

1 General Overview

This operational manual describes the function of the *AS5000 Programmer* in combination with the programming boards. This tool can program the austriamicrosystems AS5000 series magnetic rotary encoders. The graphical user interface (GUI) runs on PC running Windows XP or later and controls the programmer via the USB interface. All major access modes to the OTP memories can be established. Be aware that austriamicrosystems provides the *AS5000 Programmer* as a reference for programming and reading of below mentioned devices under laboratory conditions (no warranty for mass production).

Programming Board Part number	AS5030 PB	AS5040 PB	AS5043 PB	AS5130 PB	AS5134 PB	AS5163 PB	AS5243 PB	AS5245 PB	Supported by firmware \geq
AS5030	•								Release 04.2009
AS5040		•							0.12
AS5043			•						0.12
AS5045		•							0.12
AS5046			•						Release 04.2009
AS5130				•					Release 04.2009
AS5134					•				0.10
AS5140		•							0.10
AS5143			•						0.10
AS5145		•							0.10
AS5163						•			0.12
AS5243							•		0.10
AS5245								•	0.10
AS5263						•			0.13

Table 1: Supported AS5000 encoders

2 Hardware Components

2.1 Description of the Hardware Components



Figure 1: Three components of the Programmer solution

Figure 1 shows the three components which are needed to program the austriamicrosystems magnetic rotary encoder. Take care that the connector between programming box and programming box is plugged in the right way.

Warning:
In case of wrong connection, the components in the AS5000 programmer or the encoder can be destroyed!

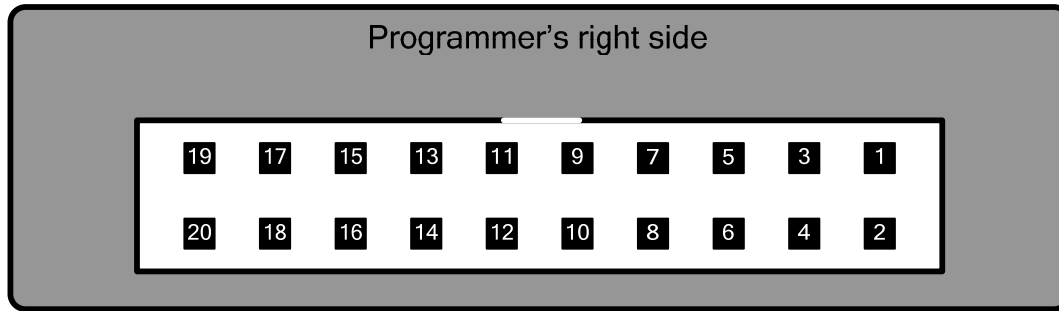


Figure 2: AS5000 Programmer MRE connector (right side view)

Pin #	Signal	Comment
1	Vzap	Programming voltage
2	Vzap	Programming voltage
3	D10	Encoder signal
4	ADC2	Device autodetection voltage
5	D9	Encoder signal
6	ADC1	Vzap feedback
7	D8	Encoder signal
8	D11	Encoder signal
9	D7	Encoder signal
10	D6	Encoder signal
11	VDD	Encoder power supply
12	VDD	Encoder power supply
13	GND	Ground
14	GND	Ground
15	D5	Encoder signal
16	D0	Encoder & LCD display signal
17	D4	Encoder signal
18	D1	LCD signal – Do not use
19	D3	Encoder & LCD display signal
20	D2	Encoder & LCD display signal

