

BLUDC

Hardware Manual



BLUDC4-S & -SE
BLUDC4-Q & -QE
BLUDC9-S & -SE
BLUDC9-Q & -QE



920-0037D
6/1/16



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Introduction

Thank you for selecting an Applied Motion Products motor control. We hope our dedication to performance, quality and economy will make your motion control project successful.

If there's anything we can do to improve our products or help you use them better, please call or fax. We'd like to hear from you, our phone number is (800) 525-1609.

You can also email support@applied-motion.com.

A Note About Names

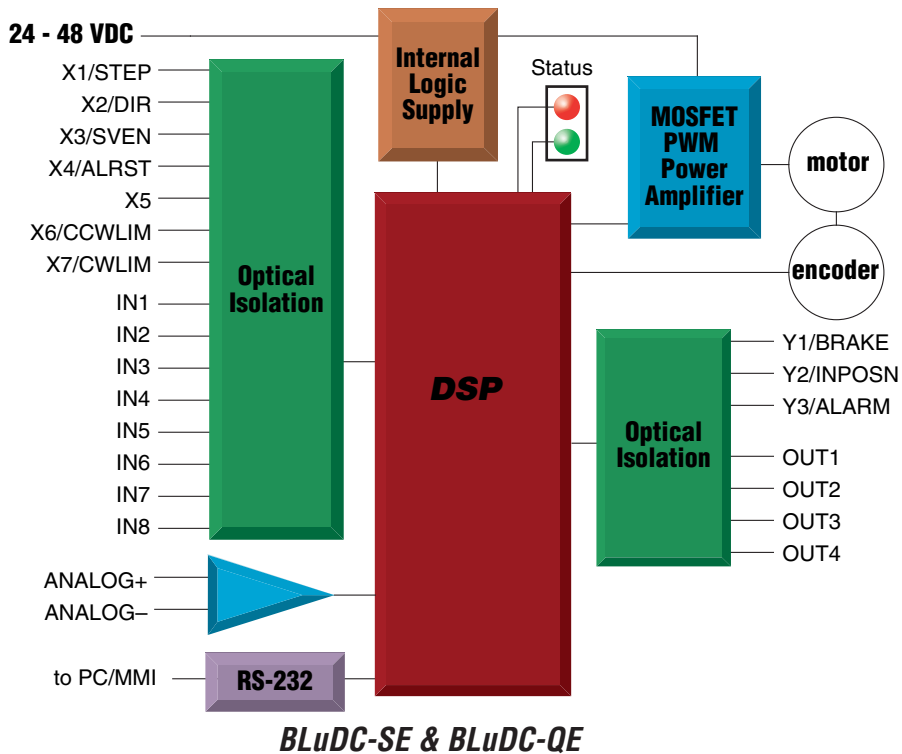
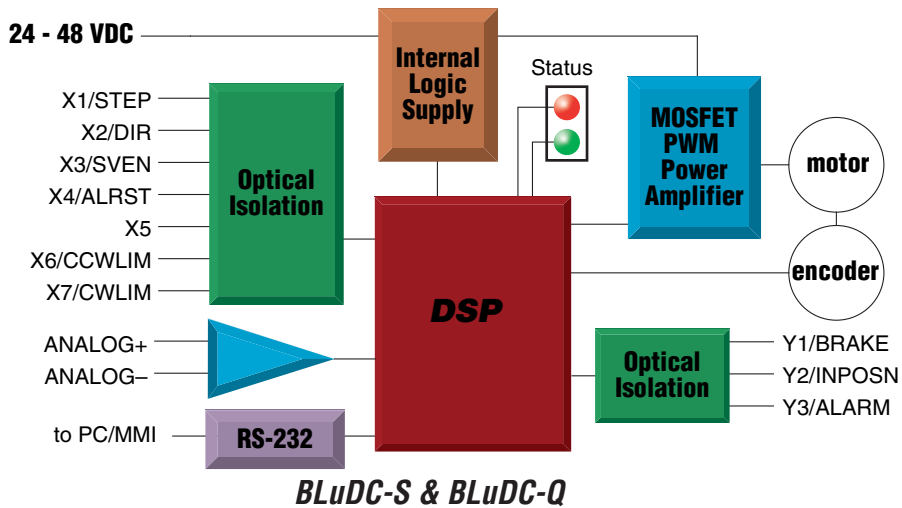
The BLUDC9 was originally called the BLU200. If you have a BLU200, please follow the instructions for the BLUDC9.

The BLUDC4 was originally called the BLU100. If you have a BLU100, please follow the instructions for the BLUDC4.

Features

- Digital servo motor driver in compact package
- Operates from 24 to 48 volt DC power supply
- Operates in torque, velocity or position mode
- Accepts analog signals, digital signals and RS-232/485 serial commands
- BLuDC4 provides motor current up to 13.5 amps peak, 4.5 amps continuous
- BLuDC9 provides motor current up to 18 amps peak, 9 amps continuous
- Seven optically isolated digital inputs (15 inputs on -SE, -QE)
- Three optically isolated digital outputs (7 outputs on -SE, -QE)
- ± 10 volt analog input for speed and torque control

Block Diagrams



Getting Started

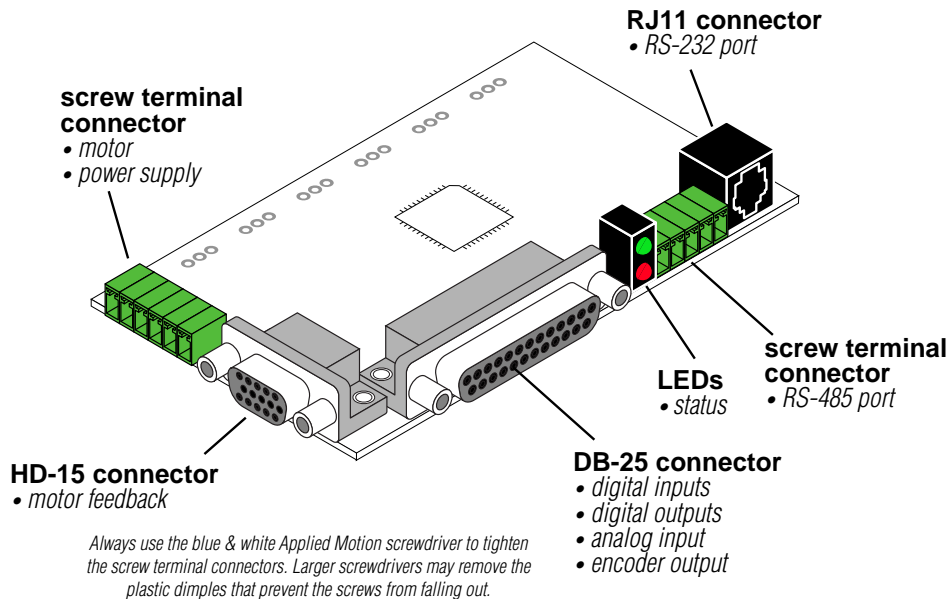
This manual describes the use of four different drive models. What you need to know and what you must have depends on the drive model. For all models, you'll need the following:

- a 24-48 volt DC power supply for the motor. Please read the section entitled *Choosing a Power Supply* for help in choosing the right power supply.
- a compatible servo motor
- cables to connect the motor to the drive. If you are using an Applied Motion A, N or M series motor, use BLUENC and BLuMTR cables (one of each).
- a small flat blade screwdriver for tightening the connectors (included).
- a personal computer running Microsoft Windows 98, 2000, NT, Me, XP, Vista or 7.
- *Quick Tuner™* software, available at www.applied-motion.com/products/software.
- An Applied Motion programming cable (included)

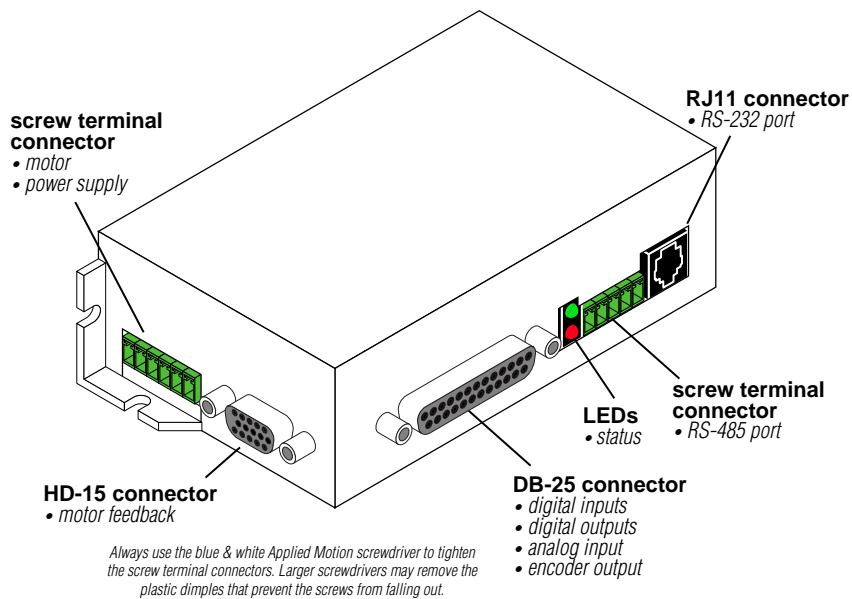
If you've never used a BLU servo before, you'll need to get familiar with the drive and the set up software before you try to deploy the system in your application. We strongly recommend the following:

1. Download and Install the *Quick Tuner™* software.
2. Launch the software by clicking Start...Programs...Applied Motion..Quick Tuner.
3. Connect the drive to your PC using the programming cable.
4. Connect the drive to the power supply.
5. Connect the drive to the motor.
6. Apply power to the drive.
7. Follow the instructions in the *Quick Tuner* manual.

