Dragino RS485BL and SEM Three

SEM Three

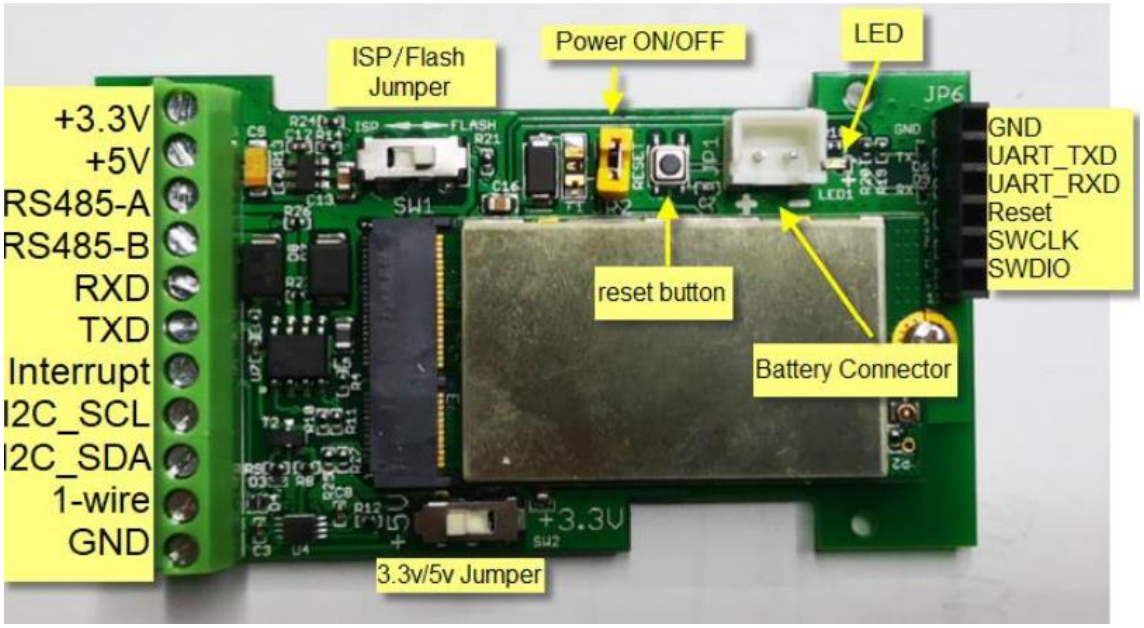
SEM Three is a three-phase energy meter that allows to monitor electrical parameters of your installation including active energy, reactive energy, voltage, current, power, maximum demand and more. These parameters are measured separately for each phase, what gives SEM Three high versatility to work as a three-phase analyzer or a triple single-phase analyzer.

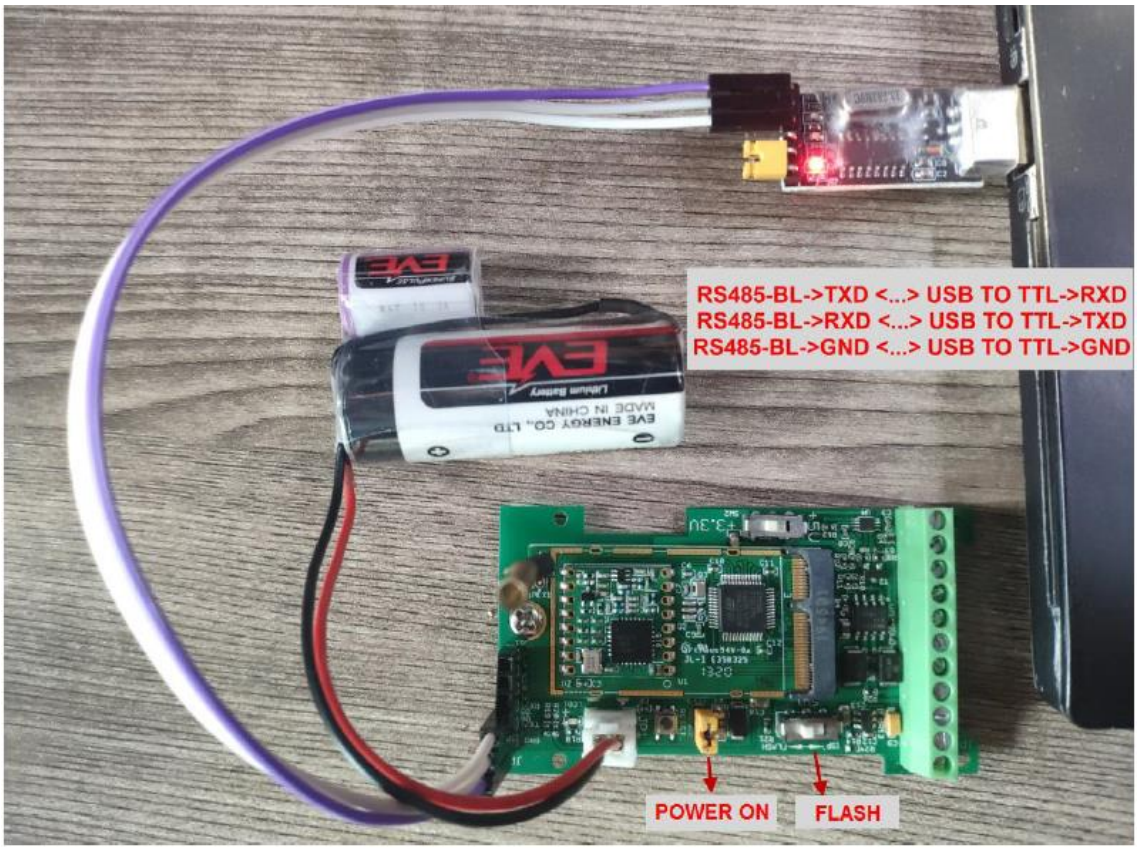
The design, occupying a single DIN rail module, allows that SEM Three can be placed easily at any installation.

The device has removal connectors for power supply (85-265 Vac), external current transformers (250 mA output) and RS-485 communications.

The communication of measured data works over Modbus RTU standard protocol.


C20 CP60
C20 CP60
C16 CP60
C16 CP60
C16 CP60
C16 CP60
Schneider Electric
C16
ON
COM
RST
SEM Three
N
I+N
No. 22-U
(20A)
I-ON
i DPN





In PC, User needs to set **serial tool**(such as putty, SecureCRT) baud rate to **9600** to access to access serial console of RS485-BL. The default password is 123456. Below is the output for reference:

```
DRAGINO RS485-BL Device

Image Version: v1.3.2

LoRaWan Stack: DR-LWS-005

Frequency Band: EU868

DevEui= A8 40 41 BC 11 82 C9 ü

DRAGINO RS485-BL Device

Image Version: v1.3.2

LoRaWan Stack: DR-LWS-005

Frequency Band: EU868

DevEui= A8 40 41 BC 11 82 C9 44


Please use AT+DEBUG to see debug info

****** UpLinkCounter= 0 ******

TX on freq 868.100 MHz at DR 5
txDone
```

```
123456
Correct Password
```

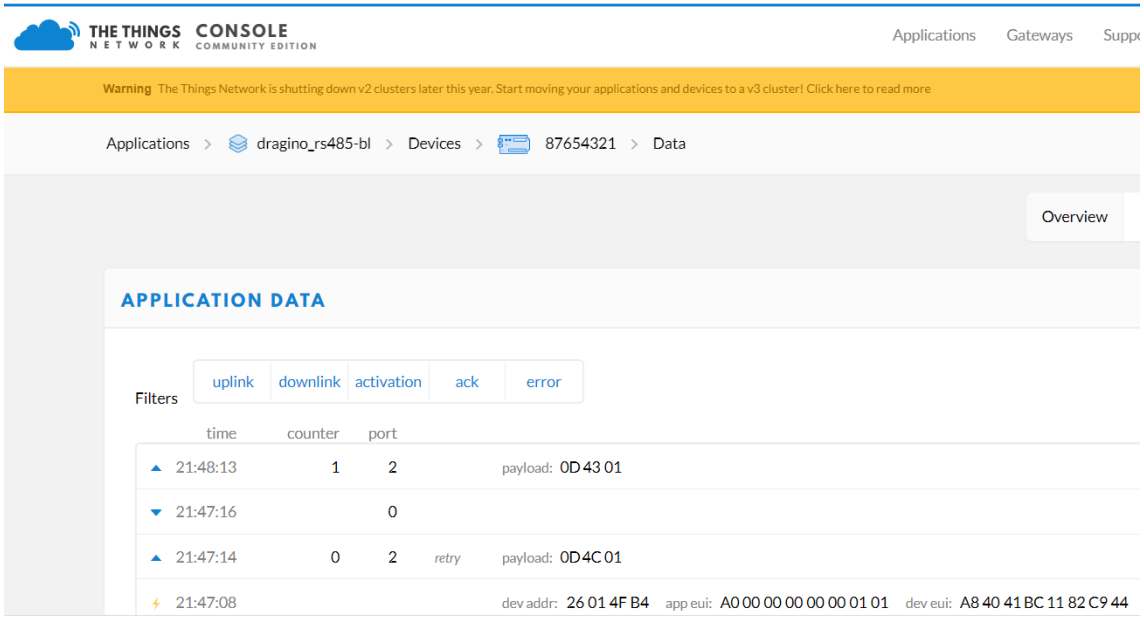
```
AT+APPEUI=?
a0 00 00 00 00 00 01 01

OK
```

```
AT+DEUI=?
a8 40 41 bc 11 82 c9 44

OK
```

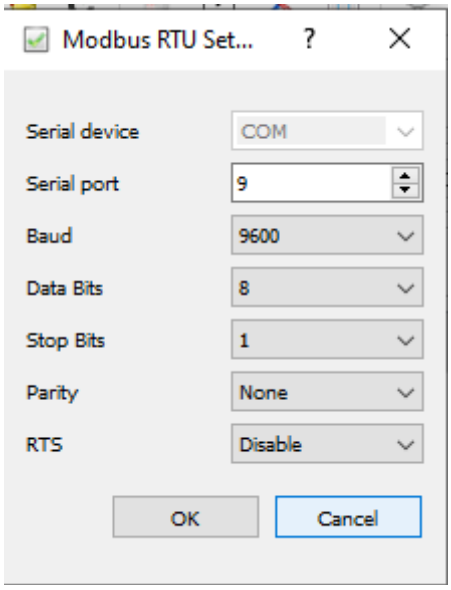
a8 40 41 bc 11 82 c9 44

```
AT+APPKEY=?
1d 27 92 e9 a5 f9 6d 77 a2 e5 ad f6 e7 4f 4b 5b

OK
```

