LoRaWAN Metering Module (HAC-MLW AU915) User Manual VI.0

Version Management

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1. Overview

The HAC-MLW wireless remote meter reading system integrates acquisition, measurement, bidirectional communication and valve control etc, and it conforms to the LORAWAN 1.0.2 standard protocol which is formulated by LoRa Alliance. The system contains wireless meter reading acquisition module HAC-MLW, gateway LoRaWAN, LoRaWAN meter reading charging system (or we call it cloud platform).

2. Meter Module Feature

2.1. Electrical characteristics

No.	Item	Function description
1	Working frequency	LoRaWANR AU915MHz ISM Band
2	Maximum transmitting power	19dbm
3	Receiving sensitivity	<-136dBm
4	Working temperature	$-20^{\circ} C$ *70° C
5	Working voltage	+2.5V *3.8V
6	Receiving current	<9mA
7	Transmitting current	<130mA (which is related to transmitting power)
8	Transmitting distance	The maximum line of sight communication distance between the gateway and the meter module is 15km
9	Valve electrical parameter	+2.5V *3.8V
10	Sleep current	<15uA
11	Dimension	42.1mm*24.8mm*3.2mm

2.2 Feature Description

No.	Feature	Function Description
1	Data reporting	There are two data reporting methods. Magnetic trigger to report data: The magnet triggers the hall components of the meter module, and the trigger time must be greater than 2S. Timed and active reporting: the reporting time slice is automatically allocated according to the Device Eui of the meter module, and the data is reported every 24 hours.
2	Power management	It will detect voltages of various states of metering module in real-time and report.

3	Measurement	TTL serial communication
4	Power-down storage	Support power-down storage function, there is no need to re-initialize the measurement value after power-off
6	Monthly and yearly frozen data storage	It can save 10 years of annual frozen data and monthly frozen data of the last 128 months, and the cloud platform can query historical data
7	Parameters setting	Support wireless near and remote parameter settings. The remote parameter setting is realized through the cloud platform, and the near parameter setting is realized through the production test tool.
8	Valve control	Valve type can be set to support remote valve control and valve fault detection (which is optional)

3. Meter module structure and interface definition

3.1. Module structure dimension



HAC-MLW 尺寸图



3.2. Interface definition

No.	Name	Pin description
1	EPW	Power Output
2	GND	Power Negative
3	RX	The S1 access terminal of the pulse can be extended to the RX terminal of LEUART
4	TX	The S2 access terminal of the pulse can be extended to the TX terminal of LEUART
5	GN	Power Negative
6	OPE	Valve open in place detection and signal input terminal
7	CLO	Valve close in place detection and signal input terminal
8	V—	Valve motor drive output terminal
9	V+	Valve motor drive output terminal
10	GND	Power Negative
11	VCC	Power positive (DC2.8V 6.0V)
12	C-	Farad capacitor negative
13	C+	Farad capacitor positive
14	HALL	Hall trigger detection
15	MR3	ADC sampling
16	OKI	Reserved

Note: The withstand voltage of the farad capacitor must be greater than the power supply voltage.

VCC: Connect the positive electrode of the 3.6V ER18505 battery.

EPW: Providing a 3.0V regulated power supply to the outside, the maximum current is 100mA, it needs to be customized and opened.

RX TX:Serial communication pin

The HAC-MLW module can be widely used in wireless remote meter reading systems. The module can be integrated in the meter or installed in a suitable position with an enclosure.

4. Instruction of production test tool

4.1.

No.	Function	LED status description
1	Down on initialization	The LED light of the meter module will flash once when the power is
1	Power-on initialization	on (it will be very short)
		When the meter module is powered on for the first time, the chip
2	Chip voltage alarm	voltage is lower than 3V, the meter module LED light will continue to
		flash at a frequency of 100ms, and the flashing time is about 30S.
		When the meter module is connected to the Internet, the LED light is
		always on, and the LED light is off when the connection is successful
3	Networking	or the maximum number of connections is reached. The LED light on
		time is related to the networking time, the longest time is 25 seconds (3
		times networking).
4		The meter module reports data regularly and the LED light will flash
4	Report data regularly	once (it takes a short time)
5	Magnetic trigger to report	After the network is successfully connected, the LED of the data
3	data	reported by the magnetic trigger meter module will flash twice (it will
	uata	be very short).

5. Instructions of meter module

- Step 1. Assemble the meter. It's processed as per the assembly document provided by HAC Telecom, if it is already assembled or does not need to be assembled, ignore this step.
- Step 2. Information report and installation: report installation of meter module information (APPK, EUI, etc.) on the cloud platform (which is mainly based on the platform actually used by clients). After the installation is completed, check whether the meter module information is consistent with the platform. If the meter module has not joined the local LoRaWAN network at this time, please follow

step 3; if it has already been joined, please skip step 3.

- Step 3. Join the local LoRaWAN network: the magnetic triggering meter module initiates networking, the LED light keeps on during the networking process, and the LED light will turn off when the networking is successful.
- Step 4. Report data: Magnetic trigger to report data, check whether the water meter parameters and flow data are accurate through the cloud platform. If the data is deviated, it can be modified by setting parameters.
- Step 5. Parameter setting: After the meter module is assembled, use the production test tool provided by HAC (if provided) or the cloud platform for parameter setting. To set the parameters using the cloud platform, you must complete the meter module information installation on the cloud platform.
- Step 6. The meter module goes offline: the meter module fails to report in two consecutive reporting cycles, and the meter module goes offline. The next time the data is reported regularly, the network request will be initiated automatically.

The hall element of metering module is as follow:



6.Precautions

6.1. The magnet triggers the hall components of the meter module. The triggering time must be greater than 2S. If the trigger time is less than 2S, there is a probability that the data report will fail.

6.2. The magnetic trigger reporting function is invalid when the meter module is connected to the Internet (the LED light of module is always on) or when the valve is controlled.

