



Enecsys Solar Dashboard

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INSTALLATION GUIDE

This installation Guide will show you how to completely install a Raspberry Pi (RPI) with Debian Jessie, configure the RPI and install the Enecsys Solar Dashboard with the help of installers. This document is a guide, there will also be a video created of the same process. I don't want to make this document to official ;)

STEP 0

You need some software to make it all happen

SD Formatter 4: To format your Micro(SD) card. scroll down to download the windows version.
https://www.sdcard.org/downloads/formatter_4/

Win32Diskmanager : To burn the image on your SD card

Putty: this is an ssh client we need to connect to the rpi and to install and configure it.

downloads:

SD formatter4: <http://www.vanmarion.nl/rpi/SDFormatterv4.zip>

Win32Diskmanager: <http://www.vanmarion.nl/rpi/Win32DiskImager-0.9.5-install.zip>

Putty: <http://www.vanmarion.nl/rpi/putty.zip>

Download empty ssh file. You will need this to enable SSH. You can do it manually or just download the zip and unpack it.

http://vanmarion.nl/rpi/ssh_file_rpi.zip

install these programs

Download RPI Image: https://downloads.raspberrypi.org/raspbian_lite_latest

Unzip the file.

STEP 1

To be able to send your data to pvoutput you have to create an account and setup your system.
NOTE*: IF you already have a pvoutput account you can skip STEP 1

Register an account

<http://www.pvoutput.org/register.jsp>

After you have logged in go to your account or press settings in the menu

Fill the settings to your needs

Data Settings

Search Min. Outputs

0

Systems with less than the number outputs will not be shown on search results

Search Last Output

All

Do not display systems that have not created an output in the specified time period

Instant Messages

Enabled

[MESSAGES](#) | [COMMENTS](#)

Disabling messaging will prevent you from sending and receiving messages

Date Format

dd/mm/yy

Display dates in the specified format

Time Format

24 Hour

Display time in the specified format

Temperature Unit

Celsius

Temperature will be displayed in the above unit

Distance Unit

Kilometres

Distances will be displayed in the above unit

Country Filter

All

Only display systems from the specified country for Live and Latest Outputs

Timezone

(UTC+1:00) Europe/Amsterdam

Data will be adjusted to your selected timezone above

Map Type

Auto

Choose the map type to display by default when viewing maps

Generation Colours

[RESET](#)

Use the above chart colours for generation data

Consumption Colours

[RESET](#)

Use the above chart colours for consumption data

Net Colours

[RESET](#)

Use the above chart colours for net data

The alert settings you can skip

The next settings are very important. You have to create an apikey which has to be set in the dashboard select the API to enabled. There should be an api key visable. If not, click on New Key. After that press save settings first

API Settings

API Access Enabled ▾ [HELP](#)

The API must be enabled to successfully process requests.

API Key 56da' [New Key](#)

Your API key is used to update your data automatically, always keep your API key secret.

Read Only Key

Add your own key with read only access to your data, ideal for 3rd party apps

API Referrer

The URL of your webpage. Only applicable if you are embedding [portlets](#).

Registered Systems

System Name	System Id	Status	Add System
Save			

Ok. time to add a system
Fill in the settings to your setup
System settings

System Name	This name will be public to others, so make up a nice one
Status	Active
Number of panels	How many inverters do you have? Set the number
Panel max power	The maximum power of the solar panel
System size	Total power of all panels together
Panel Brand/Model	optional
Orientation	Select your setup
Azimuth	Set a value
Number of inverters	Set the number
Inverter Size	Set same as system size
Country	Set yours
Postal code	Set yours
Array tilt	Set yours
Panel coefficient	Set yours
Shading	Select yours

Example part 1

Edit System

System Name

DeWilg

The new name of your system

Status

Active ▼

If you have upgraded this system, decommission it and add a new system.

Number of Panels

19

Total number of panels installed.

Panel Max Power

240

Output of your panels in watts.

System Size

4560

Your calculated system size in watts, including any additional arrays

Panel Brand/Model

shine time solar

Brand and/or model of installed panels, e.g. Sharp NU-A188EY

Orientation

South West ▼

Where your panels are facing.

Azimuth

80.00

Optional: Orientation in degrees, this overrides the orientation setting

Number of Inverters

10 ▼

Total number inverters installed - usually 1

Inverter Brand/Model

Enecsys Duo Micro Inverter

Brand and/or model of installed inverter, e.g. SMA Sunny Boy 3000

Inverter Size

4560

Total AC power output of all inverters in watts.

Country

Netherlands ▼

Country where your system is installed.

Example part 2

Postcode

Edit Location

Australian Postcode, UK Postal District or US ZIP Code

Array Tilt

35.00

Optional: Angle in degrees your PV is installed at.

Panel Coefficient

0.05

%

Percentage of production lost per degree above 25C

Shading

Low ▼

From

to

(hh:mm)

Amount of shade on your system caused by trees and/or other structures.

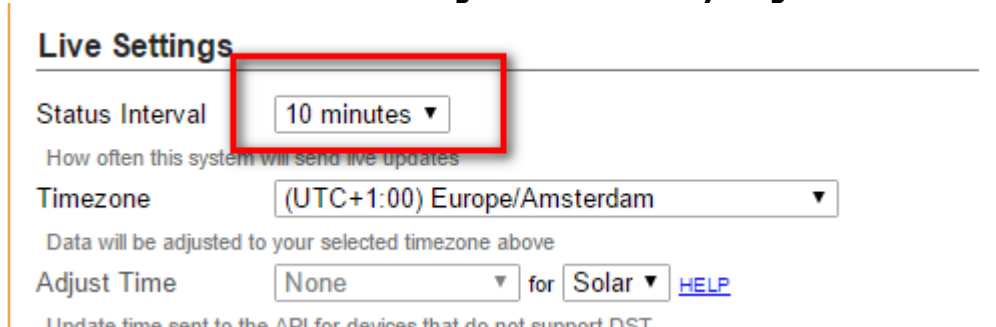
Secondary Array

No ▼

If the system is split into a second array, enter the array details below

This one is important: Live Settings

Set the status interval to 10 minutes. **Don't change this value to anything else!!**



Live Settings

Status Interval 10 minutes ▼
How often this system will send live updates

Timezone (UTC+1:00) Europe/Amsterdam ▼
Data will be adjusted to your selected timezone above

Adjust Time None ▼ for Solar ▼ [HELP](#)
Update time sent to the API for devices that do not support DST

All the rest is optional. Save the settings.

After that you will see your system. You

Registered Systems

System Name	System Id	Status	Add System
<input type="checkbox"/> vm01	34223	Active	Edit

To be able to join the Tweakers Team you have to upload at least 20 inputs.

After that you are able to join a team

We have a large group of Enecsys Users, so i would appreciate if you could join the Team :D.

