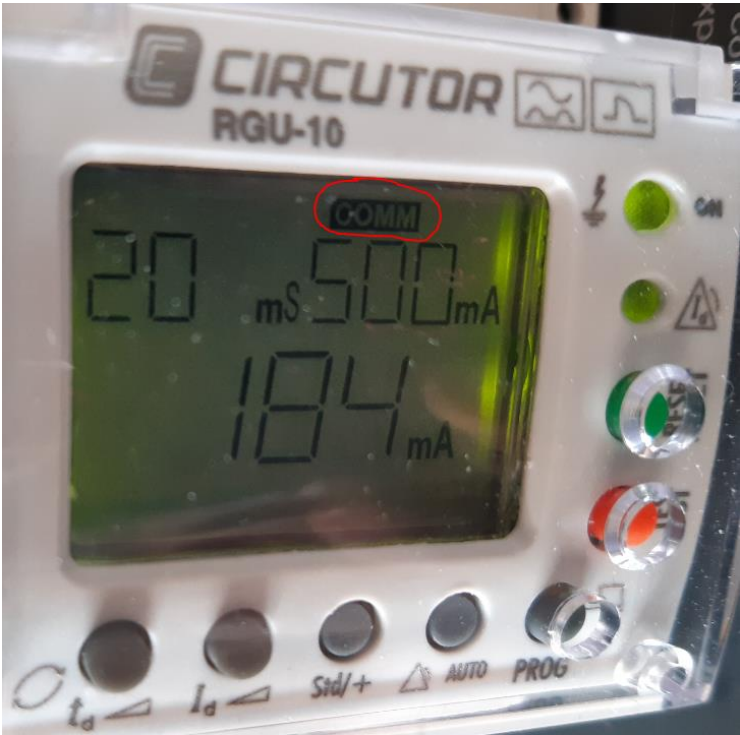


# Dragino RS485 to LoRa test

Let's test with this Modbus device

[RGU10C Circutor](#)



## 6.3.- COMANDOS MODBUS

Todas las direcciones del mapa Modbus están en Hexadecimal.

Tabla 12: Mapa de memoria Modbus.

Parámetro	Símbolo	Dirección	Lectura / Escritura	Valores	Unidades
Nº de periférico	PERI	0000	R/W	1 - 99	-
Velocidad de comunicación	bd	0001	R/W	2400-4800-9600-19200-38400-57600-115200	baudios
Tipo de paridad	PARI	0002	R/W	None - Odd - Even	-
Frecuencia de trabajo	FREC	0003	R/W	50 - 60	Hz
Corriente disparo Relé principal	ld	0004	R/W	0.03 - 0.1 - 0.3 - 0.5 - 1 - 3 - 5 - 10	A
Tiempo de retardo Relé principal	td	0005	R/W	INS - SEL - 0.02 - 0.1 - 0.3 - 0.4 - 0.5 - 0.75 - 1 - 3 - 5 - 10	s
Polaridad contactos Relé principal	Std/+	0006	R/W	Estándar - Positiva	-
Corriente disparo Prealarma	ld'	0007	R/W	OFF - 50 - 60 - 70 - 80	%
Tiempo de retardo Prealarma	td'	0008	R/W	0.02 - 0.1 - 0.2 - 0.3 - 0.4 - 0.5 - 0.75 - 1 - 3 - 5 - 10	s
Polaridad contactos Prealarma	Std/+	0009	R/W	Estándar - Positiva	-
Reconexión prealarma	REC	000A	R/W	Manual - REC	-

Let's read frequency on register 3

04 means read input registers

0003 is the address we read: Frequency

0002 is the byte number (2)

