

HBS Series Hybrid Servo Drive

Datasheet



Version HBS-2014-01

<http://www.PrimoPal.com>

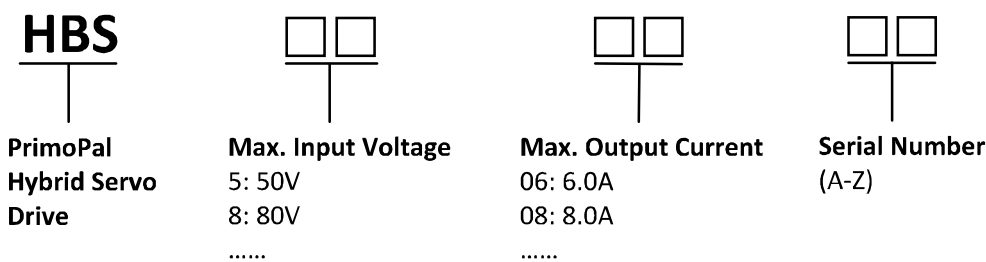
Description

PrimoPal's HBS series Hybrid Servo Drive offers an alternative for applications requiring high performance and high reliability when the servo was the only choice, while it remains cost-effective. The system includes a stepper motor combined with a fully digital, high performance drive and an internal encoder which is used to close the position, velocity and current loops in real time, just like servo systems. They are featured with closed position loop, offering huge torque, excellent acceleration & quick response, no torque reservation, high standstill stiffness, extra low noise & heating, smooth motor movement, no hunting, no overshooting for almost zero settling time, and no tuning for almost all applications.

Applications

PrimoPal's HBS series Hybrid Servo Drives are suitable for both upgrading conventional stepper systems, and replacing brushless servo systems which have closed loop and high torque requirements. These hybrid servo drives and matching closed-loop stepper motors have been successfully implemented by many OEM clients in applications such as CNC routers, plasma, milling machines, engravers, packaging machines, printing equipment, and so on.

Part Number



PrimoPal's Hybrid Servo Drives Summary

Model	Phase	Output Current	Operating Voltage		Driving Motors	Configuration	Control Type
			AC	DC			
HBS507	3	0.5-8.0	N/A	20-50	23-24	DIP Switch / RS232	Step & Dir
HBS806	2	0.5-8.2	N/A	24-80	23-34	DIP Switch / RS232	Step & Dir
HBS806AC	2	0.5-8.0	20-70	30-100	34	DIP Switch / RS232	Step & Dir
HBS1108AC	2	0.5-8.0	90-130	127-184	34-42	HMI / RS232	Step & Dir
HBS2206AC	2	0.5-6.0	150-230	212-325	34-42	HMI / RS232	Step & Dir

HBS507 Hybrid Servo Drive

20-50VDC, 8.0A Peak, Closed-loop, No Tuning

- Closed-loop, eliminates loss of synchronization
- Broader operating range – higher torque and higher speed
- Reduced motor heating and more efficient
- Smooth motion and super-low motor noise
- Do not need a high torque margin
- No Tuning and always stable
- Quick response, no delay and almost no settle time
- High torque at starting and low speed, high stiffness at standstill
- Offer servo-like performance at a much lower cost



Specifications

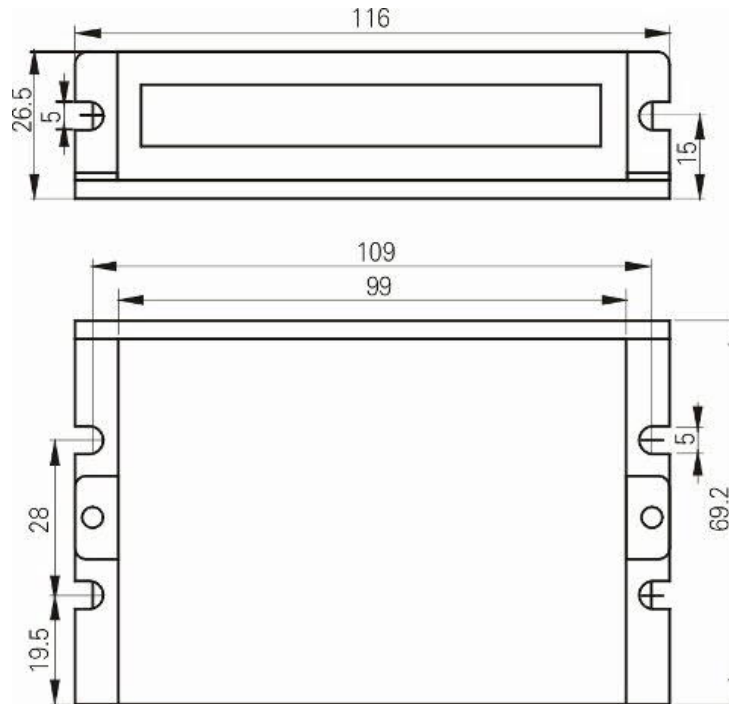
Electrical Specifications

Parameter	Min	Typical	Max	Unit
Input Voltage	20	36	50	VDC
Output Current	0	-	8.0(Peak)	A
Pulse Input Frequency	0	-	200	kHz
Logic Signal Current	7	10	16	mA
Isolation Resistance	500	-	-	MΩ

Operating Environment

Cooling	Natural Cooling or Forced cooling	
Operating Environment	Environment	Avoid dust, oil fog and corrosive gases
	Ambient Temperature	0°C — 50°C (32°F — 122°F)
	Humidity	40%RH — 90%RH
	Operating Temperature (Heat sink)	70°C (158°F) Max
	Vibration	5.9m/s ² Max
Storage Temperature	-20°C — 65°C (-4°F — 149°F)	
Weight	280g (10.0oz)	

Mechanical Specifications



Protection Indications

Priority	Time(s) of Blink	Sequence wave of RED LED	Description
1 st	1	<p>The diagram shows a single long pulse followed by a long gap, indicating a single blink.</p>	Over-current protection
2 nd	2	<p>The diagram shows two short pulses followed by a long gap, indicating two blinks.</p>	Over-voltage protection
3 rd	7	<p>The diagram shows seven short pulses followed by a long gap, indicating seven blinks.</p>	Position Following Error

Connectors and Pin Assignment

The HBS507 has three connectors, connector for control signals connections, connector for encoder feedback and connector for power and motor connections.

Control Signal Connector - Screw Terminal			
Pin	Pin Function	I/O	Description
1	PUL+	I	<p><u>Pulse signal</u>: In single pulse (pulse/direction) mode, this input represents pulse signal, each rising or falling edge active (software configurable, see the software operational manual for more details); In double pulse mode (software configurable), this input represents clockwise (CW) pulse, active both at high level and low level. 4-5V when PUL-HIGH, 0-0.5V when PUL-LOW. For reliable response, pulse width should be longer than 2.5μs. Series connect resistors for current-limiting when +12V or +24V used. The same as DIR and ENA signals.</p>
2	PUL-	I	
3	DIR+	I	<p><u>Direction Signal</u>: In single-pulse mode, this signal has low/high voltage levels, representing two directions of motor rotation. In double-pulse mode (software configurable), this signal is counter-clock (CCW) pulse, active both at high level and low level. For reliable motion response, DIR signal should be ahead of PUL signal by 5μs at least. 4-5V when DIR-HIGH, 0-0.5V when DIR-LOW. Toggle DIP switch SW1 to reverse motion direction.</p>
4	DIR-	I	
5	ENA+	I	<p><u>Enable Signal</u>: This signal is used for enabling/disabling the driver. In default, high level (NPN control signal) for enabling the driver and low level for disabling the driver. Usually left UNCONNECTED (ENABLED). Please note that PNP and Differential control signals are on the contrary, namely low level for enabling. The active level of ENA signal is software configurable.</p>
6	ENA-	I	
7	ALM+	O	<p><u>Alarm Signal</u>: OC output signal, active when one of the following protection is activated: over-voltage, over current, short circuit and position following error. This port can sink or source 20mA current at 24V. In default, the resistance between ALM+ and ALM- is low impedance in normal operation and become high when the HBS57 goes into error. The active level of alarm signal is software configurable. See the software operational manual for more details.</p>
8	ALM-	O	

Encoder Feedback Connector – HDD15 Female			
Pin	Name	I/O	Description
1	EA+	I	Encoder channel A+ input
2	EB+	I	Encoder channel B+ input
3	EGD	GND	Signal ground
4	NC	I	Not Connected, Reserved for future use.
5	NC	I	Not Connected, Reserved for future use.
6	FG	-	Ground terminal for shielded
7	NC	I	Not Connected, Reserved for future use.
8	NC	I	Not Connected, Reserved for future use.
9	NC	I	Not Connected, Reserved for future use.
10	NC	-	Not Connected
11	EA-	I	Encoder channel A- input
12	EB-	I	Encoder channel B- input

Connectors and Pin Assignment (Continued)

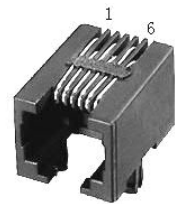
Encoder Feedback Connector – HDD15 Female			
Pin	Name	I/O	Description
13	VCC	O	+5V @100 mA max.
14	NC	-	Not Connected
15	NC	-	Not Connected

Power and Motor Connector- Screw Terminal			
Pin	Name	I/O	Description
1	U	O	Motor Phase U
2	V	O	Motor Phase V
3	W	O	Motor Phase W
4	+VDC	I	Power Supply Input (Positive) 20-45VDC recommended, leaving room for voltage fluctuation and back-EMF.
5	GND	GND	Power Ground (Negative)

RS232 Communication Port

It is used to configure the peak current, microstep, active level, current loop parameters and anti-resonance parameters.

RS232 Communication Port			
Pin	Name	I/O	Description
1	NC	-	Not connected.
2	+5V	O	+5V power output.
3	TxD	O	RS232 transmit.
4	GND	GND	Ground.
5	RxD	I	RS232 receive.
6	NC	-	Not connected.



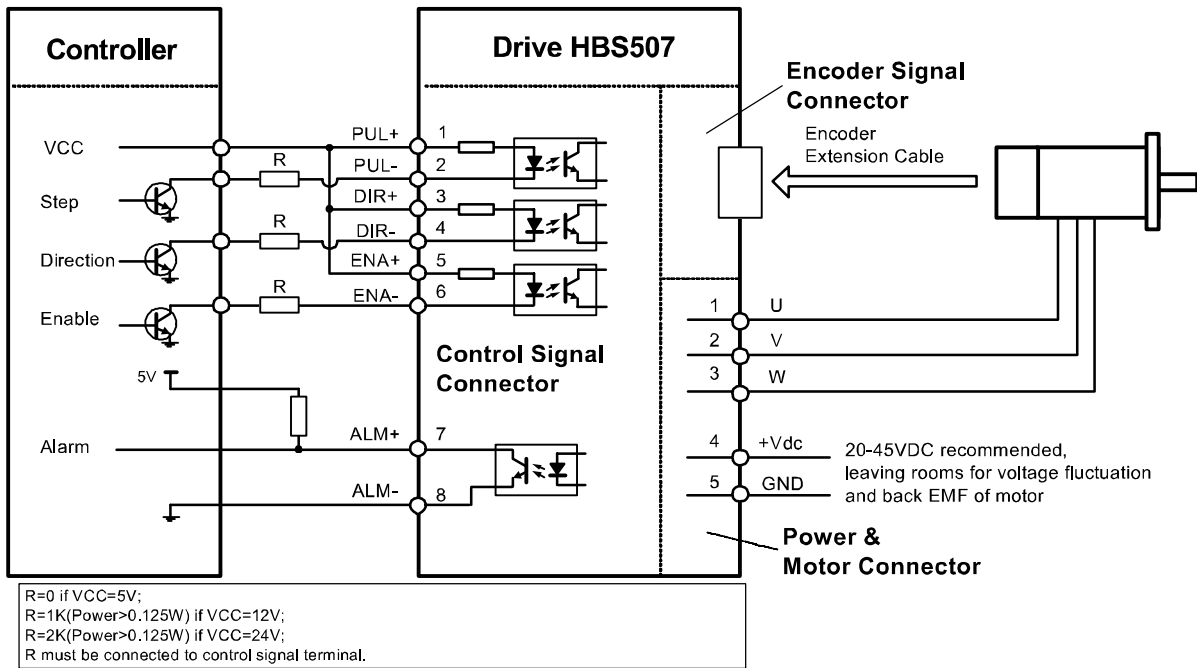
DIP Switch - Motor SEL

The SW1 can be used to change the motor direction. The SW2 is reserved for future use.

