











Current Loop Tuning Values

SW3 DIP switches add additional resistance and capacitance to the current loop tuning circuitry. SW3 switches 1-5 add additional parallel capacitance to the current loop integrator capacitor, and SW3 switches 6-10 add additional series resistance to the current loop gain resistor (see Block Diagram). Capacitance and resistance values are given in the tables below along with the appropriate DIP switch settings.

| SW3    |   |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
|--------|---|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| Switch | Additional Current Loop Integrator Capacitance (μF) |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
|        | SHORT   | .082 | .077 | .072 | .067 | .062 | .057 | .052 | .047 | .035 | .030 | .025 | .020 | .015 | .010 | .005 | OPEN |
| 1      | ON  | ON   | OFF  | ON   | OFF  | ON   | OFF  | ON   | OFF  | ON   | OFF  | ON   | OFF  | ON   | OFF  | ON   | OFF  |
| 2      | ON  | ON   | ON   | OFF  | OFF  | ON   | ON   | OFF  | OFF  | ON   | ON   | OFF  | OFF  | ON   | ON   | OFF  | OFF  |
| 3      | ON  | ON   | ON   | ON   | ON   | OFF  | OFF  | OFF  | OFF  | ON   | ON   | ON   | ON   | OFF  | OFF  | OFF  | OFF  |
| 4      | ON  | ON   | ON   | ON   | ON   | ON   | ON   | ON   | ON   | OFF  | OFF  | OFF  | OFF  | OFF  | OFF  | OFF  | OFF  |
| 5      | ON  | OFF  | OFF  | OFF  | OFF  | OFF  | OFF  | OFF  | OFF  | OFF  | OFF  | OFF  | OFF  | OFF  | OFF  | OFF  | OFF  |

| SW3                |  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|--------------------|--|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Switch             | Additional Current Loop Gain Resistance (kΩ) |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|                    | 0  | 10  | 20  | 30  | 40  | 50  | 60  | 70  | 80  | 90  | 100 | 110 | 120 | 130 | 140 | 150 |
| 6                  | ON   | OFF | ON  | OFF | ON  | OFF | ON  | OFF | ON  | OFF | ON  | OFF | ON  | OFF | ON  | OFF |
| 7                  | ON   | ON  | OFF | OFF | ON  | ON  | OFF | OFF | ON  | ON  | OFF | OFF | ON  | ON  | OFF | OFF |
| 8                  | ON   | ON  | ON  | ON  | OFF | OFF | OFF | OFF | ON  | ON  | ON  | ON  | OFF | OFF | OFF | OFF |
| 9                  | ON   | ON  | ON  | ON  | ON  | ON  | ON  | ON  | OFF | OFF | OFF | OFF | OFF | OFF | OFF | OFF |
| 10                 | ON   | ON  | ON  | ON  | ON  | ON  | ON  | ON  | ON  | ON  | ON  | ON  | ON  | ON  | ON  | ON  |
| Switch (continued) | 160  | 170 | 180 | 190 | 200 | 210 | 220 | 230 | 240 | 250 | 260 | 270 | 280 | 290 | 300 | 310 |
| 6                  | ON   | OFF | ON  | OFF | ON  | OFF | ON  | OFF | ON  | OFF | ON  | OFF | ON  | OFF | ON  | OFF |
| 7                  | ON   | ON  | OFF | OFF | ON  | ON  | OFF | OFF | ON  | ON  | OFF | OFF | ON  | ON  | OFF | OFF |
| 8                  | ON   | ON  | ON  | ON  | OFF | OFF | OFF | OFF | ON  | ON  | ON  | ON  | OFF | OFF | OFF | OFF |
| 9                  | ON   | ON  | ON  | ON  | ON  | ON  | ON  | ON  | OFF | OFF | OFF | OFF | OFF | OFF | OFF | OFF |
| 10                 | OFF  | OFF | OFF | OFF | OFF | OFF | OFF | OFF | OFF | OFF | OFF | OFF | OFF | OFF | OFF | OFF |

