

# SOLO

## Users manual



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Thank you for your purchase of the AAG CloudWatcher "Solo"!

The "Solo" has been designed to improve the overall usefulness of the AAG CloudWatcher, monitoring it, adjusting the heater, and constantly publishing information accessible in a variety of ways.

## 1) Physical installation

**The "Solo" has to be installed indoors.** The installation cannot be more easy:

- unplug your CloudWatcher from the power supply (if applicable)
- using the same power supply, power the "Solo" - any of the two plugs will do
- with the included (short) cable, join the other jack plug in the "Solo" with the CW
- Attach the SubD-9 (serial) from the CW to the "Solo"
- and, of course, connect the Solo to your local network using a standard RJ45 cable (not supplied)

... that's it. In a few seconds the "activity" LED in the "Solo" will start blinking (slowly), showing it is communicating with the CloudWatcher

## 2) Accessing the data

Now that the "Solo" is up and running, and connected to your local network, it will fetch an IP address (automatically, using DHCP, as standard in the vast majority of networks) and start publishing information in a variety of ways.

There is a separate document explaining the procedure to enable your Solo being accessed from the internet.

### 2.1) Main web page

From your web explorer, now you can type: "<http://aagsolo>" (in the address bar, *not in Google!*), and you'll see the main "Solo" page:



There are a few things worth explaining in this page:

- ◆ in the *upper left side*, the current readings are displayed. Hovering the mouse pointer over the icons will display the reading numerically.
- ◆ at its *leftmost side*, some buttons:



– stop / start auto update (will refresh every 60 seconds if enabled)



– reload data now

- ◆ in the *upper right*, a log pane with recent information
- ◆ covering the rest (and main portion) of the page, the graphs with information covering the current day and the day before.
- ◆ Also at its *leftmost side*, some buttons:



– stop / start auto update (will refresh every 60 seconds if enabled)



– reload data now



– show / hide yesterday's data



– show / hide the three color background (matching the 3 levels of each reading)



– show / hide a dotted line at the current "unsafe" setting



– choose between metric and imperial units

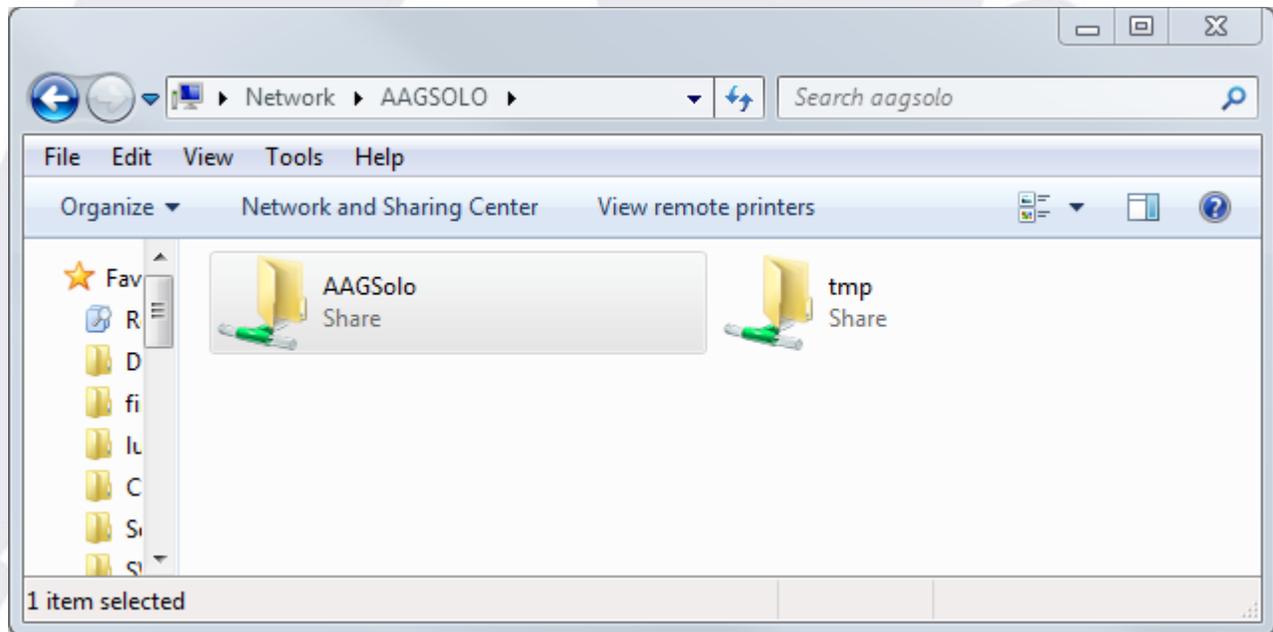
Last, in the lower right side of the page the language can be changed, for the moment Auto, English and Spanish are available.

