

USER MANUAL

dePACK

Instructions on the operation
and configuration of dePACK



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1 Safety and maintenance

These instructions provide necessary information for assembly, connection, commissioning, and configuration, as well as important information for maintenance, troubleshooting, and user safety. For this reason, it is necessary to read it before start-up and always keep it close at hand in the vicinity of the equipment as an integral part of the product.

1.1 Before starting

Please read these instructions before unpacking and putting the instrument inside into operation. Follow the instructions as described in this document.

The equipment must only be handled by qualified personnel, familiar with this type of instructions and in accordance with the specific health, safety and accident prevention regulations regulated for the area where it is located.



Attention:

The sections indicated with this symbol must be read carefully.



This symbol indicates danger of electric shock.



This symbol indicates that the equipment is protected by double insulation.



Equipment under European directive 2012/19/EC. At the end of its useful life, do not leave the equipment in a household waste container. It is necessary to follow the local regulations regarding the recycling of electronic equipment.



Complies with the relevant European directive.

1.2 Authorized personnel

All the operations described in this documentation must be carried out exclusively by qualified personnel authorized by the owner of the installation. During work on and with the device it is always necessary to use the necessary protective equipment.

1.3 Objective of the manual

This manual explains the general guidelines that must be considered for the installation, start-up and correct operation of dePACK. Contact us if you need more information.



1.4 Notice against misuse

In the event of inappropriate or unforeseen use of this equipment, it is possible that specific risks for each application may arise from it, for example, a tank overflow due to poor assembly or poor configuration. This may result in material, personal or environmental damage. The computer's protection properties may also be affected.



1.5 General safety instructions

The equipment corresponds to the level of technical development under consideration of the regulations and directives in force. The operation of this equipment is only allowed in an impeccable and safe technical state.

The owner is responsible for the perfect functioning of the equipment. In case of use in aggressive or corrosive environments in which a malfunction of the equipment may give rise to possible risks, the owner must guarantee the correct operation of the equipment by taking the appropriate measures.

The user must comply with the safety instructions in this instruction manual, the specific installation regulations of each country and the current safety and accident prevention regulations.

For security and guarantee reasons, any manipulation that goes beyond what is described in the instruction manual must be carried out by personnel authorized by the manufacturer. Remodeling or changes carried out on your own are explicitly prohibited.



1.6 Safe use of the equipment

Risk of injury!



- Disconnect power from the equipment before handling it.
- Operate the equipment only if it is in an impeccable technical condition, without errors or failures.
- The person responsible for handling the equipment without interference is the operator.



1.7 Installation

The installation of the equipment is carried out on a DIN rail, leaving all the connections inside an electrical panel. The equipment must be connected to a power supply circuit protected with type gI (IEC 269) or type M fuses, between 0.5 and 2 A. It must be fitted with a magnetothermal switch or equivalent device to disconnect the equipment from the power supply network. The power supply and voltage measurement circuit must be connected with a cable with a minimum section of 1 mm².

Do not install the equipment inside a metallic box in case you want to use wireless communications (GPRS and WiFi), as this would make it difficult for it to function correctly.



1.8 Maintenance

Remove dirt from the box from time to time.



When carrying out cleaning, keep the following in mind:

- Disconnect power from the equipment before handling it.
- Only use cleaning agents that do not damage the casing, the type plate or the seals.
- Use only cleaning methods that correspond to the degree of protection.

1.9 Recycling

The packaging is made of cardboard and wood, compatible with the environment and recyclable. Eliminate waste packaging material produced through specialized recycling companies.

Electronic products can NOT be thrown away because they are recyclable, in addition to their impact on the environment.

Hand over the equipment directly to a specialized recycling company and do not use municipal collection points for this.

First remove any batteries that may be present, whenever possible to remove them from the equipment, and proceed to dispose of them separately in the proper manner.



2 General description

dePACK is an industrial IoT controller equipped with a high-performance control unit with a fully integrated Yocto Linux system and Node-RED software.

The device includes RS-232/485 serial communications, 10/100 Ethernet network interface, and quad-band GPRS and Wi-Fi wireless communications. Ideal for fog computing applications where it is required to monitor, control and send data.

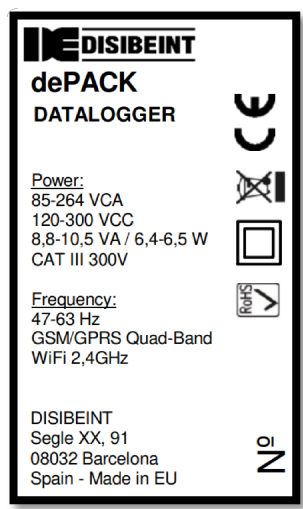
Regarding inputs, it contains Conductive, PNP, Namur, 4..20mA, potentiometric and capacitive to connect the necessary sensors for a multitude of applications.



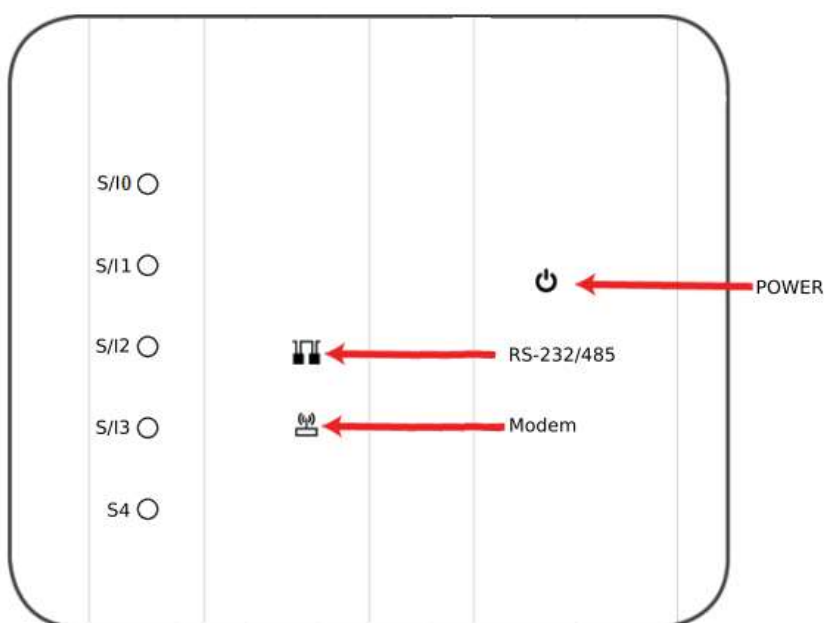
3 Main features

- ARM CORTEX-A7 700 Mhz.
- 256 MB DDR3 memory.
- 512 MB NAND flash memory
- High performance embedded system integrated with Linux Yocto
- GPRS, digital and analog I/O of different types.
- Wifi.
- RS-232/485 from 9600 to 115200 bps.
- 10/100Mbps Ethernet port.
- Node-RED integrated.

