

LS-RAI/O Series Wireless Analog Acquisition Module



Contact: Sunny

QQ: 2690803514

Whats app: 008613826574847

Skype: lensen-tech@outlook.com

Email: sunny@lensen-tech.com

Web: www.lensen-tech.com

Add: Xixiang, Bao'an, Shenzhen, China

1. General introduction

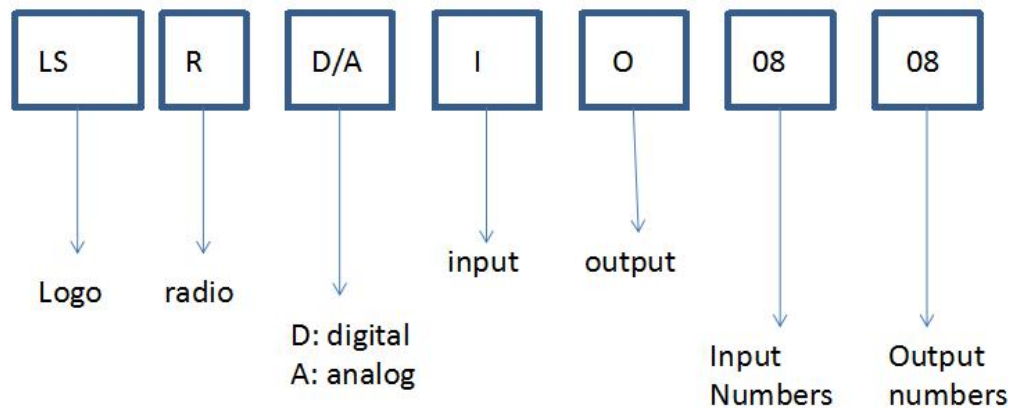
LS-RAIO Modbus RTU is an industrial controller designed by Lensen Technology. It supports point to point, point to multi-points wireless AI, AO (4-20mA or 0-5V or 0-10V signal) collection and control. This wireless RTU has the advantage of easy installation, no program required, no communication fee. It is reliable and cost-effective substitution for rail signal cable and slip ring signal wire.

This series we have 2AI, 2AO, 4AI and 4AO 4 items. Power output we have 2 versions, one is 100mW for 600m LOS control distance, and another one is 1W for 3km LOS control distance. For longer control distance, we also have other higher power output radio modem to configure.

2. Application area

LS-RAIO series are widely used for sensor's signal wireless collection and meters' data wireless transmission, kinds of sensors data like liquid level, flow, pressure, weight, temperature, humidity, vibration, distance are applied. So wireless AI, AO modules are widely used in oil, chemical industry, metallurgy, water treatment, environmental protection, air conditioning, medicine and other fields.

3. Name regulation



For example:

LS-RDIO0808 means Lensen 8DI 8DO Module

LS-RDIO0404 means Lensen 4DI 4DO Module

LS-RAI04 means Lensen 4AI module

LS-RAO02 means Lensen 2AO module

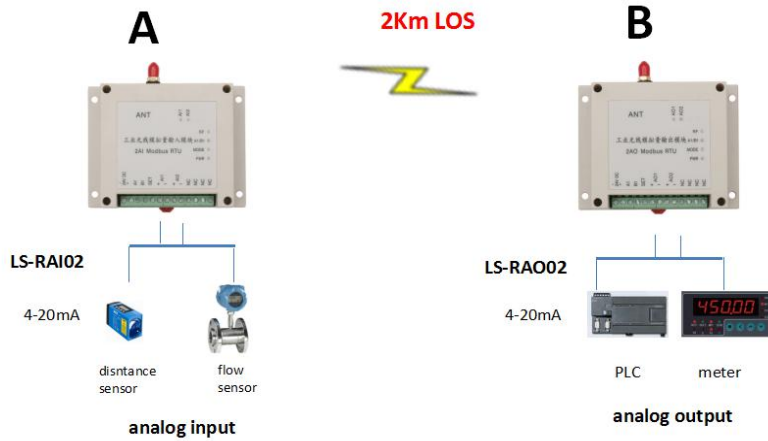
4. Parameter

Frequency	433MHz or 450MHz or 470MHz	
Power output	100mW (600m) 、1000mW(3000m)	
Products	2AI、4AI、2AO、4AO	
Input type	4-20mA or 0-5V or 0-10V	
Output type	4-20mA or 0-5V or 0-10V	
Resolution ratio	24 bit	
Accuracy	±0.02%	
Power supply	9-36V DC usually use 24V DC	
Interface	RS-485	
Channel No.	16ch default, can program via DIP switch	
Antenna	Sucker antenna with 1.5m cable	
Working temperature	-35℃~+75℃ industrial	
Working humidity	10%~90% relative humidity, no condensation	
Dimension	2AI、4AI	115×90×40(mm)
	2AO、4AO	
Fix way	Standard 3.5 inch industrial DIN guild rail	

