EDH0419En1020 - 08/25

Controller GUI Manual

# Super Agilis Series

## CONEX-SAG Controller with SAG-xxxx Stages V1.0.x


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# Warranty

MKS Instruments, Inc. warrants that this product will be free from defects in material and workmanship and will comply with MKS published specifications at the time of sale for a period of one year from date of shipment. If found to be defective during the warranty period, the product will either be repaired or replaced at MKS option.

To exercise this warranty, write or call your local MKS office or representative. You will be given prompt assistance and return instructions. Send the product, freight prepaid, to the indicated service facility. Repairs will be made, and the instrument returned freight prepaid. Repaired products are warranted for the remainder of the original warranty period or 90 days, whichever occurs last.

**Limitation of Warranty**

The above warranties do not apply to products which have been repaired or modified without MKS written approval, or products subjected to unusual physical, thermal or electrical stress, improper installation, misuse, abuse, accident or negligence in use, storage, transportation or handling.

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR USE. MKS INSTRUMENTS, Inc. SHALL NOT BE LIABLE FOR ANY INDIRECT, SPECIAL, OR CONSEQUENTIAL DAMAGES RESULTING FROM THE PURCHASE OR USE OF ITS PRODUCTS.

# EU Declaration of Conformity

2 Tech Drive
Andover, MA 01810
www.mksinst.com

## EU27 Declaration of Conformity

**Application of Council Directive(s):**

☒ Electromagnetic Compatibility Directive (EMCD) – 2014/30/EU
☒ Machinery Directive – 2006/42/EC
☒ Restriction of Hazardous Substances Directive (RoHS3) – (EU) 2015/863(7)
☒ Waste Electrical and Electronic Equipment – Directive 2012/19/EU

**Standard(s) to which conformity is declared:**

☒EN 61326-1:2013 – (EMC)
☒EN ISO 12100:2010 Safety of Machinery – General Principles of Design – Risk Assessment and Risk Reduction

**Emissions:**

☒EN 55011: 2016 +A1:2017 (4) Industrial, scientific and medical equipment - Radio-frequency disturbance characteristics - Limits and methods of measurement
☒IEC 61000-6-4: 2018 Emission standard for industrial environments

**Immunity:**

☒EN 61000-4-2:2009 EMC/Electrostatic Discharge Immunity Test
☒EN 61000-4-3:2006+A2:2010 EMC/Radiated Radio Frequency Electromagnetic Field Immunity Test
☒EN 61000-4-4:2012 EMC/Electrical Fast Transient/Burst Immunity Test
☒EN 61000-4-6:2014 EMC/Conducted Disturbances induced by Radio Frequency Fields Immunity Test
☒IEC 61000-6-2:2016 Immunity standard for industrial environments

**Manufacturers Name: MKS Instruments, Inc., 2 Tech Drive, Andover, MA 01810 USA**

Authorized Representatives Name & Location: _____

Equipment Type/Description: **CONTROLLER CONEX SUPER AGILIS**

Model Number(s) (6): CONEX-SAG-LS16, CONEX-SAG-LS32, CONEX-SAG-LS48
CONEX-SAG-LS16P, CONEX-SAG-LS32P, CONEX-SAG-LS48P

The object of the declaration described above is in conformity with the relevant Community harmonization legislation. MKS product conforms to the above Directive(s) and Standard(s) only when installed in accordance with manufacturer's specifications. This declaration has been issued under the sole responsibility of the manufacturer.

Date: 3/15/2022

Signature:

Full Name: **Le Cointe Hervé**

Title: **Quality Director**

4) Class A, Group 2
6) Compliance of the above model numbers requires the use of a braided shielded cable properly terminated at both ends – if so noted in the MKS Instruction Manual.
7) RoHS Directive has to be checked for in scope products; cannot CE mark without compliance to RoHS. RoHS Directive can be unchecked only for systems which MKS sells which qualify for "Large Scale Industrial Tool" exclusion.

# UK Declaration of Conformity

2 Tech Drive
Andover, MA 01810
www.mksinst.com

## UK Declaration of Conformity

**Application of Council Directive(s):**

☒ Electromagnetic Compatibility Directive (EMCD) – 2014/30/EU
☒ Machinery Directive – 2006/42/EC
☒ Restriction of Hazardous Substances Directive (RoHS3) – (EU) 2015/863(7)
☒ Waste Electrical and Electronic Equipment – Directive 2012/19/EU

**Standard(s) to which conformity is declared:**

☒BS EN 61326-1:2013 – (EMC)
☒BS EN ISO 12100:2010 Safety of Machinery – General Principles of Design – Risk Assessment and Risk Reduction

**Emissions:**

☒EN 55011: 2016 +A1:2017 (4) Industrial, scientific and medical equipment - Radio-frequency disturbance characteristics - Limits and methods of measurement
☒IEC 61000-6-4: 2018 Emission standard for industrial environments

**Immunity:**

☒IEC 61000-4-2:2008 EMC/Electrostatic Discharge Immunity Test
☒IEC 61000-4-3:2006 2006+AMD1:2007+AMD2:2010 EMC/Radiated Radio - Frequency Electromagnetic Field Immunity Test
☒IEC 61000-4-4:2012 EMC/Electrical Fast Transient/Burst Immunity Test
☒IEC 61000-4-6:2013 EMC/Conducted Disturbances induced by Radio Frequency Fields Immunity Test
☒IEC 61000-6-2:2016 Immunity standard for industrial environments