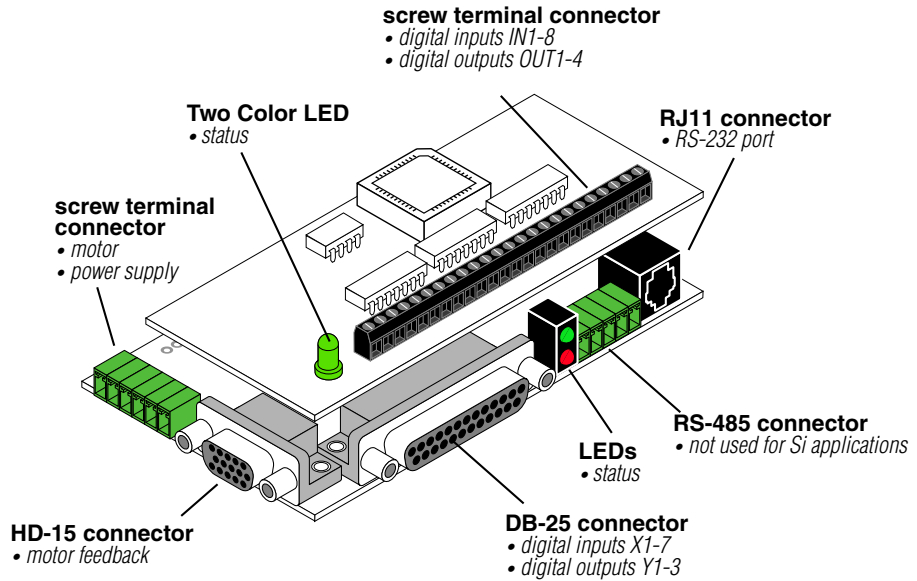
The connectors and other points of interest are illustrated on pages 7 and 8. Depending on your drive model and application, you'll need to make connections to various parts of the drive. These are detailed later in the manual.



BLUDC4-S and -Q

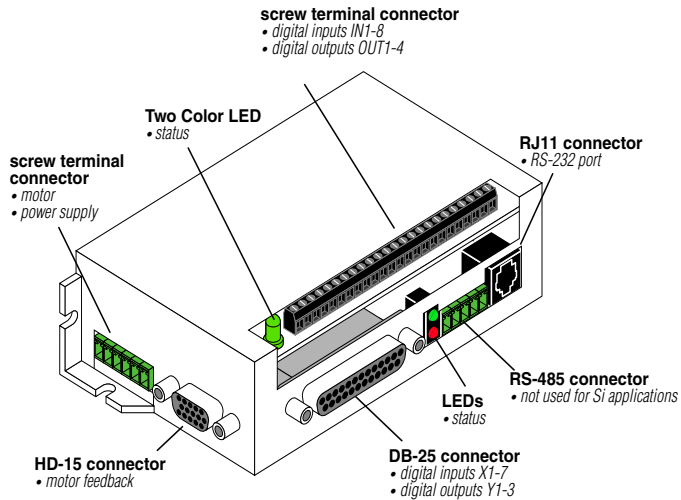


BLUDC9-S and -Q



Always use the blue & white Applied Motion screwdriver to tighten the screw terminal connectors. Larger screwdrivers may remove the plastic dimples that prevent the screws from falling out.

BLUDC4-SE & -QE



Always use the blue & white Applied Motion screwdriver to tighten the screw terminal connectors. Larger screwdrivers may remove the plastic dimples that prevent the screws from falling out.

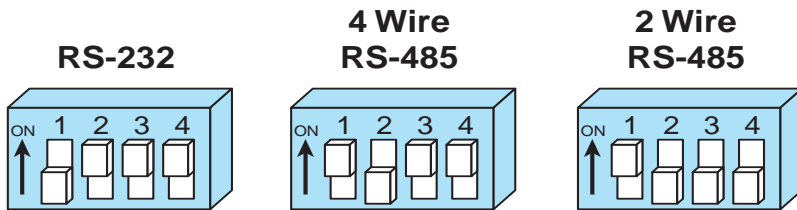
BLUDC9-SE & -QE

Connecting to the PC using RS-232

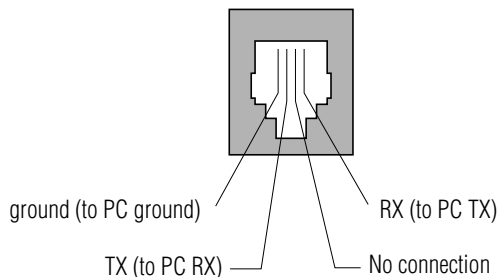
- Locate your computer within 8 feet of the BLU servo drive.
- Your drive was shipped with a communication cable. Plug the large end into the serial port of your PC and the small end into the PC/MMI jack on your drive. Secure the cable to the PC with the screws on the sides.

Never connect a BLU servo drive to a telephone circuit. It uses the same connectors and cords as telephones and modems, but the voltages are not compatible.

If your PC does not have a serial port, you should purchase a “USB Serial Converter”. We have had good results with the USB-COM-CBL from Byterunner.com. For an RS-232 port + 1 screw terminal RS-422/485 port, the USB-COMi-M from Byterunner.com is recommended. For laptops, a PCMCIA converter card is a good choice. Our applications engineers use the [SSP-100](#) from Sewell Direct.



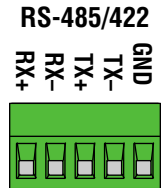
Switch Settings for the USB-COM-CBL



**Pin Assignments of the PC/MMI Port
(RJ11 connector)**

Connecting to a host using RS-485

RS-485 allows you to connect more than one drive to a single host PC, PLC or other computer. It also allows the communication cable to be long (more than 1000 feet). But the device to which you connect must have an RS-485 port.



Pin diagram and wiring are shown below. We recommend the use of Category 5 cable. It is widely used for computer networks, it is inexpensive, easy to get and certified for quality and data integrity.

The BLu Servo Drives can be used with two wire or four wire RS-485 implementations. The connection can be point to point (i.e. one drive and one host) or a multi-drop network (one host and up to 32 drives).

Four Wire Systems utilize separate transmit and receive wires. One pair of wires must connect the host computer's transmit signals to each drive's RX+ and RX- terminals. Another pair connects the TX+ and TX- drive terminals to the host computer's receive signals. A logic ground terminal is provided on each drive and can be used to keep all drives at the same ground potential. This terminal connects internally to the DC power supply return (V-), so if all the drives on the RS-485 network are powered from the same supply it is not necessary to connect the logic grounds. You should still connect one drive's GND terminal to the host computer ground.

Four wire systems are better than two wire types because the host can send and receive data at the same time, increasing system throughput. Furthermore, the host never needs to disable its transmitter, which simplifies your software.

Getting and Connecting a RS485 4-wire adaptor to your PC

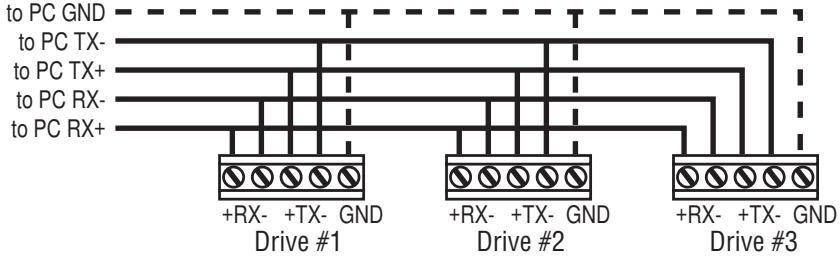
Model 117701 from [Jameco Electronics](#) (800-831-4242) works well. This adaptor is for a 25 pin serial port. If you are like most people and have a 9 pin serial port on your PC, you will also need to purchase Jameco cable 31721. Connect as follows:

adaptor	drive
1	RX+
2	RX-
3	TX-
4	TX+

Set the switches for DCE and TxON,RxON. Don't forget to plug in the DC power adaptor that comes

with the unit.

