Lora

User Manual

Document No.: APN0000236V0.3.1

Product Model	UDL07XX
Subsystem name and model	
Module name	

Revision History

Revision	Initiator	Revision Description	Reviewed by	Approved by	Issue Date
V0.1.1	Fish Yu	Initial version	Eileen Zhou Johny Wu	John Gu	13 May 2022
V0.2.1	Alex Qin	Added FCC Warning Information.	Eileen Zhou Johny Wu	John Gu	15 Jul. 2022
V0.3.1	Alex Qin	Deleted Footer of “Excelland Confidential, Do Not Copy or Distribute without Permission”.	Eileen Zhou Johny Wu	John Gu	28 Jul. 2022

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Chapter 1 Brief Introduction of Product

1.1 General

UDL07XX Lora data transmission terminal is a wireless data transmission terminal based on Lora spread spectrum technology. At the same time using Lora wireless transmission technology for short distance data transmission.

This product adopts industrial grade Lora scheme with high performance, based on embedded real-time operating system as the software platform, while providing RS232 and RS485 (or RS422) interface, can be directly connected to the serial device, realize the transparent data transmission function; low power design, lowest power consumption is less than DC 5mA@12VDC; 5 I/O, can achieve the digital input output, analog input, pulse counting function.

It has been widely used on M2M fields, such as electric power, intelli gent trafic,wireless metering, industrial automation, telemetry, water su pply, environment protection,weather, and so on.

1.2 Features and Benefits

Design for Industrial Application

- High-powered industrial Lora chip and MCU.
- High-powered industrial 32 bits CPU.
- Support low power consumption mode, including mufti-sleep and trigger modes to reduce the power dissipation farthest.
- Housing: iron, providing IP30 protection.

Power range: DC 5V～36V

Stability and Reliability

- Support hardware and software WDT.
- RS232/RS485/RS422 port: 15KV ESD protection.
- Power port: reverse-voltage and over voltage protection.
- Antenna port: lightning protection(optional).

Standard and Convenience

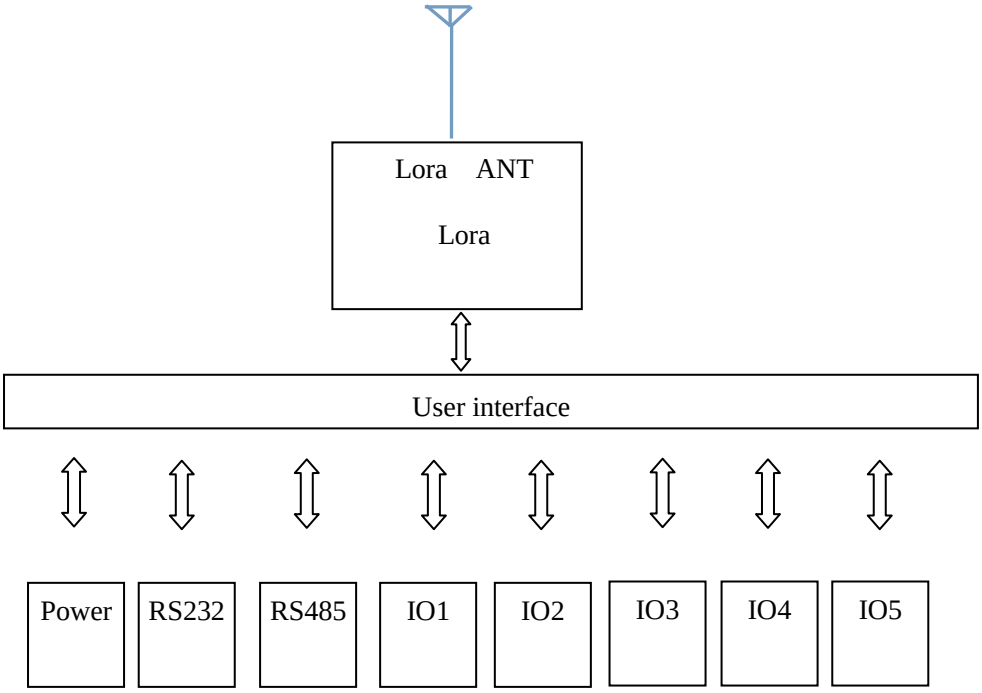
- Adopt terminal block interface, convenient for industrial application.
- Support standard RS232 and RS485(or RS422) port that can connect to serial devices directly.
- TTL logic level RS232 interface can be customized, ADC interface can be customized.
- Support intellectual mode, enter into communication state automatically when powered.
- Provide management software for remote management.
- Support several work modes.
- Convenient configuration and maintenance interface.

