USB interface and programming box

User Guide

Evaluation programmer for SPI and I²C interface

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1 Introduction

This user guide explains how to use the USB I&P Box.

The USB I&P Box is a Programming - Tool for Capacitive, Temperature and Magnetic Position Sensors with I²C or SPI Interface.

After connecting a Sensor to the I&P Box you can open the GUI on your computer and start programming.

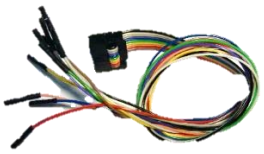
To program a sensor, it should be mounted on a PCB / Socket to ensure a proper connection to all necessary pins.

ams OSRAM provides Adapter boards where easy access from the Sensor to the USB I&P Box is possible (not included with the Tool-Kit).

Figure 1: USB I&P box

1.1 Kit content

Table 1: Kit content

Part	Description	Picture
USB I&P Box	USB Interface & Programming Box	
USB cable	To connect the USB I&P box to a computer	
10-way cable	To connect the USB I&P Box to a compatible sensor on an existing board	
Quick start guide	First steps introduction	
USB flash drive	Contains the USB I&P Box Software and manuals. To get latest SW / FW and Manuals please refer to ams-osram.com	

1.2 Ordering information

Ordering code	Description
USB I&P Box	USB interface & programming tool for sensors with I²C or SPI interface

1.3 Compatible products

Table 2: Compatible products

Product	Description	Adapterboard available
AS5013	Low power integrated hall IC for human interface applications	Yes
AS5047D	14-bit on-axis magnetic rotary position sensor	Yes
AS5047P	14-bit on-axis magnetic rotary position sensor	Yes
AS5048A	14-bit angular position sensor with SPI interface	Yes
AS5048B	14-bit angular position sensor with I²C interface	Yes
AS5050A	Low power 10-bit magnetic position sensor	Yes
AS5055A	Low power 12-bit magnetic position sensor	Yes
AS5100	12-bit magnetic position sensor for embedded applications	Yes
AS5116	On-axis magnetic position sensor with Sin/Cos outputs	Yes
AS5147	14-bit on-axis magnetic rotary position sensor	Yes
AS5147P	14-bit on-axis magnetic rotary position sensor	Yes
AS5200	12-bit-dual-die programmable contactless potentiometer	Yes
AS5247	14-bit dual-die magnetic rotary position sensor	Yes
AS5510	Linear hall sensor with I²C output	Yes
AS5600	12-bit programmable contactless potentiometer	Yes
AS5600L	12-bit smallest on axis magnetic position sensor	Yes
AS5601	12-bit programmable contactless encoder	Yes
AS5047U	14-bit on-axis magnetic rotary position sensor	Yes
AS5147U	14-bit on-axis magnetic rotary position sensor	Yes
AS5247U	14-bit on-axis magnetic rotary position sensor	Yes
AS8579	Capacitive sensor with accu. 14-bit I&Q value	Yes
AS6221	Digital temperature sensor with I²C interface	Yes

2 Getting started

The pin-out of the USB I&P box is shown below.

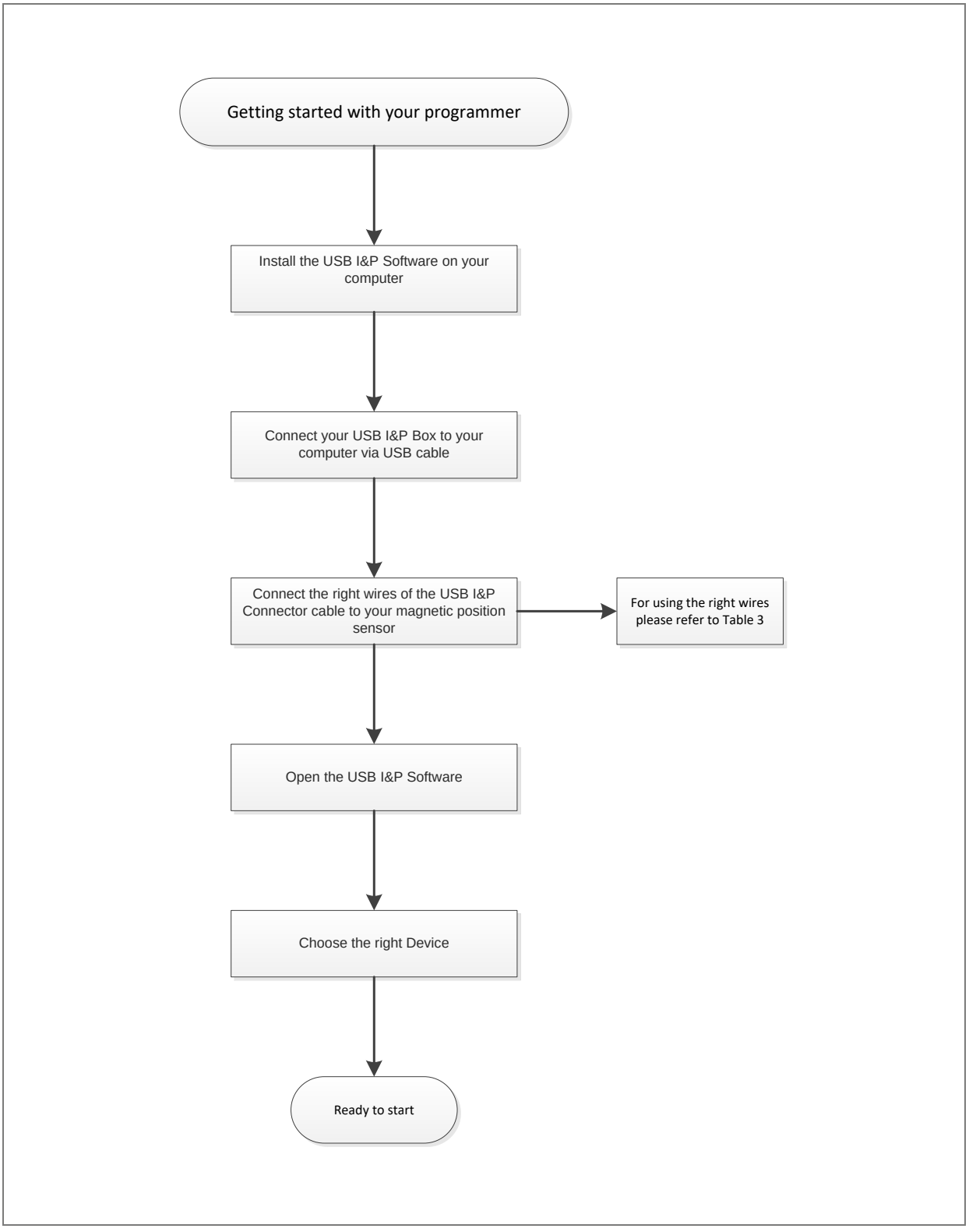
Table 3: USB I&P box pin-out and wire description

Pin #	Color	Definition	SPI mode
1	Brown	5V supply	Not used
2	Red	3.3V supply	Positive power supply
3	Orange	SPI-CS(0)	SPI-CS(0)
4	Yellow	I²C-SCL	Not used
5	Green	SPI-CLK	SPI-CLK
6	Blue	I²C-SDA	Not used
7	Purple	SPI-MOSI	SPI-MOSI
8	Grey	SPI-CS(1)	Optional (dual die version)
9	White	SPI-MISO	SPI-MISO
10	Black	GND	GND

(1) The interface voltage of the USB I&P Box is 3.3V. Use the 3.3V mode when connecting to a position sensor board.

The first steps to get started with the USB I&P Box are described below in Figure 2.

