

## Introduction

**ADVANCED** Motion Controls analog servo drives are configurable for use with a wide variety of brushed and brushless motors. Part numbers beginning with the letters B, BE, and BX are capable of driving both brush-type and brushless motors, while those part numbers that begin with a number (i.e. 30A8) are designed to drive brush-type motors only.

This application note details the basic steps required to configure and set up both brushed and brushless **ADVANCED** Motion Controls servo drives.

**NOTE:** This application note does not apply to the analog PWM Input, S-, and Z-Series drives. For instructions on configuring these types of drives, contact technical support.

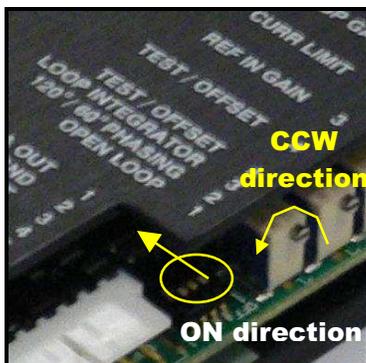


## Mode Selection

**ADVANCED** Motion Controls servo drives can operate in several different modes. Mode selection is accomplished via DIP switches on the drive. For setup purposes, use **Open Loop Mode** or **Voltage Mode**. The mode selection table on the drive's datasheet shows the proper settings. The ON direction for the switches is toward the inside of the amp.

**Note:** The final mode of operation for the system may be different than the mode used for setup.

### Switch and Pot Directions



## Current Ratings

The first number to appear in the drive part number is the maximum peak current available. Peak current is available for approximately 1-2 seconds; then the drive's current fold-back feature reduces the current to the continuous rating. Peak current time is dependent on the change in the command input. A step command from 0 to maximum peak current results in a peak current time of approximately 1 second. A step command from maximum peak current in one direction to maximum peak current in the other direction (i.e. a step command from -10V to +10V) results in a peak current time of approximately 2 seconds. The current fold-back time is approximately 3 seconds.

Continuous current from the drive is normally 1/2 of the peak current value, except when the drive is equipped with a **CONT CURR REDUCTION** switch (see section on Current Limit Switches).

**B25A20**

Peak Amps

$$\text{Continuous Amps} = \frac{1}{2} (25A) = 12.5A$$

## Current Limiting

**ADVANCED** Motion Controls servo drives have a current limiting feature that offers over-current protection for both motor and system.

Current limiting is accomplished by adjusting the **CURR LIMIT** pot. The **CURR LIMIT** pot has 12 active turns plus 1 inactive turn at each end, for a total of 14 turns. Turning the pot in a clockwise direction will increase the current output and turning it in a counterclockwise (CCW) direction will reduce (or limit) the current output. An audible click indicates the top and bottom ends of the range. **ADVANCED** Motion Controls servo drives ship with the current limit pot fully clockwise for full current output.

**Note:** Adjusting the **CURR LIMIT** pot changes both **Peak** and **Continuous** current levels but the ratio of continuous-to-peak current will remain at 50%. See section on **Current Limit Switches** for other ratio possibilities.

The **CURR LIMIT** pot needs to be adjusted to limit the continuous current delivered to the motor. The motor datasheet will give a max value of continuous current. Using this value, the number of turns of the **CURR LIMIT** pot can be calculated using the formula:

$$\frac{I_{cont}}{I_{max}} \times 12 + 1 \text{ Turn} = \# \text{ of Turns}$$

$I_{cont}$  = motor max. continuous current  
 $I_{max}$  = drive max. continuous current

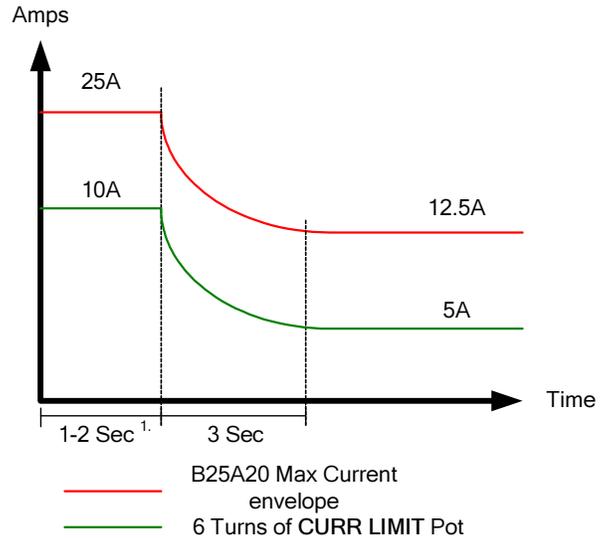
**Example:** A B25A20 is used with a motor rated for 5 Amps continuous current.

$$\frac{5A}{12.5A} \times 12 + 1 \text{ Turn} = 6 \text{ Turns}$$

To set the current limit to 5A, first turn the **CURR LIMIT** pot fully **counterclockwise** (14 turns), then turn the **CURR LIMIT** pot 6 turns **clockwise**.