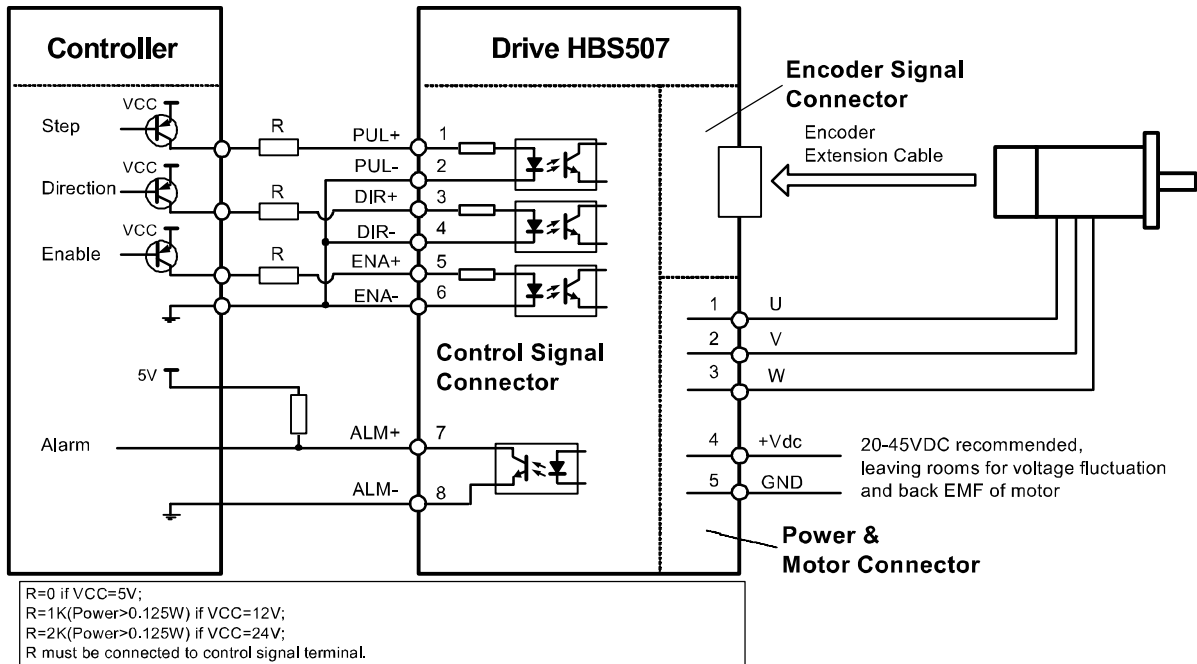
Current Control

The motor current will be adjusted automatically regarding to the load or the stator-rotor relationship. However, the user can also configure the current in the tuning software. The configurable parameters include close-loop current, holding current, encoder resolution, micro step and etc.

Typical Connections

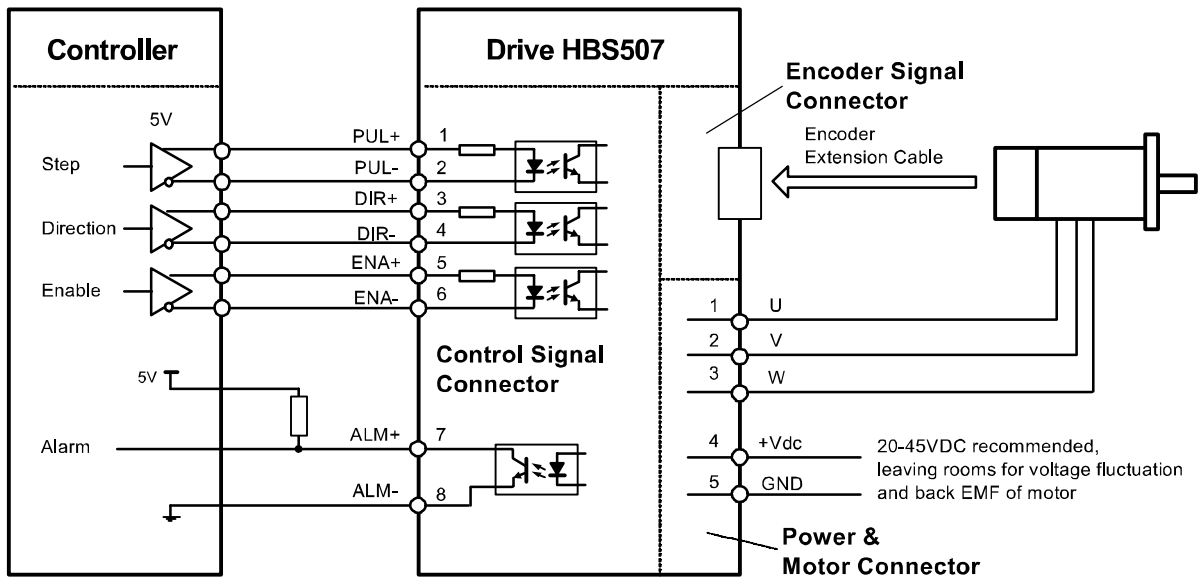


Connections to controller of sinking output



Connections to controller of sourcing output

Typical Connections (Continued)



Connections to controller of differential output

HBS806 Hybrid Servo Drive

30-80VDC, 8.2A Peak, Closed-loop, No Tuning

- Closed-loop, eliminates loss of synchronization
- Broader operating range – higher torque and higher speed
- Reduced motor heating and more efficient
- Smooth motion and super-low motor noise
- Do not need a high torque margin
- No Tuning and always stable
- Quick response, no delay and almost no settle time
- High torque at starting and low speed, high stiffness at standstill
- Offer servo-like performance at a much lower cost



Specifications

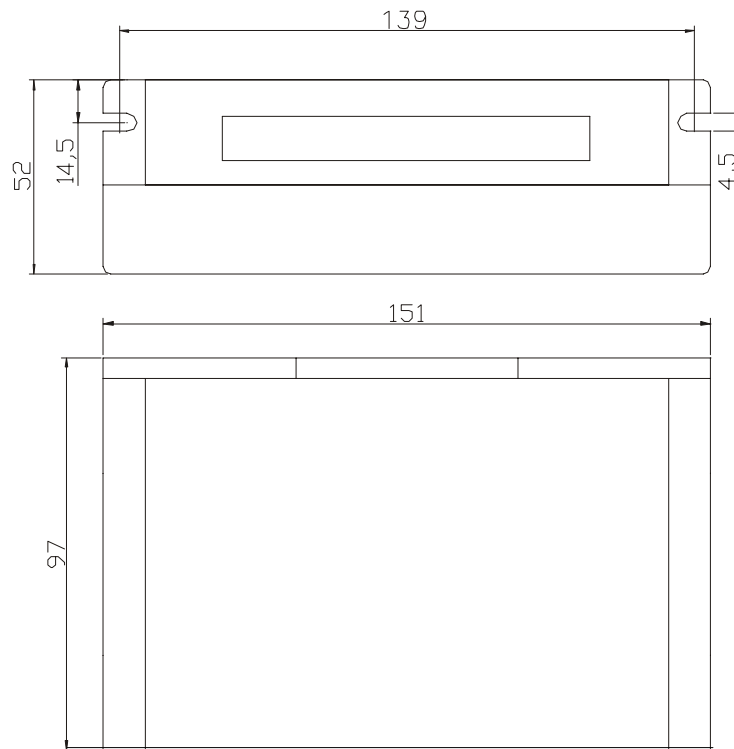
Electrical Specifications

Parameter	Min	Typical	Max	Unit
Input Voltage	30	48	80	VDC
Output Current	0	-	8.2(Peak)	A
Pulse Input Frequency	0	-	200	kHz
Logic Signal Current	7	10	16	mA
Isolation Resistance	500	-	-	MΩ

Operating Environment

Cooling	Natural Cooling or Forced cooling	
Operating Environment	Environment	Avoid dust, oil fog and corrosive gases
	Ambient Temperature	0°C — 50°C (32°F — 122°F)
	Humidity	40%RH — 90%RH
	Operating Temperature (Heat sink)	70°C (158°F) Max
	Vibration	5.9m/s ² Max
Storage Temperature	-20°C — 65°C (-4°F — 149°F)	
Weight	580g (20.5oz)	

Mechanical Specifications



Protection Indications

Priority	Time(s) of Blink	Sequence wave of RED LED	Description
1 st	1		Over-current protection
2 nd	2		Over-voltage protection
3 rd	7		Position Following Error

Connectors and Pin Assignment

The HBS806 has three connectors, connector for control signals connections, connector for encoder feedback and connector for power and motor connections.

Control Signal Connector - Screw Terminal			
Pin	Pin Function	I/O	Description
1	PUL+	I	<p>Pulse signal: In single pulse (pulse/direction) mode, this input represents pulse signal, each rising or falling edge active (software configurable, see the software operational manual for more details); In double pulse mode (software configurable), this input represents clockwise (CW) pulse, active both at high level and low level. 4.5-24V when PUL-HIGH, 0-0.5V when PUL-LOW. For reliable response, pulse width should be longer than 2.5μs.</p>
2	PUL-	I	
3	DIR+	I	<p>Direction Signal: In single-pulse mode, this signal has low/high voltage levels, representing two directions of motor rotation. In double-pulse mode (software configurable), this signal is counter-clock (CCW) pulse, active both at high level and low level. For reliable motion response, DIR signal should be ahead of PUL signal by 5μs at least. 4.5-24V when DIR-HIGH, 0-0.5V when DIR-LOW. Please note that rotation direction is also related to motor-driver-encoder wiring match. Exchanging both the connection of two wires for a coil and an encoder channel to the driver he connection will reverse motion direction. Or you can toggle the SW5 to reverse the motion direction.</p>
4	DIR-	I	
5	ENA+	I	<p>Enable signal: This signal is used for enabling/disabling the driver. In default, high level (NPN control signal) for enabling the driver and low level for disabling the driver. Usually left UNCONNECTED (ENABLED). Please note that PNP and Differential control signals are on the contrary, namely Low level for enabling. The active level of ENA signal is software configurable.</p>
6	ENA-	I	
7	Pend+	O	<p>In-position Signal: OC output signal, active when the difference between the actual position and the command position is zero. This port can sink or source 20mA current at 24V. The resistance between Pend+ and Pend- is active at high impedance.</p>
8	Pend-	O	
9	ALM+	O	<p>Alarm Signal: OC output signal, active when one of the following protection is activated: over-voltage, over current and position following error. This port can sink or source 20mA current at 24V. In default, the resistance between ALM+ and ALM- is low impedance in normal operation and become high when HBS806 goes into error. The active level of alarm signal is software configurable. See Hybrid servo software operational manual for more detail.</p>
10	ALM-	O	

Encoder Feedback Connector - Screw Terminal			
Pin	Name	I/O	Description
1	EB+	I	Encoder channel B+ input
2	EB-	I	Encoder channel B- input
3	EA+	I	Encoder channel A+ input
4	EA-	I	Encoder channel A- input
5	VCC	O	+5V @100 mA max.
6	EGND	GND	Signal ground

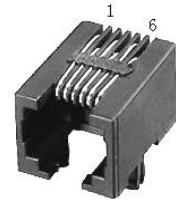
Connectors and Pin Assignment (Continued)

Power and Motor Connector- Screw Terminal			
Pin	Name	I/O	Description
1	A+	O	Motor Phase A+
2	A-	O	Motor Phase A-
3	B+	O	Motor Phase B+
4	B-	O	Motor Phase B-
5	+VDC	I	Power Supply Input (Positive) 30-72VDC recommended, leaving rooms for voltage fluctuation and back-EMF.
6	GND	GND	Power Ground (Negative)

RS232 Communication Port

It is used to configure the peak current, microstep, active level, current loop parameters and anti-resonance parameters.

RS232 Communication Port			
Pin	Name	I/O	Description
1	NC	-	Not connected.
2	+5V	O	+5V power only for STU (Simple Tuning Unit).
3	TxD	O	RS232 transmit.
4	GND	GND	Ground.
5	RxD	I	RS232 receive.
6	NC	-	Not connected.



