
Operating Manual

Key Panel SM-5



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Security advice

1.1 General advice

The manipulators and moving-tables are designated for the positioning of repositories, microscopes or tools. (e.g.: capillaries, measuring electrodes, stimulating electrodes... etc.)

For a safe function of the manipulators regard the operating and assembly manuals. Our service team will assist you, if additional information is required.

Especially comply with the security advices of this manual.

The intended protection can be endangered if the device is not used accordingly to the operating manual of the producer.

1.2 User advice

Do not touch the motor-driven manipulators during the positioning process in order to avoid injuries and bruises, and to avoid damaging the intended functionality of the device.

As a result of the modular, individually by the customer created arrangement it is possible that miscellaneous areas with increased risk of injury (especially bruises) exist.

Avoid bringing your face to close to the moving devices, as the cramped arrangement in combination with faulty operation of the manipulators can lead to breakage of glass. This can lead to severe injuries (e.g.: splinters of glass in the eye)

The provided protective covering has to be assembled accordingly to the operation manual.

1.3 Transport advice

The manipulators and moving tables are transported in a special packing in order to avoid damages and inaccuracies of the adjustment.

1.4 Service and maintenance advice

The manipulators and moving tables are maintenance-free.

For the maintenance of the operation of the devices, protect them from humidity and excessive heat. Fierce crushes can compromise the correct adjustment, which lowers the functionality of the devices.

No internal interferences are allowed, with exception of the activities mentioned in the operating manual or if instructed by our service team.

1.5 Installation location advice

Install the devices at locations with adequate air supply for aeration of the equipment.

The main control switch of the device has to be easily accessible at all time.

1.6 Disposal advice

Broken or no longer required devices do not belong in the household garbage! Dispose of them accordingly to the local legal regulations. In case of doubt ask the service team of Luigs & Neumann for help.

1.7 Guarantee advice

The producers are not liable for damages caused by not authorized interferences. Unauthorized interferences terminates all warranty claims.

1.8 Repair and readjustment advice

The devices have to be packed according to the adequate regulations. Contaminated devices have to be cleaned if possible. If this is not possible, please provide a user declaration which describes the substance and affirms the harmlessness for humans.

Key Panel SM-5

The Key Panel SM-5 allows access to up to 16 motor-driven LN-Units.

A LN-Unit consists of three motor-driven LN-Axes.

The motor-driven LN-Axes can be adjusted with the handwheels or optional with the direction keys. The exact position value is indicated on the display.

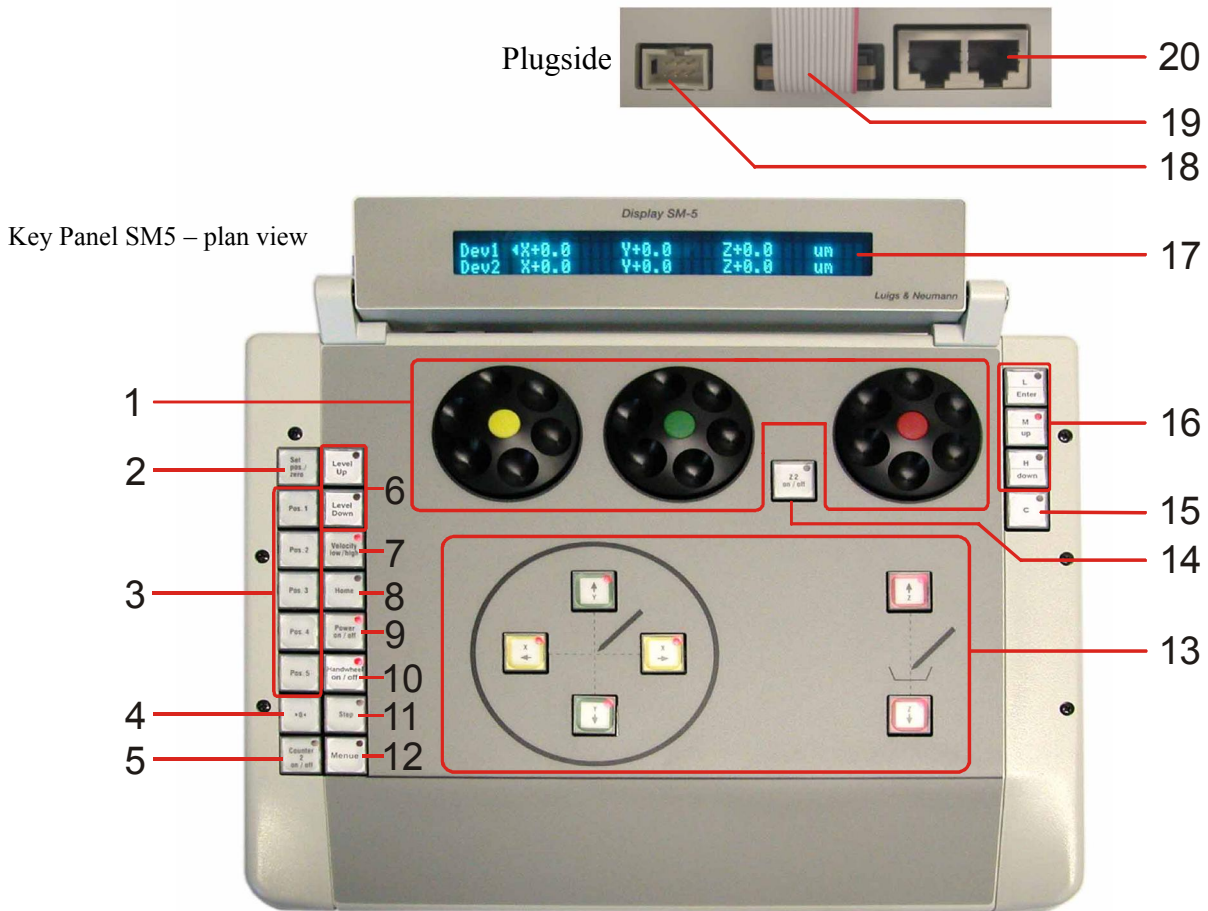
Additionally it is possible to attach up to two handcubes to the Key Panel SM-5.

