



App AMS 4516 Description

General Description

The AMS 4516 app is suitable for smartphones and tablets with Android 6.0+ operating systems and is required for communication with the AMS 4516 wireless pressure sensor.

Download the App

The app can be searched and downloaded from the Google Play Store using the search terms AMSYS or AMS 4516. The Bluetooth and GPS (for positioning) of the mobile/tablet must be switched on for operation. In addition, the app requires access to the external memory of the mobile/tablet to save the measured values of the sensor during logging, in a *.csv file on the device. These accesses must be confirmed by the user when downloading the app.

After completing the installation, the app icon with the name "AMS 4516" appears on the smartphone/tablet. Clicking on the icon will launch the app and display a list of detected wireless AMS 4516 Bluetooth devices. They are detected by the automatic scanning process automatically when the app starts. On the overview page, the most important operating data of the sensor are displayed in a brief overview under the sensor name. As long as the app scans in real time for existing AMS 4516 sensors, the message: "**App is scanning for Bluetooth devices**" appears on the screen under the app name AMS 4516. Clicking on one or more sensors from the displayed list stops the scanning process in the background and the message: "**Scanning for Bluetooth devices stopped**" is displayed. The selected sensors are marked with a green checkmark in the checkbox.

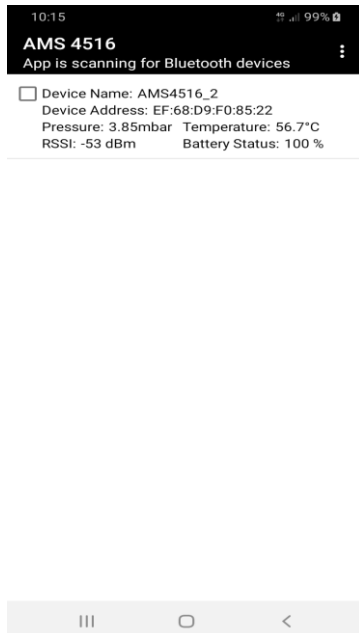


Figure 1: Main Page

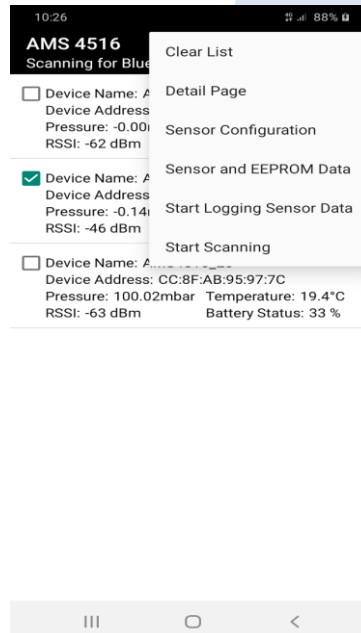


Figure 2: Main Page after clicking the menu button

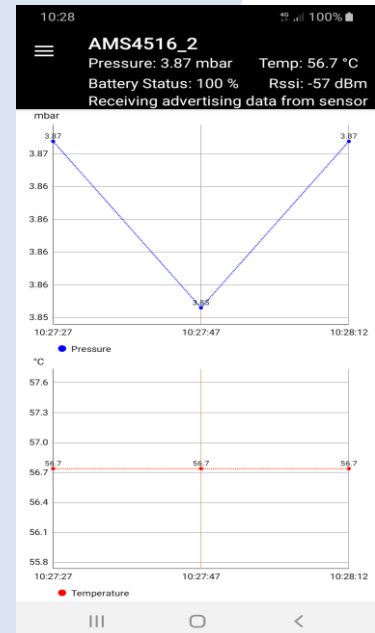


Figure 3: Detail Page (graphical view)



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The user now has various options via the menu button (☰) (Fig. 2). It is possible to look more closely at the data of a sensor and to follow the behaviour in graphical representation. For individual measurement tracking of a graphic representation, "**Detail Page**" must be selected in the menu button (☰). This will open a new view and the name of the selected sensor and the real-time advertising/broadcasting data will appear at the top of the display (Fig. 3).