5. Application example

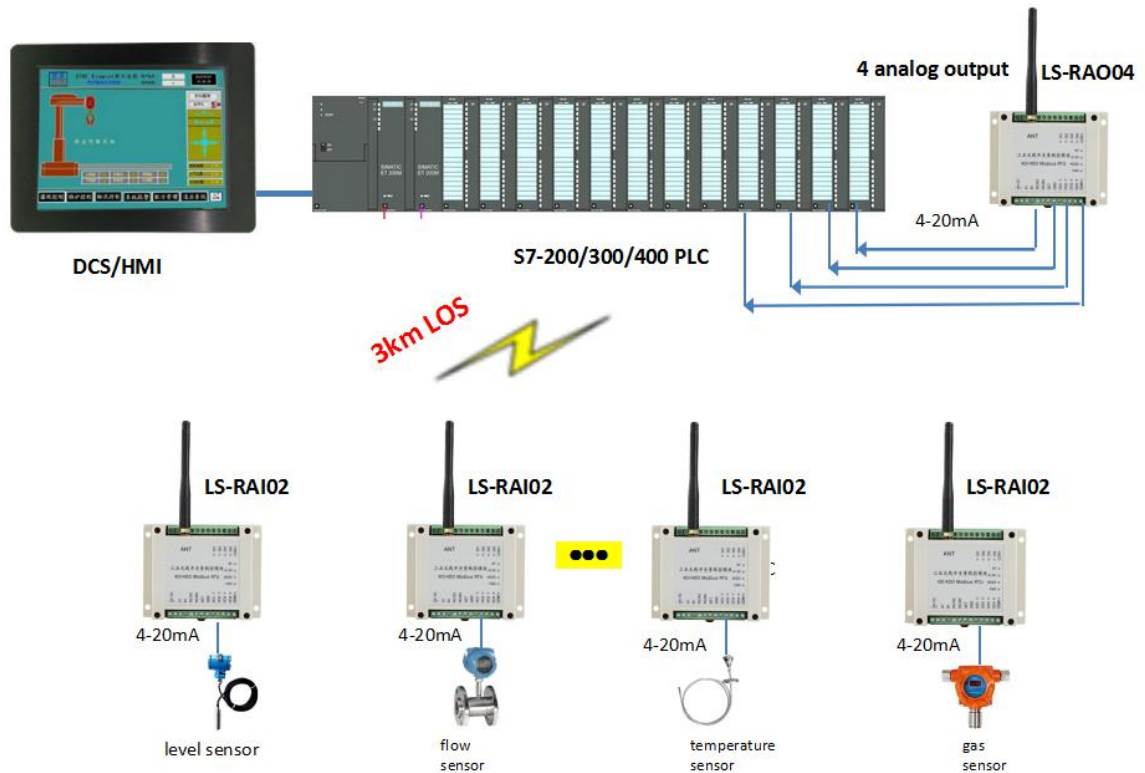
5.1. LS-RAI/O Series wireless analog acquisition module point to point wireless control application example

Point to point wireless control application



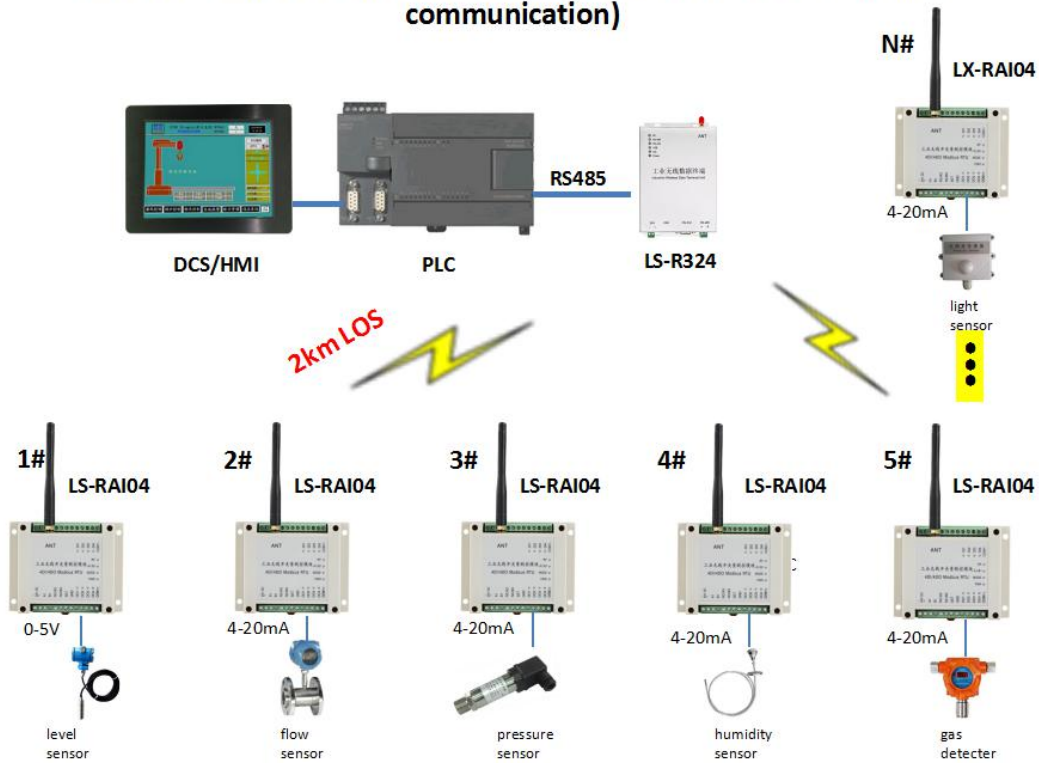
5.2 pint to multi-point wireless control(I/O---O/I)