High-performance

- Support Lora wireless short-range data transmission capabilities,with self-organizing network capabilities.
- Relay routing and terminal device functionality.
- Network capacity: 65000 nodes (typical number of 300).
- Send mode flexible: Broadcast send or destination address send mode optional.
- Supply 5 I/O channels, can achieve the analog input of the 3 channels, the digital input and output of the 2 channels; compatible with the pulse count function of the 2 channels.

1.3 Working Principle

The principle chart of the Lora is as follows:



1.4 Specifications

Lora Specification

Item	Content
Module	Industrial Lora module
Communication Frequency Band	The product family supports a wide range of frequency bands around the world (470/780/868/915 MHz)
Indoor/Urban Communication Distance	F8L10T-N:1km F8L10T-E:2km
Outdoor/Visual Communication Distance	F8L10T-N:3.5km F8L10T-E:11.5km

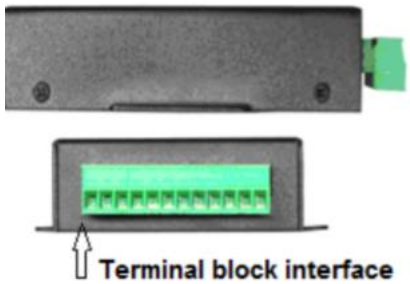
Bandwidth	6 level adjustable（0.3、0.6、1.0、1.8、3.1、5.5Kbps）
TX Power	15.18dBM（Conducted）
RX Sensitivity	-140dBm
Channel Number	32

Hardware System

Item	Content
CPU	Industrial 32bits CPU
FLASH	128KB
RAM	16KB

Interface type

Item	Content
Serial	1 RS232 port and 1 RS485(orRS422) port, 15KV ESD protection Data bits: 8 Stop bits: 1, 2 Parity: none, even, odd, space, mark Baud rate: 300、600、1200、2400、4800、9600、19200、38400、57600、115200bps
Indicator	“Power”, “ACT”, "Online”
Power	Terminal block interface, reverse-voltage and over voltage protection



Power supply

Item	Content
Standard Power	DC 12V/0.5A
Power range	DC 5~36V

Consumption

Item	Working condition	Consumption
F8L10T-N	Sleep	3.1～3.2mA@12 VDC
	Receive data	13.2～13.4mA@12 VDC
	Transmit data	60.3～61.2mA@12 VDC
	Sleep	7.3～7.4mA@5 VDC
	Receive data	26.1～26.2mA@5 VDC
	Transmit data	107.3～115.1mA@5 VDC
F8L10T-E	Sleep	3.1～3.3mA@12 VDC
	Receive data	13.2～13.4mA@12 VDC
	Transmit data	110-125mA@12 VDC
	Sleep	7.2～7.4mA@5 VDC
	Receive data	26.3～26.5mA@5 VDC
	Transmit data	210～213mA@5 VDC

Physical Characteristics

Item	Content
Housing	Iron, providing IP30 protection
Dimensions	91x58.5x22 mm
Weight	205g

Environmental Limits

Item	Content
Operating Temperature	-40~+85ºC（-40~+185℉）
Storage Temperature	-40~+125ºC（-40~+257℉）
Operating Humidity	95% (unfreezing)

Chapter 2 Installation Introduction

2.1 General

The Lora must be installed correctly to make it work properly.

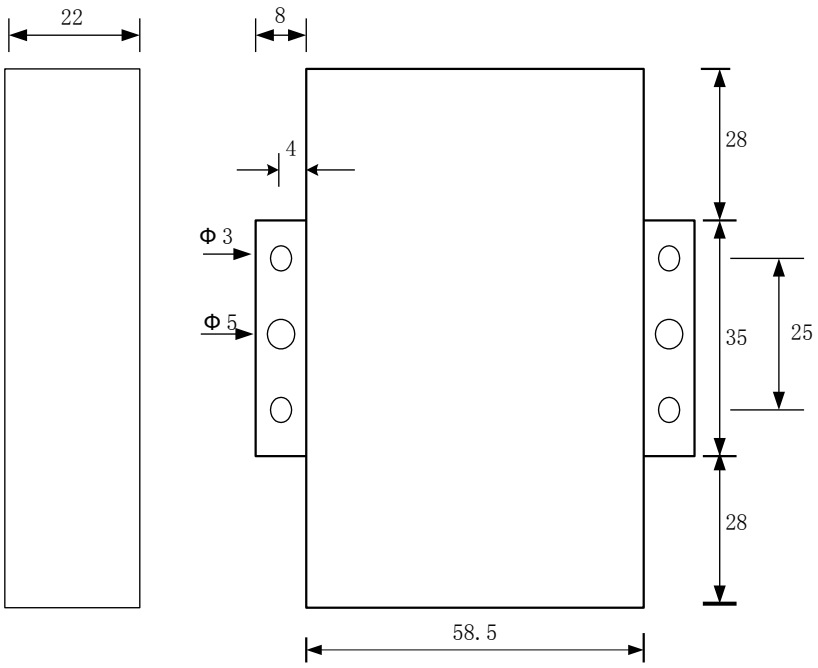
Warning: Forbid to install the MODEM when powered!