**Manufacturers Name: MKS Instruments, Inc., 2 Tech Drive, Andover, MA 01810 USA**

Authorized Representatives Name & Location: _____

Equipment Type/Description: **CONTROLLER CONEX SUPER AGILIS**

Model Number(s) (6): CONEX-SAG-LS16, CONEX-SAG-LS32, CONEX-SAG-LS48
CONEX-SAG-LS16P, CONEX-SAG-LS32P, CONEX-SAG-LS48P

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Date: 3/15/2022

Signature:

Full Name: **Le Cointe Hervé**

Title: **Quality Director**

4) Class A, Group 2
6) Compliance of the above model numbers requires the use of a braided shielded cable properly terminated at both ends – if so noted in the MKS Instruction Manual.
7) RoHS Directive has to be checked for in scope products; cannot CE mark without compliance to RoHS. RoHS Directive can be unchecked only for systems which MKS sells which qualify for "Large Scale Industrial Tool" exclusion.

# Preface

## CONFIDENTIALITY & PROPRIETARY RIGHTS

**Reservation of Title**

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## SERVICE INFORMATION

The user should not attempt any maintenance or service of the present product and its accessories beyond the procedures outlined in this manual. Any problem that cannot be resolved should be referred to MKS I Newport. When calling MKS I Newport regarding a problem, please provide the Tech Support representative with the following information:

- Your contact information.
- System serial number or original order number.
- Description of problem.
- Environment in which the system is used.
- State of the system before the problem.
- Frequency and repeatability of problem.
- Can the product continue to operate with this problem?
- Can you identify anything that may have caused the problem?

## MKS | NEWPORT RMA PROCEDURES

Any product being returned to MKS I Newport must have been assigned an RMA number by Newport. Assignment of the RMA requires the item serial number.

## PACKAGING

Materials being returned under an RMA must be securely packaged for shipment. If possible, reuse the original factory packaging.

# 1 Safety Information

## 1.1 Definitions and Symbols

The following terms and symbols are used in this documentation and also appear on the Super Agilis Controller/Driver where safety-related issues occur.

### 1.1.1 General Warning or Caution

The Exclamation Symbol may appear in Warning and Caution tables in this document. This symbol designates an area where personal injury or damage to the equipment is possible.

### 1.1.2 Electric Shock

The Electrical Shock Symbol may appear on labels affixed to the Super Agilis Controller/Driver. This symbol indicates a hazard arising from dangerous voltage. Any mishandling could result in irreparable damage to the equipment, in personal injury, or death.

### 1.1.3 European Union CE Mark

The presence of the CE Mark on Newport Corporation equipment means that it has been designed, tested and certified as complying with all applicable European Union (CE) regulations and recommendations.

### 1.1.4 United Kingdom Conformity Assessed Mark

The presence of the UKCA Mark on Newport equipment means that it has been designed, tested and certified as complying with all applicable United Kingdom's regulations and recommendations.

## 1.2 Warnings and Cautions

Definitions of, NOTE, CAUTION, WARNING and DANGER messages used throughout the manual.

| | |
|---|---|
| ***NOTE*** | **The NOTE sign denotes important information. It calls attention to a procedure, practice, condition, or the like, which is essential to highlight.** |
| ***CAUTION*** | **The CAUTION sign denotes a hazard. It calls attention to an operating procedure, practice, or the like, which, if not correctly performed or adhered to, could result in damage to or destruction of all or part of the product.** |
| ***WARNING*** | **The WARNING sign denotes a hazard. It calls attention to a procedure, practice, condition, on the like, which, if not correctly performed or adhered to, could result in injury to personnel.** |
| ***DANGER*** | **The DANGER sign Indicates an imminently hazardous situation that, if not avoided, will result in death or serious injury.** |

## 1.3 General Warnings and Cautions

The following general safety precautions must be observed during all phases of operation of this equipment.

Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture, and intended use of the equipment.

- Heed all warnings on the unit and in the operating instructions.
- To prevent damage to the equipment, read the instructions in this manual.
- Only plug the power supply to a grounded power outlet.
- Assure that the power supply is properly grounded to earth ground through the grounding lead of the AC power connector
- Route power cords and cables where they are not likely to be damaged.
- Disconnect or do not plug in the AC power cord in the following circumstances:
  - If the AC power cord or any other attached cables are frayed or damaged.
  - If the power plug or receptacle is damaged.
  - If the unit is exposed to rain or excessive moisture, or liquids are spilled on it.
  - If the unit has been dropped or the case is damaged.
  - If the user suspects service or repair is required.
- Keep air vents free of dirt and dust.
- Keep liquids away from unit.
- Do not expose equipment to excessive moisture (>85% humidity).
- Do not operate this equipment in an explosive atmosphere.
- Disconnect power before cleaning the Controller/Driver unit. Do not use liquid or aerosol cleaners.
- Do not open the CONEX-SAG controller. There are no user-serviceable parts inside.
- Return equipment to Newport Corporation for service and repair.
- Dangerous voltages associated with the 100-240 VAC power supply are present inside the power supply. To avoid injury, do not touch exposed connections or components while power is on.
- Follow precautions for static-sensitive devices when handling electronic circuits.

# 2 Introduction

## 2.1 Purpose

The purpose of this document is to provide instructions on how to use the CONEX-SAG Controller GUI.

## 2.2 Overview

The CONEX-SAG Controller GUI is a graphical user interface (GUI) which allows the user to interact with the CONEX-SAG Controller that is connected to stages. The user can initiate moves, change the state of the controller, adjust parameters, etc.

The CONEX-SAG Controller GUI runs on Windows 7, 8 and 10 platforms.