The Key Panel SM-5 comes with a menu function that allows the individual setup of all basic settings, including: adjustment speed, adjustment direction, handwheel resolution etc. The Key Panel SM-5 is compatible with the SM5 and SM6 controlbox.

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Overview: Key Panel SM-5



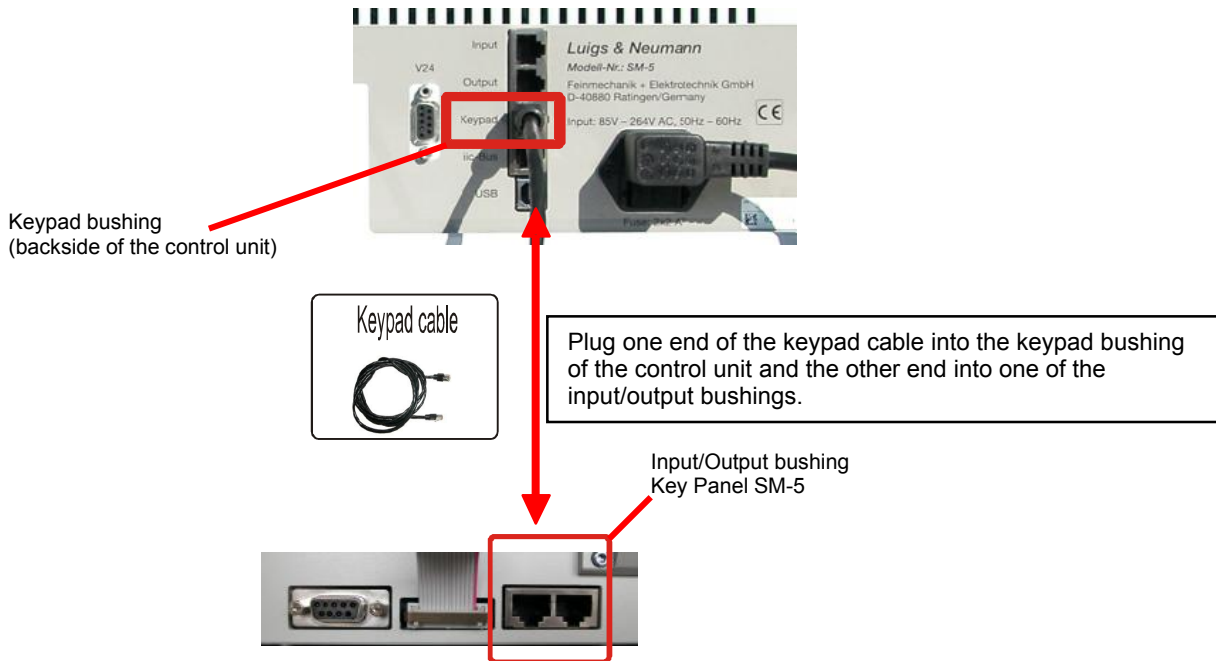
- | | |
|---|--|
| <ul style="list-style-type: none"> 1. Handwheels.....(X, Y and Z handwheels) 2. Set pos./zero.....(Saving of zero point and position) 3. Pos.1 to 5 (Move toward position 1 to 5) 4. Zero point.....(Move toward zero point) 5. Counter 2 on/off (Second counter, on/off) 6. Device select.....(Selection of units/devices) 7. Velocity low/high ... (Slow/fast switch-over) 8. HOME..... (Homefunction on/off) 9. Power on/off (Power, on/off) 10. Handwheel on/off ..(Handwheel, on/off) 11. Step (Stepfunction, on/off) 12. Menu (Menu access) | <ul style="list-style-type: none"> 13. Direction keys. (X, Y und Z) 14. Z2 on/off(Change-over Z1 to Z2) 15. C (Coarse).....(Handwheel resolution: coarse) 16. Handwheel resolution L / M / H and menu navigation keys 17. Display 18. Interface 19. Display-joint 20. Input / Output bushing |
|---|--|

