Windsensor WiFi 1000

NoWa (C) 2020, V1.14

Windsensor Documentation

For proper operation the Windsensor requires a web browser with HTML5, JavaScript and Canvas, as supported by all actual browsers. Please check browser security settings in case of malfuntions.

Main Page

The main page provides buttons to access sub pages serving different purposes. The status bar displays copyright, version number and WLAN connection quality in percent.
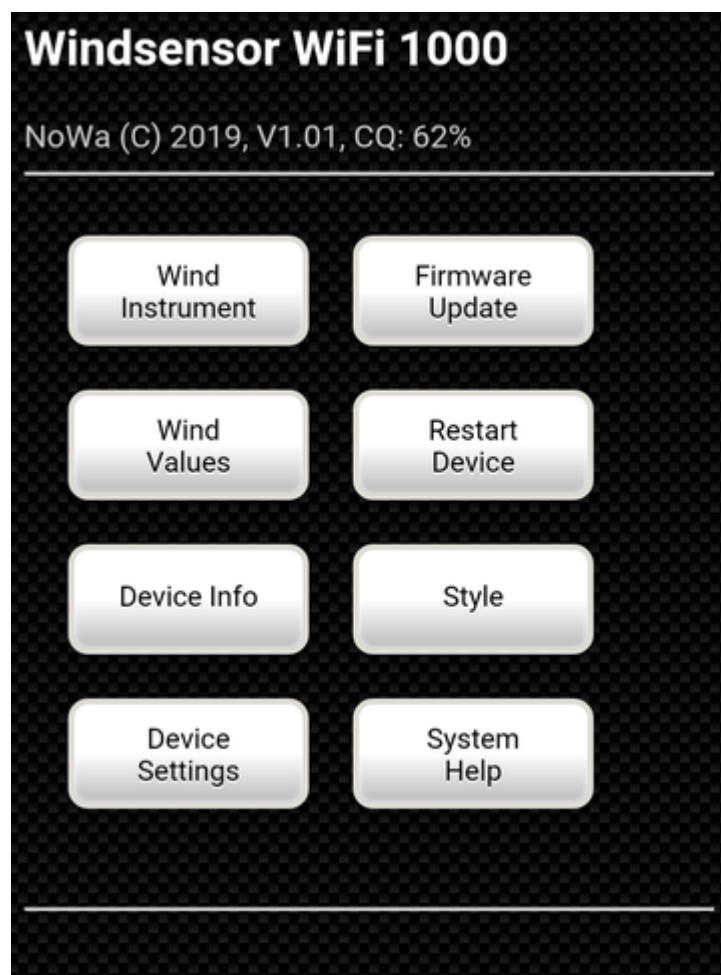

Wind Instrument

This page displays the simple Windsensor instrument type with a wind direction pointer. Inside the circle live values are shown. To change windspeed unit and down wind area (gray bottom area) refer to the Device Settings page. The user may choose between two instrument layouts (see Settings). Both instrument designs are stored in the device's memory.