Join the team: open this url: <http://www.pvoutput.org/ladder.jsp?tid=1018>

On the right top side you will see a button: Join or Leave Team

Feel free to join

2 values you need in the dashboard:

SystemID: you can retrieve that one from the settings page (see screenshot above)

PersonalID : click on Your outputs. In the browser url you will see your personal id



STEP 2

Time to insert your MicroSD. Best to format the SD first with sdformatter4. Start SD formatter 4 and select the drive where your sdcard is plugged into. In my case the K drive

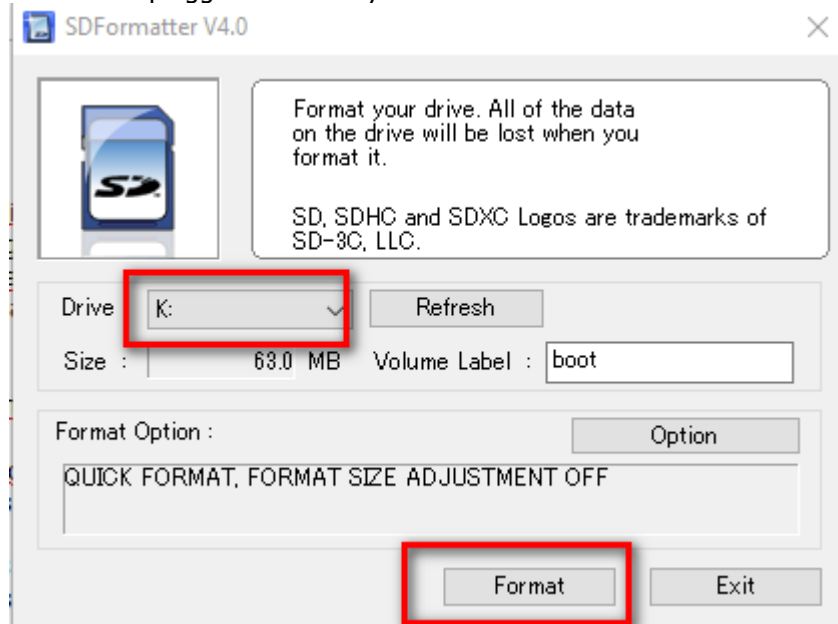
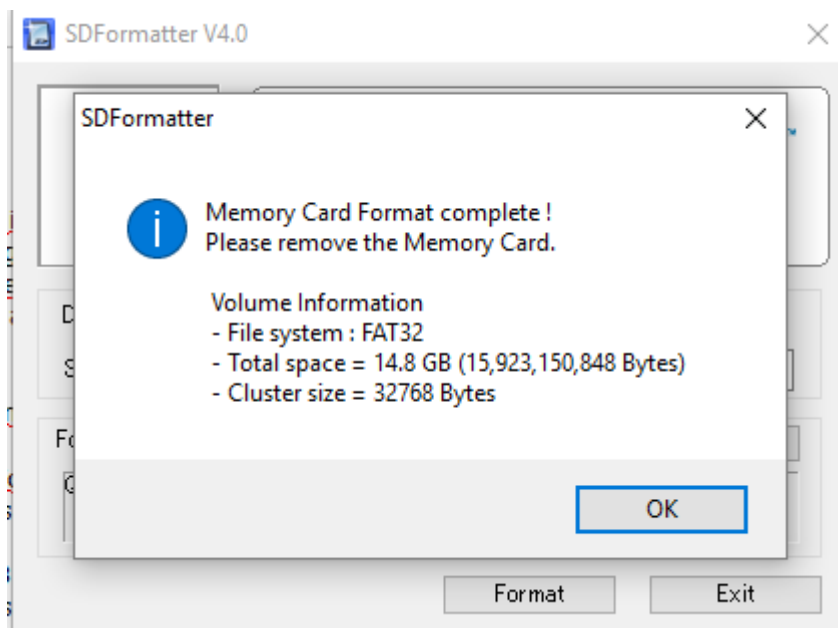


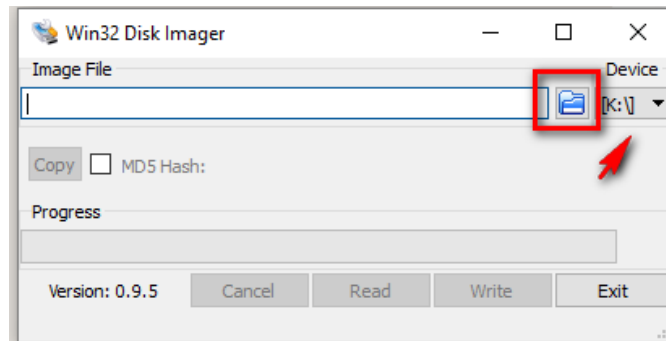
Fig
Click on Format, you will get some warnings, just click OK.



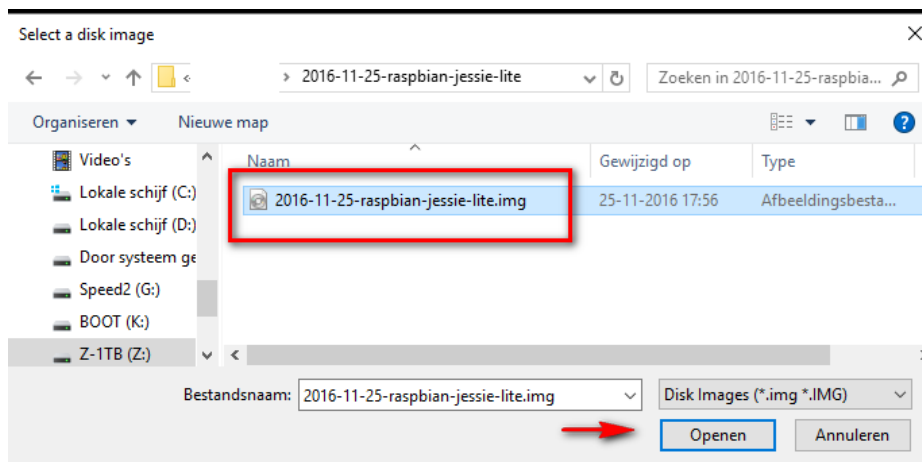
Formatting done. On to the next step.

STEP 3

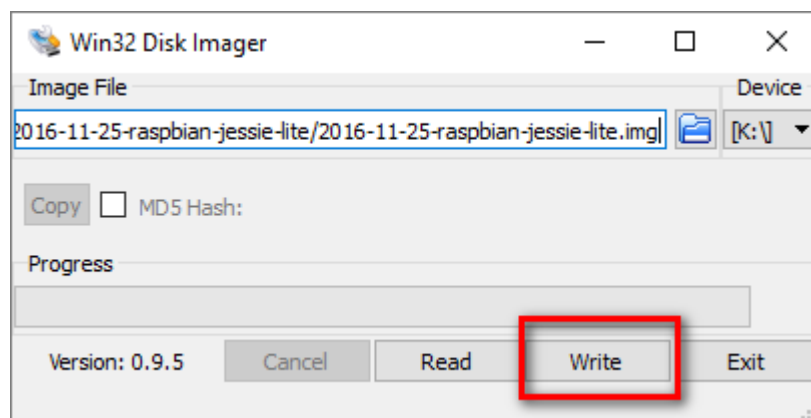
Time to burn the image on the SD Card. Start Win32diskmanager. You will see this screen. Make sure your sd card drive is selected. Click on the browse icon to select the image file you have downloaded and unzipped in step 1



Select the image. If you cant find it on your location, change the Disk Images (*.img *.IMG) to *.* and click on open

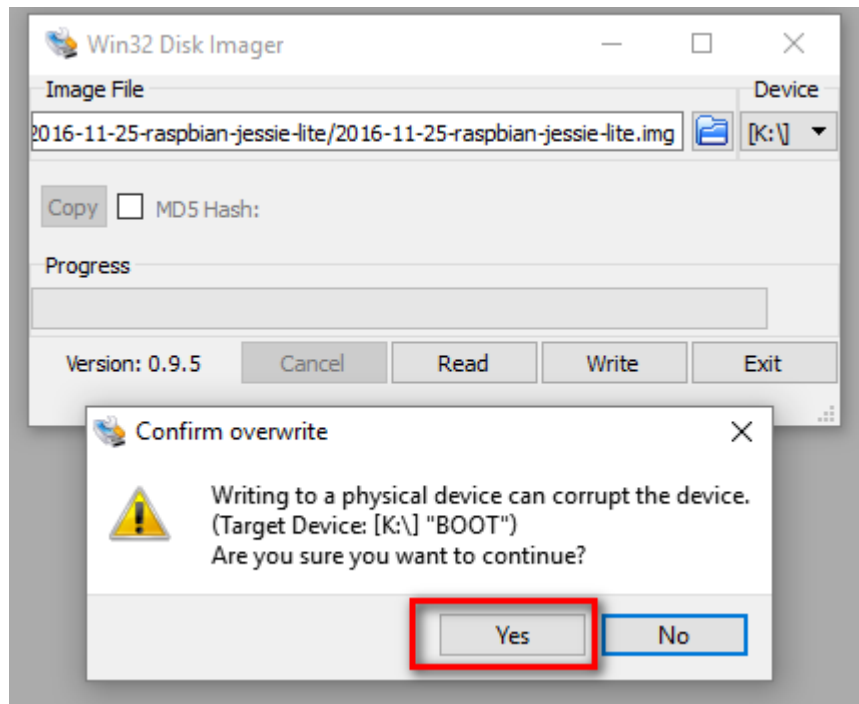


After that the image is selected. Click on Write to burn the image to your SD Card.



