Product Document

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User Manual – AS5x61 / AS5x62 Programming

AS5x61 /AS5x62 Programming Example

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1. General Description

This document describes the programming of the AS5x61 / AS5x62.

The AS5x61 / AS5x62 is a contactless magnetic angle position sensor for accurate angular measurement over a full turn of 360°. A sub range can be programmed to achieve the best resolution for the application. It is a system-on-chip, combining integrated Hall elements, analog front end, digital signal processing and best in class automotive protection features in a single device.

To measure the angle, only a simple two-pole magnet, rotating over the center of the chip, is required. The magnet may be placed above or below the IC.

The absolute angle measurement provides instant indication of the magnet's angular position with a resolution of 0.022° = 16384 positions per revolution. According to this resolution the adjustment of the application specific mechanical positions are possible. The angular output data is available over a 12 bit ratiometric analog output.

The ASx61 / AS5x62 operates at a supply voltage of 5V and the supply and output pins are protected against overvoltage up to +20V. In addition the supply pins are protected against reverse polarity up to –20V.

The Demo software for programminf is available on the Webpage. www.ams.com

2. Requirements – Applies to all output types

The following table shows the requirements to program the AS5x61/AS5x62

Table 1:
Requirements

Pos	Item	Comment
1	UART Adapter Interface	Communication over 1 PIN is necessary. UART Interface board available
2	RS232 Connection on PC	
3	Application Software	Application Software: www.ams.com
4	Labview Drivers for the Application Software	

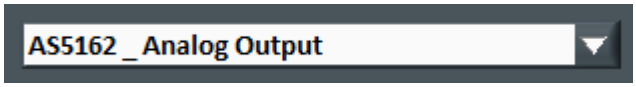
3. AS5x62 Programming

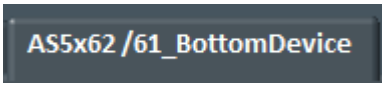
1) Connect AS5x61/AS5x62 to UART Interface board or to communication equipment. Use VCC, GND and OUT for the communication. If the ams UART Interface board is used, please connect an external 5V Powersupply to the board.

2) Start AS5x61/AS5x62 Evaluation Software

Figure 1 AS5x6y GUI

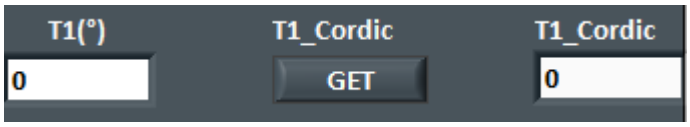
3) Choose the right device AS5162(singleDIE) or AS5262(dualDIE)



4) Click 

5) Enter beginning angle, T1. Two methods are possible:

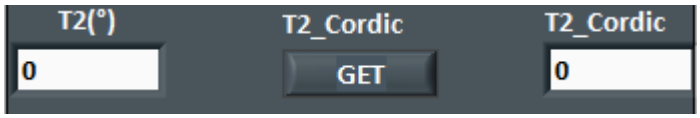
   a. Manually enter an initial position value into “T1 Cordic” field or “T1 (°),or



   b. Move magnet assembly to initial position and click “Get”. This will take the value related to the magnet current physical location as the Cordic register initial position.

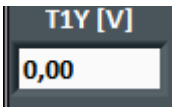
6) Enter final angle, T2. Two methods are possible, except that this position is the final position of the magnet’s rotation.

   a. Manually enter a final position value into “T2 Cordic” field or “T2 (°)”, or

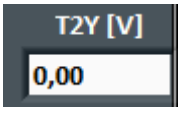


   b. Move magnet assembly to final position and click “Get”. This will take the value related to the magnet current physical location as the Cordic register initial position.

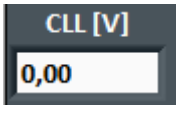
7)

8) Enter 

This is V_{OUT} at the initial magnet position.