1d 27 92 e9 a5 f9 6d 77 a2 e5 ad f6 e7 4f 4b 5b

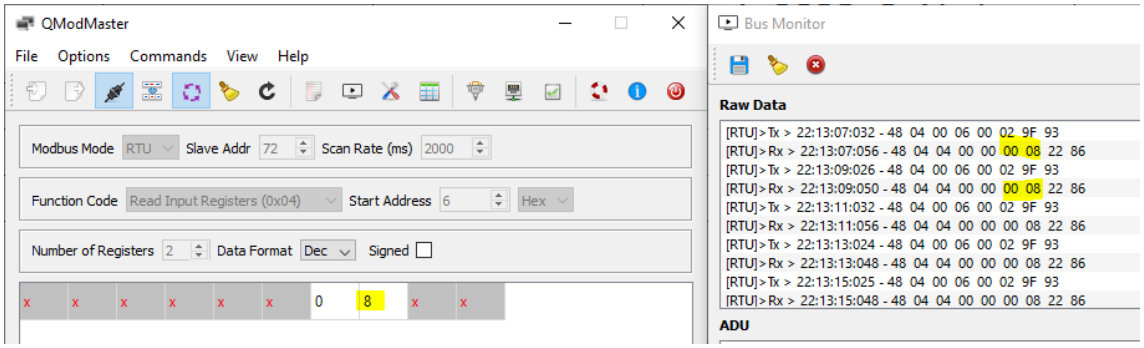


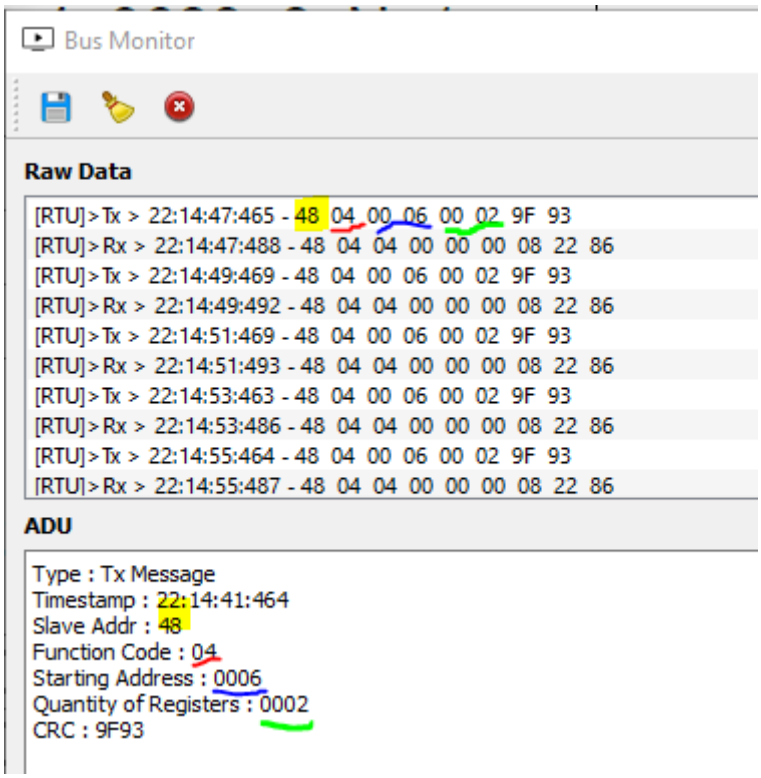
Let's connect PC to SEMThree

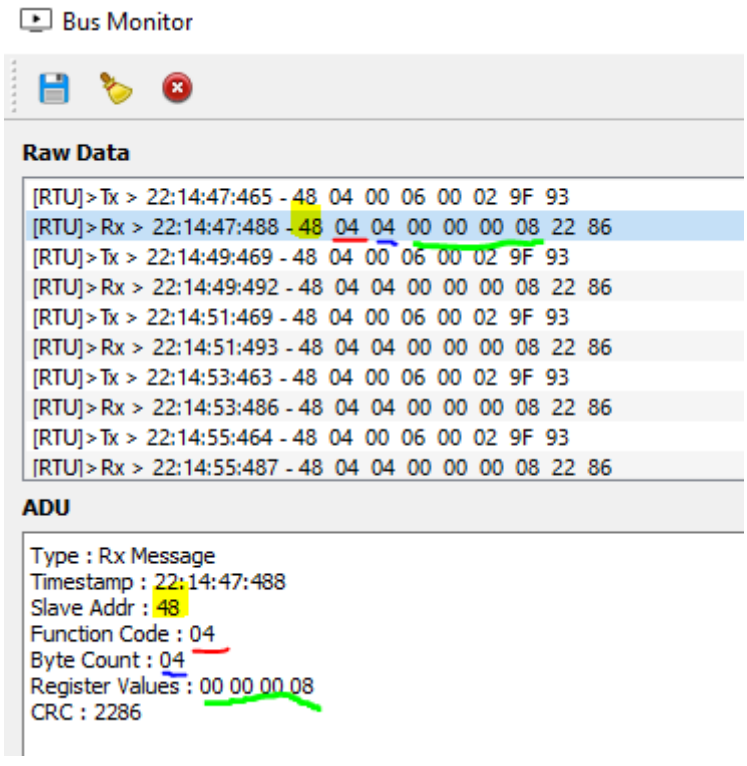


Active power phase 1	API1	0x06-0x07		W	4

Measuring power: 8 Watts at 230V







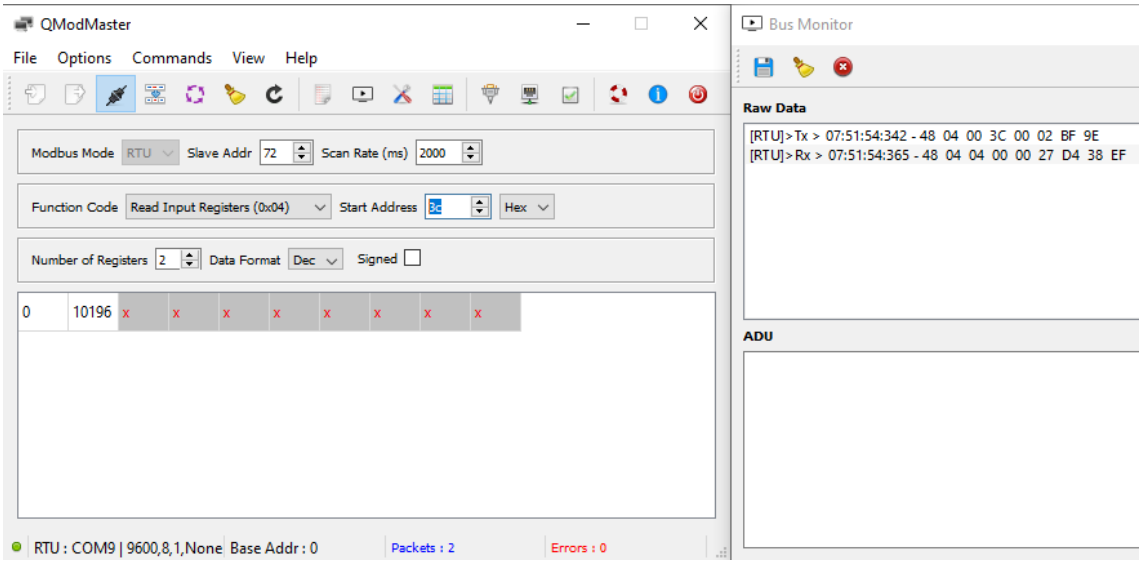
So the right command for the Dragino RS485-LN are

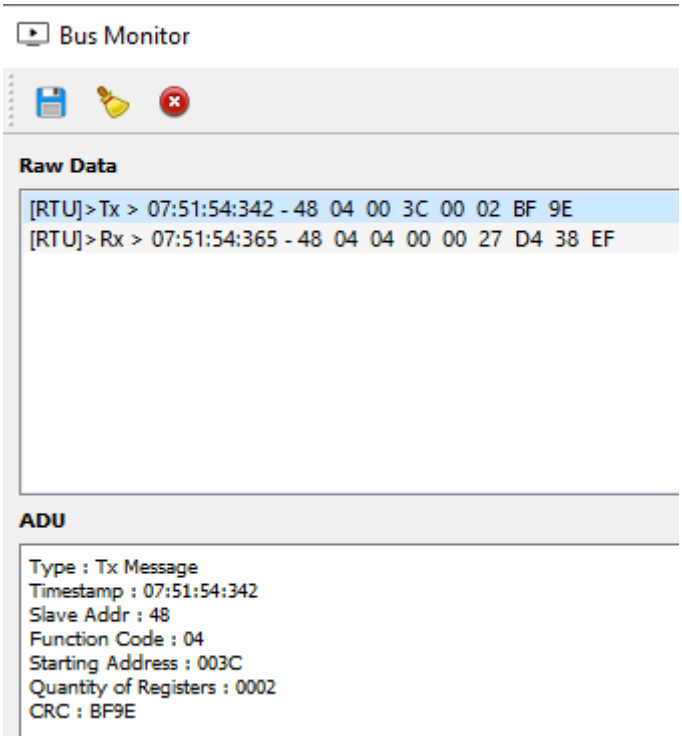
Active Power Phase 1

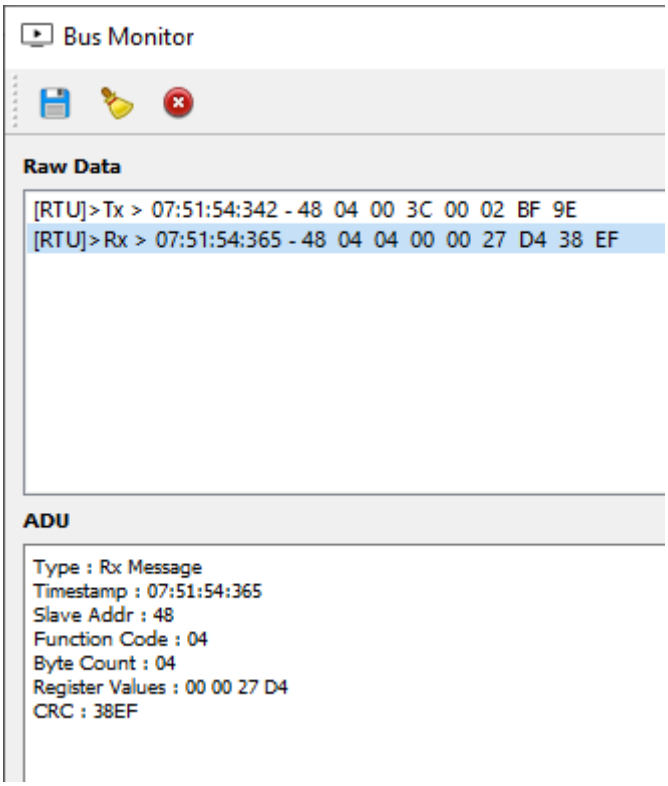
AT+COMMAND1=48 04 00 06 00 02,1

AT+DATACUT1=9,1,4+5+6+7

Active energy phase 1	AE1	0x3C-0x3D		Wh	4







So the right command for the Dragino RS485-LN are

Active Energy Phase 1

AT+COMMAND2=48 04 00 3C 00 02,1

AT+DATACUT2=9,1,4+5+6+7

Let's connect Dragino to PC

AT Commands	Description	Example
AT+BAUDR	Set the baud rate (for RS485 connection). Default Value is: 9600.	AT+BAUDR=9600 Options: (1200,2400,4800,14400,19200,115200)
AT+PARITY	Set UART parity (for RS485 connection) Default Value is: no parity.	AT+PARITY=0 Option: 0: no parity, 1: odd parity, 2: even parity
AT+STOPBIT	Set serial stopbit (for RS485 connection) Default Value is: 1bit.	AT+STOPBIT=0 for 1bit AT+STOPBIT=1 for 1.5 bit AT+STOPBIT=2 for 2 bits

```
AT+BAUDR=?
9600

OK
```

```
AT+PARITY=?
0

OK
```

