ATO BLD-100A Controller

BLD-100A

Electrical Specifications

Parameters	Min Value	Typical Value	Max Value	Unit
Enviroment Temperature	0		60	℃
Input voltage	20	36	60	V
Output Current	5	75	100	A
Speed Control Range	150	3000	50000	rpm
Hall Signal Voltage	4.5	5	5.5	V
External potentiometr er		**10K**		**Ω**

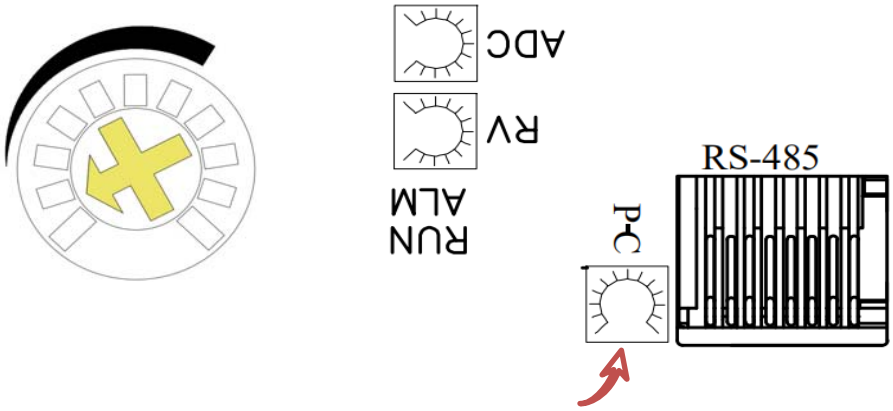
Connection Definition

Mark	Single Category	Definition
DC+	Power Connection	Power supply positiveelectrode (18V-48V)
DC-		Power supply negative electrode
W	Motor Connection	Motor line W phase
V		Motor line V phase
U		Motor line U phase
GND	Hall Signal	BLDC Hall signal power negativeelectrode
HW		Hall senor signal HW
HV		Hall senor signal HV
HU		Hall senor signal HU
VCC		BLDC Hall signal power positiveelectrode
SV	Control Signal	External Potentiometer (No Connection When Adjusting Speed With Internal Potentiometer) or Pulse Rate In Note ①
COM		Common （Low Level/Ground）
F/R		Direction: Low Level/CCW High Level or No Connection/CW Note ②
EN		Enable: High Level/Stop Low Level/Run Note ②
BRK		Quick Brake: High Level/Stop Low Level/Run Note ②
SPEED	Output Signal	Speed Signal Output
ALARM		Alarm Signal Output

Note ①: Potentiometer/10KΩ or analog signal DC 0V~+5V (Change internal switch J1/DC0- 10V). Turn off the internal potentiometer RV when using an external potentiometer to adjust the motor speed.
Note ②: High level/5V (5mA)

Set the peak output current through PC potentiometer. When the load suddenly increases, the output current will be limited to the set value to reduce the motor speed and protect the motor from damage. Set the range to 4-50a.

Note: If overcurrent protection occurs when the motor is running, please adjust the knob clockwise.



1. RV knob is speed regulating potentiometer, connected to the motor power after the rotation of RV can be adjusted speed.

2. SW1 dial code is the motor pole setting port.

3. SW2 dial code is the motor maximum speed limit setting.

4. SW7=1, SW8=2, SW9=4, SW10=8, select bit for 485 address, follow 8421 code to set the address bit. For example, when SW7 and SW9 are ON, the drive has an address code of 5.

SPEED signal output description

Speed pulse output, the end will output frequency and motor speed is proportional to the fixed pulse width pulse string, then the actual motor speed =f/N*60, N is the pole number of the motor, and f is the pulse frequency of the output.

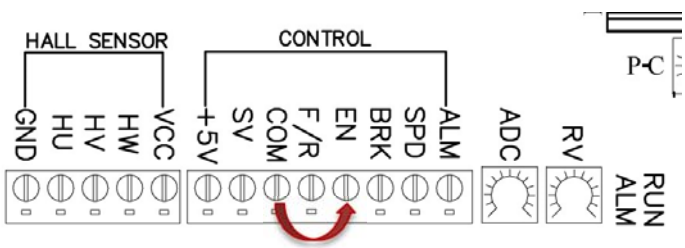
Example: 2 pairs of poles motor is 4-pole and the output pulse frequency is 100HZ. Then the motor speed is (100/2) *60=3000 RPM.