The complex wind sensor instrument type for relative winds with a beautified surface looks like this:
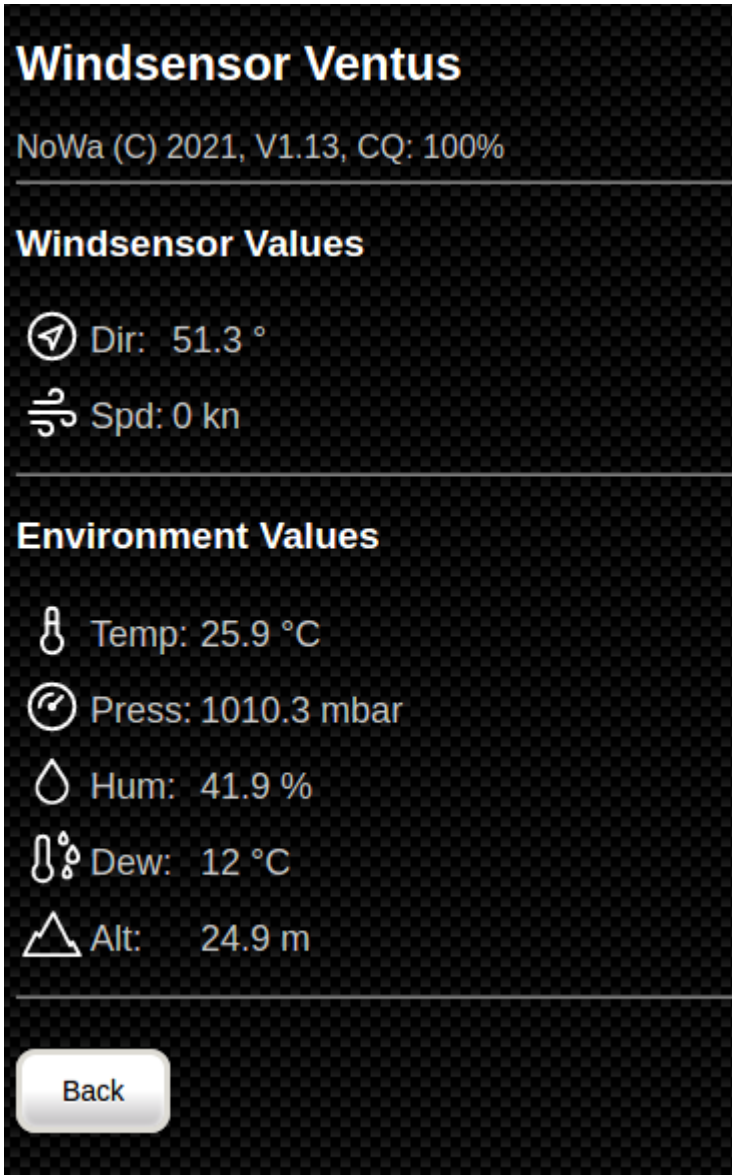
For true winds change the design of instrument:
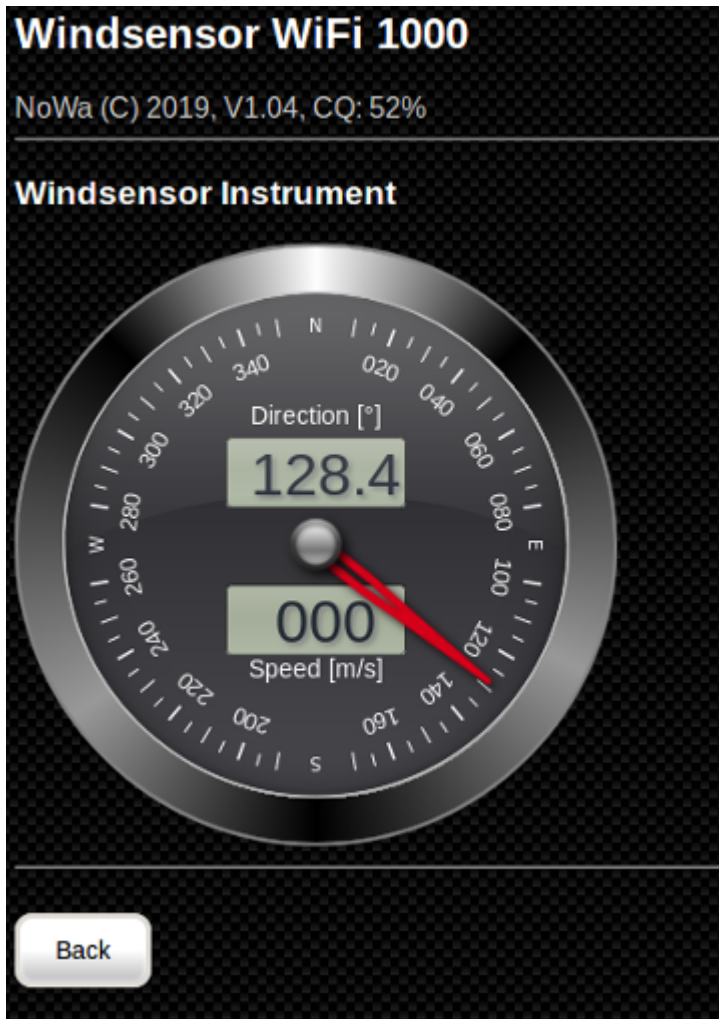
Wind Values

This screen displays apparent wind angle (AWA) and apparent windspeed values (AWS) and environment values if used Ventus wind sensor.