Below, the measured values for pressure and temperature are also displayed over time in separate graphs. The timeline is given in hours: minutes: seconds

Multiple sensors can not be selected for detail view. When choosing sensors from the larger list of sensors, "**Show selected devices**" has to be activated via the menu button. Only then the previously from the list selected sensors, will appear with the measurement data in a short form as shown in Figure 2. If a sensor can not be selected, it is probably already in the selection list. If all sensors are to be displayed again, click on "**Clear List**". If the logging of one or several sensors has been started, you can use the option "**Show Logging Devices**" in the menu to display the current logged devices. This is only possible on the main page. The menu options listed here are only displayed if one or more sensors are selected from the list.

To switch to another page, please only use the options in the menu and not the return button of the mobile/tablet.

The analysis of data can be done either in the not connected **Advertising/Broadcasting mode** or in the **Connection mode**. If the transmitter and receiver want to establish a secure Bluetooth connection and want to counteract the loss of data packets, the connection in "connected" mode is to be preferred. However, this connection also has a higher energy consumption compared to the Advertising/Broadcasting mode.

Description of the existing menu options on the Data- and Detail pages

On the left next to the displayed measured values is the menu button (☰) at the top. By clicking on the menu button or swiping on the display to the right, the various options of the Detail page (Fig. 4) and Data page (Fig. 8) are displayed. Options are explained hereafter:

- Start Scanning: Starts scanning for available AMS wireless devices, without being connected with these.
- Stop Scanning: Stops the scanning for available AMS wireless devices.
- Start Logging
Sensor Data: If not available, a new directory with the name of the sensor + "sensor data" is created in the device memory of the mobile/tablet. There the measured values for pressure and temperature are stored in a *.csv file. The first column shows the date and time the data was recorded (system time of the mobile/tablet). The second and third columns show the pressure and temperature values (Fig. 5).



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Stop Logging
Sensor Data:

This command stops the logging process.

Start Logging
EEPROM Data:

This opens a dialog box with the possibility to read out all saved EEPROM data or only a certain number of the last saved value. The app creates a new directory with the name of the sensor + "EEPROM Data" in the device memory of the smartphone/Tablets. In this directory the measured values for pressure and temperature are stored in a *.csv file. The first column shows the date and time. The second and third columns show the pressure and temperature values (*Fig. 5*). The data is additionally displayed numerically and graphically on the display.

Stop Logging
EEPROM Data:

Stops the logging of the EEPROM Data;

Sensor
Configuration:

Change to the configuration page. Here it is possible to change the configuration settings of the sensor. For this, the mobile device must first establish a Bluetooth connection with the sensor. If the connection has been established successfully, the words **sensor name + "Connected"** and below **"Bluetooth Services Discovered"** must be displayed at the top of the display (*Fig. 6*). If this is not the case and if the **sensor name + "Disconnected"** is displayed at the top of the display after opening the page, then click on **"Connect"** via the menu button (:) until the lettering changes to **"Connected"**. This is because only in Connection mode, the sensor can be configured.

For all possible configuration settings, there is an info icon with explanations on the right side. The sensor configurations can not be changed when the sensor is "logging".

Sensor and
EEPROM Data:

Change to the data page. Here, the current sensor readings are displayed in real time via a secure Bluetooth connection via Bluetooth notification (*Fig. 7*). The sensor will send the current pressure and temperature readings every 5 seconds (default, but can be changed from the Configuration page under **"Set sampling rate for the Bluetooth notification in ms"**). The data is displayed numerically and graphically below as on the Detail page (*Fig. 7*). If you want to stop the real-time transmission of the measured values, you have to press **"Disable Bluetooth Notification"** in the menu. When you close the page, all actions such as logging or Bluetooth notification are stopped and the Bluetooth connection is disconnected except when switching to the Configuration page only the connection will be still established.

Overview Page:

Switching to the Main page.

Detail Page:

Switching to the Detail page.

Connect:

Establishes a Bluetooth connection.

Disconnect:

Disconnects the Bluetooth connection.



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Set Limit Line Pressure:

You can use this command to set limits for the measurements. In the displayed dialog box, the critical value for the pressure must be entered. **Floating numbers must be entered with a point.** The limit line is shown as a red dashed line in the graphic view and the value is displayed on the right above the line. If the limit value is far outside the currently measured values, it will only be displayed graphically if this value lies within the tolerance of the graph.

Remove Limit Line: Removes the Limit Line.

Change Unit: In the dialog box, you can select the preferred unit to appear at the top of the display. There are three choices: mbar, psi and hpa. Preconfigured is mbar (Fig. 9).