***NOTE*** **The CONEX-SAG Controller GUI supports the standards screens of personal computers. Other kinds of screens are not supported (pads, smartphones, etc.).**

# 3 Getting Started

## 3.1 Software

All Necessary files can be obtained from the http://www.newport.com website.

## 3.2 CONEX-SAG Controller GUI Installation

To install CONEX-SAG Controller GUI follow the steps below:

- Download the "Newport CONEX-SAG Applet.zip" folder from the website.
- Extract in the folder of your choice.
- From this folder, select and launch “Newport CONEX-SAG Applet.application”.

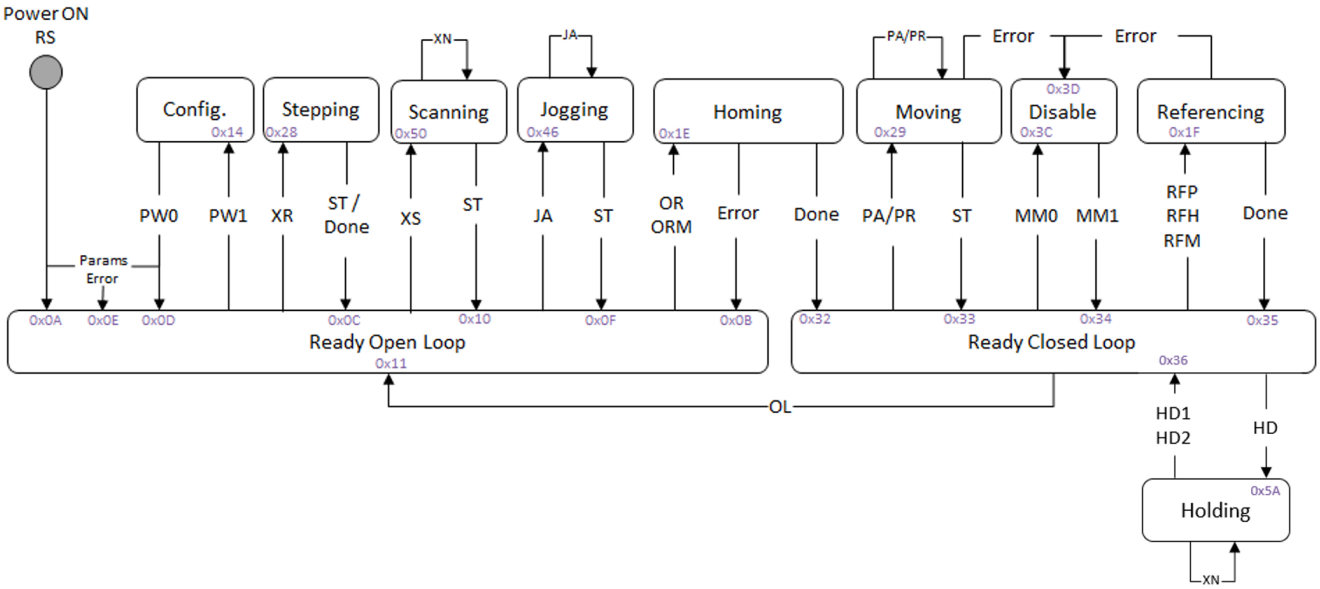
The installation completes and a shortcut is created on the desktop and in the start menu of your computer.

## 3.3 Launching Application

- Double-click on the shortcut.


## 3.4 Controller State Diagram

The CONEX-SAG Controller is defined by the following state diagram (refer to product user manual for more details).

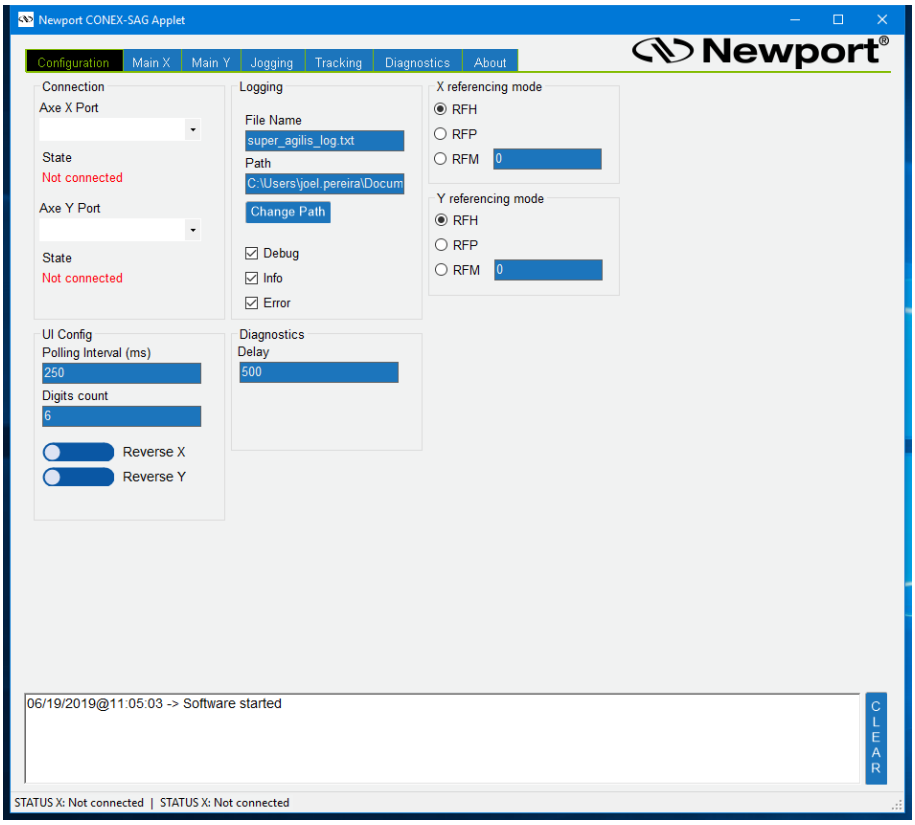


# 4 GUI Description

## 4.1 Configuration Tab

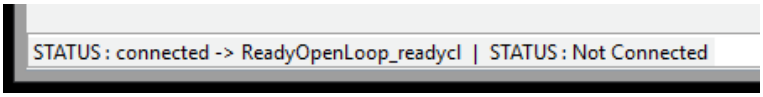
Upon start-up, the following window appears with "Configuration" tab selected.

