ELECQ Modbus Communication

for Third Party EMS

ELECQ

Version Description

Serial Number: 1

Change Description: First Edition

Author: Pang Zile

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Table of content Page

1 Introduction 4

2 Modbus Configuration 5

2.1 The configuration for the Modbus type is as follows 5

2.1.1 The configuration for TcpServer 5

2.1.2 The configuration for TcpClient 5

2.1.3 The configuration for RTU 6

2.2 How to enable Modbus ThirdParty EMS 6

3 Supported Function Code 7

3.1 03(0x03) Read Holding Registers 7

3.2 0(0x03) Read Holding Registers 8

3.2 06(0x06) Write Single Register 9

3.3 16(0x10) Write Multiple registers 10

4 ELECQ Modbus Register Address Allocation 11

4.1 ELECQ Modbus Register Address Section 11

4.2 Connector number and address 11

4.3 Elecq Modbus Register Address Mapping Table 12

4.3.1 Registers for the whole Charger info 14

1 Introduction

This solution only applies to the case where the charger is used as a Modbus Slave role, and the case where the charger is used as a Master is not considered for the time being.

The charger can choose to use TCP or RTU to communicate with the 3rd EMS, and the scenario of using TCP and RTU simultaneously for communication is not considered for the time being.

When communicating with the 3rd EMS using TCP, the charger can simultaneously act as both a Client and a Server in network communication; this can be selected through configuration.

2 Modbus Configuration

2.1 The configuration for the Modbus type is as follows

Type	Description	Info
TcpServer	Using TCP for communication, charger is server,3rd EMS is client	Default
TcpClient	Using TCP for communication, charger is client,3rd ems is server	
RTU	Using RS485 for communication	

2.1.1 The configuration for TcpServer

When the TcpServer type is selected, the following configurations need to be set:

Configuration for TCP Server	Description	info
Port	The port used by the Charger for 3rd EMS connections.	Default 502

2.1.2. The configuration for TcpClient

When the TcpClient type is selected, the following configurations need to be set:

Configuration for TCP Client	Description	info
Port	The port used by the 3rd EMS connections. The charger can use this port to connect to the 3rd EMS.	Default 502
Server address	3rd EMS's url. The charger can connect to this url.	

2.1.3 The configuration for RTU

When the RTU type is selected, the following configurations need to be set:

Configuration for RTU	Description	info
Address	The charger's RTU address	Default 1
Baud rate	The charger's RTU baud rate	115200
Data bits	The charger's RTU data bits	8
Stop bits	The charger's RTU stop bits	1
Parity	The charger's RTU parity mod	N

2.2 How to enable Modbus Third-party EMS

Steps:

1 Create a new station (or select an existing one) in the Elecq Partner App, and in the 1/4 Settings of Setup Circuit for the station configuration, set the Load Balancing option to ThirdParty EMS.

2 In the pop-up Modbus Mode option, select one of the three modes: TcpServer, TcpClient, or Rtu.

3 When TcpServer is selected in the Modbus Mode option, a Server configuration will pop up, requiring the configuration of the port to be used when the charger acts as a network server.

4 When TcpClient is selected in the Modbus Mode option, a client configuration will pop up, which requires configuring the port and IP address of the 3rd ems server to be connected to when the charger acts as a network client.

5 When RTU is selected in the Modbus Mode option, an RTU configuration window will pop up, where you need to configure the parameters of the MODBUS RTU used by the charger: Modbus slave device address, baud rate, data bits, stop bits, and parity mode.

6 After the above configuration is completed, continue with the normal station configuration process.

3 Supported Function Code

Currently only supports the three Function Codes 0x03, 0x04,0x06, and 0x10

03(0x03) Read Holding Registers

04(0x04) Read Input Registers

06(0x06) Write Single Register

16(0x10) Write Multiple registers

3.1 03(0x03) Read Holding Registers

Request

Function code	1 Byte	0x03
Starting Address	2 Bytes	0x0000 to 0xFFFF
Quantity of Registers	2 Bytes	1 to 125 (0x7D)

Response

Function code	1 Byte	0x03
Byte count	1 Byte	2 x N*
Register value	N* x 2 Bytes	

*N = Quantity of Registers

Error

Error code	1 Byte	0x83
Exception code	1 Byte	01 or 02 or 03 or 04

3.2 04(0x04) Read Holding Registers

Request

Function code	1 Byte	0x04
Starting Address	2 Bytes	0x0000 to 0xFFFF
Quantity of Input Registers	2 Bytes	1 to 125 (0x7D)

