T600-S300 Series Variable Speed Peristaltic Pump Drive Operating Manual

Contents

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 compression block 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 add 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 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 ensure it against possible damage or loss during the transport.

1.3 Contacts Information

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2 Pump Introduction

2.1 Main Features

T600 series variable speed peristaltic pump drives are mainly designed for OEM applications. The speed can be controlled by BCD dial switch, external control signal or communication commands, with 600 rpm as max. And the pump drive can be fitted with several different kinds of pump head with the max flow rate of 2200mL/min. The pump can be mounted to customer equipment through soleplate or panel.

Table 1: Product Model Table

Item	Model	Description	Product Code
1	T600-S300	Speed control through BCD dial switch or 4-20mA current signal	0563100
2	T600-S301	Speed control through BCD dial switch or 0-5V voltage signal	0563101
3	T600-S302	Speed control through BCD dial switch or 0-10V voltage signal	0563102
4	T600-S303	Speed control through BCD dial switch or 0-10kHz pulse signal	0563103
5	T600-S500	RS485 communication Control	0563200

2.2 Main Function

2.2.1 T600-S300, T600-S301, T600-S302, T600-S303 Main Function

1) Pump head options：YZ1515X, YZ2515X, YZⅡ15, YZⅡ25, DG15-24, BZ15-13, BZ25-13, etc.

2) Two control modes for pump speed control:

Internal control mode: control the speed through BCD dial switch.

External control mode: control the speed through 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) Running direction can be controlled by external switch signal: CW when switch is open, CCW when switch is closed.

2.2.2 T600-S500Main Function

1) Pump head options: YZ1515X, YZ2515X, YZⅡ15, YZⅡ25, DG15-24, BZ15-13, BZ25-13, etc.

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

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

full speed to fill or clear tubing.

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

2.3 Specifications

2.3.1 T600-S300, T600-S301, T600-S302, T600-S303 Specification

Speed range in internal control mode: 5-600rpm. 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 in external control mode: 0-600rpm. Being the linear function, the speed will increase with the increasing signal. (T600-S300 will operate at 0 rpm when signal is smaller than 4 mA, and 1 rpm when 4 mA is received)

Speed resolution is 1 rpm.

Power supply: DC 24V

Power consumption: ≤80W

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

Outline dimension: 185×120×136（mm）

Weight：2.12 kg

2.3.2 T600-S500 Specification

Speed range: 0-600rpm

Speed resolution: 1rpm

Baud rate: 1200bps or 9600bps. Refer to table 5 for baud rate setting.

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

Power supply: DC 24V

Power consumption: ≤80W

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

Outline dimension: 185×120×136（mm）

Weight: 2.12 kg

2.3.3 Applicable Pump Head and Tubing, and Reference Flow Rate

| Applicable Pump Head	Silicone Tubing	Pharmed Tubing	Reference Max Flow Rate (silicone tubing) mL/min
YZ1515x(3 rollers)、YZⅡ15	13#、14#、19#、16#、25#、17#、18#	13#、14#、19#、16#、25#、17#、18#	2200
FG15-13	13#、14#、19#、16#、25#、17#、18#	13#、14#、19#、16#	2400
DMD15-13-B DMD15-13-D	2*13#、2*14#、2*19#、2*16#、2*25#	2*13#、2*14#、2*19#、2*16#	1070
BZ15-13-A	14#	14#	150
BZ15-13-B	16#	16#	460
BZ15-13-C	25#	25#	960
BZ15-13-D	17#	Not Recommended	1600
BZ25-13-B	24#	Not Recommended	1600
DG15-24	16#、25#、17#	Not Recommended	1800(Single Channel)
YZ2515x 、YZⅡ25	15#、 24#	Not Recommended	1600
FG25-13	15# 24#	Not Recommended	2200

