INSTALLATION & OPERATION MANUAL

Alpha Series
Digital - High Bandwidth
PWM Brush and Brushless Servo Amplifiers

GLENTEK

SMB/SMC 9508	SMB/SMC 9410	SMB/SMC 9430
SMB/SMC 9515	SMB/SMC 9415	SMB/SMC 9445
SMB/SMC 9408	SMB/SMC 9420	SMB/SMC 9475

SMB Designates BUS Powered Logic
SMC Designates Separate Keep Alive Logic Power

Congratulations, You Cared Enough to Buy the Very Best!

Manual Revision Date:
13 February 2014

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Overview

This manual guides the application engineer through the steps necessary for installation of the Alpha series digital amplifiers.

All features of the Alpha Series digital amplifier are explained and the procedures for installation and tuning are covered. The following sections are presented in an order that will make installation easy for most first time users of the Alpha Series digital amplifiers.

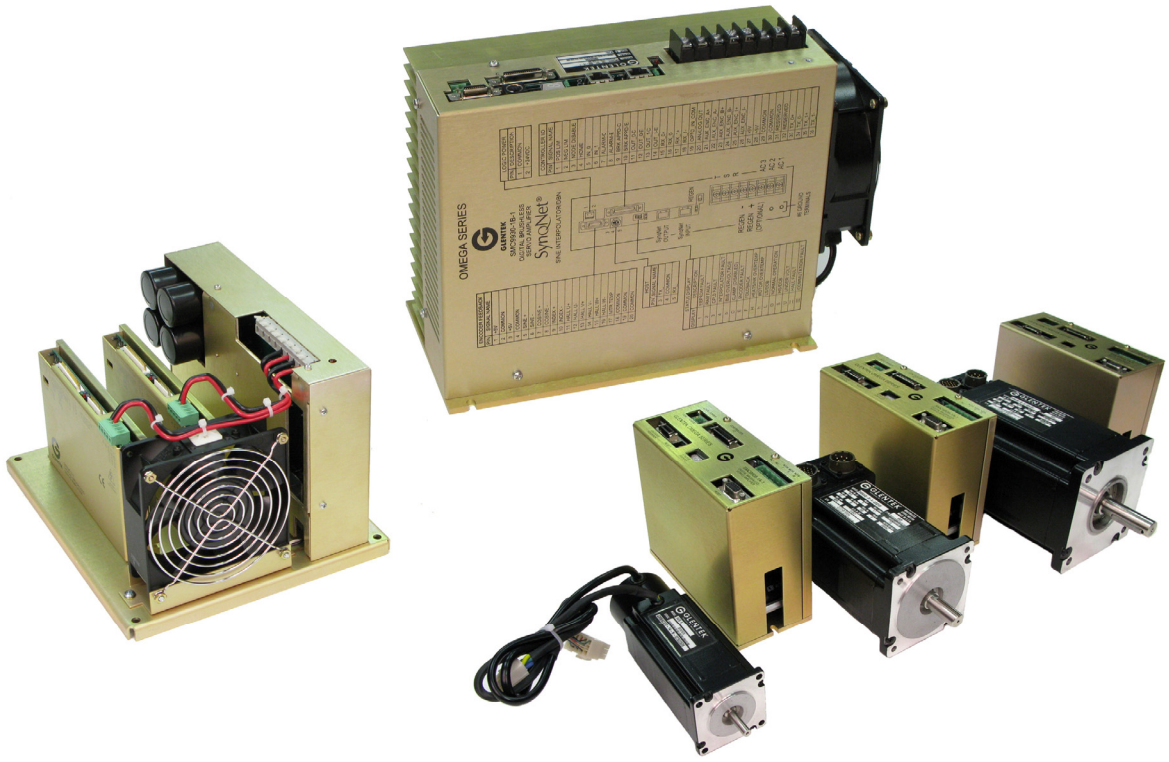
The “Product Description” and “Features” sections provide the application engineers data for system integration of the Alpha Series digital amplifiers.

Next, MotionMaestro© software is introduced. Enough material is given here to familiarize the application engineer with the software tools necessary to setup, install and run a motor using the Alpha Series digital amplifiers. For additional information refer to the MotionMaestro© Software Guide at www.Glentek.com.

The application engineer is then guided through a step by step procedure for setup and tuning a digital servo system.

As always, Glentek application engineers are available to help you in your specific application goals. If you have any questions at all, we strongly encourage you to contact us and we will help in any way we can.

Again, thank you and we look forward to providing you a product that will make your system perform at its very best level.



Product Description

Glentek's Alpha Series Digital PWM Brush and Brushless Servo Amplifiers offer the latest in high performance DSP control of both rotary and linear brush and brushless servo motors. With extensive utilization of surface mount technology and special heat transfer techniques, the Alpha Series offers one of the world's most powerful products for a given form factor. The Alpha Series employ a Field Oriented Control method which allows accurate control in both steady state and transient operation. Glentek's advanced Space Vector Pulse Width Modulation algorithms allow for maximum utilization of the DC BUS voltage while minimizing harmonic distortion of the current in the windings of 3-phase AC motors.

The Full Feature servo amplifier operates in current (torque) mode or velocity (RPM) mode, accepts a +/-10V analog input as a command reference and commutates the motor sinusoidally for ultra smooth operation at low speeds. The amplifier utilizes an incremental encoder to derive the velocity signal and to commutate the motor. The absolute commutation angle is usually determined using Hall sensors or encoder commutation tracks. However, in some cost sensitive applications where slight motor movement is acceptable upon power up, the amplifier can perform a power-on phase finding algorithm which eliminates the need for Hall sensors or Commutation tracks. The amplifier can also accept a feedback signal from a tachometer to close the velocity loop. All modes of operation can also be supported utilizing synchro resolver feedback instead of an encoder. It is best to consult Glentek's sales application group. Also, we can customize a serial port digital interface to adapt to your controller as required to meet your protocols such as Ethernet, CAN, RS485, etc.

Current (Torque) Mode Servo Amplifier

The current mode servo amplifier accepts a +/-10V analog input as a current command (direct torque command). For this mode of operation, the amplifier provides high current loop bandwidth for high acceleration and high speed applications. Glentek's high bandwidth current mode amplifiers are utilized in high performance linear motor digital positioning systems.

Velocity (RPM) Mode Servo Amplifier

The velocity mode servo amplifier accepts a +/-10V analog input as a velocity command. For this mode of operation, it is always best to use a high line count rotary encoder, typically 5000 or 8192 lines per revolution as this will give the smoothest response at low speeds. High line count and commutation tracks are always recommended. Glentek's high gain / high bandwidth velocity mode amplifiers are preferred and utilized in many very high performance digital positioning systems.

2-Phase Current Mode Servo Amplifier

The 2-Phase Current Mode servo amplifier accepts two +/-10V analog inputs as current command references for two of the motor phases. The third phase is derived from the two reference phases. This model amplifier does not need any feedback devices and is used with controllers that provide the commutation.

Pulse and Direction Position Mode Servo Amplifier

The Pulse Follower servo amplifier incorporates all the features of the Full Feature servo amplifier and also accepts two digital pulse inputs as a position command input. The pulse inputs at the amplifier are terminated by differential line receivers which can be configured to two modes of pulse and direction position mode servo amplifiers. The motor position and speed are a function of the number of pulses and the rate of the pulses respectively. They are described as follows:

Pulse (step) and Direction mode

The first input is a pulse train used to establish the absolute distance and velocity of the command and the second input is a direction signal used to establish the direction of rotation of the command. Many stepper motor controllers provide this pulse type and allows upgrading a stepper motor system to a servo motor system without the need to change controllers.

Encoder Follower mode

Two pulse inputs in quadrature, such as the output of an incremental encoder or an encoder pot determine both command distance and direction. This pulse decoding is useful to slave one motor to another by connecting the master motor's encoder output to the slave motor's pulse inputs.

CANopen Servo Amplifier

The CANopen servo amplifier incorporates all the features of the Full Feature servo amplifier and also accepts a high speed serial digital command input. The digital command can be a current command if the amplifier is operating in Current Mode, a velocity command if the amplifier is operating in Velocity Mode, a two phase current command if the amplifier is operating in Two Phase Current Mode, and a position command if the amplifier is operating in Pulse and Direction Position Mode. The CAN protocol is in compliance with CAN in Automation (CiA) DS-301 V4.02 standard. See CANopen Installation and Operation Manual for more detail.

Features

- **CE compliant:** All servo amplifiers are CE marked.
- **FOC:** All Alpha Series employ Field Oriented Control method which allows accurate control in both steady state or transient operation.
- **Digital current loops:** Current loop bandwidths up to 3 kHz.
- **Digitally tuned:** All parameters set digitally. No potentiometers to adjust. DSP control for the ultimate in high performance.
- **Silent operation:** 25 kHz PWM standard.
- **Wide operating voltage:** 24-370 VDC for Amplifier modules. All stand-alone and multi axis versions can be ordered for operation from either 110-130 VAC or 208-240 VAC (single or 3-phase, 50/60 Hz).

  Note: Non-standard voltages can be ordered on request.
- **Direct AC operation:** The stand-alone units and multi-axis chassis include DC BUS power supplies, cooling fans and a regen clamp with dumping resistor

  Note: SMX9415-1D-1 Stand Alone does not have a regen clamp.
- **External logic supply:**
  (SMC94XX, SMC9515) 24 - 48VDC, 600mA min @ 24VDC.
  (SMC9508) 5VDC @ 1A min.
  Powers all amplifier logic and encoder.
- **RS-232 or RS-485:** (RS-485 is optional) High speed (115.2K baud) serial communication interface for setup and tuning.
- **CANopen:** High speed (up to 1 Mb/s) serial communication interface for communications between nodes in real-time control applications.
- **Encoder output divider:** (Optional) The encoder input signal can be divided by a user selectable integer 1-8 for the encoder output signal.

  Note: Non-standard frequency divisor can be ordered on request.
- **Encoder feedback:** Accepts nominal encoder signals up to 5 MHz (maximum frequency of up to 10 MHz is possible, but is system dependent).
- **Tachometer feedback:** Accepts analog signals from all types of tachometer feedback.
- **Parametric filtering:** Provides control engineers advanced filtering to eliminate unwanted system mechanical resonance.
- **Sinusoidal commutation:** For the ultimate in efficiency and smooth motion, Commutates from almost any resolution linear or rotary encoder.
- **Smart-Comm Initialization:** Eliminates the need for Hall sensor or commutation tracks for many applications.
- **Auto Phase Finding:** Plug and Play for all types of three phase brushless motors. Provides control engineers the ability to connect any motor leads to any amplifier motor outputs. The amplifier's smart algorithm will automatically find and align the motor phases to allow for the most optimized smoothness and efficient commutation.

- **Auto Phase Advance:** Glentek's advanced algorithms incorporated in the Alpha Series drives, automatically provide phase advance, insuring that the current is delivered at the appropriate time, and provides the most efficient operation.
- **Space Vector Modulation:** Glentek's advanced algorithms allow for maximum utilization of the DC BUS voltage while generating minimum harmonic distortion of the currents in the winding of 3-phase AC motor.
- **Software configurable:** Glentek's Windows™ based MotionMaestro© software provides ease of set-up, monitoring and tuning with no previous programming experience required. This software is Windows™ 95/98/2000/XP, NT, Vista, and 7 compatible.
- **Non-volatile memory:** All parameters are stored in non-volatile memory for reliable start up. In addition, up to two different configurations can be stored in the amplifier's non-volatile memory.
- **Dedicated inputs:** +/- position limits, inhibit, fault , motor over temp, reset signal, +/- 10V analog input, Pulse & Direction, and 2-phase current command.
- **Dedicated outputs:** Up to two selectable analog monitor signals, fault and encoder output.
- **Relay outputs:** (Optional) These two pins provide an interface for the relay. They turn on . when desired condition occurred.
- **Complete isolation:** Complete optical isolation between signal and power stage.

  Note: SMX9508 is non-isolated. Therefore, an isolated power supply is recommended for optimal performance.
- **Fault protection:** Short from output to output, short from output to ground, amplifier RMS over current, amplifier under/over voltage, amplifier over temperature, motor over temperature.
- **Status indicator:** 7-segment display indicates amplifier status and diagnostics.

  Note: For SMX9508, the status indicator is made up of a Red and a Green LEDs.
- **Three basic models:** Covering all servo needs, the Alpha Series includes a full feature current/velocity amplifier, a 2-phase input current amplifier, and a pulse following amplifier for all Brush and Brushless motors.
- **On-the-fly mode switching:** This feature allows the amplifier to switch between any mode of operations on-the-fly. That is, the amplifier can switch between current to velocity (or velocity to current), current to position (or position to current), and velocity to position (or position to veloc ity) while the motor is in motion. This feature is available upon request. Please contact Glentek application engineers for assistance.
- **SMT construction:** Provides ultra compact size, cost competitive package and high reliability.

Standard Operating Conditions

Temperature

Min. = 0º C
Max. = 60º C

Humidity Range

5-95% Non-condensing

Altitude

This amplifier is rated for up to 1000m, above which performance may deteriorate.

Shock

Do not expose the amplifier to sudden shock (dropping, shaking, etc…)

Vibration

Do not install the amplifier in an area prone to constant vibration.

Electromagnetic Interference

Do not install the amplifier near sources of EMI

Atmospheric Pollutants

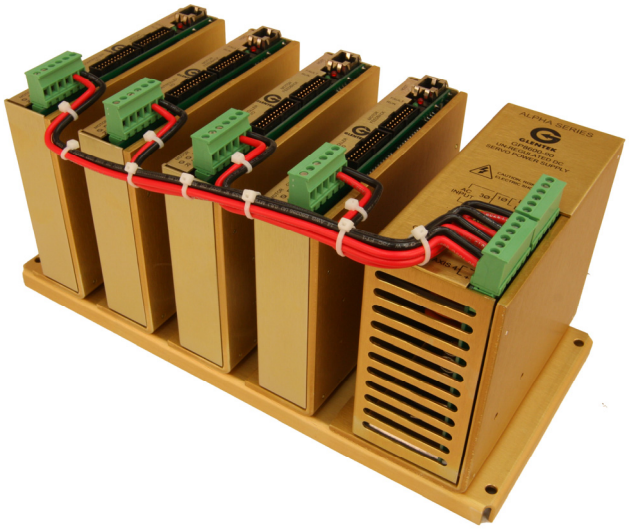
Do not install the amplifier in an environment where the atmosphere contains pollutants such as dust, corrosives, etc...

Water

Keep the amplifier away from all water hazards, including pipes that may accumulate condensation and areas that can become excessively humid.

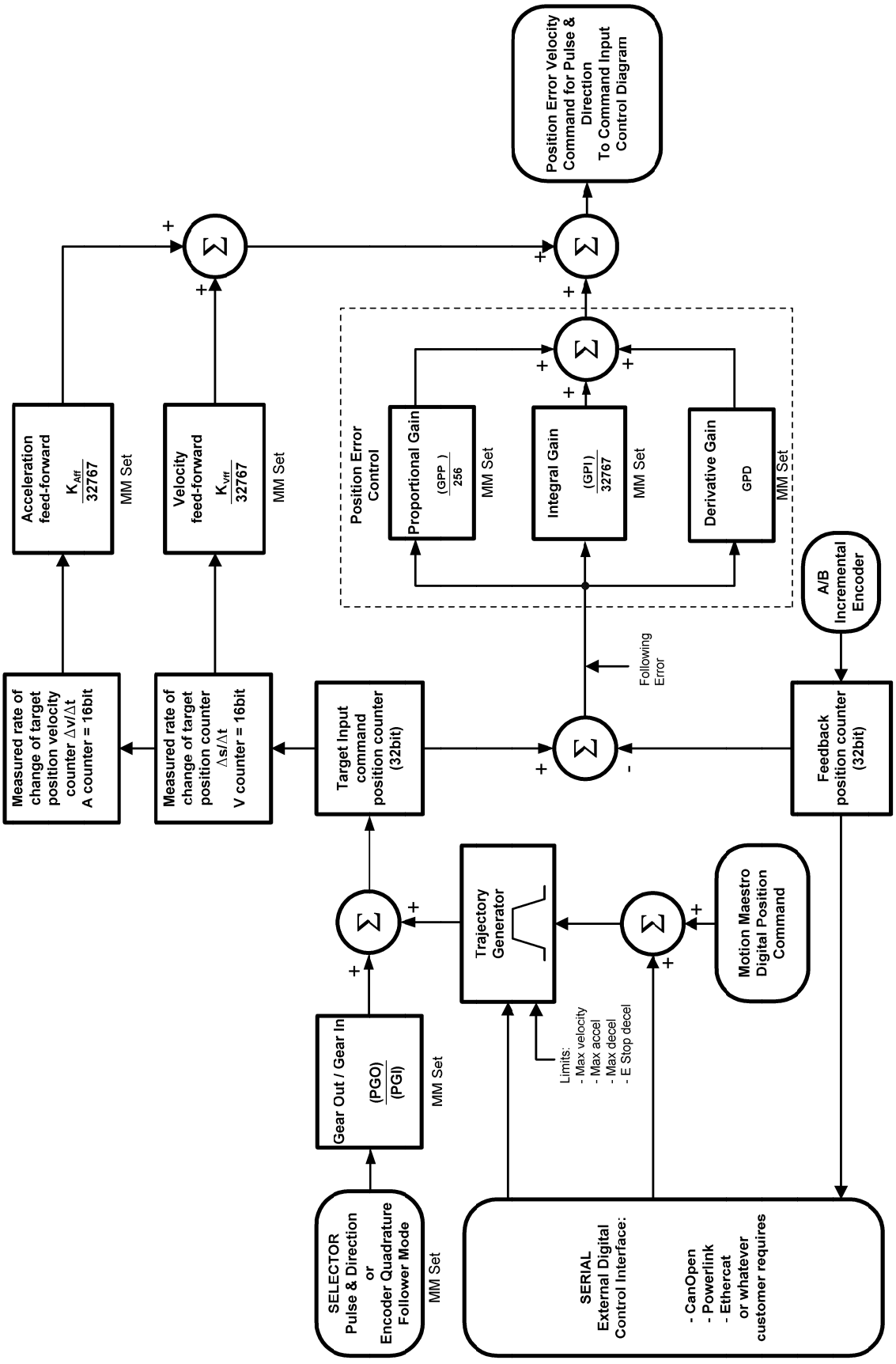
Overheating

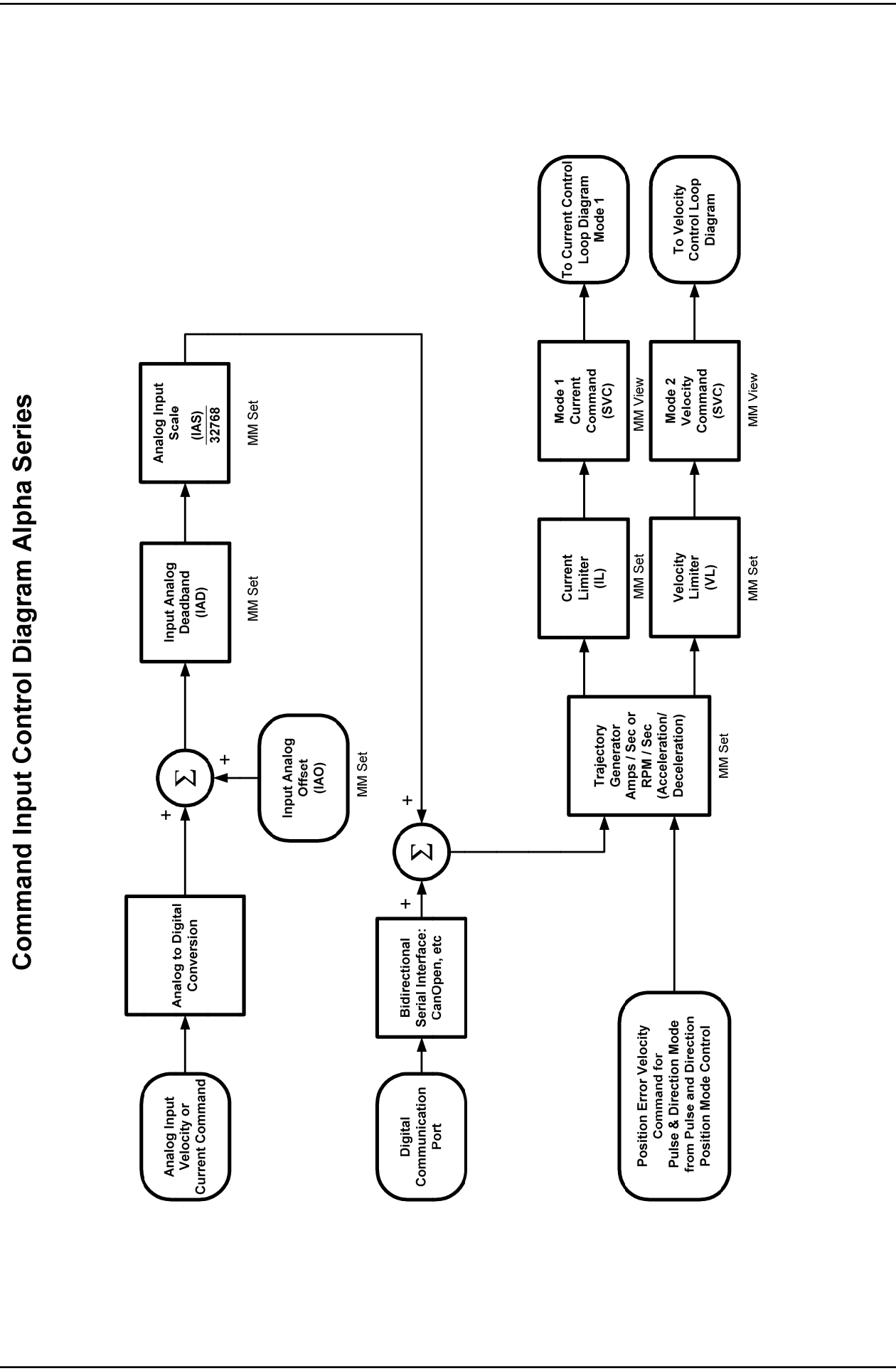
Ensure that the amplifier's air vents are not obstructed. Allow a clearance of 75mm (minimum) above the amplifier for proper ventilation.



Control Block Diagrams

Position Mode Control Diagram Alpha Series




Command Input Control Diagram Alpha Series
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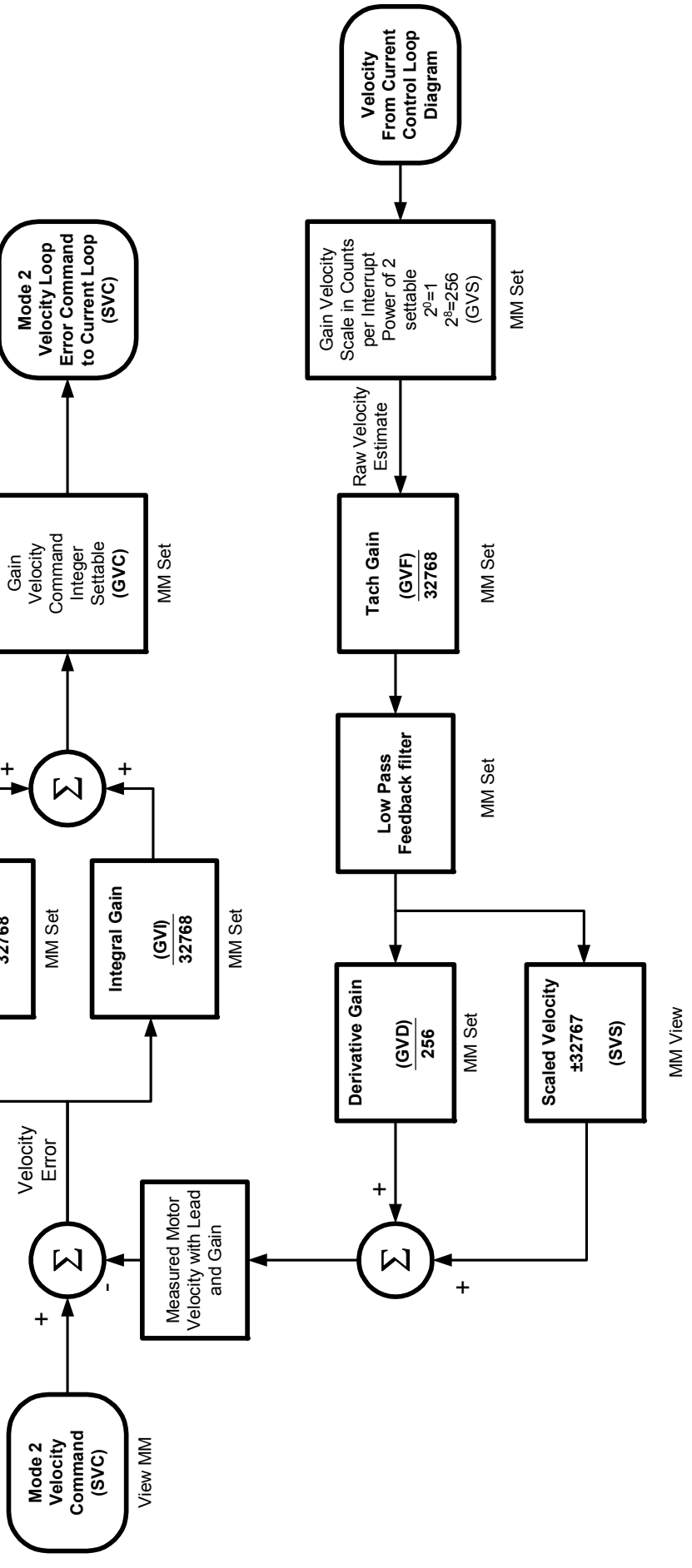

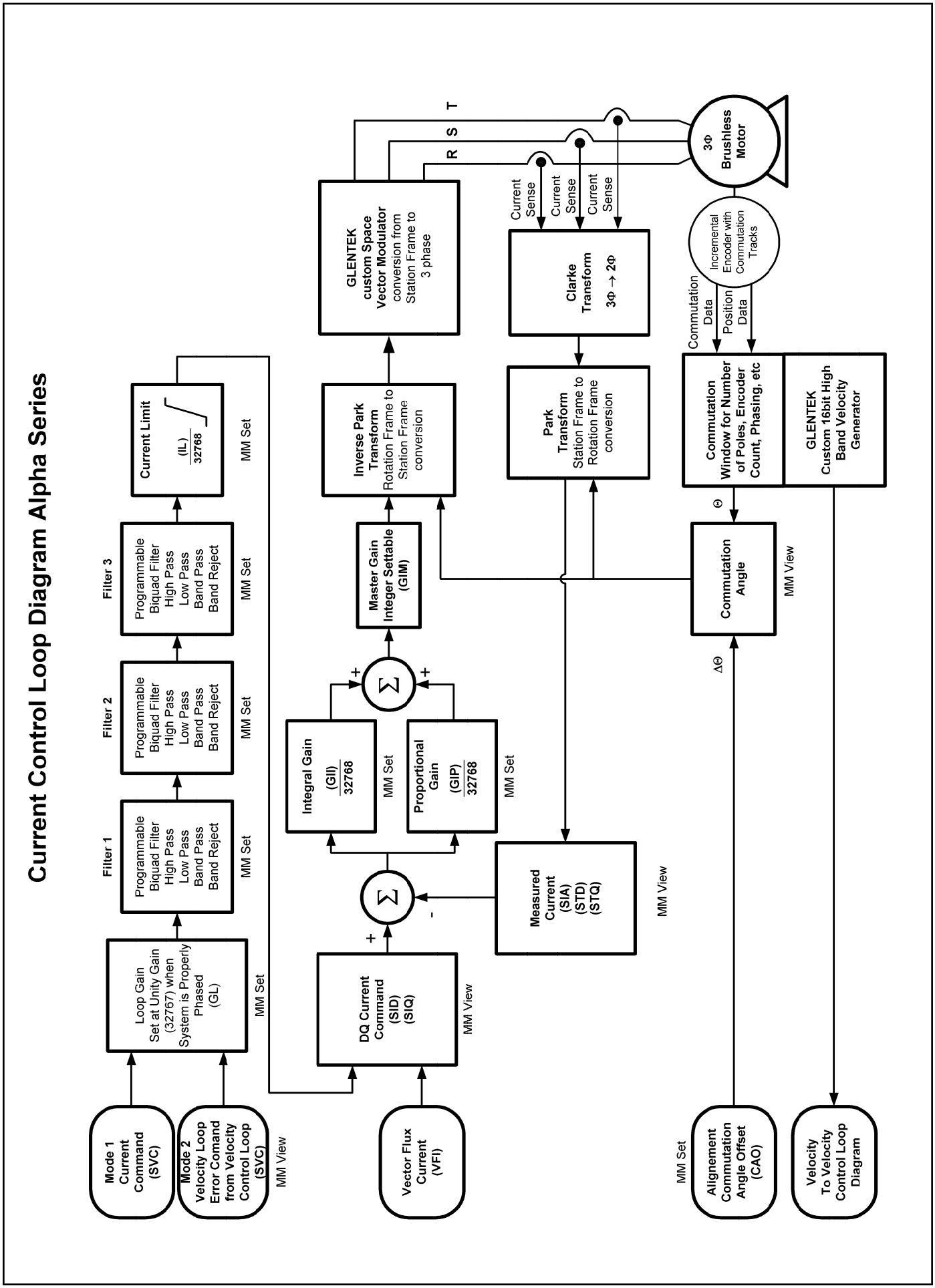
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Current Sense
Current Sense
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Park Transform Station Frame to Rotation Frame conversion
Incremental Encoder with Commutation Tracks
Commutation Data
Position Data
Commutation Window for Number of Poles, Encoder Count, Phasing, etc
GLENTEK Custom 16bit High Band Velocity Generator
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Θ
ΔΘ

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Amplifier Setup Software

MotionMaestro© is Glentek's Windows based application software that was designed to communicate with the Alpha series digital amplifiers. MotionMaestro© has many dialogs with values shown in engineering units to make it easy to select and setup the features of the amplifier. MotionMaestro© utilizes the standard binary command set and protocols. Although it is not necessary to use MotionMaestro©, installation, setup and tuning is made easier through its use. For more information please refer to the MotionMaestro© Software Guide at www.Glentek.com.

MotionMaestro© has many features that allow application engineers to easily configure a digital amp to an application. It has a terminal mode that operates at 115k baud transmission rates, an oscilloscope that can be used to monitor amplifier signals and a tuning dialog that can be used to control the motor input. By using the oscilloscope and tuning dialog, one can monitor step response to determine filter parameters for optimal control loop performance.

Glentek developed a Communication Module CM998-1 to provide Ethernet communication between the Host computer that is running MotionMaestro© and the amplifier. The Host computer communicates with the CM998-1 by Ethernet, and the CM998-1 communicates with the amplifier by RS-232 or RS485 (you must have the proper serial cable wired as described in the Amplifier Connection Interface section of this manual). The CM998-1 is plug-and-play, and there is no special setup required. Please contact one of Glentek's sale engineers for further details.

MotionMaestro© Installation

MotionMaestro© requires Windows95, Windows 98 SE, Windows ME, Windows NT 4.0, Windows 2000, Windows XP, Windows Vista or Windows 7 operating system running on a PC with at least one serial port. It is suggested that you have no less than 3 megabytes of application program disk space remaining on the hard drive prior to installation. The MotionMaestro© install disk is setup to utilize Install Shield to simplify installation. There are only a few setup options offered. In general you can press NEXT or YES until installation is complete. When installation is completed, you will find a MotionMaestro© shortcut on the windows Start\Programs menu.

DO NOT RUN MOTIONMAESTRO© UNTIL YOU HAVE READ ALL OF THIS SECTION.

The MotionMaestro© installation program is named Setup.exe. It is found in the MotionMaestro© \disk1 directory of the distribution CD. The installation will create a Glentek folder in the Program Files folder. A MotionMaestro©_X_X folder is created where _X_X matches the version number. You can have multiple versions of MotionMaestro© installed, if you wish, and they will be placed into their own directories.

MotionMaestro© amplifier setup features.

This section of this manual is an introduction to MotionMaestro's© features that are required for installation and setup of the Alpha series amplifiers. Only those features of MotionMaestro© required for defining motor characteristics are covered. This is not meant to be a step by step tutorial. The "Connecting the Amplifier to the motor" section is intended as a tutorial for motor setup. You may need to refer to this section when setting up a motor. The following features are reviewed here.

1. Opening of communications.
2. Model Information.
3. Digital I/O setup.
4. Mode setup.
5. Motor Parameters.
6. Motor Safety.
7. Commutation Setup.
8. Gearing/Encoders Setup.
9. Trajectory Generator.
10. Filters.
11. Analog I/O setup.
12. Oscilloscope.
13. Terminal Window.
14. Amplifier Status.
15. Control Panel.
16. Motor Tuning.
17. Saving parameters.
18. Backing up a copy of amplifier parameters.

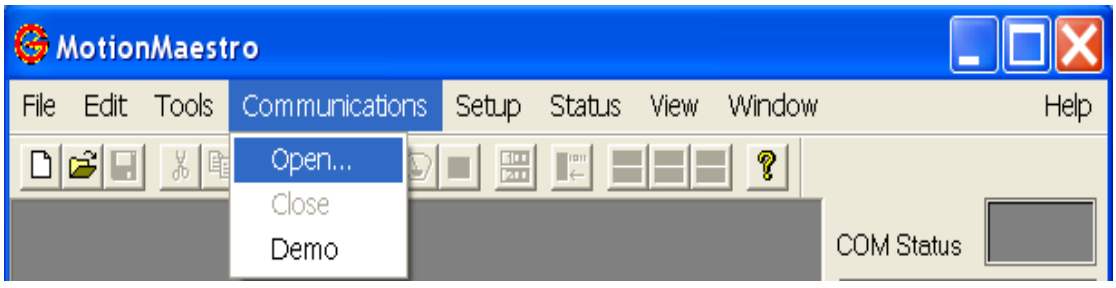
Opening of communications

Before MotionMaestro© can be used, communications must be established between the amplifier and the PC that MotionMaestro© is running on. Before opening communications in MotionMaestro©, you must decide what communication method between the Host computer and amplifier is used (RS-232 only, Ethernet to RS-232 or Ethernet to RS-485 using Communication Module CM998-1) and have a serial communications cable wired as described in the Amplifier Connection Interface section of this manual.

When MotionMaestro© is directed to establish communications with the amplifier, the amplifier is queried for a model ID and Firmware version. MotionMaestro© will configure itself and select the appropriate configuration files based on the amplifier returned values.

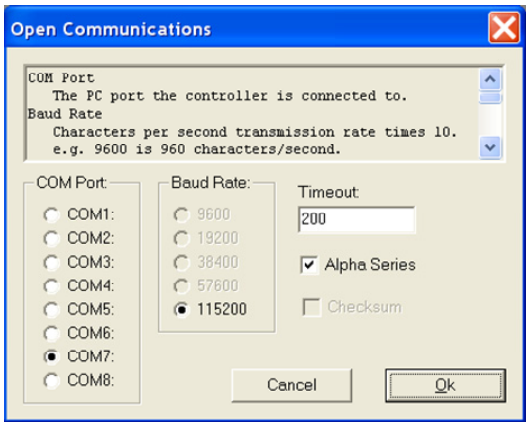
There are extensive help screens under the Help menu. Select Help Topics and you can read about the usage of MotionMaestro© and it's features.

Open communications by selecting the "Open" option on MotionMaestro's© main menu tool bar.



Open - To make connection with an amplifier

Depending on which communication method between the Host computer and amplifier is used, one of the following two screens for establishing communication link would be opened.

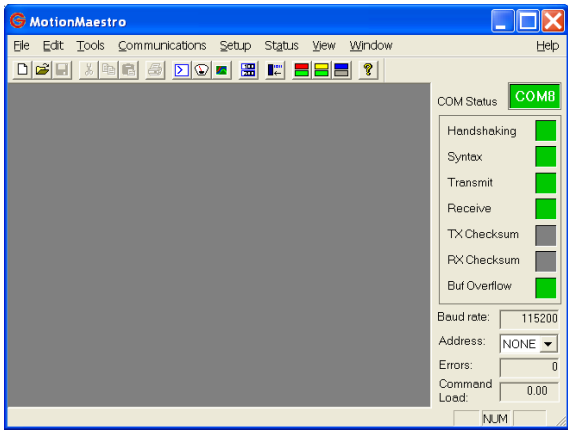


Open Communications dialog box using RS-232 between Host computer to amplifier

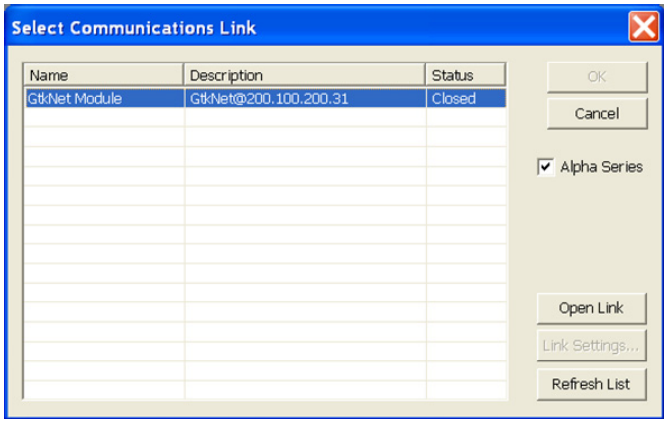
If the communication method is by RS-232 between the Host computer and amplifier, the “Open Communications” window is displayed.

Select the COM port that you connected the serial port cable to and ensure that a baud rate of 115200 is selected. Click and select the check box next to Alpha Series (to distinguish from Omega Series protocol). When you press OK, MotionMaestro© will query the amplifier to determine what amplifier model is connected.

If communications is established, you should see a screen similar to the “MotionMaestro’s main window using RS232” with all green communications status indicators.



MotionMaestro’s main window using RS-232

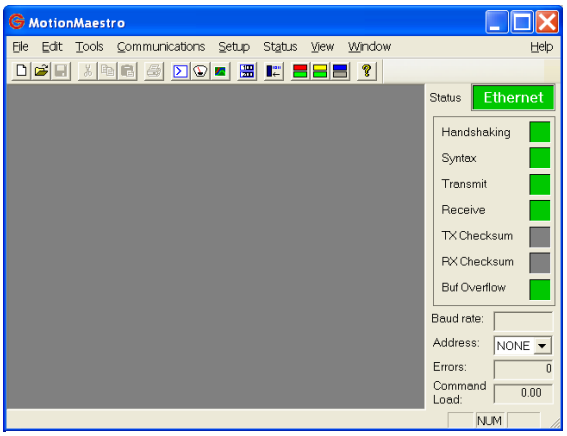


Open Communications dialog box using Ethernet between Host computer to amplifier via Communication Module CM998-1

If the communication method is by Ethernet to RS-232 or Ethernet to RS-485 using Communication Module CM998-1 between the Host computer and amplifier, the “Select Communications Link” window is displayed.

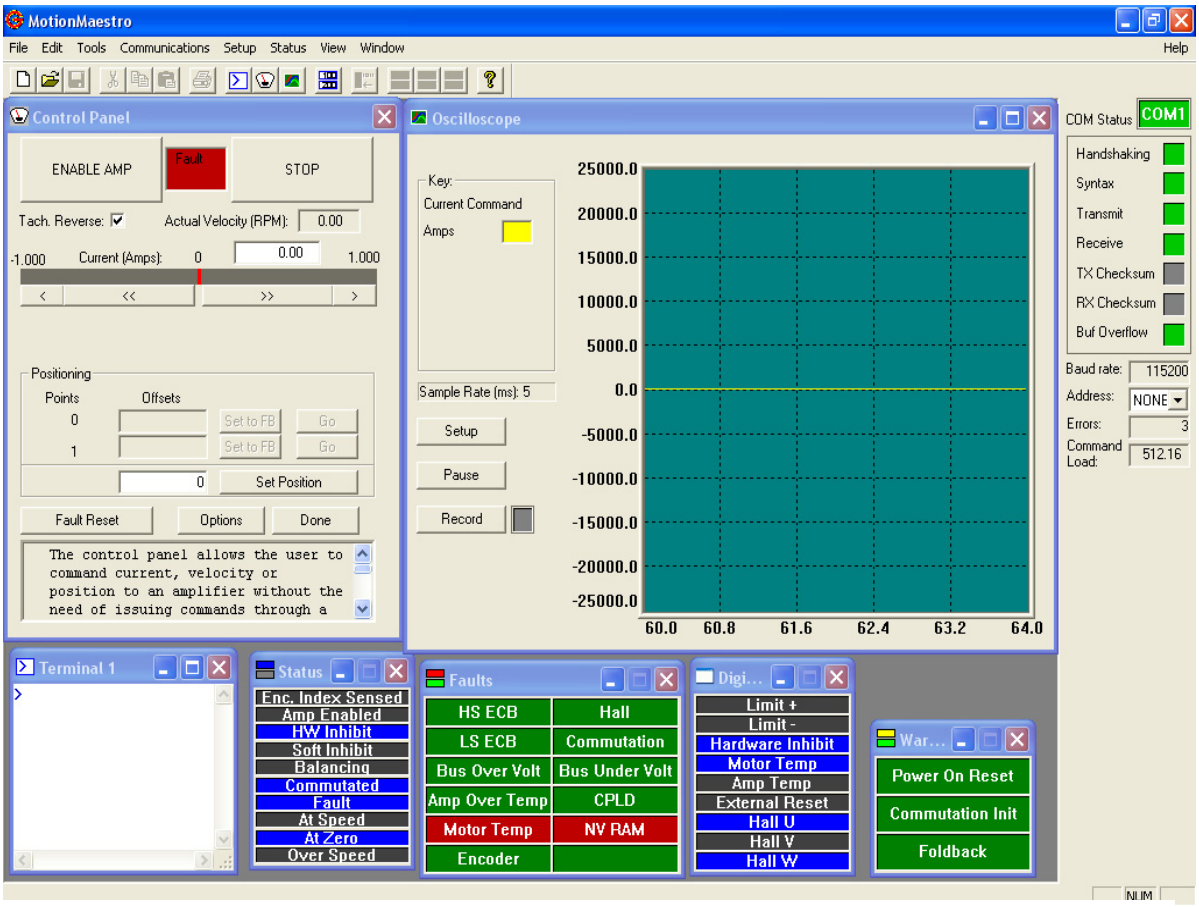
Click and select the check box next to Alpha Series (to distinguish from Omega Series protocol). Click to highlight “GtkNet Module”, and click on “Open Link”. When you press OK, MotionMaestro© will query the amplifier to determine what amplifier model is connected.

If communications is established, you should see a screen similar to the “MotionMaestro’s main window using Ethernet” with all green communications status indicators.

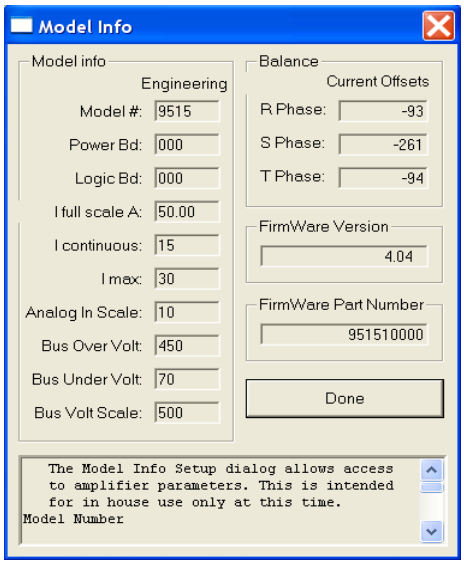


MotionMaestro’s main window using Ethernet

Below, MotionMaestro's main window is shown where communications are successfully opened and various setup and monitoring screens are activated. These active screens do not necessarily need to remain within MotionMaestro's main window, they may reside anywhere on the Windows desktop.



MotionMaestro's Sever activated windows



Model Info Box

Model Information

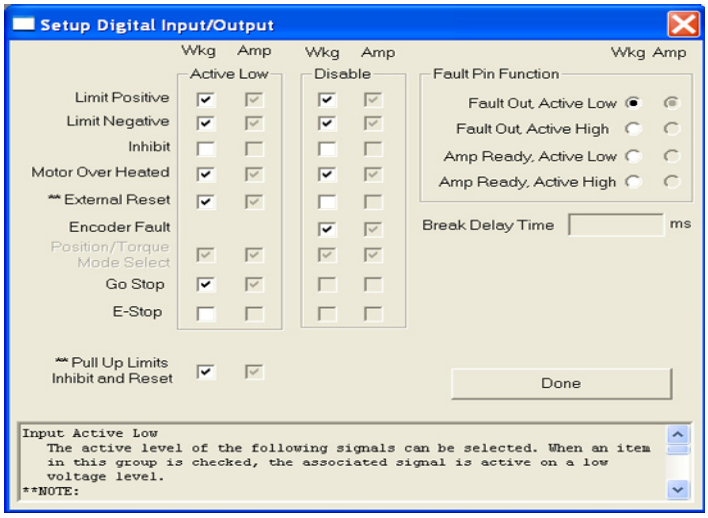
For informational purposes, you can refer to the Model Info dialog to view the design features and limits of the particular amplifier. To view this dialog, you must select the "Tools" option on Motion-Maestro's© main menu tool bar, then select "Model Info".

Here you will be able to view your firmware version, amp model number, power board number and logic board number.

In addition, MotionMaestro's Model Info dialog window will display amplifier settings. For example, on the left these settings are current balance offsets, current feedback, continuous current and peak current settings. These settings, in addition to the Bus under-voltage and over-voltage settings, are useful informational tools and are required if the user performs his own scaling of amplifier values.

Digital I/O setup

The Digital I/O settings can be used to tailor the amplifier digital signal inputs to the requirements of your application. Failure to properly setup the Digital I/O signals may result in the amplifier powering up in a fault condition. (Or worse yet a reset condition). To view this dialog, select the "Setup" option on MotionMaestro's© main menu tool bar, then select "Digital IO...". Digital I/O signals can be active high or active low depending on the applications. The Motor Over Heated condition is a good example. From this window you can modify what state the amplifier considers to be a Motor Over Heated fault condition, either high or low.



Dialog box for setting digital I/O active level

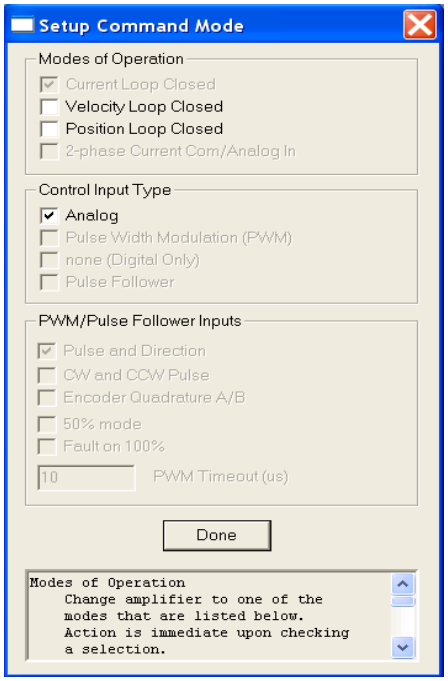
On this window there are two sets of check-boxes, for each signal, Wkg and Amp. Amp displays the current amp setting while Wkg displays the users choice. The amp is automatically updated as the Wkg box changes.

Amplifier Mode setup

The full featured amplifier can operate in either current or velocity mode. By selecting the "Setup Mode..." item on the "Setup" option menu, you can configure the amplifier to operate in desired mode.

MotionMaestro© uses the Mode setting to determine text and options on many of the dialog display windows. For example, when the Alpha series amplifiers are in current mode, parameters on the **Tuning** dialog pertaining to the velocity loop are not available.

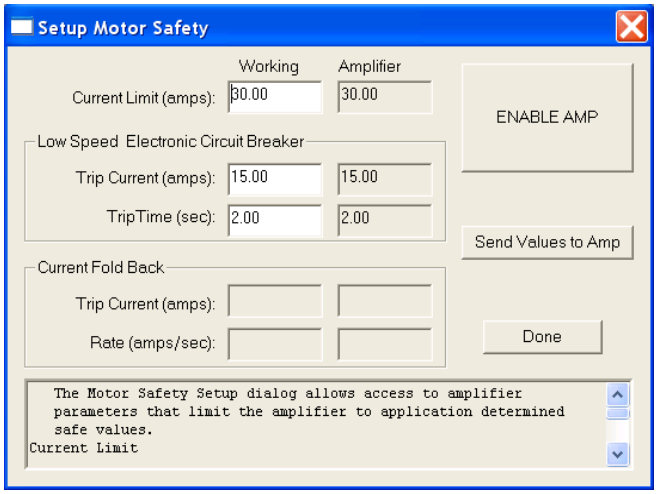
Engineering unit scaling used internally by MotionMaestro© is also adjusted to reflect proper units based on mode.



Dialog box for setting amplifier mode

Motor Safety setup

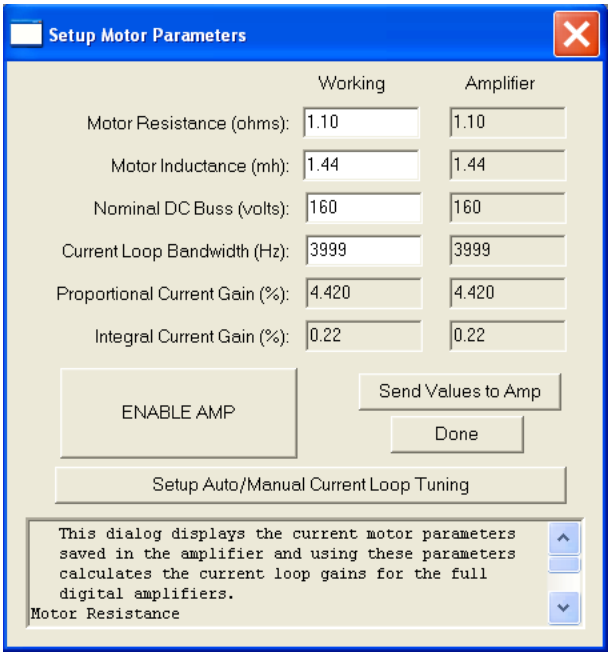
Motor safety is where limits to protect the motor are entered. The "Motor Safety Setup" dialog is available from the "Setup" menu. There are two sets of boxes, one labeled Working, the other Amplifier. Amplifier displays the current amp setting while Working displays the users selection. Here you can setup a maximum current limit, and low speed Motor safety is where limits to protect the motor are entered. In order to update the motor parameters in the amplifier, the amp must be disabled. You can do this by clicking on the "Disable/Enable Amp" button first, then the "Send Values To Amp" button. Pressing F1 displays the dialogs help text. After the values are sent to the amp, you may test the values by enabling the amplifier.



Dialog box for setting up motor safety parameters

Motor Parameters Setup

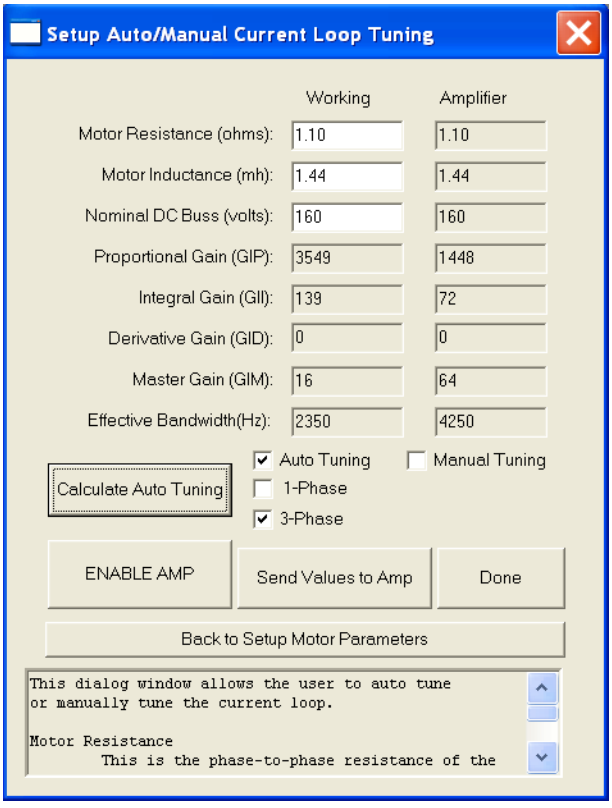
Note: Glentek recommends that you use the "Setup Motor Parameters" tuning, and only use the "Setup Auto/Manual Current Loop Tuning" window when you want some preliminary values to start with.



Dialog box for entering motor parameters

Select "Motor Parameters" on the "Setup" menu to activate the Motor Parameters dialog. The Motor Parameters dialog is used to set digital current loop gains. MotionMaestro© will calculate current loop gains based on the values entered. Select "Motor Parameters" on the "Setup" menu to activate this dialog.

Motor Resistance and Inductance are entered as phase to phase values. If these values are not indicated on the motor label, you can determine these values by measuring the resistance or inductance between two motor wires connecting two phases of the motor. Nominal DC bus voltage is the regulated bus voltage, 160 or 320 volts typically. Current loop bandwidth is a measure of the current loops responsiveness. Generally you want this to be as high as possible. A good starting point is 1500 Hz. In order to update the motor parameters in the amplifier, the amp must be disabled. You can do this by clicking on the "Disable/Enable Amp" button first then the "Send Values To Amp" button. Pressing F1 displays the dialogs help text.



Dialog box for entering motor and current loop auto/manual tuning parameters

Auto/Manual Current Loop Tuning Setup

Select "Setup Auto/Manual Current Loop Tuning" button on the "Setup Motor Parameters" window to activate this dialog.

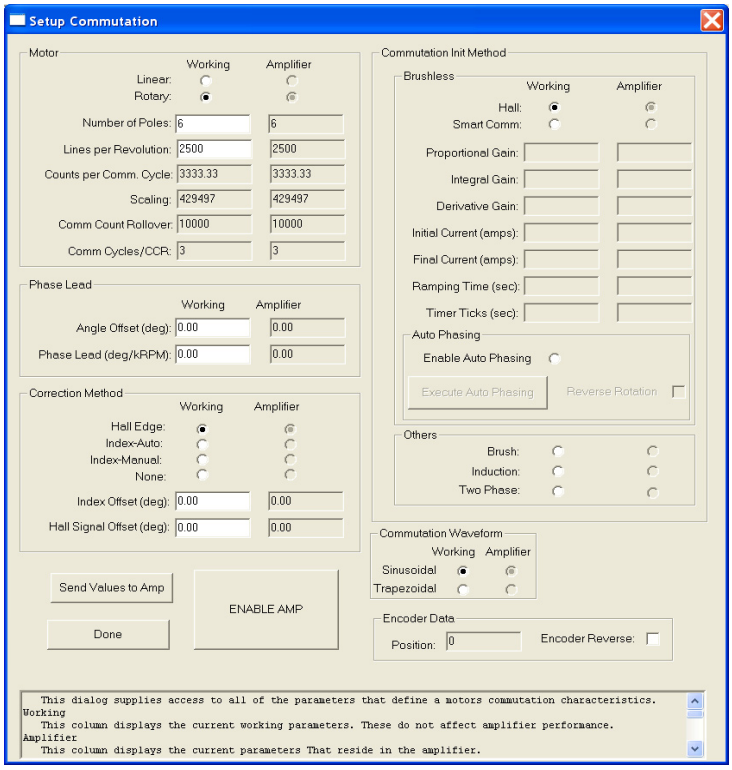
Motor Resistance, Inductance, and Nominal DC Buss voltage can be entered here if not already done so in the "Setup Motor Parameters" window. 1-Phase is selected when amplifier drives brush type DC motor or voice coil motor. 3-Phase is selected when amplifier drives 3 phase brushless motor.

There are two tuning methods that a user can choose. The auto tuning method is used to generate some preliminary values. In order to activate this method, Auto Tuning and motor type boxes are checked, then Calculate Auto Tuning button is depressed. The Proportional, Integral, Derivative, Master gains, and Effective Bandwith values are automatically calculated and optimized. You may also opt to use manual tuning method where the gains can be altered. In this mode, the Manual Tuning and motor type boxes are checked. Then all current loop gains may be adjusted and the new values send to the amplifier while viewing the current loop response with an oscilloscope or running a bode plot. For manual tuning setup information, refer to Current (Torque) mode Tuning section on page 46.

Commutation Setup

The Commutation dialog window allows you to define a motor's commutation characteristics. Here you specify motor commutation parameters, correction and methods, and encoder positioning. In the motor section, most of the boxes are calculations based on your selected motor parameters. Select "Commutation…" on the "Setup" menu to activate the dialog on the right.

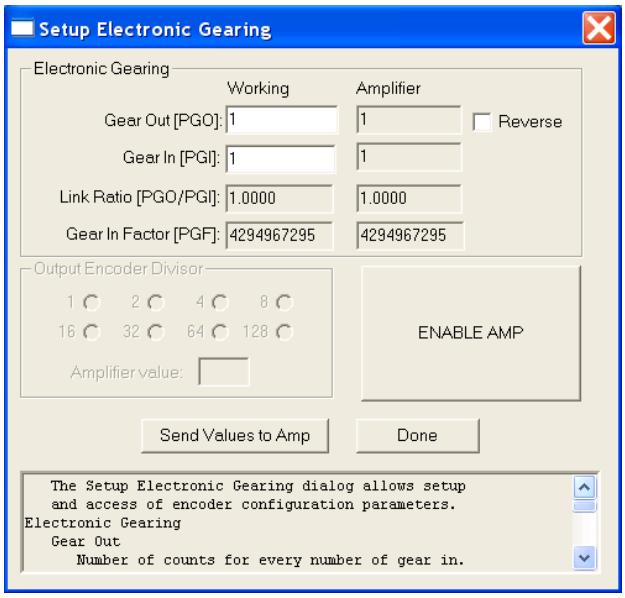
If Hall sensors or encoder commutation tracks are utilized, they need to be selected under "Commutation Method". Then, "Hall Edge" needs to be chosen as correction type. For information on Smart-Comm, refer to the Smart-Comm section on page 89. Finally, "Number of Poles" and "Lines per Revolution" need to be entered (Rotary). Selecting linear instead of rotary will display parameters that are specific to a linear motor.



Dialog box for setting up motor commutation

For additional information on edit box parameters, you may go to the help dialog at the bottom of the "Setup Commutation" window. You can scroll through the help dialog with the up or down arrows or press F1 to view the dialog help text in notepad.

The working column represents modified values that are sent to the amplifier when clicking the "Send Values to Amp" button. In order to update the commutation values, the amp must be disabled. You can do this by clicking on the "Disable/Enable Amp" button.



Gearing/Encoders Setup Dialog

Electronic Gearing Setup

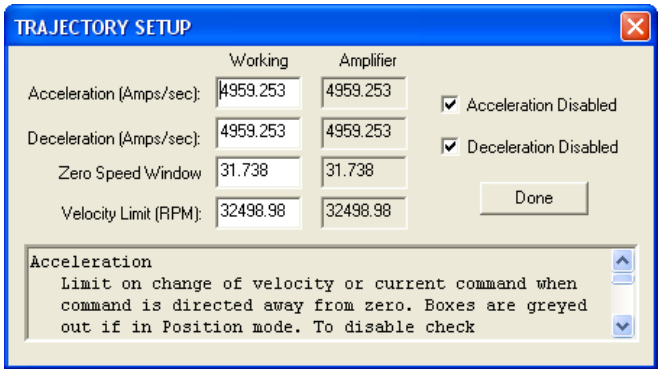
To view the Encoder dialog window, you select the "Setup" option on MotionMaestro's© main menu tool bar, then select "Gearing/Encoders...". The encoder setup dialog allows configuring the gearing ratio for Pulse and Direction Position Mode Servo Amplifier. This window is only active or available when the amplifier is in "Position" mode.

"Gear Out" is the value of position counts that the motor would move for every number of gear in.

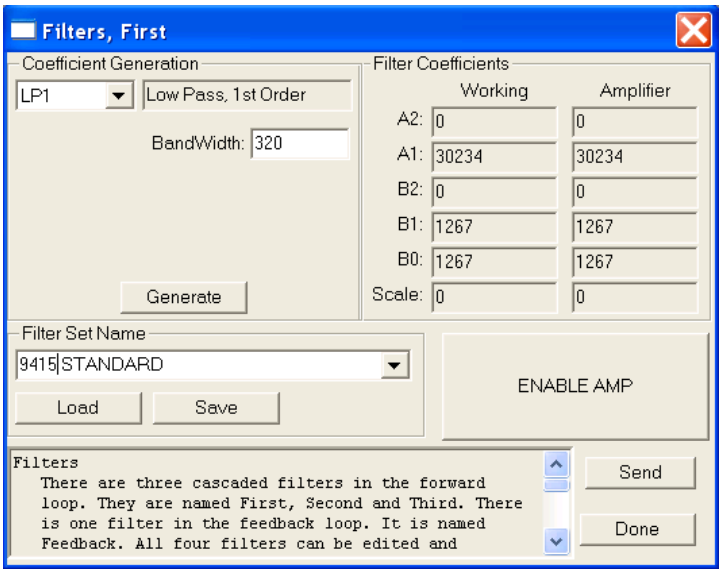
"Gear In" is the number of counts coming into the amplifier for every increment in the input position counter.

Trajectory Generator Setup

The Trajectory setup dialog window will allow you to limit the change of velocity or current command. When command is directed away from zero it's "acceleration" or when directed toward zero it's "deceleration". If velocity is below the value in "Zero Speed Window", then the ZSW bit in system status register is set. "Velocity Limit" set the maximum velocity that a motor is allowed to achieve. You can view this dialog by selecting the "Setup" option on MotionMaestro's© main menu tool bar, then select "Trajectory Generator...".



Trajectory Setup Dialog



Filters Setup Dialog

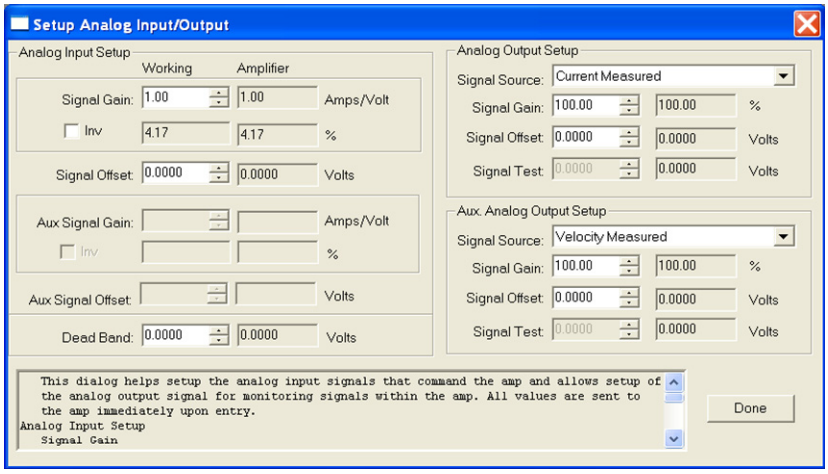
Filters Setup

To view the filter dialog window, select the "Setup" option on MotionMaestro's© main menu tool bar, then select "Filters...". At this point, select which of the four filters you would like to view/program. Three of the filters are cascaded filters in the forward loop and one is a filter in the encoder feedback loop. All four filters can be edited and displayed at the same time, but need to be opened one a time.

From these windows, MotionMaestro© allows you to enter values for defined filter equations. These equations were derived using the Tustin transform to convert variables in the frequency domain to coefficients for the digital domain equations. The first step in generating new coefficients is to select the type of filter desired., such as LL1, LP1,CLP1, etc. Once the type of filter is selected, the appropriate input edit boxes will be displayed.

Analog Input/Output Setup

The Analog Input/Output setup dialog window will allow you to setup the analog signal gains that command the amp and the analog output signals that monitor the status of the amp. The "Analog Input Setup" section on the left of the dialog window is amplifier mode dependent. For example, when the amplifier is in current mode, the signal gain is in Amps/Volt, and when the amplifier is in velocity mode, the signal gain is in RPM/Volt.

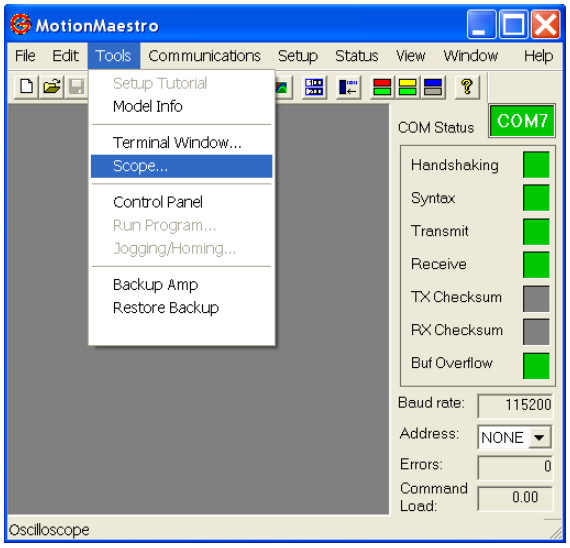


Dialog box for setting the analog input/output command signals

The "Analog Output Setup" section on the right of the dialog window allows setting up any signal to be monitor such as current or velocity of the motor, and the signal can be scaled higher or lower without affecting the signal input. One channel is default, and up to two (2) channels of different output sources can be monitor at the same time (need to specify when ordering).

Oscilloscope Setup

The Oscilloscope can either be accessed under the "Tools" option on MotionMaestro's© main menu or via a button on the toolbar.

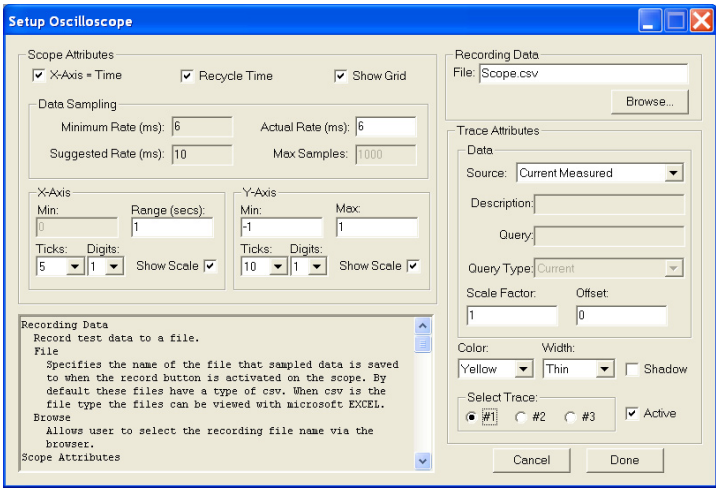


Scope in Tools tab

There is a "setup" window and a "trace display" window for the Oscilloscope. The Oscilloscope setup window provides for setup of the parameters needed to define the signals to be displayed on the Trace Window.

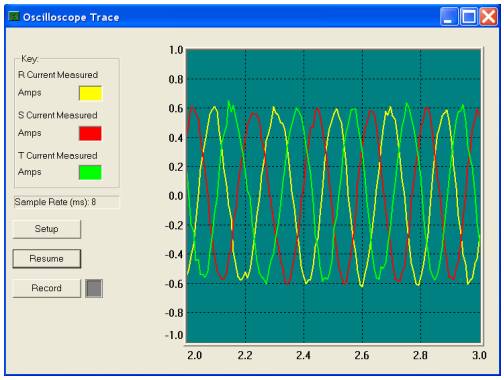
"Scope Attributes" define the X-Y attributes of the Trace display. An example is X-Axis = Time, this sets the units of the X axis to time. The range can be set for both the X and Y Axis, along with the data rate parameters.

"Trace Attributes" alters the data source and turns on/off different traces. You can monitor up to three traces at one time. All traces are color coded on the Oscilloscope Trace screen.



Oscilloscope Setup Screen

The Recording Data section is useful for recording test data to a file. The "File" specifies the name of the file that sampled data will be saved to when the record button is activated on the "Trace display" window. By default these files are saved as .csv file type. When .csv is the file type, the files can be viewed with Microsoft EXCEL.



Oscilloscope Display Screen

The Oscilloscope Trace display screen can display up to three active traces on the display. Each trace is color coded and labeled in the key. The sample rate is also displayed for convenience. The screen can be resized for versatility. Depressing the record button will allow you to record a portion of the trace waves. When record is activated a red light will be displayed near the button.

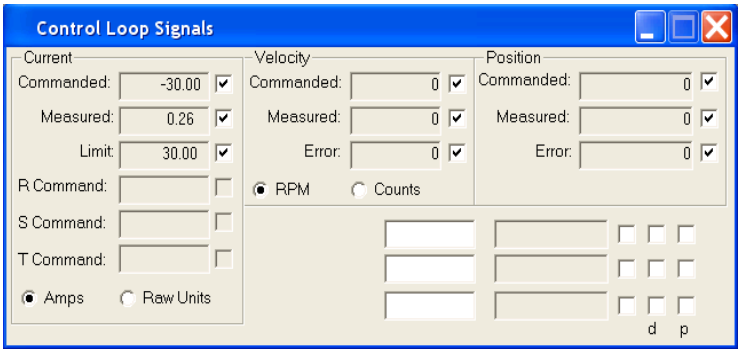
Terminal Window

The Terminal Window can either be accessed under the “Tools” option on MotionMaestro’s© main menu or via a button on the toolbar. The Terminal has direct communication to the amplifier. You can command the amplifier by typing commands to the terminal window. For example, typing BV then the enter key will send the request to read the Bus Voltage in the amplifier. If you wanted to change the Bus Voltage you would type BV200 then press enter. This would change the Bus Voltage to 200. Query command use just the ASCII letters of the command, where set commands use both Letters and a numerical value for an argument. **Caution** must be used when this window is activated due to the possibility of entering commands which would have undesirable effects.

Terminal Window

Amplifier Status

MotionMaestro© has a variety of status displays that assists the application engineer in setting up amplifier or diagnosing a amplifier setup. Rather than showing all possible status on one dialog, MotionMaestro© has been designed so that only those applicable to the situation at hand can be displayed. These dialogs continuously send queries to the amplifier to determine the amplifiers current status. The size and location of each status display is saved when exiting the display. When returning to the status the last size and position is used in positioning the window. F1 can be pressed to obtain help on the various items or status in the current dialog.



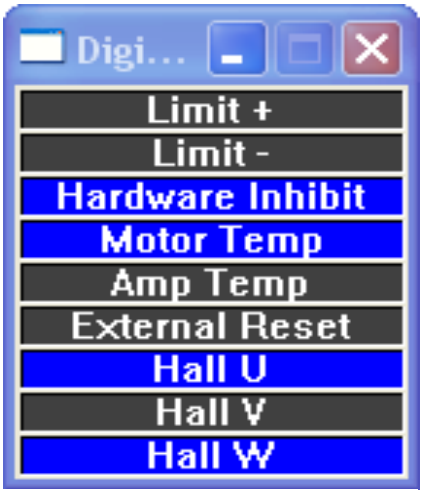
Dialog for observing control loop status

Control Loop Signals

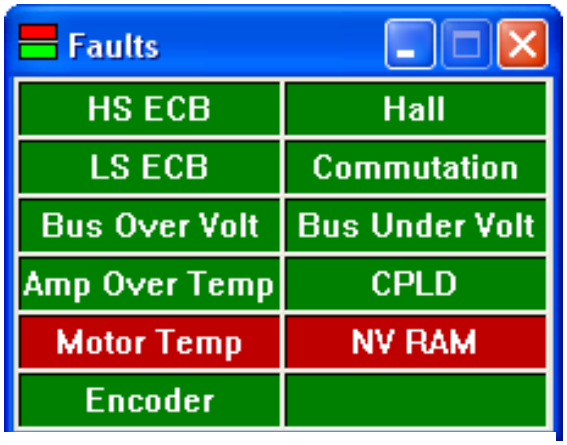
This dialog is useful for determining if an amplifier control loop is responding properly. Commanded and measured current can be displayed as well as the motors current velocity and position. Display this dialog by selecting “Status\Control Loop Signals...” or by utilizing MotionMaestro’s toolbar.

Digital Inputs

This dialog indicates the state of digital inputs coming into the amplifier. Digital inputs are those inputs that can be characterized as being active or inactive. They are typically associated with one of the controller input and output signal pins. See the associated pin in the hardware section for a description of the digital input of interest. Display this dialog by selecting “Status\Inputs\Digital…” or by utilizing MotionMaestro’s toolbar .



Status Display Digital inputs



Amplifier fault status display

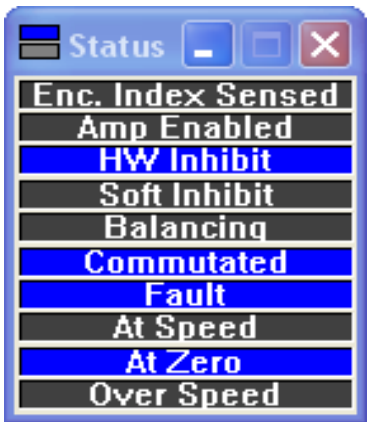
Faults

Faults occur on conditions that make it impossible to operate the amplifier in a safe and stable condition. When a fault condition occurs, the amplifier is disabled. The amplifier must be reset either with the hardware reset switch or with software (Control Panel dialog) or through the external reset pin. Conditions that cause faults are over currents, high or low bus voltages, excessive operating temperatures, and faulty sensors or amplifier hardware. An external fault can be generated by the controller through the /FAULT pin. See the hardware section for additional information on /FAULT. Display this dialog by selecting "Status\Faults " or by utilizing MotionMaestro's toolbar.

Warnings

A warning status indicates that the amplifier is fully operational, but that it is operating in an unusual mode or in a condition that warrants attention. Current fold back is such a condition. Display this dialog by selecting "Status\Warnings…" or by utilizing MotionMaestro's toolbar.

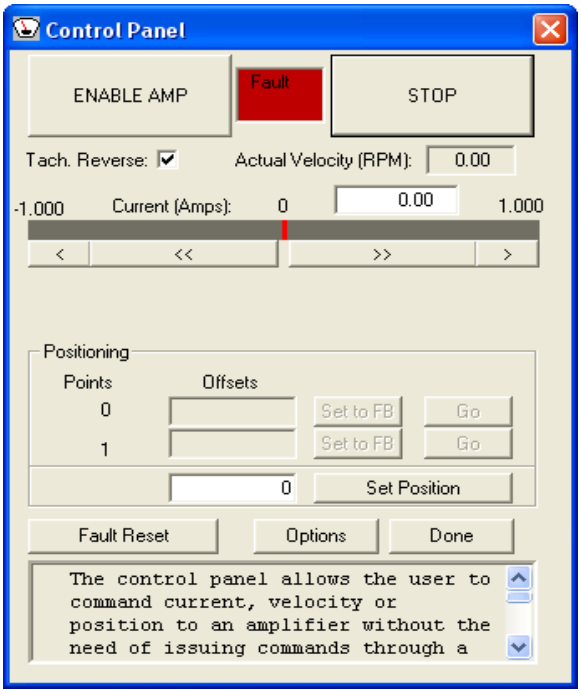
The Warning dialog



The System status display

Status

All other amplifier conditions that are not a fault or warning are displayed on the Status dialog. This status display is useful for diagnostics, setup or monitoring during operation. Display this dialog by selecting "Status\System Status…" or by utilizing MotionMaestro's toolbar.



The Control Panel display

Control Panel

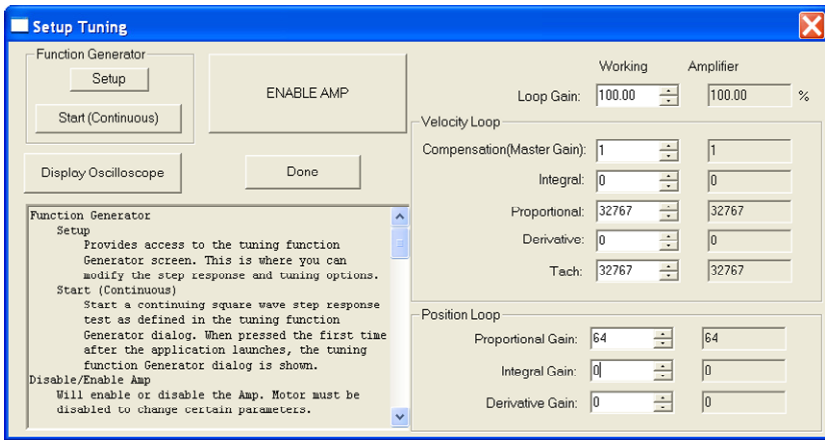
A properly connected motor can be controlled using the control panel. The control panel displays the amplifiers commanded current or velocity along with the motors actual velocity. From the control panel, you can easily command the motor. The control panel can be accessed through the “Tools” pull down menu or from the control panel icon on the tool bar.

You may set positioning offsets or an exact position by depressing the “Set Position” button. The Option button will allow you to set the maximum and minimum current, velocity, and position.

Motor Tuning

Fine tuning of motor control loop parameters is accomplished with the “Tuning” dialog. This dialog is accessed through the “Servo Tuning” item on the “Setup” menu.

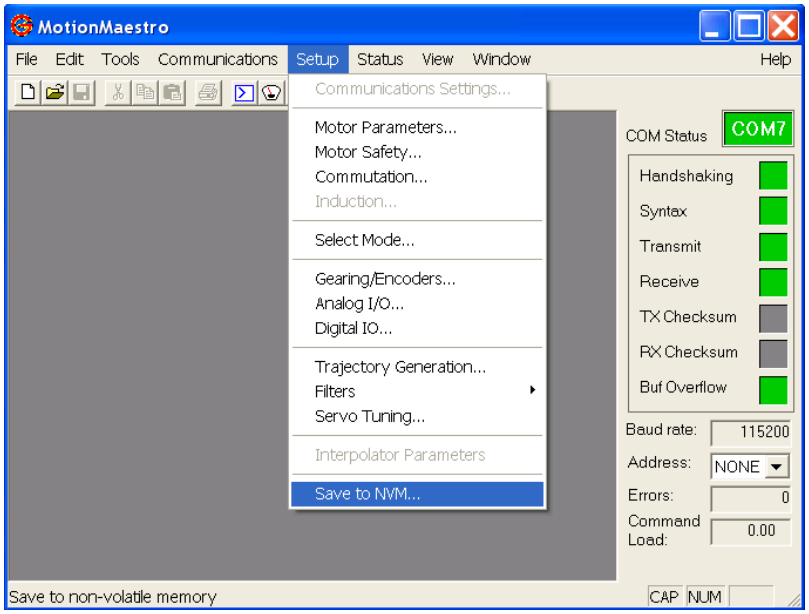
This dialog has many tools and features for tuning a motor. Real time motor velocity is always available. One can activate the motor with the “Continuous Step Response” button of the Function Generator. Then by viewing the response pattern on the scope you can see if changes to the tuning parameters improve or diminish performance. If in Velocity mode, velocity loop parameters can be altered. The Oscilloscope can query the amplifier down to a period of 2 milliseconds, which is adequate for most tuning requirements. The Tuning section describes in detail how a motor is tuned.



Dialog box for tuning the motor

Saving parameters to non-volatile memory

After a motor is configured and tuned to the applications satisfaction, the parameters must be saved to the amplifier's non-volatile memory. Upon power up or reset, the last saved parameters are loaded in the amplifier. The parameters can be saved to non-volatile memory by selecting the "Save to NVM…" option on the setup menu, as illustrated below.

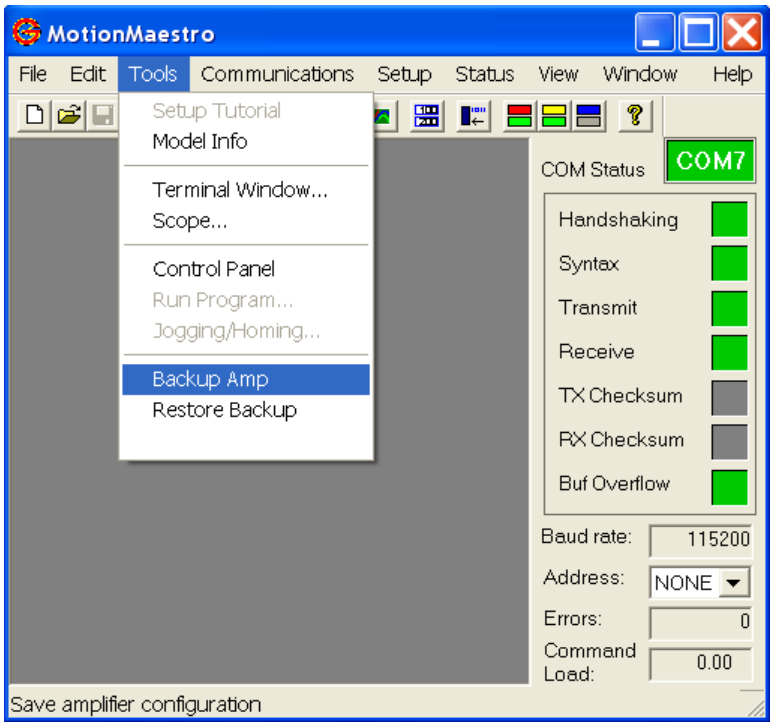


Saving parameters to amplifier non-volatile memory

Creating a back up copy of amplifier parameters on disk

An amplifier's current parameter settings can be saved to disk file that can later be used to configure another amplifier or to restore an amplifier's parameter settings. This is useful in production environments or where an application has several similar motors.

Select "Backup Amp" on the "Tools" menu to backup these parameters. You will be presented with a Windows style "Save File" dialog. Here you can give the file a meaningful name and location to save the file to. Restore backed up files to an amplifier with the "Restore Backup" selection.



Backing up amplifier parameters to a file on disk

Amplifier Connection Interface

This section describes the amplifier connections and how they are used in the typical application. Refer to the specific amplifier's installation drawing in Appendix K. This drawing indicates the location of the pins described below along with the location of the connector they can be found on.

Status Display

A diagnostic LED is provided for determining the general operating condition of the amp. It is a 7-segment LED display for SMX94XX, and SMX9515. It is a Red and a Green LED for SMX9508.

When Hall sensors are being used and the amp is operating normally, one of the outer six segments is lit for a three phase brushless motor (for a DC Brush or Two Phase Current mode, the 7-segment displays an "0"). Each of the six outer segments represents one of the six Hall states in a commutation cycle of a motor. A commutation cycle consists of two poles. In an 8-pole motor the LED will cycle through its six outer segments 4 times for one revolution of a rotary motor. When Hall sensors are not being used the display will show a "0", all outer segments of the LED are lit. When the motors current is clamped, (i.e. held to zero), or the amplifier is in a fault condition, one of the following characters will be displayed as is appropriate to the fault or state.

Note: See Appendix B for more information on Amplifier status codes.

Controller Input and Output Signals

Signals that typically are connected to an external controller are described in this section. These signals include: the primary command signal interface to the amplifier, an encoder output signal, limits, inhibits, analog output, reset and common.

The following is a list and description of the possible controller I/O signals that can be found on an installation drawing. Each amplifier may have these on different types of connectors depending on the model that was ordered. It is important to refer to appendix A-L.

Signal	Description
SIGNAL 1	Command signal analog input 1, differential signal input.
SIGNAL 2	Command signal analog input 2, differential signal input.
ANALOG OUT 1	User configurable analog output 1.
ANALOG OUT 2	User configurable analog output 2.
+ LIMIT	Inhibits the motor in the plus direction.
- LIMIT	Inhibits the motor in the minus direction.
INHIBIT	Inhibits the motor in both directions.
/FAULT	Active low fault, Output.
RESET IN	Resets latched faults.
ENCODER A	Encoder A channel Output.
ENCODER B	Encoder B channel Output.
ENCODER Z	Encoder Z index Output (reference).
TACH IN	Tachometer feedback.
+ 5V	5 volt source positive (input or output is model dependent).
PULSE	Pulse signal of Pulse & Direction interface.
DIR	Direction signal of Pulse & Direction interface.
RELAY OUT	Relay output, turns on when desired condition occurred.

