



# USB Starter Kit AMS 5812

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# USB Starter Kit AMS 5812

## INTRODUCTION

The USB Starter Kit AMS 5812 is designed for quick and easy initial operation of AMS 5812 pressure sensors with I2C interface. Together with a standard PC with Windows operating system and the relevant software, the kit enables current digital pressure and temperature values to be read out via the AMS 5812 I2C sensor interface and to be displayed on the PC.

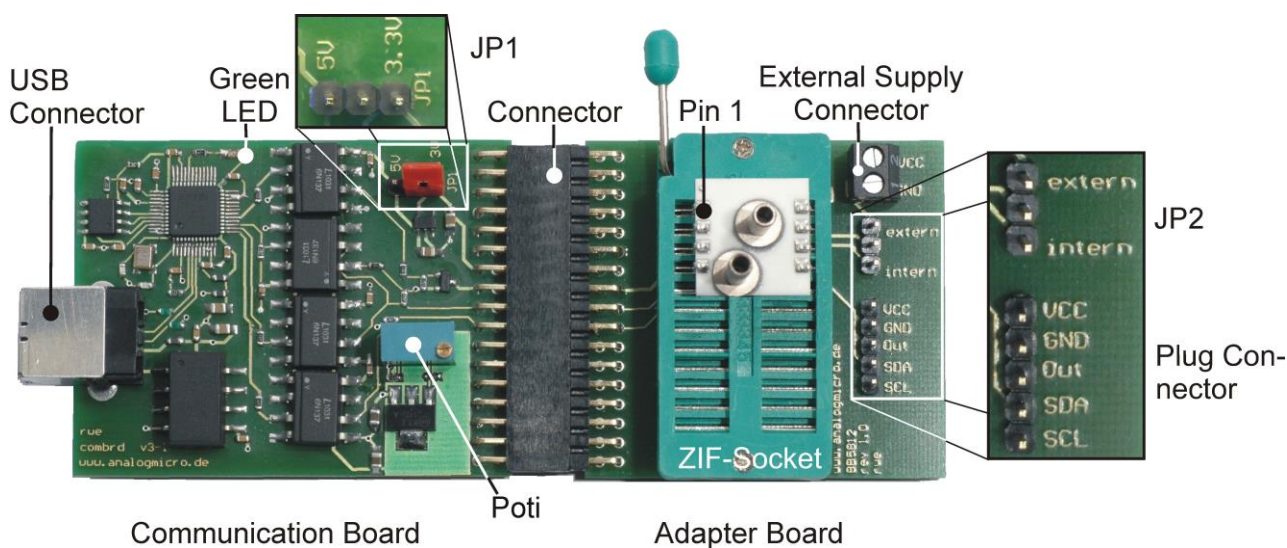
In addition the starter kit can be used to program a second individual I2C address into each AMS 5812 pressure sensor. This customized I2C address is prerequisite for the operation of several AMS 5812 pressure sensors together on one I2C bus. This address is valid in addition to the default I2C address 78<sub>hex</sub>.

The starter kit consists of two printed circuit boards and the relevant communication software package CS5812 distributed on the starter kit CD. A Windows PC with an USB port and with operating system XP SP3 or above is required for operation. The kit will be supplied by the USB port, an external supply isn't necessary.

**NB:** We recommend that you read the AMS 5812 sensor datasheet before putting the starter kit into operation.

## Hardware

The starter kit hardware consists of two printed circuit boards: the communication board *CB-I2C* and the adapter board *BB5812* with a ZIF-socket to connect one AMS 5812 sensor. Figure 1 shows the assembled kit with mounted sensor.



**Figure 1:** USB Starter Kit AMS 5812 with connected sensor.

The kit consists of a communication board *CB-I2C* and an adapter board *BB5812*, connected by a 34-pin connector.

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The *CB-I2C* printing circuit board provides the hardware which enables a PC with USB 2.0 port to communicate with a pressure sensor with I2C interface. The *BB5812* printed circuit board provides an easy way to connect an AMS 5812 pressure sensor with the *CB-I2C*. The two printed circuit boards are connected by a 34 pin connector.