This can take about 5 minutes. Depending on the size of your SD. Get some coffee :D
Sometimes the writing is stuck and nothing happens. Then start over from Step 2. It has happened me quite some times, so don't bother too much about it;)

When you have clicked on Write you will get a warning. Just click OK

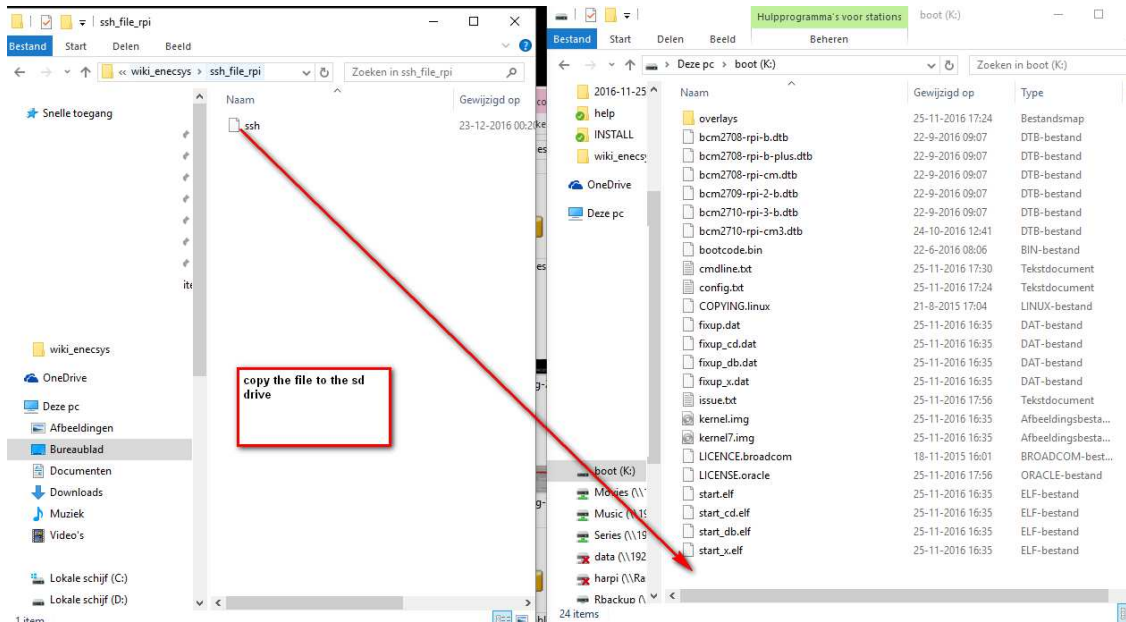


When the writing is done you will get a popup



OK. at this point we are not done yet.
Raspberry decided to remove default ssh access to the RPI. And we need SSH.

If you want to do it manually, open Notepad++ (NOT notepad). Make an empty file, save it as ssh (no dot, just ssh) and place it in the root of your SD card.
Or download the file i already created: http://vanmarion.nl/rpi/ssh_file_rpi.zip
unpack the zip file and put it in the root directory



After that you can disconnect the SD Card, stick it in your RPI and power it up and make sure the network cable is connected to your network. It will get an ipaddress automatically from your router.

STEP 4

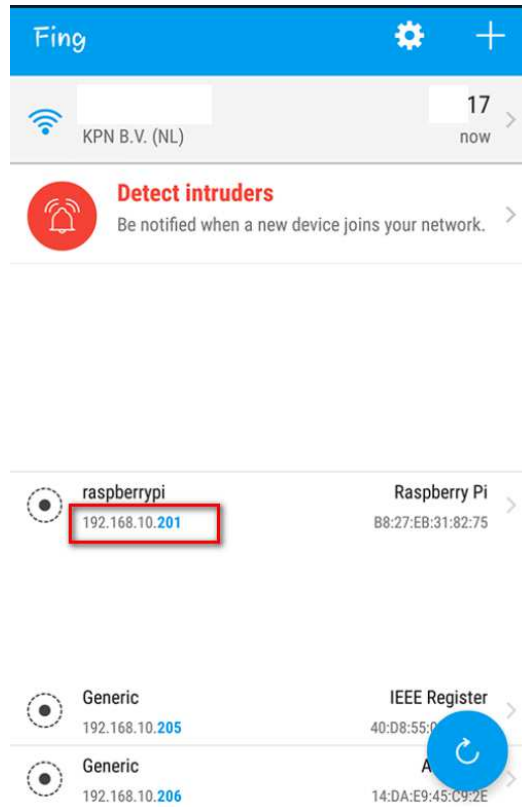
OK. How do you find your RPI in your network?

I use a mobile app Fing

<https://play.google.com/store/apps/details?id=com.overlook.android.fing&hl=nl>

So i can scan my network. It should show a rpi in there

Using Fing (android) will show my RPI in my network

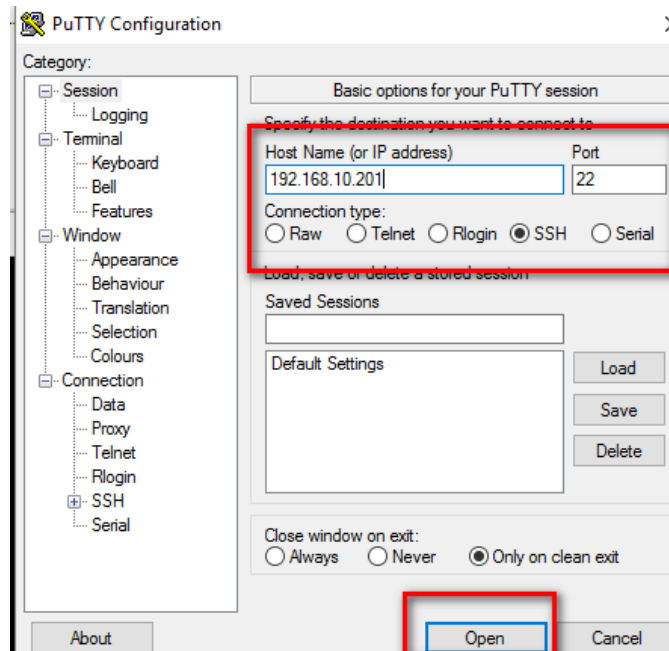


So as soon you have the ipaddress of the RPI we can continue

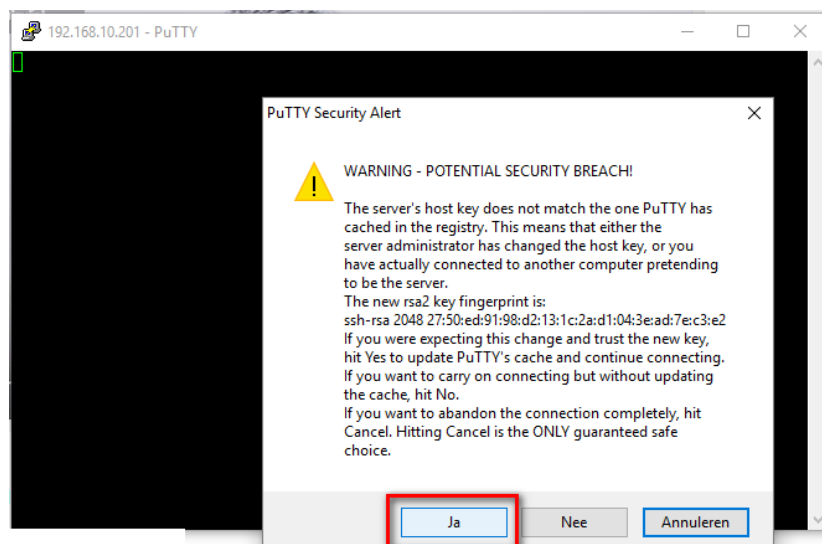
STEP 5

its time to start Putty.exe to connect to your RPI. You have downloaded this in Step 1. in my case my rpi ipadress is 192.168.10.201

the default ssh port is 22 so we need this when connecting
start putty.exe



you will get a warning (thats normal). Press Yes/ja



login with the default user and password

login: pi
password: raspberry

ok. the hardest part is done. Time to install the dashboard.