DIP Switch Settings

Microstep Resolution (SW1-SW4)

Steps/Revolution	SW1	SW2	SW3	SW4
Software Configured (Default 200)	ON	ON	ON	ON
800	OFF	ON	ON	ON
1600	ON	OFF	ON	ON
3200	OFF	OFF	ON	ON
6400	ON	ON	OFF	ON
12800	OFF	ON	OFF	ON
25600	ON	OFF	OFF	ON
51200	OFF	OFF	OFF	ON
1000	ON	ON	ON	OFF
2000	OFF	ON	ON	OFF
4000	ON	OFF	ON	OFF
5000	OFF	OFF	ON	OFF
8000	ON	ON	OFF	OFF
10000	OFF	ON	OFF	OFF
20000	ON	OFF	OFF	OFF
40000	OFF	OFF	OFF	OFF

DIP Switch Settings (Continued)

Motor Direction (SW5)

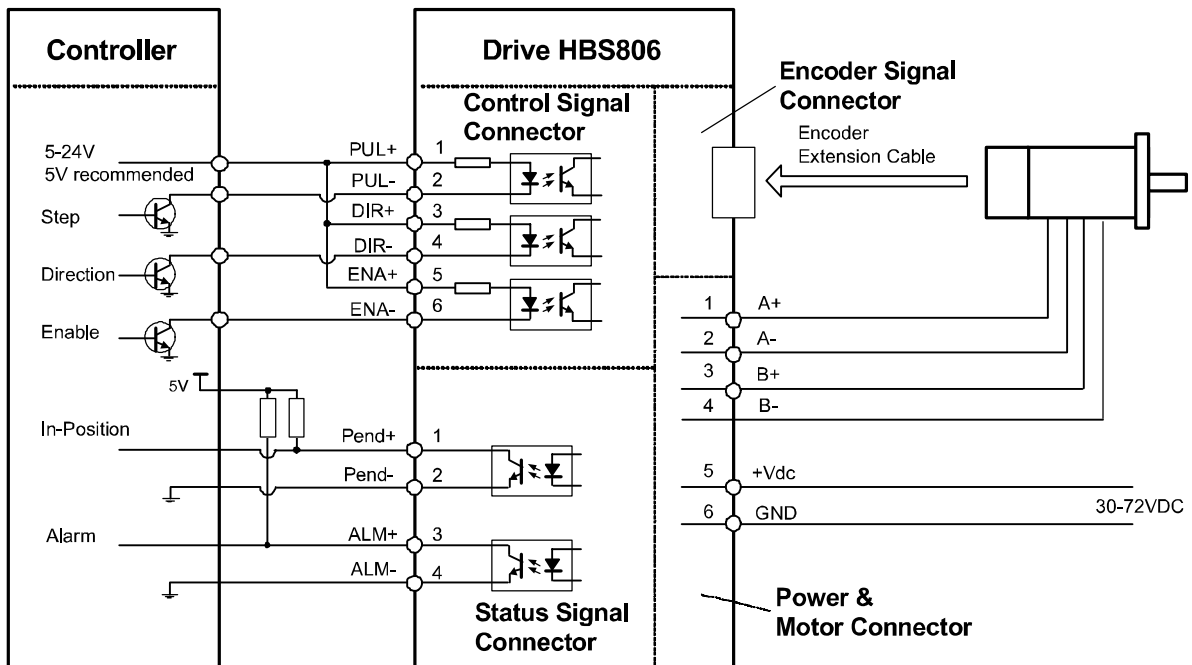
	ON	OFF
SW5	Motor direction is positive.	Motor direction is negative.

Note: The actual motor direction is also related to DIR level.

Current Control

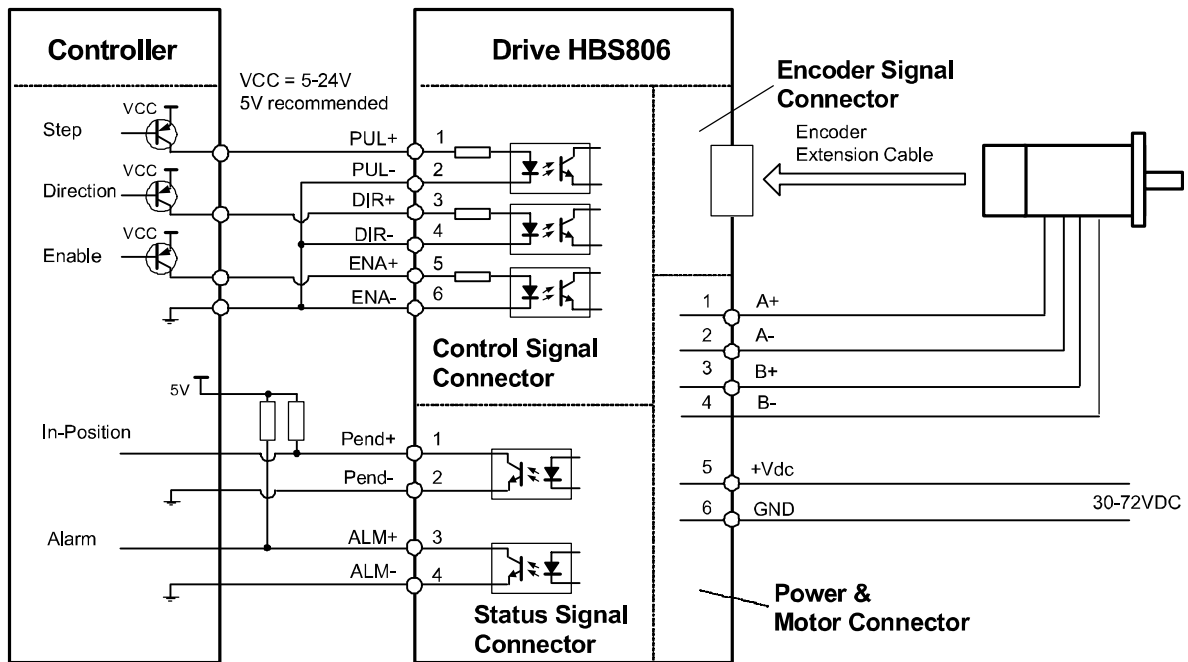
The motor current will be adjusted automatically regarding to the load or the stator-rotor relationship. However, the user can also configure the current in the tuning software. The configurable parameters include close-loop current, holding current, encoder resolution, micro step and etc.

Typical Connections

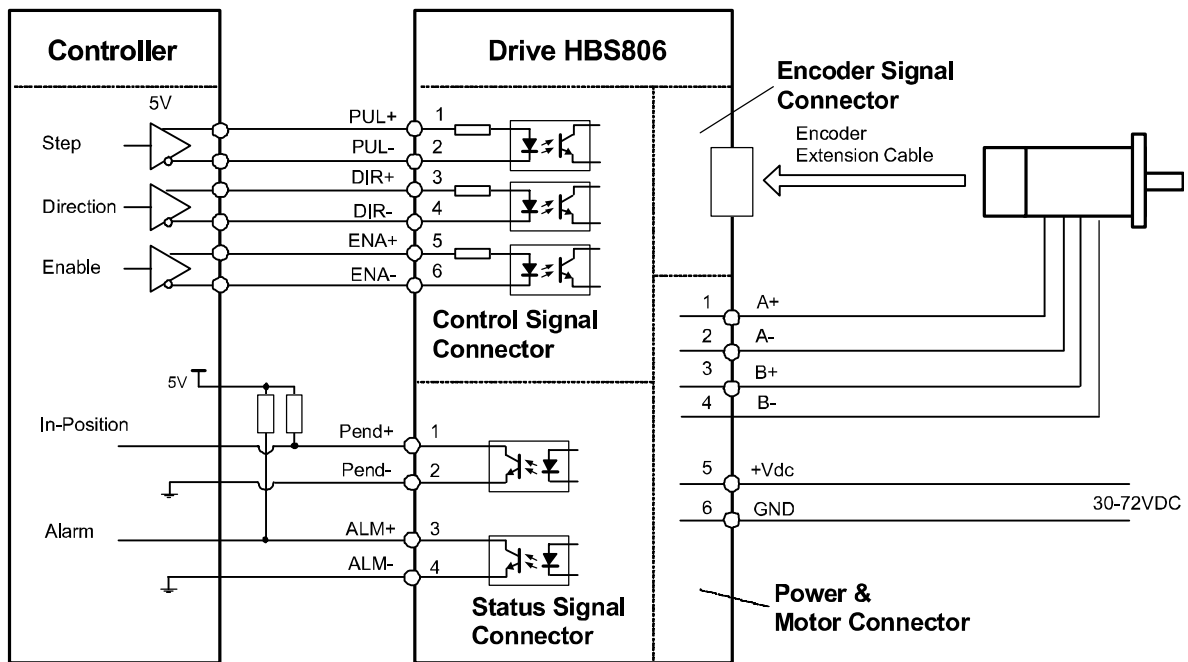


Connections to controller of sinking output

Typical Connections (Continued)



Connections to controller of sourcing output



Connections to controller of differential output

HBS806AC Hybrid Servo Drive

20-70VAC, or 30-100VDC, 8.2A Peak, Closed-loop, No Tuning

- Closed-loop, eliminates loss of synchronization
- Broader operating range – higher torque and higher speed
- Reduced motor heating and more efficient
- Smooth motion and super-low motor noise
- Do not need a high torque margin
- No Tuning and always stable
- Quick response, no delay and almost no settle time
- High torque at starting and low speed, high stiffness at standstill
- Offer servo-like performance at a much lower cost



Specifications

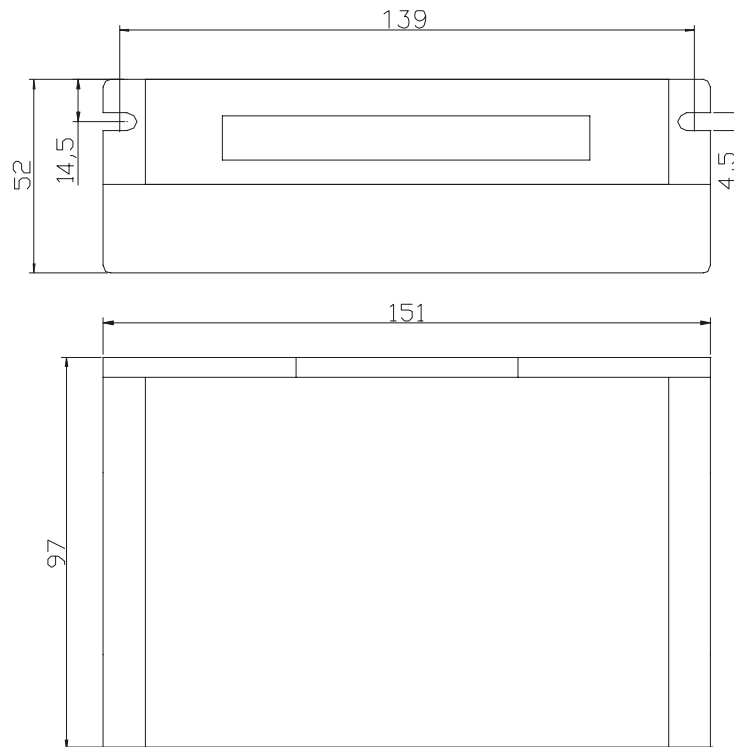
Electrical Specifications

Parameter	Min	Typical	Max	Unit
Input Voltage	30	60	100	VDC
	20	-	70	VAC
Output Current	0	-	8.2(Peak)	A
Pulse Input Frequency	0	-	200	kHz
Logic Signal Current	7	10	16	mA
Isolation Resistance	500	-	-	MΩ

Operating Environment

Cooling	Natural Cooling or Forced cooling	
Operating Environment	Environment	Avoid dust, oil fog and corrosive gases
	Ambient Temperature	0°C — 50°C (32°F — 122°F)
	Humidity	40%RH — 90%RH
	Operating Temperature (Heat sink)	70°C (158°F) Max
	Vibration	5.9m/s ² Max
Storage Temperature	-20°C — 65°C (-4°F — 149°F)	
Weight	580g (20.5oz)	

Mechanical Specifications



Protection Indications

Priority	Time(s) of Blink	Sequence wave of RED LED	Description
1 st	1		Over-current protection
2 nd	2		Over-voltage protection
3 rd	7		Position Following Error

Connectors and Pin Assignment

The HBS806AC has four connectors, connector for control signals connections, connector for stator signal connections, connector for encoder feedback and connector for power and motor connections.

Control Signal Connector - Screw Terminal			
Pin	Name	I/O	Description
1	PUL+	I	<p>Pulse signal: In single pulse (pulse/direction) mode, this input represents pulse signal, each rising or falling edge active (software configurable, see the software operational manual for more detail); In double pulse mode (software configurable), this input represents clockwise (CW) pulse, active both at high level and low level. 4.5-24V when PUL-HIGH, 0-0.5V when PUL-LOW. For reliable response, pulse width should be longer than 2.5μs.</p>
2	PUL-	I	
3	DIR+	I	<p>Direction Signal: In single-pulse mode, this signal has low/high voltage levels, representing two directions of motor rotation. In double-pulse mode (software configurable), this signal is counter-clock (CCW) pulse, active both at high level and low level. For reliable motion response, DIR signal should be ahead of PUL signal by 5μs at least. 4.5-24V when DIR-HIGH, 0-0.5V when DIR-LOW. Please note that rotation direction is also related to motor-driver-encoder wiring match. Exchanging both the connection of two wires for a coil and an encoder channel to the driver he connection will reverse motion direction. Or you can toggle the SW5 to reverse the motion direction.</p>
4	DIR-	I	
5	ENA+	I	<p>Enable signal: This signal is used for enabling/disabling the driver. In default, high level (NPN control signal) for enabling the driver and low level for disabling the driver. Usually left UNCONNECTED (ENABLED). Please note that PNP and Differential control signals are on the contrary, namely Low level for enabling. The active level of ENA signal is software configurable.</p>
6	ENA-	I	
7	Pend+	O	<p>In-position Signal: OC output signal, active when the difference between the actual position and the command position is zero. This port can sink or source 20mA current at 24V. The resistance between Pend+ and Pend- is active at high impedance.</p>
8	Pend-	O	
9	ALM+	O	<p>Alarm Signal: OC output signal, active when one of the following protection is activated: over-voltage, over current and position following error. This port can sink or source 20mA current at 24V. In default, the resistance between ALM+ and ALM- is low impedance in normal operation and become high when the HBS806AC goes into error. The active level of alarm signal is software configurable. See the software operational manual for more detail.</p>
10	ALM-	O	

Encoder Feedback Connector - Screw Terminal			
Pin	Name	I/O	Description
1	EB+	I	Encoder channel B+ input
2	EB-	I	Encoder channel B- input
3	EA+	I	Encoder channel A+ input
4	EA-	I	Encoder channel A- input
5	VCC	O	+5V @100 mA max.
6	EGND	GND	Signal ground

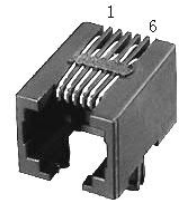
Connectors and Pin Assignment (Continued)

Power and Motor Connector- Screw Terminal			
Pin	Name	I/O	Description
1	A+	O	Motor Phase A+
2	A-	O	Motor Phase A-
3	B+	O	Motor Phase B+
4	B-	O	Motor Phase B-
5	+VDC	I	Power Supply Input (Positive) 20-63VAC or 30-90VDC recommended, leaving rooms for voltage fluctuation and back-EMF.
6	GND	GND	Power Ground (Negative)

RS232 Communication Port

It is used to configure the close-loop current, open-loop current, position following error limit and etc.

