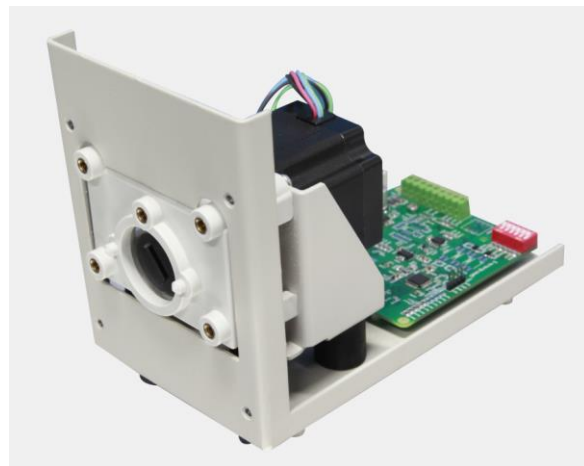


T100-SX Specification

1 Product Model

Product Model	Description
T100-SA	Speed control through BCD dial switch or 4-20mA current signal
T100-SV-05	Speed control through BCD dial switch or 0-5V voltage signal
T100-SV-10	Speed control through BCD dial switch or 0-10V voltage signal
T100-SF	Speed control through BCD dial switch or 0-10kHz pulse signal
T100-SC	RS485 communication control



2 Main Features

- CE certified with good EMC performance
- Meet RoHS 2.0 requirement
- Low vibration and low noise

3. Main Function

3.1 T100-SA, T100-SV-05, T100-SV-10, T100-SF Main Function

- 3.1.1 Two control modes for pump speed control:
 - Control the speed through BCD dial switch.
 - Control the speed through current, voltage or pulse signal.
- 3.1.2 Start/stop can be controlled by external switch signal: pump runs when switch is open, pump stops when switch is closed.
- 3.1.3 Running direction can be controlled by external switch signal: CW when switch is open, CCW when switch is closed.
- 3.1.4 Applicable pump head options: YZ1515x, YZ2515x, YZII15, YZII25, DG, FG15, FG25, BZ15, BZ25, etc.

3.2 T100-SC Main Function

- 3.2.1 Start/stop, running direction and speed are controlled through serial communication with RS485 interface.
- 3.2.2 Prime function also can be carried out through RS485 communication, to run pump at full speed for fast filling or emptying.
- 3.2.3 DIP switch is for communication address and baud rate setting.
- 3.2.4 Power-off memory function stores the running parameters automatically.
- 3.2.5 Pump is controlled via Longer OEM protocol or Modbus protocol
- 3.2.6 Applicable pump head options: YZ1515X, YZ2515X, YZII15, YZII25, DG, FG15, FG25, BZ15, BZ25, etc.

4 Technical Spec

4.1 T100-SA, T100-SV-05, T100-SV-10, T100-SF Specification

- 4.1.1 Pump speed: 0-100rpm
- 4.1.2 Speed resolution controlled by external signal: 0.1rpm
- 4.1.3 Speed corresponding to BCD dial switch position 1-F: 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 60, 70, 80, 90, 100rpm
- 4.1.4 Power supply: DC 24V
- 4.1.5 Power consumption: $\leq 50W$
- 4.1.6 Working condition: temperature 0-40°C, relative humidity <80%, no condensation