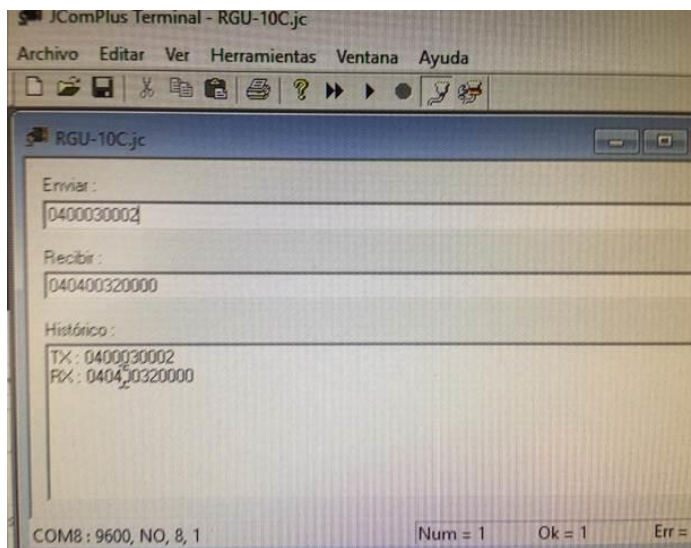
And this is the answer

04 means read input registers

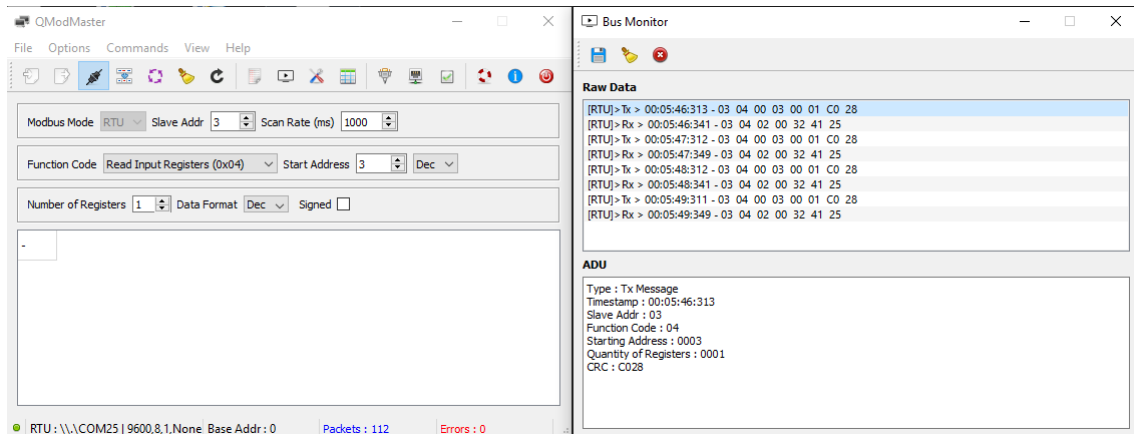
04 is the returned bytes amount, yes 00 32 00 00 (4 bytes)

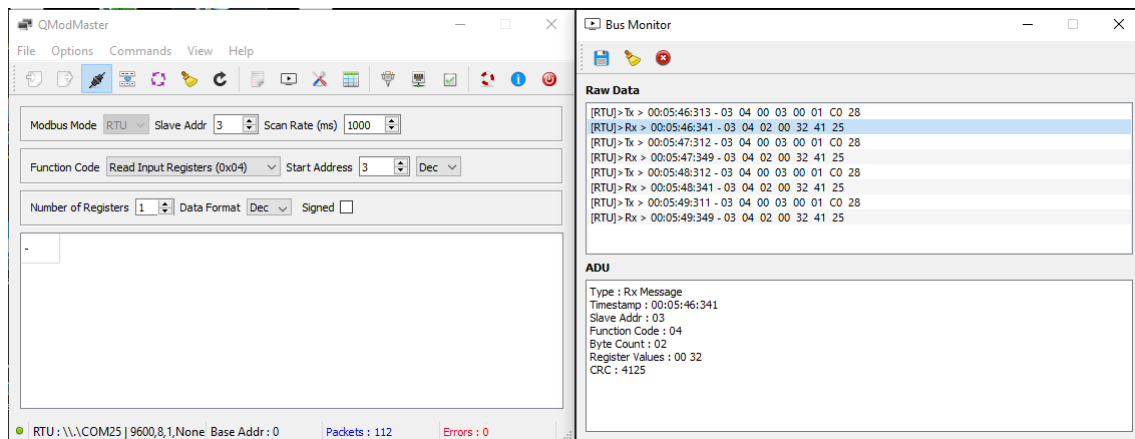
0032 is 50 in decimal, so the working frequency

With Jcom



And in more Depth including CRC





Sys > 22:39:57:938 - Connecting to Serial Port [\\.\COM25]...OK

[RTU]>Tx > 22:40:05:301 - 03 04 00 03 00 01 C0 28

[RTU]>Rx > 22:40:05:326 - 03 04 02 00 32 41 25

[RTU]>Tx > 22:40:06:303 - 03 04 00 03 00 01 C0 28

[RTU]>Rx > 22:40:06:334 - 03 04 02 00 32 41 25

[RTU]>Tx > 22:40:07:304 - 03 04 00 03 00 01 C0 28

[RTU]>Rx > 22:40:07:342 - 03 04 02 00 32 41 25

[RTU]>Tx > 22:40:08:302 - 03 04 00 03 00 01 C0 28

[RTU]>Rx > 22:40:08:333 - 03 04 02 00 32 41 25

Now we try to enter this telegram on the Draguino RS485 to send the answer to TTN