2.2 Encasement List

Name	Quantity	Remark
Lora host	1	
Lora Antenna	1	
Power adapter	1	
RS232 data cable	1	optional
RS485 data cable	1	optional
Manual CD	1	
Certification card	1	
Maintenance card	1	

2.3 Installation and Cable Connection

Dimension: (unit: mm)



User Interface Signal Definition

Pin Number	Signal Name	Default Function	Extensible Function
1	PWR	Power input anode	N/A
2	GND	Power Ground	N/A
3	GND	Power Ground	N/A
4	RX	RS232 RX	N/A
5	TX	RS232 TX	N/A
6	A	RS485 anode	N/A
7	B	RS485 cathode	N/A
8	IO1	GPIO	sleep control
9	IO2	GPIO	N/A
10	IO3	ADC, analog input function (voltage acquisition 0 ~ 5 V)	GPIO
11	IO4	ADC, analog input function (current collection 0 ~ 20	GPIO

		mA)	
12	IO5	ADC, analog input function (current collection 0 ~ 20 mA)	GPIO

Formulas to calculate collected value of ADC

Voltage: (collected value)*3.3*20.16/(4095*12.1) V

Current: (collected value)*3.3*1000/（4095*150）（mA）

Installation of cable:

IP MODEM adopts industrial terminal block interface. The recommendatory cable is 28-16AWG. The detail description of standard layout adapter and communication cables as is as follows:

Adapter（Rating Output 12VDC/0.5A）:

Cable Color	Power Output Polarity
Black &White Alternate	Anode
Black	Cathode

RS232 Cable：

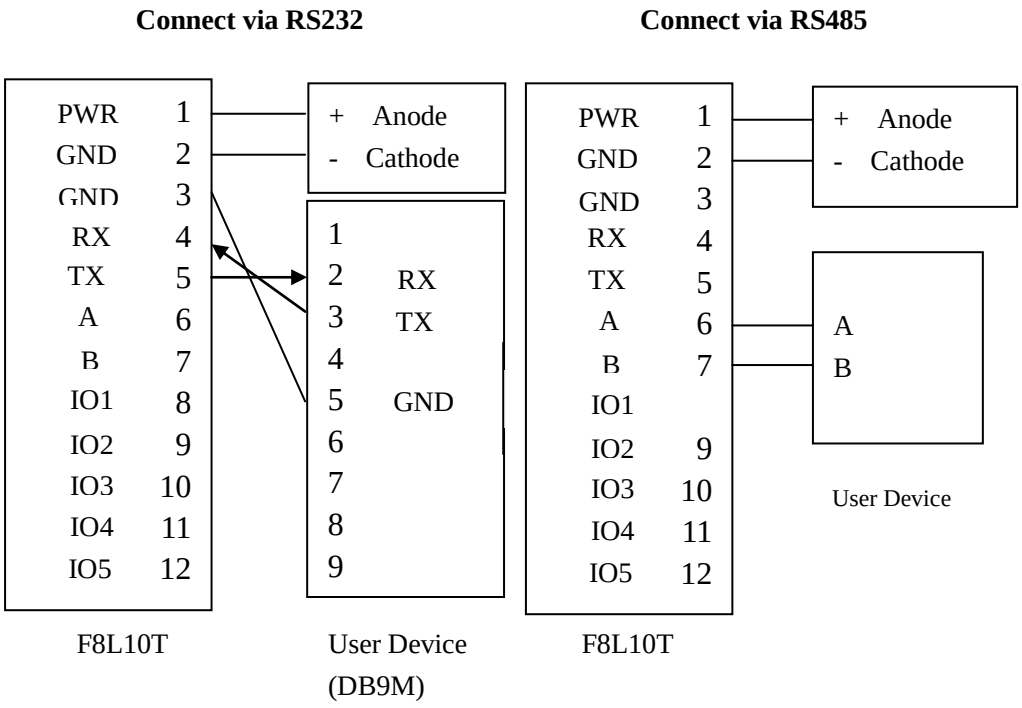
Cable Color	Corresponding DB9-M Pin Number
Brown	Pin 2
Blue	Pin 3