4 Identification tag

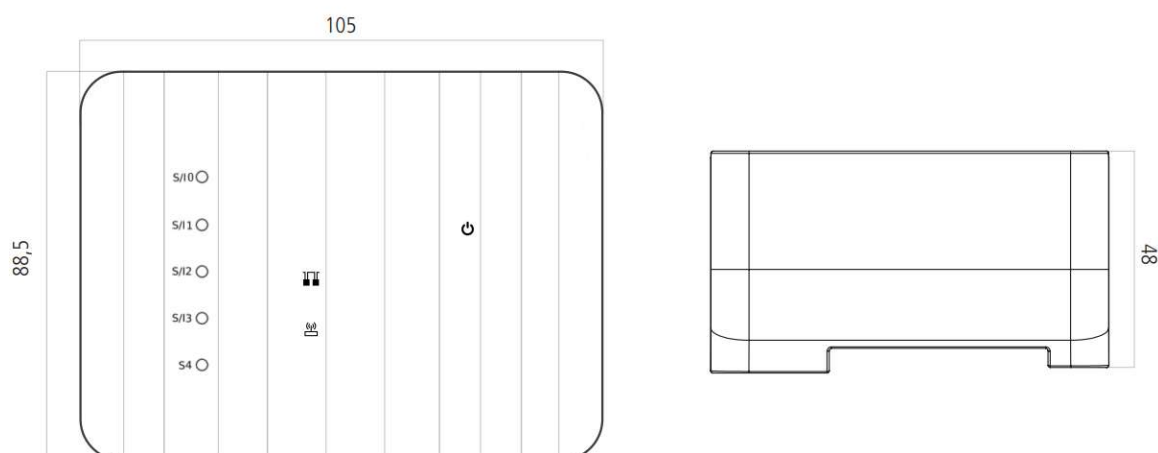


5 Leds



Led	Description
Power	On: Green
RS-232/RS-485	Data transmission: Red Data reception: Green
Modem	Data transmission: Red Data reception: Green
S/Ix	If Sx= True and Ix = False: Green If Sx= False and Ix = True: Blue If Sx= True and Ix = True: White
S4	If S4= True: Green

6 Dimensions



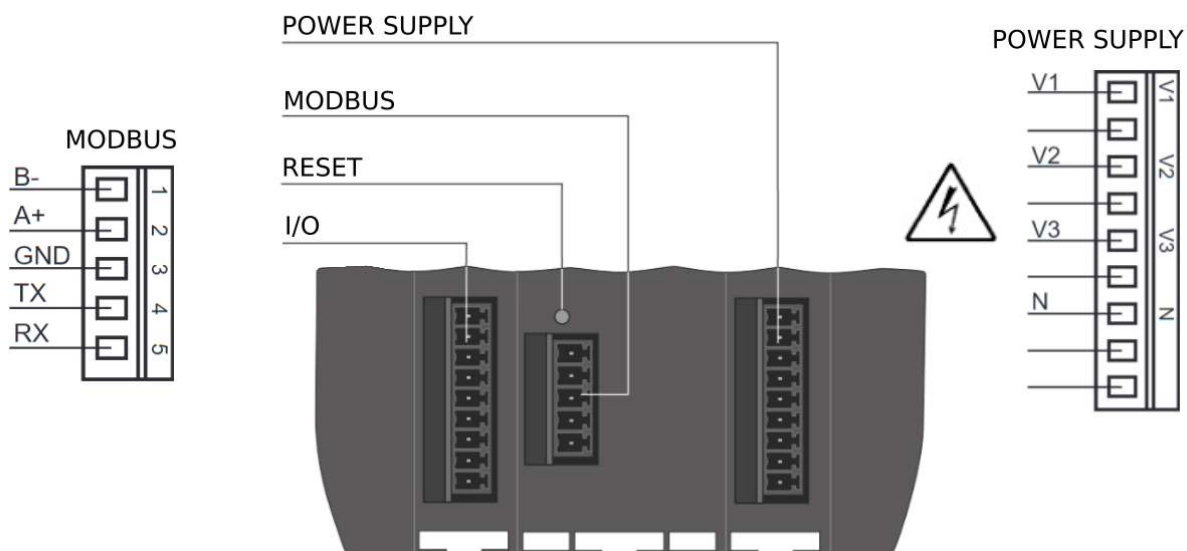
7 Technical characteristics

Electrical data	
Power supply	85 .. 264 VAC
Frequency	47 .. 63 Hz
Maximum consumption	4,6 .. 7,5 VA
Control unit	
CPU	ARM Cortex-A7 700 MHz
RAM memory	256 MB DDR3
Flash memory	512 MB NAND
Clock	RTC with battery to save time
Environmental conditions	
Temperature	-20 .. +50 °C
Humidity	5 % .. 95 %
Maximum working altitude	2000 m
Mechanical data	
Surround material	UL94-V0 self-extinguishing plastic
Protection degree	IP20
Dimensions	105 x 88,5 x 48mm
Weight	180 g
Mounting	DIN rail
Characteristics and electrical safety	
Electrical safety	CAT III 300 V according to EN 61010
Electric shock protection	Double insulation class II
Isolation	3 kVCA



Serial interface	
Type	RS-485 three threads (A+/S GND/ B-) (RX/GND/TX)
Transmission speed	9600 / 19200 bps configurable
Wireless interface	
Wi-Fi	802.11 b/g/n (2,4 GHz)
Network interface	
Type	Ethernet
Speed	10/100 Mbps
Conductive inputs	
Number and type	5 inputs for conductive probes
Resolution	12 bits (4096 points)
Configurable inputs	
Number and type	4 configurable inputs for Namur, PNP and capacitive sensors
Resolution	12 bits (4096 points)
Analog input (AI0)	
Number and type	1 analog input 0...20 mA / 4...20 mA
Resolution	12 bits (4096 points)
Potentiometric input (AI1)	
Number and type	1 Potentiometric input
Resolution	12 bits (4096 points)
Voltage outputs	
Voltage	2 of 8V2 and 1 of 24V
Regulations	
	IEC 60664, VDE 0110, UL 94, EN-61010-1, EN 55011, EN 61000-4-3, EN 61000-4-11, EN 61000-6-4, EN 61000-4-2, EN 61000-6-2, EN 61000-6-1, EN 61000-6-3, EN 61000-4-5 -CE

8 Electrical connection



9 Power connector

It can be powered with single-phase or three-phase connection:

- Single phase: wire V3 and N
- Three-phase: wire connectors V1, V2, V3 and N.