Interface Function Description

Ⅰ. Start and stop (EN port)

1. The connection wires at both ends of EN and COM control the operation and stop of the motor. The motor runs when the EN and COM ends are connected. Disconnect and slow stop the motor.

2. By connecting the switch between COM and EN or using PLC to control its on and off, the switch between motor start and stop can be realized.

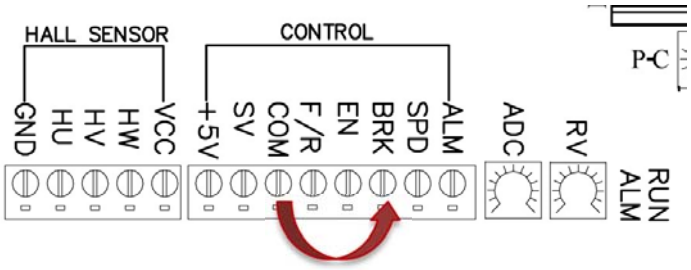


Ⅱ. Fast stop (BRK port)

1. Connecting or disconnecting the BRK and COM terminal cable can control the motor operation or stop.

2. When connecting the BRK and COM terminals, the motor runs normally.

3. When the connection wire between BRK end and COM end is disconnected, the motor stops running.



Note:
EN and BRK differences and usage options:

①EN control for natural stop; BRK controls for fast stop

②EN and BRK control the same startup state

③Choose either EN or BRK to control when you start and stop, the wiring of the other way shall be kept in the factory state.

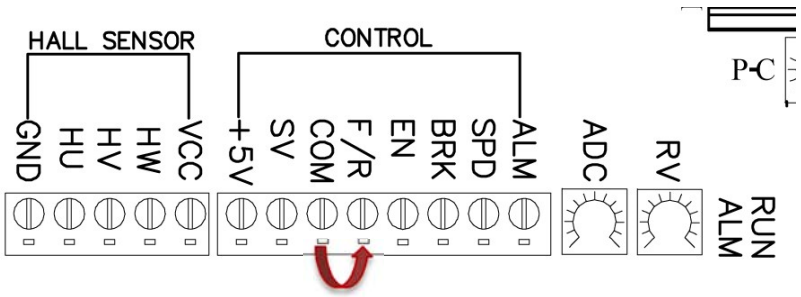
Ⅲ. Direction control

1. The F/R terminal is not connected with the factory setting of COM terminal. When the power is switched on, the motor turns forward.

2. When the connection wire between F/R end and COM terminal is disconnected, the motor turns forward.

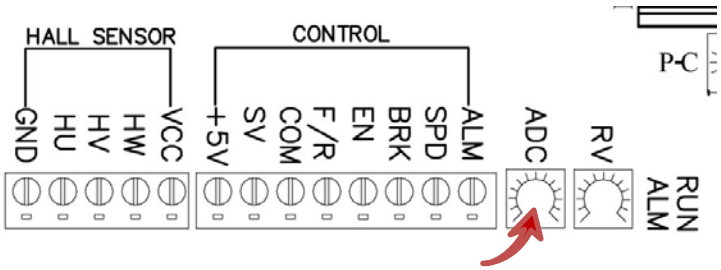
3. When F/R terminal and COM terminal are connected, the motor is reversed.

Note: When viewed from the direction of the motor shaft, the motor shaft is clockwise for forward rotation and counterclockwise for reverse rotation.