RS232 Communication Port			
Pin	Name	I/O	Description
1	NC	-	Not connected.
2	+5V	O	+5V power only for STU (Simple Tuning Unit).
3	TxD	O	RS232 transmit.
4	GND	GND	Ground.
5	RxD	I	RS232 receive.
6	NC	-	Not connected.



DIP Switch Settings

Microstep Resolution (SW1-SW4)

Steps/Revolution	SW1	SW2	SW3	SW4
Software Configured (Default 200)	ON	ON	ON	ON
800	OFF	ON	ON	ON
1600	ON	OFF	ON	ON
3200	OFF	OFF	ON	ON
6400	ON	ON	OFF	ON
12800	OFF	ON	OFF	ON
25600	ON	OFF	OFF	ON
51200	OFF	OFF	OFF	ON
1000	ON	ON	ON	OFF
2000	OFF	ON	ON	OFF
4000	ON	OFF	ON	OFF
5000	OFF	OFF	ON	OFF
8000	ON	ON	OFF	OFF
10000	OFF	ON	OFF	OFF
20000	ON	OFF	OFF	OFF
40000	OFF	OFF	OFF	OFF

DIP Switch Settings (Continued)

Motor Direction (SW5)

	ON	OFF
SW5	Motor direction is positive.	Motor direction is negative.

Note: The actual motor direction is also related to DIR level.

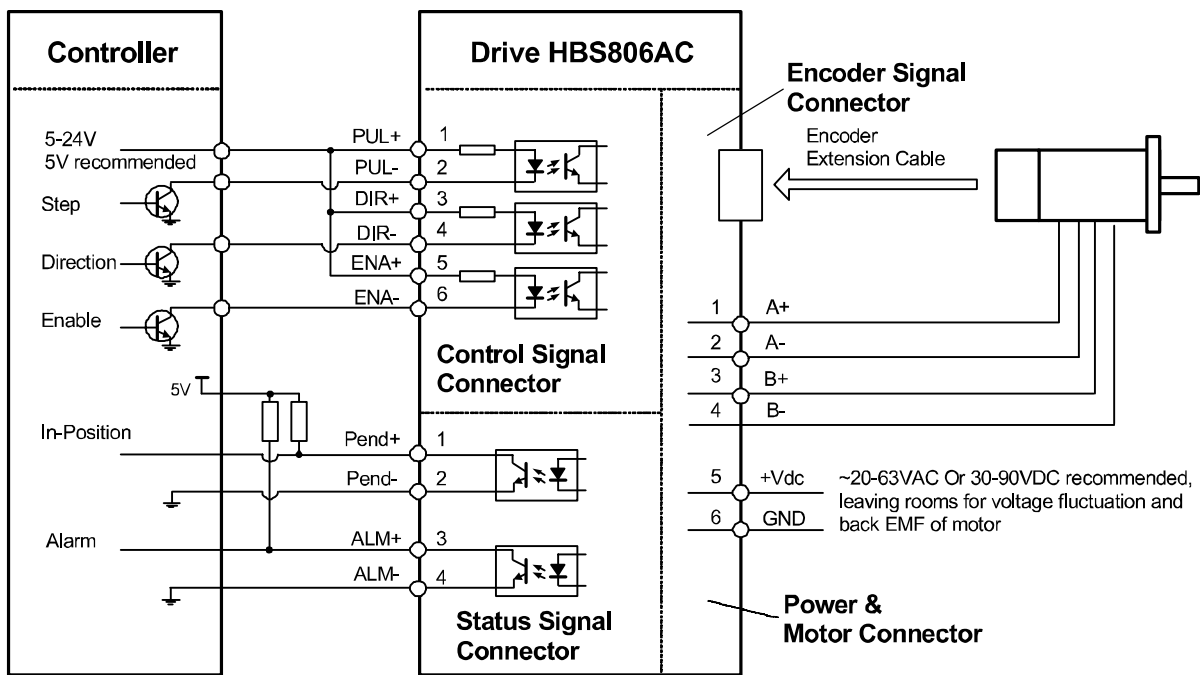
Motor Selection (SW6)

It is reserved for future use. Now it has no function for SW6.

Current Control

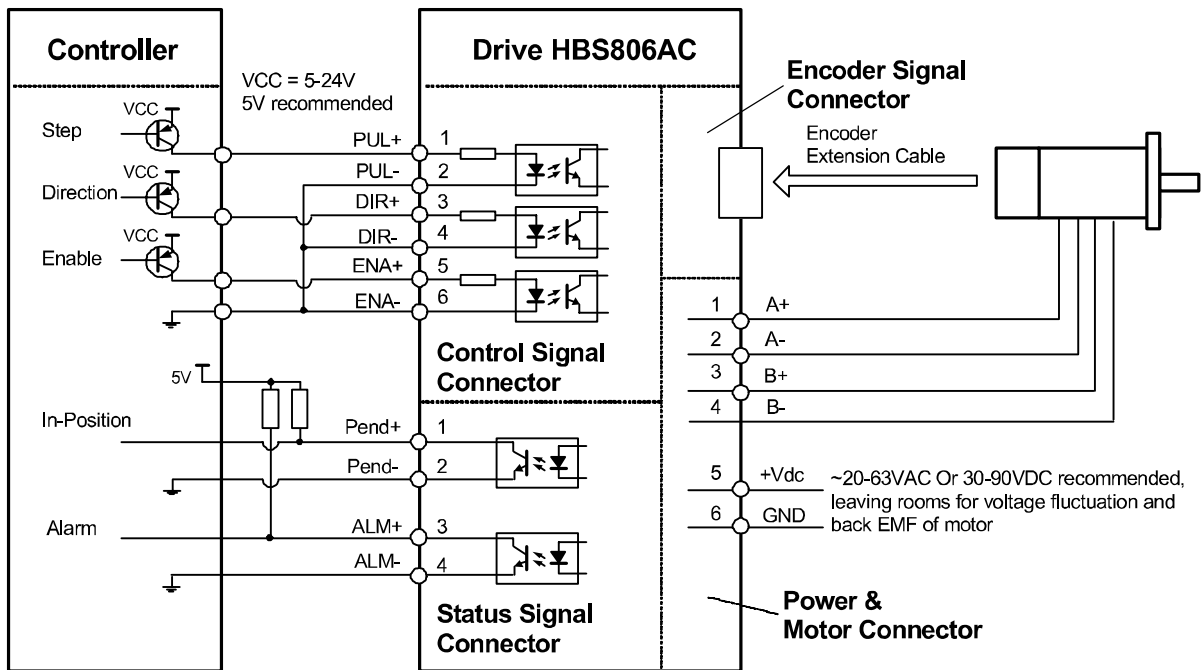
The motor current will be adjusted automatically regarding to the load or the stator-rotor relationship. However, the user can also configure the current in the tuning software. The configurable parameters include close-loop current, holding current, encoder resolution, micro step and etc.

Typical Connections

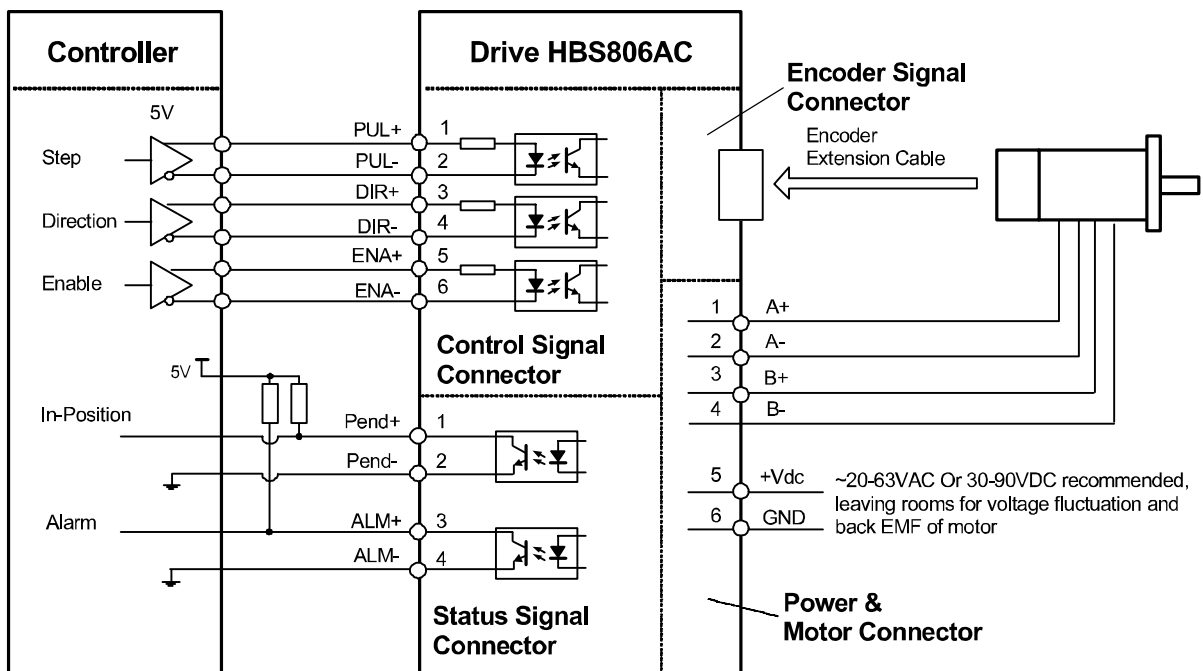


Connections to controller of sinking output

Typical Connections (Continued)



Connections to controller of sourcing output



Connections to controller of differential output

HBS1108AC Hybrid Servo Drive

70-130VAC, 8.0A Peak, Closed-loop, No Tuning



- Combine advantages of open-loop stepper systems and BLDC servo systems
- Closed-loop controls to eliminate loss of steps, stall or movement synchronization
- High starting torque and quick response
- Smooth motor movement with no vibration
- Excellent respond time, quick acceleration, and very high high-speed torque (30% over open-loop)
- Load-dependent dynamic current output from drive to motor to significantly motor heating deduction
- Input voltage from 70 to 130 VAC; MAX 8.0A peak current output from drive to motor
- Micro step resolution value from 200-51,200 (increased by 1) via software configuration
- Isolated control inputs of Pulse, Direction and Enable
- No tuning for plug and play setup
- On-board HMI for easy setup and configuration
- In-position and fault outputs to external motion controllers for complete system controls.
- Over voltage, over-current, and position-error protection
- Servo control for stepper motors with encoders up to NEMA 42

Specifications

Electrical Specifications

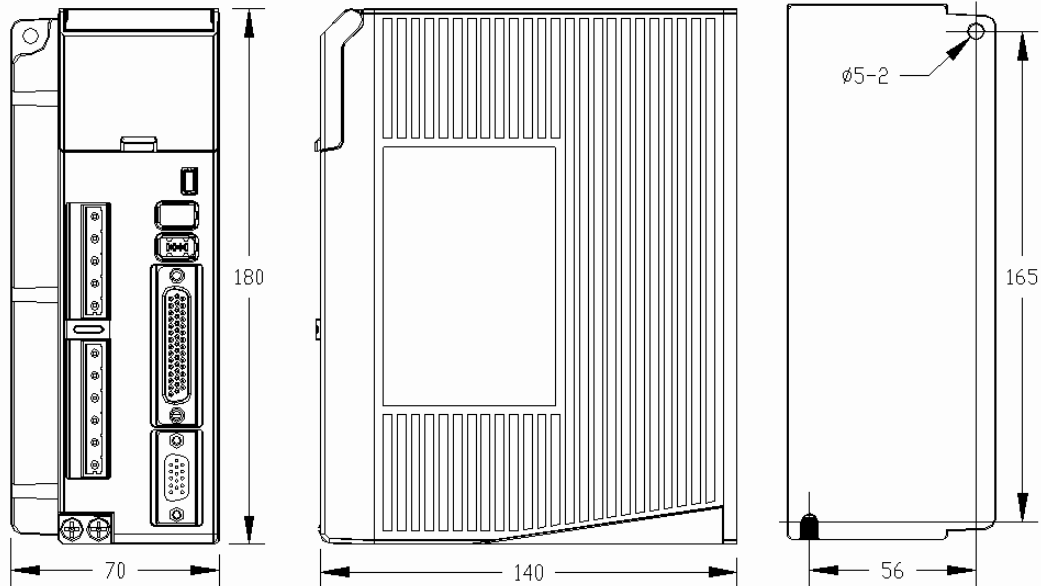
Operating Voltage	70 - 130 VAC
Maximum Continuous Current	6.0 A
MAX Step Frequency	200KHz or 500KHz (Software Configuration)
Step, Direction and Enable Voltage	5 – 24 V
Logic Signal Input Current	7 – 20 mA