2.2 Description of the programming board

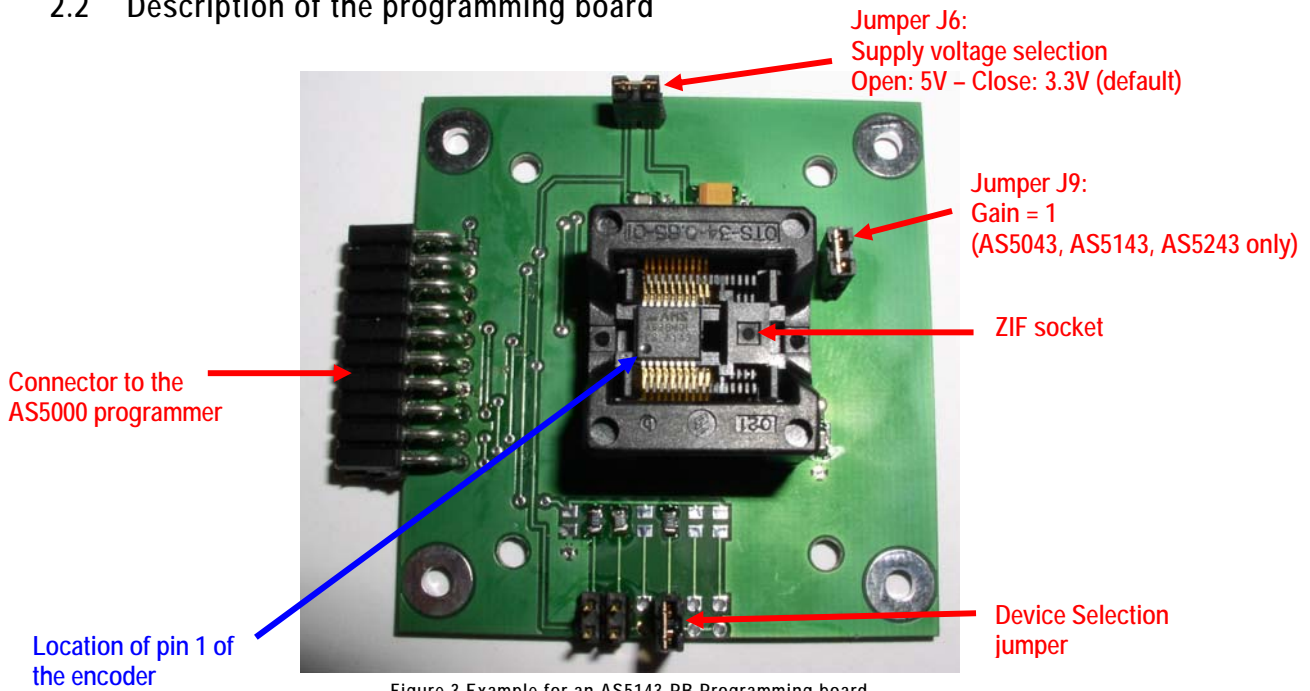


Figure 3 Example for an AS5143-PB Programming board

The programming board (AS5xxx-PB) is specific for a group of devices. By jumper setting on this board the build in firmware in the programming box automatically detects the selected device. It is not recommended to change the jumper setting to a different encoder type than installed in the socket.

To place or remove a device from the socket, push the black frame of the socket down. This socket has more connectors as the AS50xx/ AS51xx part and therefore it is important to align the device to the left side of the socket. The pin 1 of the device must be on the bottom left side. Figure 2 shows the detailed placed device in the socket.

The jumper J9 is specific for the AS5043/AS5143. This Jumper is used to close the feedback loop used for the analog output operation mode. With this jumper the gain can be set to 1.

The jumper J6 is in the default closed because the *AS5000 Programmer* by default the 3.3 V operation. In case of 5 V operation the jumper must be removed and the configuration can be changed over the GUI.

2.3 Connecting the programming components



Figure 4 connected components to the USB connector

In case of connecting the components over the USB port from the PC the *AS5000 Programmer* will be supplied with power. An external power supply is possible but not needed.



Figure 5 Status display without executed GUI at the PC



Figure 6 Status display connected with executed GUI

3 Graphical User Interface (GUI)

3.1 Installing the GUI on the PC

The preliminary software is developed for a Microsoft Windows XP operating system with Service Pack 2. In addition the dotnet (.NET) framework version 2.0 or more must be installed on the PC. This package can be downloaded free of charge from the Microsoft webpage:

<http://www.microsoft.com/downloads/details.aspx?FamilyID=0856eacb-4362-4b0d-8edd-aab15c5e04f5&displaylang=en>

Following Procedure is recommended before starting the GUI:

1. check on your PC if Service Pack 2 is installed
2. install the mentioned .net package to your computer
3. execute setup-usb-box-gui-1.007.exe
4. Finally start the GUI using the shortcut in the start menu or desktop.