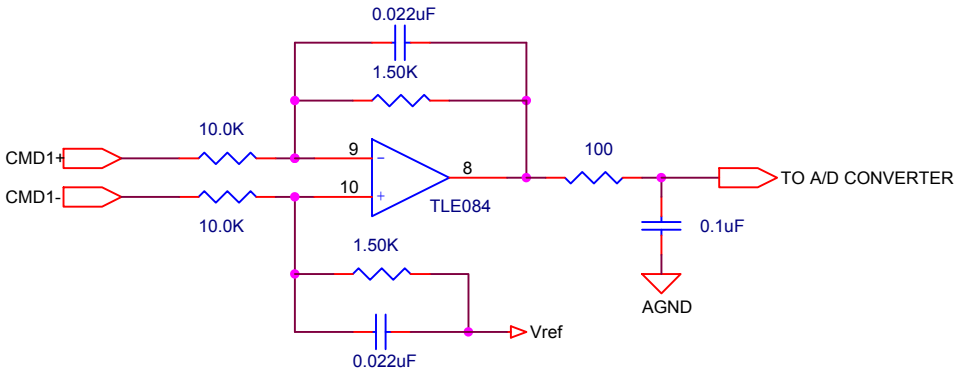
For the actual pin out of above signals, see Appendix A - Controller I/O Connector section.

Analog Input, Command Signal

Pins SIGNAL 1(+) and SIGNAL 1(-) are the command input pins. There is a primary and secondary command input. The command input takes a differential analog signal as referenced to the amplifiers' ground. Input voltage is expected to range from -10 volts to +10 volts (typical).

Note: Custom voltage ranges other than +/- 10 volts are available upon request.

The analog input stage is a difference amplifier with a differential input impedance of 20Kohm. If a single-ended input is desired, then Signal(-) should be connected to Signal common, and the command input should be connected to Signal(+). This will maintain the proper input gain for a +/-10V input range. In this configuration, the single-ended input impedance is 10Kohm. If the signal polarity is incorrect, the signal gain may be inverted in the software setup using MotionMaestro© (e.g., in "Setup Analog I/O" window, change "Signal Gain" to -300 RPM/Volt instead of +300 RPM/Volt).



Command Signal Analog Input Schematic.

Pulse and Direction Position Mode Servo Amplifier

Pins PULSE+, PULSE-, DIR+, and DIR- are the command input pins. The pulse inputs at the amplifier are terminated by differential line receivers which can be configured to two modes of pulse and direction position mode servo amplifiers.

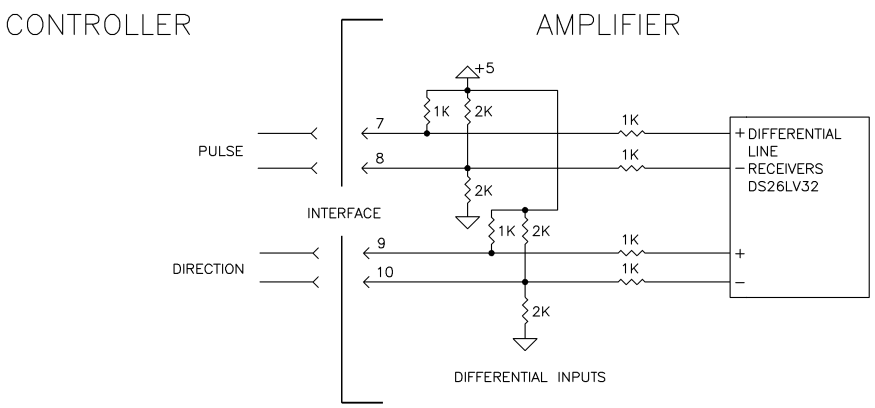
Pulse (step) and Direction mode

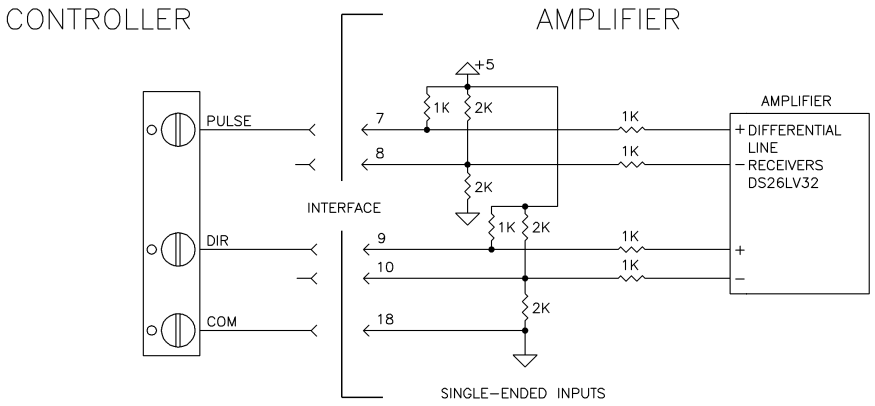
Pins PULSE+ & PULSE- are the differential inputs pulse train used to establish the absolute distance and velocity of the command. Pins DIR+ & DIR- are the differential input used to establish the direction of rotation of the command. If a single-ended input is desired, then PULSE- & DIR- are not used (left floating), and the command input should be connected to PULSE+ & DIR+.

Encoder Follower mode

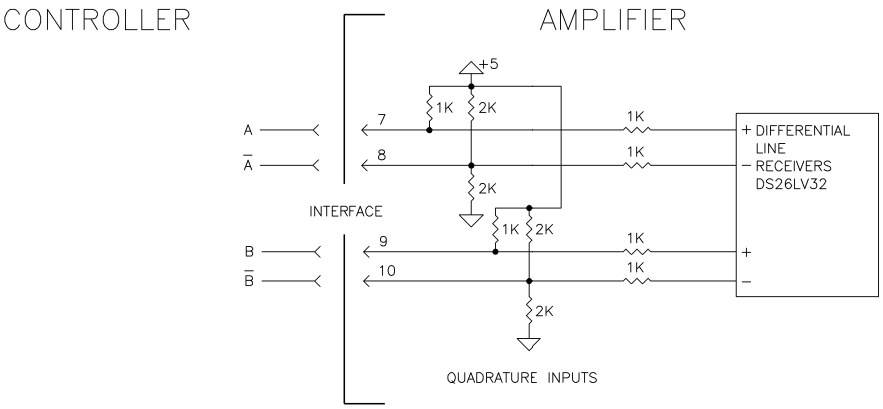
Pins PULSE+, PULSE-, DIR+, and DIR- can accept from the master motor/controller's encoder outputs Channel A+, A-, B+, and B-, respectively.

Pulse (step) and Direction mode (for Molex Connector):





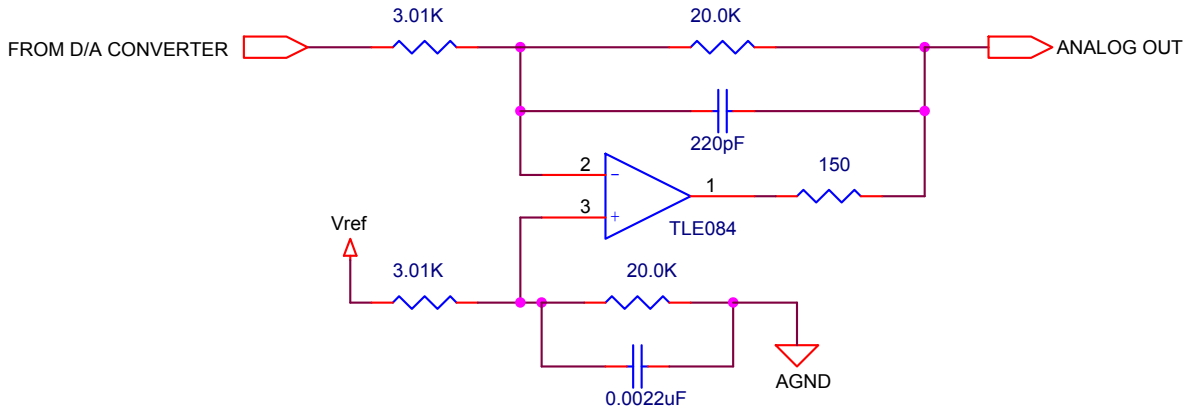
Encoder Follower mode (for Molex Connector):



Analog Outputs

There are two simultaneous analog output channels and each analog out is a user selectable analog output. The output ranges from -10 volts to +10 volts and has 12-bit resolution (16-bit resolution is available, specify when ordering).

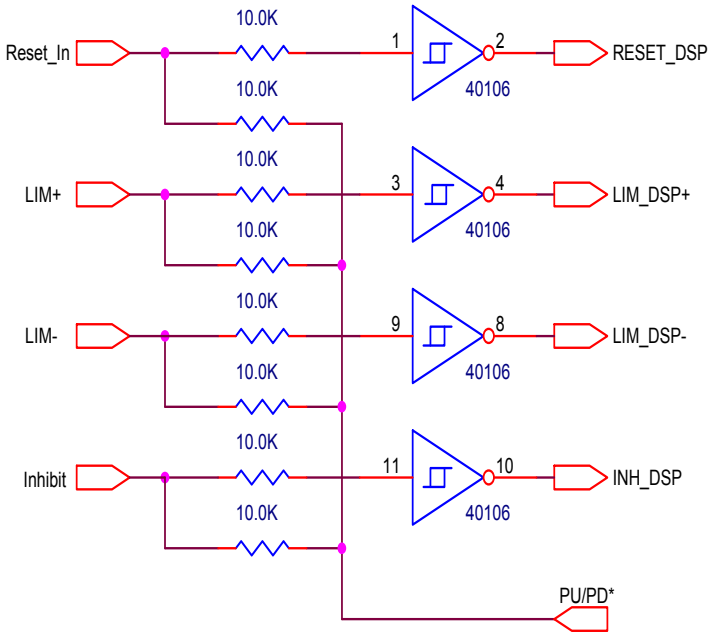
The analog output signals setup and usage can be found in the Motion Maestro Guide at www.Glentek.com. The analog output can be used to monitor amplifier signals at the servo update frequency. By doing so, the application engineer can determine the amplifiers true response to commanded signals. The analog output is for reference use only. It is not intended for control purposes. At power on, its value is undetermined until the power on reset has completed. During some amplifier functions, this output is temporarily disabled. These functions include saving and recalling parameters from non-volatile memory. The output is filtered to minimize the switching noise from the PWM amplifier.



Analog Output Schematic

Discrete Inputs

Limit+, Limit-, Hardware Inhibit, and amplifier External Reset are all single ended discrete inputs using the following circuit.



Discrete Input Schematic

Limits

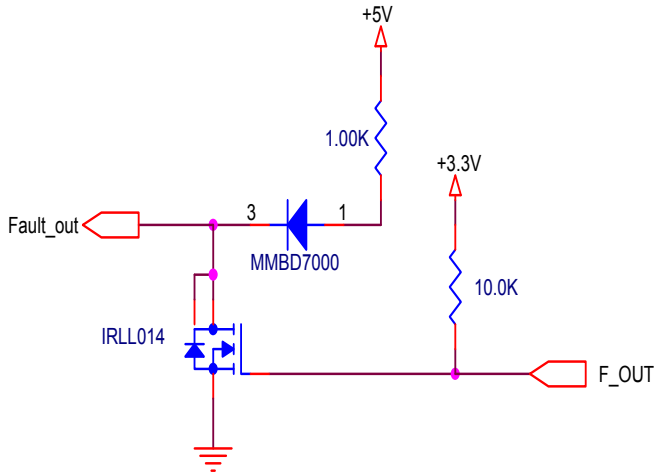
The signals LIMIT+ and LIMIT- can be active low or active high based on a user selected setting, (See Digital I/O Setup). In Current (Torque) mode, if LIMIT+ is activated then positive current through the motor is brought to zero. If LIMIT– is activated then negative current through the motor is brought to zero. These pins are normally high at 3.3 volts. Although when the current is brought to zero the motor is free to rotate by externally applied forces. In Velocity (RPM) or Position mode, if LIMIT+ or LIMIT- is activated then the motor stops moving in the commanded direction, but the motor is not free to move by externally applied forces.

Amplifier Hardware Inhibit

An external discrete input is available for amplifier INHIBIT. When activated the amplifier is disabled. The display indicates C for clamped. The motor is free to rotate via externally applied forces. This pin can be configured as active high or low, (See Digital I/O Setup).

Amplifier Reset

The amplifier can be externally commanded to reset with the RESET IN pin. This pin can be configured as active high or low. The amplifier flashes 8, all seven segments lit, while in reset.



Fault Output Schematic

Amplifier Fault Output

An external discrete fault output is available. This pin can be configured as either an active high or active low. The circuit above is used.

Encoder Output

The encoder out signals are differential output signals. The Encoder output pins are buffered representation of the motor encoder feedback.

Encoder channels A, B and Z are available as pins ENCODER A+, ENCODER A-, ENCODER B+, ENCODER B-, ENCODER Z+ and ENCODER Z-.

External Encoder Power

To work reliably, some encoders require more current (> 150 mA) and/or a higher voltage than can be supplied by the amplifier. An external voltage source can be connected to the ENC PWR pin (Note: amplifier needs to be built properly prior to using external voltage source). This power will be supplied to the encoder at the +V pin (see Encoder Feedback).

Power Input and Output Signals

The signal names for power are listed below:

Pin Name	Description
L1,L2,L3	Input - AC voltage (line 1, line 2, and line 3, respectively).
PE	Protective Earthing, Chassis GND.
B-	Input - Negative side of DC buss voltage.
B+	Input - Positive side of DC buss voltage.
PHASE T	Output - Motor phase T / Brush output B.
PHASE S	Output - Motor phase S.
PHASE R	Output - Motor phase R / Brush output A.

Bus Power

DC bus power is received at pins B- and B+. DC bus power can be used for both the logic and power section of the amplifier.

SMC94XX, and SMC9515 utilizes separate keep alive voltages (24VDC) for logic power; SMC9508 utilizes separate keep alive voltages (5VDC) for logic power, reference Appendix I.

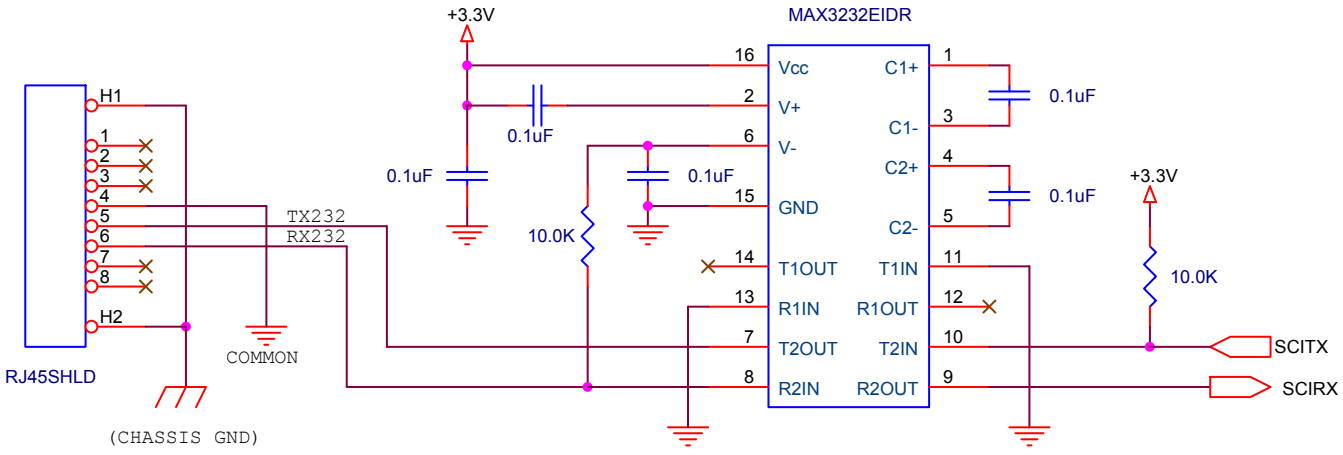
Motor Power

Motor power is delivered at pins PHASE T, S and R. The motor power is Pulse Width Modulated signals used to drive the motor.

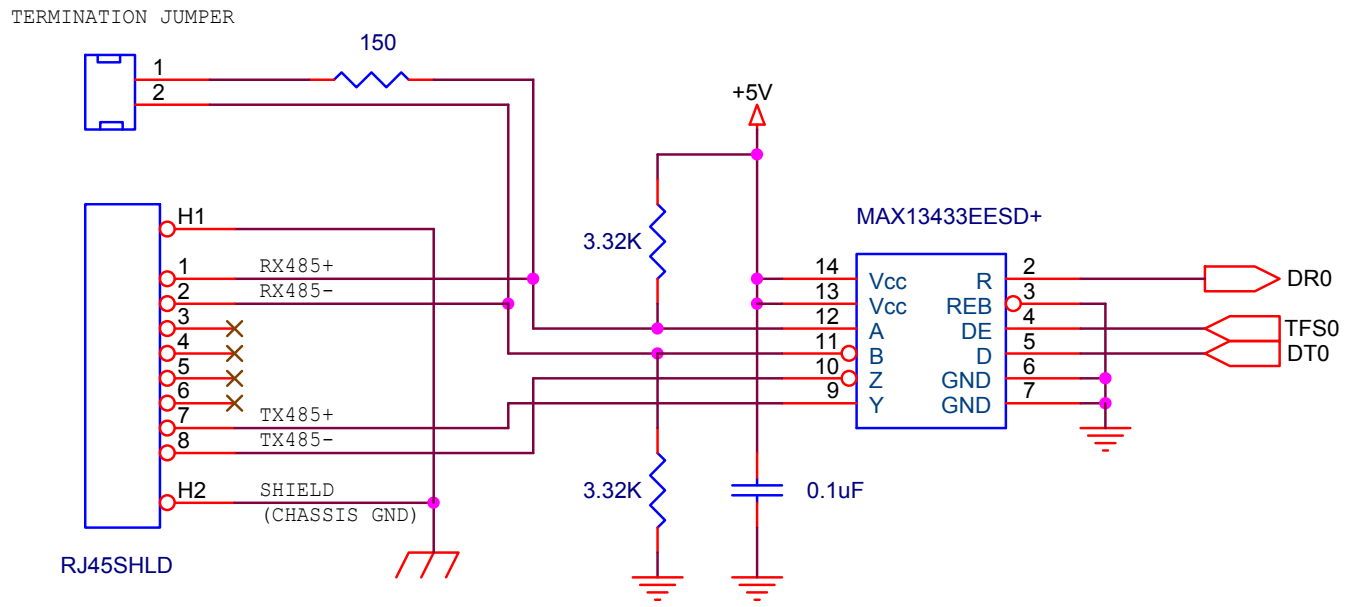
NOTE: It is best not to connect the motor power pins until it is established that the logic section is working and operational. This means that with the DC bus pins connected, one should be able to communicate with the amplifier via a serial cable and the motor encoder and Hall sensors should be functioning properly. This can all be determined without connecting the motor power.

PC Interface

The PC interface can be found at the HOST connector. A RS-232 (or optional RS-485/422) interface is on the external of the amplifier. This port is the primary means of communication with the amplifier for setup and control. The port utilizes an RJ-45 type connector.



RS-232 Input Schematic

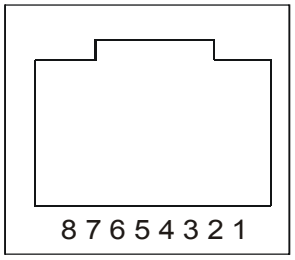


RS-485 Input Schematic

The serial cable can be made or purchased for communicating with a PC by configuring a cable with one end being a male RJ-45 plug and the other end being a DB-9 female connector. Remember that there is no standard for an RS-485 connector.

The pin-out names for the RJ-45 connector on the amplifier is shown below. A cable wired to a DB-9 connector, as shown below, will work with most RS-232 connections. RS-485 wiring depends on the pin-out of the RS-485 card communicating with the amplifier.

DB-9 pins Female	RJ-45 pins Male	AMP Pin description
6 <---------->	1	485 RX+
1 <---------->	2	485 RX -
4 <---------->	3	n/c
5 <---------->	4 *	COMMON
2 <---------->	5 *	232 TX
3 <---------->	6 *	232 RX
8 <---------->	7	485 TX+
9 <---------->	8	485 TX-
….7		n/c

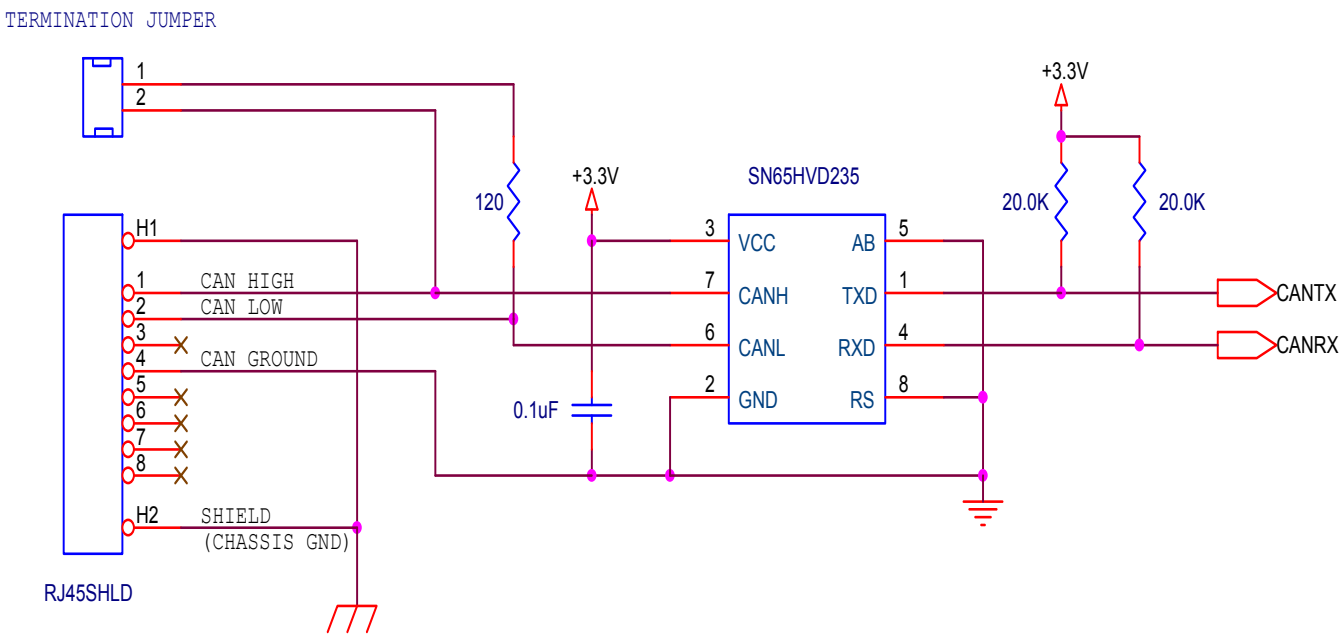


Female RJ45 pin-out

Note: RS-232 requires connecting only the 3 pins marked with an asterisk above. If required, Glentek can customize a serial port digital interface to adapt to your controller as required to meet your protocols. We are currently doing this for high speed Ethernet ports.

CANopen Interface

The CANopen interface can be found at the HOST, COM1 or COM2 connector. Glentek Alpha Series drives employ the CANopen protocol that is based on the CAN Physical Layer as standardizes in the CAN in Automation (CiA) standard DS-301 V4.02.
This port is the primary means of communication with the CANopen network for real-time control. The port utilizes an RJ45 type connector.



CANopen Input Schematic

The CANopen cable can be made or purchased for communicating with a CANopen network. The pin-out for the R-J45 connector on the amplifier is shown below.

RJ-45 pins	Pin description
1	CAN High (Dominant High)
2	CAN Low (Dominant Low)
3	Reserved
4	CAN Ground (Common)
5	Reserved
6	Reserved
7	Reserved
8	Reserved

The rate of data transmission (bit rate) depends on the total overall length of the bus and the delays associated with the transceivers. Under normal conditions, all the devices in a system transfer at uniform and fixed bit-rates. The CANopen bus must be terminated at both ends so that reflections of signals are avoided. A 120 ohms termination resistor is required at the last amplifier node in the CANopen network. This resistor is provided inside the amplifier for convenience. The amplifier is terminated by placing a two pin micro-shunt jumper across the termination jumper connector. The following bit rate is capable to be achieved at the indicated total system bus length:

- 1 M bits per second at 25 meters (82 ft)
- 800 K bits per second at 50 meters (164 ft)
- 500 K bits per second at 100 meters (328 ft)
- 250 K bits per second at 250 meters (820 ft)
- 125 K bits per second at 500 meters (1640 ft)
- 50 K bits per second at 1000 meters (3280 ft)
- 20 K bits per second at 2500 meters (8200 ft)

The CANopen BAUD rates are programmable in all Glentek Alpha Series amplifiers. Refer to CANopen Installation and Operation Manual for more information.

Most Glentek Alpha Series servo amplifiers are provided with two RJ-45 ports to facilitate chaining multiple servo amplifiers together. Either ports can be used as input or output. The signals are simply passed through the servo amplifier that in the event of one servo amplifier node is down (power is off), the rest of the nodes on the CANopen network still operable.

Note: SMX9508 has only one RJ-45 port for CANopen communication. A pass through Y-adapter for RJ-45 connector is required for chaining multiple servo amplifiers together.

Optional Relay Output

These two pins from Controller I/O port (available upon request) provides an interface for the relay. They turn on when desired condition occurred. The relay outputs are optional and not part of the standard product.

Note: The relay outputs are NOT available in SMX9508 amplifiers. On SMX94XX amplifier models that use Molex Motor Feedback and Controller I/O connectors, the relay outputs can be provided through a separate two pin Molex connector.

The relay output function is programmable (at factory). That is, its outputs can be programmed to turn on when desired condition is met. For example, when operating in velocity mode, the relay outputs can be triggered to close when actual speed is within 1% (50 RPM minimum) of command.

The relay contact supports switching voltage of up to 40 VAC/VDC and a maximum current of 1A.

Motor Feedback

The following pin description defines the main motor feedback input port.

Signal	Description
+5V	Amplifier supplied 5 volt source (output)
ENCODER A	Encoder A channel input
ENCODER B	Encoder B channel input
ENCODER Z	Encoder Z channel input
HALL 1	Hall sensor 1 input
HALL 2	Hall sensor 2 input
HALL 3	Hall sensor 3 input
TACHOMETER	Tachometer channel input
MTR TEMP	Motor over temperature switch (input)

Motor Feedback Power, Amplifier Supplied

The amplifier can supply 5 volts of encoder/Hall power. It is accessible at the +5V pin. The source is rated at 150 mA.

Encoder Channels A, B and Z

The encoder input uses a DS26LV32 differential line receivers. By default, the encoder feedback is configured for receiving differential signals (single-ended configuration is available upon request). The amplifier accepts nominal encoder frequency of 5 MHz (maximum frequency of up to 10 MHz is possible, but is system dependent). The Z channel is edge sensitive such that swapping Z and Z* does not change the behavior of the amplifier.

Hall Channels 1, 2 and 3

The Hall input uses a DS26LV32 differential line receiver inputs. Compatible with differential or single-ended commutation tracks or Hall sensors. Single-ended connections should be made to the "+" input while leaving the "-" input unconnected.

Power-on phase-finding or Smart-Comm routines available for operation without commutation tracks or Hall sensors.

Tachometer

The tachometer input accept feedback voltages of up to +/- 30VDC (typical) at 7VDC/1KRPM. Custom voltage ranges other than +/- 30VDC is available upon request.

External Event Fault

The amplifier can be faulted on an external event with the MOTOR TEMP (motor over-temperature) pin. This pin can be configured as active high or low. The amplifier displays lower case “h” when this signal is active, latches the fault and disables the amplifier.

Reset

A reset clears all faults, resets the DSP and initializes the amplifier. All the Alpha Series amplifiers can be externally reset through the amplifier’s Controller I/O port (RESET IN pin). In addition, the SMX94XX amplifiers have an additional push button switch to performs a reset.

Connecting The Amplifier To The Motor

This section outlines how to connect an amplifier to a motor. In this section, you will connect your PC serial port to the amplifier establishing communication with the amplifier. After you have completed this, you will be ready to tune the amplifier.

External Wiring of The Amplifier

Serial Port

Purchase or manufacture a serial cable as described on page 38 under the description for PC Interface. The default serial port settings are:

Baud rate:	115200
Data bits:	8
Parity:	None
Stop bits:	1
Flow control:	None

Connect Host Computer (that has MotionMaestro© software installed) to amplifier by using a Glentek made cable (Glentek P/N GC2400-AL005AM-000).

Note: GC2400-AL005AM-000 is a female DB-9 on one end and RJ45 on the other end.

In case that the Host Computer only has USB ports, a USB to RS-232 adapter (Glentek P/N GC2410-001) is needed in addition to the Host cable. There are two industry standard adapters that Glentek had tested and known to be good that you may purchase. One is from USBGEAR P/N: USBG-232, and the other one is FUTURE TECHNOLOGY DEVICES INTERNATIONAL P/N: US232R-10. Make sure to use cable with shortest length possible (6 feet or less) as longer length cable will degrade and slow down the data rate between the Host Computer and Amplifier.

If the Host Computer has an Ethernet port, a Communication Module CM998-1 developed by Glentek can be used to interface the amplifier to the Host Computer. This approach eliminates the need to find a USB to RS232 adapter and driver. All that requires is an Ethernet cable from the Host computer to the CM998-1, and a GC2400-AL005AM-000 from the CM998-1 to the amplifier. Utilizing the Host Computer Ethernet port provides a higher speed and more robust communication. Contact one of Glentek sale engineers for further details.

Encoder and Hall

Manufacture an encoder cable that will be connected to the motor feedback port. Use the pin out description under Motor Feedback (page 62 & 63) and the installation drawings in Appendix L as a guide.

For the encoder, wire differential channels A, B and Z to the matching amplifier pins. Wire the encoder +5 volt to pin +5VDC (ENC PWR). Wire the encoder ground to a COMMON pin.

Hall sensor wires should be wired to their matching amplifier pins HALL 1+, HALL 2+ and HALL 3+. A rotation of the motor should activate Hall 1, 2 and 3 sequentially. Ensure that 5 volts and ground are provided to the Hall sensors through either an external 5 Volts or from the amplifiers +5V pin. If encoder power is supplied from amplifiers +5V pin, make sure that the encoder's current draw is less than the current rating of the +5V pin. (Less than 150 mA)

IMPORTANT: Use proper shielding for the encoder/Hall logic cable. Tie amplifier chassis to encoder/Hall cable shield, and tie cable shield to motor case.

Applying Power

For this test, be sure that the encoder is connected and the motor power cable is not connected.

Testing of the amplifier communication with your PC requires that only logic power be turned on at the amplifier. Depending on the model amplifier you have, you will have to do one of the following:

1. Apply 24VDC keep alive logic power (for SMC94XX, and SMC9515).
2. Apply 5VDC keep alive logic power (for SMC9508, and special request SMC9xxx).
3. Apply DC BUS power to terminal B+ and B- (for amplifier module SMB94XX or SMB9515).
4. Apply AC power to L1, L2, and L3 (for standalone amplifier SMB94XX or multi-axis SMB9508, SMB9515, and SMB9415).

Note: Refer to the particular product's installation drawing for proper logic voltage. After the logic power is turned on, the LED status display will light indicating that the amplifier logic is powered.

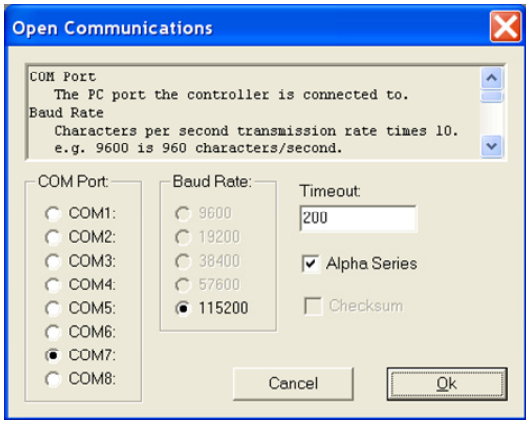
Amplifier Tuning

Glentek's digital servo amplifiers are tuned utilizing our proprietary motion control software, Motion-Maestro©. Tuning is a process where coefficients of the servo amplifier's internal equations are optimized to match the motor and the inertial load of the system it is driving. It is important to achieve a high gain, high bandwidth, critically damped velocity loop. Reference, Fig A, page 52. This will result in optimum position loop performance.

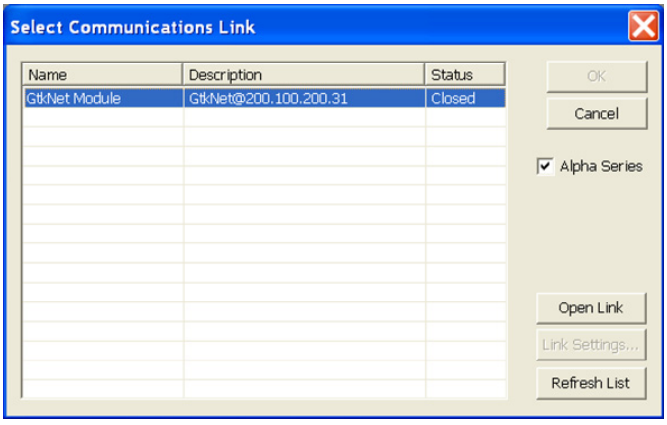
Parameter Setup

When any parameters are changed it is necessary to send these changes to the amplifier. Then it is very important to save to non-volatile memory to ensure the amplifier has the same parameters that were changed.

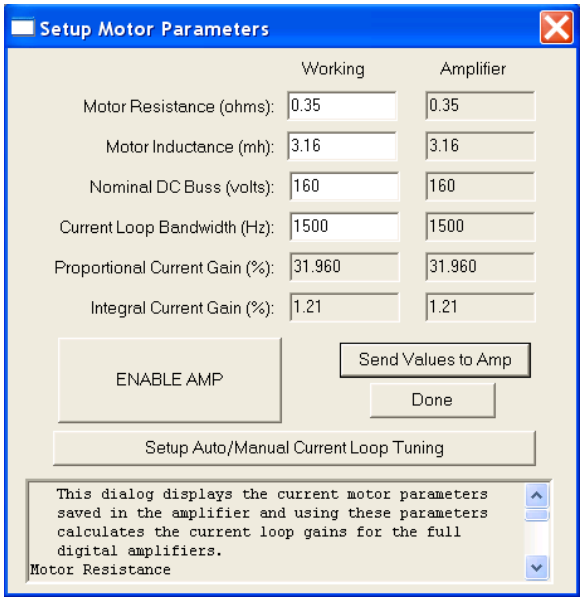
1. Start MotionMaestro©, establish communication with the amplifier in one of two methods below:
   a. Communications>Open> [select "Alpha Series", proper COM port, and ensure that a baud rate of 115200 is selected when communication method is by RS-232/USB, and then click "OK".]
   b. Communications>Open> [select "Alpha Series", click to highlight "GtkNet Module", click on "Open Link" when communication method is by Ethernet with Communication Module CM998-1, and then click "OK".]



Open Communications dialog box using RS-232/USB between Host computer to amplifier

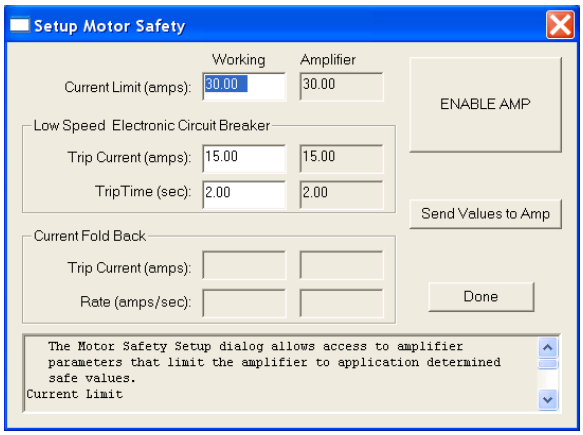


Open Communications dialog box using Ethernet between Host computer to amplifier via Communication Module CM998-1



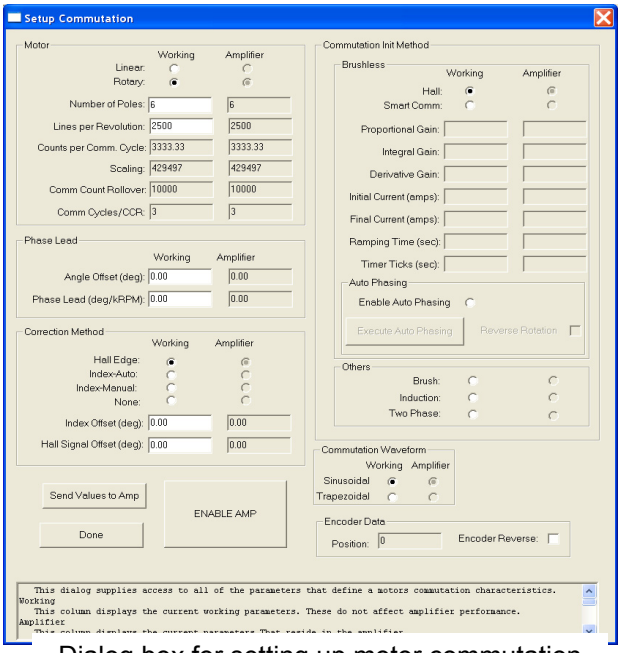
Dialog box for entering motor parameters

2. Enter the "Setup\Motor Parameters" dialog. It is very important that motor values entered into **MotionMaestro**© match those of the motor you are driving. Enter the motor resistance, Inductance, the bus voltage and the current loop bandwidth desired, a good starting point is 1500 Hz. Disable the amp, if it is not already, and send the parameters to the amplifier.



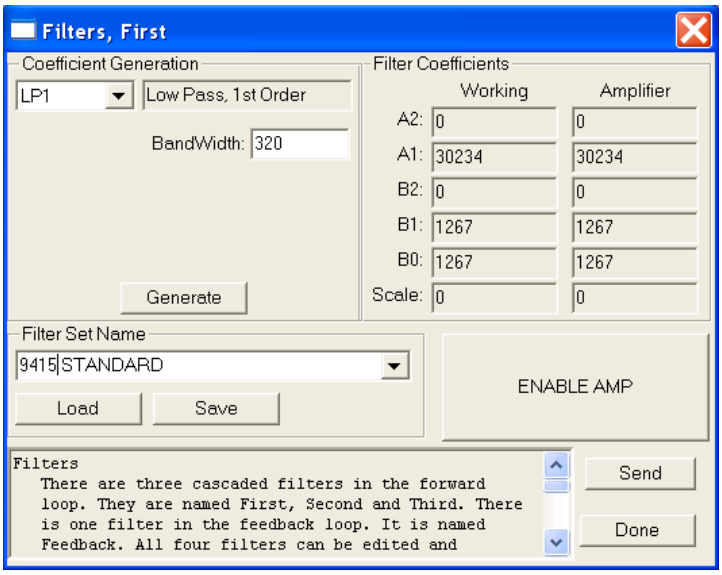
Dialog box for setting up motor safety parameters

3. Enter the "Setup\Motor Safety" dialog. Set the Current limit to the rated peak current of the motor or the peak current of the amplifier, whichever is smaller. Set the Electronic Circuit Breaker (ECB) value. The low speed ECB protects the motor and amplifier from conditions when the current remains at the current limit for excessive periods of time. Set the LS/ECB threshold to the maximum continuous current of the motor or amplifier, whichever is smaller. Start with a 2 to 4 second filter time. Disable the amp, if it is not already, and send the parameters to the amplifier.



Dialog box for setting up motor commutation

4. Enter the "Setup\Commutation" dialog. Configure the amplifiers commutation characteristics as indicated on the dialog. For rotary motors, enter the number of line counts per revolution, not the number of quadrature counts per revolution, which is always four times the line counts. This should be found on the encoder nameplate (if lines per revolution and number of poles are not documented for the motor (See appendix E "Determining Encoder Resolution and Number of Poles"). This number will need to be derived if linear scales are used. Select an appropriate commutation initialization method. See Appendix H "Amplifier Terms and Technology" for details. Disable the amp, if it is not already, and send the parameters to the amplifier.



Filters Setup Dialog

5. Enter the “Setup\Filters” dialog. Start with Filter 1 and set with an initial value 320 Hz LP1 (Low Pass Filter), Filter 2 and Filter 3 at “NONE”, no filter. Set Feedback Filter with an initial value of 320 Hz LP1 (Low Pass Filter). Send the new parameters to the amplifier.

   Note: If chose to use factory default values, this step can be skipped.

6. At this point you may want to save the parameters in non-volatile memory. Select “Setup\Save to NVM” from the menu bar. (**MotionMaestro**©: Setup > Save to NVM…)

7. You may also choose to save the current parameters in the amplifier by saving them to hard disk. Select “Tools\Backup Amp” from the menu bar.

8. Turn off all power to the amplifier and connect the motor leads to the amplifier.

   Note: Insuring that DC BUS Power (for Amplifier Module) or AC Power (for Stand Alone or Multi-axis amplifiers) is off and that there is no load on the motor. Make sure to wait for at least 30 seconds or until the capacitor voltage is fully bleed off (LED is off) before turning the voltage back on.

9. First turn on Logic Power, then the DC BUS Power or AC Power.

   Note: If you are using the motors from the third parties (non-Glentek motors), you must make sure that the motor phasing and the hall sensor phasing are matching with the Glentek’s servo drives. Please refer to Appendices A and D for more detail. Once you find the correct phasing, turn the Bus power off, connect the motor leads to the drive and proceed to the next step.

10. You may now begin tuning your system to run in Current (Torque) mode, Velocity (RPM) mode, Position mode, or Two Phase Current mode.

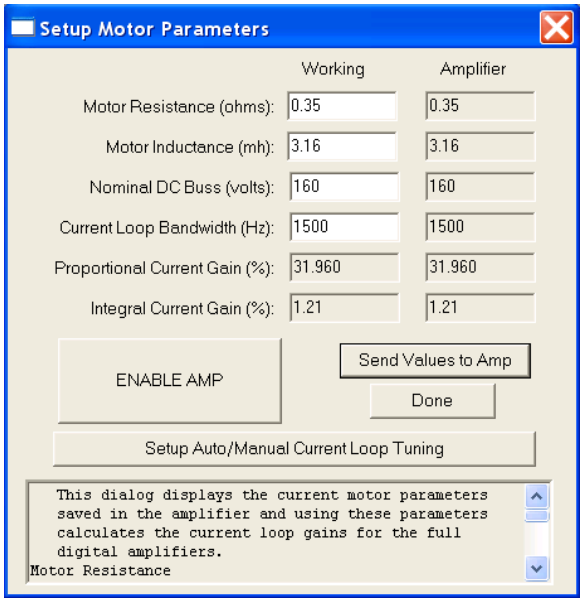
Current (Torque) mode Tuning

1. To set up the Current Loop manually, (Setup>Motor Parameters> [select “Setup Auto/Manual Current Loop Tuning”].

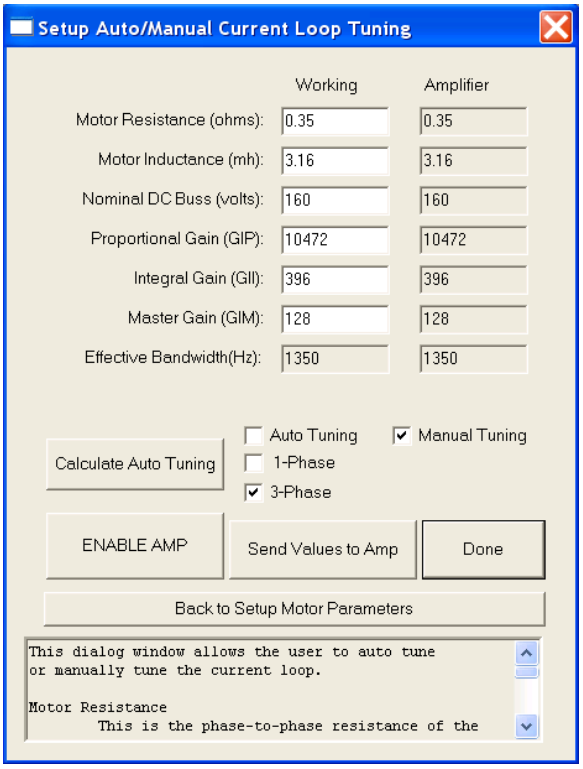
   Note: Manually tuning the Current Loop is not necessary. This procedure is needed only if the motor inductance is less than 1 mH, or the Current Loop bandwidth is very critical.

2. First, enter the motor resistance and the motor inductance at “Motor Resistance (ohms)”, and “Motor Inductance (mH)”, respectively. You may also enter the operating voltage at “Nominal DC Bus (volts)”, and specify 1500 Hz as a starting point in “Effective Bandwidth (Hz)”.

3. Then, adjust GIP, GII and GIM to obtain the desired response.



Dialog box for entering motor parameters



Dialog box for entering motor and current loop auto/manual tuning parameters

4. First, increase the Proportional Gain (GIP) to as high as you can until the motor starts making audible sound. Then, back down (decrease) the GIP gain to about eighty (80) percent of the current value. In most cases, increasing GIP value should tune the amplifier to the application. Maximum GIP gain value is 32,767. In addition, the Master Gain (GIM) can also be increased at the same time to reduce overshoot and to achieve a critically damped response. GIM gain is integer. The overall gain is (GIP ÷ 32,767) * GIM. In other words, keep GIP as high as possible, then adjust GIM to get maximum computation resolution.

5. Next, Integral Gain (GII) may be increased to achieve desired response. For most application, the GII gain never gets more than ten (10) percent of GIP. Therefore, do not add too much as system may become unstable (motor makes audible sound).

6. Save setting to NVM, Setup>Save to NVM.

Smart-Comm Tuning

In this mode of operation, the amplifier built-in smart algorithm will find the correct motor phases for optimum commutation without the need for Hall sensor or commutation tracks. During this process, a slight motor movement is performed. Refer to Appendix H, Smart-Comm section for more information on how to set the coefficients.

Note: For smart-comm commutation method, the commutation tracks are not needed (only incremental encoder is needed) as shown in the Current Loop Control Diagram Alpha Series on page 17. Skip this section if Hall signals or commutation tracks are available.

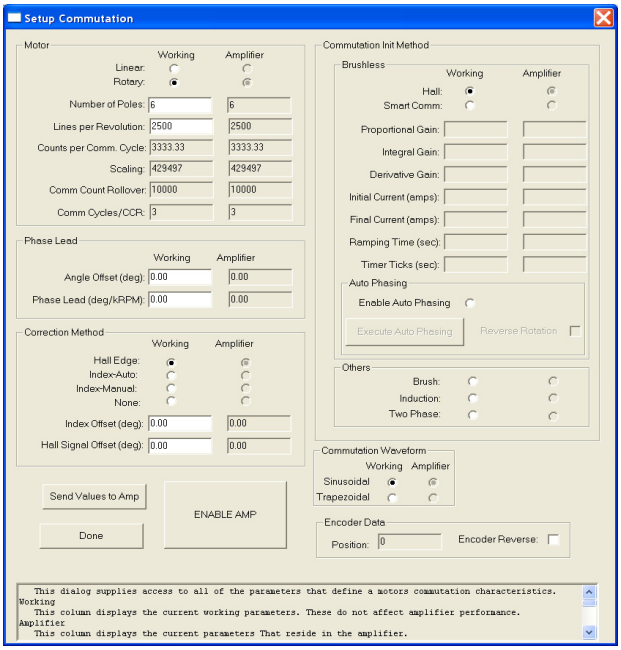
1. Select Setup > Select Mode… in Menu Tool Bar of Motion Maestro to enter Setup Command Mode window.

2. Verify that “Current Loop Closed” (selected by default, and can not be deselected) is the only item checked under “Modes of Operation”.

3. Open “Setup Commutation” window and set the number of poles of the motor and the lines per revolution of the encoder.

4. If the motor has an encoder with an index pulse, check the “Index-Auto” button under “Correction Method”. If the encoder does not have an index pulse, check “None”.

5. For Smart-Comm method, check “Smart Comm” button under “Commutation Method”.



Dialog box for setting up motor commutation

6. Start with the default values for tuning. At this time, be sure to set the “Final Current” at the motor’s rated stall current.

7. Send these values to the amplifier by pressing “Send Values to Amp” button.

8. Then save to Non-Volatile Memory (NVM) under the setup pull-down menu (page 31).

9. Next, the amplifier needs to be reset for these settings to take effect. Press the reset button on the amplifier.

10. As soon as the amplifier is enabled, the motor should be correctly commutated and ready for the next step.

11. Using “Control Panel” (page 30), command +/- current to the motor and see if the RPMs are equal for the same +/- commanded currents. If the motor does not rotate when the current is commanded, open the “Setup Commutation” window and change the “Encoder Reverse” box setting by select or de-select the selection box. Then, repeat the steps 7, 8, 9 and 10.

12. Refer to Appendix D2 on page 75 step “T” for phasing the velocity loop (Tach).

13. If you need further assistance, contact one of your Glentek sale engineers, and he/she will gladly assist you to optimize your system.

Current (Torque) Mode Running and Setting

In this mode of operation, which is also commonly referred to as torque mode, a current in the motor is produced which is directly proportional to the input signal. Be sure you have completed the Motor Phasing section in Appendix D.

Motor Running

1. Select Setup > Select Mode… in Menu Tool Bar of Motion Maestro to enter Setup Command Mode window.
2. Verify that "Current Loop Closed" (selected by default, and can not be deselected) is the only item checked under "Modes of Operation".
3. Select Tools>Control Panel in Menu Tool Bar of Motion Maestro to display the control interface.
4. Apply one amps command (or until the motor starts to move slowly) by entering in the box right below "Actual Velocity (RPM)" box. Alternately, you can click on any portion of the slider right below the "Current (Amps)" label to issue a current command.
5. While the motor is moving, verify that the velocity reading in "Actual Velocity (RPM)" displays positive number for a positive current command and negative number for a negative current command.
6. If the "Actual Velocity (RPM)" reading is not matching the current command in sign, select or de-select the box next to "Tach Reverse" so that the "Actual Velocity (RPM)" displays positive number for a positive current command and negative number for a negative current command.
7. If you would like to run in Velocity (RPM) Mode instead of Current (Torque) Mode, You may now stop the system and change to Velocity Mode and go to Velocity Loop PID Setting (Alpha Series) on next section for further information.
8. Be sure to save changes often.

Analog Input Setup

Signal Gain Setting

1. Select Setup > Analog I/O… in Menu Tool Bar of Motion Maestro to enter the Setup Analog Input/Output window.
2. In the "Signal Gain" box, enter the amps per volt scale for the signal input. For example, if the peak current for your application is 20 amps, and your maximum differential input command voltage is 10 volts, then you would enter 2.2 in the "Signal Gain" box (try to keep operating range not greater than 90% of full range).
3. Save the configuration to non-volatile memory by select Setup > Save to NVM… in Menu Tool Bar of Motion Maestro.

Signal Offset (Balance) Setting

1. Command 0V (from controller) to the amplifier "Signal 1+" and "Signal 1-" inputs.
2. Select Tools > Scope… in Menu Tool Bar of Motion Maestro to enter the Setup Oscilloscope window.
   - 2.1 Select "Current Command" option from "Source "pull down menu under "Trace Attributes" .
   - 2.2 In the " Y-Axis Range", set the values to -1 min and +1 max.
   - 2.3 Press "Done" to display oscilloscope.
   - 2.4 You should see a trace scanning across the scope.
3. Select Setup > Analog I/O… in Menu Tool Bar of Motion Maestro to enter the Setup Analog Input/Output window.
4. Adjust the "Signal Offset" box in "Analog Input Setup" section until the "Current Command" waveform sweeps at "0" Amp on the oscilloscope.
5. Save the configuration to non-volatile memory by select Setup > Save to NVM… in Menu Tool Bar of Motion Maestro.

Velocity (RPM) Mode Tuning

For this section, refer to the Velocity Control Loop Diagram Alpha Series (page 16). Before starting this section, be sure you have completed the amplifier current mode tuning section. (pages 46 & 48)

GVS (Gain Velocity Scale) Setting

Before starting the velocity tuning, be sure to select a proper GVS (gain velocity scale) multiplier. At this time, you can refer to the Velocity Control Loop Diagram Alpha Series on page 16.

The encoder counts per revolution are sampled and velocity is computed at a 25KHz (typical) interrupt sampling rate (for SMX9508, the rate is 12.5KHz). The GVS number is set as a power of 2. Example: GVS of 8 = 2^8 = 256.

If you do not initially set the GVS number, the amplifier will select 256 as a default value. Each edge of the encoder quadrature channels is counted and multiplied by the GVS number and stored to represent scaled velocity. The GVS number is chosen such that encoder edge count at maximum RPM is scaled below 32,768. For low resolution encoders, the GVS number should be increased. The standard default value for GVS is 256 and it is chosen for a 8,192 line encoder rotating at a maximum of 5,000 RPM.

The 256 GVS value is calculated as follows:

(8,192 * 4 counts / rev) * (5,000 rev / min) * (1 min / 60 sec) = 2,730,667 counts / sec

At a 25KHz interrupt sample rate, you will get

2,730,667 / 25000 = 109 counts / sample interrupt

109 * 256 (GVS) = 27,904 which is less than 32,768 as it should be.

Typical value for 5,000 line encoder @ 4,000 RPM is a GVS value of **9** = 2^9 = 512

Typical value for 2,000 line encoder @ 4,000 RPM is a GVS value of **10** = 2^10 = 1024

Typical value for 1,000 line encoder @ 4,000 RPM is a GVS value of **11** = 2^11 = 2048

To change the GVS pre-scale, you will have to use the terminal window (Tools > Terminal Window).

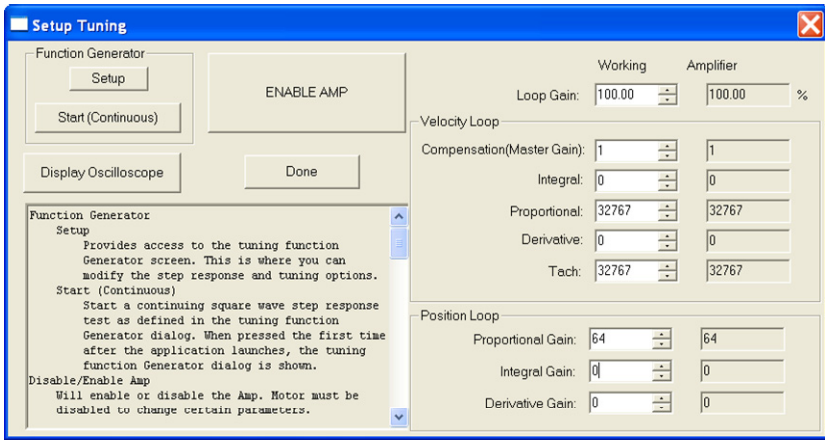
If you type GVS followed by pressing the enter key, you should get a response of 8. To change it to 9, type GVS 9 and press enter, then you can type GVS and press enter to verify the change. The rest of the gains can be set in the servo tuning window as long as the velocity loop option is selected.

Note: Any time you change GVS or GVF (Tach Gain), the conversion to RPM will change. Any **MotionMaestro**© features that use RPM conversions will have to be closed and re-opened to recalculate the proper RPM conversion. These include the control panel, the scope, the control loop signals status display and the function generator in the servo tuning window.

Velocity Loop PID Setting

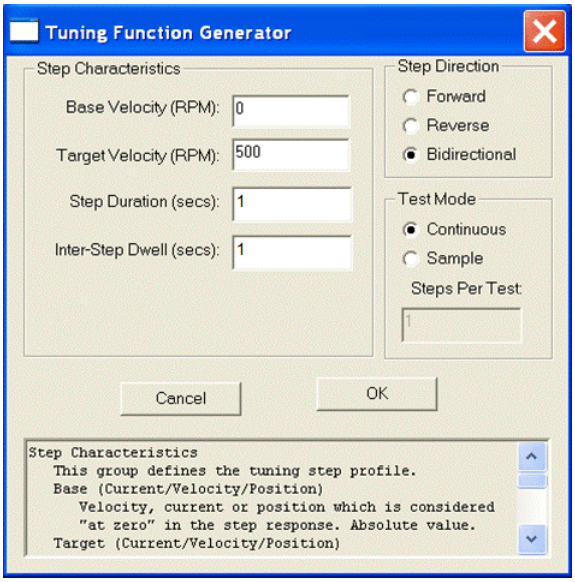
After finishing GVS setting be sure amplifier is disabled and go to:

1. **MotionMaestro**©: Setup > Select Mode…..
   Select "Velocity Loop Closed"
2. **MotionMaestro**©: Setup > Servo Tuning…
   Set "Loop Gain" at 10 (10%), at final alignment it is always set at 100 (100%). It is only used for initial phasing purposes. The purpose of "Loop Gain" is to allow "soft" closing of velocity and position loops during initial startup, preventing runaway.
   The following velocity loop coefficient values should be used for initial tuning:
   2.1 Compensation Gain: 1
   2.2 Integral Gain: 0
   2.3 Proportional Gain: 32767
   2.4 Derivative Gain: 0
   2.5 Tach Gain: 32767
   2.6 Current Loop Bandwidth: 1500 Hz
   2.7 Filters 1: 320 Hz (LP1); Filter 2 and 3 are set at "NONE"
   2.8 Feedback Filter: 320 Hz (LP1) (could be set to "NONE" for encoder that has 2500 lines or higher)



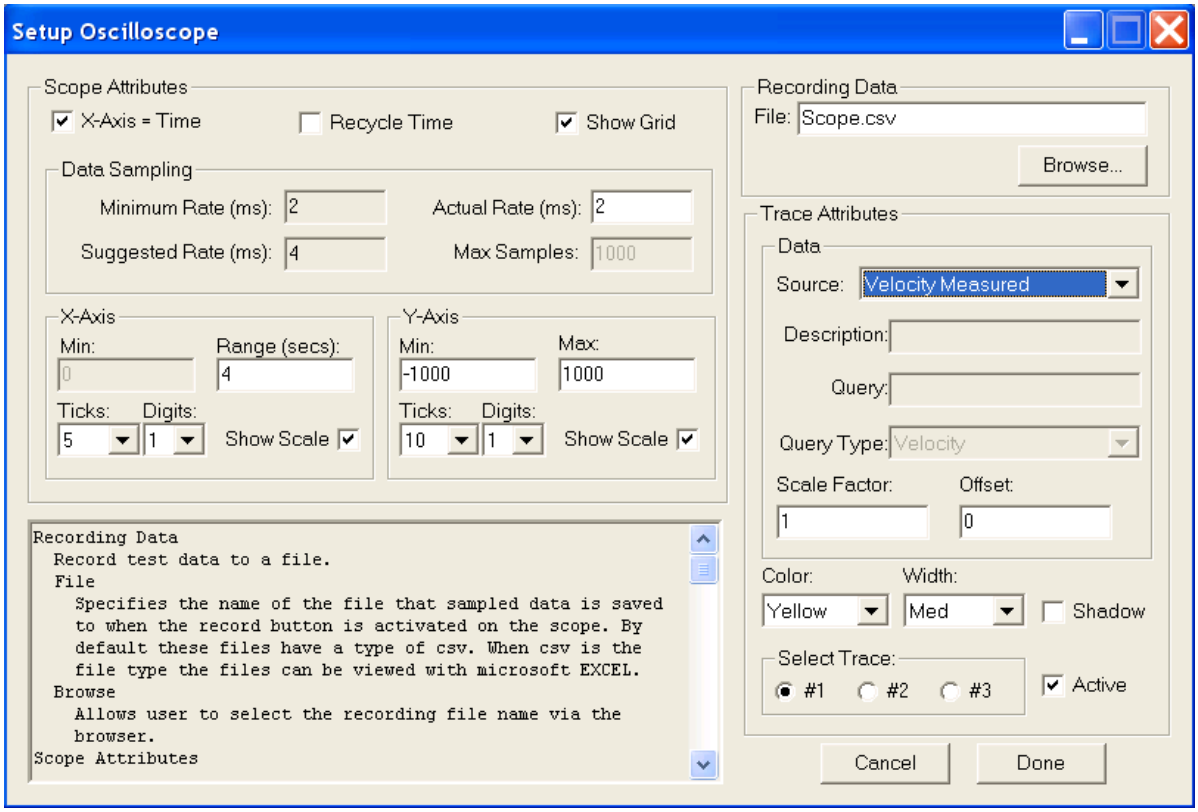
Dialog box for tuning the motor

3. Next, setup an excitation signal needed during velocity tuning.
   MotionMaestro©: In the "Function Generator" group of the tuning dialog window, press "Setup" and do the followings.
   3.1 "Tuning Setup" dialog window will appear.
   3.2 Enter "Base Velocity (RPM)". 0 RPM.
   3.3 Enter "Target Velocity (RPM)". (500 or your selection) Try to keep it under 1000 RPM.
   3.4 Enter "Step Duration (1 secs),
   3.5 Enter "Inter-Step Dwell (1 secs).
   3.6 Choose "Step Direction" (Bidirectional).
   3.7 Choose "Test Mode" (Continuous).
   3.8 Select "OK" to close window.



Dialog box for setting up step function

4. Next the Scope function needs to be setup and started to display the system velocity response. Press the “Display Oscilloscope” button on the Tuning Dialog window to open the “Setup Oscilloscope” dialog window, and do/select the followings.



Oscilloscope Setup Screen

4.1 Select X-Axis = time

4.2 Enter Data sampling “Actual Rate (mS)” select time equal to or greater than the “Minimum Rate”. The “Minimum Rate” is calculated based on **MotionMaestro**© activity and could be too high if activity is increased.

4.3 Select the “Velocity Measured” option under “Trace Attributes>Data>Source”.

4.4 Enter “ X-Axis Range”: oscilloscope sweep speed.

4.5 Enter “ Y-Axis Range”: Sets the Y axis plus and minus maximum values.
Note: The maximum values should be higher than the actual “Target Velocity (RPM)” from step 3.3.

4.6 Press “Done” to display oscilloscope.

4.7 You can always go back to the “Setup Oscilloscope” window to reset the ranges by clicking “Setup” in the “Oscilloscope” window.

4.8 You should see a trace scanning across the scope. If you do not, press “Setup” button, and adjust the scope until a trace is visible.

5. Go back to the “Tuning Setup” window, enable the amplifier, and press the “Start (continuous)” button in the function generator group.
Note: Press “OK” when the “Execute Test” pop up window appears.

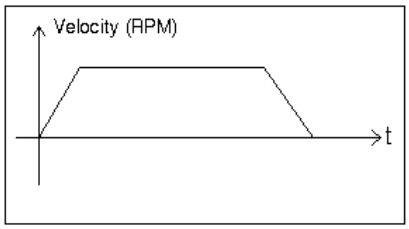
7. Slowly increase the “Compensation (Master Gain)” until the oscilloscope waveform shows critically damped response.

7.1 This should be achieved without the system becoming unstable.

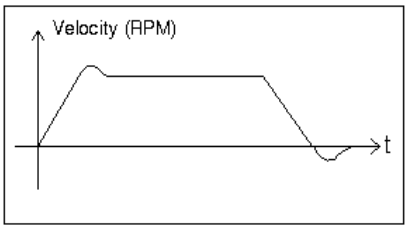
7.2 The “Compensation (Master Gain)” can be increased or decreased by the up and down arrow keys on the keyboard when the Compensation (Master Gain) edit box on tuning dialog of **MotionMaestro**© has the focus.

8. The following illustrations provide a reference for the waveforms on the Oscilloscope.

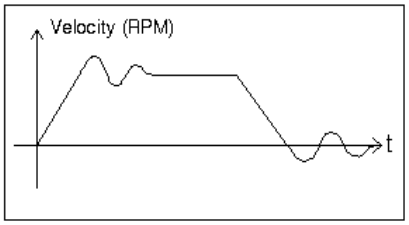
Figure A, a critically damped waveform is an ideal response for most applications.



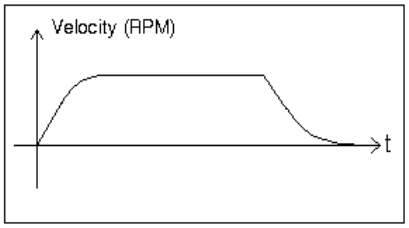
A.) Critically Damped Signal



B.) 1 Hook Overshoot Signal



C.) Under Damped Signal



D.) Over Damped Signal

9.

Tuning suggestions:

9.1. In most cases, increasing compensation value should tune the amplifier to the application. Try to achieve compensation value of six or better for high gain loop.

9.2 Integral gain may be increased to achieve stiffness at zero speed. However, do not add too much as system may become unstable. Try to keep the maximum integral gain to less than 1000.

9.3 In systems with high inertia, you may want to increase derivative gain toward 2,000, and in systems with low inertia, you may want to decrease derivative gain toward 1,000 to achieve a critically damped response.

10. When you are satisfied with the tuning, save the parameters to non-volatile memory.
    MotionMaestro: Setup > Save to NVM…

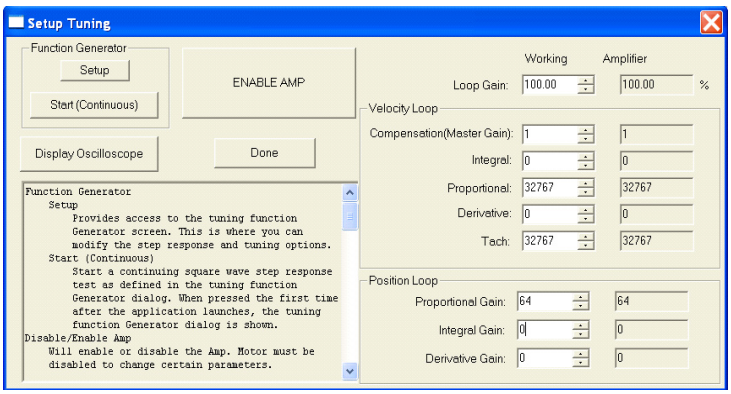
When tuning is completed, you can save the amplifier parameters to a backup file by using MotionMaestro's Backup command. You will find this command under the Tools pull-down menu. Select Backup amplifier. You will be prompted for a file name. The file can later be found under the application directory with a .bk file type descriptor. At a later time this file can be used to quickly load default parameters for an application.

5. Go back to the “Tuning Setup” window, enable the amplifier, and press the “Start (Continuous)” button in the function generator group.
   Note: Press “OK” when the “Execute Test” pop up window appears.

Pulse Follower Position Mode Tuning

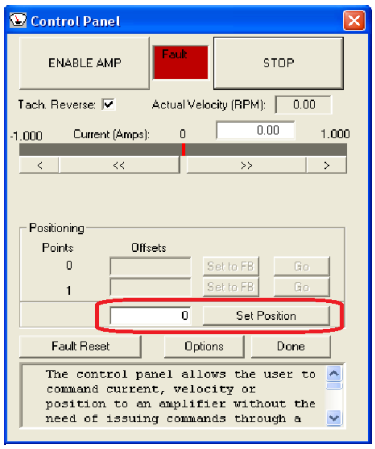
To operate in this mode, you must first optimize and tune the velocity loop for the highest gain and critically damped response. See Velocity Tuning (pages 49 - 52). Be sure to save velocity loop coefficients to NVM before you continue. Next, disable amplifier and go to position control mode and tune the position loop as follows:

Note: Use external position command if possible to tune the position loop and skip steps 4 and 5 below because the built-in Function Generator feature in current version of MotionMaestro© does not have position trajectory generator.



Dialog box for tuning the motor

1. **MotionMaestro©**:
   Setup > Select Mode...
   Select “Velocity Loop Closed”, “Position Loop Closed” and “Pulse Follower.”
2. Make sure to initialize the position counter to zero by clicking on the “Set Position” button in the Control Panel window before attempting to tune the amplifier in position mode. Failure to clear the counter may result in undesirable motor running away when first started pulsing the motor.
3. **MotionMaestro©**:
   Setup > Servo Tuning…
   Start by setting proportional gain to 64, integral and derivative gain to 0 (under Position loop).



The Control Panel display

4. Next, setup an excitation signal needed for position mode tuning. **MotionMaestro©**: In the “Function Generator” group, press “Setup” to open the “Tuning Function Generator” window and do the followings (see page 50 for reference).
   - 4.1 Enter “Base Position”. 0 counts.
   - 4.2 Enter “Target Position”. Value of encoder edge counts (after quadrature, and this should result in a < 90º move).
   - 4.3 Enter “Step Duration. 1 sec.
   - 4.4 Enter “Inter-Step Dwell. 1 sec.
   - 4.5 Choose “Step Direction” (Bidirectional).
   - 4.6 Choose “Test Mode” (Continuous).
   - 4.7 Select “OK” to close window.

   Note: You may want to change these values after you start tuning to see the waveforms better.
5. In the “Tuning Setup” window, enable the amplifier, and press the “Start (Continuous)” button in the function generator group to start pulsing the motor.
6. First keep position loop integral and derivative gain to zero, increase position loop proportional gain to as high as possible without excessive oscillation. Next, add derivative gain to help calm down the oscillation. Then add as much integral gain as possible to achieve a quick response. Observe the response all the time.

The feedback encoder quadrature edges are counted into a 32 bit position feedback counter and this counter is compared with a scaled input command 32 bit counter. The position difference is then amplified by a proportional gain and used as an error velocity command. This command is used as an input to the velocity loop, see Command Input Control Diagram on page 15. Go to Trajectory Generator Setup window on page 26 and disable acceleration and deceleration limits by checking appropriate boxes. Set maximum speed of motor into velocity limit box.

Setup Pulse/Direction Follower

All Alpha Series can operate in either Pulse (Step)/Direction Follower or in Encoder Follower mode. When operate in Pulse (Step)/Direction Follower mode, the first input is a pulse train used to establish the absolute distance and velocity of the command and the second input is a direction signal used to establish the direction of rotation of the command. Many stepper motor controllers provide this pulse type and allows upgrading a stepper motor system to a servo motor system without the need to change controllers.

It is important to note from the scaling example shown below to scale command pulses to increment 1.8 º of the motor. The encoder counts must be divisible by 200.

An example of pulse system scaling is described as follows:
1. Feedback Encoder = 5,000 lines per revolution
2. Desired motor rotation per input pulse = 1.8 º

1 rev (360 º) of feedback encoder = 5,000 * 4 = 20,000 counts
1.8 º / 360 º * 20,000 = 36,000 / 360 = 100 counts
Therefore, each input pulse must increment the input command counter by 100 counts. To achieve this, set PGI to 1 and PGO to 100 such that 1 pulse in = 100 pulses out.

To set PGI (Gear In) and PGO (Gear Out), refer to “Electronic Gearing Setup” window on page 25.

To reverse the motor rotation, go to MotionMaestro Setup > Gearing/Encoders and check or uncheck on “Reverse” check box under Auxiliary Encoder section. (refer to “Electronic Gearing Setup Dialog” on page 25)

To View the position following error go to the Control Loop Signal window (page 28) and select commanded, measured and error in the position box. The following error can also be monitored using Motion Maestro oscilloscope window. If the error is less than 100 counts the motor will follow always within 1.8°. For more info refer to the MotionMaestro guide at www.Glentek.com.

Setup Encoder Follower

When operate in Encoder Follower mode, two pulse inputs in quadrature, such as the output of an incremental encoder or an encoder pot determine both command distance and direction. This pulse decoding is useful to slave one motor to another by connecting the master motor's encoder output to the slave motor's pulse inputs.

An additional example of encoder follower scaling is described as follows:

1. Input command encoder (master) = 2,000 lines per revolution
2. Feedback following encoder (slave) = 5,000 lines per revolution
3. Desired following ratio = 1 revolution to 1 revolution

Set PGI = 2 and PGO = 5
For every 2 pulses of the input command encoder (master), the input command position counter will be incremented by 5 counts.

To further explain the above scaling example, we have provided an additional description as follows:

Let us pick the example where we have a shaft somewhere in a system that has a 2000 line encoder mounted to it and we want to remotely slave another shaft to this encoder. On this remote shaft, we mount a servo motor with a 5000 line encoder. Then, we connect the 2000 line encoder to the inputs of the remote servo amplifier in the pulse follower mode and set PGI = 2 and PGO = 5. This sets up the ratio for every two counts of the 2000 line encoder the 32 bit input command position counter (see Position Mode Control Diagram on page 14) is incremented by 5 counts. Now the remote servo will follow on a 1 to 1 ratio. That is, the remote motor with 5000 line encoder will rotate one revolution when the 2000 line encoder motor rotates one revolution.

When used as an encoder follower, the count (lines) per revolution of the encoder is preferred to have either both binary or both decimal. However, any combination of encoder count (lines) per revolution is acceptable to Alpha Series amplifier.

Let us pick the example where we have a shaft somewhere in a system that has a 4096 line encoder mounted to it and we want to remotely slave another shaft to this encoder. On this remote shaft, we mount a servo motor with a 5000 line encoder. Then, we connect the 4096 line encoder to the inputs of the remote servo amplifier in the encoder follower mode and set PGI = 512 and PGO = 625. This sets up the ratio for every 512 counts of the 4096 line encoder the 32 bit input command position counter (see Position Mode Control Diagram on page 14) is incremented by 625 counts. Now the remote servo will follow on a 1 to 1 ratio. That is, the remote motor with 5000 line encoder will rotate one revolution when the 4096 line encoder motor rotates one revolution.

2-Phase Current (Torque) Mode Tuning

This section is for users who purchased a dedicated 2 phase current mode amplifier. This type of amplifier will have special hardware built, and the amplifier is designed to run in Current Mode only.

1. Configure the motor parameters, motor safety and commutation settings as specified in the "Parameter Setup" section of Amplifier Tuning.

2. Turn the power off, and connect the motor leads (R, S and T) to the amplifier, and 2 signal inputs (Signal 1+/-, Signal 2+/-) with Common from the controller to the amplifier.

   2.1 Make sure to connect the motor leads properly.

   2.2 Connect Signal Controls for R-phase to signal 1, and for S-phase to signal 2 inputs.

3. Turn the power back on and open the "Analog I/O" window by selecting Setup > Analog I/O…

4. Set "Signal Gain", and "Aux Signal Gain" to the desired Amps/V.

   Note: Both gains should be set to the same value. "Signal Gain" corresponds signal 1 (Phase R command) input, and "Aux Signal Gain" corresponds to Signal 2 (Phase T command) input.

5. With zero value signal on both of the input signals, adjust "Signal Offset" and "Aux Signal Offset" to null the R and S commands.

   5.1 Use scope to monitor these commands by selecting Tools > Scope… or Scope icon on the tool bar.

   5.2 On the Scope set up window, select "R Current Commanded" option from "Source" under "Data Attributes" for trace 1, and "S Current Commanded" option from "Source" for trace 2.

   5.3 Go back to the Analog I/O setup window and adjust the analog offsets to get a zero value on the commanded signal traces. This will null all offsets from the controller and the amplifier.

6. The controller connection to the analog inputs can be verified by commanding 1V to each signal input. Use the MotionMaestro© Scope to check that the commanded input is as expected.

   For Example: If the signal gains are set to 2.5A/V, 1V is commanded to both inputs simultaneously, and the current limit is greater than 5A, then the MotionMaestro© Scope should display 2.5A on phase R and S current commands and -5.0A on phase T current command.

7. Set the controller command signals to 0V.

8. Save to NVM by selecting Setup > Save to NVM…

Tachometer Feedback Setup and Tuning

This section is for users who purchased a dedicated amplifier configured with special hardware that is designed to run in in either Current Mode or Velocity Mode, and use tachometer as feedback.

1. Select Setup > Select Mode… in Menu Tool Bar of Motion Maestro to enter Setup Command Mode window.

2. Verify that “Current Loop Closed” (selected by default, and can not be deselected) is the only item checked under “Modes of Operation”.

3. Configure the motor parameters, motor safety and commutation settings as specified in the “Parameter Setup” section of Amplifier Tuning.

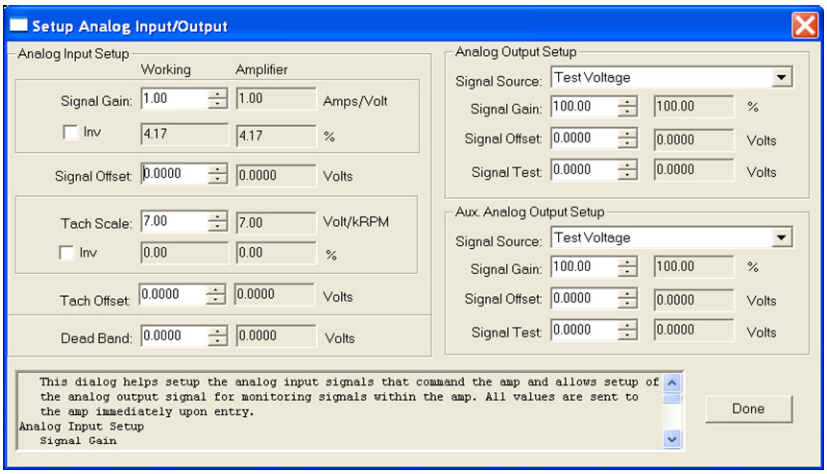
4. Turn the power off, and connect the motor leads (R, S and T) to the amplifier.

5. Connect the signal command from the controller to the amplifier Signal 1 +/- inputs.

6. Connect the tachometer feedback from the motor to the amplifier Tach +/- inputs.

7. Turn the power back on and open the “Analog I/O” window by selecting Setup > Analog I/O…

8. Set “Signal Gain”, and “Tach Scale” to the desired Amps/V and Volt/kRPM, respectively.



Dialog box for tuning the motor

Note: “Signal Gain” corresponds to Signal 1 (command) input, and “Tach Scale” corresponds to Tach input of the amplifier. By default, all amplifiers are configured to accept tachometer feedback signal of +/- 30V. At 7.00 Volt/kRPM, a theoretical maximum velocity of up to +/- 4285 RPM is possible before it is saturated. It is highly recommended not to operate the motor beyond 90% of this limit (+/-3856 RPM). If feedback signal of higher than +/- 30V is desired, please contact one of Glentek sale engineers.

9. With zero value command signal on the input, adjust “Signal Offset” to null the current or velocity commands.

   9.1 Use scope to monitor the command by selecting Tools > Scope…
   9.2 On the Scope set up window, select “Current Commanded” option from “Source” under “Data Attributes” for trace 1.

10. Go back to the Analog I/O setup window and adjust “Tach Offset” to get a zero value on the measured velocity trace.

    10.1 Use scope to monitor the measured velocity by selecting Tools > Scope…

    10.2 On the Scope set up window, select “Velocity Measured” option from “Source” under “Data Attributes” for trace 2.

Motor Running

1. Select Tools>Control Panel in Menu Tool Bar of Motion Maestro to display the control interface.

2. Apply one amps command (or until the motor starts to move slowly) by entering in the box right below “Actual Velocity (RPM)” box. Alternately, you can click on any portion of the slider right below the “Current (Amps)” label to issue a current command.

3. While the motor is moving, verify that the velocity reading in “Actual Velocity (RPM)” displays positive number for a positive current command and negative number for a negative current command.

4. If the “Actual Velocity (RPM)” reading is not matching the current command in sign, select or de-select the box next to “Tach Reverse” so that the “Actual Velocity (RPM)” displays positive number for a positive current command and negative number for a negative current command.

   Note: One of the reasons that the “Actual Velocity (RPM)” reading not matching the current command in sign is that the motor power leads are reversed (motor is not wired per amplifier’s factory default setting). The other reason is the tachometer feedback leads are reversed (tachometer is not wired per amplifier’s factory default setting).

   Alternately, this problem can also be easily corrected by click to select/de-select a check mark next to the selection box “Inv” just below the “Tach Scale” in the “Setup Analog Input/Output” window, or you can add/remove a negative sign in front of the “Tach Scale” value and press the “Enter” key on the keyboard. Verify that the “Actual Velocity (RPM)” reading matches the current command in sign.

5. If you would like to run in Velocity (RPM) Mode instead of Current (Torque) Mode, You may now stop the system and change to Velocity Mode and go to Velocity Loop PID Setting section for further information.

6. Be sure to save changes often.

The controller and tachometer feedback connections to the analog inputs can be verified by commanding 1A (1V) to signal input or just enough to move the motor slowly. Use the MotionMaestro© Scope to check that the commanded input and velocity feedback are as expected.

For Example: If the signal gains are set to 1.0A/V, 1V is commanded to input, and the current limit is greater than 5A, then the MotionMaestro© Scope should display 1.0A on the current command. Use a friction (handheld) tachometer to read the motor shaft velocity and compare to the velocity measured on the MotionMaestro© Scope. Verify that the two velocity readings are similar.