Ⅳ. Acceleration/deceleration time setting

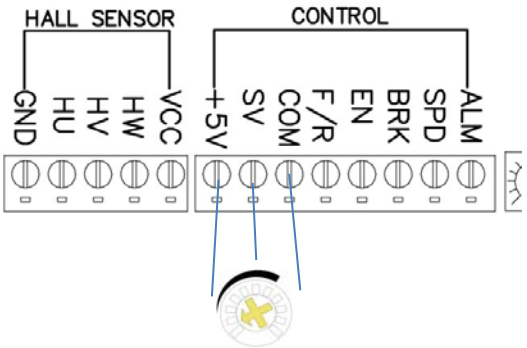
The acceleration time and deceleration time of the motor are set through the potentiometer ADC. By rotating the ADC left and right, the acceleration and deceleration time can be increased or decreased. Setting range: 0.3-15s.



Ⅴ. Use an external potentiometer for speed regulation

When using external potentiometer control, please use the resistance value of 10 k Ω potentiometer. The middle outlet end of the potentiometer is connected to SV end, and the outlet ends on both sides are respectively connected to 5V+ and GND end.

SW3	ON
SW4	OFF
SW5	ON
SW6	OFF

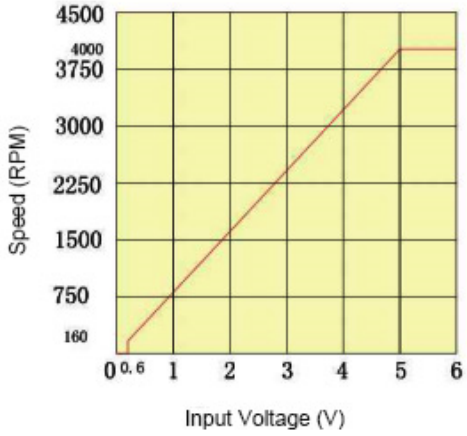


Ⅵ. Use external analog signal speed adjustment

When using external analog voltage, use 0-5v analog voltage input. The voltage output end is connected to SV end, and the outlet ends on both sides are connected to SV and GND end respectively.

When the input voltage is about 0.6v, the motor speed is 160rpm. When the input voltage is about 5V, the motor speed is 4000rpm.

SW3	ON
SW4	OFF
SW5	ON
SW6	OFF

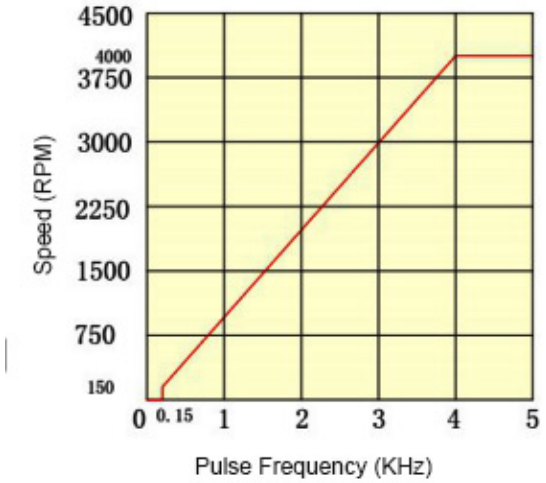


Ⅶ. Use pulse frequency control

When selecting this mode, set SW3=0N. The pulse frequency can be 0.15-4KHz and duty ratio is 50%.

When the pulse frequency is 0.15KHz, the motor speed is 150rpm. When the pulse frequency is 4KHz, the motor speed is 4000rpm. Pulse output is connected to SV GND terminal.

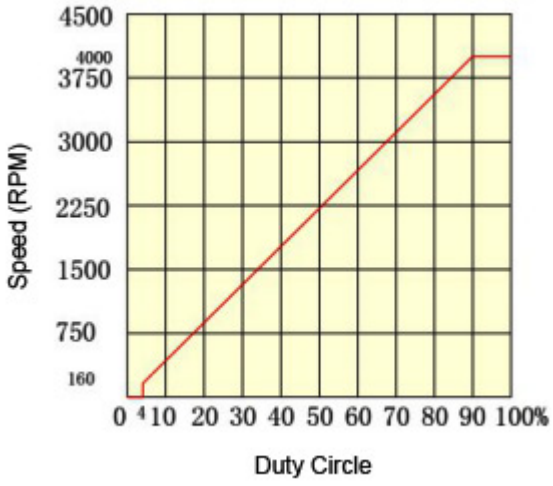
SW3	ON
SW4	ON
SW5	OFF
SW6	ON



Ⅷ. Use PWM speed regulation

When the duty cycle is 4%, the speed of the motor is 160rpm. When the duty cycle is 100%, the speed of the motor is the highest speed, 4000rpm. The output of the pulse is connected to SV and GND.