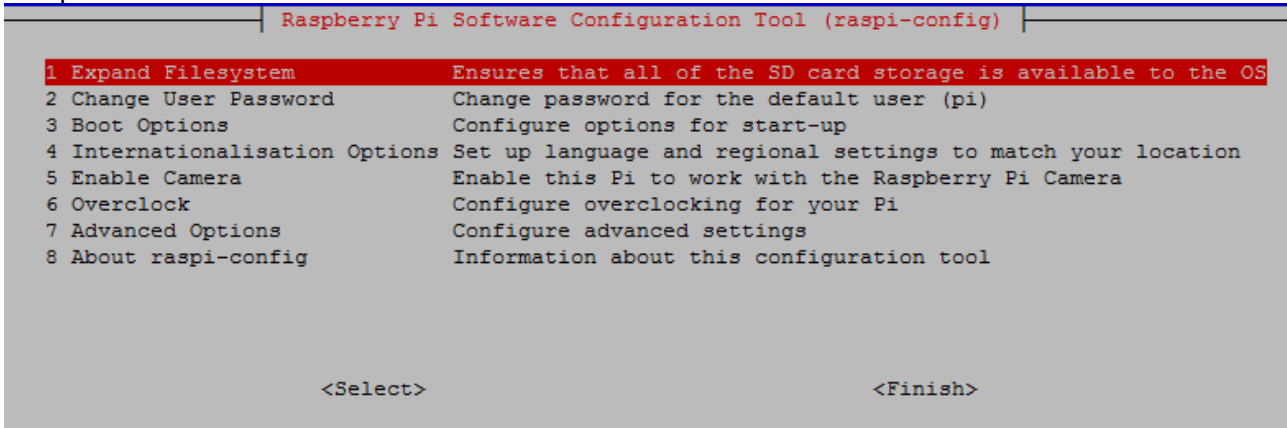
STEP 6

First things first. We have to configure the RPI. Follow the screens and you should be ok. To start it type this command: **sudo raspi-config**

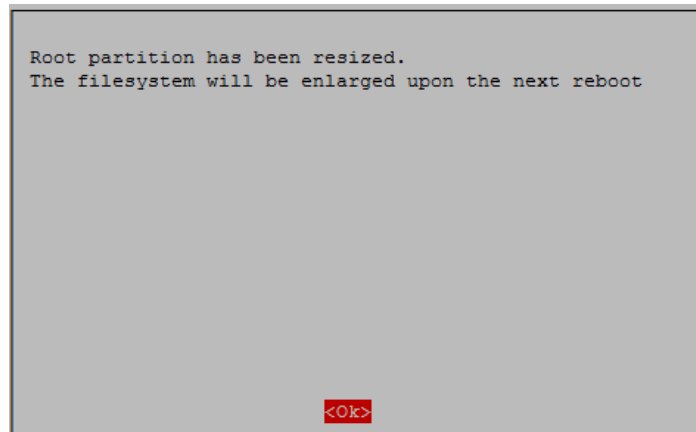
it will show this screen.

There are some steps we have to configure. The first one is to expand the filesystem. Otherwise it will only use a limited space of your SD card.

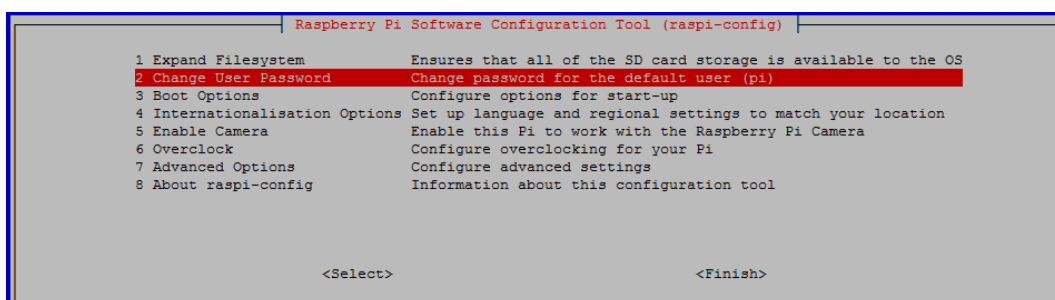
Just press enter



When you pressed enter it will show this screen. Just click OK. We will reboot later



On to changing the password. It is best to set a password of your choice. Make sure to fill it in good (when setting the password it looks like nothing happens, but it will change to what you are typing)



Set the password

```
You will now be asked to enter a new password for the pi
user
```

Type the new password twice.

```
Enter new UNIX password: █
```

When the password is changed you will get a notice

```
Password changed successfully

<Ok>
```

ok after this select 4 (Internationalisation options) and press enter

```
Raspberry Pi Software Configuration Tool (raspi-config)

1 Expand Filesystem      Ensures that all of the SD card storage is available to the OS
2 Change User Password   Change password for the default user (pi)
3 Boot Options           Configure options for start-up
4 Internationalisation Options Set up language and regional settings to match your location
5 Enable Camera          Enable this Pi to work with the Raspberry Pi Camera
6 Overclock              Configure overclocking for your Pi
7 Advanced Options       Configure advanced settings
8 About raspi-config     Information about this configuration tool

<Select> <Finish>
```

then select change Timezone

```
Raspberry Pi Software Configuration Tool (raspi-config)

I1 Change Locale          Set up language and regional settings to match your location
I2 Change Timezone        Set up timezone to match your location
I3 Change Keyboard Layout Set the keyboard layout to match your keyboard
I4 Change Wi-fi Country   Set the legal channels used in your country

<Select> <Back>
```

select the next screens to the location where you are

Configuring tzdata

Please select the geographic area in which you live. Subsequent configuration questions will narrow this down by representing the time zones in which they are located.

Geographic area:

- Africa
- America
- Antarctica
- Australia
- Arctic Ocean
- Asia
- Atlantic Ocean
- Europe
- Indian Ocean
- Pacific Ocean
- System V timezones
- US
- None of the above

<Ok> <Cancel>

Configuring tzdata

Please select the city or region corresponding to your time zone.

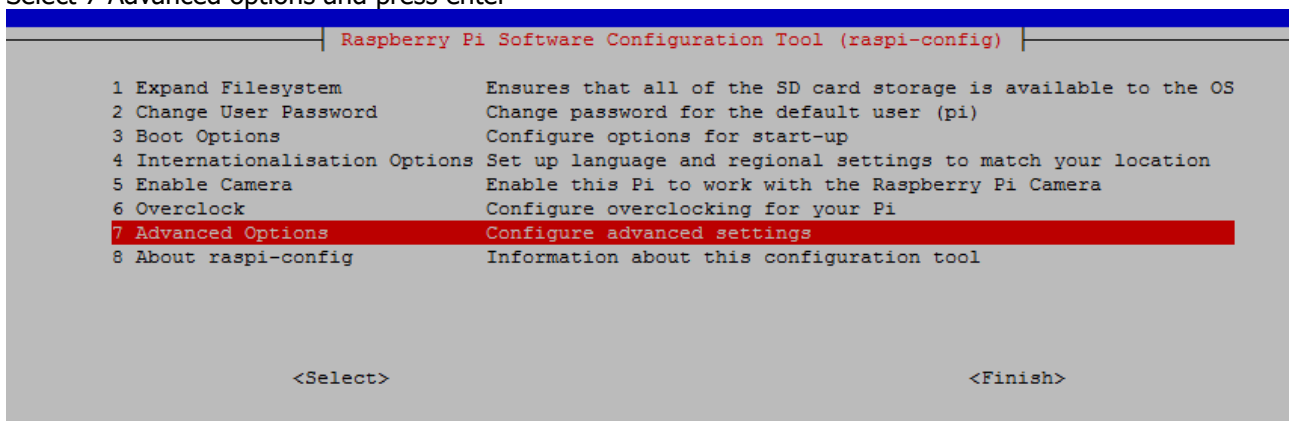
Time zone:

- Amsterdam
- Andorra
- Astrakhan
- Athens
- Belfast
- Belgrade
- Berlin
- Bratislava
- Brussels
- Bucharest
- Budapest
- Busingen
- Chisinau
- Copenhagen
- Dublin
- Gibraltar
- Guernsey
- Helsinki
- Isle_of_Man
- Istanbul
- Jersey
- Kaliningrad
- Kiev
- Kirov
- Lisbon
- Ljubljana
- London
- Luxembourg
- Madrid
- Malta
- Mariehamn
- Minsk
- Monaco

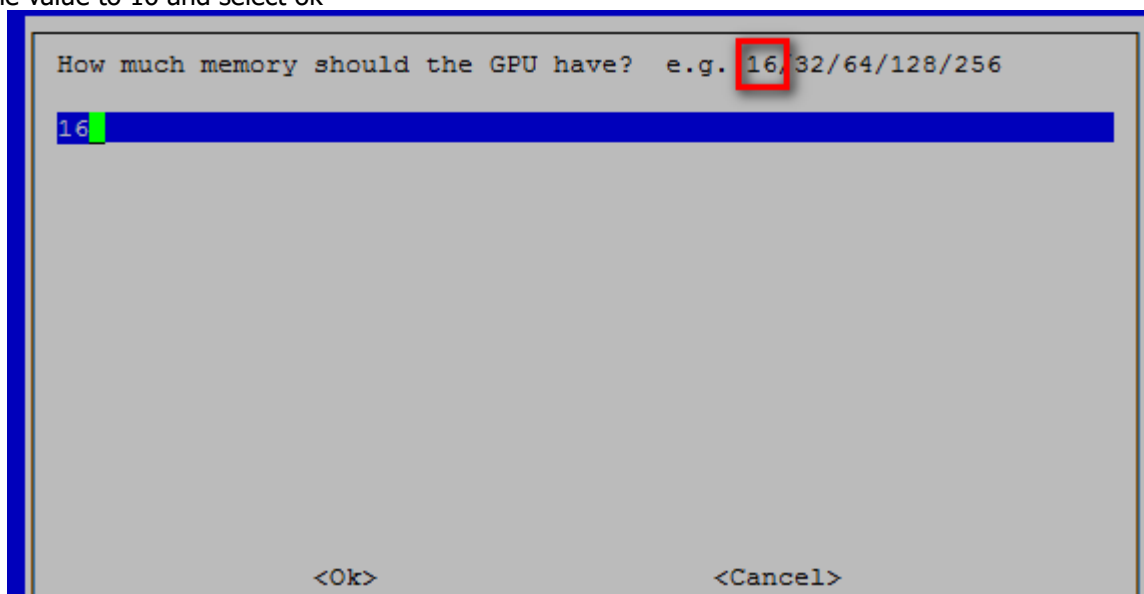
<Ok> <Cancel>

and press enter. It will automatically send you back to the main screen.

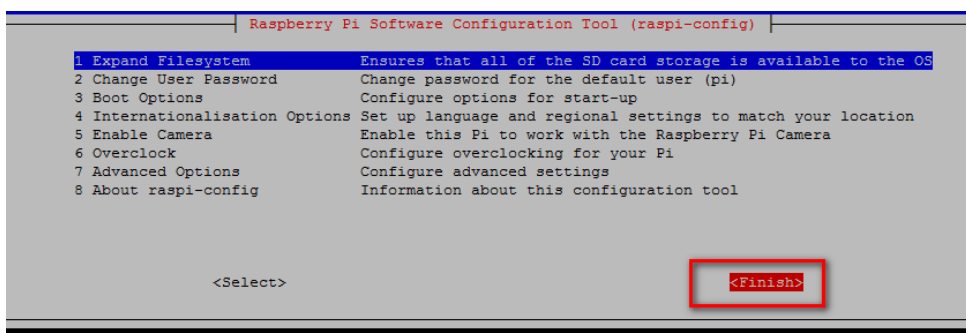
Select 7 Advanced options and press enter



First select A3 Memory Split and press enter
set the value to 16 and select ok



ok all done.
Click finish



It will ask for a reboot. Press yes.

After the RPI has been rebooted. The rpi is pretty quick in rebooting. So just wait a minute. Again connect to it with Putty (see step 5). However, now connect with the new password you have set.

STEP 7

Ok. time to start the installer process. Use only the url in this documentation, i had to use another one, because i created the documentation first before i uploaded the code

Download the Installer first

wget https://raw.githubusercontent.com/nlmaca/Enecsys_Dashboard/master/INSTALL_SCRIPTS/installer.sh

```
pi@raspberrypi: ~  
pi@raspberrypi:~$ wget https://raw.githubusercontent.com/nlmaca/Enecsys_Dashboard/master/INSTALL_SCRIPTS/installer.sh
```

after this you have to set executable rights:

chmod +x installer.sh

Ok. Now we are going to run the installer which will download all the necessary other installer scripts. Run the installer

./installer.sh

You should see these files (type in: ls) to see the files

```
pi@raspberrypi:~$ ls  
1.sudo_static_ip.sh      3.sudo_create_database.sh  5.install_dashboard_cron.sh  installer.sh  
2.sudo_install_webserver.sh  4.sudo_addsudoers.sh      6.sudo_clean_install.sh
```

All these files are needed for the dashboard installation. So lets start with the first one

STEP 8

sudo_static_ip.sh will give you the current ipadress, netmask and gateway of your rpi. It is recommended to use these settings. Just type them in the question box.

Run the command WITH SUDO!!

sudo ./1.sudo_static_ip.sh

```
pi@raspberrypi:~$ sudo ./1.sudo_static_ip.sh  
This script is only for LAN setup, not Wifi  
You can use these current ipadress / netmask / gateway if you want  
ip: 192.168.10.201 / mask: 255.255.255.0 / Gateway: 192.168.10.254  
U can fill in the above findings, or use one you want  
Set the ip of your raspberry: 192.168.10.201  
Set the netmask: 255.255.255.0  
Set your router gateway: 192.168.10.254
```

press enter it will ask for approval. Make sure the settings are correct, otherwise after a reboot you cant connect to it.

```
pi@raspberrypi:~ $ sudo ./1.sudo_static_ip.sh
This script is only for LAN setup, not Wifi
You can use these current ipaddress / netmask / gateway if you want

ip: 192.168.10.201 / mask: 255.255.255.0 / Gateway: 192.168.10.254

U can fill in the above findings, or use one you want

Set the ip of your raspberry: 192.168.10.201
Set the netmask: 255.255.255.0
Set your router gateway: 192.168.10.254

Your new network settings:
Primary interface: eth0
Router gateway: 192.168.10.254
Network mask: 255.255.255.0
Raspberry Ip address: 192.168.10.201

Is dit correct? [y/n]: y
```

it will show a message:

The new settings will be applied on the primary network interface in '/etc/network/interfaces'

After a reboot you can find your rpi on this ipaddress: 192.168.10.201

For further dashboard installation start script No. 2

For now, we dont reboot. We go on to the next step.