9) Enter 

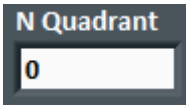
This is V_{OUT} at the final magnet position.

10) Enter 

Clamping Level Low is the voltage at the lower guard band.

11) Enter

Clamping Level High is the voltage at the upper guard band.

12) Choose the desired quadrant mode 

there are a possibility to programm up to 4 quadrants @ 1 revolution.

There are some limits for this programming: 4 Quadrants: max. 90° for each Quadrant

3 Quadrants: max 120° for each Quadrant

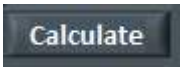
2 Quadrants: max 180° for each Quadrant

1 Quadrant: full 360°

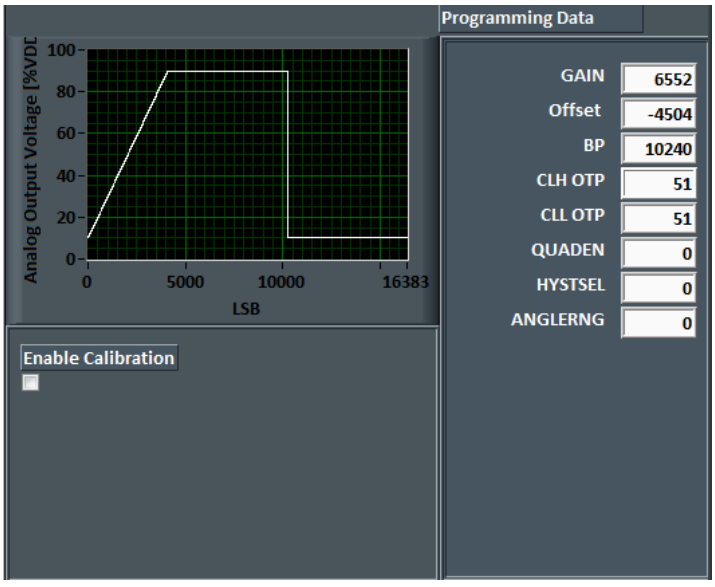
13) Choose the Breakpoint setting: a) Opt is the optimal Breakpoint, calculated by the DLL.
b) BP : set the BP in the BPW field
c) BP_T1: BP setting related to T1 position. Set value into BPWT1D field
d) BP_T2: BP setting related to T2 position. Set value into BPWT2D field

14) Additional Settings: HystLevel: Only used with 1Q 0 – 360° to move the BP.

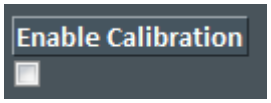
Direction: Set the right direction for the Application, CCW or CW.

15) Click 

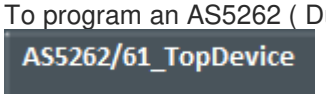
This will calculate the real values (scale factor, Breakpoint…). All this information, in addition to voltages and angles, is needed to program the AS5x62.

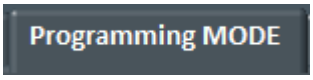


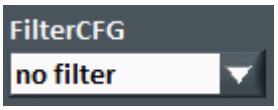
Example:1 Quadrant

16) For calibrating the T1 and T2 voltages of the OutputDac, turn 

on, and start the calibration. This calibration has to be used after the point 5 to point 15.
17) Additional

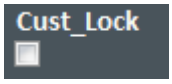
to calculate the programming data with the calibrated DAC Values.
18) To program an AS5262 (DualDie) Device, redo point 5 to point 17 on page


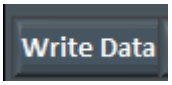
19) Click 

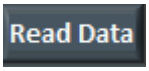
20) Set 

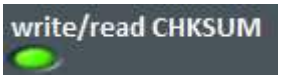
to activate the internal filter. Default setting is no filter. For further information please read AS5x62 Datasheet.
21) Set

to choose between normal airgap range or extended airgap range. For further information please read AS5x62 Datasheet.
22) To program an AS5262(DualDie) Device, redo point 20 and 21 for the Top Device.