10 Antenna connector

To install the external antenna, simply screw the connector clockwise.

11 Ethernet connector

The equipment has an Ethernet port that allows access to dePACK from the outside.

12 SIM card reader

dePACK requires a SIM card (1FF) to operate on a mobile network.

The SIM card reader slot is located on the back of dePACK. A SIM card must be inserted into the SIM card holder. To insert a SIM card, insert the card with the contacts facing up and the shorter end in. The card should not protrude once it has been inserted correctly.

Once the SIM card is installed, you can enable mobile data connectivity.

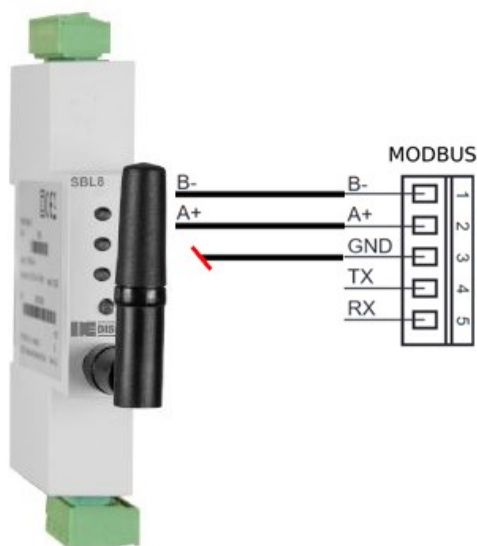


13 RS-232/RS-485 connector

To use RS232 or RS485 follow the connection diagram:



In this example, an SBL8 230 with RS-485 communication is connected to the dePACK Modbus connector. This connection must be made using a shielded cable to connect the shield to the dePACK GND, the other end of the shield must not be connected.



14 Connection examples

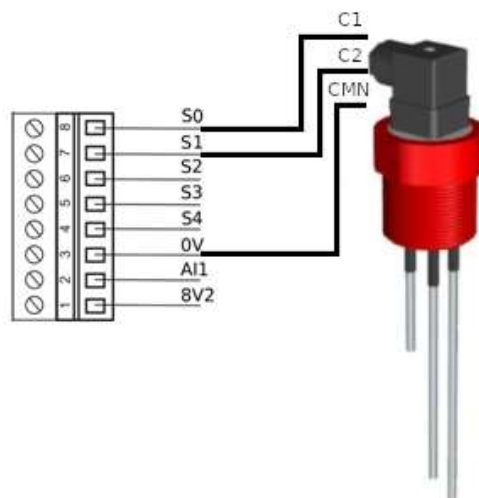
14.1 Conductive inputs

Example connection of a two-contact NR conductive probe.

C1 = Contact 1

C2 = Contact 2

CMN = Common



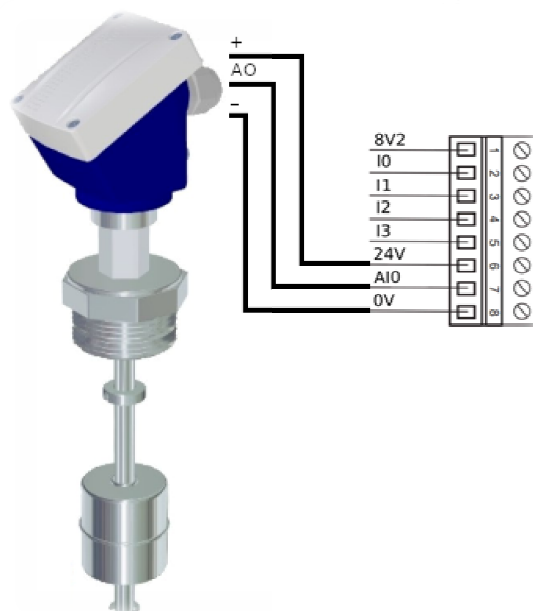
14.2 4-20mA Input

Example connection of a TMN magnetic transducer with 4-20 mA output.

+ = Positive

AO = 4-20 mA output

- = Negative



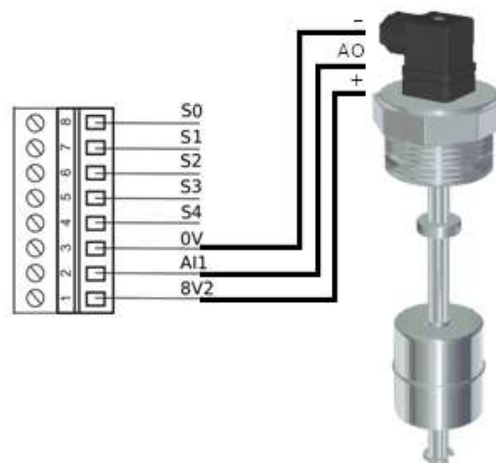
14.3 Potentiometric input

Example connection of a TMR magnetic transducer with potentiometric output.

+ = Positive

AO = Potentiometric output

- = Negative



14.4 PNP inputs

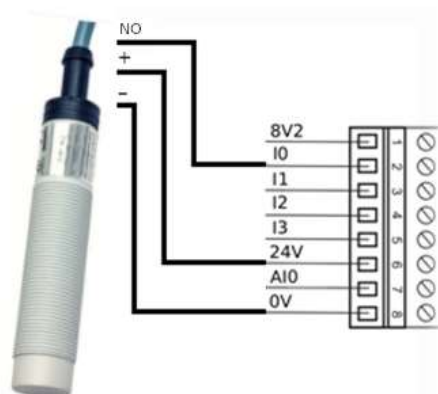
Example connection of a SCM capacitive sensor with PNP/NPN output.