SW3	OFF
SW4	ON
SW5	OFF
SW6	ON



Alarm Indicator Status

When the motor is over current, Hall input error, blocking, over temperature, over voltage and other circumstances, the driver will send an alarm signal. At this time, the fault alarm output end (ALM) And the common end (COM) will conduct, so that the fault alarm output end (ALM) becomes low level, at the same time the driver stops working, alarm light flashing.

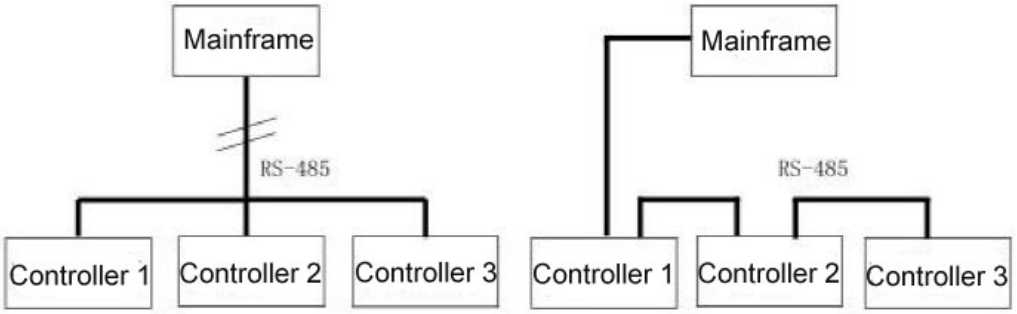
Alarm Indication	State	Cause	Solution
Red light flashes once Green light flashes once	Over current alarm	In short, resulting in excessive current flow into the controller	Please confirm whether the wire between the motor and the controller is damaged
Red light flashes twice Green light flashes once	Over temperature alarm	The temperature of the controller is over the temperature of the alarm	Reduce ambient temperature or Improving airframe ventilation
Red light flashes three Green light flashes once	Over voltage	More than 130% of the rated voltage	Verify the power supply voltage or reduce the load, or extend the acceleration and deceleration time
Red light flashes four Green light flashes once	Low voltage alarm	Power voltage below rated 60%	Confirm the power supply voltage and check the connection of the power line
Red light flashes five Green light flashes once	Sensor abnormal	The motor signal line in operation is broken or the motor signal connector falls off	Confirm the connection of controller and motor
Red light flashes six Green light flashes once	Over speed	The motor output shaft speed of more than 4800 r/min	Properly reduce the motor speed

RS485 Communication function

Our series of BLDC controllers provide common RS485 communication interface for industrial control. MODBUS standard communication protocol is adopted in the communication protocol. The controller can be used as the communication between slave computer and upper computer (such as PLC controller and PC) with the same communication interface and the same communication protocol to realize the centralized monitoring of the controller.

In addition, the user can also use address broadcast function to realize the multi-machine linkage and synchronous action of the controller. The MODBUS communication protocol RTU mode of this controller is described in detail below.

Ⅰ. Communication network



(1)Multi-level connection network mode (2)Multi-machine series control mode

Ⅱ. Communication protocol parameters and interface definition

Items	Parameter
Number of slave stations	16
BPS	9600bps
Data exchange mode	Asynchronous serial communication/half duplex
Communications protocol	MODBUS RTU
Data bits	8-bit
Stop bit	1-bit
Check bit	no
Error checking mode	CRC16
Frame length	Fixed byte 8 bits

Ⅲ. Communication protocol

PC or PLC can work as the host control driver. The specific communication methods are as follows:

(1) The driver is slave, and the master-slave point-to-point communication.

(2) The driver is slave, and the host controls multiple slave communication.

(3) When the host USES the broadcast address to send the command, many slave machines run synchronously. When the host USES the broadcast address to send the command, the slave machine does not reply.