Control Specifications

Command Input	Step/Direction, CW/CCW
Enable/Disable Input	Differential
Alarm Signal Output	Isolated OC Output
Configuration Interface	On-board HMI or RS232 communication
Regeneration Resistor	No

Mechanical Specifications

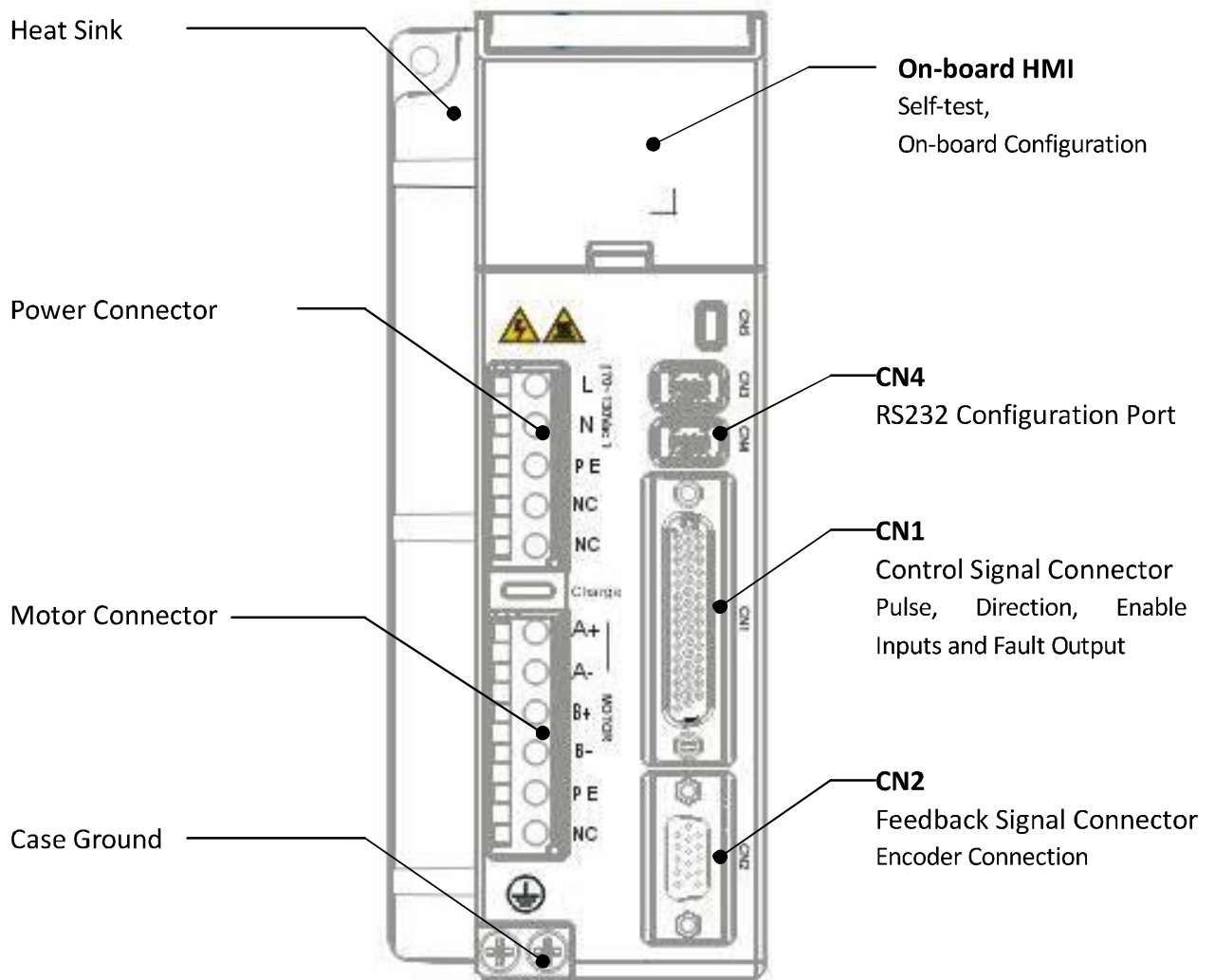
Size	180mm * 140mm * 70mm
Weight	1500 g



Operating Environment

Cooling	Natural Cooling or Forced cooling
Ambient Temperature	0°C — 40°C
Humidity	40% RH to 90% RH, No Condensation
Vibration	5.9m/s ² Max
Storage Temperature	-20 °C to 80 °C

Drive Appearance and Interfaces



Connectors and Pin Assignment

CN1 - Control Signal Connector			
D-Sub, 26 Pin, Female			
Pin	Name	I/O	Description
1	NC	-	No connection.
2	NC	-	No connection.
3	PUL+	I	<p><u>Pulse signal:</u> In single pulse (pulse/direction) mode, this input represents pulse signal, each rising or falling edge active (software configurable); In double pulse mode (software configurable), this input represents clockwise (CW) pulse, active both at high level and low level. 5-24V when PUL-HIGH, 0-0.5V when PUL-LOW. For reliable response, pulse width should be longer than 2.5uS(200K bandwidth) or 1uS(500K bandwidth)</p>
4	PUL-	I	
5	DIR+	I	<p><u>Direction Signal:</u> In single-pulse mode, this signal has low/high voltage levels, representing two directions of motor rotation. In double-pulse mode (software configurable), this signal is counter-clock (CCW) pulse, active both at high level and low level. For reliable motion response, DIR signal should be ahead of PUL signal by 5μs at least. 5-24V when DIR-HIGH, 0-0.5V when DIR-LOW. The direction signal's polarity is software configurable.</p>
6	DIR-	I	
7	ALM+	O	<p><u>Alarm Signal:</u> OC (Open Collector) output signal, activated when one of the following protection is activated: over-voltage, over current, braking error and position following error. They can sink or source MAX 100mA current at 5V. The active impedance of alarm signal is software configurable.</p>
8	ALM-	O	
9	NC	-	No connection.
10	NC	-	No connection.
11	ENA+	O	<p><u>Enable signal:</u> This signal is used for enabling/disabling the driver. By default, high level (NPN control signal) for enabling the driver and low level for disabling the driver. It is usually left UNCONNECTED (ENABLED). Please note that the PNP and Differential control signals are on the contrary, namely Low level for enabling. The active level of ENA signal is software configurable.</p>
12	ENA-	O	
13	NC	-	No connection.
14	NC	-	No connection.
15	NC	-	No connection.
16	NC	-	No connection.
17	NC	-	No connection.
18	NC	-	No connection.
19	NC	-	No connection.
20	NC	-	No connection.
21	NC	-	No connection.
22	NC	-	No connection.
23	NC	-	No connection.
24	NC	-	No connection.
25	NC	-	No connection.
26	NC	-	No connection.
27	NC	-	No connection.
28	NC	-	No connection.
29	NC	-	No connection.
30	NC	-	No connection.

Connectors and Pin Assignment (Continued)

CN1 - Control Signal Connector			
D-Sub, 26 Pin, Female			
Pin	Name	I/O	Description
31	NC	-	No connection.
32	NC	-	No connection.
33	NC	-	No connection.
34	NC	-	No connection.
35	NC	-	No connection.
36	NC	-	No connection.
37	NC	-	No connection.
38	NC	-	No connection.
39	NC	-	No connection.
40	NC	-	No connection.
41	NC	-	No connection.
42	NC	-	No connection.
43	NC	-	No connection.
44	NC	-	No connection.
	FG	-	Ground Terminal for shield.

CN2 - Feedback Signal (Encoder) Connector			
HDD15, 15Pin, Female			
Pin	Name	I/O	Description
1	EA+	I	Encoder A+ input.
2	EB+	I	Encoder B+ input
3	EGND	I/O	+5V output return ground.
4	NC	I	No connection.
5	NC	I	No connection.
6	FG	I	Ground terminal for shield.
7	EZ+	I	Encoder Z+ input.
8	EZ-	I	Encoder Z- input.
9	NC	I	No connection.
10	NC	I	No connection.
11	EA-	I	Encoder A- input.
12	EB-	I	Encoder B- input.
13	+5V	O	+5V power output for encoder, MAX 100mA.
14	NC	I	No connection.
15	NC	I	No connection.

Connectors and Pin Assignment (Continued)

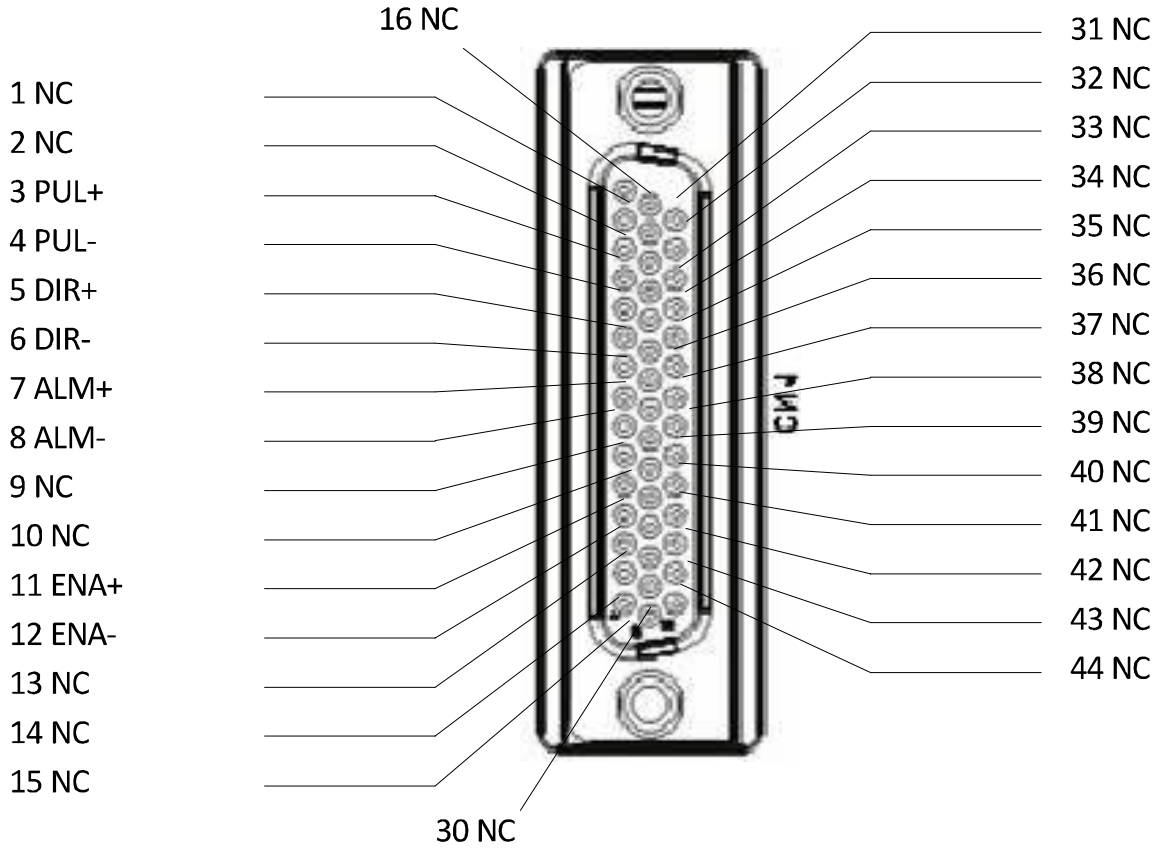
CN4 - RS232 Communication Connector			
RS232		Can be connected to PC or STU for drive configuration or servo tuning. Recommended twisted shielded cable and cable length < 2 meter.	
Pin	Name	I/O	Description
1	GND	GND	Ground.
2	TxD	O	RS232 transmit.
3	+5V	O	Reserved +5V power output (Note: Do not connect it to RS232 port)
4	RxD	O	RS232 receive.
5	NC	-	NC
6	NC	-	NC

Power Connector			
Pin	Name	I/O	Description
1	L	I	Power supply input connected to 70- 130VAC.
2	N	I	
3	PE	-	Case ground.
4	NC	-	No connection.
5	NC	-	No connection.