Using a standard USB cable the USB jack on the *CB-I2C* is connected to a free USB-port at the PC. The PC's USB-port is used for communication and for power supply of the starter kit and the sensor; an additional supply isn't required.

The connection between *CB-I2C* and *BB5812* is realised by a 34 pin connector. A zero injection force (ZIF) socket on the *BB5812* allows easy mounting and exchanging of an AMS 5812 pressure sensor. Pin 1 of the sensor is at the upper left edge of the ZIF-Socket (see Figure 1).

For the internal power supply of the connected AMS 5812 by the USB Port, JP 2 on board *BB5812* has to connect to position "intern". Additionally the sensor's supply voltage has to be chosen by the jumper JP1 on board *CB-I2C* (see Figure 1); for standard products of AMS 5812 series connect JP1 to 5V.

For external supply of the connected AMS 5812, remove jumper JP1 and connect jumper JP2 to position "extern". Subsequently the external power supply can be connected to the screw terminal block "external supply connector" on board *BB5812*.

Further, for exchanging the mounted AMS5812 the sensor voltage supply can be turned off by removing JP1 and JP2. The jumper positions are summarised in table 1.

At the 5 pin plug connector on the *BB5812* the sensor voltage supply VCC, GND, the analog output and the I2C-bus lines are connected. This plug can be used for monitoring the sensor supply voltage and further for connecting and testing sensors, which are already assembled.

For safety in case of failure an electrical isolation between the sensor and the PC was realised on the *CB-I2C*. This avoids effectively an energy flow into the connected PC.

**Table 1:** Jumper configuration of JP1 on *CB-I2C* and JP2 on *BB5812*

Sensor voltage	Jumper position JP1	Jumper position JP2
internal supply 3.3 V	central pin together with pin 3.3V	central pin together with pin intern
internal supply 5 V	central pin together with pin 5V	central pin together with pin intern
external supply	removed	central pin together with pin extern
turned off	removed	removed

**Important:** If JP1 isn't removed in case of an external sensor power supply at pin VCC, the starter kit can be damaged!

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## Software – CS5812

The communication between the PC and the AMS 5812 pressure sensor mounted onto the starter kit is realised by means of the software package CS5812. This software is provided on the starter kit CD and runs under Windows operating systems (XP SP3 or above).

## Installation

Before installation of the software package CS5812, please disconnect the starter kit. By executing the file CS5812\_Setup.exe on the CD-ROM (must be run as an administrator), an installer is started which guides through the installation process. After the installation process is finished, the necessary files for operating the starter kit are copied to the target directory and the needed drivers are installed, too. The starter kit is now ready to use and can be connected to the PC.

## CS5812 user interface

The software CS5812 can be run via the “AMS 5812” icon in the program group “AMS 5812” in the folder programs in the windows start menu.

The user interface (menu) is shown in Figure 2. The menu is divided in three submenus: “Communication Check”, “Measurement” and “Second I2C Address” which are designed as index sheets. They will be described in detail below.