The Configuration tab allows the user to view and / or change configuration information.



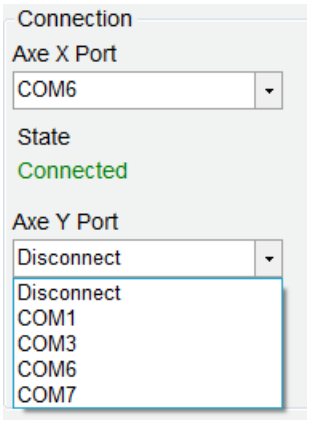

- The communication area in the bottom displays the commands and errors. This area appears in all the different tabs. It can be erased with the "Clear" button on the right.


- The axes STATUS are always displayed on the bottom of the application window (X status | Y status).

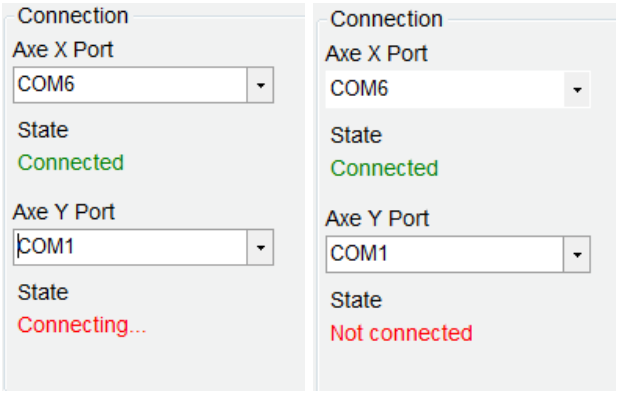


### 4.1.1 Connection Panel

Connection panel allows selecting the communication ports on which X and Y stages are connected and shows axes connection state (Connected / Not connected).




- In case a wrong port is selected, after searching for some time, the "Not connected" state is displayed and an error is reported in the communication area.

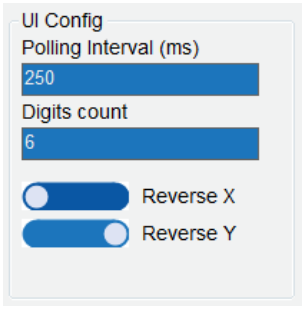



**NOTE** **If the same port is selected again for the second axis, it will be automatically disconnected from the first axis.**

### 4.1.2 UI Config Panel

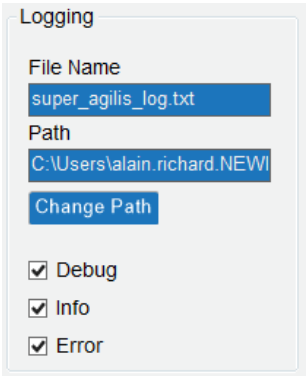
This panel allows setting Polling interval (refresh interval) and Digits count (decimal digits number for closed loop position).

Axes can also be reversed to fit desired positive direction.



### 4.1.3 Logging Panel

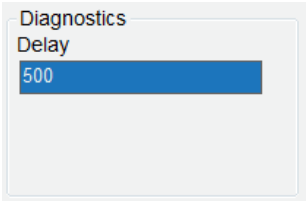
This allows changing log file name, path and recorded data.




**NOTE** **This file is size limited and filled in FIFO.**

### 4.1.4 Diagnostics Panel

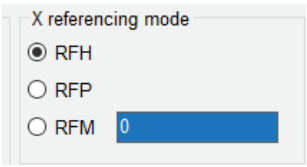
Here, delay between command executions in a command file can be set.




### 4.1.5 X Referencing Mode

This panel allows selecting X referencing mode.

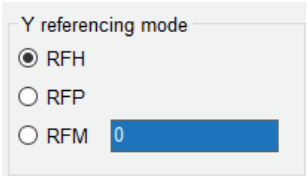
For RFM referencing mode we can add the value for the final position.




### 4.1.6 Y Referencing Mode

This panel allows selecting Y referencing mode.