(4) MODBUS communication protocol RTU mode.

Ⅳ. Written data description

Transmission mode asynchronous serial, half duplex transmission mode. At the same time, only one host and slave can send data, while the other can only receive data. In serial asynchronous communication, data is sent frame by frame in the form of message.

slave address (1byte)	Function Code (1byte)	Access address (2byte)	accessing data (2byte)	CRC chack (2byte)	Function description
0Xnn	0X06(write data)	0X00B6	0X0001	CRC chack	RS-485 Valid
0Xnn	0X06(write data)	0X00B6	0X0002	CRC chack	RS-486 Invalid
0Xnn	0X06(write data)	0X0056	0X0000	CRC chack	Motor speed
0Xnn	0X06(write data)	0X0066	0X0000	CRC chack	Motor stopped
0Xnn	0X06(write data)	0X0066	0X0001	CRC chack	Motor forward
0Xnn	0X06(write data)	0X0066	0X0002	CRC chack	Motor reverse
0Xnn	0X06(write data)	0X0066	0X0003	CRC chack	Motor brake

This function code is used to diagnose communication between host and slave. Arbitrary data is sent and returned to determine whether the communication is normal. Write specific access and slave machine response data description.

Ⅴ. Slave access write

Fieldname	Data	Description
Slave address	0X01H	The first slave address
Function data	0X06H	Write data to register
Slave register address	0X00H	Register address to write (high)
Slave register address	0X00H	Register address to write (low)
Slave register data	0X00H	Data write to the register address
Slave register data	0X00H	Data write to the register address
Error check address low bit bit	0XECH	CRC16 result
Error check address high bit bit	0X9EH	

Ⅵ. Return response from slave

Fieldname	Data	Description
Slave address	0X01H	Returns the same data as was written
Function data	0X06H	
Slave register address	0X00H	
Slave register address	0X00H	
Slave register data	0X00H	
Slave register data	0X00H	
Error check address low	0XECH	
Error check address high	0X9EH	

Ⅶ. Reading data description

slave address (1byte)	Function Code (1byte)	Access address (2byte)	accessing data (2byte)	CRC chack (2byte)	Function description
0Xnn	0X03(Read data)	0X005F	0X0001	CRC chack	Read the actual speed of the motor
0Xnn	0X03(Read data)	0X00C6	0X0001	CRC chack	Read the actual current of the motor

This function code is used to read a register (8 bits)