Connection: Key Panel and LN-Control

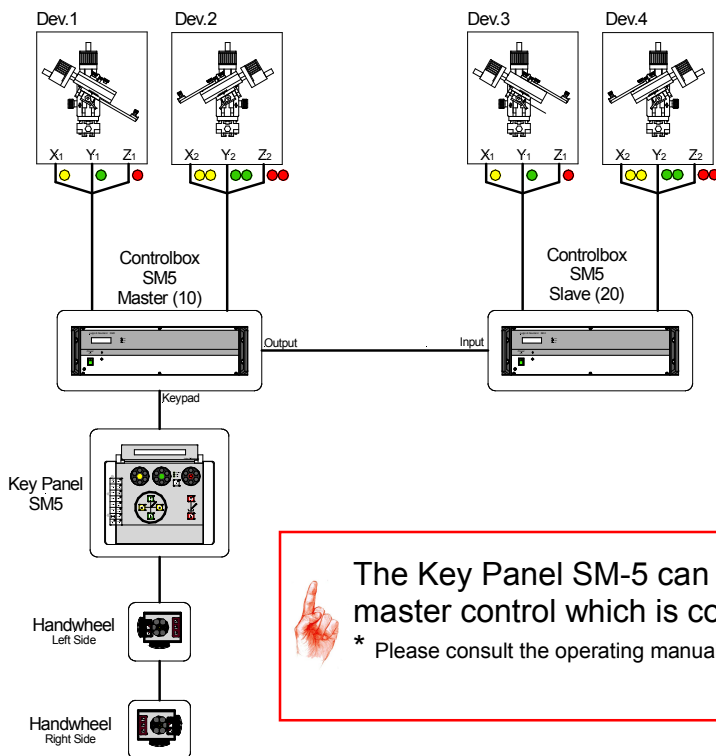
Attach the Key Panel with the Key Panel Cable to the SM-5 / SM-6 control.



While you connect the Key Panel, the control has to be **switched off!**



Complete Overview:



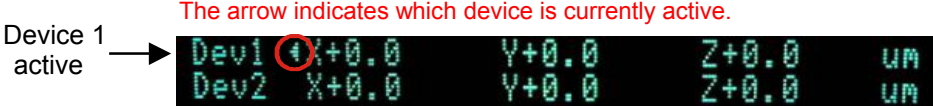
The Key Panel SM-5 can only be attached to a master control which is correctly addressed (10)
* Please consult the operating manual of the SM 5/6 for further information

Device Selection

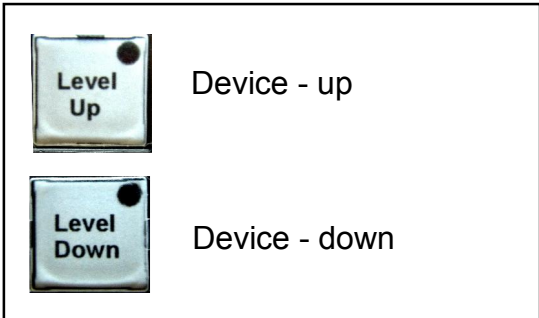
Up to sixteen motor-driven units (devices) can be operated with the Key Panel SM-5. At all times one of the units (device) is active, and can be operated with the direction keys or the handwheels of the Key Panel SM-5. If there are more than two units (devices), it is necessary to choose the desired unit (device) with the „LEVEL UP“ and „LEVEL DOWN“ keys. The display only shows two devices. The active device is indicated with an arrow symbol: „◀“.


For example: A motor-driven unit (device) could be:
A motor-driven XYZ 3-Axes Manipulator or
a motor-driven XY-Moving Table with a motor-driven focus-axis

Unit
=
Device



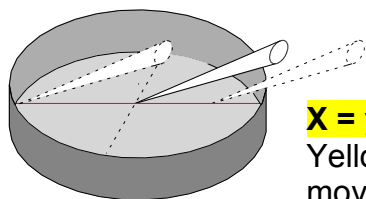
Change device:



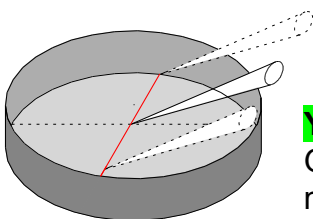
 **If there is more than one unit,** it is necessary to choose the right device with the „Level up“ and „Level down“ keys, as the display only shows two devices, and only one of them is active.