Response

Function code	1 Byte	0x03
Byte count	1 Byte	2 x N*
Input Register value	N* x 2 Bytes	

*N = Quantity of Input Registers

Error

Error code	1 Byte	0x83
Exception code	1 Byte	01 or 02 or 03 or 04

3.3 06(0x06) Write Single Register

Request

Function code	1 Byte	0x06
Register Address	2 Bytes	0x0000 to 0xFFFF
Register Value	2 Bytes	0x0000 to 0xFFFF

Response

Function code	1 Byte	0x06
Register Address	2 Bytes	0x0000 to 0xFFFF
Register Value	2 Bytes	0x0000 to 0xFFFF

Error

Error code	1 Byte	0x86
Exception code	1 Byte 01 or 02 or 03 or 04	

3.3 16(0x10) Write Multiple registers

Request

Function code	1 Byte	0x10
Starting Address	2 Bytes	0x0000 to 0xFFFF
Quantity of Registers	2 Bytes	0x0001 to 0x007B
Byte Count	1 Byte	2 x N*
Registers Value	N* x 2 Bytes	value

*N = Quantity of Registers

Response

Function code	1 Byte	0x10
Starting Address	2 Bytes	0x0000 to 0xFFFF
Quantity of Registers	2 Bytes	1 to 123 (0x7B)

Error

Error code	1 Byte	0x90
Exception code	1 Byte	01 or 02 or 03 or 04

4 ELECQ Modbus Register Address Allocation

4.1 ELECQ Modbus Register Address Section

[0x00 - 0x200): This address segment is allocated to the basic information of the whole charger, such as Model, Brand, SN, etc.

[0x200 - 0x1000): This address segment is allocated to the status information of the whole charger, such as the number of connectors, charger status, etc.

[0x1000 - 0x2000): This address segment is allocated to the status information of Connector 1, such as charging status, current/power limits, etc.

4.2 Connector number and address

[0x1000 - 0x2000): This address segment is allocated to Connector 1. Here, the highest 4 bits of the address are used to represent the Connector number. Except for the Connector number, for the same function, the other bits of the address remain unchanged.

[0x2000 - 0x3000): The address segment is allocated to Connector 2. Here, the highest 4 bits of the address are used to represent the Connector number. Except for the Connector number, for the same function, the other bits of the address remain unchanged.

[0x3000 - 0x4000): This address segment is allocated to Connector 3. Here, the highest 4 bits of the address are used to represent the Connector number. Except for the Connector number, for the same function, the other bits of the address remain unchanged.

And so on.

Connector number calculation:

```
uint16_t start_address = address_received;
int evseid = start_address >> 12;
```

4.3 Elecq Modbus Register Address Mapping Table

4.3.1 Registers for the whole Charger info

Description	Start address	Number of registers (16 bit)	Read or write	Data Type	Unit	Additional info
Modbus table version	0x00	2	RO	UNSIGNED32	N/A	1
Model	0x02	10	RO	STRING	N/A	"AE104"
Brand	0x0C	10	RO	STRING	N/A	"ELECQ"
Vendor	0x16	10	RO	STRING	N/A	"ELECQ"
Serial number	0x20	20	RO	STRING	N/A	"AE104A9G000132"
Firmware version	0x34	20	RO	STRING	N/A	"EPRO001_V1.1.21(9-1753848845)"

Description	Start address	Number of registers (16 bit)	Read or Write	Data Type	Unit	Additional info
Charger Type	0x200	1	RO	UNSIGNED16	N/A	0:AC 1:DC. For AC , "current" is used for measurement, and "power" for DC
Charger Input Phase	0x201	1	RO	UNSIGNED16	N/A	Charger Input Phase (0---L1； 1---L2；2---L3；3---L1、L2；4---L1、L3；5---L2、L3；6---L1、L2、L3. AC Only)
Number of EVSE	0x202	1	RO	UNSIGNED16	N/A	Number of connectors
Station state	0x203	1	RO	UNSIGNED16	N/A	State of the whole Charger(0:Inoperative, 1:Operative)
Charger Rated Current	0x204	2	RO	FLOAT32	A	Rated Current of the whole Charger (AC Only)
Charger Rated Power	0x206	2	RO	FLOAT32	W	Rated Power of the whole Charger (DC Only)
Modbus Communication timeout	0x208	1	RW	UNSIGNED16	Second	Modbus Communication timeout seconds
Modbus safe current	0x209	2	RW	FLOAT32	A	Each EVSE/connector fall back to safe current when Modbus timeout(AC Only)
Modbus safe power	0x20B	2	RW	FLOAT32	W	Each EVSE/connector fall back to safe power when Modbus timeout(DC Only)