Let's see the response from the Dragino device

Let's connect the programming USB to TTL. This is port 15

Let's open Termite terminal

**Serial port settings**

<b>Port configuration</b> Port: <span>COM15</span> Baud rate: <span>9600</span> Data bits: <span>8</span> Stop bits: <span>1</span> Parity: <span>none</span> Flow control: <span>none</span> Forward: <span>none</span>		<b>Transmitted text</b> <input type="radio"/> Append nothing <input checked="" type="radio"/> Append CR <input type="radio"/> Append LF <input type="radio"/> Append CR-LF <input checked="" type="checkbox"/> Local echo <b>Received text</b> Polling: <span>100</span> ms Max. lines: <span></span> Font: <span>default</span> <input type="checkbox"/> Word wrap	<b>Options</b> <input type="checkbox"/> Stay on top <input checked="" type="checkbox"/> Quit on Escape <input checked="" type="checkbox"/> Autocomplete edit line <input checked="" type="checkbox"/> Keep history <input type="checkbox"/> Close port when inactive <b>Plug-ins</b> <div></div>
---	--	---	---

User interface language: English (en) Cancel OK

Termite 3.4 (by CompuPhase)

COM15 9600 bps, 8N1, no handshake

Settings Clear About Close

```

DRAGINO RS485-LN Device
Image Version: v1.2.2
LoRaWan Stack: DR-LWS-003
Frequency Band: EU868
DevEui= A8 40 41 4C 21 82 1E 85

[1117]***** UpLinkCounter= 0 *****
[1118]TX on freq 868100000 Hz at DR 5
[1184]txDone
[6173]RX on freq 868100000 Hz at DR 5
[6201]rxTimeOut
[7179]RX on freq 869525000 Hz at DR 3
[7219]rxTimeOut

[8154]***** UpLinkCounter= 0 *****
[8155]TX on freq 868300000 Hz at DR 5
[8221]txDone
[13210]RX on freq 868300000 Hz at DR 5
[13238]rxTimeOut
[14216]RX on freq 869525000 Hz at DR 3
[14256]rxTimeOut

[15193]***** UpLinkCounter= 0 *****
[15194]TX on freq 868500000 Hz at DR 5

```

Now let's try to send some AT commands

AT+BAUDR=9600

OK

AT+PARITY=0

OK

Yeah, it is alive!

Let's connect our RGU10C to the RS485-LN

The AT+BAUDR command can set the baud rate;

The AT+PARITY command can set the data verification method;

The example given by your email, the corresponding configuration of the device:

AT+COMMAND1=03 04 00 03 00 01,1

AT+DATA CUT1=7,2,4~5

Sys > 22:39:57:938 - Connecting to Serial Port [\\.\COM25]...OK

[RTU]>Tx > 22:40:05:301 - 03 04 00 03 00 01 C0 28

[RTU]>Rx > 22:40:05:326 - 03 04 02 00 32 41 25

[RTU]>Tx > 22:40:06:303 - 03 04 00 03 00 01 C0 28

[RTU]>Rx > 22:40:06:334 - 03 04 02 00 32 41 25

[RTU]>Tx > 22:40:07:304 - 03 04 00 03 00 01 C0 28

[RTU]>Rx > 22:40:07:342 - 03 04 02 00 32 41 25

[RTU]>Tx > 22:40:08:302 - 03 04 00 03 00 01 C0 28

[RTU]>Rx > 22:40:08:333 - 03 04 02 00 32 41 25

AT+COMMAND1=03 04 00 03 00 01,1

AT+DATA CUT1=7,2,4~5

Give the commands to program the transactions

The example given by your email, the corresponding configuration of the device:

AT+COMMAND1=03 04 00 03 00 01,1

## AT+COMMAND1

AT+COMMANDx=XX XX XX XX XX XX XX XX XX XX XX XX,m

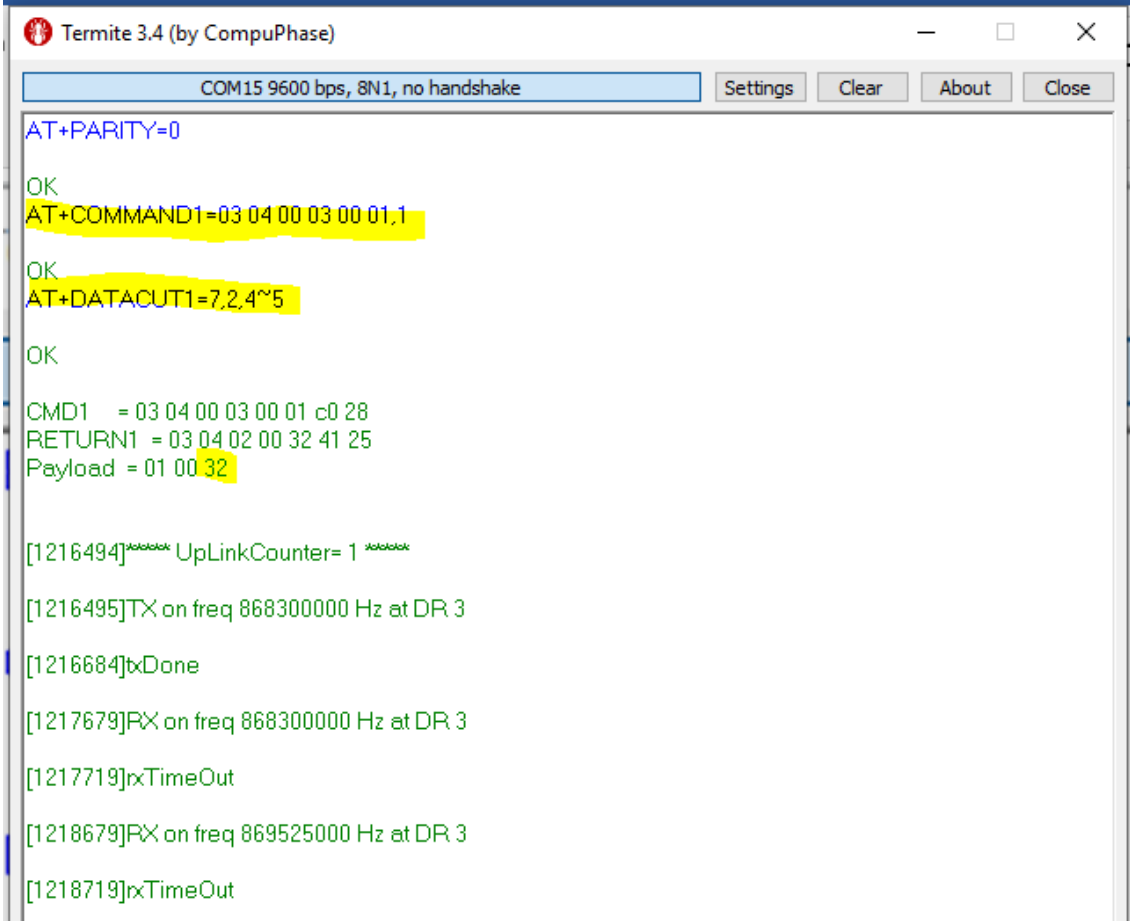
XX XX XX XX XX XX XX XX XX XX XX XX: The RS485 command to be sent

m: 0: no CRC, 1: add CRC-16/MODBUS in the end of this command

## AT+DATACUT1=7,2,4~5

AT+DATACUTx=a,b,c

- ✧ a: length for the return of AT+COMMAND
- ✧ b:1: grab valid value by byte, max 6 bytes. 2: grab valid value by bytes section, max 3 sections.
- ✧ c: define the position for valid value.



```
Termit 3.4 (by CompuPhase)
COM15 9600 bps, 8N1, no handshake
Settings Clear About Close

AT+PARITY=0
OK
AT+COMMAND1=03 04 00 03 00 01,1
OK
AT+DATACUT1=7,2,4~5
OK

CMD1  = 03 04 00 03 00 01 c0 28
RETURN1 = 03 04 02 00 32 41 25
Payload = 01 00 32

[1216494]***** UpLinkCounter= 1 *****
[1216495]TX on freq 868300000 Hz at DR 3
[1216684]txDone
[1217679]RX on freq 868300000 Hz at DR 3
[1217719]rxTimeOut
[1218679]RX on freq 869525000 Hz at DR 3
[1218719]rxTimeOut
```

It Works!

APPLICATION DATA									
Filters									
<div> <div>uplink</div> <div>downlink</div> <div>activation</div> <div>ack</div> <div>error</div> </div>									
	time	counter	port						
▲	24:15:30	1	2	payload: 01 00 32					
▼	24:05:23		0						
▲	24:05:22	0	2	retry	payload: 01				
⚡	24:05:13			dev addr:	26 01 58 AC	app eui:	A8 40 41 D1 71 82 1E 85	dev eui:	A8 40 41 4C 21 82 1E 85
⚡	23:59:13			dev addr:	26 01 48 98	app eui:	A8 40 41 D1 71 82 1E 85	dev eui:	A8 40 41 4C 21 82 1E 85

And even gets periodically each 10 minutes

APPLICATION DATA				
Filters				
uplink	downlink	activation	ack	error
time	counter	port		
▲ 24:25:21	2	2	payload: 01 00 32	
▲ 24:15:30	1	2	payload: 01 00 32	

## APPLICATION DATA

Filters

uplink

downlink

activation

ack

error

time

counter

port

▲ 24:25:21      2      2      payload: 01 00 32

### Uplink

#### Payload

01 00 32



#### Fields

*no fields*

#### Metadata

```
{
  "time": "2020-09-18T22:25:21.206797562Z",
  "frequency": 868.3,
  "modulation": "LORA",
  "data_rate": "SF9BW125",
  "coding_rate": "4/5",
  "gateways": [
    {
      "gtw_id": "eui-b827ebfffe09b11d",
      "timestamp": 1327912652,
      "time": "",
      "channel": 1,
      "rssi": -71,
      "snr": 10.2
    }
  ]
}
```