Color-code of the LN-axes

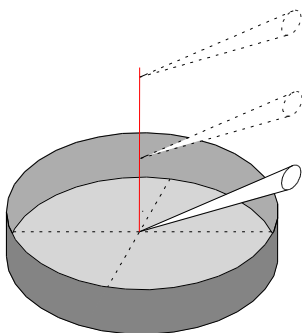
The different motor-driven LN-axes of the units are color-coded.



X = yellow
Yellow indicates the axis, which moves the capillary left/right.



Y = green
Green indicates the axis, which moves the capillary forward/backward.



Z = red
Red indicates the axis which moves the capillary upwards/downwards.

Handwheels

Three black handwheels are shown. The first has a yellow center, the second has a green center, and the third has a red center. To the right, there are three indicator lights labeled 'Standard', 'High', and 'Low', and a small 'XZ ON/OFF' switch.

Direction keys

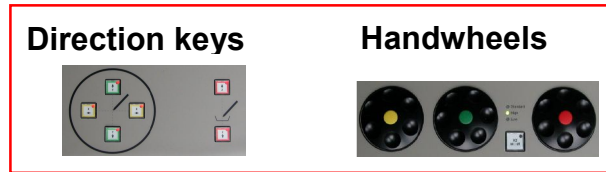
A circular keypad with four directional keys (up, down, left, right) and a central key. To the right, there are three additional keys with up, down, and left arrows.

Exit plugs of the LN-control

A row of six exit plugs with colored indicator lights above them: red, green, yellow, red, green, yellow.

Adjustment of the axes

The motor-driven LN-axes can be adjusted with the help of the direction keys or the handwheels. The direction keys offer two individual speed settings (**high** or **low**). The handwheels can be operated with four different speed settings (**L**ow, **M**iddle, **H**igh or **C**oarse).



Handwheels X, Y and Z

With the three handwheels it is possible to adjust the different motor-driven LN-axes very precisely.

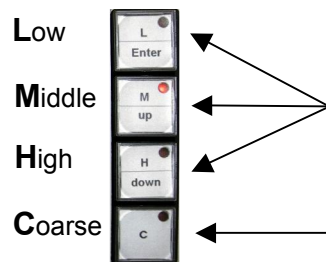


The movement direction of the handwheels and the direction keys can be set up independently.

Standard

In standard-mode the motor-driven units are operated with the handwheels very precisely. It is possible to choose from three pre-set speeds (L, M or H)

Handwheel-setup



Standard-Mode:

The speed can be adjusted in the menu individually.

* See Set-Menu_Set handwheel resolution

C-Mode: The values for all three motor-driven LN-Axes can be individually adjusted with the menu.

* See Set-Menu_Set proportionalfactor

C-Mode

For fast adjustment of the motor-driven LN-axes it is possible to switch the handwheels to C-mode.

In C-mode the motor-driven units are coarsely adjusted, and the speed is depends on the movement speed of the handwheel.



LED-Indication is **off**
C-Mode is off



LED-Indication is **on**
C-Mode active

- After deactivation of C-mode the last speed setup will be activated again.
- If you change the device during C-mode, the C-mode will be automatically deactivated.

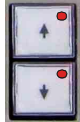
Adjustment of the axes

Direction Keys

If the direction keys are used for adjustment, there are two different speed settings. These settings are: slow (low) and fast (high). The adjustment speed can be changed individually within the menu. * See Chapter: Set-Menu_Set move direction

The LEDs on the adjustment keys X, Y and Z indicate several different settings:

Both LEDs glow



LN-axis is active
*These keys can be used to adjust the motor-driven LN-axis

Both LEDs are off



The LN-axis is deactivated
*See Power on/off
*Motor-driven LN-axis can not be adjusted

One of the LEDs glows



LN-axis has reached the final position
*The motor-driven LN-Axis can not be moved any further into this direction

One of the LEDs blinks while the other LED is off



The LN-axis is in the HOME-position
*see HOME-function

Adjustment speed

Two different adjustment speed settings are available, which can be preset in the menu.

*See Menu, Set move speed high/low

Low = slow speed

High = fast speed

Selection key for high and low



LED-Display is **on**
Active: high



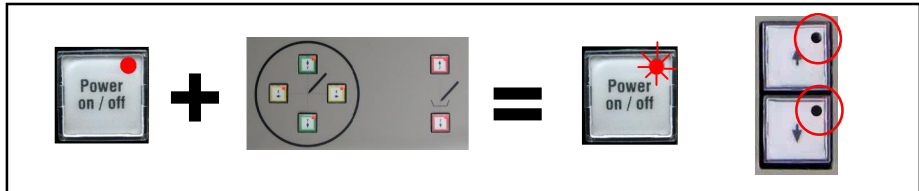
LED-Display is **off**
Active: low

Power, on/off

Each individual motor of the LN-axes can be deactivated with the „Power on/off“ function. The motor stops µm exactly.