4.2 T100-SC Specification

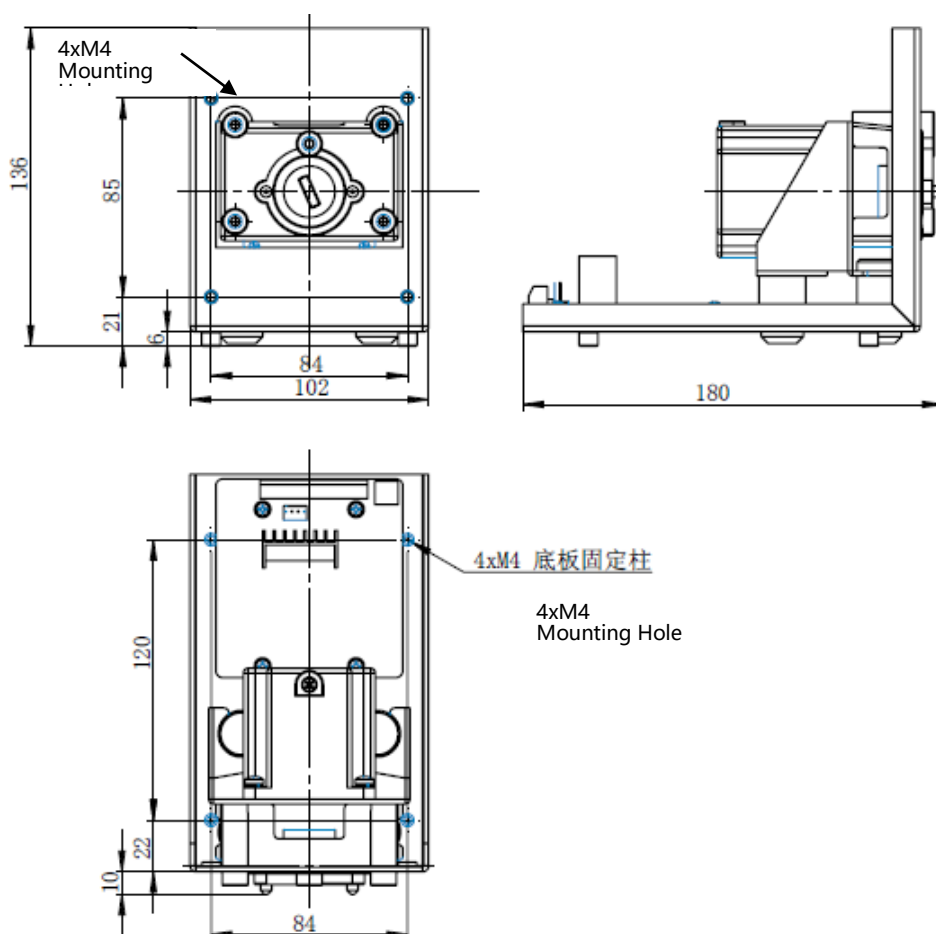
- 4.2.1 Pump speed: 0-100rpm
- 4.2.2 Speed resolution: 0.1rpm
- 4.2.3 Power supply: DC 24V
- 4.2.4 Power consumption: $\leq 50Ws$
- 4.2.5 Working condition: temperature 0-40°C, relative humidity <80%, no condensation

5 Applicable Pump Head and Tubing, and Reference Flow Rate

Pump Head	Silicone Tubing	Reference Flow Rate (with silicone tubing) mL/min	Pharmed® Tubing
YZ1515x (3 rollers), YZII15	13#, 14#, 19#, 16#, 25#, 17#, 18#	380	13#, 14#, 19#, 16#
FG15-13	13#, 14#, 19#, 16#, 25#	230	13#, 14#, 19#
DMD15-13-B DMD15-13-D	2*13#, 2*14#, 2*19#, 2*16#, 2*25#	375	2*13#, 2*14#
BZ15-13-A	14#	22	14#
BZ15-13-B	16#	80	16#
BZ15-13-C	25#	150	25#
BZ15-13-D	17#	270	Not Recommended
BZ25-13-B	24#	250	Not Recommended
DG15-24	16#, 25#, 17#	300(single channel)	Not Recommended
DG15-28	13#, 14# ID≤3.17mm Wall thickness: 0.8-1mm	75(single channel)	ID≤3.17mm Wall thickness: 0.8-1mm
DG-1, DG-2 6 rollers, or 10 rollers	ID≤3.17mm Wall thickness: 0.8-1mm	48 (6 rollers, single channel) 32 (10 rollers, single channel)	ID≤3.17mm Wall thickness: 0.8-1mm
DG-4, DG-6 6 rollers, or 10 rollers	ID≤3.17mm Wall thickness: 0.8-1mm	48 (6 rollers, single channel) 32 (10 rollers, single channel)	Not Recommended
YZ2515x, YZII25	15#, 24#	270	Not Recommended
FG25-13	15#, 24#	320	Not Recommended

Note: The flow rate in above table is only for the reference, which were tested at the indoor temperature with water. When select pump head and tubing, the decay of flow and the fluid viscosity need to be considered.

6 Installation Dimension



7 Hardware Setting and Terminal Instruction

7.1 T100-SA, T100-SV-05, T100-SV-10, T100-SF Hardware Setting and Terminal

Instruction

Terminal Instruction

Wiring Terminal	Definition	Wiring Terminal	Definition
1	Current or Voltage Signal +	6	CW/CCW Signal
2	Current or Voltage Signal -	7	Common Grounding of CW/CCW, Start/Stop

3	Pulse Signal +	8	24VDC Power Supply -
4	Pulse Signal -	9	24VDC Power Supply +
5	Start/Stop Signal		



BCD Dial Switch Position vs Speed

BCD Dial Switch Position	Speed (RPM)
0	Speed is Controlled by external signal
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

7.2 T100-SC Hardware Setting and Terminal Instruction

Terminal Instruction

Wiring Terminal	Definition
1/2/3/4/7	Reserved
5	RS485-A

6	RS485-B
8	Power Supply DC 24V(-)
9	Power Supply DC 24V(+)

DIP Switch for Baud Rate and Communication Address

DIP 1 is for baud rate setting.