6.3. The cloud platform cannot check the data reported by the magnetic trigger. The processing method is as follows:

- a) Observe whether the LED indicator status of the meter module meets the described in Chapter 4 when the data is reported by the magnetic trigger.
- b) Check whether the installation information of the cloud platform is consistent with the information of the meter module.
- c) Still unable to solve the data reporting problem, please contact our technical staff.

7. Instruction of Production Test Tool

7.1. Tool list

No.	Tool list	Function description
1	HAC-MLW-F-T 1-M2	Parameters setting and test data transfer
2	HAC-MLW-F-T2-M2	Monitor the field strength value of X meters from the LoRaWAN water meter (the distance is based on the production environment, select the returned field strength value -80dBm (the default fluctuation is 10 dBm)) to achieve fixed distance monitor.
3	5V RS232 serial cables 2PCS	Data transmission and HAC-MLW-T 1/2-M2 power supply
4	10cm 915MHz rubber rod antenna 2PCS	HAC-MLW-F-TI/2-M2 antenna
5	RS232 to USB serial cable	HAC-MLW-F-TI-M2 data transmission adapter cable
6	QR code scanning gun	Scan the QR code label of the LoRaWAN water meter to quickly get DeviceEui (which is optional)
7	IR communication device	Parameters setting
8	USB extended cable	Extend infrared communication device

It's shown as below:



7.2. Device connection

7.2.1. Wireless communication device connection

1) HAC-MLW-TI-M2 device connection, 5V RS232 serial cable DB9 female with power interface connects to HAC-MLW-T 1-M2, the other end of DB9 female interface transfers RS232 to USB serial cable to connect to the PC.The 5V RS232 serial cable adapter connects to 220V urban electricity.

It's shown as below:



2) HAC-MLW-T2-M2 equipment connection, 5V RS232 serial cable DB9 female with power interface connects to HAC-MLW-T2-M2, SV RS232 serial cable adapter connects to 220V urban electricity (HAC-MLW-T2-M2 Please refer to 4.3 sample meter standard data collection for the placement location).

3 The QR code scanner is connected to the device, and the QR code scanner is connected to the PC.

7.2.2. Infrared communication device connection

1) use a USB extended cable to connect the infrared communication device to the PC.

7.2.3. Meter data acquisition (wireless communication mode)

Place the HAC-MLW-F-T 1-M2 and the standard water meter on the workstation, turn on the host computer and switch to the [Run meter Test] interface, use a magnet to trigger the standard water meter to report data, and wait for the remote end of the HAC-MLW-F-T2-M2 to return data. Adjust the distance between HAC-MLW-F-T2-M2 and the standard water meter so that the returned field strength value is around -80dBm. At this time, fix the position of HAC-MLW-F-T2-M2 , and use the magnet to trigger the standard water meter to obtain 10 packets of remote data. The average of the field strength value of 10 packets' data is the standard field strength value of the standard field strength.

In the case of two stations, please ensure that the field strength value of the water meter collected by the distance between the HAC-MLW-T2-M2 and the two stations is between -70dBm and -90dBm. The deployment of the sampling standard field strength is shown in the figure below:



Obtain the remote field strength value:

2 iHAC-Tool-AFP-MLW_V1.0.4_20210804	×
-	

7.2.4 Supported software

The software supports two communication methods, namely wireless communication and infrared communication. The software cannot use two communication methods at the same time, only one of them can be used.

7.2.5. Software installation

Don't need to install the supported software.

Right-clicktheexecutefile/t iHAC-Tool-AFP- MLW VI.0.4_2BZ108D4.exe(iHAC-Tool-AFP-MLW V1.0.4 20210804.exe) on the desktop and run it with the privilege of administrator.

7.2.6. Interface - fi Serial port setting 1

1. Module serial port configuration, the serial port is selected according to the actual situation (please check the serial port in the device manager), the baud rate is 9600 bps, and no check.

2. Scanner serial port configuration, there are two ways of scanner data interface: ÖSerial port mode, configure it according to the actual situation of scanner; 2USB mode, do not need to configure the serial port parameters, just connect to the computer and use it.

3. The qualified field strength threshold value of the water meter and HAC-MLW-T2-M2 communication, the qualified range of field strength value can be obtained by sampling the standard water meter (the standard value method: trigger the standard water meter by a magnet to obtain 10 packets of remote data, take the average of the field strength values in the 10 packets of data). For more details, please refer to the standard data collection of the sample meter in table 7.3.

4. The voltage qualified value of battery is set to 3.6V.

5.Language setting: choose Chinese or English display interface and report data

It's shown as below:



7.2.7. Interface - fi Parameters Setting I

- 1). "Use Remote", check "Use Remote" to enable the field strength value monitoring function of the fixed-distance communication between the water meter and HAC-MLW-T2-M2.
- 2). "The base meter with valve", it's selected according to the type of water meter valve. When the water meter has a valve, check "The base meter with valve" and the valve control command will be executed.
- 3). "Water meter parameters", preset water meter parameters, including meter type, measurement mode, pulse constant, maximum measurement value, current cumulative flow.
- 4). "Meter number", it's automatically increased by 1 when it is turned on, and it's automatically increased by 1 based on the success of the previous setting.
- 5). "DeviceEui", the DeviceEui of the water meter to be tested, scan the QR code label of the water meter with the scanner to quickly obtain the DeviceEui of the water meter.
- 6). Network access parameters: preset DeviceEui, APPEUI, APPKEY of sample meter. Among them, check "AppKEY transmitted or not", you can set DeviceEui, APPEUI, APPKEY, and if you don't transmit AppKEY, you can only set DeviceEui.
- 7). Valve and frequency deviation parameters: preset the valve type and frequency deviation of the sample meter. Check the "valve and frequency deviation parameters" to set the sample meter frequency deviation and valve type, and if you don't select valve and frequency deviation parameters", the valve type and frequency deviation parameters have been set at the factory, so there is no need to set under the normal condition.
- 8). Timing time setting: the time of the entire setting process after clicking the "Set" button.
- 9). After setting and presetting the parameters, click the "Setting" button to start the countdown. If the setting is completed within 60 seconds, it will proceed to the next test. If the setting is not completed, the prompt "Failure, detection timeout" will be output on the right.
- 10). Real-time display of setting parameters and test results.