Enable Bluetooth Notification: Enables Bluetooth notification. The transmission interval has been predefined to 5 seconds by the manufacturer. The data is displayed both numerically and graphically and is permanently updated.

Disable Bluetooth Notification: Disables the Bluetooth notification.

Enable Alarm Manager: Enables a ring tone alarm when the limit line limit has been exceeded. If this value falls below again then the Alarm Manager deactivates again. To activate the Alarm Manager, the limit line must first be activated.

Disable Alarm Manager: Disables the Alarm Manager.

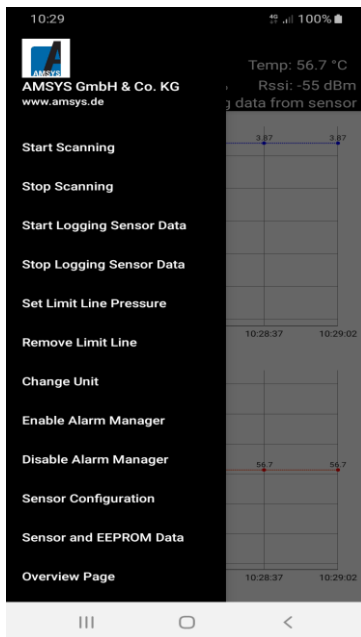


Figure 4: Menu options of Detail Page

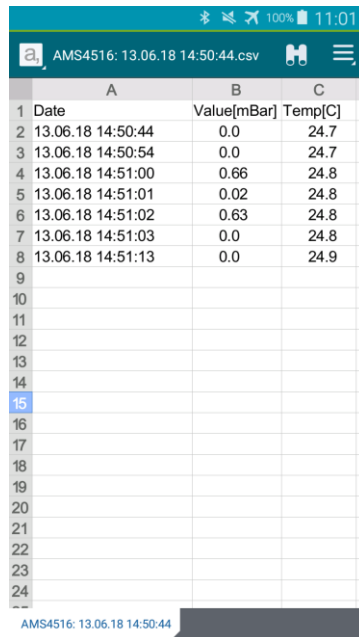


Figure 5: *.csv file after logging

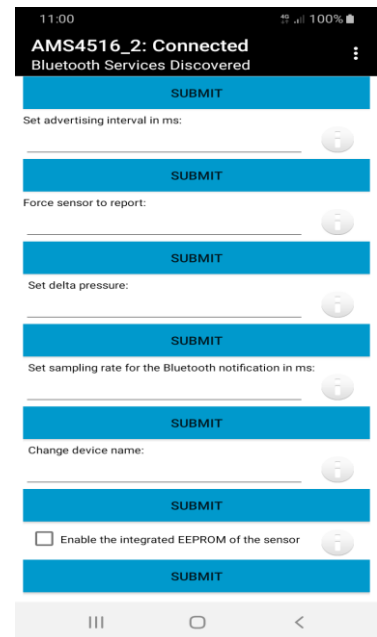


Figure 6: Configuration Page



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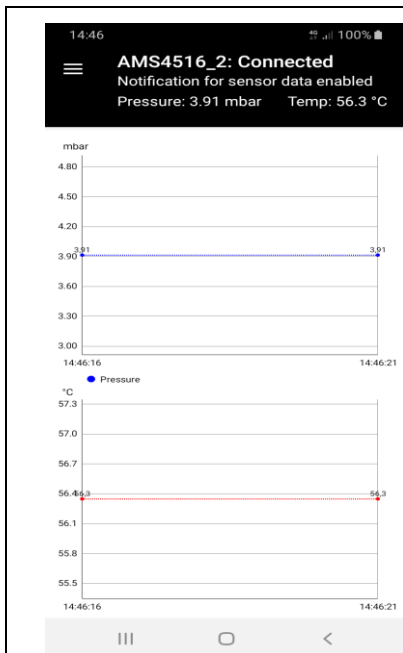