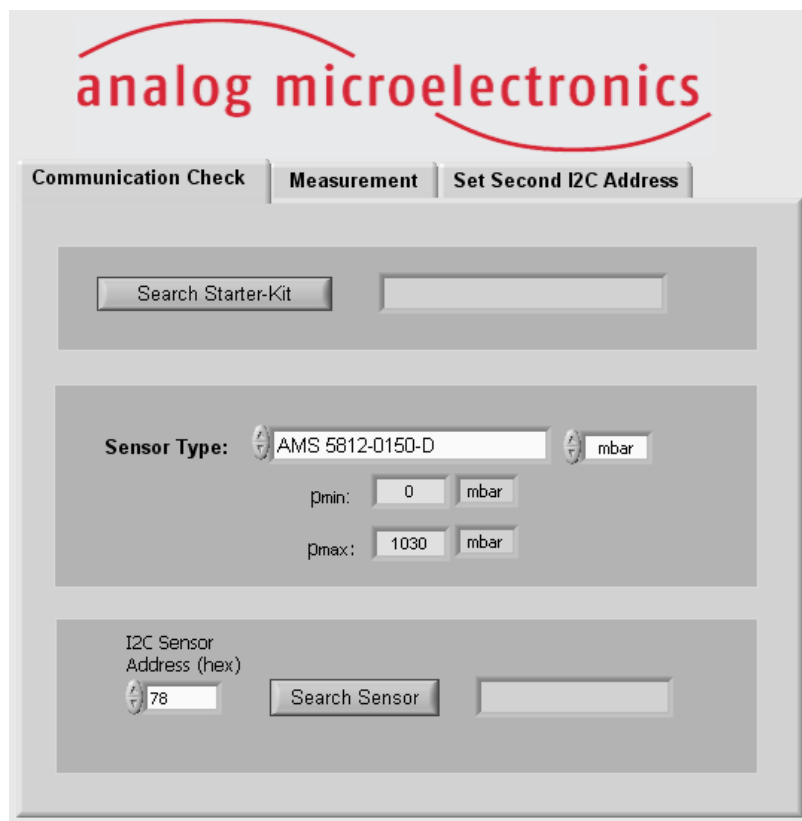
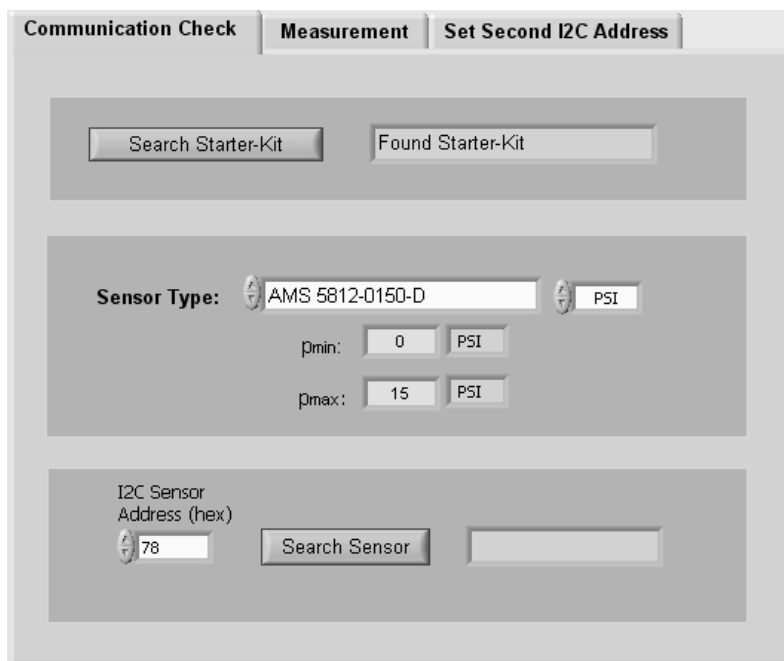


Figure 2: CS5812 user interface

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## Submenu “Communication Check”

In the submenu “Communication Check” (see Figure 3) the type of the AMS5812, which is connected to the starter kit, has to be defined and the communication between the PC and the AMS5812 can be established and tested.



**Figure 3:** Overview of submenu “Communication Check”

By pushing the button “Search Starter Kit” (in the upper third of the submenu) the link connection between the PC and the starter kit will be initiated. If it is successful (message: “Found Starter Kit”), the starter kit will be ready to use. If no starter kit was found please follow the tips given in section *Initial Operation* in paragraph 5.

In the next step, the connected sensor type has to be selected in the drop down menu with its exact ordering code (e.g.: AMS 5812-0150-D) (see middle part in Figure 3 and Figure 4 left). To the right side the physical pressure unit can be selected by a drop down menu. The units PSI, kPa, mbar and bar are available. The pressure range of the sensor type will be shown below. In case of a custom specific version or a sensor which is not listed in the menu, the sensor type “customised” has to be selected and the specified minimal and maximal pressure values  $p_{\min}$  and  $p_{\max}$  have to be filled into the adequate fields below (see Figure 4 right).