23) Two actions can happen at this point.
    a. You can confirm that the entered data operates as expected. Go to Step 23.
    b. You can go straight to burning the configuration in to the AS5x62. Go to Step 31.
24) During this procedure, **DO NOT** click on 

25) Click 

26) Click 

27) Check if write/read Chksum is green 

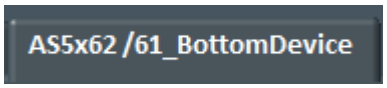
28) To program an AS5262(DualDie) Device, redo point 20 and 21 for the Top Device.
29) Click

to check with an **oscilloscope** if your trimming is what you expected.

30) If satisfied with the results go to Step 31, otherwise, go to Step19.
31) Reset the device. You have to push the reset button on the UART Interface board by hand. This will reset the programming configuration.
32) Go to Step 4 to repeat procedure to change unacceptable parameters.

**** Permanent Programming of AS5x62 beyond this point ****

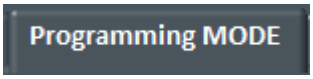
33) Reset the device.

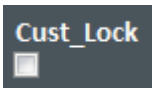
34) Select 

35) Click

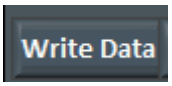
This transfers all data to “Programming Mode” screen.

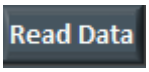
36) For programming the A5262(DualDie), redo point 34 and 35 at

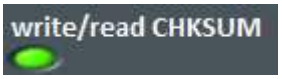
37) Click 

38) Click 

This will cause the AS5x62 to permanently enter into Output Mode when power is applied to it.

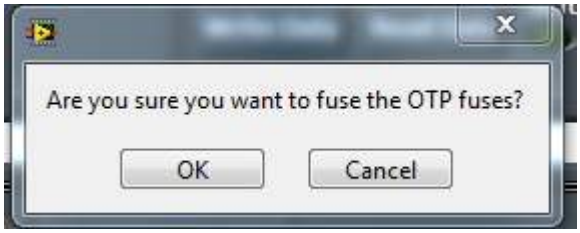
39) Click 

40) Click 

41) Check if write/read Chksum is green 

42) To program an AS5262(DualDie) Device, redo step 38 to step 41 for the Top Device.

43) Click

A message will appear. 

44) Click yes to accept. CAUTION: Once this is done, the AS5x62 will permanently be programmed.

45) Once the message disappears, the part is programmed.

46) Confirm proper operation by applying a scope or multimeter to VOUT.

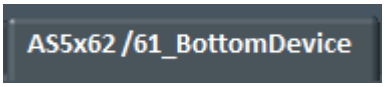
4. AS5x61 Programming

1) Connect AS5x61/AS5x62 to UART Interface board or to communication equipment. Use VCC, GND and OUT for the communication. If the ams UART Interface board is used, please connect an external 5V Powersupply to the board.

2) Start AS5x61/AS5x62 Evaluation Software

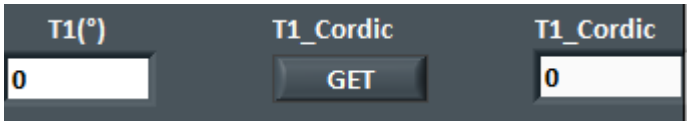
Figure 1 AS5x6y GUI

3) Choose the right device AS5162(singleDIE) or AS5262(dualDIE)

4) Click 

5) Enter beginning angle, T1. Two methods are possible:

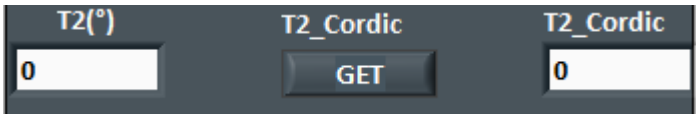
   a. Manually enter an initial position value into “T1 Cordic” field or “T1 (°),or



b. Move magnet assembly to initial position and click “Get”. This will take the value related to the magnet current physical location as the Cordic register initial position.