Figure 2: First steps with the USB I&P box



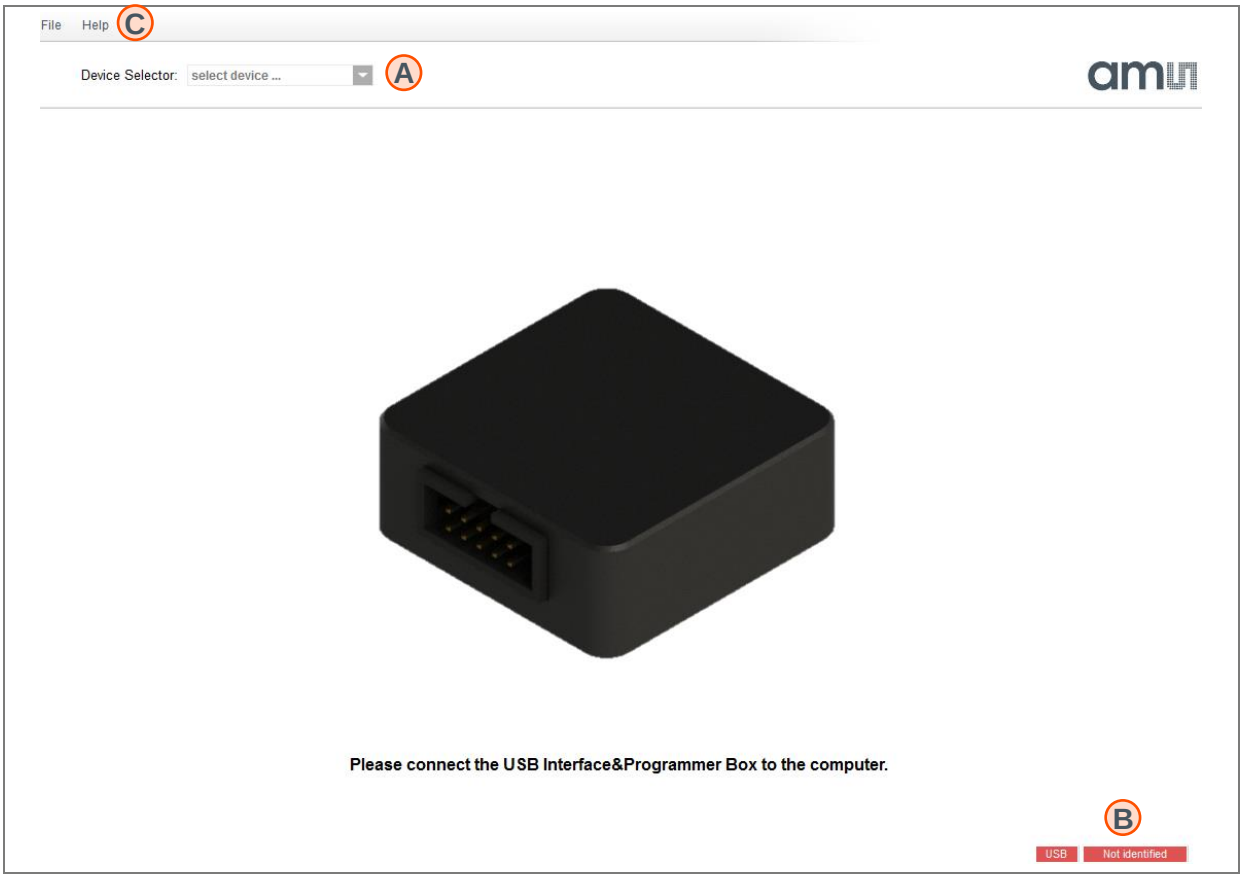
Also included in your USB I&P Tool is a USB stick with the software and firmware.

The software is needed to program a supported sensor on your computer.

After you copied the software from the USB stick to your computer, please click on it and follow the instructions of the Install Wizard through the installation procedure.

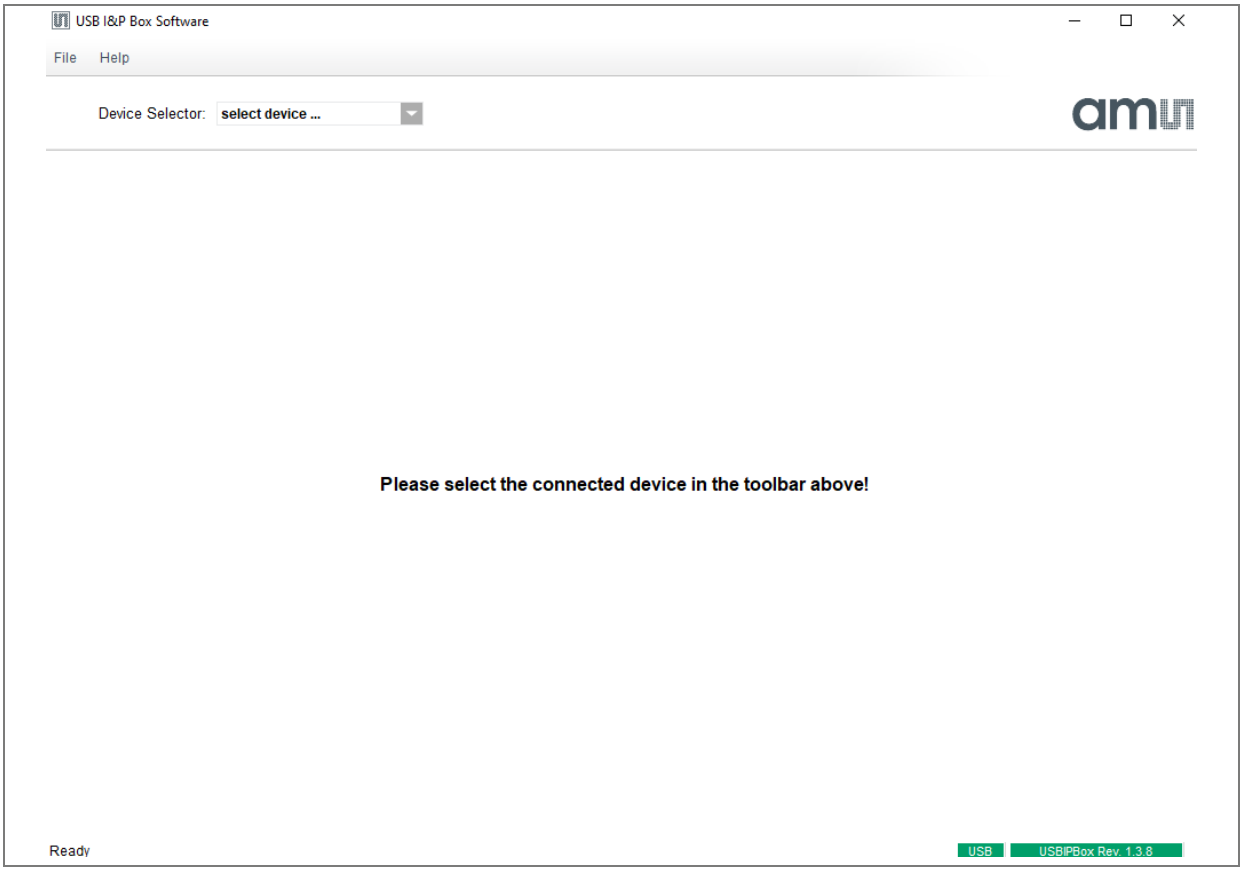
The software is compatible with Windows XP and newer versions.

Figure 3: Screenshot of the GUI starting page while no programmer is connected



A Select the Device (only possible when a I&P Box is detected)
B Check if the Programmer will be detected (or there is no bootloader on the I&P Box)
C For firmware updates click on Help and Firmware Update, for further Information about this topic refer to 2.1

Figure 4: Screenshot of the GUI starting page while programmer connected



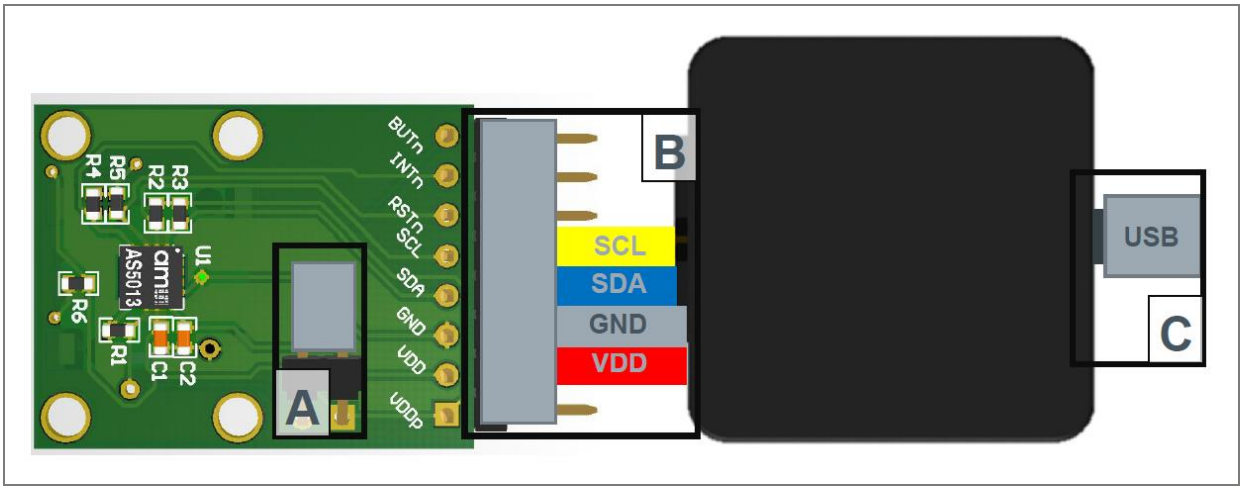
2.1 Firmware update

- Connect your I&P Box to your Computer and open the Software.
- Click on Help and Firmware Update.
- Search your computer for the new firmware file and click at it.
- The firmware installs automatically.