#### Estimated Airtime

103.424 ms



APPLICATION DATA				
Filters	uplink	downlink	activation	ack
	error			
	time	counter	port	
▲	24:25:21	2	2	payload: 01 00 32
▲	24:15:30	1	2	payload: 01 00 32

Now let's try to change the period from 60 seconds (default) to 10 seconds  
From the program terminal

```
AT+TDC=10000
OK
```

Nothing changes  
We have to reset or power off and on the Dragino device  
Not we have a periodo f 10 seconds

APPLICATION DATA					pause		🗑
Filters	uplink	downlink	activation	ack	error		
	time	counter	port				
▲	01:08:27	3	2	dev id: <a href="#">87654321</a>	payload: 01 00 32		
▲	01:08:17	2	2	dev id: <a href="#">87654321</a>	payload: 01 00 32		
▲	01:08:07	1	2	dev id: <a href="#">87654321</a>	payload: 01 00 32		
▼	01:08:01		0	dev id: <a href="#">87654321</a>			
▲	01:07:59	0	2	dev id: <a href="#">87654321</a>	payload: 01 00 32		
⚡	01:07:50			dev id: <a href="#">87654321</a>	dev addr: 26 01 26 F4   app eui: A8 40 41 D1 71 82 1E 85   dev eui: A8 40 41 4C 21 82		
▲	01:05:08	1	2	dev id: <a href="#">87654321</a>	payload: 01 00 32		
▼	24:55:12		0	dev id: <a href="#">87654321</a>			

Let's see how to change the programmed transmission  
Now we will try read on register 4 (This is the preset trip current)

From serial Terminal  
AT+COMMAND1=03 04 00 04 00 01,1

Yes

AT+COMMAND1=03 04 00 04 00 01,1

OK

CMD1 = 03 04 00 04 00 01 71 e9

RETURN1 = 03 04 02 00 05 00 f3

Payload = 01 00 05

[1169427]\*\*\*\*\* UpLinkCounter= 117 \*\*\*\*\*

[1169428]TX on freq 867100000 Hz at DR 5

[1169484]txDone

[1170473]RX on freq 867100000 Hz at DR 5

[1170501]rxTimeOut

[1171479]RX on freq 869525000 Hz at DR 3

[1171519]rxTimeOut

Yes now we get 5 corresponding to 3.0 A  
Since the possible values are

Corriente disparo Relé principal	Id	0004	R/W	0.03 - 0.1 - 0.3 - 0.5 - 1 - 3 - 5 - 10	A
----------------------------------	----	------	-----	--	---

Now we change the preset on the leak circuit breaker relay to 0.03 (30mA)  
Yes, 0 is 30mA!

## APPLICATION DATA

Filters					
uplink   downlink   activation   ack   error					
time		counter	port		
▲	01:31:17	142	2	dev id: <a href="#">87654321</a>	payload: 01 00 00
▲	01:31:17	141	2	dev id: <a href="#">87654321</a>	payload: 01 00 05
▲	01:31:01	140	2	dev id: <a href="#">87654321</a>	payload: 01 00 05

Finally we disconnect the RS485 cable from The leakage really RGU10 and we get the following result

## APPLICATION DATA

Filters					
<a href="#">uplink</a> <a href="#">downlink</a> <a href="#">activation</a> <a href="#">ack</a> <a href="#">error</a>					
	time	counter	port		
▲	01:41:17	203	2	dev id: <a href="#">87654321</a>	payload: 01 00 00
▼	01:41:10		0	dev id: <a href="#">87654321</a>	
▲	01:41:08	201	2	dev id: <a href="#">87654321</a>	payload: 01 00 00
▼	01:41:09		0	dev id: <a href="#">87654321</a>	
▲	01:40:57	200	2	dev id: <a href="#">87654321</a>	payload: 01 00 00
▼	01:40:55		0	dev id: <a href="#">87654321</a>	
▲	01:40:53	199	2	dev id: <a href="#">87654321</a>	payload: 01 00 00
▲	01:40:37	198	2	dev id: <a href="#">87654321</a>	payload: 01 00 00

Obvious since there is no one listening at address 3  
But the payload is made of bytes 4 and 5

```
CMD1   = 03 04 00 04 00 01 71 e9
RETURN1 = 00 00 00 00 00 00 00
Payload = 01 00 00
```

```
[1909002]***** UpLinkCounter= 192 *****
```

```
[1909003]TX on freq 868300000 Hz at DR 5
```

```
[1909059]txDone
```

```
[1910048]FX on freq 868300000 Hz at DR 5
```

```
[1910077]rxTimeOut
```

```
[1911054]FX on freq 869525000 Hz at DR 3
```

```
[1911094]rxTimeOut
```

```
CMD1   = 03 04 00 04 00 01 71 e9
RETURN1 = 00 00 00 00 00 00 00
Payload = 01 00 00
```