**Potentiometer Functions**

| Potentiometer | Description  | Turning CW   |
|---------------|--|--|
| Pot 1         | Loop gain adjustment in duty cycle and velocity modes. Turn this pot fully CCW in current mode.  | Increases loop gain  |
| Pot 2         | Current limit. This potentiometer adjusts both the continuous and peak current limit while maintaining the continuous to peak ratio (~55%).  | Increases current limit                                    |
| Pot 3         | Reference in gain. This potentiometer adjusts the ratio between input signal and output variables (voltage, current, and velocity).  | Increases reference input gain                             |
| Pot 4         | Test/Offset. Used to adjust any imbalance in the input signal or in the drive. When SW1-1 (DIP switch) is ON, the sensitivity of this pot is greatly increased allowing it to be used as an on-board signal source for testing purposes. | Zero speed setting is at the midpoint of this 14-turn pot. |
| Pot 5         | Ramp Time. Sets the ramp time for the command input signal.  | Decreases ramp time (faster response time)                 |
| Pot 6         | Deadband. Adjusts the amount of Deadband up to 30% of the command range.   | Decreases deadband (quicker response to commands)          |

Note: Potentiometers are approximately linear and have 12 active turns plus 1 inactive turn on each end.

*Ramping (Pot 5):*

The built-in ramp circuit allows the command input to be ramped linearly. This feature is activated by setting SW1-10 = ON. The ramp time can be set for up to 20 seconds in reaching the max command by adjusting Pot 5 fully counter-clockwise. Ramping rates are linear with respect to time and apply to both directions of motion. For example, if the single-ended command input is only 2.5 Volts, the time to ramp to this voltage would be half the time to ramp to 5 Volts.

*Deadband (Pot 6):*

Deadband is adjustable through the use of the Deadband Pot for up to 30% of the command range in each direction. Commands within the set Deadband range will have no effect on the output. Once the command is beyond the Deadband, the drive will begin to output power to the motor. The Deadband will have an offset effect on the rest of the command range. Therefore, to reach the maximum command would require increasing the Reference Input Gain (Pot3).

*Current Limit Adjustments:*

These amplifiers feature separate peak and continuous current limits. The current limit adjustment Pot 2 adjusts both peak and continuous current limit at the same time. Pot 2 has 12 active turns and one inactive turn on each end and is approximately linear. Thus, to adjust the current limit turn the potentiometer counter-clockwise to zero, then turn clockwise to the appropriate value.

**Through-hole Components†**

| Location | Description  |
|----------|--|
| CF2*     | Velocity Loop Integrator. Through-hole capacitor that can be added for more precise velocity loop tuning. See section below on Tuning with Through-hole components for more details. |
| CF1*     | Current Loop Integrator. Through-hole capacitor that can be added for more precise current loop tuning. See section below on Tuning with Through-hole components for more details.   |
| RF2*     | Tachometer Gain Scaling. Through-hole resistor that can be added to change the gain of the tachometer input. See section below on Tachometer Gain for more details.                  |
| RF1*     | IR Compensation Scaling. Through-hole resistor that can be added to configure the amplifier for IR Compensation mode. See section below on IR Compensation Notes for more details.   |

*Tuning With Through-hole Components*

In general, the drive will not need to be further tuned with through-hole components. However, for applications requiring more precise tuning than what is offered by the potentiometers and DIP switches, the drive can be manually modified with through-hole capacitors as denoted in the above table. By default, the through-hole locations are not populated when the drive is shipped. Before attempting to add through-hole components to the board, consult the section on loop tuning in the installation notes on the manufacturer's website. A general rule of thumb to follow when adding through-hole components is:

- A larger capacitor value will increase the integration time, and therefore create a slower response time.

Proper tuning using the through-hole components will require careful observation of the loop response on a digital oscilloscope to find the optimal through-hole component values for the specific application.

*Tachometer Gain*

Some applications may require an increase in the gain of the tachometer input signal. This occurrence will be most common in designs where the tachometer input has a low voltage to RPM scaling ratio. The drive offers a through-hole location listed in the above table where a resistor can be added to increase the tachometer gain. Use the drive's block diagram to determine an appropriate resistor value.

*IR Compensation*

For applications that will use IR Compensation mode, a resistor can be added to the location named in the table above. The combination of the added resistor and correct DIP switch settings will configure the amplifier for IR Compensation mode. While in IR Compensation mode, the amplifier will adjust the duty cycle to compensate for changes in the output current. Consult the amplifier's functional block diagram and the manufacturer's website for more information.