LS-RAIO series point to multipoint control (I/O----O/I)



5.3 point to multipoint wireless control(RS485 modbus communication)

LS-R series and LS-RAI/O series wireless control (via RS485 modbus communication)



6. Modbus RTU communication and corresponding value

6.1 Register types:

Register types	Read command	Write command (Control command)	Power off	Function
Hold register	0x01	Input --not support	Not keep	Can read input value
	0x03	Output--support		

A. Hold register

1. Analog input value: 0x0008~0x000B
2. Analog output value: 0x0048~0x004B

B. How to read

Hold register: can read 4 analog input or control 4 analog output at one time

6.2 Register control way

AI/AO	IC			Read/ write	Function ID	items support
No.	IC Type	PLC ID	Modbus ID			
AI1	Hold register	40009	8	Read	03	2AI/4AI
AI2	Hold register	40010	9	Read	03	
AI3	Hold register	40011	10	Read	03	4AI
AI4	Hold register	40012	11	Read	03	
AO1	Hold register	40073	72	Read/write	03/06	2AO/4AO
AO2	Hold register	40074	73	Read/write	03/06	
AO3	Hold register	40075	74	Read/write	03/06	4AO
AO4	Hold register	40076	75	Read/write	03/06	

6.3 About value calculation

Analog input

Our analog module's max measure range value is : 0X7FFF

1. Directly measure current and voltage

Exact value=value you read/0x7FFF*max range

For example: to read the 1st passage of module's (with max range of 0-20mA) input value

Register 0x0008(analog input of the 1st passage)

Feedback: 0x3801

Current value: (0x3801/0x7FFF)*20mA=8.7509mA

2. To measure sensor's value(4-20mA, 0-6 meter level sensor)

If feedback value is less than 6554, level value is 0

If feedback value is bigger than 6554, level value=(value read-6554)/(32767-6554)*measure ranges

For example: feedback value is 0X3801, then corresponding level value is: ((0X3801-6554) /26213) *6 meter=1.7815 meter

Analog output

Analog module's max measure range is: 0x7FFF

Directly control output current and voltage

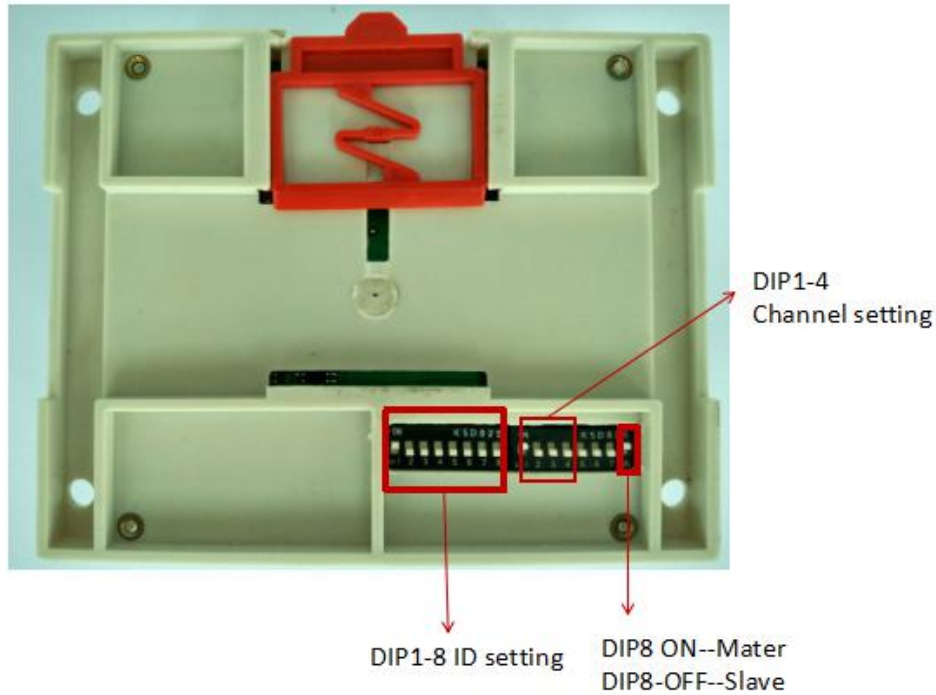
Write register value=current or voltage value/measure range*0x7FFF