**Note:** The peak current is now 10A (2x the continuous value of 5A).

## Current Limit



1. Peak current time is dependent on the change in the input command. See section on Current Ratings for details.

## Current Limit Switches

Some **ADVANCED** Motion Controls servo drives contain current limit switches that can be used to reduce the current output and change the peak-to-continuous current ratio.

If the drive being used has a **CURRENT SCALING** switch, it will be **OFF** by default, thereby limiting the peak and continuous current output to 1/2 of their maximum values. If a **CONT. CURR. REDUCTION** switch is available, then it may be used to change the continuous-to-peak current ratio from 50% to 25% (see data sheet). The table below shows an example of the 4 possible combinations of these switch settings and their corresponding current values for a B60A40 drive, which has both of these switches.

### Example: B60A40 Peak & Continuous Current values

Current Scaling (SW1-3)	Cont. Curr. Reduction (SW1-4)	Max. Peak (Amps)	Max. Continuous (Amps)
ON	ON	60	30
ON	OFF	60	15
OFF	ON	30	15
OFF	OFF	30	7.5

**Example:** A B60A40 is used with a motor rated for 10A continuous and 40A peak current.

To obtain these current limits, first set the **CURRENT SCALING** switch ON for 100% peak current output and the **CONT. CURR. REDUCTION** switch OFF for a 25% continuous-to-peak current ratio.

Next, use the equation for the **CURR LIMIT** pot:

$$\frac{10A}{15A} \times 12 + 1 \text{ Turn} = 9 \text{ turns}$$

To set the current limit to 10A, first turn the **CURR LIMIT** pot fully **counterclockwise** (14 turns), then turn the **CURR LIMIT** pot 9 turns **clockwise**.

**Note:** Because the **CONT. CURR. REDUCTION** has been turned OFF, the peak current is now 40A (4x the continuous value of 10A).

### Enabling the Drive

Make sure the drive is in the enabled state via all enable inputs. See drive enclosure labels for inhibit/enable pin(s). If the drive enclosure has the **INHIBIT IN** label, which is most common, and its model number ends with **-INV**, then the **INHIBIT IN** pin must be grounded to enable the drive. If the part number does not end with **-INV**, then grounding the inhibit input will inhibit (disable) the drive.

The 12A8, 16A20AC, 20A14, 20A20, 25A8, 25A20, 30A8, 30A20AC, 50A8, 50A20, 100A25, 100A40, 120A10, B30A40, B30A40AC, B60A40, and the B60A40AC have these pin labels:

- INHIBIT/ENABLE** (P1-11)
- +INHIBIT/ENABLE** (P1-12)
- INHIBIT/ENABLE** (P1-13)

Normally, these pins will not need to be grounded to enable unless the part number ends in **-INV** or the drive is equipped with an **INHIBIT/ENABLE** switch (see following section).

### INHIBIT/ENABLE Switch

The B30A40, B30A40AC, B60A40, and the B60A40AC will also have an **INHIBIT/ENABLE** switch (SW1-6) to control the functionality of these inhibit inputs. The default setting for SW1-6 is the **OFF** position, in which case all three (3) of the **INHIBIT/ENABLE** pins must be grounded to fully enable the drive.

**Note:** For ease of setup, SW1-6 may be turned ON to enable the amp without having to ground any of the inhibit/enable pins.

### Command from Test/Offset Pot

When setting up a motor and drive for the first time, operation may be verified by using the Test/Offset potentiometer to command voltage at the motor terminals. Turn the **TEST / OFFSET** switch **ON** and use the **TEST / OFFSET** pot to command voltage. With this configuration, the motor can be commanded in both directions. By default the **TEST/OFFSET** pot is in the middle position (50%), which corresponds to no command. However, if it is adjusted to some other value, be aware that the motor will spin up to this commanded speed immediately when power is applied and the drive is enabled.

**NOTE:** When setting up a brushless motor, testing of all six possible motor connections is recommended in order to verify proper commutation.

For trouble-shooting tips and documentation, go to [www.a-m-c.com](http://www.a-m-c.com) or contact AMC Technical Support.