Voyager Product Specification

- ARM Base Low power processor
- 4G NBIOT/LTE-M network ability
- GPS support (Option)
- Isolate Digital Input/Out ports
    - DI x 3
    - DO x2
- Isolate RS485 Modbus
- Isolate One-Wire Interface
- Battery Cell inside
- NFC EzConfig App
- AC Power Monitor
    - Current transformer (0-100A)
    - AC Sensing (0-220V)

Product Description

Voyager is a wireless sensor node that bridges the gap between traditional wired sensors and cloud servers. Low power consumption, built-in battery, can be deployed in various environments and used in a wide range of scenarios.

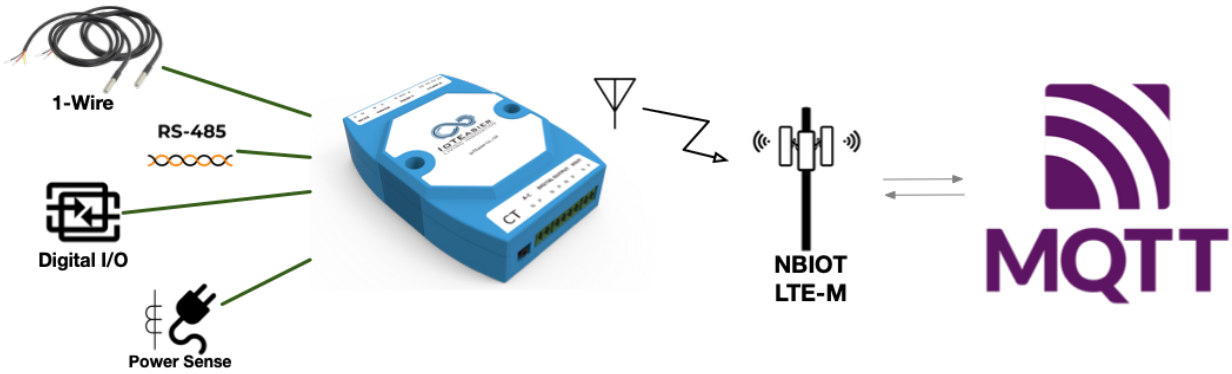
Voyager supports a variety of communication interfaces, including Modbus-RTU, One-Wire, DI/DO, and more. This covers most devices used in industrial and consumer cases.

The device collects local data and uploads it to the cloud server via the long-distance transmission technology NBIOT/LTE-M.

The local sensor information will be collected by the device and communicates with the cloud server through the standard communication protocol (MQTT)

Using our EZCONFIG App (Android Only), you can set device parameters, such as report rate of the sensor data, Network IP, MQTT sub/pub topics.

With its wireless and low-cost features, Voyager can be easily deployed into any application. Some examples include refrigerator power and health monitoring, cold chain truck tracking, and agricultural weather stations.



Picture-1

▼ Feature

- ARM Cortex-M4 Micro Processor
- NB-IOT Wireless Connectivity
- MQTT protocol for cloud connection
- Position Tracking System (GPS, GNSS)
- RS485 RTU
- AC Power meter 110V/220V 50/60Hz
  - CT sensing with 3.5mm Jack connector
  - AC Voltage Sensing
- Wide System DC IN Supply 5-17V
- One-wire interface with 5V power output
- Isolate Digital Output
- Isolate Digital Input port support Sink, Source mode

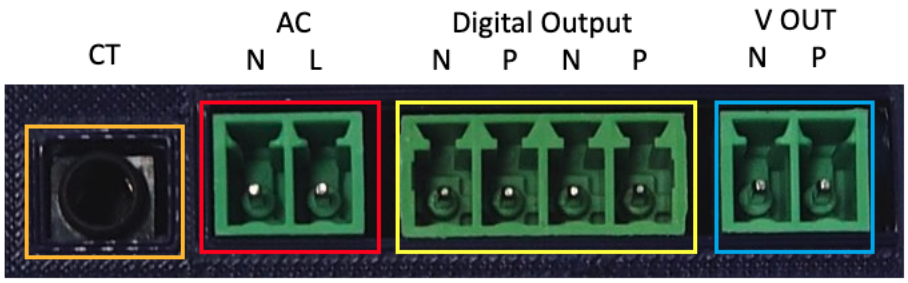
▼ Applications

- Factory Automation
- Smart Agriculture
- Refrigerated Logistics
- Assets Management
- Building Automation

▼ Device Connector Assignments

The unit uses standard industrial 3.81mm terminal block connector and A 3.5mm 2-ring audio jack for current transformer.

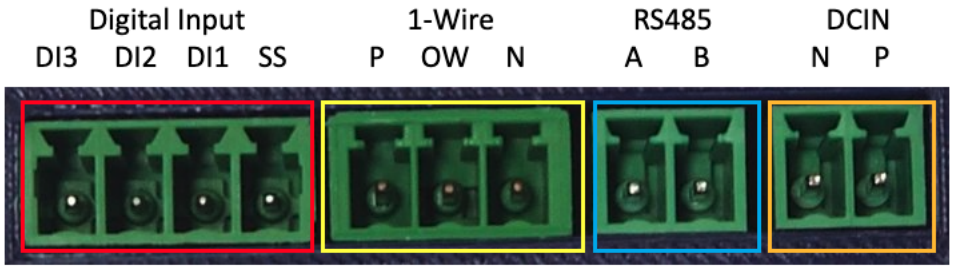
Side - 2



Picture -2

Functions	Pins Define	Description	
V OUT Port	VO_VP	**Isolated power supply output positive** Provides a 5V/100mA power output	Isolated
	VO_GND	**Isolated power supply output negative** Provides a 5V/100mA power output	Isolated
Digital Output	VO2_P		Isolated
	VO2_N		Isolated
	VO1_P		Isolated
	VO1_N		Isolated
AC-V-Sense (single Phase)	A-C L	AC Voltage Sensing LINE 0~240V AC 60Hz	⚠️ High Voltage
	A-C N	AC Voltage Sensing Nature 0~240V AC 60Hz	⚠️ High Voltage
AC-CT	CT	Current transformer AC current sensing	