Windsensor Ventus

NoWa (C) 2021, V1.13, CQ: 100%

Windsensor Values

⊘ Dir: 51.3 °

≋ Spd: 0 kn

Environment Values

🌡 Temp: 25.9 °C

⊘ Press: 1010.3 mbar

⬦ Hum: 41.9 %

🌡 Dew: 12 °C

△ Alt: 24.9 m

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Device Info

This screen provides an overview of all relevant Windsensor's data grouped in different sections.
Various information is displayed depending on the selected sensor type
(NOWA1000|Vachta|Jukolein|Ventus).

Windsensor WiFi 1000

NoWa (C) 2020, V1.09, CQ: 0%

Firmware Information

Firmware Version	V1.09
License Type	CC-BY-NC-ND

ESP8266 Informations

SDK Version	2.2.1(cfd48f3)	
ESP8266 Chip ID	284312	
ESP8266 Speed	160	[MHz]
Free Heap Size	37760	[Byte]

Network Parameter

Hostname	windsensor-0	
mDNS Name	windsensor-0.local	
WLAN Server SSID	NoWa	
WLAN Server IP	192.168.4.1	
Activ AP Channel	4	
WLAN Client SSID	Strubbel	
WLAN Client IP	192.168.1.123	
Client Field Strength	-100	[dBm]
Connection Quality	0	[%]

Device Informations
(Demo Mode)

Device Temperature	21.9	[°C]
Wind Direction	98	[°]
Resolution Wind Direction	0.4	[°]
Wind Speed	27.21	[kn]
Down Wind Speed	0	[kn]
Sensor 1 (Speed)	1	[bin]
Sensor 2 (Direction)	1	[bin]
Pulse Counter	0	[n]
Time 1 (Speed)	89.76	[ms]
Time 2 (Direction)	27.68	[ms]
Rotation Speed	11.14	[rps]

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(NOWA1000)

Firmware Information

Firmware Version Version of ESP8266 real time kernel.

License Type CC-BY-NC-ND.

ESP8266 Informations:

SDK Version: Version of software development kit used to build the ESP8266 real time kernel.

ESP8266 Chip ID: Unique ID equivalent to a serial number.

ESP8266 Speed: Current CPU speed.

Free Heap Size: Internal free memory (RAM) available for dynamic values and variables. In case of problems please check free heap size.

Network Parameter:

Hostname: Hostname of the Windserver. The hostname is a combination from name windsensor and Sensor ID. You can using this name in the following URL: http://windsensor-0 for a wind sensor with the Sensor ID 0. If you using more than one wind sensor then select for each windsensor a different Sensor ID (reffer Device Setings).

mDNS Name: Multicast DNS name. You find the wind sensor with this name in the local network. You don't need a IP address. The multicast DNS name is usable if the mDNS service is activated (refer Device Settings).

WLAN Server SSID: SSID of WLAN run by the Windserver.

WLAN Server IP: IP-adress of WLAN server run by the Windsensor.

Activ AP Channel: Actual used Access Point channel.

WLAN Client SSID: Client SSID of WLAN the Windsensor is connected to.

WLAN Client IP: Client IP adress in WLAN the Windsensor is connected to.

Client Field Strength: WLAN field strength in dBm. It indicates wireless connection quality.

Connection Quality: Quality value in percent for the wireless connection.

Device Informations:

Device Temperature: Internal device temperature.

Wind Direction: Apparent wind angle (relative to the bow - AWA).

Resolution Wind Direction: Current wind direction resolution. Resolution depends on windspeed. A higher windspeed will enhance resolution. Please refer to the user manual for details.

Wind Speed: Apparent windspeed (relative to the boat - AWS).

Down Wind Speed: Virtual Windsensor for down windspeed. For more details please refer to 'Device Settings'.

Sensor 1 (Speed): Actual output status of Hall sensor 1 (NOWA1000|Yachta|Jukolein).

Sensor 2 (Direction): Actual output status of Hall sensor 2 (NOWA1000).

Pulse Counter: Count the number of pulse per revolution for the wind direction sensor (NOWA1000). This is helpfully to control the correct Hall sensor and metal shield function. With rotating wind wheel the pulse counter must be constant at 1. If the value is greater than 1, the aperture does not switch correctly and the magnet may have to be readjusted. If the value is 0, the sensor does not switch or the wind wheel does not turn. The pulse counter is a good indicator for checking the correct sensor function. For additional tests the diagnostic mode can be activated. Then a more detailed graphical diagnosis with a software oscilloscope can be made with an external diagnosis tool (see also Diagnosis Mode).

Time 1 (Speed): Time measured per rotation of Hall sensor 1 (NOWA1000).