Two Wire Systems transmit and receive on the same pair of wires, which can lead to trouble. The



RS-485 Four Wire System

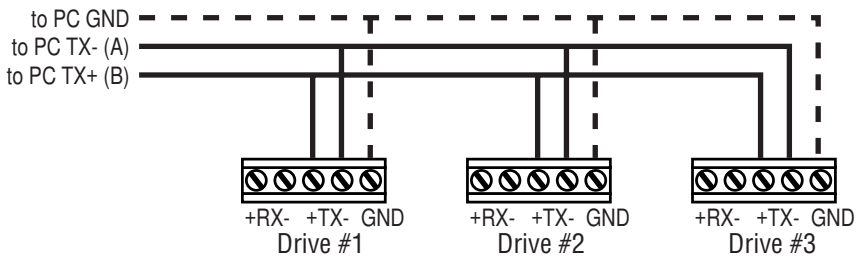
host must not only disable its transmitter before it can receive data, it must do so quickly, before a drive begins to answer a query. Fortunately, the BLu servo drives include an “transmit delay” parameter that can be adjusted to compensate for a host that is slow to disable its transmitter. This adjustment can be made over the network using the TD command, or it can be set using the Quick Tuner software. It is not necessary to set the transmit delay in a four wire system.

Getting and Connecting an RS-485 2-wire adaptor to your PC

Model 485-25E from Integrity Instruments (800-450-2001) works well. It comes with everything you need. Connect as follows:

- adaptor drive
- B TX+/RX+
- A TX-/RX-

Jumper Settings



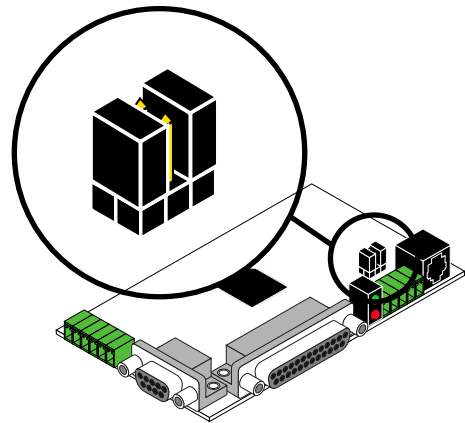
RS-485 Two Wire System

There is a small, six pin header located just behind the RS-485 connector. When the drive leaves our factory, there are two jumpers on the outside pins of this header, which selects two wire mode. For four wire operation, these jumpers must be removed. The jumpers are visible on the BLuDC4. To access the jumpers on the BLuDC9 drive, the cover must be removed.

Assigning Addresses

Before wiring the entire system, you'll need to connect each drive individually to the host computer so that a unique address can be assigned to each drive. Use the RS-232 programming cable and the *Quick Tuner™* software that came with your drive for this purpose.

Connect the drive to your PC, then launch the *Quick Tuner™* software. Finally, apply power to your drive. If you have already tuned your drive, then you should click the Upload button so that the *Quick Tuner™* settings match those of your drive. Click on the Drive tab, then select the "SCL" operating mode. If you have a Q drive, you may want to select "Q Programming". Either way, you'll see the RS-485 Address panel appear. Just click on the address character of your choice. You can use the numerals 0..9 or the special characters ! " # \$ % & ' () * + , - . / : ; < = > ? @ . Just make sure that each drive on your network has a unique address. If you are using a 2 wire network, you may need to set the Transmit Delay, too. Once you've made your choices, click Download to save the settings to your drive.



Connecting the Power Supply

If you need information about choosing a power supply, please read *Choosing a Power Supply* located elsewhere in this manual.

If you plan to use a regulated power supply you may encounter a problem with regeneration. If you rapidly decelerate a load from a high speed, much of the kinetic energy of that load is transferred back to the power supply. This can trip the overvoltage protection of a switching power supply, causing it to shut down. We offer two “regeneration clamps” that can solve this problem: the RC010 and RC050. If in doubt, buy an RC050 for your first installation. If the “regen” LED on the RC050 never flashes, you don’t need the clamp.

Connect the motor power supply “+” terminal to the driver terminal labeled “VDC”. Connect power supply “-” to the drive terminal labeled “GND”. Use 18 or 20 gauge wire.

Be careful not to reverse the wires. Reverse connection will destroy your driver, void your warranty and generally wreck your day.



RC050 Regen Clamp

Connecting the Motor

Never connect or disconnect the motor while the power is on.

Applied Motion motor:

To connect an Applied Motion servo motor to your BLU Servo, you'll need a set of mating cables called the BLUENC and the BLuMTR.

Connect the small motor connector to one end of the BLuMTR cable. The other end of the BLuMTR has lead wires that connect to the drive's screw terminal connector as follows:

A = red wire

B = white wire

C = black wire

\perp = green wire

Connect the large motor connector to one end of the BLUENC cable. The other end of the BLUENC plugs into the BLU servo.

Non-Applied Motion motor:

Connect the motor leads to the screw terminal connector as follows:

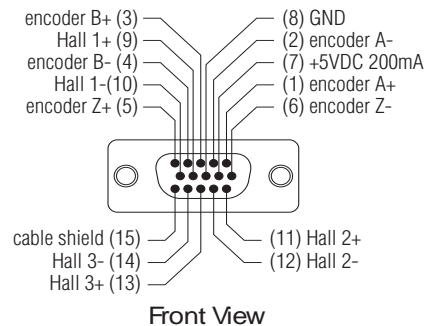
A = motor phase A, R or U

B = motor phase B, S or V

C = motor phase C, T or W

\perp = ground wire

The encoder connections use a HD-15 connector, which you must connect to your encoder as shown below. See back page for mating connector information.



Pin Assignments (facing drive)

Using DC Brushed Motors

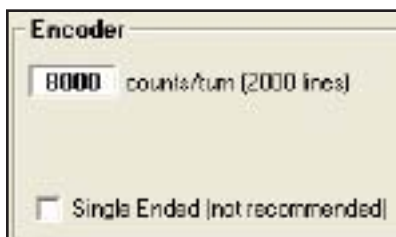
DC Brushed motors can be used with the servo drive simply by connecting the motor and encoder to the drive as show below and configuring the drive using the AMP Quick Tuner™ configuration tool.

Before connecting the Brushed motor to the servo drive you need to determine the motors polarity. That is, we need to know which wire is positive and which is negative. When applying DC power to the motor it needs to spin clockwise. After determining this, the wire connected to the positive of the DC power should be labeled at such.

Connecting the wires as shown. Positive to “A” phase and negative to “B” phase.

If an Encoder is being used Connect the Motor’s Encoder as explained earlier in this manual.

Using *QuickTuner™*, select “Brush Motor” on the “Motor - Encoder” tab. Remember to set the counts per turn in the “Encoder” setting. If the encoder is “Single Ended” be sure and check the box.



Connecting Input Signals

The BLU servo drives have four types of inputs:

- high speed digital inputs for step & direction commands or encoder following, 5 volt logic
- digital inputs for other signals, 12 - 24 volt logic
- analog input for torque and speed commands

BLU-Q and BLU-S Inputs

These drives include seven digital inputs and one analog input.

(X6, X7) CW & CCW Limit: can be used to inhibit motion in a given direction, forcing the motor and load to travel within mechanical limits. Can be configured for active closed, active open or not used.

(X1, X2) STEP & DIR: digital signal commanding position. Quadrature signals from encoders can also be used.

(X3) Servo Enable: Activate this input to enable or disable the motor. Can be configured for active closed, active open or not used.

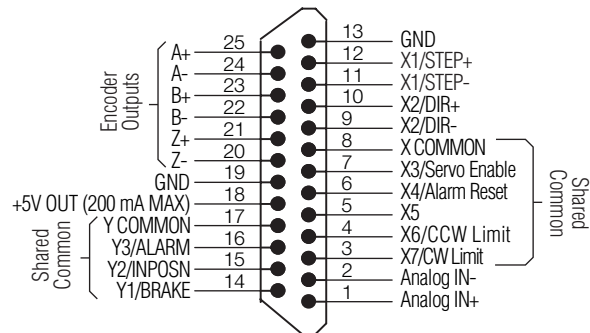
(X4) Alarm Reset: Activate this input momentarily to reset a drive fault or alarm. Can be configured for active closed, active open or not used.