3.2 Programming the AS5043/AS5143

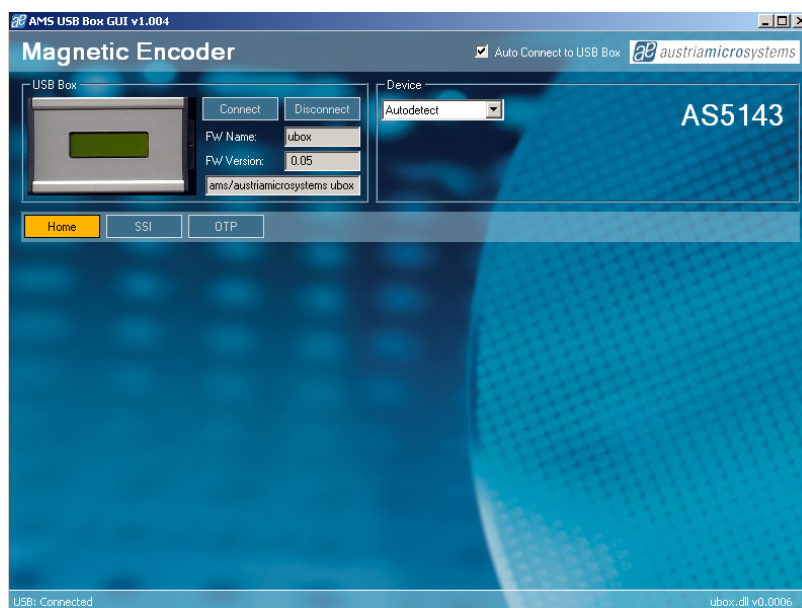


Figure 7 main window of the GUI

Figure 7 shows the main window of the GUI. In the top left corner you can see mainly the firmware (FW) version of the AS5000 Programmer. By default the GUI is in the auto detection mode. Any connected austriamicrosystems programming board will be automatically detected and displayed in the right top corner. The GUI is divided into three main sections HOME, SSI (or TWI) and OTP.

By selection the SSI button the information of the angular position and the status bits appears. See figure 8



Figure 8 SSI Data Readout before setting the zero position



Figure 9 Data Readout after setting the zero position at the AS5143

The zero position value is calculated by the software and written in the device. This operation is a write in an internal shift register the programming isn't done after this operation.

