T100&WX10 Series Variable Speed Peristaltic Pump 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 in 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 Feature

T100&WX10 series variable speed peristaltic pumps, including pump drive and WX10 pump head, are mainly designed for OEM applications. The speed can be controlled by BCD dial switch, external control signal or communication commands, with 100 rpm as max. The pump offers flow rate from 0.1 to 40mL/min and can be mounted to customer equipment through soleplate.

Please refer to Appendix A for product model.

2.2 Main Function

2.2.1 T100-S300/S301/S302/S303&WX10 Main Function

1) Pump head options: WX10-14 series pump head with 4 rollers, WX10-18 series pump head with 8 rollers and smaller pulse.

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 T100-S500&WX10 Main Function

1) Pump head options: WX10-14 series pump head with 4 rollers, WX10-18 series pump head with 8 rollers and smaller pulse.

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 Specification

2.3.1 T100-S300/S301/S302/S303&WX10 Specification

Speed range in internal control mode: 5-100rpm，BCD dial switch is used to control the speed. Refer to Table 2 for corresponding relation between BCD dial switch position and speed.

Speed range in external control mode: 0-100 rpm. Being the linear function, the speed will

increase with the increasing signal (T100-S300&WX10 will operate at 0 rpm when signal is smaller than 4mA, and 0.1 rpm when 4mA is received)

Speed resolution: 0.1rpm

Tubing options: ID≤3.17mm, wall thickness: 0.8-1.0mm

Power Supply：DC 11.4-25.2V

Power consumption：≤12W

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

Outline dimension：(L×W×H) 106×60×81(mm)

Weight：0.51kg

2.3.2 T100-S500&WX10 Specification

Speed: 0-100rpm

Speed resolution: 0.1rpm

Tubing options: ID≤3.17mm, wall thickness: 0.8-1.0mm

Baud rate: 1200bps or 9600bps. Refer to table 4 for setting.

Communication address: 1-30, 31 is broadcast address. Refer to Table 4 for communication address setting.

Power supply: DC 11.4-25.2V

Power consumption: ≤12W

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

Outline dimension: (L×W×H) 106×60×81（mm）

Weight: 0.51kg

2.3.3 Reference Flow Rate

Pump Head	Tubing(ID*wall thickness mm)	Max Flow Rate (mL/min)
WX10-14	0.5*0.8	2.5
	1*1	10
	2*1	23
	3*1	40
WX10-18	0.5*0.8	1.5
	1*1	6
	2*1	15
	3*1	22

Note: The flow rates in above table are 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.
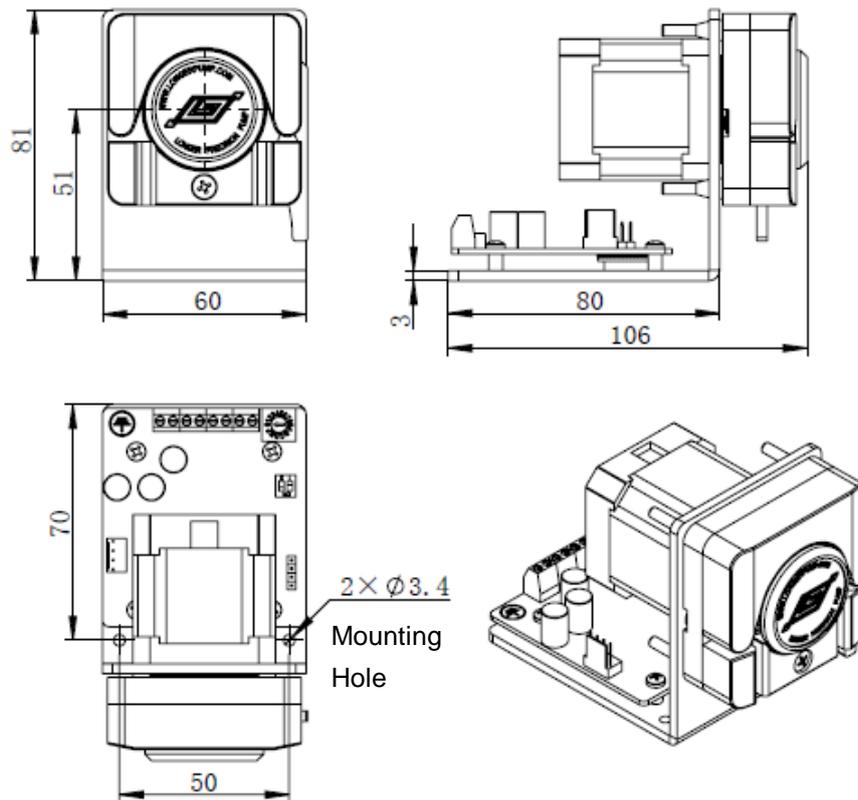
2.4 Installation Drawing

Figure 1

3 Operating Instruction

3.1 Pump Head Mounting

WX10 series pump head rotor drive shaft is the motor output shaft. The rotor needs re-aligning when mount the pump head on the pump drive. We don't recommend that you replace WX10 pump head by yourself. If you need to replace the pump head, please send the pump back to Longer or the authorized distributors.