This page can be made accessible from the Internet; the way of doing so varies from router to router, but basically involves setting up a "NAT" rule for incoming connections at a given port to be redirected to the "Solo" – and of course the "Solo" needs to have a fixed IP address. You can check our running unit at:

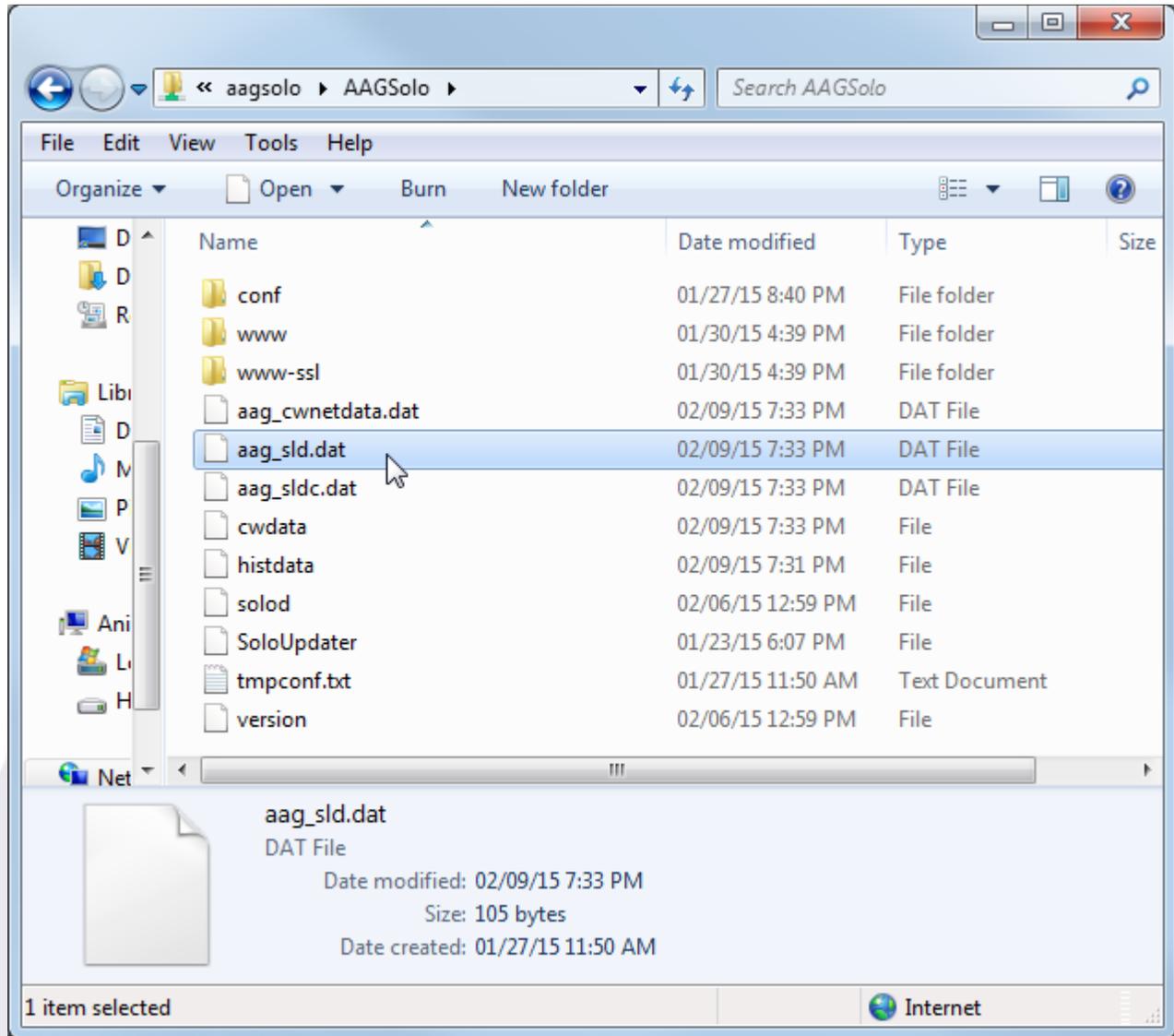
## 2.2) Single Line Data files

Some programs and drivers (at least CCDAutopilot and CCDCommander in remote mode, and also our own and Chris Rowland's ASCOM safety monitor driver), just need to access a file with weather data formatted in a specific way.

