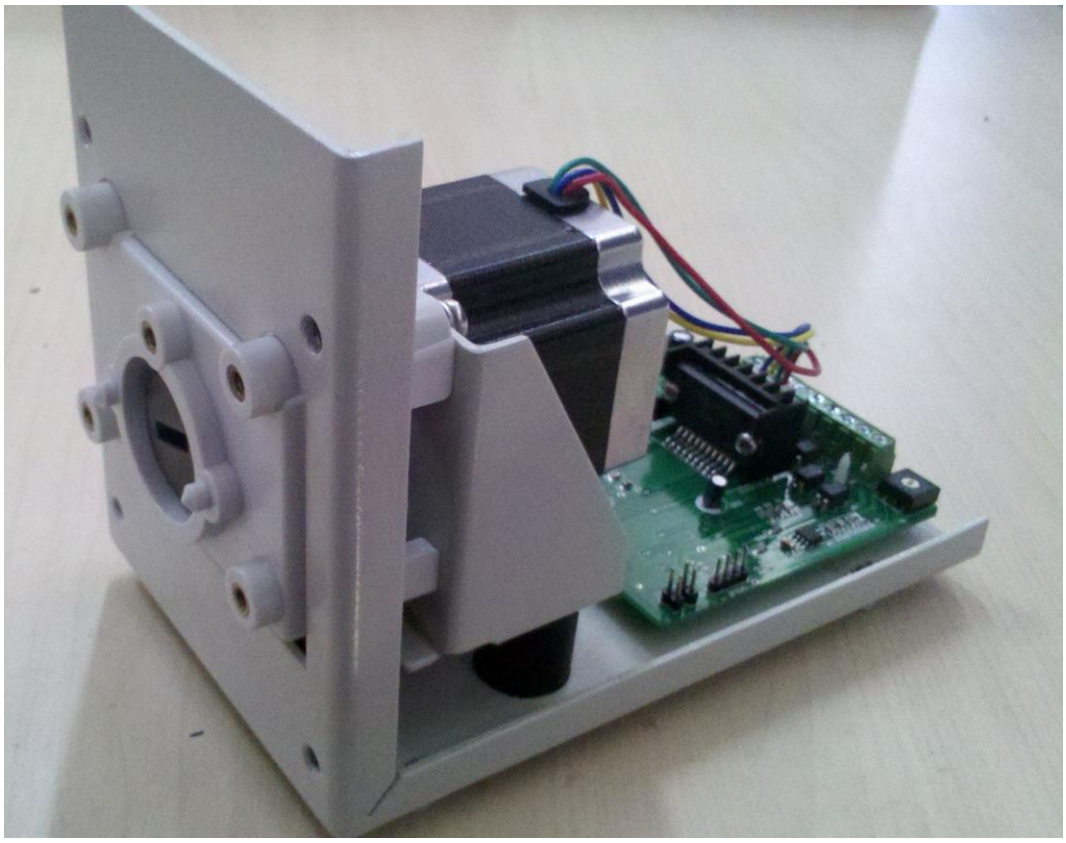
# T100 Series Variable Speed Peristaltic Pump Drive

# Operating Manual



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Please read this operating manual carefully before using the product.

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Longer reserves the right to modify or improve the designs or specifications of such products at any time without notice. Please contact with Longer or certified distributor for up-to-date manuals.

# 1 General Information

## 1.1 Precaution

- If tubing leaks or bursts, fluid may spray from the tubing and pump head. Take reasonable practicable measures to ensure the operators' safety.
- Make sure fluid in the tubing has been drained out, no pressure in the pipeline and disconnect pump from mains power, while removing or replacing the tubing.
- Disconnect pump from the mains power before connecting the control signal wire.
- Do not touch the rotor while pump is running.
- Some section of surfaces of the pump may get warm during operation. Do not take hold of the pump while it is running.
- Release the track when pump stop running for a long time to avoid tubing deformation caused by squeezing.
- Keep the rotor clean and dry to avoid tubing excessive wear and premature failure of pump head or driver.
- Please do not put lubricating oil by yourself, any improper operation could corrode the pump head housing or dislocate the tubing
- The entire unit can't resist organic solvent and corrosive liquid. Isolate the unit (except tubing) from these fluids.
- The control signal should not exceed the Max value when the pump is running under external control mode to avoid PCB damage.