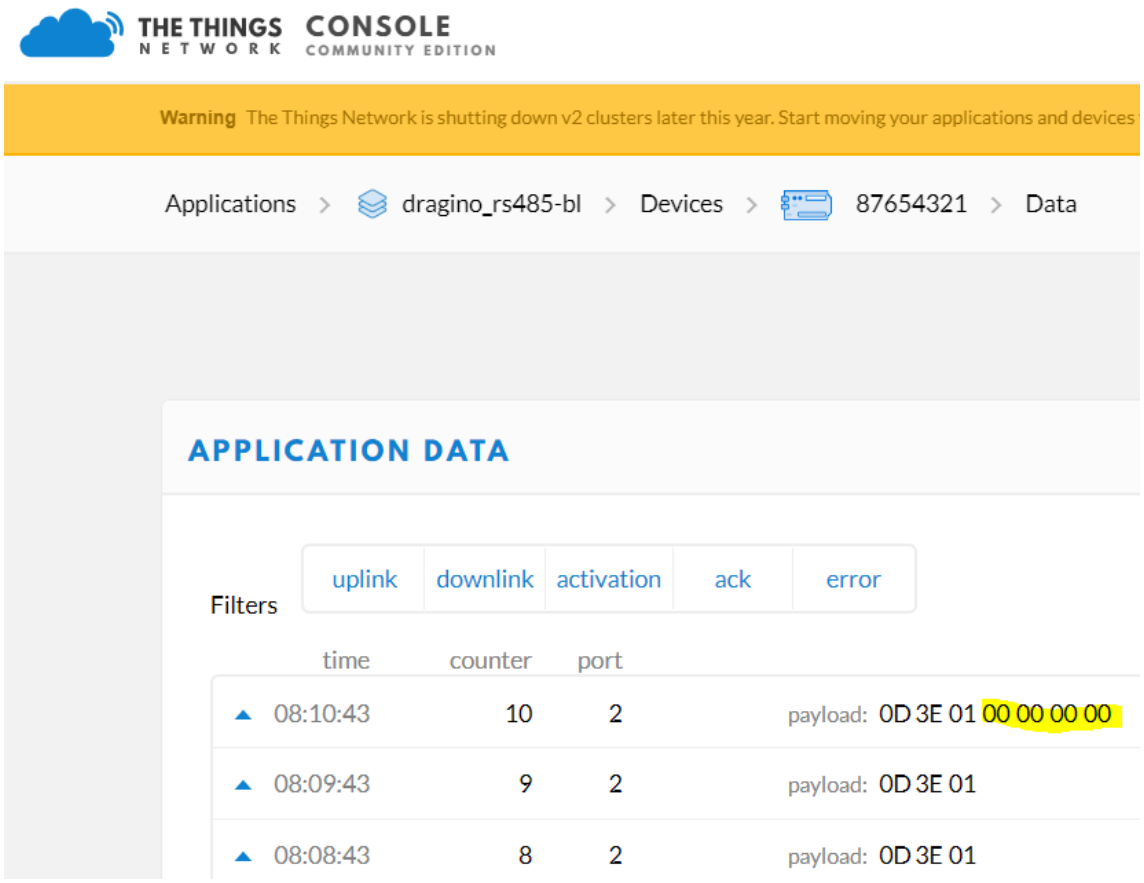
```
AT+STOPBIT=?
0

OK
```

Let’s configure the parameters reading

Power Phase1

```
AT+COMMAND1=48 04 00 06 00 02,1

OK
```

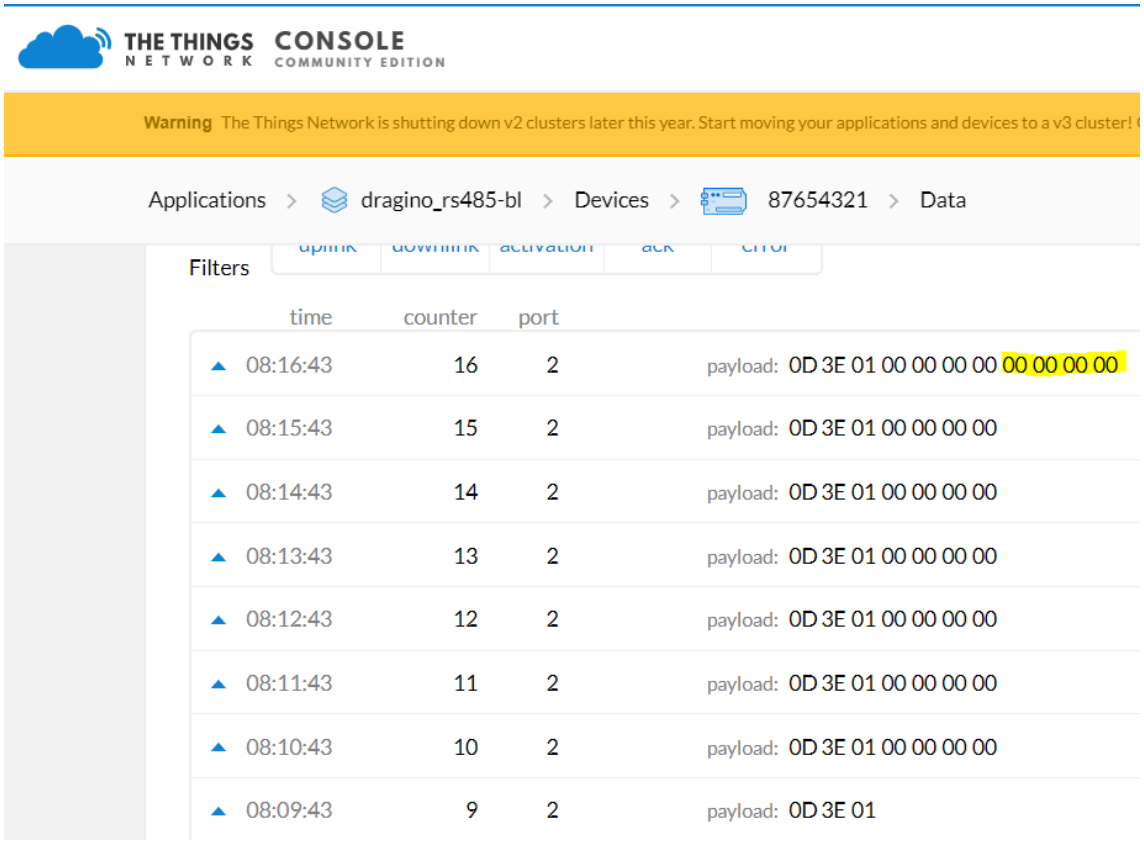
```
AT+DATACUT1=9,1,4+5+6+7

OK
```



Energy Phase1

```
AT+COMMAND2=48 04 00 3C 00 02,1

OK
```

```
AT+DATACUT2=9,1,4+5+6+7

OK
```



Power Phase 2

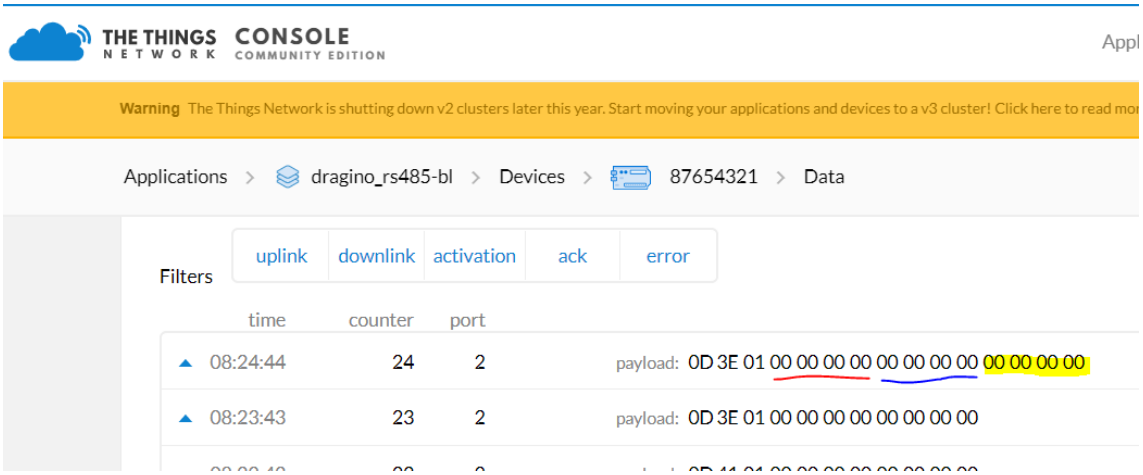
Active power phase 2	API2	0x6A-0x6B		W	4

AT+COMMAND3=48 04 00 6A 00 02,1

AT+DATACUT3=9,1,4+5+6+7

```
AT+COMMAND3=48 04 00 6A 00 02,1

OK
```

```
AT+DATACUT3=9,1,4+5+6+7

OK
```

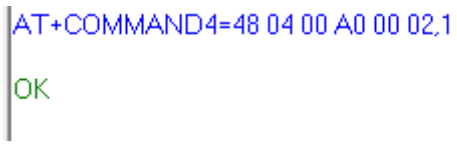


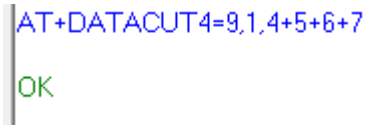
Energy Phase 2

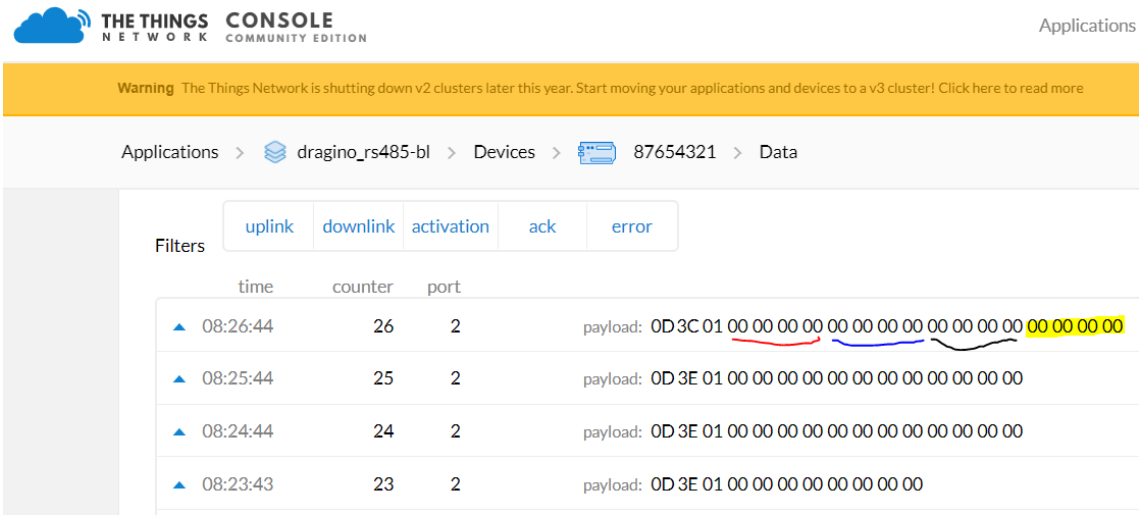
Active energy phase 2	AE2	0xA0-0xA1		Wh	4