## Variable Speed drive and Dragino RS485 to Lora for Monitoring

### Salicru CV30 VFD

Now we want to read the speed of a VFD

Our VFD is on address 1

9600 bauds

No Parity, 8 bits, 1 stop bit: N,8,1

Reading the speed on register:

Velocidad de operación	3005H	Rango: 0~65535 RPM	R
------------------------	-------	--------------------	---

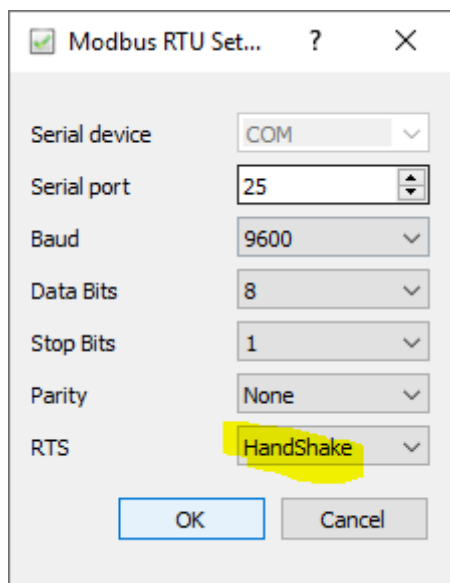
Parameter 12293 in decimal is 3005 in Hex

First we try with qModMaster terminal, in order to find out the right parameters

Connecting the VFD to the computer with a RS-485 to USB converter

Yes, we have the VFD stopped, with 0 speed as we see here 00 00 RPM

If you do not set the RTS to Handshake you will get an error



### Raw Data

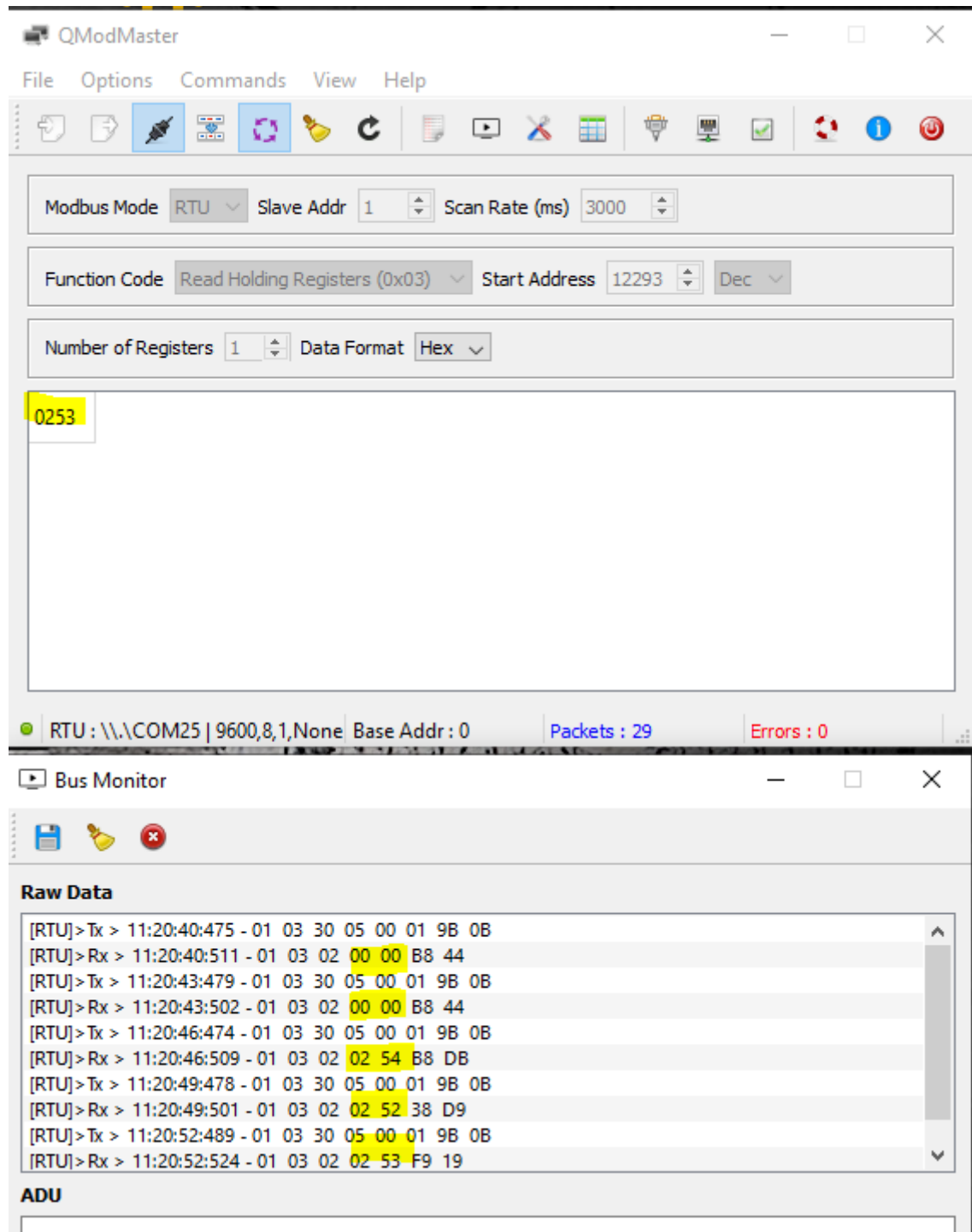
```
[RTU]>Tx > 11:20:40:475 - 01 03 30 05 00 01 9B 0B
[RTU]>Rx > 11:20:40:511 - 01 03 02 00 00 B8 44
[RTU]>Tx > 11:20:43:479 - 01 03 30 05 00 01 9B 0B
[RTU]>Rx > 11:20:43:502 - 01 03 02 00 00 B8 44
```