Time 2 (Direction): Time measured between Hall sensor 1 and Hall sensor 2 (NOWA1000).

Device Informations

Device Temperature	0	[°C]
Wind Direction	342.26	[°]
Resolution Wind Direction	0.09	[°]
Wind Speed	0	[kn]
Down Wind Speed	0	[kn]
Sensor 1 (Speed)	1	[bin]
Magn. Flux Density	1760	[mT]
Magn. Sensor (Direction)	342.26	[°]
Rotation Speed	0	[rps]

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(Yachta|Jukolein)

Magn. Flux Density: Flux density of the magnet for rotation sensor AS5600 (Yachta|Jukolein).

Magn. Sensor (Direction): Raw data without offset for wind direction AS5600 (Yachta|Jukolein).

Rotation Speed: Rotation speed of anemometer wheel.

Device Informations

Wind Direction	-93.28	[°]
Resolution Wind Direction	0.09	[°]
Wind Speed	0	[kn]
Down Wind Speed	0	[kn]
Sensor 1 (Speed)	0	[bin]
Magn. Flux Density	23	[mT]
Magn. Sensor (Direction)	66.72	[°]
Rotation Speed	0	[rps]

BME280 Informations

Air Temperature	24.01	[°C]
Air Pressure	1012.99	[mbar]
Air Humidity	45.88	[%]

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(Ventus)

Air Temperature: Air Temperature environment sensor BME280 (Ventus).

Air Pressure: Air Pressure environment sensor BME280 (Ventus).

Air Humidity: Air Humidity environment sensor BME280 (Ventus).

Device Settings

Attention:
This screen holds passwords - it is advised not to call this page while connected to public networks. Password transmission may not be safe in a public environment.

This page permits changes to the Windsensor's settings.

Windsensor WiFi 1000

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Password Settings

Use Page Password   Off

Page Password   12345678

Display Settings

Instrument Type   complex

Instrument Size   400x400 pix

Network Settings

WLAN Client SSID   Strubbel

WLAN Client Password   883428aa

Connection Timeout   30s

WLAN Server SSID   NoWa

WLAN Server Password   12345678

AP Channel   1

Server Mode   Demo Mode

mDNS Service   On

Device Settings

Serial Debug Mode	Errors + Warning: ⌄
Serial Speed	115200 Bd ⌄
Sensor ID	0 ⌄
Wind Sensor Type	NOWA1000 ⌄
Send Wind Data	On ⌄
Wind Type	Relative Wind ⌄
Offset	0 [°]
Average	1 ⌄
Speed Unit	kn ⌄
Down Wind Sensor	On ⌄
Down Wind Range	180° +/-50° ⌄
Temp Sensor Type	Off ⌄
Send Temp Data	Off ⌄
Temp Unit	°C ⌄

Speed Sensor Calibration

Calibration Slope	1.00000 [1]
Calibration Offset	0.00000 [m/s]

[Save]

[Back]

Use Page Pasword: Allows secure access via password to the web pages Device Settings, Firmware Update and Restart Device.

Page Password: Password to access the secure web pages.

A password must be entered when accessing the secured pages. Only upper and lower case letters and numbers may be used. Special characters are not allowed. The password must consist of 8 to 20 characters.

Instrument Type: Two types of instruments are available. The 'simple' type displays a lightweight grafic instrument, the 'complex' type emulates the look of a classic marine semianalog panel. Both layouts are held in the device's memory.

Instrument Size: Change the size of instrument for optimal viewing on the browser in use. The setting applies to all devices connected. Unfortunately individual layout per display unit is not possible due to ESP restrictions.

WLAN Client SSID: SSID of the external network used by the sensor to transmit raw data to OpenPlotter or other data servers.

WLAN Client Password: Password to access the external network used by the sensor to transmit raw data to data servers (e.g. OpenPlotter).

Connection Timeout: The wind sensor tries to establish a client connection until the timeout has expired. Notice: If no connection has been established, the web interface can only be reached after the timeout has expired. The timeout is useful when OpenPlotter and the wind sensor are switched on at the same time. The wind sensor starts faster and then tries to connect until the timeout expires. If the timeout is longer than the OpenPlotter's boot phase, the wind sensor can automatically log into the OpenPlotter's WLAN after switching on.

WLAN Server SSID: SSID of the wireless network created by the windsensor to provide the web interface. You can use a mobile phone or tablet to display wind data.

