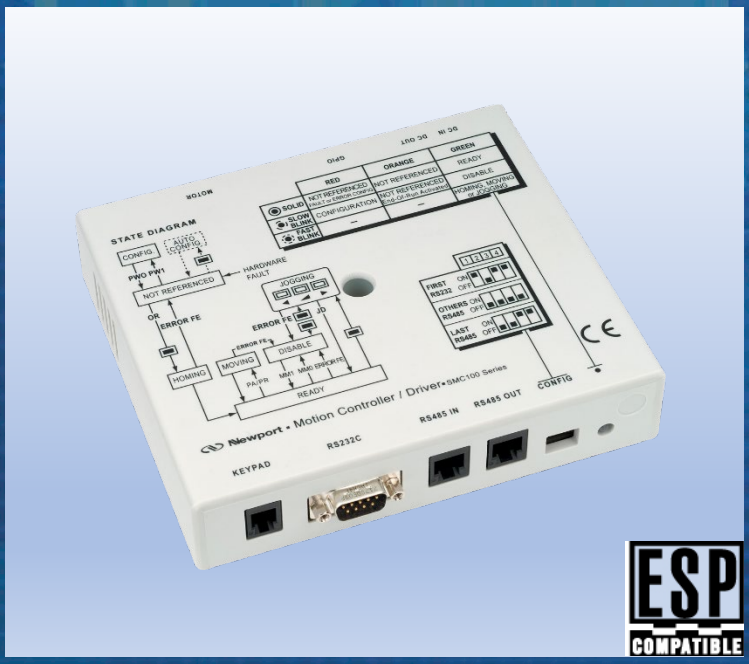
EDH0310En1040 – 02/25

Controller GUI Manual V2.0.x

SMC100CC & SMC100PP

Single-Axis Motion Controller/Driver for DC or Stepper Motor



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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.

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Application of Council Directive(s):
☒ Electromagnetic Compatibility Directive (EMCD) – 2014/30/EU
☒ 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)

Emissions:
☒ CISPR 11:2015 Industrial, Scientific and Medical Equipment Radio-Frequency Disturbance Characteristics - Limits and Methods of Measurement

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 61000-4-11:2004 + AMD 1:2017 EMC/Voltage Dips, Short Interruptions and Variations Immunity Test (5)

Manufacturers Name: MKS Instruments, Inc. Andover, MA, USA

Importer's Name & Location: /

Equipment Type/Description: **Motion Controller, single axis.**

Model Number(s) (6): **SMC100CC/PP; SMC-232/-USB/-PS80/-CB1/-CB3**

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: 12/20/2021

Le Cointe Hervé
Quality Director

5) Applicable to AC powered product only.
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.

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Page 1 of 1

Document Number: MKS-GPC-TM-20062

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Application of Council Directive(s):
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☒ Restriction of Hazardous Substances Directive (RoHS3) – (EU) 2015/863(7)
☒ Waste Electrical and Electronic Equipment – Directive 2012/19/EU

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Preface

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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 SMC100 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 SMC100 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 Corporation 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.

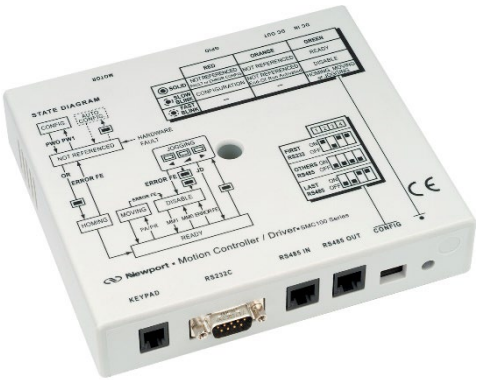
NOTE	**The NOTE sign denotes important information. It calls attention to a procedure, practice, condition, or the like, which is essential to highlight.**
CAUTION	**The CAUTION sign denotes a hazard. It calls attention to an operating procedure, practice, or the like, which, if not correctly performed 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.



Single-Axis Motion Controller/Driver SMC100CC & SMC100PP

2 Introduction

2.1 Purpose

The purpose of this document is to provide instructions on how to use the SMC100 Controller Graphical User Interface (GUI).

2.2 Overview

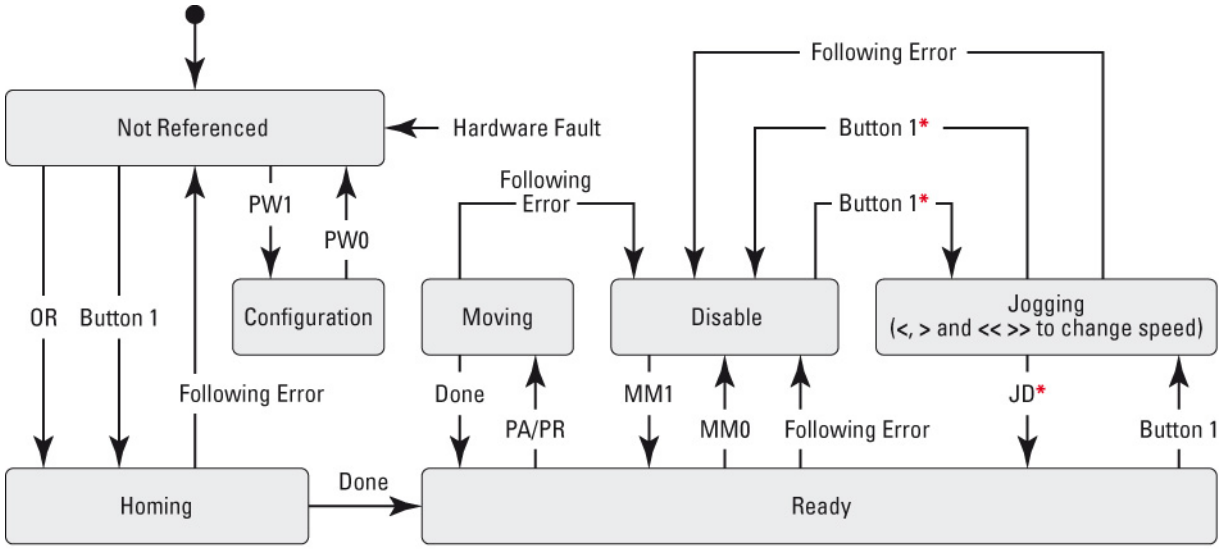
The SMC100 Controller GUI is a graphical user interface, that allows the user to interact with the SMC100CC or SMC100PP controller connected to positioner.

The user can initiate moves, change the state of the controller, adjust parameters, etc.

2.4 State Diagram

The SMC100 controller is defined by the following state diagram.

Also see SMC100 User's Manual for command/state information:



* No action, when jogging speed is different than zero, e.g. one of the keys "<", ">" or "<< >>" is pressed.

End of Runs encountered in the following state:

NOT REFERENCED:	No action.
CONFIGURATION:	No action.
HOMING:	Only check at end of HOMING and then change to NOT REFERENCED state.
MOVING:	Abort motion and then change to NOT REFERENCED state.
READY:	Change to NOT REFERENCED state.
DISABLE:	Change to NOT REFERENCED state.

LED display:

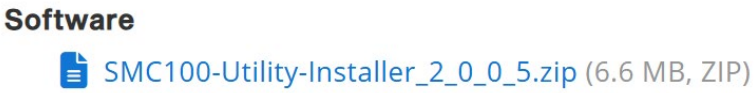
	RED	ORANGE	GREEN
SOLID	NOT REFERENCED: hardware faults or wrong parameters	NOT REFERENCED: everything is OK	READY
SLOW BLINK	CONFIGURATION	NOT REFERENCED: end of runs	DISABLE
FAST BLINK			HOMING MOVING JOGGING

3 Installation

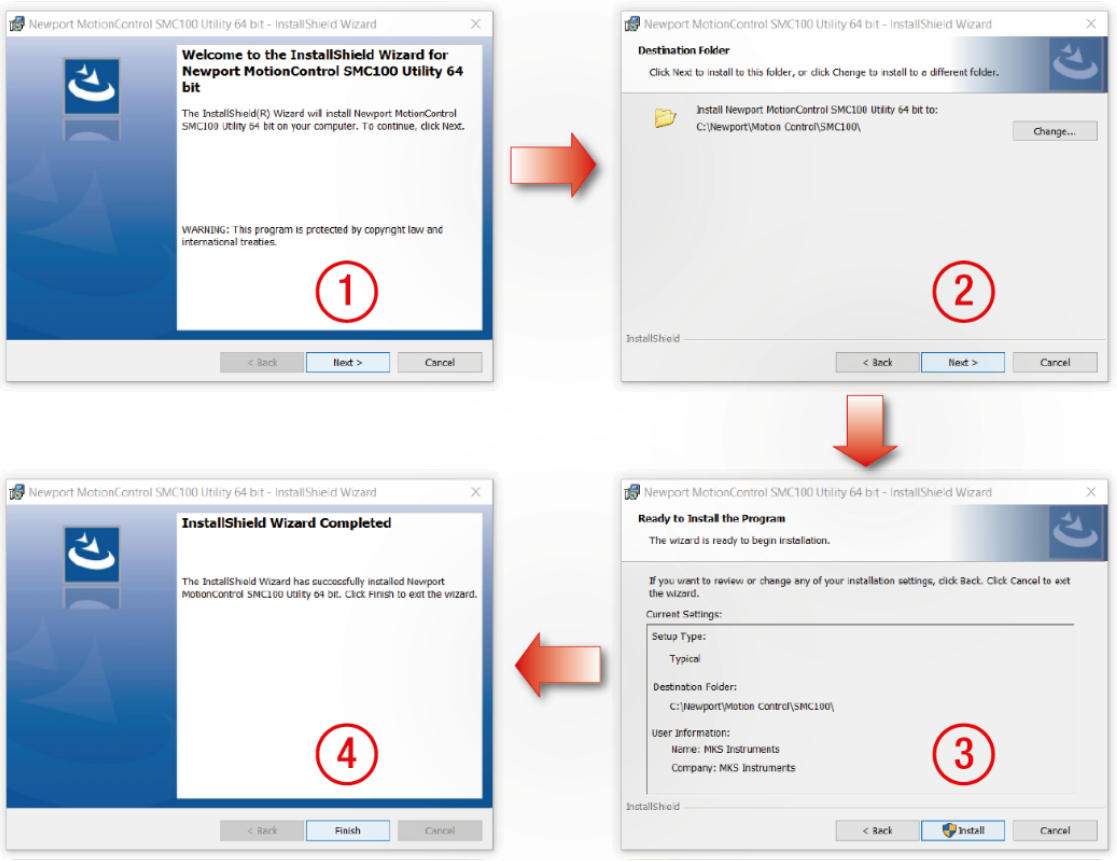
3.1 Install SMC100 Graphical User Interface

To install SMC100 Controller GUI follow the steps below:

- Download the "SMC100-Utility-Installer_2_0_0_5.zip" folder from the website.