STEP 9

ok. the next script will take a bit longer. It will update the rpi and install the mysql server, webserver, php, phpmyadmin

You have to set a new MySQL root password for it. So make sure to note it down, because you need it in the next process. Also save the passwords on a safe place

use this url to generate a random password:

<https://www.random.org/passwords/?num=1&len=12&format=html&rnd=new>

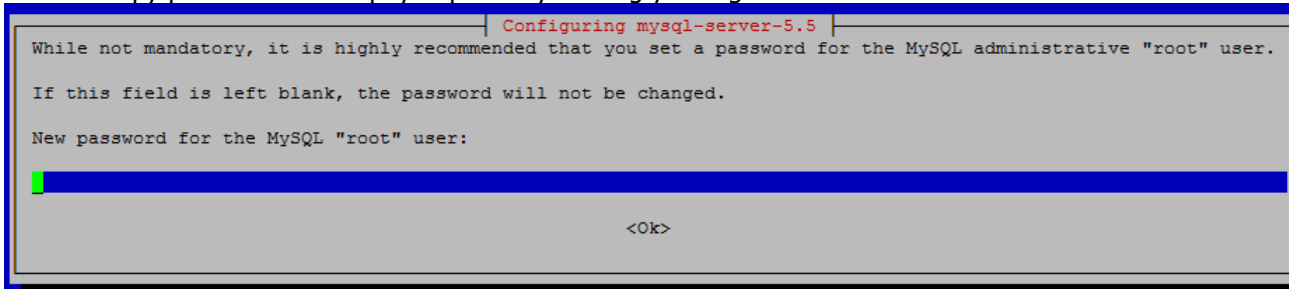
also. Run this one WITH SUDO

sudo ./2.sudo_install_webserver.sh

```
pi@raspberrypi:~ $ sudo ./2.sudo_install_webserver.sh
Update system first
Get:1 http://archive.raspberrypi.org jessie InRelease [22.9 kB]
Get:2 http://mirrordirector.raspbian.org jessie InRelease [14.9 kB]
Get:3 http://archive.raspberrypi.org jessie/main armhf Packages [130 kB]
Get:4 http://mirrordirector.raspbian.org jessie/main armhf Packages [8,981 kB]
Get:5 http://archive.raspberrypi.org jessie/ui armhf Packages [53.6 kB]
Ign http://archive.raspberrypi.org jessie/main Translation-en_GB
Ign http://archive.raspberrypi.org jessie/main Translation-en
```

it will ask you to set a new mysql root password:

You can copy paste it. On the rpi you paste by clicking your right mouse



Configuring mysql-server-5.5

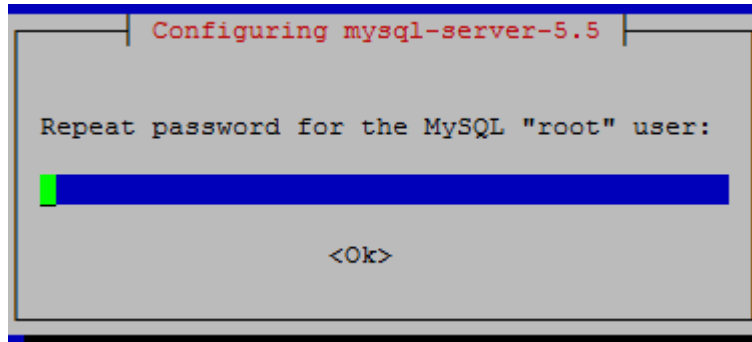
While not mandatory, it is highly recommended that you set a password for the MySQL administrative "root" user.

If this field is left blank, the password will not be changed.

New password for the MySQL "root" user:

<Ok>

it will ask you again



Configuring mysql-server-5.5

Repeat password for the MySQL "root" user:

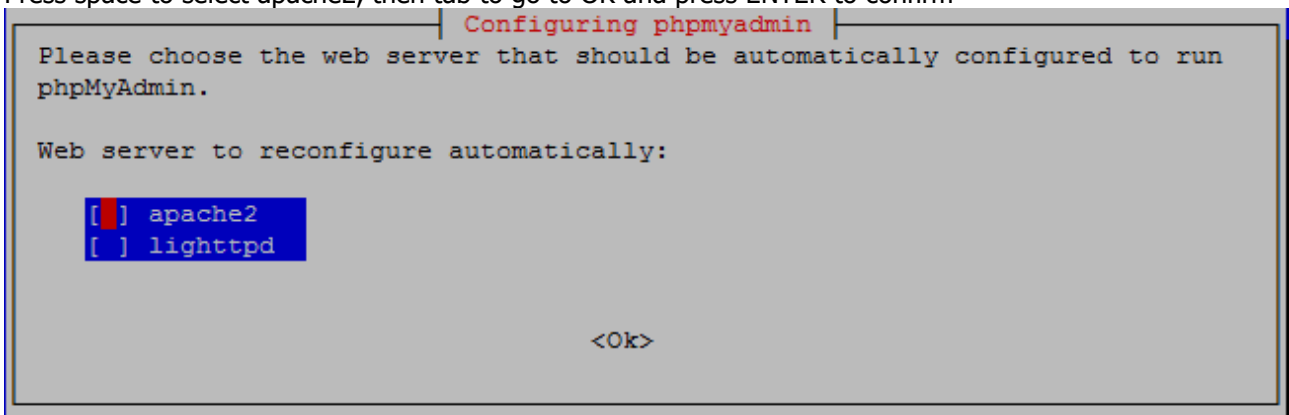
<Ok>

paste the password again. And press tab and then enter to confirm

The install process continues. It can take some time. Don;t worry when nothing happens. A lot is happening on the background.

The next question is this one: here you have to select apache.

Press space to select apache2, then tab to go to OK and press ENTER to confirm



Configuring phpmyadmin

Please choose the web server that should be automatically configured to run phpMyAdmin.

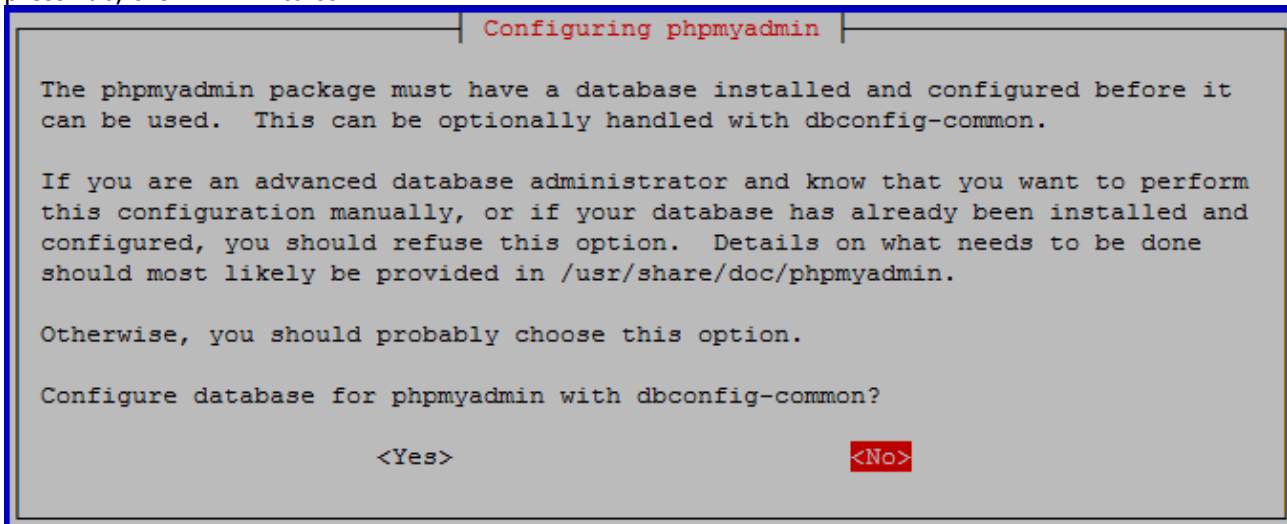
Web server to reconfigure automatically:

☒ apache2

☐ lighttpd

<Ok>

next question is for phpmyadmin. Select no
press Tab, then ENTER to confirm



This will install the last process and restart mysql (database server) and the webserver.
Step 5: echo add line to apache config ServerName 127.0.0.1

Step 6: restart apache and mysql

Installation Done! > Go to script No 3

ok. instalation done. On to the next script

STEP 10

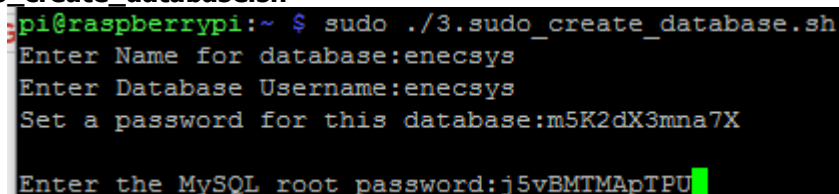
No we are going to create a database for our dashboard. You have to set a database_name, username and password for the database. Again, safe the credentials. You also nee the mysql root password you have set in STEP 9.