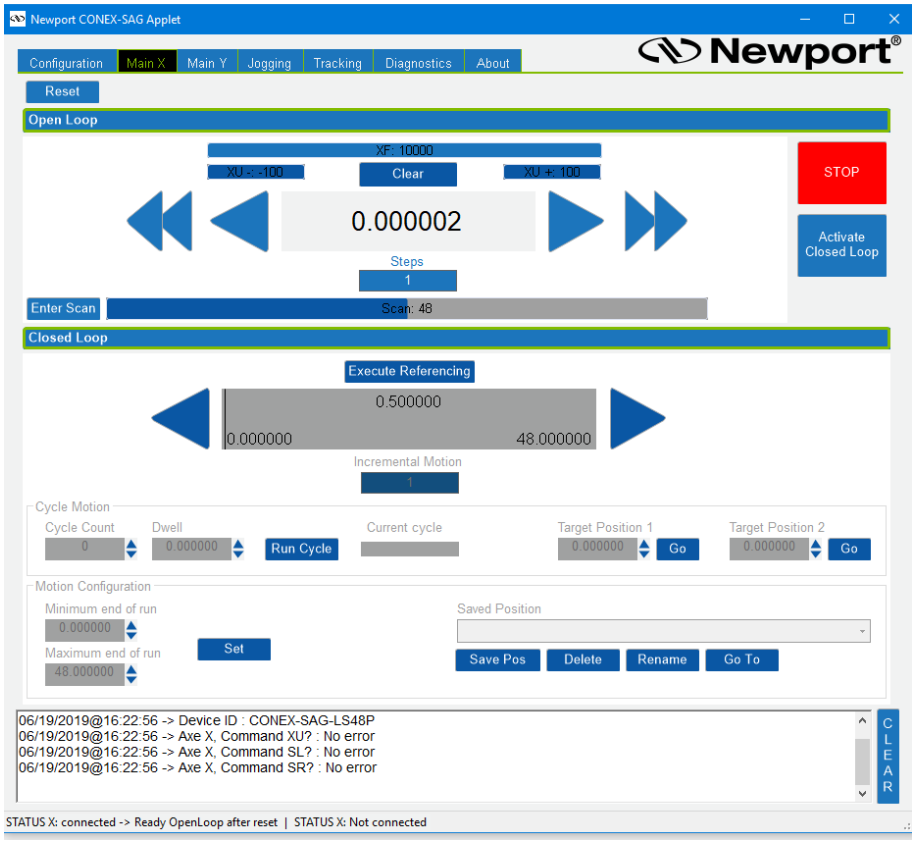
For RFM referencing mode we can add the value for the final position.



## 4.2 Main X/Main Y Tabs

Main X and Main Y tabs can be used to move the corresponding axis stage in open loop or closed loop (= encoder controlled loop - only for compatible stages).

- Top "Reset" button resets the controller (eq. to power off/on)



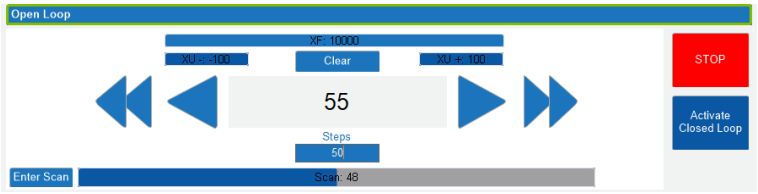

### 4.2.1 Open Loop Panel

This panel is used to move the stage in open loop (no encoder feedback).

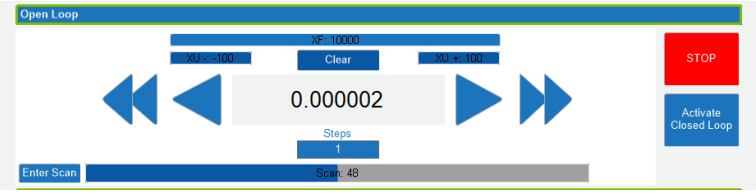
**Step mode:**

The stage is moved by the specified "Steps" number (approx. 1.5 µm per step*) in positive (right) or negative (left) direction:

- at low speed (500 Hz ≈ 0.75 mm/s*) by clicking the simple arrows
- at high speed (10 kHz ≈ 15 mm/s*) by clicking the double arrows
  (*) For step size at 100% (see command XU = -100,100)




The theoretical position in steps number is displayed at the center (for Open Loop Stage).




The theoretical position in steps number is mm at the center (for Close Loop Stage).

- It can be reset to zero by clicking "Clear" button.

This counter has no absolute reference and attention must be paid to the physical position of the stage.

In particular, no warning is reported if an end of run is reached and however, the stage won't move further.

- The stepping frequency can be adjusted by clicking on the XF bar and moving the mouse from left to right.


- The current of open loop step size can be adjusted by clicking on the XU bars and moving the mouse from left to right. The variable step size is available only for XF frequencies up to 1 kHz. For higher frequencies the step size is always 100%.


- During a move, displacement can be stopped by the "Stop" button.

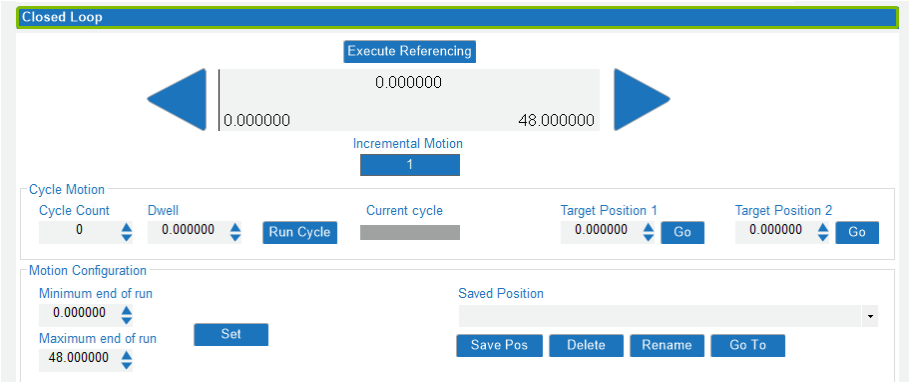
### Scan mode:

If a sub-step positioning is necessary, click on "Enter scan" button. In this mode, the piezo actuator is locked on the current step and additionally expended between 0 and maximum elongation (approx. 1.8 µm) by clicking in the scan bar and moving the mouse from left to right.