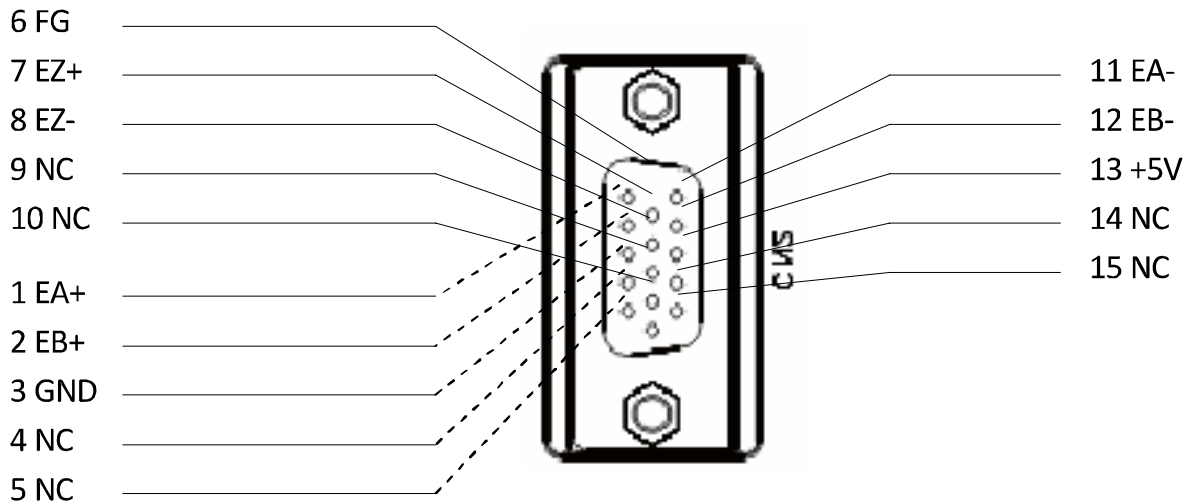
Motor Connector			
Pin	Name	I/O	Description
1	A+	O	Motor phase A+
2	A-	O	Motor phase A-
3	B+	O	Motor phase B+
4	B-	-	Motor phase B-
5	PE	-	Case ground.
6	NC	-	No connection.

Connector Pin-Out

CN1 - Control Signal Connector

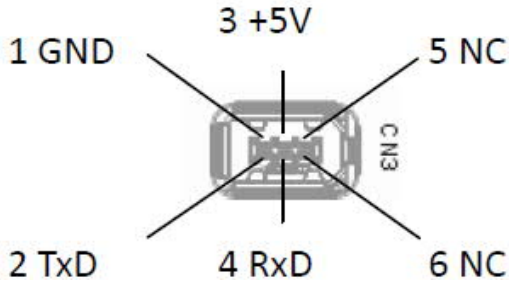


CN2 - Feedback Signal Connector



Connector Pin-Out (Continued)

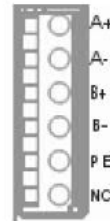
CN4 - RS232 & RS485 Connector



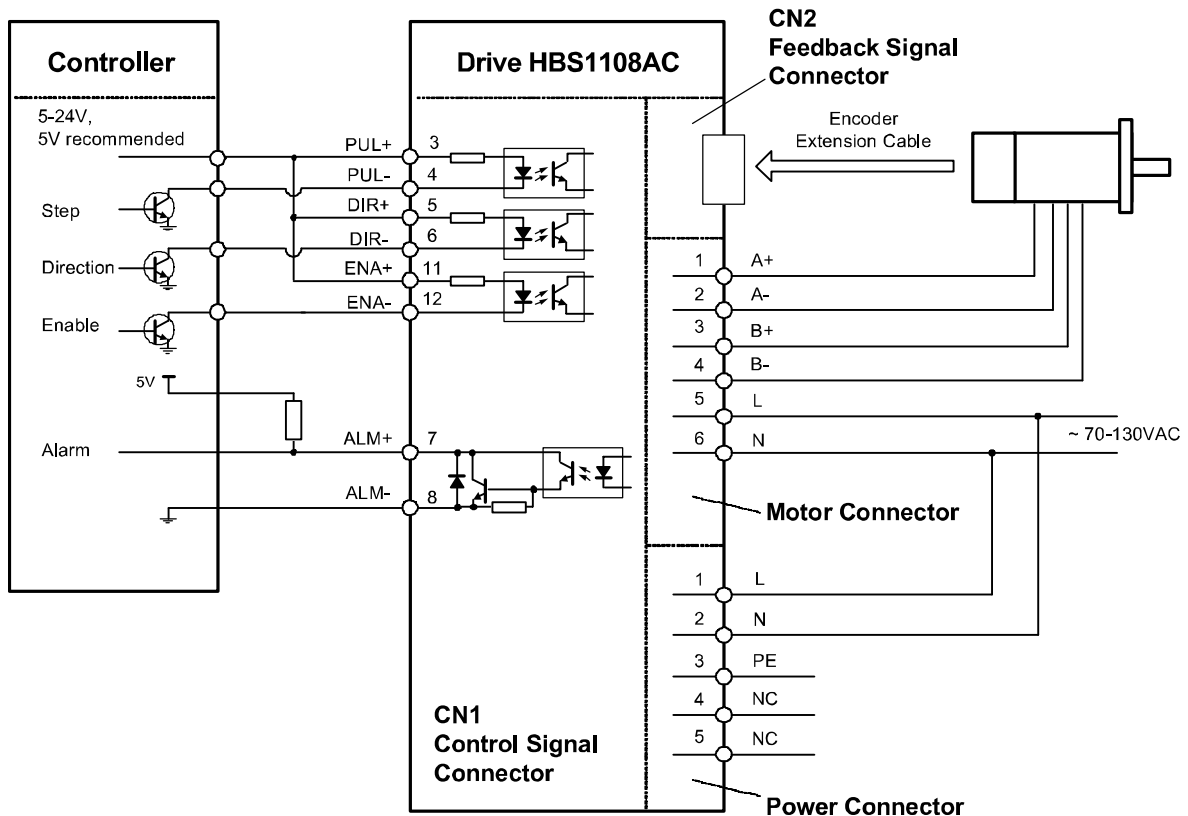
CN5 - Power Connector



CN6 - Motor Connector

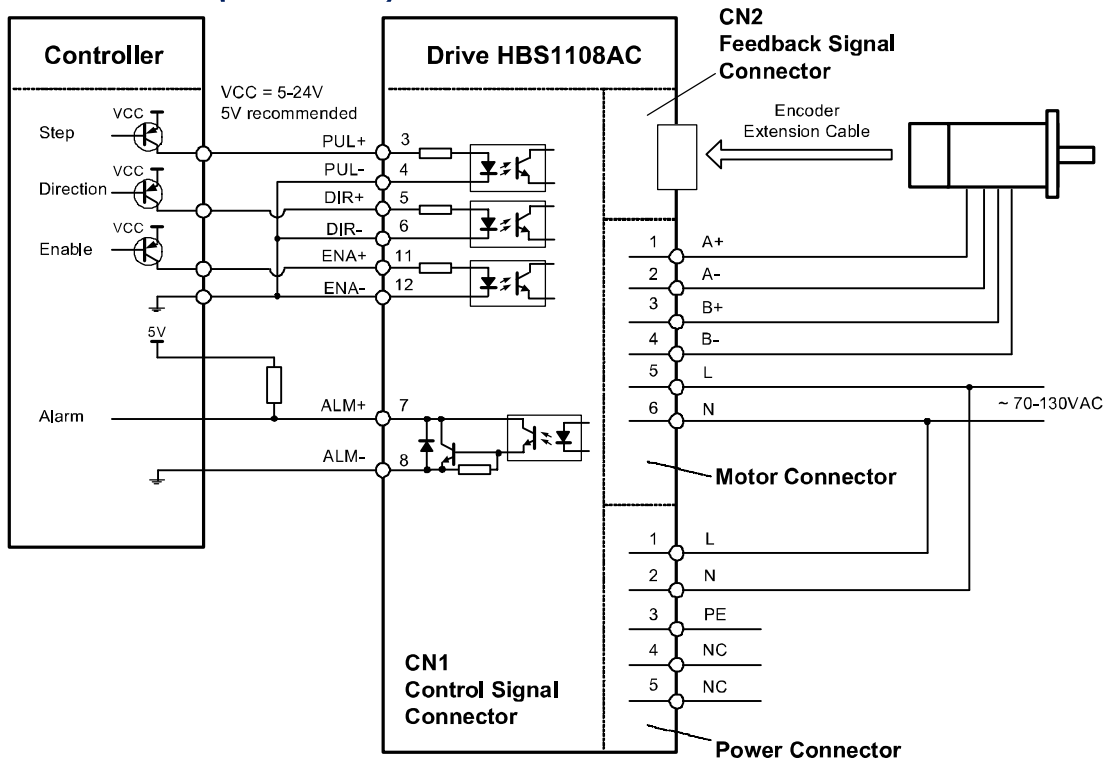


Typical Connections

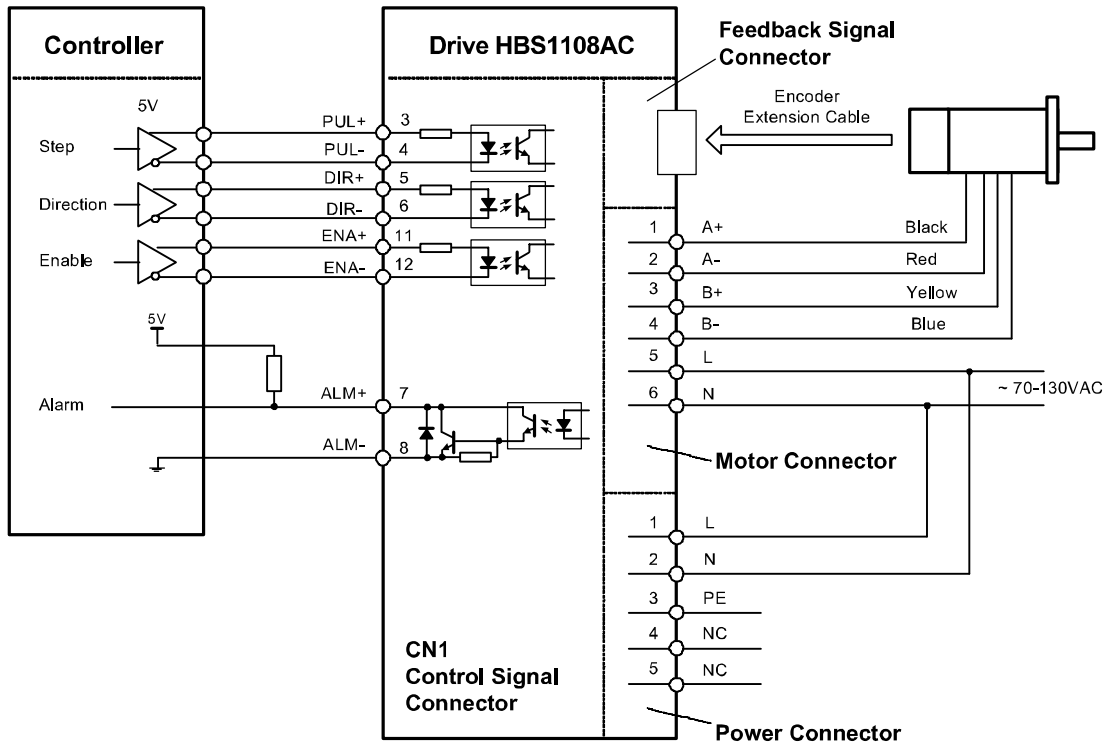


Connections to controller of differential output

Typical Connections (Continued)



Connection to controller of sinking output



Connection to controller of sourcing output

HBS2206AC Hybrid Servo Drive

150-230VAC, 6.0A Peak, Close-loop, No Tuning



- Combine advantages of open-loop stepper systems and BLDC servo systems
- Closed-loop controls to eliminate loss of steps, stall or movement synchronization
- High starting torque and quick response
- Smooth motor movement with no vibration
- Excellent respond time, quick acceleration, and very high high-speed torque (30% over open-loop)
- Load-dependent dynamic current output from drive to motor to significantly motor heating deduction
- Input voltage from 150 to 230 VAC; MAX 6.0A peak current output from drive to motor
- Micro step resolution value from 200-51,200 (increased by 1) via software configuration
- Isolated control inputs of Pulse, Direction and Enable
- No tuning for plug and play setup
- On-board HMI for easy setup and configuration
- In-position and fault outputs to external motion controllers for complete system controls.
- Over voltage, over-current, and position-error protection
- Servo control for stepper motors with encoders up to NEMA 42