## 1.2 Warranty and Service

### 1.2.1 Warranty Service

(1) Longer, obligation under this warranty is limited to a period of three (3) years from the date of original purchase. Within the 3 years of warranty period, Longer will replace or repair any defective parts free of charge. This warranty doesn't cover consumable part (tubing).

(2) Warranty does not cover:

- The repair or exchange of the entire unit after the warranty period.
- Any damage or failure caused by improper installation, storage, maintenance or usage, not in compliance with operating manual.
- Beyond or violate the conditions listed in contract or technical agreement.
- Any damage or failure caused by attempts by personnel other than authorized Longer representatives to install, repair, modify or remove the product.
- Any damage or failure caused by non-Longer parts, or user-replaceable parts purchased from unauthorized distributors.
- Any damage or failure caused by accidents or human errors (including wrong power

supply voltage, corrosion, fall-off, etc.)

- Any damage or failure caused by natural disaster or other irresistible force (earthquake, fire, etc.).
- Other product damage or failure not caused by defects in design, material and workmanship.

### 1.2.2 Maintenance Service

- Customer will be charged for the repair or replacement of the parts or accessories after warranty period.
- Parts can be replaced within 3 working days. Longer will inform customer of the date in advance if out of 3 working days.

### 1.2.3 Service Commitment

- Longer commits to provide customer solutions to any quality complaint within 2 working days.
- Longer commits to reply to customer's requirement of on-site technical supports or training within 2 working days.

### 1.2.4 Dispute Settlement

Dispute over product quality or service will be handled according to contract or agreement. If there is no related contract or agreement, it shall be resolved by the disputing parties through consultation. Otherwise, it will be resolved according to relevant national laws and regulations.

## 1.3 Repair Notes

Please contact Longer or its distributor, and provide the product serial number before returning the product. Products which has been contaminated with, or exposed to, toxic chemicals or any other substance hazardous to health must be decontaminated before returning to Longer or its distributor. You must ship the product in its original packaging or better, to insure it against possible damage or loss during the transport.

## 1.4 Contacts Information

Baoding Longer Precision Pump Co., Ltd
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Baoding, Hebei, China 071051
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# 2 Pump Introduction

## 2.1 Main Features

T100 series variable speed peristaltic pump drives are mainly designed for ODM applications. The speed can be controlled by BCD dial switch or external control signal, with 100 rpm as max. And the pump drive can be fitted with several different kinds of pump head with the max flow rate of 380mL/min. The pump can be mounted to customer's equipment through soleplate or panel.

Table 1: Product Model Table

| Item | Model | Description | Product Code |
|---|---|---|---|
| 1 | T100-S16 | Speed control through BCD dial switch or 4-20mA current signal | 055902A |
| 2 | T100-S17 | Speed control through BCD dial switch or 0-5V voltage signal | 055912A |
| 3 | T100-S18 | Speed control through BCD dial switch or 0-10V voltage signal | 055922A |
| 4 | T100-S19 | Speed control through BCD dial switch or 0-10kHz pulse signal | 055932A |
| 5 | T100-S102 | Speed control through RS485 communication | 055942A |

## 2.2 Main Function

### 2.2.1 T100-S16, T100-S17, T100-S18, T100-S19 Main Function

1) Pump head options：YZ1515X, YZ2515X, YZⅡ15, YZⅡ25, BZ15-13, BZ25-13, etc. Please refer to up-to-date product catalog for the other pump heads and applicable tubing.

2) Pump speed can be controlled through internal control mode or external control mode. The internal control mode uses BCD dial switch. The external control mode uses current, voltage or pulse signal.

3) Start/stop can be controlled by external switch signal: pump runs when switch is open, pump stops when switch is closed.

4) Direction can be controlled by external switch signal: CW when switch is open, CCW when switch is closed.

