BLDCDRV-B3 Operating Manual



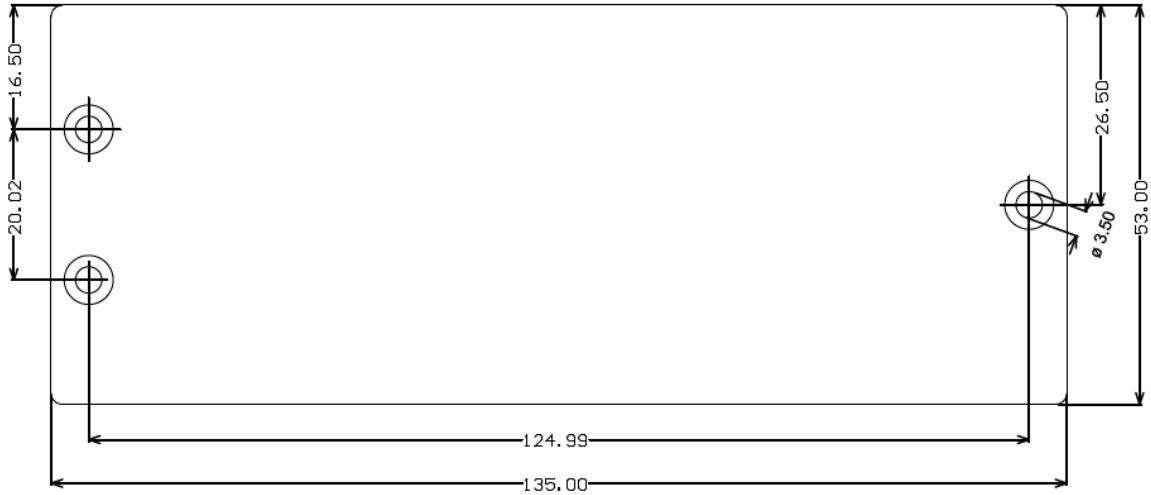
Contents

1. Main Function 2
2. Outline Drawing 2
3. Control Board Interface 2
4. Communication Protocol 3

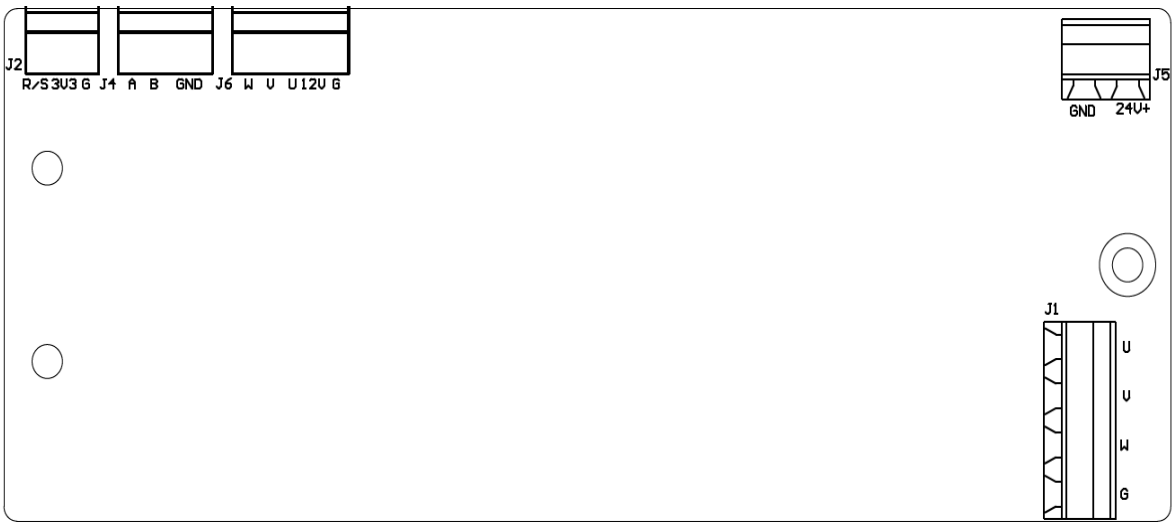
1. Main Function

1) BLDCDRV-B1 is a control board to control the brushless motor of MTH18-12 hemodialysis pump
2) Power supply requirement is 24V DC and current > 2A / power > 50W.
3) The control board can communicate with PC through RS485 interface. The pump's start/stop, operation direction and speed are controlled by RS485 serial communication.
4) The control board will stop the pump when receiving the pump head cover open state signal, the output from electromagnetic detection board.
5) No ingress protection, the control board needs to be placed into customer equipment. When the environment temperature is higher than 50℃, will need cooling measure.