To use PNP inputs, the Ix inputs must be configured using Node-RED to be of this type.

+ = Positive

NO = Normally open PNP output

- = Negative



14.5 Namur inputs

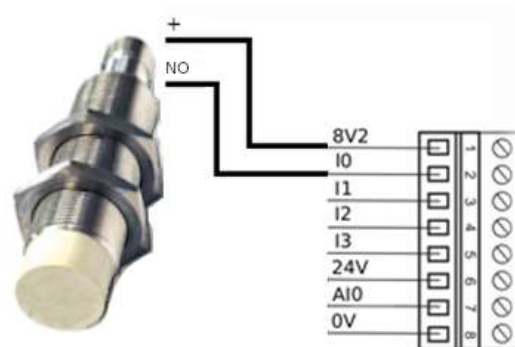
Example connection of an inductive sensor with Namur output.

To use Namur inputs, the Ix inputs must be configured using Node-RED to be of this type.

+ = Positive

NO = Exit Namur

- = Negative



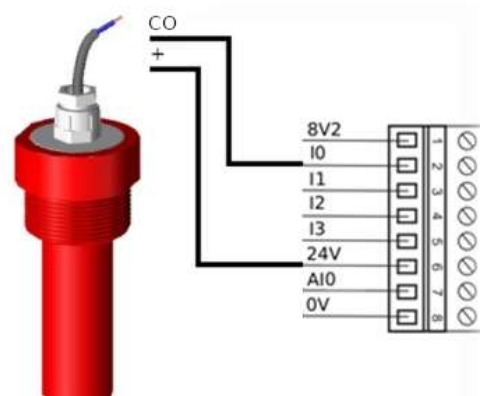
14.6 Capacitive inputs

Example connection of a capacitive sensor.

To use Capacitive inputs, the Ix inputs must be configured using Node-RED to be of this type.

+ = Positive

- = Negative



15 Connect to the same network as dePACK

To connect to dePACK it is necessary that the device from which you want to connect (PC, mobile, etc..) is in the same network as dePACK. There are 4 different ways to do this:

15.1 Wi-Fi

If you connect dePACK to a Wi-Fi network, the router will assign you an IP (E.g. 192.168.1.34). Your device must be connected to the same network as dePACK in order to interact with each other.

15.2 Ethernet

If you connect dePACK to a network via Ethernet, the dePACK router will assign you an IP (E.g. 192.168.1.34). Your device must be connected to the same network as dePACK in order to interact with each other.

15.3 Ethernet point to point

If a device is connected directly to dePACK via an Ethernet cable, it generates a network in which its IP is 10.1.10.1. To interact with dePACK you must change the IP of your device to 10.1.10.x (i.e. 10.1.10.10).

15.4 Access point

dePACK comes from the factory in 'Access point' mode. In this mode, dePACK generates its own Wi-Fi network to which the device can connect to communicate. In this network, the IP 192.168.137.1 is assigned to dePACK by default.

16 Access Node-RED

Node-RED is the tool with which dePACK is programmed.

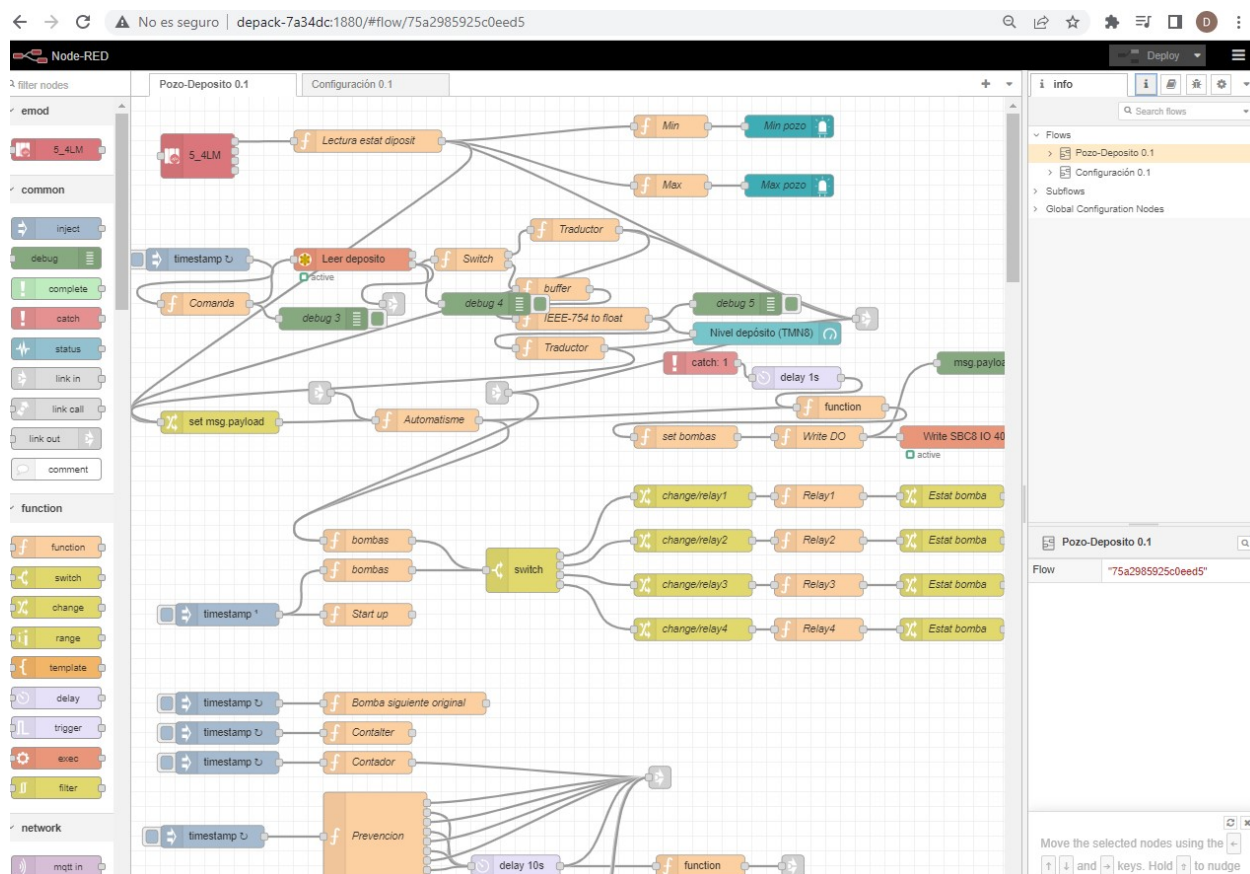
To access Node-RED our device must be on the same network as dePACK. There are two options to access:

- Write the address in the browser: dePACK-xxxxxx:1880
Being xxxxxx the last 6 characters of the dePACK MAC

depack-7a34dc:1880,

- If the IP address on the network of dePACK is known, write the address in the browser "ip":1880

192.168.137.1:1880,



17 Access to dashboard

The control panel is the portal from which the status of the application running in dePACK is viewed and controlled.

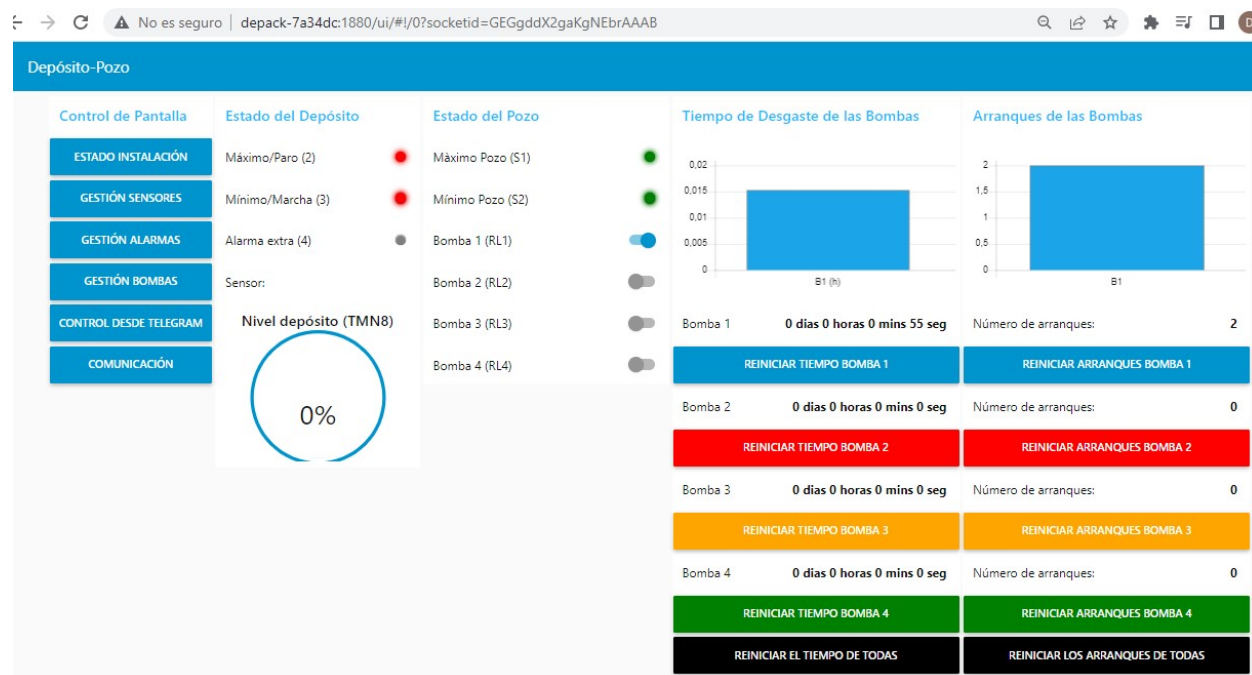
To access the control panel our device must be on the same network as dePACK. There are two options to access:

- Write the address on the browser: dePACK-xxxxxx:1880/ui
Being xxxxxx the last 6 characters of the dePACK MAC

depack-7a34dc:1880/ui,

- If the IP address on the network of dePACK is known, write the address in the browser: "ip":1880/ui

192.168.137.1:1880/ui,



18 Access to WebAdmin (Configurator)

WebAdmin is the portal from which all Wi-Fi and Ethernet settings of the dePACK are viewed and configured.

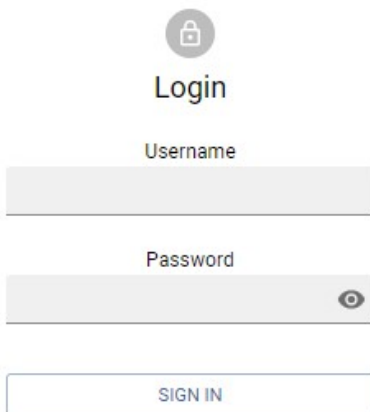
To access WebAdmin our device must be on the same network as dePACK. There are two options to access:


- Write the address in the browser: dePACK-xxxxxx:80
Being xxxxxx the last 6 characters of the dePACK MAC.

depack-7a34dc/80

- If the IP address of the dePACK is known on the network, write the address in the browser: "ip":80


192.168.137.1/80




Login

Username

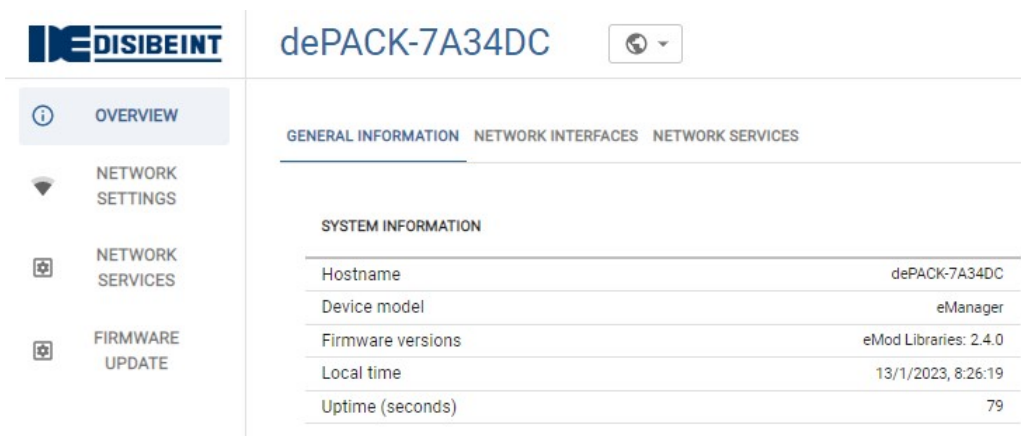
Password



Once in the WebAdmin, it asks us for a username and a password.

