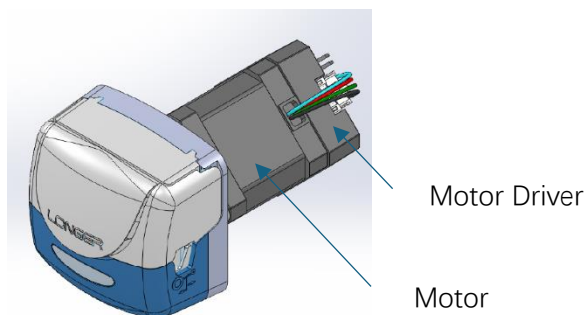


T100-SC01/T400-SC01

Operating Manual



1. Product Model

Product Model	Product Code	Max Speed	Pump Head
T100-SC01&BPH01	05.59.205	100rpm	BPH01(Included)
T400-SC01&BPH01	05.62.101	400rpm	BPH01(Included)
T100-SC01-02	05.59.207	100rpm	KZ15/KZ10
T400-SC01-02	05.62.103	400rpm	KZ15/KZ10
T100-SC01&WX10-14-H	05.59.201	100rpm	WX10-14-H(Included)
T100-SC01&JY15-12-C	05.59.203	100rpm	JY15-12-C(Included)

2. Product Type: Peristaltic Pump or Pump Drive

3. Product Features:

- a) Compact size and structure, utilizing a NEMA 17 stepper motor with an integrated driver
- b) Communication control of the pump via the RS485 interface (Modbus RTU and Longer OEM protocol).
- c) The pump is compatible with various peristaltic pump heads with a wide flow range

4. Technical Specifications

	T100-SC01&BPH01 T100-SC01&WX10-14-H T100-SC01&JY15-12-C T100-SC01-02	T400-SC01&BPH01 T400-SC01-02
Pump speed	0-100rpm	0-400rpm
Speed resolution	Modbus protocol: 0.01rpm Longer OEM protocol: 0.1rpm	Modbus protocol: 0.01rpm Longer OEM protocol: 1rpm
Control function	RS485 interface, supporting both Modbus RTU protocol and Longer Pump OEM protocol. Control the pump speed, start/stop, running direction, and prime status (full speed) via communication commands. And the pump status when power up can be configured.	
Communication parameters	Baud rate: 1200bps, 9600bps, 19200bps, 115200bps Parity: None or Even Pump address: 1-32 Stop bit: 1 bit	
Output	DC5V 10mA	
Power supply	DC24V/8W	DC24V/12W
Dimensions(L*W*H)	With BPH01 pump head: 117x64x63mm With KZ10/KZ15 pump head: 110x60x69mm With WX10-14 pump head: 94x59x67.5mm With JY15-12 pump head: 116x60x61mm	
Mounting method	Panel mount	
Working condition	Temperature: 0°C-40°C, relative humidity < 80%	
Weight	With WX10-14 pump head: 0.47kg; With BPH01/JY15/KZ10/KZ15 pump head: 0.54kg	

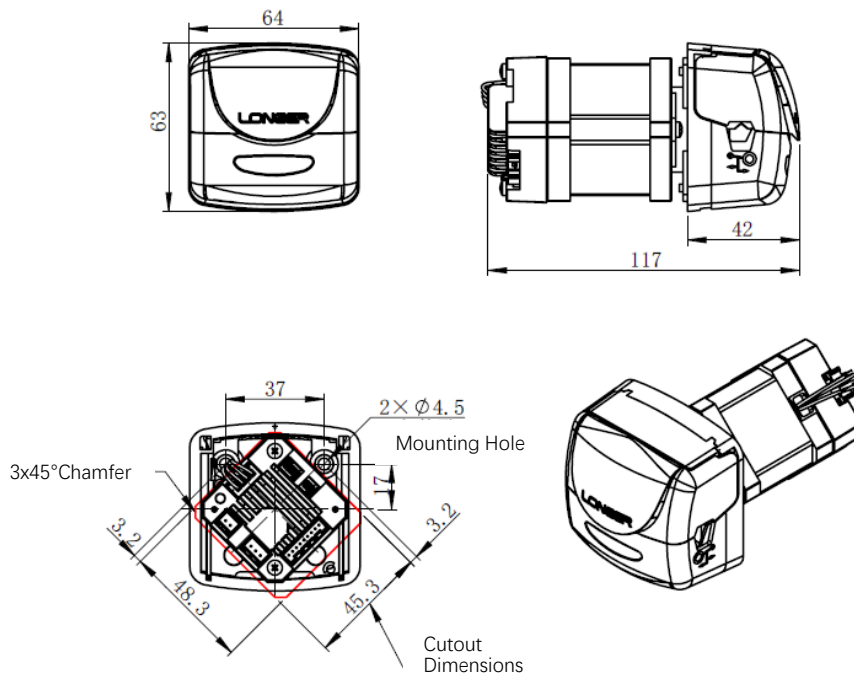
5. Applicable Pump Heads and Flow Rates for Reference

