Modbus Setting Guide for T5L Screen

Secondary development platform: T5L OS Builder;

This guide is based on the example of DGUS Modbus RTU master/slave interface, serial port: UART4; Please update the T5L OS core to V21 or above, code file can be downloaded at www.dwinhmi.com/cn.

1. Modbus Parameter Setting

Users can define the Modbus running parameters in the 22.bin profile at the position from 0x1C000 to 0x1FFFF and the total storage of this range is 16KB; Users can also directly access the variables space from 0xE000 to 0xFFFF (8KW storage) through T5L OS to define.

Variables Position	Definition	Description
0xE000	Modbus run on mark	Input 0x5AA5 to run Modbus communication
0xE001	Master/slave mark	0x0000: Modbus master, other: Modbus slave
0xE002	Baud rate setting	Unit: Kbps, one fixed decimal, E.g.115200bps=0x480
0xE003	Serial mode	0x0000=8N1(No parity), 0x0001=8E1(Even parity), 0x0002(Odd parity), 0x0003=8N2(no parity, two stop bits), Other=8N1
0xE004	Slave device position	Device position of slave mode, default: 0x005A
0xE005: H	Modbus output serial port	Range: 0x03-0x07, default: 0x04=UART4(this function cannot be set, read only)
0xE005: L	OS version	Read only
0xE006-0xE007	Preserved	
0xE008-0xE00F	The first line of Modbus instruction(16bytes)	**0x00(0xE008H)**: 0x5A=Valid, other=invalid **0x01(0xE008L)**: Modbus device position to write and read **0x02(0xE009H)**: Modbus command for write/read **0x03(0xE009L)**: Data length, 0x00 represent this line invalid **0x04(0xE00A)**: Instruction running time, ms, max: 9999ms), as for read instruction this represents slave device response time. **0x06(0xE00B)**: Instruction running modes 0x0000:Run this instruction among all the pages; 0x0001: Run this instruction at specified page; 0x0002: Run this instruction only at variable buffer whose variable position's low byte is 0x5A, after running it will remove the contents on this position. **0x08(0xE00C)**: 01mode=Page_ID, 02 mode=VP variable position.

		0x0A(0xE00D): The starting position for writing and reading data at variable memory space (0x0000-0xDFFF, 0x0000-0x1000 is system variable interface)
		0x0C(0xE00E): The starting position of Modbus device for data writing and reading
		0x0E(0xE00F): Communication bus status response 0x0000=failed, 0x00FF=succeeded; this content needs to be removed after getting read.

Table 1 Definition of Each Position

2. Modbus Master Interface

Modbus Instruction	Function	Data Length	Modbus Starting Position
0x01	Read inputting coil status	The number of coil/8	Starting coil position
0x02	Read inputting bit variables status	The number of bit variable/8	Starting input position
0x03	Read staying registers data	The number register*2	Starting position of staying register
0x04	Read inputting registers data	The number register*2	Starting position of inputting register
0x05	Place a single coil	0x02	Coil position
0x06	Reserve a single register	0x02	Register position
0x07	Read abnormal status	0x01	Random
0x0F	Place multiple coils	The number of coil	Starting position of coils
0x10	Reserve multiple registers	The number of register*2	Starting position of registers

Table 2 Modbus Master Instruction Code Table

Remarks:

1.The variable data range that master device can read or write is 0x0000 to 0xDFFF, the program will put the highest bit of the function code to 1 and return to the master device, representing a communication error.

2.When the serial baud rate configuration parameter(0xE002) is 0x0000, UART4 baud rate will reset to default (115200bps).

3.Write/read instructions responding time is 1-9999ms, default: 60ms; IF this position is 0x0000, the running time will be default.

4.When using 0x0002 instruction running mode, the system will conduct the command when the VP low byte is 0x5A and remove the contents of VP afterward, the instruction running timer will be reset.

5.180 Bytes data can be written or read at a single instruction line, if the data length is over this limit, the system will regard this line as an invalid one and move on to the next.

6.The variable position(0xE00D) shall not be over 0xDFFF and its following data shall not exceed this limit, otherwise, the instruction line will be regarded as invalid.

7.Bit variables of Modbus are defined based on LSB, while T5L platform based on MSB.

3. Settings Guide of Modbus Slave Interface

Device position is defaulted as 0x005A

Modbus Instruction	Function	Data Length	Variable Memory Space Range
0x03	Read variable space	Character(1 char.=2 bytes)	0x0000-0xDFFF
	Tx: 5A 03 14 00 00 02 CC D0 (read 4 bytes variable data from 0x1400)		
	Rx: 5A 03 04 00 01 00 02 C0 F7		
0x06	Write data at single VP	Character(1 char.=2 bytes)	0x0000-0xDFFF
	Tx: 5A 06 14 00 00 01 40 D1(write 0x0001 at 0x1400)		
	Rx: 5A 06 14 00 00 01 40 D1		
0x10	Write data to variable space	Character(1 char.=2 bytes)	0x0000-0xDFFF
	Tx: 5A 10 14 00 00 02 04 00 01 00 02 F8 8B(write 4 bytes variable data from 0x1400)		
	Rx: 5A 10 14 00 00 02 49 13		

Table 3 Modbus Slave Instruction

Remarks:

(1) Master device can only read or write variable data at the range from 0x0000 to 0xDFFF, otherwise, the system will send the function code, whose highest bit will be 1, back to the master device, representing communication failure.

(2) Data length for reading or writing is 90 characters/180 bytes at most, otherwise, communication fails.

4. 22.Bin Profile Initialization

(1) Users should set initialization via 22.bin in the system configuration profile as shown below.

System Configuration 1	0x08	1	System_Config1 (default value is 0x38)	.7: data auto-uploading. 0=On, 1=Off. .6: display control number. 0=64 control/page, 1=128 control/page. .5: initialize via 22.bin file. 1=On 0=Off .4: SD interface status. 1=on 0=ban .3: touch tone. 1=on 0=off .2: backlight system standby control. 1=on 0=off .1-.0: display direction 00=0° 01=90° 10=180° 11=270°

(2) Instruction running time parameter configuration (default: 60ms) is based on the baud rate and the length of instructions. 20ms is suggested when baud rate is default (115200 bps).

(3) Pic 1 is a reference of Modbus master parameter configuration; the first line (16 bytes) is the master interface parameter; user instructions start from 0x1C010-0x1FFFF; max: 1023 lines. Pic 2 is a reference of Modbus slave parameter configuration.

Pic 1:

```
0001c000h: 5A A5 00 00 04 80 00 00 00 5A 00 00 00 00 00 00 ; Z?..€...Z......
0001c010h: 5A 01 03 14 01 F4 00 00 00 00 14 00 00 00 00 00 ; Z....?..........
0001c020h: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ; ................
0001c030h: 5A 01 10 14 01 F4 00 00 00 00 15 00 00 0A 00 00 ; Z....?..........
0001c040h: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ; ................
0001c050h: 5A 01 03 0A 01 F4 00 02 16 00 17 00 00 14 00 00 ; Z....?..........
0001c060h: 5A 01 10 0A 01 F4 00 02 16 01 17 10 00 20 00 00 ; Z....?...... ..
0001c070h: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ; ................
0001c080h: 5A 01 03 02 01 F4 00 01 00 02 17 20 00 25 00 00 ; Z....?.... .%..
```

Pic 2:

```
0001c000h: 5A A5 00 01 04 80 00 00 00 5A 00 00 00 00 00 00 ; Z?..€...Z......
0001c010h: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ; ................
0001c020h: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ; ................
```