- Extract in the folder of your choice.
- From this folder, select and launch:
  - “SMC100 Utility Installer Win32.exe” for 32 bit system installation.
  - “SMC100 Utility Installer Win32.exe” for 32 bit system installation.
- A window opens up showing Install welcome page.
- Click on “Next”.
- A window opens up allowing destination folder selection. By default it is showing C:\.
- Click on “Next”.
- Ready to install window opens up. Click “Install”.
- Then installation starts, wait for completion. Click on “Finish” to finalize the installation.



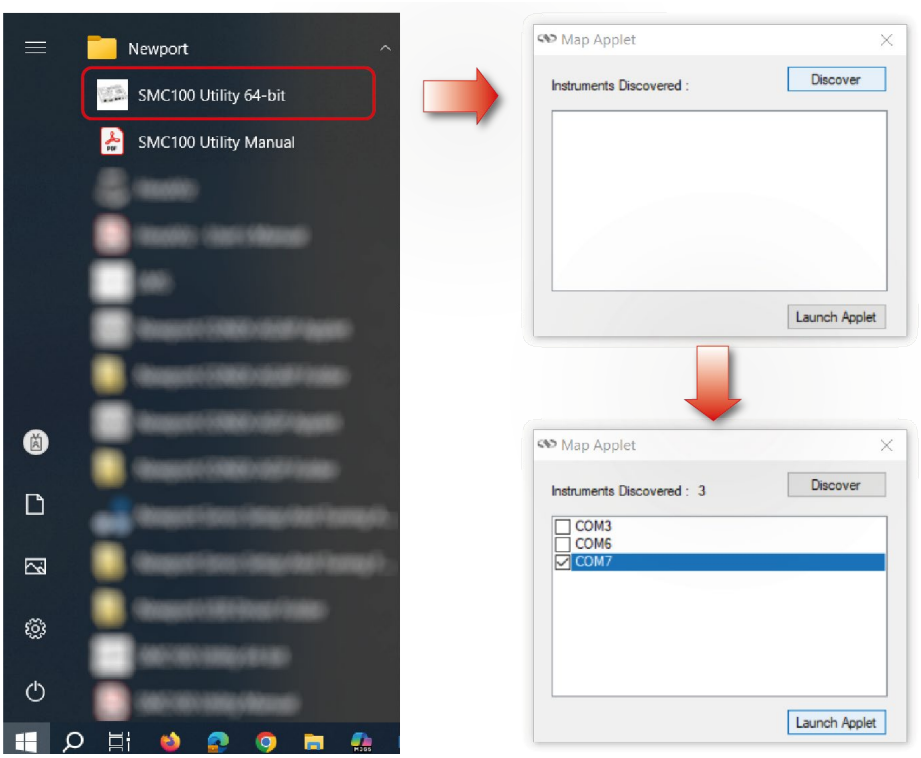
3.2 Launch GUI

From Windows “START” menu , select “Newport\SMC100 Utility 32 bit” or “Newport\SMC100 Utility 64 bit” to open the SMC100 GUI Applet.

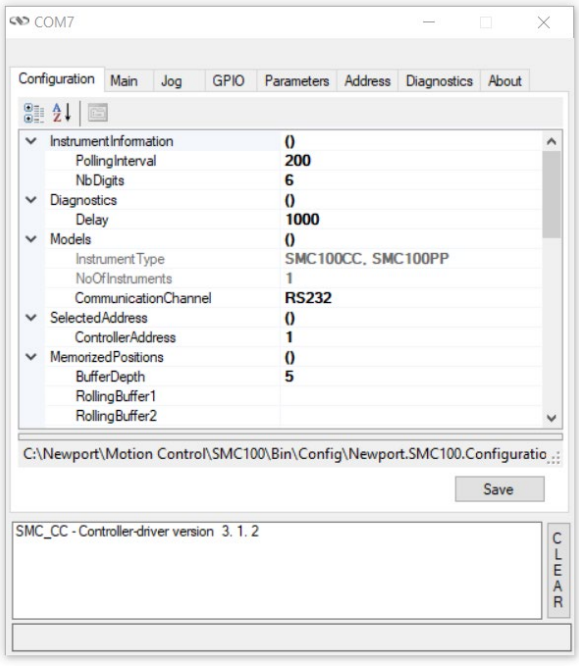
First select “Discover” button to display available COM port device.

Then select the COM port device that the SMC100 controller is connected to.

Finaly, select “Launch Applet” button,



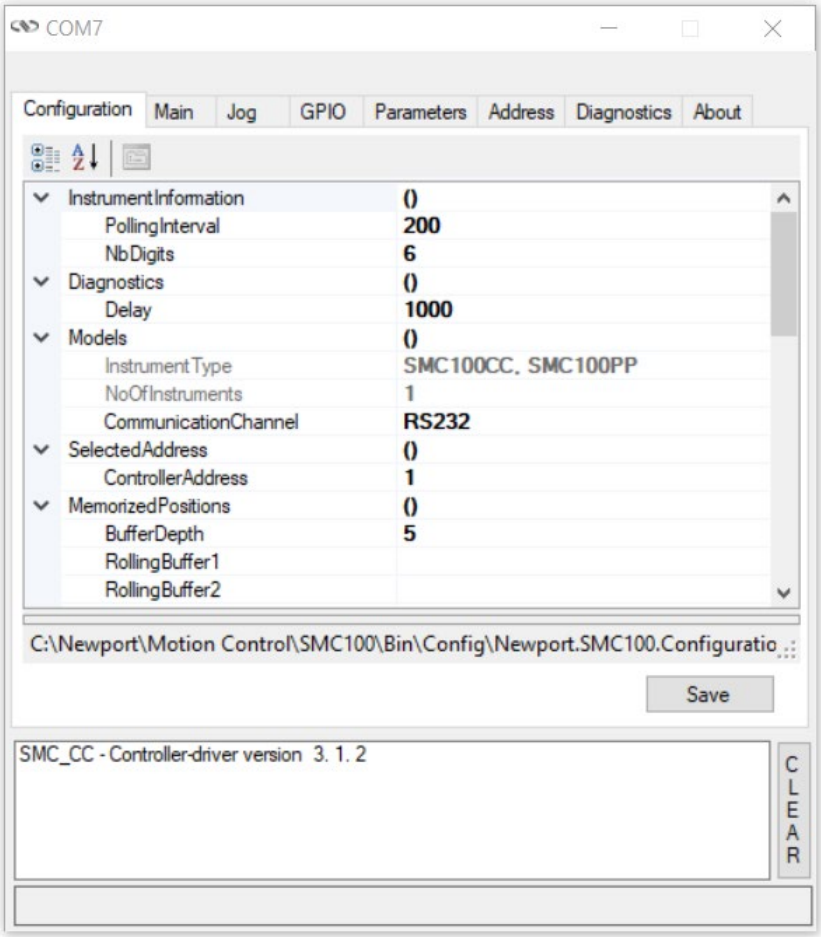
The Newport SMC100 GUI opens in the “Configuration” tab.



4 User Interface

4.1 Configuration

The Configuration tab allows the user to view and/or change information related to the logging configuration and the instrument settings.



The polling interval defines the number of milliseconds between each time the Controller GUI polls the SMC100 for the latest information. The user may change the polling interval by entering a value.

Diagnostics Delay defines the time delay in milliseconds between each command sent from a text file.

InstrumentType and NoOfInstruments display the type of controller and number of the connected instrument.