Analog In: analog torque, velocity or position command signal. Can be configured for 0-10V, 0-5V, $\pm 10V$ or $\pm 5V$, with or without offset.

BLU-SE & -QE Inputs

These drives include the same inputs and outputs as the BLu-Q and BLu-S drives, plus eight additional general purpose inputs on screw terminal connectors.

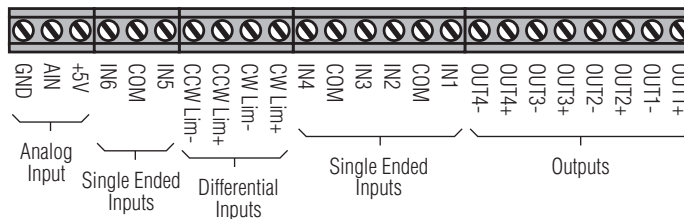
Connector Pin Diagrams



Front View

DB-25 Connector

Available on all drives



Expansion Input/Output Connector

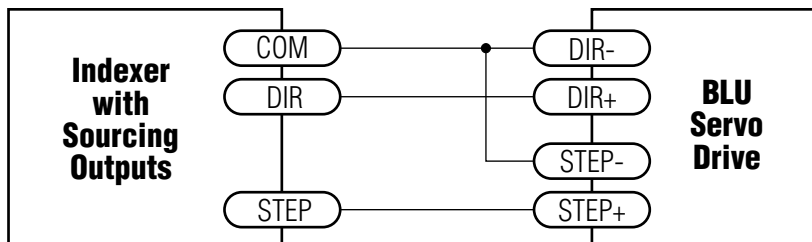
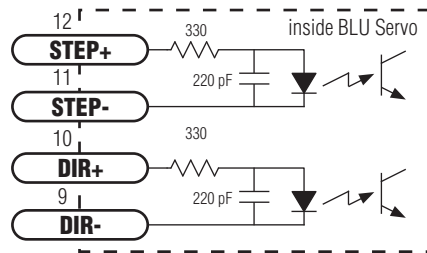
BLU-SE and -QE only

Note: All inputs on the screw terminal connector of BLu-QE and BLuSE drives act as general purpose inputs. This means end-of-travel limits, if used, are always wired to inputs X6 and X7 of the DB-25 I/O connector - not the CW LIM+, CW LIM-, CCW LIM+ and CCW LIM- terminals shown in the diagram above. In the BLu-QE and BLu-SE drives, the CW LIM and CCW LIM terminals are general purpose inputs IN7 and IN8, respectively.

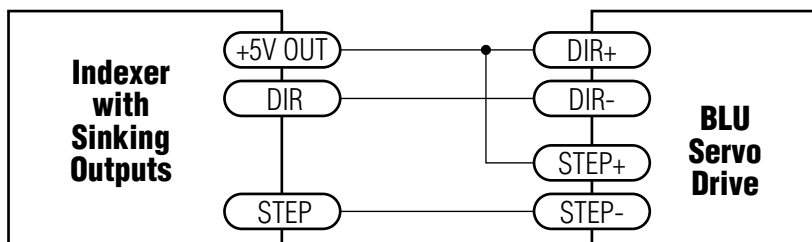
High Speed Digital Inputs

The BLU-S and BLU-Q drives include two high speed inputs called STEP and DIR. They accept 5 volt single-ended or differential signals, up to 2 MHz. Normally these inputs connect to an external controller that provides step & direction command signals. You can also connect a master encoder to the high speed inputs for following applications.

Connection diagrams follow.

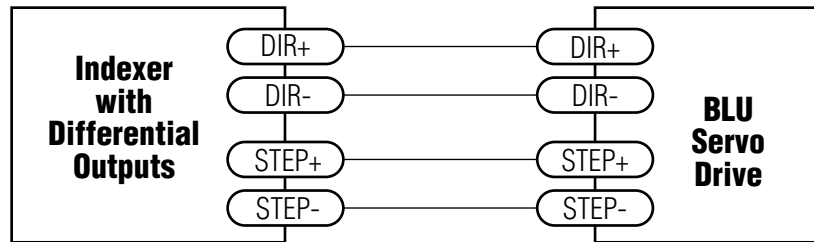


Connecting to indexer with Sourcing Outputs

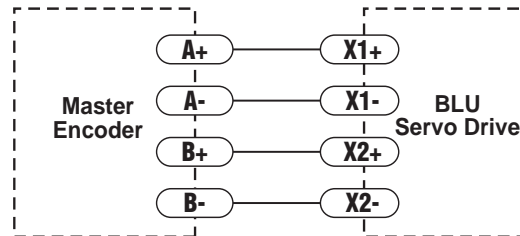


Connecting to Indexer with Sinking Outputs

(includes Applied Motion Si-1 Indexer)



Connecting to Indexer with Differential Outputs
(Many High Speed Indexers have Differential Outputs)



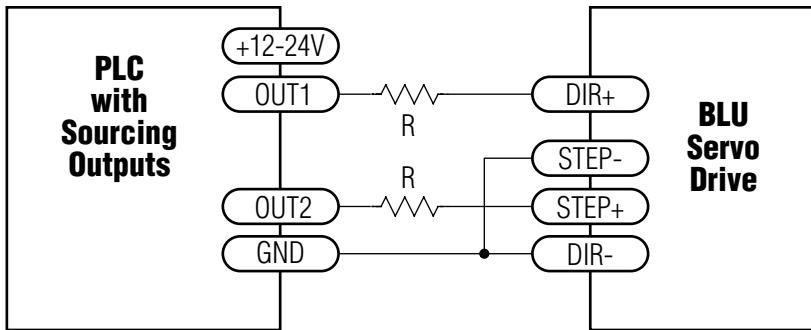
Wiring for Encoder Following

Using High Speed Inputs with 12-24 Volt Signals

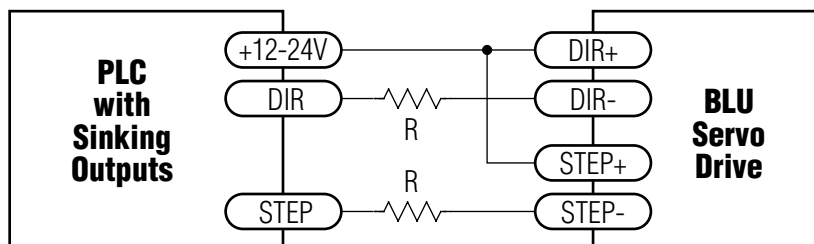
Most PLCs don't use 5 volt logic. You can connect signal levels as high as 24 volts to the STEP and DIR inputs if you add external dropping resistors, as shown below.

- For 12 volt logic, add 820 ohm, 1/4 watt resistors
- For 24 volt logic, use 2200 ohm, 1/4 watt resistors

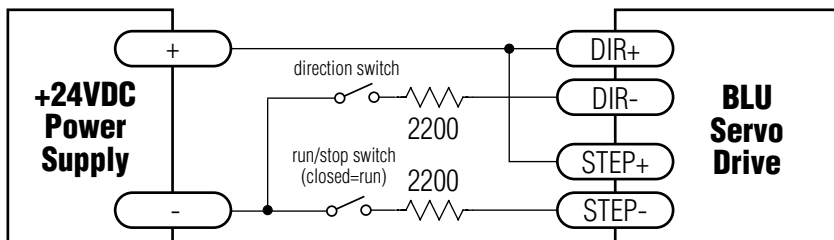
The maximum voltage that can be applied to an input terminal is 24 volts DC. Never apply AC voltage to an input terminal.



Connecting to PLC with Sourcing (PNP) Outputs
(Most PLC's use 24 volt logic)



Connecting to PLC with Sinking (NPN) Outputs
(Most PLC's use 24 volt logic)



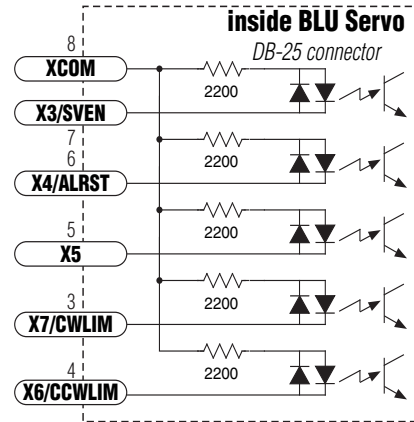
Using Mechanical Switches at 24 Volts.