2.4 Installation Dimension
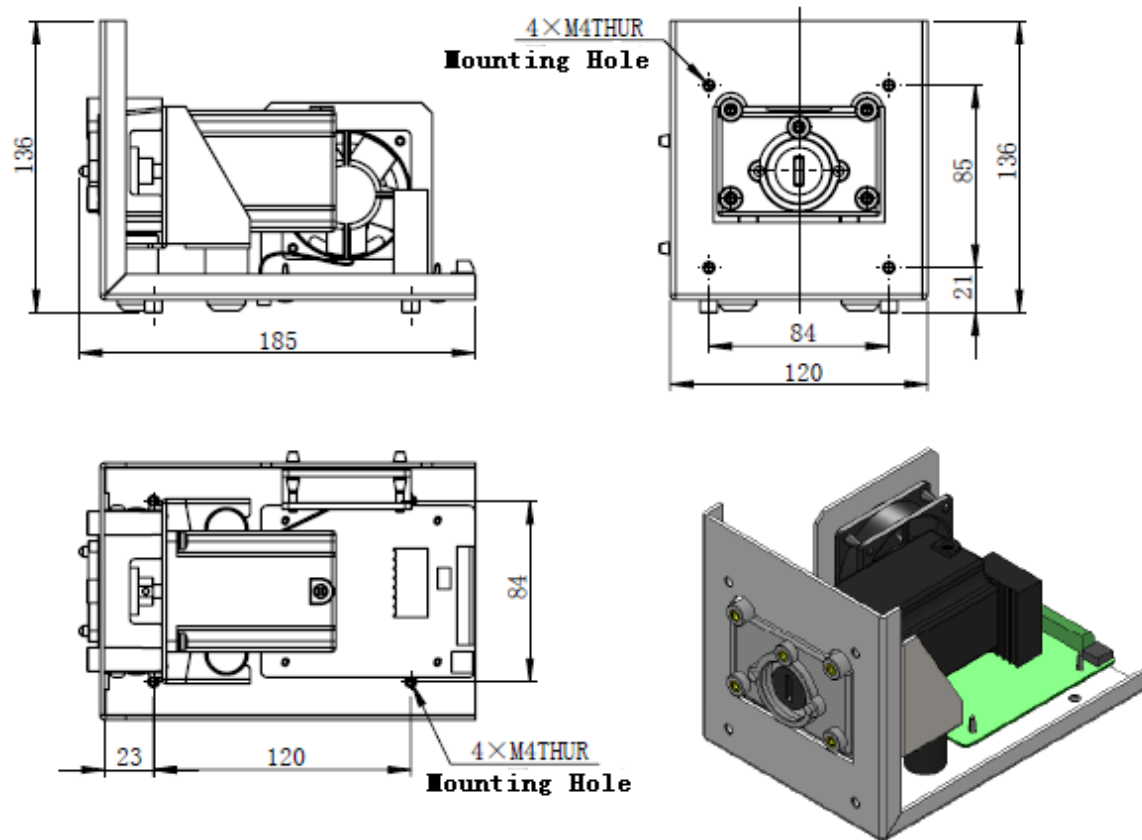
Figure 1

3 Operating Instruction

3.1 Pump and Pump Head Mounting

3.1.1 Pump Mounting

T600 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

T600 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 24V and power ≥80W. For the power supply terminal position, please refer to Figure 2 and Table 2 for T600-S300/S301/S302/S303, Figure 3 and Table 4 for T600-S500.

Wiring diagram shown as below:
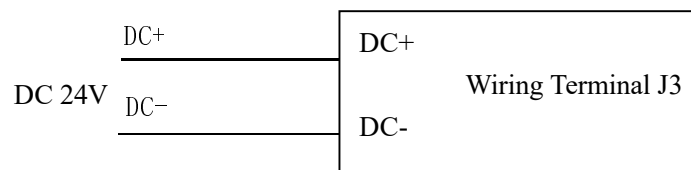
3.2.2 T600-S300, T600-S301, T600-S302, T600-S303 Hardware Setting and Wiring Instruction

T600-S300, T600-S301, T600-S302, T600-S303 speed is controlled through internal control mode or external control mode. BCD dial switch is used to set the pump speed in internal control mode. The speed is divided into 30 grades. Please refer to Table 3 for the corresponding relation between BCD dial switch position and speed. When pump is working in external control mode, the pump speed is controlled through 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. Pump start/stop and running direction are both controlled by switch signals.