LN-axis deactivation

Press and hold down the „Power on/off“ button, then press the direction key of the LN-axis you would like to deactivate.



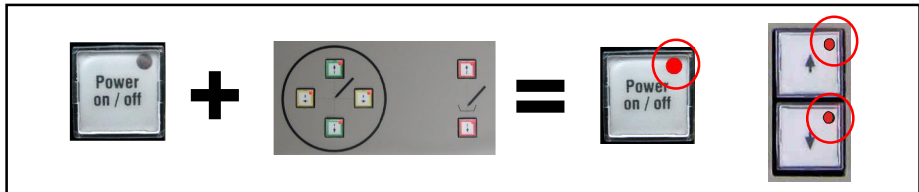
The LN-axis is now deactivated.

The LEDs on both direction keys are off, and the LED on the „Power on/off“ button blinks.

The LED on the “Power on/off” button stops blinking as soon as all LN-axes are deactivated.

LN-axis reactivation

Press and hold the „Power on/off“ button, then press the direction key of the LN-axis you would like to reactivate.



The axis is now activated.

The LEDs on both direction keys are blinking. When all LN-axes are reactivated, the LED on the “Power on/off” button is constantly glowing again.



LED glows:
All LN-axes are activated.



LED is blinking:
One or more LN-axes are deactivated.



LED is off:
All LN-axes are deactivated.


Home


The home-function is used for fast removal of the manipulator from the working area. Activation of the home-function will move the manipulator to the max. endposition. The manipulator can be moved back μm accurately. The direction and speed of the movement can be adjusted with the menu.

* See Set-Menu_Set home speed

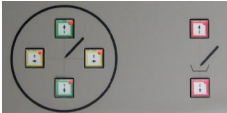
* See Set-Menu_Set home direction

Activate

1.  Press the home-key.

 Home-function is active.
The LED of the key is blinking.

Move LN-axis to the home position


2.  Press one of the two adjustment keys of the motor-driven LN-axis, which you would like to move to the end position.

The manipulator moves automatically to the end position.

The LEDs on the direction keys of the axis are off and the LED on the home key is constantly glowing.

Move LN-axis back to original position

3. Press one of the direction keys again in order to move the motor-driven axis from the home position back to the original position (μm accurate).

 The LED of the home-key is blinking

Deactivate

4. Press the home-key again

 LED is off
home-function is deactivated



The automatic movement to the home position can be stopped manually!

Stop movement to the home position

While the motor-driven LN-axis is moving to the home position:

1. Press one of the appropriate direction keys.

The manipulator stops immediately.

* The LEDs of the direction keys are glowing and the LED of the home-key is blinking.

2. Press one of the direction keys again in order to move the manipulator back to the original position.

Zero point

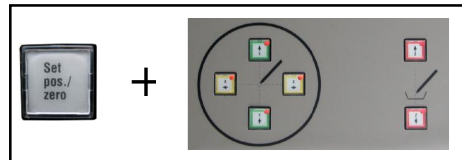
Saving the zero point will set the current position value in the display of that particular motor-driven LN-axis to zero and the current position will be saved as zero point.

The zero point can be set anew as often as desired.

The zero point is the benchmark for the positions 1 to 5. Depending on the current operating mode the zero point will be set for each individual motor-driven axis separately (single mode) or all three axes of the active device are set at the same time (complete level mode).

Single Mode

Save

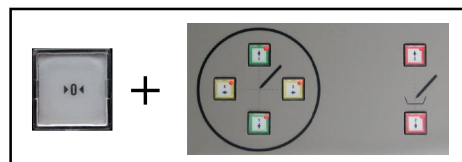


Press and hold the „Set pos./zero“-key and additionally one of the direction keys you would like to set to zero.

The counter for this specific axis will be set to zero and the current position of the motor-driven LN-axis will be saved as zero position.



Moving to the zero point

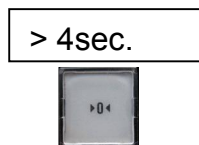


Press and hold the „zero point“ key and additionally one of the direction keys of the axis that should move to the zero point.

The corresponding motor-driven LN-axis moves automatically to the zero point.

Complete Level Mode

Save



Press and hold the „zero point“-key for more than 4 seconds.

The display shows:

Zero point stored for active Level

All three values of the the axes X, Y and Z of the currently active device in the display are set to zero and the current position is saved as new zero point.

Moving to the zero point



Press the „Zero point“-key.

All three motor-driven LN-axes are moving to the zero points.