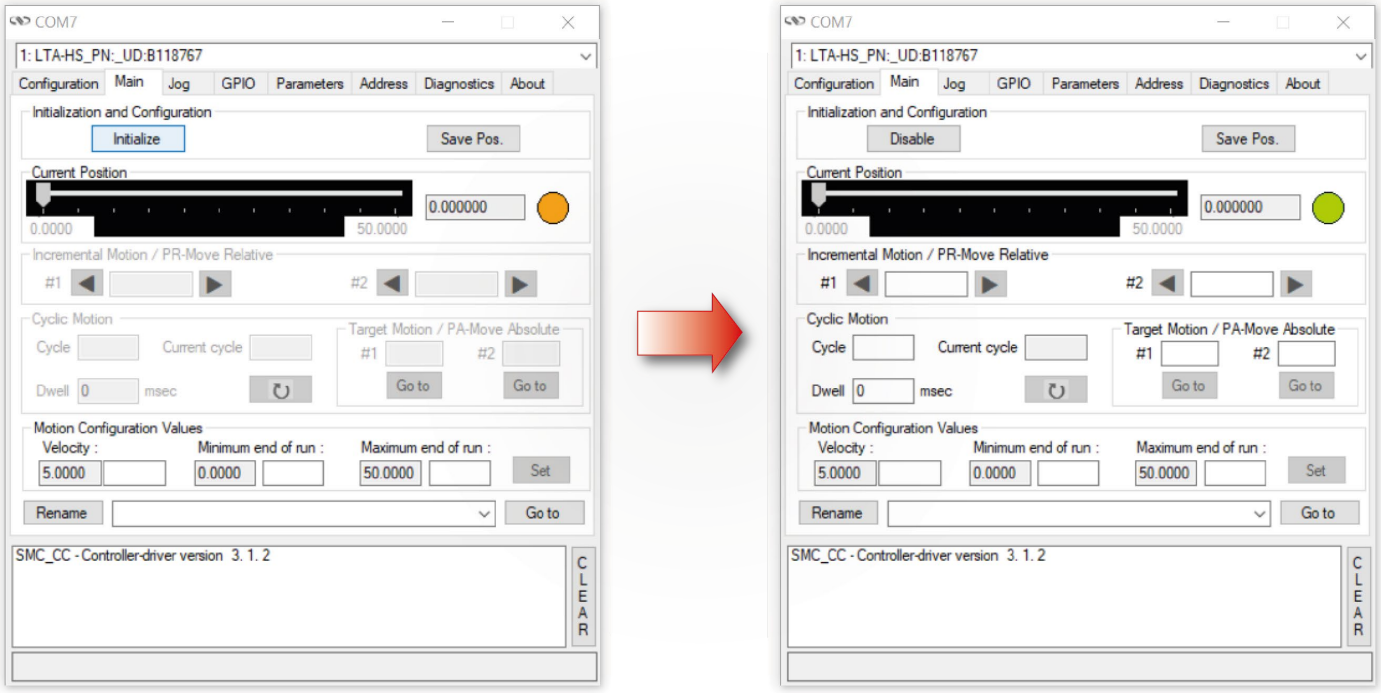
The **Save** button allows to save the current settings to the configuration file.

Parameter	Description	Values / Type	Default
InstrumentInformation			
PollingInterval	The polling interval defines the number of milliseconds (delay) between each time the Controller GUI polls the instrument for the latest information.	An Integer	**200**
NbDigits	Number of fractional digits after the decimal point.	An Integer	**6**
Models\InstrumentInfo			
CommunicationChannel	The communication channel	RS232	**RS232**
Diagnostics			
Delay	The delay defines the number of milliseconds between each sent command from a text file		**1000**
MemorizedPosition			
BufferDepth	MaxItem defines the maximum number of memorized positions in each rolling buffer.	An Integer	**5**
RollingBuffer	The list of the memorized position in the rolling buffer for a selected controller address	A String	
ControllerAddress	List of the selected controller address.	A String	

4.2 Main

The *Main* tab displays the main controls in the Controller GUI like a virtual front panel.

It is updated each time the polling interval timer expires.



"Initialization and Configuration"

In the "Initialization and Configuration" area, the first button changes the controller status to "Initialize", "Enable" or "Disable".

When in Not REFERENCED status and correctly configured the first button proposes to Initialize the positioner by operating a homing.

After operating a homing the controller status becomes READY and the first button proposes to Enable / Disable the positioner.

To see the different controller states, refer to the controller state diagram.

The second button "Save Pos." memorizes the current positions in the combo box. As soon as a new position is memorized, this is displayed in the trace.

"Current Position"

In the "Current Position" area, the current position is displayed in a text box and visualized in a slider.

The slider limits are defined with the ends of run.

The LED icon shows the current controller state.

When the mouse hovers over the LED icon, the controller state is displayed in an information bubble.

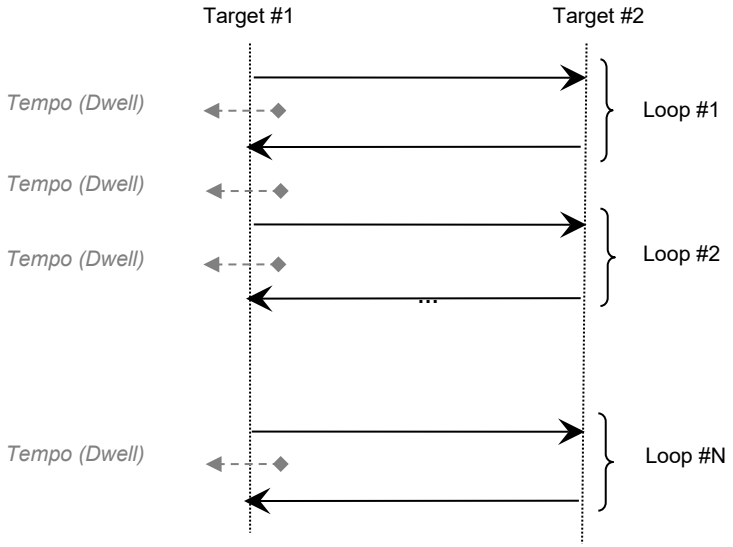
"Incremental Motion / PR-Move Relative"

In the "Incremental Motion / PR-Move Relative" area, two increment values can be defined.

For each defined increment, a relative move is preformed in either the negative direction or positive direction.

"Cyclic Motion" and "Target position / PA-Move Absolute"

In the "Cyclic Motion" area, a motion cycle is configured with a number of cycles (Cycle) and a dwell time in milliseconds. The motion cycle gets the defined target positions from the "Target position / PA-Move Absolute" area to perform the cycle.



In the "Target position / PA-Move Absolute" area, two target positions can be defined.

The "Go to" button executes the absolute move to the specified target position.

"Motion Configuration Values"

In the "Motion Configuration Values", the current ends of run and the velocity are displayed in a disabled text box: "Minimum end of run", "Maximum end of run" and "Velocity".

These ends of run and the velocity can be modified and saved with the "Set" button.

Memorized positions

The combo box allows memorizing the positions by the "Save Pos." button.

Each of these positions can be renamed or deleted.

To execute an absolute move to one of these memorized positions, select one item of the combo box and click on the "Go to" button.

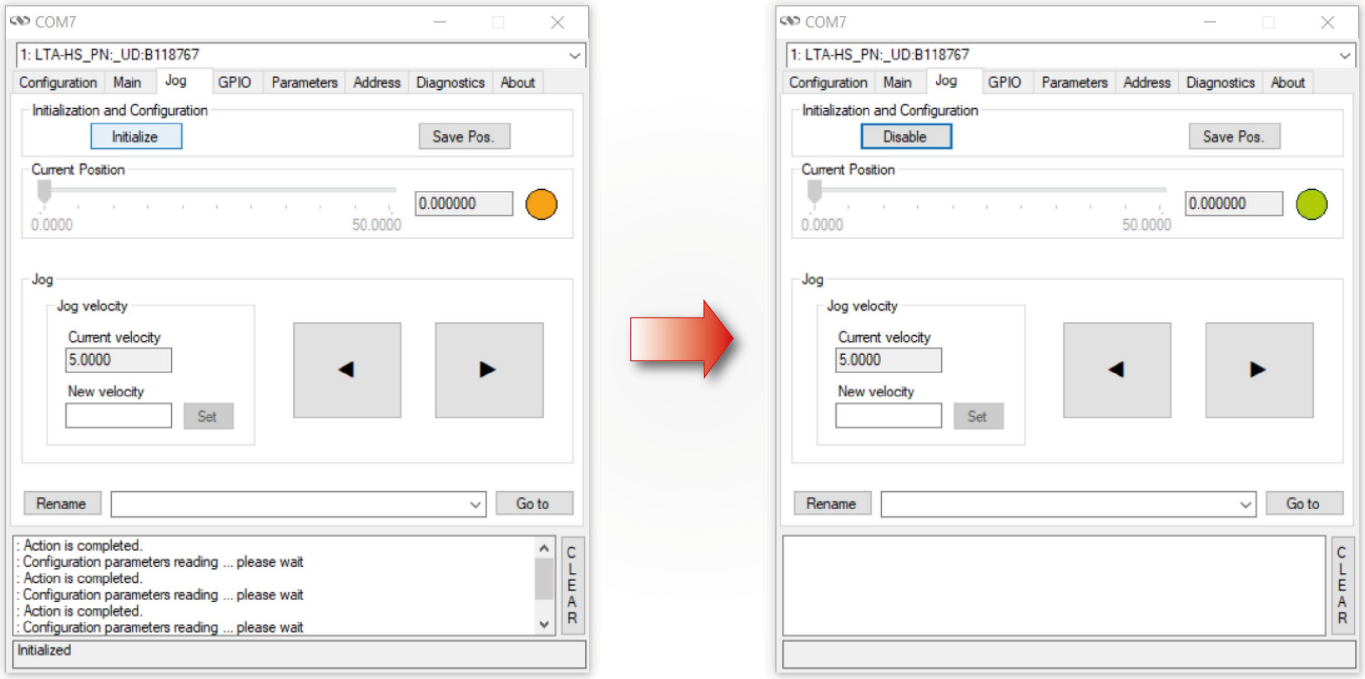
When the mouse hovers over the combo box, the selected memorized position is shown in an information balloon.

Rename a memorized position: Select an item from the combo box, edit the position name and click on the "Rename" button to save the new position name.

Delete a memorized position: Select an item from the combo box, right-click on the mouse and select "Delete" to delete the selected memorized position.

4.3 Jog

Under this tab, the controller allows the jog mode with use of two arrow buttons.



"Initialization and Configuration"

In the "Initialization and Configuration" area, the first button changes the controller status to "Initialize", "Enable" or "Disable".

