Homing Procedure Setup

This article is designed to introduce the reader to the basics of the homing procedure using myCNC software. The homing procedure is done using sensors (optical, mechanical, etc) that are set up on the edges of the machine's working surface in order to find the initial machine position (the Home position). This setup can be done for every axis that your machine is using.

A quick video recap of the full manual is presented in this video:



A lot of times, the homing procedure is initiated automatically upon program start, etc. To initiate the process manually, a Homing XYZ button is available in the Mill tab of the myCNC software (in X1366M, X1366M4E and X1366V profiles - available in the Plasma/Gas tabs in X1366P and X1366G profiles respectively):

Last update: 2022/10/21 13:54 quickstart:mycnc-quick-start:homing_setup http://docs.pv-automation.com/quickstart/mycnc-quick-start/homing_setup



In order to set up the homing procedure, do the following:

1. Go to **CNC Settings > Config > Macro List > M138**, and set up the homing procedure for the necessary axes by commenting out the axes and commands which are not required for your particular setup. This is done by adding ; in front of the commands, as shown in the screenshot below. For the configuration used in this example, the machine uses three axes (x, y and z), so the a-axis is not required, as well as the commands in the first half of the macro.



The code for a three-axes machine will therefore look like this:

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;G10L80 P7391 Q0 ;G10L80 P7392 Q0 ;G10L80 P7393 Q0 M133 (Z) ;M134 (A) M132 (Y) M131 (X)

Note that the Z axis comes first, as the machine usually needs to lift the tool up before moving it in the xy-plane as to not crash into any obstacles.

A quick explanation of what each line of the above code represents:

- The first four lines (*G10L80 P7391 Q0*, etc) will simply set a zero for a variable that indicates the need for homing (variables #7391, etc). This will allow the user to simply forego the homing procedure by effectively indicating that the homing flag for each axis has been set to zero (so that no homing is needed).
- If the actual homing is required, the user needs to comment out the commands to set the flags to zero, and to run actual homing procedures (M133, M134, etc). Therefore, one or the other has to be commented out.
- The ; symbol commends out the line, anything in brackets such as (A) is also a comment

2. Open **CNC Settings > Config > Macro Wizard** and select the particular axis you would like to run the homing procedure for (Homing X in case of this example). The screen presented to you will look as follows:

Info Support Camera Config			SAVE CFG
CNC Settings ▲ MPG through binary inputs Jog through ADC inputs J/O Expand cards mapping ADC Mapping ADC Mapping Connections Network Motion * PLC Hardware PLC Templates Hardware PLC Templates Findware PLC Configuration Software PLC Configuration Software PLC G-codes settings DXF import settings Macro Uizard ▲ Homing X Homing C Homing U Homing U Homing V Homing W Homing V Homing W Homing V Homing U Homing V Homing KY Gantry Alignment Back to Path Surface Measure Tool Length Measure Tool Change * Probing Config ▲	Homing direction Sensor Number/Type Encoder Index/Z home detection Index/Z input number Distance to Encoder Z Sensor Ignore Limits Soft stop Distance to Home Sensor Gap <u>5</u> Speed, Slow Speed Position After Homing Reset Work position Macro filename <u>M131</u> Macro header <u>(M131 Homi</u> