

## RLA<sup>net</sup> Communication Protocol V1.0

### Communication protocol introduction:

- RLA<sup>net</sup> communication with RS-485 physical interface, communication protocol follow MODBUS RTU statute. Its communication format as follows:

Data Format:	Address code	Function code	Data area	CRC check code
Data Length:	1byte	1byte	N byte	16 bit

CRC check code : CRC check code generation, the low byte before, the high byte last.

- RTU frame structure:

In RTU mode, the new information is always to at least 3.5 characters of silence time to start, and then transmit the first domain-equipment address. The whole frame information must be in a continuous flow of data for transmission. If the information is there before the end of more than 1.5 characters above the time interval of the error, and a frame of information standard structure as follows:

Start	Address domain	Function domain	Data domain	CRC check domain	End
T1—T2—T3—T4	8 bit	8bit	N*8bit	16bit	T1—T2—T3—T4

### Communications data transmission process:

When communication order send by equipment (PC host) to the receiving device (RLA<sup>net</sup>), accord with the address from machine receive communication command, and according to the function code and requirements to read information, if the CRC check is right, it is executed corresponding task ,and then execute the results back to the host ,and returned information contains address, function code, data area and the CRC check, if the CRC check is wrong, it is not to return any information.

### RLA<sup>net</sup> information frame

PC host to send command format

Address	Function	Register the starting address	Register quantity	DATA	CRC
1byte	1byte	2bytes	2bytes	N/A	2bytes

RLA<sup>net</sup> reply format

Address	Function	Data bytes quantity	DATA	CRC
1byte	1byte	1byte	N/A	2bytes

### RLA<sup>net</sup> part function code:

Function code (HEX)	operation
03	Read one or same registers of data
06	A group of binary data writing in a single register
10	Multiple binary data writing in Multiple register

**RLA<sup>net</sup> register:**

**RLA<sup>net</sup> register address distribution**

Register address (HEX)	Registers significance	property
0000	State flag word(see the State flag word table)	read
0001	Leakage data registers(Leakage distance, the unit cm/10)	read
0002	Year register (decimal BCD year)	Continuous read / write
0003	Date register (decimal BCD ,high byte is month date, low byte is day	
0004	Hour and minute register(decimal BCD ,high byte is hours, low byte is minutes)	
0005	Second register(decimal BCD ,the high byte is retained, the low byte is seconds)	
0006	Software version register (software version)	read
0007	Log quantity register (the quantity of log which produced)	read/write
0008	Sensor cable length register ( Sensor length preset value, the unit cm/10)	Read/write
0009	Sensor cable resistivity register (Sensor cable resistivity preset value, the unit hair Ohms/m)	Read /write
000A	Leakage resistance register ( leakage resistance of the upper limit value, the unit Kohms)	Read /write
000B	Leakage resistance registers( leakage resistance of the lower	limit value, the unit Kohms)
Read /write		
300B	Confirm alarm	Write
1000—1100	Log (log data)	Read
2000	Products address register (distribution of products address, 0-255)	Read/write
2001	Communication baud rate register (baud rate 2400/4800/9600/19200 N,8,1)	
Read/write		
8000	Calibration registers	Read/write

**The Status flag word table**

BIT	Specification
0	0 : Not leak ; 1 : leak
1	0 : Normal ; 1 : Fault/service
2	Retain
3	Retain
4	Retain
5	Retain
6	Retain
7	Retain
8	Retain
9	Retain
10	Retain
11	Retain
12	Retain
13	Retain
14	Retain
15	Retain