- In scan mode, the arrows are inactive. It is therefore mandatory to be positioned at the step proceeding target position before entering scan mode (axis not reversed).
- However, in case the axis is set to "Reverse" in Configuration tab, it must be positioned at the step following target position before entering scan mode.
- Click on "Stop Scan" to leave scan mode and go back to step mode. Note that the piezo additional expansion gets back to zero quickly and this generates a small drift.

### 4.2.2 Closed Loop Panel

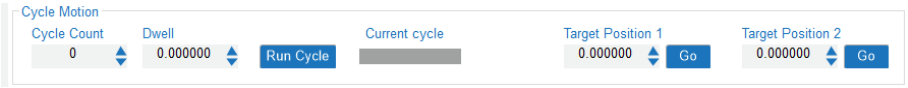
If the stage design allows, it can be driven in closed loop on encoder by clicking "Activate Closed Loop" button.




- A referencing can be set by clicking “Execute Referencing”. The sequence executed is depending on the choice done in the Tab Configuration (see 3.1.5 & 3.1.6).
- The stage is moved by the specified value in the “Incremental Motion”.

#### Cycle motion:

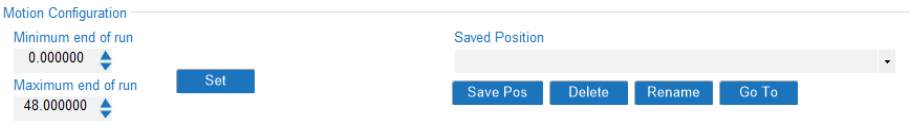
In this mode, a motion cycle can be set.




- The number of cycle is set in Cycle Count.
- Dwell is a temporization in second between each position.
- Target Position 1 is the first position for the cycle.
- Target Position 2 is the second position for the cycle.
- The cycle can be started by clicking on “Run Cycle”.

#### Motion configuration:

Travel range can be reduced using “Minimum end of run” and “Maximum end of run”. Theses virtuals end of run are activated clicking on “Set” button.

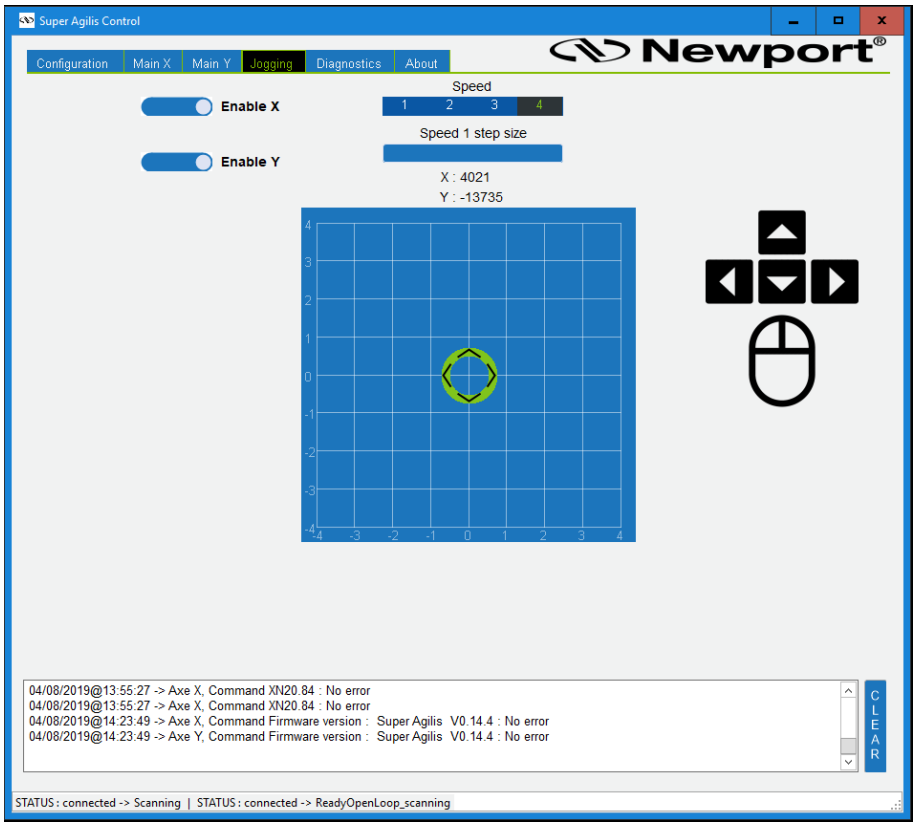



Position can be saved using the button “Save Pos”. Position saved can be found in the list box “Saved Position”.

- A position saved can be deleted using the button “Delete”.
- A position can be renamed using the button “Rename”.
- A displacement to a position saved can be operated clicking on the button “Go to”.

## 4.3 Jogging Tab

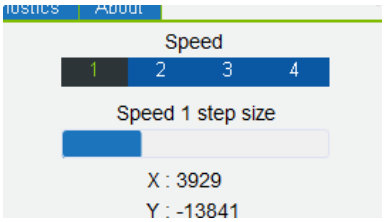
This tab allows moving the stages in jog mode exactly like with a joystick.




- Click on the green circle, maintain and move in the desired direction by one, two, three or four square intervals to move at speed 1 to 4.
- Speed 1 corresponds to 50 Hz, speed 2 to 1 kHz, speed 3 to 5 kHz and speed 4 to 10 kHz.
- Move horizontally for X axis, vertically for Y axis and in diagonal for both.

Axes can also be moved by pressing the keyboard arrows.