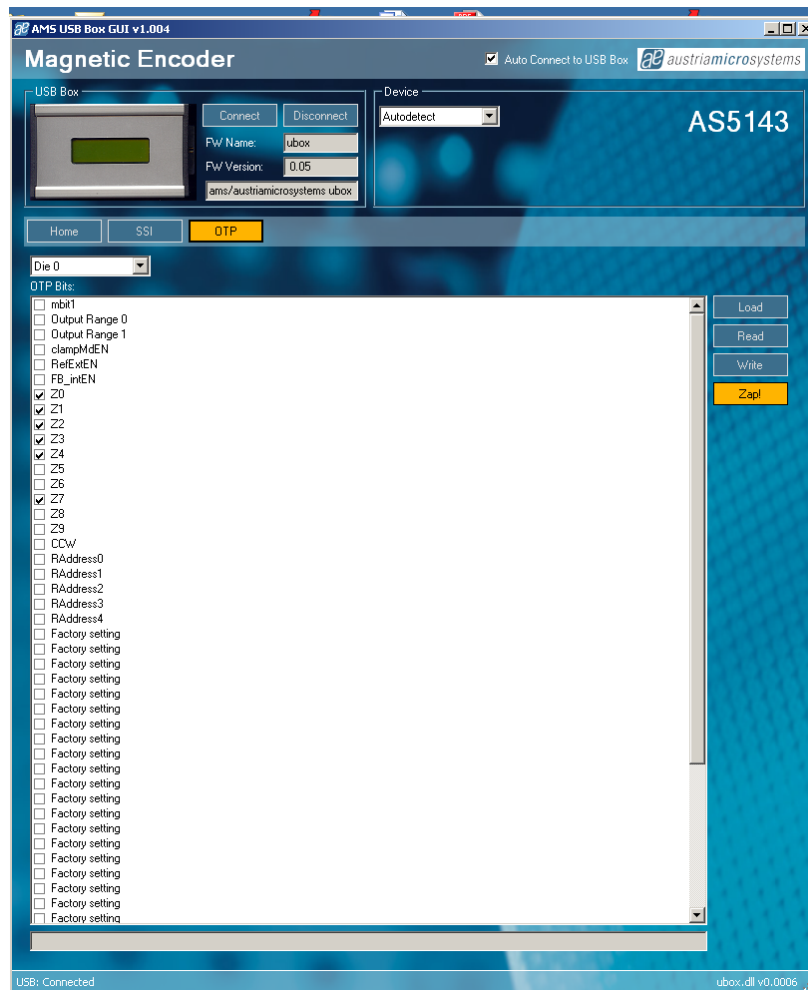


Figure 10 OTP section with calculated values for the zero position

After changing into the OTP section the calculated value for the zero position can be seen. In addition all other customer programming bits could be set. With an additional write command the data could be written in the device. Finally the Zap! Button programs the setting in the OTP memory. Take care, the programming cannot be reversed!

3.3 Programming the AS5134

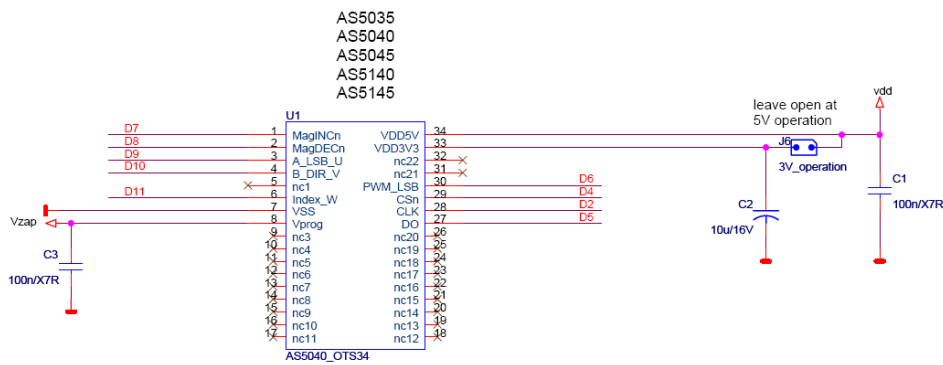
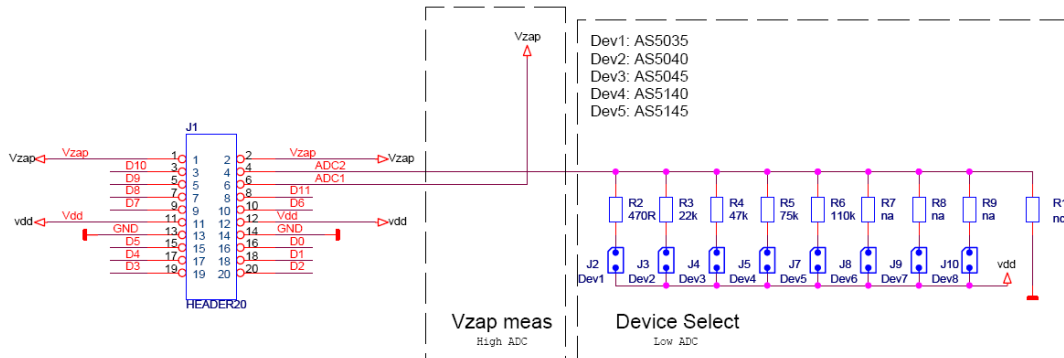