When in Not REFERENCED status and correctly configured the first button proposes to Initialize the positioner by operating a homing.

After operating a homing the controller status becomes READY and the first button proposes to Enable / Disable the positioner.

To see the different controller states, refer to the controller state diagram.

The second button "Save Pos." memorizes the current positions in the combo box. As soon as a new position is memorized, this is displayed in the trace.

"Current Position"

In the "Current Position" area, the current position is displayed in a text box and visualized in a slider.

The slider limits are defined with the ends of run.

The LED icon shows the current controller state.

When the mouse hovers over the LED icon, the controller state is displayed in an information balloon.

"Jog"

In the "Jog" area, the current velocity is displayed in a text box and visualized in a slider, it can be modified in the "New velocity" field and saved with the "Set" button.

The slider limits are defined with the ends of run.

Right and left arrows buttons allows positive or negative jog moves.

Memorized positions

The combo box allows memorizing the positions by the “Save Pos.” button.

Each of these positions can be renamed or deleted.

To execute an absolute move to one of these memorized positions, select one item of the combo box and click on the “Go to” button.

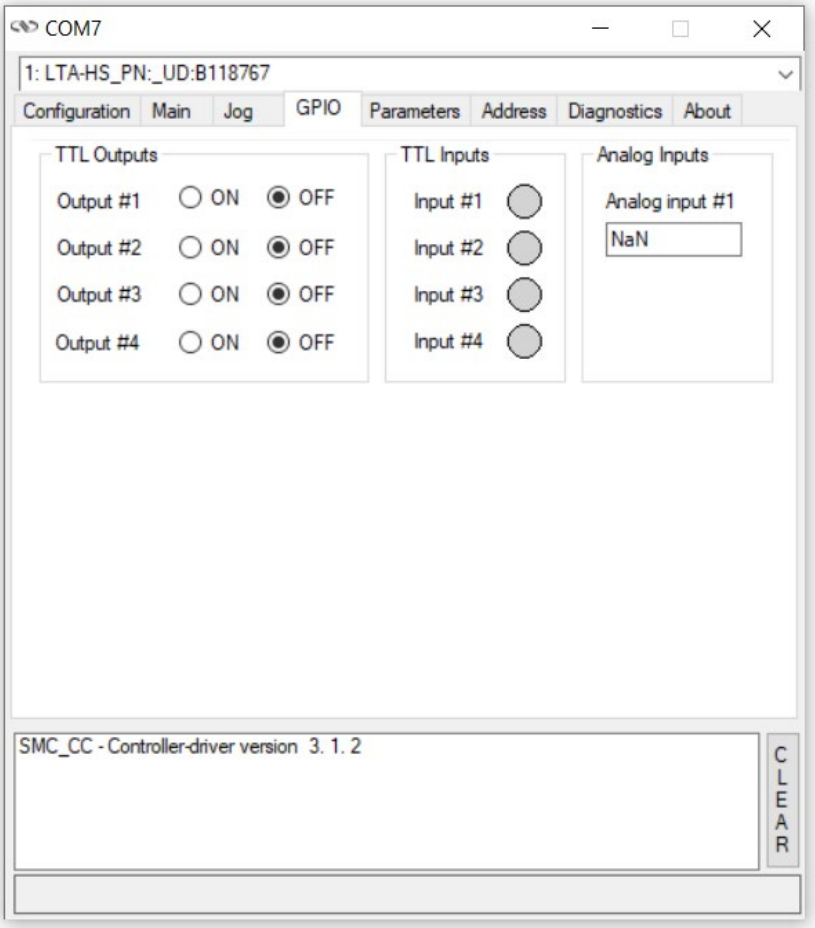
When the mouse hovers over the combo box, the selected memorized position is shown in an information balloon.

Rename a memorized position: Select an item from the combo box, edit the position name and click on the “Rename” button to save the new position name.

Delete a memorized position: Select an item from the combo box, right-click on the mouse and select “Delete” to delete the selected memorized position.

4.4 GPIO

The *GPIO* tab allows the user to modify digital outputs and to view digital and analog inputs.



Digital IO

TTL outputs

The four TTL outputs can be modified with a radio button (ON/OFF) and are updated each time the polling interval expires.

TTL inputs

The four TTL inputs are updated each time the polling interval expires.

Analog Inputs

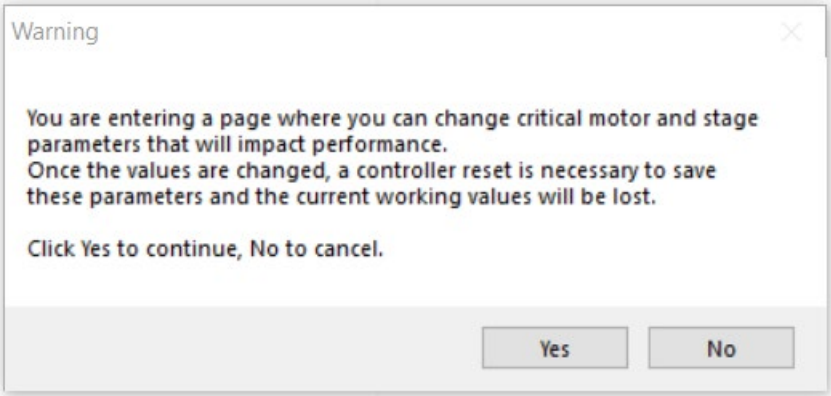
Analog input #1

The analog input is updated each time the polling interval expires.

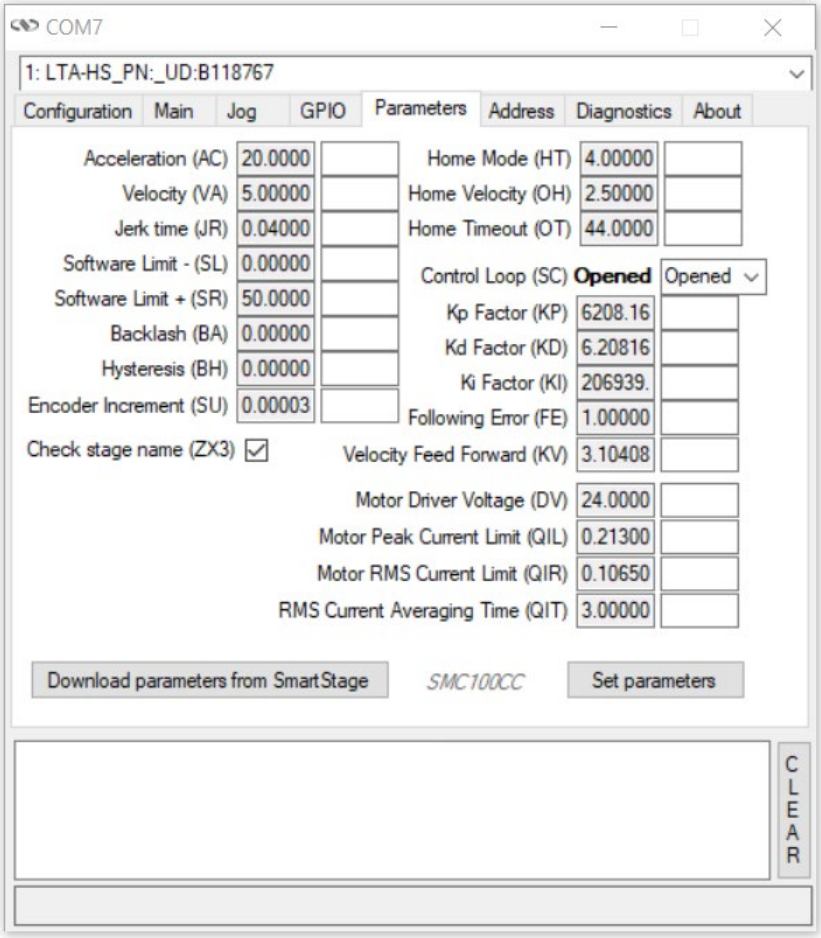
4.5 Parameters

The *Parameters* tab allows the user to view or modify positioner parameters for the selected controller.

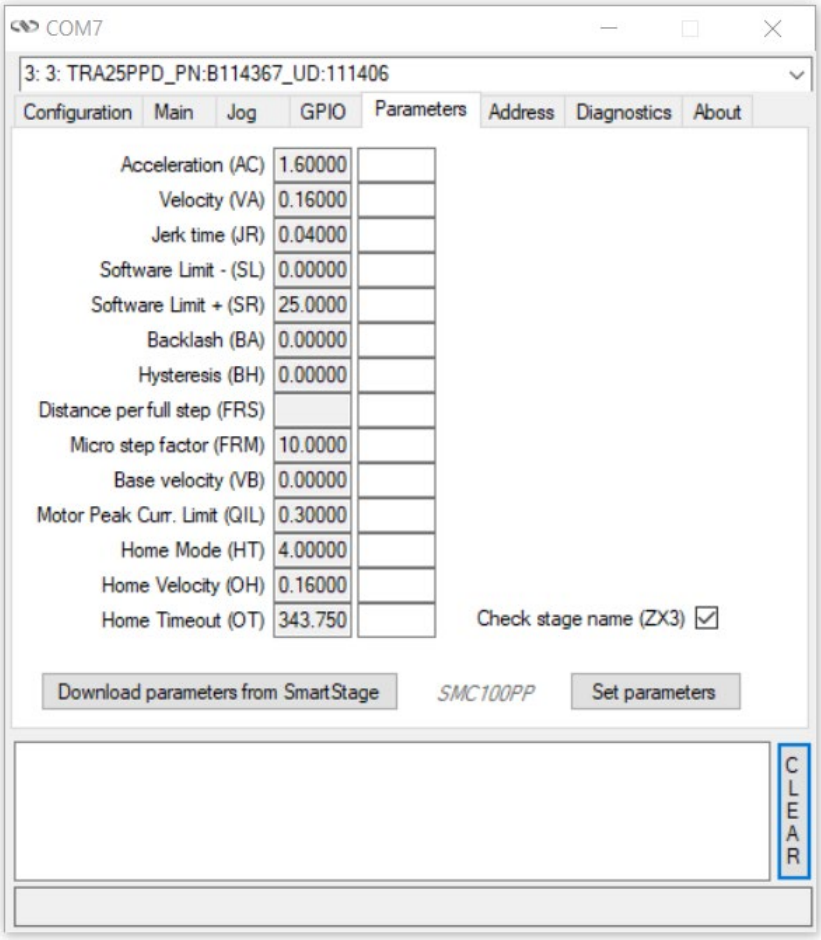
A warning message is displayed as below.