**Figure 4:** Selection of the sensor type.

*Left: sensor type AMS 5812-0150-D with a measuring range of 0 - 15 PSI*

*Right: custom specific sensor with manually adjusted measuring range of -5 – 50 PSI.*

**NB:** If the wrong sensor type is selected, sensor measurement data cannot be accurately evaluated and the displayed pressure value in physical units is wrong!



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Now, a connection to the AMS 5812 pressure sensor (mounted onto the starter kit) can be established. In the lower third of the submenu, the sensor I2C address has to be filled into the field "I2C Sensor Address" (standard I2C address: 78<sub>hex</sub>) and the Button "Search Sensor" has to be pushed. A message follows, whether a corresponding sensor was found or not.

In case of the error message "No Sensor found" (after pushing the button "Search Sensor") please check the following: the connection of the two PCBs, the position of JP1, the position of the AMS 5812 in the ZIF socket and the locking of the ZIF-socket.

## Submenu "Measurement"

Within the submenu "Measurement" (see Figure 5) it is possible to display the AMS 5812 digital pressure and temperature values.

	Physical Values	Digital Values
Pressure:	3,14 PSI	8762
Temperature:	27,8 °C	15858

**Figure 5:** View on submenu "Measurement".

The field "Sensor Type" (upper third part of the submenu) displays the selected sensor type with its pressure range, which was stipulated in the submenu "Communication Check".

With the buttons "Single Shot" and "Continuous Measurement" respectively (in the middle part of this submenu) the user can start a single measurement or a continuous measurement. In case of a continuous measurement, the time interval between the discrete measurements can be selected by the drop down menu "Loop Time". The continuous measurement can be stopped by pushing the button "Continuous Measurement" again. By pushing the button "Log Value" at the right side, the readout digital values can be saved in a file. At the first time values have to be written, a windows dialog appears to assign the file name and the folder to save in. The file includes only the digital values

In the lower third of the submenu the measurement data for pressure and temperature are displayed as digital (decimal) values and also as values in physical units. For a single measurement "Single Shot" the current measurement data available at the AMS 5812 output register is one-time read and continuously

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displayed. In case of the continuous measurement the measurement data is repeatedly read out and displayed.

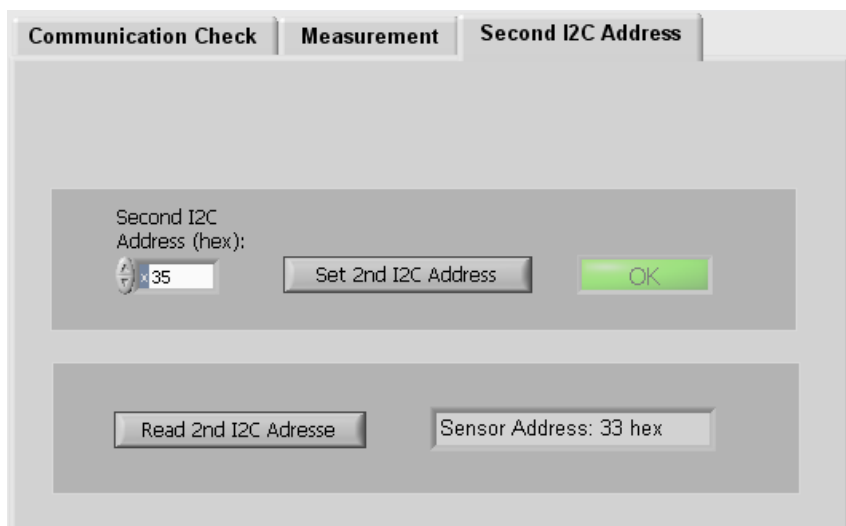
## Submenu “Second I2C Address“

The submenu “Second I2C Address” is divided into an upper and a lower part (see Figure 6):

In the upper part an individual second I2C address can be programmed into the connected AMS 5812 pressure sensor<sup>1</sup>. The second I2C address (between 00<sub>hex</sub> and 7F<sub>hex</sub>) has to be written in the box “New I2C Address” as a hexadecimal value. By pushing the button “Set 2nd Address”, the I2C address will be programmed to the AMS 5812 EEPROM. If the operation was successfully the field “OK” lights up green for a few seconds. The sensor corresponds now to the second I2C address and the standard address, too.