7. Set the controller command signals to 0V.

8. Save to NVM by selecting Setup > Save to NVM…

APPENDIX A

A - Servo Drive Connections

A - 1. Servo Drive Motor and Power Connectors

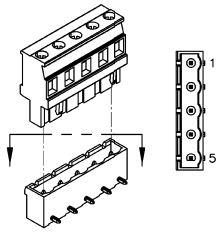


Table A - 1.1. Module Power/Motor Designations (SMX9415/SMX9515)

Designations Pin#	I/O	Name	Function
1	Input	B-	DC Bus Return
2	Input	B+	DC Bus +
3	Output	T	Motor Phase T / Brush Output B
4	Output	S	Motor Phase S
5	Output	R	Motor Phase R / Brush Output A

Table A - 1.2. Module Power/Motor Mating Connectors (SMX9415/SMX9515)

Description/Type	5-Pin Female Mating Connector
Right angle	Phoenix GMVSTBW 2,5/5-ST-7,62
Inline	Phoenix GMSTB 2,5/5-ST-7,62

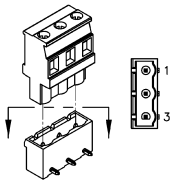


Table A - 1.3. Stand-Alone Motor Power Designations (SMX9415)

Designations Pin#	I/O	Name	Function
1	Output	T	Motor Phase T / Brush Output B
2	Output	S	Motor Phase S
3	Output	R	Motor Phase R / Brush Output A

Table A - 1.4. Stand-Alone Motor Power Mating Connectors (SMX9415)

Description/Type	3-Pin Female Mating Connector
Right angle	Phoenix GMVSTBW 2,5/3-ST-7,62
Inline	Phoenix GMSTB 2,5/3-ST-7,62

Table A - 1.5. Stand-Alone AC Power Designations (SMX9415)

Designations Pin#	I/O	Name	Function
1	Input	L 1	AC LINE 1, single phase/three phase
2	Input	L 2	AC LINE 2, single phase/three phase
3	Input	L 3	AC LINE 3 (three phase only)
4	Input	PE	Protective Earthing / Chassis Gnd

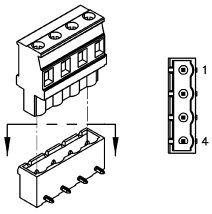


Table A - 1.6. Stand-Alone AC Power Mating (SMX9415)

Description/Type	4-Pin Female Mating Connector
Right angle	Phoenix GMVSTBW 2,5/4-ST-7,62
Inline	Phoenix GMSTB 2,5/4-ST-7,62

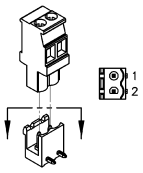


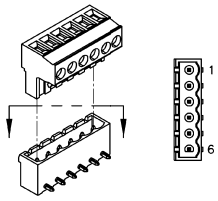
Table A - 1.7. External Logic Supply Power Designations (SMC94XX)

Designations Pin#	I/O	Name	Description
1	Input	COMMON	COMMON (Logic Ground)
2	Input	+24VDC	24 to 48VDC, 600mA max. @ 24VDC Powers all amplifier logic and encoder

Table A - 1.8. External Logic Supply Power Mating Connector (SMC94XX)

Description/Type	2-Pin Female Mating Connector
Right angle	Phoenix P/N: GMVSTBW 2,5/2-ST-5,08

Table A - 1.9. Module Power/Motor Designations (SMX9508)

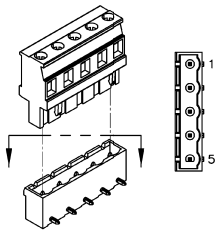


Designations Pin#	I/O	Name	Function
1	Input	B-	DC Bus Return
2	Input	B+	DC Bus +
3	Input	PE	Protective Earthing / Chassis Gnd
4	Output	T	Motor Phase T / Brush Output B
5	Output	S	Motor Phase S
6	Output	R	Motor Phase R / Brush Output A

Table A - 1.10. Module Power/Motor Mating Connectors (SMX9508)

Description/Type	6-Pin Female Mating Connector
Right angle	Phoenix MSTB 2,5/ 6-ST-5,08

Table A - 1.11. Stand-Alone Motor / AC Power Designations (SMX9408)



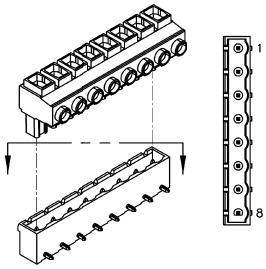
Designations Pin#	I/O	Name	Function
1	Input	L 1	AC LINE 1, single phase
2	Input	L 2	AC LINE 2, single phase
3	Output	T	Motor Phase T / Brush Output B
4	Output	S	Motor Phase S
5	Output	R	Motor Phase R / Brush Output A

Table A - 1.12. Stand-Alone Motor / AC Power Mating Connectors

Description/Type	5-Pin Female Mating Connector
Right angle	Phoenix GMVSTBW 2,5/5-ST-7,62
Inline	Phoenix GMSTB 2,5/5-ST-7,62

(SMX9408)

Table A - 1.13. Module Power/Motor Designations (SMX9420)



Designations Pin#	I/O	Name	Function
1	Output	T	Motor Phase T / Brush Output B
2	Output	S	Motor Phase S
3	Output	R	Motor Phase R / Brush Output A
4	Input	PE	Protective Earthing / Chassis Gnd
5	Input	PE	Protective Earthing / Chassis Gnd
6	Input	L 3	AC LINE 3 (three phase only)
7	Input	L 2	AC LINE 2, single phase/three phase
8	Input	L 1	AC LINE 1, single phase/three phase

Table A - 1.14. Module Power/Motor Mating Connectors (SMX9420)

Description/Type	8-Pin Female Mating Connector
Right angle	Phoenix GMSTB 2,5 HCV/ 8-ST-7,62

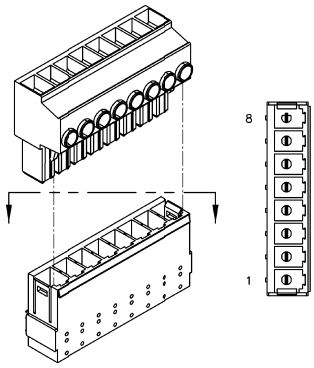


Table A - 1.15. Module Power/Motor Designations (SMX9430)

Designations Pin#	I/O	Name	Function
1	Output	T	Motor Phase T / Brush Output B
2	Output	S	Motor Phase S
3	Output	R	Motor Phase R / Brush Output A
4	Rsvd	Reserved	Reserved
5	Rsvd	Reserved	Reserved
6	Input	L 3	AC LINE 3 (three phase only)
7	Input	L 2	AC LINE 2 (three phase only)
8	Input	L 1	AC LINE 1 (three phase only)

Table A - 1.16. Module Power/Motor Mating Connectors (SMX9430)

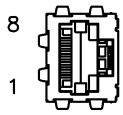
Description/Type	8-Pin Female Mating Connector
Right angle	Phoenix PC 5/ 8-ST-7,62

A - 2. Servo Drive Serial Communications Connector

Table A - 2.1. RJ-45 Serial Communications Mating Connectors

Description/Type	8-Pin Male Mating Connector
Standard Commercial, RJ-45	Commercial, RJ45

Table A - 2.2. RJ-45 (RS-232 / RS-485) Communications Designations



Pin#	I/O	Name	Function
1	Input	RS-485 RX +	RS-485 Receive +
2	Input	RS-485 RX -	RS-485 Receive -
3	Reserved	Reserved	Reserved
4	Input/output	COMMON	Logic Ground
5	Output	RS-232 TX	RS-232 Transmit
6	Input	RS-232 RX	RS-232 Receive
7	Output	RS-485 TX +	RS-485 Transmit +
8	Output	RS-485 TX -	RS-485 Transmit -

Table A - 2.3. RJ-45 (CANopen) Communications Designations

Pin#	I/O	Name	Function
1	Input/output	CAN HIGH	Dominant High
2	Input/output	CAN LOW	Dominant Low
3	Reserved	Reserved	Reserved
4	Input/output	COMMON	Logic Ground
5	Reserved	Reserved	Reserved
6	Reserved	Reserved	Reserved
7	Reserved	Reserved	Reserved
8	Reserved	Reserved	Reserved

A - 3.1. Servo Drive Motor Feedback Connector (Molex)

Table A - 3.1.1. Encoder Feedback Mating

Connector Description/Type	20-Pin Male Mating Connector Housing	Female Crimp Terminal
C-GRID III DUAL ROW CRIMP CONNECTOR, 22-24 AWG	MOLEX 90142-0020	MOLEX 90119-2110

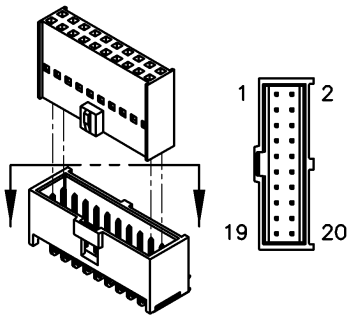


Table A - 3.1.2. Encoder Feedback

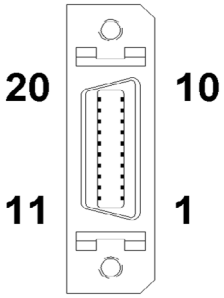
Pin#	I/O	Name	Function
1	Input	Tach +	Tachometer + Signal
2	Input	Tach –	Tachometer – Signal (not)
3	Reserved	Reserved	Reserved
4	Input	Mtr Temp SW	MotorTemp Switch Input
5	Input	Enc Z +	Encoder Channel Z +
6	Input	Enc Z –	Encoder Channel Z – (not)
7	Input	Enc B +	Encoder Channel B +
8	Input	Enc B –	Encoder Channel B – not)
9	Input	Enc A +	Encoder Channel A +
10	Input	Enc A –	Encoder Channel A – (not)
11	Input	Hall 1 +	Hall Sensor 1 + Signal
12	Input	Hall 1 –	Hall Sensor 1 – Signal (not)
13	Input	Hall 2 +	Hall Sensor 2 + Signal
14	Input	Hall 2 –	Hall Sensor 2 – Signal (not)
15	Input	Hall 3 +	Hall Sensor 3 + Signal
16	Input	Hall 3 –	Hall Sensor 3 – Signal (not)
17	Power	Enc Pwr	Encoder +5VDC Power out, 150 mA max
18	Power	Common	Enc Pwr Return, Logic Ground (Digital)
19	Power	Enc Pwr	Encoder +5VDC Power out, 150 mA max
20	Power	Common	Enc Pwr Return, Logic Ground (Digital)

A - 3.2. Servo Drive Motor Feedback Connector (Mini-D)

Table A - 3.2.1. Motor Feedback Designations

Pin#	I/O	Name	Function
1	Power	Enc Pwr	Encoder +5VDC Power out, 150 mA max
2	Power	Common	Enc Pwr Return, Logic Ground (Digital)
3	Power	Enc Pwr	Encoder +5VDC Power out, 150 mA max
4	Power	Common	Enc Pwr Return, Logic Ground (Digital)
5	Input	Enc A +	Encoder Channel A +
6	Input	Enc A –	Encoder Channel A – (not)
7	Input	Enc B +	Encoder Channel B +
8	Input	Enc B –	Encoder Channel B – not)
9	Input	Enc Z +	Encoder Channel Z +
10	Input	Enc Z –	Encoder Channel Z – (not)
11	Input	Hall 1 +	Hall Sensor 1 + Signal
12	Input	Hall 1 –	Hall Sensor 1 – Signal (not)
13	Input	Hall 2 +	Hall Sensor 2 + Signal
14	Input	Hall 2 –	Hall Sensor 2 – Signal (not)
15	Input	Hall 3 +	Hall Sensor 3 + Signal
16	Input	Hall 3 –	Hall Sensor 3 – Signal (not)
17	Input	Mtr Temp SW	MotorTemp Switch Input
18	Power	Common	Logic Ground (Digital)
19	Input	Tach +	Tachometer + Signal
20	Input	Tach –	Tachometer – Signal (not)

Table A - 3.2.2. Motor Feedback Mating Connector



Connector Description/Type	20-Pin Male Mating Connector Housing	20-Pin Male Mating Backshell
Mini D Ribbon, 28-30 AWG, Insulation Displacement, Plastic Backshell, Squeeze Latch	AMP 2-175677-2	AMP 176793-2
Mini D Ribbon, 28-30 AWG, Insulation Displacement, Metal Backshell, Squeeze Latch	3M 10120-6000EC	3M 10320-A200-00
Mini D Ribbon, 24-30 AWG, Solder Cup, Plastic Backshell, Squeeze Latch	3M 10120-3000VE	3M 10320-52F0-008

A - 4.1. Controller I/O Connectors (Molex)

Table A - 4.1.1. I/O Mating Connectors

Connector Description/Type	24-Pin Male Mating Connector Housing	Female Crimp Terminal
C-GRID III DUAL ROW CRIMP CONNECTOR, 22-24 AWG	MOLEX 90142-0024	MOLEX 90119-2110

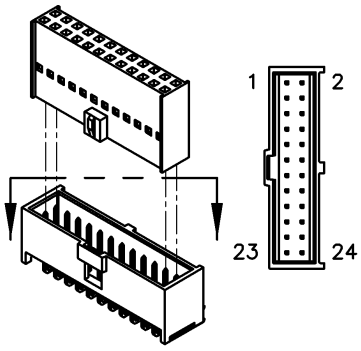


Table A - 4.1.2. I/O Connection Designations

Designations Pin#	I/O	Name	Function
1	Output	Encoder A +	Encoder A + output
2	Output	Encoder A –	Encoder A – output (not)
3	Output	Encoder B +	Encoder B + output
4	Output	Encoder B –	Encoder B – output (not)
5	Output	Encoder Z +	Encoder Z + output
6	Output	Encoder Z –	Encoder Z – output (not)
7	Input	Pulse +	Pulse input +
8	Input	Pulse –	Pulse input – (not)
9	Input	Direction +	Direction input +
10	Input	Direction –	Direction input – (not)
11	Input	Reset In	Reset Amp
12	Input	+ Limit	Limit switch +
13	Input	– Limit	Limit switch –
14	Input	Hw Inhibit	Hardware inhibit
15	Output	Fault Out	Fault out
16	Power	+5 VDC / +24 VDC Logic Power	+5 VDC @ 1 A max input (SMC9508) / +24 VDC @ 600 mA max input (SMC9515)
17	Power	Common	Logic Ground (Analog)
18	Power	Common	+5VDC / +24VDC return, Logic Ground (Digital)
19	Output	Analog Out (Aux.)	Analog out (Auxiliary)
20	Output	Analog Out	Analog out
21	Input/ Output	Signal 2 +/ Relay Out	Analog 2 command signal +/ Contact closure 21 to 22 (optional)
22	Input/ Output	Signal 2 –/ Relay Out	Analog 2 command signal – (not)/ Contact closure 21 to 22 (optional)
23	Input	Signal 1 +	Analog 1 command signal +
24	Input	Signal 1 –	Analog 1 command signal – (not)

A - 4.2. Controller I/O Connector (Mini-D)

Table A - 4.2.1. I/O Connection Designations

Designations Pin#	I/O	Name	Function
1	Input	Signal 1 +	Analog 1 command signal +
2	Input	Signal 1 –	Analog 1 command signal – (not)
3	Input	Signal 2 +	Analog 2 command signal +
4	Input	Signal 2 -	Analog 2 command signal – (not)
5	Output	Analog Out (Aux.)	Analog out (Auxiliary)
6	Output	Common	Logic Ground (Analog)
7	Output	Analog Out	Analog out
8	Input	+ Limit	Limit switch +
9	Input	- Limit	Limit switch –
10	Input	Hw inhibit	Hardware inhibit
11	Output	Fault Out	Fault out
12	Input	Common	Logic Ground (Digital)
13	Input	Reset In	Reset Amp
14	Input	Mtr Temp SW	MotorTemp Switch Input
15	Reserved		
16	Input	Common	Logic Ground (Digital)
17	Output	Encoder Z +	Encoder Z + output
18	Output	Encoder Z –	Encoder Z – output (not)
19	Output	Relay Out	Contact closure 19 to 20 (optional)
20	Output	Relay Out	Contact closure 19 to 20 (optional)
21	Input	Common	Logic Ground (Analog)
22	Input	Common	Logic Ground (Digital)
23	Input	Pulse –	Pulse input – (not)
24	Input	Pulse +	Pulse input +
25	Input	Direction –	Direction input – (not)
26	Input	Direction +	Direction input +
27	Output	+5V Out	+5 VDC out, 150 mA max
28	Output	+5V Out	+5 VDC out, 150 mA max
29	Output	Common	+5 VDC return, Logic Ground (Digital)
30	Output	Common	+5 VDC return, Logic Ground (Digital)
31	Reserved		
32	Reserved		
33	Output	Encoder A +	Encoder A + output
34	Output	Encoder A –	Encoder A – output (not)
35	Output	Encoder B +	Encoder B + output
36	Output	Encoder B –	Encoder B – output (not)

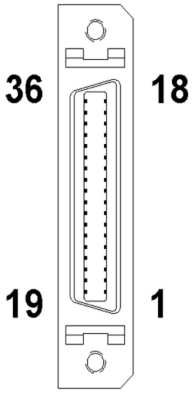


Table A - 4.2.2. I/O Mating Connectors

Connector Description/Type	24-Pin Male Mating Connector Housing	36-Pin Male Mating Backshell
Mini-D Ribbon, 24-30 AWG, Solder cup. Plastic backshell, squeeze latch	3M10136-3000VE	3M10336-52F0-008

APPENDIX B

B - Amplifier Status Codes

This appendix contains definitions of status codes displayed at the amplifier.

Table B - 1. Condition for each of the display values by a 7-segment LED display.

Display	Name	Description
1	EEPROM Fault*	Parameter EEPROM checksum fault
2	Reserved	Reserved
3	Reserved	Reserved
4	Reserved	Reserved
8	Reset	External reset
b	Bus Over Voltage	DC bus exceeded nominal input voltage
C	Clamp (Disabled)	Output stage disabled
E	Encoder Fault	Encoder fault detected
F	Foldback	Foldback condition active
H	Heatsink Over Temperature	Heatsink thermal switch tripped (65ºC typical)
h	Motor Over Temperature	Motor thermal switch / thermister tripped
L	LS/ECB	Motor RMS over current
0	Normal Operation	Amp enabled (no Hall only)
S	HS/ECB	Output short circuit detected
U	Bus Under Voltage	DC bus dropped below nominal input voltage
⎯	Hall Fault	Invalid hall state (000 or 111)
⎯ ⎯ ⎯	Commutation Fault	Hall angle does not match encoder counter angle No Halls: Phase finding routine failed
8.	Reset	Drive processor is in reset Logic power indicator
Single outer segment	Amp Enabled, Hall	Amp enabled Segment indicates one of six hall states

Table B - 2. Condition for each of the display modes by a Red and a Green LED display (SMX9508).

Red LED	Green LED	Name	Description
Stays Off	Stay On	Amp enabled	Normal Operation
Stay On	Stay On	Clamp (Disabled)	Output stage disabled
Stays Off	Blinks Once	Reset	Amp is resetting
Blinks Once	Stays Off	Heatsink Over Temperature	Heatsink thermal switch tripped (65ºC typical)
Blinks Once	Blinks Once	Motor Over Temperature	Motor thermal switch / thermister tripped
Blinks Twice	Stays Off	Bus Over Voltage	DC bus exceeded nominal input voltage
Blinks Twice	Blinks Twice	Bus Under Voltage	DC bus dropped below nominal input voltage
Blinks Three	Stays Off	LS/ECB	Motor RMS over current
Blinks Four	Stays Off	HS/ECB	Output short circuit detected
Stay On	Blinks Once	Hall Fault	Invalid hall state (000 or 111)
Stay On	Blinks Twice	Encoder Fault	Encoder fault detected
Stay On	Blinks Three	Commutation Fault	Hall angle does not match encoder counter angle No Halls: Phase finding routine failed
Stay On	Blinks Four	EEPROM Fault*	Parameter EEPROM checksum fault
Blinks Three	Stay On	Reserved	Reserved
Blinks Three	Blinks Three	Reserved	Reserved
Blinks Four	Blinks Four	Reserved	Reserved

APPENDIX C - SMx94xx, 95xx Ratings and Specifications

This appendix contains specifications for the application engineer which are necessary to utilize the SMx94xx, and SMx95xx series amplifiers.

Amplifier Model Number	Input Power	Output Power (Amps)		Available Packaging Configurations
		Cont. (Rated)	Peak	
SMx9408-bbb-jcc-1A-1	110-130 VAC	4	8	Stand-Alone
		8[1]	16[1]	
SMx9508-bbb-1cc-1[4]	24-190 VDC	4[2]	8[2]	Module
SMx9508-bbb-1cc-eA-g[4]	17-50 VAC or 110-130 VAC	4[3]	8[3]	Multi-Axis
SMx9410-bbb-jcc-1D-1 SMx9410-bbb-jcc-1F-1	110-130 VAC or 208-240 VAC	5	10	Stand-Alone
		10[1]	20[1]	
SMx9415-bbb-jcc-1 SMx9515-bbb-1cc-1	30-370 VDC	10[2]	20[2]	
		15[2]	30[2]	Module
		20[2]	40[2]	
SMx9415-bbb-jcc-1A-1 SMx9415-bbb-jcc-1D-1 SMx9415-bbb-jcc-1E-1 SMx9415-bbb-jcc-eB-g-h SMx9515-bbb-1cc-eB-g-h	110-130 VAC or 208-240 VAC	10[3]	20[3]	Stand-Alone and Multi-Axis
		15[3]	30[3]	
		20[3]	40[3]	
SMx9420-bbb-jcc-1A-1	110-130 VAC or 208-240 VAC	20[3]	40[3]	Stand-Alone
SMx9430-bbb-jcc-1B-1	110-130 VAC or 208-240 VAC	30	60	Stand-Alone
SMx9445-bbb-jcc-1B-1	110-130 VAC or 208-240 VAC	45	80	Stand-Alone
SMx9475-bbb-jcc-1B-1	110-130 VAC or 208-240 VAC	75	120	Stand-Alone

[1] Special request and require forced-air cooling.
[2] DC BUS input with forced air cooling.
[3] Three (3) Phase AC input with forced air cooling.
Output power is derated by 40% of the amp rating for single phase AC input.
[4] SMx9508 is non-isolated. That is, its logic input circuits and power input circuits are not isolated. Therefore, an isolated DC power supply is required for the module, and an isolated transformer is required for the multi-axis chassis assembly.

Power, Input and Output

Refer to table on page 68.

Signal Inputs

Input Source	Maximum Voltage VDC	Minimum Impedance Ohms
Differential	+/- 10	20,000
Single Ended	10	10,000

Digital Inputs

Input Source	Specification
Limit +	See *
Limit -	See *
Inhibit	See *
Reset	See *
Motor Temp	See *

* 40V max. -.5V min. Terminated by 10k Ohms. Digital inputs have hysteresis with thresholds at 1/3 and 2/3 of 3.3V.

Outputs

Output	Specification
Fault (as output)	Active level is configurable, open collector output can sink 500 mA max.
Analog Output(s)	User selectable D/A. Output is one channel of +/- 10V (12-bit) by default. Two channels of +/- 10V and/or (16-bit) are available upon request.
Encoder Outputs	26C31 differential line driver.
Relay Outputs	The relay contact supports switching voltage of up to 40 VAC/VDC and a maximum current of 1A.

System

Feature	Specification
Frequency response	
Velocity Loop:	Implementation dependent.
Current Loop:	Typical, depending on motor inductance, 2kHz typical. (Bandwidths available up to 3 kHz.)

Notes

1) All data in this section is based on the following ambient conditions: 25 °C (77 °F)
2) Forced air cooling is required to meet the maximum power ratings specified.
3) The amplifier modules (SMX9415-1, SMX9508-1, and SMX9515-1) require an external DC power supply.
4) The amplifier module (SMX9508-1) is non-isolated. That is, its logic input circuits and power input circuits are not isolated. Therefore, it requires an isolated DC power supply.

APPENDIX D

Matching Motor Phase Leads to Amplifier Commands Using Hall Sensors.

Below you will find the steps necessary to insure that the command phases of a digital amplifier are properly matched to any three-phase motor that has Hall sensors.

Two methods are described in detail. Section D1 describes the Glentek Auto Phasing Procedure, and section D2 describes Manual Phasing Procedure.

Please read this procedure prior to working with the motor and amplifier.

The Alpha Series amplifiers have an added feature called "Auto Phase Finding." You may use the Manual Phasing Procedure, or you may use the Auto Phase Finding Procedure if you are unsure of your motor's phase relationship.

Please note: At Glentek we take great care that all motors are phased identically, during final test, we insure the motor back EMF, encoder and hall sensors are aligned exactly the same way for each motor we ship.

D1 – Auto Phasing Procedure

This procedure should only be used at the initial start up of a system. Once completed, the settings can be saved as a back up, and these settings can then be restored in future systems. Future systems must be identical and wired exactly the same.

A) Ensure that the motor power and the feedback cables are connected to the amplifier and the amplifier is powered on.

B) Ensure that the amplifier has no faults.

C) Ensure that the information in the Motor column of the Setup Commutation window is correct (namely the Number of Poles and Lines per Revolution).

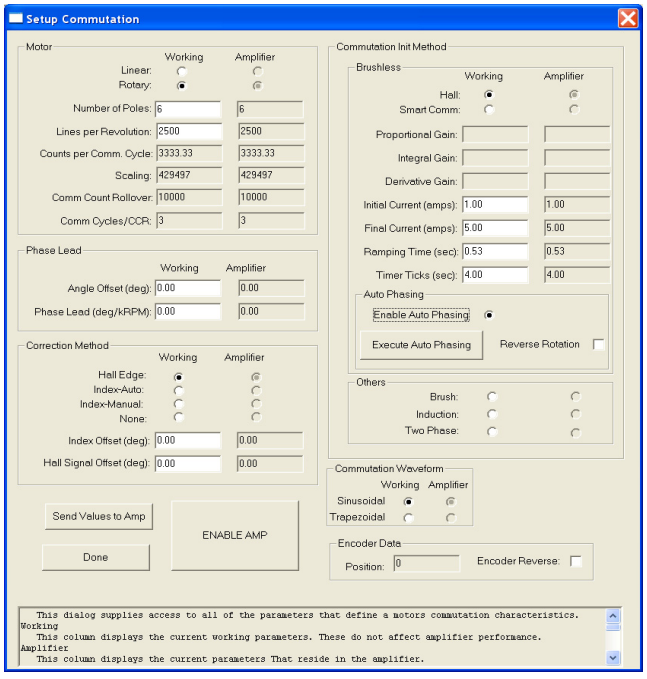
D) Ensure that "Hall Edge" is selected in the Correction Method column.

E) Check Enable Auto Phasing check box.

F) Ensure Final Current is less than the motor's rated current (refer to Smart-Comm on page 89 for more information on the how to set the coefficient values).

G) Enable the amplifier.

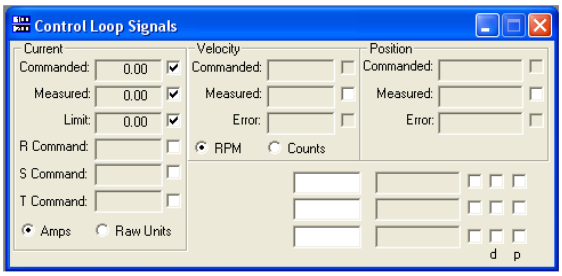
Press Execute Auto Phasing button.



Dialog box for setting up motor commutation

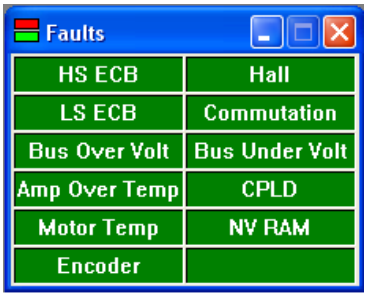
I) Observe Commanded current and Measured current from the Control Loop Signals window.

Note: Values should start at the initial current and end at the final current. Motor will have slight movement. Commutation Init on the Warning window will light yellow during execution time, then return to green.



Dialog box for viewing control loop signals

Dialog box for viewing warning



Dialog box for viewing fault status

J) Check the Fault window, if Commutation is lit green (No Fault), then go to step N. If it is red (Fault), then go to step K.

K) Verify that the motor is connected properly. Check to see if the Number of Poles (this is not pole pairs), and Line per Resolution (not the quadrature count) settings are correct. If all were correct, then increase final current to approximately 60% of motor rated current. Ensure that nothing is connected to the motor shaft.

L) Clear fault by pressing Fault Reset button on the Control Panel window.

M) Repeat from the beginning (from Step A).

N) From the Control Panel window, slowly increase (positive) the current until the motor starts to spin. Ensure that shaft is rotating in the desired direction for a positive current command.

Note: If it is running in opposite direction, select or deselect (depend on what was saved previously) the Reverse Rotation check box from the Commutation Init Method column in the Setup Commutation window.

O) Press Stop button, the command will go to zero (0), and the motor will stop.

P) Press Disable Amp button.

Q) Save setting to NVM, Setup>Save to NVM.

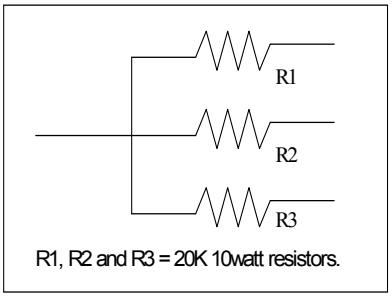
The system is now aligned. You can create a Backup File, and then restore to identical systems. Systems must be identical and connected exactly the same.

D2 – Manual Phasing Procedure

It is intended that this procedure be done once by the engineering staff, whereupon they will incorporate the findings into production drawings, wiring labels and procedures.

A) Locate or prepare the required equipment.

1. A 2 channels oscilloscope (four channels is best).
2. A 3-phase Y-connected resistive load as illustrated on the right.
3. A computer with MotionMaestro© installed.



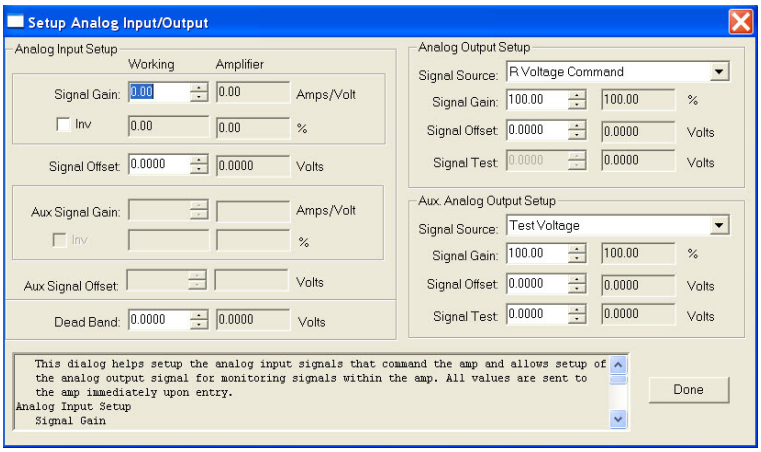
Specification for resistive load

B) With the power off, connect the motor encoder outputs and the Hall sensor outputs to the amplifier. **Leave the motor power leads disconnected**. Connect the RS232 serial cable from the amplifier to the serial port on the computer (MotionMaestro©). Alternately, Ethernet communication between the amplifier and the computer is possible when using the Glentek Communication Module CM998-1. Please contact one of Glentek sale engineers for further detail.

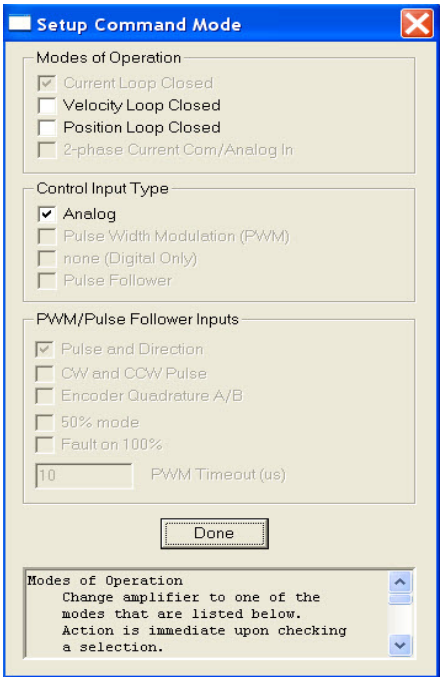
C) Apply power to the amplifier and establish communications between the amplifier and MotionMaestro©.

D) Prepare the amplifier using the following dialogs.

1. Insure that the amplifier is in **current mode**. Deselect all modes except the **current mode**.
2. Set the analog command input signal gain to zero. Use the Setup Analog Input/Output dialog as shown.



Dialog box for setting the analog input command signals

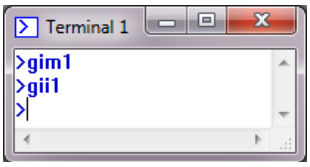


Dialog box for setting amplifier mode

3. Check then clear all faults by referring to the Amplifier Faults and Amplifier Status displays on the toolbar.
   For example, if there is an External Inhibit status warning you must open the Setup Digital IO dialog and check the inhibit box, then fix all remaining amplifier faults. After all faults have been corrected a fault reset must be completed. You may perform a reset by opening the Control Panel and depressing the "**Fault Reset**" button.

   Note: Commutation alignment can not begin until all faults are cleared.

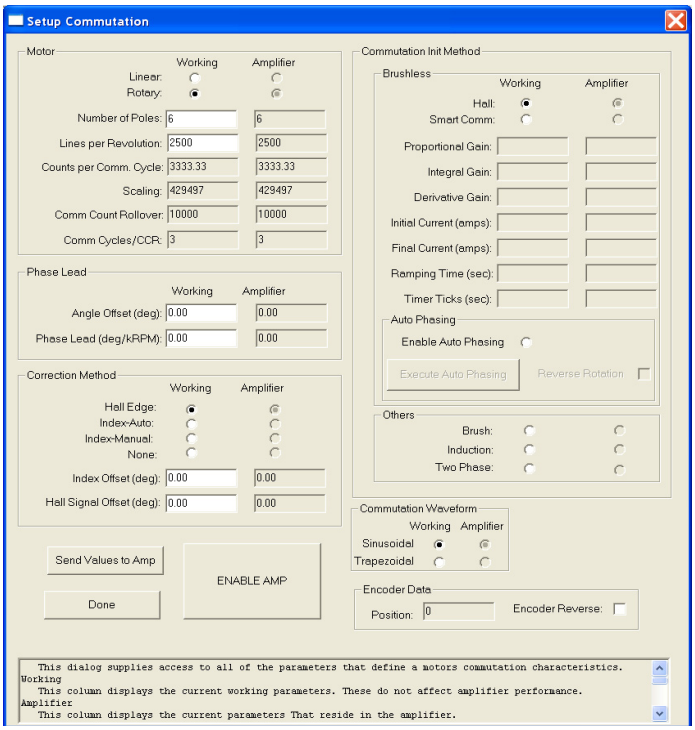
E) Disable the amplifier. Open terminal window, type “GIM” and press the enter key; type “GII” and press the enter key to query for the current values (write these numbers down so that you can reset them later). Next, type “GIM1” and press the enter key; type “GII1” and press the enter key to set the amplifier gains to minimal values. Remember to set the “GIM” and “GII” values back to original values after finish phasing motor leads or amplifier might not run.



The Terminal window

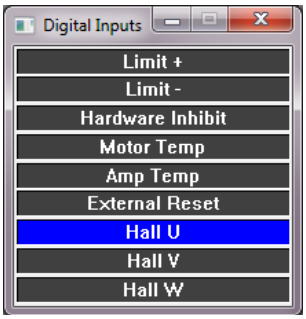
F) From the MotionMaestro© “Setup” menu, open the “Setup Commutation” dialog and setup the following items:

1. Motor type. Are you phasing a rotary or linear motor?
2. Number of Poles.
3. Encoder resolution.
4. Commutation angle offset = 0 (-30 degrees if Halls aligned phase to neutral?).
5. Commutation phase advance gain = 0.
6. Init Method = Hall.
7. Correction Method = Hall.
8. Depress “Send Values To Amp” button.



Dialog box for setting up motor commutation

G) From the MotionMaestro© Status menu, open the “Digital Inputs” status window. You will be monitoring the “Hall U, Hall V, and Hall W” display in the status window as the shaft is rotated. Note the lit Hall segment(s) before rotating the motor shaft, now turn the shaft such that Hall segment cycles through Hall U, U&V, V, V&W, W, W&U, U, and so on. Verify the Encoder Data Position counts up in the Commutation dialog. If not (the Commuatation fault will activated), check the Encoder Data Reverse box. The Encoder Data Position should now count up as Hall segment cycles through Hall U, U&V, V, V&W, W, W&U, U, and so on.

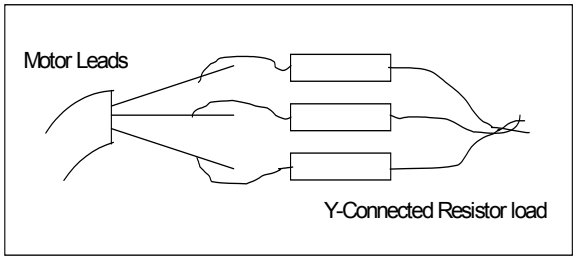


Digital Inputs Status

H) Save the new settings by selecting “Save to NVM” from the Setup menu. Answer Yes when prompted to save. Reset the amplifier to clear any fault.

I) Connect the 3-phase Y-connected resistor load to the **Motor** power leads for monitoring the motor back EMF (BEMF).

Note: do not connect the motor leads or the resistor load to the amplifier.



3-phase Y-connected resistor load

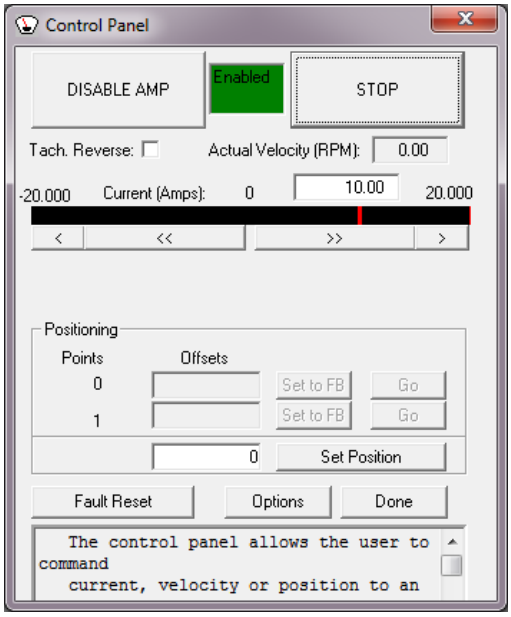
J) Connect the channel 1 scope probe to the amplifiers Analog Out pin. Connect the channel 1 scope common to the amplifiers Common pin. Set the channel 1 vertical scale to around **2V per division**.

K) Connect the channel 2 scope probe to one of the motors leads. Connect the channel 2 scope common to the center of the Y-connected resistor load. Set the channel 2 vertical scale to around **2V per division**. Set the horizontal scale to around **100 ms per division**. Scaling may need to be changed in order to best see the data.

Note: If using a 4 channels oscilloscope, connect channel 3 and 4 to the remaining two motor leads with respect to the center of the Y-connected resistor load.

L) Open the Control Panel. The square colored status box will give you the amplifier status. If the box is yellow or disabled then press the "Enable/Disable Amp" button. If the box is red the amp has a fault and must be cleared before you can proceed.

M) From the Control Panel, apply a digital current command of **10 amps** (or just enough so that voltage command waveform is observable on the oscilloscope) to the amplifier. To do this you may have to expand the range that can be commanded from the Control Panel by selecting the Options button near the bottom of the window. In the Options Control Panel window, manually enter the maximum and minimum values for the desired operating range.



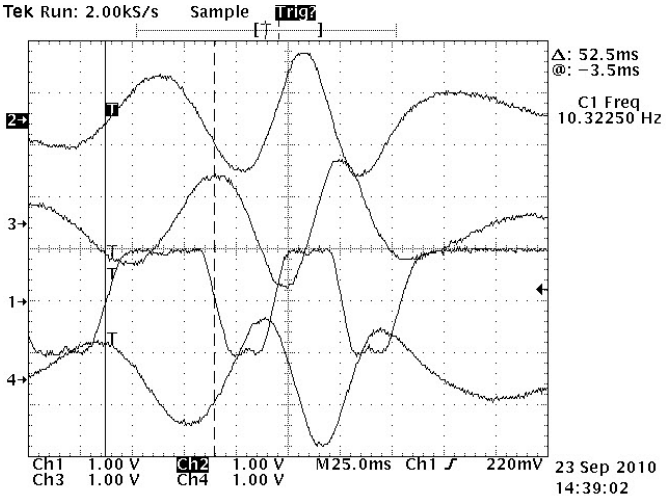
The Control Panel display

N) **Find the phase R motor lead.**

From the "Setup Analog Input/Output" dialog, set the Analog Output Signal Source to "R Voltage Command" and directly below change the Analog Output Signal Gain to 100 percent.

Rotate the motor by hand and verify the trace on channel 1 (Phase R Voltage Command) follows a sinusoidal pattern (except with a flat top). Move the channel 2 scope probe to each motor lead to determine which BEMF waveform is in phase or 180° out of phase with the phase R command. Label this lead Phase R.

For each phase, R, S and T, one direction of rotation should cause the back EMF (BEMF) to be in phase with the command while the reverse rotation direction should cause the BEMF to be 180° out of phase. Determine which direction of rotation is in phase for the phase R motor lead, then rotate the motor in that same direction when determining the S and T motor leads. Once the phases are labeled, double check that the phase R and S motor leads result in waveforms that are in phase with the corresponding digital current commands on the amplifier when rotating the motor in the same direction for both.



Oscilloscope Waveforms

The Oscilloscope Waveforms displays channel 1 as Phase R Voltage Command, channel 2, 3, and 4 as the three motor phases BEMF (captured from a 4 channels oscilloscope). As can be seen, channel 1 is in phase with channel 2. Therefore, channel 2 is motor Phase R.

Note: This method of matching motor leads to the amplifier requires that the motor's Hall sensors transitions are aligned with the motor phase to phase BEMF zero crossings. If the Hall sensors are aligned with the motor's phase to neutral BEMF, then the commutation offset angle must be set to +30 or -30 degrees (you have to try both) before comparing the commands to the BEMF waveforms.

O) **Find the phase S motor lead.**

In MotionMaestro©, change the Analog Output Signal Source *S Voltage Command*. Place the channel 2 scope probe on one of the two remaining motor leads. Rotate the motor in the same direction that was used for phase R above. Determine which of the remaining two leads of the motor result in a waveform that is in phase with the phase S command. Label this lead Phase S. Move the channel 2 probe to the remaining motor lead.

P) **Find the phase T motor lead.**

Same procedure as above with the analog output source set to *T Voltage Command*. If phases R and S were properly found, phase T will be the remaining motor wire. Label this lead phase T.

Q) Set the current command back to **0 by clicking the STOP button on the Control Panel.** Reset any current limits, foldback thresholds to the desired operational settings. Reset the Control Panel options to appropriately safe values. Set the Analog Input Signal Gain back to the desired operational value. Set the "GIM" and "GII" values back to original values. Save the settings by selecting "Save to NVM" from the Setup menu.

R) Remove the amplifier's power. Remove the scope probes. Connect the motor R, S, and T leads to the amplifier's R, S, and T terminals respectively.

S) Apply power to amplifier. The amplifier should still be in **Current Mode** and **Enabled** (unless the external inhibit is active). From the Control Panel window, issue a digital current command of **0**.**5 to 2 amps**, enough so the motor begins to rotate.

T) While the motor is rotating, verify that the polarity of the velocity in the "Actual Velocity (RPM)" matches the polarity of the commanded current in the "Current (Amps)". If NOT, mark (or unmarked if were marked previously) the **Tach Reverse** checkbox on the Control Panel and verify that the polarity now match. Command the opposite polarity current to the motor, **-.5 to -2.0 amps** and verify that the motor reverses direction and runs at approximately the same speed. The signs of the current command and actual velocity should still match.

U) Verify that for the same magnitude current command in both directions, the actual velocity readings in both directions are very close to each other.

V) Set the current command back to 0 by clicking on the **STOP** button of the Control Panel. Save the settings by selecting "Save to NVM" from the setup menu.

The motor should now be properly commutated and phased.

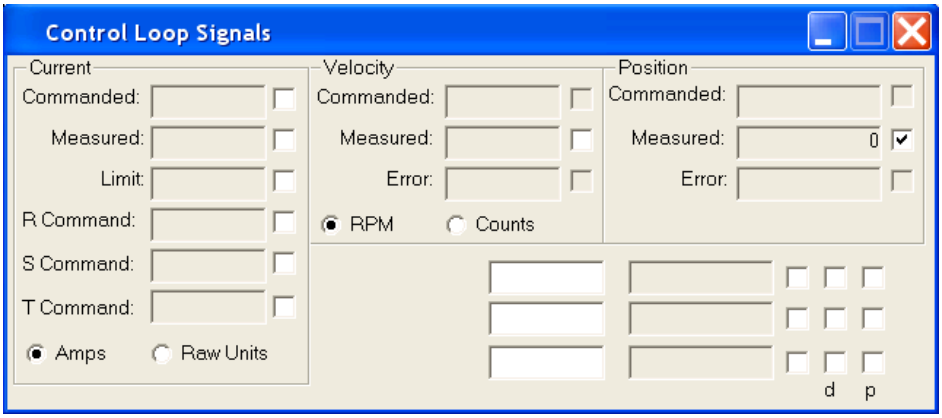
APPENDIX E

E – Determining Encoder Resolution and Number of Poles.

A) Encoder Resolution

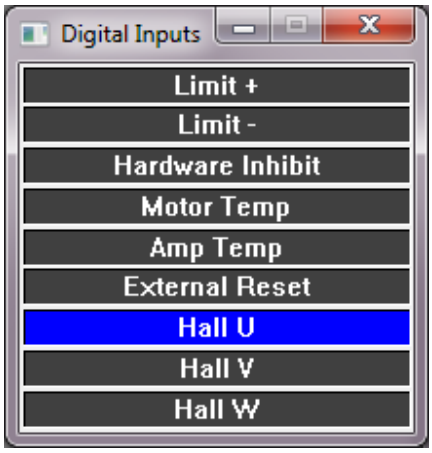
From the MotionMaestro© Status menu, open the "Control Loop Signals" dialog. Check the box that allows you to monitor "Measured" "position" of the encoder, then mark a start position on the motor shaft. Turn the shaft 360 degrees clockwise and monitor the encoder position in the Control Loop Signals dialog. Note the change in encoder counts. Take the change in encoder counts per 1 revolution (360 degrees) and divide by four (4). This is your Lines of Resolution that you will enter in your Commutation dialog. (Note: For better accuracy, you may rotate 10 turns and divide by 40 instead of 4.)

Common encoder line counts include but are not limited to 250. 256. 500, 512, 1000, 1024, 2000. 2048, 2500, 4096, 5000, 8192, and 10,000 lines/revolution.



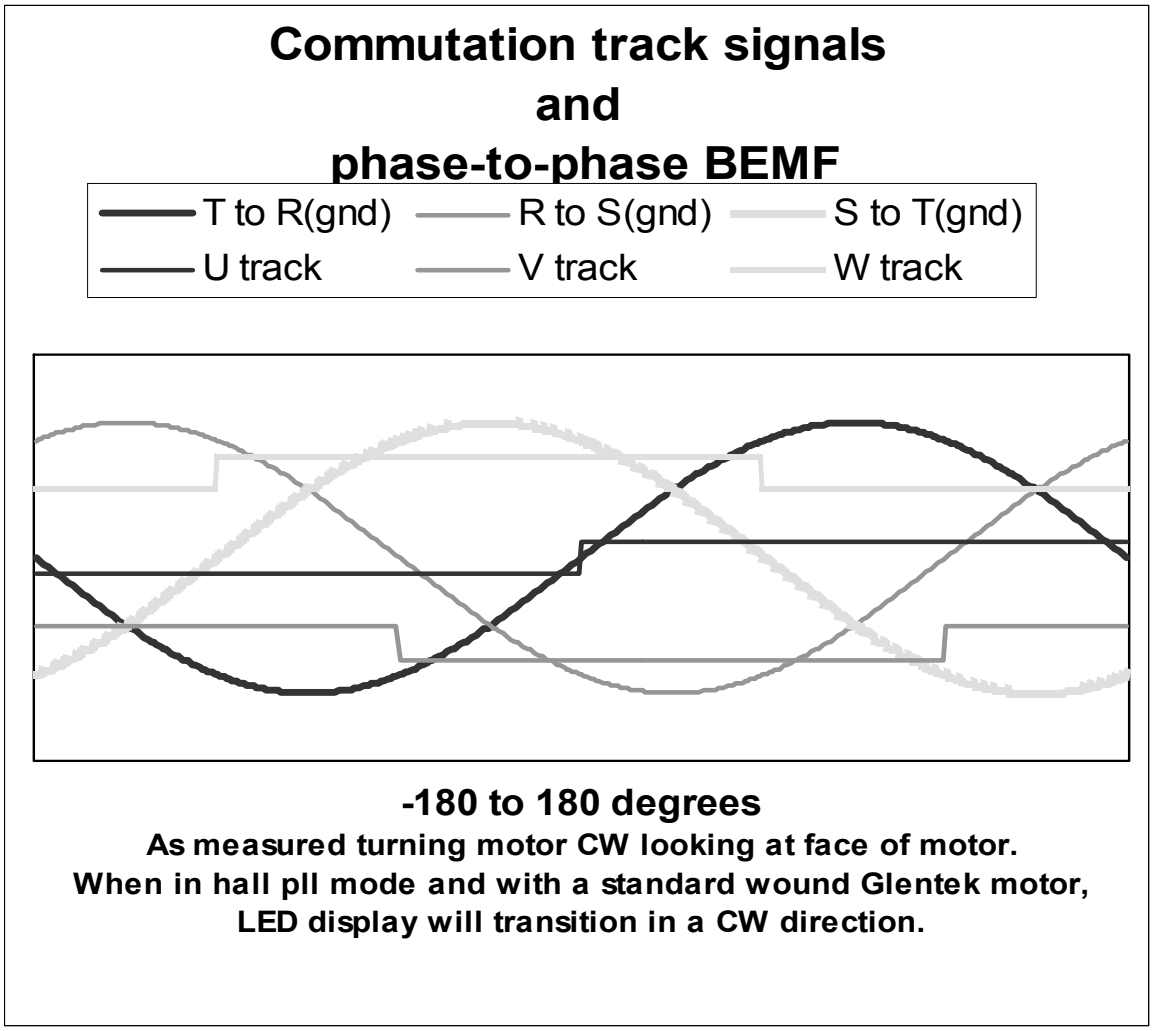
B) Number of Poles (Note: requires Hall sensors)

Enable the amplifier. Mark a start position on the motor shaft. From the MotionMaestro© Status menu, open the "Digital Inputs" status window. You will be monitoring the "Hall U, Hall V, and Hall W" display in the status window as the shaft is rotated. Note the lit Hall segment(s) before rotating the motor shaft, now turn the shaft 360 degrees either clockwise or counterclockwise. As you are rotating shaft, count the number of times the Hall segments display goes through a full rotation (i.e. let's say to start out with only Hall U lid, a full rotation would involve the Hall segment cycles through Hall U, U&V, V, V&W, W, W&U, and U). Take the number of full Hall cycles and multiply by two. This is the Number of Poles that you will enter in your Commutation dialog.



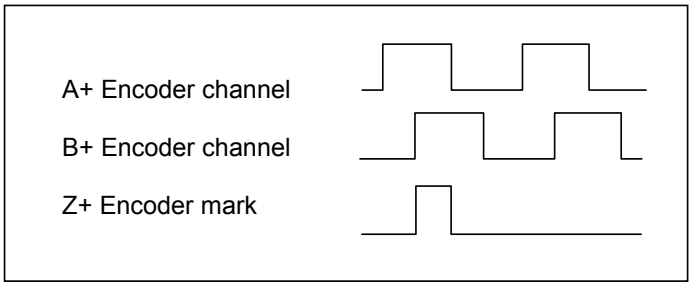
APPENDIX F

F – Commutation Track Signals and Phase-to-Phase BEMF.



Encoder Outputs

The following illustrates the encoder signals for a standard Glentek motor that is correctly commutated where the encoder is not reversed (FER=0) and the tachometer feedback is reversed (TR=1).



APPENDIX G

G – Replacement for Omega Series Amplifiers.

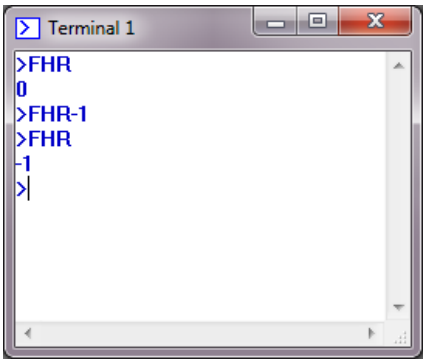
Note: It is highly advised that you contact Glentek's sales department for more detailed and up to date information about integrating a new Alpha Series amplifier as a drop-in replacement for an Omega Series amplifier in an existing design application. Please specify the Omega Series amplifier part number being used to the Glentek's sale department when purchasing the Alpha Series amplifier.

Alpha Series amplifier has extra features and is more flexible compare to the Omega Series amplifier. Therefore, Alpha Series amplifier require additional settings and configurations before it can be optimally used as replacement for Omega Series amplifier.

Note: The backup files for the Alpha Series and Omega Series amplifiers are not 100% compatible. That is, you just can not simply extract the backup file from an Omega Series amplifier and restore it to the Alpha Series amplifier and expect it to work the same. You need to retune your new Alpha Series amplifier. Refer to Amplifier Tuning section starting on page 43 for more information.

The following section describes the necessary steps that are required before an Alpha Series amplifier can be used successfully as a drop-in replacement for an Omega Series amplifier.

1. Make sure you have carried out all the steps in "Connecting The Amplifier To The Motor" section starting on page 42 for information on setting up the amplifier.
2. Make sure you have carried out all the steps in "Amplifier Tuning - Parameter Setup" section starting on page 43 for information on preparing the amplifier for controlling the motor movement.
3. Follow the "Current (Torque) Mode Running and Setting" section on page 48 to run the motor in Current mode.
4. When the motor is running, make sure to check the motor rotation direction, and compare to that of the Omega Series amplifier.
5. If for the same polarity Current command in Motion Maestro Control Panel window, the Alpha Series amplifier command the motor to rotate in the opposite direction as that of the Omega Series amplifier, you need to modify the parameter "FHR" in Terminal window of Motion Maestro software as shown below.



Terminal Window

6. Make sure the amplifier is disabled. At the Terminal window, type "FHR" and press the Enter key to query for the value.
7. If the "FHR" value is "0", then type "FHR-1" and press the Enter key to change the "FHR" value from 0 to –1. If the "FHR" value is "–1", then type "FHR0" and press the Enter key to change the "FHR" value from –1 to 0.

8. Click on Setup>Save to NVM… to permanently save the new setting into the non-volatile memory of the amplifier.
9. Enable the amplifier and follow the “Current (Torque) Mode Running and Setting” section on page 48 to run the motor in Current mode.
10. Verify that for the same polarity Current command in Motion Maestro Control Panel window, the Alpha Series amplifier command the motor to rotate in the same direction as that of the Omega Series amplifier.
11. Once you have successfully setup and run the motor in Current mode, you can continue to set and tune the Alpha Series amplifier to run other modes such as Velocity, or Step/Direction.

Note: Make sure the motor rotates in the proper direction when commanded, and the end of travel limit switches function as desired before connect the motor to other linkage in the machine.

12. The new Alpha Series amplifier is now successfully configured to behave like an Omega Series amplifier that it has just replaced.

APPENDIX H

H – European Union EMC Directives

Electromagnetic Compatibility Guidelines For Machine Design

This document provides background information about Electromagnetic Interference (EMI) and machine design guidelines for Electromagnetic Compatibility (EMC).

Introduction

Perhaps no other subject related to the installation of industrial electronic equipment is so misunderstood as electrical noise. The subject is complex and the theory easily fills a book. This section provides guidelines that can minimize noise problems.

The majority of installations do not exhibit noise problems. However, these filtering and shielding guidelines are provided as counter measures. The grounding guidelines provided below are simply good grounding practices. They should be followed in all installations.

Electrical noise has two characteristics: generation or emission of electromagnetic interference (EMI); and response or immunity to EMI. The degree to which a device does not emit EMI, and is immune to EMI is called the device's Electromagnetic Compatibility (EMC).

Equipment, which is to be brought into the European Union legally, requires a specific level of EMC. Since this applies when the equipment is brought into use, it is of considerable importance that a drive system, as a component of a machine, be correctly installed.

"EMI Source-Victim Model" shows the commonly used EMI model. The model consists of an EMI source, a coupling mechanism and an EMI victim. A device such as servo drives and computers, which contain switching power supplies and microprocessors, are EMI sources. The mechanisms for the coupling of energy between the source and victim are conduction and radiation. Victim equipment can be any electromagnetic device that is adversely affected by the EMI coupled to it.

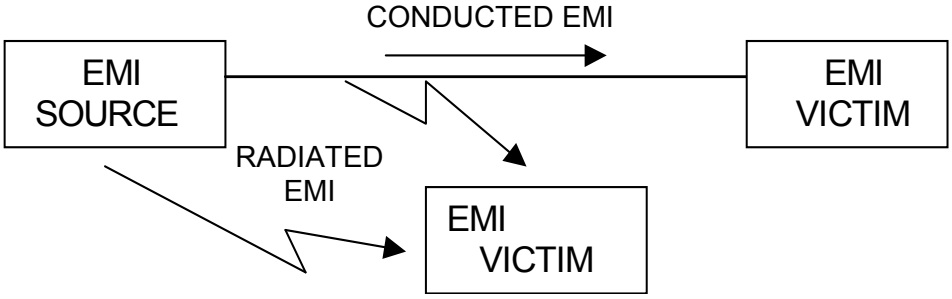


Figure 1- EMI Source-Victim Model

Immunity to EMI is primarily determined by equipment design, but how you wire and ground the device is also critical to achieving EMI immunity. Therefore, it is important to select equipment that has been designed and tested for industrial environments. The EMI standards for industrial equipment include the EN61000-4-X series (IEC 1000-4-X and IEC8O1-X), EN55011 (CISPR11), ANSI C62 and C63 and

MIL-STD-461. Also, in industrial environments, you should use encoders with differential driver outputs rather than single ended outputs, and digital inputs/outputs with electrical isolation, such as those provided with optocouplers.

The EMI model provides only three options for eliminating the EMC problem:

- Reduce the EMI at the source,
- Increase the victim's immunity to EMI (harden the victim),
- Reduce or eliminate the coupling mechanism,

In the case of servo drives, reducing the EMI source requires slowing power semiconductor switching speeds. However, this adversely affects drive performance with respect to heat dissipation and speed/torque regulation. Hardening the victim equipment may not be possible, or practical. The final and often the most realistic solution is to reduce the coupling mechanism between the source and victim. Filtering, shielding and grounding can achieve this.

Filtering

As mentioned above, high frequency energy can be coupled between circuits via radiation or conduction. The AC power wiring is one of the most important paths for both types of coupling mechanisms. The AC line can conduct noise into the drive from other devices, or it can conduct noise directly from the drive into other devices. It can also act as an antenna and transmit or receive radiated noise between the drive and other devices.

One method to improve the EMC characteristics of a drive is to use an isolation AC power transformer on the amplifier's input power. This minimizes inrush currents on power-up and provides electrical isolation. In addition, it provides common mode filtering, although the effect is limited in frequency by the interwinding capacitance. Use of a Faraday shield between the windings can increase the common mode rejection bandwidth, (shield terminated to ground) or provide differential mode shielding (shield terminated to the winding). In some cases an AC line filter will not be required unless other sensitive circuits are powered off the same AC branch circuit.

NOTE:" Common mode" noise is present on all conductors that are referenced to ground. "Differential mode" noise is present on one conductor referenced to another conductor.

The use of properly matched AC line filters to reduce the conducted EMI emitting from the drive is essential in most cases. This allows nearby equipment to operate undisturbed. The basic operating principle is to minimize the high frequency power transfer through the filter. An effective filter achieves this by using capacitors and inductors to mismatch the source impedance (AC line) and the load impedance (drive) at high frequencies.

For drives brought for use in Europe, use of the correct filter is essential to meet emission requirements. Detailed information on filters is included in the manual and transformers should be used where specified in the manual.

AC Line Filter Selection

Selection of the proper filter is only the first step in reducing conducted emissions. Correct filter installation is crucial to achieving both EMIL attenuation and to ensure safety. All of the following guidelines should be met for effective filter use.

1) The filter should be mounted to a grounded conductive surface.

2) The filter must be mounted close to the drive-input terminals, particularly with higher frequency emissions *(5-30* MHz). If the distance exceeds 600mm (2 feet), a strap should

be used to connect the drive and filter, rather than a wire.

3) The wires connecting the AC source to the filter should be shielded from, or at least separated from the wires (or strap) that connects the drive to the filter. If the connections are not segregated from each other, then the EMI on the drive side of the filter can couple over to the source side of the filter, thereby reducing, or eliminating the filter effectiveness. The coupling mechanism can be radiation, or stray capacitance between the wires. The best method of achieving this is to mount the filter where the AC power enters the enclosure. “AC Line Filter Installation” shows a good installation and a poor installation.

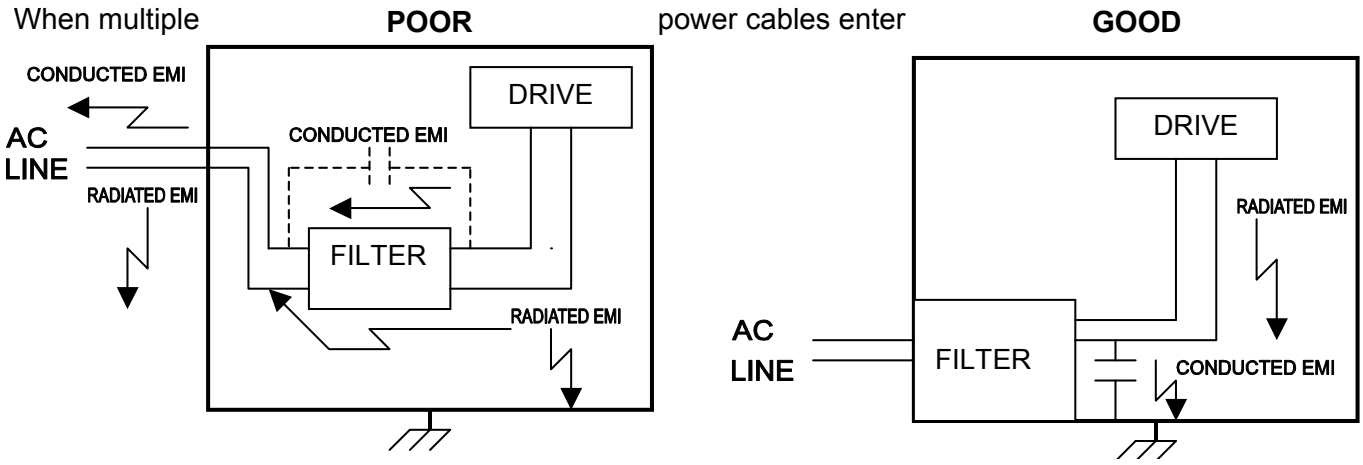
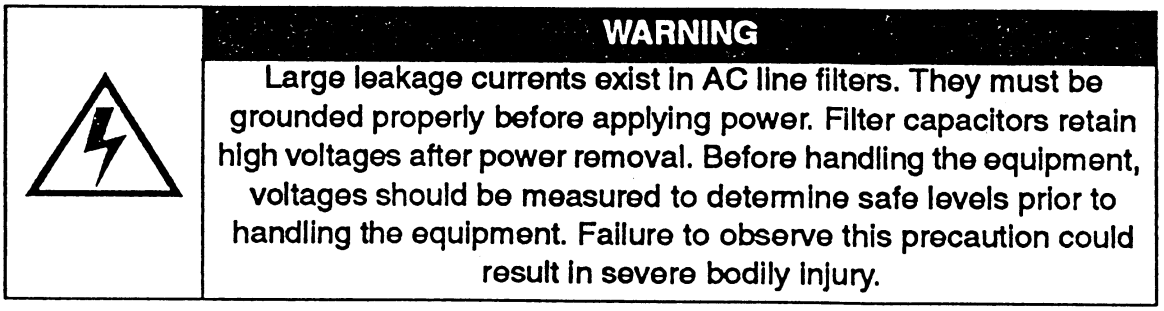


Figure 2- AC Line Filter Installation

A unfiltered line can contaminate a filtered line external to the enclosure. Therefore, all lines must be filtered to be effective. The situation is similar to a leaky boat. All the holes must be plugged to prevent sinking.

If the filter is mounted excessively far from the drive, it may be necessary to mount it to a grounded



conductive surface, such as the enclosure, to establish a high frequency (HF) connection to that surface. To achieve the HF ground, direct contact between the mounting surface and the filter must be achieved. This may require removal of paint or other insulating material from the cabinet or panel.

The only reasonable filtering at the drive output terminals is the use of inductance. Capacitors would slow the output switching and deteriorate the drive performance. A common mode choke can be used to reduce the HF voltage at the drive output. This will reduce emission coupling through the drive back to the AC line. However, the motor cable still carries a large HF voltage and current. Therefore, it is very important to segregate the motor cable from the AC power cable. More information on cable shielding and segregation is contained in the section on shielding.

Grounding

High frequency (HF) grounding is different from safety grounding. A long wire is sufficient for a safety ground, but is completely ineffective as a HF ground due to the wire inductance. As a rule of thumb, a wire has an inductance of 8 nH/in regardless of diameter. At low frequencies it acts as constant impedance, at intermediate frequencies as an inductor, and at high frequencies as an antenna. The use of ground straps is a better alternative to wires. However the length to width ratio must be *5:1,* or better yet 3:1, to remain a good high frequency connection.

The ground system's primary purpose is to function as a return current path. It is commonly thought of as an equipotential circuit reference point, but different locations in a ground system may be at different potentials. This is due to the return current flowing through the ground systems finite impedance. In a sense, ground systems are the sewer systems of electronics and as such are sometimes neglected.

The primary objective of a high frequency ground system is to provide a well-defined path for HF currents and to minimize the loop area of the HF current paths. It is also important to separate HF grounds from sensitive circuit grounds. "Single Point Ground Types" shows single point grounds for both series (daisy chain) and parallel (separate) connections. A single point, parallel connected ground system is recommended.

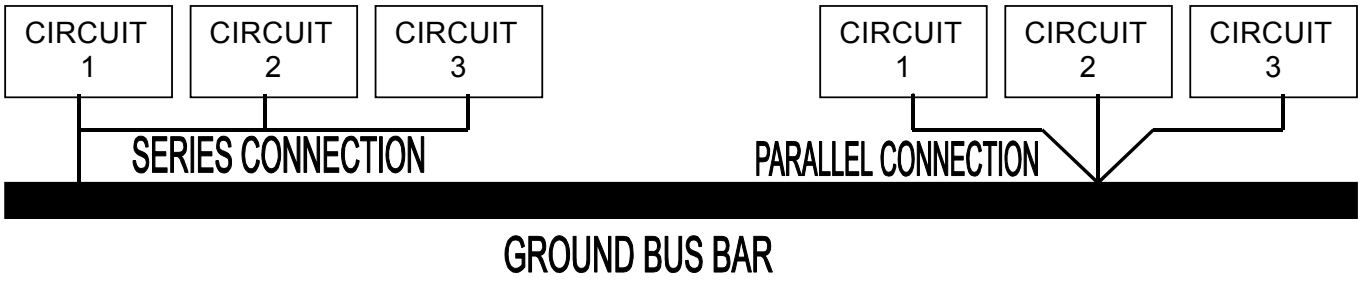


Figure 3-Single Point Ground Types

A ground bus bar or plane should be used as the "single point" where circuits are grounded. This will minimize common (ground) impedance noise coupling. The ground bus bar (GBB) should be connected to the AC ground, and if necessary, to the enclosure. All circuits or subsystems should be connected to the GBB by separate connections. These connections should be as short as possible and straps should be used when possible. The motor ground conductor must return to the ground terminal on the drive, not the GBB.

Shielding and Segregation

The EMI radiating from the drive enclosure drops off very quickly over distance. Mounting the drive in an enclosure, such as an industrial cabinet, further reduces the radiated emissions. The cabinet should have a high frequency ground and the size of the openings should be minimized. In addition, the drive is considered an "open" device that does not provide the proper IP rating for the environment in which it is installed. For this reason the enclosure must provide the necessary degree of protection. An IP rating or Nema rating (which is similar to IP) specifies the degree of protection that an enclosure provides.

The primary propagation route for EMI emissions from a drive is through cabling. The cables conduct the EMI to other devices, and can also radiate the EMI. For this reason, cable segregation and shielding are important factors in reducing emissions. Cable shielding can also increase the level of immunity for a drive. For example:

- Shield termination at both ends is extremely important. The common misconception that shields should be terminated at only one end originates from audio applications with frequen-

cies <20 kHz. RF applications must be terminated with the shield at both ends, and possibly at intermediate points for exceptionally long cables.

- When shielded cables are not terminated at the cable connection and pass through the wall of a cabinet, the shield must be bonded to the cabinet wall to prevent noise acquired inside the cabinet from radiating outside the cabinet, and vice versa.

- When shielded cables are terminated to connectors, the shield must be able to provide complete 360^0 coverage and terminate through the connector backshell. The shield must ***not*** be grounded inside the connector through a drain wire. Grounding the shield inside the connector couples the noise on the shield to the signal conductors sharing the connector and virtually guarantees failure to meet European EMC requirements.

- The shield must be continuous. Each intermediate connector must continue the shield connection through the backshell.

- All cables, both power and signal should use twisted wire pairing.

The shield termination described above provides a coaxial type of configuration, which provides magnetic shielding, and the shield provides a return path for HF currents that are capacitively coupled from the motor windings to the frame. If power frequency circulating currents are an issue, a 250 VAC capacitor should be used at one of the connections to block 50/60 Hz current while passing HF currents. Use of a properly shielded motor cable is essential to meet European EMC requirements.

The following suggestions are recommended for all installations.

1. Motor cables must have a continuous shield and be terminated at both ends. The shield must connect to the ground bus bar or drive chassis at the drive end, and the motor frame at the motor end. Use of a properly shielded motor cable is essential to meet European EMC requirements.

2. Signal cables (encoder, serial, and analog) should be routed away from the motor cable and power wiring. Separate steel conduit can be used to provide shielding between the signal and power wiring. Do not route signal and power wiring through common junctions or raceways.

3. Signal cables from other circuits should not pass within 300 mm (1 ft.) of the drive.

4. The length or parallel runs between other circuit cables and the motor or power cable should be minimized. A rule of thumb is 300 mm (1 ft.) of separation for each 10 m (30 ft.) of parallel run. The 300 mm (1 ft.) separation can be reduced if the parallel run is less than 1 m (3 ft.).

5. Cable intersections should always occur at right angles to minimize magnetic coupling.

6. The encoder mounted on the brushless servomotor should be connected to the amplifier with a cable using multiple twisted wire pairs and an overall cable shield. Encoder cables are offered in various lengths that have correct terminations.

Persistent EMI problems may require additional countermeasures. The following suggestions for system modification may be attempted.

1. A ferrite toroid or “doughnut” around a signal cable may attenuate common mode noise, particularly RS-232 communication problems. However, a ferrite toroid will not help differential mode noise. Differential mode noise requires twisted wire pairs.

2. Suppress each switched inductive device near the servo amplifier. Switch inductive devices include solenoids, relay coils, starter coils and AC motors (such as motor driven mechanical timers).

3. DC coils should be suppressed with a “free-wheeling” diode connected across the coil.

4. AC coils should be suppressed with RC filters (a 200 Ohm 1/2 Watt resistor in series with a *0.5* uF, 600 Volt capacitor is common).

Following these guidelines can minimize noise problems. However, equipment EMC performance must meet regulatory requirements in various parts of the world, specifically the European Union. Ultimately, it is the responsibility of the machine builder to ensure that the machine meets the appropriate requirements as installed.

RECOMMENDATIONS FOR GLENTEK AMPLIFIERS

All amplifiers installed in a NEMA 12 enclosures or equivalent with wiring in metal conduit or enclosed metal wire trough (see Shielding and segregation).

Use Glentek shielded feedback and motor cables.

An AC line filter properly installed in a NEMA 12 enclosure or equivalent (see Filtering).

AC line filters for single-phase applications

1A-15A	input current, 120-250VAC use: Schaffner FN2070-16 or equivalent.
15A-25A	input current, 120-250VAC use: Schaffner FN2070-25 or equivalent.
25A-36A	input current, 120-250VAC use: Schaffner FN2070-36 or equivalent.

AC line filters for 3-phase applications

1A-15A	input current, 120-250VAC use: Schaffner FN258-16 or equivalent.
15A-25A	input current, 120-250VAC use: Schaffner FN258-30 or equivalent.
25A-36A	input current, 120-250VAC use: Schaffner FN258-42 or equivalent.
36A-50A	input current, 120-250VAC use: Schaffner FN258-55 or equivalent.
50A-75A	input current, 120-250VAC use: Schaffner FN258-75 or equivalent.
75A-100A	input current, 120-250VAC use: Schaffner FN258-100 or equivalent.

EUROPEAN UNION
DECLARATION OF INCORPORATION
MOTION CONTROL SYSTEMS

Classified as Components of Machinery

Model Series SMX9Yaa

Council Directive 89/392/EEC Machinery Directive

The Products cited below and their accessories comply with the following Safety of Machinery Standards when installed and operated in accordance with the Instructions provided in the Operation & Installation Manuals. The products are declared to comply by virtue of Design Third Party Evaluations and Testing. EMC Testing and Product Safety Evaluations and Risk Assessments were conducted by Intertek ETL SEMKO, an independent Nationally Recognized Test Laboratory, located in Laguna Niguel, CA 92677, USA.

As components of Machinery, please be advised that:

1. These are not individually classified as machinery within the scope of directive 89/392/EEC.
2. These are intended to be incorporated into machinery or to be assembled with other machinery to constitute machinery covered by directive 89/392/EEC, as amended.
3. As such, do therefore not in every respect comply with the provisions of directive 89/392/EEC.

SAFETY STANDARDS

EN60204-1 (IEC204-1)	Electrical Equipment of Industrial Machines
	Collateral Test Standards, Specified by EN60204-1
EN61000-6-4:2001	EMC – Emission standard for industrial environments
EN61000-6-2:2001	EMC – Immunity for industrial environments
	Collateral Test Standards, Specified by EN61000-6-2

Manufacturers Name:	GLENTEK INC.
Manufacturers Address:	208 Standard Street El Segundo, CA 90245, USA
Description of Equipment:	Motion Control Systems including Amplifiers and Servo Motors
Model / Type Reference:	Omega series: SMX9Yaa, where X can be A, B or C, Y can be 1-9 and aa represents amp rating which can be 08, 15, 20, 30, 45, or 75. Maybe followed by bbb-, may be followed by ccc-, may be followed by ddd-, may be followed by ef-, may be followed by g-, may be followed by h where b,c,d,e,g, and h can be 0 to 9 and f can be A-E.

The undersigned hereby declares that the equipment specified above conforms to the noted Directives and Standards.

MANUFACTURER

Helen M. Vasak

HELEN M. VASAK

SECRETARY-TREASURER

1-22-2008

Prepared By: Intertek Testing Services, Laguna Niguel, CA
Confirmed By: John Quigley, Quality Manager

APPENDIX I

I - Amplifier Terms and Technology

This appendix contains information that describes and explains the terms and concepts referred to in this manual. The information contained here is generic to amplifiers and motion control technology in general and does not apply specifically to the SMX94XX, and SMX95XX series amplifiers. The TERMS section is a glossary that defines the terms used when discussing amplifiers. The TECHNOLOGY section describes methods or concepts that involves the usage of multiple terms.

TERMS

Analog Current Command Mode

Analog current mode, also called Torque mode or Current mode, indicates that the amplifier is being commanded by an analog signal and that the amplifiers' control loop is controlling current. This command mode is used when one needs to control torque. The analog signal, in volts, is a scaled representation of desired current as measure at the output. For instance -10 volts to 10 volts at the analog input becomes -15 amps to 15 amps at the amplifiers output. The scaling is different for different amplifiers.

Analog Velocity Command Mode

Analog velocity mode indicates that the amplifier is being commanded by an analog signal and that the amplifiers' control loop is controlling velocity. This command mode is used when one needs to control the speed of some device. The analog signal, in volts, is a scaled representation of desired velocity as measured at the output. For instance -10 volts to 10 volts at the analog input becomes -3000 rpm to 3000 rpm at the device being moved. The scaling is can often be configured by the application engineer.

Command Mode

A term used to refer to the method by which a command is given to an amplifier. The amplifier uses this command in its' control loop as a target to be achieved. The command mode usually includes how the amplifier is to interpret the command. That is, is the command to represent current, velocity or position. There are many forms and methods by which commands are submitted to an amplifier. Traditionally the command was given as an analog voltage input to the amplifier. Today there is analog, digital, serial communications or some combination of these.

Commutation

Commutation is the term used to describe the method by which current is applied to the windings of a motor such that the applied current moves the motor in a desired direction, or to a desired position, with the minimum current. Brushes are the method of commutation in a brush motor. In a three phase brushless motor, Sinusoidal Commutation is the usual method of commutation. See Sinusoidal Commutation.

Commutation Initialization Method

In order to properly commutate a brushless motor, the servo drive must know the absolute position of the rotor with respect to the motor windings in the stator. Since incremental shaft encoders only supply "relative" rotor position, the servo drive must perform a power-on, phase-finding scheme to determine the absolute position of the shaft. This is known as commutation initialization. Once the absolute position is determined, the position from the encoder can be used to maintain the absolute position. The SMX94XX/SMX95XX amplifiers have two power-on commutation initialization methods available for

finding the absolute position of the rotor. The Smart-Comm method requires the rotor to move; the second scheme, Hall, does not require motion. The Hall method does require the addition of Hall sensors or commutation tracks. Commutation tracks are simulated Hall sensors built into the shaft encoder.

Hall Commutation Initialization

Hall commutation initialization is a method that relies on sensors to give an approximation of the initial commutation angle of a motor. Hall initialization uses Hall sensors or commutation tracks (simulated Hall sensors built into the shaft encoder) to determine the rotor angle. In a brushless motor three Hall sensors are used to detect rotor position. The three Hall sensors employed are commonly named U, V and W; S1, S2 and S3; or A, B and C. The I sensors are digital (on/off) devices and therefore the combination of the three can result in eight different states. The sensors are aligned with the motor in a way that causes the output of the sensors to transition through six of the eight possible states as the motor is rotated through 360 electrical degrees. Each Hall state corresponds to 60 electrical degrees. Only one sensor changes states at any given transition.

At power up, the servo drive reads the state of the Hall sensors and from this state can determine within ±30 electrical degrees where the motor shaft is located. This is close enough to start commutating the motor, so the servo drive uses this approximation as the actual rotor position. Once motion is commanded (position, velocity or torque), the servo drive starts commutating with this value and watches for a transition of the Halls state. Upon this transition, the servo drive knows the exact location of the rotor shaft and updates the commutation angle based on this known location.

The hall method does not move the rotor shaft at power up. Instead, it uses a non-optimal commutation angle at start-up and corrects to the optimal commutation angle upon the first Hall state transition once motion is commanded.

Phase Lead

Glentek's advanced algorithms provide automatic phase lead and eliminate the need to manually specify phase lead. These advanced algorithms ensure that the system is operating at the highest possible speed and with maximum efficiency.

Sinusoidal Commutation

In sinusoidal commutation a sinusoidal current is applied to each phase of the motor to cause the motor to rotate. In a three phase motor, the relationship of the currents applied in the three phases for a positive rotation of the rotor is:

$IR(\theta e) = I * \sin(\theta e)$,
$IS(\theta e) = I * \sin(\theta e - 120°)$,
$IT(\theta e) = I * \sin(\theta e - 240°)$;

where:

IR, IS, and IT are the currents applied to phase R, S, and T respectively,
I is the amplitude of the commanded current,
θe is the "electrical angle" of the applied currents.

The relationship between the electrical angle, θc, and the mechanical angle (the angle of the rotor), θm, is:

$\theta m = \theta c \times 2/N$,

where

N is the number poles in the motor.

For example, a 4-pole motor (two North poles and two South poles) will rotate 180 mechanical degrees as the currents applied are varied through 360 electrical degrees.

Smart-Comm

Smart-Comm commutation is a method that does not rely on encoder commutation tracks or hall sensors for motor commutation. It is important to note that the smart-comm algorithm always returns the motor shaft to its initial starting position after moving the motor shaft a few encoder counts to determine the correct commutation angle. The following gain variables listed below can be used to additionally tune the algorithm if it is desired.

Note: For smart-comm commutation method, the commutation tracks are not needed (only incremental encoder is needed) as shown in the Current Loop Control Diagram Alpha Series on page 17.

If you are planning to use smart-comm, be sure to contact your Glentek sales agent first, and he/she can have these following variables preset at the factory before shipment. However, the default value in the amplifier will work for most cases.

Proportional Gain: This value should initially be set to a low value. The default value is 1024 and this should be a low enough value to start off with in most situations. Depending on the shaft size or the inertia of the motor, the beginning Proportional Gain may need to be set lower than the default value. The higher the Proportional Gain value is set to, it will make the shaft have less movement during commutation initialization. The max value for this value is 32767.

Integral Gain: This value can be initially set to 0. If a high Proportional Gain can be achieved, there will be very little movement during commutation initialization, and Integral Gain may not be necessary. However, any value of Integral Gain will pull the motor back to its original position. The higher the integral gain the faster this will happen. This value should be relatively low and the max value should be no more than 100.

Derivative Gain: This value can be initially zero but after the Proportional Gain is set then the Derivative Gain can be set as high as possible, typically 1/2 of Proportional Gain.

Initial Current: This value can always be 0. The only reason to use it would be to reduce the total initialization time by giving the current a head start. This is especially true if the Final Current is a large number.

Final Current: This value must be greater than the Initial Current. The Final Current should be enough to make the motor shaft move or enough current to make the load move. Typically, the final current is set at the motor's rated stall current.

Ramping Time: This value is the amount of time that it will take the to change the initial current to the final current. This value is in seconds.

Timer Ticks: This value is the amount of time that the commutation initialization will take. This value must be greater than the Ramping Time. This value is in seconds.

TECHNOLOGY

Selection of a commutation initialization method

The first step in selecting a commutation initialization method is to determine whether motion can be tolerated upon power up. If motion is not acceptable, then the motor must be equipped with Hall sensors or commutation tracks and Hall initialization should be used. If motion is acceptable at power up, then the second item which will prevent Smart-Comm initialization from working properly is the presence of large external torque applied on the motor rotor. If large external torque exist which either resist rotor motion (such as a break or excessive friction), or cause the rotor to rotate (such as a gravity), then Smart-Comm can result in a non-optimal commutation angle. This occurs because these modes both rely upon finding equilibrium between the applied motor current and the rotor position; an external torque will alter this equilibrium position. If a large enough current is applied during initialization, this external torque can be overcome and an acceptable commutation angle can be achieved.

If Smart-Comm is selected, the amount of current to the motor during initialization must be set. The values such as initial current and final current need to be set for commutation initialization to occur. The default value can be used as a basis. After following the process outlined in the Terms Appendix (page 87) these values can be tuned to the application necessary.

FOC (Field Oriented Control)

This is a math-intensive technique for controlling brushless dc and ac induction motors that consists of controlling the stator currents represented by a vector. This control is based on projections which transform a three-phase time and speed dependent system into a two co-ordinate (d and q co-ordinates) time invariant system. This makes the control accurate in every working operation (steady state and transient) and independent of the limited bandwidth mathematical model. This reduces motor size, cost and power consumption.

SVPWM (Space Vector Pulse Width Modulation)

This is an algorithm for the control of pulse width modulation (PWM). It is used for the creation of alternating current (AC) waveforms; most commonly to drive 3 phase AC powered motors at varying speeds from DC using multiple class-D amplifiers. The SVPWM generates minimum harmonic distortion of the currents in the winding of 3-phase AC motor. SVPWM also provides a more efficient use of the supply voltage in comparison with sinusoidal modulation methods.

APPENDIX J

J - Amplifier Model Numbering

This appendix explains the model numbering system for Glentek's Alpha Series Digital servo amplifiers. The model numbering system is designed so that you, our customer, will be able to quickly and accurately create the model number for the amplifier that best suits your needs. This manual contains complete model numbering information for the following amplifier types:

SMB/SMC 9508	**SMB/SMC 9410**	**SMB/SMC 9430**
SMB/SMC 9515	**SMB/SMC 9415**	**SMB/SMC 9445**
SMB/SMC 9408	**SMB/SMC 9420**	**SMB/SMC 9475**

In order to minimize confusion, the above amplifier types have their own respective model numbering sections on the pages that follow. In order to accurately select a complete part number, please follow the steps shown below:

1. Select the amplifier type which meets your power requirements (i.e. SMB94XX, SMC94XX) and proceed to that section of model numbering.

2. Select the industry standard mounting configuration which meets your needs (i.e. Module, Stand Alone or Multi-Axis).

3. Utilize the model number key in conjunction with the tables at the beginning of each section to select the complete model number for your requirements. Note: A complete model number example follows the model number key and includes a full description of the individual codes which make up the complete model number.

The difference between SMB94XX/SMB9515 and SMC94XX/SMC9515.

1. SMB94XX/SMB9515 uses BUS input to power up the logic board and encoder.
- Advantage: Only requires one input power source to operate the amplifier.
- Disadvantage: In case of input power failure, the amplifier will shut down completely including the logic board and encoder.