WLAN Server Password: Password of the wireless network created by the windsensor to provide the web interface.

AP Channel: Access Point channel for WiFi network. Attention! The WiFi channel can only be freely set if the wind sensor is not connected to another WiFi network (e.g. OpenPlotter) .If the wind sensor

is connected to another WiFi network, its channel is used.

Server Mode: 'HTTP (JSON/NMEA)' is the default value. The Windsensor provides a web interface with data formatted as JSON. This mode may also be used for other applications accepting JSON. In the same mode is it possible to transmit NMEA0183 data to applications like OpenPlotter on Port 6666. In this case the Windsensor serves as data server with OpenPlotter being the client. With **'NMEA Serial'** you can setup a RS232 serial connection for NMEA0183 data transmission by wired cable. The mode supports also a serial debug mode for hardware debugging. In this case select and change the settings in **Serial Debug Mode**. **'MQTT'** Is reserved for future functions to connect to an MQTT server. Currently the function is not implemented. **'Diagnostic'**In diagnostic mode, more in-depth functions of the wind sensor can be checked. A software oscilloscope has been integrated into the wind sensor to display the digital sensor data over time. This enables a simple control of the sensor function without having to connect a hardware oscilloscope to the IC pins. The oscilloscope data is transferred via a JSON interface to an external diagnostic tool and displayed there. The diagnostic tool can be downloaded here: [Calibration Tool](#) Additional information on the tests can be found in the description of the diagnostic tool. When set to **'Demo Mode'** the Windsensor provides demo data using HTTP (JSON/NMEA) data format.

nDNS Service: Avtivate the mDNS service for the local network. The wind sensor supports a hostname (e.g. windsensor-0.local). You can connect the wind sensor with this name in the local network. The mDNS service supports also different network services for HTTP and NMEA0183 connections. In the navigation software AVnav you can very easy directly connect the wind sensor without any IP and port declaration as Zero-Config.

Serial Debug Mode: The Serial Debug Mode supports hardware debugging. You can monitor and control all Windsensor functions over a serial RS232 connection (RX,TX,GND). The output signal level is set to 3.3V TTL. Use a level shifter TTL/RS232-USB to connect with a PC. On PC side you can use a terminal program to display all ASCII debug information.

Serial Speed: Serial Speed determines the RS232 line speed.

Sensor ID: Unique ID of the Windsensor when multiple sensors are installed.

Wind Sensor Type: Describes the type of wind transducer. At present just Windsensor NOWA1000 is available. Future versions may provide different sensors.

Send Wind Data: Setting this value to 'true' enables wind data transmission. When set to 'false' data transmission will be stopped.

Wind Type: Describes the type of wind for other applications. The Windsensor only measures apparent wind direction and speed relative to the boat. With 'true wind' however you can send the sensor's wind data using a different label in case your data processing application just accepts true wind data. In 'true wind' mode change the design of instrument to fix direction scale. This mode is usable for a weather station with stationary wind sensor.

Offset: The offset value is used to correct the wind direction in case the wind sensor has not been aligned exactly midships. Valid values are -180°...+180°.

Average: Factor for moving average calculation. Higher factors smoothen wind angle and speed values. Decrease the factor for more reactive values.

Speed Unit: The selected unit will be used to display windspeed.

Down Wind Sensor: Set to 'true' to use the Down Wind Sensor. This is a performance value

indicating the unused windspeed. If the boat's speed is equal to windspeed, this value will be zero and Wind force is optimally used. Down Wind Sensor values will be calculated when wind hits from aft within the Down Wind Range, otherwise set to zero.

Down Wind Range: Defines the wind range for down winds. Down wind range is shown in the bottom area of the grafic instruments.

Temp Sensor Type: Select type of temperature sensor that may be optionally installed. In future applications we consider providing weather sensors.

Send Temp Data: 'True' to enable temperature sensor data. 'False' to stop temperature data transmission.

Temp Unit: Temperature unit to be displayed on all devices attached.