3 Connecting compatible products

3.1 AS5013

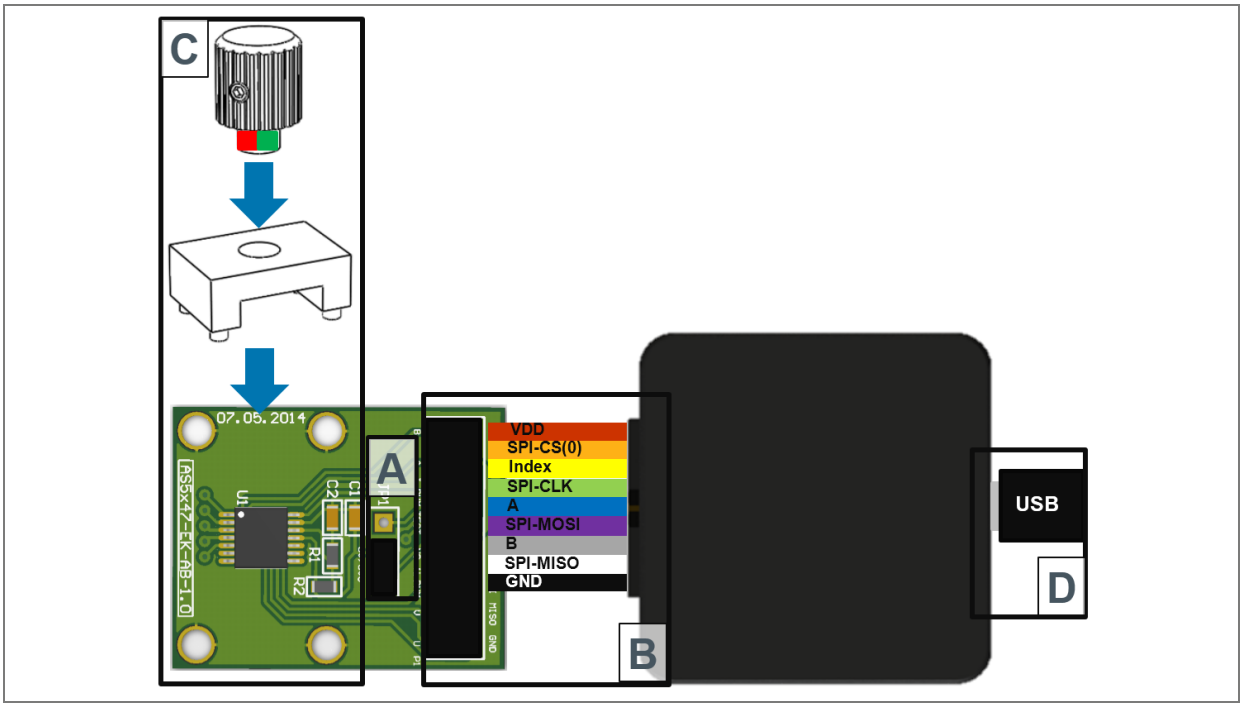
Figure 5: AS5013



A Open/Close J1 for choosing I²C slave address 0x40 or 0x41.
B Connect the USB I&P Box with the AS5013-QF_EK_AB using the 10-way cable.
C Connect the USB I&P Box using the USB cable to Computer.

3.2 AS5047D/AS5147/AS5047P/AS5147P

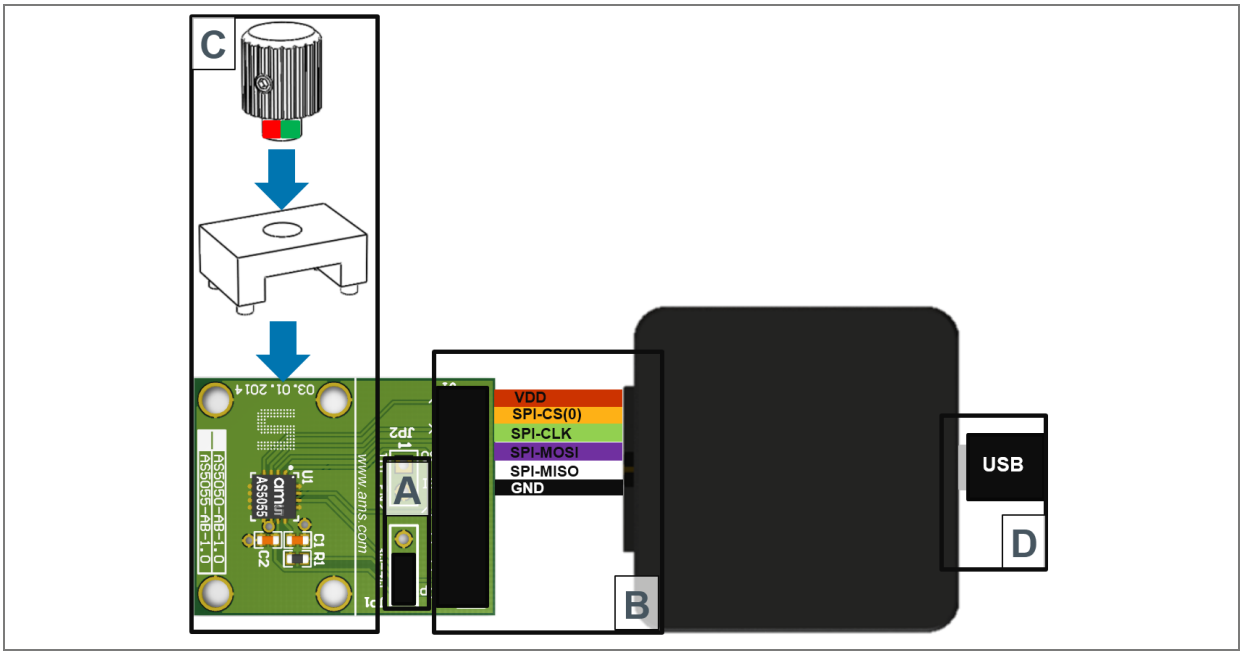
Figure 6: AS5047D/AS5147/AS5047P/AS5147P



A Short J1 on the adapterboard to set-up the 3V3 mode.
B Connect the USB I&P Box with the AS5x47_EK_AB using the 10-way cable.
C Place the RMH05 over the adapterboard.
D Connect the USB I&P Box to the PC, using the USB cable. The USB device is detected by Windows and by the AS5x47 Demo Software.