**Register the operating instructions (as an example to address 1)**

- 1) Status flag word (**0000**), property read-only (function code **03**)  
 Send the command to get the status word(hex value):01 **03 00 00 00 01 84 0A**  
 Return the data(hex value):01 03 02 **00 00** B8 44  
 The value of the data fields is status flag word, the high byte did not use, low byte meaning see the status flag word table.  
 The values for the example: 00 00 means not leak or normal.
- 2) Leakage data registers (**0001**), property read-only (function code **03**)  
 Send the command to get the status word(hex value):01 **03 00 01 00 01 D5 CA**  
 Return the data(hex value):01 03 02 **00 01** 79 84  
 The value of the data fields is leakage data. Data calculation method: Data/10(unit is meters).  
 The values for the example :00 01, means the location of the leak is 1/10 meter (0.1m),  
 when the data is FF FF, means leakage
- 3) Year register, date register, time register, second register, the four registers only support continuous reading and writing.  
 Function code: read **03**; write **10**, the starting address is year register(0002),register quantity is 4  
 Read the time:01 **03 00 02 00 04 E5 C9**  
 Return the data:01 03 08 **20 10 11 20 21 26 00 32** 6E AA  
 The value of the data fields is year (20 10), month (11), day (20), hour (21), minute (26), second (32).  
 Write the time : 01 **10 00 02 00 04 20 10 11 20 21 26 00 32** 57 55  
 Write the time is year (20 10), month (11), day (20), hour (21), minute (26), second (32).  
 Return the data:01 10 02 00 00 BC C0
- 4) Log quantity register (0007), read: 03, write:06  
 Read this register can obtain the quantity of log article, if write 0 in this register it will remove the log quantity.  
 Read the log quantity : 01 03 00 07 00 01 35 CB  
 Return the data : 01 03 02 **00 20** B9 9C  
 Return the data is 00 20, means the log quantity is 32 items  
 Write the register : 01 06 00 07 00 01 00 00 03 C7
- 5) Sensor cable length register (0008) read:03,write:06  
 The register store the sensor cable length, the unit is cm  
 Read the data : 01 03 **00 08** 00 01 05 C8  
 Return the data : 01 03 02 **00 96** 38 2A Return data is 00 96, means the sensor cable length is 150cm,also is 15m.  
 Write the sensor cable length in the register : 01 06 00 08 00 01 **00 C8** 56 50
- 6) Sensor cable resistivity register (0009) Read:03 ,write :06  
 The register is used to store the resistivity value of sensor cable. unit is hair ohms/m.  
 Read the data : 01 **03 00 09** 00 01 54 08  
 Return the data : 01 03 02 **34 15** 6F 4B return the data is 34 15.means the resistivity  
 value of sensor cable is 13333 hair ohms/m  
 Write the resistivity value of 13333 hair ohms/m in the register:01 06 00 09 00 01 34 15 BD 09
- 7) Write the leakage resistance of the upper limit value register (000A),read:03,write:06  
 Leakage upper resistance is used to set limits on the leakage impedance of the upper limit (unit kohms),when the leakage  
 resistance exceeds this value, the system will think that on leakage. Typically this value can be set from 30-100, the higher  
 the value, the higher the sensitivity.  
 Read data:01 03 00 0A 00 01A4 08  
 Return data : 01 03 02 **00 3C** B8 55 The Maximum leakage resistance is 60 kohms  
 Write the upper limit of 60 kilohms : 01 06 0A 00 01 00 3C 2E 17
- 8) Write the Leakage resistance of the lower limit register (000B). Read:03, Write :06  
 This register is used to bet the lower limit of the lower leakage resistance (unit kilohms),when the leakage resistance below  
 this value, the system will think about no leakage. Typically this value can be set from 0-10, write higher values the stronger

anti-interference ability, but lead to low impedance leak leaking liquid produced omission. The instructions defined reference types and value leakage resistance limit register.

- 9) Confirm the alarm register (300B).Write:(06)  
When sending this command, it will screen current alarm  
Send command:01 **06 30 0B** 00 01 36 C8  
Return: 01 06 02 00 00 B8 88
  
- 10) Log data register (1000--1080) Read:(03)  
The range of register is to storage the log data, a log takes up to four registers (8 bytes of data),so a log data should be read four register. Log data base address of 1000, the starting address must be a multiple of the base address plus 4. The log data contain leaked time (BCD code: year, month, date, hour, minute) and leakage location values(cm/10).Read the log can only read one, not tonal, Recommended to read the log of the number of queries.  
Read the second log: 01 03 **10 04** 00 04 01 08  
Return: 01 03 08 **20 10 11 20 22 18 00 01** 4F 37 meaning of the data: at 22:18 on November 0.1m location occurs at the leak.
  
- 11) Products address register(2000),read :(03),write:(06)  
Address range is 0-255  
Write address 2: 01 **06 20 00** 01 **00 02** 5A 60
  
- 12) Communication baud rate register(2001) read :(03),write:(06)  
Baud rate range (2004/4800/9600/19200),N,8,1 format  
Write baud rate 9600 in the register:01 06 20 01 **25 80** 97 97
  
- 13) Calibration register (8000), read: (03),write:(06)  
Calibration register is used to stores the correction factor of AD, reducing the error, its value based on 1000 to increase or cut down.  
Read the Calibration register :01 03 80 00 01 AD CA  
Return the data:01 03 02 **03 E8** B8 FA  
the correction factor of AD is 03 E8 means:1000  
Written correction value 1000: 01 06 80 00 00 01 **03 E8** A9 79
  
- 14) 14 CRC check  
CRC16 checksum verification value, low byte first ,high byte in the post