Side - 1



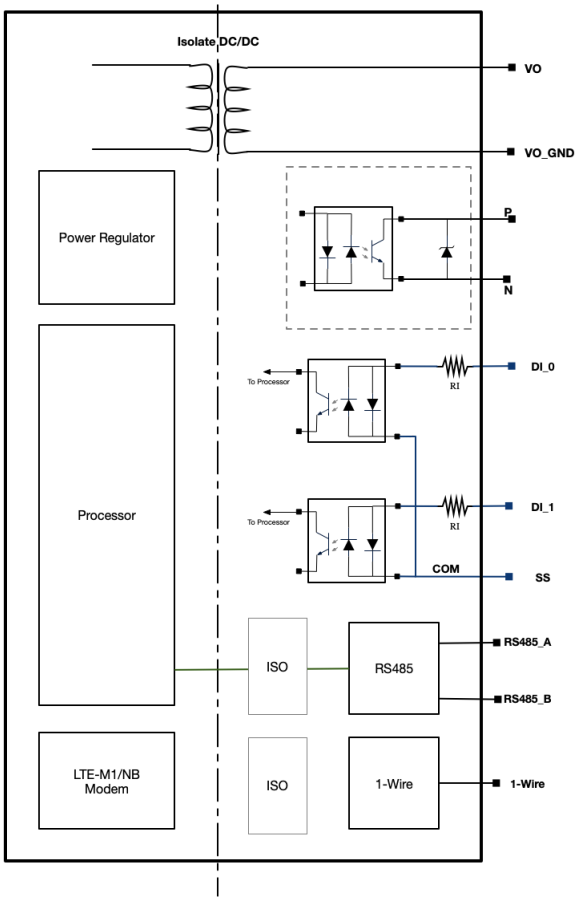
Picture-3

Functions	Pins Define	Description	
PWR IN	VDD	**Power Supply input positive** Device requirement a 7-17V power to supply system operate	
	GND	**Power Supply input negative** Device requirement a 7-17V power to supply system operate	
RS485-RTU	RS485_B	**The RS-485 differential line consists of two signals** which is low for logic 1 and high for logic 0	Isolated

Functions	Pins Define	Description	
	RS485_A	**The RS-485 differential line consists of two signals** which is high for logic 1 and low for logic 0	Isolated
One-Wire	1-Wire N	**Isolated power supply output negative** Provides a 5V/100mA power output	⭐
	1-Wire OW		
	1-Wire P	**Isolated power supply output positive** Provides a 5V/100mA power output	⭐
Digital Input	SS	the isolate input common connect	Isolated
	DI1	Digital input signal of channel 1	Isolated
	DI2	Digital input signal of channel 2	Isolated
	DI3	Digital input signal of channel 3	Isolated

⭐ The total power output capacity of the device is 5V/100mA.

Interfaces



RS485-RTU

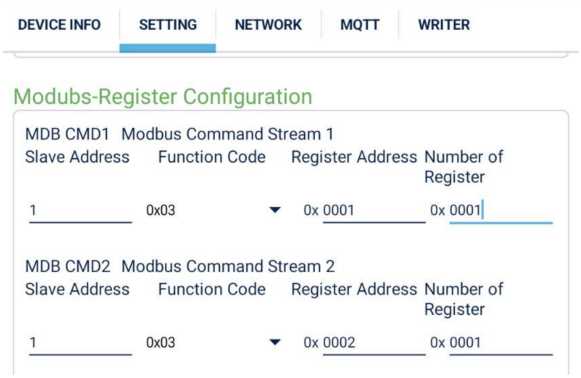
RS-485 is an industrial specification that defines the electrical interface and physical layer for point-to-point communication of electrical equipment. The RS-485 standard allows long wiring distances in electrically noisy environments and can support multiple devices on the same bus.

The device Modbus automatic polling function can support a total of 20 commands for 4 device IDs. You can set the ID, Register and time period you want to read in the EZCONFIG App.