3.3 AS5050A/AS5055A

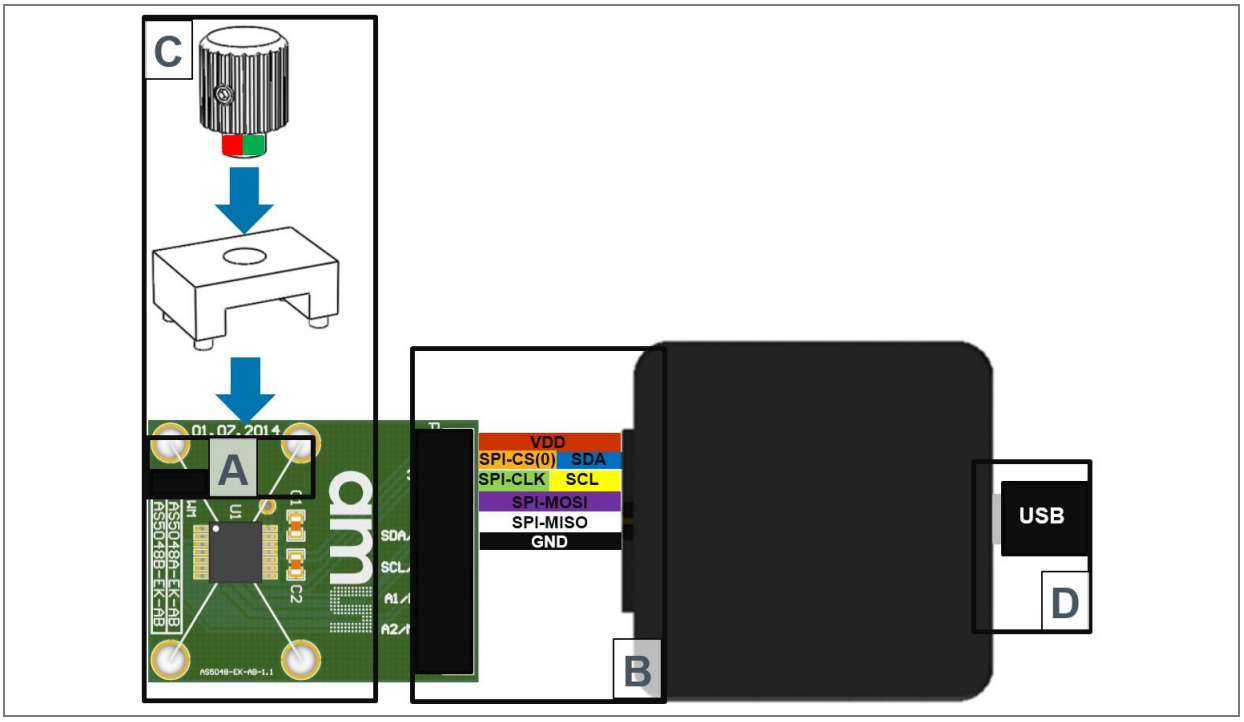
Figure 7: AS5050A/AS5055A



A Short JP1 either on 3-wire SPI mode or 4-wire SPI mode.
B Connect the USB I&P Box with the AS5050 / AS5055-AB using the 10-way cable.
C Place the RMH05 over the adapterboard.
D Connect the USB I&P Box to the PC, using the USB cable. The USB device is detected by Windows and by the AS5050 / AS5055-AB Demo Software.

3.4 AS5048A/AS5048B

Figure 8: AS5048A/AS5048B



A Check first if you are using AS5048A or AS5048B.
AS5048A uses SPI and AS5048B I²C interface.

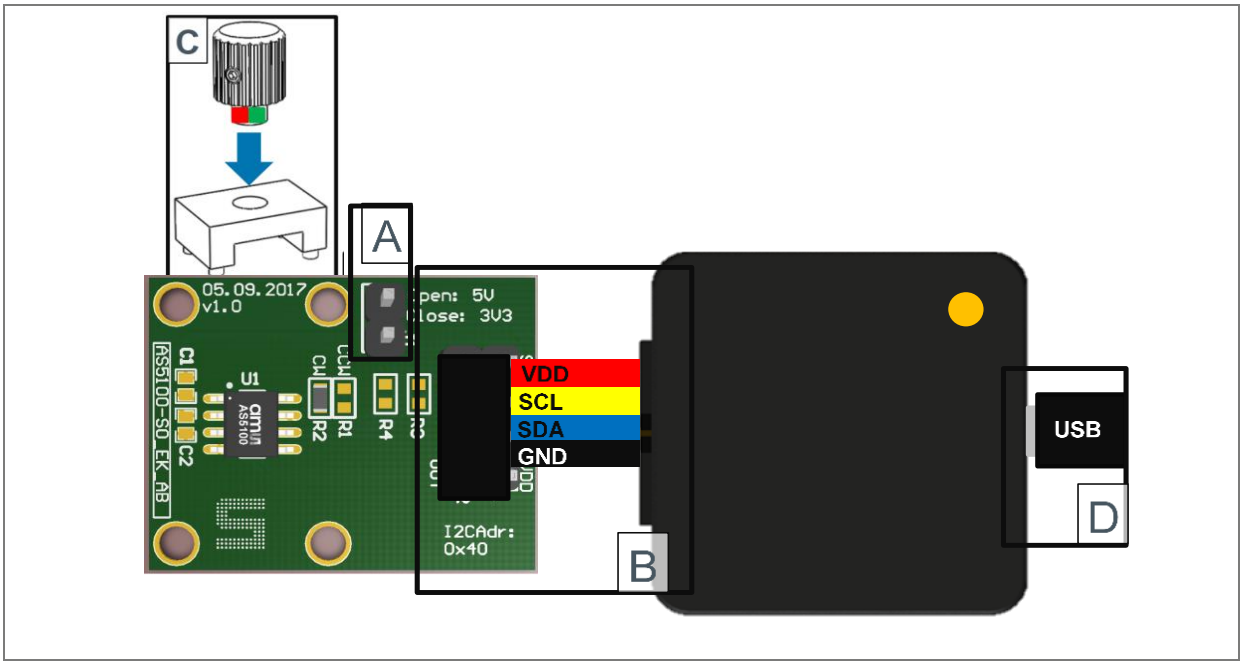
B Connect the USB I&P Box with the AS5048A/B-AB using the 10-way cable.

C Place the RMH05 over the adapterboard.

D Connect the USB I&P Box to the PC, using the USB cable. The USB device is detected by Windows and by the AS5048A/B Demo Software.

3.5 AS5100

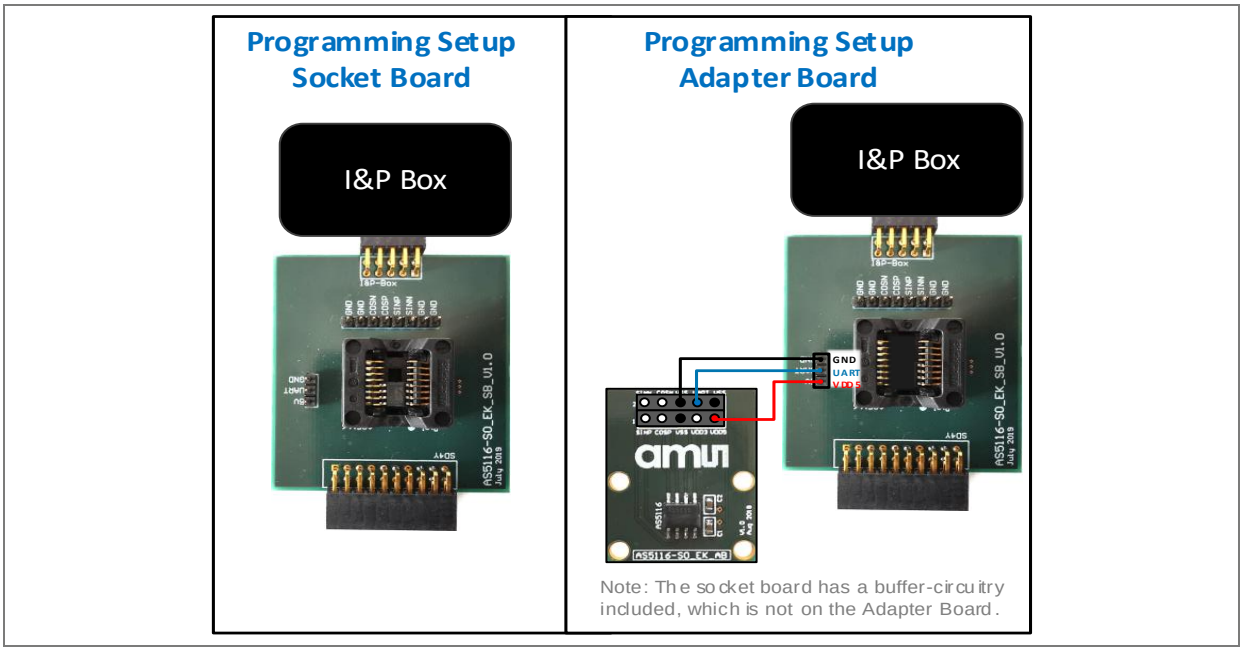
Figure 9: AS5100



A Close J1 for 3V3 supply.
B Connect the USB I&P Box with the AS5100-SO_EK_AB using the 10-way cable.
C Use an RMH Kit + Magnet to get a stable angle readout.
D Connect the USB I&P Box to the PC, using the USB cable.