2. SMC94XX/SMC9515 requires external 24VDC "Keep Alive" input to power up the logic board and encoder.
- Advantage: As long as the external 24VDC stays on, the logic board and encoder power will stay alive even if the BUS input shuts down.
- Disadvantage: Needs two separate input power sources (external 24VDC & BUS input) to operate the amplifier.

Note: SMX9508 is non-isolated. Therefore, an isolated power supply is highly recommended for optimal performance. SMC9508 requires external 5VDC "Keep Alive" input to power up the logic and encoder. Please contact one of Glentek sale engineers if logic power other than 24VDC is needed for SMC94XX/SMC9515.

SMx9508 Amplifier Model Numbering

The following tables are used to fill in the different parts of the model number. Refer to these when constructing a model number for your requirements.

SMx9508 Module

Model number key: **SMx9508 - bbb - 1cc - 1**

x = B Designates BUS Logic Power.

x = C Designates External 5VDC Logic Power.

bbb Input BUS and Power Rating Configuration Code.

1cc Functionality Configuration Code.

1 Single amplifier module.

SMx9508 Multi - Axis Amplifier

Model number key: **SMx9508 - bbb - 1cc - eA - g**

x = B Designates BUS Logic Power.

x = C Designates External 5VDC Logic Power.

bbb Input BUS and Power Rating Configuration Code.

1cc Functionality Configuration Code.

eA Mounting Configuration Code.

g Number of amplifiers installed.

bbb		Power	Power Input Voltage		Continuous Current (Amps)	Peak Current (Amps)
SMB	SMC		Module (VDC)	Chassis (VAC)		
003	**103**	Standard	70 - 190	110 - 130	4	8
006	**106**	Standard	24 - 70	17-50	4	8

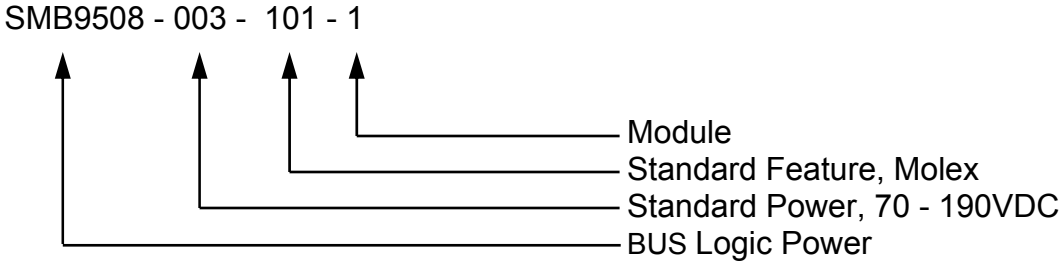
1cc	Functionality Description	Controller I/O & Feedback Connectors	Host Connector
101	Standard Feature	Molex	RJ45
107	Pulse Follower	Molex	RJ45
109	2 phase Current Mode	Molex	RJ45
111	Brush Type and Encoder	Molex	RJ45
113	Brush Type and Tachometer	Molex	RJ45
115	CANopen	Molex	RJ45

eA	Mounting
2A	2-Axis Chassis
4A	4-Axis Chassis
5A*	5-Axis Chassis

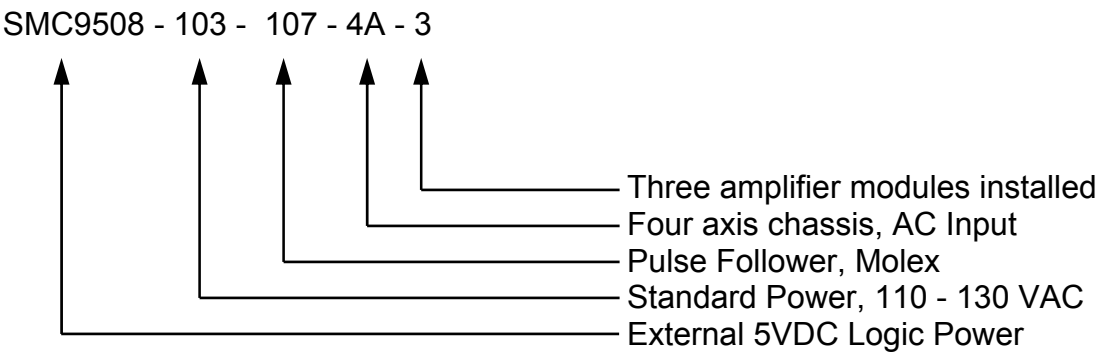
* 5-Axis Chassis is available. Consult with Glentek sales department before selecting this option.

g	Number of Amplifiers Installed
1	1 Amplifier Installed
2	2 Amplifiers Installed
3	3 Amplifiers Installed
4	4 Amplifiers Installed
5*	5 Amplifiers Installed

Module Example :



Multi-axis Example :



SMx9515 Amplifier Model Numbering

The following tables are used to fill in the different parts of the model number. Refer to these when constructing a model number for your requirements.

SMx9515 Module

Model number key: **SMx9515 - bbb - 1cc - 1**

x = B Designates BUS Logic Power.

x = C Designates External 24VDC Logic Power.

bbb Input BUS and Power Rating Configuration Code.

1cc Functionality Configuration Code.

1 Single amplifier module.

SMx9515 Multi - Axis Amplifier

Model number key: **SMx9515 - bbb - 1cc - eB - g - h**

x = B Designates BUS Logic Power.

x = C Designates External 24VDC Logic Power.

bbb Input BUS and Power Rating Configuration Code.

1cc Functionality Configuration Code.

eB Mounting Configuration Code.

g Number of amplifiers installed.

h Fan Power.

bbb		Power	Power Input Voltage		Continuous Current (Amps)	Peak Current (Amps)
SMB	**SMC**		Module (VDC)	Chassis (VAC)		
000	**100**	Standard	190 - 370	208 - 240	15	30
001	**101**	High	190 - 370	208 - 240	20	40
002	**102**	Low	190 - 370	208 - 240	10	20
003	**103**	Standard	70 - 190	110 - 130	15	30
004	**104**	High	70 - 190	110 - 130	20	40
005	**105**	Low	70 - 190	110 - 130	10	20
006	**106**	Standard	24 - 70	Not Available	15	30
007	**107**	High	24 - 70	Not Available	20	40
008	**108**	Low	24 - 70	Not Available	10	20

1cc	Functionality Description	Controller I/O & Feedback Connectors	Host Connector
101	Standard Feature	Molex	RJ45
107	Pulse Follower	Molex	RJ45
109	2 phase Current Mode	Molex	RJ45
111	Brush Type and Encoder	Molex	RJ45
113	Brush Type and Tachometer	Molex	RJ45
115	CANopen	Molex	RJ45

eB	Mounting
2B*	2-Axis Chassis
4B*	4-Axis Chassis
5B**	5-Axis Chassis

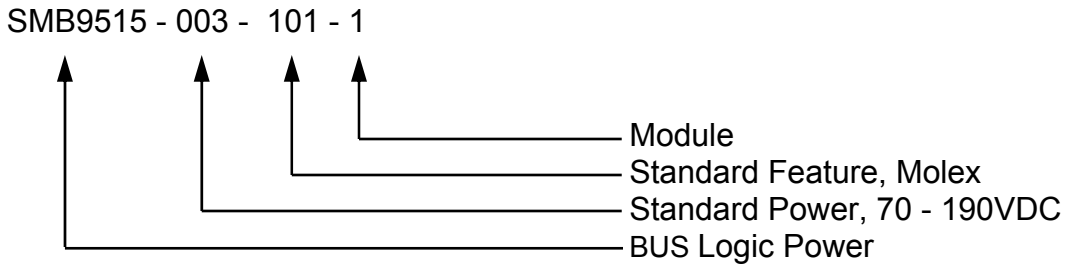
h	Fan Power
1	115VAC
2	230VAC

g	Number of Amplifiers Installed
1	1 Amplifier Installed
2	2 Amplifiers Installed
3	3 Amplifiers Installed
4	4 Amplifiers Installed
5**	5 Amplifiers Installed

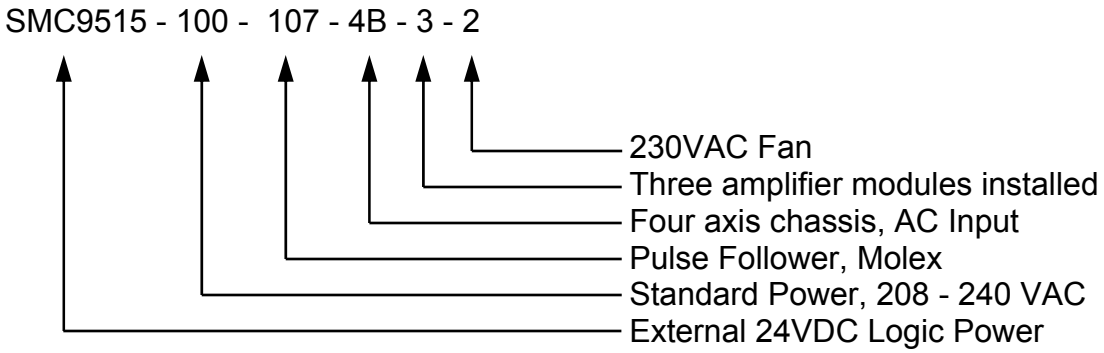
* The 2B and 4B designators shown above for the 2 and 4-axis chassis represent the incorporation of the latest generation bus power supply. The older style bus power supply was designated as 2A and 4A which can be special ordered upon request.

** 5-Axis Chassis is available. Consult with Glentek sales department before selecting this option.

Module Example :



Multi-axis Example :



SMx9408 Amplifier Model Numbering

The following tables are used to fill in the different parts of the model number. Refer to these when constructing a model number for your requirements.

SMx9408 Stand Alone

Model number key: **SMx9408 - bbb - jcc - 1A - 1**

x = B Designates BUS Logic Power.

x = C Designates External 24VDC Logic Power.

bbb Input BUS and Power Rating Configuration Code.

jcc Logic Board Configuration Code.

1A Mounting Configuration Code, Single axis Stand Alone.

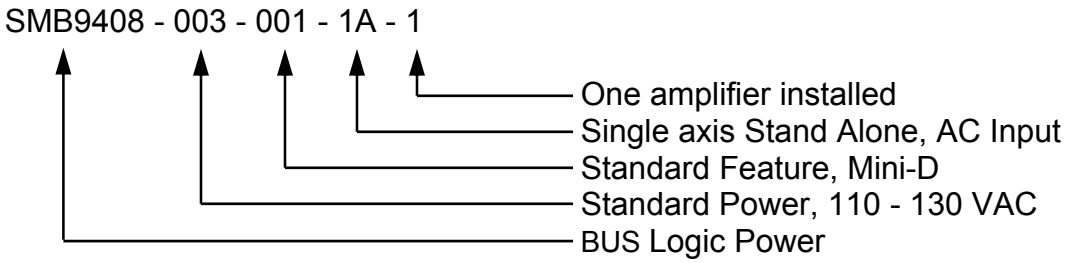
1 Single amplifier module.

bbb		Power	Power Input Voltage	Continuous Current (Amps)	Peak Current (Amps)
SMB	SMC		Stand Alone (VAC)		
003	**103**	Standard	110 - 130	4	8
004	**104**	High	110 - 130	8*	16*

* Consult with Glentek sales department before selecting this option, and it requires external forced-air cooling. It is highly recommended that SMx9410 amplifier is ordered when current requirement of this level or higher is needed.

jcc	Controller I/O & Feedback Connectors		Functionality Description	Host Connector
	j = 0	j = 1		
j01	Mini-D	Molex	Standard Feature	RJ45
j07	Mini-D	Molex	Pulse Follower	RJ45
j09	Mini-D	Molex	2 phase Current Mode	RJ45
j11	Mini-D	Molex	Brush Type and Encoder	RJ45
j13	Mini-D	Molex	Brush Type and Tachometer	RJ45
j15	Mini-D	Molex	CANopen	RJ45

Stand Alone Example :



SMx9410 Amplifier Model Numbering

The following tables are used to fill in the different parts of the model number. Refer to these when constructing a model number for your requirements.

SMx9410 Stand Alone

Model number key: **SMx9410 - bbb - jcc - 1f - 1**

x = B Designates BUS Logic Power.

x = C Designates External 24VDC Logic Power.

bbb Input BUS and Power Rating Configuration Code.

jcc Logic Board Configuration Code.

1f Mounting Configuration Code, Single axis Stand Alone.

1 Single amplifier module.

bbb		Power	Power Input Voltage	Continuous Current (Amps)	Peak Current (Amps)
SMB	SMC		Stand Alone (VAC)		
000	**100**	Standard	208 - 240	5	10
001	**101**	High	208 - 240	10*	20*
003	**103**	Standard	110 - 130	5	10
004	**104**	High	110 - 130	10*	20*

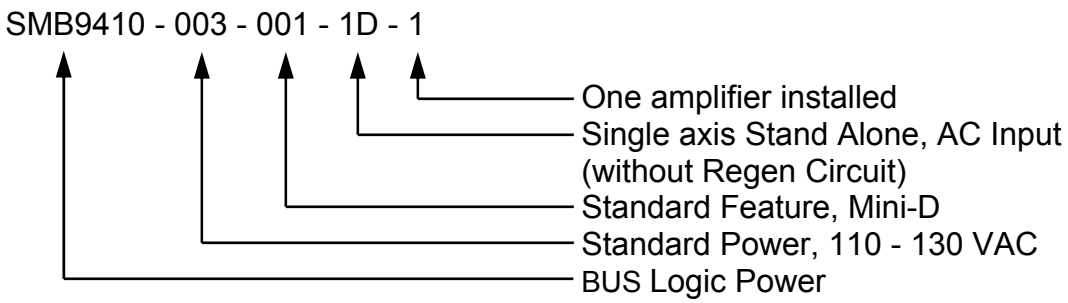
jcc	Controller I/O & Feedback Connectors		Functionality Description	Host Connector
	j = 0	j = 1		
j01	Mini-D	Molex	Standard Feature	RJ45
j07	Mini-D	Molex	Pulse Follower	RJ45
j09	Mini-D	Molex	2 phase Current Mode	RJ45
j11	Mini-D	Molex	Brush Type and Encoder	RJ45
j13	Mini-D	Molex	Brush Type and Tachometer	RJ45
j15	Mini-D	Molex	CANopen	RJ45

1f	Mounting
1D	1 - axis Stand Alone Without Regen Circuit
1F**	1 - axis Stand Alone With Regen Circuit

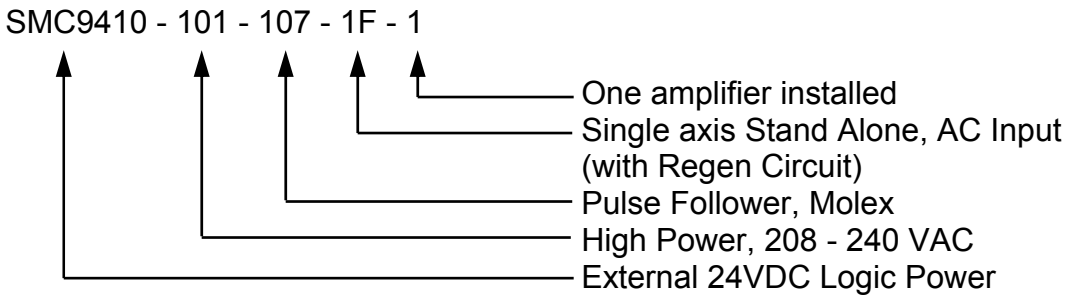
* Requires external forced-air cooling.

** Requires external regen resistors. Amplifier height is slightly wider in the 1F package than that of the 1D (see installation drawings for further info).

Stand Alone (without Regen Circuit) Exam-



Stand Alone (with Regen Circuit) Example :



SMx9415 Amplifier Model Numbering

The following tables are used to fill in the different parts of the model number. Refer to these when constructing a model number for your requirements.

SMx9415 Module

Model number key: **SMx9415 - bbb - jcc - 1**

x = B Designates BUS Logic Power.

x = C Designates External 24VDC Logic Power.

bbb Input BUS and Power Rating Configuration Code.

jcc Logic Board Configuration Code.

1 Single amplifier module.

SMx9415 Multi - Axis Amplifier

Model number key: **SMx9415 - bbb - jcc - eB - g - h**

x = B Designates BUS Logic Power.

x = C Designates External 24VDC Logic Power.

bbb Input BUS and Power Rating Configuration Code.

jcc Logic Board Configuration Code.

eB Mounting Configuration Code.

g Number of amplifiers installed.

h Fan Power.

SMx9415 Stand Alone

Model number key: **SMx9415 - bbb - jcc - 1f - 1**

x = B Designates BUS Logic Power.

x = C Designates External 24VDC Logic Power.

bbb Input BUS and Power Rating Configuration Code.

jcc Logic Board Configuration Code.

1f Mounting Configuration Code.

1 Single amplifier module.

bbb		Power	Power Input Voltage		Continuous Current (Amps)	Peak Current (Amps)
SMB	**SMC**		Module (VDC)	Stand Alone/ Chassis (VAC)		
000	**100**	Standard	190 - 370	208 - 240	15	30
001	**101**	High	190 - 370	208 - 240	20	40
002	**102**	Low	190 - 370	208 - 240	10	20
003	**103**	Standard	70 - 190	110 - 130	15	30
004	**104**	High	70 - 190	110 - 130	20	40
005	**105**	Low	70 - 190	110 - 130	10	20
006	**106**	Standard	24 - 70	Not Available	15	30
007	**107**	High	24 - 70	Not Available	20	40
008	**108**	Low	24 - 70	Not Available	10	20

jcc	Controller I/O & Feedback Connectors		Functionality Description	Host Connector
	j = 0	j = 1		
j01	Mini-D	Molex	Standard Feature	RJ45
j07	Mini-D	Molex	Pulse Follower	RJ45
j09	Mini-D	Molex	2 phase Current Mode	RJ45
j11	Mini-D	Molex	Brush Type and Encoder	RJ45
j13	Mini-D	Molex	Brush Type and Tachometer	RJ45
j15	Mini-D	Molex	CANopen	RJ45

eB	Mounting
2B*	2-Axis Chassis
4B*	4-Axis Chassis
5B**	5-Axis Chassis

1f	Mounting
1A	1 - axis Stand Alone With Built-in Regen
1D	1 - axis Stand Alone Without Built-in Regen
1E***	1 - axis Stand Alone Without Built-in Regen (Narrow)

g	Number of Amplifiers Installed
1	1 Amplifier Installed
2	2 Amplifiers Installed
3	3 Amplifiers Installed
4	4 Amplifiers Installed
5**	5 Amplifiers Installed

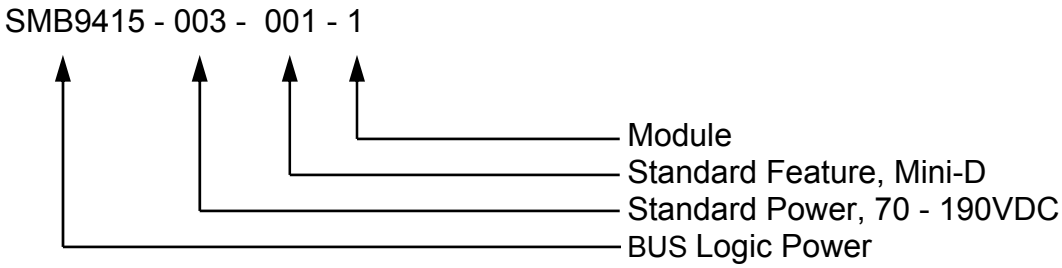
h	Fan Power
1	115VAC
2	230VAC

* The 2B and 4B designators shown above for the 2 and 4-axis chassis represent the incorporation of the latest generation bus power supply. The older style bus power supply was designated as 2A and 4A which can be special ordered upon request.

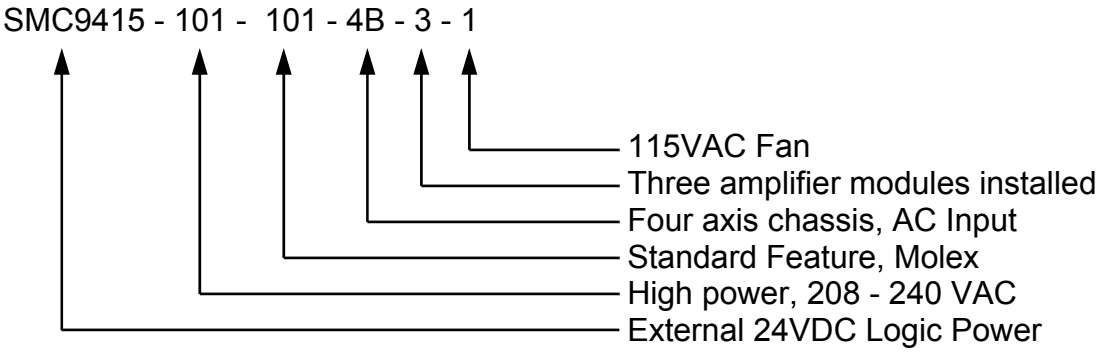
** 5-Axis Chassis is available. Consult with Glentek sales department before selecting this option.

*** The 1E package is only available for Standard and Low Power amplifier configuration.

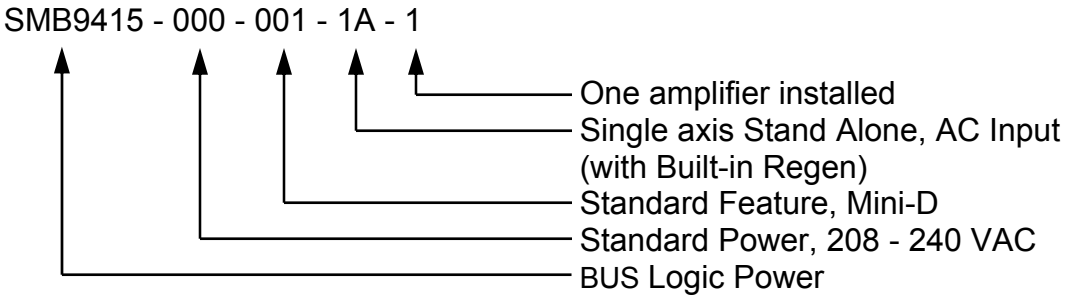
Module Example :



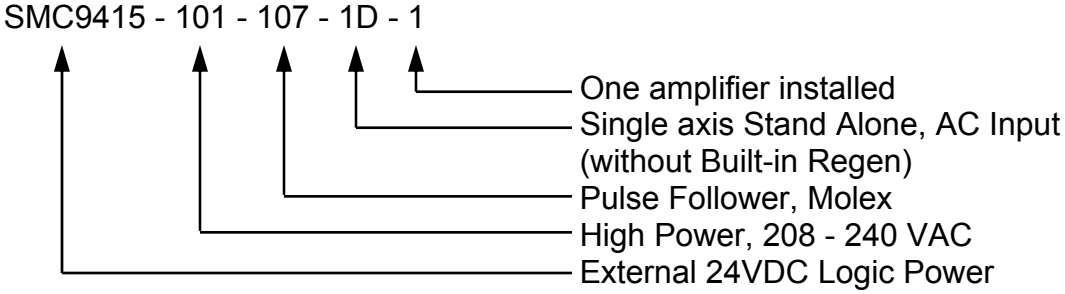
Multi-axis Example :



Stand Alone (with Built-in Regen) Example :



Stand Alone (without Built-in Regen) Example :



SMx9420 Amplifier Model Numbering

The following tables are used to fill in the different parts of the model number. Refer to these when constructing a model number for your requirements.

SMx9420 Stand Alone

Model number key: **SMx9420 - bbb - jcc - 1A - 1**

x = B Designates BUS Logic Power.

x = C Designates External 24VDC Logic Power.

bbb Input BUS and Power Rating Configuration Code.

jcc Logic Board Configuration Code.

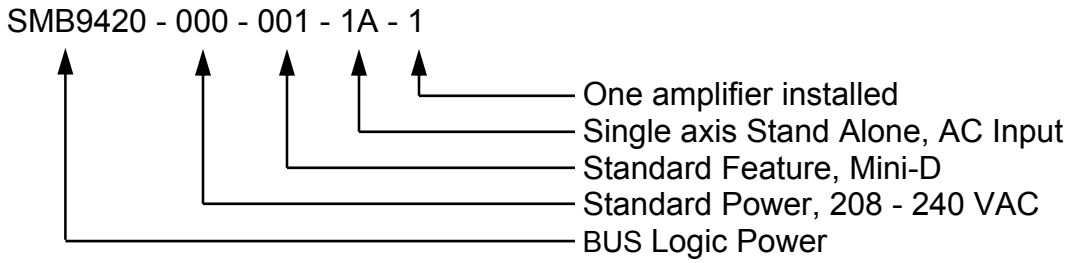
1A Mounting Configuration Code, Single axis Stand Alone, with Built-in Regen.

1 Single amplifier module.

bbb		Power	Power Input Voltage	Continuous Current (Amps)	Peak Current (Amps)
SMB	SMC		Stand Alone (VAC)		
000	**100**	Standard	208 - 240	20	40
003	**103**	Standard	110 - 130	20	40

jcc	Controller I/O & Feedback Connectors		Functionality Description	Host Connector
	j = 0	j = 1		
j01	Mini-D	Molex	Standard Feature	RJ45
j07	Mini-D	Molex	Pulse Follower	RJ45
j09	Mini-D	Molex	2 phase Current Mode	RJ45
j11	Mini-D	Molex	Brush Type and Encoder	RJ45
j13	Mini-D	Molex	Brush Type and Tachometer	RJ45
j15	Mini-D	Molex	CANopen	RJ45

Stand Alone Example :



SMx9430 Amplifier Model Numbering

The following tables are used to fill in the different parts of the model number. Refer to these when constructing a model number for your requirements.

SMx9430 Stand Alone

Model number key: **SMx9430 - bbb - jcc - 1B - 1**

x = B Designates BUS Logic Power.

x = C Designates External 24VDC Logic Power.

bbb Input BUS and Power Rating Configuration Code.

jcc Logic Board Configuration Code.

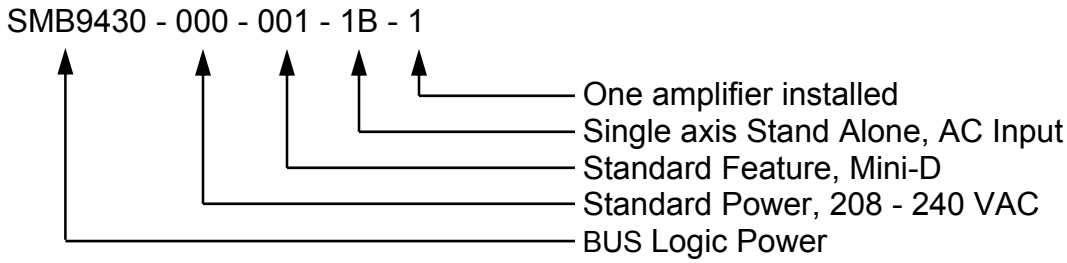
1B Mounting Configuration Code, Single axis Stand Alone, with Built-in Regen.

1 Single amplifier module.

bbb		Power	Power Input Voltage	Continuous Current (Amps)	Peak Current (Amps)
SMB	SMC		Stand Alone 3 phase (VAC)		
000	**100**	Standard	208 - 240	30	60
003	**103**	Standard	110 - 130	30	60

jcc	Controller I/O & Feedback Connectors		Functionality Description	Host Connector
	j = 0	j = 1		
j01	Mini-D	Molex	Standard Feature	RJ45
j07	Mini-D	Molex	Pulse Follower	RJ45
j09	Mini-D	Molex	2 phase Current Mode	RJ45
j11	Mini-D	Molex	Brush Type and Encoder	RJ45
j13	Mini-D	Molex	Brush Type and Tachometer	RJ45
j15	Mini-D	Molex	CANopen	RJ45

Stand Alone Example :



SMx9445 Amplifier Model Numbering

The following tables are used to fill in the different parts of the model number. Refer to these when constructing a model number for your requirements.

SMx9445 Stand Alone

Model number key: **SMx9445 - bbb - jcc - 1B - 1**

x = B Designates BUS Logic Power.

x = C Designates External 24VDC Logic Power.

bbb Input BUS and Power Rating Configuration Code.

jcc Logic Board Configuration Code.

1B Mounting Configuration Code, Single axis Stand Alone, with Built-in Regen.

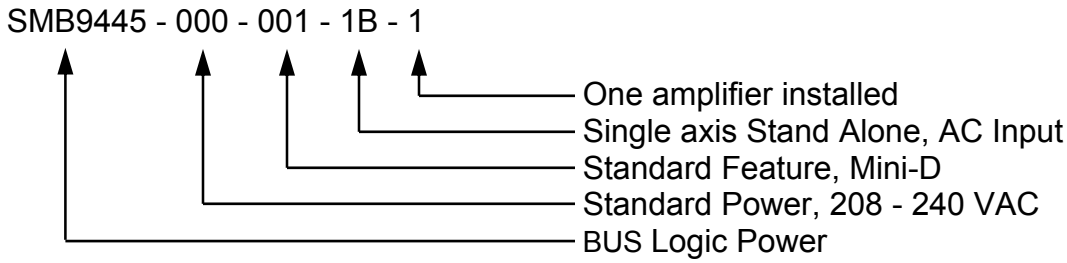
1 Single amplifier module.

bbb		Power	Power Input Voltage	Continuous Current (Amps)	Peak Current (Amps)
SMB	SMC		Stand Alone 3 phase (VAC)		
000	100	Standard	208 - 240	45	80*
003	103	Standard	110 - 130	45	80*

* 90 Amp peak current is available upon special request.

jcc	Controller I/O & Feedback Connectors		Functionality Description	Host Connector
	j = 0	j = 1		
j01	Mini-D	Molex	Standard Feature	RJ45
j07	Mini-D	Molex	Pulse Follower	RJ45
j09	Mini-D	Molex	2 phase Current Mode	RJ45
j11	Mini-D	Molex	Brush Type and Encoder	RJ45
j13	Mini-D	Molex	Brush Type and Tachometer	RJ45
j15	Mini-D	Molex	CANopen	RJ45

Stand Alone Example :



SMx9475 Amplifier Model Numbering

The following tables are used to fill in the different parts of the model number. Refer to these when constructing a model number for your requirements.

SMx9475 Stand Alone

Model number key: **SMx9475 - bbb - jcc - 1B - 1**

x = B Designates BUS Logic Power.

x = C Designates External 24VDC Logic Power.

bbb Input BUS and Power Rating Configuration Code.

jcc Logic Board Configuration Code.

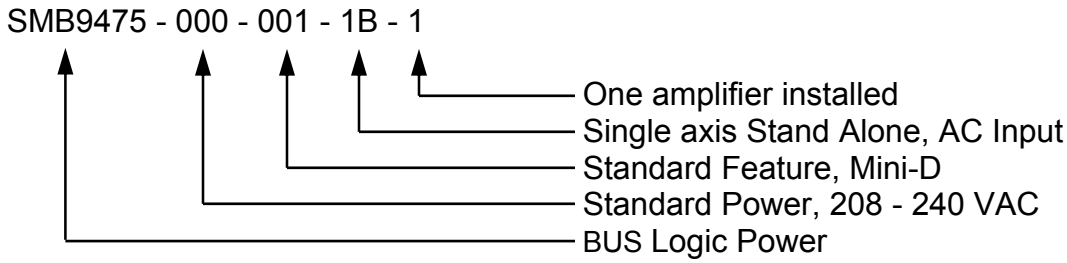
1B Mounting Configuration Code, Single axis Stand Alone, with Built-in Regen.

1 Single amplifier module.

bbb		Power	Power Input Voltage	Continuous Current (Amps)	Peak Current (Amps)
SMB	SMC		Stand Alone 3 phase (VAC)		
000	**100**	Standard	208 - 240	75	120
003	**103**	Standard	110 - 130	75	120

jcc	Controller I/O & Feedback Connectors		Functionality Description	Host Connector
	j = 0	j = 1		
j01	Mini-D	Molex	Standard Feature	RJ45
j07	Mini-D	Molex	Pulse Follower	RJ45
j09	Mini-D	Molex	2 phase Current Mode	RJ45
j11	Mini-D	Molex	Brush Type and Encoder	RJ45
j13	Mini-D	Molex	Brush Type and Tachometer	RJ45
j15	Mini-D	Molex	CANopen	RJ45

Stand Alone Example :



Appendix K
Factory Repair, Maintenance and Warranty

Factory Repair

Should it become necessary to return an servo drive to Glentek for repair, please follow the procedure described below:

1. Reassemble the unit, if necessary, making certain that all the hardware is in place.
2. Tag the unit with the following information:
    A. Serial number and model number.
    B. Company name, phone number, and name of representative returning the unit.
    C. A brief notation explaining the malfunction.
    D. Date the unit is being returned.
3. Repackage the unit with the same care and fashion in which it was received. Label the container with the appropriate stickers (e.g.: FRAGILE: HANDLE WITH CARE).
4. Contact a Glentek representative, confirm that the unit is being returned to the factory and obtain an RMA (Return Material Authorization) number. The RMA number must accompany the unit upon return to Glentek. Do not ship unit with RMA number. Show RMA number on outside of package.
5. Return the unit by the best means possible. The method of freight chosen will directly affect the timeliness of its return.

Glentek may offer a 24-48 hr. expedited repair service, in the unlikely event that your system is down and you do not have a replacement.

Maintenance

There are no field-serviceable or replaceable parts or components in the SMX94XX, SMX9508, and SMX9515 amplifiers. Should the amplifier require a service, please contact Glentek about repairs.

Warranty:

Any product, or part thereof, manufactured by Glentek, Inc., which, under normal operating conditions in the plant of the original purchaser thereof, proves defective in material or workmanship within one year from the date of shipment by us, as determined by an inspection by us, will be repaired or replaced, at our discretion, free of charge, FOB our factory, El Segundo, California, U.S.A. Provided that you promptly send to us notice of the defect and establish that the product has been properly installed, maintained, and operated within the limits of rated and normal usage, and that no factory sealed adjustments have been tampered with. Glentek's liability is limited to repair or replacement of defective parts. Repaired items will carry a 90-day warranty.

Any product or part manufactured by others and merely installed by us, such as an encoder, etc., is specifically not warranted by us and it is agreed that such product or part shall only carry the warranty, if any, supplied by the manufacturer of that part. It is also understood that you must look directly to such manufacturer for any defect, failure, claim or damage caused by such product or part.

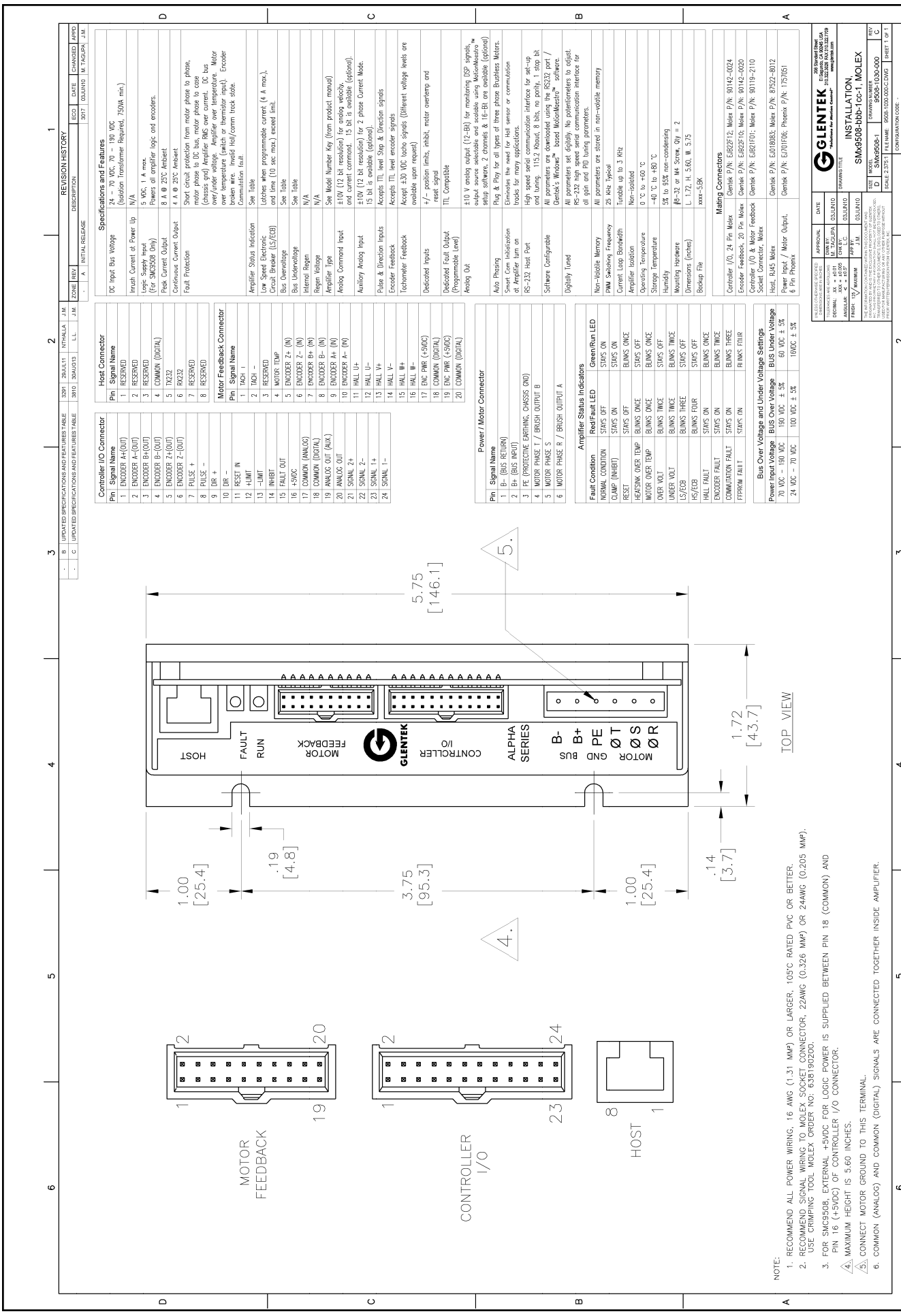
Under no circumstances shall Glentek, Inc. or any of our affiliates have any liability whatsoever for claims or damages arising out of the loss of use of any product or part sold to you. Nor shall we have any liability to yourself or anyone for any indirect or consequential damages such as injuries to person and property caused directly or indirectly by the product or part sold to you, and you agree in accepting our product or part to save us harmless from any and all such claims or damages that may be initiated against us by third parties.

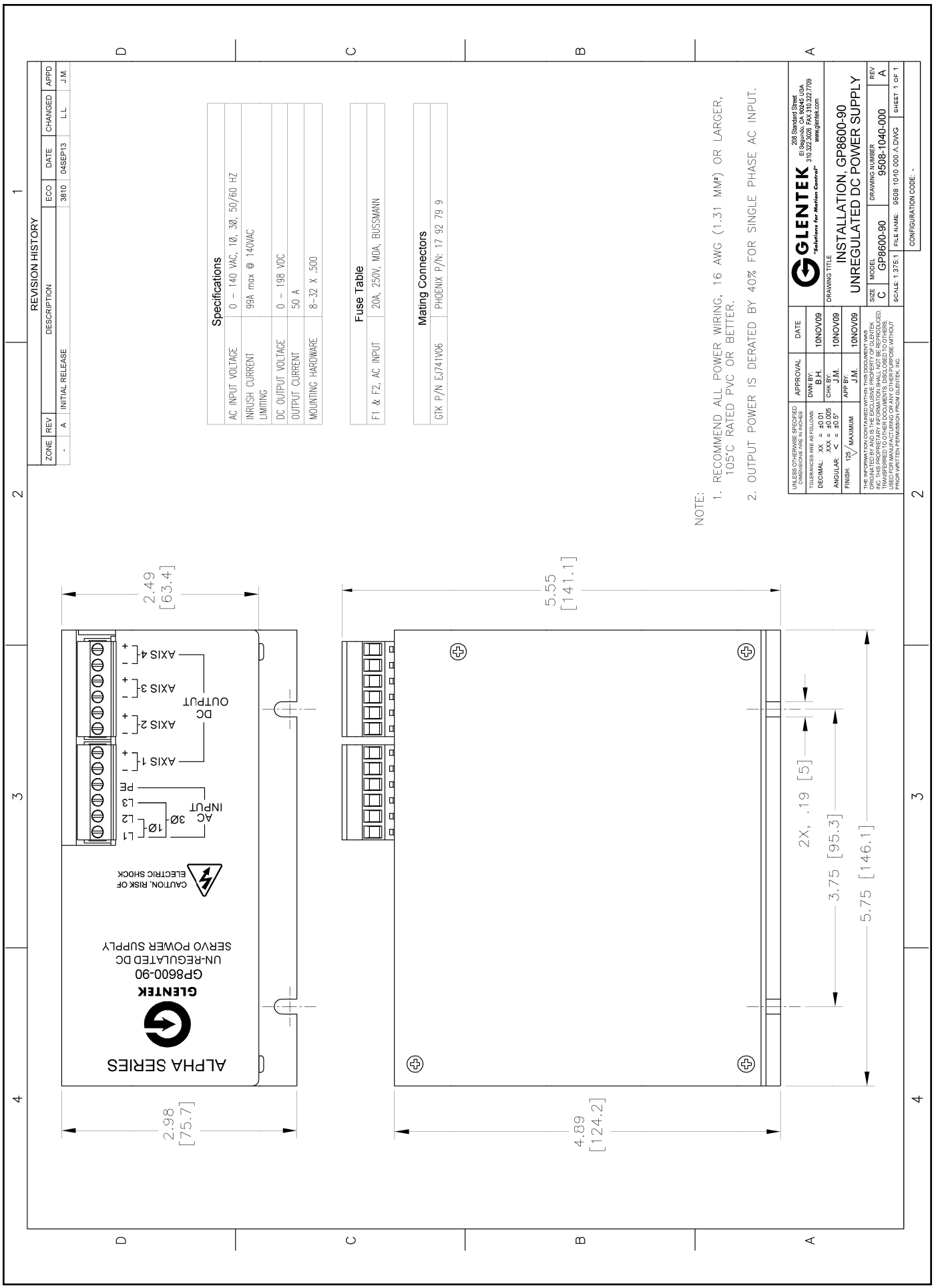
APPENDIX L

L– Drawings

SMB/SMC9508	Amplifier Module Standard Power
GP8600-90	Power Supply
SMB/SMC9508	2 Axis base plate chassis installation
SMB/SMC9508	4 Axis base plate chassis installation
SMB/SMC9515	Amplifier Module Standard / Low Power
SMB/SMC9515	Amplifier Module High Power
SMB/SMC9515	2 Axis base plate chassis installation (2 STD/LO PWR)
SMB/SMC9515	2 Axis base plate chassis installation (2 HI PWR)
SMB/SMC9515	4 Axis base plate chassis installation (4 STD/LO PWR)
SMB/SMC9515	4 Axis base plate chassis installation (4 HI PWR)
SMB/SMC9415	Amplifier Module Standard / Low Power, Molex
SMB/SMC9415	Amplifier Module Standard / Low Power, Mini-D
SMB/SMC9415	Amplifier Module High Power, Molex
SMB/SMC9415	Amplifier Module High Power, Mini-D
SMB/SMC9415	2 Axis base plate chassis installation (2 STD/LO PWR)
SMB/SMC9415	2 Axis base plate chassis installation (2 HI PWR)
SMB/SMC9415	4 Axis base plate chassis installation (4 STD/LO PWR)
SMB/SMC9415	4 Axis base plate chassis installation (4 HI PWR)
GP8600-70	Power Supply
SMB/SMC9408-1A	Amplifier, With Built-In DC Power Supply, Standard Power, Molex (Stand Alone, No Regen)
SMB/SMC9408-1A	Amplifier, With Built-In DC Power Supply, Standard Power, Mini-D (Stand Alone, No Regen)
SMB/SMC9410-1F	Amplifier, With Built-In DC Power Supply, STD, and HI Power, Molex (Stand Alone, w/ Ext. Regen)
SMB/SMC9410-1F	Amplifier, With Built-In DC Power Supply, STD, and HI Power, Mini-D (Stand Alone, w/ Ext. Regen)

SMB/SMC9415-1D	Amplifier, With Built-In DC Power Supply, STD, LO, and HI Power, Molex (Stand Alone, No Regen)
SMB/SMC9415-1D	Amplifier, With Built-In DC Power Supply, STD, LO, and HI Power, Mini-D (Stand Alone, No Regen)
SMB/SMC9415-1E	Amplifier, With Built-In DC Power Supply, STD, LO, and HI Power, Molex (Stand Alone, No Regen)
SMB/SMC9415-1E	Amplifier, With Built-In DC Power Supply, STD, LO, and HI Power, Mini-D (Stand Alone, No Regen)
SMB/SMC9415-1A	Amplifier, With Built-In DC Power Supply, STD, LO, and HI Power, Molex (Stand Alone, w/ Regen)
SMB/SMC9415-1A	Amplifier, With Built-In DC Power Supply, STD, LO, and HI Power, Mini-D (Stand Alone, w/ Regen)
SMB/SMC9420-1A	Amplifier, With Built-In DC Power Supply, Standard Power, Molex (Stand Alone, With Regen)
SMB/SMC9420-1A	Amplifier, With Built-In DC Power Supply, Standard Power, Mini-D (Stand Alone, With Regen)
SMB/SMC9430-1B	Amplifier, With Built-In DC Power Supply, Standard Power, Molex (Stand Alone, With Regen)
SMB/SMC9430-1B	Amplifier, With Built-In DC Power Supply, Standard Power, Mini-D (Stand Alone, With Regen)
SMB/SMC9445-1B	Amplifier, With Built-In DC Power Supply, Standard Power, Molex (Stand Alone, With Regen)
SMB/SMC9445-1B	Amplifier, With Built-In DC Power Supply, Standard Power, Mini-D (Stand Alone, With Regen)
SMB/SMC9475-1B	Amplifier, With Built-In DC Power Supply, Standard Power, Molex (Stand Alone, With Regen)
SMB/SMC9475-1B	Amplifier, With Built-In DC Power Supply, Standard Power, Mini-D (Stand Alone, With Regen)


REVISION HISTORY
ZONE REV DESCRIPTION ECO DATE CHANGED APPD
- A INITIAL RELEASE 3017 03JUN10 M.TAGLIPA J.M.
- B UPDATED SPECIFICATIONS AND FEATURES TABLE 3291 29JUL11 NTHALLA J.M.
- C UPDATED SPECIFICATIONS AND FEATURES TABLE 3810 30AUG13 L.L. J.M.
Specifications and Features
DC Input Bus Voltage 24 ~ 70 VDC, 70 ~ 190 VDC (Isolation Transformer Required, 750VA min.)
Inrush Current at Power Up N/A
Logic Supply Input (For SMC9508 Only) 5 VDC, 1 A max. Powers all amplifier logic and encoders.
Peak Current Output 8 A @ 25°C Ambient
Continuous Current Output 4 A @ 25°C Ambient
Fault Protection Short circuit protection from motor phase to phase, motor phase to DC bus, motor phase to case (chassis gnd) Amplifier I²MAS over current. DC bus over/under voltage. Amplifier over temperature. Motor over temperature (switch or thermistor input). Encoder broken wire. Invalid hall/comm track state. Communication fault.
Amplifier Status Indication See Table
Low Speed Electronic Circuit Breaker (LS/ECB) Latches when programmable current (4 A max.), and time (10 sec. max.) exceed limit.
Bus Overvoltage See Table
Bus Undervoltage See Table
Internal Regen N/A
Regen Voltage N/A
Amplifier Type See Model Number Key (from product manual)
Analog Command Input ±10V (12 bit resolution) for analog velocity, and current command. 15 bit is available (optional).
Auxiliary Analog Input ±10V (12 bit resolution) for 2 phase Current Mode. 15 bit is available (optional).
Pulse & Direction Inputs Accepts TTL level Step & Direction signals
Encoder Feedback Accepts TTL level encoder signals
Tachometer Feedback Accept ±30 VDC tacho signals (Different voltage levels are available upon request)
Dedicated Inputs +/- position limits, inhibit, motor overtemp and reset signal
Dedicated Fault Output (Programmable Level) TTL Compatible
Analog Out ±10 V analog output (12-Bit) for monitoring DSP signals, output source selectable and scalable using MotionMaestro™ setup software, 2 channels & 16-Bit are available (optional)
Auto Phasing Plug & Play for all types of three phase Brushless Motors.
Smart Com Initialization at Amplifier turn on Eliminates the need for Hall sensor or commutation tracks for many applications.
RS-232 Host Port High speed serial communication interface for set-up and tuning. 115.2 Kbaud, 8 bits, no parity, 1 stop bit.
Software Configurable All parameters are downloaded using the RS232 port / Gentek's Windows® based MotionMaestro® software.
Digitally Tuned All parameters set digitally. No potentiometers to adjust. RS-232 high speed serial communication interface for all gain and PID tuning parameters.
Non-Volatile Memory All parameters are stored in non-volatile memory
PWM Switching Frequency 25 KHz Typical
Current Loop Bandwidth Tunable up to 3 KHz
Amplifier Isolation Non-Isolated
Operating Temperature 0 °C to +60 °C
Storage Temperature -40 °C to +80 °C
Humidity 5% to 95% non-condensing
Mounting Hardware #8-32 or M4 Screw, Qty = 2
Dimensions (inches) L 1.72, H. 5.60, W. 5.75
Backup File xxxx-.SDK
Mating Connectors
Controller I/O, 24 Pin Molex Gentek P/N: GJ822F112; Molex P/N: 90142-0024
Encoder Feedback, 20 Pin Molex Gentek P/N: GJ822F10; Molex P/N: 90142-0020
Controller I/O & Motor Feedback Socket Connector, Molex Gentek P/N: GJ821F01; Molex P/N: 90119-2110
Host, RJ45 Molex Gentek P/N: GJ018083; Molex P/N: 87522-8012
Power Input / Motor Output, 6 Pin Phoenix Gentek P/N: GJ701F06; Phoenix P/N: 1757051
Controller I/O Connector
Pin Signal Name
1 ENCODER A+/(OUT)
2 ENCODER A-/(OUT)
3 ENCODER B+/(OUT)
4 ENCODER B-/(OUT)
5 ENCODER Z+/(OUT)
6 ENCODER Z-/(OUT)
7 PULSE +
8 PULSE -
9 DIR +
10 DIR -
11 RESET IN
12 +LIMIT
13 -LIMIT
14 INHIBIT
15 FAULT OUT
16 +5VDC
17 COMMON (ANALOG)
18 COMMON (DIGITAL)
19 ANALOG OUT (AUX.)
20 ANALOG OUT
21 SIGNAL 2+
22 SIGNAL 2-
23 SIGNAL 1+
24 SIGNAL 1-
Host Connector
Pin Signal Name
1 RESERVED
2 RESERVED
3 RESERVED
4 COMMON (DIGITAL)
5 TX232
6 RX232
7 RESERVED
8 RESERVED
Motor Feedback Connector
Pin Signal Name
1 TACH +
2 TACH -
3 RESERVED
4 MOTOR TEMP
5 ENCODER Z+ (N)
6 ENCODER Z- (N)
7 ENCODER B+ (N)
8 ENCODER B- (N)
9 ENCODER A+ (N)
10 ENCODER A- (N)
11 HALL U+
12 HALL U-
13 HALL V+
14 HALL V-
15 HALL W+
16 HALL W-
17 ENC. PWR (+5VDC)
18 COMMON (DIGITAL)
19 ENC. PWR (+5VDC)
20 COMMON (DIGITAL)
Power / Motor Connector
Pin Signal Name
1 B- (BUS RETURN)
2 B+ (BUS INPUT)
3 PE (PROTECTIVE EARTHING, CHASSIS GND)
4 MOTOR PHASE T / BRUSH OUTPUT B
5 MOTOR PHASE S
6 MOTOR PHASE R / BRUSH OUTPUT A
Amplifier Status Indicators
Fault Condition Red/Fault LED Green/Run LED
NORMAL CONDITION STAYS OFF STAYS ON
CLAMP (INHIBIT) STAYS ON STAYS ON
RESET STAYS OFF BLINKS ONCE
HEATSINK OVER TEMP BLINKS ONCE STAYS OFF
MOTOR OVER TEMP BLINKS ONCE BLINKS ONCE
OVER VOLT BLINKS TWICE STAYS OFF
UNDER VOLT BLINKS TWICE BLINKS TWICE
LS/ECB BLINKS THREE STAYS OFF
HS/ECB BLINKS FOUR STAYS OFF
HALL FAULT STAYS ON BLINKS ONCE
ENCODER FAULT STAYS ON BLINKS TWICE
COMMUTATION FAULT STAYS ON BLINKS THREE
FFPROM FAULT STAYS ON RAPIDLY FLASH
Bus Over Voltage and Under Voltage Settings
Power Input Voltage BUS Over Voltage BUS Under Voltage
70 VDC ~ 190 VDC 190 VDC ± 5% 60 VDC ± 5%
24 VDC ~ 70 VDC 100 VDC ± 5% 16VDC ± 5%
UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [MILLIMETERS] TOLERANCES ARE AS FOLLOWS: DECIMAL XX = ±0.01 XXX = ±0.005 ANGULAR: < = ±1/2° FINISH: 125 MICROINCH
DRAWN BY: L.C. 03JUN10
CHK BY: J.M. 03JUN10
APPROVAL
DATE
GLENTEK 208 Standard Street El Segundo, CA 90245-3810 U.S.A. 310.322.2026 FAX 310.322.7709 www.glentek.com
DRAWING TITLE
INSTALLATION, SMx9508-bbb-1cc-1, MOLEX
SIZE D MODEL NUMBER SMx9508-1 DRAWING NUMBER 9508-1030-000 REV C
SCALE 2.375:1 FILE NAME 9508-1030-000-C.DWG SHEET 1 OF 1
CONFIGURATION CODE: -
THE INFORMATION CONTAINED WITHIN THIS DOCUMENT IS PROPRIETARY TO GLENTEK INC. AND IS NOT TO BE DISCLOSED TO ANY THIRD PARTY WITHOUT THE EXPRESS WRITTEN CONSENT OF GLENTEK INC. THIS DOCUMENT SHALL NOT BE COPIED OR USED FOR MANUFACTURING OR ANY OTHER PURPOSE WITHOUT PRIOR WRITTEN PERMISSION OF GLENTEK INC.
TOP VIEW
HOST
FAULT
RUN
MOTOR FEEDBACK
CONTROLLER I/O
ALPHA SERIES
B- B+ PE
MOTOR ØT ØS ØR
5.75 [146.1]
1.00 [25.4]
.19 [4.8]
3.75 [95.3]
1.00 [25.4]
.14 [3.7]
1.72 [43.7]
4.
5.
MOTOR FEEDBACK
CONTROLLER I/O
HOST
NOTE:
1. RECOMMEND ALL POWER WIRING, 16 AWG (1.31 MM²) OR LARGER, 105°C RATED PVC OR BETTER.
2. RECOMMEND SIGNAL WIRING TO MOLEX SOCKET CONNECTOR, 22AWG (0.326 MM²) OR 24AWG (0.205 MM²). USE CRIMPING TOOL MOLEX ORDER NO: 63811902OO.
3. FOR SMC9508, EXTERNAL +5VDC FOR LOGIC POWER IS SUPPLIED BETWEEN PIN 18 (COMMON) AND PIN 16 (+5VDC) OF CONTROLLER I/O CONNECTOR.
4. MAXIMUM HEIGHT IS 5.60 INCHES.
5. CONNECT MOTOR GROUND TO THIS TERMINAL.
6. COMMON (ANALOG) AND COMMON (DIGITAL) SIGNALS ARE CONNECTED TOGETHER INSIDE AMPLIFIER.


REVISION HISTORY
ZONE | REV | DESCRIPTION | ECO | DATE | CHANGED | APPD
- | A | INITIAL RELEASE | 3810 | 04SEP13 | L.L. | J.M.
Specifications
AC INPUT VOLTAGE | 0 – 140 VAC, 10, 30, 50/60 HZ
INRUSH CURRENT LIMITING | 99A max @ 140VAC
DC OUTPUT VOLTAGE | 0 – 198 VDC
OUTPUT CURRENT | 50 A
MOUNTING HARDWARE | 8-32 X .500
Fuse Table
F1 & F2, AC INPUT | 20A, 250V, MDA, BUSSMANN
Mating Connectors
GTK P/N EJ741W06 | PHOENIX P/N: 17 92 79 9
NOTE:
1. RECOMMEND ALL POWER WIRING, 16 AWG (1.31 MM²) OR LARGER, 105°C RATED PVC OR BETTER.
2. OUTPUT POWER IS DERATED BY 40% FOR SINGLE PHASE AC INPUT.
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ARE AS FOLLOWS
DECIMAL: XX. = ±0.01 XXX = ±0.005
ANGULAR: < = ±0.5°
FINISH: 125 MAXIMUM
APPROVAL | DATE
DWN BY: B.H. | 10NOV09
CHK BY: J.M. | 10NOV09
APP BY: J.M. | 10NOV09
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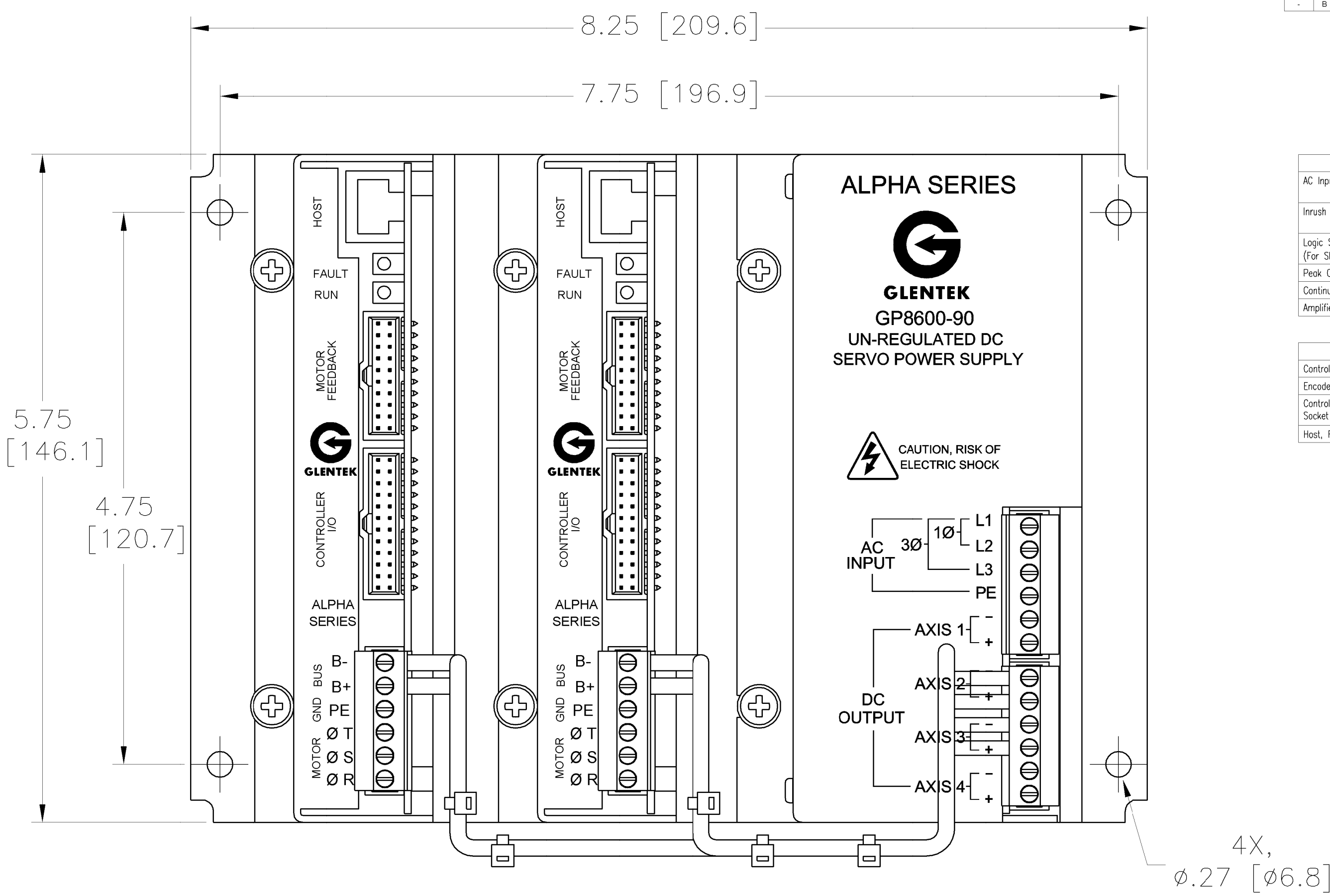
GLENTEK "Solutions for Motion Control" 208 Standard Street El Segundo, CA 90245 USA 310.322.3026 FAX 310.322.7709 www.glentek.com
DRAWING TITLE
INSTALLATION, GP8600-90
UNREGULATED DC POWER SUPPLY
SIZE C | MODEL GP8600-90 | DRAWING NUMBER 9508-1040-000 | REV A
SCALE: 1.375:1 | FILE NAME: 9508 1040 000 A.DWG | SHEET 1 OF 1
CONFIGURATION CODE: -
ALPHA SERIES
GLENTEK
GP8600-90
UN-REGULATED DC
SERVO POWER SUPPLY
CAUTION, RISK OF ELECTRIC SHOCK
AC INPUT
1Ø
3Ø
L1
L2
L3
PE
DC OUTPUT
AXIS 1
AXIS 2
AXIS 3
AXIS 4
2.49 [63.4]
2.98 [75.7]
5.55 [141.1]
4.89 [124.2]
2X, .19 [5]
3.75 [95.3]
5.75 [146.1]

REVISION HISTORY

ZONE	REV	DESCRIPTION	ECO	DATE	CHANGED	APPD
-	A	INITIAL RELEASE	3017	02JUN10	M.TAGUPA	J.M.
-	B	UPDATED SPECIFICATIONS AND FEATURES TABLE	3810	30AUG13	L.L.	J.M.



Specifications and Features

AC Input Voltage	17 – 50 VAC, 110 – 130 VAC, 1Ø, 3Ø, 50/60 HZ (Isolation Transformer Required, 1.5KVA min.)
Inrush Current Limiting	36 A max. @ 50 VAC 92 A max. @ 130 VAC
Logic Supply Input (For SMC9508 Only)	5 VDC, 1 A max. per amplifier Powers all amplifier logic and encoders.
Peak Output Current	8 A @ 25°C Ambient per amplifier
Continuous Output Current	4 A @ 25°C Ambient per amplifier
Amplifier Modules	SMx9508–bbb–1cc–1 (QTY: 2)

Mating Connectors

Controller I/O, 24 Pin Molex	Glentek P/N: EJB22F12; Molex P/N: 90142–0024
Encoder Feedback, 20 Pin Molex	Glentek P/N: EJB22F10; Molex P/N: 90142–0020
Controller I/O & Motor Feedback Socket Connector, Molex	Glentek P/N: EJB21F01; Molex P/N: 90119–2110
Host, RJ45 Molex	Glentek P/N: EJ018083; Molex P/N: 87522–8012

NOTE:

1. FOR SMC9508, EXTERNAL +5VDC FOR LOGIC POWER IS SUPPLIED BETWEEN PIN 16 (+5VDC) AND PIN 18 (COMMON) OF CONTROLLER I/O CONNECTOR. THIS EXTERNAL +5VDC MUST BE ALWAYS ON BEFORE APPLYING BUSS POWER.
2. RECOMMEND SIGNAL WIRING TO MOLEX SOCKET CONNECTOR, 22AWG (0.326 MM²) OR 24AWG (0.205 MM²). USE CRIMPING TOOL MOLEX ORDER NO: 638190200.
3. USE SHIELDED CABLE FOR COMMAND SIGNAL.
4. RECOMMEND MOTOR OUTPUTS WIRING, 16AWG (1.31 MM²) OR LARGER. 105°C RATED PVC OR BETTER.
5. RECOMMEND POWER INPUTS WIRING, 16AWG (1.31 MM²) OR LARGER. 105°C RATED PVC OR BETTER.
6. NEVER GROUND THE OUTPUTS OF THE AMPLIFIERS.
7. PLEASE MAINTAIN A MIN. OF 2" to 3" OF SPACE AT BOTH ENDS AND TOP OF THE AMPLIFIERS TO ENSURE PROPER VENTILATION FOR THE UNIT.
8. PLEASE ALLOW 6.5 INCHES MIN. HEIGHT CLEARANCE.

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES. TOLERANCES ARE AS FOLLOWS: DECIMAL: .XX = ±0.01, .XXX = ±0.005; ANGULAR: ∠ = ±0.5°; FINISH: 125 MAXIMUM

APPROVAL		DATE
DWN BY:	M. TAGUPA	02JUN10
CHK BY:	L.C.	02JUN10
APP BY:	J.M.	02JUN10

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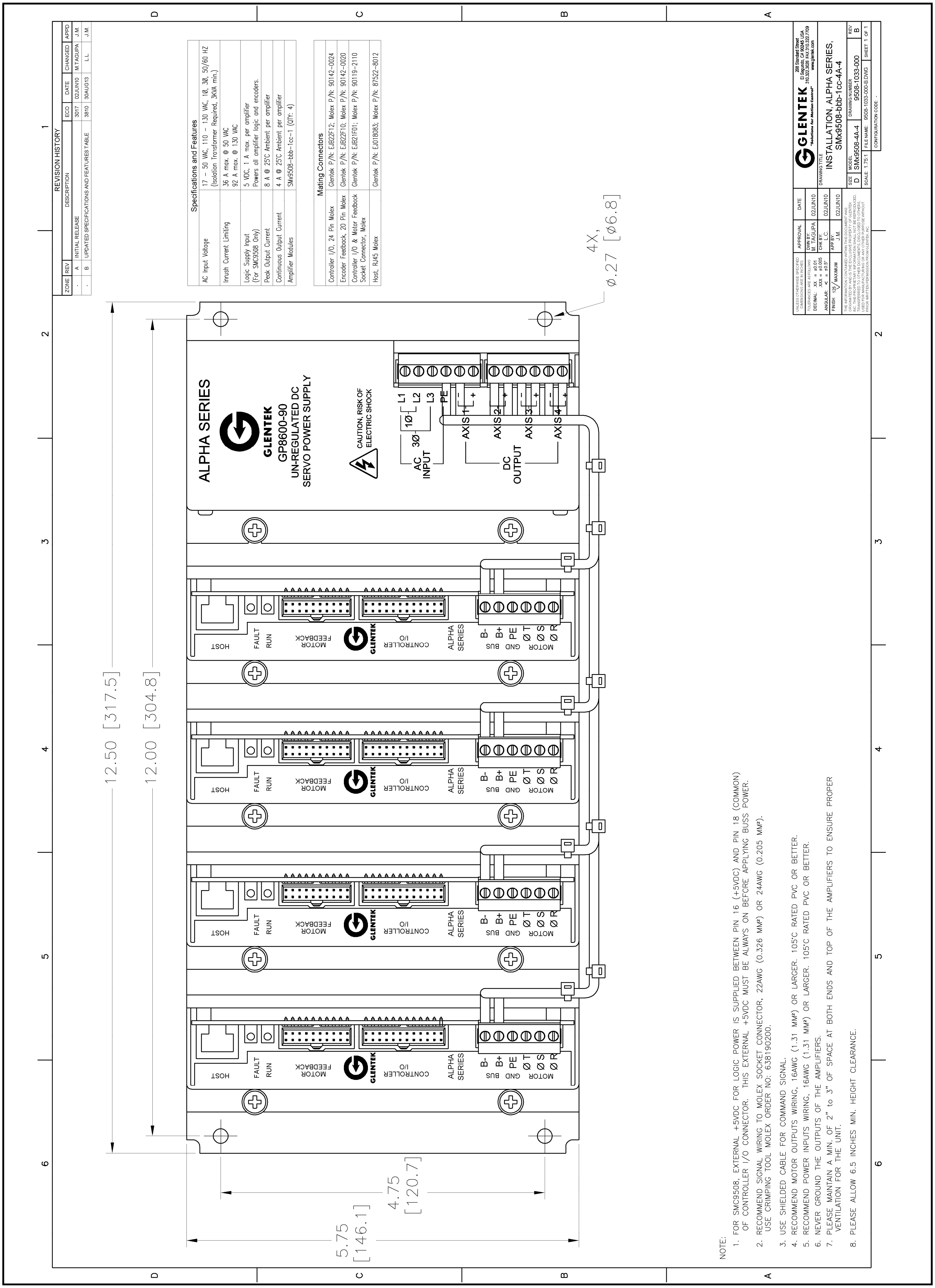
GLENTEK "Solutions for Motion Control" 208 Standard Street, El Segundo, CA 90245 USA, 310.322.3026 FAX 310.322.7709 www.glentek.com

DRAWING TITLE: INSTALLATION, ALPHA SERIES, SMx9508-bbb-1cc-2A-2

SIZE: D | MODEL: SMx9508-2A-2 | DRAWING NUMBER: 9508-1032-000 | REV: B

SCALE: 1.75:1 | FILE NAME: 9508-1032-000-B.DWG | SHEET 1 OF 1

CONFIGURATION CODE: -



REVISION HISTORY						
ZONE	REV	DESCRIPTION	ECO	DATE	CHANGED	APPD
-	A	INITIAL RELEASE	3017	02JUN10	M.TAGUPA	J.M.
-	B	UPDATED SPECIFICATIONS AND FEATURES TABLE	3810	30AUG13	L.L.	J.M.

Specifications and Features	
AC Input Voltage	17 – 50 VAC, 110 – 130 VAC, 1Ø, 3Ø, 50/60 HZ (Isolation Transformer Required, 3KVA min.)
Inrush Current Limiting	36 A max. @ 50 VAC 92 A max. @ 130 VAC
Logic Supply Input (For SMC9508 Only)	5 VDC, 1 A max. per amplifier Powers all amplifier logic and encoders.
Peak Output Current	8 A @ 25°C Ambient per amplifier
Continuous Output Current	4 A @ 25°C Ambient per amplifier
Amplifier Modules	SMx9508-bbb-1cc-1 (QTY: 4)

Mating Connectors	
Controller I/O, 24 Pin Molex	Glentek P/N: EJB22F12; Molex P/N: 90142-0024
Encoder Feedback, 20 Pin Molex	Glentek P/N: EJB22F10; Molex P/N: 90142-0020
Controller I/O & Motor Feedback Socket Connector, Molex	Glentek P/N: EJB21F01; Molex P/N: 90119-2110
Host, RJ45 Molex	Glentek P/N: EJ018083; Molex P/N: 87522-8012

NOTE:

1. FOR SMC9508, EXTERNAL +5VDC FOR LOGIC POWER IS SUPPLIED BETWEEN PIN 16 (+5VDC) AND PIN 18 (COMMON) OF CONTROLLER I/O CONNECTOR. THIS EXTERNAL +5VDC MUST BE ALWAYS ON BEFORE APPLYING BUSS POWER.
2. RECOMMEND SIGNAL WIRING TO MOLEX SOCKET CONNECTOR, 22AWG (0.326 MM²) OR 24AWG (0.205 MM²). USE CRIMPING TOOL MOLEX ORDER NO: 638190200.
3. USE SHIELDED CABLE FOR COMMAND SIGNAL.
4. RECOMMEND MOTOR OUTPUTS WIRING, 16AWG (1.31 MM²) OR LARGER. 105°C RATED PVC OR BETTER.
5. RECOMMEND POWER INPUTS WIRING, 16AWG (1.31 MM²) OR LARGER. 105°C RATED PVC OR BETTER.
6. NEVER GROUND THE OUTPUTS OF THE AMPLIFIERS.
7. PLEASE MAINTAIN A MIN. OF 2" to 3" OF SPACE AT BOTH ENDS AND TOP OF THE AMPLIFIERS TO ENSURE PROPER VENTILATION FOR THE UNIT.
8. PLEASE ALLOW 6.5 INCHES MIN. HEIGHT CLEARANCE.