Other Digital Inputs

As we mentioned in the previous section, the high speed STEP/PWM and DIR inputs are configured for five volt logic. All other digital inputs are designed for operation between 12 and 24 volts DC. This includes five inputs on the main board and the eight digital inputs on the Si™ board.

Single Ended Inputs

The BLU servos include single ended, optically isolated input circuits that can be used with sourcing or sinking signals, 12 to 24 volts. This allows connection to PLCs, sensors, relays and mechanical switches. Because the input circuits are isolated, they require a source of power. If you are connecting to a PLC, you should be able to get power from the PLC power supply. If you are using relays or mechanical switches, you will need a 12-24 V power supply. This also applies if you are connecting the inputs to the programmable outputs of an Si product from Applied Motion.

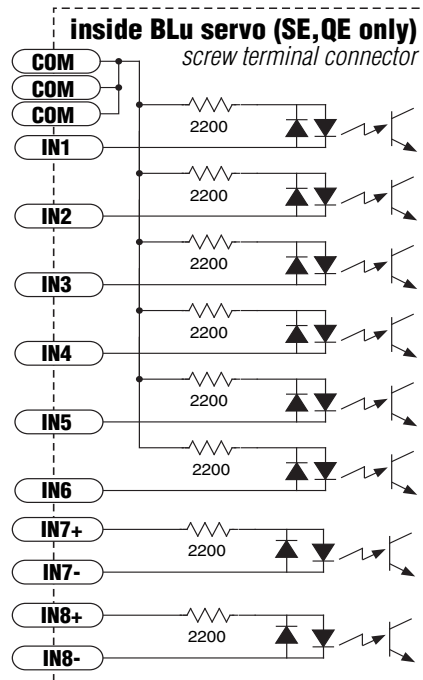


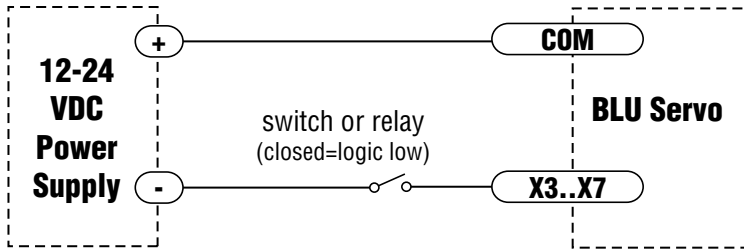
What is COM?

“Common” is an electronics term for an electrical connection to a common voltage. Sometimes “common” means the same thing as “ground”, but not always. In the case of the BLU Servo, if you are using sourcing (PNP) input signals, then you will want to connect COM to ground (power supply -). If you are using sinking (NPN) signals, then COM must connect to power supply +.

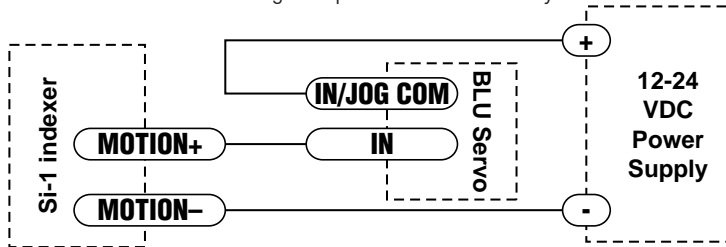
Note: If current is flowing into or out of an input, the logic state of that input is low or closed. If no current is flowing, or the input is not connected, the logic state is high or open.

The diagrams on the following pages show how to connect the inputs to various commonly used devices.



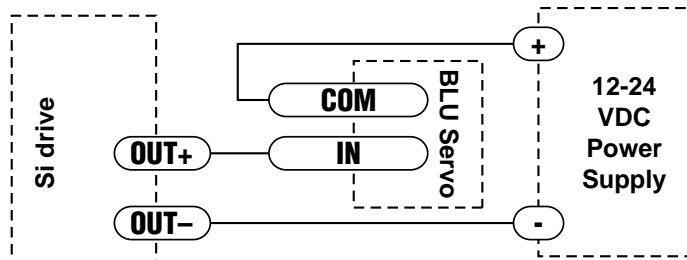


Connecting an Input to a Switch or Relay



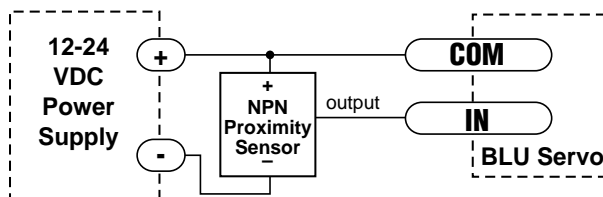
Connecting an Input to the Si-1 Motion Output

(Set Si-1 motion signal to "in position". Si-1 will trigger servo drive at end of each move).



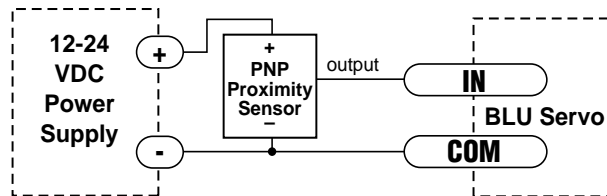
Connecting an Si™ drive to the BLU servo

(When output closes, input goes low).



Connecting an NPN Type Proximity Sensor to an input

(When prox sensor activates, input goes low).

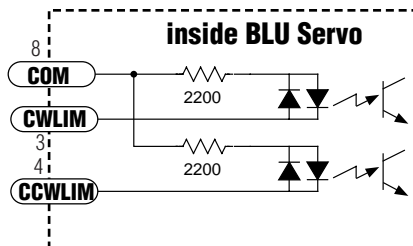


Connecting a PNP Type Proximity Sensor to a an input
(When prox sensor activates, input goes low).

Connecting Limit Switches to the BLU Drives

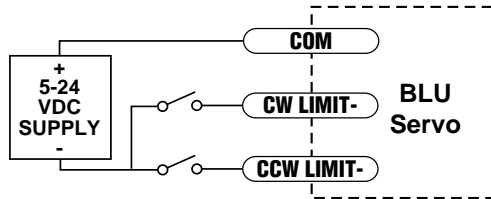
The CWLIMIT and CCWLIMIT inputs are used for connecting end of travel sensors. These inputs are differential, which allows you to use signals that are sinking (NPN), sourcing (PNP) or differential (line driver). By connecting switches or sensors that are triggered by the motion of the motor or load, you can force the motor to operate within certain limits. This is useful if a program or operator error could cause damage to your system by traveling too far.

The limit inputs are optically isolated. This allows you to choose a voltage for your limit circuits of 12 to 24 volts DC. This also allows you to have long wires on limit sensors that may be far from the drive with less risk of introducing noise to the drive electronics. The schematic diagram of the limit switch input circuit is shown below.



Wiring a Mechanical Limit Switch

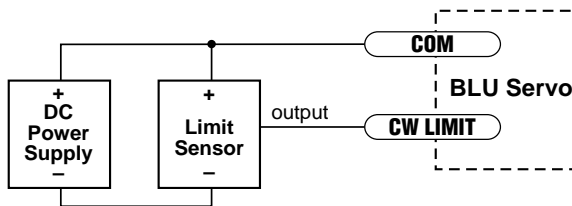
You can use normally open or normally closed limit switches. Either way, wire them as shown here.



Wiring a Limit Sensor

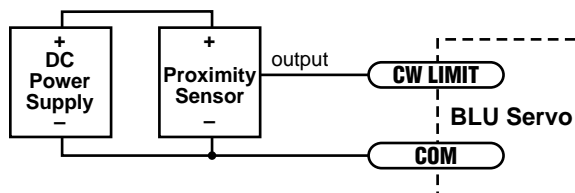
Some systems use active limit sensors that produce a voltage output rather than a switch or relay closure. These devices must be wired differently than switches.

If your sensor has an open collector output or a **sinking** output, wire it like this:



If the sensor output goes low at the limit, select the option “closed” (in the software). If the output is open, or high voltage, choose “open”.