Speed Sensor Calibration

If necessary, the wind speed can be calibrated with the following two parameters to improve the measurement accuracy. For calibration the Speed Unit must be set to [m/s]. Afterwards, measurement data is recorded simultaneously with a reference measuring device and the wind sensor and entered in an Excel diagram. A calibration can be carried out very easily on a windless day with a car and a GPS app on a mobile phone as a reference speedometer. The measurement data are provided with a linear fit. The fit parameters are then the correction data for the slope and the offset. The horizontal axis contains the uncorrected wind speed data and the vertical axis contains the corrected data. Here you can find an Excel template for calibration: [Calibration Tool](#)

$f(x) = 0.8413808941x + 1.1786336714$
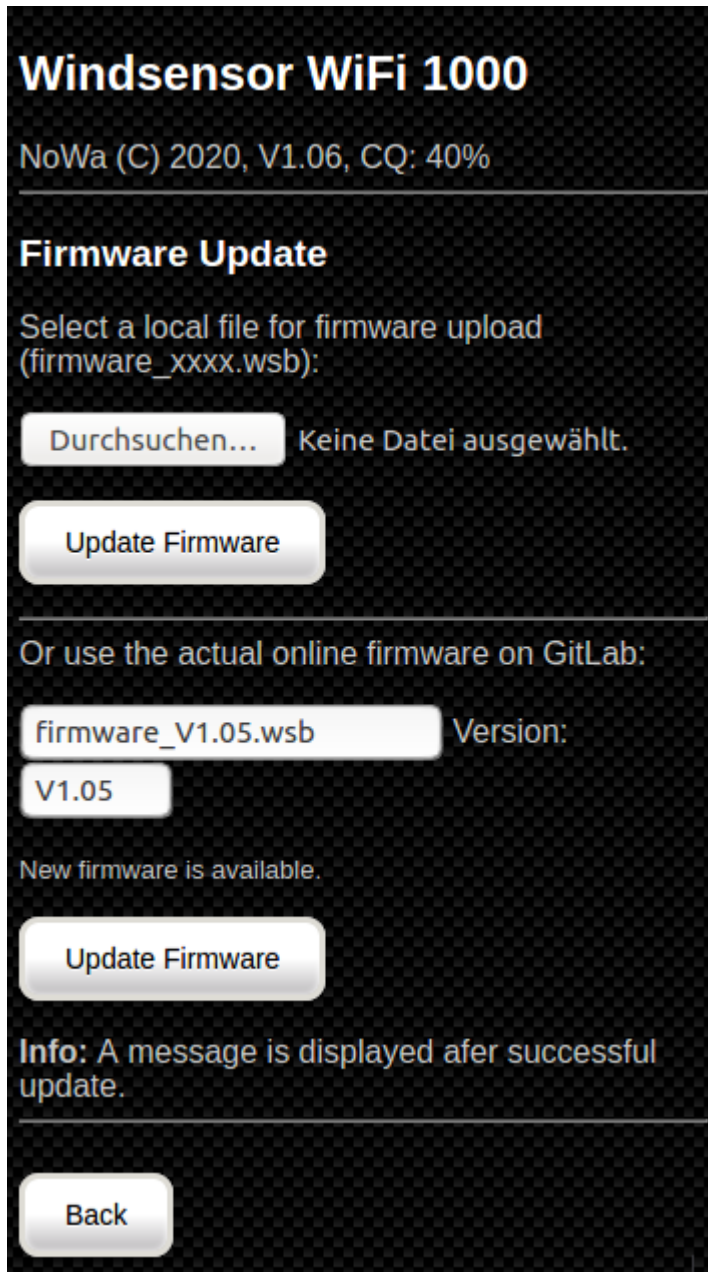$R^2 = 0.9952066698$
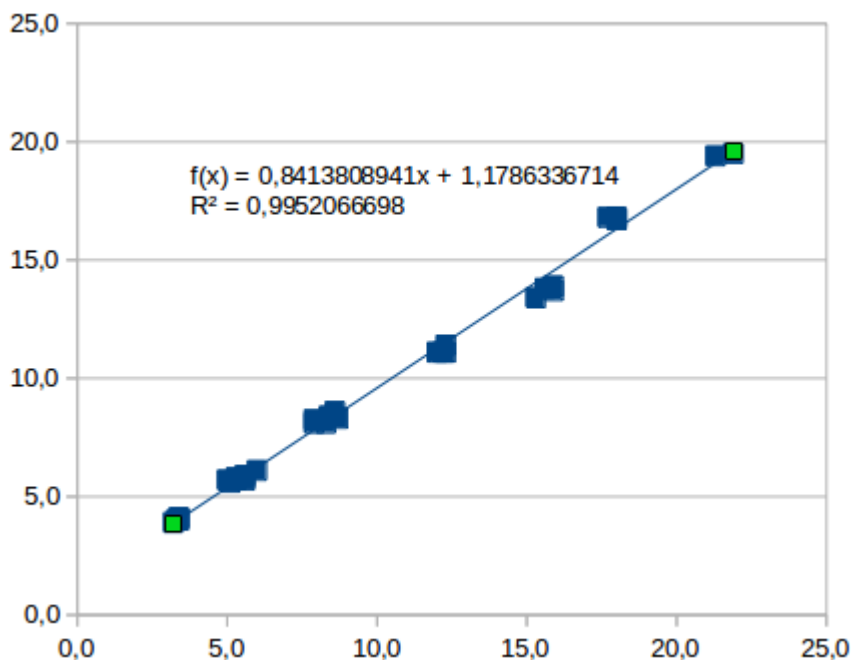
Calibration Slope: Calibration slope is a factor with which the measured values can be increased or decreased.