Items	Description	Max	Notes
Nu Of Devices	number of devices connection on the modbus bus	4 Devices	
Data Rate	RS485 baud rate	9600	Fixed

Modbus Register Configure in the EZCONFIG

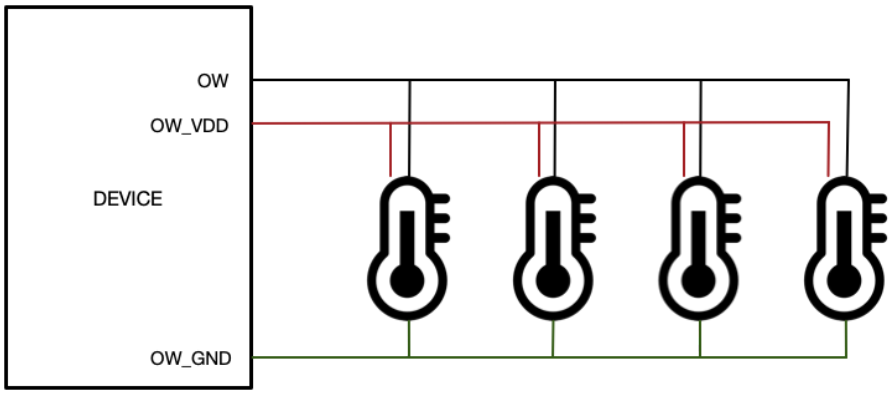
After entering the ID, Function Code, Register and the number of registers you want to read in the programming App, the device will automatically poll the set registers according to the configure (registers, polling period…). The device auto polling engine only support function code FC=0x03 (Read Holding Registers) and FC=0x04 (Read Input Registers).



One-Wire Interface

The basis of 1-Wire® technology is a serial protocol using a single data line plus a ground reference for communication. A 1-Wire master initiates and controls the communication with one or more 1-Wire slave devices on the 1-Wire bus (Figure 1). Each 1-Wire slave device has a unique, unalterable, factory-programmed, 64-bit identification number (ID).

When the system is powered on the device will search 1-wire bus devices automatically. Then the information will be reported regally according to the EZCONFIG settings. If the sensor is plugged-in after the system is powered on (booted), the you need to use the OW_Search command to reconfigure 1-wire bus. System can support up to four 1-wire devices connect on the bus.



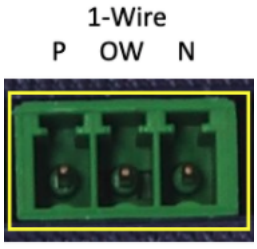
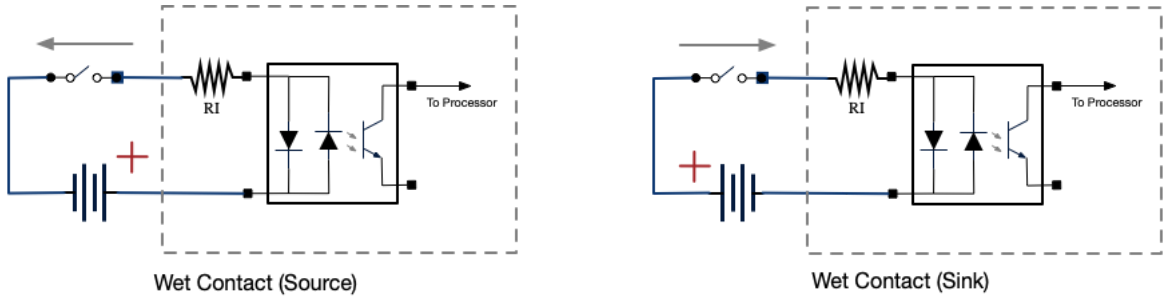


Figure-1

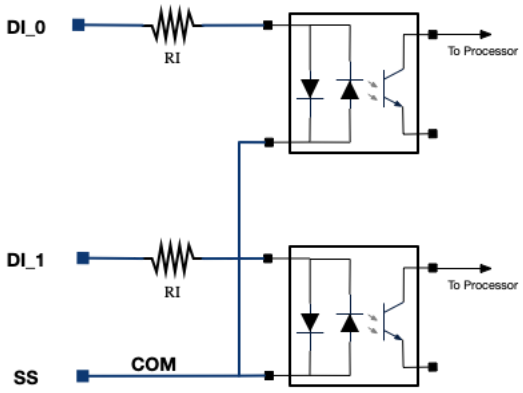
Pin Out	Description	Notes
OW_V	**Isolated power output positive (5V)** The power output is used to supply the ow sensor.	V+
OW__S	**1-Wire interface signal**	
OW_N	**Isolated power output Negative (GND)** The power output is used to supply the ow sensor.	V-

Isolate Digital Input Port

Digital input ports with isolate and support Wet contact. The digital input port can report the pin's status and transition count.



The device has three digital input ports and supports two wiring methods for the sink and source structure. but these three inputs must use the same structure connection. because the connection uses the same SS pin.



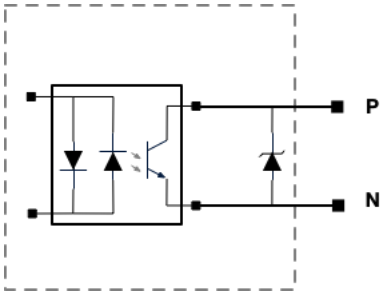
I/O Specification

Number of Channel	3	Notes
Wet Contact	Sink & Source	
Counter - Frequency	50Hz	
Counter - Pulse Width	10mS	
Input Voltage	5-30 VDC	On level
Input Voltage	4VDC	Off Level

Input impedance (RI)	4Kohm	
Overvoltage Protection	+/-30VDC	

Isolate Digital Output Port

The device uses an optocoupler isolated with BJT output circuit design.



Channels	2	Notes
Output Type	Darlington	
PNP/NPN		
Load Voltage		
OVP	Yes	30VDC
Isolation Rated Voltage	5000	Vrms
Driving Current	30mA	IC

System Reset and Configure

There are two ways to reset the system, one is to use the **EZCONFIG** App and the other is to remotely reset the system through MQTT messages.