3.6 AS5116

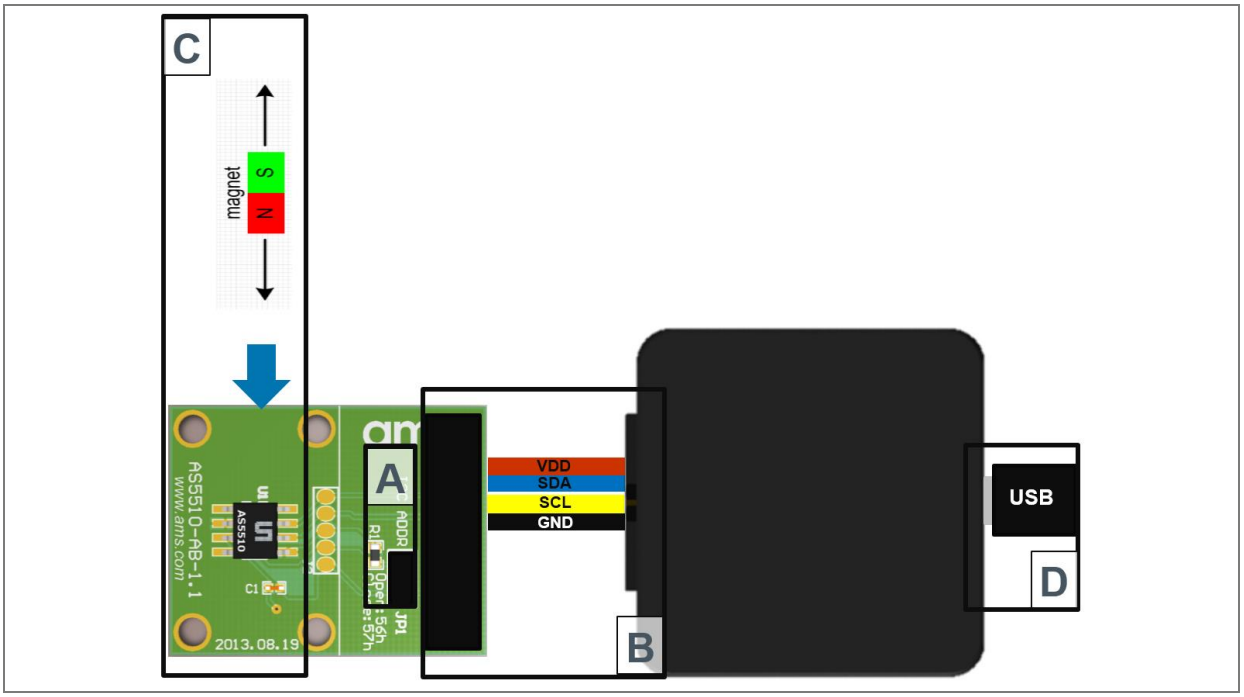
Figure 10: AS5116



(1) A Socket Board can be connected directly to the I&P Box to program an Adapter Board. Use an empty Socket Board and pass through power supply lines and UART.

3.7 AS5510

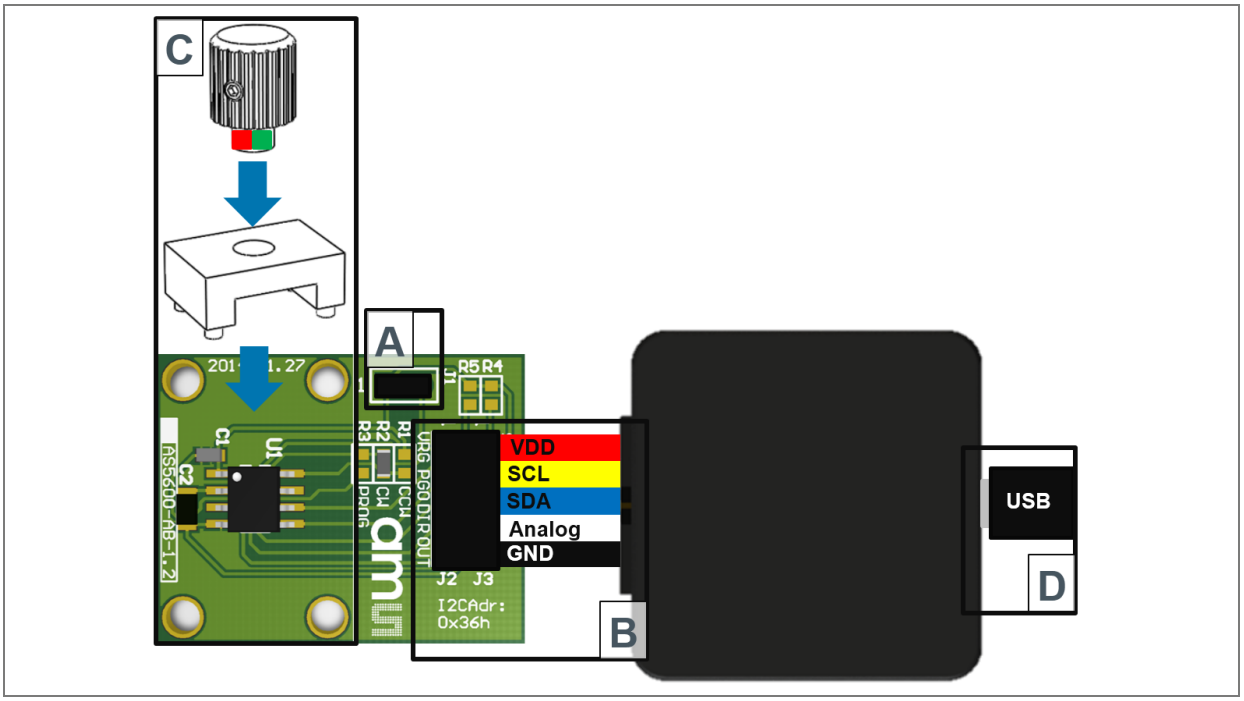
Figure 11: AS5510



A JP1 closed - I²C address = 57h; JP1 open - I²C address = 56h
B Connect the USB I&P Box with the AS5510-AB using the 10-way cable.
C Place a 2-pole magnet over the AS5510.
D Connect the USB I&P Box to the computer using the USB cable.

3.8 AS5600

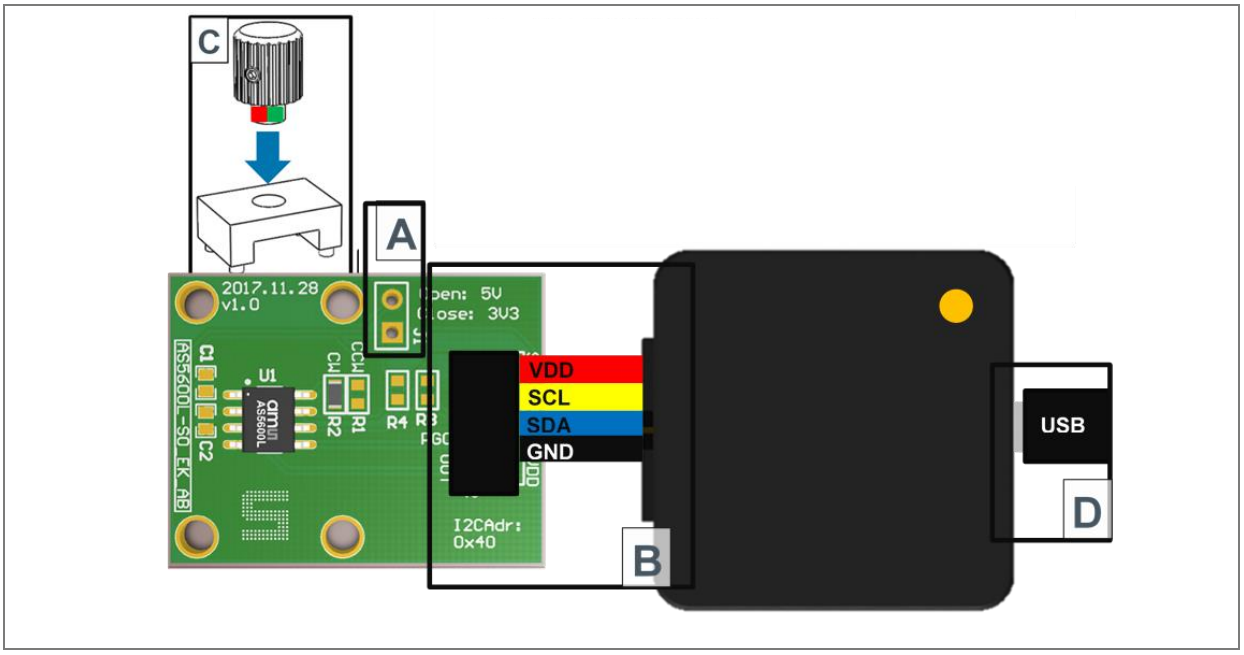
Figure 12: AS5600



A Short J1 on the adapterboard to set-up 3V3 mode.
B Connect the USB I&P Box with the AS5600_SO_EK_AB using the 10-way cable.
C Place the RMH05 over the adapterboard.
D Connect the USB I&P Box to the PC, using the USB cable. The USB device is detected by Windows and by the AS560x Demo Software.
The setup is ready for demonstration.

