



FIFO Motion Mode



Application Note



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1 Introduction

1.1 Scope

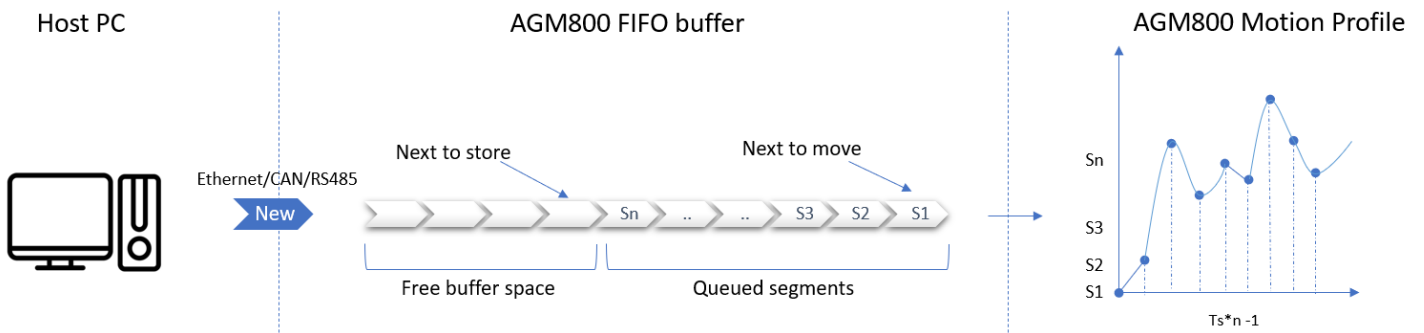
This document is to explain how to configure and use the FIFO motion mode in agito motion controls.

The FIFO is a motion mode which the controller generating motion profile, according to motion segments stored in a FIFO buffer. The host feeds motion segments to the controller (into the FIFO buffer) by means of communication, typically Ethernet.

FIFO (First In First Out) buffer the first input segment is also the first output segment to perform the motion.

The motion segments shall be pushed to the FIFO buffer before or during the motion, with the condition that the FIFO buffer is not full. If the FIFO is full, the push operation is rejected with an error.

A graphical representation of the workflow of the FIFO feature:



Picture 1- FIFO flow chart.

If during a motion in this mode, the controller reaches the last element in the FIFO and completes this motion segment, and yet no new element was pushed, the motion is automatically ended.

For more detailed information you can look at the document:

[FIFO Motion Mode definitions.](#)

2 Configuration

2.1 FIFO Keyword references

Command	Description
MotorOn=1	To access FIFO mode the motor must be ON
MotionMode = 9	Activates FIFO motion mode
FIFOClear	Clear the FIFO buffer-good practice before starting to push variables into the buffer.
FIFOPushCycle,1639	<p>Defines cycle time between command executions. This must be the first value of the array the FIFO function will not work. In This case the command time is 99.98 ms.</p> <p>The value to insert is calculated as so:</p> $Value = \frac{T_{command} [msec]}{0.061}$ <p>The dividing in 0.061 because the sampling time of the controller is 61 microseconds.</p> <p>For your application make sure to use it to calculate the command time</p>
FIFOPushLinP,16384000	<p>Pushing a linear position value- delta position from the relative position the motor is currently on. The relative movement based on the speed of the movement. The calculation of this value is as follows:</p> $PosValue = delta\ position \cdot 16384$ <p>16384- is the sampling frequency of the control loop. So, the relative position is 1000 user-units</p>
“Begin”	Begin the movement by taking segments out of the FIFO buffer and executing them
FIFOStatus[2]	Checks the amount of free space in the buffer. This will have help to determine if pushing to the buffer is needed or not, or when the buffer is near completion.

The maximum number of values that can be inserted into the array is 128.

After you filled the FIFO buffer with several values (at least one), you can enable the motors and begin the movement.

After starting the movement, the first value from the array will be executed.

In parallel with motion , the FIFO buffer shall be filled as long as there are free segments in the buffer. In case buffer become empty the motion will stop. In order start motion again fill the buffer and send Begin command.

If the buffer is empty the request to push a value to the array will be denied and a suitable error will be presented.

The same will happen if the buffer is full, the motor will stop, and a suitable error will be presented.

2.2 FIFO PCSuite Configuration

An example code from the PCSuite IDE:

```
29      BHomingOn=1
30      BMotorOn=1
31      BMotionMode = 9
32      BFIFOClear
33      BFIFOPushCycle,1639
34      BFIFOPushLinP,16384000
35      BFIFOPushLinP,32768000
36      BFIFOPushLinP,49152000
37      BFIFOPushLinP,65536000
38      BFIFOPushLinP,81920000
39      BFIFOPushLinP,81920000
40      BFIFOPushLinP,81920000
41      BFIFOPushLinP,81920000
42      BFIFOPushLinP,65536000
43      BFIFOPushLinP,49152000
44      BFIFOPushLinP,32768000
45      BFIFOPushLinP,16384000
46
47      BBegin
```

Picture 2- example code for FIFO.