Parameters page for a CC positioner



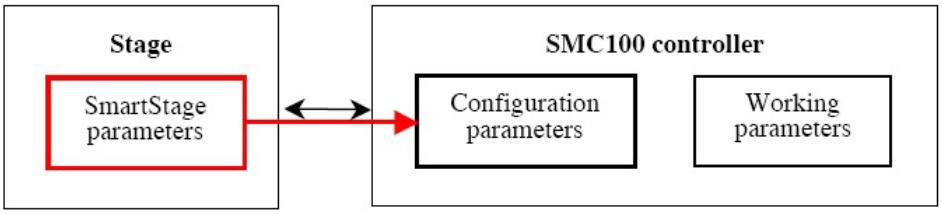
Parameters page for a PP positioner



"Download parameters from SmartStage" button

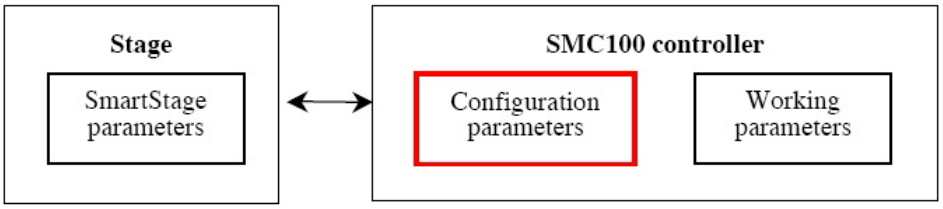
The "Download parameters from SmartStage" button downloads parameters from the SmartStage and saves them in its flash memory (configuration parameters).

After the parameters have been downloaded the configuration parameters are read and updated.



“Set parameters” button

The “Set parameters” button modifies the configuration parameters.



Edit parameters

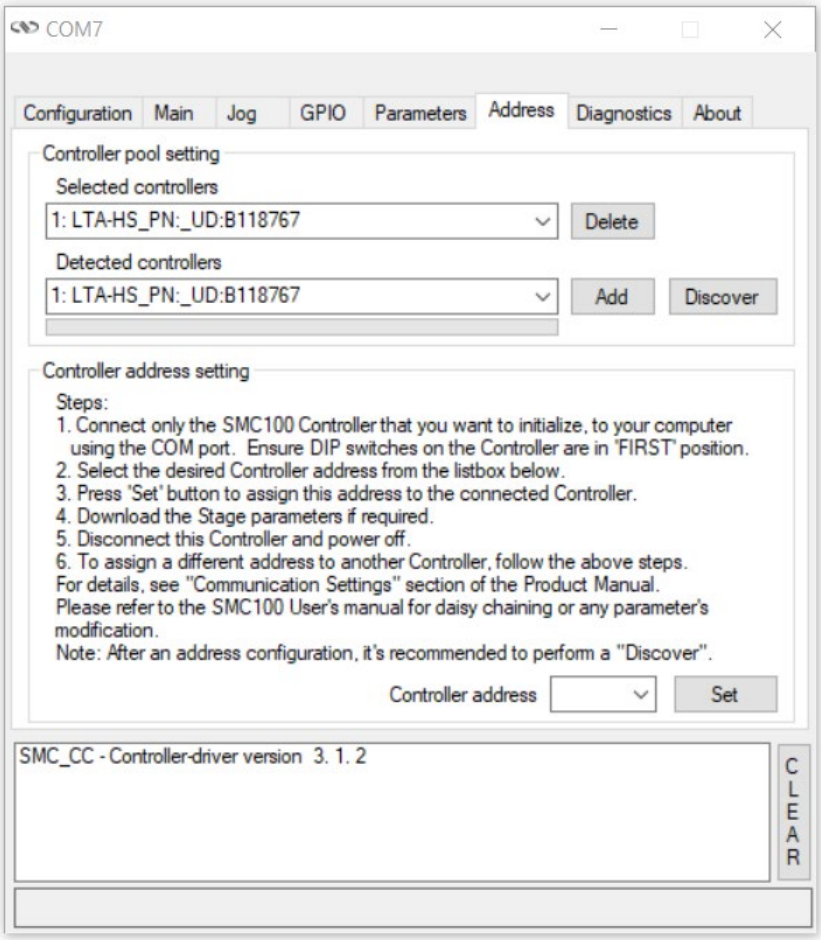
Parameters depends on the positioner’s characteristics, refer to positioner’s datasheet to set correct parameters.

For further information about the meaning of the different parameters, refer to the explanations at the corresponding two letter commands (see command names in brackets) in section Command Set – SMC100 User’s Manual.

For example, the “Acceleration (AC)” parameter is associated to the AC command.

4.6 Address

The *Address* tab allows the user to set up controllers for daisy-chain operations.



"Controller address setting"

The "Controller address setting" area reminds the steps to configure controllers' RS485 address when operating with several SMC100 controllers (daisy-chained configuration).

The "Controller address" field allows to define RS485 address of the current controller (connected to RS232C) and saved it with the "Set" button.

"Controller pool setting"

The "Controller pool setting" area allows to discover the chained controllers when RS485 addresses are set and the chain is completed, using "Discover" button.

After discovering connected controllers in the chain, the "Detected controllers" list allows to select desired controllers to be add in the chain and add it using the "Add" button.

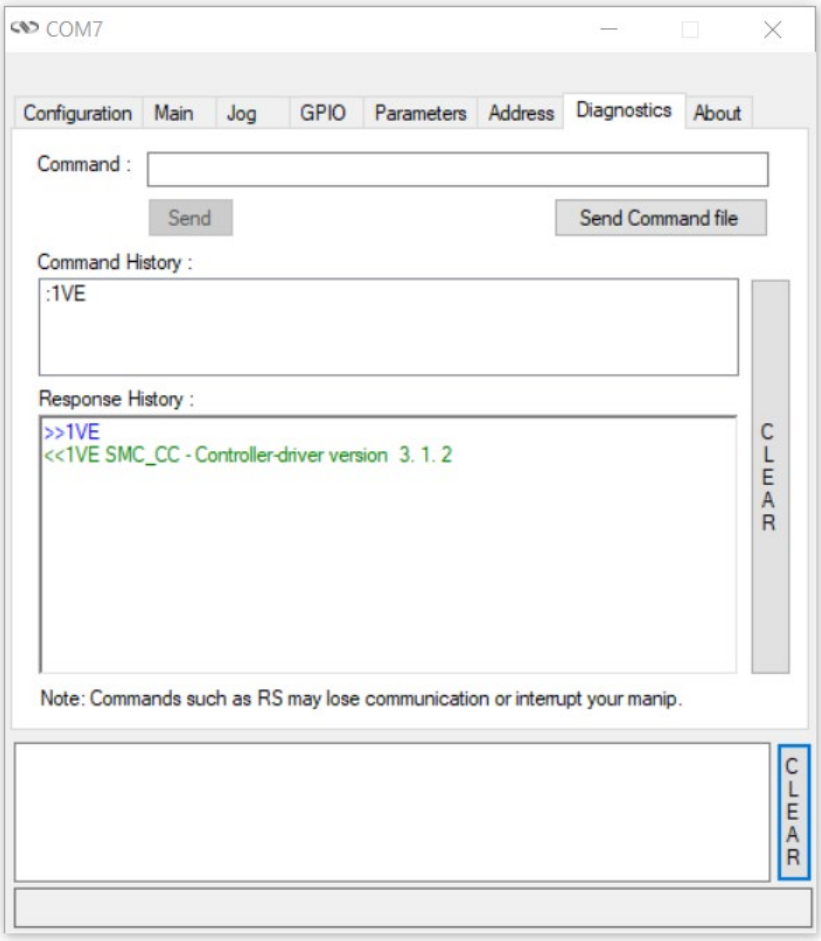
Finaly, the "Selected controllers" list allows to manage the list of the chained controllers using "Delete" button.

4.7 Diagnostics

The *Diagnostics* tab allows the user to enter instrument commands and to view the history of commands that were sent and the responses that were received.

This list of commands and the syntax of each command can be found in the Command Set – SMC100 User's Manual.

A file of commands can be sent line by line to the controller with the "Send Command file" button.