Pump Model	Max Speed	Pump Head	Tubings	Max Flow Rate for Reference (mL/min)
T100-SC01&BPH01	100rpm	BPH01 (Included)	Silicone tubing: 13#, 14#, 19#, 16#, 25# PharMed® tubing: 13#, 14#, 19#, 16#, 25#	82
T400-SC01&BPH01	400rpm	BPH01 (Included)	Silicone tubing: 13#, 14#, 19#, 16#, 25# PharMed® tubing: 13#, 14#, 19#, 16#, 25#	340

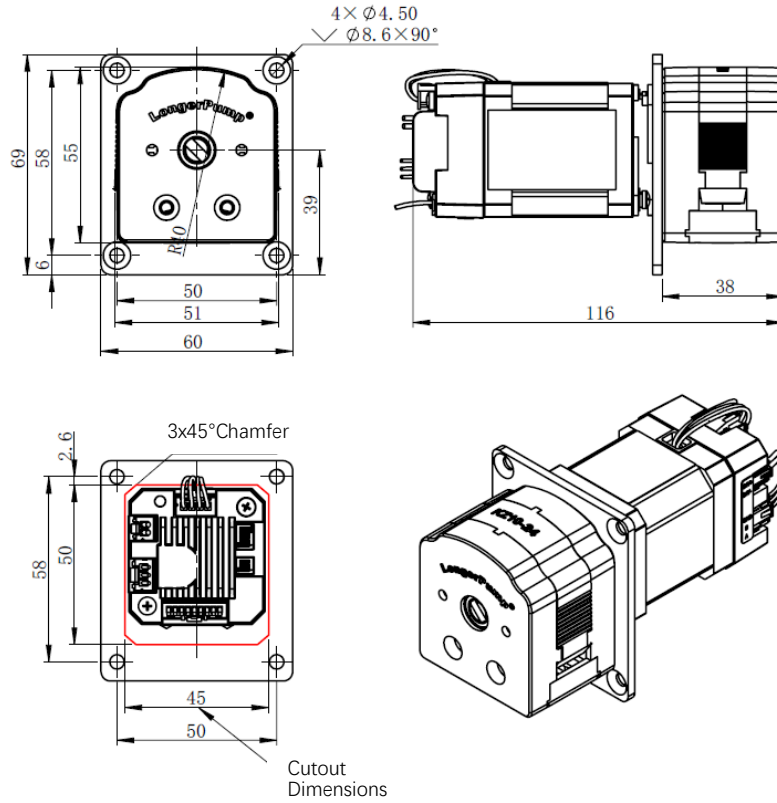
T100-SC01-02	100rpm	KZ10	Silicone tubing: ID≤3.17mm, W.T.: 0.86mm PharMed® tubing: ID≤3.17mm, W.T.: 0.86mm	23
		KZ15	Silicone tubing:13#, 14#, 19#, 16# PharMed® tubing:13#, 14#, 19#, 16#	42
T400-SC01-02	400rpm	KZ10	Silicone tubing: ID≤3.17mm, W.T.: 0.86mm PharMed® tubing: ID≤3.17mm, W.T.: 0.86mm	92
		KZ15	Silicone tubing:13#, 14#, 19#, 16# Pharmed:13#, 14#, 19#, 16#	168
T100-SC01&WX10-14-H	100rpm	WX10-14-H (Included)	Silicone tubing: ID≤3.17mm, W.T.: 0.8-1.0mm PharMed® tubing: ID≤3.17mm, W.T.: 0.86mm	40
T100-SC01&JY15-12-C	100rpm	JY15-12-C (Included)	Silicone tubing: 25# 17# PharMed® tubing: 25#	170