Then we start the motor manually with a digital input on the drive (speed is controlled by Modbus)

We see

595 RPM (0253 Hex)

It Works!



So now we know the right command to programm to The Dragino RS-485 transactions

And this is:

AT+COMMAND1=01 03 30 05 00 01,1

AT+DATAUT1=7,2,4~5 (But this was already programmed on the Dragino so we do not need to resend this AT command)

Yes, we have already programmed the Dragino, but the response is still 000000000 since we have not connected the VFD to the Dragino

```
AT+COMMAND1=01 03 30 05 00 01,1
OK
CMD1  = 01 03 30 05 00 01 9b 0b
RETURN1 = 00 00 00 00 00 00 00
Payload = 01 00 00

[209427]***** UpLinkCounter= 20 *****
[209428]TX on freq 867900000 Hz at DR 3
[209597]txDone
[210592]RX on freq 867900000 Hz at DR 3
[210632]rxTimeOut
```

Let's connect the VFD to Dragino RS-485-LN

Voilà,

First drive stopped, and the drive started at speed 02 54 in Hex (595 RPM in decimal)

APPLICATION DATA						
Filters	<div>uplinkdownlinkactivationackerror</div>					
	time	counter	port			
▲	11:41:32	57	2	dev id: <a href="#">87654321</a>	payload: 01 02 54	
▲	11:41:22	56	2	dev id: <a href="#">87654321</a>	payload: 01 02 54	
▲	11:41:12	55	2	dev id: <a href="#">87654321</a>	payload: 01 02 55	
▲	11:41:02	54	2	dev id: <a href="#">87654321</a>	payload: 01 00 00	
▲	11:40:52	53	2	dev id: <a href="#">87654321</a>	payload: 01 00 00	

CMD1 = 01 03 30 05 00 01 9b 0b  
RETURN1 = 01 03 02 00 00 b8 44  
Payload = 01 00 00

[429427] UpLinkCounter= 42

[429428]TX on freq 868300000 Hz at DR 3

[429597]txDone

[430592]RX on freq 868300000 Hz at DR 3

[430632]rxTimeOut

[431592]RX on freq 869525000 Hz at DR 3

[431632]rxTimeOut

CMD1 = 01 03 30 05 00 01 9b 0b  
RETURN1 = 01 03 02 02 54 b8 db  
Payload = 01 02 54

## APPLICATION DATA

Filters

uplink downlink activation ack error

	time	counter	port	
▲	11:41:32	57	2	dev id: <a href="#">87654321</a> payload: 01 02 54
▲	11:41:22	56	2	dev id: <a href="#">87654321</a> payload: 01 02 54
▲	11:41:12	55	2	dev id: <a href="#">87654321</a> payload: 01 02 55
▲	11:41:02	54	2	dev id: <a href="#">87654321</a> payload: 01 00 00
▲	11:40:52	53	2	dev id: <a href="#">87654321</a> payload: 01 00 00



But let's decode the payload since it is in Hex



## APPLICATION DATA

Filters uplink downlink activation ack error

	time	counter	port			
▲	12:39:22	271	2	dev id: <a href="#">87654321</a>	payload: 01 00 00	rpm: 0
▲	12:39:12	270	2	dev id: <a href="#">87654321</a>	payload: 01 02 54	rpm: 596
▲	12:39:02	269	2	dev id: <a href="#">87654321</a>	payload: 01 00 00	rpm: 0