3.9 AS5600L (for WLCSP-15 and SOIC-8 package)

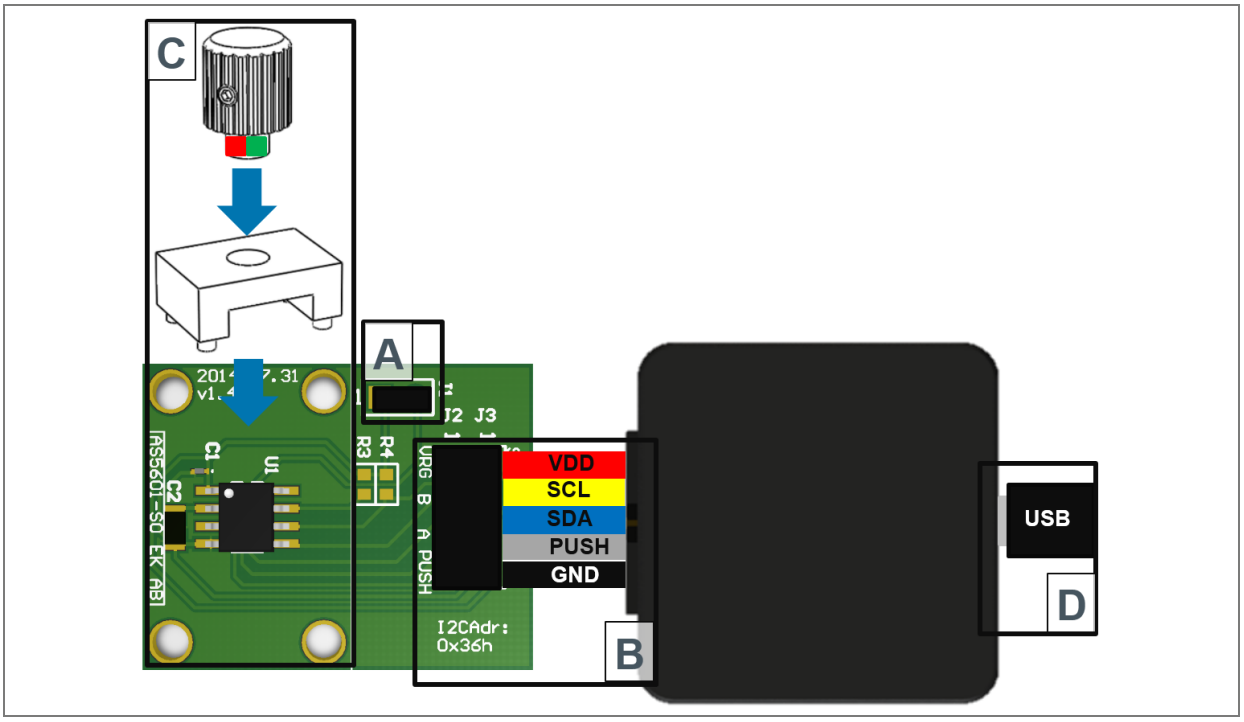
Figure 13: AS5600L (for WLCSP-15 and SOIC-8 package)



A Short J1 on the adapterboard to set-up 3V3 mode.
B Connect the USB I&P Box with the AS5600L_SO_EK_AB using the 10-way cable.
C Place the RMH05 over the adapterboard.
D Connect the USB I&P Box to the PC, using the USB cable.

3.10 AS5601

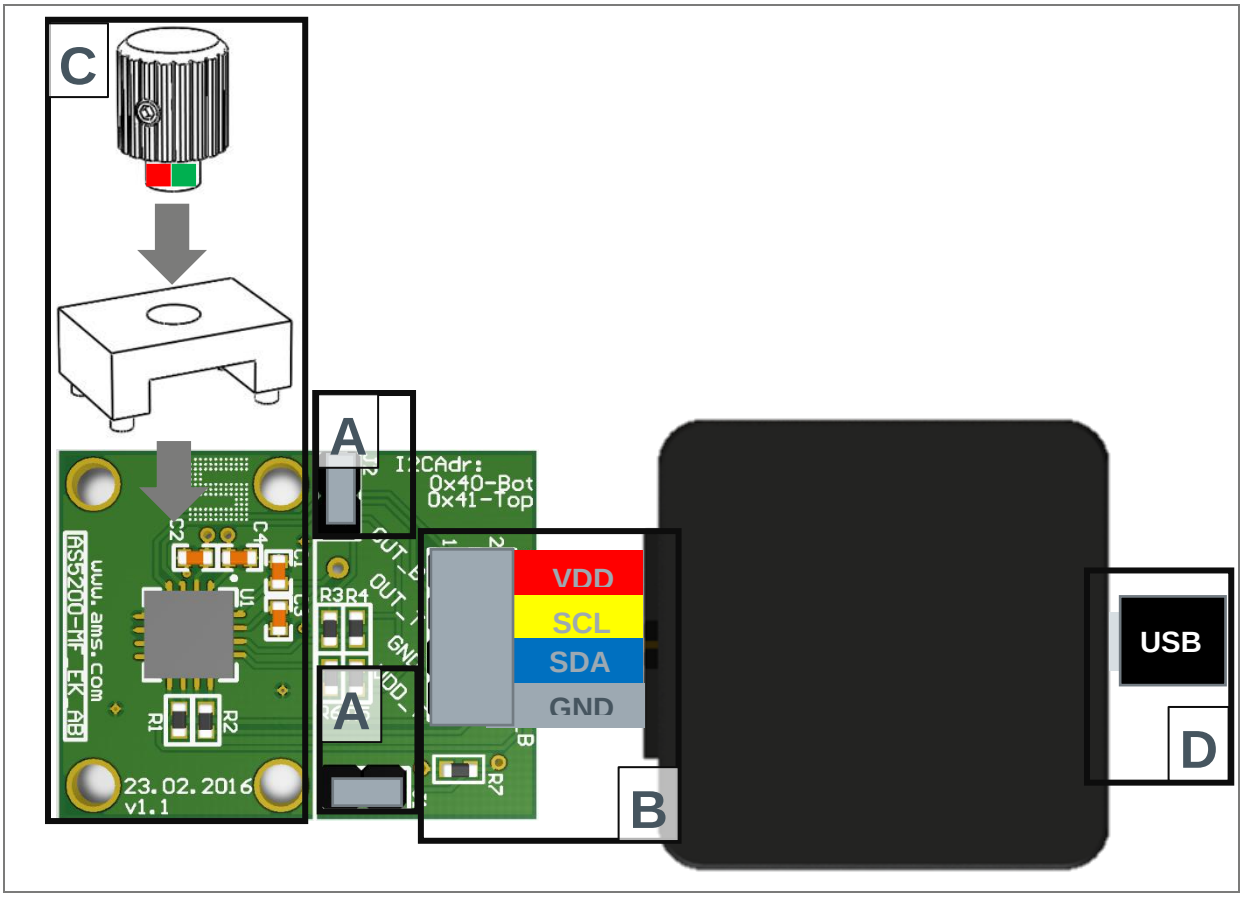
Figure 14: AS5601



A Short J1 on the adapterboard to set-up 3V3 mode.
B Connect the USB I&P Box with the AS5601_SO_EK_AB using the 10-way cable.
C Place the RMH05 over the adapterboard.
D Connect the USB I&P Box to the PC, using the USB cable. The USB device is detected by Windows and by the AS560x Demo Software.

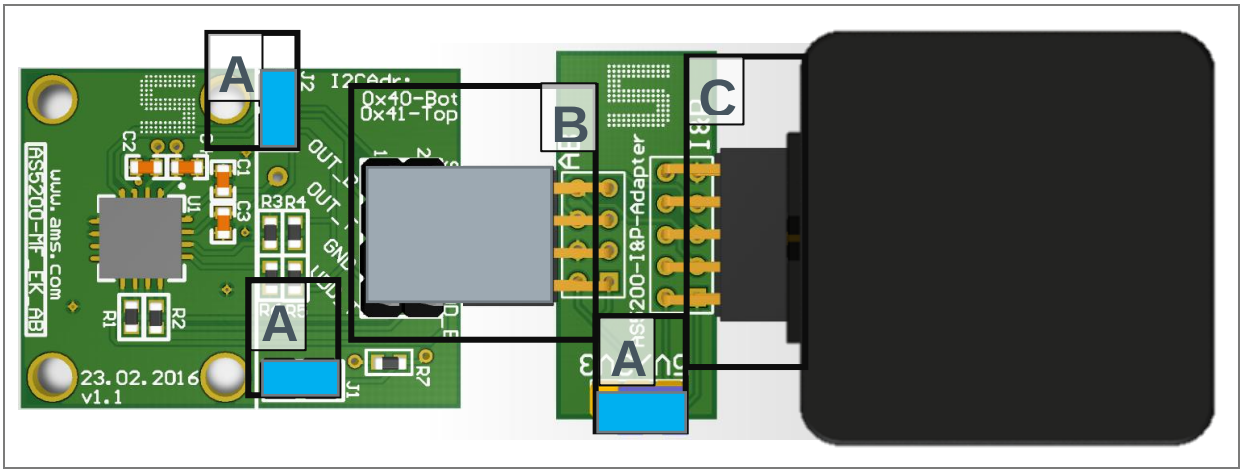
3.11 AS5200A/L

Figure 15: AS5200A/L



A Short J1 and J2 on the adapterboard to set-up 3V3 mode.
Otherwise 5V supply has to be used.
B Connect the USB I&P Box with the AS5200A/L-MF_EK_AB using the 10-way cable.
C Place the RMH05 over the adapterboard.
D Connect the USB I&P Box to the PC, using the USB cable.