By pushing the button “Read 2nd I2C Adresse” the user can read out the second I2C address. Figure 6 shows an example with a sensor address 33<sub>hex</sub>.

**NB:** If several AMS 5812 sensors are to be operated together on one I2C bus, each sensor must first be allocated its own individual second I2C address.



**Figure 6:** View on submenu “Second I2C Address”

*The second I2C address can be programmed in the upper part. The optionally programmed second I2C address can be read out in the lower part.*

<sup>1</sup> The second I2C is additionally valid to the standard I2C address 78<sub>hex</sub>



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## INITIAL OPERATION

The following steps are necessary for the starter kit initial operation setup:

1. Installation of the Software *CS5812* (for details see section software)
2. Assembly starter kit

First, the adapter board *BB5812* for AMS 5812 sensor and the communication board *CB-I2C* are connected together by the 34 pin connector. Then, the sensor AMS 5812 has to be connected into the ZIF-socket on *BB5812* (orientation of pin 1: see Figure 1).

3. Select sensor voltage supply (for details see section hardware):

For internal power supply (AMS 5812 is supplied by the USB Port) JP 2 on board *BB5812* has to be connected to position "intern". Additionally the sensor supply voltage has to be chosen by the jumper JP1 on board *CB-I2C* to 5V.

For external power supply (with additional power supply) remove jumper JP1 on board *CB-I2C*. Connect the external power supply to the screw terminal block "external supply connector" on board *BB5812* and set jumper JP2 to position "extern".

4. Connect the starter kit to a free USB-port at the PC by an USB cable.
5. The green LED on the communication board flashes up, when the board is detected by the PC and the drivers are loaded successfully (see Figure 1).

If the green LED remains dark, the user has to look in the device manager for a new device called "USB Serial Converter" in the device group "USB-Controller". If this doesn't exist, the user has to disconnect the starter kit from the PC by removing the USB-cable. At a reconnection, the device "USB Serial Converter" should appear. If not, the problem could be solved by manually executing the file *Treiber\_Setup.exe* in the program folder of the AMS 5812 Software (e.g.: C:\program files\AMS 5812). If the led remains still dark and the starter kit wasn't found, contact Analog Microelectronics GmbH for further support.

6. A voltmeter can be connected up to the 5 pin plug connector on the *BB5812* if the AMS 5812 analog output signal is to be read.

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## IMPORTANT NOTES

1. For changing an AMS 5812 pressure sensor while the communication board is connected to the PC, we recommend to remove the jumpers JP1 and JP2. It prevents sensor damage.
2. If JP1 won't be removed in case of external supply, the starter kit could be damaged
3. As there is no protective circuitry safeguarding against reverse polarity and overvoltage, the polarity and voltage of the external voltage supply of +5 V must be checked before voltage is applied.
4. The Communication Board *CB-I2C* can be used for read out pressure sensors of the series AMS 5105 and AMS 5915, too. For starting up, only the corresponding adapter boards *BB5105* respectively *BB5912* and the according software *CS5105* respectively *CS5915* are necessary.
5. The analog output signal is ratiometric to the supply voltage. If AMS 5812's specifications are to be tested, the supply voltage must be exactly 5.000 V. Any deviation in percent must be accounted for accordingly. In case of internal power supply the sensor voltage can be adjusted by the potentiometer on the *CB-I2C* (see Figure 1) exactly.

## ADDITIONAL EQUIPMENT

- USB-Cable 2.0, FullSpeed A-St to B-St .

## ADDITIONAL DOCUMENTS

- Data Sheet of AMS 5812 Pressure Sensor Series

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