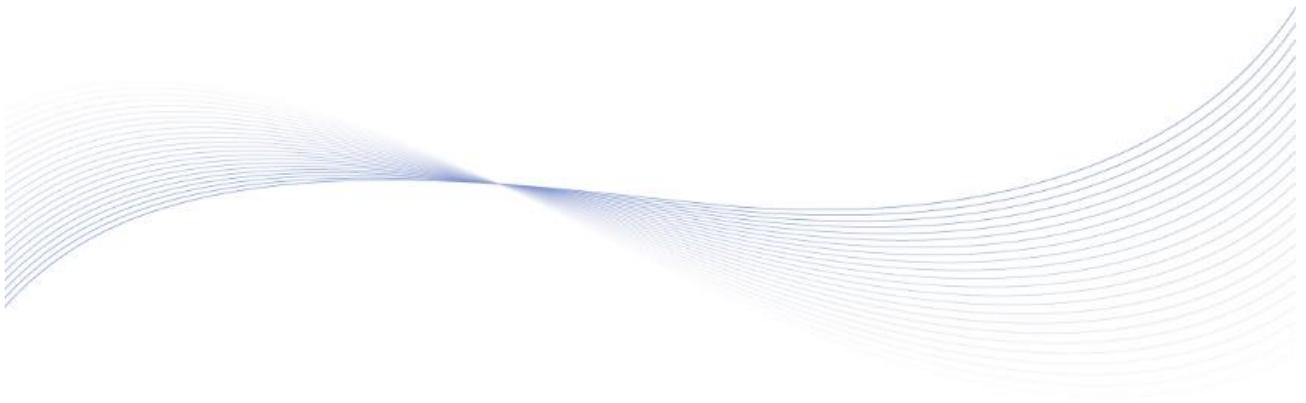

SmartGen

MAKING CONTROL SMARTER

FPC1700

ELECTRIC FIRE PUMP CONTROLLER

COMMUNICATION PROTOCOL



郑州众智科技股份有限公司
SMARTGEN(ZHENGZHOU)TECHNOLOGY CO.,LTD.

SmartGen Registered trademark

No. 28 Xuemei Street, Zhengzhou, Henan, China

Tel: +86-371-67988888/67981888/67992951

+86-371-67981000(overseas)

Fax: +86-371-67992952

Web: www.smartgen.com.cn/

www.smartgen.cn/

Email: sales@smartgen.cn

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Table 1 Software Version

Date	Version	Content
2023-11-03	V1.0	Original release.
2024-09-20	V1.1	Add parameter data of jockey pump II.

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1. DESCRIPTION

This protocol describes read and write command format of LINK full-duplex serial port communication and definition of internal information data for the third-party to develop and use.

The controller can be used as the slave, using Modbus-RTU protocol, and does not support other protocols such as Modbus-ASCII.

Communication address: 1~254 (default: 1)

Baud rate: 9600bps

Start bit: 1-bit

Data bit: 8-bit

Parity bit: 1-bit

Supported function code: 01H, 03H. Function code 01H is used for reading controller's alarm status and coil data , 03H is used for reading data of voltage and sensors.

Data calibration method: CRC16.

Internal registers of controller are in the unit of "byte (double bytes)".

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2. CONTROLLER INTERNAL REGISTER ADDRESS AND DATA

“/” in the table represents that this item is reserved.

2.1 FUNCTION CODE 01H MAPPING ALARM, STATUS COIL DATA FIELD

Table 2 Data Field of Alarm and Status Coil

Modbus Address	PLC Address	Item	Description
0000	0001	Jockey Pump Overload	1 for active
0001	0002	Aux. Input	1 for active
0002	0003	/	1 for active
0003	0004	Power Voltage Normal	1 for active
0004	0005	Auto	1 for active
0005	0006	Stop	1 for active
0006	0007	Start	1 for active
0007	0008	Emergency Stop Input	1 for active
0008	0009	/	1 for active
0009	0010	Jockey Pump Start Output	1 for active
0010	0011	Aux. Output	1 for active
0011	0012	Inhibit Start Input	1 for active
0012	0013	Jockey Pump Control Input	1 for active
0013	0014	Jockey Pump II Overload Input	1 for active
0014	0015	Low Pipe Pressure	1 for active
0015	0016	Jockey Pump I Overload Input	1 for active
0016	0017	Common Warning	1 for active
0017	0018	Power Overvoltage	1 for active
0018	0019	Power Undervoltage	1 for active
0019	0020	Power Loss of Phase	1 for active
0020	0021	Power Overfrequency	1 for active
0021	0022	Power Underfrequency	1 for active
0022	0023	Power Reverse Phase Sequence	1 for active
0023	0024	Power Voltage Abnormal	1 for active
0024	0025	Voltage Blackout	1 for active
0025	0026	Common Alarm	1 for active
0026	0027	Jockey Pump I Control Output	1 for active
0027	0028	Jockey Pump II Control Output	1 for active
0028	0029	/	1 for active
0029	0030	/	1 for active
0030	0031	/	1 for active
0031	0032	/	1 for active
0032	0033	Sensor 1 open	1 for active

Example:

If need to read first 8 coils, firstly get their first-byte address is 0000 by checking the table, then it is known that 1-byte data needs to be read.

Assume the slave address is 01, the master request command is as following:

Table 3 Master (Computer) Request Command

Slave Address	Function Code	Starting Address (0)		Request Data Qty. (2)		CRC 16 Calibration	
		MSB	LSB	MSB	LSB	LSB	MSB
01	01	00	00	00	08	3D	CC

The slave response command is as following:

Table 4 Slave (Controller) Response Command

Slave Address	Function Code	Data Qty. (Bytes)	Data	CRC 16 Calibration	
			Data of Address 0000	LSB	MSB
01	01	01	A0	51	F0

Table 5 Data Analysis

Item	Address	Received Data
Jockey Pump Overload	0000	0
Aux. Input	0001	0
/	0002	0
Power Voltage Normal	0003	0
Auto	0004	0
Stop	0005	1
Start	0006	0
Emergency Stop Input	0007	1

2.2 FUNCTION CODE 03H MAPPING PARAMETER DATA FIELD

Table 6 Data Field of Parameter

Modbus Address	PLC Address	Item	Range (Decimal)	Ratio	Unit	Description	Remark
0000	40001	UA1	0~65000	1	V	16-bit Unsigned	
0001	40002	UB1	0~65000	1	V	16-bit Unsigned	
0002	40003	UC1	0~65000	1	V	16-bit Unsigned	
0003	40004	UAB1	0~65000	1	V	16-bit Unsigned	
0004	40005	UBC1	0~65000	1	V	16-bit Unsigned	
0005	40006	UCA1	0~65000	1	V	16-bit Unsigned	
0006	40007	UA1 Phase	0~360	1	°	16-bit Unsigned	NOTE3
0007	40008	UB1 Phase	0~360	1	°	16-bit Unsigned	
0008	40009	UC1 Phase	0~360	1	°	16-bit Unsigned	
0009	40010	Frequency	0~100.0	0.1	Hz	16-bit Unsigned	
0010	40011	Voltage Status	0~65535	No.		16-bit Unsigned	See Power Status Description
0011	40012	Delay Value	0~65535	1	s	16-bit Unsigned	
0012	40013	Sensor Resistance Value	0~65535	0.1		16-bit Unsigned	
0013	40014	Sensor Value	0~65535	0.1		16-bit Unsigned	
0014	40015	Pipe Pressure	0~65535	0.1		16-bit Unsigned	
0015	40016	Jockey Pump I Start Times LSB	0~65535	1		16-bit Unsigned	
0016	40017	Jockey Pump I Start Times MSB	0~65535			16-bit Unsigned	
0017	40018	Jockey Pump I Running Time LSB	0~65535			16-bit Unsigned	
0018	40019	Jockey Pump I Running Time MSB	0~65535			16-bit Unsigned	
0019	40020	/				16-bit Unsigned	
0020	40021	SW	0~65535			16-bit Unsigned	
0021	40022	Year	0~65535			16-bit Unsigned	
0022	40023	Month	0~65535			16-bit Unsigned	
0023	40024	Day	0~65535			16-bit Unsigned	
0024	40025	Jockey Pump I Single Running Time LSB	0~65535	1		16-bit Unsigned	
0025	40026	Jockey Pump I Single Running Time MSB	0~65535	1		16-bit Unsigned	
0026	40027	Jockey Pump Status	0~65535	1		16-bit Unsigned	See Jockey Pump Status
0027	40028	Delay	0~65535	1		16-bit Unsigned	
0028	40029	Jockey Pump II	0~65535	1		16-bit Unsigned	