### 2.2.2 T100-S102 Main Function

1) Pump head options: YZ1515X, YZ2515X, YZⅡ15, YZⅡ25, BZ15-13, BZ25-13, etc. Please refer to up-to-date product catalog for other pump heads.

2) The pump's start/stop, operation direction and speed are controlled through serial communication with RS485 port..

3) Prime function also can be carried out through RS485 signals, to run pump at full speed

to fill or clear lines.

4) Power-off memory function: storing the running parameters automatically.

## 2.3 Specifications

### 2.3.1 T100-S16, T100-S17, T100-S18, T100-S19 Specification

Speed range under internal control mode: 5-100rpm. BCD dial switch is used to control the speed. Refer to Table 3 for corresponding relation between BCD dial switch position and speed.

Speed range under external control mode: 0-100rpm. Being the linear function, the speed will increase with the increasing signal. (T100-S16 will operate at 0 rpm when signal is smaller than 4 mA, and 0.1 rpm when 4 mA is received)

Speed resolution is 0.1 rpm.

Power supply: DC 11.4-25.2V

Power consumption: ≤20W

Working condition: temperature: 0-40℃， relative humidity: <80%, no condensation

Outline dimension: 183×120×136（mm）

Weight：1.2 kg

### 2.3.2 T100-S102 Specification

Speed range: 0-100rpm

Speed resolution: 0.1rpm

Baud rate (bit rate): 1200 or 9600 baud (1200 or 9600 bps). Refer to table 5 for data transmission speed setting.

Communication address: 1-30, 31 is broadcast address. Refer to Table 6 for communication address setting.