It's shown as below.

- 1		_	
]Use remote	12 at 11.6 at 1 answer		
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Use infrated communication 3	E12345000000000	6	
oub_e reed jipe 🗸			
ls≥ constant 4			
meterins pulse is liter 🗸	Valve, and frequency deviation parameters		
azimum 7 digitz 🗸 🗸		7	
		Network access parameter setting:	To be checked
		Valve type and frequency deviation parameters:	To be checked
		Parameter setting:	To be checked
JUSJUULI		8 Valve opening test:	To be checked
uligouti i			
vice Etil (Get soun code by the so		Valve closing test:	To be checked

7.2.8 Interface - fi Data Statistics I

After the test is passed, the last reported data will be recorded (the data will not be recorded when the test is unqualified), and the recorded data will be generated into an Excel and stored in the "ExcelFile" file in the installation directory.

It's shown as below:

No. (Margandal att) Time DeviceTail Heter no. False constant Table type Matering node Maximum mode Current value(s') Current files(s') Current value(s') 9 2021-06-05 09:25:36 333362105000003 210500003 1 metering pulse is 1 Water meter Single Hall 99999.99 0 3.66 3 2021-06-05 09:25:36 33362105000003 210500003 1 metering pulse is 1 Water meter Single Hall 99999.99 0 3.66 6 2021-06-05 09:25:36 33362105000003 210500003 1 metering pulse is 1 Water meter Single Hall 9999.99 0 3.6 6 2021-06-05 09:22:12 33362105000003 210500006 1 metering pulse is 1 Water meter Single Hall 9999.99 0 3.6 3 2021-06-05 09:22:12 203362105000003 210500006 1 metering pulse is 1 Water meter Single Mall 9999.99 0 3.6 2 2021-06-05 09:21:32 833682105000003 2105000003 210500003 1 metering pulse is		configurati	on Farameter setting	Statistics Stopwate	h to test						
9 2021-06-05 09:39:59 8333692105000003 210500003 1 metering pulse is 1 Water meter Single Hall 9999.99 0 3.66 8 2021-06-05 69:25:35 6333692105000003 210500003 1 metering pulse is 1 Water meter Single Hall 9999.99 0 3.6 6 2021-06-05 09:25:15 833692105000003 210500003 1 metering pulse is 1 Water meter Single Hall 9999.99 0 3.6 6 2021-06-05 09:22:12 833692105000003 210500006 1 metering pulse is 1 Water meter Single Hall 9999.99 0 3.6 4 2021-06-05 09:22:12 033692105000003 210500006 1 metering pulse is 1 Water meter Single Hall 9999.99 0 3.6 2 2021-06-05 09:21:33 833692105000003 210500004 1 metering pulse is 1 Water meter Single Hall 9999.99 0 3.6 2 2021-06-05 09:15:14 833692105000003 2105000004 </th <th></th> <th>No. (Non-module</th> <th>Time</th> <th>DeviceEui</th> <th>Meter no.</th> <th>Pulse constant</th> <th>Table type</th> <th>Metering mode</th> <th>Maxinum measurement value(m²)</th> <th>Current cumulative flow(m²)</th> <th>Battery voltage(V)</th>		No. (Non-module	Time	DeviceEui	Meter no.	Pulse constant	Table type	Metering mode	Maxinum measurement value(m ²)	Current cumulative flow(m ²)	Battery voltage(V)
8 2021-06-05 09:25:36 833362105000003 210500003 1 metering pulse is 1 Water meter Single Hall 9999.99 0 3.6 6 2021-06-05 09:24:15 83362105000003 210500003 1 metering pulse is 1 Water meter Single Hall 9999.99 0 3.6 5 2021-06-05 09:24:15 83362105000003 210500003 210500003 1 metering pulse is 1 Water meter Single Hall 9999.99 0 3.6 5 2021-06-05 09:22:12 83362105000003 210500006 1 metering pulse is 1 Water meter Single Hall 9999.99 0 3.6 4 2021-06-05 09:22:12 83362105000003 210500006 1 metering pulse is 1 Water meter Single Hall 9999.99 0 3.6 2 2021-06-05 09:15:14 83362210500003 210500004 1 metering pulse is 1 Water meter Single Hall 9999.99 0 3.6 1 2021-06-05 09:05:28 83362210500003	1	9	2021-08-05 09:39:59	8333692105000003	2105000003	1 metering pulse is 1	Water meter	Single Hall	99999.99	0	3.66
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5 2021-08-05 09:23:82 833682105000003 2105000006 1 metering pulse is 1 Yater meter Single Hall 9999.99 0 3.6 4 2021-08-05 09:22:12 933692105000003 2105000006 1 metering pulse is 1 Yater meter Single Hall 9999.99 0 3.6 3 2021-08-05 09:20:33 833692105000003 2105000006 1 metering pulse is 1 Yater meter Single Hall 9999.99 0 3.6 2 2021-08-05 09:15:14 833692105000003 2105000003 2105000003 1 metering pulse is 1 Yater meter Single Hall 9999.99 0 3.6 1 2021-08-05 09:05:26 833692105000003 2105000003 1 metering pulse is 1 Yater meter Single Hall 9999.99 0 3.6 1 2021-08-05 09:05:26 833692105000003 2105000003 1 metering pulse is 1 Yater meter Single Hall 9999.99 0 3.6 1 2021-08-05 09:05:26 833692105000003 2105000003 1 metering pulse is 1 Yater meter Single Hall 9999.99 0 3.6	1	8	2021-08-05 09:24:15	8333692105000003	2105000008	1 metering pulse is 1	Water meter	Single Hall	99999.99	0	3.6
4 2021-06-05 09:22:12 0333692105000003 210500006 1 metering pulse is 1 Water meter Single Mall 9999.99 0 3.6 3 2021-06-05 09:20:33 833692105000003 210500006 1 metering pulse is 1 N Single Mall 9999.99 0 3.6 2 2021-06-05 09:15:14 933692105000003 2105000003 1 metering pulse is 1 Water meter Single Mall 9999.99 0 3.6 1 2021-08-05 09:05:28 833692105000003 2105000003 1 metering rulse is 1 Water meter Single Mall 9999.99 0 3.6		5	2021-08-05 09:23:52	8333692105000003	2105000007	1 metering pulse is 1	8	Single Hall	99999.99	0	3.6
3 2021-08-05 09:20:33 83336921050000003 2105000004 1 metering pulse is 1 Vature meter Single Hall 99999.99 0 3.6 2 2021-08-05 09:15:14 6333692105000003 2105000004 1 metering pulse is 1 Water meter Single Hall 99999.99 0 3.6 1 2021-08-05 09:05:28 0933692105000003 2105000003 1 metering rulse is 1 Water meter Single Hall 99999.99 0 3.6		1	2021-08-05 09:22:12	8333692105000003	2105000006	1 metering pulse is 1	Water meter	Single Hall	99999.99	0	3.6
2 2021-06-05 09:15:14 8333692105000003 2105000004 1 metering pulse is 1 Water meter Single Mall 99999.99 0 3.6 1 2021-08-05 09:05:28 833692105000003 2105000003 1 metering vulse is 1 Water meter Single Mall 99999.99 0 3.6		3	2021-08-05 09:20:33	8333692105000003	2105000005	1 metering pulse is 1	1	Single Hall	99999, 99	0	3.6
1 2021-06-05 09:05:28 8333632105000003 2105000003 1 meteriar sulte is 1 Water meter Single Hall 99999.99 0 3.66		2	2021-08-05 09:15:14	8333692105000003	2105000004	1 metering pulse is 1	Water meter	Single Hall	99999.99	0	3.6
			2021-08-05 09:05:28	8333692105000003	2105000003	1 metering pulse is 1	Water meter	Single Hall	99999, 99	0	3.66