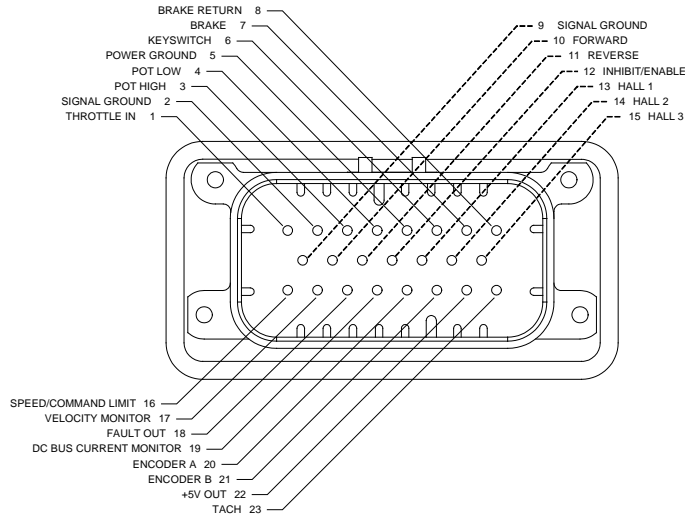
**†NOTE: DAMAGE DONE TO THE DRIVE WHILE PERFORMING THESE MODIFICATIONS WILL VOID THE WARRANTY.**



**MECHANICAL INFORMATION**

**I/O - Signal Connector**

|                       |                     |   |
|-----------------------|---------------------|---|
| Connector Information |                     | 23-pin, AMPSEAL connector   |
| Mating Connector      | Details             | TE Connectivity: Housing P/N 770680-1; Socket Contacts P/N 770854-3 (loose); Seal Plug P/N 770678-1; Crimp Tool P/N 58529-1 |
|                       | Included with Drive | No  |