AT+COMMAND4=48 04 00 A0 00 02,1

AT+DATACUT4=9,1,4+5+6+7







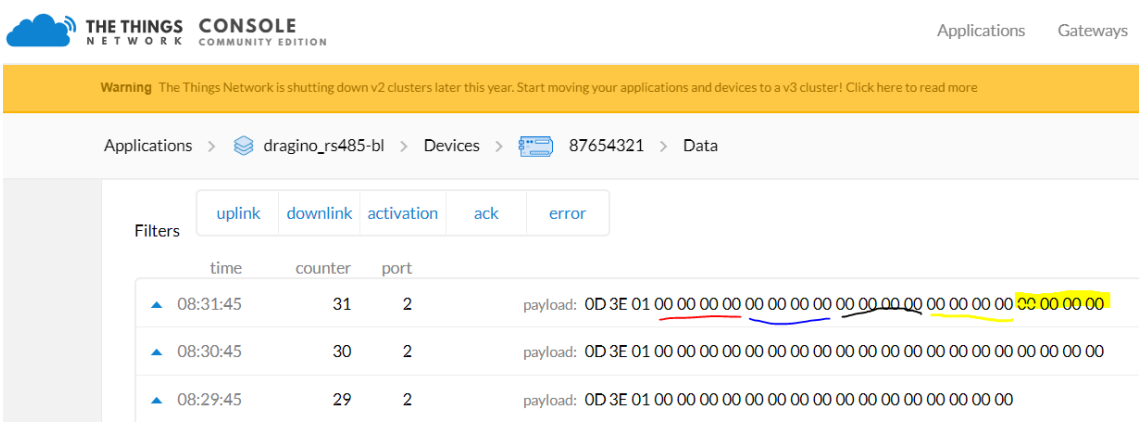
Power Phase 3

Active power phase 3	API3	0xCE-0xCF		W	4

AT+COMMAND5=48 04 00 CE 00 02,1

AT+DATACUT5=9,1,4+5+6+7

```
AT+COMMAND5=48 04 00 CE 00 02,1

OK

AT+DATACUT5=9,1,4+5+6+7

OK
```



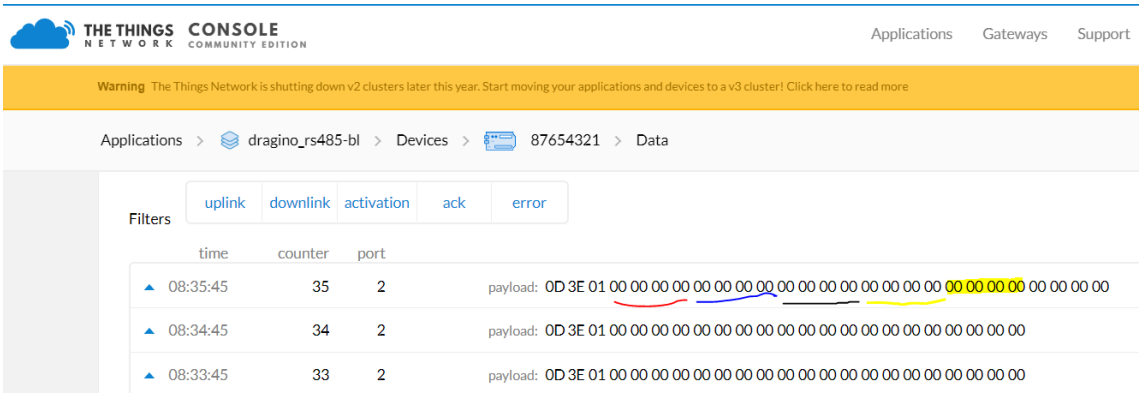
Active energy Phase 3

Active energy phase 3	AE3	0x104-0x105		Wh	4

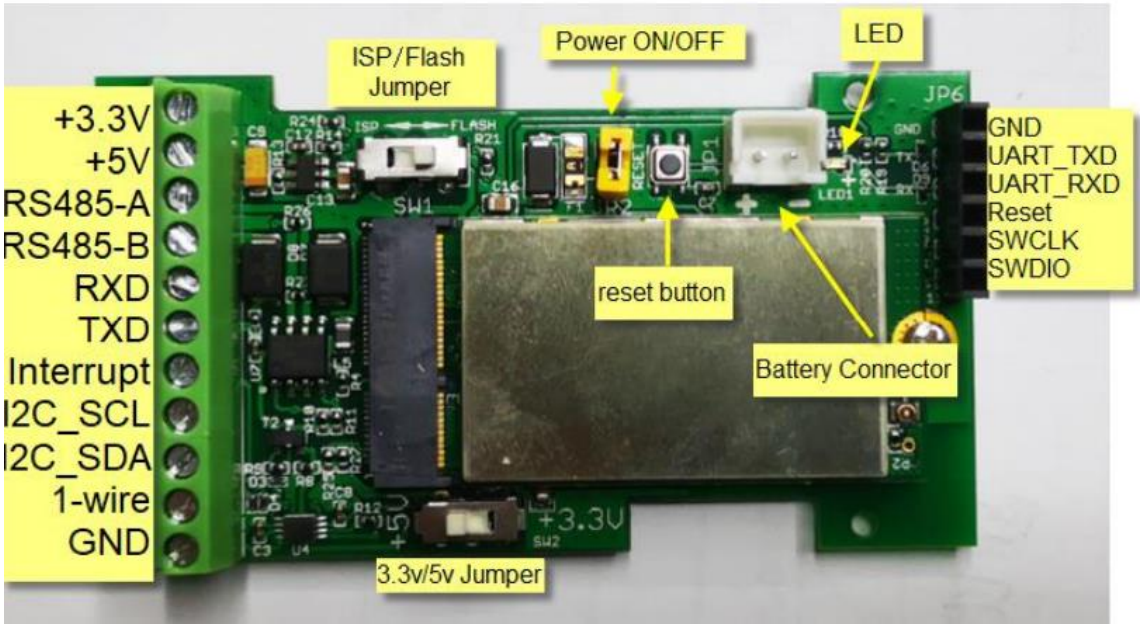
AT+COMMAND6=48 04 01 04 00 02,1

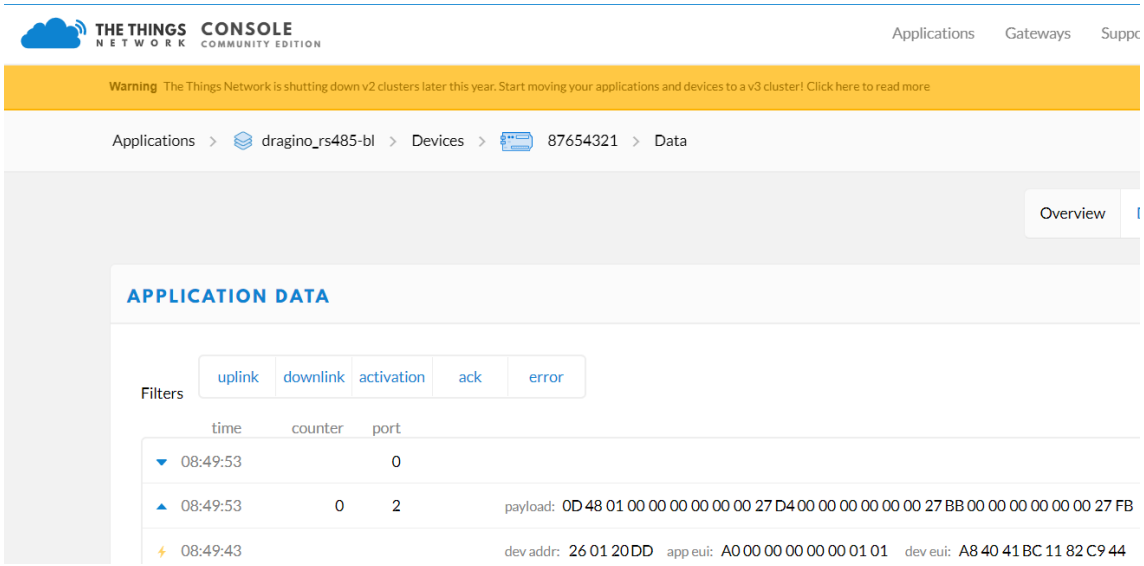
AT+DATACUT6=9,1,4+5+6+7

```
AT+COMMAND6=48 04 01 04 00 02,1

OK

AT+DATACUT6=9,1,4+5+6+7

OK
```



Let’s connect the SEM Three to the Dragino RS485-BL





Here we have the three values of Energy on phase 1, 2 and 3

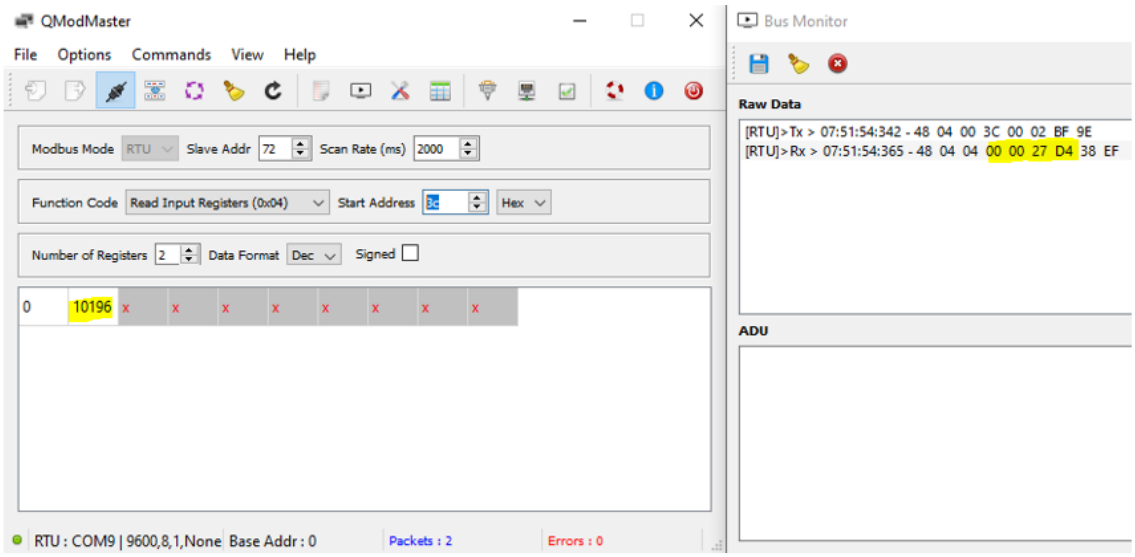
0D4801000000000000027D400000000000027BB00000000000027FB