Other sensors have **sourcing** outputs. That means that current can flow out of the sensor output, but not into it. In that case, wire the sensor this way:



Interfacing to a Motion Controller

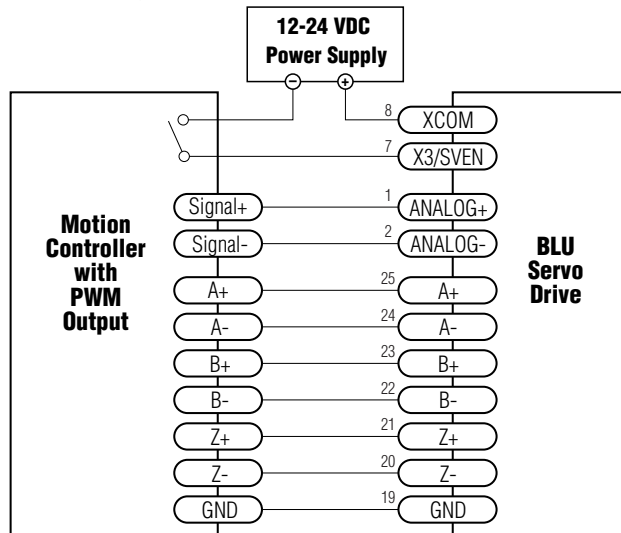
In some applications, servo control is provided by a motion controller and the drive simply obeys a velocity or torque command. The industry standard for this command signal is $\pm 10V$. In most cases, the encoder signals from the motor must feed back to the controller. The BLU-Q and BLU-S servo drives are well suited for such applications.

To set up a BLU servo for this type of application, you must make a cable to connect the motion controller to the BLU servo's DB-25 I/O connector. Diagrams are shown below.

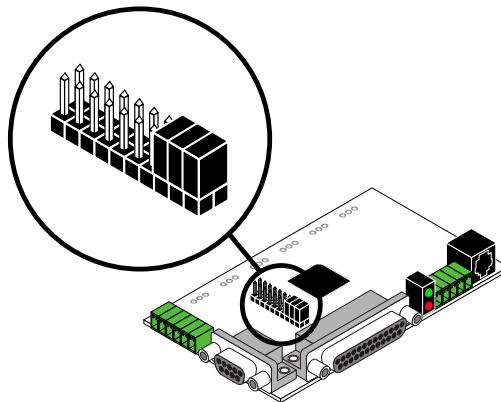
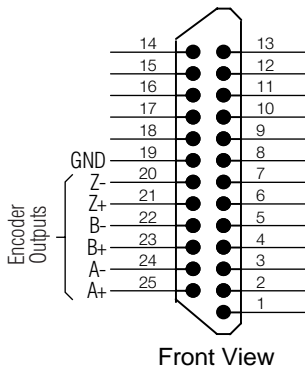
You'll also need to use our *Quick Tuner* software to set the drive for torque or velocity mode, to set the scaling and off-set, and to configure the motor. You may download the software at www.applied-motion.com/products/software.

Encoder Outputs

If you are using the BLU Servo in torque or velocity mode with a servo controller, you may need to feed the encoder signals back to the controller. The DB-25 I/O connector includes encoder output signals for this purpose. Make sure the three jumpers are set as shown below.



Connecting a Motion Controller with Analog ($\pm 10V$) Output

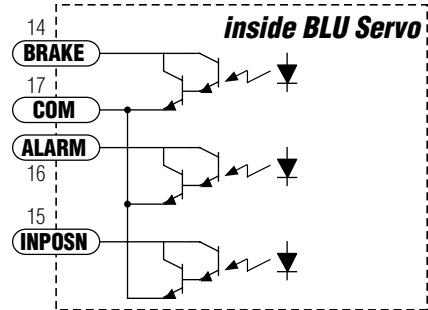


Programmable Outputs

The BLU-S and BLU-Q drives feature three digital outputs:
 Brake: controls an electric brake relay, automatically releasing and engaging as the drive requires

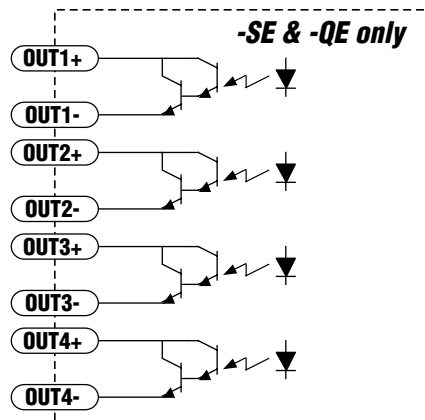
Alarm: closes or opens when a drive fault or alarm condition occurs. The red and green LEDs will flash an error code.

In Position: indicates that the drive has achieved a desired goal, such as a target position.



The -SE and -QE have four additional programmable outputs.

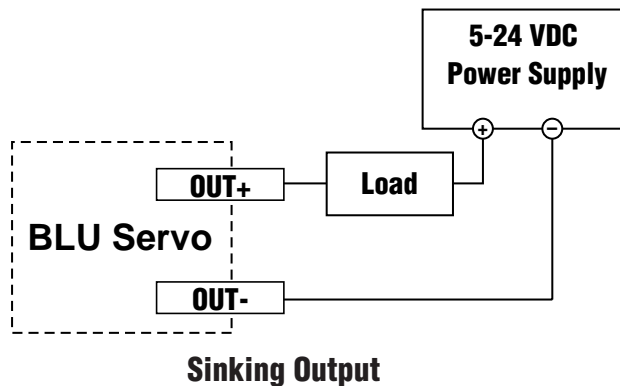
The outputs can be used to drive LEDs, relays and the inputs of other electronic devices like PLCs and counters. For OUT1-4, the "+" (collector) and "-" (emitter) terminals of each transistor are available at the connector. This allows you to configure each output for current sourcing or sinking. The BRAKE, ALARM and INPOSN outputs can only sink current. The COM terminal must be tied to power supply (-).

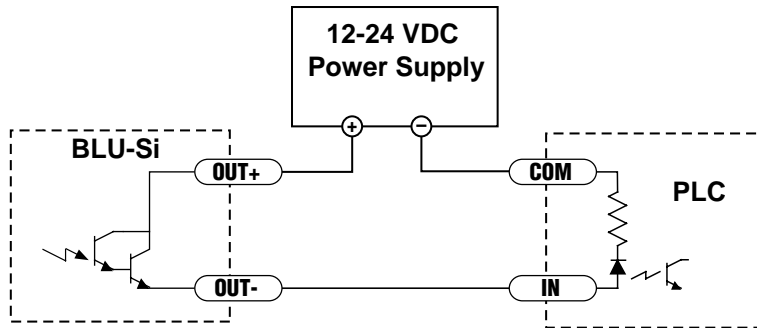


Diagrams of each type of connection follow.

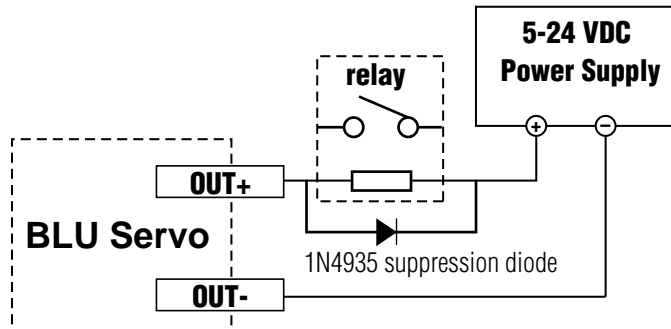
Do not connect the outputs to more than 30VDC.

The current through each output terminal must not exceed 100 mA.





Sourcing Output



Driving a Relay

Choosing a Power Supply

When choosing a power supply, there are many things to consider. If you are manufacturing equipment that will be sold to others, you probably want a supply with all the safety agency approvals. If size and weight are an issue get a switching supply.

And you must decide what size of power supply (in terms of voltage and current) is needed for your application.

Voltage

PWM drives like the BLU Servo work by switching the voltage to the motor terminals on and off while monitoring current to achieve a precise level of phase current. Depending on how fast you want to run the motor, you may not need a power supply equal to the rated voltage of the motor. To get a rough estimate of how much voltage you need, multiply the voltage constant of the motor (K_e) by the maximum speed required for your application. For example, if you want to oper-

ate the A0100-103-3 at 4000 rpm, you'll need $V = K_e * \text{rpm} = (4.04\text{V/krpm})(4 \text{krpm}) = 16 \text{volts}$. To produce any real torque at that speed, add 50%, for a total of 24 V.

Always check the "no load" voltage of the power supply before using it with the drive, to be sure that it does not exceed 52 VDC.

Current

The maximum supply current you could ever need is three times the motor current. However, you will generally need a lot less than that, depending on the motor type, voltage, speed and load conditions. That's because the BLU servo uses a switching amplifier, converting a high voltage and low current into lower voltage and higher current. The more the power supply voltage exceeds the motor voltage, the less current you'll need from the power supply. A motor running from a 48 volt supply can be expected to draw only half the supply current that it would with a 24 volt supply. Furthermore, the servo loop only commands the amplifier to provide as much current as load conditions require.

We recommend the following selection procedure:

1. If you plan to use only a few drives, get a power supply with at least 3X the rated continuous current of the motor.
2. If you are designing for mass production and must minimize cost, get one power supply with more than twice the rated current of the motor. Install the motor in the application and monitor the current coming out of the power supply and into the drive at various motor loads. This will tell you how much current you really need so you can design in a lower cost power supply.