Figure 7: Data Page



Figure 8: Data Page after clicking on the menu button

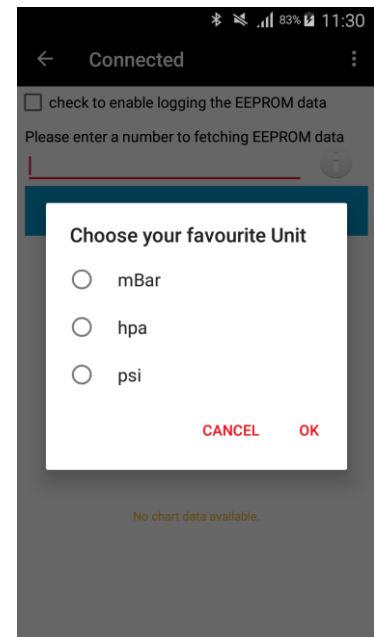


Figure 9: Data Page after clicking on „Change Unit”

Notes for the sensor configuration

- 1) The Advertising interval can be set between 20ms and 10s in ms (2s default).
- 2) The sampling rate for the sensor readings can be set in the range of 100 ms to 500 seconds in ms (60 s default).
- 3) The sampling rate for the battery status can be set in the range of 1 to 500 seconds (200 s default).
- 4) The sampling rate for the Bluetooth notification can be set in the range of 100 ms to 500 seconds in ms (5 s default).
- 5) With Force Sensor to report, a value is entered from when the sensor must send the result even if the value has not changed (default 5).
- 6) Set delta pressure is used to compare the difference with the previous measured value. If this value is reached or exceeded then the sensor sends the result (1 mbar default).
- 7) With Change device name the name of the sensor can be changed.
- 8) Enable the integrated EEPROM of the sensor to start saving on the sensor via a ring buffer (256 kBit) (it is switched off by default).
- 9) The default value for the minimum respectively maximum connection interval is set to 100 ms respectively 200 ms.

Conclusion

With the Android app AMS 4516, the measured values of the barometric pressure sensor AMS 4516 can be logged, read out and graphically displayed. In addition, some sensor configurations can be customized. The AMS 4516 app can be downloaded for free from the Google Play Store. AMSYS also offers a Bluetooth gateway (Fig. 10). On request at AMSYS the app / Gateway can be customized.



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Bluetooth Gateway Description

In addition to the query of the measurement data via a mobile device explained here, in conjunction with an app, the sensor data can also be read out and stored via a gateway.

The screenshot displays the Node-RED Dashboard interface for the AMSYS Bluetooth Gateway. The top navigation bar shows 'Home' and the current time '31.3.2020, 12:56:02'. The main content area features the AMSYS logo, company name 'AMSYS GmbH & Co. KG', and website 'www.amsys.de'. A 'Bluetooth Status' section indicates 'Scanning for Bluetooth devices' with a 'BLE Scanning ON/OFF' toggle set to 'ON' and a 'SHOW LOGFILE' button. Below this are input fields for 'Enter critical minimum pressure', 'Enter critical maximum pressure', and 'Enter sampling rate: 3', each with 'SUBMIT', 'SET', and 'SAVE' buttons respectively.

| Nr. | Select | Device Name | Pressure Range | Min. Pressure | Max. Pressure | Address | Pressure | Temperature | Rssi | Battery Level | Chart View | Start Logging | Stop Logging |
|-----|--------------------------|-------------|----------------|---------------|---------------|-------------------|----------|-------------|------|---------------|------------|---------------|--------------|
| 1 | <input type="checkbox"/> | AMS4506_20 | 10-2000 | 100 | 1000 | d8:eb:5c:12:57:0c | 1016.11 | 21.82 | -85 | 100 | | | |
| 2 | <input type="checkbox"/> | AMS4516_4 | 0-100 | 0 | 100 | c9:eb:26:56:f5:bc | 0.00 | 59.67 | -80 | 100 | | | |
| 3 | <input type="checkbox"/> | AMS45167 | 0-100 | 0 | 100 | e9:42:96:4e:d7:45 | 49.99 | 19.14 | -82 | 100 | | | |
| 4 | <input type="checkbox"/> | AMS4506_7 | 10-2000 | 10 | 2000 | c1:e5:c0:52:ce:18 | 1013.00 | 22.17 | -79 | 100 | | | |
| 5 | <input type="checkbox"/> | AMS4506_6 | 10-2000 | 10 | 2000 | ff:f7:93:eb:e9:13 | 1012.88 | 22.08 | -73 | 100 | | | |

The bottom screenshot shows the 'Lab' view for device 'AMS4506_6' at '26.3.2020, 11:22:51'. It features two large gauge charts: 'Pressure [mbar]' showing a value of 1005.07 and 'Temperature [°C]' showing a value of 21.27. Below each gauge is a corresponding line chart showing the data trend over time from 11:22:34 to 11:22:50. The interface also includes a 'BLE Scanning ON/OFF' toggle and a 'BACK TO OVERVIEW' button.