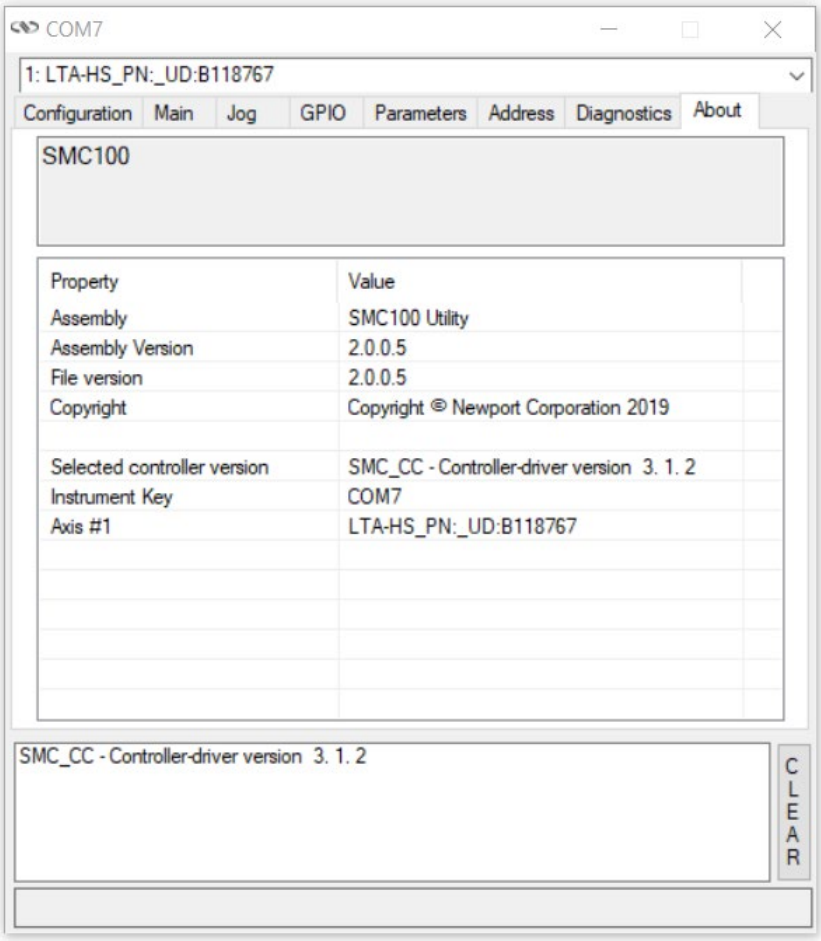


4.8 About

The *About* tab displays the information about the Controller GUI and the connected instrument.

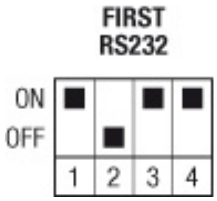
It displays the Controller GUI name, version, and copyright information.

It also displays the instrument model, the instrument key (serial number or COM port), the firmware version for the selected axis and the list of the selected axes.



5 Communication to a Single SMC100CC/PP

Set the dip switches on the SMC100CC/PP to FIRST:

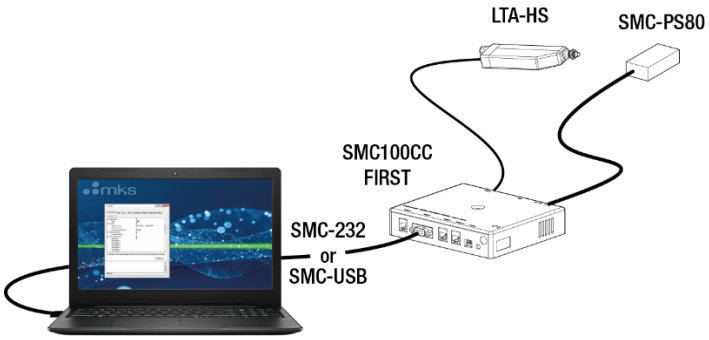


Connect the SMC100CC/PP to the RS232 or to the USB port (via RS232C to USB converter) of the PC.

Connect the positioner to the SMC100CC/PP (MOTOR connector).

Connect the power supply.

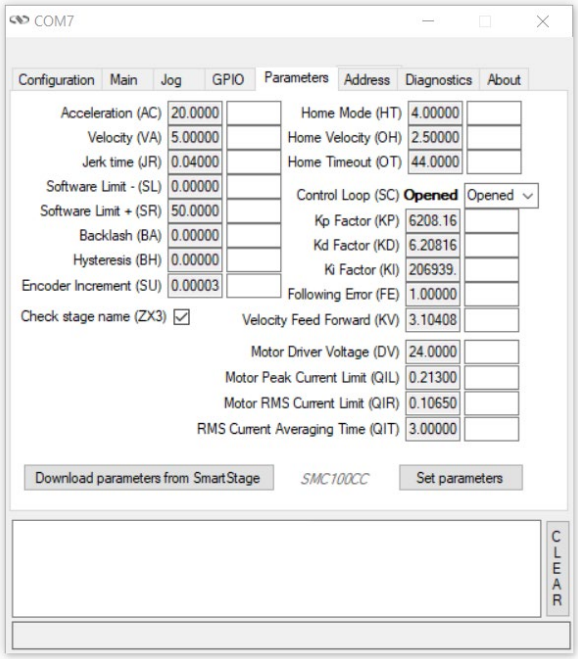
The LED on the SMC100CC/PP turns RED.

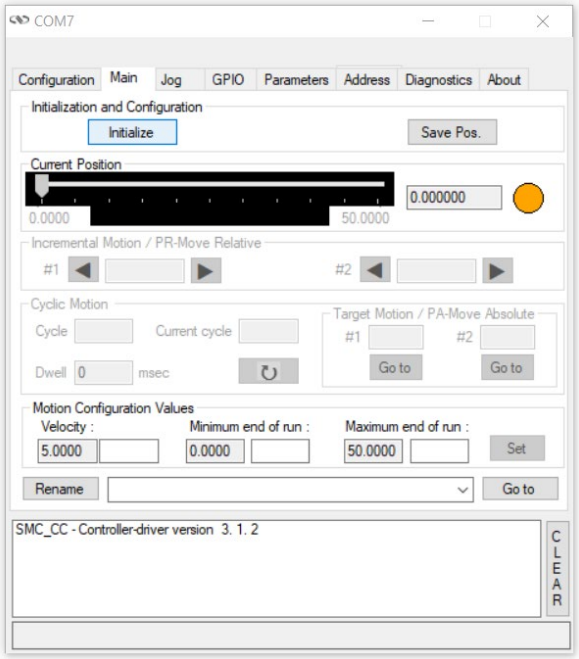


Launch the SMC100 Utility to open the SMC100 GUI Applet.

Controller's status is displayed using LED display.

Set parameters and initialize positioners using **Download parameters from SmartStage** button in the "Parameters" tab and the **Initialize** button in the "Main" or "Jog" tab.





6 Communication to Several SMC100CC/PP

The SMC100 controller is equipped with a RS485 internal link for chaining up to 31 controllers from the same RS232C COM port.

Setting up a chain of several SMC100 controllers requires to:

- Configure RS485 address of all controllers,
- Configure the dip switches of all controllers according to the chaining process,
- Link the controllers to RS485 internal link,
- Configure the chain with the SMC100 applet,
- Configure and set parameters of each controller according to the connected positioner with the SMC100 applet.

NOTE **Command read is accepted in all states.**

SMC100CC and SMC100PP can be mixed in a daisy-chain.

6.1.1 Controller RS485 Address Setting

The first thing to do is applying an individual RS485 address to each SMC100CC/PP controller.

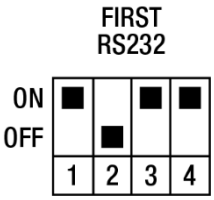
By default SMS100CC/PP are delivered in FIRST RS232 configuration with RS485 address number 2.

The SMC100 controller in the chain connected to the PC via the RS232 link is automatically identified as the first element in the chain and its RS485 address is 1, so there is no need to configure its RS485 address.

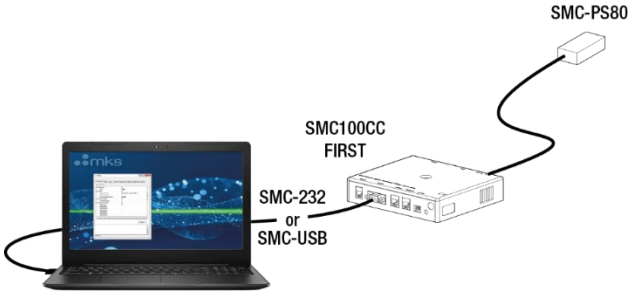
All other SMC100CC/PP controllers connected through the internal RS485 communication link have to be configured with a unique RS485 address from 2 to 31.

Each controller of the chain must be configured separately using RS232 link and must be configure in FIRST RS232:

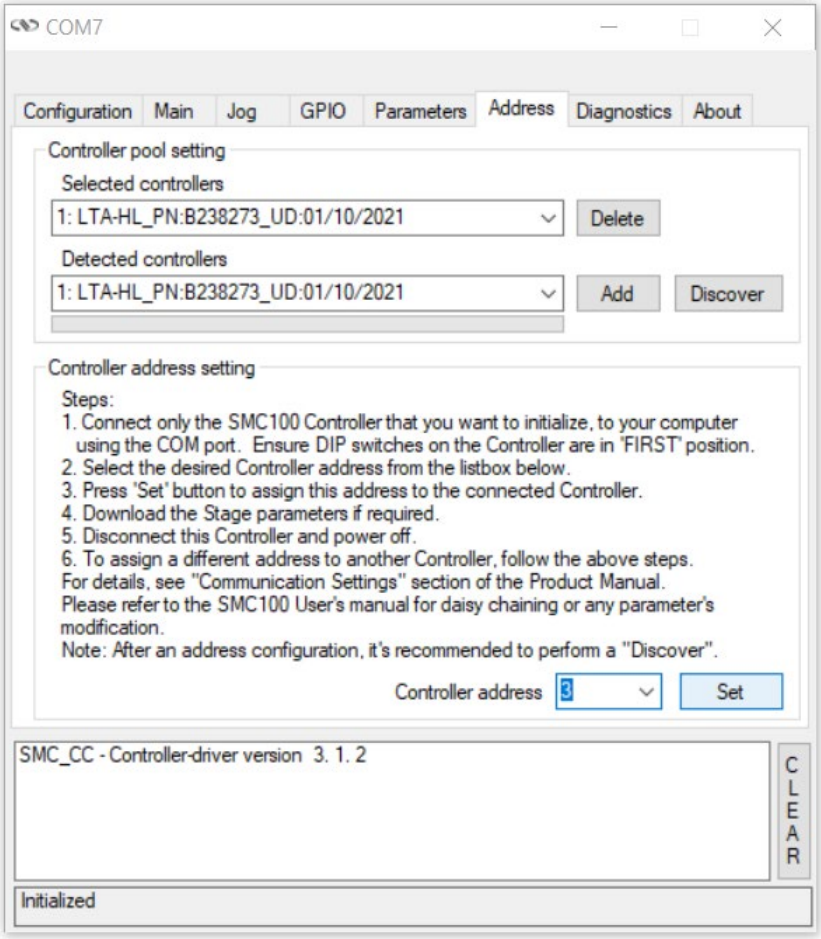
1. Set the dip switches of the SMC100CC/PP controller to FIRST RS232 (see graphic below).