Specifications

Electrical Specifications

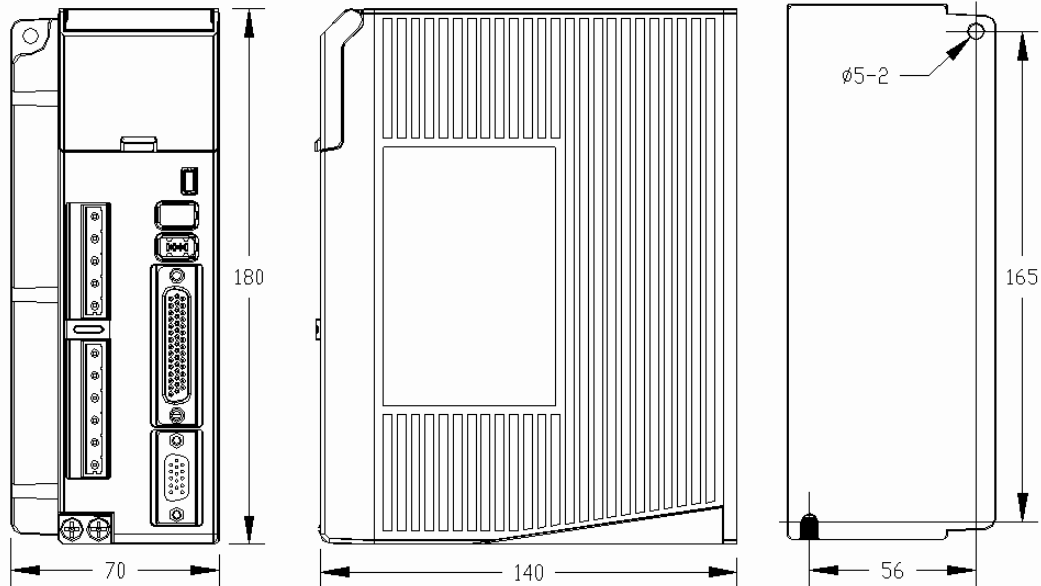
Operating Voltage	150 - 230 VAC
Maximum Continuous Current	6.0 A
MAX Step Frequency	200KHz or 500KHz (Software Configuration)
Step, Direction and Enable Voltage	5 – 24 V
Logic Signal Input Current	7 – 20 mA

Control Specifications

Command Input	Step/Direction, CW/CCW
Enable/Disable Input	Differential
Alarm Signal Output	Isolated OC Output
Configuration Interface	On-board HMI or RS232 communication
Regeneration Resistor	Built-in (50 Ohm, 100W), Support External

Mechanical Specifications

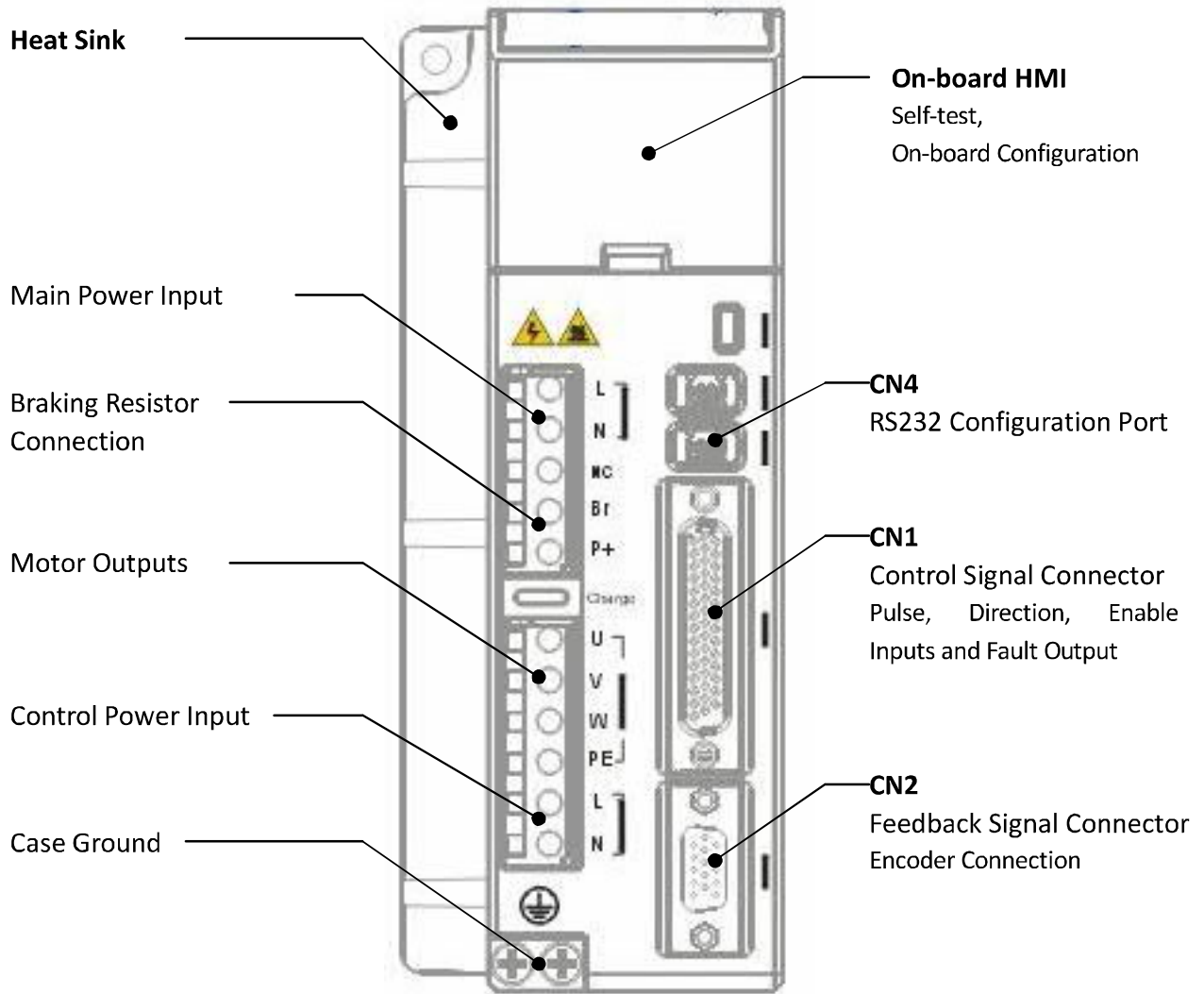
Size	180mm * 140mm * 70mm
Weight	1500 g



Operating Environment

Cooling	Natural Cooling or Forced cooling
Ambient Temperature	0°C — 40°C
Humidity	40% RH to 90% RH, No Condensation
Vibration	5.9m/s ² Max
Storage Temperature	-20 °C to 80 °C

Drive Appearance and Interfaces



Connectors and Pin Assignment

CN1 - Control Signal Connector			
D-Sub, 26 Pin, Female			
Pin	Name	I/O	Description
1	NC	-	No connection.
2	NC	-	No connection.
3	PUL+	I	<p><u>Pulse signal:</u> In single pulse (pulse/direction) mode, this input represents pulse signal, each rising or falling edge active (software configurable); In double pulse mode (software configurable), this input represents clockwise (CW) pulse, active both at high level and low level. 5-24V when PUL-HIGH, 0-0.5V when PUL-LOW. For reliable response, pulse width should be longer than 2.5uS(200K bandwidth) or 1uS(500K bandwidth)</p>
4	PUL-	I	
5	DIR+	I	<p><u>Direction Signal:</u> In single-pulse mode, this signal has low/high voltage levels, representing two directions of motor rotation. In double-pulse mode (software configurable), this signal is counter-clock (CCW) pulse, active both at high level and low level. For reliable motion response, DIR signal should be ahead of PUL signal by 5μs at least. 5-24V when DIR-HIGH, 0-0.5V when DIR-LOW. The direction signal's polarity is software configurable.</p>
6	DIR-	I	
7	ALM+	O	<p><u>Alarm Signal:</u> OC (Open Collector) output signal, activated when one of the following protection is activated: over-voltage, over current, braking error and position following error. They can sink or source MAX 100mA current at 5V. The active impedance of alarm signal is software configurable.</p>
8	ALM-	O	
9	NC	-	No connection.
10	NC	-	No connection.
11	ENA+	O	<p><u>Enable signal:</u> This signal is used for enabling/disabling the driver. By default, high level (NPN control signal) for enabling the driver and low level for disabling the driver. It is usually left UNCONNECTED (ENABLED). Please note that the PNP and Differential control signals are on the contrary, namely Low level for enabling. The active level of ENA signal is software configurable.</p>
12	ENA-	O	
13	NC	-	No connection.
14	NC	-	No connection.
15	NC	-	No connection.
16	NC	-	No connection.
17	NC	-	No connection.
18	NC	-	No connection.
19	NC	-	No connection.
20	NC	-	No connection.
21	NC	-	No connection.
22	NC	-	No connection.
23	NC	-	No connection.
24	NC	-	No connection.
25	NC	-	No connection.
26	NC	-	No connection.
27	NC	-	No connection.
28	NC	-	No connection.
29	NC	-	No connection.
30	NC	-	No connection.

Connectors and Pin Assignment (Continued)

CN1 - Control Signal Connector			
D-Sub, 26 Pin, Female			
Pin	Name	I/O	Description
31	NC	-	No connection.
32	NC	-	No connection.
33	NC	-	No connection.
34	NC	-	No connection.
35	NC	-	No connection.
36	NC	-	No connection.
37	NC	-	No connection.
38	NC	-	No connection.
39	NC	-	No connection.
40	NC	-	No connection.
41	NC	-	No connection.
42	NC	-	No connection.
43	NC	-	No connection.
44	NC	-	No connection.
	FG	-	Ground Terminal for shield.

CN2 - Feedback Signal (Encoder) Connector			
HDD15, 15Pin, Female			
Pin	Name	I/O	Description
1	EA+	I	Encoder A+ input.
2	EB+	I	Encoder B+ input
3	EGND	I/O	+5V output return ground.
4	NC	I	No connection.
5	NC	I	No connection.
6	FG	I	Ground terminal for shield.
7	EZ+	I	Encoder Z+ input.
8	EZ-	I	Encoder Z- input.
9	NC	I	No connection.
10	NC	I	No connection.
11	EA-	I	Encoder A- input.
12	EB-	I	Encoder B- input.
13	+5V	O	+5V power output for encoder, MAX 100mA.
14	NC	I	No connection.
15	NC	I	No connection.

Connectors and Pin Assignment (Continued)

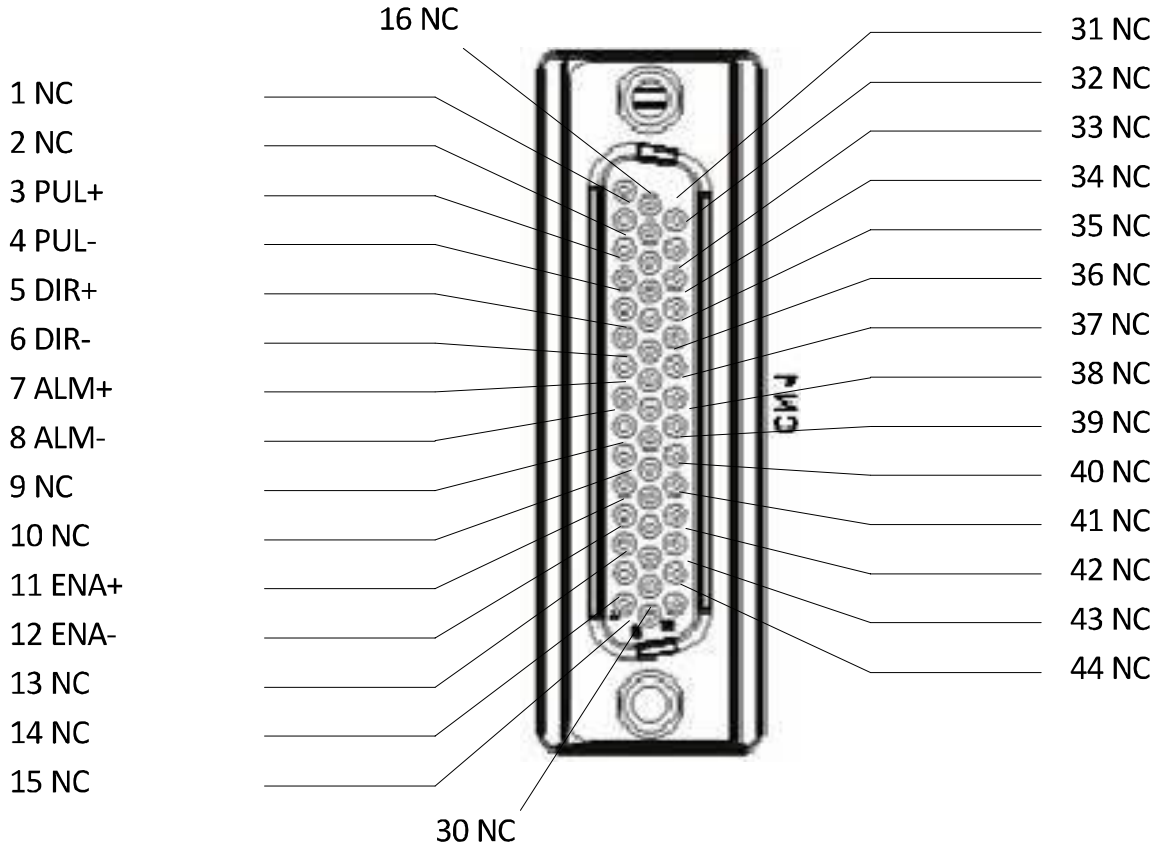
CN4 - RS232 Communication Connector			
RS232		Can be connected to PC or STU for drive configuration or servo tuning. Recommended twisted shielded cable and cable length < 2 meter.	
Pin	Name	I/O	Description
1	GND	GND	Ground.
2	TxD	O	RS232 transmit.
3	+5V	O	Reserved +5V power output (Note: Do not connect it to RS232 port)
4	RxD	O	RS232 receive.
5	NC	-	NC
6	NC	-	NC

Main Power Supply Connector			
Pin	Name	I/O	Description
1	L	I	Main power supply input connected to 150- 230VAC.
2	N	I	
3	NC	-	
4	BR1	I	External regeneration resistor connection.
5	P+	O	Internal DC bus voltage output. The regeneration resistor should be connected between BR1 and P+.