6. Installation Dimensions and Instructions

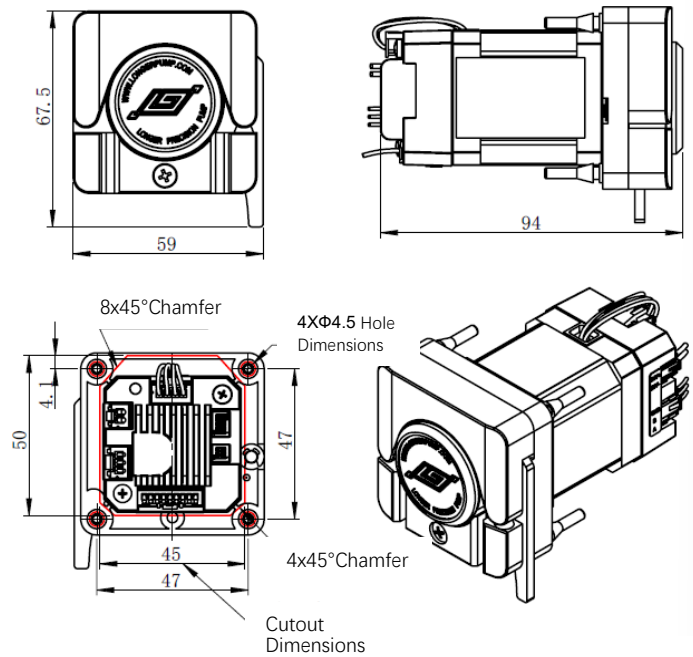
a. T100-SC01&BPH01 or T400-SC01&BPH01



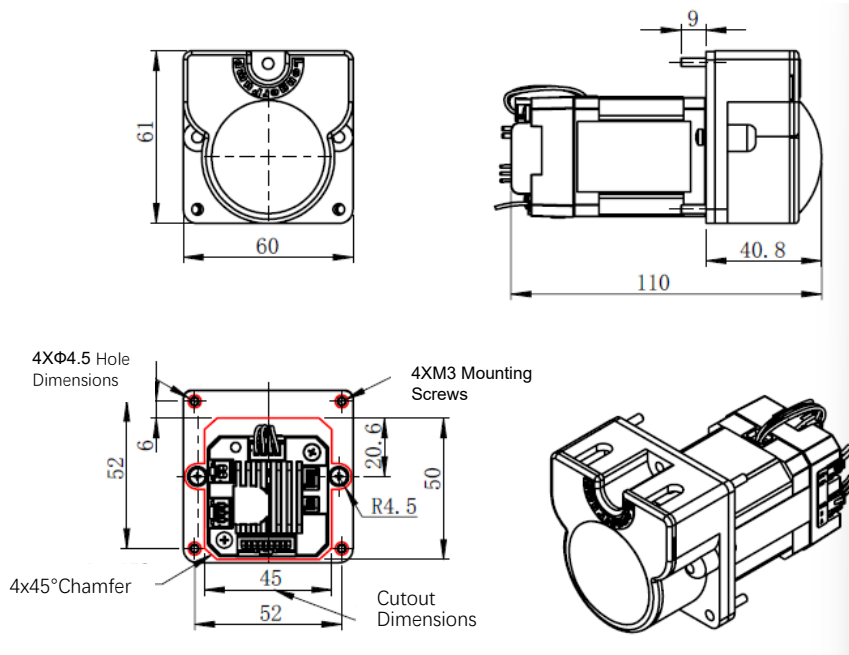
b. T100-SC01-02 or T400-SC01-02, mounted with KZ10 or KZ15 pump head