Registers for Connector

Registers for EVSE 1(Connector 1):

Description	Start address	Number of registers (16 bit)	Read or write	Data Type	Unit	Additional info
EVSE state	0x1000	1	RO	UNSIGNED16	N/A	EVSE sate((0:Inoperative, 1:Charging, 2:Not in Charging))
EVSE Current Total	0x1001	2	RO	FLOAT32	A	EVSE Current Total
EVSE Current Phase L1	0x1003	2	RO	FLOAT32	A	EVSE Current Phase L1 (AC Only)
EVSE Current Phase L2	0x1005	2	RO	FLOAT32	A	EVSE Current Phase L2 (AC Only)
EVSE Current Phase L3	0x1007	2	RO	FLOAT32	A	EVSE Current Phase L3 (AC Only)
EVSE Voltage	0x1009	2	RO	FLOAT32	V	EVSE Voltage (DC Only)
EVSE Voltage Phase L1-N	0x100B	2	RO	FLOAT32	V	EVSE Voltage Phase L1-N(AC Only)
EVSE Voltage Phase L2-N	0x100D	2	RO	FLOAT32	V	EVSE Voltage Phase L2-N(AC Only)
EVSE Voltage Phase L3-N	0x100F	2	RO	FLOAT32	V	EVSE Voltage Phase L3-N(AC Only)
EVSE Power Total	0x1011	2	RO	FLOAT32	W	EVSE Power Total
EVSE Power Phase L1	0x1013	2	RO	FLOAT32	W	EVSE Power Phase L1 (AC Only)
EVSE Power Phase L2	0x1015	2	RO	FLOAT32	W	EVSE Power Phase L2 (AC Only)
EVSE Power Phase L3	0x1017	2	RO	FLOAT32	A	EVSE Power Phase L3 (AC Only)

Description	Start address	Number of registers (16 bit)	Read or write	Data Type	Unit	Additional info
EVSE Demand Current	0x1400	2	RO	FLOAT32	A	EVSE Demand Current Per Phase (AC Only)
EVSE Demand Power	0x1402	2	RO	FLOAT32	W	EVSE Demand Power Total(DC Only)
EVSE 1 L1 Demand Current	0x1404	2	RO	FLOAT32	A	EVSE 1 L1 Demand Current (AC Only)
EVSE 1 L2 Demand Current	0x1406	2	RO	FLOAT32	A	EVSE 1 L2 Demand Current (AC Only)
EVSE 1 L3 Demand Current	0x1408	2	RO	FLOAT32	A	EVSE 1 L3 Demand Current (AC Only)
EVSE 1 L1 Demand Power	0x140A	2	RO	FLOAT32	W	EVSE 1 L1 Demand Power L1 (AC Only)
EVSE 1 L2 Demand Power	0x140C	2	RO	FLOAT32	W	EVSE 1 L2 Demand Power L1 (AC Only)
EVSE 1 L3 Demand Power	0x140E	2	RO	FLOAT32	W	EVSE 1 L3 Demand Power L1 (AC Only)
Cumulative Reading of EVSE 1 Energy Meter	0x1410	4	RO	DOUBLE64	kWh	Cumulative Reading of EVSE 1 Energy Meter
EVSE1 phase switch type	0x1414	1	RO	UNSIGNED16	N/A	EVSE 1 phase switch type 0:Disabled, 1:Dynamic switch(switch to any phase:L1, L2 or L3), 2: Static switch: (switch to phase L1) (AC Only)
EVSE1 phase switch	0x1415	1	RW	UNSIGNED16	N/A	EVSE 1 Charge using 1 or 3 phases, (0---L1；1---L2；2---L3；3---L1、L2；4---L1、L3；5---L2、L3；6---L1、L2、L3. AC Only)
EVSE 3rd EMS Max Current	0x1416	2	RW	FLOAT32	A	EVSE 1 Current Total 3rd EMS Set Max Limit Per Phase (AC Only)
EVSE 3rd EMS Max Power	0x1418	2	RW	FLOAT32	W	EVSE 1 Power Total 3rd EMS Set Max Limit (DC Only)

Registers for EVSE 2(Connector 2): the same with EVSE1 registers, address range from 0x2000-0x2FFF

Registers for EVSE 3(Connector 3): the same with EVSE1 registers, address range from 0x3000-0x3FFF

Registers for EVSE n(connector n): the same with EVSE1 registers, address range from 0xn000-0xnFFF (n is range from 1 to F, supports maximum to 15 connectors)