Black	Pin 5

RS485 Cable：

Cable Color	Signal definition
Red	RS485(A)
Black	RS485(B)

Power adapter and communication cable connection chart is as follows:



2.4 Power

The power range of the Lora is DC 5~36V.

Warning: When we use other power, we should make sure that the power can supply power above 4W.

We recommend user to use the standard DC 12V/0.5A power.

2.5 Indicator Lights Introduction

The Lora provides three indicator lights: “Power”, “ACT”, “Online”.

Indicator Light	State	Introduction
Power	ON	Lora is powered on
	OFF	Lora is powered off
ACT	BLINK	Data is communicating
	OFF	No data
Online	ON	Lora has logged on network
	OFF	Lora hasn't logged on network

Chapter 3 Configuration

3.1 Configure connection

In the Lora digital transmission terminal configuration, the need to pass the factory configuration RS232 serial cable or rs232-485 conversion line Lora data transmission terminal and configured to connect the PC together, is as follows:

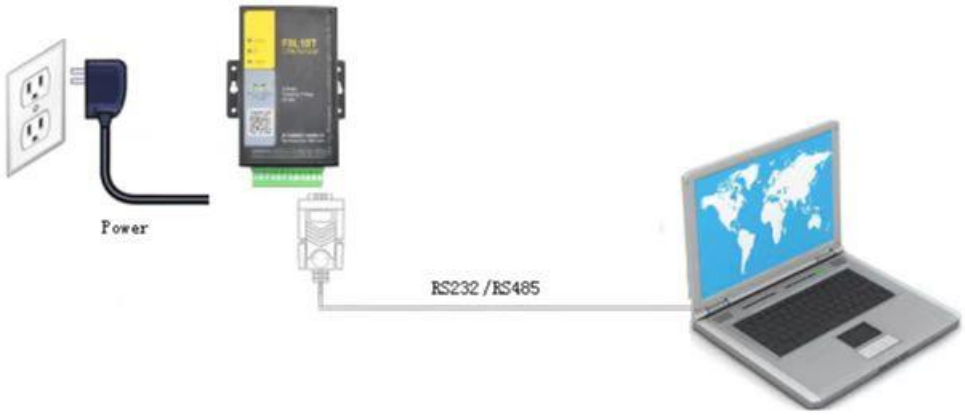


Figure 3-1 UDL07XX Configuration Connection with PC

3.2 Introduction of parameter configuration

There are two ways to configure the device:

- Four-Faith Configuration software tool "LoraConfig": All the settings are configured through the shipped software tool. It's necessary to have one PC to run this tool.
- Extended AT command: All the settings are configured through AT command, so any device with serial port can configure it. Before configuration with AT command, you should make device enter configure state.

For more details, refer to "*AT command manual*".

Configure the UDL07XX parameters by configuration software, as shown in Figure 3-2.

