TEKTROL

Technology Solutions

TEK-FLUX 1400A

Electromagnetic Flow Meter

Modbus Manual

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NOTICE

Read this manual before working with the product. For personal and system safety, and for optimum product performance, make sure you thoroughly understand the contents before installing, using, or maintaining this product.

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1 Protocol of Tek-Flux 1400A Electromagnetic Flow Meter

1.1 Introduction

Protocol for Tek-Flux 1400A Electromagnetic Flow Meter is designed for industrial applications. This version is mostly used for real-time data acquisition, flow measurement, flow cumulation control, and some parameter modification.

1.2 Master System Communication Components

Master System Communication require following components:

- International Standard RS-485 or RS-232 communication interface unit
- Support 1200,2400,4800,9600,19200 communication baud rate.
- Support the half-duplex communication mode.
- Communication program should allow the FIFO, and the slaver requires the FIFO is not less than 11Bytes.

2 Protocol Structure

- Tek-Flux 1400A Electromagnetic Flow Meter protocol is based on the OSI reference model.
- The basic OSI reference model provides the basic structure and elements of communication systems.
- Tek-Flux 1400A Electromagnetic Flow Meter protocol with a simplified OSI reference model provides only 1,2 and 7 layers.

Table 1: Basic Open Systems Interconnection Reference Model

Layer No.	Layer Name	Function	Tek-Flux 1400A Protocol
1	Physical Layer	Device Connection	RS-485, RS-232
2	Link Layer	Data Link Connection	CP Link
3	Network Layer		
4	Transport Layer		
5	Session Layer		
6	Presentation Layer		
7	Application Layer		CP command

2.1 Physical Structure

- The communication interface of Tek-Flux 1400A Electromagnetic Flow Meter RS-485 adopts the way of electrical isolation in physical structure.
- The isolation voltage is 1,500 volts.
- Communication is a half-duplex data transmission interface.
- The standard communication speed is greater than 250KHz.
- The communication direction conversion time is 3.5μS.
- The electrical Standards communication interface complies with RS-485 international Standards.
- Tek-Flux 1400A type of network structure can be used Star and BUS network structure.
- Standard communication connect with shielded twisted pair medium.

3 Modbus Protocol RTU Message Frame Definition

- Data communication is initiated by the master.
- First, the master transmits the RTU message frame.
- Messages start with a silent interval of at least 3.5-character times.
- The first field transmitted the device address.
- For all fields, the allowable characters transmitted are hexadecimal 0 ... 9, A... F.
- Network devices monitor the network bus continuously, during the silent intervals.
- When the first field (the address field) is received, each device is decoded to determine if it is the addressed device.
- A similar interval of at least 3.5-character times marks the message's end after the last transmitted character.
- After this interval, a new message can begin.
- The entire message frame must be transmitted as a continuous stream.
- If a silent interval of more than 1.5-character times occurs before completion of the frame, the receiving device flushes the incomplete message and assumes that the next byte will be the address field of a new message.
- Similarly, if a new message begins earlier than 3.5-character times following a previous message, the receiving device will continue the previous message.
- This will set an error, as the final CRC field's value will not be valid for the combined messages.
- The master message frame is shown in table 2.
- The slaver message frame is shown in table 3.

Table 2: Master RTU Message Frame

Start Bit	Device Address	Function Code	Resister Address	Register Length	CRC Checksum	End Symbol
T1-T2-T3-T4	8Bit	8Bit	16Bit	16Bit	16Bit	T1-T2-T3-T4

Table 3: Slaver RTU message frame

Start bit	Device Address	Function code	Data	CRC Checksum	End Symbol
T1-T2-T3-T4	8Bit	8Bit	n 8Bit	16Bit	T1-T2-T3-T4

4 Modbus Protocol Command Code

- Tek-Flux 1400A protocol is based on Modbus Protocol.
- Tek-Flux 1400A protocol uses a simplified Modbus protocol, which only uses 03, 04 and 06 function code.

Table 4: Modbus Protocol Command Code

Function code	Name	Function
01	Read Coil Status	Reservation
02	Read Input Status	Reservation
03	Read Holding Registers	Reservation
04	Read Input Register	Read Real-Time Information
05	Strong Set Single Coil	Reservation
06	Preset Single Register	Reservation
07	Read Abnormal Status	Reservation

08	Loopback Diagnostic Check	Reservation
09	Program (Only Used For 484)	Reservation
10	Control Exercise (Only Used For 484)	Reservation
11	Read Events Count	Reservation
12	Read Communication Events Record	Reservation
13	Program (184/384 484 584)	Reservation
14	Inquire (184/384 484 584)	Reservation
15	Strong Multi-Coil Set	Reservation
16	Preset Multiple Registers	Reservation
17	Report Slave ID	Reservation
18	(884和micro 84)	Reservation
19	Reset Communication Link	Reservation
20	Read Common Parameter (584L)	Reservation
21	Write Common Parameter (584L)	Reservation
22 to 64	Reserved for the Expansion of Standby	Reservation
65 to 72	Reserve for the Use of User Functionality	Reservation
73 to 119	Illegal Function	Reservation
120 to 127	Reservation	Reservation
128 to 255	Reservation	Reservation

5 Register Address for Electromagnetic Flow Meter

For the special register of PLC configuration software

Table 5: Register Address for Electromagnetic Flow Meter

PLC Addresses (Base 1)	Protocol Addresses (Base 0)	Data format	Resister definition
34113	0x1010	Float Inverse	Instantaneous flow float representation
34115	0x1012	Float Inverse	Instantaneous velocity float representation
34117	0x1014	Float Inverse	Float representation of the flow percentage (reservation for battery-powered)
34119	0x1016	Float Inverse	Floating representation of fluid conductivity ratio
34121	0x1018	Long Inverse	Integer part of the cumulative positive value
34123	0x101A	Float Inverse	Decimal part of the cumulative positive value
34125	0x101C	Long Inverse	Integer part of the cumulative negative value
34127	0x101E	Float Inverse	Decimal part of the cumulative negative value
34129	0x1020	Unsigned short	Instantaneous flow unit
34130	0x1021	Unsigned short	Cumulative total units
34131	0x1022	Unsigned short	Upper limit alarm
34132	0x1023	Unsigned short	Lower limit alarm
34133	0x1024	Unsigned short	Empty pipe alarm
34134	0x1025	Unsigned short	System alarm

6 Data Analysis

- Basic data analysis analyses the instantaneous flow and flow rate, flow percentage, fluid conductivity ratio.
- The fractional part of the positive and negative accumulation is transmitted by float format.
- The long integer of positive and negative accumulation is transmitted by an integral format.

Table 6: Instantaneous Flow Units

Integer	Units
0	L/S
1	L/M
2	L/H
3	m^3/S
4	m^3/Min
5	m^3/Hrs
6	UKG
7	USG

Table 7: Cumulative Units

Integer	Units
0	L
1	m^3
2	UKG
3	USG

Table 8 shows the alarm display of Upper and Lower limit alarm, empty pipe alarm and system alarm.

Table 8: Alarm Display

Integer	Function
0	No Alarm
1	Alarm

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