27 Hex =39 in Decimal

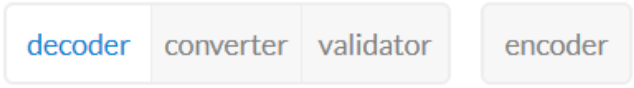
D4 Hex = 212 in Decimal

39*256+212=9984+212=10196 Wath

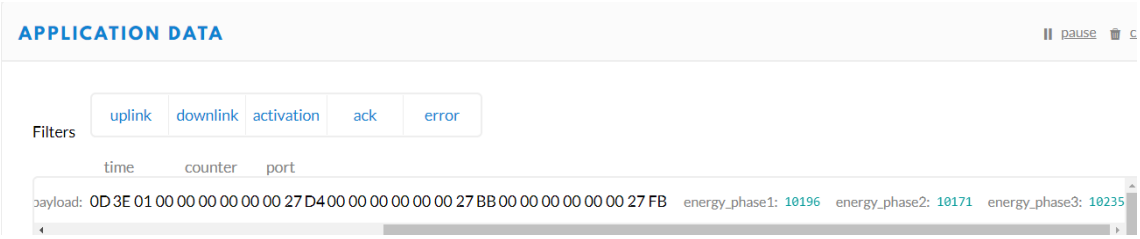
Yes



So we can build the payload decoder




```
function Decoder(bytes, port) {
  // Decode an uplink message from a buffer
  // (array) of bytes to an object of fields.
  var decoded = {};

  if (port === 2) decoded.energy_phase1 = 256*bytes[9]+bytes[10];
  if (port === 2) decoded.energy_phase2 = 256*bytes[17]+bytes[18];
  if (port === 2) decoded.energy_phase3 = 256*bytes[25]+bytes[26];

  return decoded;
}
```



And same with Power

decoder | converter | validator | encoder

```
function Decoder(bytes, port) {
  // Decode an uplink message from a buffer
  // (array) of bytes to an object of fields.
  var decoded = {};
  if (port === 2) decoded.power_phase1 = 256*bytes[5]+bytes[6];
  if (port === 2) decoded.energy_phase1 = 256*bytes[9]+bytes[10];
  if (port === 2) decoded.power_phase2 = 256*bytes[13]+bytes[14];
  if (port === 2) decoded.energy_phase2 = 256*bytes[17]+bytes[18];
  if (port === 2) decoded.power_phase3 = 256*bytes[21]+bytes[22];
  if (port === 2) decoded.energy_phase3 = 256*bytes[25]+bytes[26];

  return decoded;
}
```

Applications > dragino_rs485-bl > Data

Filters uplink downlink activation ack error

time counter port

Payload

```
0D 3C 01 00 00 00 00 00 00 27 D4 00 00 00 00 00 00 27 BB 00 00 00 00 00 00 27 FB
```

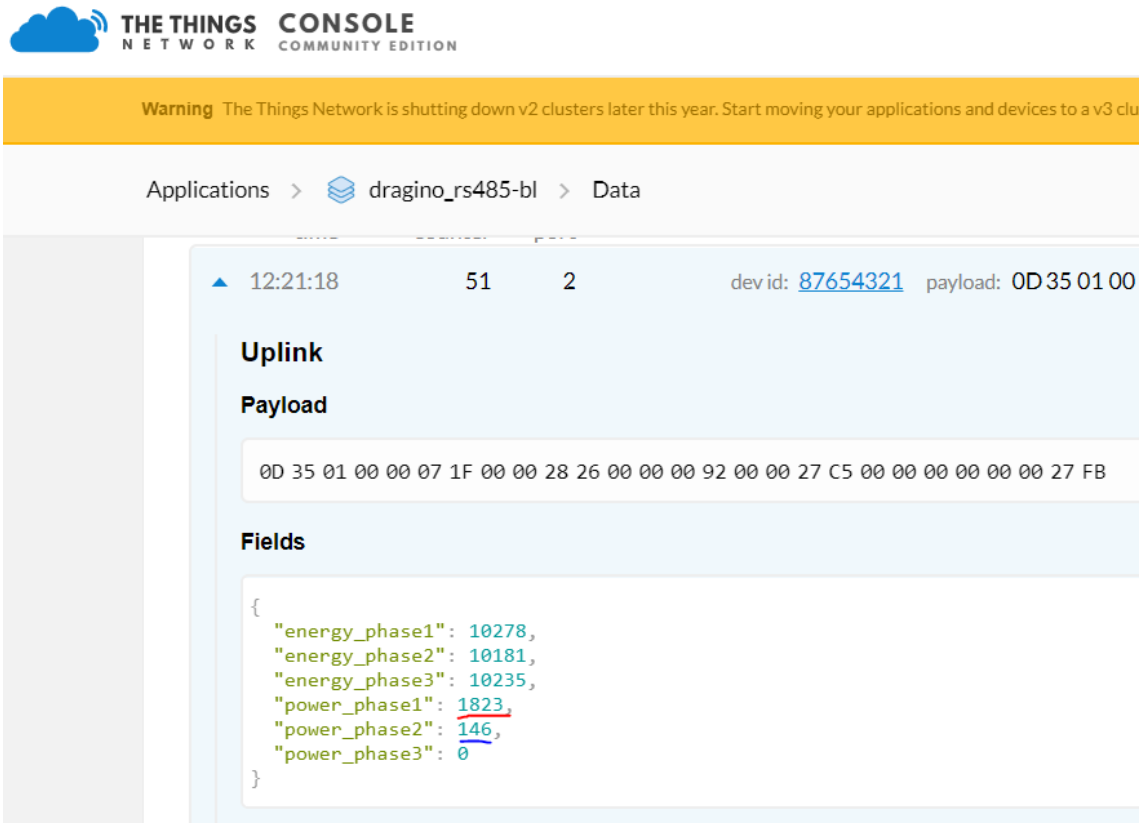
Fields

```
{
  "energy_phase1": 10196,
  "energy_phase2": 10171,
  "energy_phase3": 10235,
  "power_phase1": 0,
  "power_phase2": 0,
  "power_phase3": 0
}
```

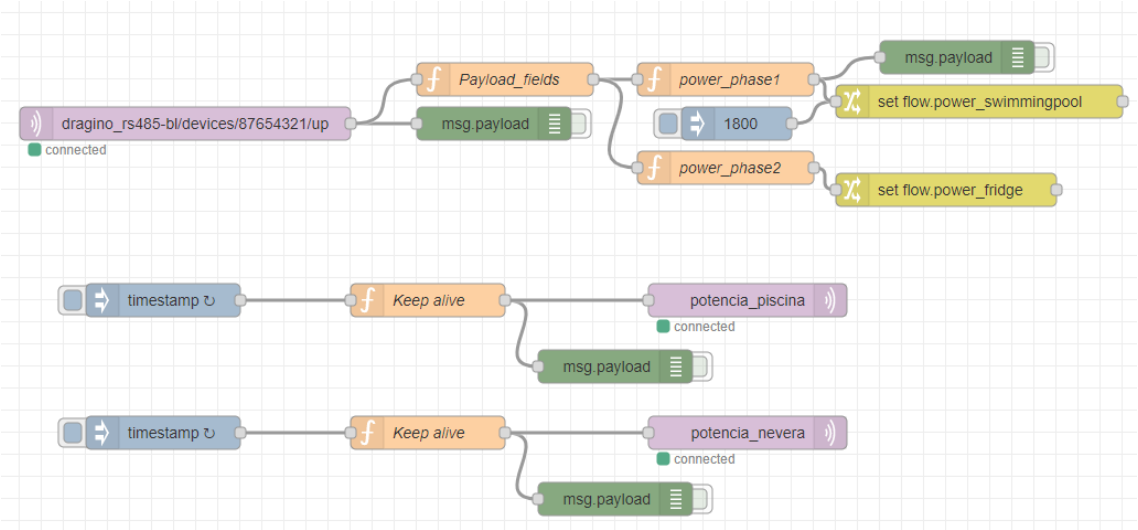
Let’s connect The SEM Three to the instal.lation

Phase 1 is the swimming pool (1800 watts)

Phase 2 is the fridge (7 watts in stantd by, 146 watts with the compressor on)