c. T100-SC01&WX10-14-H

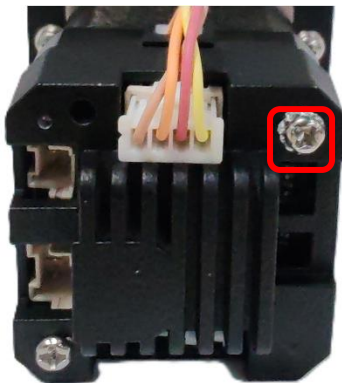


d. T100-SC01&JY15-12-C



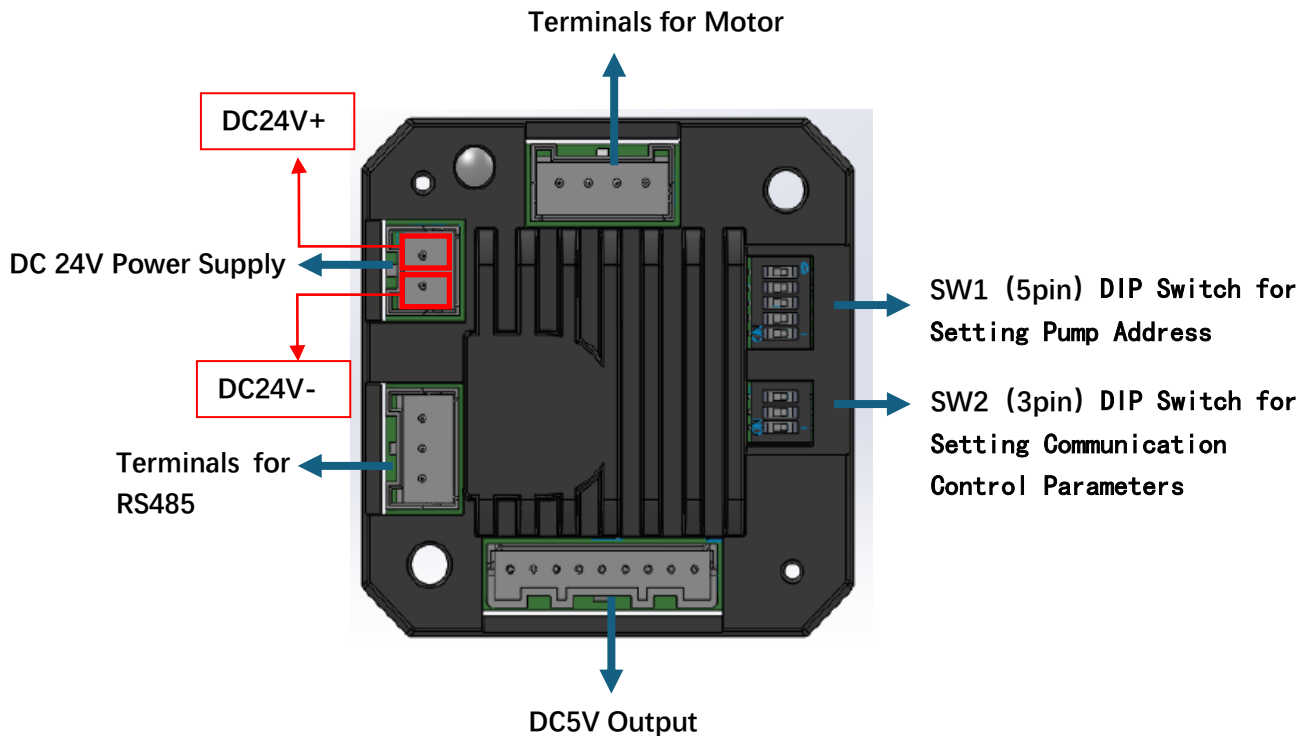
e. Instructions for the pump installation:

- The pump can be mounted through panel mounting or soleplate mounting. Refer to the dimension drawings.
- Connect the external control cable or communication cable first, then connect the pump to the power supply. (Refer to Chapter 7 for the interface specifications and wiring details.)
- Connect the protective earth (PE) at the serrated washer position of the pump. Refer to below picture. Connecting the PE improves the pump's resistance to electromagnetic interference. In environments with severe static electricity or electromagnetic interference, grounding protection is mandatory.