The "Solo" does publish this file, and thus you can add weather safety just accessing it from the network. Browse the network to the "aagsolo" computer (by the way, user "**pi**", password "**cloudwatcher**" ):



Forget the "tmp" folder, and go to the "AAGSolo" one:



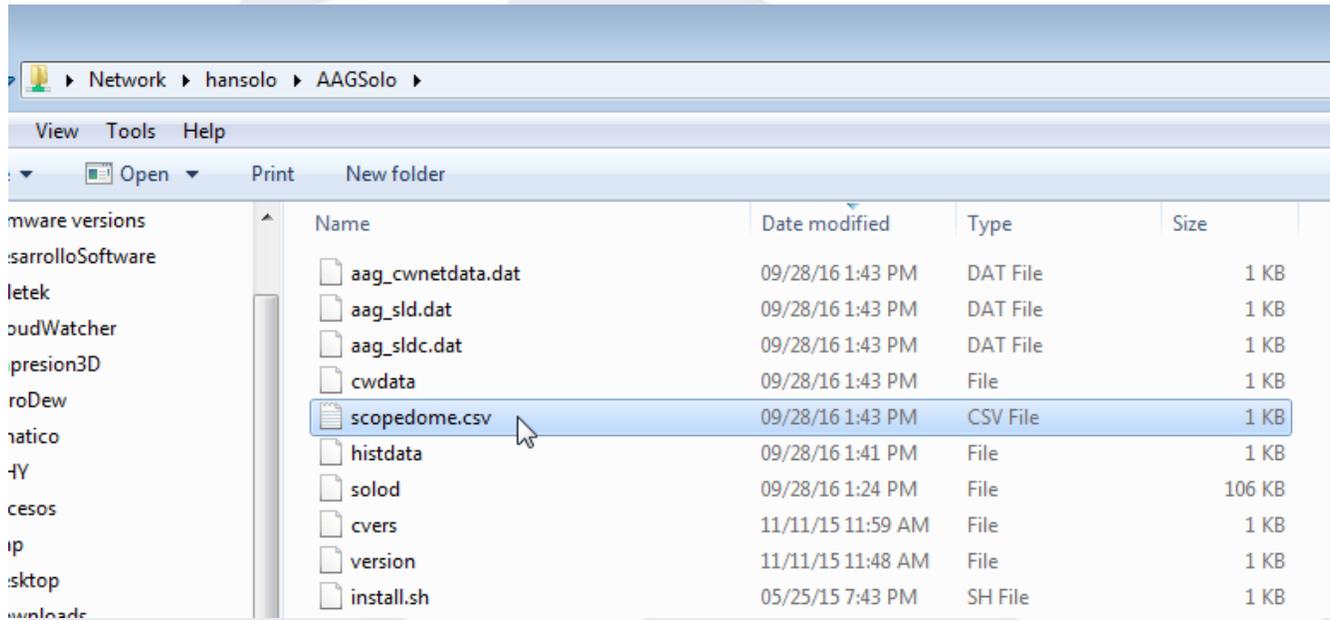
There are quite a few files, but it is "aag\_sld.dat" (meaning AAG Single Line Data) the one we're looking for.

There's also a file called "aag\_slcd.dat", being the same but with a comma "," separating the decimal numbers. I've check that at least CCDAP, if installed in a machine with a locale using that comma to separate decimal numbers, needs this file.

So, you just have to make your automation software (or ASCOM driver) point to this shared folder. Important, depending on the Windows version, you may have to connect to the "aagsolo" from the Windows explorer at least once at the start of every session.

