MCS Hand Control Module

MCS-3H-TAB

User Manual

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1 Manufacturer Declarations

1.1 Declaration of Conformity

Declaration of Conformity
according to ISO/IEC 17050-1:2004

Manufacturer: SmarAct GmbH
Manufacturer's Address: Schütte-Lanz-Straße 9
                         26135 Oldenburg, Germany

CE

The manufacturer hereby declares that the product

Product name: MCS
Model Numbers: MCS-xxx
Product Options: all

complies – if installed in a compatible chassis from SmarAct – with the following European directives:

2006/95/EC Low-voltage Directive
2004/108/EC EMC Directive

The applied standards certifying the conformity are listed below:

Electromagnetic Emission: EN61000-6-3:2011, EN55011:2011
Electromagnetic Immunity: EN61000-6-1:2007
Safety (Low Voltage Directive): EN61010-1:2001

December 20, 2012
Oldenburg, Germany

Axel Kortschack
Managing Director

2 Introduction

This document is a user manual for the SmarAct MCS Hand Control Module MCS-3H-TAB, which is either connected as external module to the MCS main controller or which is part of the MCS controller housing.

external hand control module

integrated hand control module

The MCS Hand Control Module offers easy and ready-to-go control by joysticks and control knobs - without the need of complex installation procedures.

Below please find a typical configuration with a six-channel controller, a three-channel sensor module as well as a hand control module (MCS-NH-TAB).
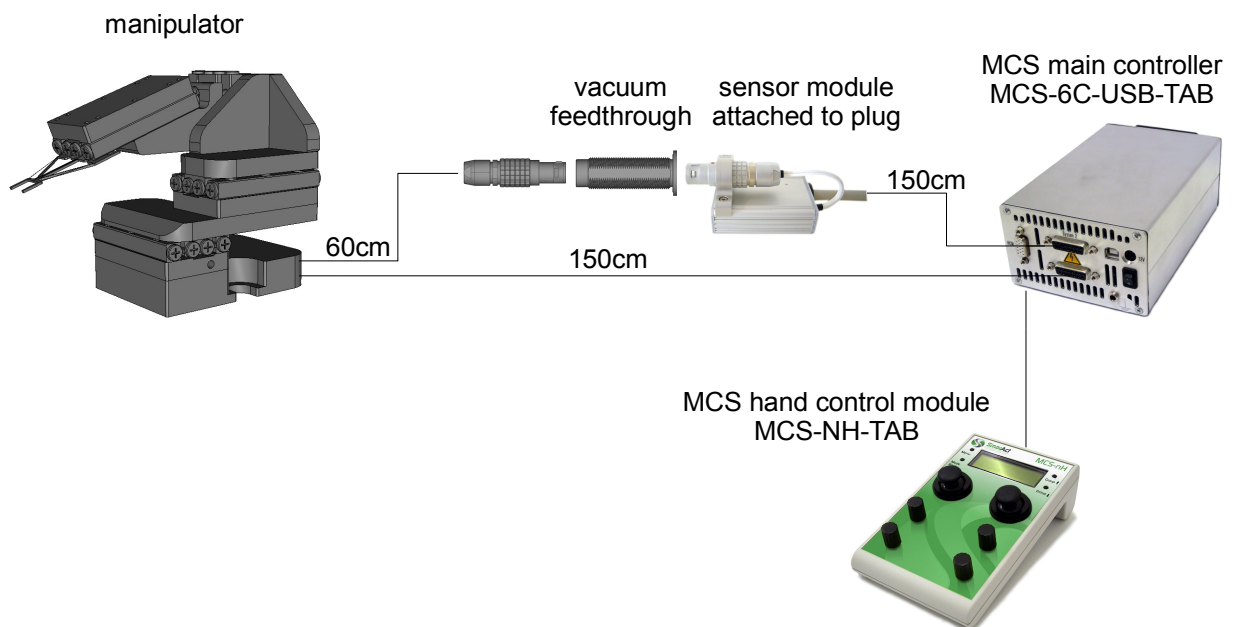
3 Hand Control Module