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES	APPROVAL	DATE
TOLERANCES ARE AS FOLLOWS DECIMAL: .XX = ±0.01 .XXX = ±0.005 ANGULAR: ∠ = ±0.5°	DWN BY: M. TAGUPA	02JUN10
	CHK BY: L.C.	02JUN10
FINISH: 125 MAXIMUM	APP BY: J.M.	02JUN10

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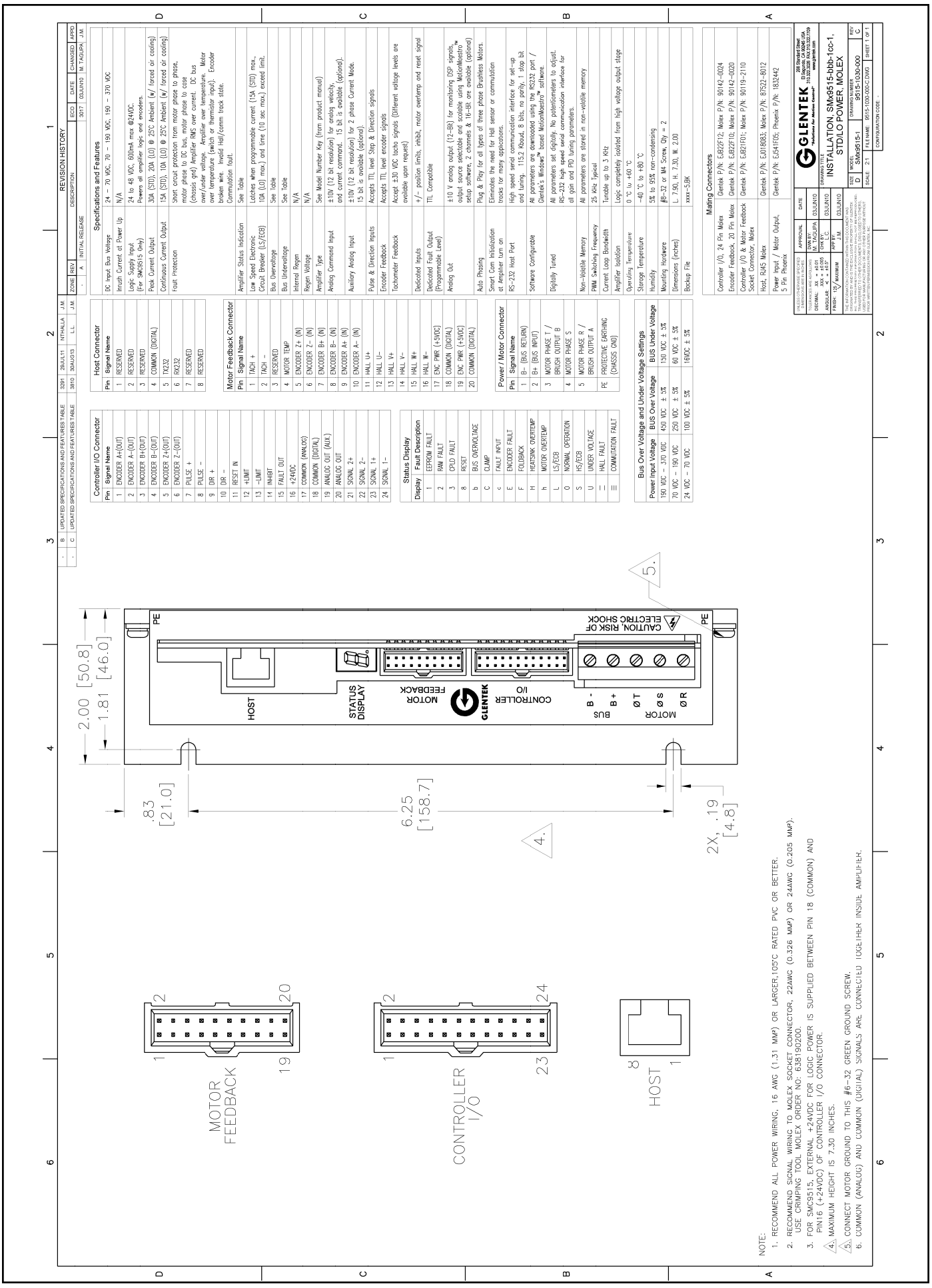
DRAWING TITLE: INSTALLATION, ALPHA SERIES, SMx9508-bbb-1cc-4A-4

SIZE	MODEL	DRAWING NUMBER	REV
D	SMx9508-4A-4	9508-1033-000	B
SCALE: 1.75:1	FILE NAME: 9508-1033-000-B.DWG		SHEET 1 OF 1
	CONFIGURATION CODE: -		


REVISION HISTORY
ZONE | REV | DESCRIPTION | ECO | DATE | CHANGED | APPD
- | A | INITIAL RELEASE | 3017 | 03JUN10 | M.TAGLIPA | J.M.
- | B | UPDATED SPECIFICATIONS AND FEATURES TABLE | 3291 | 29JUL11 | NTHALLA | J.M.
- | C | UPDATED SPECIFICATIONS AND FEATURES TABLE | 3410 | 30AUG13 | L.L. | J.M.
Specifications and Features
DC Input Bus Voltage | 24 ~ 70 VDC, 70 ~ 190 VDC, 190 ~ 370 VDC
Inrush Current at Power Up | N/A
Logic Supply Input (For SMC9515 Only) | 24 to 48 VDC, 600mA max @24VDC. Powers all amplifier logic and encoders.
Peak Current Output | 30A (STD), 20A (LO) @ 25°C Ambient (w/ forced air cooling)
Continuous Current Output | 15A (STD), 10A (LO) @ 25°C Ambient (w/ forced air cooling)
Fault Protection | Short circuit protection from motor phase to phase, motor phase to DC bus, motor phase to case (chassis gnd) Amplifier RMS over current. DC bus over/under voltage. Amplifier over temperature. Motor over temperature (switch or thermistor input). Encoder broken wire. Invalid Hall/comm track state. Commutation fault.
Amplifier Status Indication | See Table
Low Speed Electronic Circuit Breaker (LS/ECB) | Latches when programmable current (15A (STD) max., 10A (LO) max.) and time (10 sec. max.) exceed limit.
Bus Overvoltage | See Table
Bus Undervoltage | See Table
Internal Regen | N/A
Regen Voltage | See Model Number Key (from product manual)
Amplifier Type | See Model Number Key (from product manual)
Analog Command Input | ±10V (12 bit resolution) for analog velocity, and current commands. 15 bit is available (optional).
Auxiliary Analog Input | ±10V (12 bit resolution) for 2 phase Current Mode. 15 bit is available (optional).
Pulse & Direction Inputs | Accepts TTL level Step & Direction signals
Encoder Feedback | Accepts TTL level encoder signals
Tachometer Feedback | Accept ±30 VDC tacho signals (Different voltage levels are available upon request)
Dedicated Inputs | +/- position limits, inhibit, motor overtemp and reset signal
Dedicated Fault Output (Programmable Level) | TTL Compatible
Analog Out | ±10 V analog output (12-Bit) for monitoring DSP signals, output source selectable and scalable using MotionMaestro™ setup software, 2 channels & 16-Bit are available (optional)
Auto Phasing | Plug & Play for all types of three phase Brushless Motors.
Smart Com Initialization at Amplifier turn on | Eliminates the need for Hall sensor or commutation tracks for many applications.
RS-232 Host Port | High speed serial communication interface for set-up and tuning. 115.2 Kbaud, 8 bits, no parity, 1 stop bit
Software Configurable | All parameters are downloaded using the RS232 port / Gentek's Windows® based MotionMaestro™ software.
Digitally Tuned | All parameters set digitally. No potentiometers to adjust. RS-232 high speed serial communication interface for all gain and PID tuning parameters.
Non-Volatile Memory | All parameters are stored in non-volatile memory
PWM Switching Frequency | 25 kHz Typical
Current Loop Bandwidth | Tunable up to 3 kHz
Amplifier Isolation | Logic completely isolated from high voltage output stage
Operating Temperature | 0 °C to +60 °C
Storage Temperature | -40 °C to +80 °C
Humidity | 5% to 95% non-condensing
Mounting Hardware | #8-32 or M4 Screw, Qty = 2
Dimensions (inches) | L: 7.90, H: 7.30, W: 2.00
Backup File | xxxx-S.BK
Host Connector
Pin | Signal Name
1 | RESERVED
2 | RESERVED
3 | RESERVED
4 | COMMON (DIGITAL)
5 | TX232
6 | RX232
7 | RESERVED
8 | RESERVED
Motor Feedback Connector
Pin | Signal Name
1 | TACH +
2 | TACH –
3 | RESERVED
4 | MOTOR TEMP
5 | ENCODER Z+ (N)
6 | ENCODER Z– (N)
7 | ENCODER B+ (N)
8 | ENCODER B– (N)
9 | ENCODER A+ (N)
10 | ENCODER A– (N)
11 | HALL U+
12 | HALL U–
13 | HALL V+
14 | HALL V–
15 | HALL W+
16 | HALL W–
17 | ENC PWR (+5VDC)
18 | COMMON (DIGITAL)
19 | ENC PWR (+5VDC)
20 | COMMON (DIGITAL)
Power / Motor Connector
Pin | Signal Name
1 | B– (BUS RETURN)
2 | B+ (BUS INPUT)
3 | MOTOR PHASE T / BRUSH OUTPUT B
4 | MOTOR PHASE S
5 | MOTOR PHASE R / BRUSH OUTPUT A
PE | PROTECTIVE EARTHING (CHASSIS GND)
Controller I/O Connector
Pin | Signal Name
1 | ENCODER A+(OUT)
2 | ENCODER A–(OUT)
3 | ENCODER B+(OUT)
4 | ENCODER B–(OUT)
5 | ENCODER Z+(OUT)
6 | ENCODER Z–(OUT)
7 | PULSE +
8 | PULSE –
9 | DIR +
10 | DIR –
11 | RESET IN
12 | +LIMIT
13 | –LIMIT
14 | INHIBIT
15 | FAULT OUT
16 | +24VDC
17 | COMMON (ANALOGS)
18 | COMMON (DIGITAL)
19 | ANALOG OUT (AUX.)
20 | ANALOG OUT
21 | SIGNAL 2+
22 | SIGNAL 2–
23 | SIGNAL 1+
24 | SIGNAL 1–
Status Display
Display | Fault Description
1 | EEPROM FAULT
2 | RAM FAULT
3 | CPLD FAULT
8 | RESET
b | BUS OVERVOLTAGE
C | CLAMP
c | FAULT INPUT
E | ENCODER FAULT
F | FOLDBACK
H | HEATSINK OVERTEMP
h | MOTOR OVERTEMP
L | LS/ECB
O | NORMAL OPERATION
S | HS/ECB
U | UNDER VOLTAGE
= | HALL FAULT
≡ | COMMUTATION FAULT
Bus Over Voltage and Under Voltage Settings
Power Input Voltage | BUS Over Voltage | BUS Under Voltage
190 VDC ~ 370 VDC | 450 VDC ± 5% | 150 VDC ± 5%
70 VDC ~ 190 VDC | 250 VDC ± 5% | 60 VDC ± 5%
24 VDC ~ 70 VDC | 100 VDC ± 5% | 16VDC ± 5%
Mating Connectors
Controller I/O, 24 Pin Molex | Gentek P/N: EJB22F12; Molex P/N: 90142-0024
Encoder Feedback, 20 Pin Molex | Gentek P/N: EJB22E10; Molex P/N: 90142-0020
Controller I/O & Motor Feedback Socket Connector, Molex | Gentek P/N: EJB21F01; Molex P/N: 90119-2110
Host, RJ45 Molex | Gentek P/N: EJ018883; Molex P/N: 87522-8012
Power Input / Motor Output, 5 Pin Phoenix | Gentek P/N: EJ541F05; Phoenix P/N: 1832442
GLENTEK
208 Standard Street El Segundo, CA 90245 USA
310.322.3026 FAX 310.322.7709
www.glentek.com
DRAWING TITLE
INSTALLATION, SMx9515-bbb-1cc-1, STD/LO POWER, MOLEX
SIZE D | MODEL SMx9515-1 | DRAWING NUMBER 9515-1030-000 | REV C
SCALE 2:1 | FILE NAME 9515-1030-000-C.DWG | SHEET 1 OF 1
CONFIGURATION CODE: -
APPROVAL | DATE
DRAWN BY: M.TAGLIPA 03JUN10
CHK BY: L.C. 03JUN10
APP BY: J.M. 03JUN10
DECIMAL XX. = ±0.01, XXX. = ±0.005
ANGULAR: < ± ±0.5°
FINISH: 125 MICROINCH
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ARE AS FOLLOWS
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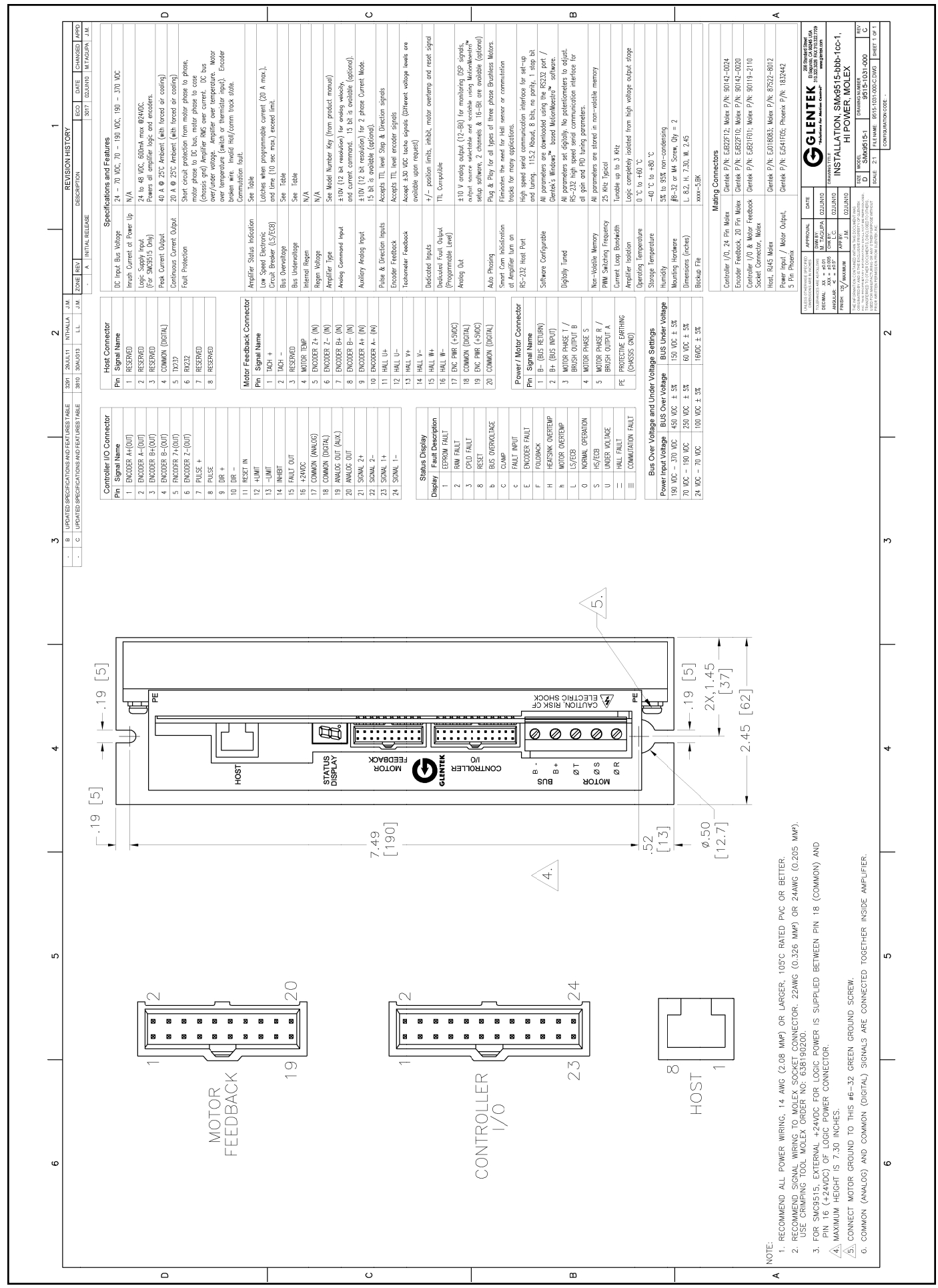
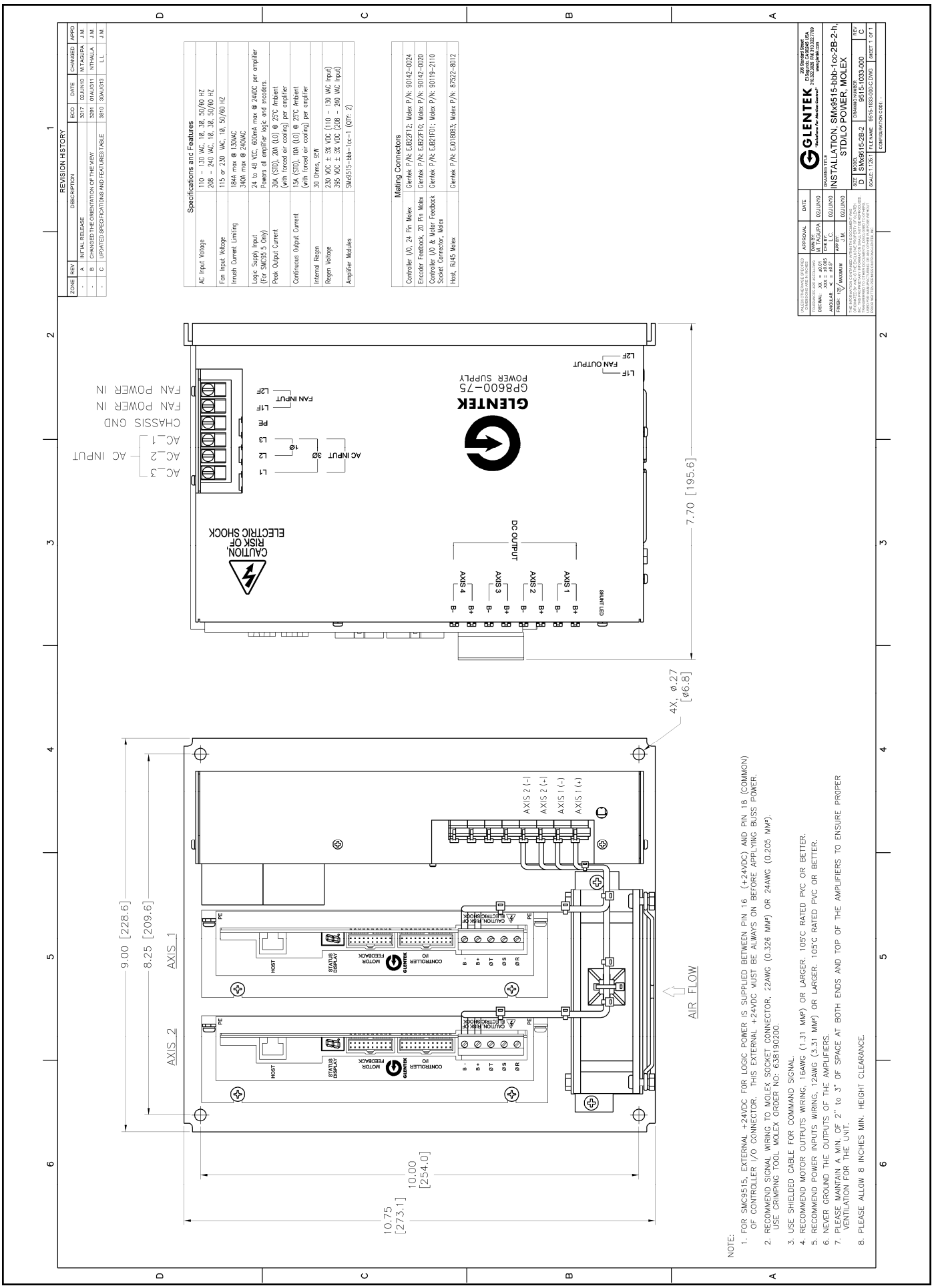
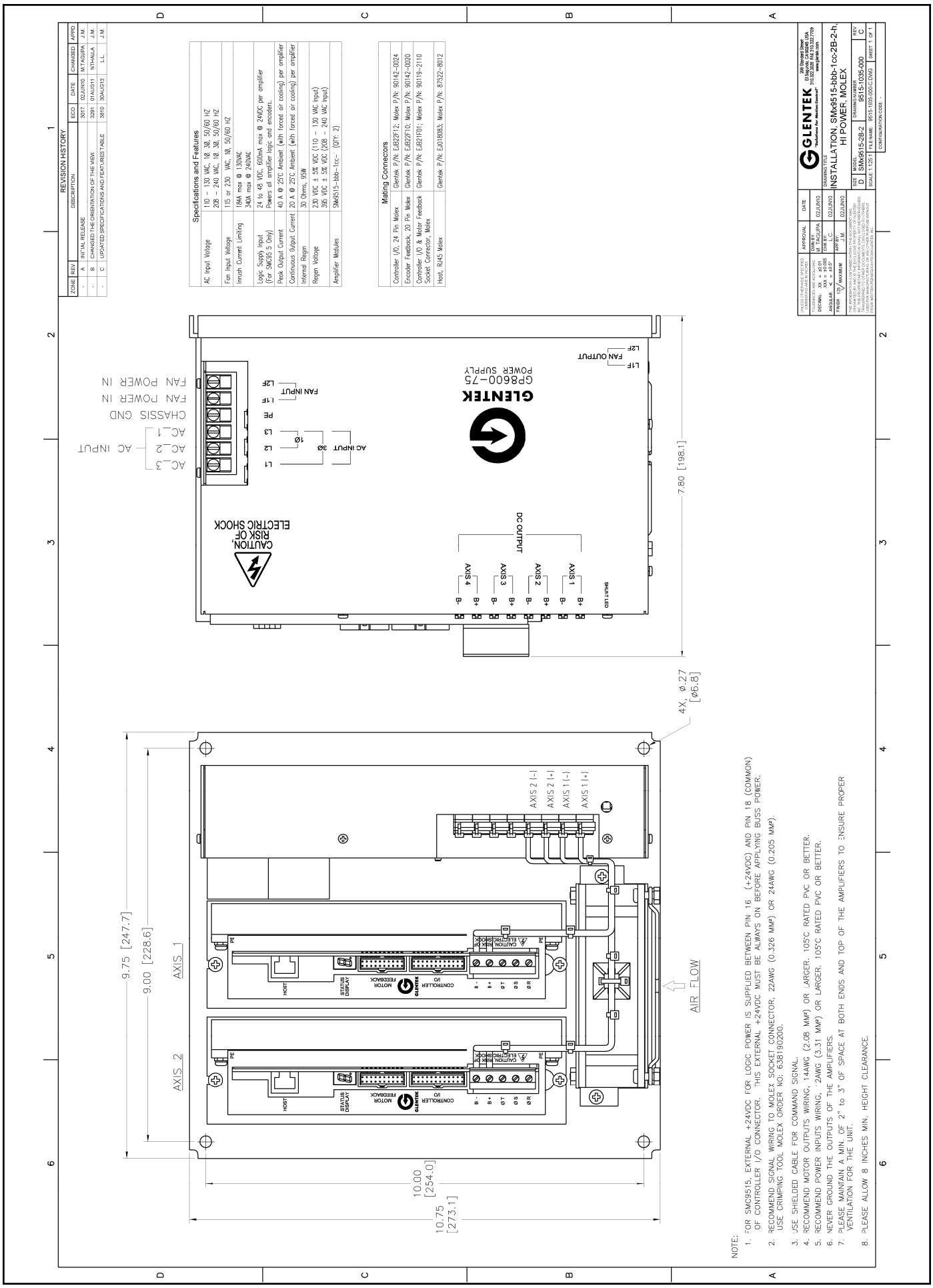
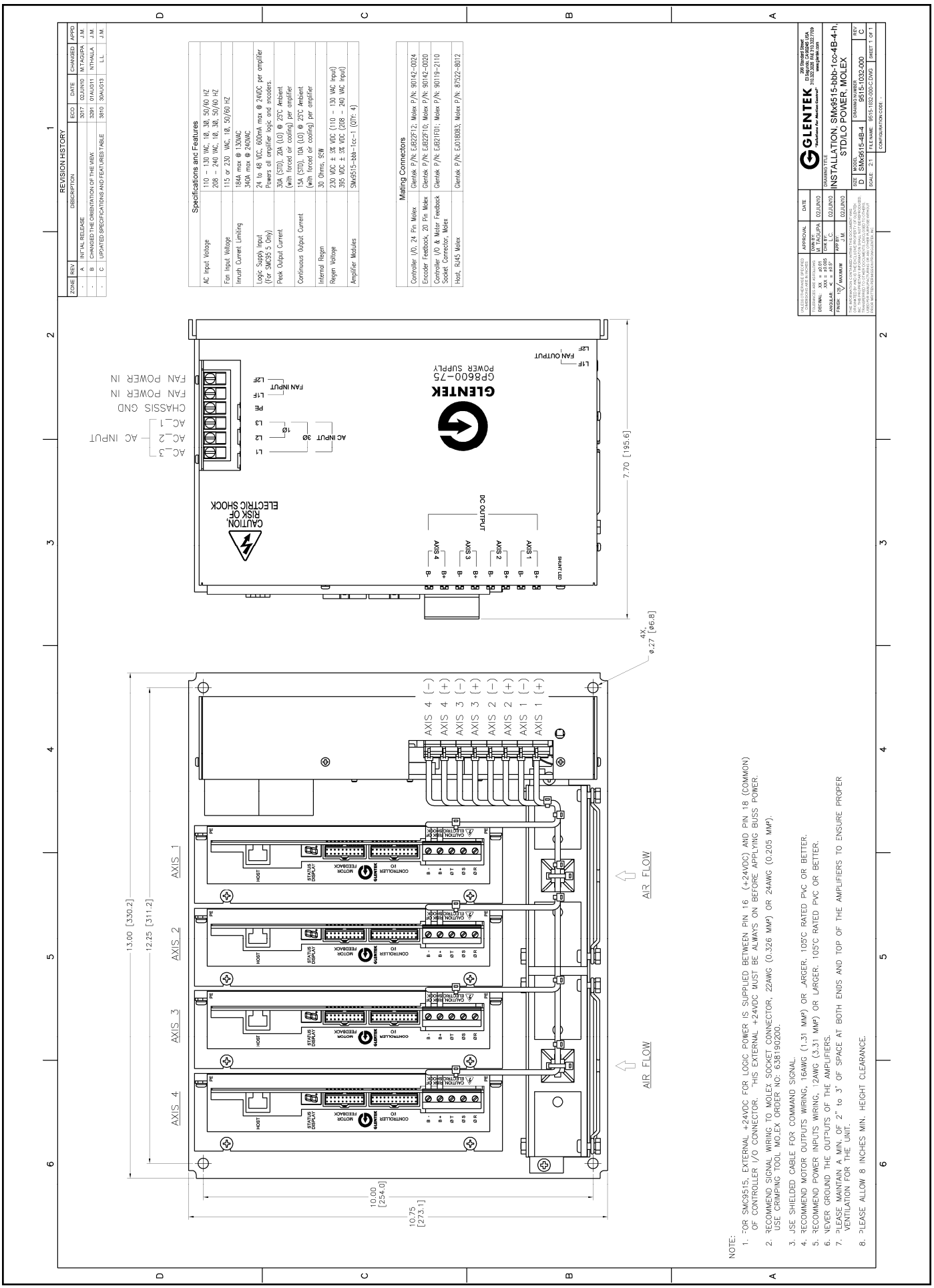
2.00 [50.8]
1.81 [46.0]
.83 [21.0]
6.25 [158.7]
2X, .19 [4.8]
HOST
STATUS DISPLAY
MOTOR FEEDBACK
CONTROLLER I/O
BUS B- B+
MOTOR ØT ØS ØR
CAUTION, RISK OF ELECTRIC SHOCK
PE
MOTOR FEEDBACK
CONTROLLER I/O
HOST
1 2 19 20
1 2 23 24
1 8
NOTE:
1. RECOMMEND ALL POWER WIRING, 16 AWG (1.31 MM²) OR LARGER, 105°C RATED PVC OR BETTER.
2. RECOMMEND SIGNAL WIRING TO MOLEX SOCKET CONNECTOR, 22AWG (0.326 MM²) OR 24AWG (0.205 MM²). USE CRIMPING TOOL MOLEX ORDER NO: 63819-0200.
3. FOR SMC9515, EXTERNAL +24VDC FOR LOGIC POWER IS SUPPLIED BETWEEN PIN 18 (COMMON) AND PIN16 (+24VDC) OF CONTROLLER I/O CONNECTOR.
4. MAXIMUM HEIGHT IS 7.30 INCHES.
5. CONNECT MOTOR GROUND TO THIS #6-32 GREEN GROUND SCREW.
6. COMMON (ANALOG) AND COMMON (DIGITAL) SIGNALS ARE CONNECTED TOGETHER INSIDE AMPLIFIER.


REVISION HISTORY
ZONE | REV | DESCRIPTION | ECO | DATE | CHANGED | APPD
A | INITIAL RELEASE | 3017 | 02JUN10 | M.TAGUPA | J.M.
B | UPDATED SPECIFICATIONS AND FEATURES TABLE | 3291 | 29JUL11 | NTHALLA | J.M.
C | UPDATED SPECIFICATIONS AND FEATURES TABLE | 3810 | 30AUG13 | L.L. | J.M.
Specifications and Features
DC Input Bus Voltage | 24 - 70 VDC, 70 - 190 VDC, 190 - 370 VDC
Inrush Current at Power Up | N/A
Logic Supply Input (For SMC9515 Only) | 24 to 48 VDC, 600mA max @24VDC. Powers all amplifier logic and encoders.
Peak Current Output | 40 A @ 25°C Ambient (with forced air cooling)
Continuous Current Output | 20 A @ 25°C Ambient (with forced air cooling)
Fault Protection | Short circuit protection from motor phase to phase, motor phase to DC bus, motor phase to case (chassis gnd) Amplifier RMS over current. DC bus over/under voltage. Amplifier over temperature. Motor over temperature (switch or thermistor input). Encoder broken wire. Invalid Hall/comm track state. Communication fault.
Amplifier Status Indication | See Table
Low Speed Electronic Circuit Breaker (LSJ/ECB) | Latches when programmable current (20 A max.), and time (10 sec. max.) exceed limit.
Bus Overvoltage | See Table
Bus Undervoltage | See Table
Internal Regen | N/A
Regen Voltage | See Model Number Key (from product manual)
Amplifier Type | See Model Number Key (from product manual)
Analog Command Input | ±10V (12 bit resolution) for analog velocity, and current commands. 15 bit is available (optional).
Auxiliary Analog Input | ±10V (12 bit resolution) for 2 phase Current Mode. 15 bit is available (optional).
Pulse & Direction Inputs | Accepts TTL level Step & Direction signals
Encoder Feedback | Accepts TTL level encoder signals
Tachometer Feedback | Accept ±30 VDC tacho signals (Different voltage levels are available upon request)
Dedicated Inputs | +/- position limits, inhibit, motor overtemp and reset signal
Dedicated Fault Output (Programmable Level) | TTL Compatible
Analog Out | ±10 V analog output (12-Bit) for monitoring DSP signals, output source selectable and scalable using MotionMaestro™ setup software. 2 channels & 16-Bit are available (optional)
Auto Phasing | Plug & Play for all types of three phase Brushless Motors.
Smart Com Initialization | Eliminates the need for Hall sensor or commutation tracks for many applications.
RS-232 Host Port | High speed serial communication interface for set-up and tuning. 115.2 Kbaud, 8 bits, no parity, 1 stop bit
Software Configurable | All parameters are downloaded using the RS232 port / Glentek's Windows™ based MotionMaestro™ software.
Digitally Tuned | All parameters set digitally. No potentiometers to adjust. RS-232 high speed serial communication interface for all gain and PID tuning parameters.
Non-Volatile Memory | All parameters are stored in non-volatile memory
PWM Switching Frequency | 25 KHz Typical
Current Loop Bandwidth | Tunable up to 3 KHz
Amplifier Isolation | Logic completely isolated from high voltage output stage
Operating Temperature | 0°C to +60 °C
Storage Temperature | -40°C to +80 °C
Humidity | 5% to 95% non-condensing
Mounting Hardware | #8-32 or M4 Screw, Qty = 2
Dimensions (inches) | L. 8.2, H. 7.30, W. 2.45
Backup File | xxxx-SBK
Mating Connectors
Controller I/O, 24 Pin Molex | Glentek P/N: EJB22F12; Molex P/N: 90142-0024
Encoder Feedback, 20 Pin Molex | Glentek P/N: EJB22F10; Molex P/N: 90142-0020
Controller I/O & Motor Feedback Socket Connector, Molex | Glentek P/N: EJB21F01; Molex P/N: 90119-2110
Host, RJ45 Molex | Glentek P/N: EJ018083; Molex P/N: 87522-8012
Power Input / Motor Output, 5 Pin Phoenix | Glentek P/N: EJ541F05; Phoenix P/N: 1832442
Controller I/O Connector
Pin | Signal Name
1 ENCODER A+(OUT)
2 ENCODER A-(OUT)
3 ENCODER B+(OUT)
4 ENCODER B-(OUT)
5 ENCODER Z+(OUT)
6 ENCODER Z-(OUT)
7 PULSE +
8 PULSE -
9 DIR +
10 DIR -
11 RESET IN
12 +LIMIT
13 -LIMIT
14 INHIBIT
15 FAULT OUT
16 +24VDC
17 COMMON (ANALOG)
18 COMMON (DIGITAL)
19 ANALOG OUT (AUX.)
20 ANALOG OUT
21 SIGNAL 2+
22 SIGNAL 2-
23 SIGNAL 1+
24 SIGNAL 1-
Host Connector
Pin | Signal Name
1 RESERVED
2 RESERVED
3 RESERVED
4 COMMON (DIGITAL)
5 TX232
6 RX232
7 RESERVED
8 RESERVED
Motor Feedback Connector
Pin | Signal Name
1 TACH +
2 TACH -
3 RESERVED
4 MOTOR TEMP
5 ENCODER Z+ (IN)
6 ENCODER Z- (IN)
7 ENCODER B+ (IN)
8 ENCODER B- (IN)
9 ENCODER A+ (IN)
10 ENCODER A- (IN)
11 HALL U+
12 HALL U-
13 HALL V+
14 HALL V-
15 HALL W+
16 HALL W-
17 ENC PWR (+5VDC)
18 COMMON (DIGITAL)
19 ENC PWR (+5VDC)
20 COMMON (DIGITAL)
Power / Motor Connector
Pin | Signal Name
1 B- (BUS RETURN)
2 B+ (BUS INPUT)
3 MOTOR PHASE T / BRUSH OUTPUT B
4 MOTOR PHASE S
5 MOTOR PHASE R / BRUSH OUTPUT A
PE PROTECTIVE EARTHING (CHASSIS GND)
Status Display
Display | Fault Description
1 EEPROM FAULT
2 RAM FAULT
3 CPLD FAULT
8 RESET
b BUS OVERVOLTAGE
C CLAMP
c FAULT INPUT
E ENCODER FAULT
F FOLDBACK
H HEATSINK OVERTEMP
h MOTOR OVERTEMP
L LSJ/ECB
O NORMAL OPERATION
S HSJ/ECB
U UNDER VOLTAGE
= HALL FAULT
≡ COMMUTATION FAULT
Bus Over Voltage and Under Voltage Settings
Power Input Voltage | BUS Over Voltage | BUS Under Voltage
190 VDC - 370 VDC | 450 VDC ± 5% | 150 VDC ± 5%
70 VDC - 190 VDC | 250 VDC ± 5% | 60 VDC ± 5%
24 VDC - 70 VDC | 100 VDC ± 5% | 16VDC ± 5%
HOST
STATUS DISPLAY
MOTOR FEEDBACK
GLENTEK
CONTROLLER I/O
CAUTION RISK OF ELECTRIC SHOCK
BUS B- B+
MOTOR Ø T Ø S Ø R
PE
.19 [5]
7.49 [190]
.52 [13]
ø.50 [12.7]
2X 1.45 [37]
2.45 [62]
MOTOR FEEDBACK
CONTROLLER I/O
HOST
NOTE:
1. RECOMMEND ALL POWER WIRING, 14 AWG (2.08 MM²) OR LARGER, 105°C RATED PVC OR BETTER.
2. RECOMMEND SIGNAL WIRING TO MOLEX SOCKET CONNECTOR, 22AWG (0.326 MM²) OR 24AWG (0.205 MM²). USE CRIMPING TOOL MOLEX ORDER NO: 638190200.
3. FOR SMC9515, EXTERNAL +24VDC FOR LOGIC POWER IS SUPPLIED BETWEEN PIN 18 (COMMON) AND PIN 16 (+24VDC) OF LOGIC POWER CONNECTOR.
4. MAXIMUM HEIGHT IS 7.30 INCHES.
5. CONNECT MOTOR GROUND TO THIS #6-32 GREEN GROUND SCREW.
6. COMMON (ANALOG) AND COMMON (DIGITAL) SIGNALS ARE CONNECTED TOGETHER INSIDE AMPLIFIER.
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES: DECIMAL .XX = ±0.01 .XXX = ±0.005
ANGULAR ±1°
FINISH 125 MAXIMUM
APPROVAL | DATE
DRAWN BY: M.TAGUPA | 02JUN10
CHK'D BY: | 02JUN10
APP'D BY: J.M. | 02JUN10
GLENTEK
208 Standard Street, El Segundo, CA 90245 USA
Phone: (310) 322-3026 FAX: (310) 322-3094
www.glentek.com
DRAWING TITLE:
INSTALLATION, SMx9515-bbb-1cc-1, HI POWER, MOLEX
SIZE D | MODEL: SMx9515-1 | DRAWING NUMBER: 9515-1031-000 | REV C
SCALE: 2:1 | FILE NAME: 9515-1031-000-C.DWG | SHEET 1 OF 1
CONFIGURATION CODE: -
THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF GLENTEK. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF GLENTEK IS PROHIBITED. THIS DRAWING AND THE INFORMATION CONTAINED IN IT ARE SUBMITTED AND LOANED IN CONFIDENCE AND MUST NOT BE COPIED OR TRANSFERRED TO OTHER DOCUMENTS, DISCLOSED TO OTHERS OR USED IN ANY MANNER DETRIMENTAL TO THE INTEREST OF GLENTEK EXCEPT WITH PRIOR WRITTEN PERMISSION FROM GLENTEK INC.


REVISION HISTORY
ZONE | REV | DESCRIPTION | ECO | DATE | CHANGED | APPD
- | A | INITIAL RELEASE | 3017 | 02JUN10 | M.TAGUPA | J.M.
- | B | CHANGED THE ORIENTATION OF THE VIEW. | 3091 | 01AUG11 | N.THALLA | J.M.
- | C | UPDATED SPECIFICATIONS AND FEATURES TABLE | 3810 | 30AUG13 | L.L. | J.M.
Specifications and Features
AC Input Voltage: 110 – 130 VAC, 10, 3Ø, 50/60 HZ; 208 – 240 VAC, 10, 3Ø, 50/60 HZ
Fan Input Voltage: 115 or 230 VAC, 1Ø, 50/60 HZ
Inrush Current Limiting: 184A max @ 130VAC; 340A max @ 240VAC
Logic Supply Input (For SMC95.5 Only): 24 to 48 VDC, 600mA max @ 24VDC per amplifier. Powers all amplifier logic and encoders.
Peak Output Current: 30A (STD), 20A (LO) @ 25°C Ambient (with forced air cooling) per amplifier
Continuous Output Current: 15A (STD), 10A (LO) @ 25°C Ambient (with forced air cooling) per amplifier
Internal Regen: 30 Ohms, 5KW
Regen Voltage: 230 VDC ± 3% VDC (110 – 130 VAC Input); 395 VDC ± 3% VDC (208 – 240 VAC Input)
Amplifier Modules: SMx9515-bbb-1cc-1 (QTY: 2)
Mating Connectors
Controller I/O, 24 Pin Molex: Glentek P/N: EJB22F12; Molex P/N: 90142-0024
Encoder Feedback, 20 Pin Molex: Glentek P/N: EJB22F10; Molex P/N: 90142-0020
Controller I/O & Motor Feedback Socket Connector, Molex: Glentek P/N: EJB21F01; Molex P/N: 90119-2110
Host, RJ45 Molex: Glentek P/N: EJ01808J; Molex P/N: 87522-8012
GLENTEK
208 Standard Street, El Segundo, CA 90245
310.322.3026 FAX 310.322.7709
www.glentek.com
INSTALLATION, SMx9515-bbb-1cc-2B-2-h, STD/LO POWER, MOLEX
SIZE: D | DRAWING NO: SMx9515-2B-2 | REV: C
SCALE: 1.125:1 | FILENAME: 9515-1033-000C.DWG | SHEET 1 OF 1
CONFIGURATION CODE: -
DRAWN BY: M.TAGUPA 02JUN10
CHK'D BY: L.C. 02JUN10
APP'D BY: J.M. 02JUN10
DRAWING NO: 9515-1033-000
DECIMAL: XX ± ±0.01; XXX ± ±0.005
ANGULAR: .X ± ±1.5°
FINISH: 125/ MAXIMUM
GP8600-75
POWER SUPPLY
GLENTEK
CAUTION, RISK OF ELECTRIC SHOCK
AC INPUT
AC L1
AC L2
AC L3
CHASSIS GND
FAN POWER IN
FAN POWER IN
AC INPUT
3Ø
1Ø
L1
L2
L3
PE
L1F
L2F
FAN INPUT
FAN OUTPUT
DC OUTPUT
AXIS 4
AXIS 3
AXIS 2
AXIS 1
B-
B+
SHUNT LED
7.70 [195.6]
4X, Ø.27 [Ø6.8]
AIR FLOW
AXIS 2 (-)
AXIS 2 (+)
AXIS 1 (-)
AXIS 1 (+)
HOST
STATUS DISPLAY
MOTOR FEEDBACK
CONTROLLER I/O
ØT
ØS
ØR
9.00 [228.6]
8.25 [209.6]
AXIS 1
AXIS 2
10.00 [254.0]
10.75 [273.1]
NOTE:
1. FOR SMC9515, EXTERNAL +24VDC FOR LOGIC POWER IS SUPPLIED BETWEEN PIN 16 (+24VDC) AND PIN 18 (COMMON) OF CONTROLLER I/O CONNECTOR. THIS EXTERNAL +24VDC MUST BE ALWAYS ON BEFORE APPLYING BUSS POWER.
2. RECOMMEND SIGNAL WIRING TO MOLEX SOCKET CONNECTOR, 22AWG (0.326 MM²) OR 24AWG (0.205 MM²). USE CRIMPING TOOL MOLEX ORDER NO: 638190200.
3. USE SHIELDED CABLE FOR COMMAND SIGNAL.
4. RECOMMEND MOTOR OUTPUTS WIRING, 16AWG (1.31 MM²) OR LARGER. 105°C RATED PVC OR BETTER.
5. RECOMMEND POWER INPUTS WIRING, 12AWG (3.31 MM²) OR LARGER. 105°C RATED PVC OR BETTER.
6. NEVER GROUND THE OUTPUTS OF THE AMPLIFIERS.
7. PLEASE MAINTAIN A MIN. OF 2" to 3" OF SPACE AT BOTH ENDS AND TOP OF THE AMPLIFIERS TO ENSURE PROPER VENTILATION FOR THE UNIT.
8. PLEASE ALLOW 8 INCHES MIN. HEIGHT CLEARANCE.


REVISION HISTORY
ZONE | REV | DESCRIPTION | ECO | DATE | CHANGED | APPD
- | A | INITIAL RELEASE | 3017 | 02JUN10 | M.TAGUPA | J.M.
- | B | CHANGED THE ORIENTATION OF THE VIEW. | 3391 | 01AUG11 | NTHALLA | J.M.
- | C | UPDATED SPECIFICATIONS AND FEATURES TABLE | 3910 | 30AUG13 | L.L. | J.M.
Specifications and Features
AC Input Voltage
110 – 130 VAC, 10 3Ø, 50/60 HZ
208 – 240 VAC, 10 3Ø, 50/60 HZ
Fan Input Voltage
115 or 230 VAC, 1Ø, 50/60 HZ
Inrush Current Limiting
184A max @ 130VAC
340A max @ 240VAC
Logic Supply Input (For SMC95's Only)
24 to 48 VDC, 600mA max @ 24VDC per amplifier
Powers all amplifier logic and encoders.
Peak Output Current
40 A @ 25°C Ambient (with forced air cooling) per amplifier
Continuous Output Current
20 A @ 25°C Ambient (with forced air cooling) per amplifier
Internal Regen
30 Ohms, 95W
Regen Voltage
230 VDC ± 5% VDC (110 – 130 VAC Input)
395 VDC ± 5% VDC (208 – 240 VAC Input)
Amplifier Modules
SMx9515-bbb-1cc-- (QTY: 2)
Mating Connectors
Controller I/O, 24 Pin Molex | Glentek P/N: EJB22F12; Molex P/N: 90142-0024
Encoder Feedback, 20 Pin Molex | Glentek P/N: EJB22F10; Molex P/N: 90142-0020
Controller I/O & Motor Feedback Socket Connector, Molex | Glentek P/N: EJB21F01; Molex P/N: 90119-2110
Host, RJ45 Molex | Glentek P/N: EJ01B003; Molex P/N: 87522-8012
GLENTEK
GP8600-75
POWER SUPPLY
FAN OUTPUT
FAN INPUT
AC INPUT
CAUTION, RISK OF ELECTRIC SHOCK
DC OUTPUT
AXIS 4
AXIS 3
AXIS 2
AXIS 1
SHUNT-LED
AC_L1
AC_L2
AC_L3
CHASSIS GND
FAN POWER IN
FAN POWER IN
7.80 [198.1]
4X, ø.27 [ø6.8]
AIR FLOW
9.75 [247.7]
9.00 [228.6]
AXIS 2
AXIS 1
10.00 [254.0]
10.75 [273.1]
AXIS 2 (-)
AXIS 2 (+)
AXIS 1 (-)
AXIS 1 (+)
HOST
STATUS DISPLAY
MOTOR FEEDBACK
CONTROLLER I/O
CAUTION, RISK OF ELECTRIC SHOCK
NOTE:
1. FOR SMC9515, EXTERNAL +24VDC FOR LOGIC POWER IS SUPPLIED BETWEEN PIN 16 (+24VDC) AND PIN 18 (COMMON) OF CONTROLLER I/O CONNECTOR. THIS EXTERNAL +24VDC MUST BE ALWAYS ON BEFORE APPLYING BUSS POWER.
2. RECOMMEND SIGNAL WIRING TO MOLEX SOCKET CONNECTOR, 22AWG (0.326 MM²) OR 24AWG (0.205 MM²). USE CRIMPING TOOL MOLEX ORDER NO: 638190200.
3. USE SHIELDED CABLE FOR COMMAND SIGNAL.
4. RECOMMEND MOTOR OUTPUTS WIRING, 14AWG (2.08 MM²) OR LARGER. 105°C RATED PVC OR BETTER.
5. RECOMMEND POWER INPUTS WIRING, 12AWG (3.31 MM²) OR LARGER. 105°C RATED PVC OR BETTER.
6. NEVER GROUND THE OUTPUTS OF THE AMPLIFIERS.
7. PLEASE MAINTAIN A MIN. OF 2" to 3" OF SPACE AT BOTH ENDS AND TOP OF THE AMPLIFIERS TO ENSURE PROPER VENTILATION FOR THE UNIT.
8. PLEASE ALLOW 8 INCHES MIN. HEIGHT CLEARANCE.
GLENTEK
Solutions For Motion Control
208 Standard Street
El Segundo, CA 90245 USA
310.322.3026 FAX 310.322.7709
www.glentek.com
DRAWING TITLE
INSTALLATION, SMx9515-bbb-1cc-2B-2-h, HI POWER, MOLEX
SIZE | MODEL | DRAWING NUMBER | REV
D | SMx9515-2B-2 | 9515-1035-000 | C
SCALE 1 / 25.1 | FILE NAME: 9515-1035-000-C.DWG | SHEET 1 OF 1
CONFIGURATION CODE: -


REVISION HISTORY
ZONE | REV | DESCRIPTION | ECO | DATE | CHANGED | APPD
- | A | INITIAL RELEASE | 3017 | 02JUN10 | M.TAGUPA | J.M.
- | B | CHANGED THE ORIENTATION OF THE VIEW. | 3091 | 01AUG11 | N.THALLA | J.M.
- | C | UPDATED SPECIFICATIONS AND FEATURES TABLE | 3810 | 30AUG13 | L.L. | J.M.
Specifications and Features
AC Input Voltage: 110 – 130 VAC, 10, 30, 50/60 HZ; 208 – 240 VAC, 10, 30, 50/60 HZ
Fan Input Voltage: 115 or 230 VAC, 10, 50/60 HZ
Inrush Current Limiting: 184A max @ 130VAC; 340A max @ 240VAC
Logic Supply Input (For SMC95 S Only): 24 to 48 VDC, 600mA max @ 24VDC per amplifier. Powers all amplifier logic and encoders.
Peak Output Current: 30A (STD), 20A (LO) @ 25°C Ambient (with forced air cooling) per amplifier
Continuous Output Current: 15A (STD), 10A (LO) @ 25°C Ambient (with forced air cooling) per amplifier
Internal Regen: 30 Ohms, 90W
Regen Voltage: 230 VDC ± 3% VDC (110 – 130 VAC Input); 395 VDC ± 3% VDC (208 – 240 VAC Input)
Amplifier Modules: SMx9515-bbb-1cc-1 (QTY: 4)
Mating Connectors
Controller I/O, 24 Pin Molex: Glentek P/N: EJB22F12; Molex P/N: 90142-0024
Encoder Feedback, 20 Pin Molex: Glentek P/N: EJB22F10; Molex P/N: 90142-0020
Controller I/O & Motor Feedback Socket Connector, Molex: Glentek P/N: EJB21F01; Molex P/N: 90119-2110
Host, RJ45 Molex: Glentek P/N: EJU018083; Molex P/N: 87522-8012
GLENTEK
GP8600-75
POWER SUPPLY
AC INPUT
FAN INPUT
FAN OUTPUT
DC OUTPUT
AXIS 1
AXIS 2
AXIS 3
AXIS 4
SHUNT CED
CAUTION, RISK OF ELECTRIC SHOCK
AC_L1
AC_L2
AC_L3
CHASSIS GND
FAN POWER IN
FAN POWER IN
7.70 [195.6]
4X, ø.27 [ø6.8]
AXIS 1
AXIS 2
AXIS 3
AXIS 4
13.00 [330.2]
12.25 [311.2]
10.00 [254.0]
10.75 [273.1]
AIR FLOW
AIR FLOW
NOTE:
1. FOR SMC9515, EXTERNAL +24VDC FOR LOGIC POWER IS SUPPLIED BETWEEN PIN 16 (+24VDC) AND PIN 18 (COMMON) OF CONTROLLER I/O CONNECTOR. THIS EXTERNAL +24VDC MUST BE ALWAYS ON BEFORE APPLYING BUSS POWER.
2. RECOMMEND SIGNAL WIRING TO MOLEX SOCKET CONNECTOR, 22AWG (0.326 MM²) OR 24AWG (0.205 MM²). USE CRIMPING TOOL MOLEX ORDER NO: 638190200.
3. USE SHIELDED CABLE FOR COMMAND SIGNAL.
4. RECOMMEND MOTOR OUTPUTS WIRING, 16AWG (1.31 MM²) OR LARGER. 105°C RATED PVC OR BETTER.
5. RECOMMEND POWER INPUTS WIRING, 12AWG (3.31 MM²) OR LARGER. 105°C RATED PVC OR BETTER.
6. NEVER GROUND THE OUTPUTS OF THE AMPLIFIERS.
7. PLEASE MAINTAIN A MIN. OF 2" to 3" OF SPACE AT BOTH ENDS AND TOP OF THE AMPLIFIERS TO ENSURE PROPER VENTILATION FOR THE UNIT.
8. PLEASE ALLOW 8 INCHES MIN. HEIGHT CLEARANCE.
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN MILLIMETERS
TOLERANCES ARE AS FOLLOWS
DECIMAL: XX ± ±0.01, XXX ± ±0.005
ANGULAR: .X° ± ±1.0°
FINISH: 125 µ/MAXIMUM
APPROVAL
DWN BY: M.TAGUPA 02JUN10
CHK BY: L.C. 02JUN10
APP BY: J.M. 02JUN10
DATE
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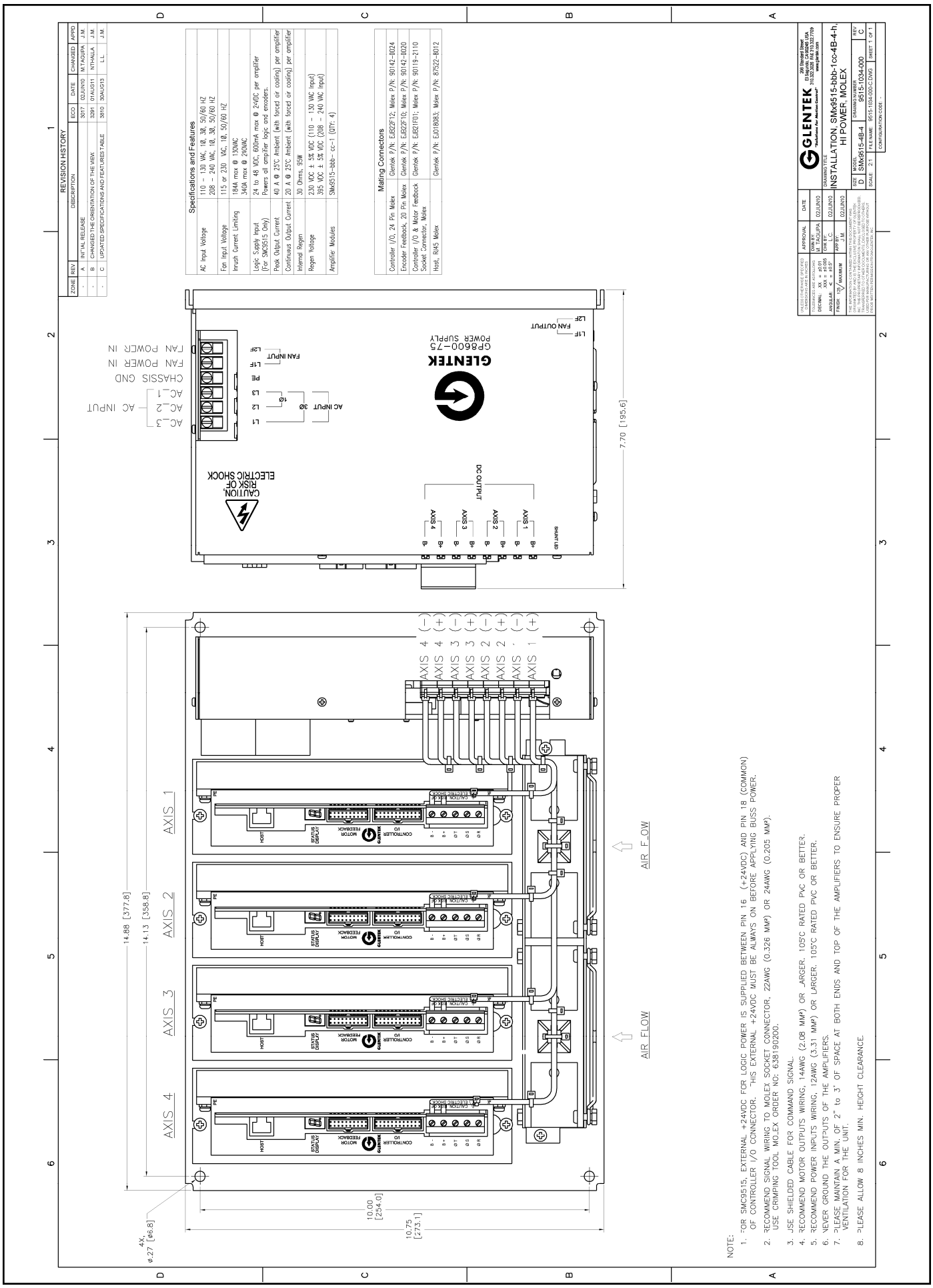
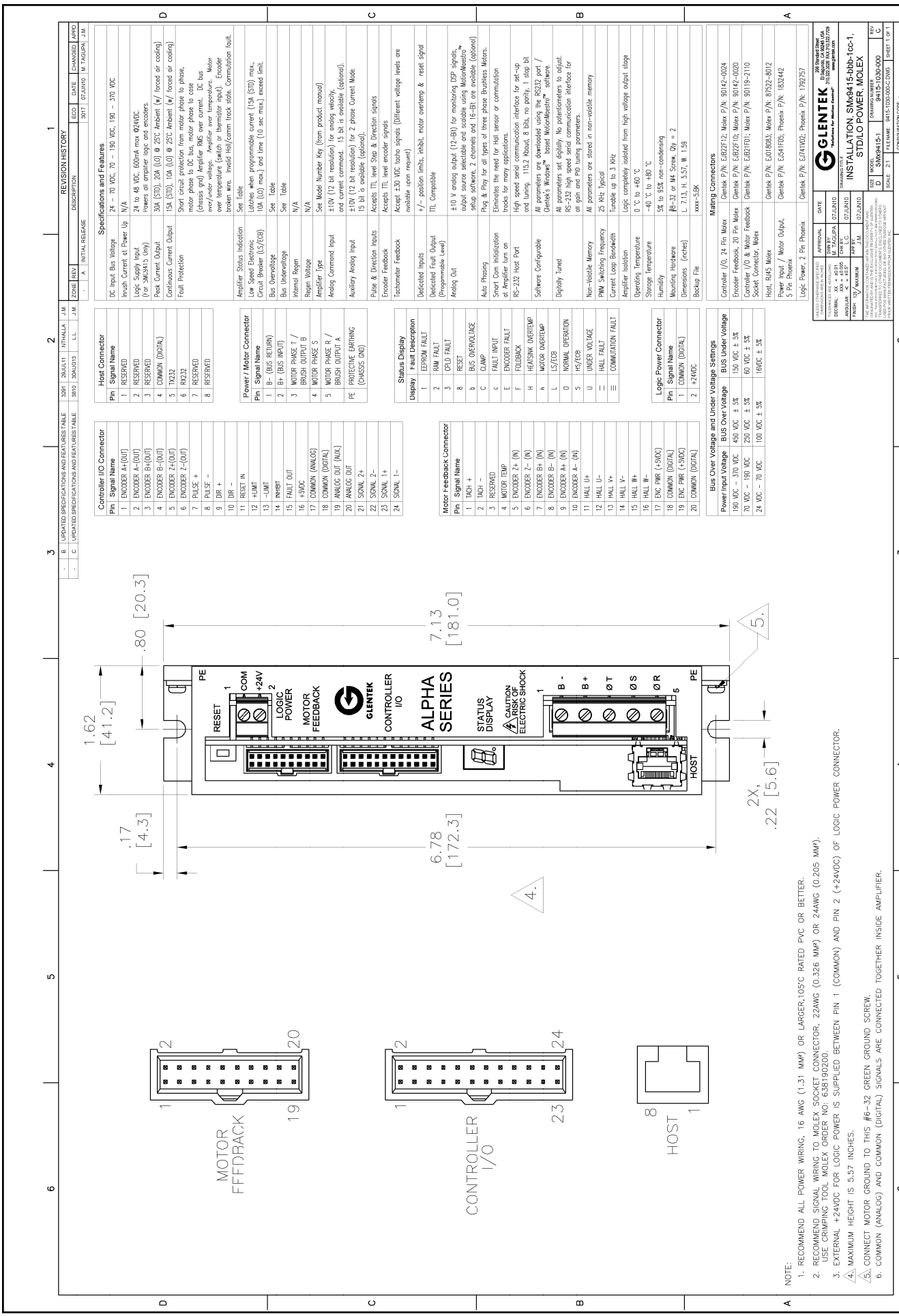
GLENTEK
208 Standard Street El Segundo, CA 90245-3866 USA
310.322.3026 FAX 310.322.7709
www.glentek.com
DRAWING TITLE
INSTALLATION, SMx9515-bbb-1cc-4B-4-h, STD/LO POWER, MOLEX
SIZE: D
DWG NO: SMx9515-4B-4
DRAWING NO: 9515-1032-000
REV: C
SCALE: 2:1
FILENAME: 9515-1032-000C-1.DWG
SHEET 1 OF 1
CONFIGURATION CODE: -


REVISION HISTORY
ZONE | REV | DESCRIPTION | ECO | DATE | CHANGED | APPD
- | A | INITIAL RELEASE | 3017 | 02JUN10 | M.TAGUPA | J.M.
- | B | CHANGED THE ORIENTATION OF THE VIEW. | 3391 | 01AUG11 | NTHALLA | J.M.
- | C | UPDATED SPECIFICATIONS AND FEATURES TABLE | 3910 | 30AUG13 | LL | J.M.
Specifications and Features
AC Input Voltage
110 ~ 130 VAC, 10, 3Ø, 50/60 HZ
208 ~ 240 VAC, 10, 3Ø, 50/60 HZ
Fan Input Voltage
115 or 230 VAC, 1Ø, 50/60 HZ
Inrush Current Limiting
16A max @ 130VAC
34A max @ 240VAC
Logic Supply Input (For SMX9515 Only)
24 to 48 VDC, 600mA max @ 24VDC per amplifier
Powers all amplifier logic and encoders.
Peak Output Current
40 A @ 25°C Ambient (with forced air cooling) per amplifier
Continuous Output Current
20 A @ 25°C Ambient (with forced air cooling) per amplifier
Internal Regen
30 Ohms, 35W
Regen Voltage
230 VDC ± 5% VDC (110 ~ 130 VAC Input)
395 VDC ± 5% VDC (208 ~ 240 VAC Input)
Amplifier Modules
SMx9515-bbb- cc-1 (QTY: 4)
Mating Connectors
Controller I/O, 24 Pin Molex
Glentek P/N: EJB22F12; Molex P/N: 90142-8024
Encoder Feedback, 20 Pin Molex
Glentek P/N: EJB22F10; Molex P/N: 90142-8020
Controller I/O & Motor Feedback Socket Connector, Molex
Glentek P/N: EJB21F01; Molex P/N: 90119-2110
Host, RJ45 Molex
Glentek P/N: EJ018083; Molex P/N: 87522-8012
GLENTEK
GP8600-75
POWER SUPPLY
CAUTION
RISK OF
ELECTRIC SHOCK
AC INPUT
AC_L3
AC_L2
AC_L1
CHASSIS GND
FAN POWER IN
FAN POWER IN
AC INPUT
L1
L2
L3
1Ø
3Ø
PE
FAN INPUT
L1F
L2F
FAN OUTPUT
DC OUTPUT
AXIS 1
AXIS 2
AXIS 3
AXIS 4
SHUNT LED
7.70 [195.6]
AXIS 1
AXIS 2
AXIS 3
AXIS 4
14.88 [377.8]
14.13 [358.8]
10.00 [254.0]
10.75 [273.1]
4X ø.27 [ø6.8]
AIR FLOW
AIR FLOW
NOTE:
1. FOR SMC9515, EXTERNAL +24VDC FOR LOGIC POWER IS SUPPLIED BETWEEN PIN 16 (+24VDC) AND PIN 18 (COMMON) OF CONTROLLER I/O CONNECTOR. THIS EXTERNAL +24VDC MUST BE ALWAYS ON BEFORE APPLYING BUSS POWER.
2. RECOMMEND SIGNAL WIRING TO MOLEX SOCKET CONNECTOR, 22AWG (0.326 MM²) OR 24AWG (0.205 MM²). USE CRIMPING TOOL MOLEX ORDER NO: 638190200.
3. USE SHIELDED CABLE FOR COMMAND SIGNAL.
4. RECOMMEND MOTOR OUTPUTS WIRING, 14AWG (2.08 MM²) OR ARGER. 105°C RATED PVC OR BETTER.
5. RECOMMEND POWER INPUTS WIRING, 12AWG (3.31 MM²) OR LARGER. 105°C RATED PVC OR BETTER.
6. NEVER GROUND THE OUTPUTS OF THE AMPLIFIERS.
7. PLEASE MAINTAIN A MIN. OF 2" to 3" OF SPACE AT BOTH ENDS AND TOP OF THE AMPLIFIERS TO ENSURE PROPER VENTILATION FOR THE UNIT.
8. PLEASE ALLOW 8 INCHES MIN. HEIGHT CLEARANCE.
GLENTEK
Solutions For Motion Control
208 Standard Street
El Segundo, CA 90245 USA
310.322.3026 FAX 310.322.7709
www.glentek.com
DRAWING TITLE
INSTALLATION, SMx9515-bbb-1cc-4B-4-h,
HI POWER, MOLEX
SIZE | MODEL | DRAWING NUMBER | REV
D | SMx9515-4B-4 | 9515-1034-000 | C
SCALE: 2:1 | FILE NAME: 9515-1034-000-C.DWG | SHEET 1 OF 1
CONFIGURATION CODE: -


REVISION HISTORY
ZONE | REV | DESCRIPTION | ECO | DATE | CHANGED | APPD
- | A | INITIAL RELEASE | 3017 | 07JUN10 | M. TAGUPA | J.M.
- | B | UPDATED SPECIFICATIONS AND FEATURES TABLE | 3291 | 29JUL11 | NTHALLA | J.M.
- | C | UPDATED SPECIFICATIONS AND FEATURES TABLE | 3810 | 30AUG13 | L.L. | J.M.
Specifications and Features
DC Input Bus Voltage: 24 ~ 70 VDC, 70 ~ 190 VDC, 190 ~ 370 VDC
Inrush Current at Power Up: N/A
Logic Supply Input (For 34M341-1 Only): 24 to 48 VDC, 600mA max @24VDC. Powers all amplifier logic and encoders.
Peak Current Output: 30A (STD), 20A (LO) @ 25°C Ambient (w/ forced air cooling)
Continuous Current Output: 15A (STD), 10A (LO) @ 25°C Ambient (w/ forced air cooling)
Fault Protection: Short circuit protection from motor phase to phase, motor phase to DC bus, motor phase to case (chassis gnd) Amplifier RMS over current. DC bus over/under voltage. Amplifier over temperature. Motor over temperature (switch or thermistor input). Encoder broken wire. Invalid Hall/comm track state. Commutation fault.
Amplifier Status Indication: See Table
Low Speed Electronic Circuit Breaker (LSCB): Latches when programmable current (15A (STD) max, 10A (LO) max.) and time (10 sec. max.) exceed limit.
Bus Overvoltage: See Table
Bus Undervoltage: See Table
Internal Regen: N/A
Regen Voltage: N/A
Amplifier Type: See Model Number Key (from product manual)
Analog Command Input: ±10V (12 bit resolution) for analog velocity, and current command. 15 bit is available (optional).
Auxiliary Analog Input: ±10V (12 bit resolution) for 2 phase Current Mode. 15 bit is available (optional).
Pulse & Direction Inputs: Accepts TTL level Step & Direction signals
Encoder Feedback: Accepts TTL level encoder signals
Tachometer Feedback: Accept ±30 VDC tacho signals (Different voltage levels are available upon request)
Dedicated Inputs: +/- position limits, inhibit, motor overtemp & reset signal
Dedicated Fault Output (Programmable Level): TTL Compatible
Analog Out: ±10 V analog output (12-Bit) for monitoring DSP signals, output source selectable and scalable using MotionMaestro™ setup software, 2 channels and 16-bit are available (optional)
Auto Phasing: Plug & Play for all types of three phase Brushless Motors.
Smart Com Initialization at Amplifier turn on: Eliminates the need for Hall sensor or commutation tracks for many applications.
RS-232 Host Port: High speed serial communication interface for set-up and tuning. 115.2 Kbaud, 8 bits, no parity, 1 stop bit
Software Configurable: All parameters are downloaded using the RS232 port / Glentek's Windows™ based MotionMaestro™ software.
Digitally Tuned: All parameters set digitally. No potentiometers to adjust. RS-232 high speed serial communication interface for all gain and PID tuning parameters.
Non-Volatile Memory: All parameters are stored in non-volatile memory
PWM Switching Frequency: 25 KHz Typical
Current Loop Bandwidth: Tunable up to 3 KHz
Amplifier Isolation: Logic completely isolated from high voltage output stage
Operating Temperature: 0 °C to +60 °C
Storage Temperature: -40 °C to +80 °C
Humidity: 5% to 95% non-condensing
Mounting Hardware: #6-32 or M4 Screw, Qty = 2
Dimensions (inches): L 7.13, H 5.57, W 1.59
Backup File: xxxx-SJBK
Mating Connectors
Controller I/O, 24 Pin Molex: Glentek P/N: EJB22F12; Molex P/N: 90142-0024
Encoder Feedback, 20 Pin Molex: Glentek P/N: EJB22F10; Molex P/N: 90142-0020
Controller I/O & Motor Feedback Socket Connector, Molex: Glentek P/N: EJB21F01; Molex P/N: 90119-2110
Host, RJ45 Molex: Glentek P/N: EJ01R003; Molex P/N: 87522-8012
Power Input / Motor Output, 5 Pin Phoenix: Glentek P/N: EJ541F05; Phoenix P/N: 1832442
Logic Power, 2 Pin Phoenix: Glentek P/N: EJ741V02; Phoenix P/N: 1792757
Controller I/O Connector
Pin | Signal Name
1 ENCODER A+(OUT)
2 ENCODER A-(OUT)
3 ENCODER B+(OUT)
4 ENCODER B-(OUT)
5 ENCODER Z+(OUT)
6 ENCODER Z-(OUT)
7 PULSE +
8 PULSE -
9 DIR +
10 DIR -
11 RESET IN
12 +LIMIT
13 -LIMIT
14 INHIBIT
15 FAULT OUT
16 +5VDC
17 COMMON (ANALOG)
18 COMMON (DIGITAL)
19 ANALOG OUT (AUX.)
20 ANALOG OUT
21 SIGNAL 2+
22 SIGNAL 2-
23 SIGNAL 1+
24 SIGNAL 1-
Motor Feedback Connector
Pin | Signal Name
1 TACH +
2 TACH -
3 RESERVED
4 MOTOR TEMP
5 ENCODER Z+ (IN)
6 ENCODER Z- (IN)
7 ENCODER B+ (IN)
8 ENCODER B- (IN)
9 ENCODER A+ (IN)
10 ENCODER A- (IN)
11 HALL U+
12 HALL U-
13 HALL V+
14 HALL V-
15 HALL W+
16 HALL W-
17 ENC PWR (+5VDC)
18 COMMON (DIGITAL)
19 ENC PWR (+5VDC)
20 COMMON (DIGITAL)
Host Connector
Pin | Signal Name
1 RESERVED
2 RESERVED
3 RESERVED
4 COMMON (DIGITAL)
5 TX232
6 RX232
7 RESERVED
8 RESERVED
Power / Motor Connector
Pin | Signal Name
1 B- (BUS RETURN)
2 B+ (BUS INPUT)
3 MOTOR PHASE T / BRUSH OUTPUT B
4 MOTOR PHASE S
5 MOTOR PHASE R / BRUSH OUTPUT A
PE PROTECTIVE EARTHING (CHASSIS GND)
Status Display
Display | Fault Description
1 EEPROM FAULT
2 RAM FAULT
3 CPLD FAULT
8 RESET
b BUS OVERVOLTAGE
C CLAMP
c FAULT INPUT
E ENCODER FAULT
F FOLDBACK
H HEATSINK OVERTEMP
h MOTOR OVERTEMP
L LS/ECB
O NORMAL OPERATION
S HS/ECB
U UNDER VOLTAGE
= HALL FAULT
≡ COMMUTATION FAULT
Logic Power Connector
Pin | Signal Name
1 COMMON (DIGITAL)
2 +24VDC
Bus Over Voltage and Under Voltage Settings
Power Input Voltage | BUS Over Voltage | BUS Under Voltage
190 VDC ~ 370 VDC | 450 VDC ± 5% | 150 VDC ± 5%
70 VDC ~ 190 VDC | 250 VDC ± 5% | 60 VDC ± 5%
24 VDC ~ 70 VDC | 100 VDC ± 5% | 16VDC ± 5%
GLENTEK
208 Standard Street El Segundo, CA 90245 USA
TEL (310) 322-3026 FAX (310) 322-7709
www.glentek.com
INSTALLATION, SMx9415-bbb-1cc-1, STD/LO POWER, MOLEX
SIZE D | MODEL SMx9415-1 | DRAWING NUMBER 9415-1030-000 | REV C
SCALE 2:1 | FILE NAME 9415-1030-000-C.DWG | SHEET 1 OF 1
CONFIGURATION CODE: -
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ARE AS FOLLOWS
DECIMAL: XX = ±0.05, XXX = ±0.010
ANGULAR: < = ±0.5°
FINISH: 125 MAXIMUM
DRAWN BY: M. TAGUPA 07JUN10
CHK BY: L.C. 07JUN10
APP'D BY: J.M. 07JUN10
APPROVAL
DATE
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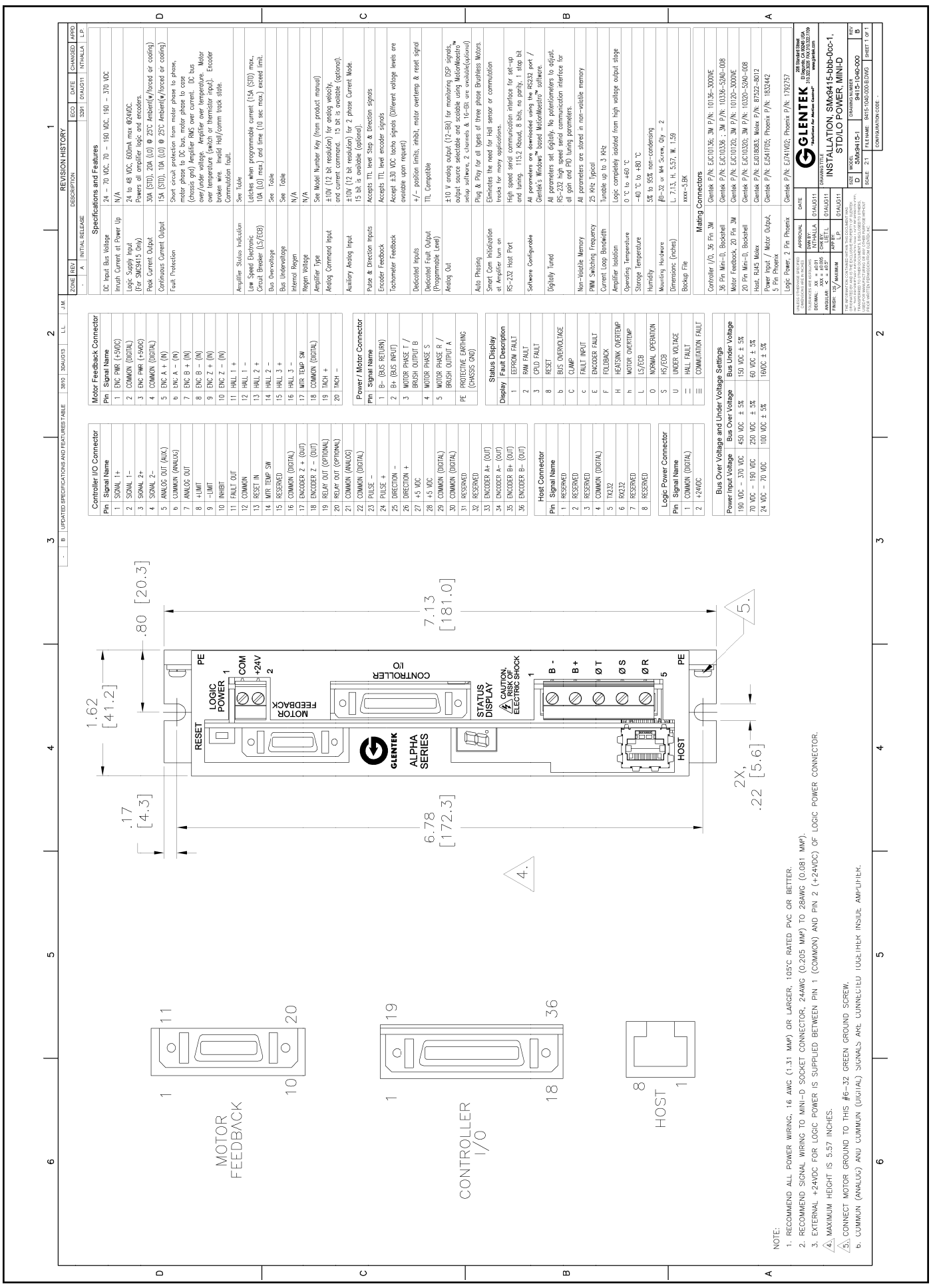
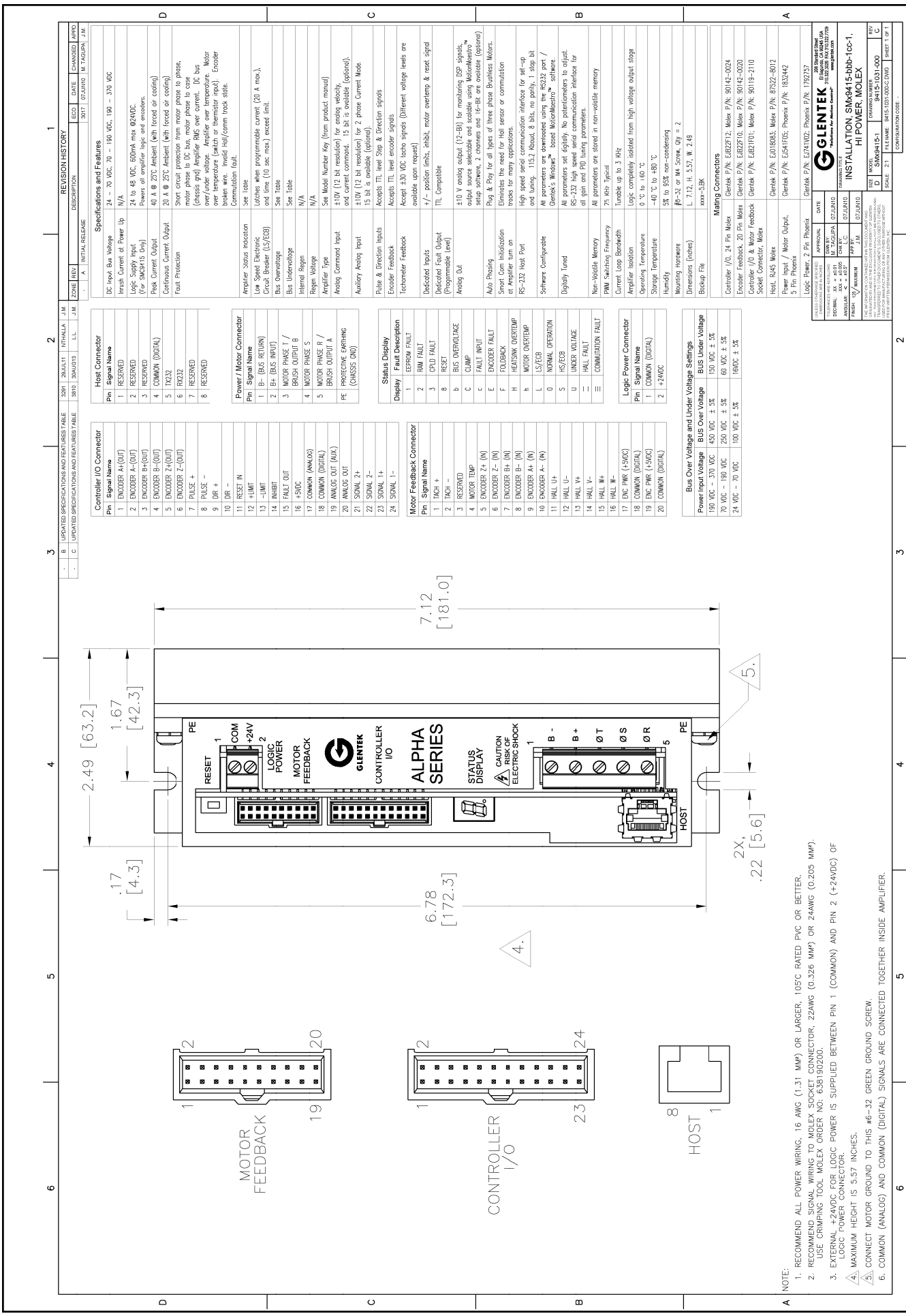
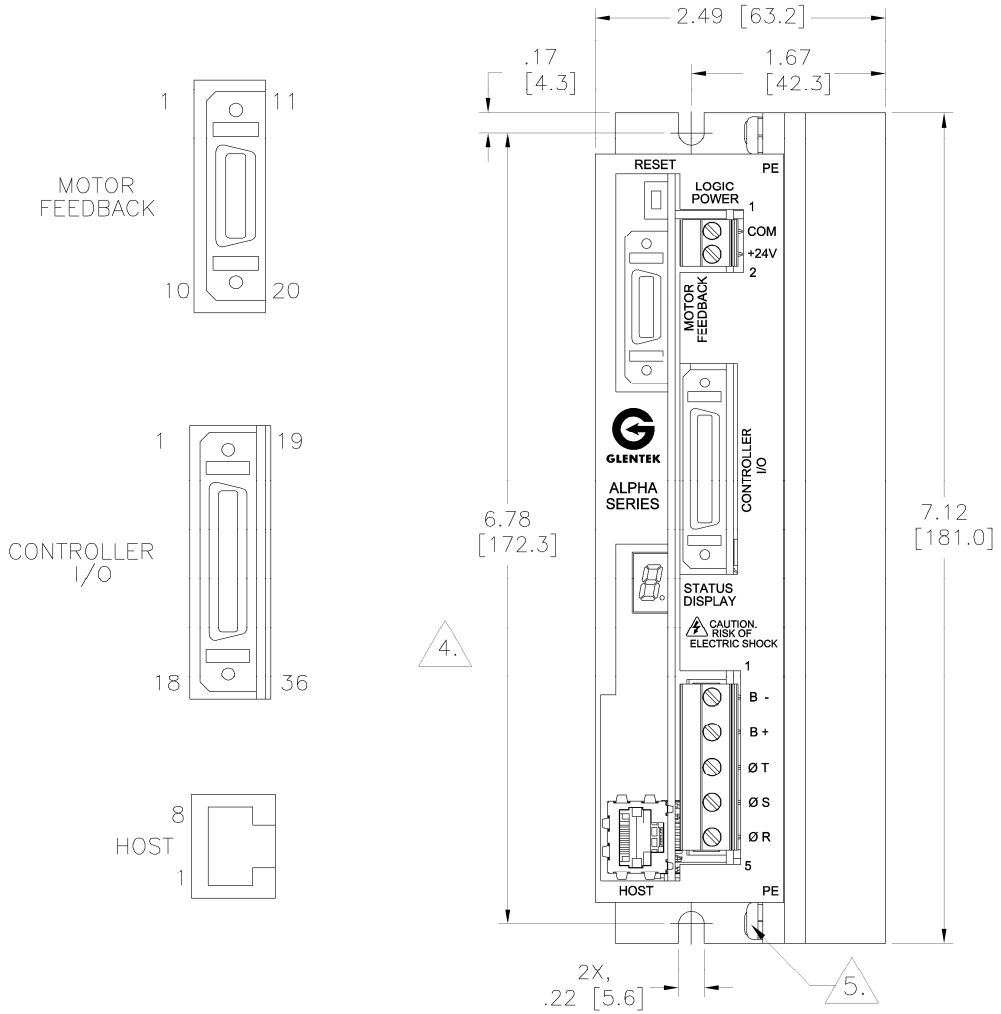
MOTOR FEEDBACK
CONTROLLER I/O
HOST
RESET
COM
+24V
LOGIC POWER
MOTOR FEEDBACK
GLENTEK
CONTROLLER I/O
ALPHA SERIES
STATUS DISPLAY
CAUTION RISK OF ELECTRIC SHOCK
B -
B +
ØT
ØS
ØR
PE
HOST
1.62 [41.2]
.80 [20.3]
.17 [4.3]
6.78 [172.3]
7.13 [181.0]
2X, .22 [5.6]
4.
5.
NOTE:
1. RECOMMEND ALL POWER WIRING, 16 AWG (1.31 MM²) OR LARGER,105°C RATED PVC OR BETTER.
2. RECOMMEND SIGNAL WIRING TO MOLEX SOCKET CONNECTOR, 22AWG (0.326 MM²) OR 24AWG (0.205 MM²). USE CRIMPING TOOL MOLEX ORDER NO. 63819-0200.
3. EXTERNAL +24VDC FOR LOGIC POWER IS SUPPLIED BETWEEN PIN 1 (COMMON) AND PIN 2 (+24VDC) OF LOGIC POWER CONNECTOR.
4. MAXIMUM HEIGHT IS 5.57 INCHES.
5. CONNECT MOTOR GROUND TO THIS #6-32 GREEN GROUND SCREW.
6. COMMON (ANALOG) AND COMMON (DIGITAL) SIGNALS ARE CONNECTED TOGETHER INSIDE AMPLIFIER.


REVISION HISTORY
ZONE | REV | DESCRIPTION | ECO | DATE | CHANGED | APPD
- | A | INITIAL RELEASE | 3591 | 01AUG11 | NTHALLA | L.P.
- | B | UPDATED SPECIFICATIONS AND FEATURES TABLE | 3810 | 30AUG13 | L.L. | J.M.
Specifications and Features
DC Input Bus Voltage | 24 – 70 VDC, 70 – 190 VDC, 190 – 370 VDC
Inrush Current at Power Up | N/A
Logic Supply Input (For SMC9415 Only) | 24 to 48 VDC, 600mA max @24VDC. Powers all amplifier logic and encoders.
Peak Current Output | 30A (STD), 20A (LO) @ 25°C Ambient(w/forced air cooling)
Continuous Current Output | 15A (STD), 10A (LO) @ 25°C Ambient(w/forced air cooling)
Fault Protection | Short circuit protection from motor phase to phase, motor phase to DC bus, motor phase to case (chassis gnd) Amplifier RMS over current. DC bus over/under voltage. Amplifier over temperature. Motor over temperature (switch or thermistor input). Encoder broken wire. Invalid Hall/comm track state. Commutation fault.
Amplifier Status Indication | See Table
Low Speed Electronic Circuit Breaker (LSCB) | Latches when programmable current (15A (STD) max, 10A (LO) max.) and time (10 sec. max.) exceed limit.
Bus Overvoltage | See Table
Bus Undervoltage | See Table
Internal Regen | N/A
Regen Voltage | N/A
Amplifier Type | See Model Number Key (from product manual)
Analog Command Input | ±10V (12 bit resolution) for analog velocity, and current command. 13 bit is available (optional).
Auxiliary Analog Input | ±10V (12 bit resolution) for 2 phase Current Mode. 15 bit is available (optional).
Pulse & Direction Inputs | Accepts TTL level Step & Direction signals
Encoder Feedback | Accepts TTL level encoder signals
Tachometer Feedback | Accept ±30 VDC tacho signals (Different voltage levels are available upon request)
Dedicated Inputs | +/– position limits, inhibit, motor overtemp & reset signal
Dedicated Fault Output (Programmable Level) | TTL Compatible
Analog Out | ±10 V analog output (12-Bit) for monitoring DSP signals, output source selectable and scalable using MotionMaestro™ setup software, 2 channels & 16-Bit are available(optional)
Auto Phasing | Plug & Play for all types of three phase Brushless Motors.
Smart Com Initialization at Amplifier turn on | Eliminates the need for Hall sensor or commutation tracks for many applications.
RS-232 Host Port | High speed serial communication interface for set-up and tuning. 115.2 Kbaud, 8 bits, no parity, 1 stop bit
Software Configurable | All parameters are downloaded using the RS232 port / Glentek's Windows™ based MotionMaestro™ software.
Digitally Tuned | All parameters set digitally. No potentiometers to adjust. RS-232 high speed serial communication interface for all gain and PID tuning parameters.
Non-Volatile Memory | All parameters are stored in non-volatile memory
PWM Switching Frequency | 25 KHz Typical
Current Loop Bandwidth | Tunable up to 3 KHz
Amplifier Isolation | Logic completely isolated from high voltage output stage
Operating Temperature | 0 °C to +60 °C
Storage Temperature | –40 °C to +80 °C
Humidity | 5% to 95% non-condensing
Mounting Hardware | #6-32 or M4 Screw, Qty – 2
Dimensions (inches) | L. 7.13, H. 5.57, W. 1.59
Backup File | xxxx–5.BK
Mating Connectors
Controller I/O, 36 Pin 3M | Glentek P/N: EJC10136; 3M P/N: 10136–3000VE
36 Pin Mini–D, Backshell | Glentek P/N: EJC10336 ; 3M P/N: 10336–5240–008
Motor Feedback, 20 Pin 3M | Glentek P/N: EJC10120; 3M P/N: 10120–3000VE
20 Pin Mini–D, Backshell | Glentek P/N: EJC10320; 3M P/N: 10320–5240–008
Host, RJ45 Molex | Glentek P/N: EJD18083; Molex P/N: 87522–8012
Power Input / Motor Output, 5 Pin Phoenix | Glentek P/N: EJ541F05; Phoenix P/N: 1852442
Logic Power, 2 Pin Phoenix | Glentek P/N: EJ741W02; Phoenix P/N: 1792757
Controller I/O Connector
Pin | Signal Name
1 | SIGNAL 1+
2 | SIGNAL 1–
3 | SIGNAL 2+
4 | SIGNAL 2–
5 | ANALOG OUT (AUX.)
6 | COMMON (ANALOG)
7 | ANALOG OUT
8 | +LIMIT
9 | –LIMIT
10 | INHIBIT
11 | FAULT OUT
12 | COMMON
13 | RESET IN
14 | MTR TEMP SW
15 | RESERVED
16 | COMMON (DIGITAL)
17 | ENCODER Z + (OUT)
18 | ENCODER Z – (OUT)
19 | RELAY OUT (OPTIONAL)
20 | RELAY OUT (OPTIONAL)
21 | COMMON (ANALOG)
22 | COMMON (DIGITAL)
23 | PULSE –
24 | PULSE +
25 | DIRECTION –
26 | DIRECTION +
27 | +5 VDC
28 | +5 VDC
29 | COMMON (DIGITAL)
30 | COMMON (DIGITAL)
31 | RESERVED
32 | RESERVED
33 | ENCODER A+ (OUT)
34 | ENCODER A– (OUT)
35 | ENCODER B+ (OUT)
36 | ENCODER B– (OUT)
Motor Feedback Connector
Pin | Signal Name
1 | ENC PWR (+5VDC)
2 | COMMON (DIGITAL)
3 | ENC PWR (+5VDC)
4 | COMMON (DIGITAL)
5 | ENC A + (IN)
6 | ENC A – (IN)
7 | ENC B + (IN)
8 | ENC B – (IN)
9 | ENC Z + (IN)
10 | ENC Z – (IN)
11 | HALL 1 +
12 | HALL 1 –
13 | HALL 2 +
14 | HALL 2 –
15 | HALL 3 +
16 | HALL 3 –
17 | MTR TEMP SW
18 | COMMON (DIGITAL)
19 | TACH +
20 | TACH –
Power / Motor Connector
Pin | Signal Name
1 | B– (BUS RETURN)
2 | B+ (BUS INPUT)
3 | MOTOR PHASE T / BRUSH OUTPUT B
4 | MOTOR PHASE S
5 | MOTOR PHASE R / BRUSH OUTPUT A
PE | PROTECTIVE EARTHING (CHASSIS GND)
Host Connector
Pin | Signal Name
1 | RESERVED
2 | RESERVED
3 | RESERVED
4 | COMMON (DIGITAL)
5 | TX232
6 | RX232
7 | RESERVED
8 | RESERVED
Logic Power Connector
Pin | Signal Name
1 | COMMON (DIGITAL)
2 | +24VDC
Status Display
Display | Fault Description
1 | EEPROM FAULT
2 | RAM FAULT
3 | CPLD FAULT
8 | RESET
b | BUS OVERVOLTAGE
C | CLAMP
c | FAULT INPUT
E | ENCODER FAULT
F | FOLDBACK
H | HEATSINK OVERTEMP
h | MOTOR OVERTEMP
L | LS/ECB
O | NORMAL OPERATION
S | HS/ECB
U | UNDER VOLTAGE
= | HALL FAULT
≡ | COMMUTATION FAULT
Bus Over Voltage and Under Voltage Settings
Power Input Voltage | Bus Over Voltage | Bus Under Voltage
190 VDC – 370 VDC | 450 VDC ± 5% | 150 VDC ± 5%
70 VDC – 190 VDC | 250 VDC ± 5% | 60 VDC ± 5%
24 VDC – 70 VDC | 100 VDC ± 5% | 16VDC ± 5%
GLENTEK, 208 Standard Street, El Segundo, CA 90245 (310) 322-3026 www.glentek.com
INSTALLATION; SMc9415-bbb-0cc-1, STD/LO POWER, MINI-D
SIZE D | MODEL SMc9415-1 | DRAWING NUMBER 9415-1040-000 | REV B
SCALE 2:1 | FILENAME 9415-1040-000.B.DWG | SHEET 1 OF 1
DO NOT SCALE DRAWING
UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES; TOLERANCES: DECIMAL: XX ± ±0.01, XXX ± ±0.005; ANGULAR: ±0.5°; FINISH: 125 µ" MAXIMUM
DRAWN BY: NTHALLA 01AUG11; CHK'D BY: L.L. 01AUG11; APP'D BY: L.P. 01AUG11
THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF GLENTEK. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF GLENTEK, INC. IS PROHIBITED.
CONFIGURATION CODE: -
MOTOR FEEDBACK
CONTROLLER I/O
HOST
RESET
LOGIC POWER
MOTOR FEEDBACK
CONTROLLER I/O
STATUS DISPLAY
CAUTION, RISK OF ELECTRIC SHOCK
B -
B +
Ø T
Ø S
Ø R
PE
COM
+24V
ALPHA SERIES
1.62 [41.2]
.80 [20.3]
.17 [4.3]
7.13 [181.0]
6.78 [172.3]
2X, .22 [5.6]
4.
5.
NOTE:
1. RECOMMEND ALL POWER WIRING, 16 AWG (1.31 MM²) OR LARGER, 105°C RATED PVC OR BETTER.
2. RECOMMEND SIGNAL WIRING TO MINI-D SOCKET CONNECTOR, 24AWG (0.205 MM²) TO 28AWG (0.081 MM²).
3. EXTERNAL +24VDC FOR LOGIC POWER IS SUPPLIED BETWEEN PIN 1 (COMMON) AND PIN 2 (+24VDC) OF LOGIC POWER CONNECTOR.
4. MAXIMUM HEIGHT IS 5.57 INCHES.
5. CONNECT MOTOR GROUND TO THIS #6-32 GREEN GROUND SCREW.
6. COMMON (ANALOG) AND COMMON (DIGITAL) SIGNALS ARE CONNECTED TOGETHER INSIDE AMPLIFIER.