Figure 11 GUI for the AS5134

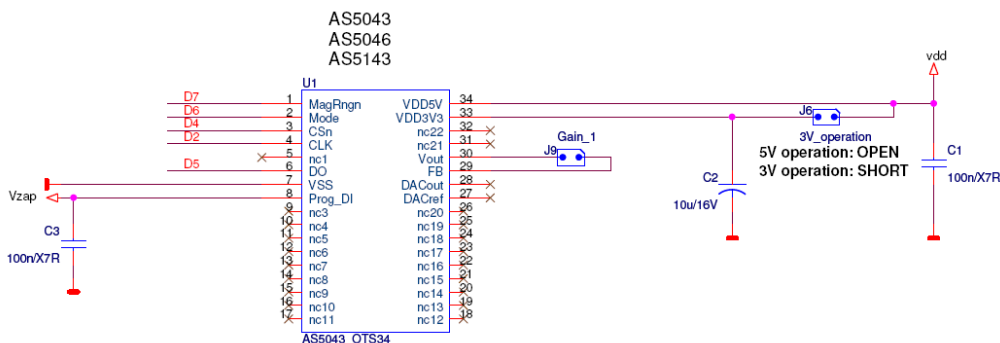
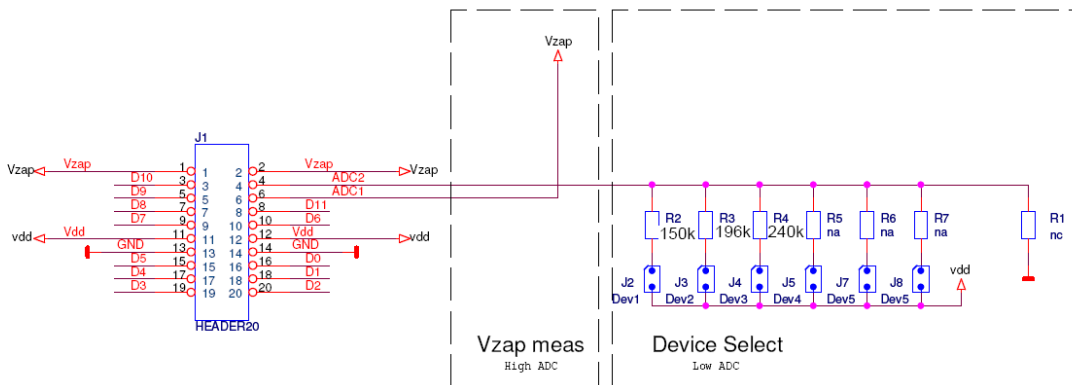
Additional window for the BLDC output signals

4 Programming boards (PB) Schematics

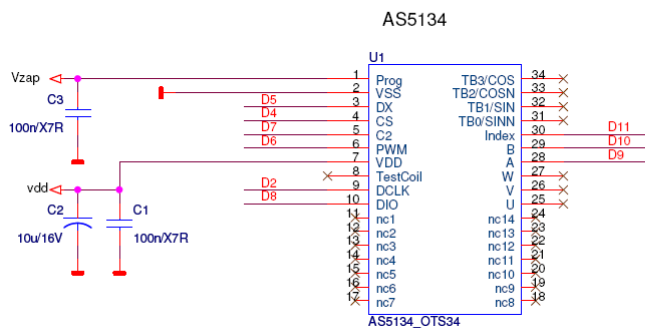
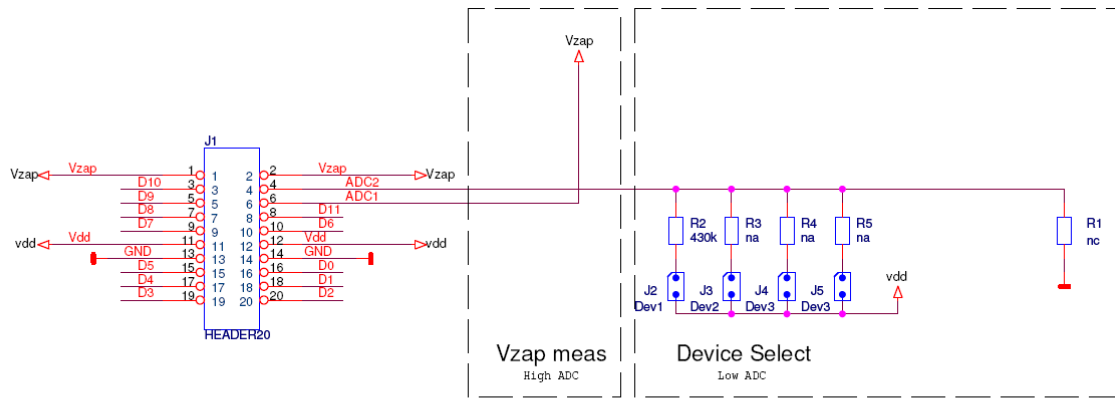
4.1 AS5040-PB