EZCONFIG App

Every time you use the **EZCONFIG** App to "Write" the parameters(even without any parameters change), the system will be automatically reset to import the newly configure parameters.

MQTT SRST Remotely Reset

Device support remote software reset command through the MQTT message. When the device receives the “SRST” command, it will then reply with a confirmation command “SRST_N_Y” to determine whether to perform a system reset. when the “SRST_N_Y” is received you should feedback an “SRST_Y” to confirm software execution. (SRST_Y confirmation command must be replied within 3 minutes, otherwise a new procedure must be resent)

MQTT Specification

MQTT (Message Queuing Telemetry Transport) is a Client Server publish/subscribe messaging transport protocol. It is light weight, open, simple, and designed so as to be easy to implement. These characteristics make it ideal for use in many situations, including constrained environments such as for communication in Machine to Machine (M2M) and Internet of Things (IoT) contexts where a small code footprint is required and/or network bandwidth is at a premium.

- Supported MQTT Protocol Version : V3.1, V3.1.1

- Publish: Supported, with one topic
- Quality of Service (QoS) : Supported
  - 0 : At most Once (default)
  - 1 : At Last Once
  - 2 Exactly Once

> 💡 For QoS=1 or 2, Voyager uses msgID 1-300 (Please avoid using msgID in this range on the same topic)

- Retained Message : Supported
  - Default : Disabled
- Subscribe: supported, one topic (can be different from the publish topic)
- Keep Alive Interval: supported
  - Default 1200 seconds, MAX: 3600 seconds
- Interval Report : (Report Rate)
  - Default 1200 Seconds, Max 3600 Seconds
- Interrupt Report : Supported
  - Default : Disabled

Publishes three different kinds of messages based on the corresponding conditions

Regular Report Message:

This type of message is published regularly based on user defined interval (for example: every 10 minutes). The upper limit for the interval is 1 hour (3600 seconds)

▼ Device META Data

- Software Version
- Modem Version
- Modem Firmware Version
- DC Input Status (Power Supply)
- Modbus Device Type

▼ Sensor Data

- Digital Inputs
- Digital Input Counters
- Digital Outputs
- One-Wire ID
- One-Wire Temperature
- On-board Temperature & Humidity
- Current Transformer 100A
- AC Voltage Detector

▼ Global Positions System

- GNSS
- Serving Cell Information
- Neighboring Cell Information

▼ RS-485 Modbus

- Modbus Slave Address
- Modbus Device Type
- Modbus Register Reading

Interrupt Report Message:

This type of message is published if user enables the interrupt mode and sensor reading's pre-defined condition is met

The Interrupt report message function can be set on or off in EZCONFIG App. When the interrupt function is turned off, the following messages will not be sent. The interrupt report message will be sent additionally when the specific event changes, like missing power, a drastic temperature change, digital input port event change…

Command Echo Message:

This type of message is published as an echo if Voyager is subscribed to a MQTT topic and receives a message containing a command (see command list)

Echo mode must confirm the online status of the device and make sure published and subscribed in same topic of MQTT. You can set the MQTT keep-alive time on the EZCONFIG App for the MQTT page. After the alive timeout, the connection between the MQTT broker and the device will be disconnected. and device will be missing MQTT echo message and not replying echo message.

MQTT Command List

▼ Regular Report Message:

▼ MQTT META Message

Device META Data is published once after connecting to the MQTT Server.

Tag	**Description**	Format	Notes
VERSION	0.2.32.7	String	
PCBID	3	**String Decimal**	
ModemVersion	BG96	String	
ModemFirmwareVersion	Modem Firmware Version	String	
DCIN	DC IN Powered status 1 : DC_IN Power supply is True 0 : DC_IN Power Supply is False	Decimal	
MDB_01	MODBUS Slave ID 1	String HEX	
MDB_02	MODBUS Slave ID 2	String HEX	
MDB_03	MODBUS Slave ID 3	String HEX	
MDB_04	MODBUS Slave ID 4	String HEX	

META data message example


```
{
  "device_id":"DEVICE_ID",
  "time":"CURRENT_TIME",
  "VERSION":"0.2.32.7",
  "PCBID":"3",
  "ModemVersion":"BG96",
  "ModemFirmwareVersion":"BG96MAR02A07M1G_BETA1112A_01.019.01.019_BETA1112A",
  "DCIN":1,
  "MDB_01":"0001",
```

```
  "MDB_02":"0002",
  "MDB_03":"0003",
  "MDB_04":"0004"
}
```

▼ Regular report message (General)

Use the EZCONFIG app to set the device configuration to regularly report the contents of the MQTT message.