Figure 2 shows BCD dial switch, S1 and wiring terminal on control board. Refer to Table 2 for wiring terminal definition.

Wiring Terminal J3   S1   BCD Dial Switch
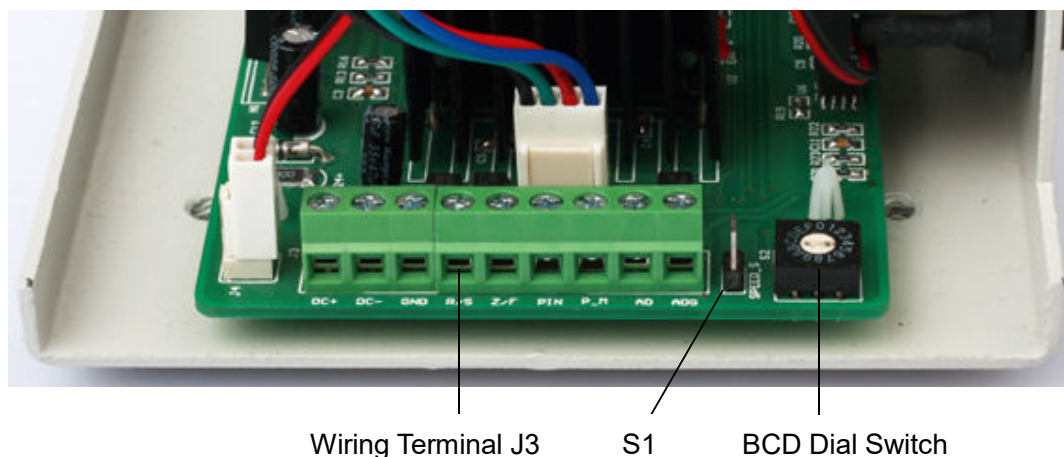
Figure2

Table2：Wiring Terminal Instruction

Wiring Terminal	Definition	Wiring Terminal	Definition
DC+	DC Power Supply +	PIN	Pulse Signal+
DC-	DC Power Supply -	P_M	Pulse Signal-
GND	Common Grounding of CW/CCW, Start/Stop	AD	Current or Voltage Signal +
R/S	Start/Stop Signal	ADG	Current or Voltage Signal -
Z/F	CW/CCW Signal		

Note:

Terminals AD and ADG are only applicable to T600-S300/S301/S302

Terminals PIN and P_M are only applicable to T600-S303

Table 3：BCD Dial Switch Position vs Speed

Control Mode	BCD Dial Switch Position	Speed（RPM）
External Control	0	
Internal Control Low Speed Grade (S1 plugs short circuit block)	1	5
	2	10
	3	20
	4	40
	5	60
	6	80
	7	100
	8	125
	9	150
	A	175
	B	200
	C	225
	D	250
	E	275
	F	300
Internal Control High Speed Grade (S1 unplugs short circuit block)	1	320
	2	340
	3	360
	4	380
	5	400
	6	420
	7	440
	8	460
	9	480
	A	500
	B	520
	C	540
	D	560
	E	580
	F	600

3.2.3 T600-S500 Hardware Setting and Wiring Instruction

T600-S500 receives RS485 communication signal to control start/stop, speed, direction and prime function. It also has the function of power-off memory. The baud rate and communication address are set through DIP switch. Figure 3 shows DIP switch and wiring terminal on control board. Please refer to Table 5 and Table 6 for baud rate and communication address setting, refer to Table 4 for wiring terminal definition, and refer to Appendix A for communication protocol.