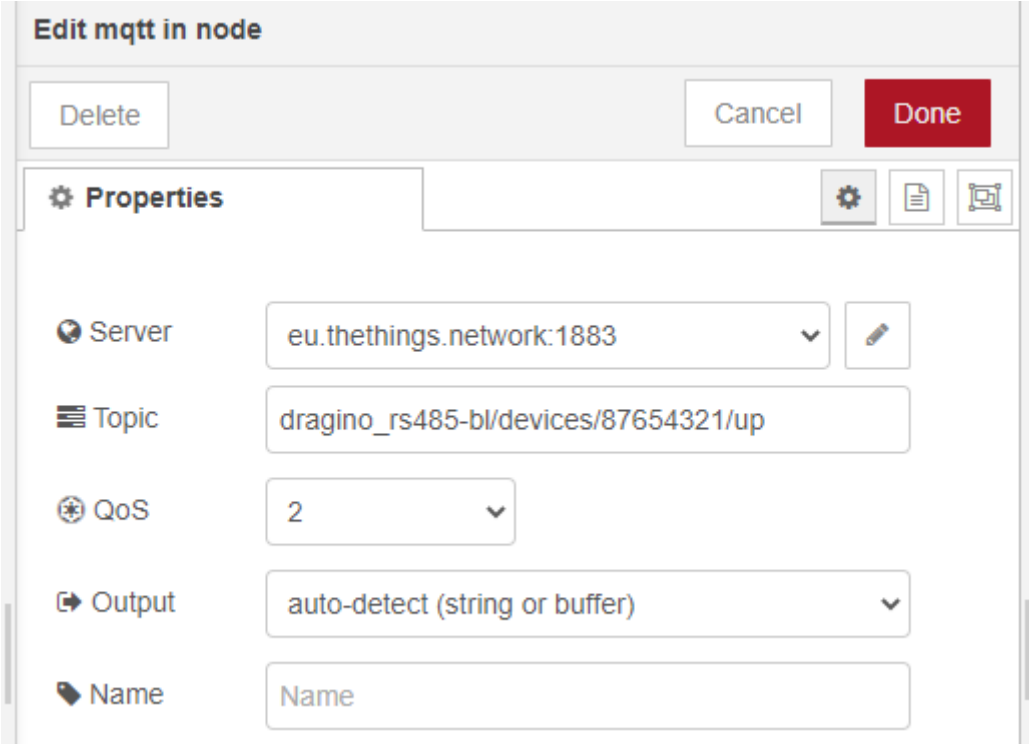


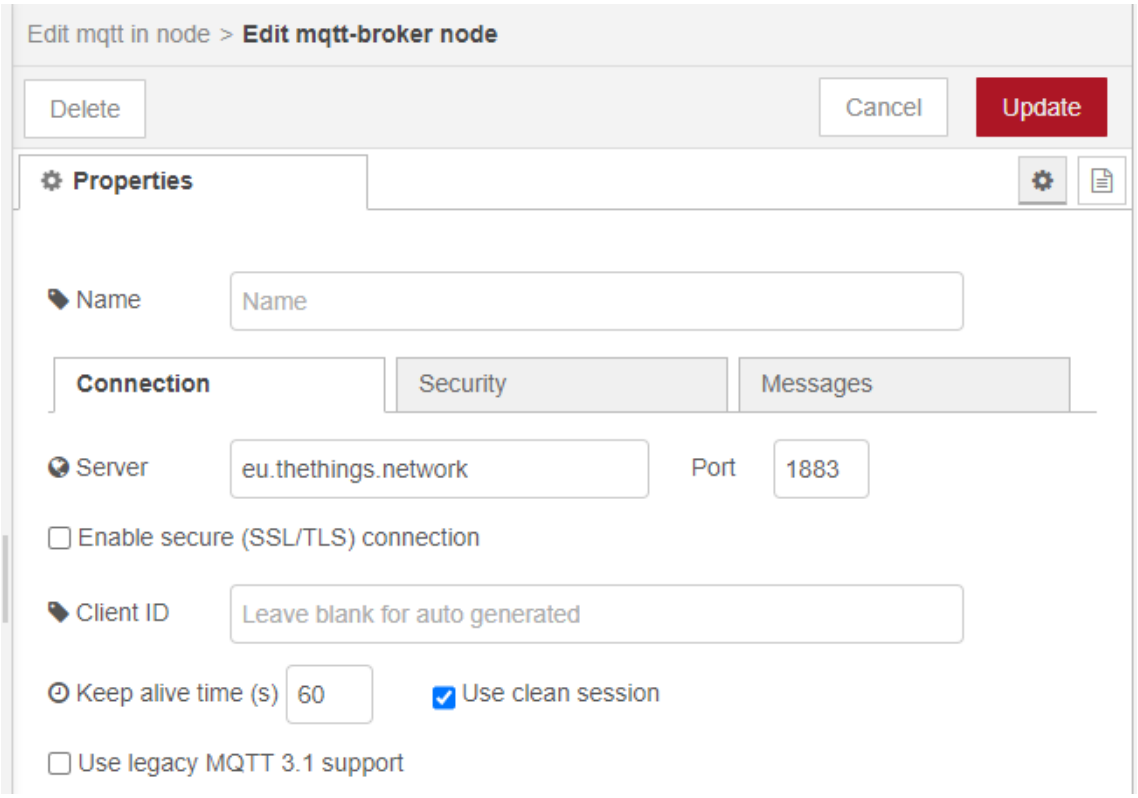
Now let's visualize these values on the mobile pone

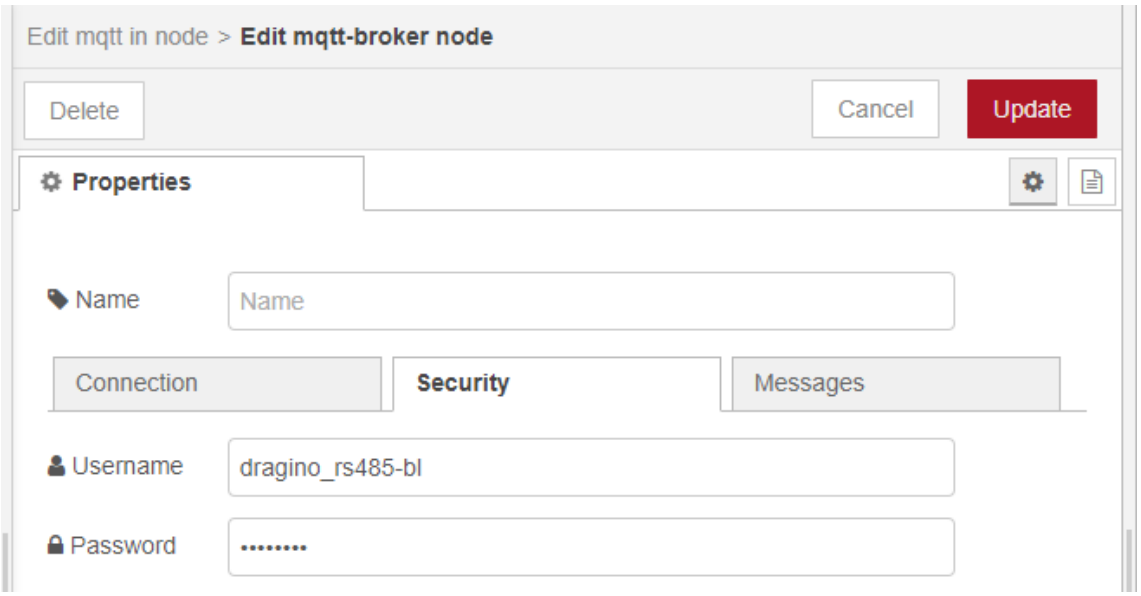


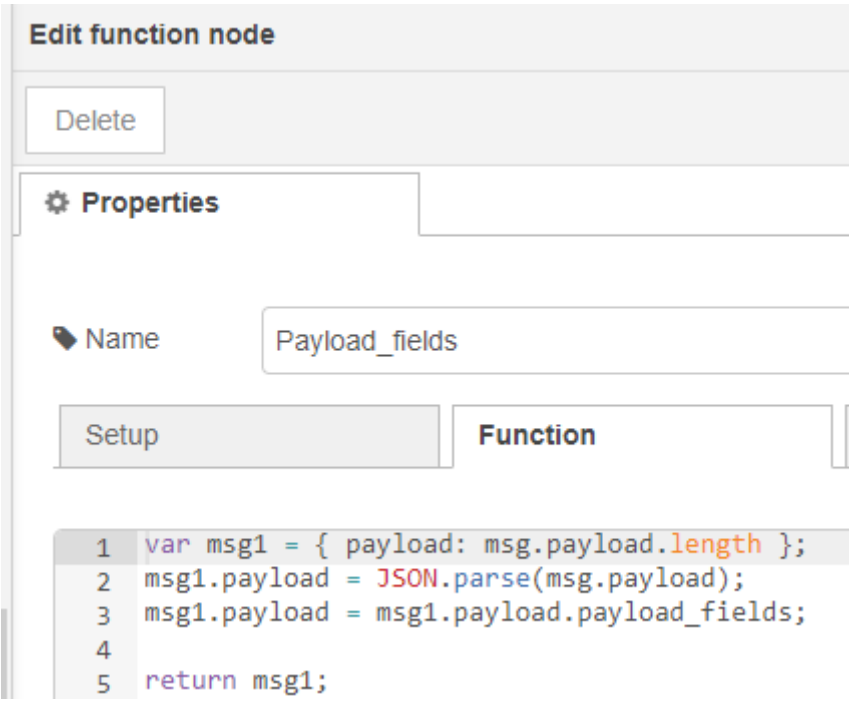
You can find the code here

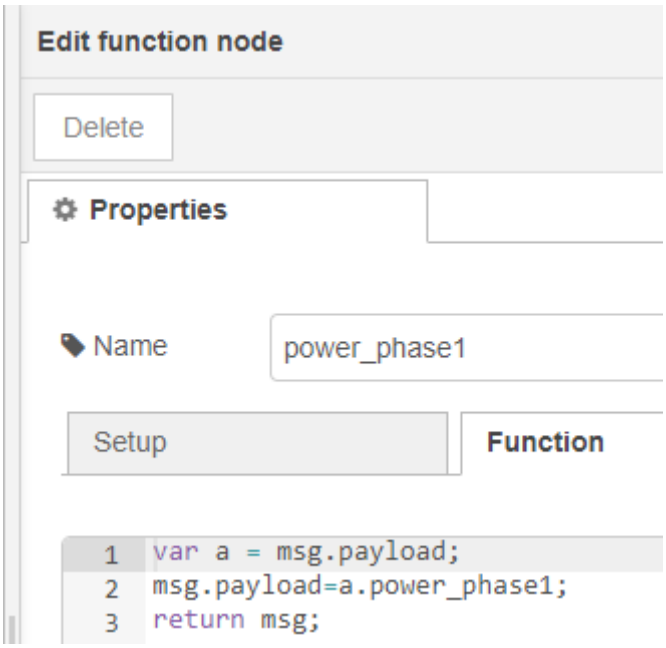
https://github.com/xavierflorensa/SEMthree-Dragino-RS485-BL-power-meter

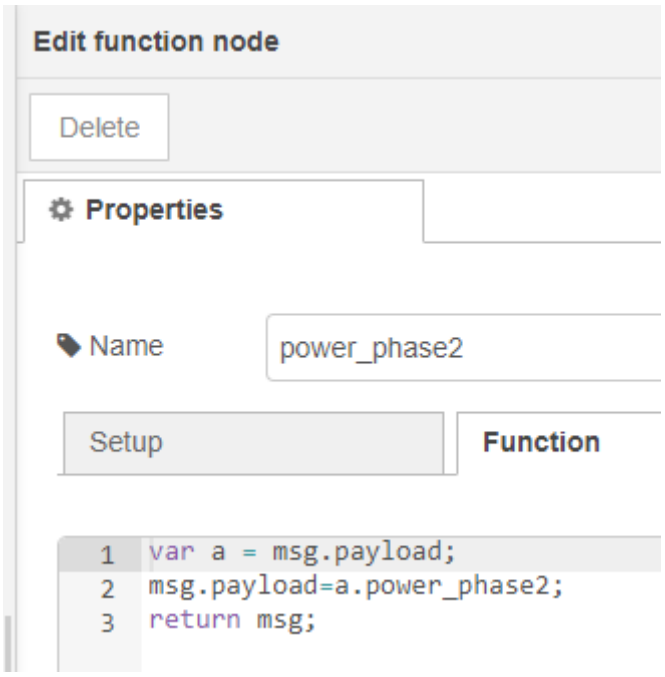

Edit mqtt in node
Delete
Cancel
Done
Properties
Server
eu.thethings.network:1883
Topic
dragino_rs485-bl/devices/87654321/up
QoS
2
Output
auto-detect (string or buffer)
Name
Name

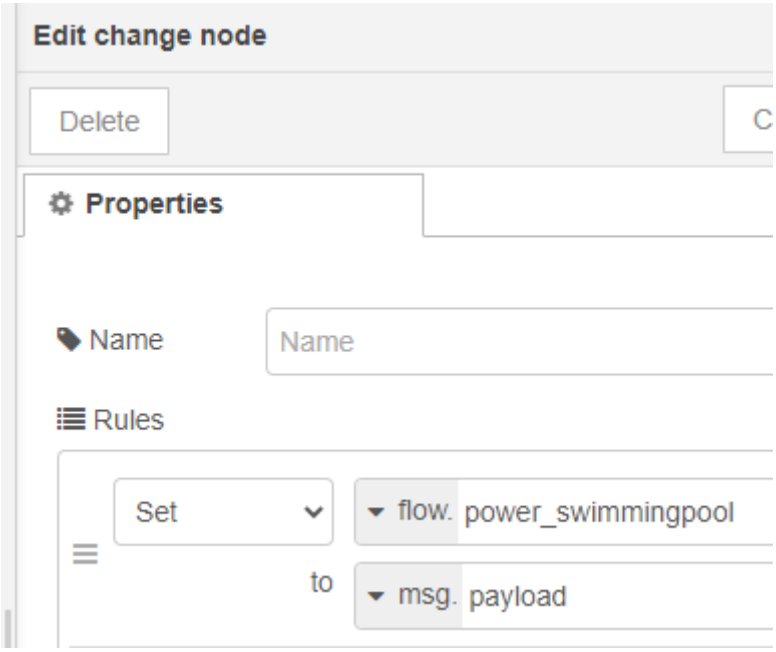

Edit mqtt in node > Edit mqtt-broker node
Delete
Cancel
Update
Properties
Name
Name
Connection
Security
Messages
Server
eu.thethings.network
Port
1883
Enable secure (SSL/TLS) connection
Client ID
Leave blank for auto generated
Keep alive time (s)
60
Use clean session
Use legacy MQTT 3.1 support