Connector (with serrated washer) to PE

7. DIP Switch, Terminal Definitions and Wiring Instructions



a). Terminals for Motor:

From the left to the right: A1,A2,B1,B2

b). Terminals for Power Supply:

From the top to the bottom: DC24V+, DC24V-

c). Terminals for RS485:

From the top to the bottom: GND, RS485-B, RS485-A

d). DC5V Output:

From the right to the left: Pin 8: GND, Pin 9: DC5V, other pins are reserved

e). SW1 DIP Switch setting for the pump address:

Note:

Pump address range for Modbus RTU protocol is 1-32, and 0 is broadcast address.

Pump address range for Longer OEM protocol is 1-30, and 31 is the broadcast address.

Pump address factory default setting is 1.

T100-SC01 T400-SC01	SW1:5 Pin DIP				
	Adress	1	2	3	4
1	OFF	OFF	OFF	OFF	OFF
2	OFF	OFF	OFF	OFF	ON
3	OFF	OFF	OFF	ON	OFF
4	OFF	OFF	OFF	ON	ON
5	OFF	OFF	ON	OFF	OFF
6	OFF	OFF	ON	OFF	ON
7	OFF	OFF	ON	ON	OFF
8	OFF	OFF	ON	ON	ON
9	OFF	ON	OFF	OFF	OFF
10	OFF	ON	OFF	OFF	ON
11	OFF	ON	OFF	ON	OFF
12	OFF	ON	OFF	ON	ON
13	OFF	ON	ON	OFF	OFF
14	OFF	ON	ON	OFF	ON
15	OFF	ON	ON	ON	OFF
16	OFF	ON	ON	ON	ON
17	ON	OFF	OFF	OFF	OFF
18	ON	OFF	OFF	OFF	ON
19	ON	OFF	OFF	ON	OFF
20	ON	OFF	OFF	ON	ON
21	ON	OFF	ON	OFF	OFF
22	ON	OFF	ON	OFF	ON
23	ON	OFF	ON	ON	OFF
24	ON	OFF	ON	ON	ON
25	ON	ON	OFF	OFF	OFF
26	ON	ON	OFF	OFF	ON
27	ON	ON	OFF	ON	OFF
28	ON	ON	OFF	ON	ON
29	ON	ON	ON	OFF	OFF
30	ON	ON	ON	OFF	ON
31	ON	ON	ON	ON	OFF
32	ON	ON	ON	ON	ON

f). SW2 DIP Switch setting for the communication control parameters:

T100-SC01 T400-SC01	SW2:3 Pin DIP		
Settings	1	2	3
None Parity	OFF	/	/
Even Parity	ON	/	/
1200 bps	/	OFF	OFF
9600 bps	/	OFF	ON
19200 bps	/	ON	OFF
115200 bps	/	ON	ON

Factory default settings: none parity, 115200bps baud rate.

8. Pump Operating

Control the pumps T100-SC01 and T400-SC01 through communication commands. The interface is RS485, and protocol can be Modbus RTU or Longer OEM protocol. Control the pump as following:

1. Set the communication control parameters: Set the pump address through SW1 DIP switch. Set other parameters through SW2 DIP switch. Refer to Chapter 7 for details.

Pump address range for Modbus RTU protocol is 1-32, and 0 is the broadcast address. Pump address range for Longer OEM protocol is 1-30, and 31 is the broadcast address. Pump address factory default setting is 1.

Parity: none (factory default setting) or even.

Baud rate: 1200bps, 9600bps, 19200bps, 115200bps. Factory default setting is 115200bps.

Stop bit: 1

2. Connect the pump to the host controller (such as a PLC) via an RS485 cable. Configure the communication control parameters on the controller to match the DIP switch settings of the pump. Then establish the communication link between the controller and the pump.
3. Control the pump via communication commands: start/stop the pump, change running direction, adjust pump speed, and enable full-speed operation. For details, refer to Appendix 2 - Modbus Register Definition and Appendix 3 - Longer OEM Protocol.

9. Contacts

Baoding Longer Precision Pump Co., Ltd.