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7.2.9 lntefae- {RunnngMeteyTest}

Real-time display of data in the process of setting parameters, and supports valve control.

1). Valve control: fi11 in the DeviceEui number, click the button "valve open" or "valve close", and then use a magnet to trigger the water meter to report data to achieve valve control.

2). Clear the data: click the button "Clear the Data" to clear the data displayed in the list.

It's shown as below:

(Non-module	Time	DeviceEui	Meter no.	Pulse constant	Table type	Metering	Maximum measurement	Current	Battery
data)	2021-08-05 09:25:35	8333692105000003	2105000003	1 metering pulse is 1	Water meter	Single Hall	value(n²) 99999.99	flow(m ¹)	3.6
				It meter my parse is i	l'acce meeter	onget nati	00000.00	19	0.0

8. Production Test Flow

8.1 Wireless communication mode

8.1.1 The production setting steps can be referred as below:

- 1). Check "Use remote" and "Base meter with valve".
- 2). Preset the parameters of meter.
- 3). Use the scanner to scan the QR code label of meter to obtain DeviceEui, or manually enter it.

4). After clicking "Setting", the meter will be triggered to report data and start production test. After the production test is completed, the corresponding prompted message will be output on the upper right. It's shown as below:

ified
funitied
y deviation paramet: To be checked Qualified

8.2. Infrared communication method (the meter must support infrared communication)

- 8.2.1 The production setup steps are as follow:
 - 1). Check "Use infrared communication".
 - 2). Preset meter parameters
 - 3). Use the scanner to scan the QR code label of meter to obtain DeviceEui, or manually enter it.
 - 4). Align the infrared communication device vertically with the infrared transceiver diodes of meter, and the distance between them is less than 8cm.
 - 5). After clicking "Setting", the meter will be triggered to report data and start production test. After the production test is completed, the corresponding prompted message will be output on the upper right. It's shown as below:

' >HAC- OOI AFP-MLW VI.0.4 20210804			х
Base watch with control valve	Fetvord +cecess pin +neter settins	Qual i f i ed	
Meter number 🗌 Automatically sód 1	Two-line valve v	Network access parameter setting: Valve type and frequency deviation parameters Parameter setting Valve opening test	Outlified To be checked Qualified To be checked
			10 10 GIRCEBU

8.3. Precautions for production setup

- 1). The magnet triggers hall components of meter module. The triggering time must be greater than 2S. If it's less than 2S, there is a possibility that the triggering of the data report will fail.
- 2). DeviceEui is the only address for communication between meter and the supported software. The DeviceEui entered by the supported software must be consistent with the DeviceEui of meter.
- 3). When the meter is connected to the Internet (the red light is always on) or when re-transmitting, the function of triggering "data report" is invalid.
- 4). There is a fault flag in the data reported by the meter, and the parameters can be set only after the fault flag is cleared.
- 5). Infrared communication will affect the communication between the product and infrared tools under strong light. It is necessary to avoid performing infrared communication under strong light.
- 6). Use wireless communication to set the parameters, try to avoid multi-station simultaneous production settings, and the production settings will interfere with each other. The more stations, the greater the interference, and the greater the probability of parameter failure.
- 7). When modifying APPKEY, the default value of APPEUI must be modified. The default value of APPEUI is 4841434D4C570001.

9. LoRaWAN Gateway Device Feature

9.1.Electrical characteristics

HAC-MLW Metering Module User Manual V1.0

No.	Item	Function description
	Working frequency	LoRaWANR AU915MHz ISM Band
2	Maximum	19dbm
2	transmitting power	
3	Receiving sensitivity	<-136dBm
4	Working temperature	-20°C *70°C
S	Working voltage	+2.5V *3.8V
6	Receiving current	<9mA
7	Transmitting current	<130mA (which is related to transmitting power)
0	Transmitting distance	The maximum line of sight communication distance between the gateway and the
0		meter module is 15km
0	Valve electrical	+2.5V *3.8V
9	parameter	
io	Sleep current	<15uA
11	Dimension	42.1mm*24.8mm*3.2mm

9.2. Functional characteristics

1). Support LoRaWANR network.