This code executes a linear relative movement for 40000 steps - PTP.

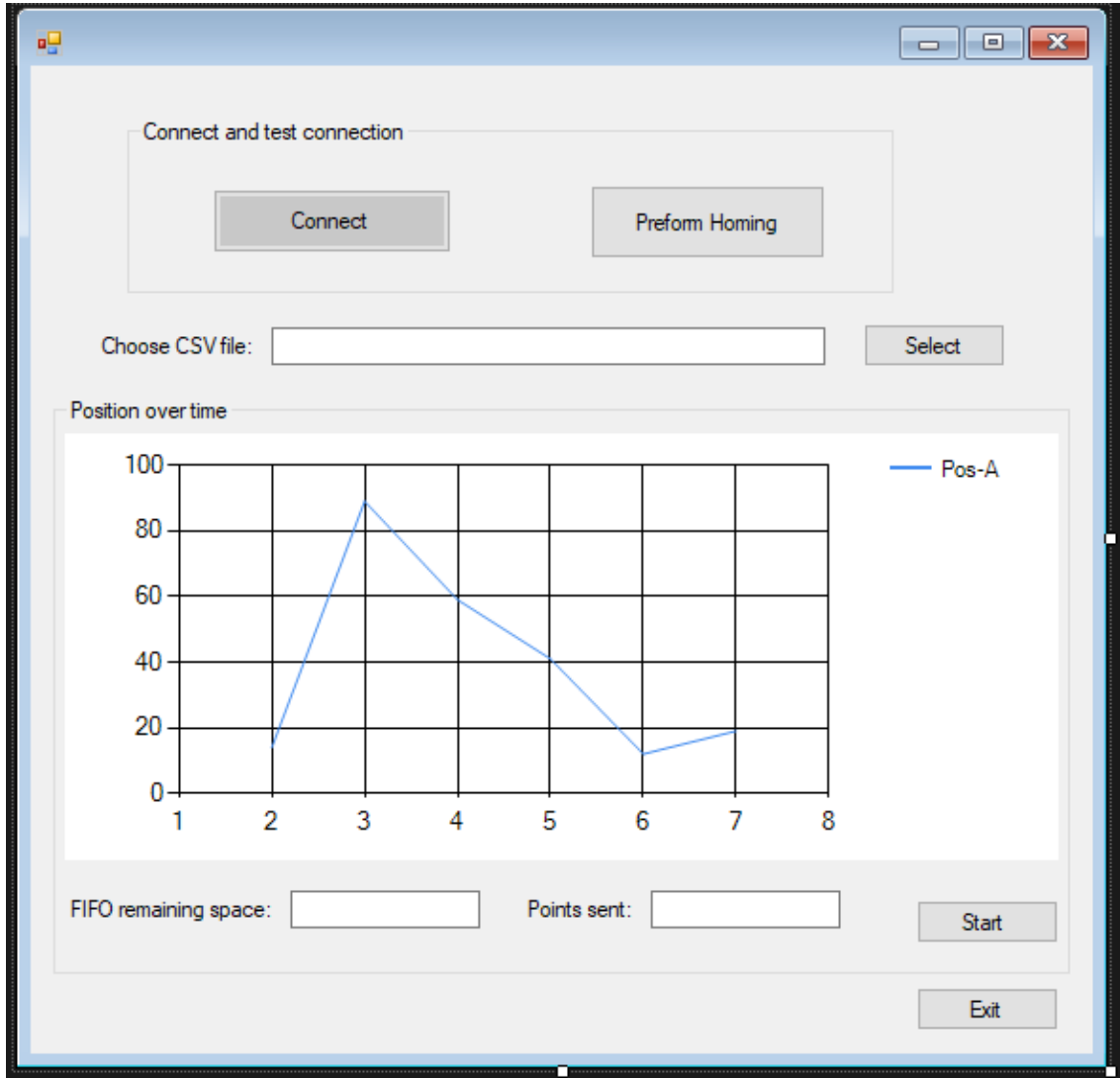
Note: The homing process used for starting from position 0.

The workflow is the most important part that we turn the motor on, the motion mode is assigned as FIFO mode, clearing the buffer, pushing the FIFO execution time, and just then pushing the position/velocity/acceleration commands and at the end starting the motion.

Full code: [FIFO code](#)

3 Example-Application

The Application is an example of a repeating linear position profile with a range of 40000 steps.



Picture 3 -the application for FIFO demonstration.

Buttons explanation:

“Connect”- connect to a controller.

“Preform Homing”- the motor will perform homing sequence, so when the FIFO motion will start no position limit will be crossed.

“Select”- opens a window to choose the CVS file with the FIFO array.

“Start”-after choosing the CSV File start sending the FIFO array and start the motion.

“Exit”- stop the motion, turn off the motor, disconnect from the motor and close the program.

The position during movement can be seen on the graph in real-time.

The remaining space of the FIFO buffer and the number of positions sent can be seen in real-time too.