3.2 Tube Loading

Note: Please disconnect pump from the mains power before loading the tube.

1）Release the trigger and open the compression block.
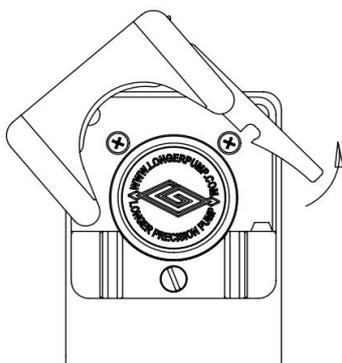
2）Tube loading

a) For single rotate direction application, only the inlet of the tubing needs one stop collar. For two rotate direction application, the outlet of the tubing also needs one stop collar. The tubing length between two stop collars is 93mm.
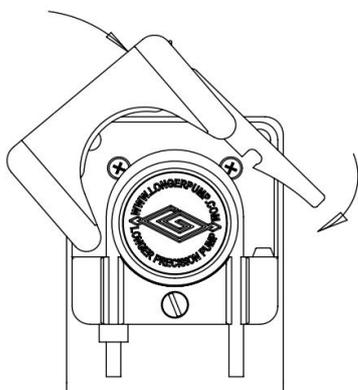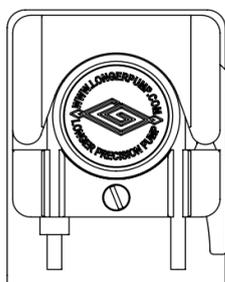
b) Fit the inlet of the tubing into the slot. Place the stop collar outside the slot.

c) Lightly stretch the tubing across rollers.

d) Fit the outlet of the tubing into the other slot. (The other stop collar will be placed outside the slot for the two rotate direction application.)

3）Close the compression block and fasten the trigger.

3.3 Pump Mounting

T100&WX10 series variable speed peristaltic pump can be mounted on customer equipment through soleplate. Refer to Figure 1 "Mounting Hole" for the mounting position.

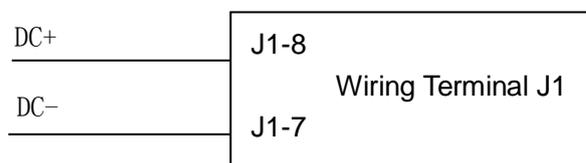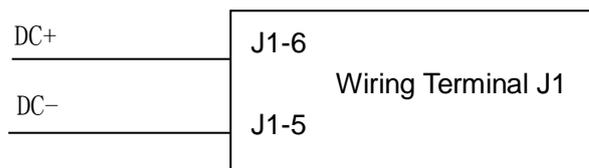## 3.4 Hardware Setting

3.4.1 Power Supply

The power supply requirement is DC 11.4V-25.2V and ≥12W. For the power supply terminal position, please refer to Figure 2 and Table 1 for T100-S300&WX10，T100-S301&WX10，T100-S302&WX10，T100-S303&WX10, Figure 3 and Table 3 for T100-S500&WX10.

Wiring Diagram shown as below:

T100-S300&WX10，T100-S301&WX10，T100-S302&WX10，T100-S303&WX10:

T100-S500&WX10：

3.4.2 T100-S300/301/302/303&WX10 Hardware Setting and Wiring Instruction

BCD dial switch is used to set the pump speed in internal control mode. The speed is divided into 15 grades. Please refer to Table 2 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 and wiring terminal on control board. Refer to Table 1 for the terminal definition.

BCD Dial Switch   Wiring Terminal J1
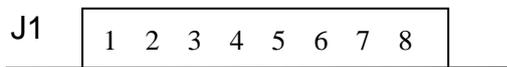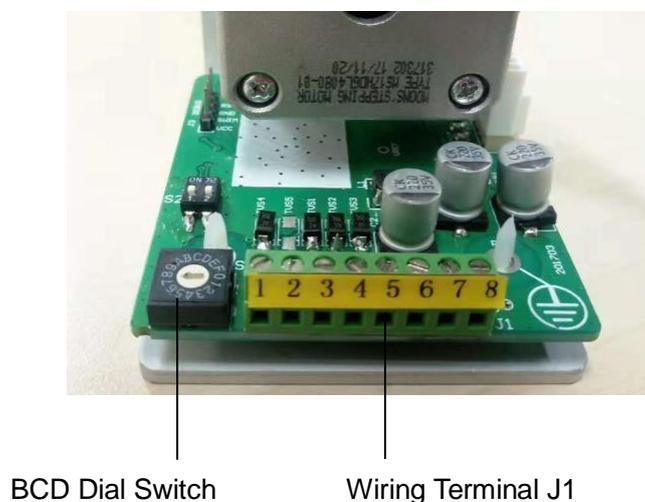
Figure 2