Position 1 to 5

The Key Panel SM-5 features five position-keys that can be used to save five positions of the individual motor-driven LN-axes (**Single Mode**) or of the entire device (**Complete Level Mode**). It is possible to move to the set position μm accurately, and to overwrite the saved position at any position. The positioning speed can be set individually in the menu.

* See Set Menu_Set positioning spees fast

* See Set Menu_Set positioning spees slov

* See Set Menu_Set positioning mode speed/Slov

The currently set mode is indicated on the display after activation of the controller. This calibration can be changed in the menu.* See Set Menu_Set positioning mode

The menu features the additional option to move the motor-driven manipulator to the saved position with two different speed settings.

Single Stage-Mode

All axes have to be saved individually and it is necessary to move each axis individually to the saved position.

Complete Level-Mode

In Complete Level-Mode all positions of the deviced are saved and reached simultaneously.

Position 1 to 5 (Complete Mode)

Save

Press and hold one of the position keys (1 to 5) for three seconds until the display shows „**Position 1...5 stored for active level**“.
The positions of all three axes (x,y and z) are now saved on the “**pos.**” key.

Moving to saved position

Press the “**pos.**” key. (max. 2sec.).
All three axes of the device move simultaneously to the saved position.

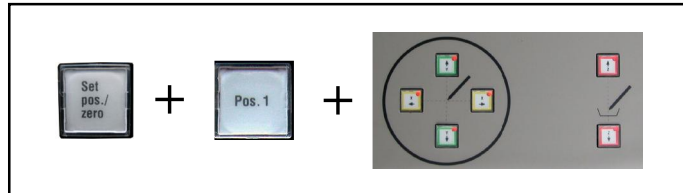
! Attention !

Changing the zero position will also change the saved positions pos. 1 to pos. 5 accordingly.

Position 1 to 5 (Single Mode)

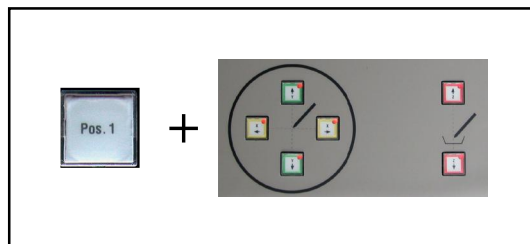
Save

1. Press and hold the “Set pos./zero” key
2. Additionally press and hold one of the pos. 1 to 5 key
3. Press one of the direction keys of the axis you would like to change, and release all keys.



Moving to saved position

1. Press and hold one of the position keys in order to save.
2. Press one of the direction keys of the axis which should move to the saved position.
The LN-axis moves to the saved position automatically.



! Attention !

Changing the zero position of the individual axes will also change the saved positions pos. 1 to pos. 5 corresponding to the new zero position.

Additional option „PoS“: Move to position

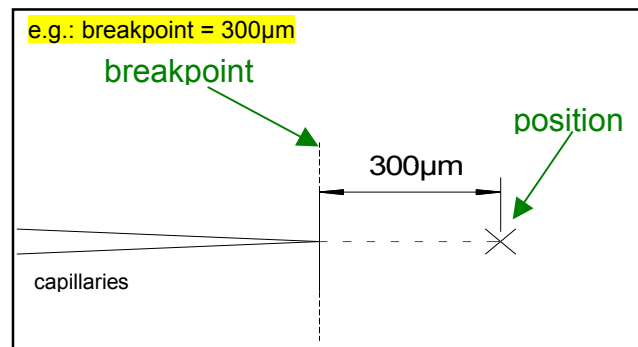
When the additional option “PoS” is activated, the motor-driven LN-axis will move to the saved position with two different speeds. The axis moves fast to a stop position, and the remaining distance with a preset slower velocity (PoS speed). The fast and the PoS speed can be preset individually in the menu.

Activation and deactivation of the PoS-function

Access „Menu“ and activate or deactivate „**Set point of switching (PoS) on/off**“ by choosing „on“ or „off“

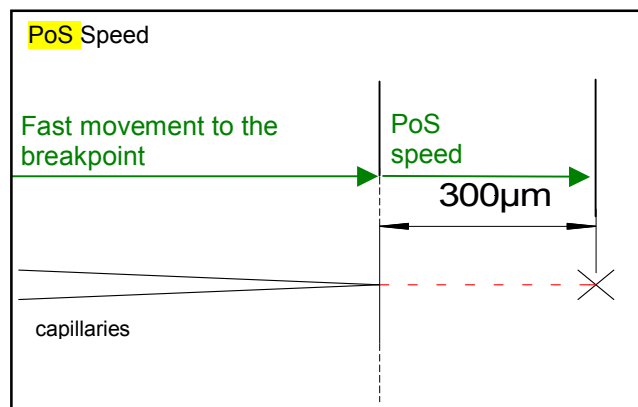
Set breakpoint

Access „Menu“ and use „**Set point of switching position**“ in order to set the desired breakpoint distance with μm accuracy.