- Username: admin

- Password: depack



The interface shows the dePACK-7A34DC configuration page. The left sidebar contains navigation options: OVERVIEW (selected), NETWORK SETTINGS, NETWORK SERVICES, and FIRMWARE UPDATE. The main content area displays system information under the 'GENERAL INFORMATION' tab.

SYSTEM INFORMATION	
Hostname	dePACK-7A34DC
Device model	eManager
Firmware versions	eMod Libraries: 2.4.0
Local time	13/1/2023, 8:26:19
Uptime (seconds)	79

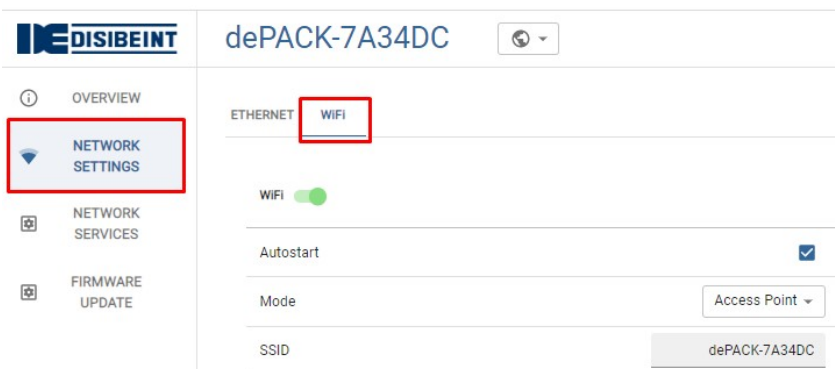
19 Wi-Fi configuration

The dePACK Wi-Fi settings are found and modified in WebAdmin. It has two Wi-Fi modes: STA mode and AP mode.

19.1 STA mode

In this mode, dePACK connects to an external Wi-Fi network.

1. To configure the STA mode, you must access the WebAdmin (review the section “Access to WebAdmin”).
2. Once inside the WebAdmin, you must select the “Network settings” section and within it the “WiFi” box.



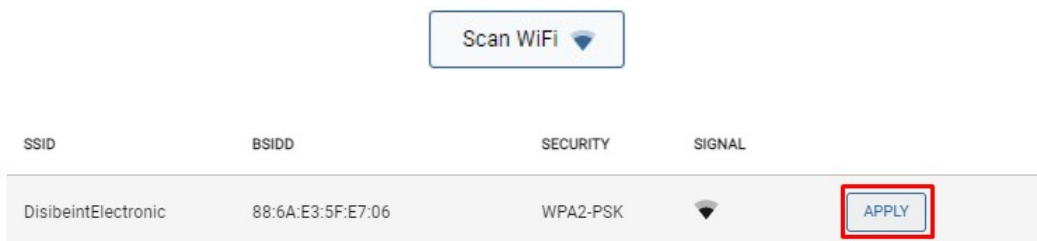
The screenshot shows the WebAdmin interface for device dePACK-7A34DC. On the left sidebar, the 'NETWORK SETTINGS' option is highlighted with a red box. In the main content area, the 'WIFI' tab is selected and highlighted with a red box. Below the tab, the 'WIFI' toggle is turned on (green). The 'Autostart' checkbox is checked. The 'Mode' dropdown is set to 'Access Point'. The 'SSID' field contains the text 'dePACK-7A34DC'.

3. Then select the Station mode.




The screenshot shows the 'Mode' dropdown menu. The 'Station' option is selected and highlighted with a red box.

4. Scan available Wi-Fi networks and select the desired one.



The screenshot shows the 'Scan WiFi' button. Below it, a table lists available Wi-Fi networks. The 'APPLY' button is highlighted with a red box.

SSID	BSID	SECURITY	SIGNAL
DisibeintElectronic	88:6A:E3:5F:E7:06	WPA2-PSK	

5. Finally enter the Wi-Fi network password and save the changes.

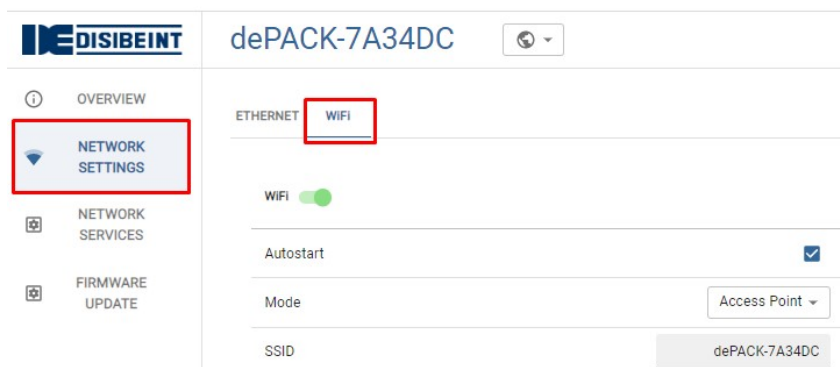


The screenshot shows the 'Password' field and the 'IP Protocol' dropdown. The 'Password' field is highlighted with a red box. The 'IP Protocol' dropdown is set to 'DHCP'. The 'SAVE' button is highlighted with a red box.

19.2 AP mode

dePACK comes from the factory in AP (Access point) mode. When in this mode, dePACK generates its own Wi-Fi network (without an internet connection) to which another device can connect to interact with dePACK.

1. To configure this mode, you must access WebAdmin (see section “Access WebAdmin”)
2. Once inside WebAdmin, you must select the “Network settings” section and within this the “WiFi” box.