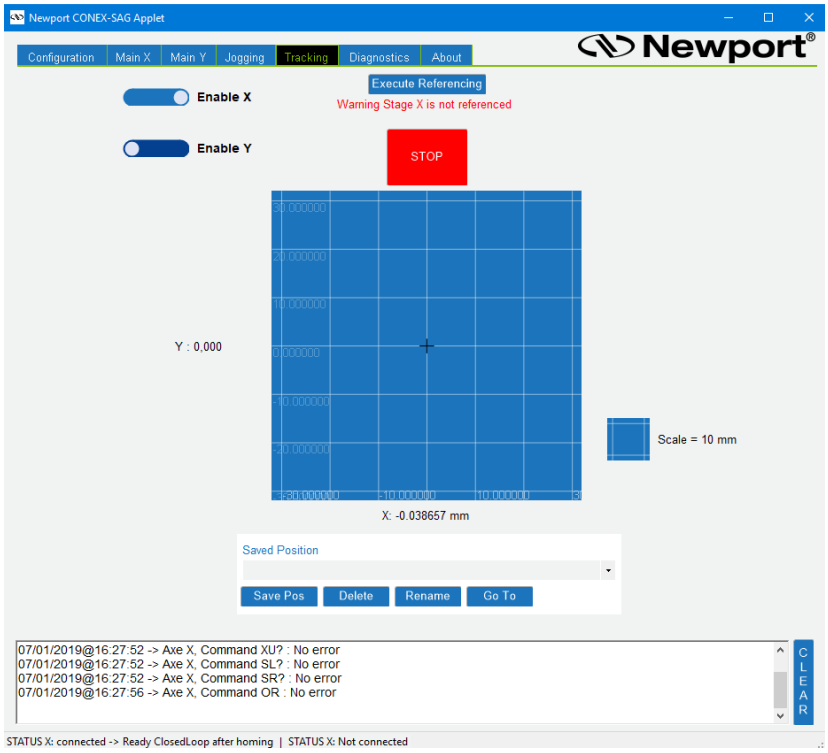
- In this case, select velocity by clicking one of the four "Speed" buttons on the top.
- In speed 1, velocity can be decreased further by reducing step size. Click on "Speed 1 step size" bar to set (also applicable to joystick).



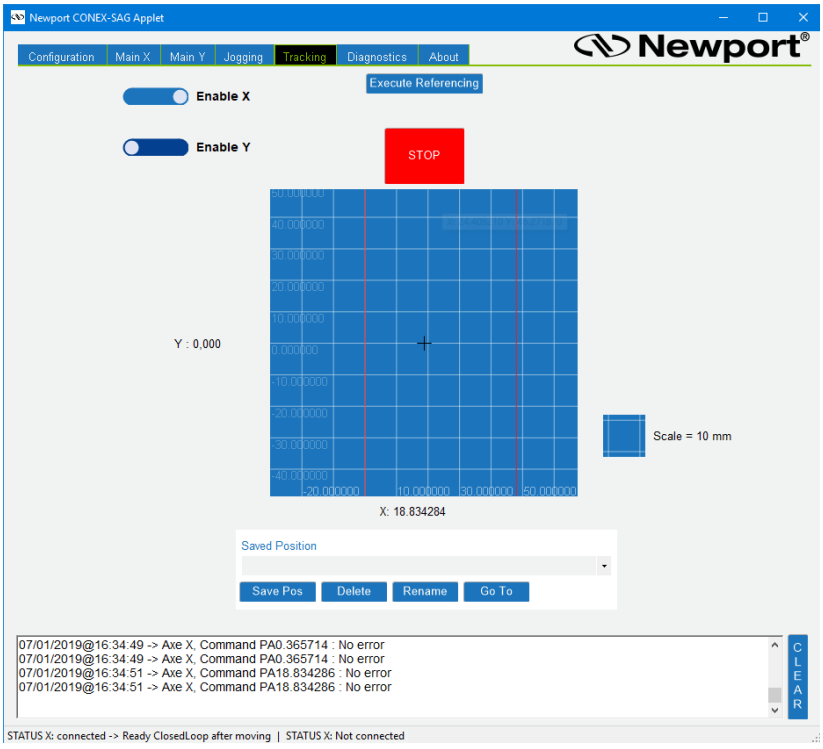

**NOTE** **X or Y axis can be disabled by toggling "Enable X" or "Enable Y".**

## 4.4 Tracking Tab

This tab allows moving the stages in track mode. In order to active this mode a referencing must be perform, the button “Execute Referencing” accomplish this sequence.




After the referencing, track mode is active. Two red lines appear to represent the limit of the travel range.




- Choose the position desired with the mouse and click. The stage displace to the position.