2). 8 LoRa receiving channels, 1 transmitting channel, of which 8 receiving channels receive data at the same time.

3). The maximum line of sight communication distance between gateway and module is 15km.

- 4). Built-in GNSS synchronization position coordinate information.
- 5). Support Ethernet and 4G LTE data backhaul links.
- 6). Robust shell, waterproof IP65,
- 7). Working temperature: -40 $^{\circ}$ C +80 $^{\circ}$ C, which is suitable for the outdoor environment.

- 9.3. LoRaWAN Gateway Structure and Interface Definition
 - 9.3.1. Gateway Structure Dimension



9.3.2. External Interface Definition



1		LAN POE
2		POWER
3	WiFi	antenna interface
4	4G	antenna interface
5	LoRa	antenna interface
6	GPS	receiving antenna

24V/IA POE power input DC power input 12 24V Connect WiFi 2.4G antenna Connect 4G antenna Connect LoRa antenna GPS receiving antenna

9.3.3. Internal Interface Definition



No.	Interface/Button	Description
1	SIM Card Slot	Insert a SIM card
2	RESET button	Reset button, reset the system

9.4. LoRaWAN Gateway Installation and Boot

9.4.1 Gateway Installation

Please refer to the manual of gateway installation

9.4.2. Gateway boot

There are two ways for the gateway data return link:

1). In Ethernet mode, connect the gateway to the 24V/IA POE power supply and network cable, and it can be turned on after power on.

2). In 4G LTE mode, insert a 4G SIM card (it needs to remove the bottom shell of the gateway), and then connect the gateway to a 24V/1A POE power supply, and it can be turned on when it is powered on.

10. Device Management Platform

10.1.Account login

Login URL: http://lora.haciot.cn:50100/mls/, enter the assigned user name and password to log in.

It's shown as below:



10.2. Community management

The community management is divided into three-level areas, such as the 6th floor of Building 2, Xili University Town Creative Park, Nanshan District, Shenzhen. The first floor is Shenzhen City, the second floor is Nanshan District, and the third floor is the 6th floor of Building 2, Xili University Town Creative Park. The name of the community cannot be repeated. You can add up to three floors, or you can add multiple 2-story and 3-story areas.

l). Add the first level area, click "Add Category" to pop up the dialog box of category name, enter Shenzhen and click "OK". It's shown as below:



2) Add a second-level area, click the "+" after the first-level area to pop up a dialog box for entering the sub-category name, enter Nanshan District and click "OK". It's shown as below:

Device Management	System	2001 House						0 🚚 ▼ 🕸 Theme 👻 😌 pengyy 👻
🔒 User management 👻	🗖 Welcome Use 🔹 Comm	management +						
🖽 The business logic 🔫	Area	Rebuch Edit	Delete Please enter	IME Q				
🖯 Data management 👻	► dass 1	Nu.	Region		Address	Creator	Region code	Charge type
🗖 Regional manage 🔺	🛱 Shenzhen City 🛄 🖉 🗑					NO DATA		
Comm manage	Add category							
		U						

3) Add a third-level area, click the "+" after the second-level area to pop up the dialog box for entering the sub-category name , enter the 6th floor of Building 2, Xili University Town Creative Park, and click "OK". It's shown as below:

Device Management	System				🗢 🗃 🕶 🖷 Theme 🕶 🔍 pengyy 🕶
음 User management 👻	🗖 Welcome Use 📄 Commin	nanagement ×	·····		
#A The business logic 📼	Area	Refeash Edit Delete	Please enter IME		
🔁 Data management 💌	► class 1	Nu	Region	Address	Creator
Regional manage +	Shenzhen City Nanshan District	1 6th floor, build	ling 2, creative park, Kill University City	Shenzhen City/Nanshan Elstrict/6th floor, building 2, creative park, XII University City	pengyy
Comm manage	A 6th floor, building 2, cre				
	Add cateopry				
	2000 (Strong State				
		1 - Tr - Tr - T	name Excluse total of 1 James 50 Hermalm	ges V	

10.3. Device information

l) Download the template, click "Template" to pop up the dialog box of "Platform Selection", select "LORA" and click "Submit" to download the template. It's shown as below:

Device Management System 🗾 102/00 (02/00) (02/00)	🟶 🗃 🕶 Theme 🍷 🕸 pengyy 👻
3 User management 🔺 🗔 Welcome Use 🛛 C Device Information 🔹	
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Ade management MEL Install time Description Description	IMSI ICCID
m The business logic 🔺	
# TP platform	
Q Device internati	
(the second s	
© More commands	
C Data management 🔺 Select platform 🗙	
O Original data Emplate: ScoAP CNUP COMMELCAND CCH LUDP CHAR BLORA Z	
+ Classified data OML 09分元	
Treplocal manage. •	

2) Fill in the template information and open the "LORADeviceInfo TelIOT EN" form to fill in the module information. It's shown as below:

n		D	0		r .	0	п	1
LAPPK:Optional 2.ASX:Optional 3.RSX:Optional 4.Short Address:Optional 5.RUI: Enadatory 6.Device Name: Handatory(At least 7.Description: Optional 8.Address: Optional 9.ProtocolType: Endatory(LORA:9)	t 4 digits in lengtl	w						
APPK	ASK	NSK	Short Address	EUI	Device Name	Description	Address	Protocol Type
4841 4320404C572020031 80000033369				8333692010000001	2012140001		Shenzhen	9
4841 432D4D4C572020031 80000033369				8333692010000002	2012140002		Shenzhen	9
4841432D4D4C57202003180000033369				8333692010000003	2012140003		Shenzhen	9

3) Import the template, select the third layer area, click "Import" to pop up the "Import file dialog box", select the template type, network access method, community, application and node type, click "choose file" to load the filled template, and finally click "Upload" "

It's shown as below:



10.4. Data Management

Select the third layer area, click "query" or enter IMEI (DeviceEui) to query. It's shown as below:

HAC-MLW Metering Module User Manual V1.0

te business logic 📼	Nansn	an District spezor - pr	her Olicy -	Note Query Herresh	Lipoit										
ata management 🔺	 class 	1:fPwkhM	IME	Device	Davice type: Valve	rtype Meter reading(m ⁴)	Valve sta	RSSI	SNR(dB)	Magnet	Voltage	Report time	Measurement model	PN	Report mod
Original data	• Sher	anshan Uhtnict:VotZlaG	8333692010000001	2012140001	Wat	0.000	Clo	-115	3.5	No	1.660	2021-08-13 09:21:37	Double pulse	-1	Magne
	-		8333692010000001	2012140001	Wat	0.000	: C/0	-115	0	No	3.660	2021-08-13 09:21:29	Double pulse		Magne
lassified data	8	2012140001	8333692010000001	2012140001	Wat	3.000	C30	-114	3.5	No	1.990	2021-08-13 09:21:10	Double pulse		Magne
ional manage •	4	2012140001	8333692010000001	2012140001	Wat	3,000	C10	-117	0.5	No	3,660	2021-08-13 09:2359	Double pulse	1	Magne
	-5.	2012140001	8333692010000001	2012140001	Wat	3.000	⊆lo	-118	-1.8	No	3.660	2021-08-13 09:20:52	Double pulse	1	Magne
	0	2012140001	8333692010000001	2012140001	Wat	0.000	Clo	-105	7.5	No	1.660	2021-08-13 09:20:40	Double pulse	1	Magne
	7	2012140001	8333692010000001	2012140001	Wat	0.000	Clo	-104	8.2	No	1.660	2021-08-13 09:23:07	Double pulse	1	Magne
	8	2012140001	8333692010000001	2012140001	Wat	2.000	Clo	-105	5.5	No	3.660	2021-08-13 09:19:56	Double pulse	1	Magne
	9	2012140001	8333692010000001	2012140001	Wat	3.000	Clo	-111	5.8	No	3.660	2021-08-13 09:19:47	Double pulse	1	Magne
	10	2012140001	8333692010000001	2012140001	Wat	0.000	Clo	+112	5.8	No	1.650	2021-08-13 09:18:57	Double pulse	1	Magne
	11	2012140001	8333692010000001	2012140001	Wat	3.000	Sla	~108	4.2	No	3.660	2021-08-13 09:18:49	Double pulse	1	Magne
	12	2012140001	8133692010000001	2012140001	Wat	0.000	Cio	-105	.8	No	3.660	2021-08-13 09:18:32	Double pulse	1	Magne
	13	2012140001	8333692010000001	2012140001	Wat	3,000	Clo	-96	7,5	No	3.660	2021-08-13 09:18:22	Double pulse	1	Magne
	11 12 13	2012140001 2012140001 2012140001	8133962010010001 81335652010000001 81335652010000001	2012140001 2012140001 2012140001	Wat Wat	3.000	00 00 00	-108 -105 -96	4.5 .4 .7.5	No No	1.660 1.660	2001-08-13 09:18:49 2021-08-13 09:18:32 2021-08-13 09:18:32	Double pulse Double pulse Double pulse	1	

10.5. More Command

10.5.1 Select the third layer area, check the IMEI (DeviceEui) of meter, click the command that needs to be transmitted, and then trigger the meter to report data. After the platform receives the data reported by the meter, it will transmit the command. After receiving the command by the meter, execute the corresponding action and report the data. The reported data can be inquired in the data management or in the command information column.

No.	Command list	Command Description					
1	Set the meter readings command	Set the meter readings					
2	Metering mode command	Different metering modes can be configured according to the meter, such as: single and dual pulse metering (hall, reed switch, non-magnetic, etc.)					
3	Read monthly freeze command	Read the monthly frozen data generated by the meter, and the meter can sat the monthly frozen data of the latest 128 months at most					
4	Read yearly freeze command	Read the annual frozen data generated by the meter, the meter can save the annual frozen data for a maximum of 10 years					
5	Valve control command	It's used to valve control of meter.					
6	Timing dredging valve command	It is used to control the valve of meter at regular time. Open the dredge valve at regular time. The meter will complete the valve at the 3rd of each month. Otherwise, the valve will not be dredged.					

HAC-MLW Metering Module User Manual V1.0

7	Device type command	It configures different device type of meter, such as: water meter, electric meter, heat meter, gas meter etc.							
8	Read module time It's used to read the current time of meter.								
9	Write module time	It's used to set the module time							
10	Valve dredge command	It's used to dredge the valve of meter.							
11	Read the software version info command	Read the current software version information of meter							

It's shown as below:

Device Management	System									• ⊒ • •⊓	eme 👻 🖗 pengiyy 👻
🕒 User management 💌	I Welco	me Use 🛞 Ori	iginal cata 🔹 🛞 M	ote commands 🔹 🕀 Sig	inal trans						
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	Release	Expert Sectal No Device	E Querr Sarial NO	More Charge IMEE	Crind name	Sending time	Crind status	Return time	Return cmd	Send cmd	Return cmd
	9	2012140001	2012140001	40334692910090001	LORACMO	2021-00-13 09:21:37		70.15/00 01-00-1505	SUCCESSFUL		(AttackStatus-Normal, Att
	2	2012140001	2012140801	8333652010000001	LURAUND	2021-08-13 09:21:37	CK	2021-08-13 0921:37		261c15080d091525152cM	
	1	2012140001	20121-0001	8333692010000001	LORACMD	2021-08-13 09:21:29	CIK	2021-08-13 09:21-29		261c15080d09151d192be	
	4	2012140001	2012140001	4003692010000001	LORACMD	es:15/00-13/09/21/29		2021-00-13 09:21:29	SUCCESSFUL		(AttackStatus=Normal, Att
	9 100 .~	2012140001 • • Fage 1 c	2012140001 ef 1 1 1 1 0	8383692010000001	LOBACMO	2021-88-13 09:21:10		2021-08-13 0921:10	513(CP55P0)		(Amari Status - Normal Am Dupleying 1 to (2 of (2 items