Use the link again to create a password

i will use these settings as an example
database name: enecsys
username: enecsys
password: m5K2dX3mna7X

So. start the script again WITH SUDO

sudo ./3.sudo_create_database.sh



Ok. installation went without problems. The database is created

```
pi@raspberrypi:~ $ sudo ./3.sudo_create_database.sh
Enter Name for database:enecsys
Enter Database Username:enecsys
Set a password for this database:m5K2dX3mna7X

Enter the MySQL root password:j5vBMTMApTPU
First check if the database exists or not
Database does not exist. A new one will be created with your given credentials
The database will be created with the settings you gave
-----
Database has been created successfully ,save these credentials!!
-----
Database Info:

Database Name      : enecsys
Database User      : enecsys
Database Password: m5K2dX3mna7X
-----
MySQL Installation Done!
Note the database name, username and password on a safe place. You will also need them
in the install process
Start script No 4.
pi@raspberrypi:~ $
```

Again, save the credentials, you will need them later on.

STEP 11

The next script is an easy one, it will add the apache user to the sudo list, so you are able to reboot the RPI from within the dashboard. It will also grant the apache user permissions to run the cronjobs

run the script WITH SUDO

sudo ./4.sudo_addsudoers.sh

```
pi@raspberrypi:~ $ sudo ./4.sudo_addsudoers.sh
Line added to sudoers
Installation Done. Go to step No 5.
pi@raspberrypi:~ $
```

STEP 12

ok. this is an important one to run it right. You have to set a webdirectory as a parameter, so for example if you want to see it in the browser as http://192.168.10.201/enecsys_solar you have to set **enecsys_solar** as parameter. This will also install all the cronjobs on the pi user based on the parameter you set. You can use `enecsys_solar` if you don't know what i mean;).

This command will download all the files from my github page to your RPI and will unpack it into the webdirectory. So the hard part is done for you automatically :D

You have to run this script WITHOUT SUDO. So don't set `sudo` in front of it. Because we need everything to run on the pi user, and NOT on the root

./5.install_dashboard_cron.sh enecsys_solar

```
pi@raspberrypi:~ $ ./5.install_dashboard_cron.sh enecsys_solar
```

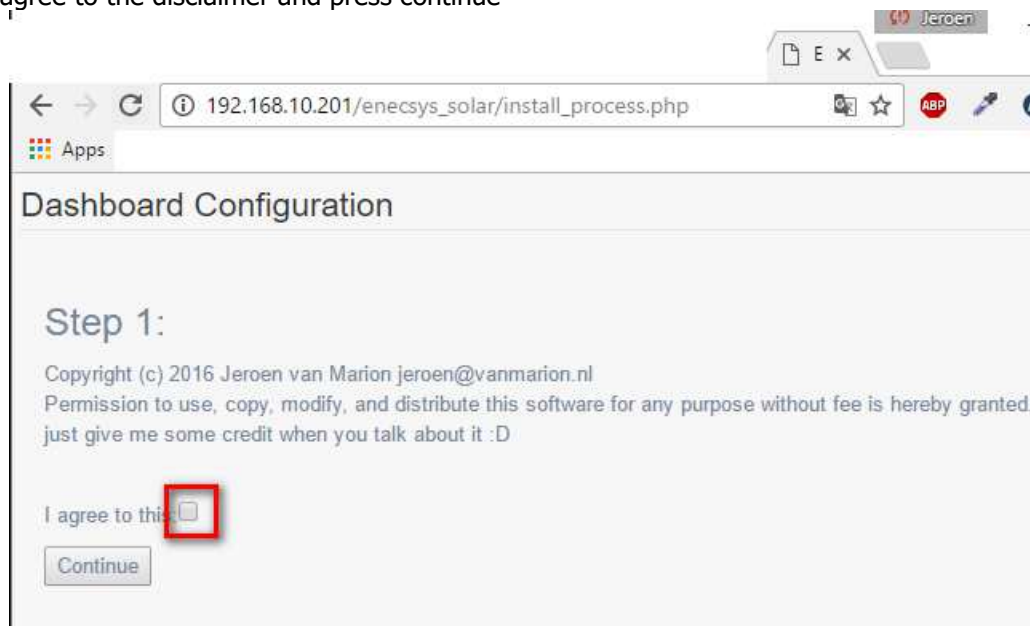
It will download the files, unpack them, install them, install the cronjobs. After that you will get this message. In there you will see an url. Copy this one into your browser

```
inflating: master/pages/settings_user_update.php
inflating: master/pages/usage_system.php
inflating: master/pages/widget_live_inverters.php
inflating: master/currency_symbols.php
Checking if cronjobs exists for this installation and pi user. If o
s exists they will be deleted.
Installation Done.
Open your browser and go to:
http://192.168.10.201/enecsys_solar/install_process.php
pi@raspberrypi:~ $
```

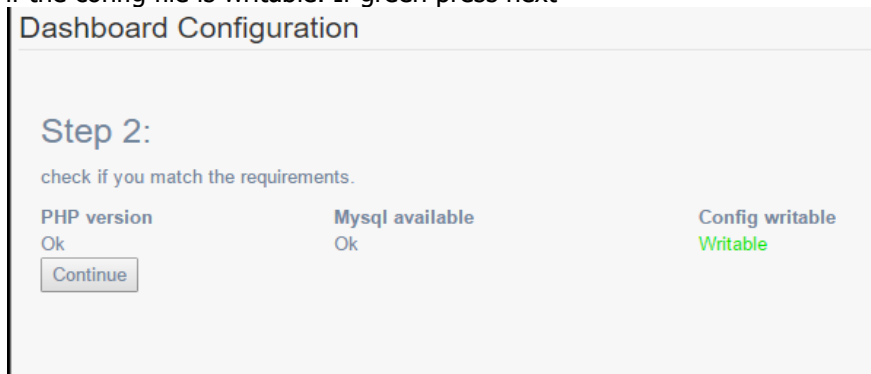
STEP 13

on to the webinstaller. Open the url in your browser to start the dashboard installation, make sure to enter the complete url. In my case: http://192.168.10.201/enecsys_solar/install_process.php

after that agree to the disclaimer and press continue



next it will check if the config file is writable. If green press next



Dashboard Configuration

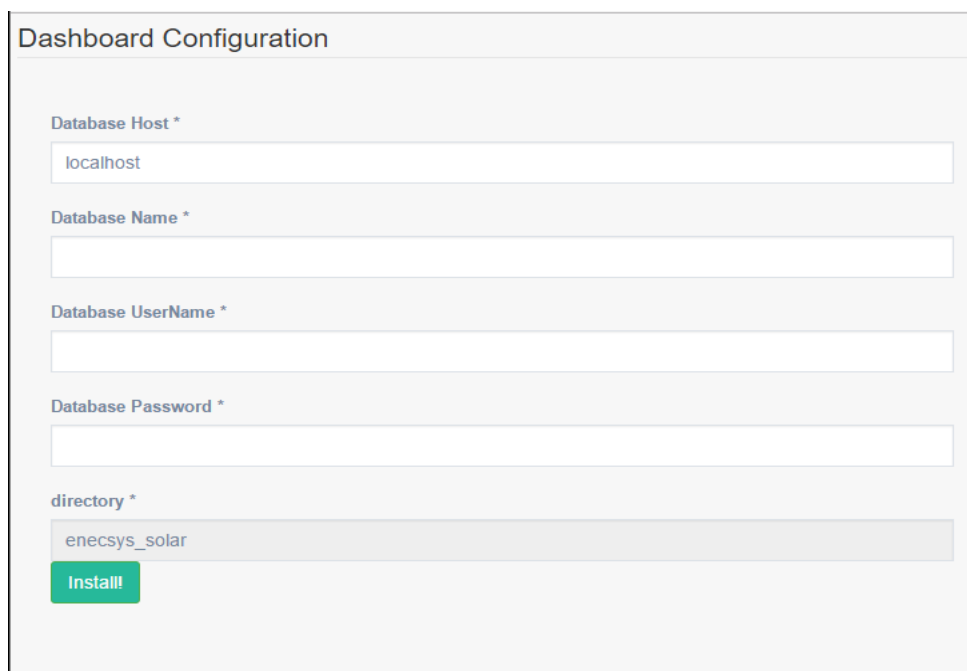
Step 2:
check if you match the requirements.