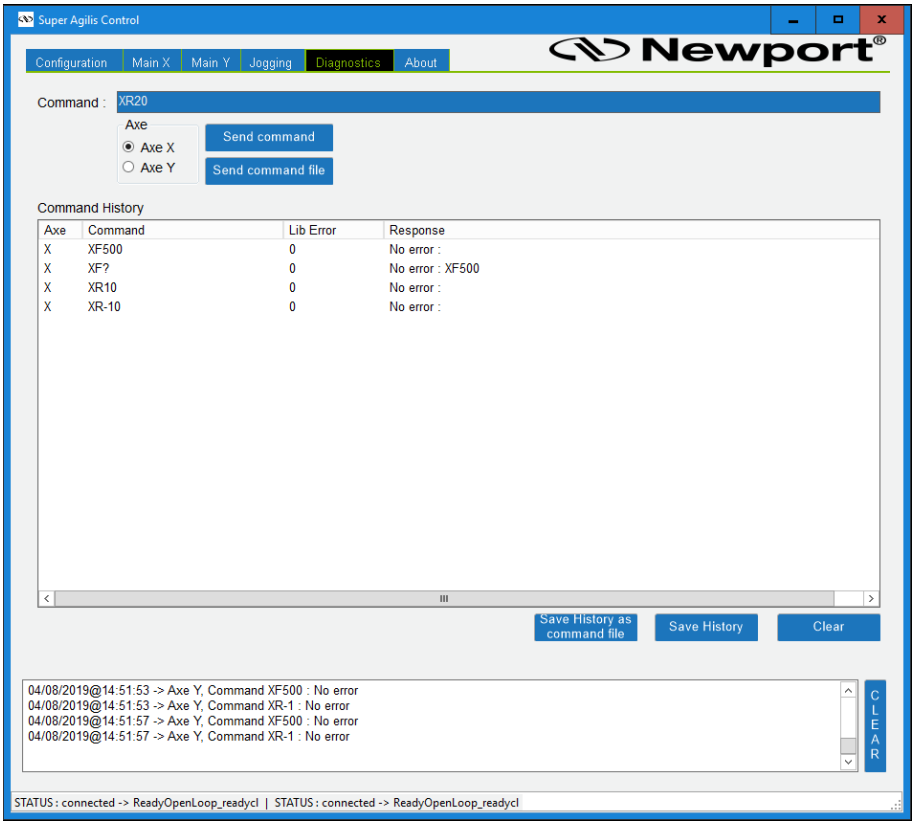
- With the scroll wheel a dynamic zoom can be done on the blue square.
- During a move, displacement can be stopped by the "Stop" button.

**NOTE** **X or Y axis can be disabled by toggling "Enable X" or "Enable Y".**

## 4.5 Diagnostics Tab

This tab allows sending direct ASCII commands or a command file to the controller. These commands will be immediately executed (with a delay between commands from a file).

Refer to CONEX SAG Controller and stage User Manual for command set description.




- Tick the involved axis
- Type the command in the "Command" area and click "Send command" (or press Enter).

The command (with the response) is added to the "Command History"list in the middle.

- Double click on a line of the list to copy this command in the "Command" area for execution again.

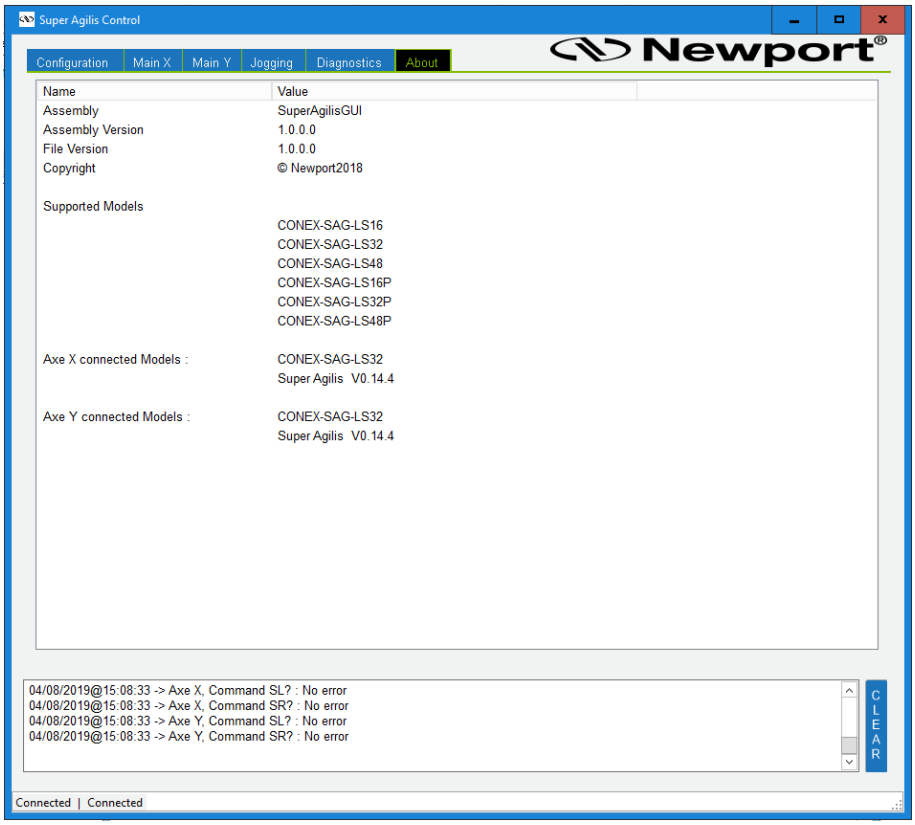
A list of command can also be sent by clicking "Send command file". Browse the file location and click OK for execution.

The "Command History" list can be saved by clicking "Save History as command file" (commands only) or "Save History" (commands + error + response).

This list can also be erased with the "Clear" button.

## 4.6 About Tab

This one displays information about GUI name and version, supported stages, connected stage names and firmware versions.




# 5 Closing the Application

To close the GUI software:

- Close the application by clicking Windows cross on top right.

# Service Form

**Your Local Representative**

Tel.:

Fax:

Name: _____

Company: _____

Address: _____

Country: _____

P.O. Number: _____

Item(s) Being Returned: _____

Model#: _____

Return authorization #: _____

*(Please obtain prior to return of item)*

Date: _____

Phone Number: _____

Fax Number: _____

Serial #: _____

Description: _____

Reasons of return of goods (please list any specific problems): _____

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# www.newport.com


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