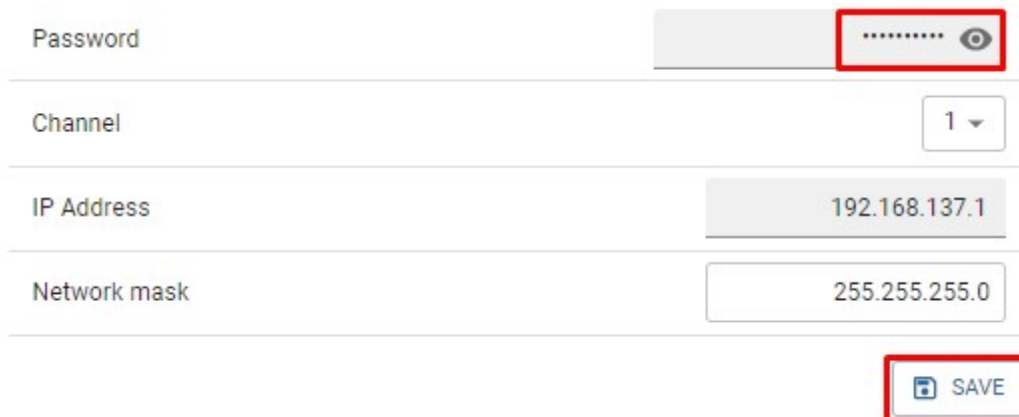


3. Then select Access point mode.

Mode

Access Point ▼

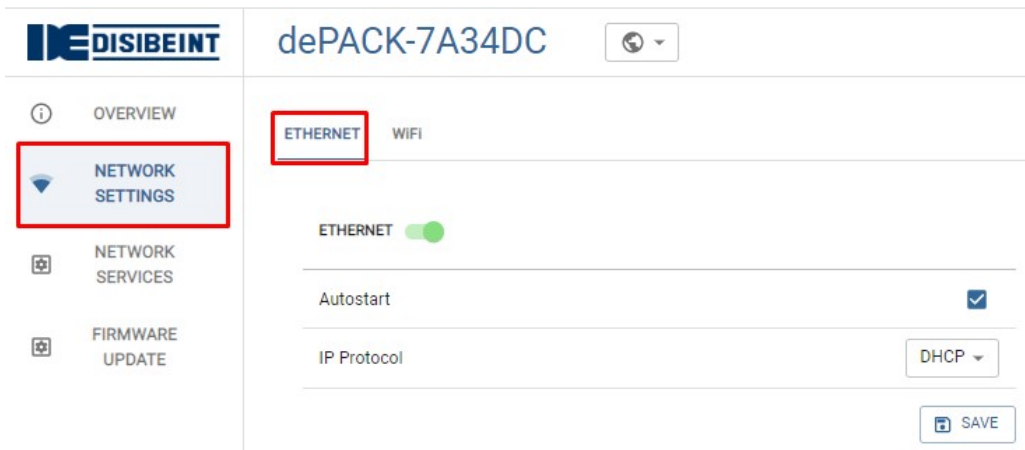
4. Finally enter the password that will have the network generated by dePACK and save changes.



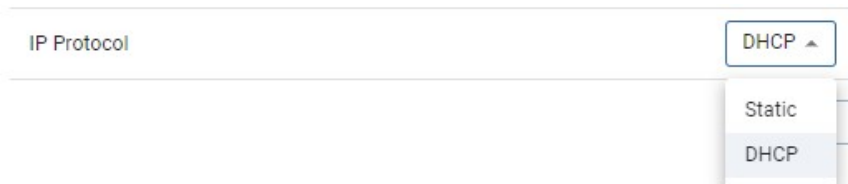
20 Ethernet

The dePACK Ethernet settings are found and modified in WebAdmin. The dePACK IP within the Ethernet network can be configured as dynamic or static.

1. To configure the type of IP, you must access WebAdmin (review the section “Access WebAdmin”)
2. Once inside WebAdmin, select the “Network settings” section and click on the Ethernet box.



3. Then choose the type of IP you want in “IP Protocol”



4. In the case of choosing dynamic IP (DHCP) just click on “save” to save the changes.

In the case of choosing static IP, you will have to complete the pop-up fields and then save the changes.

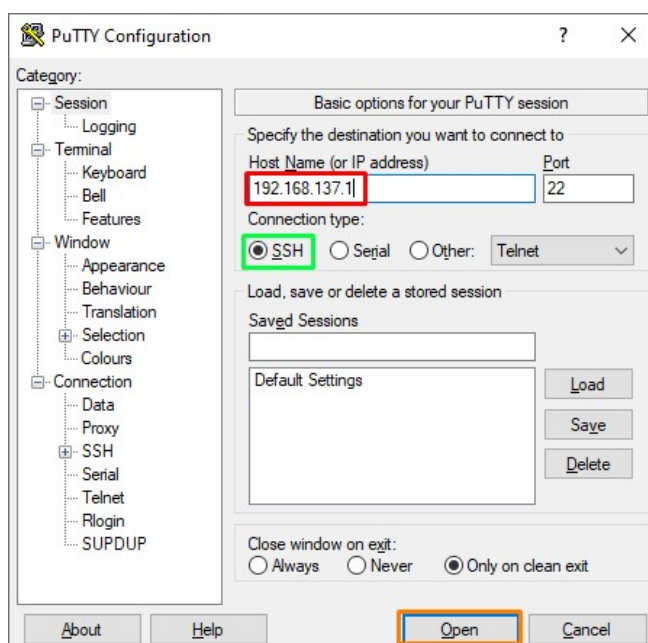


21 GPRS configuration

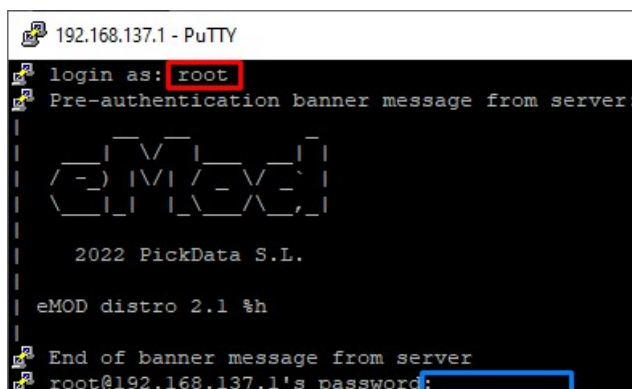
To configure dePACK's GPRS you must connect to it using an SSH client. For example:

- OpenSSH command line client (the ssh command): An open source implementation that is typically included with MacOS and Linux distributions.
- Putty: a free implementation for Windows.
- SecureCRT: a commercial implementation with a free trial for Windows, Mac and Linux

1. To connect we will open our SSH client (in this case PUTTY) In host name we will introduce the IP of the dePACK, we will choose SSH connection and the "port" 22 and finally we will click on "open".