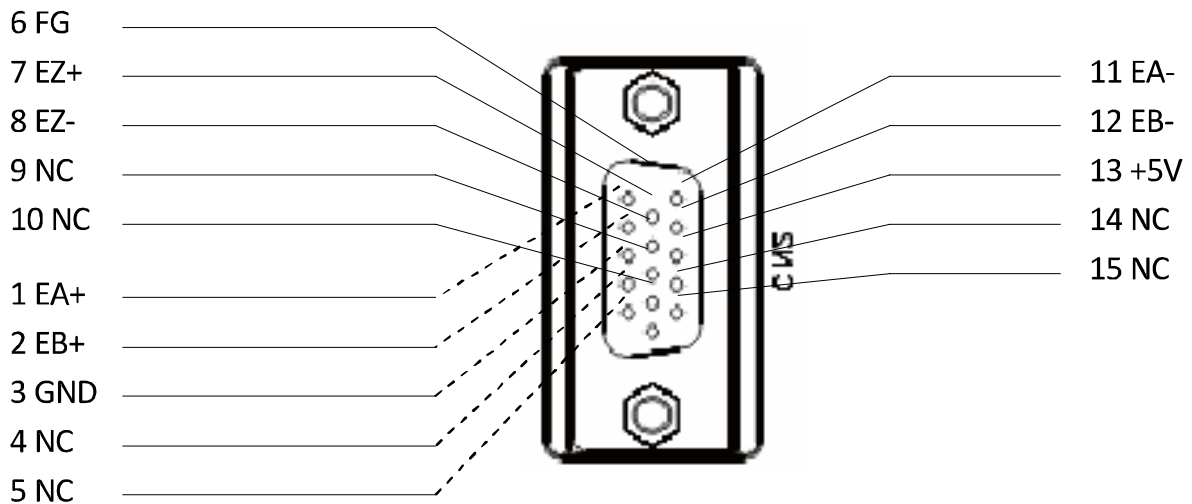
Motor & Control Power Supply Connector			
Pin	Name	I/O	Description
1	U	O	Motor phase U
2	V	O	Motor phase V
3	W	O	Motor phase W
4	PE	-	Case ground
5	L	I	Control Power Supply from 150VAC to 230VAC.
6	N	I	

Connector Pin-Out

CN1 - Control Signal Connector

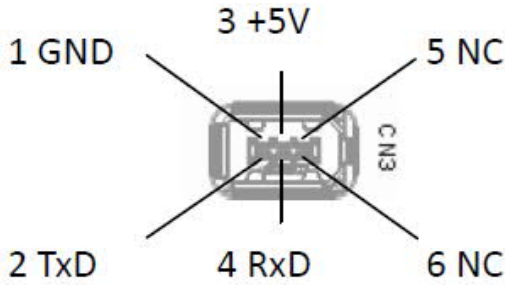


CN2 - Feedback Signal Connector



Connector Pin-Out (Continued)

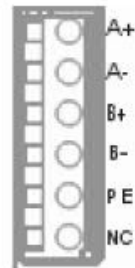
CN4 - RS232 & RS485 Connector



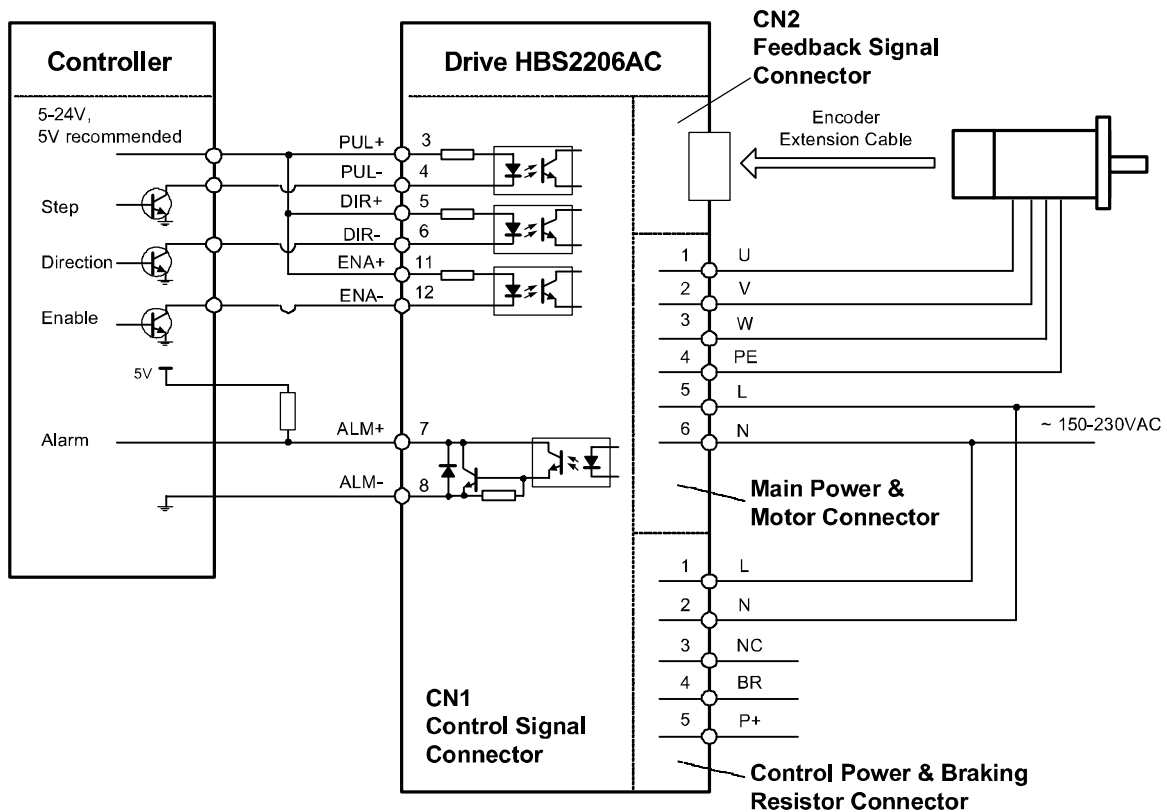
CN5 - Power Connector



CN6 - Motor Connector

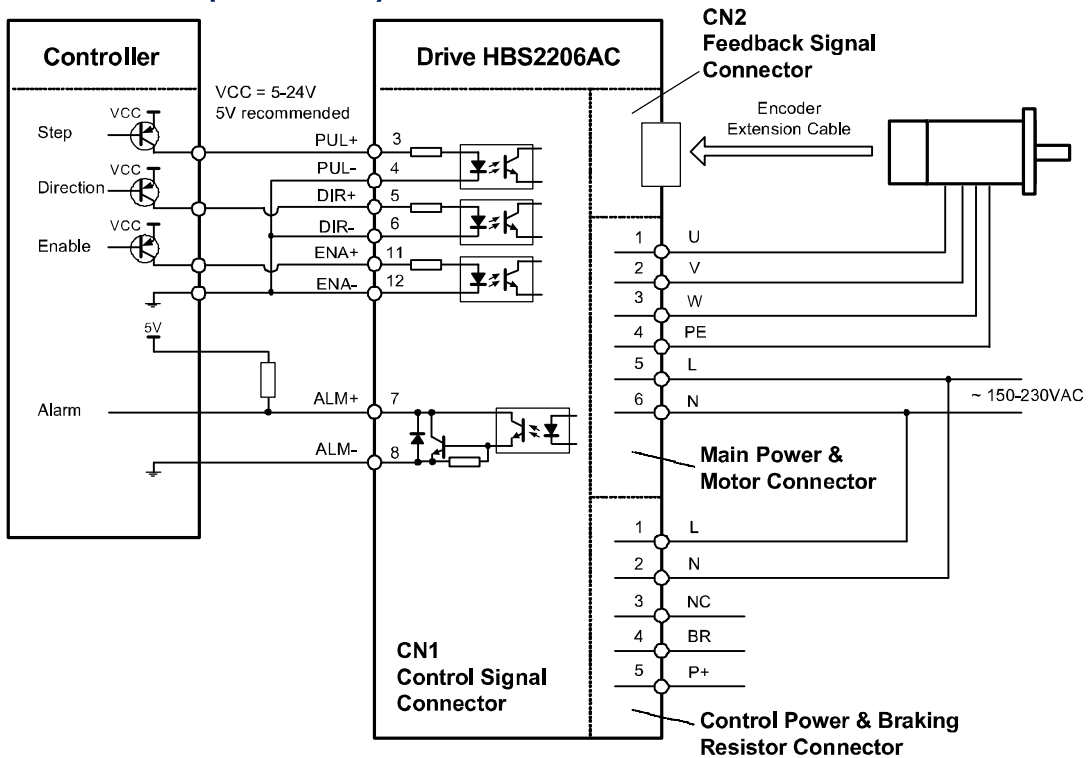


Typical Connections

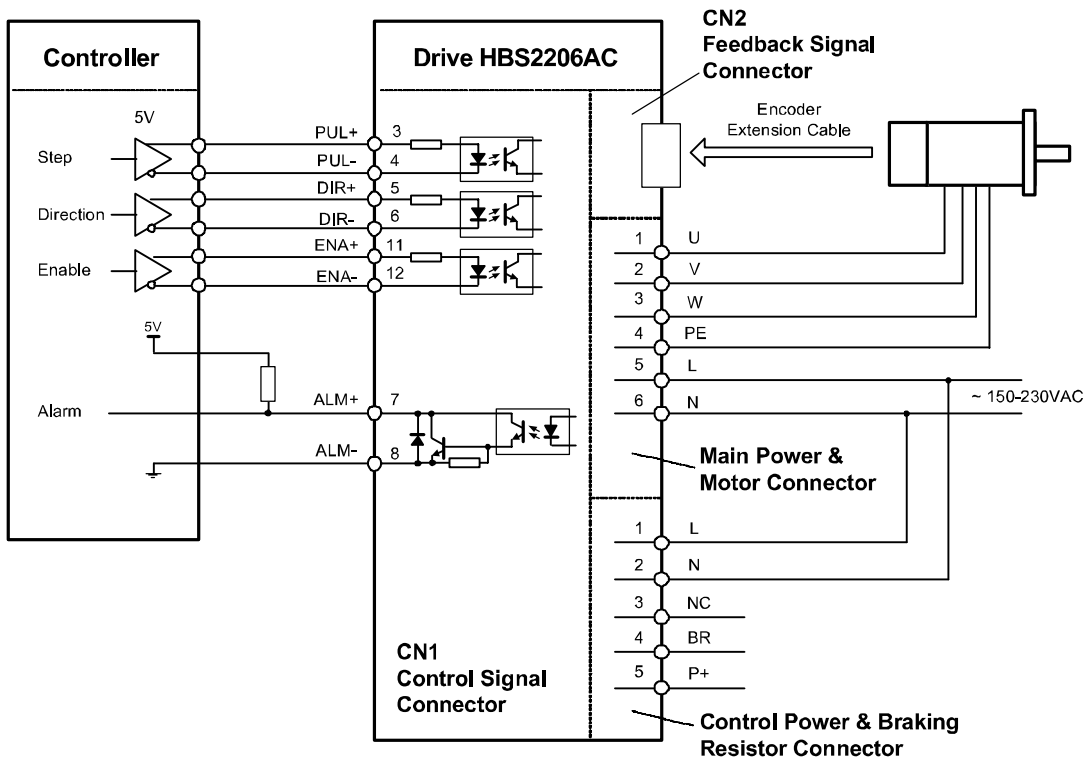


Connections to controller of differential output

Typical Connections (Continued)



Connection to controller of sinking output



Connection to controller of sourcing output