- Digital Input Status
- Digital Output Status
- OneWire interface Report
- DC_IN Power plug
- Internal Sensor (temperature, humidity)
- Power Monitor Meter (Current Transfer, AC_Sense)

Tag	Description	Format	Notes
device_id	device ID	**String**	
time	CURRENT Report Time	Float	“20yy/MM/DD, HH:MM:SS TD” **TD:** expressed in quarters of an hour, between the local time and GMT
itemp	DEVICE onboard temperature	float	Celsius
ihum	DEVICE onboard humidity	decimal	
DCIN	DC IN Powered status 1 : DC_IN Power supply is True 0 : DC_IN Power Supply is False	Decimal	
ow1_ID	One-Wire sensor ID	String	
ow1_temp	One-Wire Sensor Temperature Value	Float	Celsius
ow2_ID	One-Wire sensor ID	String	
ow2_temp	One-Wire Sensor Temperature Value	Float	Celsius
ow3_ID	One-Wire sensor ID	String	
ow3_temp	One-Wire Sensor Temperature Value	Float	Celsius
ow4_ID	One-Wire sensor ID	String	
ow4_temp	One-Wire Sensor Temperature Value	Float	Celsius
CT	Current Transfer Current (A)	Float	0-100A
AC	AC Power sensing (Volt)	Float	0~220V
DI0	Digital Input Port “0” Status	Decimal	at present
DI0count	Digital Input Port “0” toggle count	Decimal	H/L Transition Current, auto clear every report
DI1	Digital Input Port “1” Status	Decimal	at present
DI1count	Digital Input Port “1” toggle count	Decimal	H/L Transition Current, auto clear every report
DI2	Digital Input Port “2” Status	Decimal	at present
DI2count	Digital Input Port “2” toggle count	Decimal	H/L Transition Current, auto clear every report
DO0	Digital Output state for Port “0”	Decimal	
DO1	Digital Output state for Port “1”	Decimal	

MQTT Regally Message Example (JSON)

```
{
"device_id":"DEVICE_ID",
"time":"CURRENT_TIME",
"itemp":32.60,
"ihum":34.0,
"DCIN":1,
"ow1_ID":"ffff",
"ow1_temp":0.00,
"ow2_ID":"ffff",
"ow2_temp":0.00,
"ow3_ID":"ffff",
"ow3_temp":0.00,
"ow4_ID":"ffff",
"ow4_temp":0.00,
"CT":1.13,
"AC":0.34,
"DI0":0,
"DI0count":0,
"DI1":0,
"DI1count":0,
"DI2":1,
"DI2count":0,
"DO0":1,
"DO1":1
}
```

▼ Regally report message (GPS)

Regulator MQTT message output.

This message will only be sent when the GPS function is turned on, the rate of return of the GPS message can be set in the EZCONFG App.

In special cases, GPS is automatically sent when the device's power supply is unplugged, and the location is automatically sent every five minutes before power is restored.

Tag	Description	Format	Notes
GPSLOC	GPS location	String	
ServingCell	**ServingCell**	String	
NeighborCell	**NeighborCell**	String	
NeighborCell	**NeighborCell**	String	

GPSLOC

▼ <UTC>,<latitude>,<longitude>,<HDOP>,<altitude>,<fix>,<COG>,<spkm>,<spkn>,<date>,<nsat>

<mode>	Integer type. Latitude and longitude display format. 0 <latitude>, <longitude> format: ddmm.mmmmN/S,dddmm.mmmmE/W 1 <latitude>,<longitude> format: ddmm.mmmmmm,N/S,dddmm.mmmmmm,E/W 2 <latitude>, <longitude> format: (-)dd.ddddd,(-)ddd.ddddd
<time>	Integer type. The time when the queried results are reported periodically. Range: 0– 3600. Default value: 0. Unit: second. 0 indicates turn off this feature.
<UTC>	String type. UTC time. Format: hhmmss.sss (Quoted from GPGGA sentence).
<latitude>	Float type. Latitude. If <mode> is 0: Format: ddmm.mmmmN/S (Quoted from GPGGA sentence) dd 00–89 (Unit: degree) mm.mmmm 00.0000–59.9999 (Unit: minute) N/S North latitude/South latitude If <mode> is 1: Format: ddmm.mmmmmm,N/S (Quoted from GPGGA sentence) dd 00–89 (Unit: degree) mm.mmmmmm 00.000000–59.999999 (Unit: minute) N/S North latitude/South latitude If <mode> is 2: Format:

	(-)dd.ddddd (Quoted from GPGGA sentence) dd.ddddd -89.99999 to 89.99999 (Unit: degree) - South latitude
<longitude>	Float type. Longitude. If <mode> is 0: Format: dddmm.mmmmE/W (Quoted from GPGGA sentence) ddd 000–179 (Unit: degree) mm.mmmm 00.0000–59.9999 (Unit: minute) E/W East longitude/West longitude If <mode> is 1: Format: dddmm.mmmmmm,E/W (Quoted from GPGGA sentence) ddd 000–179 (Unit: degree) mm.mmmmmm 00.000000–59.999999 (Unit: minute) E/W East longitude/West longitude If <mode> is 2: Format: (-)dd.ddddd (Quoted from GPGGA sentence) dd.ddddd -179.99999 to 179.99999 (Unit: degree) - West longitude
<HDOP>	Float type. Horizontal precision: 0.5–99.9 (Quoted from GPGGA sentence).
<altitude>	Float type. The altitude of the antenna away from the sea level, accurate to one decimal place. Unit: meter. (Quoted from GPGGA sentence)
<fix>	Integer type. GNSS positioning mode (Quoted from GNGSA/GPGSA sentence). 2 2D positioning 3 3D positioning
<COG>	String type. Course Over Ground based on true north. Format: ddd.mm (Quoted from GPVTG sentence). ddd 000–359 (Unit: degree) mm 00–59 (Unit: minute)
<spkm>	Speed over ground. Format: xxxx.x; unit: Km/h; accurate to one decimal place (Quoted from GPVTG sentence).
<spkn>	Float type. Speed over ground. Format: xxxx.x. Unit: knots. Accurate to one decimal place (Quoted from GPVTG sentence)
<date>	String type. UTC time when fixing position. Format: ddmmyy (Quoted from GPRMC sentence)
<nsat>	Integer type. Number of satellites, from 00 (the first 0 should be retained) to 12 (Quoted from GPGGA sentence).