2. Outline Drawing



3. Control Board Interface



1) J1：Interface for motor
   J1-U：green, J1-V: orange, J1-W: brown
2) J2：Interface for electromagnetic detection board(used for open cover protection function)
   J2-R/S：Signal input，J2-3V3：3.3V+, J2-G：GND
3) J4：Interface for RS485 communication
   J4-1：RS485-A, J4-2：RS485-B, J4-3：GND
4) J5：Interface for power supply
   J5-GND：24V-，J5-24V+：24V+
5) J6: Direction, speed feedback interface
   J6-W：Blue，J6-V：White，J6-U：Yellow，J6-12V：Red，J6-G：Black

4. Communication Protocol

1 Frame format：1start + 8data + 1even parity + 1stop ， 19200bps。

2. Message format：flag+ addr + len + pdu + fcs。

flag：E9H, the message head. When sending the message, the data E8H after message head will be replaced with E8H 00H, and E9H after message head will be replaced with E8H 01H. When receiving the message, the data E8H 00H after message head will be reverted to E8H, and E8H 01H after message head will be reverted to E9H. (Note: if E8 00 replaced E8 or E8 01 replaced E9, E8 00 or E8 01 will be regarded as one byte, no influence on the length of **pdu**.)

addr：one byte, pump address, 1~30. 31 is broadcast address (default address is 1)

len：one byte，length of pdu.

fcs：one byte, XOR of **addr**、 **len**、**pdu**.

3. pdu format：application layer code format

3.1 PC sets pump's running parameter

PC sends command：

WJ	Speed (2 bytes)	Start/stop (1 byte)	Direction (1 byte)

Pump responds:

WJ

- WJ：2 bytes, using ASCII code, to indicate that this command is used to set pump's running parameter. ASCII code of W is 57H, ASCII code of J is 4AH.
- Speed: 2 bytes, hexadecimal number, most significant byte first, resolution is 0.1rpm, speed range: 0-70rpm. Example: 01F4H means 50rpm.
- Start/stop：
  Bit0：1 means pump runs, 0 means pump stops.
- Direction：
  Bit0: 1 means CW, 0 means CCW.

Note：

1. When set the running parameter, the **addr** in message can be pump address (1-30) or

broadcast address. All pumps will operate according to the same command without response when using broadcast address.

2. Pump will stop when the pump head cover is open.

3.2 PC reads pump's running state

PC calls:

RJ

Pump responds:

RJ	Start/stop and cover open/close (1byte)	Direction (1 byte)

- RJ：2 bytes, using ASCII code, to indicate that this call is used to read pump's running state. ASCII code of R is 52H, ASCII code of J is 4AH.
- Start/stop and cover open/close：
  Bit0：1 means pump runs, 0 means pump stops.
  Bit2: 1 means pump head cover is closed, 0 means pump head cover is open
- Direction：
  0XCC: means pump stops, 0XAA: means CW, 0X55: means CCW.

Note：

1. When read the running state, the **addr** in the message only can be pump address (1-30).

2. Normally the start/stop state feedback is same as the setting parameter sent from PC. But when the pump head cover is open, the pump stops and feedback is stop. Direction is read from HALL sensor.

3.3 PC reads pump speed：

PC calls:

RFS

Pump responds:

RFS	Speed (2 bytes)

- RFS：3 bytes, using ASCII code, to indicate that this call is used to read pump's speed. ASCII code of R is 52H, ASCII code of F is 46H, ASCII code of S is 53H.
- Speed: 2 bytes, hexadecimal number, resolution is 0.1rpm. Example: 01F4H means 50rpm.

Note：

- 1. When read the running state, the **addr** in the message only can be pump address (1-30).
- 2. The speed feedback is calculated from the frequency read from HALL sensor. So the

feedback is not timely for low speed. The delay time of the speed feedback is about 8 seconds for 0.1rpm, and the delay time is within 1 second for speed higher than 1rpm.

3.4 PC sets pump address:

PC sends command:

WID	New address (1 byte)

Pump responds:

WID

- WID：3 bytes，using ASCII code, to indicate that this command is used to set pump's address. ASCII code of W is 57H, ASCII code of I is 49H., ASCII code of D is 44H.

Note: When set the pump address, the **addr** in message can be pump address (1-30) or broadcast address 31. If the **addr** in message is broadcast address, there should be only one pump in the RS485 communication network, and no respond to the this address setting command

3.5 PC reads pump address

PC calls:

RID

Pump responds:

RID

- RID：3 bytes, using ASCII code, to indicate that this call is used to read pump address. ASCII code of R is 52H, ASCII code of I is 49H, and ASCII code of D is 44H.

Note: When read the pump address, the **addr** in the message only can be pump address (1-30). This command can be used for address verification.

4. Example:

(a). To set a pump (addr：01) to run CW at speed of 50.0rpm, PC should send the message as:

E9 01 06 57 4A 01 F4 01 01 EF

(b). To read the pump running parameter, PC should send the message as:

E9 01 02 52 4A 1B