2. Once connected we must log in:
 - Username: root
 - Password: dePACK



3. Create the network operator file name and fill in the APN name. For example, apn.EXAMPLE. Check the “Operator APNs table” section to find out which APN to use.

```
echo 'AT+CGDCONT=1,"IP","operator_apn"' > /etc/ppp/chatscripts/apn.EXAMPLE
```

```
root@dePACK-7A2A8C:~# echo 'AT+CGDCONT=1,"IP","movistar.es"' > /etc/ppp/chatscripts/apn.EXAMPLE
```

Assign the symbolic link apn to point to the newly created file:

```
ln -sf /etc/ppp/chatscripts/apn.EXAMPLE /etc/ppp/chatscripts/apn
```

```
root@dePACK-7A2A8C:~# ln -sf /etc/ppp/chatscripts/apn.EXAMPLE /etc/ppp/chatscripts/apn
```

If the APN requires a username and password, follow steps 3.1 and 3.2:

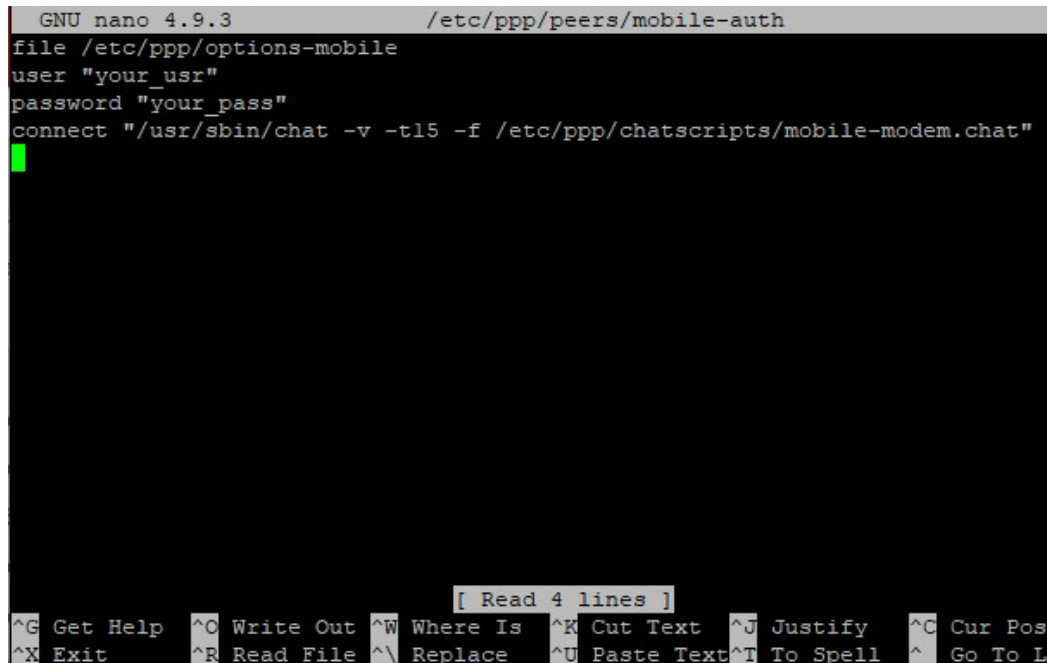
- 3.1. Edit the mobile authentication file using:

```
nano /etc/ppp/peers/mobile-auth
```

Type your username on the ‘user’ field.

Write your password on the ‘password’ field.

Save and exit: CTRL + X. Confirm save with Y.



```
GNU nano 4.9.3 /etc/ppp/peers/mobile-auth
file /etc/ppp/options-mobile
user "your_usr"
password "your_pass"
connect "/usr/sbin/chat -v -tl5 -f /etc/ppp/chatscripts/mobile-modem.chat"
[ Read 4 lines ]
^G Get Help ^C Write Out ^W Where Is ^K Cut Text ^J Justify ^C Cur Pos
^X Exit ^R Read File ^\ Replace ^U Paste Text ^T To Spell ^_ Go To L
```

- 3.2. Use this command:

```
ln -sf /etc/ppp/peers/mobile-auth /etc/ppp/peers/provider
```


4. If the SIM requires a PIN code, create a PIN code file with the correct PIN:

```
echo 'AT+CPIN=PIN' > /etc/ppp/chatscripts/pin.CODE
```

Assign the symbolic link pin to point to the newly created file:

```
ln -sf /etc/ppp/chatscripts/pin.CODE /etc/ppp/chatscripts/pin
```

If the SIM card does not require a PIN code, assign the symbolic link pin to pin.NONE:

```
ln -sf /etc/ppp/chatscripts/pin.NONE /etc/ppp/chatscripts/pin
```

5. Use this command to start the ppp service and connect to the mobile network:

```
systemctl start ppp@provider.service
```

If you need to connect automatically at every startup, you must enable the service:

```
systemctl enable ppp@provider.service
```

```
root@dePACK-7A2A8C:~# systemctl start ppp@provider.service
root@dePACK-7A2A8C:~# systemctl enable ppp@provider.service
Created symlink /etc/systemd/system/multi-user.target.wants/ppp@provider.service
→ /lib/systemd/system/ppp@.service.
```

6. Check the status of the connection and the assigned IP address using this command:

```
ip a | grep ppp0
```

```
root@dePACK-7A2A8C:~# ip a | grep ppp0
6: ppp0: <POINTOPOINT,MULTICAST,NOARP,UP,LOWER_UP> mtu 1280 qdisc pfifo_fast sta
te UNKNOWN group default qlen 3
    inet 83.48.174.50 peer 192.168.254.254/32 scope global ppp0
root@dePACK-7A2A8C:~#
```

21.1 Operator APNs table

This table shows the APNs, users and passwords of the mobile operators that Disibeint recommends.

Mobile operator	APN name	User	Password
Movistar 1	movistar.es	MOVISTAR	MOVISTAR
Vodafone	airtelwap.es	wap@wap	wap125
Orange	orangeworld	orange	orange