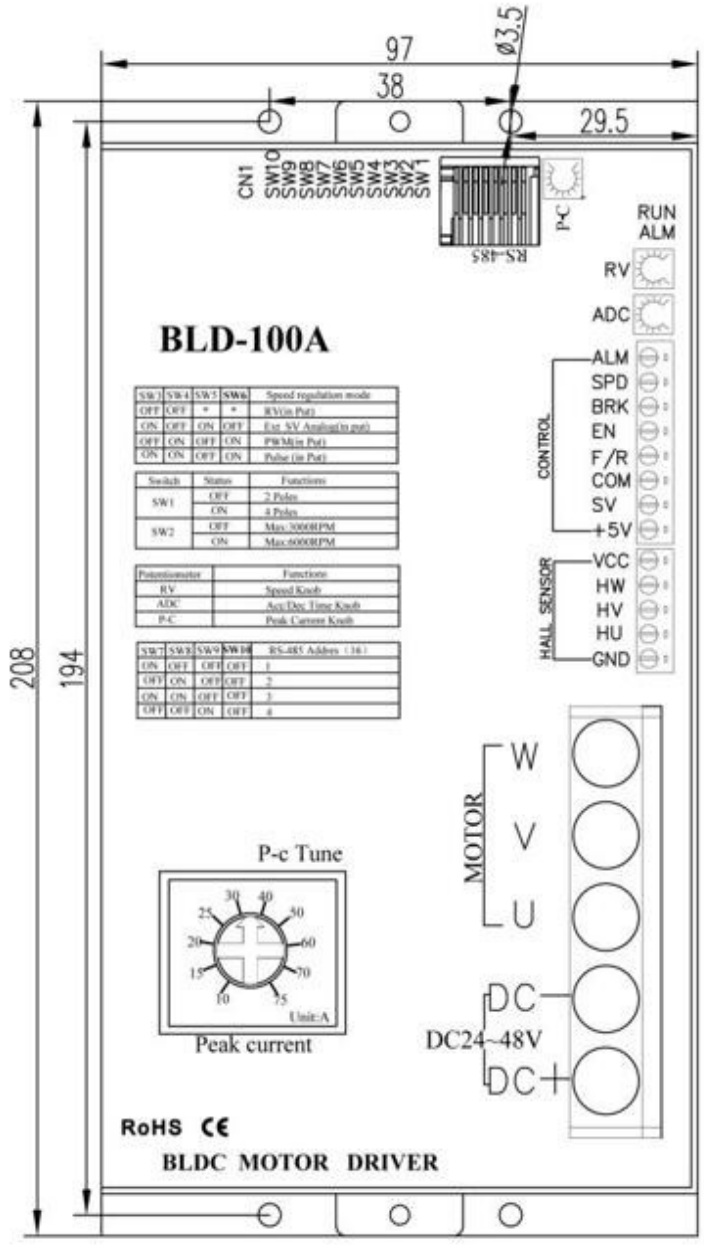
Ⅷ. Slave access write

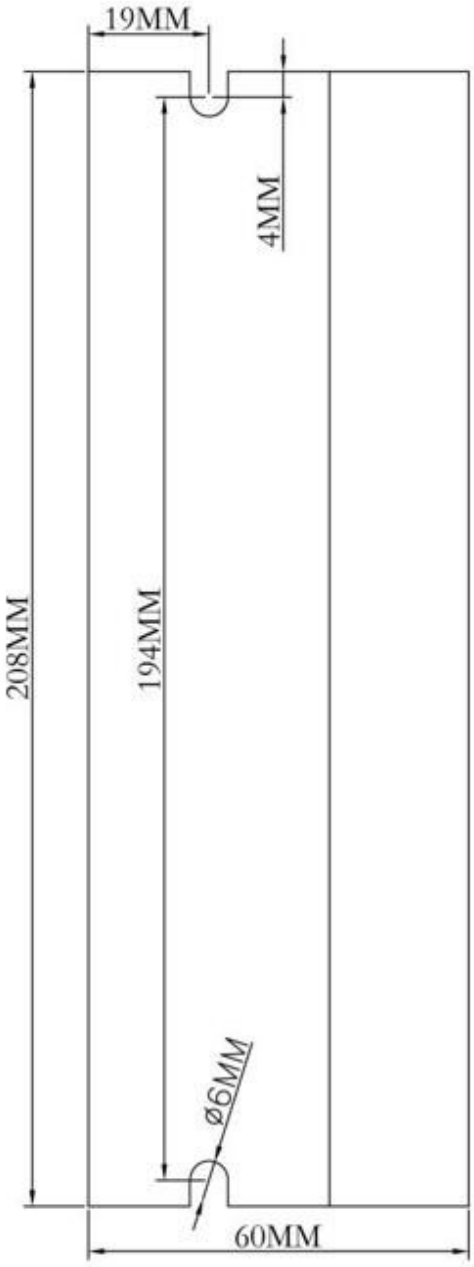
Fieldname	Data	Description
Slave address	0X01H	The first slave address
Function data	0X03H	To read data from a register
Slave register address	0X00H	Read register address
Slave register address	0X00H	
Slave register data	0X00H	Read the byte length of the register address
Slave register data	0X04H	
Error check address low bit	0XEC H	CRC16 result
Error check address high bit	0X9EH	