PoS-speed

Access „Menu“ and choose the desired speed level with „**Set low positioning velocity behind PoS**“ (0 to 15).



! Attention !

The PoS-function is only active for positions that are saved (Pos.-keys 1 to 5). If the axis moves to the zero point, it will move with only one speed. If you would also like to move the axis to the zero point with two different speeds, it is necessary to save the zero position with the pos.-keys and access it with the help of the pos.-keys.

Counter-2

The counter-2 is an additional counter used to measure distances without changing the zero position or pos. 1 to 5.



By pressing the „**Counter 2 on/off**“ key you can switch counter-1 and counter-2



The display indicates „**C2**“ when the „counter-2“ mode is active.



LED off:
Counter-1
(Reference-Counter)



LED on:
Counter-2
(Measuring-Counter)



Zeroing counter-2 does not influence the zero-position or the saved positions of counter-1.

Saving pos. changes always alludes to the position value of counter-1.

Step


When the step-function is activated, pressing a direction key will move the manipulator a preset step-distance with a preset step-speed.

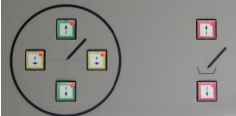
The step-speed and the step-distance can be preset individually in the menu.

* see Menu_Set step dist / Speed

activate

1.  Press the step-key.


 LED is on.
Step-function is active.

2.  Press one of the direction keys of the desired LN-axis.

The motor-driven LN-axis moves constantly with the preset speed the preset distance.

deactivate

In order to deactivate the step-function, press the step-function key again.

 LED is off.
Step-function is deactivated.





The step-function can also be activated by an external TTL-signal of the SM6 control.

* See operating manual SM6

Menu

The Key Panel SM-5 offers a menu-section that allows the individual setup of all basic settings.

Open menu

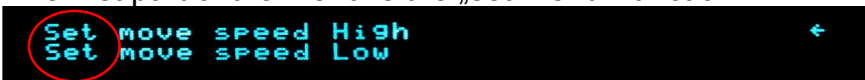
1.  Press the „menu“ key
 The LED of the „menu“key lights up and the display shows the following notification:





After a few seconds the menu opens:

The first part of the menu is the „set-menu“ function.

Set-Menu



Here you can choose the desired setup option with the help of the navigation keys.

<p>Navigation keys</p> 	
	<p>The arrow at the right end of the display indicates the currently active selection.</p>

2. Select the option you would like to adjust and confirm with the enter key.

Thereafter you get to the **device-menu**.

Device-Menu



3. Choose the device you would like to adjust and confirm with the enter key.

Thereafter you get to the **adjust-menu**.

Adjust-Menu



The adjust-menu allows the individual setup of the parameters of each motor-driven LN-axis.

After confirmation of a parameter value with the enter key the next parameter value can be changed and so forth.

Menu

```
Adjust move speed high
Device: 1 X:10 Y:10 Z:10
```

- 4. The system will jump back to the device menu after confirmation of the last parameter (Z) in the adjust menu.

```
Select device (set move speed high)
Device:1
```


- 5. You can choose an other device or get back to the set - menu by pressing „exit”.

```
Select device (set move speed high)
Device:exit
```

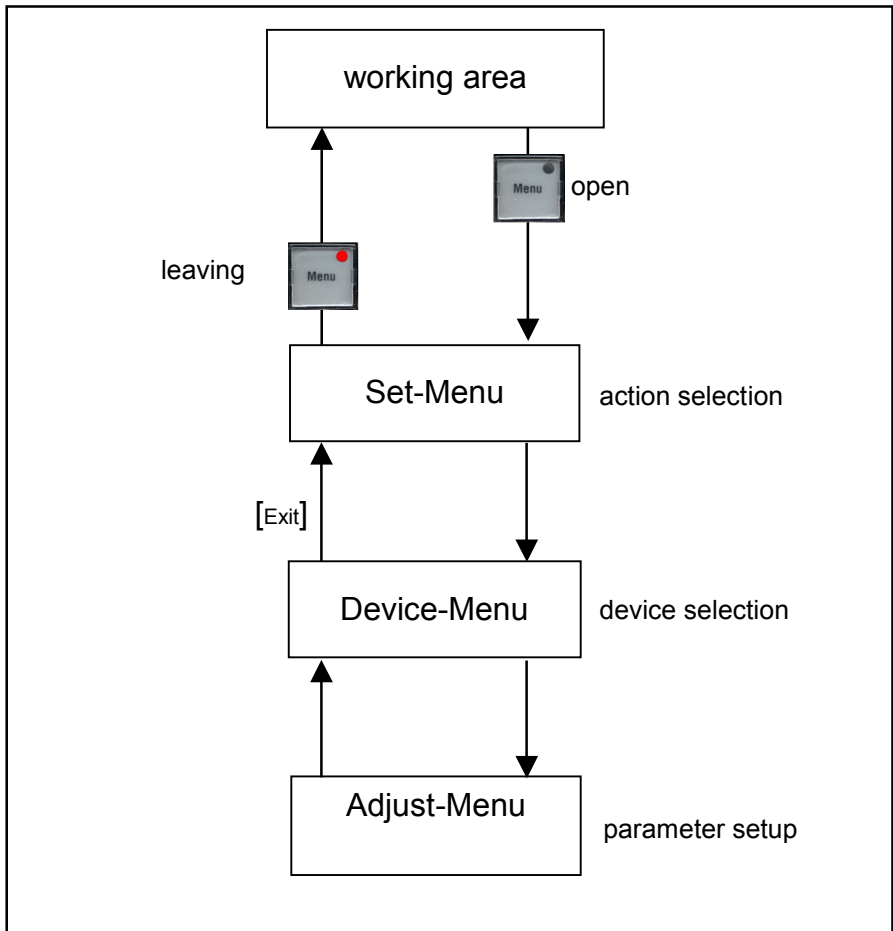
```
Set move speed High
Set move speed Low
```