DIP Switch   Wiring Terminal
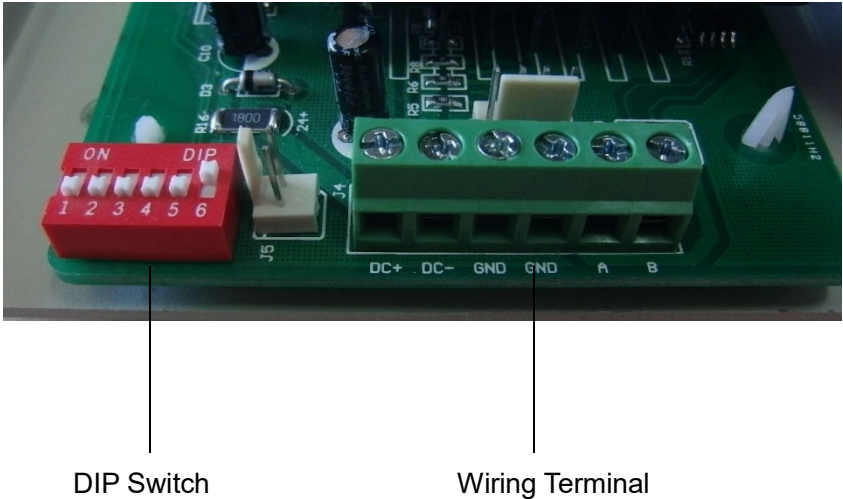
Figure 3

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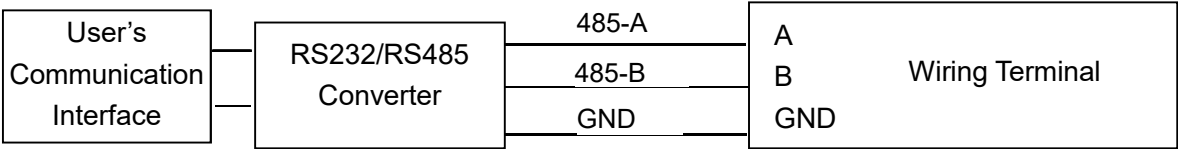
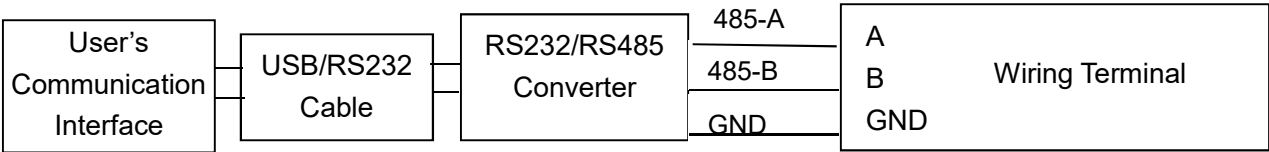3) User's communication interface is USB, please refer to below wiring diagram:

Table 4：Wiring Terminal Instruction

Wiring Terminal	Definition	Wiring Terminal	Definition
DC+	DC Power Supply	GND	Common Grounding

DC-	+ DC Power Supply -	A	RS485-A
GND	Common Grounding	B	RS485-B

Table 5：DIP Switch vs. Data Transmission Speed

DIP1 Position	Baud Rate (bps)
ON	9600
OFF	1200

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 T600-S300, T600-S301, T600-S302, T600-S303 Operating Procedures

1) Make sure the power supply is DC 24V and ≥80W.

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 R/S and GND terminals.

Control the pump direction with switch signal connected to Z/F and GND terminals.

Control the pump speed with external control signal connected to AD (ground to ADG) for T600-S300/S301/S302, connected to PIN (ground to P_M) for T600-S303.

3) Power on the pump and control the speed

Speed control in 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 set the pump speed. Pump will be at 0 rpm but still in running state, when BCD is set at "0" position. Short circuit block needs to be plugged at S1 to set "Low Speed Grade". Pump will stop when close start/stop switch. We recommend external control mode when speed needs to be adjusted frequently.

Speed control in 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 T600-S500 Operating Procedures

1) Make sure the power supply is DC 24V and ≥80W.

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

3) Set the baud rate and pump address according to Table 5 and 6.

4) Power on the pump, send the commands according to Appendix A "communication protocol" to control the pump.

APPENDIX A: T600-S500 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 byte, hexadecimal number, most significant byte first. Example: 0258H means 600rpm
- 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 600rpm. The message should be:

E9 01 06 57 4A 02 58 01 01 40