For example: to control the 1st passage of analog module whose max measure range is 0-20mA









Register 0x0048 (analog output of the 1st passage)

To write register value: (8.75/20mA) *0X7FFF =14336=0x3800

7. DIP Setting:



1) Outer(right side) DIP 1-4 are used for channel setting. Please check the following definition:

Channel No.	DIP Setting	Channel No.	DIP Setting	Channel No.	DIP setting	Channel No.	DIP setting
1	 1234	2	 1234	3	 1234	4	 1234
5	 1234	6	 1234	7	 1234	8	 1234

2) Outer(right side) DIP 5-8 are used for mode setting. Please check the following definition

DIP	Status	Function	Remarks
5	OFF	With feedback	
	ON	No feedback mode	remote side DI, this side only DO
6、7	OFF、OFF	1 to 1 control	Master set ID to X, Slave module's ID set to X (ie. master ID1, slave ID1. remember set ID the same)
6、7	ON、OFF	1 to 2 slaves control	Master set to ID1, 2 slave modules' ID set to 1 and 2 respectively
6、7	OFF、ON	1 to 4 slaves control	Master set to ID 1, 4 salve modules' ID set to 1, 2, 3 and 4 respectively
8	OFF	Slave mode	
	ON	Master mode	

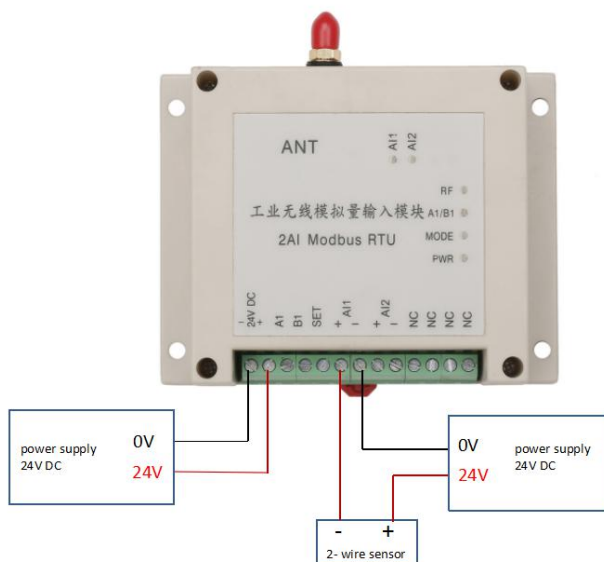
3) Interior(left side)DIP 1-8 are used for module's ID setting (also Modbus slaves' ID.), for example

ID	DIP setting	ID	DIP setting	ID	DIP setting
1		2		3	
4		5		6	
7		8		9	
10		11		12	
13		14		15	

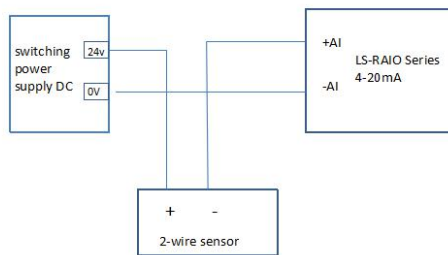
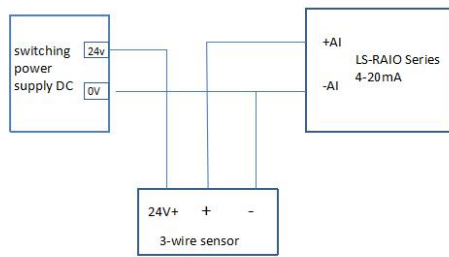
DIP for slaves with ID 16-254, please refer the above regulation to set

Note: Above sample picture is ID1

8. How to connect



analog I/O module wiring



9. LS-RAI/O series wireless I/O module

Item No.	Distance	I/O No.	Power supply	Communication port
LS-RAI02	600m、2000m	2AI	9-36V DC	RS-485
LS-RAI04		4AI		
LS-RA002		2AO		
LS-RA004		4AO		