## 2.3) ScopeDome data file

Accessing the network in the same way, we can find a special file for the ScopeDome software, namely "scopedome.csv":



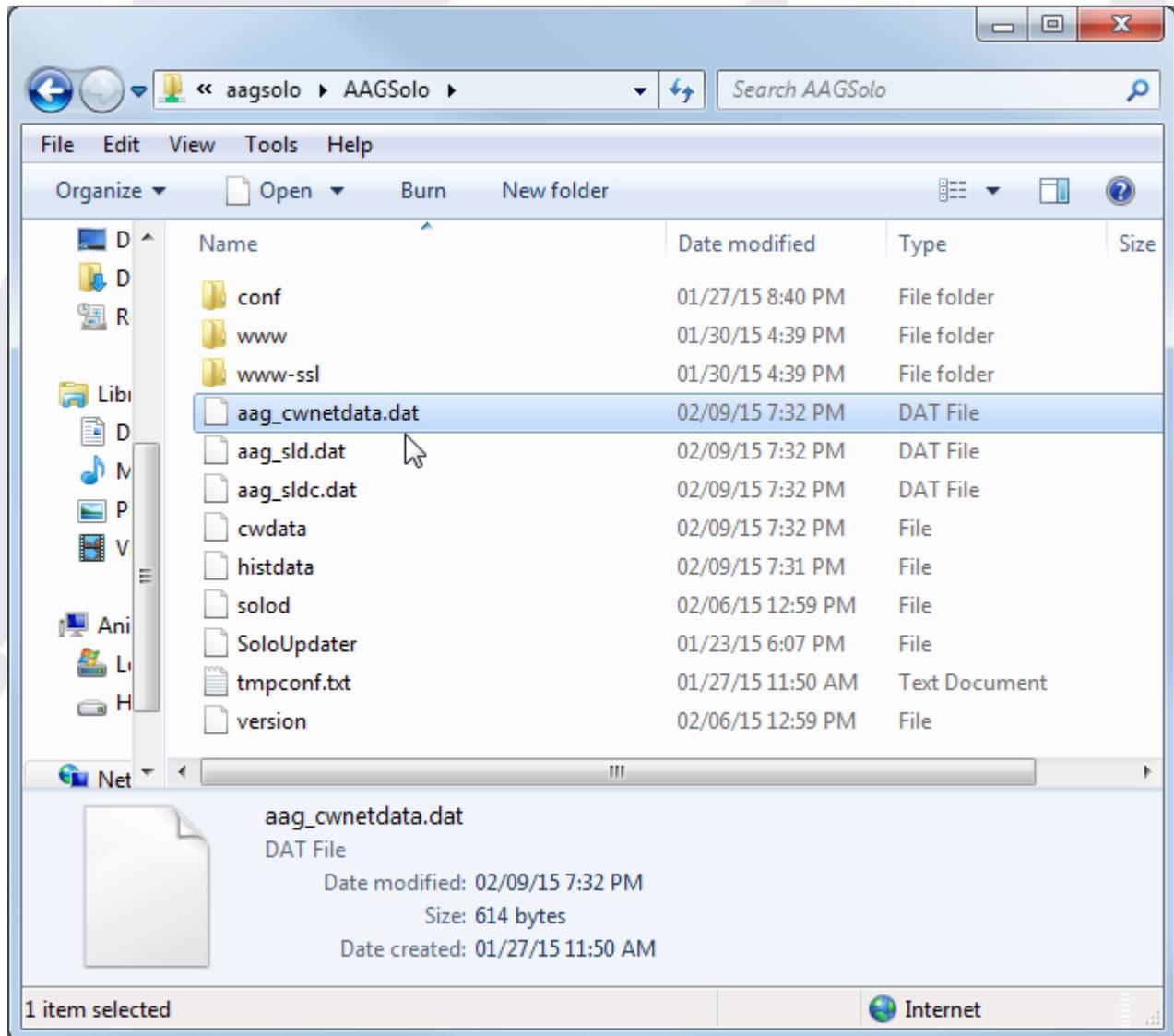
... just select this file in your ScopeDome software, Config, Cloud Sensor Config (Current Cloud Sensor Status File Name)