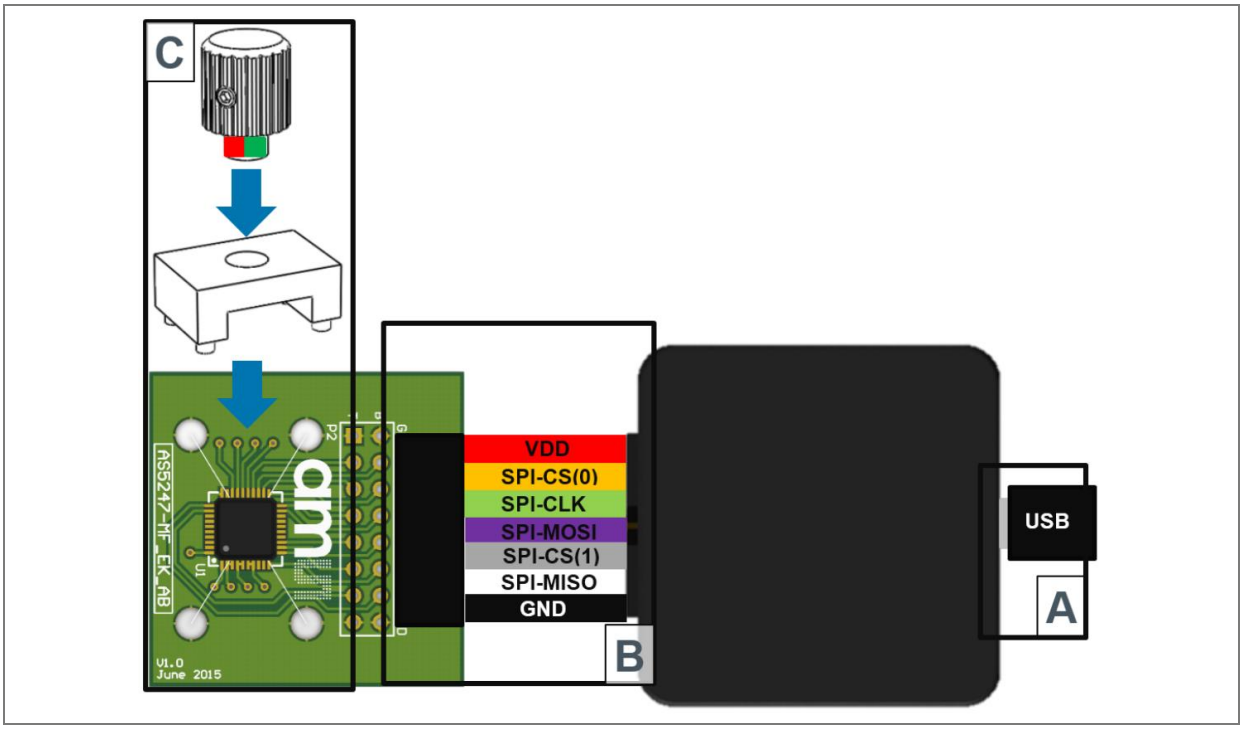
Figure 16: AS5200A/L



A Set J1&J2 and the jumper on the adapter to 3V3 to use 3.3V supply. To use 5V supply leave J1&J2 open and set 5V on the adapter PCB.
B Connect the adapter with the AS5200A/L-MF_EK_AB
C Connect the adapter with the USB I&P Box

3.12 AS5247

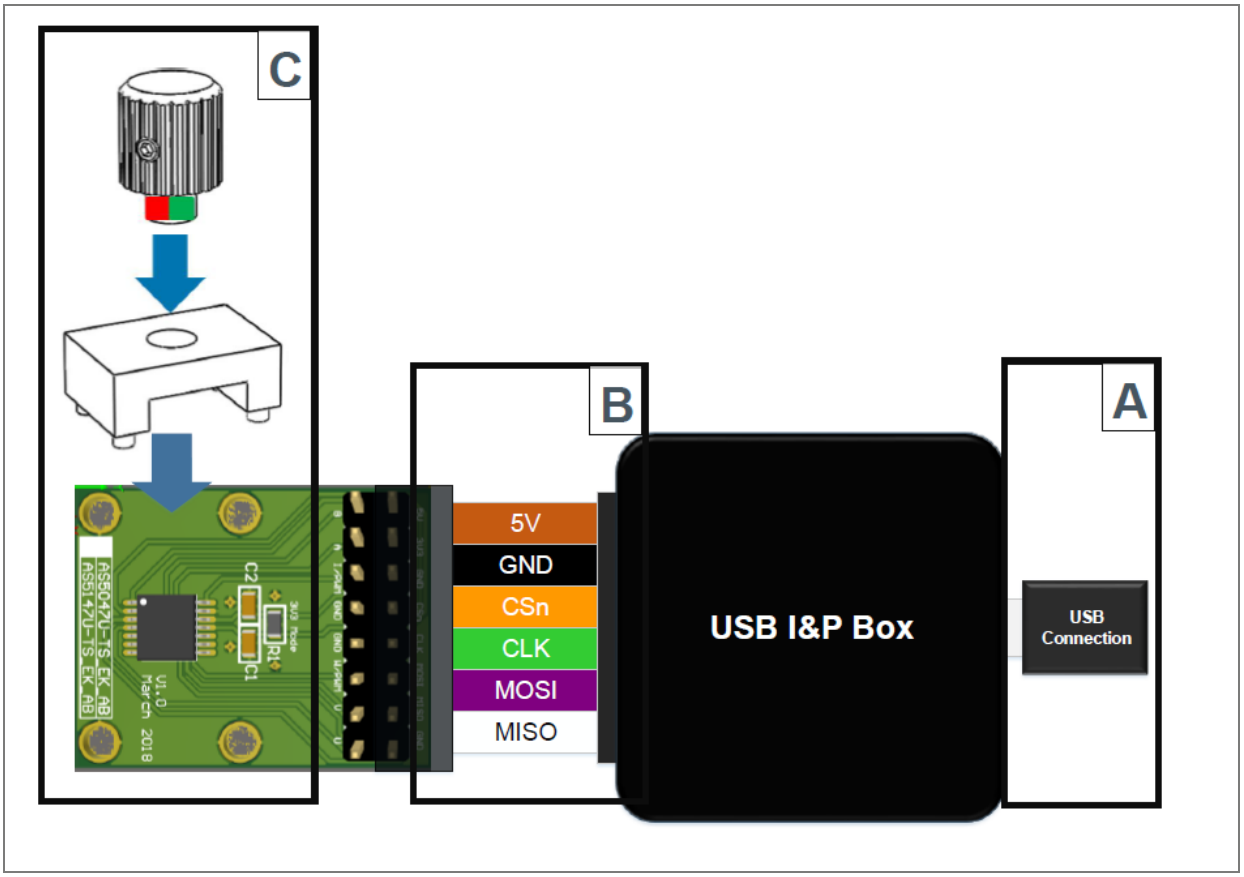
Figure 17: AS5247



A Connect the USB I&P Box using the USB cable to the PC.
B Connect the USB I&P Box with the AS5247-SO_EK_AB using the 10-way cable.
C Place the RMH05 over the adapterboard.