Calibration Offset: Calibration Offset is a fixed value which is added to the measurement data.

Firmware Update

This page allows updating the Windsensor's firmware in two variants. The latest actual firmware is displayed. Download the latest firmware and save it. Then select the new firmware file and click button 'Update Firmware'. Please be careful to enter the right filename extension (**wsb**) for firmware update. Success status will be displayed upon completion. OK indicates a successful update. Otherwise an error information will be shown. **Caution! By loading an incorrect or corrupted file the Windsensor will not work and may require a manufacturer service.** The Windsensor reboot automatically after successful firmware update.
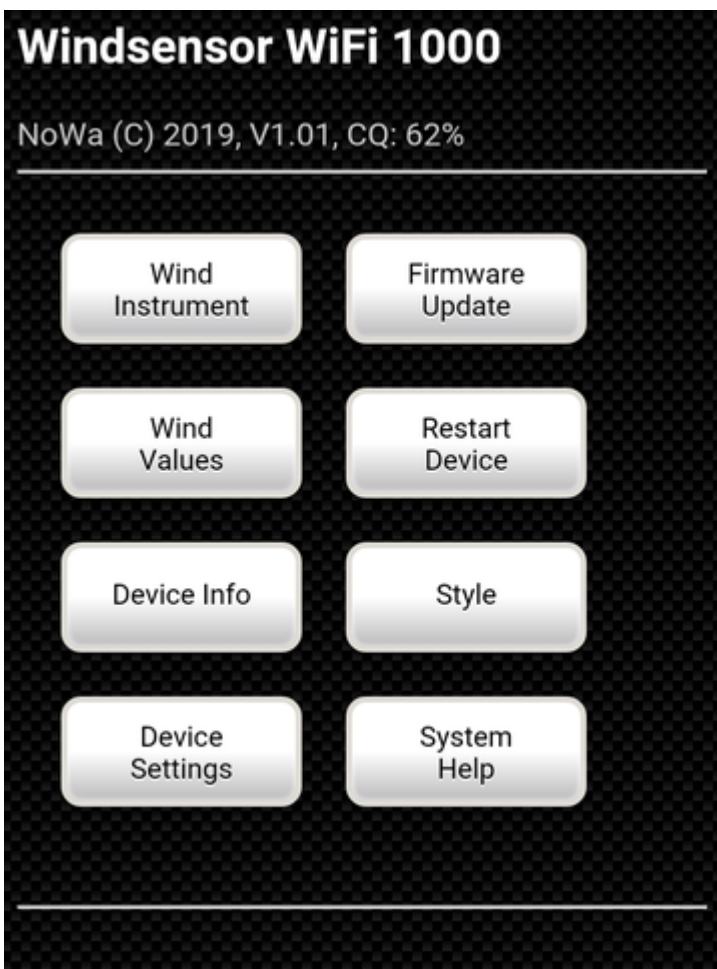