This is the payload decoder

## PAYLOAD FORMATS

### Payload Format

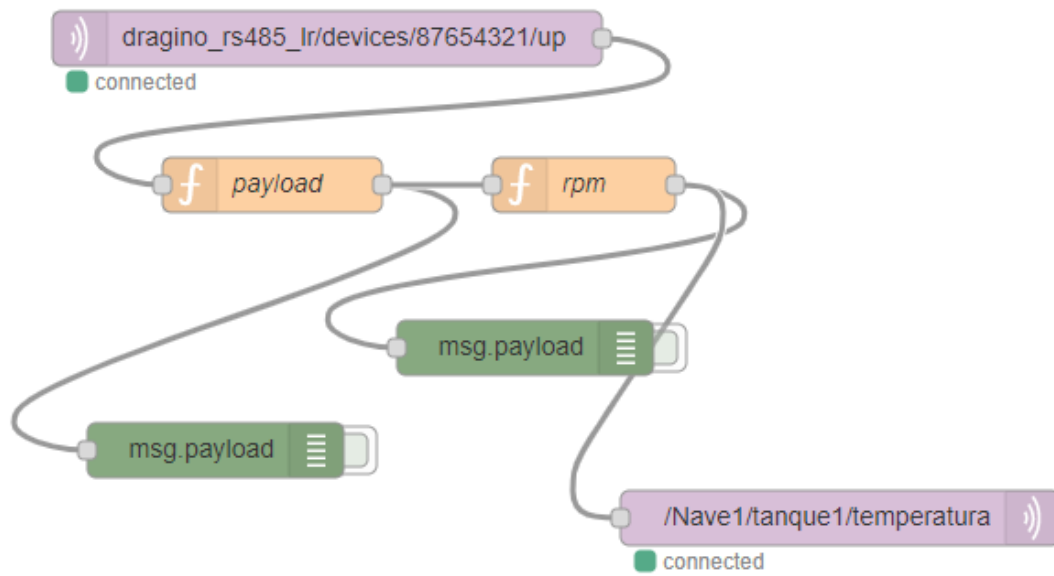
The payload format sent by your devices

Custom

decoder converter validator encoder

```
1 function Decoder(bytes, port) {  
2   // Decode an uplink message from a buffer  
3   // (array) of bytes to an object of fields.  
4   var decoded = {};  
5  
6   if (port === 2) decoded.rpm = bytes[1]*256+bytes[2];  
7  
8   return decoded;  
9 }
```

How to send the speed values to a mobile phone with “IoT On Off  
“ App



**Edit mqtt in node**

Delete

Cancel

Done

**Properties**

Server

eu.thethings.network

Topic

dragino\_rs485\_lr/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

eu.thethings.network

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

eu.thethings.network

Connection

Security

Messages

👤 Username

dragino\_rs485\_lr

🔒 Password

.....

Edit function node

Delete

Cancel

Done

⚙️ Properties

⚙️

📄

🔗

🔑 Name

payload

📄

▼

🔧 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

Cancel

Done

⚙️ Properties

⚙️

📄

🔗

🔑 Name

rpm

📄

▼

🔧 Function

↗️

1

var a = msg.payload;

2

msg.payload=a.rpm;

3

return msg;

Edit mqtt out node

Delete
Cancel
Done

Properties

Server
broker.hivemq.com:1883

Topic
/Nave1/tanque1/temperatura

QoS
Retain

Name
Name

Tip: Leave topic, qos or retain blank if you want to set them via msg properties.

You can find the Node-RED code here:

<https://github.com/xavierflorensa/Salicru-VFD-Dragino-RS485-to-LoRaWAN-to-IOT-OnOff-App-Node-RED-flow>

## How to change the speed from TTN downlink message injection

<a href="#">Configure AT+COMMANDx or AT+DATACUTx</a>	AF	Dynamic
AF MM NN LL XX XX XX XX YY		

### Type Code 0xAF

0xAF downlink command can be used to set AT+COMMANDx or AT+DATACUTx.

Note: if user use AT+COMMANDx to add a new command, he also need to send AT+DATACUTx downlink.

Format: AF MM NN LL XX XX XX XX YY

Where:

- MM: the ATCOMMAND or AT+DATACUT to be set. Value from 01 ~ 0F,
- NN: 0: no CRC; 1: add CRC-16/MODBUS ; 2: set the AT+DATACUT value.
- LL: The length of AT+COMMAND or AT+DATACUT command
- XX XX XX XX: AT+COMMAND or AT+DATACUT command
- YY: If YY=0, RS485-LN will execute the downlink command without uplink; if YY=1, RS485-LN will execute an uplink after got this command.

Example:

AF 03 01 06 0A 05 00 04 00 01 00: Same as AT+COMMAND3=0A 05 00 04 00 01,1

How to change the speed from a mobile phone