After power up the device is ready to use and you may start using your positioning system right away. This section describes how to control your positioners with the integrated Hand Control Module. The device offers two joysticks and three knobs to control the positioners, as well as a display and four buttons to configure the device.
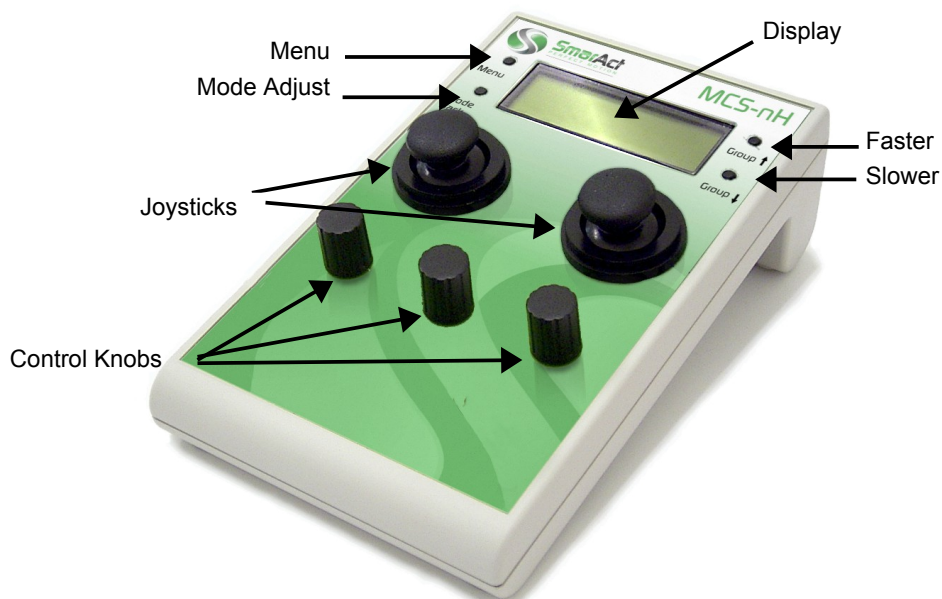
Top view

Hand Control Module MCS-3H-TAB

3.1 Display Setup

In normal operation the display is organized in lines. The top line is the status line. The other lines are used to display channel information, one line for each channel.

Display Setup

3.1.1 Status Line

The first two characters of the status line indicate the state of control elements of the MCS. There are several possible symbols displayed:

- Joystick symbols: A joystick symbol on the first position indicates that the left joystick is active and may be used to control the positioners. A joystick symbol on the second position indicates that the right joys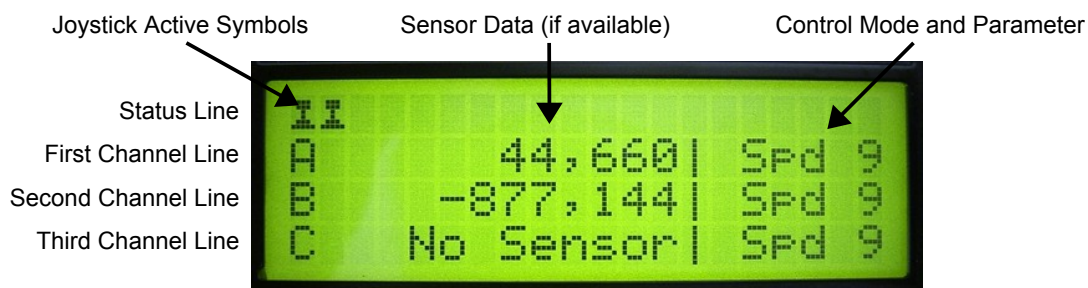tick is active and may be used to control the positioners. The joysticks may be deactivated via the menu (see section "Menu") to avoid accidental movement.

- Two white spaces (nothing displayed): This state indicates that both joysticks have been deactivated. The knobs remain active to control the positioners.

- "xx": In this state the device controls (joysticks *and* knobs) have been disabled by PC software. Sensor data is still displayed (if available).

3.1.2 Channel Lines

The first character of each channel line marks the channel name being a single character. The contents of the rest of the line depend on the current control mode of the channel and if there is sensor data available. See section "Control Modes" for more information. Note that the channel name may be changed via the menu (see section "Configuration"). Throughout this documentation it is assumed that the channel names are A, B and C.