Restart Device

Allows the wind sensor to be restarted. Then you get to the start page.
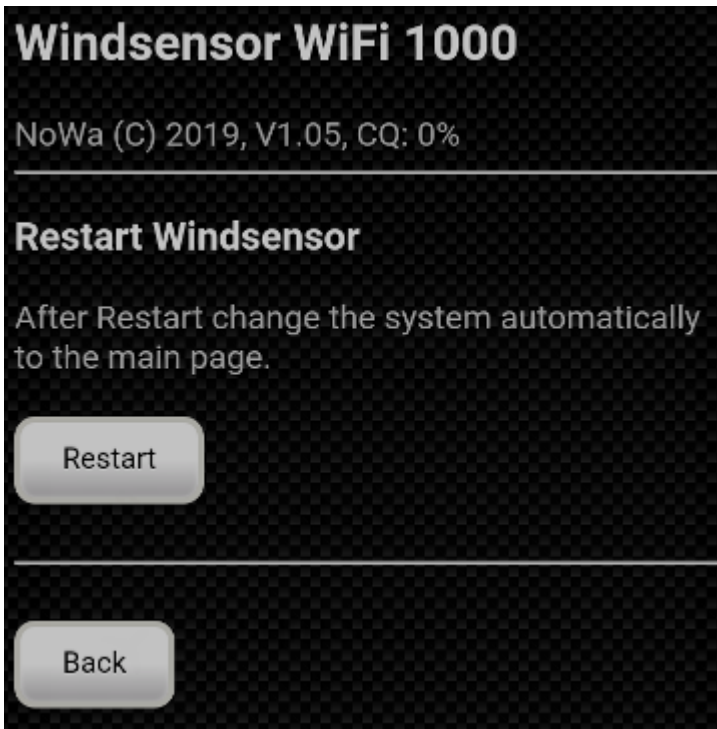
Style

You can toggle between three page styles. Click the button again to change to the next style. Beware that all changes will apply to all displays connected.

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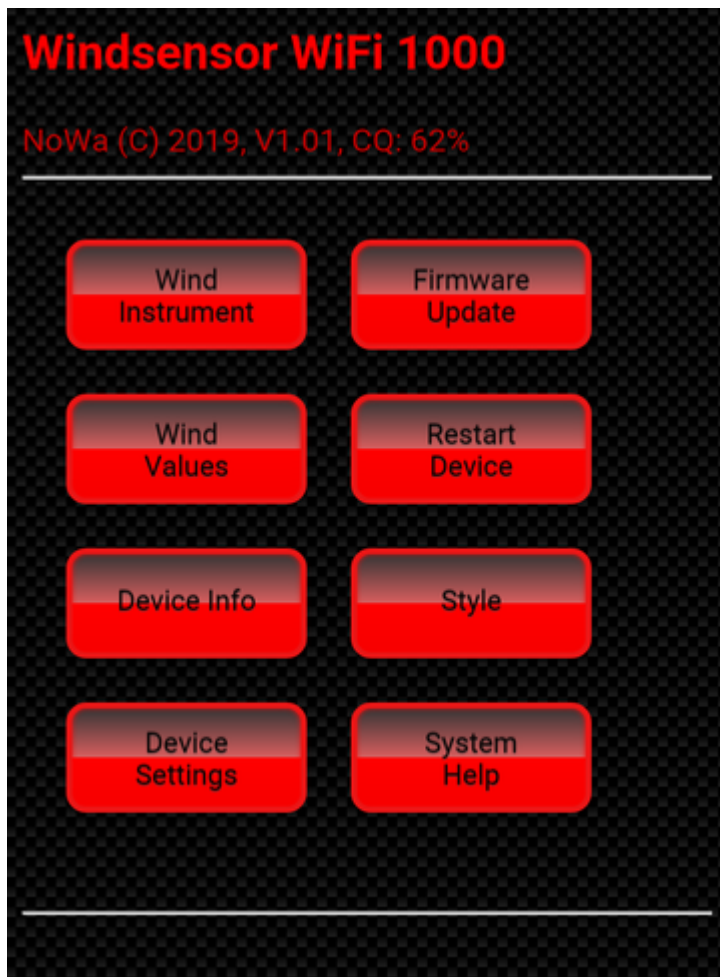|	
Wind Instrument	Firmware Update
Wind Values	Restart Device
Device Info	Style
Device Settings	System Help

System Help

Displays this help text. If you require more information, please refer to the project page on GitLab.

[Windsensor WiFi 1000](#)

Thanks Note

Benjamin Wagner	For the valuable tips regarding OnShape CAD system and 3D printing
Kurt Georg Walter	For the 3D printer donation
Jacob Schwarzmann	For the excellent manufacturing of all metal prototype parts
Michael Satzinger	For software testing and translation support
Gerrit Grunwald	For the nice canvas steelseries instrument library
GitLab Team	For the project hosting platform and for hosting of software parts

Donation

If you want to help or you consider this project as useful, please donate. Thanks for your support!

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