## 2.4) AAG CloudWatcher "Master"

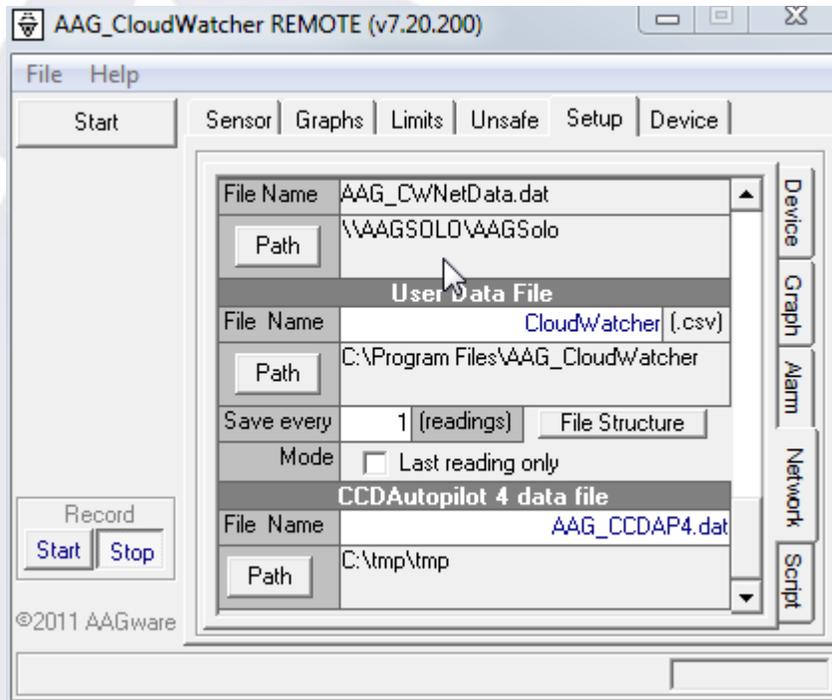
The "Solo" also behaves as a CloudWatcher Windows application in Master mode, so you can connect other instances of the Windows software, running as Remote, to the "Solo".

**Note:** to change your current Windows software from Master to Remote, you'll have to run a small utility called "AAG\_ResetParameters" included in your current software. Browse your hard disk to the installation folder, typically C:\Program Files\AAG\_CloudWatcher or C:\Program Files (x86)\AAG\_CloudWatcher, to find it. Reset all parameters (please take note of your current K-factors and Limits settings before doing so!), and running your software again will ask "Is this a Master or Remote installation"

Browse the network again to the aagsolo machine (reminder, user "pi" password "cloudwatcher"), and you'll find the AAG\_CWNetData.dat file:



This is the file your "remote" AAG programs will need to operate. Selecting, from those applications, the folder containing it will allow them to run.



As said before, depending on the Windows version, you may have to connect to the "agsolo" from the Windows explorer at least once at the start of every session.

## 2.5) Data Logger

A new (for version 1.4) and useful feature of the Solo is its ability to record a CSV file in a user supplied USB stick. You just need to insert, in one of Solo USB ports, a suitably formatted USB memory stick (suitably formatted means FAT – other formats may work if you know what you're doing...).

Once the stick is inserted, the Solo software will detect it, mount, and start adding information to a CSV file (userdata.csv) in the base folder of the stick – so you just have to insert the stick for the logging to start.

However, to remove the stick, you have to “unmount” it (similar to the Windows “safely remove” operation) – there is an option in the configuration pages to do so.

Final note: the software will append information to the file if it exists; if you have already taken the file in your computer and want to start afresh, just delete it from the USB stick before inserting it again in the Solo.

### 3) Configuration

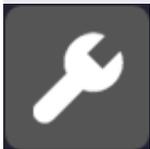
To access the configuration pages, please, again in your web browser, type:

<https://aagsolo/config/>

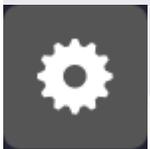
notice the “s” after http – this means it is a secure protocol. You'll get a warning, or maybe several, about the site not being secure. You are in your local network, so please trust you're accessing your “Solo”. You'll be asked for user and password, in this case the user is “**solo**”, the password the same as before, that is, “**cloudwatcher**”.

*The reason for this warning is we're using a custom certificate that allows all information to be encrypted, for safety, but the certificate itself is not registered in a certification authority; that's a more complex and expensive step unneeded here.*

Once you've agreed to proceed to the site, you can access three pages:



- **configuration**, where you'll be able to setup your “Solo” in a very similar way to the CloudWatcher Windows software.