ServingCell

- GSM
  mode: state,RAT,MCC,MNC,LAC,cellID,bsic,ARFCN,band,RxLev,txp,rla,DRX,c1,c2,GPRS,tch,ts,ta,MAIO,HSM,rxlevsu
- LTE/NB: state,RAT,is_tdd,MCC,MNC,cellID,PCI,EARFCN,freq_band_ind,UL_bandwidth,DL_bandwidth,TAC,RSRP,RS

NeighborCell

- GSM mode: RAT,MCC,MNC,LAC,cellID,bsic,ARFCN,RxLev,c1,c2,c31,c32
- LTE/NB_intra: neighbourcell intra,RAT,EARFCN,PCI,RSRQ,RSRP,RSSI,SINR,srxlev,cell_resel_priority,s_non_intra_se
- LTE/NB_inter: neighbourcell inter,RAT,EARFCN,PCI,RSRQ,RSRP,RSSI,SINR,srxlev,threshX_low,threshX_high,cell_re

```
{
"device_id":"DEVICE_ID",
"time":"CURRENT_TIME",
"GPSLOC":"Not Available",
"ServingCell":"CONNECT,CAT-NB,FDD,466,01,18A7179,43,9454,28,0,0,2795,-107,-7,-100,10,-",
"NeighborCell":"neighbourcell intra,CAT-NB,9454,477,-10,-106,-96,0,-,-,-,-,-",
"NeighborCell":"neighbourcell intra,CAT-NB,9454,43,-6,-107,-100,0,-,-,-,-,-"
}
```

▼ MDB MODBUS MQTT message

Modbus Data are published regularly at user defined interval. (Detail check the EZCONFIG App)

Each MODBUS device (slave address) will be reported separately following this order: slave address 1, slave address 2, slave address 3, slave address 4

Tag	Description	Format
MDBSlave	Modbus slave address ID	String Decimal
MDBType	Modbus command type	String HEX
REG_0000	Modbus Register reading 1 ”REG_000X”:”DataLengthN Data1 Data2 .. DataN CRC1 CRC2”	String HEX
REG_0002	Modbus Register reading 2 ”REG_000X”:”DataLengthN Data1 Data2 .. DataN CRC1 CRC2”	String HEX

☝ REG_000X = Modbus register read ID
DatalengthN / Data1 / Data2 / … / DataN / CRC1 / CRC2

Modbus Message Example:

```
{

"device_id":"DEVICE_ID",
"time":"CURRENT_TIME",
"MDBSlave":"01",
"MDBType":"0001",
"REG_0000":"04 00 00 00 00 FA 33",
"REG_0002": "04 00 00 00 00 FA 33",
"REG_0004":"04 8B 4A 41 BC C1 E0",
"REG_0006":"04 00 00 00 00 FA 33",
"REG_0008":"04 00 00 00 00 FA 33”
}
```

Modbus Devices Error Message

If Modbus settings contain any error, device may fail to retrieve Modbus device readings and will output error message

"REG_000X":"ERROR *errorCode*"

- ERR_NOT_MASTER = -1
- ERR_POLLING = -2
- ERR_BUFF_OVERFLOW = -3
- ERR_BAD_CRC = -4
- ERR_EXCEPTION = -5
- ERR_BAD_SIZE = -6
- ERR_BAD_ADDRESS = -7
- ERR_TIME_OUT = -8
- ERR_BAD_SLAVE_ID = -9
- ERR_BAD_TCP_ID = -10
- ERR_OK_QUERY = -11

▼ Command Echo Message:

Echo mode must confirm the online status of the device and make sure published and subscribed in same topic of MQTT. You can set the MQTT keep-alive time on the EZCONFIG App for the MQTT page. After the alive timeout, the connection between the MQTT broker and the device will be disconnected. and device will be missing MQTT echo message and not replying echo message.

▼ BATTERY Status Query

Get the battery power status by follows

```
{
"command":"BATTERY_GET"
}
```

> BAT > 230 : 100%
>
> BAT > 215 : 75%
>
> BAT > 209 : 50%
>
> BAT > 200 : 25%
>
> BAT < 197: 0%

Battery status MQTT message Example:

```
{
  "device_id":"VEVT32217271156",
  "time":"2022/10/14,17:59:32+32",
  "BAT":241
}
```

▼ Device Digital Input Status

To get the Digital Input status by following command.

```
{
  "COMMAND":"DI_Get"
}
```

Tag	Description	Format	Notes
DI0	Digital Input Port 0 Status	Decimal	
DI1	Digital Input Port 1 Status	Decimal	
DI2	Digital Input Port 2 Status	Decimal	

```
{
"device_id":"DEVICE_ID",
"time":"CURRENT_TIME",
"DI0":1,
"DI1":1,
"DI2":1
}
```

▼ One-Wire Temperature

When the system is powered on the device will search for the connected 1-wire devices automatically. And the device will automatically send data to the MQTT broker according to the EZCONFIG settings.