2. Connect the SMC100CC/PP to the RS232C or to the USB port of the PC by using a RS232 to USB converter (SMC-USB).
   It is not needed to connect any positioner to the controller.
   Connect the power supply.
   The LED turns RED.



3. Launch the SMC100 Utility to open the SMC100 GUI Applet.
4. In the Newport SMC100 GUI, click on the “Address” tab, enter the desired controller address (in the SMC100 daisy-chain order) in the **Controller address** field and click on the **Set** button to save the controller’s address.



NOTE **Setting an address can also be performed by sending a SA command through GUI Diagnostics tab.**

This method requires to set the controller in CONFIGURATION state using PW command.

NOTE **It is recommended to note down the RS485 address of the controller, stickers are supplied with the SMC100CC/PP for this purpose.**

5. Disconnect the controller from the PC.
6. Repeat the procedure for all SMC100 controller of the chain.

6.1.2 Building the System

Once all controller addresses have been defined, the system can be built.

Pull out all cables from all controllers.

Set the dip switches of the controller with the address number 1 as FIRST RS232, this controller will be connected to the PC via RS232 link.

Set the dip switches of the other controllers, except one, as OTHERS RS485, and set the dip switches of one controller as LAST RS485. See below graphic for illustration.

NOTE **When only two controllers are involved, one has to be set as FIRST RS232 (the one connected to the PC via RS232), and the other one as LAST RS485.**

Connect the SMC100CC/PP configured as FIRST RS232 to the RS232C or to the USB port of the PC by using a RS232 to USB converter (SMC-USB).

Connect a RS485 network cable from the RS485 OUT of the FIRST RS232 controller to the RS485 IN of the next controller (OTHERS 485).

Connect all controllers together from RS485 OUT of one to RS485 IN of the following controller.

The last controller in the chain is simply connected via its RS485 IN connector to the previous controller and is configured as LAST RS485.

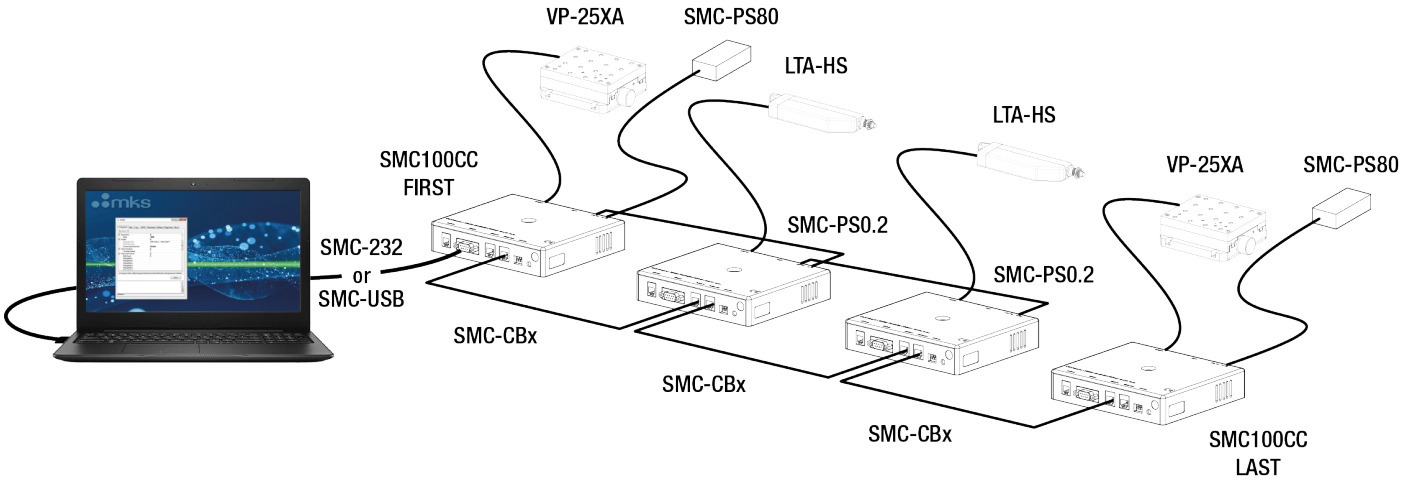
Connect the positioners to the SMC100CC/PP's (MOTOR connector).

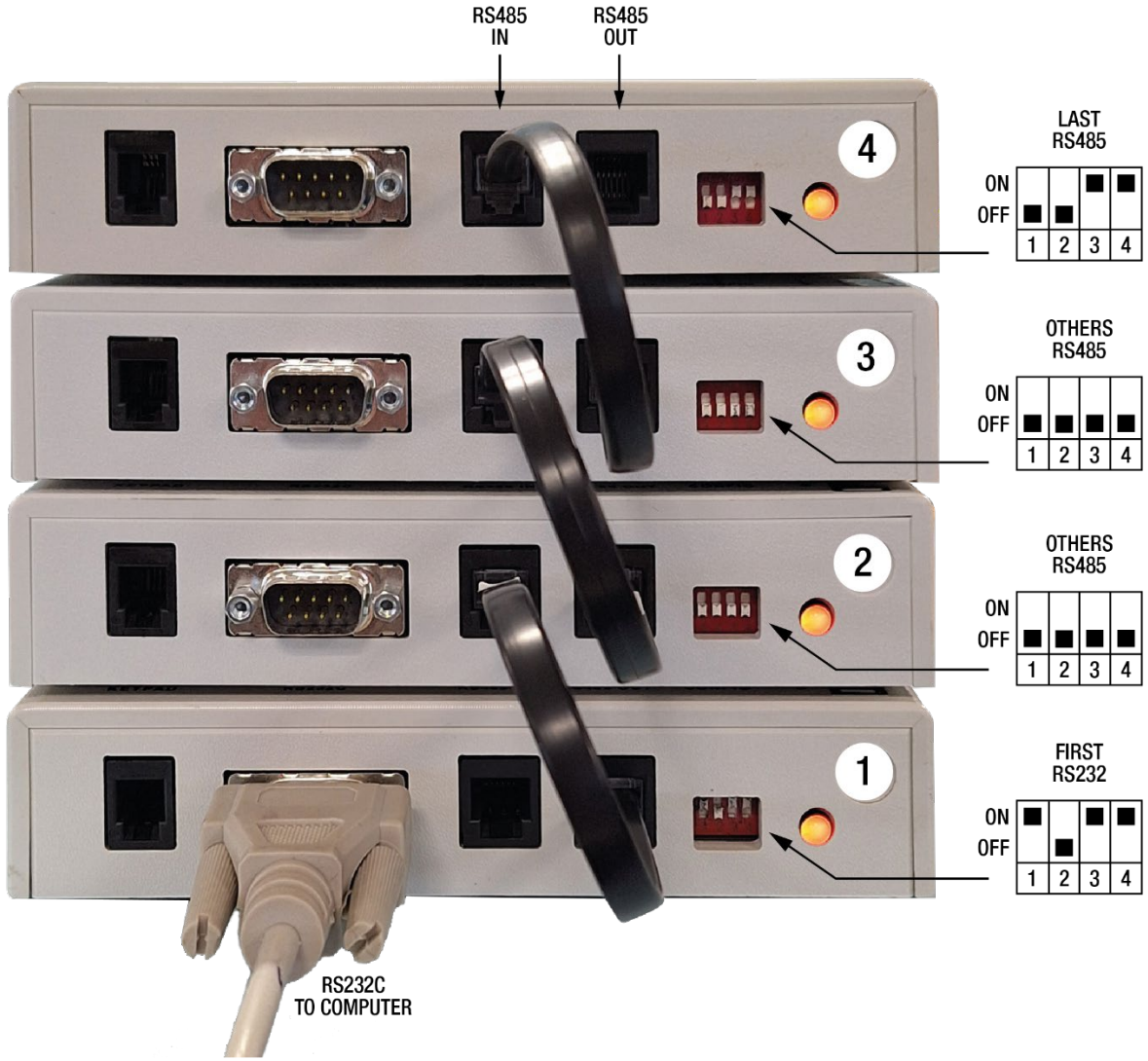
Connect the SMC100CC/PP's to power.

NOTE **The SMC100CC/PP allows chaining power from one SMC100CC/PP to another one using the SMC-PSC0.2 cable supplied with the controller. But the total power consumption of all positioners connected to the same power supply should not exceed 80 W. The maximum power consumption of each Newport positioner is listed in the Newport catalog and on the Newport web site. In case of questions, contact Newport.**

Example:
The maximum power consumption of a VP-25XA is 48 W. The maximum power consumption of an LTA-HS is 6 W. So it is possible to connect one VP-25XA and up to 5 LTA-HS to the same power supply. But it is not possible to connect two VP-25XA to the same power supply.