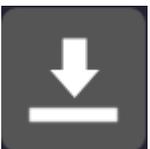


- **system details**, where you can make some adjustments, set the time / date, network configuration, change the default password<sup>1</sup> (“cloudwatcher”), reboot the system (just in case), and also shutdown it.

- For the shutdown process, and given it will take you a trip to the observatory to start it again, you'll be challenged to confirm your selection.



- **USB status**, it may be unmounted, as shown, or mounted. Clicking the button will check the USB status again (if unmounted) or unmount it prior to a safe removal (if mounted)



- Last, **update the system**. From here you can check if there's a new version and, optionally, update to it.

<sup>1</sup> Please note the password you can change here is the one to access this configuration section of the web. It does not affect the password used to access the files using the Windows network.

Just a few notes about the configuration – please consult the online documentation for the Windows program for more specific data.

The screenshot shows a configuration window for 'Mediocielo / Halfsky observatory'. At the top right, it displays the date and time: 'Tuesday, February, 10 2015 10:57 GMT+01'. Below the title bar, there are three buttons: 'Load current config', 'Load previous config', and 'Load default config'. To the right of these buttons are two icons: a green checkmark and a red 'X'. The main configuration area is divided into several sections:

- Observatory:** Title: 'Mediocielo / Halfsky observatory', Subtitle: '... because the other half is unavailable', Timezone: 'Europe/Madrid'.
- Status limits:** Clear: < -10 °C, Cloudy: < 0 °C, Overcast: < 30 °C, Calm: < 5 Km/h, Windy: < 44 Km/h, Very windy: < 999 Km/h, Dry: > 2000, Wet: > 1700, Rain: > 400, Max. rain graph: > 2700, Dark: > 2100, Light: > 6, Very Light: > 0, Max. light graph: > 59950.
- Switch & limits:** Use switch: , Unknow is unsafe: , Delay after unsafe: 300 s, Clouds: > -10 °C, Wind: > 25 Km/h, Rain: < 1700, Light: < 15.
- K factors:** K1: 33, K2: 0, K3: 4, K4: 100, K5: 100, K6: 0, K7: 0.
- Offsets:** Ambient temp. offset: 0, IR temp. offset: 0.
- Heater:** Temp low: 0, Delta low: 6, Temp high: 20, Delta High: 4, Min. heating: 10, High temp: 10, High durat.: 60, High cycle: 600.

At the bottom left, there is a copyright notice: '© Lunático Astronomía, S.L.'.

- **timezone:** you have to select your time zone so the readings are accurate and match your local time, for the automation programs. The data in the web pages will match the local time of the place you're connecting from.
- **load previous / default configuration:** options to let you recover from errors or tests.
- **max rain graph / max light graph:** defining the upper limit of the graphs, so they look pretty. The other graphs (cloud, temperature, wind speed) adjust themselves in the current data range.
- **Ambient and IR temperature offsets,** used to compensate for the electronics heating and other factors; the offsets will be subtracted from the raw readings of the sensors.
- And last, **the “unsafe” limits;** here you can specify the limit exceeding which a reading will be considered unsafe. This is a difference from the Windows software, where you had only 3 options (matching the 3 ranges) for setting unsafe. So, for instance, you can define wind speeds 0 to 5 Km/h to be calm, 6 to 25 to be windy, and above that to be very windy, but set the unsafe wind limit to, say, 20 Km/h.

The System page is very straightforward, only worth noting is the Network configuration:

**Network config**

Change your network configuration

DHCP (full automatic)

DHCP + static (semi automatic)

Eth:

IP DHCP:

IP static:

... here we can specify if we just want the address of the Solo to be obtained automatically for our router (full automatic), avoiding any problem, or if we prefer to also specify a static (fixed) address, which is useful to make the Solo accessible from the internet.

## 4) "Hidden" features

There are a number of interesting things the Solo can do that lack proper support in the configuration pages, for the moment, but still can be accessed.

### 4.1) Push via Pushbullet



If you want the Solo to send push messages to your smartphone, PC, or whatever, now there is support for this using Pushbullet, a great and free system.

You'll need to open a Pushbullet account; then you'll have the option to install a client or you can check your notifications in the website; the client program is available for many platforms, and quite useful IMHO. With your account you'll have a key, a long string of characters, that identify your Pushbullet account.