Ⅸ. Return response from slave

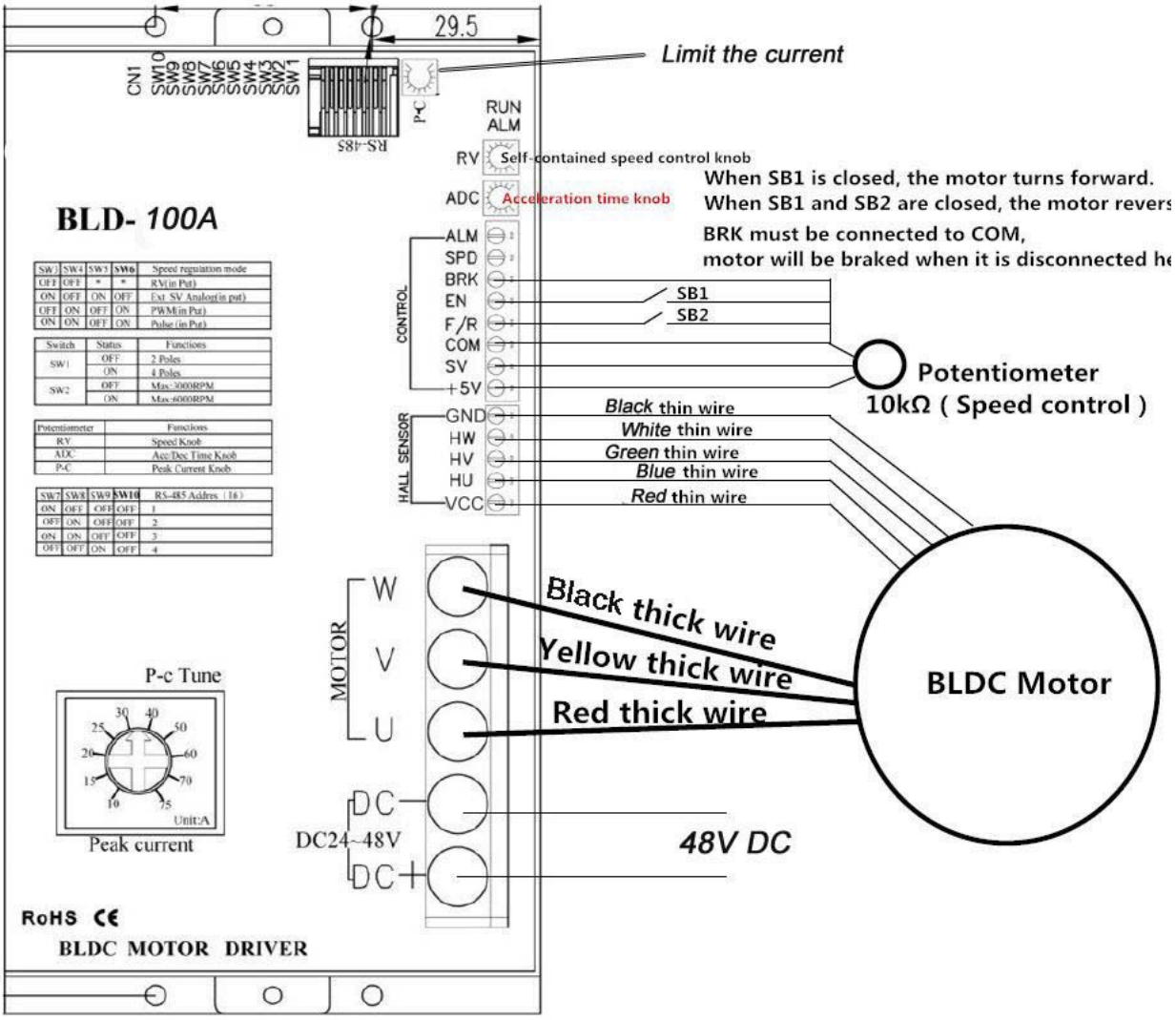
Fieldname	Data	Description
Slave address	0X01H	Same query method
Function data	0X03H	
Slave register address	0X00H	
Slave register address	0X00H	
Slave register data	0X00H	
Slave register data	0X04H	
Error check address low bit	0XECH	
Error check address high bit	0X9EH	