Address: Floor 3-4, Block B, Building 6, University Science Park, No. 5699 North
Second Ring Road, National High-tech Industrial Development Zone, Baoding City,
Hebei Province, China

Telephone: +86-312-3110087

Website: www.longerpump.com

Appendix 1: Factory Default Settings

Parameters	T100-SC01	T400-SC01
Communication parameters	115200 bps baud rate, none parity, 1 stop bit	
Pump speed	100rpm	400rpm
Start/stop status	Stop	
Running direction	Clockwise	
Pump status when power up	Stop	
Acceleration	1875rpm/s	
Deceleration	1875rpm/s	
Startup speed	30rpm	
Cutoff speed	30rpm	

Appendix 2: Modbus Register Definition

Pump address range: 1-32, and 0 is the broadcast address. Communication parameters default settings: 115200bps baud rate, none parity, 1 stop bit. The communication parameters can be set by SW2 DIP switch.

Function	Parameter Variable	Register Address	Data Type	Read/Write	Parameter Stored?	Default	Description
Running Control	Pump speed	0x0000	uint_16	R/W	Y	T100: 10000 T400: 40000	T100: 0-10000, data unit: 0.01rpm T400: 0-40000, data unit: 0.01rpm
Running Control	Full-speed operation	0x0001	uint_16	R/W	N	0	0: disable the full-speed operation and return to the previous operating status. 1: enable the full-speed operation
Running Control	Start/stop control	0x0002	uint_16	R/W	Y	0	0: stop 1: start
Running Control	Running direction control	0x0003	uint_16	R/W	Y	1	0: counterclockwise 1: clockwise
System	Pump status when power up	0x0020	uint_16	R/W	Y	0	0: stop 1: return to the status before power-off
System	Acceleration	0x0040	uint_16	R/W	Y	1875	Setting range: 100 - 7500rpm/s, data unit: 1rpm/s
System	Deceleration	0x0041	uint_16	R/W	Y	1875	Setting range: 100 - 7500rpm/s, data unit: 1rpm/s
System	Startup speed	0x0042	uint_16	R/W	Y	30	Setting range for T100: 10-100rpm, data unit: 1rpm Setting range for T400: 10-150rpm, data unit: 1rpm
System	Cutoff speed	0x0043	uint_16	R/W	Y	30	Setting range for T100: 10-100rpm, data unit: 1rpm Setting range for T400: 10-400rpm, data unit: 1rpm

Note: The system parameters must be set when the pump is stopped.

Appendix 3: Longer OEM Communication Protocol

1. Frame format (Character format): 1start + 8data + parity + 1stop

- 1 Start bit
- 8 data bits
- 1 parity bit (none or even)
- 1 stop bit
- Baud rate: 1200bps, 9600bps, 19200bps, or 115200bps

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.

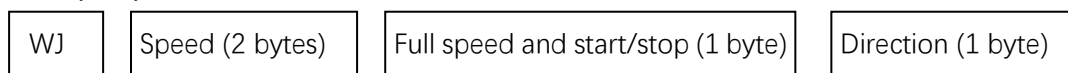
len: one byte, length of pdu.

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

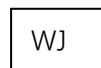
3. pdu format: application layer code format

3.1 Set the pump running parameters

Send to the pump:



Pump responds:



Note: When setting the running parameter, the **addr** in message can be pump address (1-30) or broadcast address 31. All pumps will operate according to the same command without response when using broadcast address.

3.2 Read the pump running status

Send to the pump:



Pump responds:



Note: When reading 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

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

Supplementary notes

1. W, R, J, I, D, use ASCII code: 57H, 52H, 4AH, 49H, 44H
2. Pump speed data uses hexadecimal number, most significant byte first.
T100 max speed is 100.0 rpm, data unit is 0.1rpm. For example: 03E8H means 100rpm.
T400 max speed is 400 rpm, data unit is 1rpm. For example: 0190H means 400rpm.
3. Full speed and start/stop:
Bit0:
1: pump runs, 0: pump stops
Bit1:
1: full speed, 0: normal speed
4. Direction:
Bit0:
1: CW, 0: CCW
5. For example:
 - a. T100 series pump: set the pump (addr: 01) to run at 100rpm, with a clockwise direction. The command is:
E9 01 06 57 4A 03 E8 00 01 01 F1
 - b. T400 series pump: set the pump (addr: 01) to run at 400rpm, with a clockwise direction. The command is:
E9 01 06 57 4A 01 90 01 01 8B