For positioners with integrated sensors, linear position data is displayed in nanometers and rotary position data is displayed in microdegrees. The type of data depends on the configuration of the channel (see section "Configuration").

3.2 Control Modes

In normal operation the joysticks and the knobs are used to control the positioners. The behavior of a positioner depends on the *control mode* that is currently configured for the channel that the positioner is connected to.

There are four different modes to control the positioners:

- Simple Control Mode
- Advanced Control Mode
- Scan Control Mode
- Closed-Loop Control Mode

The control modes are described in detail in the next sections. Each channel of the MCS may be configured with its own control mode independently. To change the mode of a channel press and hold the mode adjust button next to the display (bottom left). The text "Mode Adjust" will appear in the status line of the display as long as this button is pressed. In this state, instead of moving the positioners, the knobs are used to adjust the control modes of the corresponding channels. By turning the knobs you may cycle through the available control modes in both directions.

> Note: The Closed-Loop Control Mode is not available to channels that have no sensor.

Each control mode may be configured with several parameters. Generally, the parameters of a control mode may be changed by pressing the corresponding knob. This brings up an arrow indicating the parameter change state. See the following sections for a detailed description of the control modes and their parameter settings.

> Hint: When entering the parameter change state the corresponding positioner is implicitly stopped. This may be useful to abort a movement.

3.2.1 Simple Control Mode

In this mode a positioner is moved according to its current *speed level*. The speed level is a generic number ranging from 1 (slowest) to 17 (fastest) and the positioner will perform stepping movements. When turning a knob the positioner will perform bursts of steps. Moving a joystick will lead to a continuous movement until released.

Display

The current speed level of a channel is displayed on the right side of the channel line. If there is sensor data available it will be displayed in the left side of the channel line, otherwise "`No Sensor`" will be displayed.

Example channel line display without sensor: "`A   No Sensor| Spd 9`"
Example channel display line with sensor: "`A  -1,675,756| Spd 9`"

Changing the Speed Level

To change the speed level press the knob corresponding to the channel. An arrow will appear next to the speed level display indicating the parameter change state. In this state the knob is used to adjust the speed level. Turning the knob right will increase the speed level, turning it left will decrease it. Pressing the knob will hide the arrow and exit the parameter change state.

To globally adjust the speed levels of all channels simultaneously you can press the "Slower" or "Faster" buttons on the right side of the display. These two buttons always only affect the Simple Control Mode.

3.2.2 Advanced Control Mode

The Advanced Control Mode is also used for stepping movements. However, in this mode you have more control over the parameters that the steps are performed with. You may adjust amplitude and frequency separately as well as the number of steps that are performed per burst.

The *Steps* parameter ranges from 1 to 9,000. The *Amplitude* parameter is given as a 12-bit value and ranges from 100 to 4,095. A 0 would correspond to 0 Volts, 4,095 corresponds to 100 Volts. The *Frequency* parameter is given in Hz and ranges from 5Hz to 18,500Hz.

Turning a knob will perform a burst of steps with the given parameters. Moving a joystick will lead to a continuous movement until released. The range of frequencies (and therefore the sensitivity of the joystick) is controlled by the *Steps* parameter. A higher value will result in a coarser movement. The step width remains the *Amplitude* parameter. Note that the *Frequency* parameter has no influence when you control the positioner with the joystick.

Display

If there is sensor data available it will be displayed on the left side of the channel line and the *Steps* parameter on the right side. In this case the *Amplitude* and *Frequency* parameters are hidden. If there is no sensor data available all three parameters will be displayed in the channel line.

Example channel line display without sensor: "A S1000 A4095 F10000"
Example channel display line with sensor: "A 13,286,430| S1000"

Changing Parameters

To change the parameters press the knob corresponding to the channel. Sensor data (if available) will be hidden and all parameters displayed along with an arrow symbol indicating the parameter currently being edited. Turning the knob will increase resp. decrease the current parameter.

To change the current parameter press and hold the knob. The arrow will change to a left/right arrow symbol. Turning the knob in this state (while pressed) will change the current parameter.

Pressing and releasing the knob without having changed the current parameter will exit the parameter change state.