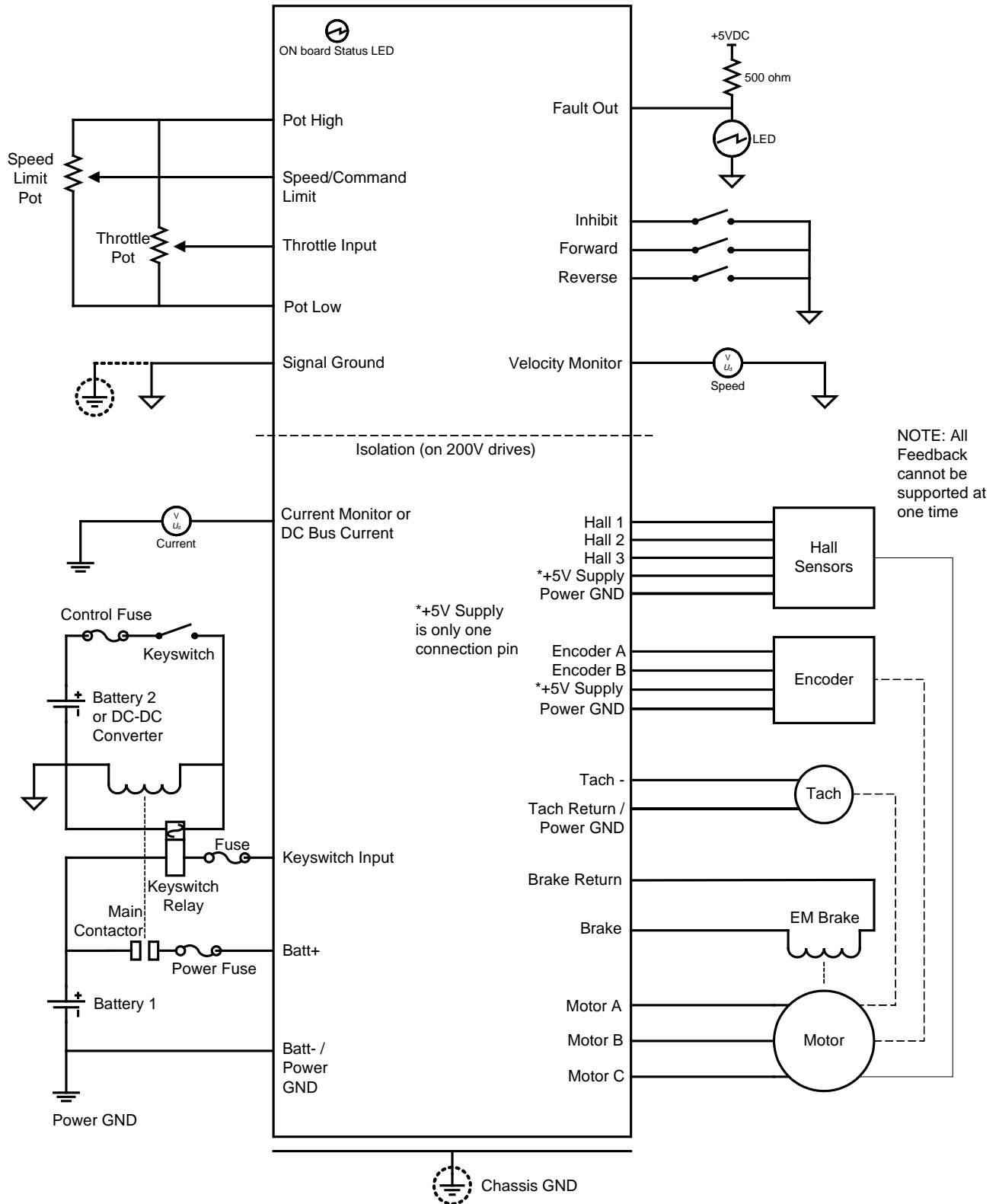
**MOTOR POWER - Power Connector**

|                       |                     |  |
|-----------------------|---------------------|--|
| Connector Information |                     | Three individual M6 threaded terminals |
| Mating Connector      | Details             | M6 screw or bolt with washer           |
|                       | Included with Drive | Yes                                    |