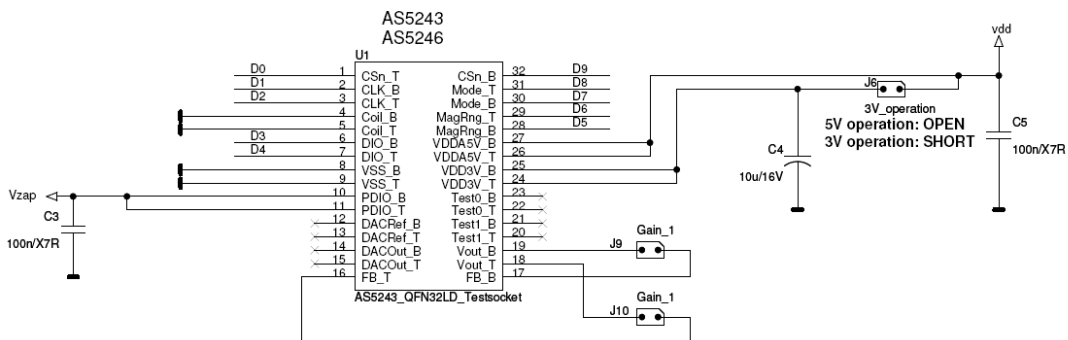
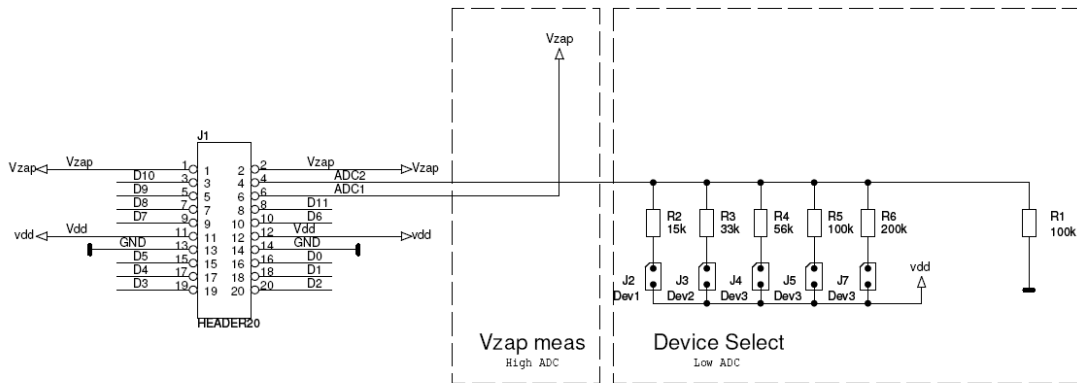
4.2 AS5043-PB



4.3 AS5134-PB



4.4 AS5243-PB



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5 Revision History

Revision	Date	Description	
R1.0	March.29, 2008	New copy	
R1.1	May 22, 2008	All paragraphs, new pictures included	
R1.2	June 16, 2008	AS5134 device added	
R1.3	September 4, 2008	New devices added, minor corrections	
R1.4	September 26, 2008	Minor corrections	
R1.5	December 15, 2008	Minor corrections	
R1.6	January 26, 2009	Layout modification, PB schematics	
R1.7	March 3, 2009	Supported devices table added	

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