Table 1：Wiring Terminal Instruction

Terminal No.	Definition	Terminal No.	Definition
1	Current or Voltage Signal +	5	CW/CCW Signal
2	Current or Voltage Signal -	6	Common Grounding of CW/CCW, Start/Stop, Pulse Signal
3	Pulse Signal +	7	DC Power Supply -
4	Start/Stop Signal	8	DC Power Supply +

Note:

Terminals J1-1 and J1-2 are only applicable to T100-S300/S301/S302&WX10 series products

Terminals J1-3 is only applicable to T100-S303&WX10 series products

Table 2： 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

3.4.3 T100-S500&WX10 Hardware Setting and Wiring Instruction

T100-S500&WX10 receives RS485 communication commands 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 dial switches S1 and S2, refer to Table 4 for setting details. Figure 3 shows dial switches and wiring terminal on control board. Refer to Table 3 for wiring terminal definition, and refer to Appendix B for communication protocol.

Dial Switch S2

Dial Switch S1   Wiring Terminal J1

J1

| 1 | 2 | 3 | 4 | 5 | 6 |
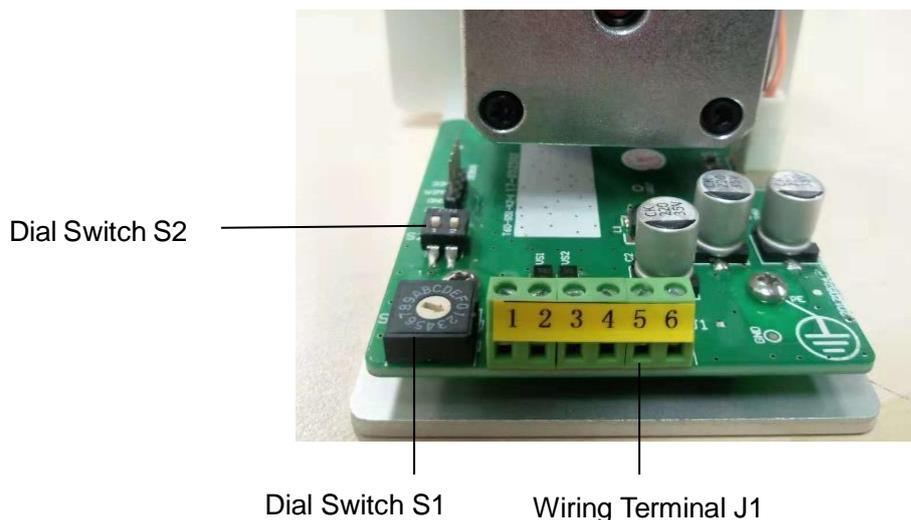
Figure 3

Communication wire connection instruction:

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

User's Communication Interface	485-A	J1-1	
	485-B	J1-2	Wiring Terminal J1
	GND	J1-3	

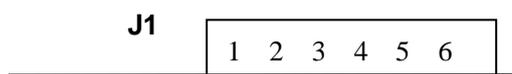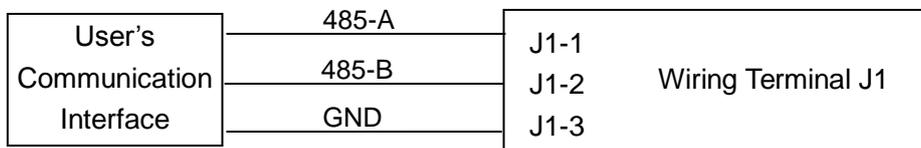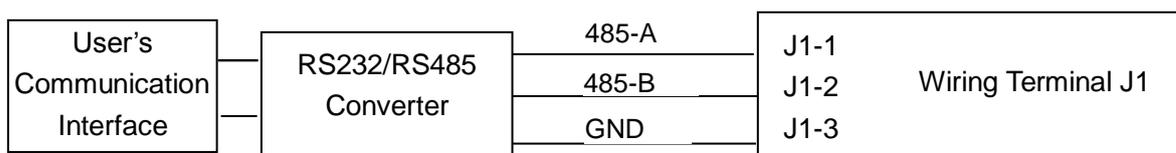2) User's communication interface is RS232, please refer to below wiring diagram:

User's Communication Interface	RS232/RS485 Converter	485-A	J1-1	
		485-B	J1-2	Wiring Terminal J1
		GND	J1-3	

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

User's Communication Interface	USB/RS232 Cable	RS232/RS485 Converter	485-A	J1-1	
			485-B	J1-2	Wiring Terminal J1
			GND	J1-3	
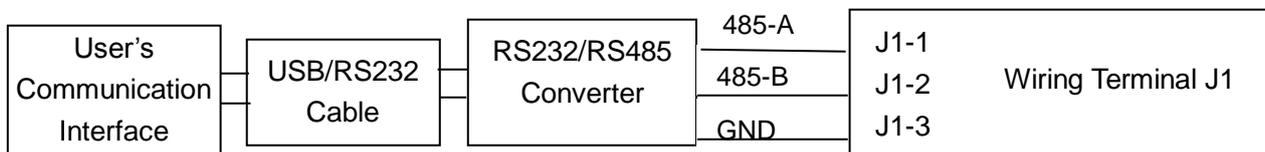
Table 3：Wiring Terminal Instruction

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 4：Baud Rate and Communication Address Setting

Pump Address — Switch S1 / Baud Rate Switch S2			Dial Switch S1																
			0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
Dial Switch S2	1	OFF		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		ON	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	
	2	OFF	1200bps															
		ON	9600bps															

3.5 Operation

3.5.1 T100-S300/301/302/303&WX10 Operating Procedures

1) Make sure the power supply is DC 11.4V-25.2V and ≥12W.

2) Connect the power supply and necessary control signal wire according to Figure 2 and Table 1.

Control the pump start/stop with switch signal connected to J1-4 and J1-6 terminals.

Control the pump running direction with switch signal connected to J1-5 and J1-6 terminals.

Control the pump speed with external control signal connected to J1-1 (ground to J1-2) for T100-S300/S301/S302&WX10, connected to J1-3 (ground to J1-6) for T100-S303&WX10.

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. 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.

3.5.2 T100-S500&WX10 Operating Procedures

1) Make sure the power supply is DC 11.4V-25.2V and ≥12W.

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

3) Set the pump address and baud rate according to Table 4.

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

Appendix A: Product Model Table

Item	Model	Description	Product Code
1	T100-S300&WX10-14-H	Speed control through BCD dial switch or 4-20mA signal. Black pump head with 4 POM rollers	05.60.01H
2	T100-S300&WX10-18-H	Speed control through BCD dial switch or 4-20mA signal. Black pump head with 8 POM rollers	05.60.07H
3	T100-S301&WX10-14-H	Speed control through BCD dial switch or 0-5V signal. Black pump head with 4 POM rollers	05.60.02H
4	T100-S301&WX10-18-H	Speed control through BCD dial switch or 0-5V signal. Black pump head with 8 POM rollers	05.60.08H
5	T100-S302&WX10-14-H	Speed control through BCD dial switch or 0-10V signal. Black pump head with 4 POM rollers	05.60.03H
6	T100-S302&WX10-18-H	Speed control through BCD dial switch or 0-10V signal. Black pump head with 8 POM rollers	05.60.09H
7	T100-S303&WX10-14-H	Speed control through BCD dial switch or 0-10kHz signal. Black pump head with 4 POM rollers	05.60.04H
8	T100-S303&XX10-18-H	Speed control through BCD dial switch or 0-10kHz signal. Black pump head with 8 POM rollers	05.60.10H
9	T100-S500&WX10-14-H	RS485 communication Control. Black pump head with 4 POM rollers	05.60.05H
10	T100-S500&WX10-18-H	RS485 communication Control. Black pump head with 8 POM rollers	05.60.11H

Appendix B: T100-S500&WX10 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.
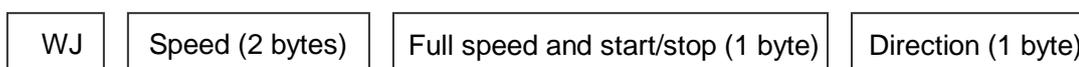
   len: one byte, length of **pdu**.

   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 (2 bytes)	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.
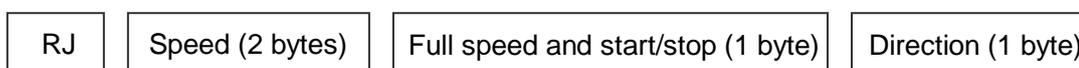- Direction:
  Bit0: 1 means CW, 0 means CCW.

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 (2 bytes)	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