3.2.3   Scan Control Mode

This mode is exclusively used for scanning movements. No steps will be performed. In this mode you have control over the elongation of the piezo element of the positioner. The current elongation is given as a 12-bit value ranging from 0 to 4,095. Turning a knob or moving a joystick will perform a scanning movement of a certain increment. The increment parameter may be adjusted.

When reaching a boundary (0 or 4,095) the positioner will stop. In this state a scan movement instruction in the direction of the boundary will have no effect. If you wish to move the positioner further in this direction you must switch to one of the other control modes.

Display

The current elongation of the piezo element of the positioner is displayed on the right side of the channel line (given as a 12-bit value). If there is sensor data available it will be displayed in the left side of the channel line, otherwise the increment parameter will be displayed.

Example channel line display without sensor: "A ΔV 100 | V2047"
Example channel display line with sensor: "A   -62,095| V2047"

Changing the Increment Parameter

To change the increment parameter press the knob corresponding to the channel. Sensor data (if available) will be hidden and the increment parameter displayed along with an arrow symbol indicating the parameter change state. In this state the knob is used to adjust the increment parameter. Turning the knob right will increase the increment, turning it left will decrease it. Pressing the knob will hide the arrow and exit the parameter change state.

3.2.4   Closed-Loop Control Mode

This mode is only available to channels that have a sensor attached to it. If so you may instruct the positioner to travel a certain (relative) distance. The joysticks can not be used to control positioners in this mode. Turning a knob will move the positioner by the configured increment.

The increment parameter depends on the type of the positioner that is configured for a channel (see section "Configuration"). Linear increments range from 1nm to 5mm. Rotary increments range from 1µ° to 90°.

Display

The current increment is displayed on the right side of the channel line. The sensor data is displayed in the left side of the channel line.

Example channel display line (linear):   "`A  -4,462,339| 100µm`"
Example channel display line (rotary):   "`A  36,195,735|   2m°`"

Changing the Increment Parameter

To change the increment parameter press the knob corresponding to the channel. An arrow will appear next to the increment display indicating the parameter change state. In this state the knob is used to adjust the increment. Turning the knob right will increase the increment, turning it left will decrease it. Pressing the knob will hide the arrow and exit the parameter change state.

Hold Time

The Closed-Loop Mode has a global parameter that affects all channels equally. The *hold time* represents the time (in seconds) that a target position is actively held after reaching it. To adjust this parameter, enter the main menu (top left button next to the display), select "Sensor Options" and scroll to the "CL Hold Time" entry. A value of 0s will simply stop the positioner once the target is reached. Other values will cause the positioner to hold the position, potentially compensating for drift effects and the like. If set to infinite the positioner will only stop holding the position on an explicit stop (pressing the knob) or by performing other movements in different control modes.

Note that this option also affects the "Find Reference" function (see section "Configuration").

3.3   Configuration

Before using the device for the first time, you should configure it to fit your needs. In particular, a reasonable channel mapping depends on the mechanical setup of your positioners. Positioners that are equipped with sensors should also be configured before using them.

There are several memory slots that you may use to save and load different configurations (Main menu, "Load Config" / "Save Config"). The first slot is the default slot and will automatically be loaded when the device is powered up.

Note that changes made to the configuration of the device take immediate effect, but will not be saved to a memory slot automatically. If you power down the device before saving the new configuration to a slot the changes will be lost.

3.3.1   Channel Mapping

Although all positioners may be controlled without setting up a mapping, it is usually more convenient to map the control knobs and joystick axes to specific positioners. Several options are available:

- Knob → Channel Mapping
  To define which channel to control with each knob, enter the main menu (top left button next to the display) and select "Knob Options". Note that two knobs may not be mapped to the same channel. If you want to switch two mappings, you need to unmap one first.
  Note: The sequence of the channel lines in the display depends on the knob channel mapping. The first channel line always displays the data of the channel that the left knob is mapped to, the second channel line always displays the data of the channel that the middle knob is mapped to and the third channel line always displays the data of the channel that the right knob is mapped to.

- Joystick Axis → Channel Mapping
  To define which channel to control with each joystick axis, enter the main menu (top left button next to the display) and select "Joystick Options". As with the knob channel mapping, two joystick axes may not be mapped to the same channel.
  A typical example would be to map the Y axis of the second joystick to the z-axis of an xyz-manipulator.