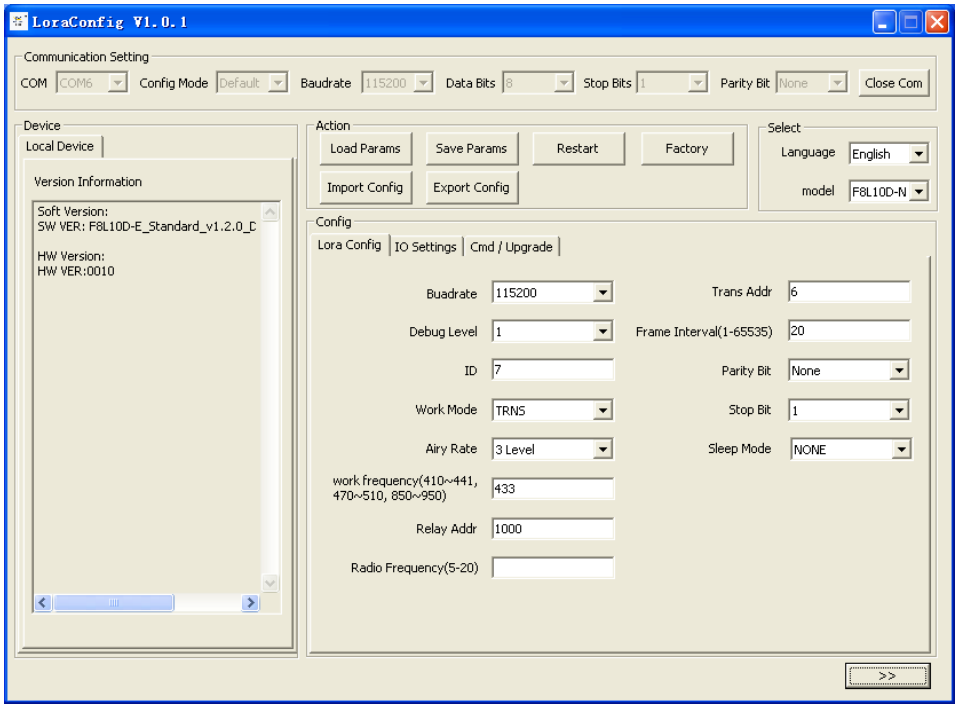


Figure 3-2 Configuration Interface

Column display serial parameters currently open serial port settings in the serial port parameters,please choose the correct value of this configuration, at the same time, open the serial port. The serial port parameter settings column if the right button is displayed as "closed serial". That serial port has been opened, otherwise please open the serial port.

The equipment again after power, configuration software UDL07XX into the configuration state, and automatically load the current configuration parameters of equipment, in the area on the right side of the display parameters, thus can start all configuration parameters in the configuration f8l10t, as shown in Figure 3-2.

3.3 Detailed parameters

3.3.1 Serial port configuration

It can configure the baud rate, data bit, parity bit and stop bit of the communication serial port.
Default: 115200 Baud rate, Attributes 8N1.

3.3.2 Serial port work mode

Module serial data work can be divided into "TRNS","AT" and "API".

"TRNS": data transmission, when the need to pass through the address configuration, namely the destination address.

"AT": protocol format reference " Lora AT commands manual",usually used for parameter configuration and manual testing.

"API": serial data must be based on a certain data format for sending and receiving, protocol format reference " Lora API commands manual". The maximum length is 100 bytes.
Default: TRNS

3.3.3 ID

Set the module ID, configurable range 0~65535.

3.3.4 working frequency

Module data transmission frequency, different hardware modules can work different frequency bands, roughly divided into low frequency band (525MHz below) and high frequency band (525MHz above) two categories.Typical operating frequency band is 410M ~ 441MHz, 470M ~ 510MHz, 850 ~ 950MHz, etc., 1000KHz for a channel.Different application areas have different frequency band restrictions, as well as different channel interference factors, the error rate is different, so need to adjust the value according to the actual situation.

3.3.5 Air speed

The rate of data in the air can be divided into 6 levels, The higher the level, the higher the rate. Under the same conditions, the higher the rate, the closer the transmission distance.Therefore, you need to adjust this value according to the actual environment.

Attention: all devices must be at the same rate, otherwise they can not communicate.

Default: 3 Level

3.3.6 Transmitting power

The hardware module without PA can set the transmit power of 5 ~ 20dBm. The power of the hardware module with PA is fixed at 30dBm.

Default: 20

3.3.7 Relay address

When the transmission distance between nodes is too far, this parameter is set to the relay node' ID, and the relay node will help the node forward the data to the final destination node.
Default: 1000

3.3.8 Sleep mode

When the device is in low power mode, can be set to NONE(not dormant), TIME(timing dormant) and DEEP(deep sleep). Regular sleep, you need to configure the "wake up time" and "sleep time"; the depth of dormancy, only through the IO1 pin to wake up.
Default: NONE

In regular sleep, keep the device wake-up time, unit MS, when the device wake up super this time will go to sleep.

In regular sleep, keep the device dormant time, unit MS, when the device sleep over this time will wake up, in a normal working state.

3.3.9 Debug level

Debug level control module log display, can be divided into three debugging levels, which:
0 do not output any log information
1 output Key log information
2 output detailed log information
Default: 1

FCC Radiation Exposure Statement:

This equipment complies with FCC radiation exposure limits set forth for an

uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

FCC Warning

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

NOTE 1: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
-Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
-Consult the dealer or an experienced radio/TV technician for help.

NOTE 2: Any changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate

the equipment.