When done, the configuration should look as follow:

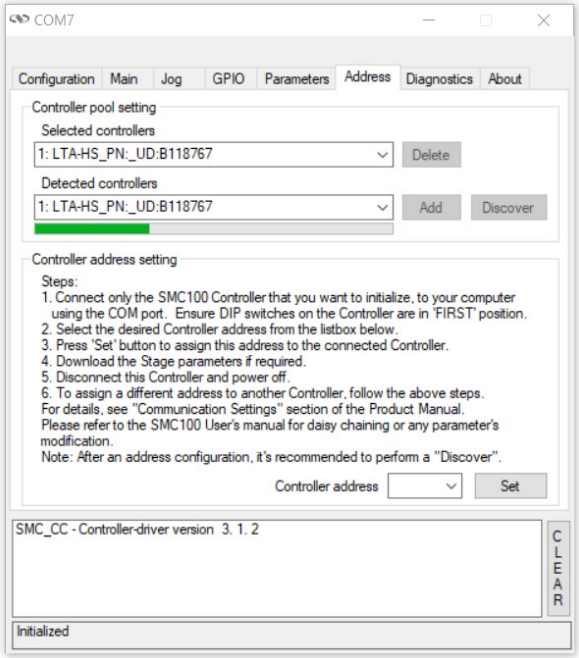




6.1.3 Configuring the Controller

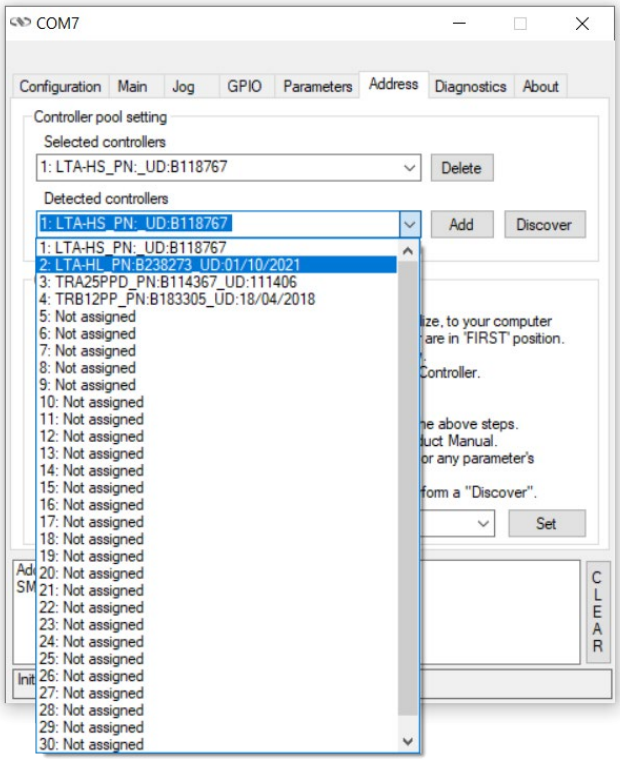
Launch the SMC100 Utility to open the SMC100 GUI Applet.

When using the SMC100CC/PP with Newport ESP compatible positioners (see label on the positioner), select “Address” tab and press **Discover** button.

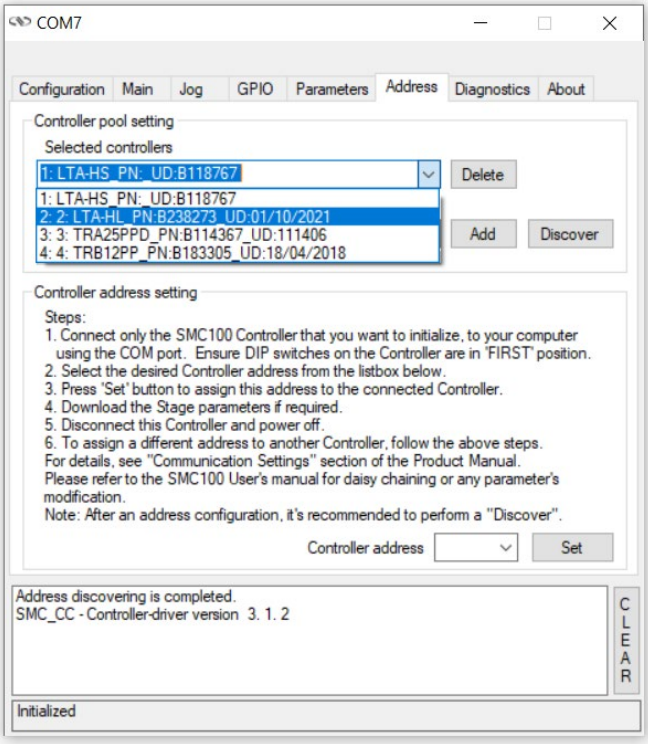


The SMC100 applet checks all the connected SMC100 and identifies the connected positioners.

Once the discovering process is completed, select the positioners to add in the SMC100 daisy-chain in the **Detected Controllers** list and add them pressing **Add** button.

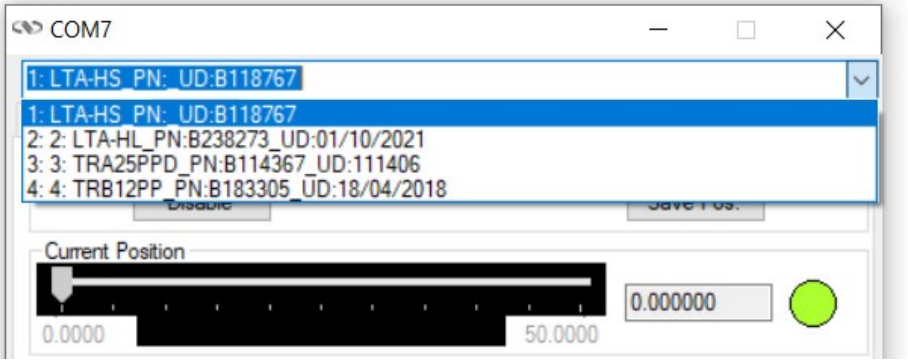


The list of the daisy-chained controllers is updated in the **Selected Controllers** list and can be managed using the **Delete** button.

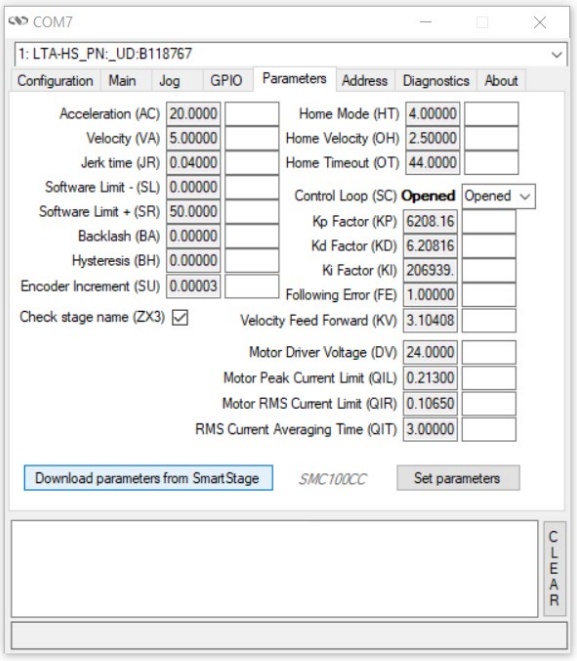


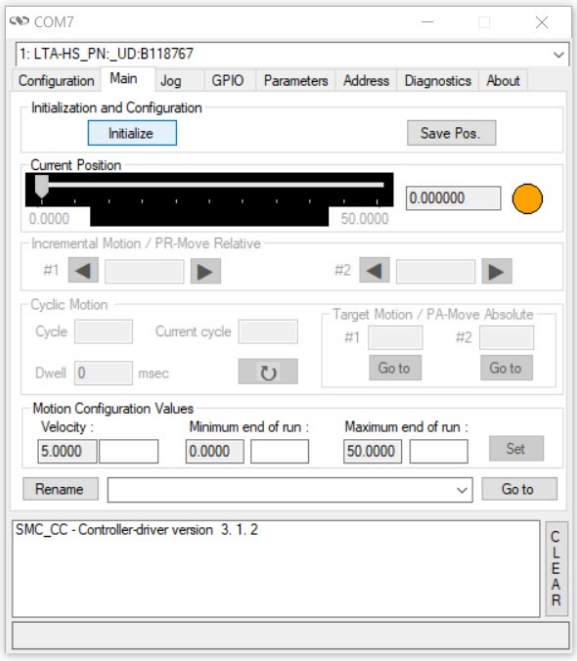
The daisy-chain is created, controller's status are displayed using LED display.

Once the daisy-chain is created, a selection list is displayed above the function tabs and allows to select the controller to drive.



Set parameters and initialize positioners using **Download parameters from SmartStage** button in the “Parameters” tab and the **Initialize** button in the “Main” or “Jog” tab.





6.1.4 Using the SMC100CC/PP with non Newport ESP compatible positioners or changing the default values

When using the SMC100CC/PP with non Newport ESP compatible positioners, enter the positioner parameters manually in the “Parameters” tab.

In the “Parameters” tab edit the configuration parameters stored in the controller.

NOTE **This method is not recommended unless for an experienced user.**

For further information about the meaning of the different parameters, refer to the explanations at the corresponding two letter commands (see command names in brackets) in section Command Set – SMC100 User’s Manual.

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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