REVISION HISTORY
ZONE | REV | DESCRIPTION | ECO | DATE | CHANGED | APPD
- | A | INITIAL RELEASE | 3017 | 07JUN10 | M. TAGLIPA | J.M.
- | B | UPDATED SPECIFICATIONS AND FEATURES TABLE | 3291 | 29JUL11 | NTHALLA | J.M.
- | C | UPDATED SPECIFICATIONS AND FEATURES TABLE | 3810 | 30AUG13 | L.L. | J.M.
Specifications and Features
DC Input Bus Voltage | 24 - 70 VDC, 70 - 190 VDC, 190 - 370 VDC
Inrush Current at Power Up | N/A
Logic Supply Input (For SMC9415 Only) | 24 to 48 VDC, 600mA max @24VDC. Powers all amplifier logic and encoders.
Peak Current Output | 40 A @ 25°C Ambient (with forced air cooling)
Continuous Current Output | 20 A @ 25°C Ambient (with forced air cooling)
Fault Protection | Short circuit protection from motor phase to phase, motor phase to I/O bus, motor phase to case (chassis gnd) Amplifier RMS over current. I2t bus over/under voltage. Amplifier over temperature. Motor over temperature (switch or thermistor input). Encoder broken wire. Invalid Hall/comm track state. Commutation fault.
Amplifier Status Indication | See Table
Low Speed Electronic Circuit Breaker (LS/ECB) | Latches when programmable current (20 A max.), and time (10 sec max.) exceed limit.
Bus Overvoltage | See Table
Bus Undervoltage | See Table
Internal Regen | N/A
Regen Voltage | N/A
Amplifier Type | See Model Number Key (from product manual)
Analog Command Input | ±10V (12 bit resolution) for analog velocity, and current commands. 15 bit is available (optional).
Auxiliary Analog Input | ±10V (12 bit resolution) for 2 phase Current Mode. 15 bit is available (optional).
Pulse & Direction Inputs | Accepts TTL level Step & Direction signals
Encoder Feedback | Accepts TTL level encoder signals
Tachometer Feedback | Accept ±30 VDC tacho signals (Different voltage levels are available upon request)
Dedicated Inputs | +/- position limits, inhibit, motor overtemp & reset signal
Dedicated Fault Output (Programmable Level) | TTL Compatible
Analog Out | ±10 V analog output (12-Bit) for monitoring DSP signals, output source selectable and scalable using MotionMaestro™ setup software. 2 channels and 16-Bit are available (optional)
Auto Phasing | Plug & Play for all types of three phase Brushless Motors.
Smart Com Initialization at Amplifier turn on | Eliminates the need for Hall sensor or commutation tracks for many applications.
RS-232 Host Port | High speed serial communication interface for set-up and tuning. 115.2 Kbaud, 8 bits, no parity, 1 stop bit
Software Configurable | All parameters are downloaded using the RS232 port / Glentek's Windows™ based MotionMaestro™ software.
Digitally Tuned | All parameters set digitally. No potentiometers to adjust. RS-232 high speed serial communication interface for all gain and PID tuning parameters.
Non-Volatile Memory | All parameters are stored in non-volatile memory
PWM Switching Frequency | 25 KHz Typical
Current Loop Bandwidth | Tunable up to 3 KHz
Amplifier Isolation | Logic completely isolated from high voltage output stage
Operating Temperature | 0 °C to +60 °C
Storage Temperature | -40 °C to +80 °C
Humidity | 5% to 95% non-condensing
Mounting Hardware | #8-32 or M4 Screw, Qty = 2
Dimensions (inches) | L. 7.12, H. 5.57, W. 2.49
Backup File | xxxx-SBK
Mating Connectors
Controller I/O, 24 Pin Molex | Glentek P/N: EJB22F12; Molex P/N: 90142-0024
Encoder Feedback, 20 Pin Molex | Glentek P/N: EJB22F10; Molex P/N: 90142-0020
Controller I/O & Motor Feedback Socket Connector, Molex | Glentek P/N: EJB21F01; Molex P/N: 90119-2110
Host, RJ45 Molex | Glentek P/N: EJ0180B3; Molex P/N: 87522-8012
Power Input / Motor Output, 5 Pin Phoenix | Glentek P/N: EJ541F05; Phoenix P/N: 1832442
Logic Power, 2 Pin Phoenix | Glentek P/N: EJ741W02; Phoenix P/N: 1792757
GLENTEK
208 Standard Street
El Segundo, CA 90245
310.322.3026 FAX 310.322.7709
www.glentek.com
INSTALLATION, SMx9415-bbb-1cc-1, HI POWER, MOLEX
SIZE D | MODEL NO. SMx9415-1 | DRAWING NUMBER 9415-1031-000 | REV C
SCALE 2:1 | FILE NAME 9415-1031-000-C.DWG | SHEET 1 OF 1
CONFIGURATION CODE -
Controller I/O Connector
Pin | Signal Name
1 ENCODER A+(OUT)
2 ENCODER A-(OUT)
3 ENCODER B+(OUT)
4 ENCODER B-(OUT)
5 ENCODER Z+(OUT)
6 ENCODER Z-(OUT)
7 PULSE +
8 PULSE -
9 DIR +
10 DIR -
11 RESET IN
12 +LIMIT
13 -LIMIT
14 INHIBIT
15 FAULT OUT
16 +5VDC
17 COMMON (ANALOG)
18 COMMON (DIGITAL)
19 ANALOG OUT (AUX.)
20 ANALOG OUT
21 SIGNAL 2+
22 SIGNAL 2-
23 SIGNAL 1+
24 SIGNAL 1-
Host Connector
Pin | Signal Name
1 RESERVED
2 RESERVED
3 RESERVED
4 COMMON (DIGITAL)
5 TX232
6 RX232
7 RESERVED
8 RESERVED
Power / Motor Connector
Pin | Signal Name
1 B- (BUS RETURN)
2 B+ (BUS INPUT)
3 MOTOR PHASE T / BRUSH OUTPUT B
4 MOTOR PHASE S
5 MOTOR PHASE R / BRUSH OUTPUT A
PE PROTECTIVE EARTHING (CHASSIS GND)
Status Display
Display | Fault Description
1 EEPROM FAULT
2 RAM FAULT
3 CPLD FAULT
8 RESET
b BUS OVERVOLTAGE
C CLAMP
c FAULT INPUT
E ENCODER FAULT
F FOLDBACK
H HEATSINK OVERTEMP
h MOTOR OVERTEMP
L LS/ECB
O NORMAL OPERATION
S HS/ECB
U UNDER VOLTAGE
V+ HALL FAULT
= COMMUTATION FAULT
Motor Feedback Connector
Pin | Signal Name
1 TACH +
2 TACH -
3 RESERVED
4 MOTOR TEMP
5 ENCODER Z+ (N)
6 ENCODER Z- (N)
7 ENCODER B+ (N)
8 ENCODER B- (N)
9 ENCODER A+ (N)
10 ENCODER A- (N)
11 HALL U+
12 HALL U-
13 HALL V+
14 HALL V-
15 HALL W+
16 HALL W-
17 ENC PWR (+5VDC)
18 COMMON (DIGITAL)
19 ENC PWR (+5VDC)
20 COMMON (DIGITAL)
Logic Power Connector
Pin | Signal Name
1 COMMON (DIGITAL)
2 +24VDC
Bus Over Voltage and Under Voltage Settings
Power Input Voltage | BUS Over Voltage | BUS Under Voltage
190 VDC - 370 VDC | 450 VDC ± 5% | 150 VDC ± 5%
70 VDC - 190 VDC | 250 VDC ± 5% | 60 VDC ± 5%
24 VDC - 70 VDC | 100 VDC ± 5% | 16VDC ± 5%
7.12 [181.0]
2.49 [63.2]
1.67 [42.3]
.17 [4.3]
6.78 [172.3]
2X, .22 [5.6]
PE
RESET
COM
+24V
LOGIC POWER
MOTOR FEEDBACK
GLENTEK
CONTROLLER I/O
ALPHA SERIES
STATUS DISPLAY
CAUTION RISK OF ELECTRIC SHOCK
B -
B +
ØT
ØS
ØR
HOST
MOTOR FEEDBACK
CONTROLLER I/O
HOST
NOTE:
1. RECOMMEND ALL POWER WIRING, 16 AWG (1.31 MM²) OR LARGER, 105C RATED PVC OR BETTER.
2. RECOMMEND SIGNAL WIRING TO MOLEX SOCKET CONNECTOR, 22AWG (0.326 MM²) OR 24AWG (0.205 MM²). USE CRIMPING TOOL MOLEX ORDER NO: 638190200.
3. EXTERNAL +24VDC FOR LOGIC POWER IS SUPPLIED BETWEEN PIN 1 (COMMON) AND PIN 2 (+24VDC) OF LOGIC POWER CONNECTOR.
4. MAXIMUM HEIGHT IS 5.57 INCHES.
5. CONNECT MOTOR GROUND TO THIS #6-32 GREEN GROUND SCREW.
6. COMMON (ANALOG) AND COMMON (DIGITAL) SIGNALS ARE CONNECTED TOGETHER INSIDE AMPLIFIER.



Controller I/O Connector	
Pin	Signal Name
1	SIGNAL 1+
2	SIGNAL 1–
3	SIGNAL 2+
4	SIGNAL 2–
5	ANALOG OUT (AUX.)
6	COMMON (ANALOG)
7	ANALOG OUT
8	+LIMIT
9	–LIMIT
10	INHIBIT
11	FAULT OUT
12	COMMON
13	RESET IN
14	MTR TEMP SW
15	RESERVED
16	COMMON (DIGITAL)
17	ENCODER Z + (OUT)
18	ENCODER Z – (OUT)
19	RELAY OUT (OPTIONAL)
20	RELAY OUT (OPTIONAL)
21	COMMON (ANALOG)
22	COMMON (DIGITAL)
23	PULSE –
24	PULSE +
25	DIRECTION –
26	DIRECTION +
27	+5 VDC
28	+5 VDC
29	COMMON (DIGITAL)
30	COMMON (DIGITAL)
31	RESERVED
32	RESERVED
33	ENCODER A+ (OUT)
34	ENCODER A– (OUT)
35	ENCODER B+ (OUT)
36	ENCODER B– (OUT)

Power / Motor Connector	
Pin	Signal Name
1	B– (BUS RETURN)
2	B+ (BUS INPUT)
3	MOTOR PHASE T / BRUSH OUTPUT B
4	MOTOR PHASE S
5	MOTOR PHASE R / BRUSH OUTPUT A
PE	PROTECTIVE EARTHING (CHASSIS GND)

Logic Power Connector	
Pin	Signal Name
1	COMMON (DIGITAL)
2	+24VDC

Bus Over Voltage and Under Voltage Settings		
Power Input Voltage	Bus Over Voltage	Bus Under Voltage
190 VDC – 370 VDC	450 VDC ± 5%	150 VDC ± 5%
70 VDC – 190 VDC	250 VDC ± 5%	60 VDC ± 5%
24 VDC – 70 VDC	100 VDC ± 5%	16VDC ± 5%

Motor Feedback Connector	
Pin	Signal Name
1	ENC PWR (+5VDC)
2	COMMON (DIGITAL)
3	ENC PWR (+5VDC)
4	COMMON (DIGITAL)
5	ENC A + (IN)
6	ENC A – (IN)
7	ENC B + (IN)
8	ENC B – (IN)
9	ENC Z + (IN)
10	ENC Z – (IN)
11	HALL 1 +
12	HALL 1 –
13	HALL 2 +
14	HALL 2 –
15	HALL 3 +
16	HALL 3 –
17	MTR TEMP SW
18	COMMON (DIGITAL)
19	TACH +
20	TACH –

Host Connector	
Pin	Signal Name
1	RESERVED
2	RESERVED
3	RESERVED
4	COMMON (DIGITAL)
5	TX232
6	RX232
7	RESERVED
8	RESERVED

Status Display	
Display	Fault Description
1	EEPROM FAULT
2	RAM FAULT
3	CPLD FAULT
8	RESET
b	BUS OVERVOLTAGE
C	CLAMP
c	FAULT INPUT
E	ENCODER FAULT
F	FOLDBACK
H	HEATSINK OVERTEMP
h	MOTOR OVERTEMP
L	LS/ECB
O	NORMAL OPERATION
S	HS/ECB
U	UNDER VOLTAGE
=	HALL FAULT
≡	COMMUTATION FAULT

NOTE:

1. RECOMMEND ALL POWER WIRING, 16 AWG (1.31 MM²) OR LARGER, 105°C RATED PVC OR BETTER.
2. RECOMMEND SIGNAL WIRING TO MINI-D SOCKET CONNECTOR, 24AWG (0.205 MM²) TO 28AWG (0.081 MM²).
3. EXTERNAL +24VDC FOR LOGIC POWER IS SUPPLIED BETWEEN PIN 1 (COMMON) AND PIN 2 (+24VDC) OF LOGIC POWER CONNECTOR.
4. MAXIMUM HEIGHT IS 5.37 INCHES.
5. CONNECT MOTOR GROUND TO THIS #6-32 GREEN GROUND SCREW.
6. COMMON (ANALOG) AND COMMON (DIGITAL) SIGNALS ARE CONNECTED TOGETHER INSIDE AMPLIFIER.

REVISION HISTORY

ZONE	REV.	DESCRIPTION	ECO	DATE	CHANGED	APPD
-	A	INITIAL RELEASE	3291	01AUG11	NTHALLA	L.P.
-	B	UPDATED SPECIFICATIONS AND FEATURES TABLE	3810	30AUG13	L.L.	J.M.

Specifications and Features	
DC Input Bus Voltage	24 – 70 VDC, 70 – 190 VDC, 190 – 370 VDC
Inrush Current at Power Up	N/A
Logic Supply Input (For SMC9415 Only)	24 to 48 VDC, 600mA max @24VDC. Powers all amplifier logic and encoders.
Peak Current Output	40 A @ 25°C Ambient (with forced air cooling)
Continuous Current Output	20 A @ 25°C Ambient (with forced air cooling)
Fault Protection	Short circuit protection from motor phase to phase, motor phase to DC bus, motor phase to case (chassis gnd) Amplifier RMS over current. DC bus over/under voltage. Amplifier over temperature. Motor over temperature (switch or thermistor input). Encoder broken wire. Invalid Hall/comm track state. Commutation fault.
Amplifier Status Indication	See Table
Low Speed Electronic Circuit Breaker (LS/ECB)	Latches when programmable current (20 A max.), and time (10 sec max.) exceed limit.
Bus Overvoltage	See Table
Bus Undervoltage	See Table
Internal Regen	N/A
Regen Voltage	N/A
Amplifier Type	See Model Number Key (from product manual)
Analog Command Input	±10V (12 bit resolution) for analog velocity, and current command. 15 bit is available (optional).
Auxiliary Analog Input	±10V (12 bit resolution) for 2 phase Current Mode. 15 bit is available (optional).
Pulse & Direction Inputs	Accepts TTL level Step & Direction signals
Encoder Feedback	Accepts TTL level encoder signals
Tachometer Feedback	Accept ±30 VDC tacho signals (Different voltage levels are available upon request)
Dedicated Inputs	+/– position limits, inhibit, motor overtemp & reset signal
Dedicated Fault Output (Progammable Level)	TTL Compatible
Analog Out	±10 V analog output (12-Bit) for monitoring DSP signals, output source selectable and scalable using MotionMaestro™ setup software, 2 channels & 16-Bit are available(optional)
Auto Phasing	Plug & Play for all types of three phase Brushless Motors.
Smart Com Initialization at Amplifier turn on	Eliminates the need for Hall sensor or commutation tracks for many applications.
RS-232 Host Port	High speed serial communication interface for set-up and tuning. 115.2 Kbaud, 8 bits, no parity, 1 stop bit
Software Configurable	All parameters are downloaded using the RS232 port / Glentek's Windows™ based MotionMaestro™ software.
Digitally Tuned	All parameters set digitally. No potentiometers to adjust. RS-232 high speed serial communication interface for all gain and PID tuning parameters.
Non-Volatile Memory	All parameters are stored in non-volatile memory
PWM Switching Frequency	25 KHz Typical
Current Loop Bandwidth	Tunable up to 3 KHz
Amplifier Isolation	Logic completely isolated from high voltage output stage
Operating Temperature	0 °C to +60 °C
Storage Temperature	–40 °C to +80 °C
Humidity	5% to 95% non-condensing
Mounting Hardware	#8-32 or M4 Screw, Qty = 2
Dimensions	L= 7.12 in, H= 5.37 in, W= 2.49in
Backup File	xxxx-5.BK

Mating Connectors	
Controller I/O, 36 Pin 3M	Glentek P/N: EJC10136; 3M P/N: 10136-3000VE
36 Pin Mini-D, Backshell	Glentek P/N: EJC10336 ; 3M P/N: 10336-52A0-008
Motor Feedback, 20 Pin 3M	Glentek P/N: EJC10120; 3M P/N: 10120-3000VE
20 Pin Mini-D, Backshell	Glentek P/N: EJC10320; 3M P/N: 10320-52A0-008
Host, RJ45 Molex	Glentek P/N: EJ018083; Molex P/N: 87522-8012
Power Input / Motor Output, 5 Pin Phoenix	Glentek P/N: EJ541F05; Phoenix P/N: 1832442
Logic Power, 2 Pin Phoenix	Glentek P/N: EJ741V02; Phoenix P/N: 1792757

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES
TOLERANCES ARE ACCUMULATIVE
DECIMAL: XX ± ±0.01, XXX ± ±0.005
ANGULAR: < ± ±0.5°
FINISH: 125 µ MAXIMUM

	APPROVAL	DATE
DWN BY:	NTHALLA	01AUG11
CHK BY:	LIET.L	01AUG11
APP BY:	L.P.	01AUG11

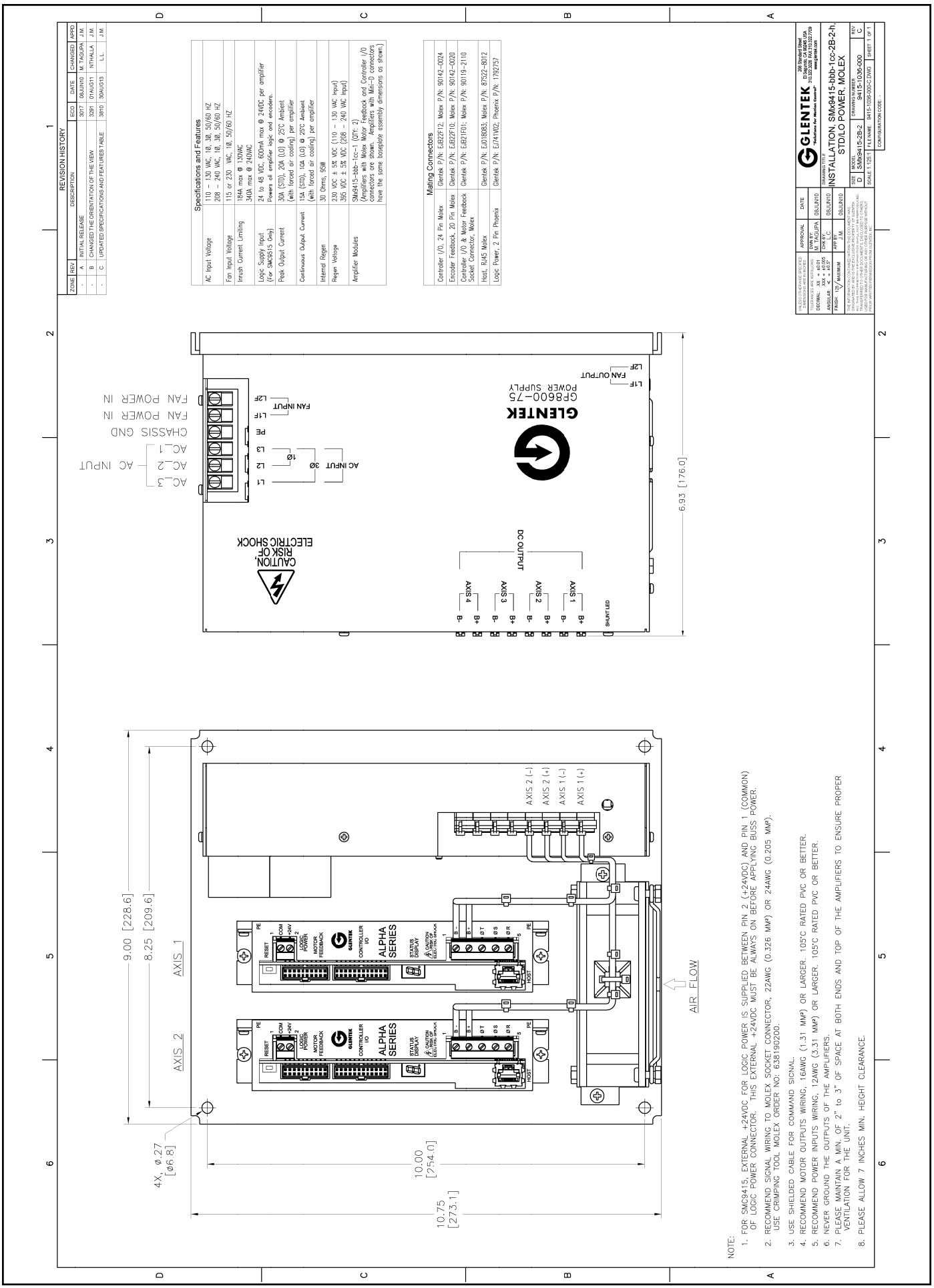
GLENTEK "Solutions for Motion Control"
208 Standard Street
El Segundo, CA 90245 USA
310.322.3026 FAX 310.322.7709
www.glentek.com

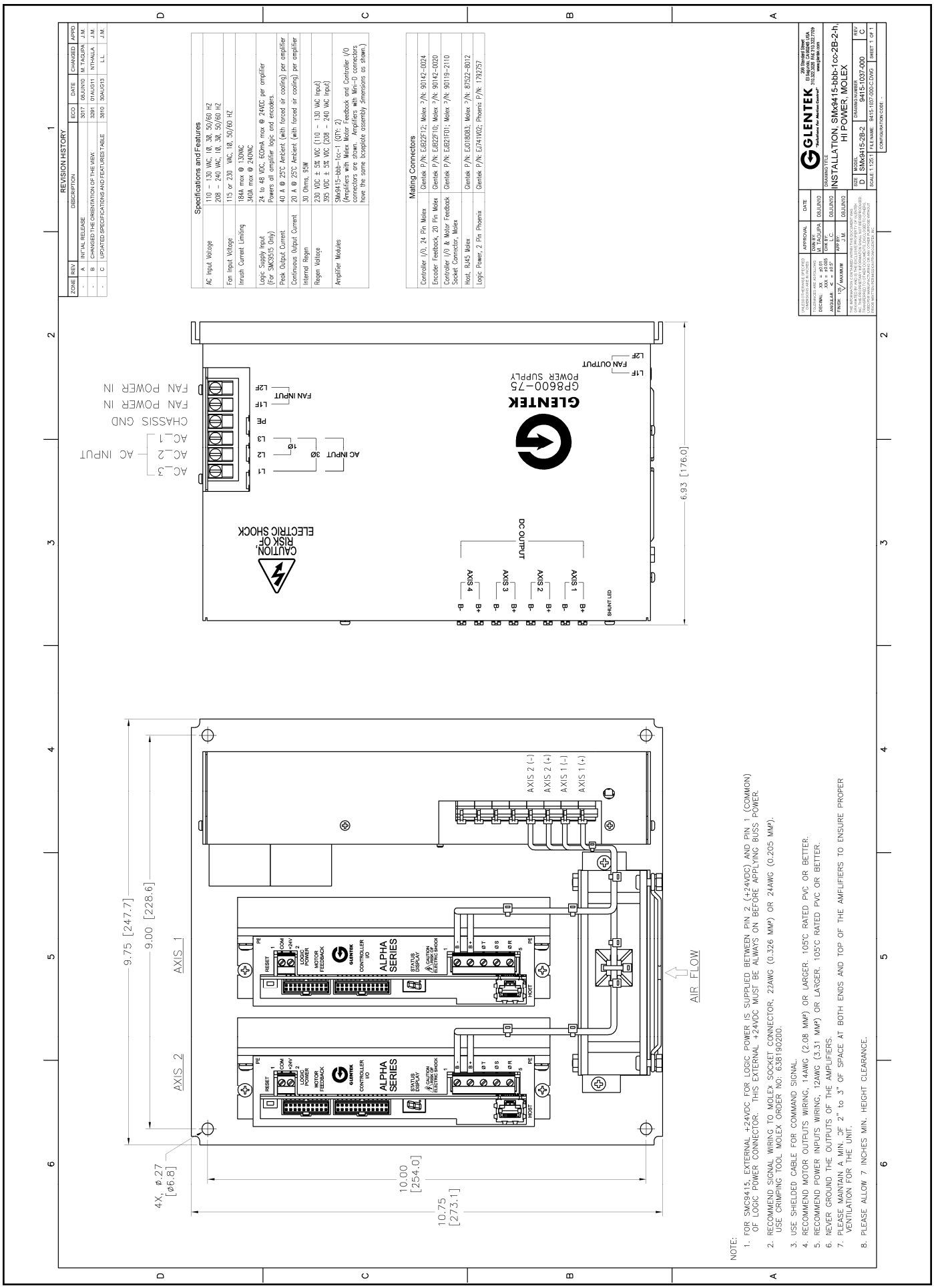
DRAWING TITLE
INSTALLATION, SMx9415-bbb-0cc-1, HI POWER, MINI-D

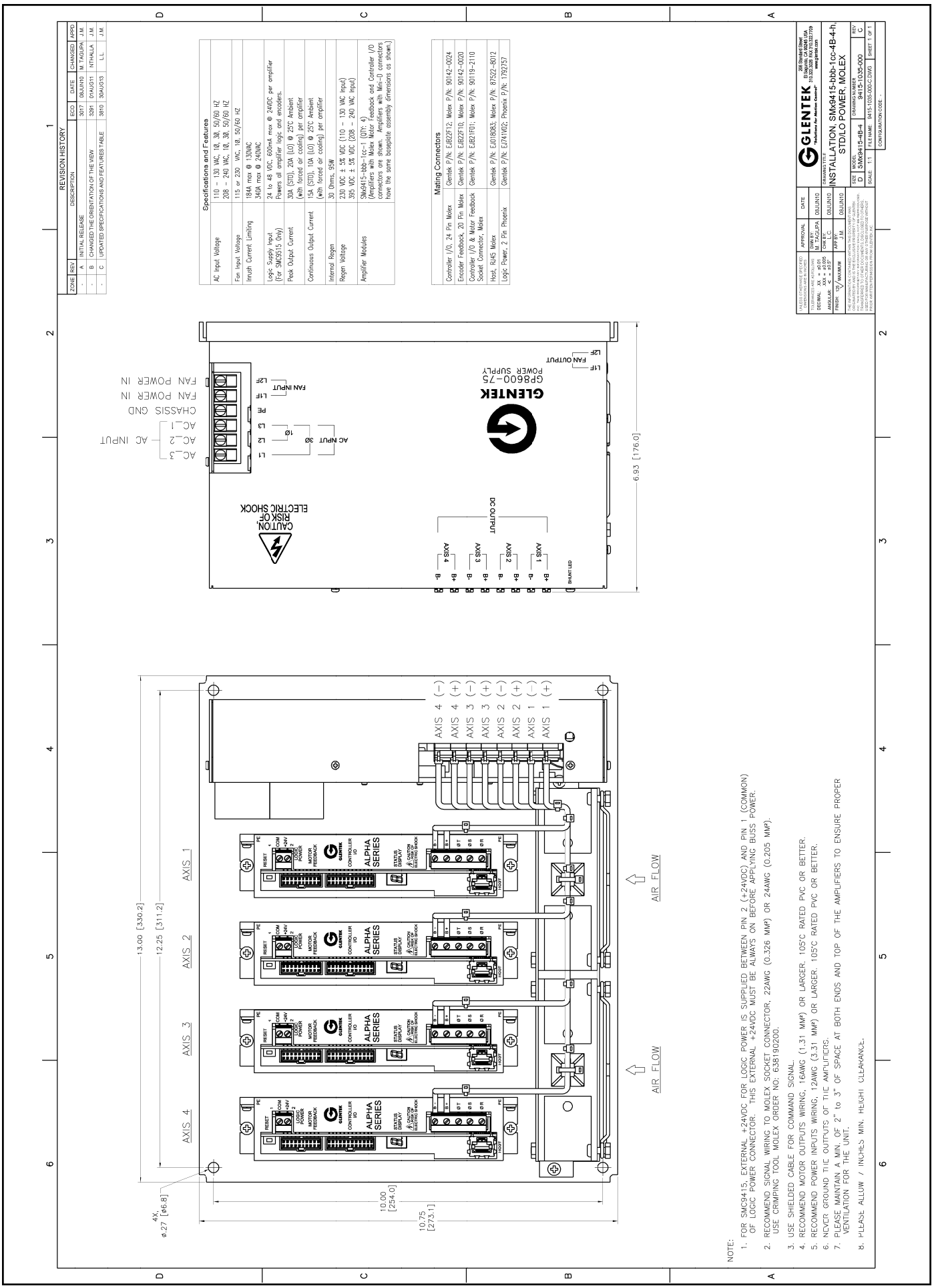
SIZE	MODEL	DRAWING NUMBER	REV
D	SMx9415-1	9415-1041-000	B

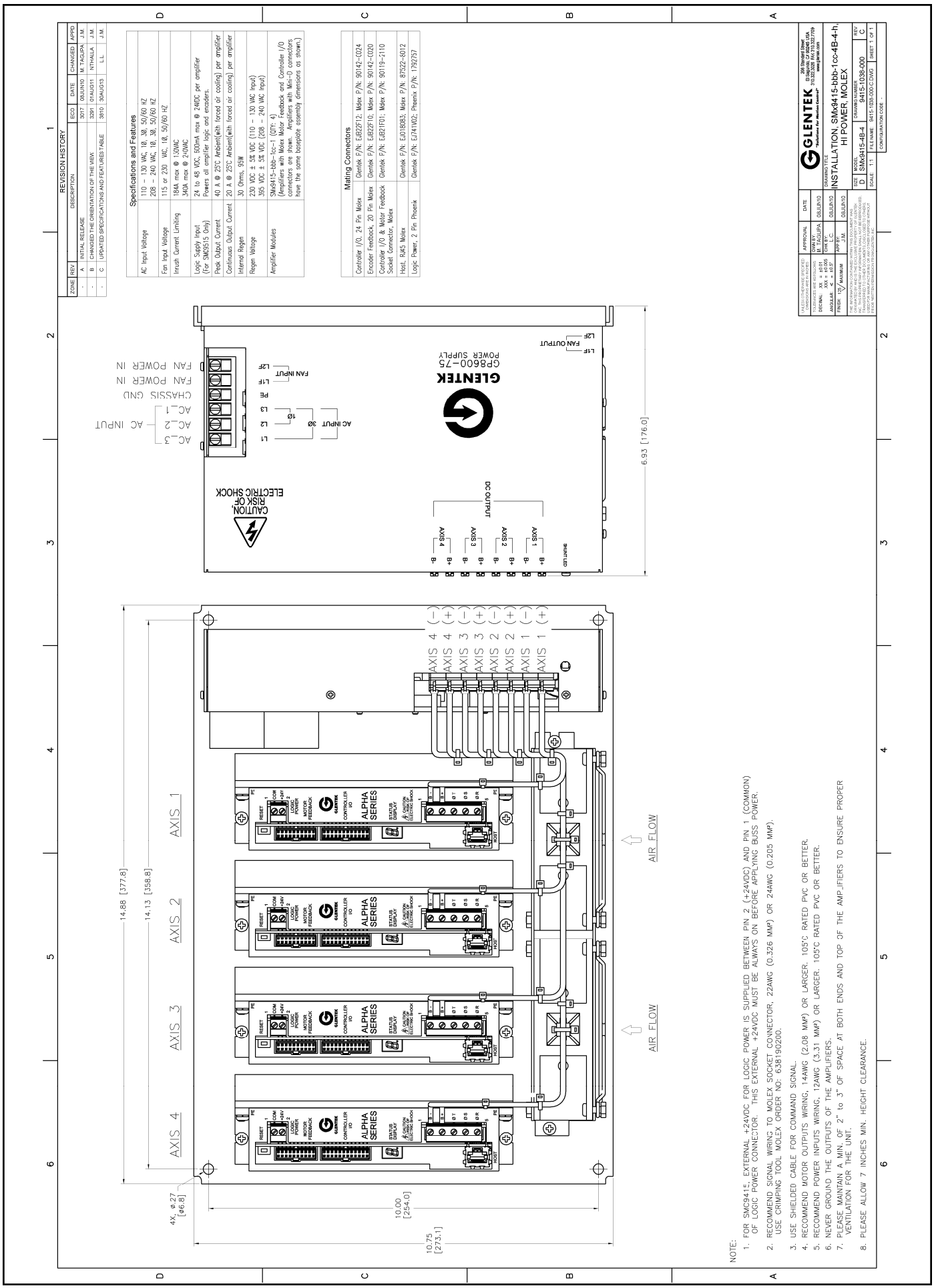
SCALE: 2:1 | FILE NAME: 9415-1041-000-B.DWG | SHEET 1 OF 1

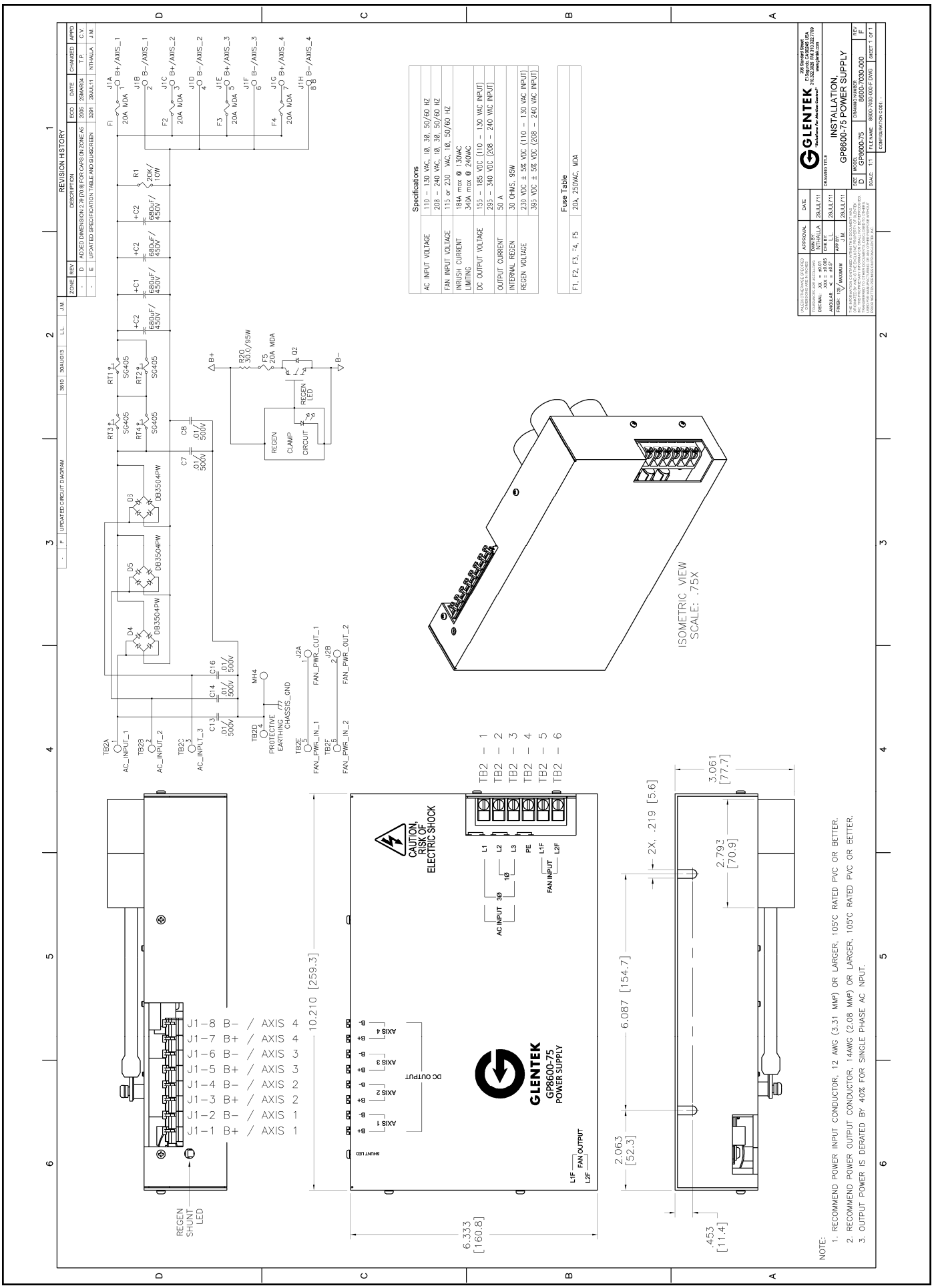
CONFIGURATION CODE: -


REVISION HISTORY
ZONE | REV | DESCRIPTION | ECO | DATE | CHANGED | APPD
- | A | INITIAL RELEASE | 3017 | 08JUN10 | M. TAGLIPA | J.M.
- | B | CHANGED THE ORIENTATION OF THE VIEW | 3391 | 01AUG11 | N.THALLA | J.M.
- | C | UPDATED SPECIFICATIONS AND FEATURES TABLE | 3810 | 30AUG13 | L.L. | J.M.
Specifications and Features
AC Input Voltage
110 – 130 VAC, 1Ø, 3Ø, 50/60 HZ
208 – 240 VAC, 1Ø, 3Ø, 50/60 HZ
Fan Input Voltage
115 or 230 VAC, 1Ø, 50/60 HZ
Inrush Current Limiting
184A max @ 130VAC
340A max @ 240VAC
Logic Supply Input (For SMC9515 Only)
24 to 48 VDC, 600mA max @ 24VDC per amplifier
Powers all amplifier logic and encoders.
Peak Output Current
30A (STD), 20A (LO) @ 25°C Ambient
(with forced air cooling) per amplifier
Continuous Output Current
15A (STD), 10A (LO) @ 25°C Ambient
(with forced air cooling) per amplifier
Internal Regen
30 Ohms, 95W
Regen Voltage
230 VDC ± 5% VDC (110 – 130 VAC Input)
395 VDC ± 5% VDC (208 – 240 VAC Input)
Amplifier Modules
SMx9415-bbb-1cc-1 (QTY: 2)
(Amplifiers with Molex Motor Feedback and Controller I/O connectors are shown. Amplifiers with Mini-D connectors have the same baseplate assembly dimensions as shown.)
Mating Connectors
Controller I/O, 24 Pin Molex
Glentek P/N: EJB22F12; Molex P/N: 90142-0024
Encoder Feedback, 20 Pin Molex
Glentek P/N: EJB22F10; Molex P/N: 90142-0020
Controller I/O & Motor Feedback Socket Connector, Molex
Glentek P/N: EJB21F01; Molex P/N: 90119-2110
Host, RJ45 Molex
Glentek P/N: EJ018B83; Molex P/N: 87522-8012
Logic Power, 2 Pin Phoenix
Glentek P/N: EJ741W02; Phoenix P/N: 1792757
GLENTEK
GP8600-75
POWER SUPPLY
FAN OUTPUT
L2F
L1F
DC OUTPUT
AXIS 4
AXIS 3
AXIS 2
AXIS 1
SHUNT LED
CAUTION
RISK OF
ELECTRIC SHOCK
AC INPUT
FAN POWER IN
FAN POWER IN
CHASSIS GND
FAN INPUT
6.93 [176.0]
9.00 [228.6]
8.25 [209.6]
AXIS 1
AXIS 2
4X, ø.27 [ø6.8]
10.00 [254.0]
10.75 [273.1]
AIR FLOW
ALPHA SERIES
CONTROLLER I/O
STATUS DISPLAY
LOGIC POWER
MOTOR FEEDBACK
HOST
RESET
AXIS 2 (-)
AXIS 2 (+)
AXIS 1 (-)
AXIS 1 (+)
NOTE:
1. FOR SMC9415, EXTERNAL +24VDC FOR LOGIC POWER IS SUPPLIED BETWEEN PIN 2 (+24VDC) AND PIN 1 (COMMON) OF LOGIC POWER CONNECTOR. THIS EXTERNAL +24VDC MUST BE ALWAYS ON BEFORE APPLYING BUSS POWER.
2. RECOMMEND SIGNAL WIRING TO MOLEX SOCKET CONNECTOR, 22AWG (0.326 MM²) OR 24AWG (0.205 MM²). USE CRIMPING TOOL MOLEX ORDER NO: 63819020O.
3. USE SHIELDED CABLE FOR COMMAND SIGNAL.
4. RECOMMEND MOTOR OUTPUTS WIRING, 16AWG (1.31 MM²) OR LARGER. 105°C RATED PVC OR BETTER.
5. RECOMMEND POWER INPUTS WIRING, 12AWG (3.31 MM²) OR LARGER. 105°C RATED PVC OR BETTER.
6. NEVER GROUND THE OUTPUTS OF THE AMPLIFIERS.
7. PLEASE MAINTAIN A MIN. OF 2" to 3" OF SPACE AT BOTH ENDS AND TOP OF THE AMPLIFIERS TO ENSURE PROPER VENTILATION FOR THE UNIT.
8. PLEASE ALLOW 7 INCHES MIN. HEIGHT CLEARANCE.
UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES [MM]
TOLERANCES ARE AS FOLLOWS: DECIMAL: XX = ±0.01, XXX = ±0.005 ANGULAR: < = ±0.5°
FINISH: 125/ MAXIMUM
APPROVAL: DRAWN BY: M.TAGLIPA 08JUN10; CHK BY: L.C. 08JUN10; APP BY: J.M. 08JUN10
DATE
GLENTEK 208 Standard Street El Segundo, CA 90245 USA 310.322.3026 FAX 310.322.7709 www.glentek.com
DRAWING TITLE: INSTALLATION, SMx9415-bbb-1cc-2B-2-h, STD/LO POWER, MOLEX
SIZE: D | MODEL NUMBER: SMx9415-2B-2 | DRAWING NUMBER: 94115-1036-000 | REV: C
SCALE: 1.125 | FILE NAME: 9415-1036-000-C.DWG | SHEET 1 OF 1
CONFIGURATION CODE: -


REVISION HISTORY
ZONE REV DESCRIPTION ECO DATE CHANGED APPD
- A INITIAL RELEASE 3017 09JUN10 MI TAGUPA J.M.
- B CHANGED THE ORIENTATION OF THE MEN 3391 01AUG11 NTHALLA J.M.
- C UPDATED SPECIFICATIONS AND FEATURES TABLE 3910 30AUG13 L.L. J.M.
Specifications and Features
AC Input Voltage 110 ~ 130 VAC, 10, 3Ø, 50/60 HZ
208 ~ 240 VAC, 10, 3Ø, 50/60 HZ
Fan Input Voltage 115 or 230 VAC, 1Ø, 50/60 HZ
Inrush Current Limiting 184A max @ 130VAC
340A max @ 240VAC
Logic Supply Input (For SMC9315 Only) 24 to 48 VDC, 660mA max @ 24VDC per amplifier
Powers all amplifier logic and encoders.
Peak Output Current 40 A @ 25°C Ambient (with forced air cooling) per amplifier
Continuous Output Current 20 A @ 25°C Ambient (with forced air cooling) per amplifier
Internal Regen 30 Ohms, 50W
Regen Voltage 230 VDC ± 5% VDC (110 ~ 130 VAC Input)
395 VDC ± 5% VDC (208 ~ 240 VAC Input)
Amplifier Modules SMx9415-6bb-1cc-1 (QTY: 2)
(Amplifiers with Molex Motor Feedback and Controller I/O connectors on drive. Amplifiers with Molex Connectors have the same faceplate assembly dimensions as shown.)
Mating Connectors
Controller I/O, 24 Pin Molex Glentek P/N: EJ622F12; Molex P/N: 90142-0024
Encoder Feedback, 20 Pin Molex Glentek P/N: EJ622F10; Molex P/N: 90142-0020
Controller I/O & Motor Feedback Socket Connector, Molex Glentek P/N: EJ621F01; Molex P/N: 90119-2110
Host, RJ45 Molex Glentek P/N: EJ018083; Molex P/N: 87522-8012
Logic Power, 2 Pin Phoenix Glentek P/N: EJ741V02; Phoenix P/N: 1792757
GLENTEK
GP8600-75
POWER SUPPLY
FAN OUTPUT
L1F
L2F
DC OUTPUT
AXIS 4
AXIS 3
AXIS 2
AXIS 1
B-
B+
SHUNT LED
6.93 [176.0]
CAUTION
RISK OF
ELECTRIC SHOCK
AC INPUT
AC_L1
AC_L2
AC_L3
CHASSIS GND
FAN POWER IN
FAN POWER IN
L1
L2
L3
PE
L1F
L2F
FAN INPUT
1Ø
3Ø
AC INPUT
AXIS 2 (-)
AXIS 2 (+)
AXIS 1 (-)
AXIS 1 (+)
ALPHA SERIES
GLENTEK
CONTROLLER I/O
LOGIC POWER
MOTOR FEEDBACK
STATUS DISPLAY
HOST
RESET
COM
+24V
PE
AIR FLOW
9.75 [247.7]
9.00 [228.6]
AXIS 1
AXIS 2
4X, Ø.27 [Ø6.8]
10.00 [254.0]
10.75 [273.1]
NOTE:
1. FOR SMC9415, EXTERNAL +24VDC FOR LOGIC POWER IS SUPPLIED BETWEEN PIN 2 (+24VDC) AND PIN 1 (COMMON) OF LOGIC POWER CONNECTOR. THIS EXTERNAL +24VDC MUST BE ALWAYS ON BEFORE APPLYING BUSS POWER.
2. RECOMMEND SIGNAL WIRING TO MOLEX SOCKET CONNECTOR, 22AWG (0.326 MM²) OR 24AWG (0.205 MM²). USE CRIMPING TOOL MOLEX ORDER NO: 638190200.
3. USE SHIELDED CABLE FOR COMMAND SIGNAL.
4. RECOMMEND MOTOR OUTPUTS WIRING, 14AWG (2.08 MM²) OR LARGER. 105°C RATED PVC OR BETTER.
5. RECOMMEND POWER INPUTS WIRING, 12AWG (3.31 MM²) OR LARGER. 105°C RATED PVC OR BETTER.
6. NEVER GROUND THE OUTPUTS OF THE AMPLIFIERS.
7. PLEASE MAINTAIN A MIN. OF 2" to 3" OF SPACE AT BOTH ENDS AND TOP OF THE AMPLIFIERS TO ENSURE PROPER VENTILATION FOR THE UNIT.
8. PLEASE ALLOW 7 INCHES MIN. HEIGHT CLEARANCE.
UNLESS OTHERWISE SPECIFIED DRAWN M. TAGUPA 09JUN10
DIMENSIONS ARE IN INCHES APPROVAL M. TAGUPA 09JUN10
DECIMAL XX ±0.05 XXX ±0.005
ANGULAR XX° ± 1° XXX° ± 0.5°
FINISH 125 APPROVED J.M. 09JUN10
CHK BY: 09JUN10
APP BY: 09JUN10
DATE
GLENTEK
Solutions Are Motion Control
208 Standard Street
El Segundo, CA 90245 USA
310.322.3026 FAX 310.322.7709
www.glentek.com
DRAWING TITLE
INSTALLATION, SMx9415-bbb-1cc-2B-2-h, HI POWER, MOLEX
SIZE MODEL D SMx9415-2B-2
DRAWING NUMBER 9415-1037-000
REV C
SCALE 1:12.5 FILE NAME 9415-1037-000-C.DWG
SHEET 1 OF 1
CONFIGURATION CODE: -


REVISION HISTORY
ZONE | REV | DESCRIPTION | ECO | DATE | CHANGED | APPD
- | A | INITIAL RELEASE | 3017 | 08JUN10 | M. TAGUPA | JM
- | B | CHANGED THE ORIENTATION OF THE VIEW | 3391 | 01AUG11 | NTHALLA | JM
- | C | UPDATED SPECIFICATIONS AND FEATURES TABLE | 3810 | 30AUG13 | LL | JM
Specifications and Features
AC Input Voltage: 110 - 130 VAC, 10, 30, 50/60 HZ; 208 - 240 VAC, 10, 30, 50/60 HZ
Fan Input Voltage: 115 or 230 VAC, 10, 50/60 HZ
Inrush Current Limiting: 184A max @ 130VAC; 340A max @ 240VAC
Logic Supply Input (For SMC9515 Only): 24 to 48 VDC, 600mA max @ 24VDC per amplifier. Powers all amplifier logic and encoders.
Peak Output Current: 30A (STD), 20A (LO) @ 25°C Ambient. (with forced air cooling) per amplifier
Continuous Output Current: 15A (STD), 10A (LO) @ 25°C Ambient. (with forced air cooling) per amplifier
Internal Regen: 30 Ohms, 95W
Regen Voltage: 230 VDC ± 5% VDC (110 - 130 VAC Input); 395 VDC ± 5% VDC (208 - 240 VAC Input)
Amplifier Modules: SMx9415-bbb-1cc-1 (QTY: 4) (Amplifiers with Molex Motor Feedback and Controller I/O connectors are shown. Amplifiers with Mini-D connectors have the same baseplate assembly dimensions as shown.)
Mating Connectors
Controller I/O, 24 Pin Molex: Glentek P/N: EJB2F212; Molex P/N: 90142-0024
Encoder Feedback, 20 Pin Molex: Glentek P/N: EJB2F210; Molex P/N: 90142-0020
Controller I/O & Motor Feedback Socket Connector, Molex: Glentek P/N: EJB2FF01; Molex P/N: 90119-2110
Host, RJ45 Molex: Glentek P/N: EJ018083; Molex P/N: 87522-8012
Logic Power, 2 Pin Phoenix: Glentek P/N: EJ741V02; Phoenix P/N: 1792757
GLENTEK
GP8600-75
POWER SUPPLY
FAN OUTPUT
FAN INPUT
AC INPUT
CHASSIS GND
FAN POWER IN
FAN POWER IN
AC INPUT
DC OUTPUT
AXIS 4
AXIS 3
AXIS 2
AXIS 1
SMART LED
CAUTION
RISK OF
ELECTRIC SHOCK
6.93 [176.0]
13.00 [330.2]
12.25 [311.2]
AXIS 4
AXIS 3
AXIS 2
AXIS 1
4X, ø.27 [ø6.8]
10.00 [254.0]
10.75 [273.1]
AIR FLOW
AIR FLOW
ALPHA SERIES
NOTE:
1. FOR SMC9415, EXTERNAL +24VDC FOR LOGIC POWER IS SUPPLIED BETWEEN PIN 2 (+24VDC) AND PIN 1 (COMMON) OF LOGIC POWER CONNECTOR. THIS EXTERNAL +24VDC MUST BE ALWAYS ON BEFORE APPLYING BUSS POWER.
2. RECOMMEND SIGNAL WIRING TO MOLEX SOCKET CONNECTOR, 22AWG (0.326 MM²) OR 24AWG (0.205 MM²). USE CRIMPING TOOL MOLEX ORDER NO: 638190200.
3. USE SHIELDED CABLE FOR COMMAND SIGNAL.
4. RECOMMEND MOTOR OUTPUTS WIRING, 16AWG (1.31 MM²) OR LARGER, 105°C RATED PVC OR BETTER.
5. RECOMMEND POWER INPUTS WIRING, 12AWG (3.31 MM²) OR LARGER, 105°C RATED PVC OR BETTER.
6. NEVER GROUND THE OUTPUTS OF THE AMPLIFIERS.
7. PLEASE MAINTAIN A MIN. OF 2" to 3" OF SPACE AT BOTH ENDS AND TOP OF THE AMPLIFIERS TO ENSURE PROPER VENTILATION FOR THE UNIT.
8. PLEASE ALLOW INCHES MIN. HEIGHT CLEARANCE.
GLENTEK
208 Standard Street
El Segundo, CA 90245-4284 USA
310.322.3026 FAX 310.322.7709
www.glentek.com
DRAWING TITLE
INSTALLATION, SMx9415-bbb-1cc-4B-4-h, STD/LO POWER, MOLEX
SIZE: D
MODEL NO.: SMx9415-4B-4
DRAWING NUMBER: 9415-1035-000
REV: C
SCALE: 1:1
FILE NAME: 9415-1035-000-C.DWG
SHEET 1 OF 1
CONFIGURATION CODE: -


REVISION HISTORY
ZONE | REV | DESCRIPTION | ECO | DATE | CHANGED | APPD
- | A | INITIAL RELEASE | 3917 | 08JUN10 | M. TAGLIPA | J.M.
- | B | CHANGED THE ORIENTATION OF THE VIEW. | 3291 | 01AUG11 | NTHALLA | J.M.
- | C | UPDATED SPECIFICATIONS AND FEATURES TABLE | 3810 | 30AUG13 | L.L. | J.M.
Specifications and Features
AC Input Voltage
110 – 130 VAC, 1Ø, 3Ø, 50/60 HZ
208 – 240 VAC, 1Ø, 3Ø, 50/60 HZ
Fan Input Voltage
115 or 230 VAC, 1Ø, 50/60 HZ
Inrush Current Limiting
184A max @ 130VAC
340A max @ 240VAC
Logic Supply Input (For SMK9515 Only)
24 to 48 VDC, 900mA max @ 24VDC per amplifier
Powers all amplifier logic and encoders.
Peak Output Current
40 A @ 25°C Ambient(with forced air cooling) per amplifier
Continuous Output Current
20 A @ 25°C Ambient(with forced air cooling) per amplifier
Internal Regen
30 Ohms, 95W
Regen Voltage
230 VDC ± 5% VDC (110 – 130 VAC Input)
395 VDC ± 5% VDC (208 – 240 VAC Input)
Amplifier Modules
SMK9415-bbb-1cc-1 (QTY: 4)
(Amplifiers with Molex Motor Feedback and Controller I/O connectors are shown. Amplifiers with Mini-D connectors have the same baseplate assembly dimensions as shown)
Mating Connectors
Controller I/O, 24 Pin Molex
Glentek P/N: EJB22F12; Molex P/N: 90142-0024
Encoder Feedback, 20 Pin Molex
Glentek P/N: EJB22F10; Molex P/N: 90142-0020
Controller I/O & Motor Feedback Socket Connector, Molex
Glentek P/N: EJB21F01; Molex P/N: 90119-2110
Host, RJ45 Molex
Glentek P/N: EJ01B083; Molex P/N: 87522-8012
Logic Power, 2 Pin Phoenix
Glentek P/N: EJ741W02; Phoenix P/N: 1792757
GLENTEK
GP8600-75
POWER SUPPLY
CAUTION RISK OF ELECTRIC SHOCK
AC INPUT
AC_L1
AC_L2
AC_L3
CHASSIS GND
FAN POWER IN
FAN POWER IN
FAN INPUT
FAN OUTPUT
DC OUTPUT
AXIS 4
AXIS 3
AXIS 2
AXIS 1
SHUNT LED
6.93 [176.0]
AXIS 4
AXIS 3
AXIS 2
AXIS 1
AIR FLOW
AIR FLOW
14.88 [377.8]
14.13 [358.8]
4X, ø.27 [ø6.8]
10.00 [254.0]
10.75 [273.1]
NOTE:
1. FOR SMC9415, EXTERNAL +24VDC FOR LOGIC POWER IS SUPPLIED BETWEEN PIN 2 (+24VDC) AND PIN 1 (COMMON) OF LOGIC POWER CONNECTOR. THIS EXTERNAL +24VDC MUST BE ALWAYS ON BEFORE APPLYING BUSS POWER.
2. RECOMMEND SIGNAL WIRING TO MOLEX SOCKET CONNECTOR, 22AWG (0.326 MM²) OR 24AWG (0.205 MM²). USE CRIMPING TOOL MOLEX ORDER NO: 63819-0200.
3. USE SHIELDED CABLE FOR COMMAND SIGNAL.
4. RECOMMEND MOTOR OUTPUTS WIRING, 14AWG (2.08 MM²) OR LARGER. 105°C RATED PVC OR BETTER.
5. RECOMMEND POWER INPUTS WIRING, 12AWG (3.31 MM²) OR LARGER. 105°C RATED PVC OR BETTER.
6. NEVER GROUND THE OUTPUTS OF THE AMPLIFIERS.
7. PLEASE MAINTAIN A MIN. OF 2" to 3" OF SPACE AT BOTH ENDS AND TOP OF THE AMPLIFIERS TO ENSURE PROPER VENTILATION FOR THE UNIT.
8. PLEASE ALLOW 7 INCHES MIN. HEIGHT CLEARANCE.
UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES
DECIMAL: XX ±0.01 XXX ± ±0.005
ANGULAR: ± ±1°
FINISH: 125 √ MACHINE
APPROVAL: M. TAGLIPA
DRAWN BY: CHK'D BY:
APP'D BY: J.M.
DATE: 08JUN10
08JUN10
08JUN10
GLENTEK
208 Standard Street El Segundo, CA 90245 USA
TEL: (310) 322-3026 FAX: (310) 322-7709
www.glentek.com
DRAWING TITLE
INSTALLATION, SMX9415-bbb-1cc-4B-4-h, HI POWER, MOLEX
SIZE: D
MODEL: SMX9415-4B-4
DRAWING NUMBER: 94115-1038-000
REV: C
SCALE: 1:1
FILE NAME: 9415-1038-000-C.DWG
SHEET 1 OF 1
CONFIGURATION CODE:


REVISION HISTORY
ZONE REV DESCRIPTION ECO DATE CHANGED APPD
- D ADDED DIMENSION 2.79 [70.9] FOR CAPS ON ZONE A5 2005 25MAR04 T.P. C.V.
- E UPDATED SPECIFICATION TABLE AND SILKSCREEN 3391 29JUL11 NTHALLA J.M.
UPDATED CIRCUIT DIAGRAM
Specifications
AC INPUT VOLTAGE 110 – 130 VAC, 1Ø, 3Ø, 50/60 HZ
208 – 240 VAC, 1Ø, 3Ø, 50/60 HZ
FAN INPUT VOLTAGE 115 or 230 VAC, 1Ø, 50/60 HZ
INRUSH CURRENT LIMITING 184A max @ 130VAC
340A max @ 240VAC
DC OUTPUT VOLTAGE 155 – 185 VDC (110 – 130 VAC INPUT)
295 – 340 VDC (208 – 240 VAC INPUT)
OUTPUT CURRENT 50 A
INTERNAL REGEN 30 OHMS, 95W
REGEN VOLTAGE 230 VDC ± 5% VDC (110 – 130 VAC INPUT)
395 VDC ± 5% VDC (208 – 240 VAC INPUT)
Fuse Table
F1, F2, F3, F4, F5 20A 250VAC, MDA
GLENTEK
208 Standard Street El Segundo, CA 90245 USA
310.322.3026 FAX 310.322.7709
www.glentek.com
INSTALLATION,
GP8600-75 POWER SUPPLY
DRAWING TITLE
DRAWING NO. 8600-7030-000
GP8600-75
FILENAME: 8600-7030-000.F.DWG
SCALE: 1:1
SHEET 1 OF 1
CONFIGURATION CODE: -
ISOMETRIC VIEW
SCALE: .75X
J1-8 B– / AXIS 4
J1-7 B+ / AXIS 4
J1-6 B– / AXIS 3
J1-5 B+ / AXIS 3
J1-4 B– / AXIS 2
J1-3 B+ / AXIS 2
J1-2 B– / AXIS 1
J1-1 B+ / AXIS 1
REGEN SHUNT LED
10.210 [259.3]
CAUTION. RISK OF ELECTRIC SHOCK
AC INPUT
FAN INPUT
DC OUTPUT
AXIS 1
AXIS 2
AXIS 3
AXIS 4
SHUNT LED
FAN OUTPUT
6.333 [160.8]
6.087 [154.7]
2X. .219 [5.6]
2.063 [52.3]
2.793 [70.9]
3.061 [77.7]
.453 [11.4]
NOTE:
1. RECOMMEND POWER INPUT CONDUCTOR, 12 AWG (3.31 MM²) OR LARGER, 105°C RATED PVC OR BETTER.
2. RECOMMEND POWER OUTPUT CONDUCTOR, 14AWG (2.08 MM²) OR LARGER, 105°C RATED PVC OR EETTER.
3. OUTPUT POWER IS DERATED BY 40% FOR SINGLE PHASE AC INPUT.

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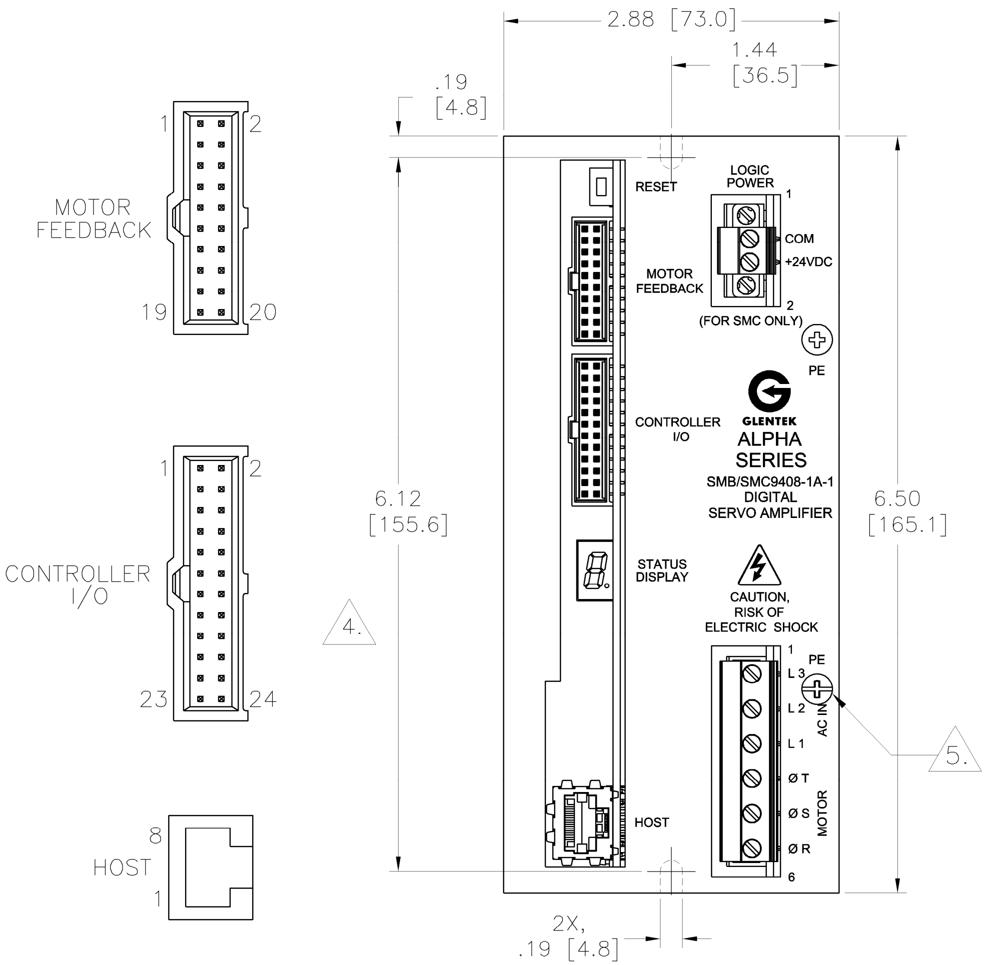
ZONE	REV	DESCRIPTION	ECO	DATE	CHANGED	APPD
-	A	INITIAL RELEASE	3017	09JUN10	M. TAGUPA	J.M.
-	B	UPDATED SPECIFICATIONS AND FEATURES TABLE	3291	29JUL11	NTHALLA	J.M.
-	C	UPDATED SPECIFICATIONS AND FEATURES TABLE	3810	30AUG13	L.L.	J.M.

REVISION HISTORY



NOTE:

1. RECOMMEND ALL POWER WIRING, 16 AWG (1.31 MM²) OR LARGER, 105°C RATED PVC OR BETTER.
2. RECOMMEND SIGNAL WIRING TO MOLEX SOCKET CONNECTOR, 22AWG (0.326 MM²) OR 24AWG (0.205 MM²). USE CRIMPING TOOL MOLEX ORDER NO: 638190200.
3. EXTERNAL +24VDC FOR LOGIC POWER IS SUPPLIED BETWEEN PIN 1 (COMMON) AND PIN 2 (+24VDC) OF LOGIC POWER CONNECTOR.
4. MAXIMUM HEIGHT IS 6.45 INCHES.
5. CONNECT MOTOR GROUND TO THIS #6-32 GREEN GROUND SCREW.
6. COMMON (ANALOG) AND COMMON (DIGITAL) SIGNALS ARE CONNECTED TOGETHER INSIDE AMPLIFIER.

Controller I/O Connector

Pin	Signal Name
1	ENCODER A+(OUT)
2	ENCODER A-(OUT)
3	ENCODER B+(OUT)
4	ENCODER B-(OUT)
5	ENCODER Z+(OUT)
6	ENCODER Z-(OUT)
7	PULSE +
8	PULSE -
9	DIR +
10	DIR -
11	RESET IN
12	+LIMIT
13	-LIMIT
14	INHIBIT
15	FAULT OUT
16	+5VDC
17	COMMON (ANALOG)
18	COMMON (DIGITAL)
19	ANALOG OUT (AUX.)
20	ANALOG OUT
21	SIGNAL 2+
22	SIGNAL 2-
23	SIGNAL 1+
24	SIGNAL 1-

Motor Feedback Connector

Pin	Signal Name
1	TACH +
2	TACH -
3	RESERVED
4	MOTOR TEMP
5	ENCODER Z+ (IN)
6	ENCODER Z- (IN)
7	ENCODER B+ (IN)
8	ENCODER B- (IN)
9	ENCODER A+ (IN)
10	ENCODER A- (IN)
11	HALL U+
12	HALL U-
13	HALL V+
14	HALL V-
15	HALL W+
16	HALL W-
17	ENC PWR (+5VDC)
18	COMMON (DIGITAL)
19	ENC PWR (+5VDC)
20	COMMON (DIGITAL)

Host Connector

Pin	Signal Name
1	RESERVED
2	RESERVED
3	RESERVED
4	COMMON (DIGITAL)
5	TX232
6	RX232
7	RESERVED
8	RESERVED

Power / Motor Connector

Pin	Signal Name
1	AC LINE 3 (THREE PHASE)
2	AC LINE 2 (SINGLE PHASE)
3	AC LINE 1 (SINGLE PHASE)
4	MOTOR PHASE T / BRUSH OUTPUT B
5	MOTOR PHASE S
6	MOTOR PHASE R / BRUSH OUTPUT A
PE	PROTECTIVE EARTHING (CHASSIS GND)

Status Display

Display	Fault Description
1	EEPROM FAULT
2	RAM FAULT
3	CPLD FAULT
8	RESET (FLASHING)
b	BUS OVERVOLTAGE
C	CLAMP
c	FAULT INPUT
E	ENCODER FAULT
F	FOLDBACK
H	HEATSINK OVERTEMP
h	MOTOR OVERTEMP
L	LS/ECB
0	NORMAL OPERATION
S	HS/ECB
U	UNDER VOLTAGE
═	HALL FAULT
≡	COMMUTATION FAULT

Logic Power Connector

Pin	Signal Name
1	COMMON (DIGITAL)
2	+24VDC

Bus Over Voltage and Under Voltage Settings

Power Input Voltage	BUS Over Voltage	BUS Under Voltage
110 VAC - 130 VAC	250 VDC ± 5%	60 VDC ± 5%

Specifications and Features

AC Supply Input	110 - 130 VAC, 1Ø, 3Ø, 50/60 HZ
Inrush Current at Power Up	92A max @ 130VAC
Logic Supply Input (For SMC9408 Only)	24 to 48 VDC, 600mA max @24VDC. Powers all amplifier logic and encoders.
Peak Current Output	8 A @ 25°C Ambient
Continuous Current Output	4 A @ 25°C Ambient
Fault Protection	Short circuit protection from motor phase to phase, motor phase to DC bus, motor phase to case (chassis gnd) Amplifier RMS over current. DC bus over/under voltage. Amplifier over temperature. Motor over temperature (switch or thermistor input). Encoder broken wire. Invalid Hall/comm track state. Commutation fault.
Amplifier Status Indication	See Table
Low Speed Electronic Circuit Breaker (LS/ECB)	Latches when programmable current (4 A max.), and time (10 sec max.) exceed limit.
Bus Overvoltage	See Table
Bus Undervoltage	See Table
Internal Regen	N/A
Regen Voltage	N/A
Amplifier Type	See Model Number Key (from product manual)
Analog Command Input	±10V (12 bit resolution) for analog velocity, and current command. 15 bit is available (optional).
Auxiliary Analog Input	±10V (12 bit resolution) for 2 phase Current Mode. 15 bit is available (optional).
Pulse & Direction Inputs	Accepts TTL level Step & Direction signals
Encoder Feedback	Accepts TTL level encoder signals
Tachometer Feedback	Accept ±30 VDC tacho signals (Different voltage levels are available upon request)
Dedicated Inputs	+/- position limits, inhibit, motor overtemp & reset signal
Dedicated Fault Output (Programmable Level)	TTL Compatible
Analog Out	±10 V analog output (12-Bit) for monitoring DSP signals, output source selectable and scalable using MotionMaestro™ setup software, 2 channels & 16-Bit are available(optional)
Auto Phasing	Plug & Play for all types of three phase Brushless Motors.
Smart Com Initialization at Amplifier turn on	Eliminates the need for Hall sensor or commutation tracks for many applications.
RS-232 Host Port	High speed serial communication interface for set-up and tuning. 115.2 Kbaud, 8 bits, no parity, 1 stop bit
Software Configurable	All parameters are downloaded using the RS232 port / Glentek's Windows™ based MotionMaestro™ software.
Digitally Tuned	All parameters set digitally. No potentiometers to adjust. RS-232 high speed serial communication interface for all gain and PID tuning parameters.
Non-Volatile Memory	All parameters are stored in non-volatile memory
PWM Switching Frequency	25 KHz Typical
Current Loop Bandwidth	Tunable up to 3 KHz
Amplifier Isolation	Logic completely isolated from high voltage output stage
Operating Temperature	0 °C to +60 °C
Storage Temperature	-40 °C to +80 °C
Humidity	5% to 95% non-condensing
Mounting Hardware	#8-32 or M5 Screw, Qty = 2
Dimensions (inches)	L. 6.50, H. 6.20, W. 2.88
Backup File	xxxx-5.BK

Mating Connectors

Controller I/O, 24 Pin Molex	Glentek P/N: EJB22F12; Molex P/N: 90142-0024
Encoder Feedback, 20 Pin Molex	Glentek P/N: EJB22F10; Molex P/N: 90142-0020
Controller I/O & Motor Feedback Socket Connector, Molex	Glentek P/N: EJB21F01; Molex P/N: 90119-2110
Host, RJ45 Molex	Glentek P/N: EJ018083; Molex P/N: 87522-8012
Power Input / Motor Output, 5 Pin or 6 Pin Phoenix	Glentek P/N: EJ541F05; Phoenix P/N: 1832442 Glentek P/N: EJ501F06; Phoenix P/N: 1832455
Logic Power, 2 Pin Phoenix	Glentek P/N: EJ741V02; Phoenix P/N: 1792757

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES	APPROVAL	DATE
TOLERANCES ARE AS FOLLOWS: DECIMAL: .XX = ±0.01, .XXX = ±0.005; ANGULAR: < = ±0.5°	DWN BY: M. TAGUPA	09JUN10
	CHK BY: L.C.	09JUN10
FINISH: 125 √ MAXIMUM	APP BY: J.M.	09JUN10

GLENTEK "Solutions for Motion Control" 208 Standard Street, El Segundo, CA 90245 USA, 310.322.3026 FAX 310.322.7709, www.glentek.com

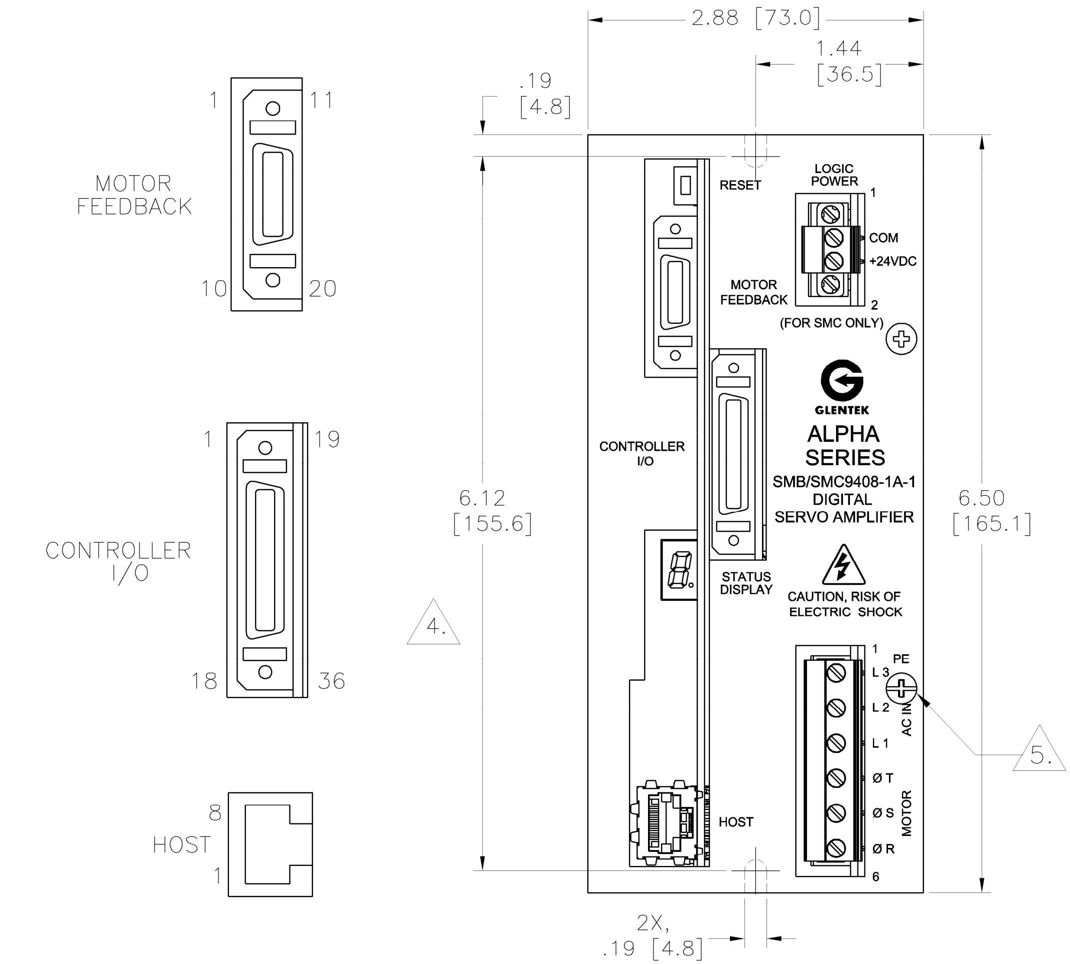
DRAWING TITLE: INSTALLATION, SMx9408-bbb-1cc-1A-1, STD POWER, MOLEX

SIZE	MODEL	DRAWING NUMBER	REV
D	SMx9408-1A-1	9408-1030-000	C

SCALE: 2:1 | FILE NAME: 9408-1030-000-C.DWG | SHEET 1 OF 1

CONFIGURATION CODE: -

REVISION HISTORY						
ZONE	REV	DESCRIPTION	ECO	DATE	CHANGED	APPD
-	A	INITIAL RELEASE	3291	01AUG11	NTHALLA	L.P.
-	B	UPDATED SPECIFICATIONS AND FEATURES TABLE	3810	30AUG13	L.L.	J.M.



Controller I/O Connector	
Pin	Signal Name
1	SIGNAL 1+
2	SIGNAL 1−
3	SIGNAL 2+
4	SIGNAL 2−
5	ANALOG OUT (AUX.)
6	COMMON (ANALOG)
7	ANALOG OUT
8	+LIMIT
9	−LIMIT
10	INHIBIT
11	FAULT OUT
12	COMMON
13	RESET IN
14	MTR TEMP SW
15	RESERVED
16	COMMON (DIGITAL)
17	ENCODER Z + (OUT)
18	ENCODER Z − (OUT)
19	RELAY OUT (OPTIONAL)
20	RELAY OUT (OPTIONAL)
21	COMMON (ANALOG)
22	COMMON (DIGITAL)
23	PULSE −
24	PULSE +
25	DIRECTION −
26	DIRECTION +
27	+5 VDC
28	+5 VDC
29	COMMON (DIGITAL)
30	COMMON (DIGITAL)
31	RESERVED
32	RESERVED
33	ENCODER A+ (OUT)
34	ENCODER A− (OUT)
35	ENCODER B+ (OUT)
36	ENCODER B− (OUT)

Host Connector	
Pin	Signal Name
1	RESERVED
2	RESERVED
3	RESERVED
4	COMMON (DIGITAL)
5	TX232
6	RX232
7	RESERVED
8	RESERVED

Logic Power Connector	
Pin	Signal Name
1	COMMON (DIGITAL)
2	+24VDC

Motor Feedback Connector	
Pin	Signal Name
1	ENC PWR (+5VDC)
2	COMMON (DIGITAL)
3	ENC PWR (+5VDC)
4	COMMON (DIGITAL)
5	ENC A + (IN)
6	ENC A − (IN)
7	ENC B + (IN)
8	ENC B − (IN)
9	ENC Z + (IN)
10	ENC Z − (IN)
11	HALL 1 +
12	HALL 1 −
13	HALL 2 +
14	HALL 2 −
15	HALL 3 +
16	HALL 3 −
17	MTR TEMP SW
18	COMMON (DIGITAL)
19	TACH +
20	TACH −

Power / Motor Connector	
Pin	Signal Name
1	AC LINE 3 (THREE PHASE)
2	AC LINE 2 (SINGLE PHASE)
3	AC LINE 1 (SINGLE PHASE)
4	MOTOR PHASE T / BRUSH OUTPUT B
5	MOTOR PHASE S
6	MOTOR PHASE R / BRUSH OUTPUT A
PE	PROTECTIVE EARTHING (CHASSIS GND)

Status Display	
Display	Fault Description
1	EEPROM FAULT
2	RAM FAULT
3	CPLD FAULT
8	RESET
b	BUS OVERVOLTAGE
C	CLAMP
c	FAULT INPUT
E	ENCODER FAULT
F	FOLDBACK
H	HEATSINK OVERTEMP
h	MOTOR OVERTEMP
L	LS/ECB
0	NORMAL OPERATION
S	HS/ECB
U	UNDER VOLTAGE
=	HALL FAULT
≡	COMMUTATION FAULT

Bus Over Voltage and Under Voltage Settings		
Power Input Voltage	Bus Over Voltage	Bus Under Voltage
110 VAC − 130 VAC	250 VDC ± 5%	60 VDC ± 5%

Specifications and Features	
AC Supply Input	110 − 130 VAC, 1Ø, 3Ø, 50/60 HZ
Inrush Current at Power Up	92A max @ 130VAC
Logic Supply Input (For SMC9408 Only)	24 to 48 VDC, 600mA max @24VDC. Powers all amplifier logic and encoders.
Peak Current Output	8 A @ 25°C Ambient
Continuous Current Output	4 A @ 25°C Ambient
Fault Protection	Short circuit protection from motor phase to phase, motor phase to DC bus, motor phase to case (chassis gnd) Amplifier RMS over current. DC bus over/under voltage. Amplifier over temperature. Motor over temperature (switch or thermistor input). Encoder broken wire. Invalid Hall/comm track state. Commutation fault.
Amplifier Status Indication	See Table
Low Speed Electronic Circuit Breaker (LS/ECB)	Latches when programmable current (4 A max.), and time (10 sec max.) exceed limit.
Bus Overvoltage	See Table
Bus Undervoltage	See Table
Internal Regen	N/A
Regen Voltage	N/A
Amplifier Type	See Model Number Key (from product manual)
Analog Command Input	±10V (12 bit resolution) for analog velocity, and current command. 15 bit is available (optional).
Auxiliary Analog Input	±10V (12 bit resolution) for 2 phase Current Mode. 15 bit is available (optional).
Pulse & Direction Inputs	Accepts TTL level Step & Direction signals
Encoder Feedback	Accepts TTL level encoder signals
Tachometer Feedback	Accept ±30 VDC tacho signals (Different voltage levels are available upon request)
Dedicated Inputs	+/− position limits, inhibit, motor overtemp & reset signal
Dedicated Fault Output (Progammable Level)	TTL Compatible
Analog Out	±10 V analog output (12−Bit) for monitoring DSP signals, output source selectable and scalable using MotionMaestro™ setup software, 2 channels & 16−Bit are available(optional)
Auto Phasing	Plug & Play for all types of three phase Brushless Motors.
Smart Com Initialization at Amplifier turn on	Eliminates the need for Hall sensor or commutation tracks for many applications.
RS−232 Host Port	High speed serial communication interface for set−up and tuning. 115.2 Kbaud, 8 bits, no parity, 1 stop bit
Software Configurable	All parameters are downloaded using the RS232 port / Glentek's Windows™ based MotionMaestro™ software.
Digitally Tuned	All parameters set digitally. No potentiometers to adjust. RS−232 high speed serial communication interface for all gain and PID tuning parameters.
Non−Volatile Memory	All parameters are stored in non−volatile memory
PWM Switching Frequency	25 KHz Typical
Current Loop Bandwidth	Tunable up to 3 KHz
Amplifier Isolation	Logic completely isolated from high voltage output stage
Operating Temperature	0 °C to +60 °C
Storage Temperature	−40 °C to +80 °C
Humidity	5% to 95% non−condensing
Mounting Hardware	#8−32 or M5 Screw, Qty = 2
Dimension	L− 6.50 in, H− 6.20 in, W− 2.88 in
Backup File	xxxx−5.BK

Mating Connectors	
Controller I/O, 36 Pin 3M	Glentek P/N: EJC10136; 3M P/N: 10136−3000VE
36 Pin Mini−D, Backshell	Glentek P/N: EJC10336 ; 3M P/N: 10336−52A0−008
Motor Feedback, 20 Pin 3M	Glentek P/N: EJC10120; 3M P/N: 10120−3000VE
20 Pin Mini−D, Backshell	Glentek P/N: EJC10320; 3M P/N: 10320−52A0−008
Host, RJ45 Molex	Glentek P/N: EJ018083; Molex P/N: 87522−8012
Power Input / Motor Output, 5 Pin or 6 Pin Phoenix	Glentek P/N: EJ541F05; Phoenix P/N: 1832442 (5 Pin) Glentek P/N: EJ501F06; Phoenix P/N: 1832455 (6 Pin)
Logic Power, 2 Pin Phoenix	Glentek P/N: EJ741V02; Phoenix P/N: 1792757

NOTE:

1. RECOMMEND ALL POWER WIRING, 16 AWG (1.31 MM²) OR LARGER, 105°C RATED PVC OR BETTER.
2. RECOMMEND SIGNAL WIRING TO MINI−D SOCKET CONNECTOR, 24AWG (0.205 MM²) TO 28AWG (0.081 MM²).
3. EXTERNAL +24VDC FOR LOGIC POWER IS SUPPLIED BETWEEN PIN 1 (COMMON) AND PIN 2 (+24VDC) OF LOGIC POWER CONNECTOR.
4. MAXIMUM HEIGHT IS 6.45 INCHES.
5. CONNECT MOTOR GROUND TO THIS #6−32 GREEN GROUND SCREW.
6. COMMON (ANALOG) AND COMMON (DIGITAL) SIGNALS ARE CONNECTED TOGETHER INSIDE AMPLIFIER.