Power supply: DC 11.4-25.2V

Power consumption: ≤20W

Working condition: temperature: 0-40℃, relative humidity: <80%, no condensation

Outline dimension: 183×120×136（mm）

Weight: 1.2 kg

### 2.4 Installation Dimension

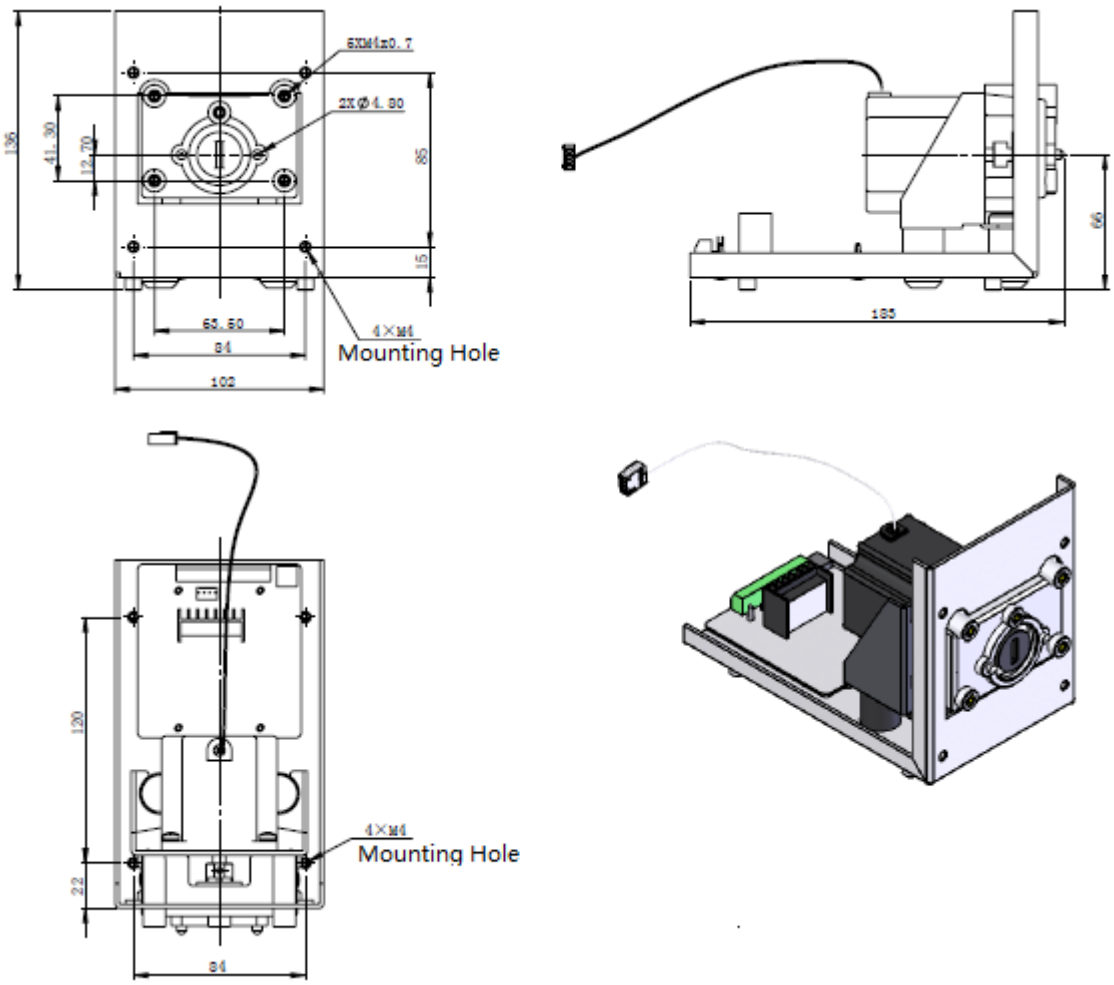



Figure 1

## 3 Operating Instruction

### 3.1 Pump and Pump Head Mounting

#### 3.1.1 Pump Mounting

T100 series variable speed peristaltic pump drive can be mounted on customer equipment through soleplate or panel. Refer to Figure 1 “Mounting Hole” for the mounting position.

#### 3.1.2 Pump Head Mounting

T100 series variable speed peristaltic pump drive has standard pump head mounting bracket. Refer to related pump head operating manual for the mounting details.

### 3.2 Hardware Setting

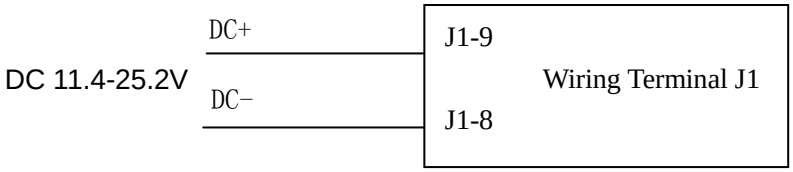
#### 3.2.1 Power Supply

The power supply requirement is DC 11.4-25.2V and power ≥20W. For the power supply terminal position, please refer to Figure 2 and Table 2 for T100-S16/S17/S18/S19, Figure 3 and

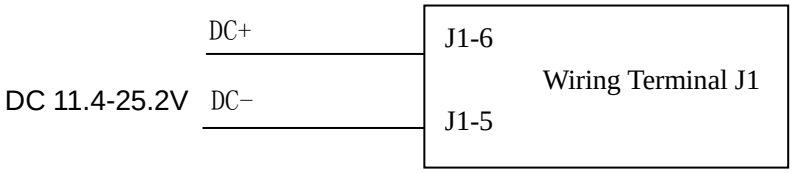
Table 4 for T100-S102.

Wiring diagram shown as below:

T100-S16/S17/S18/S19



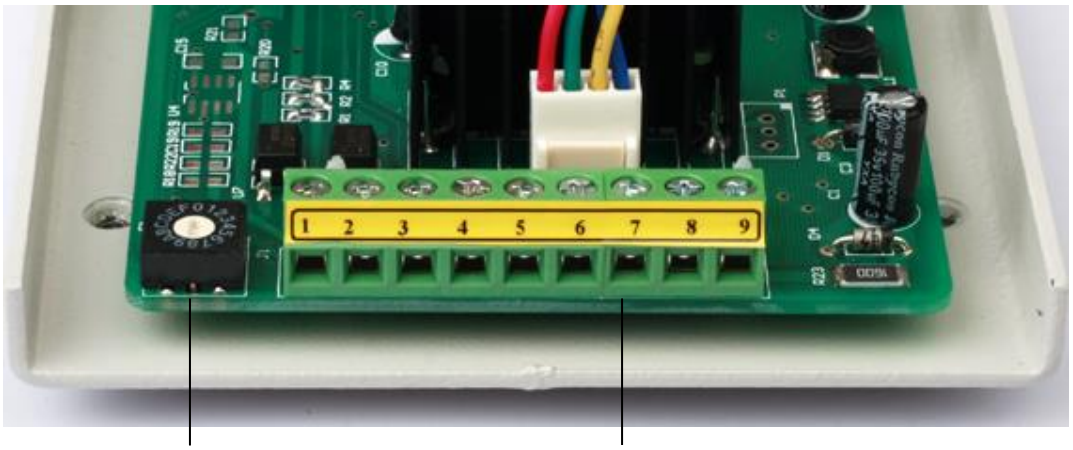

T100-S102：




### 3.2.2 T100-S16, T100-S17, T100-S18, T100-S19 BCD Dial Switch and Wiring Terminal Instruction

T100-S16, T100-S17, T100-S18, T100-S19 speed is controlled through internal control mode or external control mode. The internal control mode uses BCD dial switch, and the speed is divided into 15 grades. Please refer to Table 3 for the corresponding relation between BCD dial switch position and speed. The external control mode uses current signal (4-20mA), voltage signal (0-5V or 0-10V) or pulse signal (0-10kHz). Being the linear function, the speed will increase with the increasing signal. Switch signal is applied across terminals J1-5 and J1-7 to start/stop pump. Another switch signal is applied across terminals J1-6 and J1-7 to control operation direction as CW or CCW.

Figure 2 shows BCD dial switch and wiring terminal on control circuit board. Refer to Table 2 for wiring terminal definition.




BCD Dial Switch　　Wiring Terminal J1

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|




Figure2

Table2：Wiring Terminal Instruction

| Wiring Terminal | Definition | Wiring Terminal | Definition |
|---|---|---|---|
| 1 | Current or Voltage Signal + | 6 | CW/CCW Signal |
| 2 | Current or Voltage Signal - | 7 | CW/CCW, Start/Stop Common Grounding |
| 3 | Pulse Signal + | 8 | DC Power Supply - |
| 4 | Pulse Signal - | 9 | DC Power Supply + |
| 5 | Start/Stop Signal | | |

Note:

Terminals J1-1 and J1-2 are only applicable to T100-S16/S17/S18

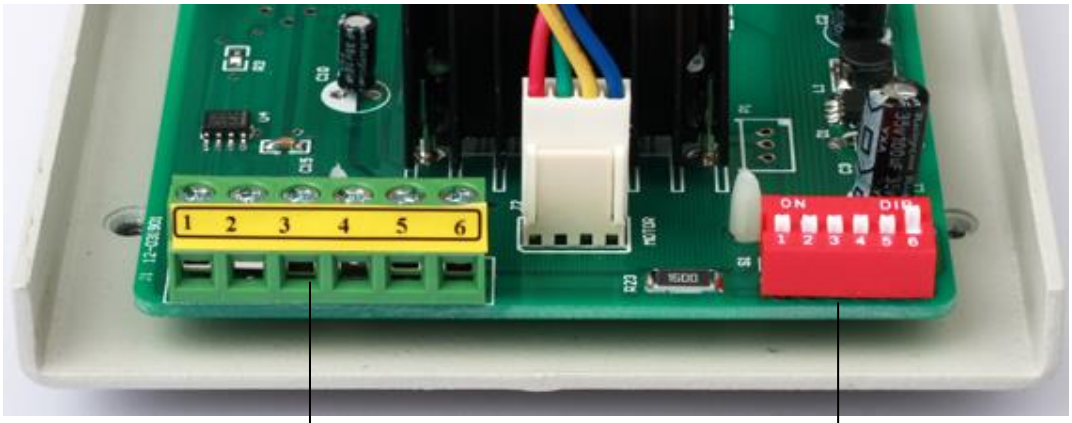
Terminals J1-3 and J1-4 are only applicable to T100-S19