3.13 AS5047U/AS5147U

Figure 18: AS5047U/AS5147U



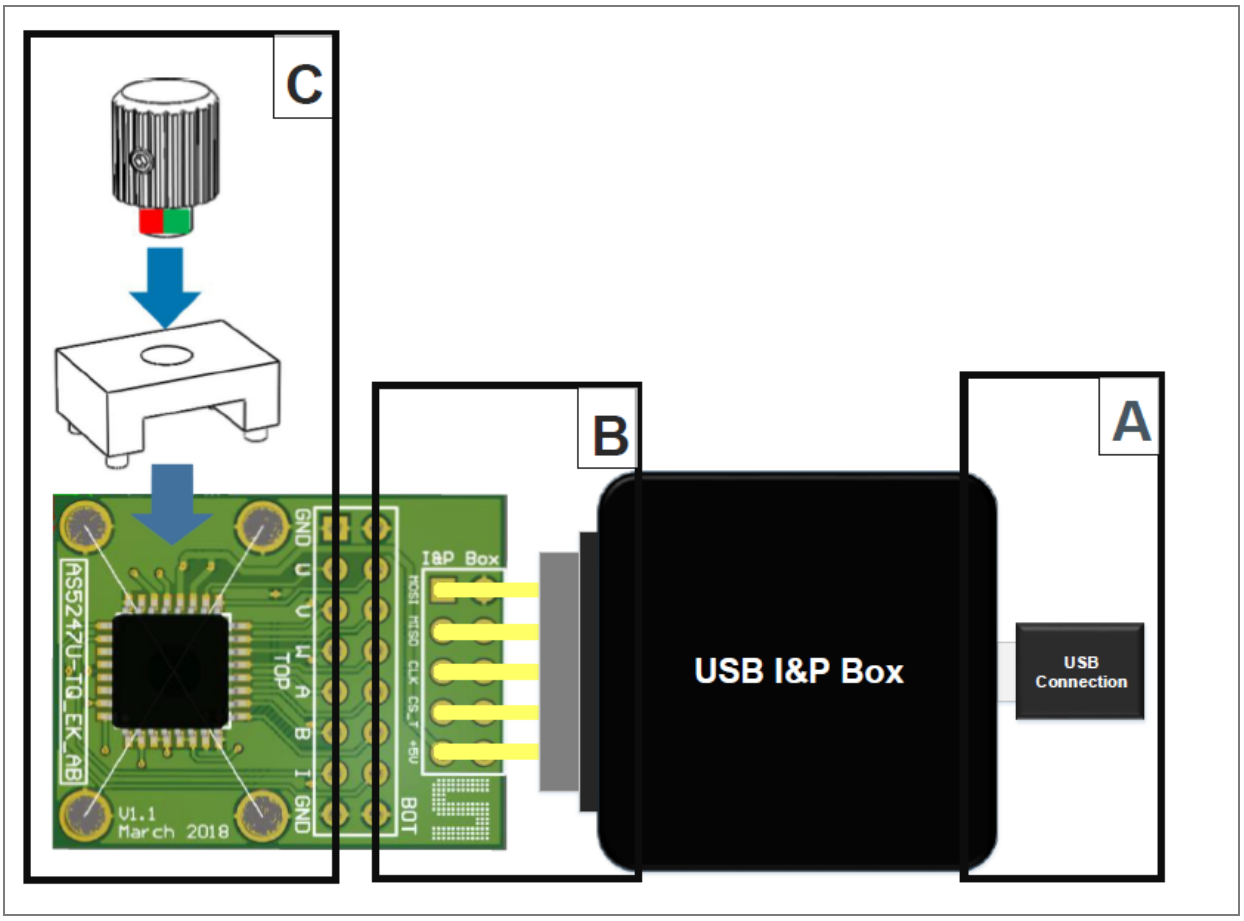
A Connect the USB I&P Box using the USB cable to the PC.
B Connect the USB I&P Box with the AS5047U / AS5174U adapterboard using the 10-way cable.
C Place the RMH05 over the adapterboard.

3.14 AS5247U

Plug the AS5247U-TQ_EK_AB directly with the populated 10-way connector to the USB I&P Box.

It is possible to extend the connections with cables. Maximum wire length is 30 cm.

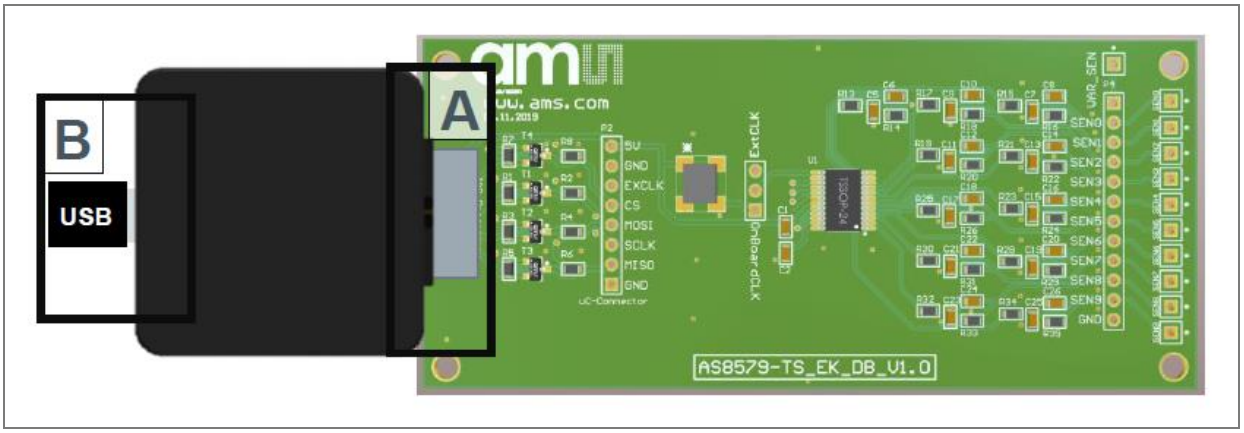
Figure 19: AS5247U



A USB Connection to host PC with to be used with I&P Box software.
B Connection from USB I&P Box to AS5247U adapterboard with the provided 10-way cable.
C Mounting holes for the RMH05 magnet holder.

3.15 AS8579

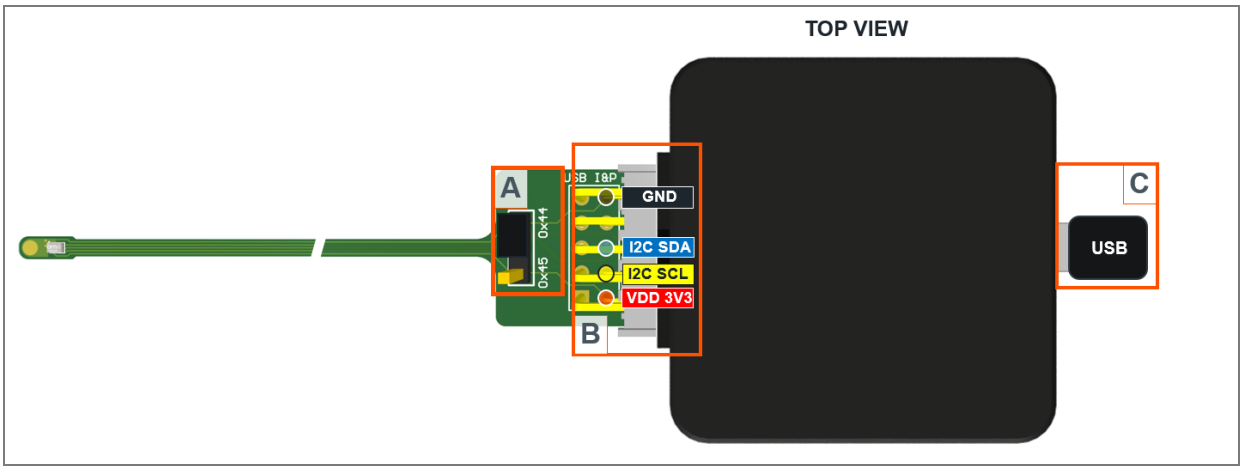
Figure 20: AS8579



A Connect the USB I&P Box with the AS8579-TS_EK_DB using the P1 – Connector.
B Connect the USB I&P Box using the USB cable to Computer.

3.16 AS6221

Figure 21: AS6221



A Set Jumper to select the I²C slave address 0x44 or 0x45.
B Connect the AS6221_Flex_PCB to the USB I&P Box (Top Side up).
C Use the USB cable to connect the USB I&P Box to the PC.

4 Revision information

Definitions

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Changes from previous released version to current revision v2-00	Page
This User Guide UG001055 replaces the Application Note AN001012 (v1-08)	
Added AS6221 product information	5, 25

- Page and figure numbers for the previous version may differ from page and figure numbers in the current revision.
- Correction of typographical errors is not explicitly mentioned.

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