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES	APPROVAL	DATE
TOLERANCES ARE AS FOLLOWS: DECIMAL: .XX = ±0.01, .XXX = ±0.005; ANGULAR: < = ±0.5°	DWN BY: NTHALLA	01AUG11
	CHK BY: LIET L	01AUG11
FINISH: 125 √ MAXIMUM	APP BY: L.P.	01AUG11

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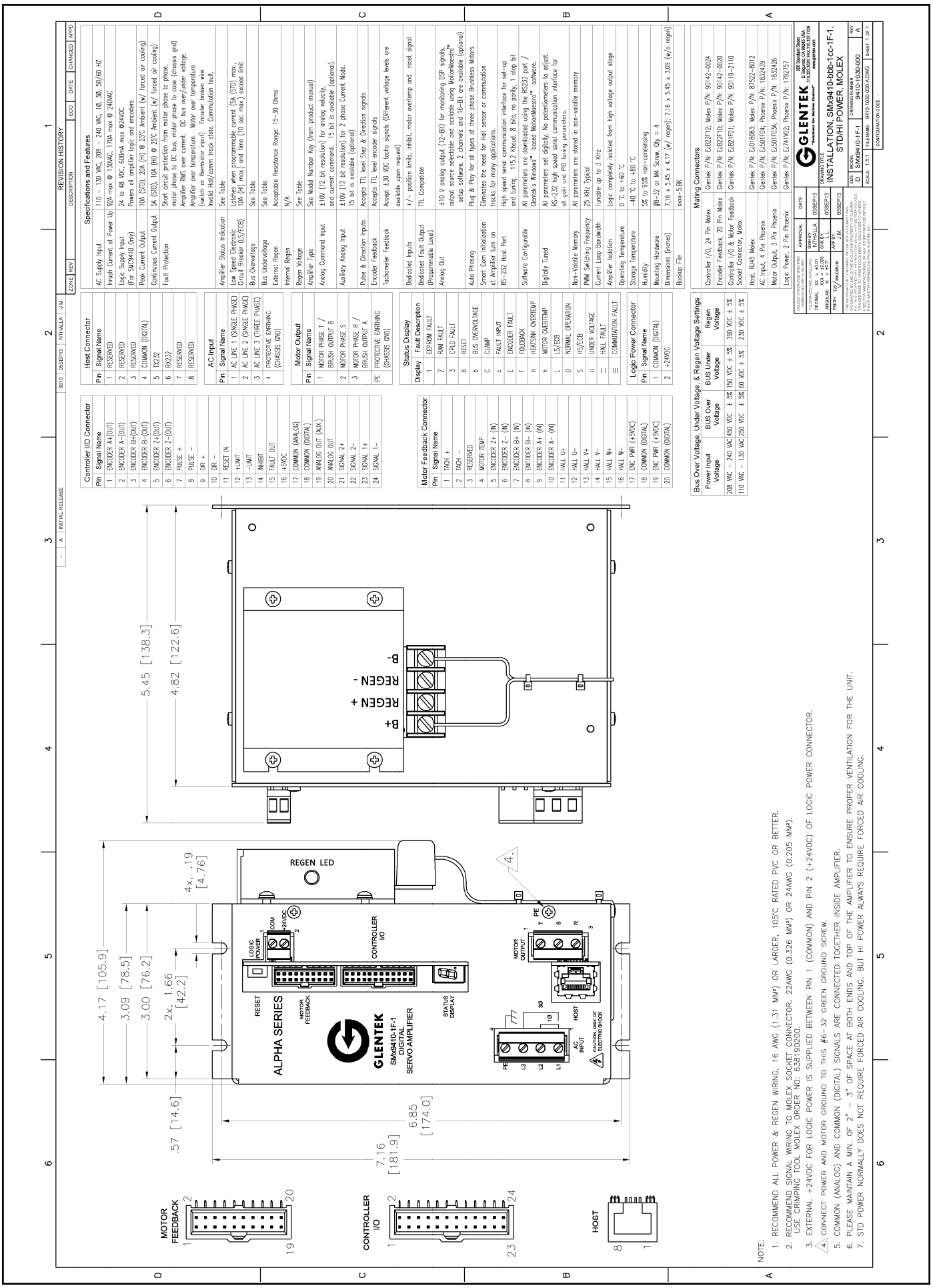
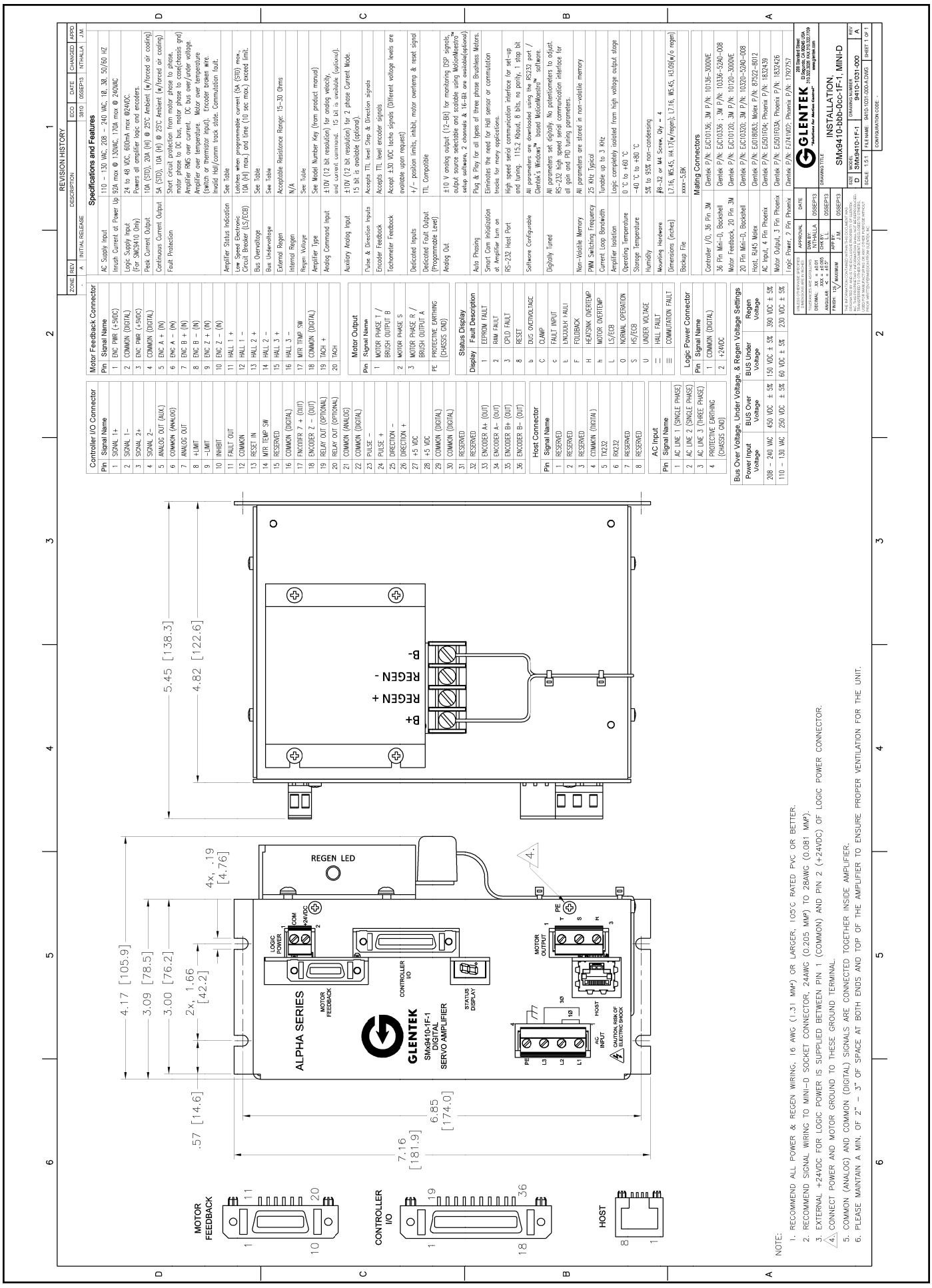
GLENTEK "Solutions for Motion Control" 208 Standard Street, El Segundo, CA 90245 USA, 310.322.3026 FAX 310.322.7709, www.glentek.com

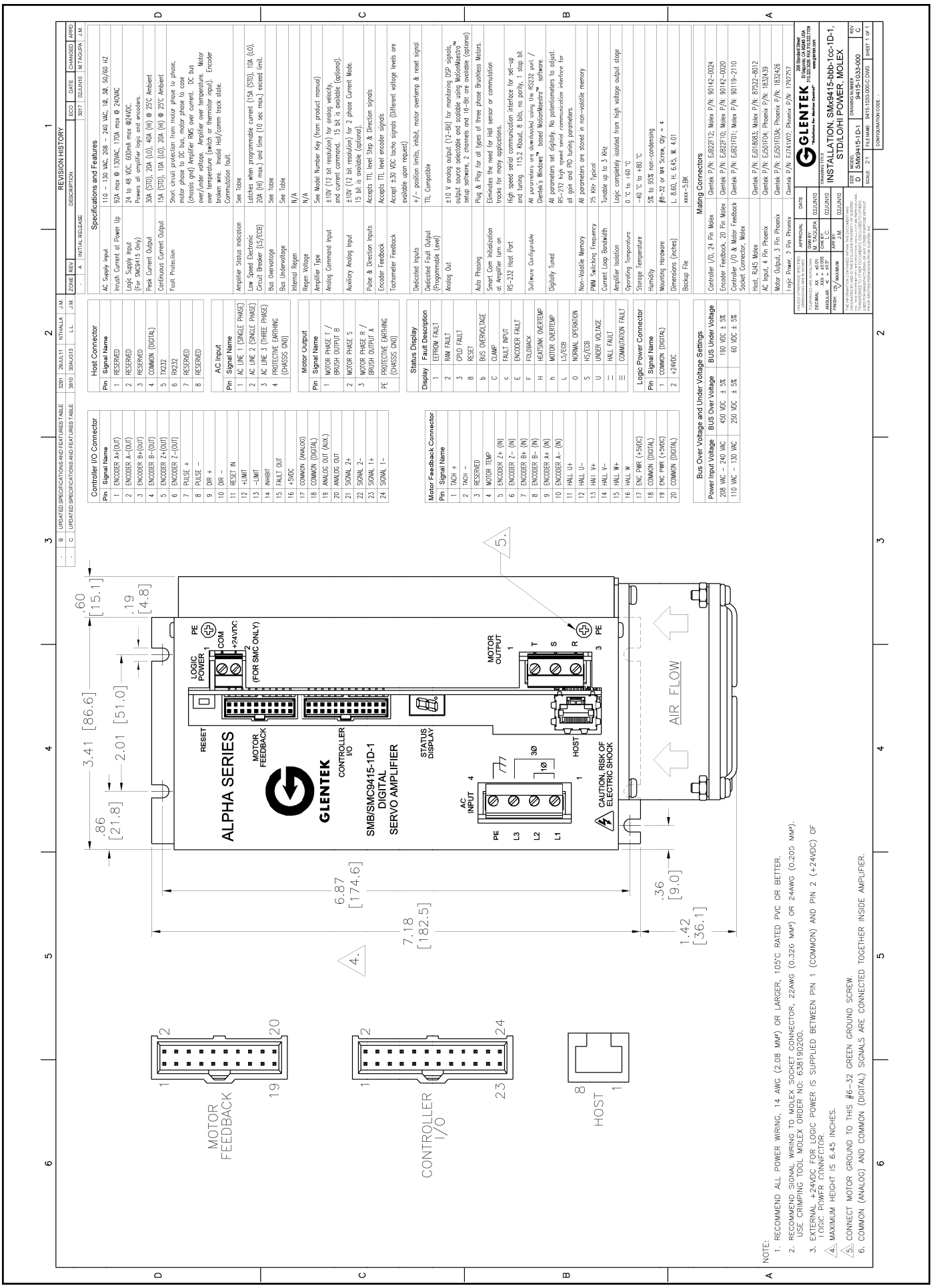
DRAWING TITLE: INSTALLATION, SMx9408-bbb-0cc-1A-1, STD POWER, MINI-D

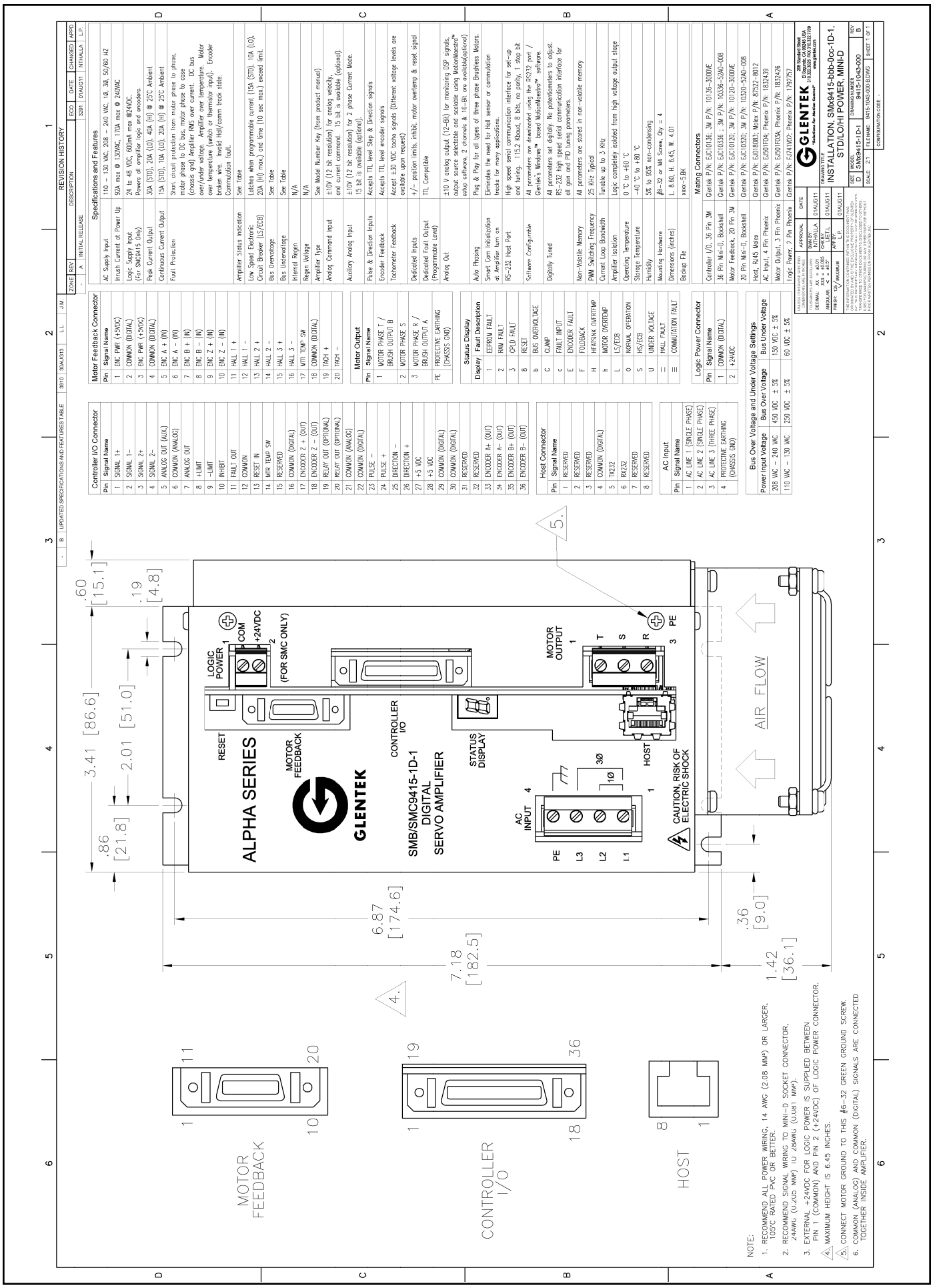
SIZE	MODEL	DRAWING NUMBER	REV
D	SMx9408-1A-1	9408-1031-000	B
SCALE: 2:1		FILE NAME: 9408-1031-000-B.DWG	SHEET 1 OF 1

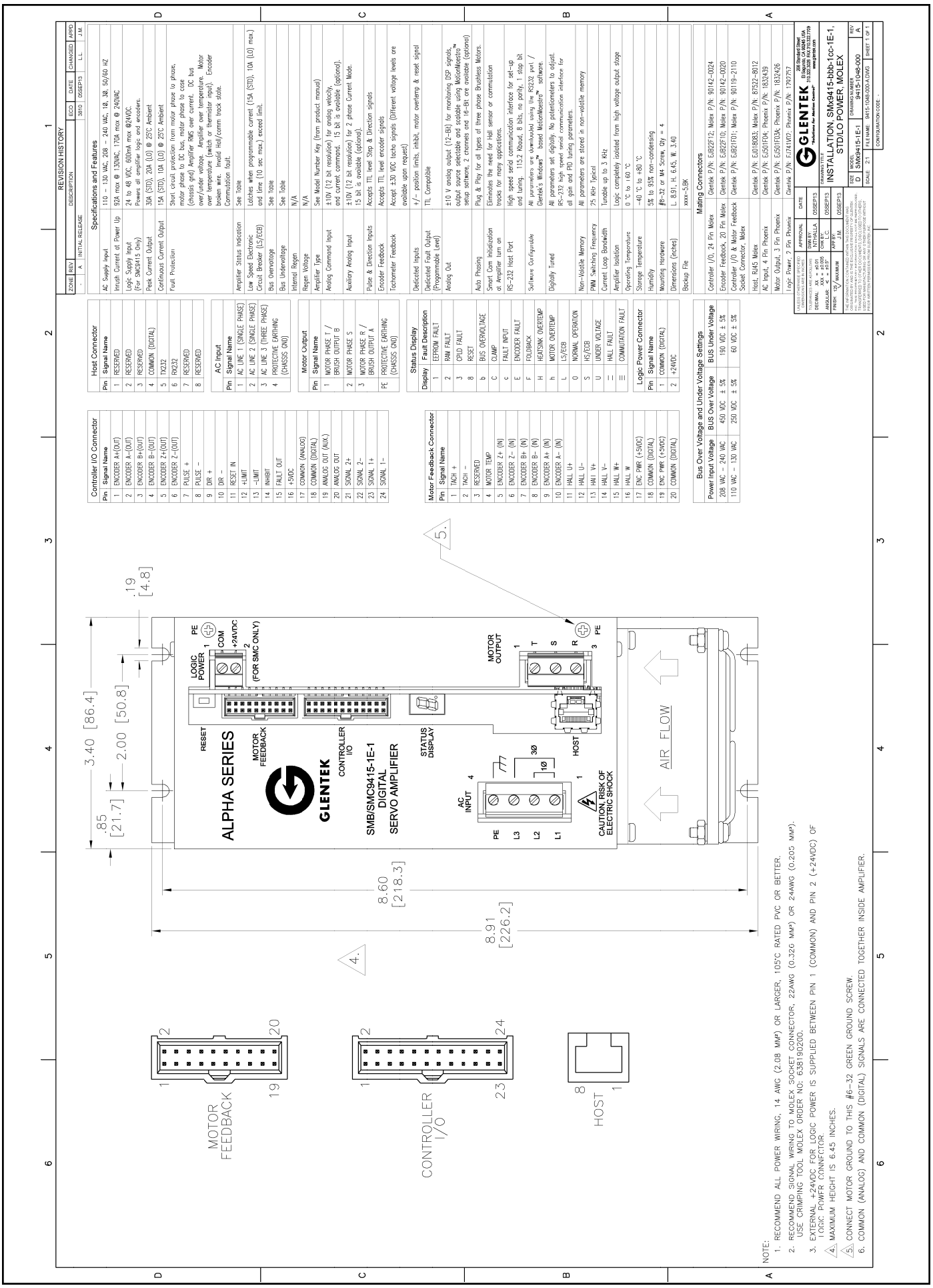
CONFIGURATION CODE: -


REVISION HISTORY
DESCRIPTION
ECO
DATE
CHANGED
APPD
Specifications and Features
Controller I/O Connector
Host Connector
AC Input
Motor Output
Motor Feedback Connector
Status Display
Logic Power Connector
Bus Over Voltage, Under Voltage, & Regen Voltage Settings
Mating Connectors
INSTALLATION, SMx9410-bbb-1cc-1F-1, STD/HI POWER, MOLEX
SMx9410-1F-1
DIGITAL SERVO AMPLIFIER
ALPHA SERIES
REGEN LED
RESET
STATUS DISPLAY
MOTOR FEEDBACK
CONTROLLER I/O
HOST
LOGIC POWER
MOTOR OUTPUT
AC INPUT
B+
REGEN +
REGEN -
B-
5.45 [138.3]
4.82 [122.6]
4.17 [105.9]
3.09 [78.5]
3.00 [76.2]
2x, 1.66 [42.2]
4x, .19 [4.76]
.57 [14.6]
7.16 [181.9]
6.85 [174.0]
MOTOR FEEDBACK
CONTROLLER I/O
HOST
NOTE:
1. RECOMMEND ALL POWER & REGEN WIRING, 16 AWG (1.31 MM²) OR LARGER, 105°C RATED PVC OR BETTER.
2. RECOMMEND SIGNAL WIRING TO MOLEX SOCKET CONNECTOR, 22AWG (0.326 MM²) OR 24AWG (0.205 MM²).
USE CRIMPING TOOL MOLEX ORDER NO: 63819-0200.
3. EXTERNAL +24VDC FOR LOGIC POWER IS SUPPLIED BETWEEN PIN 1 (COMMON) AND PIN 2 (+24VDC) OF LOGIC POWER CONNECTOR.
4. CONNECT POWER AND MOTOR GROUND TO THIS #6-32 GREEN GROUND SCREW.
5. COMMON (ANALOG) AND COMMON (DIGITAL) SIGNALS ARE CONNECTED TOGETHER INSIDE AMPLIFIER.
6. PLEASE MAINTAIN A MIN. OF 2" - 3" OF SPACE AT BOTH ENDS AND TOP OF THE AMPLIFIER TO ENSURE PROPER VENTILATION FOR THE UNIT.
7. STD POWER NORMALLY DOES NOT REQUIRE FORCED AIR COOLING, BUT HI POWER ALWAYS REQUIRE FORCED AIR COOLING.


REVISION HISTORY
ZONE | REV | DESCRIPTION | ECO | DATE | CHANGED | APPD
- | A | INITIAL RELEASE | 3810 | 05SEP13 | NTHALLA | JM
Specifications and Features
AC Supply Input 110 – 130 VAC, 208 – 240 VAC, 10, 30, 50/60 HZ
Inrush Current at Power Up 92A max @ 120VAC, 170A max @ 240VAC
Logic Supply Input (For SMX9410 Only) 24 to 48 VDC, 600mA max @24VDC. Powers all amplifier logic and encoders.
Peak Current Output 10A (STD), 20A (H) @ 25°C Ambient (w/forced air cooling)
Continuous Current Output 5A (STD), 10A (H) @ 25°C Ambient (w/forced air cooling)
Fault Protection Short circuit protection from motor phase to phase, motor phase to DC bus, motor phase to case(chassis gnd) Amplifier RMS over current. DC bus over/under voltage. Amplifier over temperature. Motor over temperature (Switch or thermistor input). Encoder broken wire. Invalid Hall/comm track state. Commutation fault.
Amplifier Status Indication See Table
Low Speed Electronic Circuit Breaker (LSCB) Latches when programmable current (5A (STD) max., 10A (H) max.) and time (10 sec max.) exceed limit.
Bus Overvoltage See Table
Bus Undervoltage See Table
External Regen Acceptable Resistance Range: 15–30 Ohms
Internal Regen N/A
Regen Voltage See Table
Amplifier Type See Model Number Key (from product manual)
Analog Command Input ±10V (12 bit resolution) for analog velocity, and current commands. 15 bit is available (optional).
Auxiliary Analog Input ±10V (12 bit resolution) for 2 phase Current Mode. 15 bit is available (optional).
Pulse & Direction Inputs Accepts TTL level Step & Direction signals
Encoder Feedback Accepts TTL level encoder signals
Tachometer Feedback Accept ±30 VDC tacho signals (Different voltage levels are available upon request)
Dedicated Inputs +/– position limits, inhibit, motor overtemp & reset signal
Dedicated Fault Output (Programmable Level) TTL Compatible
Analog Out ±10 V analog output (12–Bit) for monitoring DSP signals, output source selectable and scalable using MotionMaestro™ setup software. 2 channels & 16–Bit are available(optional)
Auto Phasing Plug & Play for all types of three phase Brushless Motors.
Smart Comm Initialization at Amplifier turn on Eliminates the need for Hall sensor or commutation tracks for many applications.
RS–232 Host Port High speed serial communication interface for set–up and tuning. 115.2 Kbaud, 8 bits, no parity, 1 stop bit
Software Configurable All parameters are downloaded using the RS232 port / Glentek's Windows™ based MotionMaestro™ software.
Digitally Tuned All parameters set digitally. No potentiometers to adjust. RS–232 high speed serial communication interface for all gain and PID tuning parameters.
Non–Volatile Memory All parameters are stored in non–volatile memory
PWM Switching Frequency 25 kHz Typical
Current Loop Bandwidth Tunable up to 3 kHz
Amplifier Isolation Logic completely isolated from high voltage output stage
Operating Temperature 0 °C to +60 °C
Storage Temperature -40 °C to +80 °C
Humidity 5% to 95% non–condensing
Mounting Hardware #8–32 or M4 Screw, Qty = 4
Dimensions (inches) L7.16, W5.45, H4.17(w/regen), L7.16, W5.45, H3.09(w/o regen)
Backup File xxxx–5.BK
Mating Connectors
Controller I/O, 36 Pin 3M Glentek P/N: EJC10136; 3M P/N: 10136–3000VE
36 Pin Mini–D, Backshell Glentek P/N: EJC10336 ; 3M P/N: 10336–52A0–008
Motor Feedback, 20 Pin 3M Glentek P/N: EJC10120; 3M P/N: 10120–3000VE
20 Pin Mini–D, Backshell Glentek P/N: EJC10320; 3M P/N: 10320–52A0–008
Host, RJ45 Molex Glentek P/N: EJD18083; Molex P/N: 87522–8012
AC Input, 4 Pin Phoenix Glentek P/N: EJ50170A; Phoenix P/N: 1632439
Motor Output, 3 Pin Phoenix Glentek P/N: EJ50170A; Phoenix P/N: 1832426
Logic Power, 2 Pin Phoenix Glentek P/N: EJ7410VD2; Phoenix P/N: 1797757
Controller I/O Connector
Pin | Signal Name
1 SIGNAL 1+
2 SIGNAL 1–
3 SIGNAL 2+
4 SIGNAL 2–
5 ANALOG OUT (AUX.)
6 COMMON (ANALOG)
7 ANALOG OUT
8 +LIMIT
9 –LIMIT
10 INHIBIT
11 FAULT OUT
12 COMMON
13 RESET IN
14 MTR TEMP SW
15 RESERVED
16 COMMON (DIGITAL)
17 ENCODER Z + (OUT)
18 ENCODER Z – (OUT)
19 RELAY OUT (OPTIONAL)
20 RELAY OUT (OPTIONAL)
21 COMMON (ANALOG)
22 COMMON (DIGITAL)
23 PULSE –
24 PULSE +
25 DIRECTION –
26 DIRECTION +
27 +5 VDC
28 +5 VDC
29 COMMON (DIGITAL)
30 COMMON (DIGITAL)
31 RESERVED
32 RESERVED
33 ENCODER A+ (OUT)
34 ENCODER A– (OUT)
35 ENCODER B+ (OUT)
36 ENCODER B– (OUT)
Motor Feedback Connector
Pin | Signal Name
1 ENC PWR (+5VDC)
2 COMMON (DIGITAL)
3 ENC PWR (+5VDC)
4 COMMON (DIGITAL)
5 ENC A + (IN)
6 ENC A – (IN)
7 ENC B + (IN)
8 ENC B – (IN)
9 ENC Z + (IN)
10 ENC Z – (IN)
11 HALL 1 +
12 HALL 1 –
13 HALL 2 +
14 HALL 2 –
15 HALL 3 +
16 HALL 3 –
17 MTR TEMP SW
18 COMMON (DIGITAL)
19 TACH +
20 TACH –
Motor Output
Pin | Signal Name
1 MOTOR PHASE T / BRUSH OUTPUT B
2 MOTOR PHASE S
3 MOTOR PHASE R / BRUSH OUTPUT A
PE PROTECTIVE EARTHING (CHASSIS GND)
Status Display
Display | Fault Description
1 EEPROM FAULT
2 RAM FAULT
3 CPLD FAULT
8 RESET
b DUS OVERVOLTAGE
C CLAMP
c FAULT INPUT
L UNDERVOLTAGE
F FOLDBACK
H HEATSINK OVERTEMP
h MOTOR OVERTEMP
L LS/ECB
O NORMAL OPERATION
S HS/ECB
U UNDER VOLTAGE
= HALL FAULT
≡ COMMUTATION FAULT
Host Connector
Pin | Signal Name
1 RESERVED
2 RESERVED
3 RESERVED
4 COMMON (DIGITAL)
5 TX232
6 RX232
7 RESERVED
8 RESERVED
AC Input
Pin | Signal Name
1 AC LINE 1 (SINGLE PHASE)
2 AC LINE 2 (SINGLE PHASE)
3 AC LINE 3 (THREE PHASE)
4 PROTECTIVE EARTHING (CHASSIS GND)
Logic Power Connector
Pin | Signal Name
1 COMMON (DIGITAL)
2 +24VDC
Bus Over Voltage, Under Voltage, & Regen Voltage Settings
Power Input Voltage | BUS Over Voltage | BUS Under Voltage | Regen Voltage
208 – 240 VAC | 450 VDC ± 5% | 150 VDC ± 5% | 390 VDC ± 5%
110 – 130 VAC | 250 VDC ± 5% | 60 VDC ± 5% | 230 VDC ± 5%
APPROVAL | DATE
DRAWN BY: NTHALLA | 05SEP13
CHK'D BY: | 05SEP13
APP'D BY: | 05SEP13
DRAWING TITLE
INSTALLATION,
SMx9410-0bb-0cc-1F-1, MINI-D
SIZE: B | SCALE: 1.5:1 | DRAWING NUMBER: SMX9410-1F-1 | 9410-1031-000 | REV: A
FILE NAME: 9410-1031-000.A.DWG | SHEET 1 OF 1
CONFIGURATION CODE: -
GLENTEK 208 Standard Street, El Segundo, CA 90245 (310)322-2026 FAX:(310)322-7709 www.glentek.com
"Pedestrian Fun Machine Company"
DECIMAL: XX = ±0.01, XXX = ±0.005
ANGULAR: ±0.5°
FINISH: 125 µ MAXIMUM
THE INFORMATION CONTAINED HEREIN IS THE EXCLUSIVE PROPERTY OF GLENTEK INC. AND SHALL NOT BE REPRODUCED WITHOUT WRITTEN PERMISSION OF GLENTEK INC. EXCEPT AS NECESSARY FOR THE MANUFACTURE OF GLENTEK INC. PRODUCTS AND ITEMS FURNISHED BY GLENTEK INC.
4.17 [105.9]
3.09 [78.5]
3.00 [76.2]
2x, 1.66 [42.2]
4x, .19 [4.76]
.57 [14.6]
7.16 [181.9]
6.85 [174.0]
5.45 [138.3]
4.82 [122.6]
REGEN LED
ALPHA SERIES
GLENTEK
SMx9410-1F-1 DIGITAL SERVO AMPLIFIER
LOGIC POWER
MOTOR FEEDBACK
CONTROLLER I/O
STATUS DISPLAY
MOTOR OUTPUT
HOST
AC INPUT
CAUTION: RISK OF ELECTRIC SHOCK
B+
REGEN +
REGEN -
B-
MOTOR FEEDBACK
CONTROLLER I/O
HOST
NOTE:
1. RECOMMEND ALL POWER & REGEN WIRING, 16 AWG (1.31 MM²) OR LARGER, 105°C RATED PVC OR BETTER.
2. RECOMMEND SIGNAL WIRING TO MINI–D SOCKET CONNECTOR, 24AWG (0.205 MM²) TO 28AWG (0.081 MM²).
3. EXTERNAL +24VDC FOR LOGIC POWER IS SUPPLIED BETWEEN PIN 1 (COMMON) AND PIN 2 (+24VDC) OF LOGIC POWER CONNECTOR.
4. CONNECT POWER AND MOTOR GROUND TO THESE GROUND TERMINAL.
5. COMMON (ANALOG) AND COMMON (DIGITAL) SIGNALS ARE CONNECTED TOGETHER INSIDE AMPLIFIER.
6. PLEASE MAINTAIN A MIN. OF 2" – 3" OF SPACE AT BOTH ENDS AND TOP OF THE AMPLIFIER TO ENSURE PROPER VENTILATION FOR THE UNIT.


ALPHA SERIES
GLENTEK
SMB/SMC9415-1D-1
DIGITAL
SERVO AMPLIFIER
MOTOR FEEDBACK
CONTROLLER I/O
STATUS DISPLAY
RESET
LOGIC POWER
(FOR SMC ONLY)
MOTOR OUTPUT
AC INPUT
HOST
AIR FLOW
CAUTION: RISK OF ELECTRIC SHOCK
3.41 [86.6]
2.01 [51.0]
.86 [21.8]
.60 [15.1]
.19 [4.8]
6.87 [174.6]
7.18 [182.5]
.36 [9.0]
1.42 [36.1]
MOTOR FEEDBACK
CONTROLLER I/O
HOST
REVISION HISTORY
INSTALLATION, SMx9415-bbb-1cc-1D-1, STD/LO/HI POWER, MOLEX
GLENTEK
SMB9415-1D-1
9415-1033-000
NOTE:
1. RECOMMEND ALL POWER WIRING, 14 AWG (2.08 MM²) OR LARGER, 105°C RATED PVC OR BETTER.
2. RECOMMEND SIGNAL WIRING TO MOLEX SOCKET CONNECTOR, 22AWG (0.326 MM²) OR 24AWG (0.205 MM²). USE CRIMPING TOOL MOLEX ORDER NO: 63811902OO.
3. EXTERNAL +24VDC FOR LOGIC POWER IS SUPPLIED BETWEEN PIN 1 (COMMON) AND PIN 2 (+24VDC) OF LOGIC POWER CONNECTOR.
4. MAXIMUM HEIGHT IS 6.45 INCHES.
5. CONNECT MOTOR GROUND TO THIS #6-32 GREEN GROUND SCREW.
6. COMMON (ANALOG) AND COMMON (DIGITAL) SIGNALS ARE CONNECTED TOGETHER INSIDE AMPLIFIER.


REVISION HISTORY
ZONE | REV | DESCRIPTION | ECO | DATE | CHANGED | APPD
A | INITIAL RELEASE | 3391 | 01AUG11 | NTHALLA | L.P.
Specifications and Features
AC Supply Input: 110 – 130 VAC, 208 – 240 VAC, 1Ø, 3Ø, 50/60 Hz
Inrush Current at Power Up: 92A max @ 132VAC, 170A max @ 240VAC
Logic Supply Input (For SMC9415 Only): 24 to 48 VDC, 600mA max @24VDC. Powers all amplifier logic and encoders.
Peak Current Output: 30A (STD), 20A (LO), 40A (HI) @ 25°C Ambient
Continuous Current Output: 15A (STD), 10A (LO), 20A (HI) @ 25°C Ambient
Fault Protection: Short circuit protection from motor phase to phase, motor phase to DC bus, motor phase to case (chassis gnd) Amplifier RMS over current. DC bus over/under voltage. Amplifier over temperature. Motor over temperature (switch or thermistor input). Encoder broken wire. Invalid Hall/comm track state. Commutation fault.
Amplifier Status Indication: See Table
Low Speed Electronic Circuit Breaker (LS/ECB): Latches when programmable current (15A (STD), 10A (LO), 20A (HI) max.) and time (10 sec max.) exceed limit.
Bus Overvoltage: See Table
Bus Undervoltage: See Table
Internal Regen: N/A
Regen Voltage: N/A
Amplifier Type: See Model Number Key (from product manual)
Analog Command Input: ±10V (12 bit resolution) for analog velocity, and current command. 15 bit is available (optional).
Auxiliary Analog Input: ±10V (12 bit resolution) for 2 phase Current Mode. 15 bit is available (optional).
Pulse & Direction Inputs: Accepts TTL level Step & Direction signals
Encoder Feedback: Accepts TTL level encoder signals
Tachometer Feedback: Accept ±30 VDC tacho signals (Different voltage levels are available upon request)
Dedicated Inputs: +/– position limits, inhibit, motor overtemp & reset signal
Dedicated Fault Output (Programmable Level): TTL Compatible
Analog Out: ±10 V analog output (12–Bit) for monitoring DSP signals, output source selectable and scalable using MotionMaestro™ setup software, 2 channels & 16–Bit are available(options)
Auto Phasing: Plug & Play for all types of three phase Brushless Motors.
Smart Comm Initialization at Amplifier turn on: Eliminates the need for Hall sensor or commutation tracks for many applications.
RS–232 Host Port: High speed serial communication interface for set–up and tuning. 115.2 Kbaud, 8 bits, no parity, 1 stop bit.
Software Configurable: All parameters are downloaded using the RS232 port / Glentek's Windows™ based MotionMaestro™ software.
Digitally Tuned: All parameters set digitally. No potentiometers to adjust. RS–232 high speed serial communication interface for all gain and PID tuning parameters.
Non–Volatile Memory: All parameters are stored in non–volatile memory
PWM Switching Frequency: 25 KHz Typical
Current Loop Bandwidth: Tunable up to 3 KHz
Amplifier Isolation: Logic completely isolated from high voltage output stage
Operating Temperature: 0°C to +60°C
Storage Temperature: –40°C to +80°C
Humidity: 5% to 95% non–condensing
Mounting Hardware: #8–32 or M4 Screw, Qty = 4
Dimensions (inches): L 8.60, H. 6.45, W. 4.01
Backup File: xxxx–5.BK
Mating Connectors
Controller I/O, 36 Pin 3M: Glentek P/N: E&C10136; 3M P/N: 10136–3000VE
36 Pin Mini–D, Backshell: Glentek P/N: E&C10336 ; 3M P/N: 10336–52A0–008
Motor Feedback, 20 Pin 3M: Glentek P/N: E&C10120; 3M P/N: 10120–3000VE
20 Pin Mini–D, Backshell: Glentek P/N: E&C10320; 3M P/N: 10320–52A0–008
Host, RJ45 Molex: Glentek P/N: E&01B083; Molex P/N: 87522–8012
AC Input, 4 Pin Phoenix: Glentek P/N: E&5617F04; Phoenix P/N: 1832439
Motor Output, 3 Pin Phoenix: Glentek P/N: E&5617F03A; Phoenix P/N: 1832426
Logic Power, 2 Pin Phoenix: Glentek P/N: FJ7414W02; Phoenix P/N: 1797757
Controller Feedback Connector
Pin | Signal Name
1 ENC PWR (+5VDC)
2 COMMON (DIGITAL)
3 ENC PWR (+5VDC)
4 COMMON (DIGITAL)
5 ENC A + (IN)
6 ENC A – (IN)
7 ENC B + (IN)
8 ENC B – (IN)
9 ENC Z + (IN)
10 ENC Z – (IN)
11 HALL 1 +
12 HALL 1 –
13 HALL 2 +
14 HALL 2 –
15 HALL 3 +
16 HALL 3 –
17 MTR TEMP SW
18 COMMON (DIGITAL)
19 TACH +
20 TACH –
Motor Output
Pin | Signal Name
1 MOTOR PHASE T / BRUSH OUTPUT B
2 MOTOR PHASE S
3 MOTOR PHASE R / BRUSH OUTPUT A
PE PROTECTIVE EARTHING (CHASSIS GND)
Status Display
Display | Fault Description
1 EEPROM FAULT
2 RAM FAULT
3 CPLD FAULT
8 RESET
b BUS OVERVOLTAGE
C CLAMP
c FAULT INPUT
E ENCODER FAULT
F FOLDBACK
H HEATSINK OVERTEMP
h MOTOR OVERTEMP
L LS/ECB
O NORMAL OPERATION
S HS/ECB
U UNDER VOLTAGE
= HALL FAULT
≡ COMMUTATION FAULT
Controller I/O Connector
Pin | Signal Name
1 SIGNAL 1+
2 SIGNAL 1–
3 SIGNAL 2+
4 SIGNAL 2–
5 ANALOG OUT (AUX.)
6 COMMON (ANALOG)
7 ANALOG OUT
8 +LIMIT
9 –LIMIT
10 INHIBIT
11 FAULT OUT
12 COMMON
13 RESET IN
14 MTR TEMP SW
15 RESERVED
16 COMMON (DIGITAL)
17 ENCODER Z + (OUT)
18 ENCODER Z – (OUT)
19 RELAY OUT (OPTIONAL)
20 RELAY OUT (OPTIONAL)
21 COMMON (ANALOG)
22 COMMON (DIGITAL)
23 PULSE –
24 PULSE +
25 DIRECTION –
26 DIRECTION +
27 +5 VDC
28 +5 VDC
29 COMMON (DIGITAL)
30 COMMON (DIGITAL)
31 RESERVED
32 RESERVED
33 ENCODER A+ (OUT)
34 ENCODER A– (OUT)
35 ENCODER B+ (OUT)
36 ENCODER B– (OUT)
Host Connector
Pin | Signal Name
1 RESERVED
2 RESERVED
3 RESERVED
4 COMMON (DIGITAL)
5 TX232
6 RX232
7 RESERVED
8 RESERVED
AC Input
Pin | Signal Name
1 AC LINE 1 (SINGLE PHASE)
2 AC LINE 2 (SINGLE PHASE)
3 AC LINE 3 (THREE PHASE)
4 PROTECTIVE EARTHING (CHASSIS GND)
Logic Power Connector
Pin | Signal Name
1 COMMON (DIGITAL)
2 +24VDC
Bus Over Voltage and Under Voltage Settings
Power Input Voltage | Bus Over Voltage | Bus Under Voltage
208 VAC – 240 VAC | 450 VDC ± 5% | 150 VDC ± 5%
110 VAC – 130 VAC | 250 VDC ± 5% | 60 VDC ± 5%
LOGIC POWER
COM
+24VDC
(FOR SMC ONLY)
MOTOR OUTPUT
T
S
R
PE
RESET
ALPHA SERIES
MOTOR FEEDBACK
GLENTEK
CONTROLLER I/O
SMB/SMC9415-1D-1
DIGITAL
SERVO AMPLIFIER
STATUS DISPLAY
HOST
AC INPUT
PE
L3
L2
L1
CAUTION, RISK OF ELECTRIC SHOCK
AIR FLOW
.86 [21.8]
3.41 [86.6]
2.01 [51.0]
.60 [15.1]
.19 [4.8]
6.87 [174.6]
7.18 [182.5]
.36 [9.0]
1.42 [36.1]
MOTOR FEEDBACK
CONTROLLER I/O
HOST
NOTE:
1. RECOMMEND ALL POWER WIRING, 14 AWG (2.08 MM²) OR LARGER, 105°C RATED PVC OR BETTER.
2. RECOMMEND SIGNAL WIRING TO MINI–D SOCKET CONNECTOR, 24AWG (0.205 MM²) TO 26AWG (0.081 MM²).
3. EXTERNAL +24VDC FOR LOGIC POWER IS SUPPLIED BETWEEN PIN 1 (COMMON) AND PIN 2 (+24VDC) OF LOGIC POWER CONNECTOR.
4. MAXIMUM HEIGHT IS 6.45 INCHES.
5. CONNECT MOTOR GROUND TO THIS #6–32 GREEN GROUND SCREW.
6. COMMON (ANALOG) AND COMMON (DIGITAL) SIGNALS ARE CONNECTED TOGETHER INSIDE AMPLIFIER.
GLENTEK
INSTALLATION, SMx9415-bbb-0cc-1D-1, STD/LO/HI POWER, MINI-D
SIZE D | MODEL SMx9415-1D-1 | DRAWING NUMBER 64-1043-000 | REV B
SCALE 2:1 | FILE NAME 9415-1043-000.EDWG | SHEET 1 OF 1


REVISION HISTORY
ZONE | REV | DESCRIPTION | ECO | DATE | CHANGED | APPD
- | A | INITIAL RELEASE | 3810 | 05SEP13 | LL | JM
Specifications and Features
AC Supply Input: 110 ~ 130 VAC, 208 ~ 240 VAC, 1Ø, 3Ø, 50/60 HZ
Inrush Current at Power Up: 92A max @ 130VAC, 170A max @ 240VAC
Logic Supply Input (For SMC9415 Only): 24 to 48 VDC, 600mA max @24VDC. Powers all amplifier logic and encoders.
Peak Current Output: 30A (STD), 20A (LO) @ 25°C Ambient
Continuous Current Output: 15A (STD), 10A (LO) @ 25°C Ambient
Fault Protection: Short circuit protection from motor phase to phase, motor phase to DC bus, motor phase to case (chassis gnd) Amplifier RMS over current. DC bus over/under voltage. Amplifier over temperature. Motor over temperature (switch or thermistor input). Encoder broken wire. Invalid Hall/comm block state. Commutation fault.
Amplifier Status Indication: See Table
Low Speed Electronic Circuit Breaker (I2t/ECB): Latches when programmable current (15A (STD), 10A (LO) max.) and time (10 sec max.) exceed limit.
Bus Overvoltage: See Table
Bus Undervoltage: See Table
Internal Regen: N/A
Regen Voltage: N/A
Amplifier Type: See Model Number Key (from product manual)
Analog Command Input: ±10V (12 bit resolution) for analog velocity, and current command. 15 bit is available (optional).
Auxiliary Analog Input: ±10V (12 bit resolution) for 2 phase Current Mode. 15 bit is available (optional).
Pulse & Direction Inputs: Accepts TTL level Step & Direction signals
Encoder Feedback: Accepts TTL level encoder signals
Tachometer Feedback: Accept ±30 VDC tacho signals (Different voltage levels are available upon request)
Dedicated Inputs: +/- position limits, inhibit, motor overtemp & reset signal
Dedicated Fault Output (Programmable Level): TTL Compatible
Analog Out: ±10 V analog output (12-Bit) for monitoring DSP signals, output source selectable and scalable using MotionMaestro™ setup software, 2 channels and 16-Bit are available (options)
Auto Phasing: Plug & Play for all types of three phase Brushless Motors.
Smart Com Initialization at Amplifier turn on: Eliminates the need for Hall sensor or commutation tracks for many applications.
RS-232 Host Port: High speed serial communication interface for set-up and tuning. 115.2 Kbaud, 8 bits, no parity, 1 stop bit
Software Configurable: All parameters are downloaded using the RS232 port / Glentek's Windows™ based MotionMaestro™ software.
Digitally Tuned: All parameters set digitally, No potentiometers to adjust. RS-232 high speed serial communication interface for all gain and PID tuning parameters.
Non-Volatile Memory: All parameters are stored in non-volatile memory
PWM Switching Frequency: 25 KHz Typical
Current Loop Bandwidth: Tunable up to 3 KHz
Amplifier Isolation: Logic completely isolated from high voltage output stage
Operating Temperature: 0 °C to +60 °C
Storage Temperature: -40 °C to +80 °C
Humidity: 5% to 95% non-condensing
Mounting Hardware: #8-32 or M4 Screw, Qty = 4
Dimensions (inches): L 8.91, H. 6.45, W. 3.40
Backup File: xxxx-S.BK
Mating Connectors
Controller I/O, 24 Pin Molex: Glentek P/N: 62F212; Molex P/N: 90142-0024
Encoder Feedback, 20 Pin Molex: Glentek P/N: 62F210; Molex P/N: 90142-0020
Controller I/O & Motor Feedback Socket Connector, Molex: Glentek P/N: 62F1F01; Molex P/N: 90119-2110
Host, RJ45 Molex: Glentek P/N: E0180803; Molex P/N: 87522-8012
AC Input, 4 Pin Phoenix: Glentek P/N: E2501F04; Phoenix P/N: 1832439
Motor Output, 3 Pin Phoenix: Glentek P/N: E2501F03A; Phoenix P/N: 1832426
Logic Power, 2 Pin Phoenix: Glentek P/N: F1741WD; Phoenix P/N: 1787757
Bus Over Voltage and Under Voltage Settings
Power Input Voltage | BUS Over Voltage | BUS Under Voltage
208 VAC ~ 240 VAC | 450 VDC ± 5% | 190 VDC ± 5%
110 VAC ~ 130 VAC | 250 VDC ± 5% | 60 VDC ± 5%
Logic Power Connector
Pin | Signal Name
1 | COMMON (DIGITAL)
2 | +24VDC
Status Display
Display | Fault Description
1 | EEPROM FAULT
2 | RAM FAULT
3 | CPLD FAULT
8 | RESET
b | BUS OVERVOLTAGE
C | CLAMP
c | FAULT INPUT
E | ENCODER FAULT
F | FOLDBACK
H | HEATSINK OVERTEMP
h | MOTOR OVERTEMP
L | L5/ECB
O | NORMAL OPERATION
S | HI5/ECB
U | UNDER VOLTAGE
= | HALL FAULT
≡ | COMMUTATION FAULT
Motor Output
Pin | Signal Name
1 | MOTOR PHASE T / BRUSH OUTPUT B
2 | MOTOR PHASE S
3 | MOTOR PHASE R / BRUSH OUTPUT A
PE | PROTECTIVE EARTHING (CHASSIS GND)
AC Input
Pin | Signal Name
1 | AC LINE 1 (SINGLE PHASE)
2 | AC LINE 2 (SINGLE PHASE)
3 | AC LINE 3 (THREE PHASE)
4 | PROTECTIVE EARTHING (CHASSIS GND)
Host Connector
Pin | Signal Name
1 | RESERVED
2 | RESERVED
3 | RESERVED
4 | COMMON (DIGITAL)
5 | TX232
6 | RX232
7 | RESERVED
8 | RESERVED
Controller I/O Connector
Pin | Signal Name
1 | ENCODER A+(OUT)
2 | ENCODER A-(OUT)
3 | ENCODER B+(OUT)
4 | ENCODER B-(OUT)
5 | ENCODER Z+(OUT)
6 | ENCODER Z-(OUT)
7 | PULSE +
8 | PULSE -
9 | DIR +
10 | DIR -
11 | RESET IN
12 | +LIMIT
13 | -LIMIT
14 | INHIBIT
15 | FAULT OUT
16 | +5VDC
17 | COMMON (ANALOG)
18 | COMMON (DIGITAL)
19 | ANALOG OUT (AUX.)
20 | ANALOG OUT
21 | SIGNAL 2+
22 | SIGNAL 2-
23 | SIGNAL 1+
24 | SIGNAL 1-
Motor Feedback Connector
Pin | Signal Name
1 | TACH +
2 | TACH -
3 | RESERVED
4 | MOTOR TEMP
5 | ENCODER Z+ (IN)
6 | ENCODER Z- (IN)
7 | ENCODER B+ (IN)
8 | ENCODER B- (IN)
9 | ENCODER A+ (IN)
10 | ENCODER A- (IN)
11 | HALL U+
12 | HALL U-
13 | HALL V+
14 | HALL V-
15 | HALL W+
16 | HALL W-
17 | ENC PWR (+5VDC)
18 | COMMON (DIGITAL)
19 | ENC PWR (+5VDC)
20 | COMMON (DIGITAL)
3.40 [86.4]
2.00 [50.8]
.85 [21.7]
.19 [4.8]
8.60 [218.3]
8.91 [226.2]
LOGIC POWER
PE
COM
+24VDC
(FOR SMC ONLY)
RESET
MOTOR FEEDBACK
ALPHA SERIES
GLENTEK
CONTROLLER I/O
SMB/SMC9415-1E-1
DIGITAL
SERVO AMPLIFIER
STATUS DISPLAY
MOTOR OUTPUT
T
S
R
PE
AC INPUT
PE
L3
L2
L1
HOST
CAUTION, RISK OF ELECTRIC SHOCK
AIR FLOW
MOTOR FEEDBACK
CONTROLLER I/O
HOST
NOTE:
1. RECOMMEND ALL POWER WIRING, 14 AWG (2.08 MM²) OR LARGER, 105°C RATED PVC OR BETTER.
2. RECOMMEND SIGNAL WIRING TO MOLEX SOCKET CONNECTOR, 22AWG (0.326 MM²) OR 24AWG (0.205 MM²). USE CRIMPING TOOL MOLEX ORDER NO: 63811902OO.
3. EXTERNAL +24VDC FOR LOGIC POWER IS SUPPLIED BETWEEN PIN 1 (COMMON) AND PIN 2 (+24VDC) OF LOGIC POWER CONNECTOR.
4. MAXIMUM HEIGHT IS 6.45 INCHES.
5. CONNECT MOTOR GROUND TO THIS #6-32 GREEN GROUND SCREW.
6. COMMON (ANALOG) AND COMMON (DIGITAL) SIGNALS ARE CONNECTED TOGETHER INSIDE AMPLIFIER.
GLENTEK
INSTALLATION, SMx9415-bbb-1cc-1E-1, STD/LO POWER, MOLEX
SIZE: D | MODEL NO.: SMx9415-1E-1 | DRAWING NUMBER: 9415-1048-000 | REV: A
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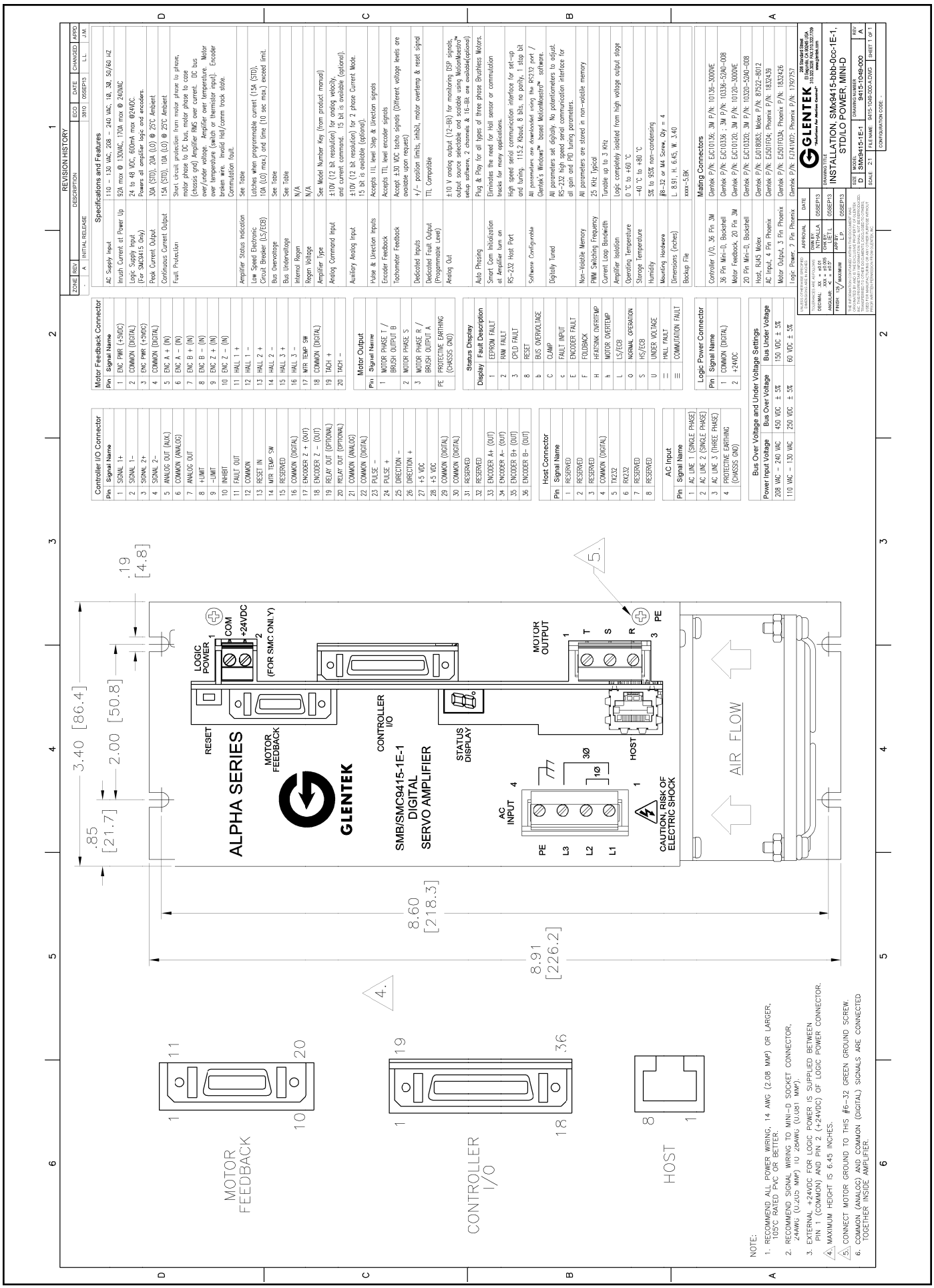
REVISION HISTORY
ZONE REV DESCRIPTION ECO DATE CHANGED APPD
A INITIAL RELEASE 3810 05SEP13 LL JM
Specifications and Features
AC Supply Input 110 – 130 VAC, 208 – 240 VAC, 10, 30, 50/60 HZ
Inrush Current at Power Up 92A max @ 130VAC, 170A max @ 240VAC
Logic Supply Input (For SMC9415 Only) 24 to 48 VDC, 600mA max @24VDC. Powers all amplifier logic and encoders.
Peak Current Output 30A (STD), 20A ([.0]) @ 25°C Ambient
Continuous Current Output 15A (STD), 10A ([.0]) @ 25°C Ambient
Fault Protection Short circuit protection from motor phase to phase, motor phase to DC bus, motor phase to case (chassis gnd) Amplifier RMS over current. DC bus over/under voltage. Amplifier over temperature. Motor over temperature (switch or thermistor input). Encoder broken wire. Invalid Hall/comm track state. Commutation fault.
Amplifier Status Indication See Table
Low Speed Electronic Circuit Breaker (LS/ECB) Latches when programmable current (15A (STD), 10A ([.0] max.) and time (10 sec max.) exceed limit.
Bus Overvoltage See Table
Bus Undervoltage See Table
Internal Regen N/A
Regen Voltage N/A
Amplifier Type See Model Number Key (from product manual)
Analog Command Input ±10V (12 bit resolution) for analog velocity, and current command. 15 bit is available (optional).
Auxiliary Analog Input ±10V (12 bit resolution) for 2 phase Current Mode. 15 bit is available (optional).
Pulse & Direction Inputs Accepts 11L level Step & Direction signals
Encoder Feedback Accepts TTL level encoder signals
Tachometer Feedback Accept ±30 VDC tacho signals (Different voltage levels are available upon request)
Dedicated Inputs +/– position limits, inhibit, motor overtemp & reset signal
Dedicated Fault Output (Programmable Level) TTL Compatible
Analog Out ±10 V analog output (12-Bit) for monitoring DSP signals, output source selectable and scalable using MotionMaestro™ setup software, 2 channels & 16-Bit are available(optional)
Auto Phasing Plug & Play for all types of three phase Brushless Motors.
Smart Com Initialization at Amplifier turn on Eliminates the need for Hall sensor or commutation tracks for many applications.
RS-232 Host Port High speed serial communication interface for set-up and tuning. 115.2 Kbaud, 8 bits, no parity, 1 stop bit
Software Configurable All parameters are downloaded using the RS232 port / Glentek's Windows™ based MotionMaestro™ software.
Digitally Tuned All parameters set digitally. No potentiometers to adjust. RS-232 high speed serial communication interface for all gain and PID tuning parameters.
Non-Volatile Memory All parameters are stored in non-volatile memory
PWM Switching Frequency 25 KHz Typical
Current Loop Bandwidth Tunable up to 3 KHz
Amplifier Isolation Logic completely isolated from high voltage output stage
Operating Temperature 0 °C to +50 °C
Storage Temperature -40 °C to +80 °C
Humidity 5% to 95% non-condensing
Mounting Hardware #8-32 or M4 Screw, Qty = 4
Dimensions (inches) L 8.91, H. 6.45, W. 3.40
Backup File xxxx-5.BK
Mating Connectors
Controller I/O, 36 Pin 3M Glentek P/N: E&C10136 ; 3M P/N: 10136-3000VE
36 Pin Mini-D, Backshell Glentek P/N: E&C10336 ; 3M P/N: 10336-5240-008
Motor Feedback, 20 Pin 3M Glentek P/N: E&C10120; 3M P/N: 10120-3000VE
20 Pin Mini-D, Backshell Glentek P/N: E&C10320; 3M P/N: 10320-52A0-008
Host, RJ45 Molex Glentek P/N: E&C10088; Molex P/N: 87522-8012
AC Input, 4 Pin Phoenix Glentek P/N: E&50TF04; Phoenix P/N: 1832439
Motor Output, 3 Pin Phoenix Glentek P/N: E&50TF03A; Phoenix P/N: 1832426
Logic Power, 2 Pin Phoenix Glentek P/N: E&1714VDC; Phoenix P/N: 1797757
Controller I/O Connector
Pin Signal Name
1 SIGNAL 1+
2 SIGNAL 1–
3 SIGNAL 2+
4 SIGNAL 2–
5 ANALOG OUT (AUX)
6 COMMON (ANALOG)
7 ANALOG OUT
8 +LIMIT
9 –LIMIT
10 INHIBIT
11 FAULT OUT
12 COMMON
13 RESET IN
14 MTR TEMP SW
15 RESERVED
16 COMMON (DIGITAL)
17 ENCODER Z + (OUT)
18 ENCODER Z – (OUT)
19 RELAY OUT (OPTIONAL)
20 RELAY OUT (OPTIONAL)
21 COMMON (ANALOG)
22 COMMON (DIGITAL)
23 PULSE –
24 PULSE +
25 DIRECTION –
26 DIRECTION +
27 +5 VDC
28 +5 VDC
29 COMMON (DIGITAL)
30 COMMON (DIGITAL)
31 RESERVED
32 RESERVED
33 ENCODER A+ (OUT)
34 ENCODER A– (OUT)
35 ENCODER B+ (OUT)
36 ENCODER B– (OUT)
Motor Feedback Connector
Pin Signal Name
1 ENC PWR (+5VDC)
2 COMMON (DIGITAL)
3 ENC PWR (+5VDC)
4 COMMON (DIGITAL)
5 ENC A + (IN)
6 ENC A – (IN)
7 ENC B + (IN)
8 ENC B – (IN)
9 ENC Z + (IN)
10 ENC Z – (IN)
11 HALL 1 +
12 HALL 1 –
13 HALL 2 +
14 HALL 2 –
15 HALL 3 +
16 HALL 3 –
17 MTR TEMP SW
18 COMMON (DIGITAL)
19 TACH +
20 TACH –
Motor Output
Pin Signal Name
1 MOTOR PHASE T / BRUSH OUTPUT B
2 MOTOR PHASE S
3 MOTOR PHASE R / BRUSH OUTPUT A
PE PROTECTIVE EARTHING (CHASSIS GND)
Status Display
Display Fault Description
1 EEPROM FAULT
2 RAM FAULT
3 CPLD FAULT
8 RESET
b BUS OVERVOLTAGE
c CLAMP
C FAULT INPUT
E ENCODER FAULT
F FOLDBACK
H HFAETSINK OVERTEMP
h MOTOR OVERTEMP
L LSYECB
O NORMAL OPERATION
S HSYECB
U UNDER VOLTAGE
= HALL FAULT
≡ COMMUTATION FAULT
Host Connector
Pin Signal Name
1 RESERVED
2 RESERVED
3 RESERVED
4 COMMON (DIGITAL)
5 TX232
6 RX232
7 RESERVED
8 RESERVED
AC Input
Pin Signal Name
1 AC LINE 1 (SINGLE PHASE)
2 AC LINE 2 (SINGLE PHASE)
3 AC LINE 3 (THREE PHASE)
4 PROTECTIVE EARTHING (CHASSIS GND)
Logic Power Connector
Pin Signal Name
1 COMMON (DIGITAL)
2 +24VDC
Bus Over Voltage and Under Voltage Settings
Power Input Voltage Bus Over Voltage Bus Under Voltage
208 VAC – 240 VAC 450 VDC ± 5% 150 VDC ± 5%
110 VAC – 130 VAC 250 VDC ± 5% 60 VDC ± 5%
LOGIC POWER
COM
+24VDC
(FOR SMC ONLY)
MOTOR FEEDBACK
RESET
ALPHA SERIES
GLENTEK
CONTROLLER I/O
SMB/SMC9415-1E-1
DIGITAL
SERVO AMPLIFIER
STATUS DISPLAY
MOTOR OUTPUT
T
S
R
PE
HOST
AC INPUT
PE
L3
L2
L1
CAUTION: RISK OF ELECTRIC SHOCK
AIR FLOW
3.40 [86.4]
2.00 [50.8]
.85 [21.7]
.19 [4.8]
8.60 [218.3]
8.91 [226.2]
MOTOR FEEDBACK
CONTROLLER I/O
HOST
NOTE:
1. RECOMMEND ALL POWER WIRING, 14 AWG (2.08 MM²) OR LARGER, 105°C RATED PVC OR BETTER.
2. RECOMMEND SIGNAL WIRING TO MINI-D SOCKET CONNECTOR: 24AWG (0.205 MM²) TO 26AWG (0.081 MM²).
3. EXTERNAL +24VDC FOR LOGIC POWER IS SUPPLIED BETWEEN PIN 1 (COMMON) AND PIN 2 (+24VDC) OF LOGIC POWER CONNECTOR.
4. MAXIMUM HEIGHT IS 6.45 INCHES.
5. CONNECT MOTOR GROUND TO THIS #6-32 GREEN GROUND SCREW.
6. COMMON (ANALOG) AND COMMON (DIGITAL) SIGNALS ARE CONNECTED TOGETHER INSIDE AMPLIFIER.
UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL ± DECIMAL: .XX ± .01 .XXX ± .005 ANGULAR: ± 0.5° FINISH: 125 √ MAXIMUM
APPROVAL DATE
DRAWN BY: NTHALLA 05SEP13
CHK'ED BY: LL 05SEP13
APP'D BY: LP 05SEP13
THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF GLENTEK. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF GLENTEK INC. IS PROHIBITED.
GLENTEK
208 Standard Street El Segundo, CA 90245, USA Phone: (310) 322-3026 FAX: (310) 322-3029 www.glentek.com
DRAWING TITLE
INSTALLATION, SMx9415-bbb-0cc-1E-1, STD/LO POWER, MINI-D
SIZE D MODEL SMx9415-1E-1 DRAWING NUMBER 9415-1049-000 REV A
SCALE: 2:1 FILENAME: 9415-1049-000-A.DWG SHEET 1 OF 1
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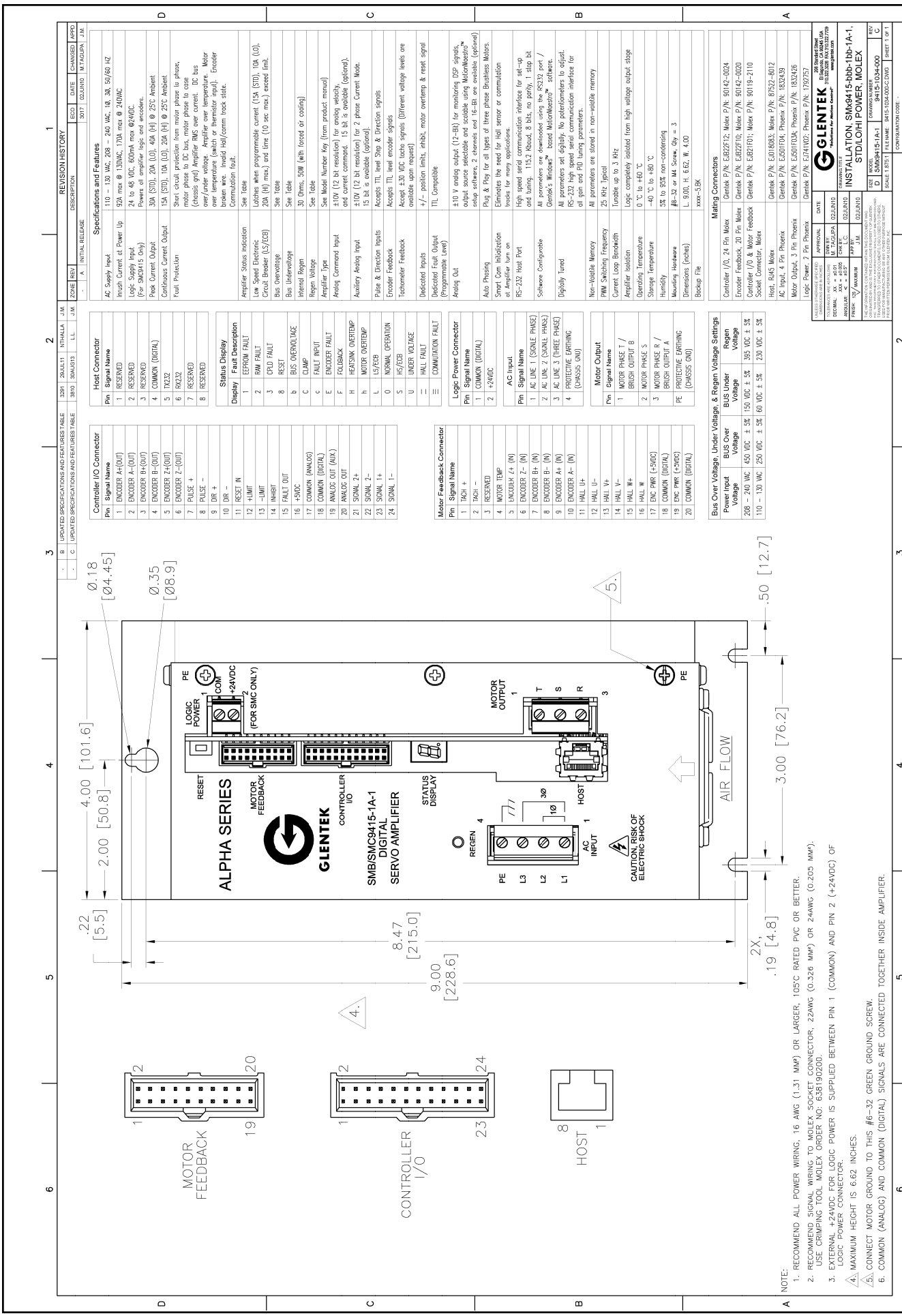
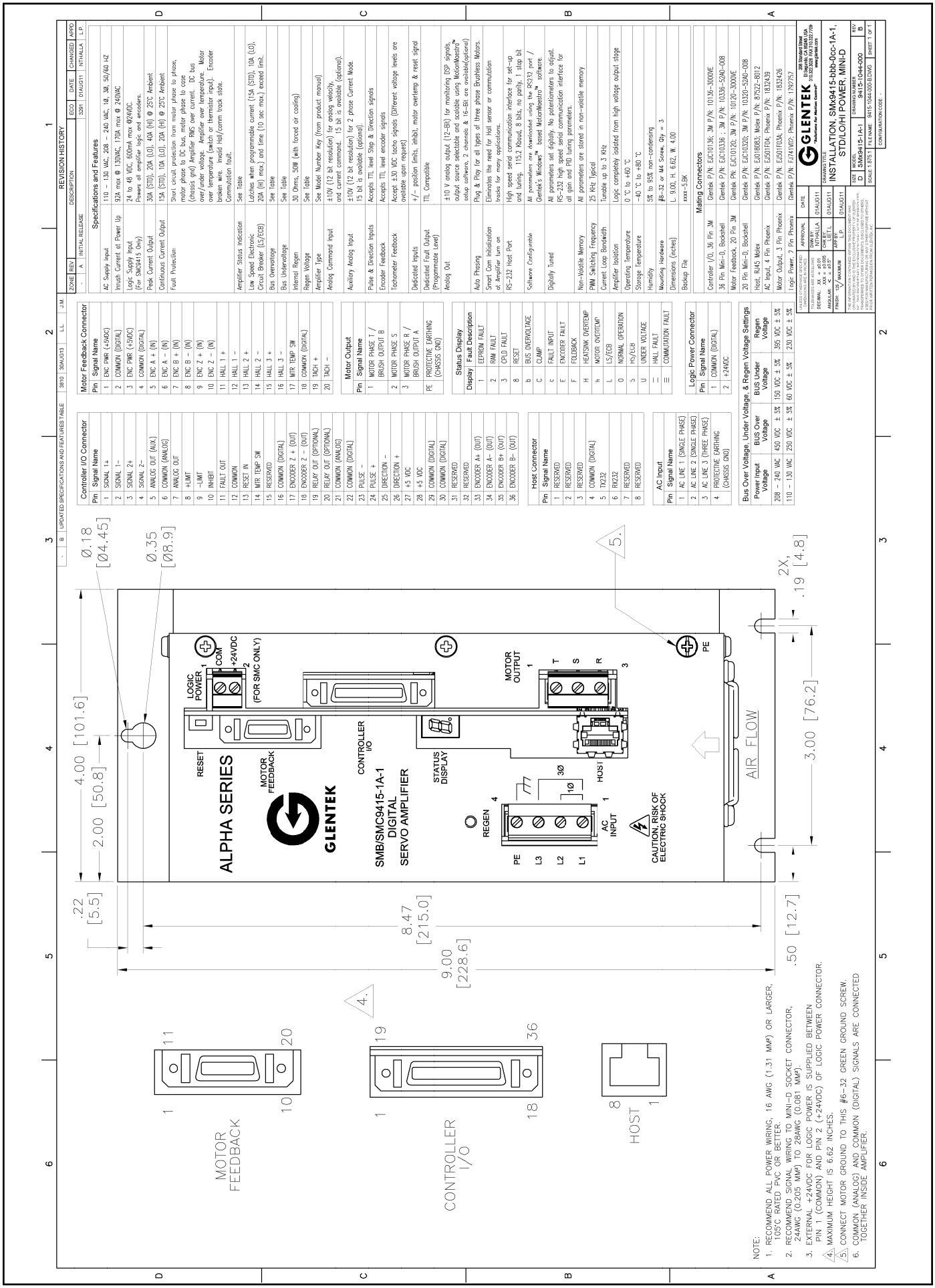
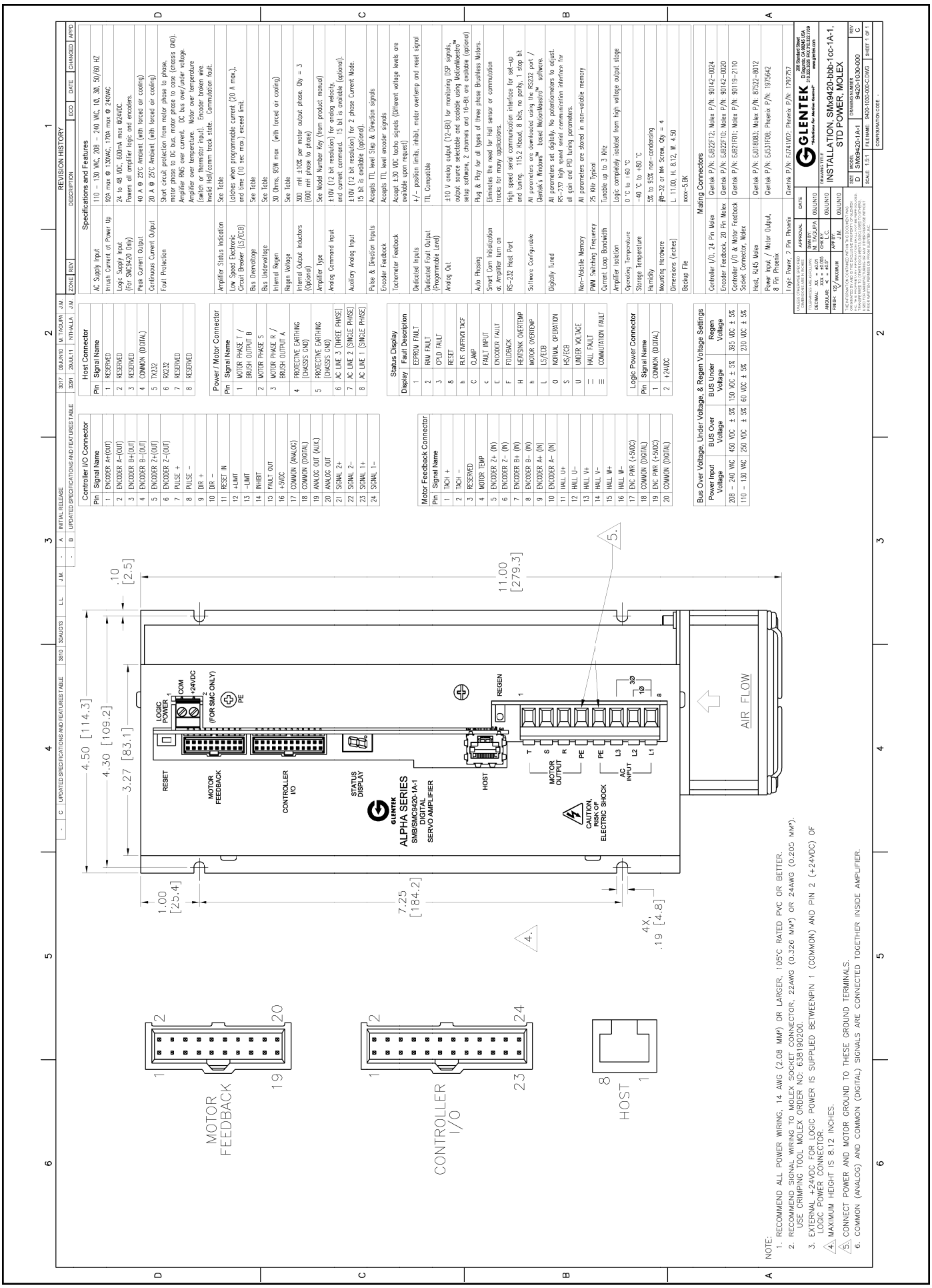
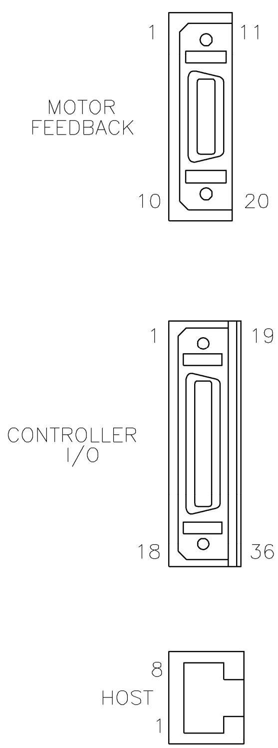
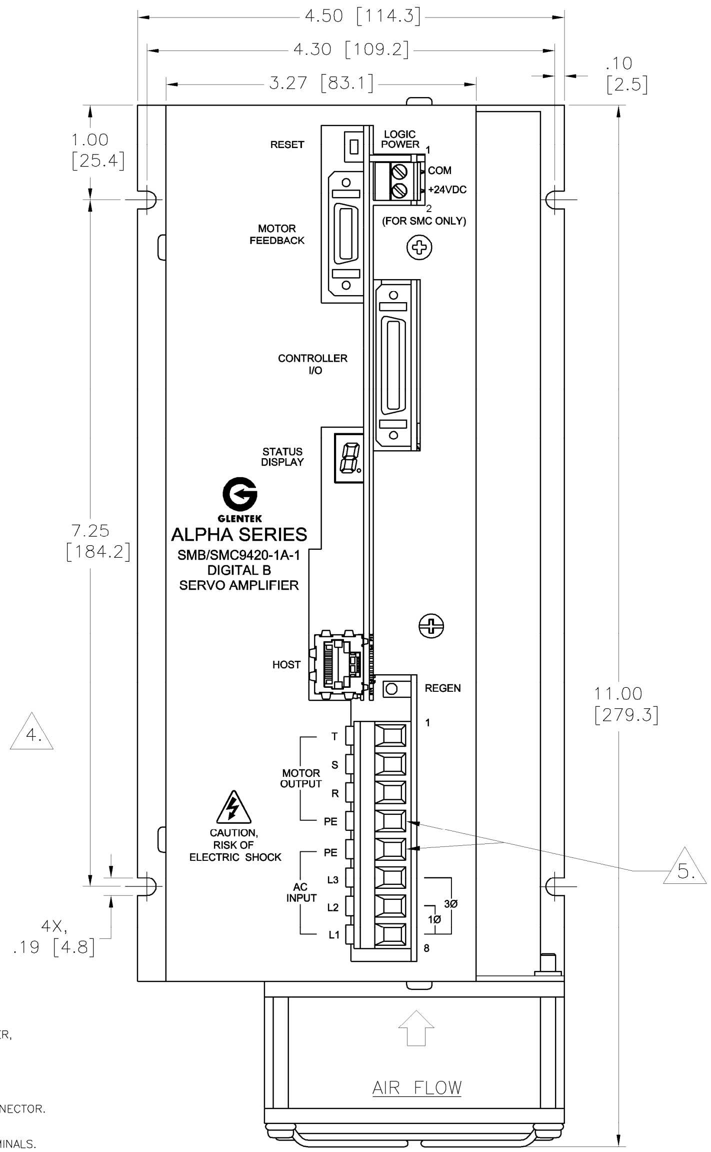

ALPHA SERIES
SMB/SMC9415-1A-1
DIGITAL
SERVO AMPLIFIER
GLENTEK
RESET
MOTOR FEEDBACK
CONTROLLER I/O
STATUS DISPLAY
LOGIC POWER
(FOR SMC ONLY)
MOTOR OUTPUT
REGEN
AC INPUT
HOST
CAUTION: RISK OF ELECTRIC SHOCK
AIR FLOW
MOTOR FEEDBACK
CONTROLLER I/O
HOST
4.00 [101.6]
2.00 [50.8]
.22 [5.5]
Ø.18 [Ø4.45]
Ø.35 [Ø8.9]
8.47 [215.0]
9.00 [228.6]
3.00 [76.2]
.50 [12.7]
2X, .19 [4.8]
NOTE:
1. RECOMMEND ALL POWER WIRING, 16 AWG (1.31 MM²) OR LARGER, 105°C RATED PVC OR BETTER.
2. RECOMMEND SIGNAL WIRING TO MOLEX SOCKET CONNECTOR, 22AWG (0.326 MM²) OR 24AWG (0.205 MM²). USE CRIMPING TOOL MOLEX ORDER NO: 638190200.
3. EXTERNAL +24VDC FOR LOGIC POWER IS SUPPLIED BETWEEN PIN 1 (COMMON) AND PIN 2 (+24VDC) OF LOGIC POWER CONNECTOR.
4. MAXIMUM HEIGHT IS 6.62 INCHES.
5. CONNECT MOTOR GROUND TO THIS #6-32 GREEN GROUND SCREW.
6. COMMON (ANALOG) AND COMMON (DIGITAL) SIGNALS ARE CONNECTED TOGETHER INSIDE AMPLIFIER.