Table 3：BCD Dial Switch Position vs Speed

| Control Mode | BCD Dial Switch Position | Speed（RPM） |
|---|---|---|
| External Control | 0 | |
| Internal Control | 1 | 5 |
| | 2 | 10 |
| | 3 | 15 |
| | 4 | 20 |
| | 5 | 25 |
| | 6 | 30 |
| | 7 | 35 |
| | 8 | 40 |
| | 9 | 45 |
| | A | 50 |
| | B | 60 |
| | C | 70 |
| | D | 80 |
| | E | 90 |
| | F | 100 |

### 3.2.3 T100-S102 Communication Address Setting, Wiring Terminal and Communication Wire Connection Instruction

T100-S102 receives RS485 communication signal to control start/stop, speed, direction and prime function. It also has the function of power-off memory. The data transmission speed and communication address are set through DIP switch. Figure 3 shows DIP switch and wiring terminal on control circuit board. Please refer to Table 5 and Table 6 for DIP switch setting, refer to Table 4 for wiring terminal definition, and refer to Appendix A for communication protocol.



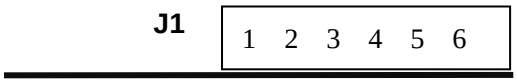



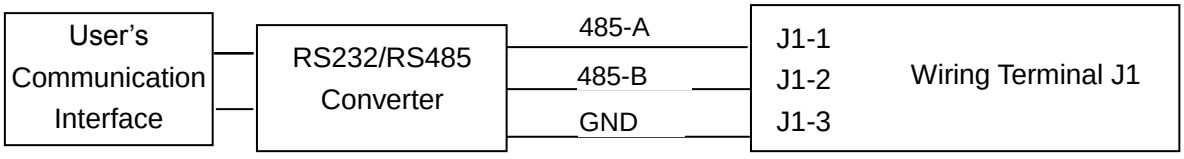

Figure 3

Communication wire connection instruction:

1) User's communication interface is RS485, please refer to below wiring diagram:




2) User's communication interface is RS232, please refer to below wiring diagram:




3) User's communication interface is USB, please refer to below wiring diagram:

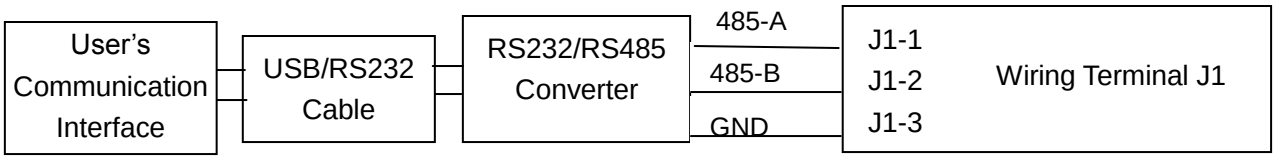


Table 4：Wiring Terminal Instruction

| Wiring Terminal | Definition | Wiring Terminal | Definition |
|---|---|---|---|
| 1 | RS485-A | 4 | Common Grounding |
| 2 | RS485-B | 5 | DC Power Supply - |
| 3 | Common Grounding | 6 | DC Power Supply + |

Table 5：DIP Switch vs. Data Transmission Speed

| DIP1 Position | Baud Rate (Bit Rate) |
|---|---|
| ON | 9600 baud (9600 bps) |
| OFF | 1200 baud (1200 bps) |