Device Management	System	accore	NUMBER OF STREET, STRE							0 2- 01	hense = 🕈 pengyy =	
🕒 User management 👻	C Webs	ome Use 🛞 Orig	inal data 👘 🕐 N	fore commands								
The business logic TP plottom	CRAPation			Crossing Mar (s Mar) (s Mar) On Neucling Tim On V	Community: deb floor, building 2, or ~ IMBTE @33362010000001					divida state Trave 9 read/or-sku state 11		
	Referch	Front Serial NO	Cherry	Moin Guery								
		Device	Serial NO	IMD	Cend name	Sending time	Cmd status	Return time	Return cmd	Send cmd	Return cmd	
	t.	2012140001	2012142001	8353592010006001	LORACMD	2021-08-13 09-12:18	СK	2021-03-13 09:42:48		261c15080d092a30192c1	0	
	2	2012140001	2012140001	8353592010030001	LORACMD	2321-08-13 03:42:48		2021-08-13 09:42:48	SUCCESSFUL		(AttackStatus=Normal, Att	
		2012140001	2012140001	8313592010030001	LORACMD	2021-08-13 09 21:37		2021-08-13 09:21:37	SUCCESSFUL		(AttackStatus=Normal, Att	
	4	2012140001	2012140001	83339201000000	LORACMD	10159041-00-13092131	UK	2021-00-13 09:21:37		261c15080d091525192d	i	
	s 100 ~	2012143001 II C Page 1 of	201221001 1 1 1 10	83:399201000001	LORACMO	2101.0R.1109.2109	CK.	3021_04_11.04/21/24		361/15095409151/1936	Displaying 1 to 74 of 74 items	

The command information column will display the uplink and downlink command information, double-click

to view the detailed information. It's shown as below:

Device Management S	System	-	the sector of the							0 2 - 0 1	hene 🕶 🖯 pengyy 🕶
(3) User management ★	= Welcs	one Use // Clas	offied data 👘 🕐	More commands							
43 The business logic A 4 TP platform (* Dovice informati (*) Signal turn				Communit 2 Refer Mar(7	PN 11	ng 2 cr = IIMEL 833	3692010000001				
(1) More commands				Registration information					E	3	
🕤 Data management 🔺			OR A Platform	Return cried SUCCESSFUL							
S Original data		ELEI - M		Send and							
Classified data					(AttackStatus=Norma), AttackStatusCode=0, BackWaterAlarm=Normal, DER=Norma, DER						
🕾 Regional manage 👻						Norma, Messarehali-Norma, Meauvehalk,ose-II, PNI-1, PNI, ode-1, Poise-Fall-Romal , Poise-Fall-Ode-0, Poise-Fall-Sonma, Poise-Bann-Ode-0, Sadi-117.000, Tashg Waterkami-Roma, Thing:Drogghiave-Clock, Vaiefalt-Alona, Wuvefall-Close-C, Valietkina-Clock, Vaiefalt-Juliet,oole-1, applicatioN-1-30, applicatioName-EURS1,8 73.222, bid, stat-JihefnishdeURAIJaJAAAAAACOMILACMBIC+- busine-ottaliae=1.66.				del'lime ontetto	
	Refresh	b toport Selia NO: Usey		Return amd		datr+5-78WI25, bevaddr+012e992t, deiname+30098855-5843-47ce-6848-793 raddod2c5,				Continued	Balance and
	1	2012140001	2012140001	8333692010000001	LCRACMD	2021 08 13 (942)48	DK DK	gatawayanin 24c529a6325609c1 2021 08 13 09:42:48	(Texa)	251c15080d0925301936	natura cind
	2	20121/0001	20121/0001	8333602010000001	LORACMD	2021-08-13 09:42-48	24	2021-08-13-09-42-10	SUCCESSFUL		(AttackStatus - Normal, Att
	3	2012140001	2012140001	8333652010003001	ECRACMD	2021-08-11 (4:21:17		2121.08.13 69.21:37	SUCCESSEUR		(AttackStatus+Norma), Att
	4	2012140001	2012140001	8333692010000001	LORACMD	2021-08-15 09:21:37	OK	2021-08-13 09:21:37		251c15060d091525192d	4
	100~	2012140001 Page 1 af	NH2NANN O M 4 7	RECENSION	HORACMD	ALM-08-1+0454124	1)K	21/148-110421(4		Aste143030415111926	o Displaying 1 to 74 of 74 herra

Sales and Service

You can contact our sales person to purchase modules and development kits.



Address:9th Floor,Block A,Building l,International Innovation Valley,Xingke l" street,Nanshan district,Shenzhen,Guangdong

Tellphone: 0755-23981076/1077/1078/1079 Service hotline: 13322922467 Sales Manager: anlan@rf-module-china.com Website: www.haccom.cn



FCC Caution.

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.

Any Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Note: 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.

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.

Integration instructions for host product manufacturers according to KDB 996369 D03 OEM Manual v01

2.2 List of applicable FCC rules

List the FCC rules that are applicable to the modular transmitter. These are the rules that specifically establish the bands of operation, the power, spurious emissions, and operating fundamental frequencies. DO NOT list compliance to unintentional-radiator rules (Part 15 Subpart B) since that is not a condition of a module grant that is extended to a host manufacturer. See also Section 2.10 below concerning the need to notify host manufacturers that further testing is required.

Explanation: FCC Part 15 Subpart C 15.249

2.3 Summarize the specific operational use conditions

Describe use conditions that are applicable to the modular transmitter, including for example any limits on antennas, etc. For example, if point-to-point antennas are used that require reduction in power or compensation for cable loss, then this information must be in the instructions. If the use condition limitations extend to professional users, then instructions must state that this information also extends to the host manufacturer's instruction manual. In addition, certain information may also be needed, such as peak gain per frequency band and minimum gain, specifically for master devices in 5 GHz DFS bands.