To activate the sending of messages when the weather changes from UNSAFE to SAFE (and vice versa), just open your internet explorer, chrome, or whatever and type:

<https://aagsolo/cgi-bin/cgiSetPBKey?your-pushbullet-key>

Please note the "s" in "https", and replace the "your-pushbullet-key" for the actual key.

To disable it:

<https://aagsolo/cgi-bin/cgiSetPBKey>

Suggestion: activate it only in imaging nights.

### 4.2) Setting DNS servers

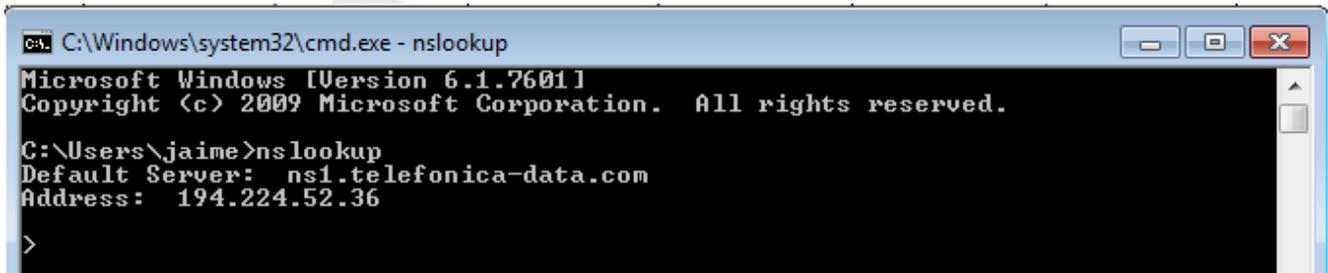
If your Solo has problems accessing the internet (you will most probably notice when trying to check for updates), you can set your correct DNS servers, as provided by your ISP, using this cgi (web program):

<https://aagsolo/cgi-bin/cgiSetDNS?ip.of.your.dns>

... you can set up to two DNS:

<https://aagsolo/cgi-bin/cgiSetDNS?ip.of.your.dns1&ip.of.your.dns2>

Tip: to find out your current DNS, open a windows command prompt and type "nslookup":



```
C:\Windows\system32\cmd.exe - nslookup
Microsoft Windows [Version 6.1.7601]
Copyright (c) 2009 Microsoft Corporation. All rights reserved.

C:\Users\jaime>nslookup
Default Server: ns1.telefonica-data.com
Address: 194.224.52.36

>
```

... as shown above. The Address shown is your current DNS server (for your PC), and you can safely use it for the Solo, so it would be, for that address:

<https://aagsolo/cgi-bin/cgiSetDNS?194.224.52.36>

### 4.3) Rolling back to a previous version - or to a future one

In case some version goes wrong in the future, we hope not, you'll be able to force the system to download and install any specific version:

[https://aagsolo/cgi-bin/cgiForceVersion?version\\_number](https://aagsolo/cgi-bin/cgiForceVersion?version_number)

To reinstall this current version 1.2, for instance, that would be:

<https://aagsolo/cgi-bin/cgiForceVersion?12>

... notice we don't use the dot between the numbers.

## 5) Other interesting facts about the "Solo"

- ✓ The "Solo" is based on the Raspberry Pi model "B", and has a really friendly power consumption of approx < 2 W.
  - ✓ Inside the box there's a SD card acting as the hard disk of the device. It is mounted in "read only" mode, meaning that:
    - there's no problem at all unpowering the unit, the SD card will never become corrupt. It is only written, for a very short while, after configuration changes or a system update.
    - It will take a while (minutes...), after powering the Solo, for it to retrieve the correct time and date, please be patient!
    - Also, the SD will not "worn out"; these cards had a limited number of write operations, so being read only will extend its life almost indefinitely.
  - ✓ You can get the last reading from the CloudWatcher easily to use in a program or a personal web: <http://aagsolo/cgi-bin/cgiLastData>
  - ✓ In a similar way, you can get the historical data for up to 48h: <http://aagsolo/cgi-bin/cgiHistData>
  - ✓ The system is quite hacker friendly; you can, *under your responsibility*, login via ssh and tweak the web pages or whatever. For ssh connections, the user is "pi", the password "cloudwatcher".
  - ✓ ... and, as always, your suggestions are most welcome.
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