- Movement Inversion
  For the movement inversion there are two independent settings available: channel inversion (main menu → "Channel Options") and joystick axis inversion (main menu → "Joystick Options"). Each channel and each joystick axis has its own inversion setting. The scheme below depicts the behavior of the system.
  When turning a knob, only the channel inversion applies to the input before the actual movement is executed. When moving a joystick axis, both the joystick axis inversion and the channel inversion apply.
  Note that the channel inversion is bound to a channel and not to a knob. Therefore, when remapping the knobs to different channels, you don't need to adjust the inversion parameters.
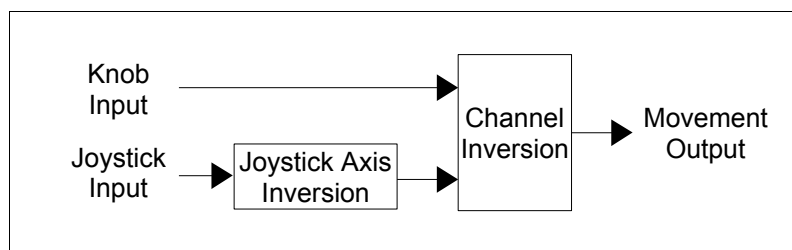
3.3.2 Channel Naming

Simply for convenience, each channel may be given a "name" being a single character. The names will be displayed in the channel lines and throughout the menus. To change the name of a channel, enter the main menu (top left button next to the display) and select "Channel Options". Selecting one of the "ChX symbol" entries will bring up a blinking cursor on the current channel name. In this mode you may turn any knob to adjust the symbol for the selected channel. To finish editing press any knob. To abort the editing press the menu button.

3.3.3 Sensor Types

Before using positioners that are equipped with sensors, the device must be told which type of positioner is connected to each channel. The settings affect the position calculation and closed-loop control. To configure the sensor types, enter the main menu (top left button next to the display) and select "Sensor Options" → "Configure Types". For positioners that do not have an integrated sensor "none" will be displayed. Otherwise you may cycle through the following types:

Type	Positioner Series	Comment
S	SLCxxxxs, SLxxxxs	linear positioners with nano sensor
SR	SR36xxs, SR3511s, SR5714s, SR7021s	rotary positioner with nano sensor
MR	SR1910m	rotary positioner with micro sensor
SP	SLCxxxxrs, SLxxxxrs	linear positioners with nano sensor, large actuator
SC	SLCxxxxsc, SLxxxxsc	linear positioners with nano sensor, distance-coded reference marks

M25	SR1410s	rotary positioner with micro sensor
SR20	SR2013s, SR162s, SR2812s	rotary positioner with nano sensor
M	SLCxxxxm, SLxxxxm	linear positioners with micro sensor
GC	SR1910m	rotary positioner with micro sensor, no reference mark, end stops
GD	SGO60.5m	goniometer with micro sensor (60.5mm radius)
GE	SGO77.5m	goniometer with micro sensor (77.5mm radius)
RA	SFWxxxxam	rotary positioner with absolute sensory
GF	SR1209m	rotary positioner with micro sensor
RB	SR1910m	rotary positioner with micro sensor, no reference mark, no end stops (unlimited rotation)
G605S	SGO60.5s	goniometer with nano sensor (60.5mm radius)
G775S	SGO77.5s	goniometer with nano sensor (77.5mm radius)
SC500	SLL-x	linear positioners with nano sensor, distance-coded reference marks
G955S	SGO95.5s	goniometer with nano sensor (95.5mm radius)
SR77	SR77xxs	rotary positioner with nano sensor

Please note that when changing the sensor type the sensor must be calibrated thereafter for proper operation.