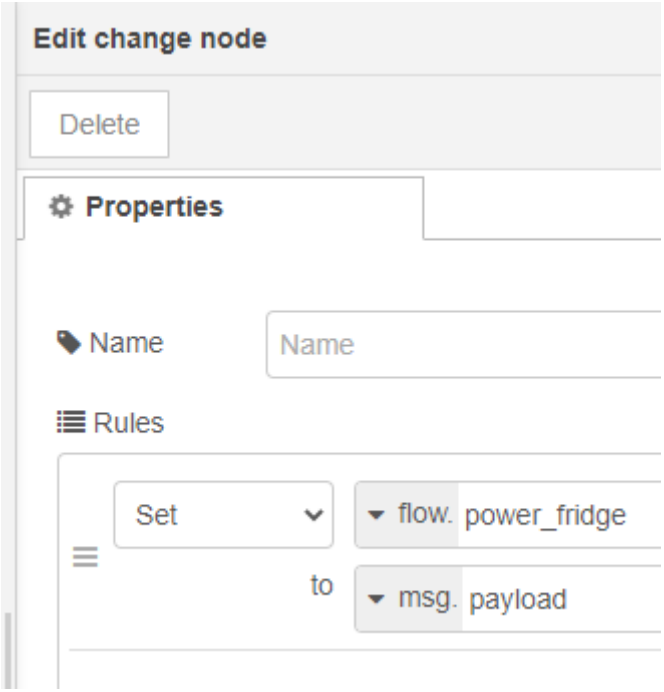

Edit mqtt in node > Edit mqtt-broker node
Delete
Cancel
Update
Properties
Name
Name
Connection
Security
Messages
Username
dragino_rs485-bl
Password
••••••••

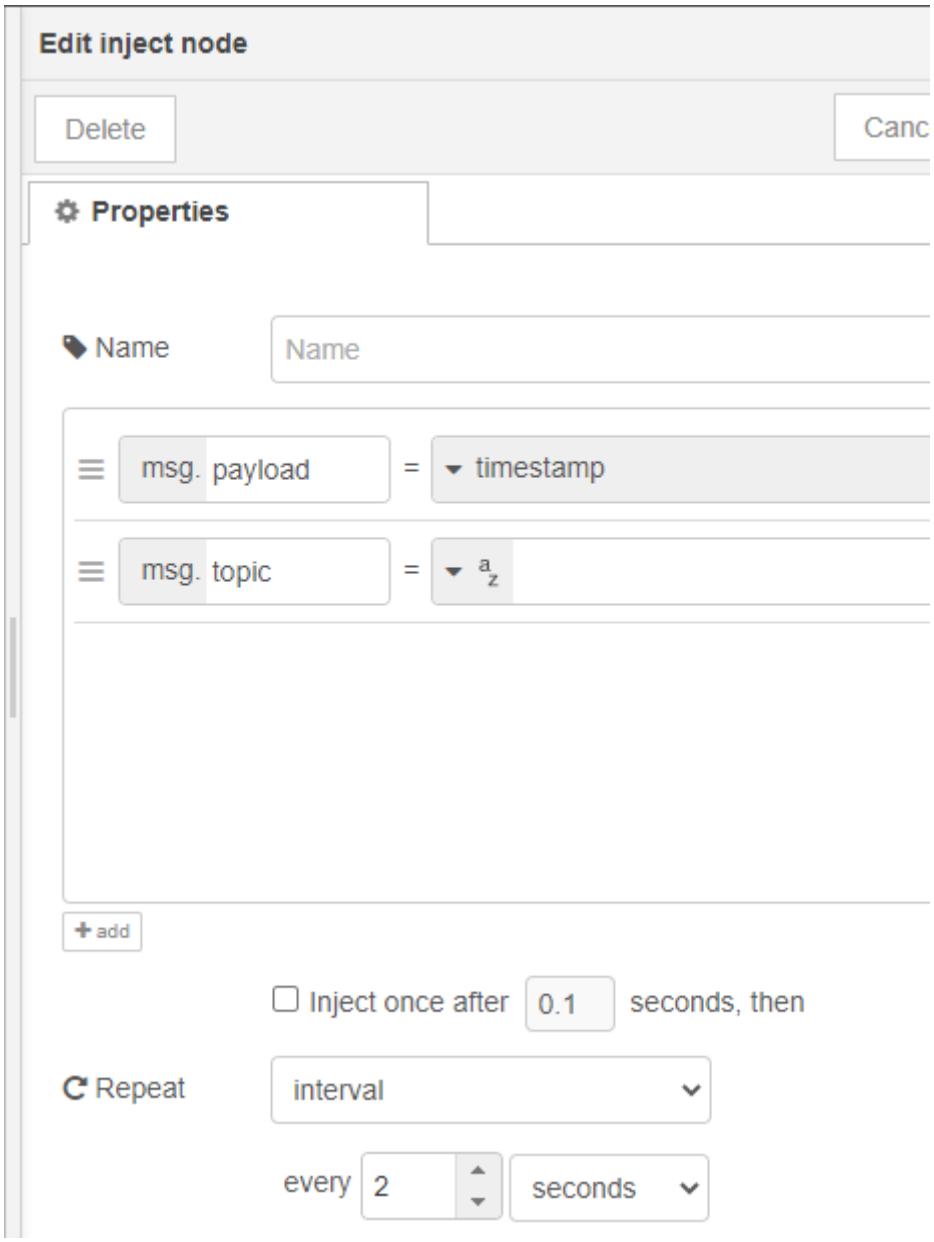

Edit function node
Delete
Properties
Name
Payload_fields
Setup
Function
1 var msg1 = { payload: msg.payload.length };
2 msg1.payload = JSON.parse(msg.payload);
3 msg1.payload = msg1.payload.payload_fields;
4
5 return msg1;

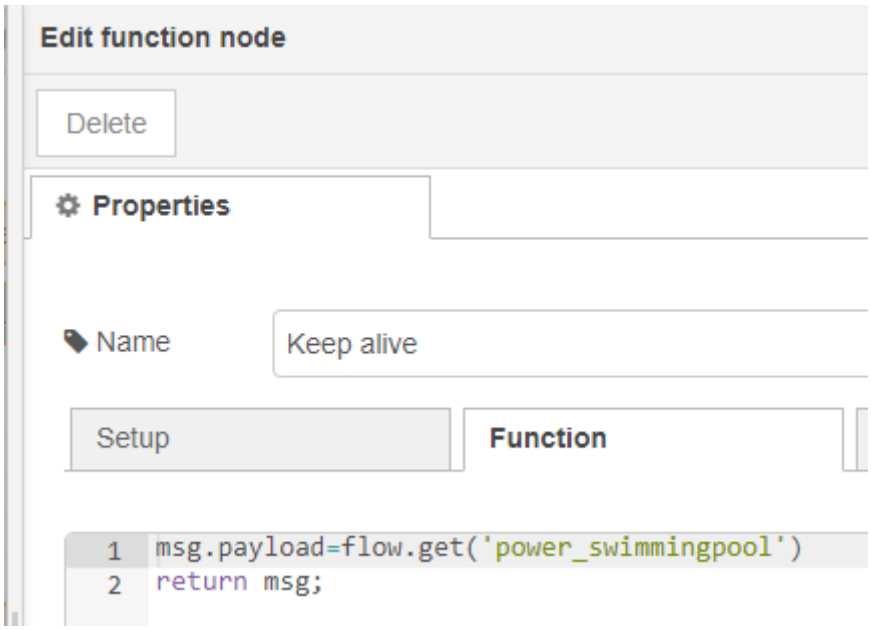

Edit function node
Delete
Properties
Name
power_phase1
Setup
Function
1 var a = msg.payload;
2 msg.payload=a.power_phase1;
3 return msg;

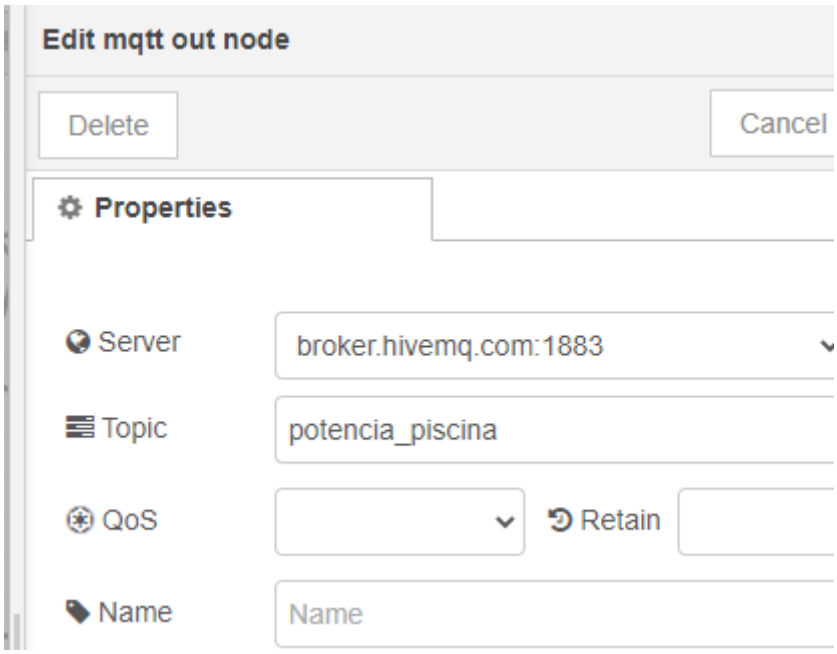

Edit function node
Delete
Properties
Name
power_phase2
Setup
Function
1 var a = msg.payload;
2 msg.payload=a.power_phase2;
3 return msg;