PHP version Ok	Mysql available Ok	Config writable Writable
--------------------------	------------------------------	------------------------------------

Next screen is where we have to set the database credentials you have set in STEP 10

You only have to set:

- Database Name
- Database UserName
- Database Password



Dashboard Configuration

Database Host *

Database Name *

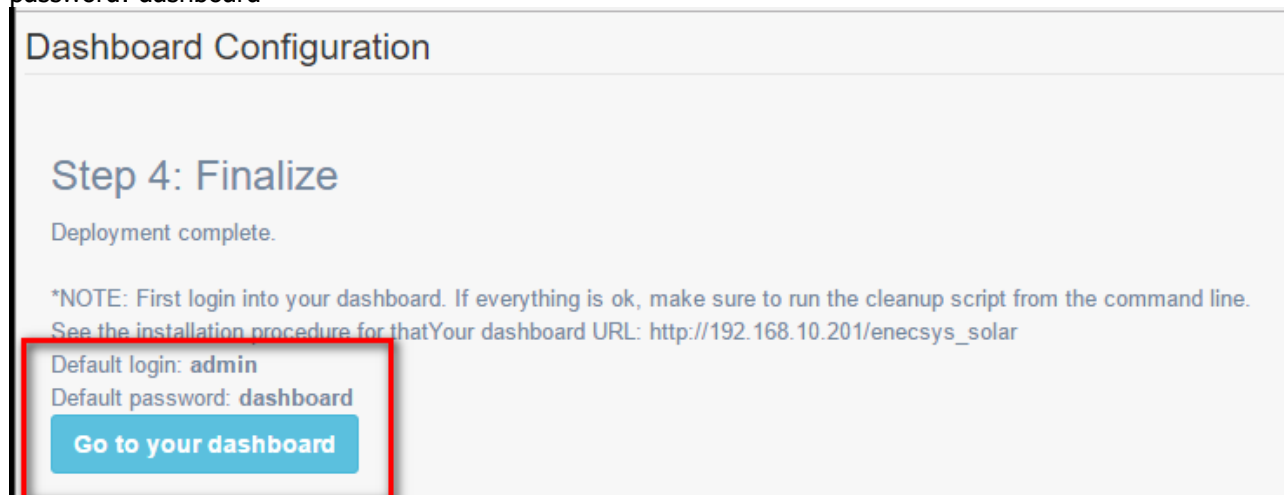
Database UserName *

Database Password *

directory *

ok. almost done. Below will show a link you can click to go to your dashboard.

The default credentials are:
username: admin
password: dashboard



Click on: go to your dashboard and bookmark the page.

NOTE. YOU ARE NOT DONE YET.
Follow this last step

STEP 14

Please go the last step to cleanup the INSTALL files. Run the last script **WITH THE WEBDIRECTORY** (see step 12)

sudo ./6.sudo_clean_install.sh enecsys_solar

```
pi@raspberrypi:~$ sudo ./6.sudo_clean_install.sh
Cleanup done. You can logout and manage the rest in the dashboard. Have fun:D
pi@raspberrypi:~$
```

Ok. now you are done. Logout of the RPI by using this command:
exit

STEP 15

The next step is to set your Enecsys Gateway to the new RPI address. You can find the ipaddress of the Enecsys gateway on the gateway itself



It is best to set the Enecsys Gateway to a static ipaddress. You can do that by deselecting the DHCP because in my experience the gateway will change ipaddresses when you reboot your router.

Go to the ipadress of your enecsys gateway in the browser and login (i don't have the credentials, you should have them). Default credentials are:

username: admin

password: password

Make sure DHCP settings is not selected

In the Remote server address or name enter the ipaddress of the RPI. In my case that would be 192.168.10.201

enecsys
MICRO-INVERTERS

- [Main Settings](#)
- [Home](#)
- [Debug Information](#)

Enecsys Ethernet Gateway Settings

Take great care in adjusting these settings and if in doubt consult your system administrator.
If you get the settings wrong you can lose contact with the gateway.

Gateway Serial Number 2000010466 Online

DHCP Settings ☒ Enable

Fixed IP Address	192.168.0.139
Subnet Mask	255.255.255.0
Network Gateway IP Address	192.168.0.6
Primary DNS Server	8.8.8.8
Secondary DNS Server	8.8.4.4

Proxy Settings ☒ Enable

Proxy Server Address or name	gw.enecsysmonitor.net
Proxy Server Port number	5040
Use Authentication	<input checked="" type="checkbox"/> Enable
Proxy Username	admin
Proxy Password	*****

Configure remote Server

Remote Server Address or name	
Remote Server Port number	5040

Configure NTP Server

NTP Server Address	pool.ntp.org
--------------------	--------------

Apply New Settings

(c) 2009 Wireless Measurement Ltd. All rights reserved.

After that Apply New settings.

Ok almost done. Time to go the dashboard to input your inverters, and configure all the settings

STEP 16

Dashboard configuration

Almost done. There are 2 pages you have to edit in the dashboard. Login in your browser with the url you got from step 10

go to settings-> E2PV

make sure these fields are adjusted: **common mistake is that users add the personal id in the systemid field. So make sure you set the correct one!!**

E2PV Overview



General Settings

Description	Value
Verbose: ⓘ	0
Total Inverters: ⓘ	0
PVOutput Apikey:	apikey
PVOutput System ID:	0
Lifetime: ⓘ	0
Mode: ⓘ	AGGREGATE
Extended: ⓘ	0
AC: ⓘ	0

Edit e2pv Settings

After that set the general settings. The data is not depending on it, but its best to configure the settings first fill them to your needs

System Settings

Description	Value
Enecsys Gateway IP:	0.0.0.0
Language:	English
City:	Emmen
Country:	 Netherlands
Timezone:	Europe/Amsterdam
Currency:	 Euro
kWh Price:	0.22
Temperature:	Celcius
PV Output ID:	37406
PV Output System ID:	34223
PV Output Team ID:	1018
PV Output Team Name:	Enecsys by Tweakers

Edit Settings

The last setting for now is the Settings → Inverters
you will have to set all the inverter serial numbers you have

Inverter: The inverter serial number.
Inverter type: select the type of your panels
part nr: optional
build date: optional
Duo single: select the inverter type duo/single
Watt panel 1, 2 . Set the watt for each panel
Alias: example: top left panels or bottom roof

After you have set all your inverters and settings its time to reboot the rpi.
YOU NEED TO REBOOT EVERY TIME YOU CHANGE THE E2PV SETTINGS!!

Go to System-> reboot/Shutdown
Click on Reboot RPI to confirm all the changes and to reboot the RPI.
After the reboot you have to wait for data coming in. (so you need daylight)

Ok. now you are done. There is a help page in the dashboard with common issues and a short knowledge base.
Have fun

regards,
NLMaca / Jeroen van Marion