3.3.4   Reference Marks

Positioners that are equipped with an integrated sensor may be instructed to move to a known physical position (the reference mark). For this, enter the main menu and select "Sensor Options" → "Calibrate". Select one of the "Find Ref." menu entries (depending on the channel). Note that if a positioner is not equipped with a sensor, the corresponding menu entry will have an "x" on the right side of the display instead of the usual arrow to indicate that this function is not available. Selecting an entry will bring up a separate control menu. In this menu the buttons next to the display are used to control the positioner. The selected positioner and its current status are displayed in the middle of the display. Pressing the "Forward" or "Backward" button will start the search for the reference mark in the given direction and the status will change to "Searching". If the mark has been found, the status will return to "Stopped" or "Holding" if the hold time is set to a value greater than 0. You may use the "Stop" button to abort the search manually. Use the "Exit" button to return to the Sensor Calibration menu.
Note that the closed-loop hold time also applies to this feature (see section "Closed-Loop Control Mode"). If a hold time is specified, the positioner status will switch to "Holding" and not "Stopped" once the reference mark has been found.

Some sensor types (e.g. "M", linear positioners with micro sensor) do not have a physical reference mark. For these positioners the mechanical end stops are used for referencing. Which end stop is used is defined by the configured safe direction which may be configured via the menu. Note that in this case it makes no difference whether you press the "Forward" or "Backward" button. The positioner will always move in the safe direction.

3.3.5   Sensor Calibration

The calibration may be used to increase the accuracy of the position calculation and should be done once for each channel if the mechanical setup changes (different positioners connected to different channels). The calibration data is saved to non-volatile memory immediately. Therefore, if the mechanical setup is unchanged, it is not necessary to issue the calibration routine on each power up. Note though that newly connected positioners have to be calibrated in order to ensure proper operation.

> **Important:** It must be ensured, that the calibration routine is not issued while the positioner is near a mechanical end stop. Otherwise the calibration might fail and lead to unexpected behavior when using the closed-loop control mode.
>
> During the calibration the positioner will perform a movement in the range of up to several mm. As a safety precaution, make sure that the positioner has enough freedom to move without damaging other equipment.

To calibrate a sensor, enter the main menu (top left button next to the display) and select "Sensor Options" → "Calibrate". Select one of the "Calibrate" menu entries (depending on the channel). Note that if a positioner is not equipped with a sensor, the corresponding menu entry will have an "x" on the right side of the display instead of the usual arrow to indicate that this function is not available. Selecting an entry will bring up a separate control menu. In this menu the buttons next to the display are used to control the positioner. The selected positioner and its current status is displayed in the middle of the display. Pressing the "Start" button will start the calibration routine and the status will change to "Calibrating". The calibration takes a few seconds to complete. If finished, the status will return to "Stopped". The calibration data is saved and will be used on future power ups. You may use the "Stop" button to abort the search manually. Use the "Exit" button to return to the Sensor Calibration menu.

Sensor types that are referenced via mechanical end stops (e.g. "M", linear positioners with micro sensor) are moved to the end stop as part of the calibration routine. Which end stop is used is defined by the configured safe direction (see below).

3.3.6   Sensor Modes

If there are sensors attached to the connected positioners, you have the option to chose between three different modes ("Disabled", "Enabled" and "Powersave").

If the sensors are permanently supplied with power ("Enabled" mode) they generate heat which may cause the system to drift in case of weak thermal coupling (e.g. inside an SEM). For this, the sensors may be powered down ("Disabled" mode) if sensor data is (temporarily) not needed. Note though that moving a positioner in this mode will invalidate the position information.

The "Powersave" mode handles the power supply of the sensors automatically. Whenever a positioner is moving the sensors are enabled to be able to keep track of the current position of the positioner. When it is stopped the sensors are disabled, only checking the current position once in a while, minimizing heat generation.

3.4 Menu

The menu is used to configure the MCS. To enter the menu press the "Menu" button next to the display (top left). To exit the menu press this button again or select the exit menu entry.

Menu Name

Current Menu Entry

Menu Entries

Menu Display Setup

The navigation through the menu and sub menus follows a simple scheme. The first line of the display shows the name of the current menu. The rest of the lines display the menu entries. Turning any knob will cycle through the entries in a scrolling manner. The solid arrow on the left side indicates the current menu entry (always the middle line). A small arrow on the right side of a menu entry indicates that a sub menu will be entered. Pressing any knob will select the current menu entry. The joysticks have no function while in menu mode.

Note that changes to the device configuration via the menu will not be automatically saved. If you wish to keep your settings save them to a configuration slot via the Save Configuration menu.