DIP 2 to 6 are for communication address

DIP Switch						Communication address
1	2	3	4	5	6	
OFF: Baud rate is 1200 bps ON: Baud rate is 9600 bps	OFF	OFF	OFF	OFF	OFF	1
	ON	OFF	OFF	OFF	OFF	2
	OFF	ON	OFF	OFF	OFF	3
	ON	ON	OFF	OFF	OFF	4
	OFF	OFF	ON	OFF	OFF	5

ON	OFF	ON	ON	ON	30	

8 Operating

8.1 T100-SA, T100-SV-05, T100-SV-10, T100-SF Operating

1) Make sure the power supply is DC 24V and $\geq 50W$.

2) Connect the power supply and necessary control signal wires

Control the pump start/stop with switch signal connected to terminal 5 and 7.

Control the pump direction with switch signal connected to terminal 6 and 7.

Control the pump speed:

For T100-SA: connect 4-20mA signal+ to terminal 1 and signal- to terminal 2.

For T100-SV-05: connect 0-5V signal+ to terminal 1 and signal- to terminal 2.

For T100-SV-10: connect 0-10V signal+ to terminal 1 and signal- to terminal 2.

For T100-SF: connect 0-10kHz signal+ to terminal 3 and signal- to terminal 4.

3) Power on the pump and control the pump

Start/stop control: open the switch (terminal 5 and 7 are disconnected) then pump runs, close

the switch (terminal 5 and 7 are connected) then pump stops.

Direction control: open the switch (terminal 6 and 7 are disconnected) then pump runs CW, close the switch (terminal 6 and 7 are connected) then pump runs CCW.

Speed control through BCD: set the BCD dial switch at the position according to desired speed.

Speed control through external signal: Set BCD dial switch at "0" position, then input the external signal to control the pump speed. The speed is linearly proportional to the input speed signal.

8.2 T100-SC Operating

Connect the power supply and communication wire according to Terminal Instruction (terminal 5 for RS485-A, terminal 6 for RS485-B). Set the baud rate and pump address. Then power on the pump, and send the commands according to Appendix A and B "communication protocol" to control the pump.

Appendix A Longer OEM 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.

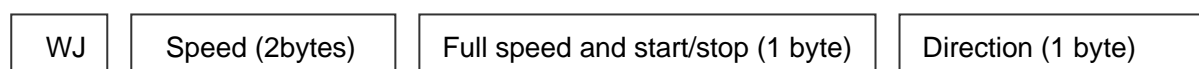
len: one byte, length of **pdu**.

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

3. **pdu** format: application layer code format

3.1 PC sets pump running parameters

PC sends command:



Pump responds:

WJ

- WJ: 2 bytes, using ASCII code, to indicate that this command is used to set pump 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: 01F4H means 50rpm.
- 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.

Example 1:

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

E9 01 06 57 4A 01 F4 01 01 EF

Example 2:

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

E9 01 06 57 4A 01 F4 03 00 EC

3.2 PC reads pump 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 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

Appendix B Modbus Communication Protocol

Parameter	Address	Data Type	Note
Pump speed	0x00	uint_16	Range: 0-1000, corresponding to 0.1rpm to 100rpm, in increments of 0.1rpm Example: 1 means 0.1rpm. 1000 means 100rpm.
Full speed running	0x01	uint_16	1: Pump runs at full speed. 0: Pump running state is determined by "Pump speed" and "Start/stop" parameters. Note: "Full speed running" only can be set as 1 when "Start/stop" is 1. When "Full speed running" is 1, "Pump speed" remains previous parameter.
Start/stop	0x02	uint_16	1: Pump runs at the speed of "Pump Speed" 0: Pump stops. Note: "Full speed running" will be 0 when "Start/top" is set as 0.
Direction	0x03	uint_16	0: pump runs CW 1: pump runs CCW

Note:

- 1 Frame format: 1start+8data+1even parity+1stop
- 2 For 2-byte word data: most significant byte first. For 2- words data: low address first
- 3 Pump only supports function codes of 03 (0x03), 06 (0x06) and 16 (0x10). Reports an error when receives other function code.