Leave menu

In the set-menu you can choose other setup options or leave the menu array by pressing the menu-key.

 Only in the set-menu it is possible to leave the menu array by pressing the menu-key!

Overview



Menu overview

Set-Menu	Adjust-Menu	Description
- Set move speed high	Adjust move speed high X:0...15 Y:0...15 Z:0...15	Fast adjustment speed
- Set move speed low	Adjust move speed low X:0...15 Y:0...15 Z:0...15	Slow adjustment speed
- Set home speed	Adjust home speed X:0...15 Y:0...15 Z:0...15	Adjustment speed of the home function
- Set positioning speed fast	Adjust positioning speed X:0...15 Y:0...15 Z:0...15	Fast adjustment speed while moving to position
- Set positioning speed slow	Adjust positioning speed slow X:0...15 Y:0...15 Z:0...15	Slow adjustment speed while moving to position
- Set positioning mode speed / Slow	Adjust positioning speed mode X:slow/fast Y:slow/fast Z:slow/fast	Speed selection (fast /slow) for movement to position
- Set step speed	Adjust step speed X:0...15 Y:0...15 Z:0...15	Adjust speed for step mode
- Set home direction	Adjust home direction X: - / + Y: - / + Z: - / +	Movement direction for Home Selection: - or +
- Set step distance	Adjust step distance X:1...1000 Y:1...1000 Z:1...1000	Stepdistance entry Adjustable 1µm to 1000µm
- Set ramp length	Adjust start-stop ramp length X:0...15 Y:0...15 Z:0...15	Electronic Chute for pull out and deceleration of the mot. LN-axes
- Set move direction	Adjust move direction X: - / + Y: - / + Z: - / +	Direction of movement of the direction keys
- Set position sign	Adjust position sign X: - / + Y: - / + Z: - / +	Position sign for the LN-axes
- Set handwheel move direction	Adjust handwheel move direction X: - / + Y: - / + Z: - / +	Direction of movement of the handwheels
- Set handwheel resolution	Adjust handwheel resolution L:0...255 S:0...255 H:0...255	Adjust handwheel resolution (low, standard, high)

Menu

- Set low positioning velocity behind PoS	Adjust positioning velocity after SP X:0...15 Y:0...15 Z:0...15	Velocity for the PoS-range.
- Set point of switching position	Adjust distance behind PoS X:0...9990µm	Breakpoint range is adjustable in 10µm steps
- Set interrupt positioning on/off	Adjust interrupt positioning on/off X= on/off _____	See operating manual of the Specialcube-SM5
- Set point of switching (PoS) on/off	Adjust point of switching on/off X= ob/off	Switch the PoS-Function on/off
- Set cube step direction	Adjust step direction of cube Cub1: -/+ cub2: -/+	Step-direction for the step-key of the cube
- Set proportionalfactor	Adjust proportionalfactor X:0...31 Y:0...31 Z:0...31	Rough movement speed for „C“
- Set positioning mode	Adjust positioning mode Mode: Complete level Mode: Single stage	Selection of positioning mode - Complete level oder - Single stage

Technical Data

Casing (LxBxH): approx. 300 x 270 x 65mm

Weight: 1,7kg

Operating voltage: $U_B=12V_{DC}$

Operating current: $I_B=300mA$

EC-conformity declaration
2004/108/EG
EN61000-4-2 (Level 3/3)
EN61000-4-4 (Level 4)
EN55022-B