Explanation: The EUT is NB IOT external rubber rod waterproof integrated antenna, the antenna use a permanently attached antenna which is not replaceable.

2.4 Limited module procedures

If a modular transmitter is approved as a "limited module," then the module manufacturer is responsible for approving the host environment that the limited module is used with. The manufacturer of a limited

module must describe, both in the filing and in the installation instructions, the alternative means that the limited module manufacturer uses to verify that the host meets the necessary requirements to satisfy the module limiting conditions.

A limited module manufacturer has the flexibility to define its alternative method to address the conditions that limit the initial approval, such as: shielding, minimum signaling amplitude, buffered modulation/data inputs, or power supply regulation. The alternative method could include that the limited module manufacturer reviews detailed test data or host designs prior to giving the host manufacturer approval.

This limited module procedure is also applicable for RF exposure evaluation when it is necessary to demonstrate compliance in a specific host. The module manufacturer must state how control of the product into which the modular transmitter will be installed will be maintained such that full compliance of the product is always ensured. For additional hosts other than the specific host originally granted with a limited module, a Class II permissive change is required on the module grant to register the additional host as a specific host also approved with the module.

Explanation: The Module is not a limited module.

2.5 Trace antenna designs

For a modular transmitter with trace antenna designs, see the guidance in Question 11 of KDB Publication 996369 D02 FAQ – Modules for Micro-Strip Antennas and traces. The integration information shall include for the TCB review the integration instructions for the following aspects: layout of trace design, parts list (BOM), antenna, connectors, and isolation requirements.

a) Information that includes permitted variances (e.g., trace boundary limits, thickness, length, width, shape(s), dielectric constant, and impedance as applicable for each type of antenna);

b) Each design shall be considered a different type (e.g., antenna length in multiple(s) of frequency, the wavelength, and antenna shape (traces in phase) can affect antenna gain and must be considered);c) The parameters shall be provided in a manner permitting host manufacturers to design the printed circuit (PC) board layout;

d) Appropriate parts by manufacturer and specifications;

e) Test procedures for design verification; and

f) Production test procedures for ensuring compliance.

The module grantee shall provide a notice that any deviation(s) from the defined parameters of the antenna trace, as described by the instructions, require that the host product manufacturer must notify the module grantee that they wish to change the antenna trace design. In this case, a Class II permissive change application is required to be filed by the grantee, or the host manufacturer can take responsibility through the change in FCC ID (new application) procedure followed by a Class II permissive change application.

Explanation: Yes, the antenna use a permanently attached antenna which is not replaceable, Please refer to the antenna specification book for antenna dimension.

2.6 RF exposure considerations

It is essential for module grantees to clearly and explicitly state the RF exposure conditions that permit a host product manufacturer to use the module. Two types of instructions are required for RF exposure information: (1) to the host product manufacturer, to define the application conditions (mobile, portable – xx cm from a person's body); and (2) additional text needed for the host product manufacturer to provide to end users in their end-product manuals. If RF exposure statements and use conditions are not provided, then the host product manufacturer is required to take responsibility of the module through a change in FCC ID (new application).

Explanation: Transmitter meets MPE calculation of 47 CFR 1.1307 and KDB 447498. Refer to MPE Reports

2.7 Antennas

A list of antennas included in the application for certification must be provided in the instructions. For modular transmitters approved as limited modules, all applicable professional installer instructions must be included as part of the information to the host product manufacturer. The antenna list shall also

identify the antenna types (monopole, PIFA, dipole, etc. (note that for example an "omni-directional antenna" is not considered to be a specific "antenna type")).

For situations where the host product manufacturer is responsible for an external connector, for example with an RF pin and antenna trace design, the integration instructions shall inform the installer that unique antenna connector must be used on the Part 15 authorized transmitters used in the host product. The module manufacturers shall provide a list of acceptable unique connectors.

Explanation: The EUT is NB IOT external rubber rod waterproof integrated antenna, the antenna use a permanently attached antenna which is not replaceable.

2.8 Label and compliance information

Grantees are responsible for the continued compliance of their modules to the FCC rules. This includes advising host product manufacturers that they need to provide a physical or e-label stating "Contains FCC ID" with their finished product. See Guidelines for Labeling and User Information for RF Devices – KDB Publication 784748.

Explanation: The modular has a permanent fixed label, and below statement was listed in the User Manual ;The host device must be labeled to display the FCC ID of the module "Contains FCC ID: 2BFX9E-BULK"

2.9 Information on test modes and additional testing requirements

Additional guidance for testing host products is given in KDB Publication 996369 D04 Module Integration Guide. Test modes should take into consideration different operational conditions for a stand-alone modular transmitter in a host, as well as for multiple simultaneously transmitting modules or other transmitters in a host product.

The grantee should provide information on how to configure test modes for host product evaluation for different operational conditions for a stand-alone modular transmitter in a host, versus with multiple, simultaneously transmitting modules or other transmitters in a host.

Grantees can increase the utility of their modular transmitters by providing special means, modes, or instructions that simulates or characterizes a connection by enabling a transmitter. This can greatly simplify a host manufacturer's determination that a module as installed in a host complies with FCC requirements.

Explanation: The module comply with all specific rules applicable to the transmitter including all the conditions provided in the integration instructions by the grantee, Refer to test report

2.10 Additional testing, Part 15 Subpart B disclaimer

The grantee should include a statement that the modular transmitter is only FCC authorized for the specific rule parts (i.e., FCC transmitter rules) listed on the grant, and that the host product manufacturer is responsible for compliance to any other FCC rules that apply to the host not covered by the modular transmitter grant of certification. If the grantee markets their product as being Part 15 Subpart B compliant (when it also contains unintentional-radiator digital circuity), then the grantee shall provide a notice stating that the final host product still requires Part 15 Subpart B compliance testing with the modular transmitter installed.

Explanation: The module without unintentional-radiator digital circuity, so the module does not require an evaluation by FCC Part 15 Subpart B. The host shoule be evaluated by the FCC Subpart B.