If you want to get the 1-wire data outside of the regal report cycle, you can achieve it through the following commands.

```
{
"command":"OW_Get"
}
```

Device Reply Message

Tag	Description	Format	
OW1_ID	1-Wire sensor ID	String	
OW1_temp	1-wire data out (Temperature Value)	Float	Celsius

```
{
"device_id":"DEVICE_ID",
"time":"CURRENT_TIMES",
"ow1_ID":"ffff",
"ow1_temp":0.00,
"ow2_ID":"ffff",
"ow2_temp":0.00,
"ow3_ID":"ffff",
"ow3_temp":0.00,
"ow4_ID":"ffff",
"ow4_temp":0.00
}
```

▼ Received Signal Strength Indicator (RSSI)

You can check the network signal strength with the following commands:

```
// QUERY COMMAND
{
  "command":"PING"
}
```

Replay message

Tag	Description	Format	Notes
RSSI	**DECIMAL**	Decimal	

```
//REPLAY MESSAGE
{
"device_id":"device_id",
"time":"current_time",
"RSSI":signal_strength
}
```

RF Connectivity Quality	**RSSI Value**	**Notes**
Excellent	0-1	-111dBm or less
Good	2..30	-109 ~ -53dBm
Weaker	31	-51dBm or Greater
undetectable	99	Not detectable

▼ Device Digital Output State Control

Configure the device digital output status by follow in command message

DO0_OFF:

set digital output 0 to **HIGHT “**DO0_ON”

set digital output 0 to **LOW “**DO1_OFF”:

set digital output 1 to **HIGHT “**DO1_ON”:

set digital output 1 to **LOW** “DO1_OFF”

```
{
  "COMMAND":"DO0_ON"
}
//
```

Device Replay Message

```
//replay example
{
"device_id":"DEVICE_ID","time":"CURRENT_TIME","DO0":0
}
```

▼ Digital Input Count Flow

```
{
"command":"COUNT_FLOW"
}
```

```
{"device_id":"DEVICE_ID",
"time":"CURRENT_TIME",
"FLOW_COUNT":0}
```

▼ Power Monitor status get

Get the device power monitor port status

- AC voltage measurement
- Current transformer status

```
{
"command":"CT_Get"
}
```

MQTT reply message

Tag	Description	Format	Notes
CT	Current transformer sensing current	Float	0-100A unit = A
AC	ACIN Voltage sensing 0-240VAC	Float	V

```
{
"device_id":"DEVICE_ID",
"time":"CURRENT_TIME",
"CT":0.99,
"AC":0.67
}
```

▼ One-Wire Devices Search

When the system is boot up (Reset), Device will automatically search OW ID for the number of devices on the One-Wire bus, and will record the temperature change according to the time set by the user.

However, if the One-Wire devices is inserted after the system booted, the system will not inquire about the temperature change of the One-Wire devices. The user must send the one-wire bus reset command through MQTT to make the system reconfigure the One-wire devices. The command to reset the One-Wire bus is as follows

```
{
"command":"OW_Search"
}
```

Device Reply Message

Device will research the one-wire bus devices and feedback how many One-Wire devices found on the OW Bus.

Tag	Description	Format	Notes
OW_COUNT	How many 1-wire devices found on the bus	Decimal	* 1-4 devices found * Currently unavailable : no 1-wire device found on the bus, please check the connection again.

```
{
"device_id":"DEVICE_ID",
"time":"CURRENT_TIME",
"OW_COUNT":1
}
```

```
//if no device found after OW serch

{
"device_id":"DEVICE_ID",
"time":"CURRENT_TIME",
"OW_COUNT":"Currently Unavailable"
}
```

▼ GPS MQTT message

```
{"device_id":"VEVT32217480067","time":"2022/09/18,13:50:58+32","GPS_REPLY":60}

{"device_id":"VEVT32217480067","time":"2022/09/18,13:50:58+32","GPS_REPLY":"Disabled”}
{"device_id":"VEVT32217480067","time":"2022/09/18,13:50:58+32","GPS_REPLY":"Not Available"}

{"device_id":"VEVT32217480067","time":"2022/09/18,13:50:58+32","GPS_REPLY":”Wrong Command"}



{
  "device_id":"VEVT32217480067",
  "time":"2022/09/18,13:50:58+32",
  "GPSLOC":"033027.000,2502.0678N,12133.7463E,1.7,-
•17.5,2,0.00,0.0,0.0,200821,03",
  "ServingCell":"CONNECT,CAT-M,FDD,466,92,33D720D,379,1750,3,5,5,2DB4,-115,-12,-85,10,-
",
  "NeighborCell":"neighbourcell intra,CAT-M,1750,379,-14,-112,-81,0,-,-,-,-,-”
}
```

▼ Modbus Access Command

You cam ask Device to read or write ModBus slave device register with the following commands.