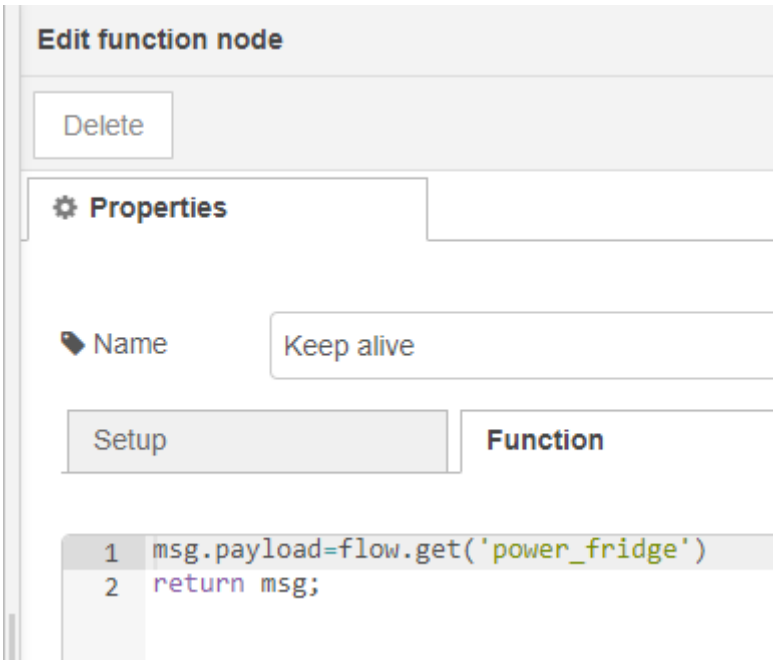

Edit change node
Delete
C
Properties
Name
Name
Rules
Set
flow.
power_swimmingpool
to
msg.
payload

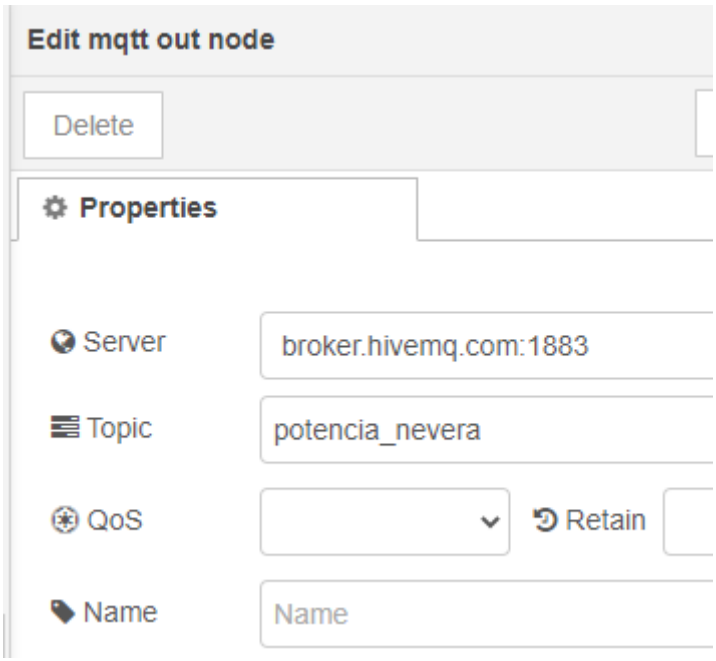

Edit change node
Delete
Properties
Name
Name
Rules
Set
flow.
power_fridge
to
msg.
payload

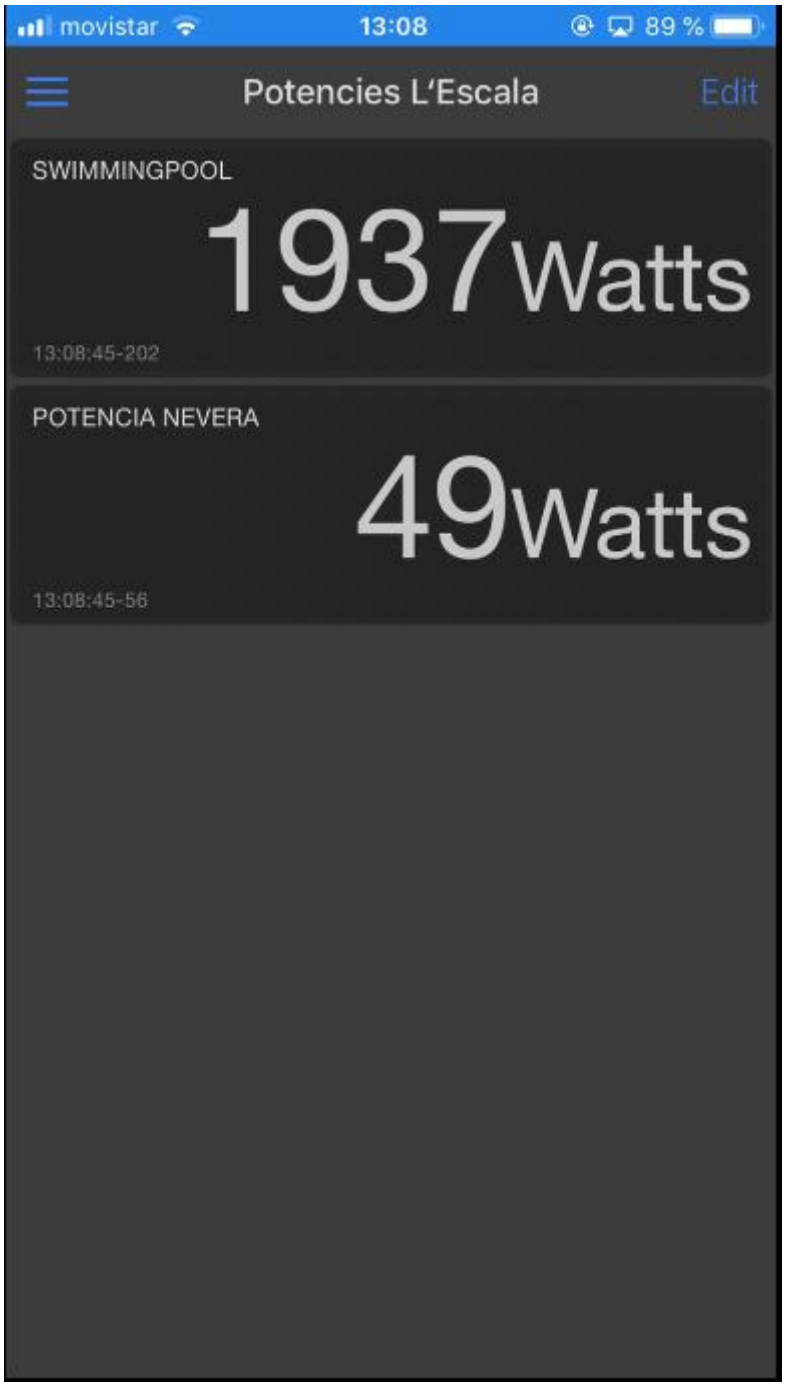

Edit inject node
Delete
Canc
Properties
Name
Name
msg. payload
=
timestamp
msg. topic
=
add
Inject once after
0.1
seconds, then
Repeat
interval
every
2
seconds

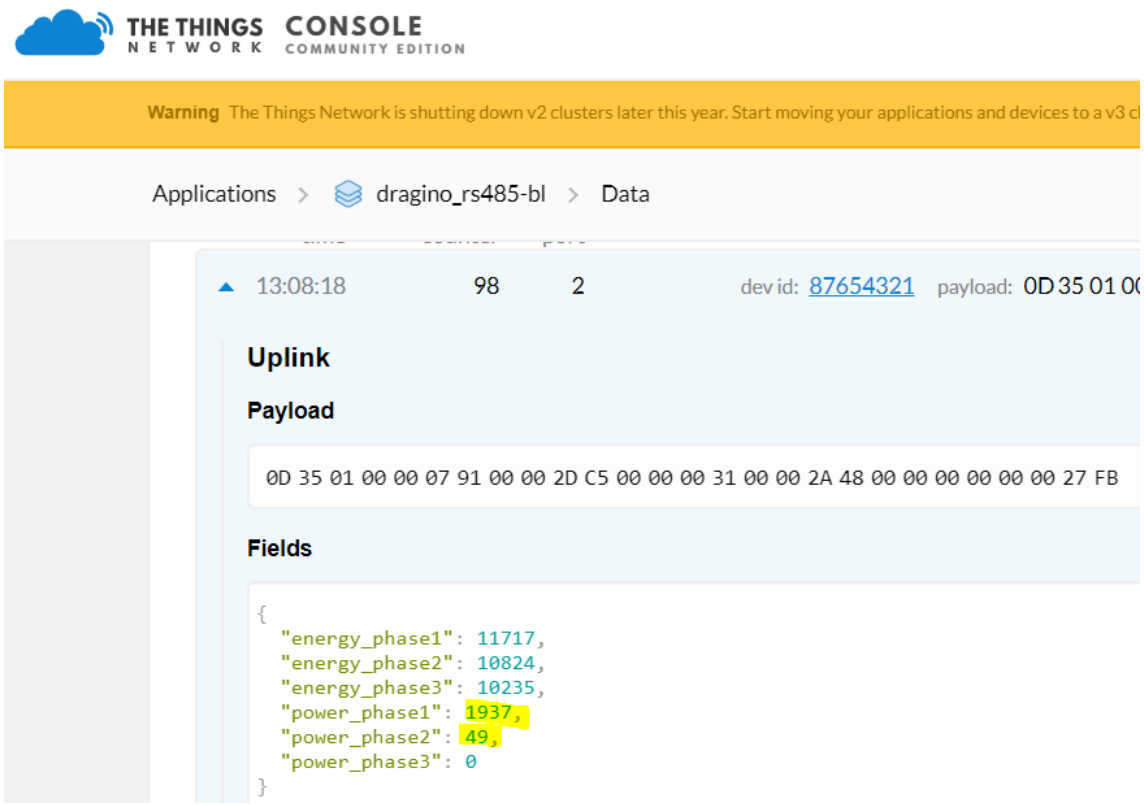

Edit function node
Delete
Properties
Name
Keep alive
Setup
Function
1 msg.payload=flow.get('power_swimmingpool')
2 return msg;


Edit mqtt out node
Delete
Cancel
Properties
Server
broker.hivemq.com:1883
Topic
potencia_piscina
QoS
Retain
Name
Name


Edit function node
Delete
Properties
Name
Keep alive
Setup
Function
1 msg.payload=flow.get('power_fridge')
2 return msg;


Edit mqtt out node
Delete
Properties
Server
broker.hivemq.com:1883
Topic
potencia_nevera
QoS
Retain
Name
Name


movistar
13:08
89 %
Potencies L'Escala
Edit
SWIMMINGPOOL
1937Watts
13:08:45-202
POTENCIA NEVERA
49Watts
13:08:45-56


THE THINGS NETWORK CONSOLE COMMUNITY EDITION
Warning The Things Network is shutting down v2 clusters later this year. Start moving your applications and devices to a v3 cl
Applications > dragino_rs485-bl > Data
13:08:18 98 2 dev id: 87654321 payload: 0D 35 01 0
Uplink
Payload
0D 35 01 00 00 07 91 00 00 2D C5 00 00 00 31 00 00 2A 48 00 00 00 00 00 00 27 FB
Fields
{
"energy_phase1": 11717,
"energy_phase2": 10824,
"energy_phase3": 10235,
"power_phase1": 1937,
"power_phase2": 49,
"power_phase3": 0
}