If you plan to use a regulated power supply you may encounter a problem with regeneration. If you rapidly decelerate a load from a high speed, much of the kinetic energy of that load is transferred back to the power supply. This can trip the overvoltage protection of a switching power supply, causing it to shut down. Unregulated power supplies are better because they generally do not have overvoltage protection and have large capacitors for storing energy coming back from the drive. They are also less expensive.

Recommended Motors

Part Number	Current ¹ amps	Voltage VDC	Rotor Inertia g-cm ²	Power watts	Torque ¹ oz-in	Torque ¹ N-m
<i>M series metric motors</i>						
M0050-153-3*	3.9	24	20	50	22.5	.159
M0100-103-3	7.4	24	30	100	45.0	.318
M0100-103-4	7.7	24	90	100	45.0	.318
M0200-104-4	6.4	48	180	200	90.6	.64
M0200-154-4*	6.4	48	180	200	90.6	.64
<i>N series NEMA motors</i>						
N0100-103-A	7.4	24	30	100	45.0	.318
N0100-103-B	7.7	24	90	100	45.0	.318
N0100-153-B*	7.7	24	90	100	45.0	.318
N0200-104-B	6.4	48	180	200	90.6	.64
N0200-154-B*	6.4	48	180	200	90.6	.64
<i>low cost ValueLine NEMA 23 motors</i>						
VL23-020D	6.6	24	103	72	32.6	.23
VL23-021D	3.0	48	103	72	32.6	.23
VL23-030D	7.9	24	190	132	59.4	.42
VL23-031D	4.8	48	190	132	59.4	.42
<i>A series metric motors, not recommended for new designs</i>						
A0030-103-2	2.90	24	10	30	13.4	.095
A0030-104-2	1.38	48	10	30	13.4	.095
A0050-103-3	3.10	24	23	50	22.5	.159
A0050-104-3	2.00	48	23	50	22.5	.159
A0100-103-3	4.70	24	42	100	45.0	.318
A0100-104-3	4.00	48	42	100	45.0	.318
A0200-104-4	6.68	48	200	200	90.6	.64

* includes brake

¹ continuous (stall) ratings

Note: to connect these motors to a BLU servo drive, an extension cable is required. They are available in lengths of 4, 10 and 20 feet. Please contact your distributor or call the factory to order.

Other People's Motors

If you want to use a motor other than those recommended here, it must be a three phase motor with 120° commutation timing. The motor must also have an incremental encoder (index signal is not required) with no fewer than 100 lines and no greater than 12,500 lines. The halls and encoder must operate from +5VDC, 200 mA max (supplied by the BLU drive). The hall signals may be single-ended or differential. We strongly recommend that the encoder have differential line driver outputs, but single-ended may be acceptable if you use a shielded cable.

The BLU servo drives feature sine commutation, which makes motors run more smoothly than trapezoidal drives. *If you choose a low cost motor with internal hall effect devices instead of a quality motor with precision commutation tracks on the encoder disk, your performance may suffer.*

Setting Drive Current Limits

The BLUDC allows the user to set both the Motor Continuous and Peak current limits. Current settings are an RMS value. Using the QuickTuner™ the current settings can be uploaded and downloaded.

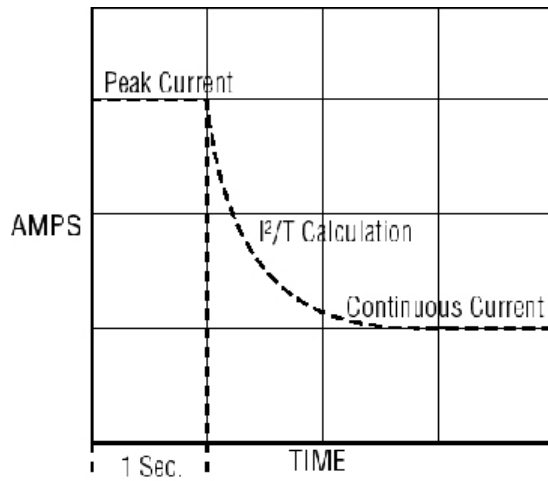
Setting the current limits requires the user to know the limitations of the motor. In most cases referring to the motor manufacturers specification will give the proper information. For AMP motors, motor settings are available in parameter files that are located on the PC where QuickTuner™ was installed.

What is “Peak Current Limit”?

The BLUDC uses this current value to establish the maximum possible RMS current that will be driven to the motor. The peak current time is set to one second. That is, if the drive attempts to run at peak current for more than one second it will fold back the current to the continuous current setting.

The peak current time is actually calculated on a curve using an I^2/T method. For current values that

are less than the peak but greater than the continuous, the current foldback time is calculated from the peak and continuous settings. As shown in the diagram below, current values below the peak value can be used for longer periods of time.



Mounting the Drive

BLUDC4-Q and BLUDC4-S

These compact, low cost drives consist of a single printed circuit board with a mounting hole in each corner. We include four plastic spacers with the drive. These spacers snap into the holes in the BLuDC4 drive and can be secured to a panel with #6-32 self tapping screws. The hole pattern and drive outline are shown on page 28.

BLUDC4-SE & -QE

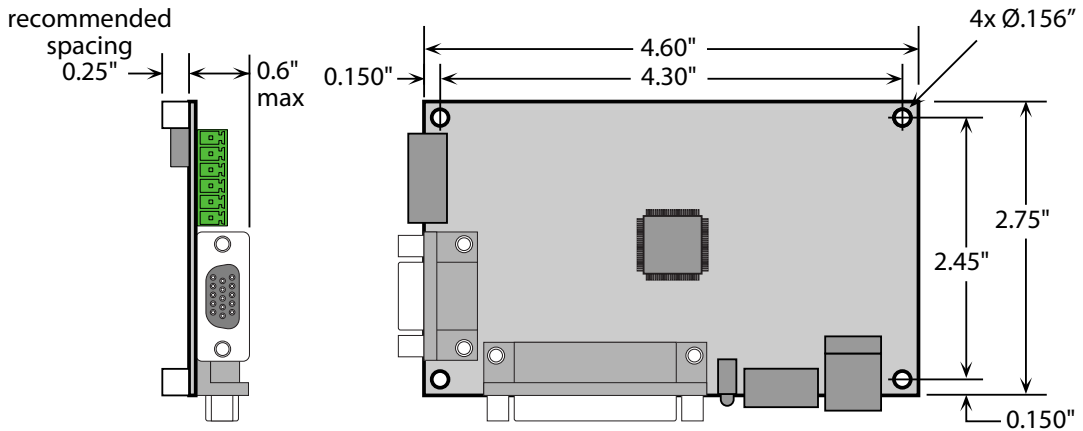
These drives have two pc boards fixed together. Plastic mounting feet which accept #4-40 screws are built-in. The hole pattern and drive outline are shown on page 28.

BLUDC9 (all models)

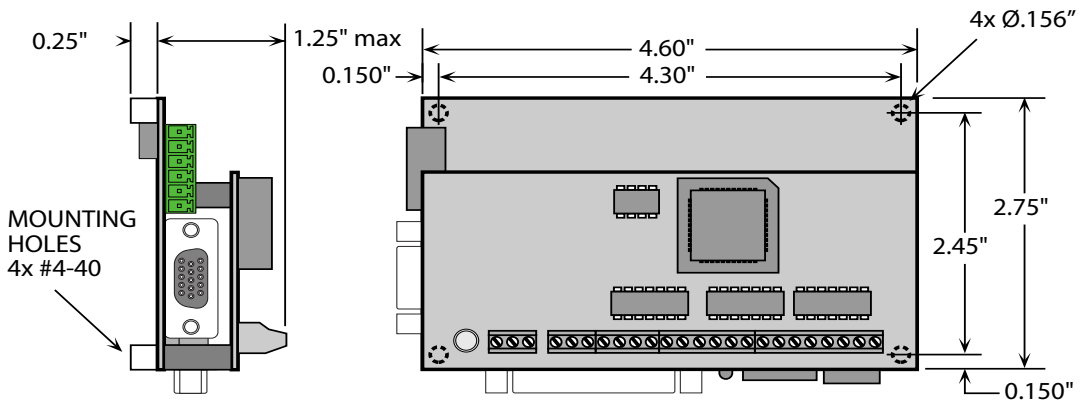
These drives can be mounted on the narrow (1.48 x 5.35) side or the wide (2.9 x 5.35) side. Either way, you'll need two #6 screws to secure the drive using the 0.17" mounting slots. The hole pattern and drive outline are shown on page 28