Modbus Address	PLC Address	Item	Range (Decimal)	Ratio	Unit	Description	Remark
		Start Times LSB					
0029	40030	Jockey Pump II Start Times MSB	0~65535	1		16-bit Unsigned	
0030	40031	Jockey Pump II Running Time LSB	0~65535	1		16-bit Unsigned	
0031	40032	Jockey Pump II Running Time MSB	0~65535	1		16-bit Unsigned	
0032	40033	Jockey Pump II Single Running Time LSB	0~65535	1		16-bit Unsigned	
0033	40034	Jockey Pump II Single Running Time MSB	0~65535	1		16-bit Unsigned	

NOTE1: Actual value=received data*ratio. Take the frequency as the example, if the received data is 500 (1F4H), ratio is 0.1Hz, then the actual frequency value is 50.0Hz (500*0.1Hz);

NOTE2: For 4-byte data, actual value=received data MSB*65536+received data LSB;

NOTE3: When received data is 32766, it represents no normal data, “###” will display;

NOTE4: Definition of signed number. Take received data 8000H as the example, transfer it to binary 1000 0000 0000 0000b, the MSB is 1, which is a negative number. One’s complement is obtained by subtracting 1 from it, which is inverted to obtain the absolute value of the negative number. Then transfer it to -32768 in decimal.

Example:

If need to read “UA1, UB1”, firstly get their addresses are 0 and 1 by checking the table, then it is known that you need to read 1-byte data.

Assume the slave address is 01, the master request command is as following:

Table 7 Master Request Command

Slave Address	Function Code	Starting Address (1000)		Request Data Qty. (2)		CRC 16 Calibration	
		MSB	LSB	MSB	LSB	LSB	MSB
01	03	00	00	00	02	C4	0B

The slave response command is as following:

Table 8 Slave Response Command

Slave Address	Function Code	Data Qty. (Bytes)	Data				CRC 16 Calibration	
			Data MSB of Address 1000	Data LSB of Address 1000	Data MSB of Address 1001	Data LSB of Address 1001	LSB	MSB
01	03	04	01	7C	01	7C	3A	66

Fill the received data into the corresponding address, as shown in the table below:

Table 9 Data Analysis

Address	Received Data (Hex)
0000	03E8H
0001	03E8H

2.3 POWER STATUS

Table 10 Power Status Description

Value (No.)	Item	Delay
0	Available	Delay (unit: s)
1	Unavailable	Delay (unit: s)
2	Voltage Normal	No delay
3	Voltage Blackout	No delay
4	Overvoltage	No delay
5	Undervoltage	No delay
6	Overfrequency	No delay
7	Underfrequency	No delay
8	Loss of Phase	No delay
9	Reverse Phase Sequence	No delay

Example:

If the content of address 10 in Table 6 is 1, content of 11 is 5, then it represents that currently power voltage unavailable delay is in progress, countdown is 5s.

If the content of address 10 in Table 6 is 4, then it represents that currently power overvoltage occurs.

2.4 JOCKEY PUMP STATUS

Table 11 Jockey Pump Status Description

Value (No.)	Item	Delay
0	Start Delay	Delay (unit: s)
1	Stop Delay	Delay (unit: s)
2	Jockey Pump Start	No delay
3	Jockey Pump Stop	No delay