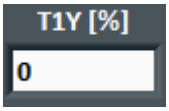
6) Enter final angle, T2. Two methods are possible, except that this position is the final position of the magnet’s rotation.

a. Manually enter a final position value into “T2 Cordic” field or “T2 (°)”, or

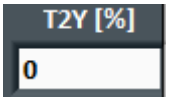


b. Move magnet assembly to final position and click “Get”. This will take the value related to the magnet current physical location as the Cordic register initial position.

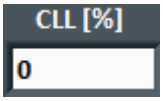
7)

8) Enter 

This is duty cycle at the initial magnet position.

9) Enter 

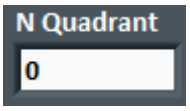
This is duty cycle at the final magnet position.

10) Enter 

Clamping Level Low is the duty cycle at the lower guard band.

11) Enter

Clamping Level High is the voltage at the upper guard band.

12) Choose the desired quadrant mode 

there are a possibility to programm up to 4 quadrants @ 1 revolution.

There are some limits for this programming: 4 Quadrants: max. 90° for each Quadrant

3 Quadrants: max 120° for each Quadrant

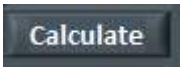
2 Quadrants: max 180° for each Quadrant

1 Quadrant: full 360°

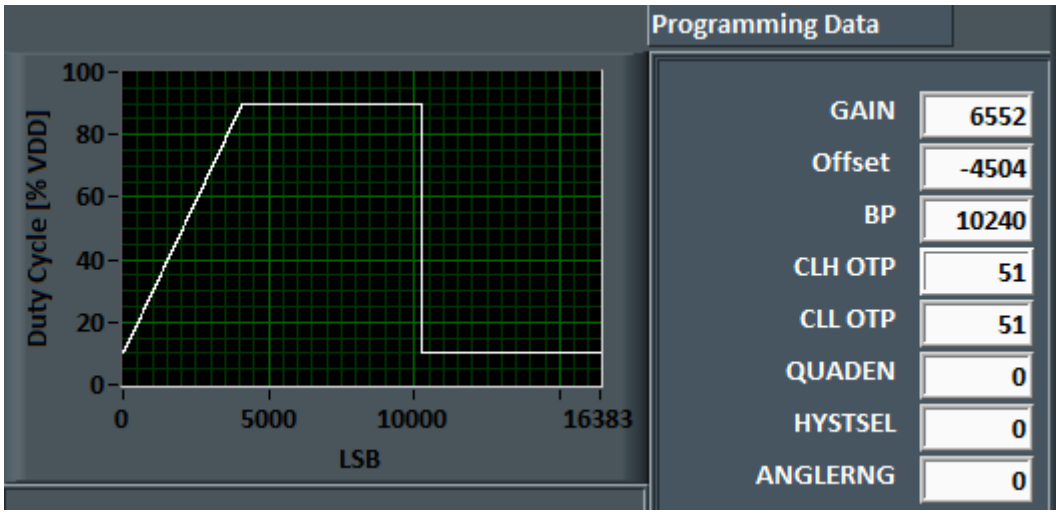
13) Choose the Breakpoint setting: a) Opt is the optimal Breakpoint, calculated by the DLL.
b) BP : set the BP in the BPW field
c) BP_T1: BP setting related to T1 position. Set value into BPWT1D field
d) BP_T2: BP setting related to T2 position. Set value into BPWT2D field

14) Additional Settings: HystLevel: Only used with 1Q 0 – 360° to move the BP.

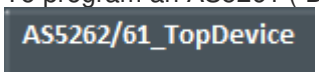
Direction: Set the right direction for the Application, CCW or CW.