MDB [SlaveID] [Fun_Code] [Register_Address] [Length]

[SlaveID] : Client device ID

[Fun_Code] : Modbus function code, we can support the FunCode = 3, 4 & 6

[Register_Address] : Client start register address

[Length] : how many register you want to access

☝ SlaveID, Register_Address, Lenght & YourData must all be in Decimal

```
{
  "command":"MDB 1 3 8192 2"
}
```

☝ Register Address 0x2000[HEX] = 8192[DEC]

“REG_xxxx”:”[Fun_Code] [DataLength] [Data_0] [Data_2] […] [Data_N] [CRC1] [CRC2]

MQTT Reply Message

```
{
  "device_id": "DEVICE_ID",
  "time": "CURRENT_TIME",
  "MDB_REPLY": "01",
  "REG_2000": "03 04 42 EE 66 66 25 F4"
}
```

▼ Software Reset Command

Device support remote software reset command through the MQTT message. When the device receives the “SRST” command, it will then reply with a confirmation command “SRST_N_Y” to determine whether to perform a system reset. when the “SRST_N_Y” is received you should feedback an “SRST_Y” to confirm software execution. (SRST_Y confirmation command must be replied within 3 minutes, otherwise a new procedure must be resent)

```
//software request
{
"command":"SRST"
}

//Waitting for Device Reply
{
"SRST":"SRST_N_Y"
}

//Send confirmation message to execution reset event
{
"command":"SRST_Y"
}
```

▼ Interrupt Report Message:

The Interrupt report message function can be set on or off in EZCONFIG App. When the interrupt function is turned off, the following messages will not be sent. The interrupt report message will be sent additionally when the specific event changes, like missing power, a drastic temperature change, digital input port event change…

▼ Abnormal power supply or power failure

When the power supply of the device is unplug or any abnormal, the system will send a message notification, and immediately send GPS location information.

The battery is mainly used to provide prompts for emergency messages. The battery of the device can provide about 30 minutes of operation when the power supply is removed. After the message is sent, the device will send a battery message every 30 seconds until the power is supplied again or the battery runs out

This message item has the highest priority, whether the MQTT interrupt function is enabled or not on the EZCONFIG App, the message will be sent when the power supply is abnormal happened.

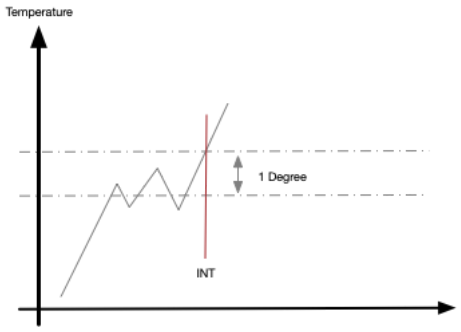
Tag	Descrption	Format	Notes
DCIN	DC IN Powered status 1 : DC_IN Power supply is True 0 : DC_IN Power Supply is False	Decimal	
BAT	BATTERY Capacitor BAT > 230 : 100% BAT > 215 : 75% BAT > 209 : 50% BAT > 200 : 25% BAT < 197: 0%		

```
{
"device_id":"DEVICE_ID",
"time":"CURRENT_TIME",
"DCIN":0,
"BAT":240
}
```

▼ Drastic Temperature Changes of the One-Wire

When the temperature changes of the one-wire interface by more than one degree. The one-wire temperature sampling period is every 15 seconds, when the temperature changes more than one degree between each sampling then the device will be generated an interrupt event.

The device supports up to 4
one-wire sensors and any sensor temperature exceeding the condition will send an interrupt message.



MQTT Message Example

```
{
"device_id":"DEVICE_ID",
"time":"CURRENT_TIME",
"ow1_ID":"ffff",
"ow1_temp":0.00,
"ow2_ID":"ffff",
"ow2_temp":0.00,
"ow3_ID":"ffff",
"ow3_temp":0.00,
"ow4_ID":"ffff",
"ow4_temp":0.00,
}
```

▼ Digital Input port event changed

An interrupt message is sent to MQTT when any input signal changes.

Tag	Description	Format	Notes
DI0	Digital Input Port “0” Status	Decimal	Present State
DI0count	Digital Input Port “0” toggle count	Decimal	

```
{
"device_id":"DEVICE_ID",
"time":"CURRENT_TIME",
"DI0":0,
"DI0count":0,
"DI1":0,
"DI1count":0,
"DI2":1,
"DI2count":0,
"DO0":1,
"DO1":1
}
```

Device Specification

Power Supply

The device supports DC power supply input (7-17V/10W) and has a built-in lithium battery for sending emergency messages. When the power supply is abnormal (power failure), the backup battery can provide about 30 minutes of time, which can be used for emergency treatment in the event of a power failure.

When the power supply is abnormal, the device will send power disconnect messages through MQTT (even if the MQTT interrupt function is not turned on). After the power disconnect message is sent, the battery capacity message will be sent every 30 seconds until the power supply is restored or the battery is exhausted.

Hardware specification

APPLICATION CORE Processor	ARM Cortex M4 with DSP 80MHz	
MODEM	LTE Technology: Rel.14 LTE Cat-M1 Rel.14 LTE Cat-NB2	
BAND	B1/B2/B3/B4/B5/B8/B12/B13/B18/B19/B20/B26/B28/B39	
Connectivity PROTOCOLS	MQTT V.3.1, V3.1.1	
Configure method	NFC EZCONFIG (Android App Only)	
LOCATION	GPS, GLONASS, Beidou	
INTERFACE	RS-485 / One-Wire (Isolate)	
DIGITAL INPUT	Wet Contact x3 (Isolate)	Dry
DIGITAL OUTPUT	BJT x 2 (Isolate)	
ELECTRICAL	Supply Voltage Range: 7V to 17V	
ANALOG INPUT	Voltage Detect AC-220V Current Transform 100A(Max)	
Installation	DIN Rail	
Battery Capacitor	300mAH (Use of emergency messages)	
DIMENSIONS	71.5(W) x 102.5(L) x 26.5(T) mm	