Table 6：DIP Switch vs. Communication Address

| DIP2 | DIP3 | DIP4 | DIP5 | DIP6 | Communication Address |
|---|---|---|---|---|---|
| OFF | OFF | OFF | OFF | ON | 1 |
| OFF | OFF | OFF | ON | OFF | 2 |
| OFF | OFF | OFF | ON | ON | 3 |
| OFF | OFF | ON | OFF | OFF | 4 |
| OFF | OFF | ON | OFF | ON | 5 |
| OFF | OFF | ON | ON | OFF | 6 |
| OFF | OFF | ON | ON | ON | 7 |
| OFF | ON | OFF | OFF | OFF | 8 |
| OFF | ON | OFF | OFF | ON | 9 |
| OFF | ON | OFF | ON | OFF | 10 |
| OFF | ON | OFF | ON | ON | 11 |
| OFF | ON | ON | OFF | OFF | 12 |
| OFF | 0N | ON | OFF | ON | 13 |
| OFF | ON | ON | ON | OFF | 14 |
| OFF | ON | ON | ON | ON | 15 |
| ON | OFF | OFF | OFF | OFF | 16 |
| ON | OFF | OFF | OFF | ON | 17 |
| ON | OFF | OFF | ON | OFF | 18 |
| ON | OFF | OFF | ON | ON | 19 |
| ON | OFF | ON | OFF | OFF | 20 |
| ON | OFF | ON | OFF | ON | 21 |
| ON | OFF | ON | ON | OFF | 22 |
| ON | OFF | ON | ON | ON | 23 |
| ON | ON | OFF | OFF | OFF | 24 |
| ON | ON | OFF | OFF | ON | 25 |
| ON | ON | OFF | ON | OFF | 26 |
| ON | ON | OFF | ON | ON | 27 |

| | | | | | |
|---|---|---|---|---|---|
| ON | ON | ON | OFF | OFF | 28 |
| ON | ON | ON | OFF | ON | 29 |
| ON | ON | ON | ON | OFF | 30 |

### 3.3 Operation

#### 3.3.1 T100-S16, T100-S17, T100-S18, T100-S19 Operating Procedures

1) Ensure the power supply is DC 11.4-25.2V and power≥20W.

2) Connect the power supply and necessary control signal wire according to Figure 2 and Table 2.

Control the pump start/stop with switch signal connected to J1-5 and J1-7 terminals.

Control the pump direction with switch signal connected to J1-6 and J1-7 terminals.

Control the pump speed with external control signal connected to J1-1 (ground to J1-2) for T100-S16/S17/S18, connected to J1-3 (ground to J1-4) for T100-S19.

3) Power on the pump and control the speed

Speed control under internal control mode:

Set the BCD dial switch at the position required, then power on the pump, pump will operate clockwise (start/stop and direction contacts are open by default). Pump will operate counter-clockwise when close direction switch. Change BCD position to control the pump speed. Pump will be at 0 rpm but still in running state, when BCD is set at “0” position. Pump will stop when close start/stop switch. We recommend external control mode where a high number of speed changes is required.

Speed control under external control mode:

Set BCD dial switch at “0” position, then power on the pump. Input the external current signal, voltage signal or pulse signal, the pump will operate clockwise (start/stop and direction contacts are open by default). Pump will operate counter-clockwise when close direction switch. Control the speed of pump with external control signal. Being the linear function, the speed will increase with the increasing external control signal. Pump will stop when close start/stop switch.

#### 3.3.2 T100-S102 Operating Procedures

1) Ensure the power supply is DC 11.4-25.2V and power≥20W.

2) Connect the power supply and communication wire according to Figure 3 and Table 4.

3) Power on the pump, input RS485 signal according to Appendix A “communication protocol” to control the pump.

## APPENDIX A：T100-S102 Communication Protocol

1. Frame format: 1start + 8data + 1even parity + 1stop, 1200bps or 9600bps

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.

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 (2bytes) | Full speed and 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. Example: 0258H means 60rpm.
- Full speed and start/stop:
  Bit0: 1 means pump runs, 0 means pump stops.
  Bit1: 1 means full speed, 0 means normal speed.
- Direction:
  Bit0: 1 means CW, 0 means CCW.

Note: 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.

3.2 PC reads pump's running state

PC calls:

| RJ |
|---|

Pump responds:

| RJ | Speed (2bytes) | Full speed and start/stop (1 byte) | 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.

- Refer to para. 3.1 for instructions of speed, full speed, start/stop, direction

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

3.3 Read 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).

4. Example:

To set a pump (addr: 01) to run CW at speed of 50rpm. The message should be:

E9 01 06 57 4A 01 F4 01 01 EF