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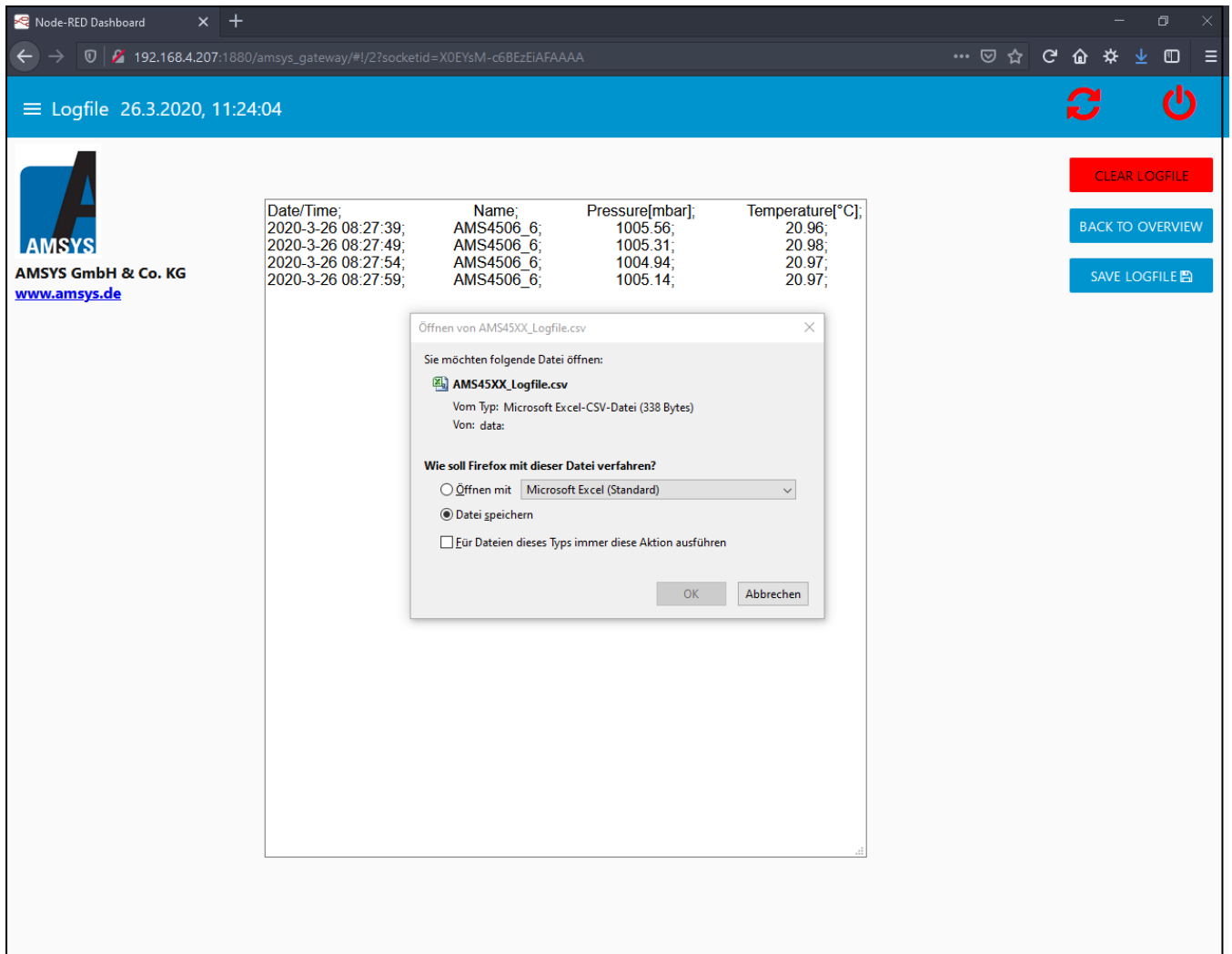


Figure 10: Visualization of the measurement results via the gateway

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