- ***Never use your drive in a space where there is no air flow or where other devices cause the surrounding air to be more than 40°C.***
- ***Never put the drive where it can get wet or where metal particles can get on it.***
- ***Always provide air flow around the drive. The BLUDC4 can only eliminate excess heat by convection , so make sure it has air flow above and below the circuit board.***

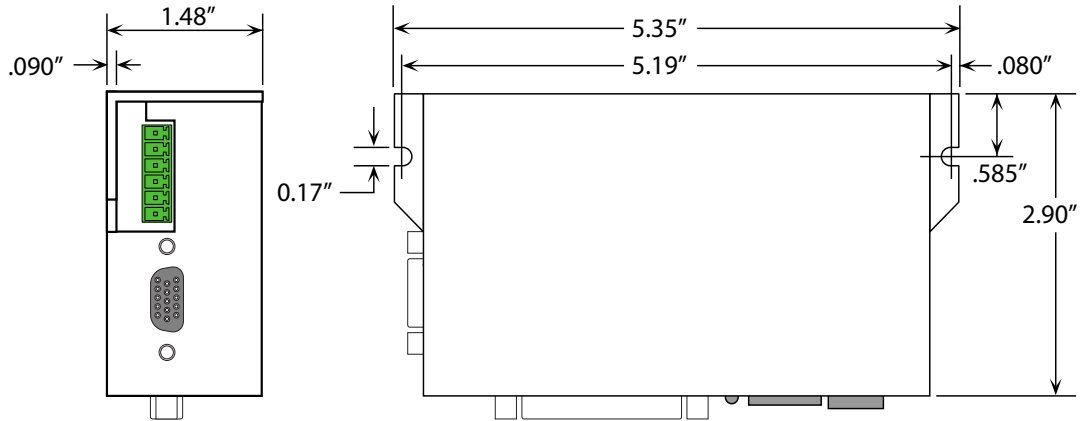
Mechanical Outlines



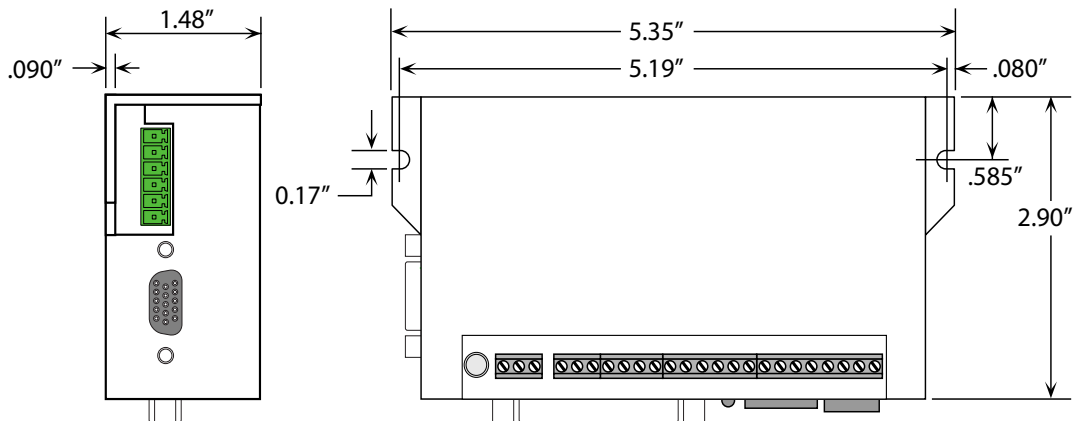
BLUDC4-S & -Q



BLUDC4-SE & -QE



BLUDC9-S & -Q



BLUDC9-SE & -QE

Technical Specifications

Amplifier	Sine commutation MOSFET. 16 kHz PWM. 18 - 53 VDC input BLUDC4 motor current: 4.5A continuous, 13.5A peak BLUDC9 motor current: 9A continuous, 18A peak
Digital Inputs	Step/PWM & Direction: differential, optically isolated, 5V logic. 330 ohms internal resistance. 0.5 μ sec minimum pulse width. 2 μ sec minimum set up time for direction signal. All other digital inputs: optically isolated, 12 - 24V logic. 2200 ohms. Maximum current: 10 mA
Analog Inputs	\pm 10VDC, 12 bit ADC
Outputs	Photodarlington, 100 mA, 30 VDC max. Voltage drop: 1.2V max at 100 mA.
Encoder Output	26C31 line driver
Physical	BLUDC4-S,-Q: 0.85 x 2.75 x 4.6 inches overall. 3.1 oz (87 g) -SE,-QE: 1.50 x 2.75 x 4.6 inches overall. 5.0 oz (140 g) BLUDC9: 1.48 x 5.35 x 2.90 inches overall. 10 oz (280 g) Ambient temperature range: 0 to 40° C.
Position Feedback	Hall signals (U,V,W) and incremental encoder (A/B quadrature). Encoder line counts between 50 and 32,000 lines (200 and 128,000 quadrature counts). Maximum frequency is 2 MHz in quadrature counts.

Mating Connectors and Accessories

Mating Connectors

Motor/power supply: PCD P/N ELVP06100, included with drive.

X1-X7 & Y1-Y3: DB-25 male. AMP P/N 747912-2. Shell Kit AMP P/N748678-3. Included.

Motor feedback: HD-15 male. Norcomp P/N 180-015-102-001. Shell Kit AMP P/N 748678-1. Not included.

Accessories

Motor Cables for Applied Motion “A”, “N” and “M” series servo motors:

BLUMTR-CA-04, four foot shielded cable

BLUMTR-CA-10, ten foot shielded cable

BLUMTR-CA-20, twenty foot shielded cable

Encoder Cables for Applied Motion “A”, “N” and “M” series servo motors:

BLUENC-CA-04, four foot shielded cable

BLUENC-CA-10, ten foot shielded cable

BLUENC-CA-20, twenty foot shielded cable

Breakout Box for DB-25 Connectors

BOB-1, includes cable

Screw Terminal Connectors that mate directly to the DB-25 connector on the front panel of the drive:

Phoenix Contact P/N [2761622](#)

This connector is not available from Applied Motion. You must purchase it from a [Phoenix distributor](#).

Mating Cable for IN/OUT connector with “flying leads”

Black Box P/N: BC00702

This cable is not available from Applied Motion. You must purchase it from [Black Box](#).

Useful for custom wired applications. This shielded cable has a DB-25 connector on each end. You can cut off the female end to create a 6 foot “DB-25 to flying lead cable”.

It'll be easier to wire if you get the [cable color chart from Black Box's web site](#).

Regeneration Clamp:

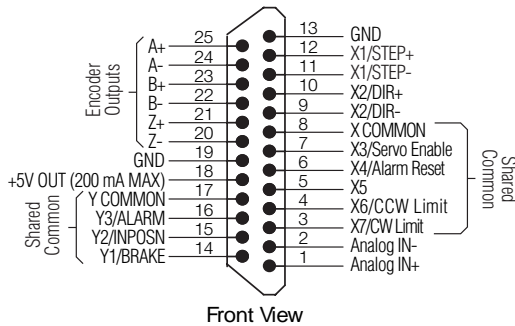
Applied Motion Products [RC050](#).

Alarm Codes

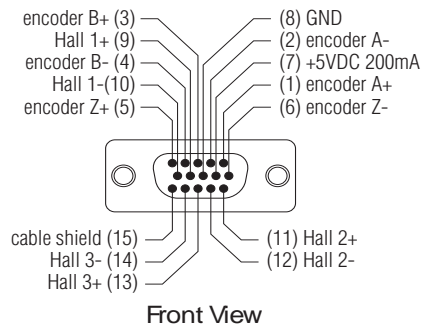
In the event of an error, the green LED on the main board will flash one or two times, followed by a series of red flashes. The pattern repeats until the alarm is cleared.

Code	Error
1 red, 1 green	position error exceeds fault limit
1 red, 2 green	move attempted while motor disabled
2 red, 1 green	ccw limit
2 red, 2 green	cw limit
3 red, 1 green	drive internal temperature exceeds 85°C
3 red, 2 green	internal voltage out of range
4 red, 1 green	power supply voltage is more than 55 VDC
4 red, 2 green	power supply voltage is less than 18 VDC
5 red, 1 green	over current / short circuit
5 red, 2 green	current limit
6 red, 1 green	bad commutation(Hall) signal
6 red, 2 green	bad encoder signal
7 red, 1 green	serial communication error
solid green	no alarm, motor disabled
flashing green	no alarm, motor enabled

Connector Diagrams



DB-25 I/O Connector



HD-15 Encoder Connector

RS-485/422

GND
TX-
TX+
RX-
RX+



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