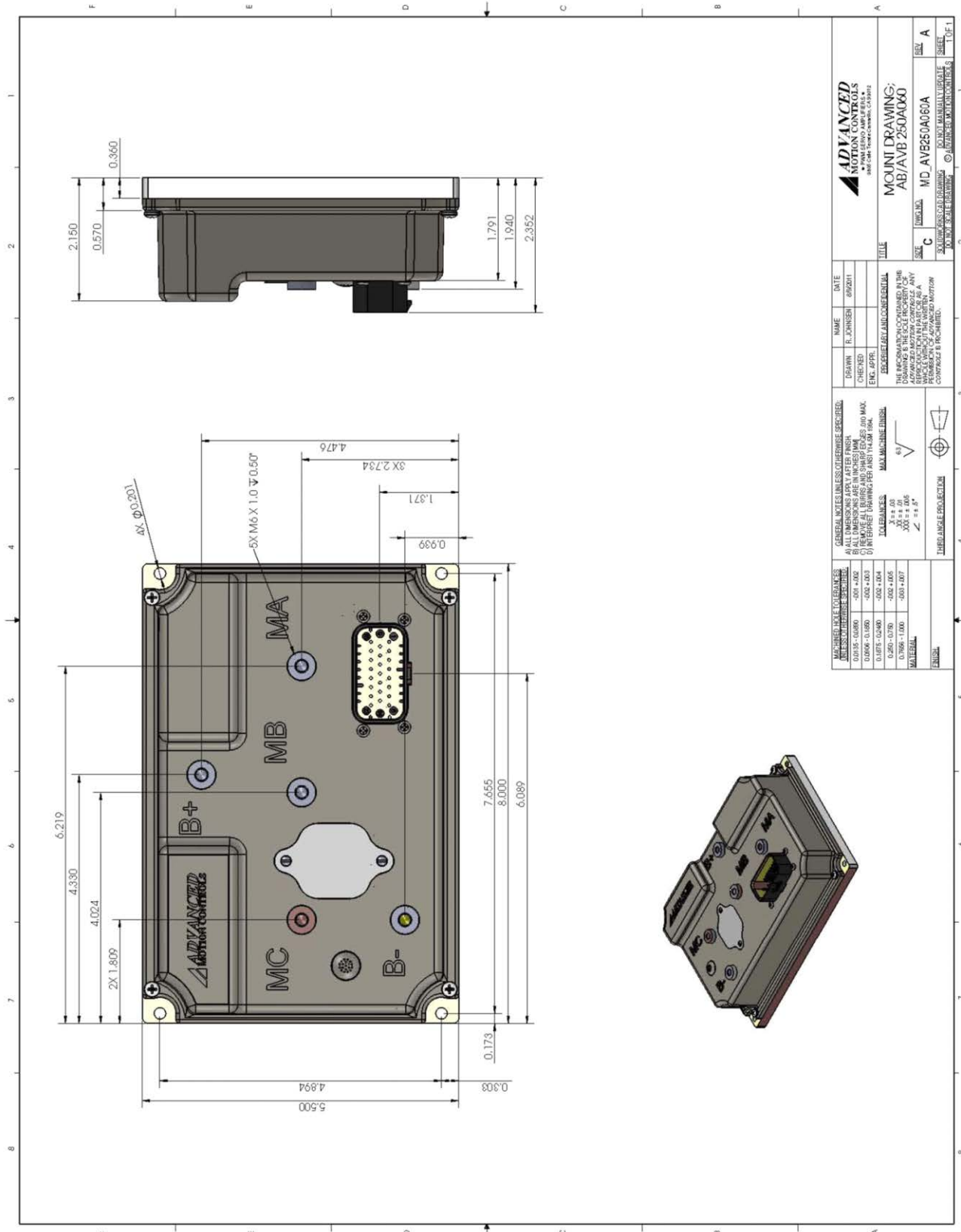
**POWER - Power Connector**

|                       |                     |                                      |
|-----------------------|---------------------|--------------------------------------|
| Connector Information |                     | Two individual M6 threaded terminals |
| Mating Connector      | Details             | M6 screw or bolt with washer         |
|                       | Included with Drive | Yes                                  |

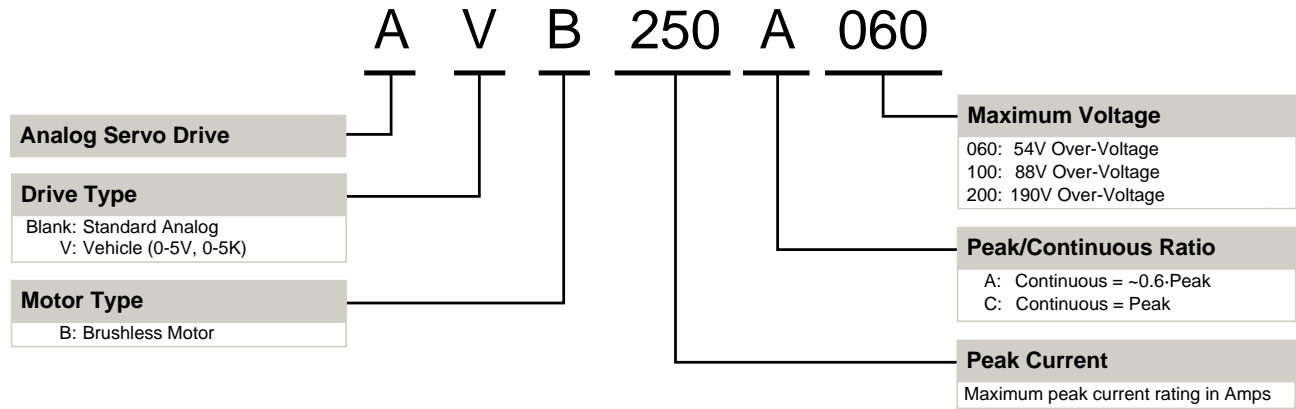
**WIRING DIAGRAM**



**MOUNTING DIMENSIONS**



**PART NUMBERING INFORMATION**



ADVANCED Motion Controls servo drives are available in many configurations. Note that not all possible part number combinations are offered as standard drives. All models listed in the selection tables of the website are readily available, standard product offerings.

ADVANCED Motion Controls also has the capability to promptly develop and deliver specified products for OEMs with volume requests. Our Applications and Engineering Departments will work closely with your design team through all stages of development in order to provide the best servo drive solution for your system. Equipped with on-site manufacturing for quick-turn customs capabilities, ADVANCED Motion Controls utilizes our years of engineering and manufacturing expertise to decrease your costs and time-to-market while increasing system quality and reliability.

**Examples of Customized Products**

- ▲ Integration of Drive into Motor Housing
- ▲ Mount OEM PCB onto Drive Without Cables
- ▲ Multi-axis Configuration for Compact System
- ▲ Custom PCB and Baseplate for Optimized Footprint
- ▲ RTV/Epoxy Components for High Vibration
- ▲ OEM Specified Connectors for Instant Compatibility
- ▲ OEM Specified Silkscreen for Custom Appearance
- ▲ Increased Thermal Limits for High Temp. Operation
- ▲ Integrate OEM Circuitry onto Drive PCB
- ▲ Custom Control Loop Tuned to Motor Characteristics
- ▲ Custom I/O Interface for System Compatibility
- ▲ Preset Switches and Pots to Reduce User Setup
- ▲ Optimized Switching Frequency
- ▲ Ramped Velocity Command for Smooth Acceleration
- ▲ Remove Unused Features to Reduce OEM Cost
- ▲ Application Specific Current and Voltage Limits

Feel free to contact Applications Engineering for further information and details.

All specifications in this document are subject to change without written notice. Actual product may differ from pictures provided in this document.