REVISION HISTORY
ZONE | REV | DESCRIPTION | ECO | DATE | CHANGED | APPD
A | INITIAL RELEASE | 3291 | 01AUG11 | NTHALLA | L.P.
Specifications and Features
AC Supply Input: 110 – 130 VAC, 208 – 240 VAC, 1Ø, 3Ø, 50/60 HZ
Inrush Current at Power Up: 92A max @ 130VAC, 170A max @ 240VAC
Logic Supply Input (For SMC9415 Only): 24 to 48 VDC, 600mA max @24VDC. Powers all amplifier logic and encoders.
Peak Current Output: 30A (STD); 20A (LO), 40A (HI) @ 25°C Ambient
Continuous Current Output: 15A (STD), 10A (LO), 20A (HI) @ 25°C Ambient
Fault Protection: Short circuit protection from motor phase to phase, motor phase to DC bus, motor phase to case (chassis gnd) Amplifier RMS over current. DC bus over/under voltage. Amplifier over temperature. Motor over temperature (switch or thermistor input). Encoder broken wire. Invalid Hall/comm track state. Commutation fault.
Amplifier Status Indication: See Table
Low Speed Electronic Circuit Breaker (LS/ECB): Latches when programmable current (15A (STD), 10A (LO), 20A (HI) max.) and time (10 sec max.) exceed limit.
Bus Overvoltage: See Table
Bus Undervoltage: See Table
Internal Regen: 30 Ohms, 50W (with forced air cooling)
Regen Voltage: See Table
Amplifier Type: See Model Number Key (from product manual)
Analog Command Input: ±10W (12 bit resolution) for analog velocity, and current command. 15 bit is available (optional).
Auxiliary Analog Input: ±10W (12 bit resolution) for 2 phase Current Mode. 15 bit is available (optional).
Pulse & Direction Inputs: Accepts TTL level Step & Direction signals
Encoder Feedback: Accepts TTL level encoder signals
Tachometer Feedback: Accept ±30 VDC tacho signals (Different voltage levels are available upon request)
Dedicated Inputs: +/– position limits, inhibit, motor overtemp & reset signal
Dedicated Fault Output (Programmable Level): TTL Compatible
Analog Out: ±10 V analog output (12-Bit) for monitoring DSP signals, output source selectable and scalable using MotionMaestro™ setup software, 2 channels & 16-Bit are available(optional)
Auto Phasing: Plug & Play for all types of three phase Brushless Motors.
Smart Com Initialization at Amplifier turn on: Eliminates the need for Hall sensor or commutation tracks for many applications.
RS-232 Host Port: High speed serial communication interface for set-up and tuning. 115.2 Kbaud, 8 bits, no parity, 1 stop bit
Software Configurable: All parameters are downloaded using the RS232 port / Glentek's Windows™ based MotionMaestro™ software.
Digitally Tuned: All parameters set digitally. No potentiometers to adjust. RS-232 high speed serial communication interface for all gain and PID tuning parameters
Non-Volatile Memory: All parameters are stored in non-volatile memory
PWM Switching Frequency: 25 KHz Typical
Current Loop Bandwidth: Tunable up to 3 KHz
Amplifier Isolation: Logic completely isolated from high voltage output stage
Operating Temperature: 0 °C to +60 °C
Storage Temperature: -40 °C to +80 °C
Humidity: 5% to 95% non-condensing
Mounting Hardware: #8-32 or M4 Screw, Qty = 3
Dimensions (inches): L. 9.00, H. 6.62, W. 4.00
Backup File: xxxx-5.BK
Mating Connectors
Controller I/O, 36 Pin 3M: Glentek P/N: EJC10136; 3M P/N: 10136-3000VE
36 Pin Mini-D, Backshell: Glentek P/N: EJC10336 ; 3M P/N: 10336-52A0-008
Motor Feedback, 20 Pin 3M: Glentek PN: EJC10120; 3M P/N: 10120-3000VE
20 Pin Mini-D, Backshell: Glentek P/N: EJC10320; 3M P/N: 10320-52A0-008
Host, RJ45 Molex: Glentek P/N: EJD10083; Molex P/N: 87522-8012
AC Input, 4 Pin Phoenix: Glentek P/N: EJ5501F04; Phoenix P/N: 1812439
Motor Output, 3 Pin Phoenix: Glentek P/N: EJ5501F03A; Phoenix P/N: 1832426
Logic Power, 2 Pin Phoenix: Glentek P/N: EJ7415V02; Phoenix P/N: 1792757
Motor Feedback Connector
Pin | Signal Name
1 ENC PWR (+5VDC)
2 COMMON (DIGITAL)
3 ENC PWR (+5VDC)
4 COMMON (DIGITAL)
5 ENC A + (IN)
6 ENC A – (IN)
7 ENC B + (IN)
8 ENC B – (IN)
9 ENC Z + (IN)
10 ENC Z – (IN)
11 HALL 1 +
12 HALL 1 –
13 HALL 2 +
14 HALL 2 –
15 HALL 3 +
16 HALL 3 –
17 MTR TEMP SW
18 COMMON (DIGITAL)
19 TACH +
20 TACH –
Controller I/O Connector
Pin | Signal Name
1 SIGNAL 1+
2 SIGNAL 1–
3 SIGNAL 2+
4 SIGNAL 2–
5 ANALOG OUT (AUX.)
6 COMMON (ANALOG)
7 ANALOG OUT
8 +LIMIT
9 –LIMIT
10 INHIBIT
11 FAULT OUT
12 COMMON
13 RESET IN
14 MTR TEMP SW
15 RESERVED
16 COMMON (DIGITAL)
17 ENCODER Z + (OUT)
18 ENCODER Z – (OUT)
19 RELAY OUT (OPTIONAL)
20 RELAY OUT (OPTIONAL)
21 COMMON (ANALOG)
22 COMMON (DIGITAL)
23 PULSE –
24 PULSE +
25 DIRECTION –
26 DIRECTION +
27 +5 VDC
28 +5 VDC
29 COMMON (DIGITAL)
30 COMMON (DIGITAL)
31 RESERVED
32 RESERVED
33 ENCODER A+ (OUT)
34 ENCODER A– (OUT)
35 ENCODER B+ (OUT)
36 ENCODER B– (OUT)
Motor Output
Pin | Signal Name
1 MOTOR PHASE T / BRUSH OUTPUT B
2 MOTOR PHASE S
3 MOTOR PHASE R / BRUSH OUTPUT A
PE PROTECTIVE EARTHING (CHASSIS GND)
Status Display
Display | Fault Description
1 EEPROM FAULT
2 RAM FAULT
3 CPLD FAULT
8 RESET
b BUS OVERVOLTAGE
C CLAMP
c FAULT INPUT
E ENCODER FAULT
F FOLDBACK
H HEATSINK OVERTEMP
h MOTOR OVERTEMP
L LS/ECB
O NORMAL OPERATION
S HS/ECB
U UNDER VOLTAGE
– HALL FAULT
= COMMUTATION FAULT
Host Connector
Pin | Signal Name
1 RESERVED
2 RESERVED
3 RESERVED
4 COMMON (DIGITAL)
5 TX232
6 RX232
7 RESERVED
8 RESERVED
AC Input
Pin | Signal Name
1 AC LINE 1 (SINGLE PHASE)
2 AC LINE 2 (SINGLE PHASE)
3 AC LINE 3 (THREE PHASE)
4 PROTECTIVE EARTHING (CHASSIS GND)
Logic Power Connector
Pin | Signal Name
1 COMMON (DIGITAL)
2 +24VDC
Bus Over Voltage, Under Voltage, & Regen Voltage Settings
Power Input Voltage | BUS Over Voltage | BUS Under Voltage | Regen Voltage
208 – 240 VAC | 450 VDC ± 5% | 150 VDC ± 5% | 395 VDC ± 5%
110 – 130 VAC | 250 VDC ± 5% | 60 VDC ± 5% | 230 VDC ± 5%
ALPHA SERIES
SMB/SMC9415-1A-1 DIGITAL SERVO AMPLIFIER
GLENTEK
RESET
MOTOR FEEDBACK
CONTROLLER I/O
STATUS DISPLAY
LOGIC POWER
COM
+24VDC
(FOR SMC ONLY)
MOTOR OUTPUT
T
S
R
REGEN
PE
L3
L2
L1
AC INPUT
HOST
CAUTION, RISK OF ELECTRIC SHOCK
AIR FLOW
Ø.18 [Ø4.45]
Ø.35 [Ø8.9]
4.00 [101.6]
2.00 [50.8]
.22 [5.5]
8.47 [215.0]
9.00 [228.6]
3.00 [76.2]
.19 [4.8]
2X,
.50 [12.7]
MOTOR FEEDBACK
CONTROLLER I/O
HOST
NOTE:
1. RECOMMEND ALL POWER WIRING, 16 AWG (1.31 MM²) OR LARGER, 105°C RATED PVC OR BETTER.
2. RECOMMEND SIGNAL WIRING TO MINI-D SOCKET CONNECTOR, 24AWG (0.205 MM²) TO 28AWG (0.081 MM²).
3. EXTERNAL +24VDC FOR LOGIC POWER IS SUPPLIED BETWEEN PIN 1 (COMMON) AND PIN 2 (+24VDC) OF LOGIC POWER CONNECTOR.
4. MAXIMUM HEIGHT IS 6.62 INCHES.
5. CONNECT MOTOR GROUND TO THIS #6-32 GREEN GROUND SCREW.
6. COMMON (ANALOG) AND COMMON (DIGITAL) SIGNALS ARE CONNECTED TOGETHER INSIDE AMPLIFIER.
GLENTEK
INSTALLATION, SMx9415-bbb-0cc-1A-1, STD/LO/HI POWER, MINI-D
SIZE: D | DRAWING NUMBER: 9415-1044-000 | REV: B
SCALE: 1.875:1 | FILENAME: 9415-1044-000-B.DWG | SHEET 1 OF 1


REVISION HISTORY
ZONE | REV | DESCRIPTION | ECO | DATE | CHANGED | APPD
- | A | INITIAL RELEASE | 3017 | 09JUN10 | MK TAGUPA | JM
- | B | UPDATED SPECIFICATIONS AND FEATURES TABLE | 3291 | 26JUL11 | NTHALLA | JM
Specifications and Features
AC Supply Input | 110 ~ 130 VAC, 208 ~ 240 VAC, 10, 30, 50/60 HZ
Inrush Current at Power Up | 92A max @ 120VAC, 170A max @ 240VAC
Logic Supply Input (For SMX9420 Only) | 24 to 48 VDC, 600mA max @24VDC.
Powers all amplifier logic and encoders.
Peak Current Output | 40 A @ 25°C Ambient (with forced air cooling)
Continuous Current Output | 20 A @ 25°C Ambient (with forced air cooling)
Fault Protection | Short circuit protection from motor phase to phase, motor phase to DC bus, motor phase to case (chassis GND). Amplifier RMS over current. DC bus over/under voltage. Amplifier over temperature. Motor over temperature (switch or thermistor input). Encoder broken wire. Invalid Hall/comm track state. Commutation fault.
Amplifier Status Indication | See Table
Low Speed Electronic Circuit Breaker (LS/ECB) | Latches when programmable current (20 A max.), and time (10 sec max.) exceed limit.
Bus Overvoltage | See Table
Bus Undervoltage | See Table
Internal Regen | 30 Ohms, 95W max (with forced air cooling)
Regen Voltage | See Table
Internal Output Inductors (Optional) | 300 mH ±10% per motor output phase. Qty = 3
(600 mH phase to phase)
Amplifier Type | See Model Number Key (from product manual)
Analog Command Input | ±10V (12 bit resolution) for analog velocity, and current command. 15 bit is available (optional).
Auxiliary Analog Input | ±10V (12 bit resolution) for 2 phase Current Mode. 15 bit is available (optional).
Pulse & Direction Inputs | Accepts TTL level Step & Direction signals
Encoder Feedback | Accepts TTL level encoder signals
Tachometer Feedback | Accept ±30 VDC tacho signals (Different voltage levels are available upon request)
Dedicated Inputs | +/- position limits, inhibit, motor overtemp and reset signal
Dedicated Fault Output (Programmable Level) | TTL Compatible
Analog Out | ±10 V analog output (12-Bit) for monitoring DSP signals, output source selectable and scalable using MotionMaestro™ setup software. 2 channels and 16-Bit are available (optional)
Auto Phasing | Plug & Play for all types of three phase Brushless Motors.
Smart Com Initialization at Amplifier turn on | Eliminates the need for Hall sensor or commutation tracks for many applications.
RS-232 Host Port | High speed serial communication interface for set-up and tuning. 115.2 Kbaud, 8 bits, no parity, 1 stop bit
Software Configurable | All parameters are downloaded using the RS232 port / Glentek's Windows™ based MotionMaestro™ software.
Digitally Tuned | All parameters set digitally. No potentiometers to adjust. RS-232 high speed serial communication interface for all gain and PID tuning parameters.
Non-Volatile Memory | All parameters are stored in non-volatile memory
PWM Switching Frequency | 25 KHz Typical
Current Loop Bandwidth | Tunable up to 3 KHz
Amplifier Isolation | Logic completely isolated from high voltage output stage
Operating Temperature | 0°C to +60 °C
Storage Temperature | -40 °C to +80 °C
Humidity | 5% to 95% non-condensing
Mounting Hardware | #8-32 or M4 Screw, Qty = 4
Dimensions (inches) | L: 11.00, H: 8.12, W: 4.50
Backup File | xxxx-5.DK
Mating Connectors
Controller I/O, 24 Pin Molex | Glentek P/N: GJB22F12; Molex P/N: 90142-0024
Encoder Feedback, 20 Pin Molex | Glentek P/N: GJB22F10; Molex P/N: 90142-0020
Controller I/O & Motor Feedback Socket Connector, Molex | Glentek P/N: GJB21F01; Molex P/N: 90119-2110
Host, RJ45 Molex | Glentek P/N: GJ01B083; Molex P/N: 87522-8012
Power Input / Motor Output, 8 Pin Phoenix | Glentek P/N: GJ53IF08; Phoenix P/N: 1975642
Logic Power, 2 Pin Phoenix | Glentek P/N: FJ74V10; Phoenix P/N: 1792757
Controller I/O Connector
Pin | Signal Name
1 ENCODER A+(OUT)
2 ENCODER A-(OUT)
3 ENCODER B+(OUT)
4 ENCODER B-(OUT)
5 ENCODER Z+(OUT)
6 ENCODER Z-(OUT)
7 PULSE +
8 PULSE -
9 DIR +
10 DIR -
11 RESET IN
12 +LIMIT
13 -LIMIT
14 INHIBIT
15 FAULT OUT
16 +5VDC
17 COMMON (ANALOG)
18 COMMON (DIGITAL)
19 ANALOG OUT (AUX.)
20 ANALOG OUT
21 SIGNAL 2+
22 SIGNAL 2-
23 SIGNAL 1+
24 SIGNAL 1-
Host Connector
Pin | Signal Name
1 RESERVED
2 RESERVED
3 RESERVED
4 COMMON (DIGITAL)
5 TX232
6 RX232
7 RESERVED
8 RESERVED
Power / Motor Connector
Pin | Signal Name
1 MOTOR PHASE T / BRUSH OUTPUT B
2 MOTOR PHASE S
3 MOTOR PHASE R / BRUSH OUTPUT A
4 PROTECTIVE EARTHING (CHASSIS GND)
5 PROTECTIVE EARTHING (CHASSIS GND)
6 AC LINE 3 (THREE PHASE)
7 AC LINE 2 (SINGLE PHASE)
8 AC LINE 1 (SINGLE PHASE)
Status Display
Display | Fault Description
1 EEPROM FAULT
2 RAM FAULT
3 CPLD FAULT
8 RESET
h PLUS OVERVOLTAGE
C CLAMP
c FAULT INPUT
E ENCODER FAULT
E FOLDBACK
H HEATSINK OVERTEMP
h MOTOR OVERTEMP
L LS/ECB
O NORMAL OPERATION
S HS/ECB
U UNDER VOLTAGE
— HALL FAULT
≡ COMMUTATION FAULT
Motor Feedback Connector
Pin | Signal Name
1 TACH +
2 TACH -
3 RESERVED
4 MOTOR TEMP
5 ENCODER Z+ (IN)
6 ENCODER Z- (IN)
7 ENCODER B+ (IN)
8 ENCODER B- (IN)
9 ENCODER A+ (IN)
10 ENCODER A- (IN)
11 HALL U+
12 HALL U-
13 HALL V+
14 HALL V-
15 HALL W+
16 HALL W-
17 ENC PWR (+5VDC)
18 COMMON (DIGITAL)
19 ENC PWR (+5VDC)
20 COMMON (DIGITAL)
Logic Power Connector
Pin | Signal Name
1 COMMON (DIGITAL)
2 +24VDC
Bus Over Voltage, Under Voltage, & Regen Voltage Settings
Power Input Voltage | BUS Over Voltage | BUS Under Voltage | Regen Voltage
208 ~ 240 VAC | 450 VDC ± 5% | 150 VDC ± 5% | 395 VDC ± 5%
110 ~ 130 VAC | 250 VDC ± 5% | 60 VDC ± 5% | 230 VDC ± 5%
LOGIC POWER
COM
+24VDC
(FOR SMC ONLY)
PE
RESET
MOTOR FEEDBACK
CONTROLLER I/O
STATUS DISPLAY
GLENTEK
ALPHA SERIES
SMB/SMX9420-1A-1
DIGITAL
SERVO AMPLIFIER
HOST
REGEN
MOTOR OUTPUT
T
S
R
PE
AC INPUT
PE
L3
L2
L1
CAUTION, RISK OF ELECTRIC SHOCK
AIR FLOW
4.50 [114.3]
4.30 [109.2]
3.27 [83.1]
.10 [2.5]
11.00 [279.3]
1.00 [25.4]
7.25 [184.2]
4X, .19 [4.8]
4.
5.
MOTOR FEEDBACK
CONTROLLER I/O
HOST
NOTE:
1. RECOMMEND ALL POWER WIRING, 14 AWG (2.08 MM²) OR LARGER, 105°C RATED PVC OR BETTER.
2. RECOMMEND SIGNAL WIRING TO MOLEX SOCKET CONNECTOR, 22AWG (0.326 MM²) OR 24AWG (0.205 MM²). USE CRIMPING TOOL MOLEX ORDER NO: 638190200.
3. EXTERNAL +24VDC FOR LOGIC POWER IS SUPPLIED BETWEENPIN 1 (COMMON) AND PIN 2 (+24VDC) OF LOGIC POWER CONNECTOR.
4. MAXIMUM HEIGHT IS 8.12 INCHES.
5. CONNECT POWER AND MOTOR GROUND TO THESE GROUND TERMINALS.
6. COMMON (ANALOG) AND COMMON (DIGITAL) SIGNALS ARE CONNECTED TOGETHER INSIDE AMPLIFIER.
GLENTEK
INSTALLATION, SMx9420-bbb-1cc-1A-1, STD POWER, MOLEX
SIZE D | MODEL SMX9420-1A-1 | DRAWING NUMBER 9420-1030-000 | REV C
SCALE 1.5:1 | FILE NAME 9420-1030-000-C.DWG | SHEET 1 OF 1
CONFIGURATION CODE -

REVISION HISTORY							
ZONE	REV	DESCRIPTION	ECO	DATE	CHANGED	APPD
-	B	UPDATED SPECIFICATIONS AND FEATURES TABLE	3810	30AUG13	L.L.	J.M.
-	A	INITIAL RELEASE	3291	01AUG11	NTHALLA	L.P.





NOTE:

1. RECOMMEND ALL POWER WIRING, 14 AWG (2.08 MM²) OR LARGER, 105°C RATED PVC OR BETTER.
2. RECOMMEND SIGNAL WIRING TO MINI-D SOCKET CONNECTOR, 24AWG (0.205 MM²) TO 28AWG (0.081 MM²).
3. EXTERNAL +24VDC FOR LOGIC POWER IS SUPPLIED BETWEEN PIN 1 (COMMON) AND PIN 2 (+24VDC) OF LOGIC POWER CONNECTOR.
4. MAXIMUM HEIGHT IS 8.12 INCHES.
5. CONNECT POWER AND MOTOR GROUND TO THESE GROUND TERMINALS.
6. COMMON (ANALOG) AND COMMON (DIGITAL) SIGNALS ARE CONNECTED TOGETHER INSIDE AMPLIFIER.

Controller I/O Connector

Pin	Signal Name
1	SIGNAL 1+
2	SIGNAL 1–
3	SIGNAL 2+
4	SIGNAL 2–
5	ANALOG OUT (AUX.)
6	COMMON (ANALOG)
7	ANALOG OUT
8	+LIMIT
9	–LIMIT
10	INHIBIT
11	FAULT OUT
12	COMMON
13	RESET IN
14	MTR TEMP SW
15	RESERVED
16	COMMON (DIGITAL)
17	ENCODER Z + (OUT)
18	ENCODER Z – (OUT)
19	RELAY OUT (OPTIONAL)
20	RELAY OUT (OPTIONAL)
21	COMMON (ANALOG)
22	COMMON (DIGITAL)
23	PULSE –
24	PULSE +
25	DIRECTION –
26	DIRECTION +
27	+5 VDC
28	+5 VDC
29	COMMON (DIGITAL)
30	COMMON (DIGITAL)
31	RESERVED
32	RESERVED
33	ENCODER A+ (OUT)
34	ENCODER A– (OUT)
35	ENCODER B+ (OUT)
36	ENCODER B– (OUT)

Host Connector

Pin	Signal Name
1	RESERVED
2	RESERVED
3	RESERVED
4	COMMON (DIGITAL)
5	TX232
6	RX232
7	RESERVED
8	RESERVED

Logic Power Connector

Pin	Signal Name
1	COMMON (DIGITAL)
2	+24VDC

Motor Feedback Connector

Pin	Signal Name
1	ENC PWR (+5VDC)
2	COMMON (DIGITAL)
3	ENC PWR (+5VDC)
4	COMMON (DIGITAL)
5	ENC A + (IN)
6	ENC A – (IN)
7	ENC B + (IN)
8	ENC B – (IN)
9	ENC Z + (IN)
10	ENC Z – (IN)
11	HALL 1 +
12	HALL 1 –
13	HALL 2 +
14	HALL 2 –
15	HALL 3 +
16	HALL 3 –
17	MTR TEMP SW
18	COMMON (DIGITAL)
19	TACH +
20	TACH –

Status Display

Display	Fault Description
1	EEPROM FAULT
2	RAM FAULT
3	CPLD FAULT
8	RESET
b	BUS OVERVOLTAGE
C	CLAMP
c	FAULT INPUT
E	ENCODER FAULT
F	FOLDBACK
H	HEATSINK OVERTEMP
h	MOTOR OVERTEMP
L	LS/ECB
0	NORMAL OPERATION
S	HS/ECB
U	UNDER VOLTAGE
=	HALL FAULT
≡	COMMUTATION FAULT

Power / Motor Connector

Pin	Signal Name
1	MOTOR PHASE T / BRUSH OUTPUT B
2	MOTOR PHASE S
3	MOTOR PHASE R / BRUSH OUTPUT A
4	PROTECTIVE EARTHING (CHASSIS GND)
5	PROTECTIVE EARTHING (CHASSIS GND)
6	AC LINE 3
7	AC LINE 2
8	AC LINE 1

Bus Over Voltage, Under Voltage, & Regen Voltage Settings

Power Input Voltage	BUS Over Voltage	BUS Under Voltage	Regen Voltage
208 – 240 VAC	450 VDC ± 5%	150 VDC ± 5%	395 VDC ± 5%
110 – 130 VAC	250 VDC ± 5%	60 VDC ± 5%	230 VDC ± 5%

Specifications and Features

AC Supply Input	110 – 130 VAC, 208 – 240 VAC, 1Ø, 3Ø, 50/60 HZ
Inrush Current at Power Up	92A max @ 130VAC, 170A max @ 240VAC
Logic Supply Input (For SMC9420 Only)	24 to 48 VDC, 600mA max @24VDC. Powers all amplifier logic and encoders.
Peak Current Output	40 A @ 25°C Ambient (with forced air cooling)
Continuous Current Output	20 A @ 25°C Ambient (with forced air cooling)
Fault Protection	Short circuit protection from motor phase to phase, motor phase to DC bus, motor phase to case (chassis GND). Amplifier RMS over current. DC bus over/under voltage. Amplifier over temperature. Motor over temperature (switch or thermistor input). Encoder broken wire. Invalid Hall/comm track state. Commutation fault.
Amplifier Status Indication	See Table
Low Speed Electronic Circuit Breaker (LS/ECB)	Latches when programmable current (20 A max.), and time (10 sec max.) exceed limit.
Bus Overvoltage	See Table
Bus Undervoltage	See Table
Internal Regen	30 Ohms, 95W max (with forced air cooling)
Regen Voltage	See Table
Internal Output Inductors (Optional)	300 mH ±10% per motor output phase, Qty = 3 (600 mH phase to phase)
Amplifier Type	See Model Number Key (from product manual)
Analog Command Input	±10V (12 bit resolution) for analog velocity, and current command. 15 bit is available (optional).
Auxiliary Analog Input	±10V (12 bit resolution) for 2 phase Current Mode. 15 bit is available (optional).
Pulse & Direction Inputs	Accepts TTL level Step & Direction signals
Encoder Feedback	Accepts TTL level encoder signals
Tachometer Feedback	Accept ±30 VDC tacho signals (Different voltage levels are available upon request)
Dedicated Inputs	+/– position limits, inhibit, motor overtemp & reset signal
Dedicated Fault Output (Progammable Level)	TTL Compatible
Analog Out	±10 V analog output (12–Bit) for monitoring DSP signals, output source selectable and scalable using MotionMaestro™ setup software, 2 channels & 16 Bit are available(optional)
Auto Phasing	Plug & Play for all types of three phase Brushless Motors.
Smart Com Initialization at Amplifier turn on	Eliminates the need for Hall sensor or commutation tracks for many applications.
RS-232 Host Port	High speed serial communication interface for set-up and tuning. 115.2 Kbaud, 8 bits, no parity, 1 stop bit
Software Configurable	All parameters are downloaded using the RS232 port / Glentek's Windows™ based MotionMaestro™ software.
Digitally Tuned	All parameters set digitally. No potentiometers to adjust. RS-232 high speed serial communication interface for all gain and PID tuning parameters.
Non-Volatile Memory	All parameters are stored in non-volatile memory
PWM Switching Frequency	25 KHz Typical
Current Loop Bandwidth	Tunable up to 3 KHz
Amplifier Isolation	Logic completely isolated from high voltage output stage
Operating Temperature	0 °C to +60 °C
Storage Temperature	-40 °C to +80 °C
Humidity	5% to 95% non-condensing
Mounting Hardware	#8-32 or M4 Screw, Qty = 4
Dimensions (inches)	L. 11.00, H. 8.12, W. 4.50
Backup File	xxxx–5.BK

Mating Connectors

Controller I/O, 36 Pin 3M	Glentek P/N: EJC10136; 3M P/N: 10136-3000VE
36 Pin Mini-D, Backshell	Glentek P/N: EJC10336 ; 3M P/N: 10336-52A0-008
Motor Feedback, 20 Pin 3M	Glentek P/N: EJC10120; 3M P/N: 10120-3000VE
20 Pin Mini-D, Backshell	Glentek P/N: EJC10320; 3M P/N: 10320-52A0-008
Host, RJ45 Molex	Glentek P/N: EJ018083; Molex P/N: 87522-8012
Power Input / Motor Output, 8 Pin Phoenix	Glentek P/N: EJ531F08; Phoenix P/N: 1975642
Logic Power, 2 Pin Phoenix	Glentek P/N: EJ741V02; Phoenix P/N: 1792757

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES	APPROVAL	DATE
TOLERANCES ARE AS FOLLOWS: DECIMAL .XX = ±0.01 .XXX = ±0.005 ANGULAR: ∠ = ±0.5°	DWN BY: NTHALLA	01AUG11
	CHK BY: LIET.L	01AUG11
FINISH: 125 √ MAXIMUM	APP BY: L.P.	01AUG11

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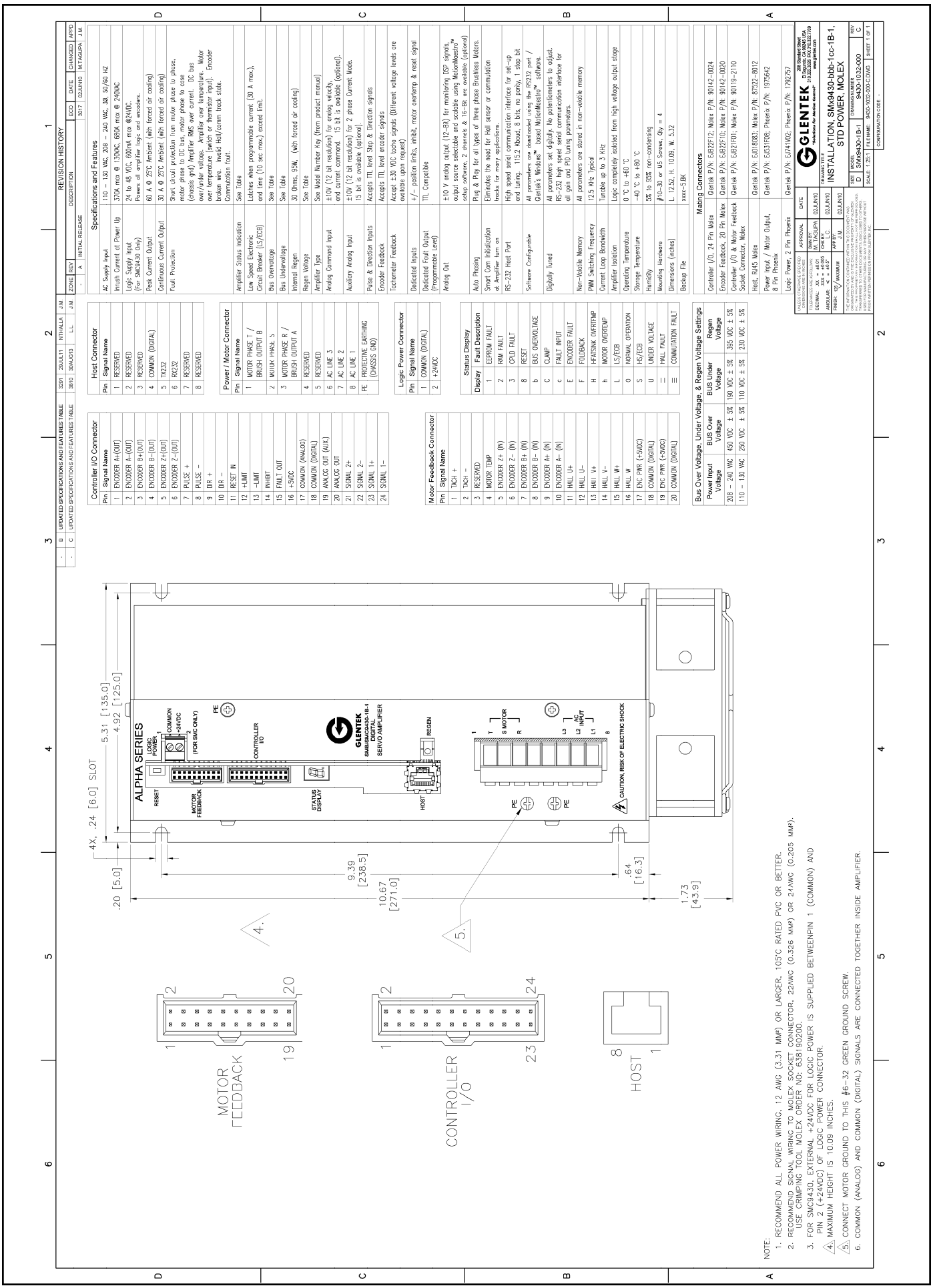
GLENTEK "Solutions for Motion Control" 208 Standard Street El Segundo, CA 90245 USA 310.322.3026 FAX 310.322.7709 www.glentek.com

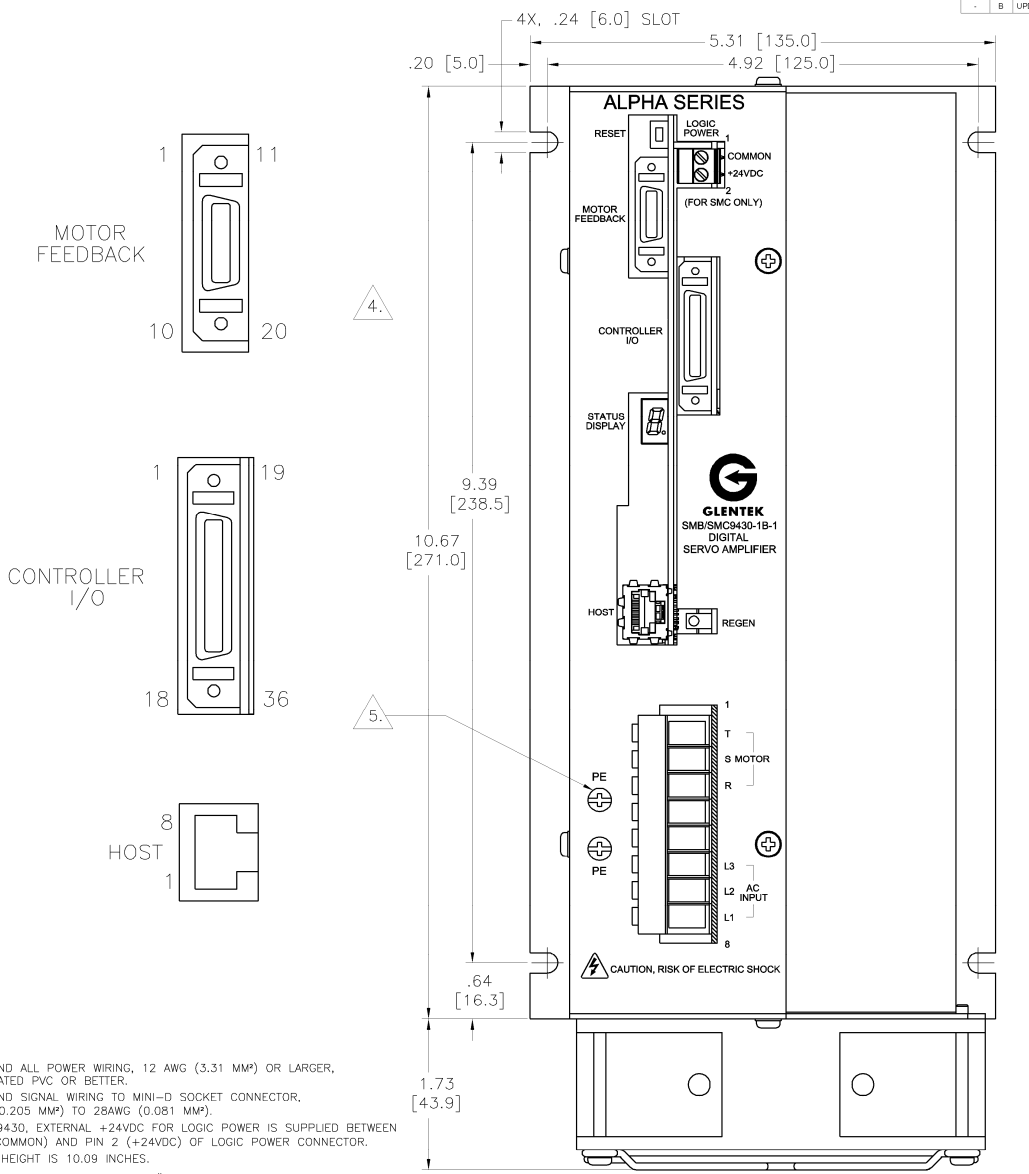
DRAWING TITLE: INSTALLATION, SMx9420-bbb-0cc-1A-1, STD POWER, MINI-D

SIZE	MODEL	DRAWING NUMBER	REV
D	SMx9420-1A-1	9420-1031-000	B

SCALE: 1.625:1 | FILE NAME: 9420-1031-000-B.DWG | SHEET 1 OF 1

CONFIGURATION CODE: -


ALPHA SERIES
GLENTEK
SMB9430-1B-1
DIGITAL
SERVO AMPLIFIER
LOGIC POWER
COMMON
+24VDC
(FOR SMC ONLY)
RESET
MOTOR FEEDBACK
CONTROLLER I/O
STATUS DISPLAY
HOST
REGEN
PE
MOTOR
L3
L2
L1
AC INPUT
CAUTION, RISK OF ELECTRIC SHOCK
4X, .24 [6.0] SLOT
5.31 [135.0]
4.92 [125.0]
.20 [5.0]
9.39 [238.5]
10.67 [271.0]
.64 [16.3]
1.73 [43.9]
MOTOR FEEDBACK
CONTROLLER I/O
HOST
Controller I/O Connector
Host Connector
Power / Motor Connector
Logic Power Connector
Motor Feedback Connector
Status Display
Specifications and Features
Mating Connectors
Bus Over Voltage, Under Voltage, & Regen Voltage Settings
REVISION HISTORY
NOTE:
1. RECOMMEND ALL POWER WIRING, 12 AWG (3.31 MM²) OR LARGER, 105°C RATED PVC OR BETTER.
2. RECOMMEND SIGNAL WIRING TO MOLEX SOCKET CONNECTOR, 22AWG (0.326 MM²) OR 24AWG (0.205 MM²). USE CRIMPING TOOL MOLEX ORDER NO: 63819-0200.
3. FOR SMC9430, EXTERNAL +24VDC FOR LOGIC POWER IS SUPPLIED BETWEENPIN 1 (COMMON) AND PIN 2 (+24VDC) OF LOGIC POWER CONNECTOR.
4. MAXIMUM HEIGHT IS 10.09 INCHES.
5. CONNECT MOTOR GROUND TO THIS #6-32 GREEN GROUND SCREW.
6. COMMON (ANALOG) AND COMMON (DIGITAL) SIGNALS ARE CONNECTED TOGETHER INSIDE AMPLIFIER.



NOTE:

1. RECOMMEND ALL POWER WIRING, 12 AWG (3.31 MM²) OR LARGER, 105°C RATED PVC OR BETTER.
2. RECOMMEND SIGNAL WIRING TO MINI-D SOCKET CONNECTOR, 24AWG (0.205 MM²) TO 28AWG (0.081 MM²).
3. FOR SMC9430, EXTERNAL +24VDC FOR LOGIC POWER IS SUPPLIED BETWEEN PIN 1 (COMMON) AND PIN 2 (+24VDC) OF LOGIC POWER CONNECTOR.
4. MAXIMUM HEIGHT IS 10.09 INCHES.
5. CONNECT MOTOR GROUND TO THIS #6-32 GREEN GROUND SCREW.
6. COMMON (ANALOG) AND COMMON (DIGITAL) SIGNALS ARE CONNECTED TOGETHER INSIDE AMPLIFIER.

Controller I/O Connector

Pin	Signal Name
1	SIGNAL 1+
2	SIGNAL 1-
3	SIGNAL 2+
4	SIGNAL 2-
5	ANALOG OUT (AUX.)
6	COMMON (ANALOG)
7	ANALOG OUT
8	+LIMIT
9	-LIMIT
10	INHIBIT
11	FAULT OUT
12	COMMON
13	RESET IN
14	MTR TEMP SW
15	RESERVED
16	COMMON (DIGITAL)
17	ENCODER Z + (OUT)
18	ENCODER Z - (OUT)
19	RELAY OUT (OPTIONAL)
20	RELAY OUT (OPTIONAL)
21	COMMON (ANALOG)
22	COMMON (DIGITAL)
23	PULSE -
24	PULSE +
25	DIRECTION -
26	DIRECTION +
27	+5 VDC
28	+5 VDC
29	COMMON (DIGITAL)
30	COMMON (DIGITAL)
31	RESERVED
32	RESERVED
33	ENCODER A+ (OUT)
34	ENCODER A- (OUT)
35	ENCODER B+ (OUT)
36	ENCODER B- (OUT)

Power / Motor Connector

Pin	Signal Name
1	MOTOR PHASE T / BRUSH OUTPUT B
2	MOTOR PHASE S
3	MOTOR PHASE R / BRUSH OUTPUT A
4	RESERVED
5	RESERVED
6	AC LINE 3
7	AC LINE 2
8	AC LINE 1
PE	PROTECTIVE EARTHING (CHASSIS GND)

Logic Power Connector

Pin	Signal Name
1	COMMON (DIGITAL)
2	+24VDC

Motor Feedback Connector

Pin	Signal Name
1	ENC PWR (+5VDC)
2	COMMON (DIGITAL)
3	ENC PWR (+5VDC)
4	COMMON (DIGITAL)
5	ENC A + (IN)
6	ENC A - (IN)
7	ENC B + (IN)
8	ENC B - (IN)
9	ENC Z + (IN)
10	ENC Z - (IN)
11	HALL 1 +
12	HALL 1 -
13	HALL 2 +
14	HALL 2 -
15	HALL 3 +
16	HALL 3 -
17	MTR TEMP SW
18	COMMON (DIGITAL)
19	TACH +
20	TACH -

Host Connector

Pin	Signal Name
1	RESERVED
2	RESERVED
3	RESERVED
4	COMMON (DIGITAL)
5	TX232
6	RX232
7	RESERVED
8	RESERVED

Status Display

Display	Fault Description
1	EEPROM FAULT
2	RAM FAULT
3	CPLD FAULT
8	RESET
b	BUS OVERVOLTAGE
C	CLAMP
c	FAULT INPUT
E	ENCODER FAULT
F	FOLDBACK
H	HEATSINK OVERTEMP
h	MOTOR OVERTEMP
L	LS/ECB
O	NORMAL OPERATION
S	HS/ECB
U	UNDER VOLTAGE
⎺	HALL FAULT
☰	COMMUTATION FAULT

Bus Over Voltage, Under Voltage, & Regen Voltage Settings

Power Input Voltage	BUS Over Voltage	BUS Under Voltage	Regen Voltage
208 - 240 VAC	450 VDC ± 5%	190 VDC ± 5%	395 VDC ± 5%
110 - 130 VAC	250 VDC ± 5%	110 VDC ± 5%	230 VDC ± 5%

REVISION HISTORY

ZONE	REV	DESCRIPTION	ECO	DATE	CHANGED	APPD
-	A	INITIAL RELEASE	3291	01AUG11	NTHALLA	L.P.
-	B	UPDATED SPECIFICATIONS AND FEATURES TABLE	3810	30AUG13	L.L.	J.M.

Specifications and Features

AC Supply Input	110 - 130 VAC, 208 - 240 VAC, 3Ø, 50/60 HZ
Inrush Current at Power Up	370A max @ 130VAC, 680A max @ 240VAC
Logic Supply Input (For SMC9430 Only)	24 to 48 VDC, 600mA max @24VDC. Powers all amplifier logic and encoders.
Peak Current Output	60 A @ 25°C Ambient (with forced air cooling)
Continuous Current Output	30 A @ 25°C Ambient (with forced air cooling)
Fault Protection	Short circuit protection from motor phase to phase, motor phase to DC bus, motor phase to case (chassis gnd) Amplifier RMS over current. DC bus over/under voltage. Amplifier over temperature. Motor over temperature (switch or thermistor input). Encoder broken wire. Invalid Hall/comm track state. Commutation fault.
Amplifier Status Indication	See Table
Low Speed Electronic Circuit Breaker (LS/ECB)	Latches when programmable current (30 A max.), and time (10 sec max.) exceed limit.
Bus Overvoltage	See Table
Bus Undervoltage	See Table
Internal Regen	30 Ohms, 95W (with forced air cooling)
Regen Voltage	See Table
Amplifier Type	See Model Number Key (from product manual)
Analog Command Input	±10V (12 bit resolution) for analog velocity, and current command. 15 bit is available (optional).
Auxiliary Analog Input	±10V (12 bit resolution) for 2 phase Current Mode. 15 bit is available (optional).
Pulse & Direction Inputs	Accepts TTL level Step & Direction signals
Encoder Feedback	Accepts TTL level encoder signals
Tachometer Feedback	Accept ±30 VDC tacho signals (Different voltage levels are available upon request)
Dedicated Inputs	+/- position limits, inhibit, motor overtemp & reset signal
Dedicated Fault Output (Progammable Level)	TTL Compatible
Analog Out	±10 V analog output (12-Bit) for monitoring DSP signals, output source selectable and scalable using MotionMaestro™ setup software, 2 channels & 16-Bit are available(optional)
Auto Phasing	Plug & Play for all types of three phase Brushless Motors.
Smart Com Initialization at Amplifier turn on	Eliminates the need for Hall sensor or commutation tracks for many applications.
RS-232 Host Port	High speed serial communication interface for set-up and tuning. 115.2 Kbaud, 8 bits, no parity, 1 stop bit
Software Configurable	All parameters are downloaded using the RS232 port / Glentek's Windows™ based MotionMaestro™ software.
Digitally Tuned	All parameters set digitally. No potentiometers to adjust. RS-232 high speed serial communication interface for all gain and PID tuning parameters.
Non-Volatile Memory	All parameters are stored in non-volatile memory
PWM Switching Frequency	12.5 KHz Typical
Current Loop Bandwidth	Tunable up to 3 KHz
Amplifier Isolation	Logic completely isolated from high voltage output stage
Operating Temperature	0 °C to +60 °C
Storage Temperature	-40 °C to +80 °C
Humidity	5% to 95% non-condensing
Mounting Hardware	#10-30 or M5 Screws, Qty = 4
Dimensions (inches)	L. 12.52, H. 10.09, W. 5.32
Backup File	xxxx-5.BK

Mating Connectors

Controller I/O, 36 Pin 3M	Glentek P/N: EJC10136; 3M P/N: 10136-3000VE
36 Pin Mini-D, Backshell	Glentek P/N: EJC10336 ; 3M P/N: 10336-52A0-008
Motor Feedback, 20 Pin 3M	Glentek P/N: EJC10120; 3M P/N: 10120-3000VE
20 Pin Mini-D, Backshell	Glentek P/N: EJC10320; 3M P/N: 10320-52A0-008
Host, RJ45 Molex	Glentek P/N: FJ018083; Molex P/N: 87522-8012
Power Input / Motor Output, 8 Pin Phoenix	Glentek P/N: EJ531F08; Phoenix P/N: 1975642
Logic Power, 2 Pin Phoenix	Glentek P/N: EJ741V02; Phoenix P/N: 1792757

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ARE AS FOLLOWS:
DECIMAL: .XX = ±0.01
.XXX = ±0.005
ANGULAR: < = ±0.5°
FINISH: 125 MAXIMUM

APPROVAL	DATE
DWN BY: NTHALLA	01AUG11
CHK BY: LIET.L	01AUG11
APP BY: L.P.	01AUG11

GLENTEK "Solutions for Motion Control"
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310.322.3026 FAX 310.322.7709
www.glentek.com

DRAWING TITLE: INSTALLATION, SMx9430-bbb-0cc-1B-1, STD POWER, MINI-D

SIZE: D | MODEL: SMx9430-1B-1 | DRAWING NUMBER: 9430-1033-000 | REV: B

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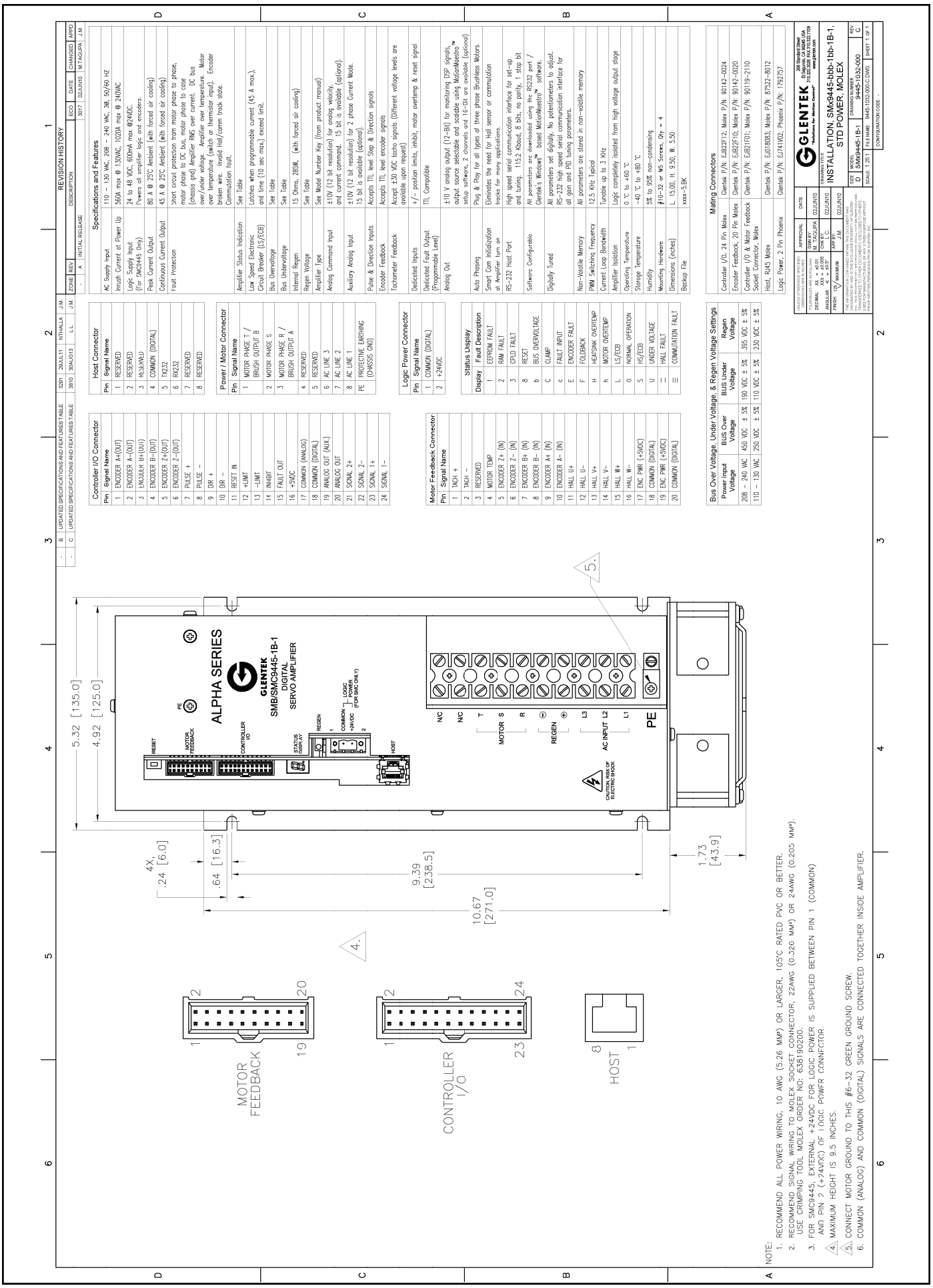
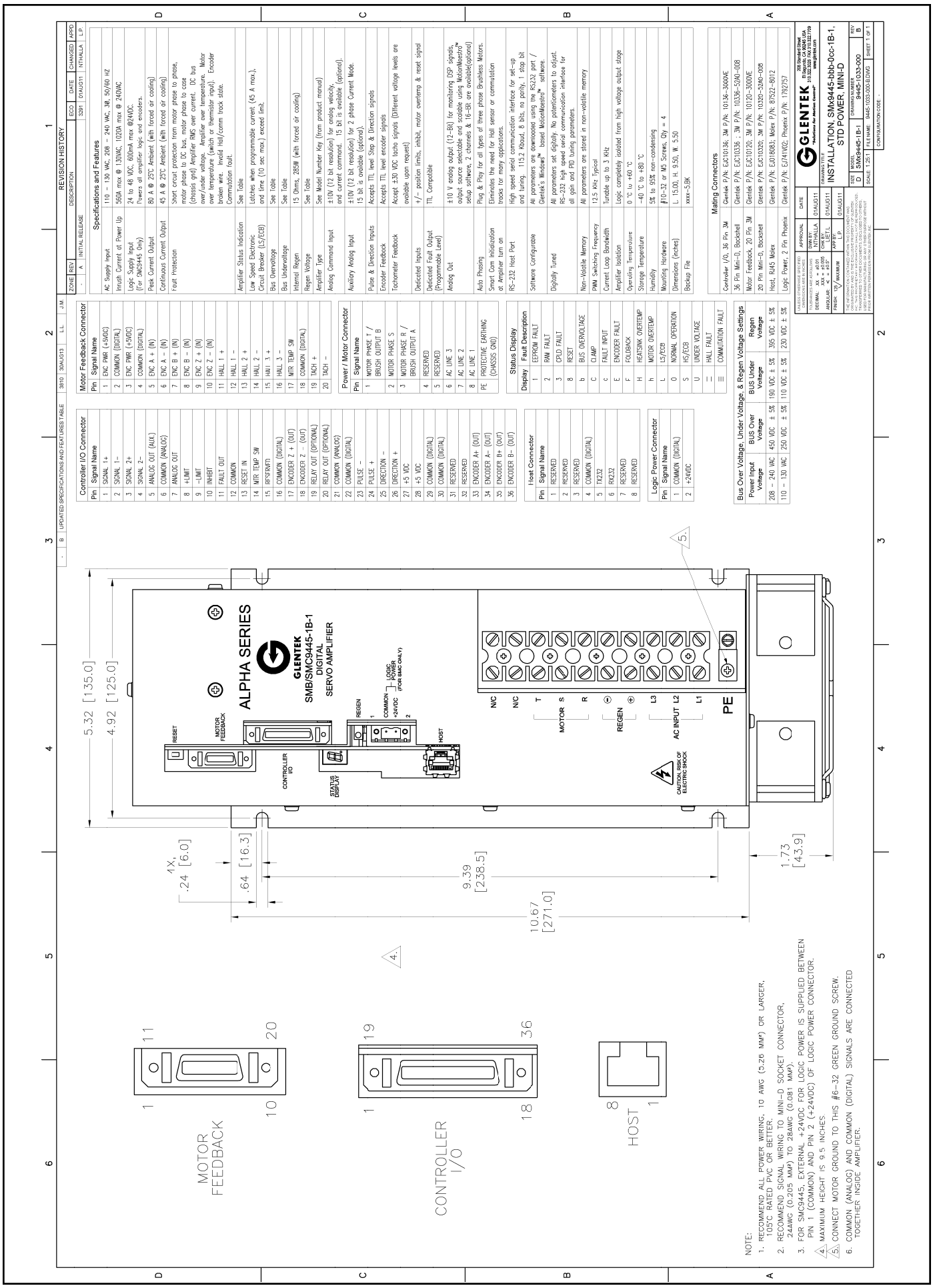
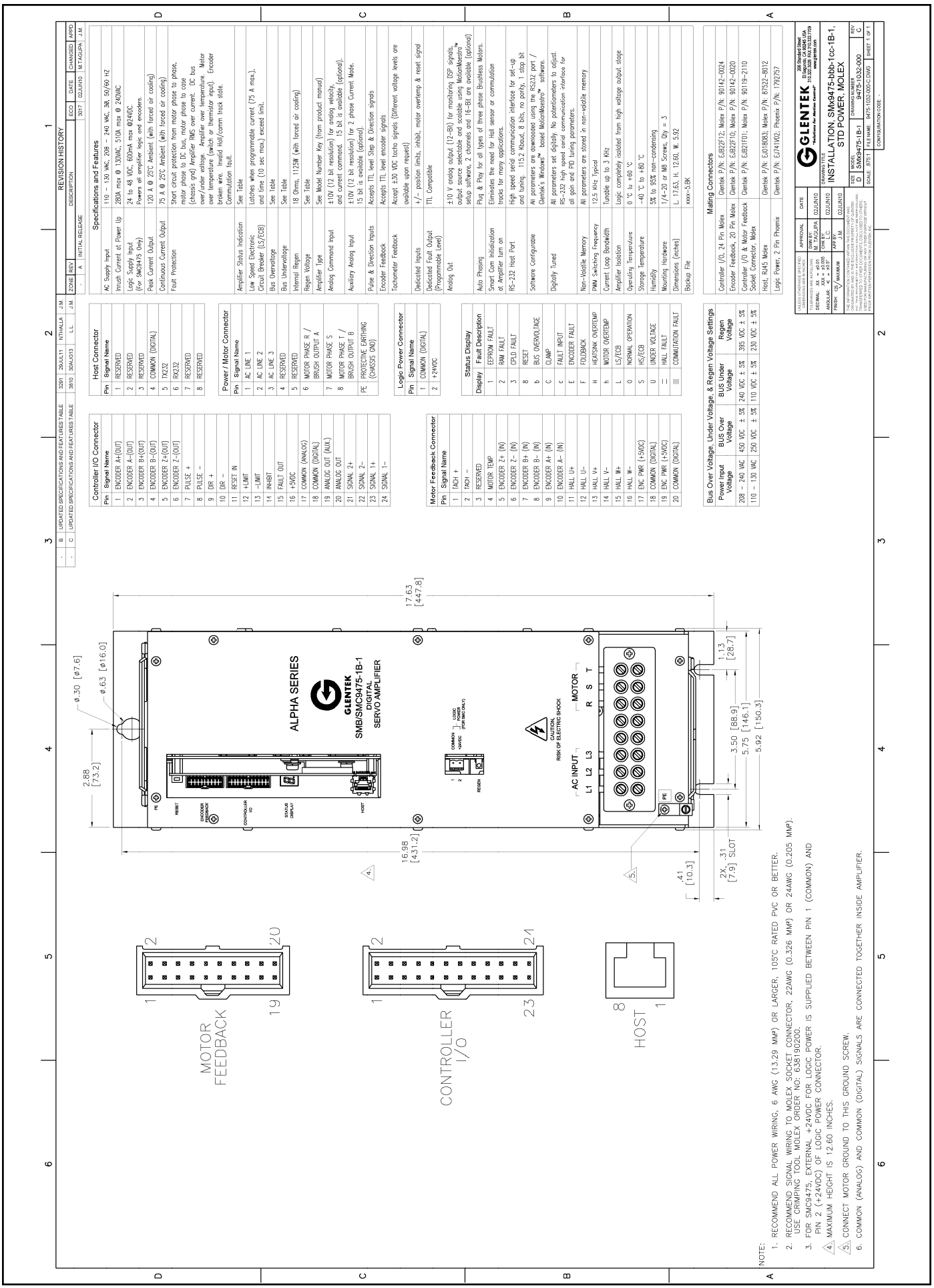

REVISION HISTORY
ZONE | REV | DESCRIPTION | ECO | DATE | CHANGED | APPD
A | INITIAL RELEASE | 3017 | 02JUN10 | M.TAGLIPA | J.M.
Specifications and Features
Controller I/O Connector
Host Connector
Power / Motor Connector
Logic Power Connector
Motor Feedback Connector
Status Display
Bus Over Voltage, Under Voltage, & Regen Voltage Settings
Mating Connectors
INSTALLATION, SMx9445-bbb-1bb-1B-1, STD POWER, MOLEX
GLENTEK
ALPHA SERIES
GLENTEK SMB/SMC9445-1B-1 DIGITAL SERVO AMPLIFIER
MOTOR FEEDBACK
CONTROLLER I/O
HOST
CAUTION, RISK OF ELECTRIC SHOCK
5.32 [135.0]
4.92 [125.0]
.64 [16.3]
4X .24 [6.0]
9.39 [238.5]
10.67 [271.0]
1.73 [43.9]
NOTE:
1. RECOMMEND ALL POWER WIRING, 10 AWG (5.26 MM²) OR LARGER, 105°C RATED PVC OR BETTER.
2. RECOMMEND SIGNAL WIRING TO MOLEX SOCKET CONNECTOR, 22AWG (0.326 MM²) OR 24AWG (0.205 MM²). USE CRIMPING TOOL MOLEX ORDER NO: 638190200.
3. FOR SMC9445, EXTERNAL +24VDC FOR LOGIC POWER IS SUPPLIED BETWEEN PIN 1 (COMMON) AND PIN 2 (+24VDC) OF LOGIC POWER CONNECTOR.
4. MAXIMUM HEIGHT IS 9.5 INCHES.
5. CONNECT MOTOR GROUND TO THIS #6-32 GREEN GROUND SCREW.
6. COMMON (ANALOG) AND COMMON (DIGITAL) SIGNALS ARE CONNECTED TOGETHER INSIDE AMPLIFIER.


ALPHA SERIES
GLENTEK
SMB/SMC9445-1B-1
DIGITAL
SERVO AMPLIFIER
MOTOR FEEDBACK
CONTROLLER I/O
STATUS DISPLAY
HOST
RESET
REGEN
COMMON +24VDC LOGIC POWER (FOR SMC ONLY)
MOTOR S R T
REGEN
AC INPUT L1 L2 L3
N/C
N/C
PE
CAUTION, RISK OF ELECTRIC SHOCK
5.32 [135.0]
4.92 [125.0]
.64 [16.3]
4X, .24 [6.0]
9.39 [238.5]
10.67 [271.0]
1.73 [43.9]
MOTOR FEEDBACK
CONTROLLER I/O
HOST
REVISION HISTORY
Specifications and Features
Motor Feedback Connector
Controller I/O Connector
Power / Motor Connector
Host Connector
Logic Power Connector
Status Display
Mating Connectors
Bus Over Voltage, Under Voltage, & Regen Voltage Settings
INSTALLATION, SMx9445-bbb-0cc-1B-1, STD POWER, MINI-D
GLENTEK
SMB9445-1B-1
SMC9445-1B-1
NOTE:
1. RECOMMEND ALL POWER WIRING, 10 AWG (5.26 MM²) OR LARGER, 105°C RATED PVC OR BETTER.
2. RECOMMEND SIGNAL WIRING TO MINI-D SOCKET CONNECTOR, 24AWG (0.205 MM²) TO 28AWG (0.081 MM²).
3. FOR SMC9445, EXTERNAL +24VDC FOR LOGIC POWER IS SUPPLIED BETWEEN PIN 1 (COMMON) AND PIN 2 (+24VDC) OF LOGIC POWER CONNECTOR.
4. MAXIMUM HEIGHT IS 9.5 INCHES.
5. CONNECT MOTOR GROUND TO THIS #6-32 GREEN GROUND SCREW.
6. COMMON (ANALOG) AND COMMON (DIGITAL) SIGNALS ARE CONNECTED TOGETHER INSIDE AMPLIFIER.



Controller I/O Connector

Pin	Signal Name
1	ENCODER A+(OUT)
2	ENCODER A–(OUT)
3	ENCODER B+(OUT)
4	ENCODER B–(OUT)
5	ENCODER Z+(OUT)
6	ENCODER Z–(OUT)
7	PULSE +
8	PULSE –
9	DIR +
10	DIR –
11	RESET IN
12	+LIMIT
13	–LIMIT
14	INHIBIT
15	FAULT OUT
16	+5VDC
17	COMMON (ANALOG)
18	COMMON (DIGITAL)
19	ANALOG OUT (AUX.)
20	ANALOG OUT
21	SIGNAL 2+
22	SIGNAL 2–
23	SIGNAL 1+
24	SIGNAL 1–

Motor Feedback Connector

Pin	Signal Name
1	TACH +
2	TACH –
3	RESERVED
4	MOTOR TEMP
5	ENCODER Z+ (IN)
6	ENCODER Z– (IN)
7	ENCODER B+ (IN)
8	ENCODER B– (IN)
9	ENCODER A+ (IN)
10	ENCODER A– (IN)
11	HALL U+
12	HALL U–
13	HALL V+
14	HALL V–
15	HALL W+
16	HALL W–
17	ENC PWR (+5VDC)
18	COMMON (DIGITAL)
19	ENC PWR (+5VDC)
20	COMMON (DIGITAL)

Host Connector

Pin	Signal Name
1	RESERVED
2	RESERVED
3	RESERVED
4	COMMON (DIGITAL)
5	TX232
6	RX232
7	RESERVED
8	RESERVED

Power / Motor Connector

Pin	Signal Name
1	AC LINE 1
2	AC LINE 2
3	AC LINE 3
4	RESERVED
5	RESERVED
6	MOTOR PHASE R / BRUSH OUTPUT A
7	MOTOR PHASE S
8	MOTOR PHASE T / BRUSH OUTPUT B
PE	PROTECTIVE EARTHING (CHASSIS GND)

Logic Power Connector

Pin	Signal Name
1	COMMON (DIGITAL)
2	+24VDC

Status Display

Display	Fault Description
1	EEPROM FAULT
2	RAM FAULT
3	CPLD FAULT
8	RESET
b	BUS OVERVOLTAGE
C	CLAMP
c	FAULT INPUT
E	ENCODER FAULT
F	FOLDBACK
H	HEATSINK OVERTEMP
h	MOTOR OVERTEMP
L	LS/ECB
O	NORMAL OPERATION
S	HS/ECB
U	UNDER VOLTAGE
=	HALL FAULT
≡	COMMUTATION FAULT

Bus Over Voltage, Under Voltage, & Regen Voltage Settings

Power Input Voltage	BUS Over Voltage	BUS Under Voltage	Regen Voltage
208 – 240 VAC	450 VDC ± 5%	240 VDC ± 5%	395 VDC ± 5%
110 – 130 VAC	250 VDC ± 5%	110 VDC ± 5%	230 VDC ± 5%

REVISION HISTORY

ZONE	REV.	DESCRIPTION	ECO	DATE	CHANGED	APPD
-	A	INITIAL RELEASE	3017	02JUN10	M.TAGLIPA	J.M.
-	B	UPDATED SPECIFICATIONS AND FEATURES TABLE	3816	30AUG13	L.L.	J.M.
-	C	UPDATED SPECIFICATIONS AND FEATURES TABLE	3891	29JUL11	N.THALLA	J.M.

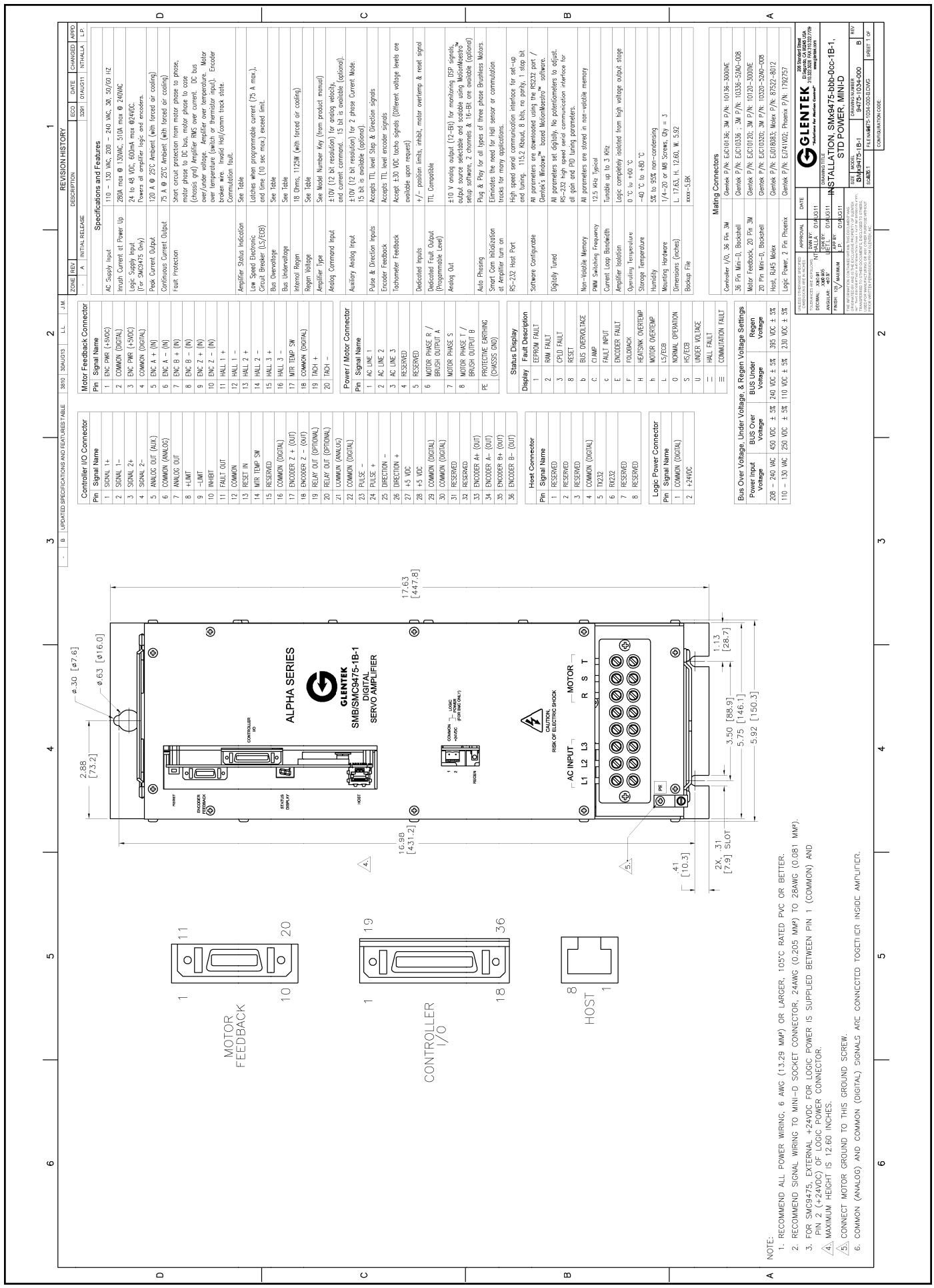
Specifications and Features

AC Supply Input	110 – 130 VAC, 208 – 240 VAC, 3Ø, 50/60 HZ
Inrush Current at Power Up	280A max @ 130VAC, 510A max @ 240VAC
Logic Supply Input (For SMC9475 Only)	24 to 48 VDC, 600mA max @24VDC. Powers all amplifier logic and encoders.
Peak Current Output	120 A @ 25°C Ambient (with forced air cooling)
Continuous Current Output	75 A @ 25°C Ambient (with forced air cooling)
Fault Protection	Short circuit protection from motor phase to phase, motor phase to DC bus, motor phase to case (chassis gnd) Amplifier RMS over current. DC bus over/under voltage. Amplifier over temperature. Motor over temperature (switch or thermistor input). Encoder broken wire. Invalid Hall/comm track state. Commutation fault.
Amplifier Status Indication	See Table
Low Speed Electronic Circuit Breaker (LS/ECB)	Latches when programmable current (75 A max.), and time (10 sec. max.) exceed limit.
Bus Overvoltage	See Table
Bus Undervoltage	See Table
Internal Regen	18 Ohms, 1125W (with forced air cooling)
Regen Voltage	See Table
Amplifier Type	See Model Number Key (from product manual)
Analog Command Input	±10V (12 bit resolution) for analog velocity and current commands. 15 bit is available (optional).
Auxiliary Analog Input	±10V (12 bit resolution) for 2 phase Current Mode. 15 bit is available (optional).
Pulse & Direction Inputs	Accepts TTL level Step & Direction signals
Encoder Feedback	Accepts TTL level encoder signals
Tachometer Feedback	Accept ±30 VDC tacho signals (different voltage levels are available upon request)
Dedicated Inputs	+/– position limits, inhibit, motor overtemp & reset signal
Dedicated Fault Output (Programmable Level)	TTL Compatible
Analog Out	±10 V analog output (12–Bit) for monitoring DSP signals, output source selectable and scalable using MotionMaestro™ setup software, 2 channels and 16–Bit are available (optional)
Auto Phasing	Plug & Play for all types of three phase Brushless Motors.
Smart Com Initialization at Amplifier turn on	Eliminates the need for Hall sensor or commutation tracks for many applications.
RS–232 Host Port	High speed serial communication interface for set–up and tuning. 115.2 Kbaud, 8 bits, no parity, 1 stop bit
Software Configurable	All parameters are downloaded using the RS232 port / Glentek's Windows™ based MotionMaestro™ software.
Digitally Tuned	All parameters set digitally. No potentiometers to adjust. RS–232 high speed serial communication interface for all gain and PID tuning parameters.
Non–Volatile Memory	All parameters are stored in non–volatile memory
PWM Switching Frequency	12.5 KHz Typical
Current Loop Bandwidth	Tunable up to 3 KHz
Amplifier Isolation	Logic completely isolated from high voltage output stage
Operating Temperature	0 °C to +50 °C
Storage Temperature	–40 °C to +80 °C
Humidity	5% to 95% non–condensing
Mounting Hardware	1/4–20 or M6 Screws, Qty = 3
Dimensions (inches)	L. 17.63, H. 12.60, W. 5.92
Backup File	xxxx–5.BK

Mating Connectors

Controller I/O, 24 Pin Molex	Glentek P/N: GJ822F12; Molex P/N: 90142–0024
Encoder Feedback, 20 Pin Molex	Glentek P/N: GJ822F10; Molex P/N: 90142–0020
Controller I/O & Motor Feedback Socket Connector, Molex	Glentek P/N: GJ822T01; Molex P/N: 90119–2110
Host, RJ45 Molex	Glentek P/N: EJ018083; Molex P/N: 87522–8012
Logic Power, 2 Pin Phoenix	Glentek P/N: GJ741W02; Phoenix P/N: 1792257

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE: DECIMAL XX = ±0.05 XXX = ±0.010 ANGULAR: < ° = ±0.5° FINISH: 125 MAXIMUM	APPROVAL	DATE	GLENTEK 208 Standard Street El Segundo, CA 90245 USA 310.322.3026 FAX 310.322.7709 www.glentek.com
	DRAWN BY: M.TAGLIPA	02JUN10	DRAWING TITLE: INSTALLATION, SMx9475-bbb-1cc-1B-1, STD POWER, MOLEX
	CHK BY: L.C.	02JUN10	
	APP'D BY: J.M.	02JUN10	
THE INFORMATION CONTAINED WITHIN THIS DOCUMENT IS PROPRIETARY TO GLENTEK INC. AND IS NOT TO BE DISCLOSED TO THIRD PARTIES OR REPRODUCED, USED OR MANUFACTURED BY ANY OTHER PERSON WITHOUT WRITTEN PERMISSION FROM GLENTEK INC.	SIZE: D	MODEL: SMx9475-1B-1	DRAWING NUMBER: 9475-1032-000-C.DWG
	SCALE: .875:1	FILE NAME: 9475-1032-000-C.DWG	REV: C
		SHEET 1 OF 1	CONFIGURATION CODE: -



Controller I/O Connector

Pin	Signal Name
1	SIGNAL 1+
2	SIGNAL 1–
3	SIGNAL 2+
4	SIGNAL 2–
5	ANALOG OUT (AUX.)
6	COMMON (ANALOG)
7	ANALOG OUT
8	+LIMIT
9	–LIMIT
10	INHIBIT
11	FAULT OUT
12	COMMON
13	RESET IN
14	MTR TEMP SW
15	RESERVED
16	COMMON (DIGITAL)
17	ENCODER Z + (OUT)
18	ENCODER Z – (OUT)
19	RELAY OUT (OPTIONAL)
20	RELAY OUT (OPTIONAL)
21	COMMON (ANALOG)
22	COMMON (DIGITAL)
23	PULSE –
24	PULSE +
25	DIRECTION –
26	DIRECTION +
27	+5 VDC
28	+5 VDC
29	COMMON (DIGITAL)
30	COMMON (DIGITAL)
31	RESERVED
32	RESERVED
33	ENCODER A+ (OUT)
34	ENCODER A– (OUT)
35	ENCODER B+ (OUT)
36	ENCODER B– (OUT)

Motor Feedback Connector

Pin	Signal Name
1	ENC PWR (+5VDC)
2	COMMON (DIGITAL)
3	ENC PWR (+5VDC)
4	COMMON (DIGITAL)
5	ENC A + (IN)
6	ENC A – (IN)
7	ENC B + (IN)
8	ENC B – (IN)
9	ENC Z + (IN)
10	ENC Z – (IN)
11	HALL 1 +
12	HALL 1 –
13	HALL 2 +
14	HALL 2 –
15	HALL 3 +
16	HALL 3 –
17	MTR TEMP SW
18	COMMON (DIGITAL)
19	TACH +
20	TACH –

Power / Motor Connector

Pin	Signal Name
1	AC LINE 1
2	AC LINE 2
3	AC LINE 3
4	RESERVED
5	RESERVED
6	MOTOR PHASE R / BRUSH OUTPUT A
7	MOTOR PHASE S
8	MOTOR PHASE T / BRUSH OUTPUT B
PE	PROTECTIVE EARTHING (CHASSIS GND)

Status Display

Display	Fault Description
1	EEPROM FAULT
2	RAM FAULT
3	CPLD FAULT
8	RESET
b	BUS OVERVOLTAGE
C	CLAMP
c	FAULT INPUT
E	ENCODER FAULT
F	FOLDBACK
H	HEATSINK OVERTEMP
h	MOTOR OVERTEMP
L	LS/ECB
O	NORMAL OPERATION
S	HS/ECB
U	UNDER VOLTAGE
–	HALL FAULT
=	COMMUTATION FAULT

Host Connector

Pin	Signal Name
1	RESERVED
2	RESERVED
3	RESERVED
4	COMMON (DIGITAL)
5	TX232
6	RX232
7	RESERVED
8	RESERVED

Logic Power Connector

Pin	Signal Name
1	COMMON (DIGITAL)
2	+24VDC

Bus Over Voltage, Under Voltage, & Regen Voltage Settings

Power Input Voltage	BUS Over Voltage	BUS Under Voltage	Regen Voltage
208 – 240 VAC	450 VDC ± 5%	240 VDC ± 5%	395 VDC ± 5%
110 – 130 VAC	250 VDC ± 5%	110 VDC ± 5%	230 VDC ± 5%

REVISION HISTORY

ZONE	REV	DESCRIPTION	ECO	DATE	CHANGED	APPD
	A	INITIAL RELEASE	3391	01AUG11	NTHALLA	L.P.

Specifications and Features

AC Supply Input	110 – 130 VAC, 200 – 240 VAC, 3Ø, 50/60 HZ
Inrush Current at Power Up	280A max @ 130VAC, 510A max @ 240VAC
Logic Supply Input (For SMC9475 Only)	24 to 48 VDC, 600mA max @24VDC. Powers all amplifier logic and encoders.
Peak Current Output	120 A @ 25°C Ambient (with forced air cooling)
Continuous Current Output	75 A @ 25°C Ambient (with forced air cooling)
Fault Protection	Short circuit protection from motor phase to phase, motor phase to DC bus, motor phase to case (chassis gnd) Amplifier RMS over current. DC bus over/under voltage. Amplifier over temperature. Motor over temperature (switch or thermistor input). Encoder broken wire. Invalid Hall/comm track state. Commutation fault.
Amplifier Status Indication	See Table
Low Speed Electronic Circuit Breaker (LS/ECB)	Latches when programmable current (75 A max.), and time (10 sec max.) exceed limit.
Bus Overvoltage	See Table
Bus Undervoltage	See Table
Internal Regen	18 Ohms, 1125W (with forced air cooling)
Regen Voltage	See Table
Amplifier Type	See Model Number Key (from product manual)
Analog Command Input	±10V (12 bit resolution) for analog velocity, and current command. 15 bit is available (optional).
Auxiliary Analog Input	±10V (12 bit resolution) for 2 phase Current Mode. 15 bit is available (optional).
Pulse & Direction Inputs	Accepts TTL level Step & Direction signals
Encoder Feedback	Accepts TTL level encoder signals
Tachometer Feedback	Accept ±30 VDC tacho signals (Different voltage levels are available upon request)
Dedicated Inputs	+/– position limits, inhibit, motor overtemp & reset signal
Dedicated Fault Output (Programmable Level)	TTL Compatible
Analog Out	±10 V analog output (12-Bit) for monitoring DSP signals, output source selectable and scalable using MotionMaestro™ setup software, 2 channels & 16-Bit are available (optional)
Auto Phasing	Plug & Play for all types of three phase Brushless Motors.
Smart Comm Initialization at Amplifier turn on	Eliminates the need for Hall sensor or commutation tracks for many applications.
RS-232 Host Port	High speed serial communication interface for set-up and tuning. 115.2 Kbaud, 8 bits, no parity, 1 stop bit.
Software Configurator	All parameters are downloaded using the RS232 port / Glentek's Windows™ based MotionMaestro™ software.
Digitally Tuned	All parameters set digitally. No potentiometers to adjust. RS-232 high speed serial communication interface for all gain and PID tuning parameters.
Non-Volatile Memory	All parameters are stored in non-volatile memory
PWM Switching Frequency	12.5 KHz Typical
Current Loop Bandwidth	Tunable up to 3 KHz
Amplifier Isolation	Logic completely isolated from high voltage output stage
Operating Temperature	0 °C to +60 °C
Storage Temperature	–40 °C to +80 °C
Humidity	5% to 95% non-condensing
Mounting Hardware	1/4–20 or M6 Screws, Qty = 3
Dimensions (inches)	L: 17.63, H: 12.60, W: 5.92
Backup File	xxxx–5.BK

Mating Connectors

Controller I/O, 36 Pin 3M	Glentek P/N: EAC10136; 3M P/N: 10136–3000VE
36 Pin Mini–D, Backshell	Glentek P/N: EAC10336 , 3M P/N: 10336–5240–008
Motor Feedback, 20 Pin 3M	Glentek P/N: EAC10120; 3M P/N: 10120–3000VE
20 Pin Mini–D, Backshell	Glentek P/N: EAC10320; 3M P/N: 10320–5240–008
Host, RJ45 Molex	Glentek P/N: EJ01808J; Molex P/N: 87522–8012
Logic Power, 2 Pin Phoenix	Glentek P/N: EJ7411V02; Phoenix P/N: 1792757

NOTE:
1. RECOMMEND ALL POWER WIRING, 6 AWG (13.29 MM²) OR LARGER, 105°C RATED PVC OR BETTER.
2. RECOMMEND SIGNAL WIRING TO MINI–D SOCKET CONNECTOR, 24AWG (0.205 MM²) TO 28AWG (0.081 MM²).
3. FOR SMC9475, EXTERNAL +24VDC FOR LOGIC POWER IS SUPPLIED BETWEEN PIN 1 (COMMON) AND PIN 2 (+24VDC) OF LOGIC POWER CONNECTOR.
4. MAXIMUM HEIGHT IS 12.60 INCHES.
5. CONNECT MOTOR GROUND TO THIS GROUND SCREW.
6. COMMON (ANALOG) AND COMMON (DIGITAL) SIGNALS ARE CONNECTED TOGETHER INSIDE AMPLIFIER.

GLENTEK
"Solutions for Motion Control"
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www.glentek.com

APPROVAL: DRAWN BY: NTHALLA 01AUG11
CHECKED BY: JMEYER 01AUG11
ENGR APP BY: 01AUG11
DATE:

DRAWING NO. SMB/SMC9475-1B-1
SIZE: B
DRAWING NUMBER: 9475-1154-000
REV: B
FILENAME: 9475-000.EDWG
SCALE: 1
SHEET 1 OF 1

INSTALLATION, SMx9475-bbb-0cc-1B-1, STD POWER, MINI-D

CONFIGURATION CODE:

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Alpha Series Digital PWM Brushless Servo Amplifiers

- PWM (Pulse-Width-Modulated) Brushless servo amplifiers to 20KW

Analog Brush Type Servo Amplifiers

- Linear Brush type servo amplifiers to 2.6KW
- PWM (Pulse-Width-Modulated) Brush type servo amplifiers to 28KW

Analog Brushless Servo Amplifiers

- Linear Brushless servo amplifiers to 3.5KW
- PWM (Pulse-Width-Modulated) Brushless servo amplifiers to 51KW

Permanent Magnet DC Brush Type Servo Motors

- Continuous Torques to 335 in. lb.
- Peak Torques to 2100 in. lb.

Permanent Magnet DC Brushless Servo Motors

- Continuous Torques to 1100 in. lb.
- Peak Torques to 2200 in. lb.

GLENTEK

"Solutions for Motion Control"

Manual#: 9515-1040-000-4
Manual Revision Date:
13 February 2014

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