3.4.1 Main Menu

The main menu has the following entries:

0. Exit – Exits the menu mode.
1. Sensor Options – Enters a sub menu with sensor related options.
2. Joystick Options – Enters a sub menu with joystick related options.
3. Knob Options – Enters a sub menu with knob related options.
4. Channel Options – Enters a sub menu with channel related options.
5. Save Config – Enters a sub menu to save the current configuration to a slot.
6. Load Config – Enters a sub menu to load a configuration from a slot.

3.4.2 Sensor Options Menu

The Sensor Settings menu has the following entries:

0. Exit – returns to the main menu.
1. Zero All – Defines the current position of all positioners as their zero position.
2. Zero ChA – Defines the current position of the first positioner as its zero position.
3. Zero ChB – Defines the current position of the second positioner as its zero position.
4. Zero ChC – Defines the current position of the third positioner as its zero position.
5. Calibrate – Enters a sub menu with sensor calibration options.
6. Configure Types – Enters a sub menu to configure positioner types.
7. Set Safe Dirs – Enters a sub menu to configure safe directions.
8. CL Hold Time – Configures the hold time for the closed-loop mode (see section "Closed-Loop Control Mode").

9. Mode – Selects between "Disabled", "Enabled" and "Powersave" (see section "Sensor Modes").

3.4.3 Joystick Options Menu

The Joystick Settings menu has the following entries:

0. Exit – Returns to the main menu.

1. Joy1X map – Specifies which channel should be controlled by the x-axis of the left joystick. Selecting this menu entry will cycle through the channels. A value of "-" deactivates the x-axis of the joystick. A channel already selected for other joystick axes will not be selectable.

2. Joy1Y map – Specifies which channel should be controlled by the y-axis of the left joystick. Selecting this menu entry will cycle through the channels. A value of "-" deactivates the y-axis of the joystick. A channel already selected for other joystick axes will not be selectable.

3. Joy2X map – Specifies which channel should be controlled by the x-axis of the right joystick. Selecting this menu entry will cycle through the channels. A value of "-" deactivates the x-axis of the joystick. A channel already selected for other joystick axes will not be selectable.

4. Joy2Y map – Specifies which channel should be controlled by the y-axis of the right joystick. Selecting this menu entry will cycle through the channels. A value of "-" deactivates the y-axis of the joystick. A channel already selected for other joystick axes will not be selectable.

5. Joy1X invert – Selects whether the x-axis of the left joystick should be inverted or not.

6. Joy1Y invert – Selects whether the y-axis of the left joystick should be inverted or not.

7. Joy2X invert – Selects whether the x-axis of the right joystick should be inverted or not.

8. Joy2Y invert – Selects whether the y-axis of the right joystick should be inverted or not.

9. Joy1 active – This option can be used to activate or deactivate the left joystick.

10. Joy2 active – This option can be used to activate or deactivate the right joystick.

3.4.4 Knob Options Menu

The Knob Settings menu has the following entries:

0. Exit – returns to the main menu.

1. Knob1 map – Selects the channel that the left knob is mapped to.

2. Knob2 map – Selects the channel that the middle knob is mapped to.

3. Knob3 map – Selects the channel that the right knob is mapped to.

> Note: Two knobs may not be mapped to the same channel.

3.4.5 Channel Options Menu

The Channel Settings menu has the following entries:

0. Exit – returns to the main menu.

1. ChA invert – If set to "yes", turning the knob that is mapped to channel A will generate an inverted movement of the positioner.

2. ChB invert – If set to "yes", turning the knob that is mapped to channel B will generate an inverted movement of the positioner.

3. ChC invert – If set to "yes", turning the knob that is mapped to channel C will generate an inverted movement of the positioner.

4. Ch1 symbol – May be used to change the displayed symbol for the first channel.

5. Ch2 symbol – May be used to change the displayed symbol for the second channel.

6. Ch3 symbol – May be used to change the displayed symbol for the third channel.

3.4.6   Save Configuration Menu

The Save Configuration menu may be used to save the current device configuration to a configuration slot. This is useful when using the same device for different setups. Simply select a slot to save the configuration to. Note that slot 1 is the default slot which will be loaded on a device power-up.