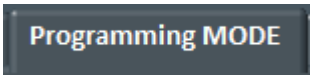
15) Click 

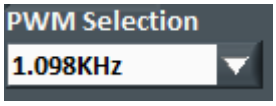
This will calculate the real values (scale factor, Breakpoint…). All this information, in addition to voltages and angles, is needed to program the AS5x62.

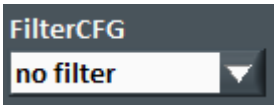


Example:1 Quadrant

16) To program an AS5261 (DualDie) Device, redo step 5 to step 15 on page 

17) Click 

18) Select the desired PWM Frequency. 

19) Set 

to activate the internal filter. Default setting is no filter. For further information please read AS5x62 Datasheet.

20) Set

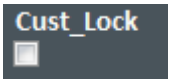
to choose between normal airgap range or extended airgap range. For further information please read AS5x61 Datasheet.

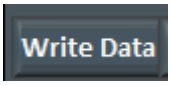
21) To program an AS5261(DualDie) Device, redo step 18 to step 20 for the Top Device.

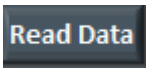
22) Two actions can happen at this point.

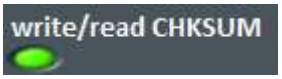
    a. You can confirm that the entered data operates as expected. Go to Step 23.

b. You can go straight to burning the configuration in to the AS5x62. Go to Step 31.

23) During this procedure, **DO NOT** click on 

24) Click 

25) Click 

26) Check if write/read Chksum is green 

27) To program an AS5261(DualDie) Device, redo step 24 to step 26 for the Top Device.

28) Click

to check with an **oscilloscope** if your trimming is what you expected.

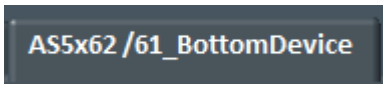
29) If satisfied with the results go to Step 31, otherwise, go to Step19.

30) Reset the device. You have to push the reset button on the UART Interface board by hand. This will reset the programming configuration.

31) Go to Step 4 to repeat procedure to change unacceptable parameters.

**** Permanent Programming of AS5x61 beyond this point ****

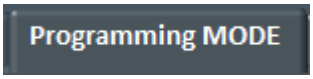
32) Reset the device.

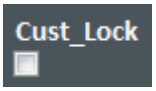
33) Select 

34) Click

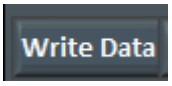
This transfers all data to “Programming Mode” screen.

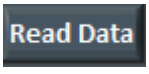
35) For programming the A5261(DualDie), redo point 34 and 35 at

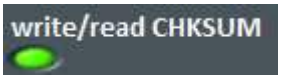
36) Click 

37) Click 

This will cause the AS5x61 to permanently enter into Output Mode when power is applied to it.

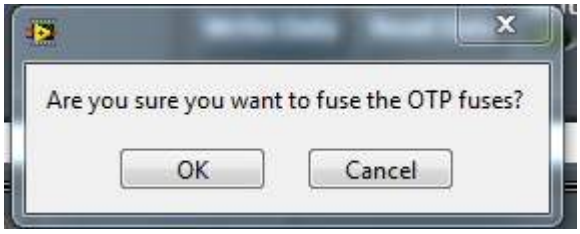
38) Click 

39) Click 

40) Check if write/read Chksum is green 

41) To program an AS5261(DualDie) Device, redo step 38 to step 41 for the Top Device.

42) Click

A message will appear. 

43) Click yes to accept. CAUTION: Once this is done, the AS5x61 will permanently be programmed.

44) Once the message disappears, the part is programmed.

45) Confirm proper operation by applying a scope to VOUT.

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Contact Information

Headquarters

ams AG
Tobelbader Strasse 30
8141 Unterpremstaetten
Austria
T. +43 (0) 3136 500 0
For Sales Offices, Distributors and Representatives, please visit:
http://www.ams.com/contact