**: Check all motor connections, especially the Hall sensor wires, to ensure they are firm and correctly connected.

6. **Locked Alarm**:

   - **Indicator**: Red light flashes 7 times.

   - **Possible Cause**: The motor might be overloaded or jammed.

   - **Solution**: Check for any obstructions or mechanical issues causing the motor to jam. Ensure the motor is not overloaded beyond its specified torque.

7. **Multiple Alarms**:

   - **Indicator**: Red light flashes 8 times.

   - **Possible Cause**: Multiple issues, common conditions include Hall and locked-rotor alarms.

   - **Solution**: Check both the Hall sensor connections and ensure the motor is not jammed or overloaded. Adjust the P-sv to the maximum value of the motor

red indicator	description	
red flash 2	over voltage alarm	ON 1S 5S OFF 1S
red flash 3	power tube over current alarm	ON 1S 5S OFF 1S
red flash 4	over current alarm	ON 1S 5S OFF 1S
red flash 5	under voltage alarm	ON 1S 5S OFF 1S
red flash 6	Hall alarm	ON 1S 5S OFF 1S
red flash 7	stall alarm	ON 1S 5S OFF 1S
red flash 8	two or more alarm	ON 1S 5S OFF 1S