3.4.7   Load Configuration Menu

The Load Configuration menu may be used to load a device configuration from a configuration slot. Simply select a slot to load the configuration from. Note that slot 1 is the default slot which will be loaded on a device power-up.

3.4.8   Sensor Calibration Menu

The Sensor Calibration menu has the following entries:

0. Exit – returns to the Sensor Options menu.

1. Find Ref. ChA – Enters a control menu to search for the reference mark of the first channel (see section "Configuration").

2. Find Ref. ChB – Enters a control menu to search for the reference mark of the second channel.

3. Find Ref. ChC – Enters a control menu to search for the reference mark of the third channel.

4. Calibrate ChA – Enters a control menu to calibrate the sensor of the first channel (see section "Configuration").

5. Calibrate ChB – Enters a control menu to calibrate the sensor of the second channel.

6. Calibrate ChC – Enters a control menu to calibrate the sensor of the third channel.

Note: The usual sub menu arrows on the right side of the display will be replaced by an "x" if the corresponding channel does not have a sensor.

3.4.9   Sensor Types Menu

The Sensor Types menu has the following entries:

0. Exit – returns to the Sensor Options menu.

1. Type ChA – Sets the sensor type for the first positioner. You may cycle through the available sensor types. If the positioner is not equipped with a sensor, "none" is displayed.

2. Type ChB – Sets the sensor type for the second positioner. You may cycle through the available sensor types. If the positioner is not equipped with a sensor, "none" is displayed.

3. Type ChC – Sets the sensor type for the third positioner. You may cycle through the available sensor types. If the positioner is not equipped with a sensor, "none" is displayed.

3.4.10   Safe Directions Menu

The Safe Directions menu has the following entries:

0. Exit – returns to the Sensor Options menu.
1. Dir ChA – Sets the safe direction for the first positioner (forward or backward).
2. Dir ChB – Sets the safe direction for the second positioner (forward or backward).
3. Dir ChC – Sets the safe direction for the third positioner (forward or backward).

Note that the safe direction only affects sensor types that do not have a physical reference mark. For these sensors the mechanical end stops are used for referencing.

3.5   FAQ

Q: When I turn the knob in the Closed-Loop Mode nothing happens. Why?

A: If the Closed-Loop Hold Time is deactivated (0 seconds) then the movement increments are always executed relative to the current position of the actuator. With this setting, executing very small increments (e.g. 2nm) might have no effect due to sensor noise, since the target is "immediately" reached and the positioner stopped.

To avoid this behavior, increase the Hold Time via the menu settings. This will cause multiple small increments to accumulate. Thus, the increments are not executed relative to the current position of the actuator, but relative to the last target position.

Q: When remapping channels I can't select the channel I want. Why?

A: Two joystick axes or two knobs may not be mapped to the same channel. Therefore, it might be necessary to "unmap" another joystick axis (or knob) before being able to select the desired channel.

Q: I can't select the Closed-Loop Mode for a channel!

A: The Closed-Loop Mode is only available to channels that have a sensor attached to it. If a sensor is present check if all wires are connected properly and restart the system.

Q: I can hear the positioner doing steps, but apparently it is not moving. How can this be?

A: The positioners must be driven with a certain minimum amplitude in order to function properly. This minimum value may vary from positioner to positioner. Try increasing the amplitude value.

Q: When I move a joystick to control a positioner nothing happens. What's wrong?

A: The joysticks may be deactivated via the menu settings in order to avoid accidental movements. Check the upper left corner of the display (when not in menu mode) to see the activation state of the joysticks. See also section "Display setup".

The control elements also might have been disabled by PC software.

Another reason might be that the positioner is currently configured for closed-loop control. In this mode it is not possible to control the positioner with a joystick.

Q: When I try to look for a reference mark with a positioner, nothing happens and the status stays at "Stopped".

A: This may be the case if the positioner is already on its reference mark, i.e. the mark is "found" immediately. If no hold time was specified (in which case the status would switch to "Holding"), nothing happens.

3.6 Operating Conditions

The MCS controller must be used in normal environmental conditions:

- Indoor usage only.
- Temperature range: 5°C to 40°C.