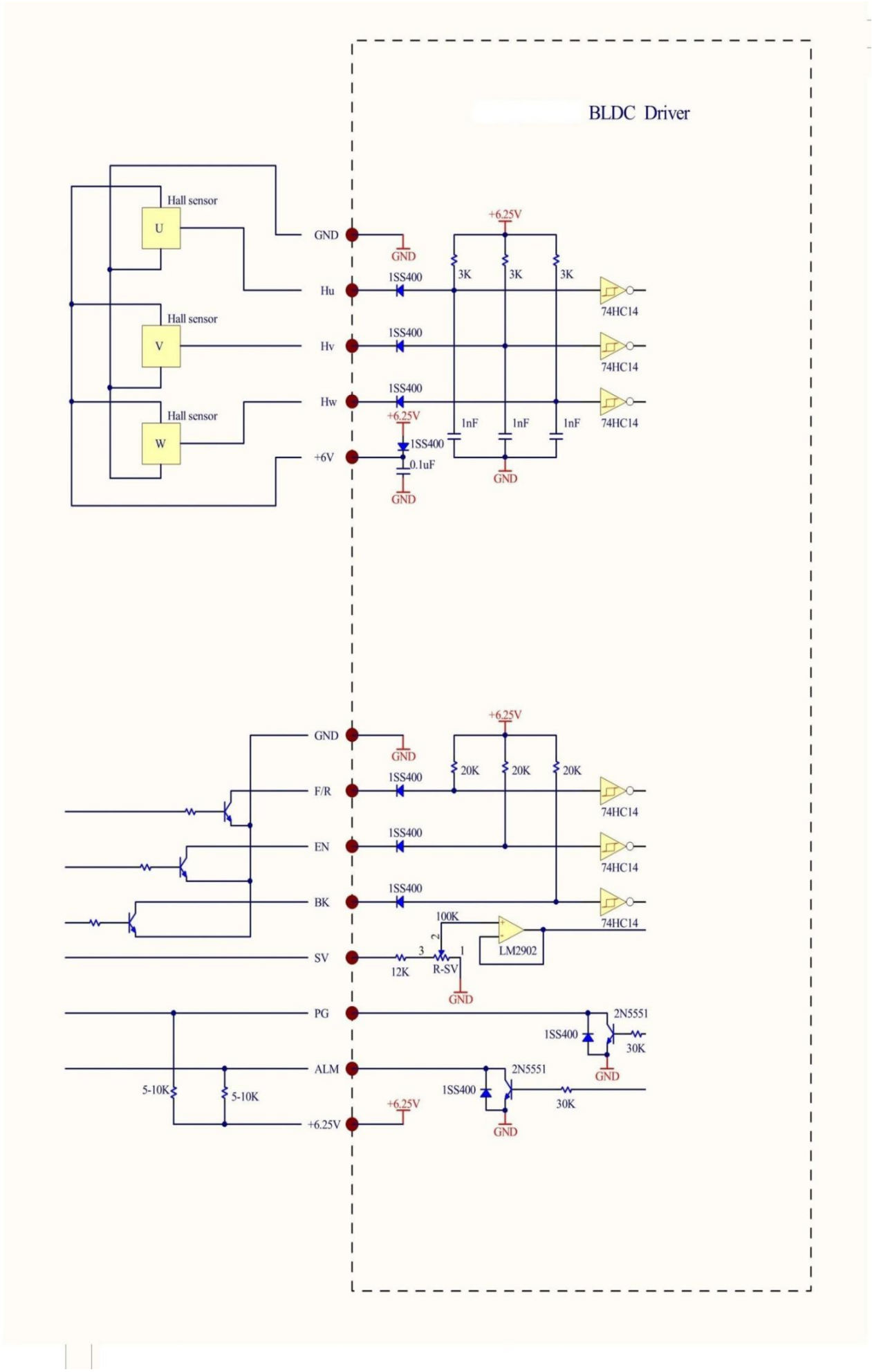
Mechanical Drawings





Controller Wiring Diagram




BLDC Driver
Hall sensor
U
Hall sensor
V
Hall sensor
W
GND
Hu
Hv
Hw
+6V
+6.25V
1SS400
3K
74HC14
1nF
0.1uF
F/R
EN
BK
SV
PG
ALM
+6.25V
20K
100K
LM2902
12K
R-SV
2N5551
30K
5-10K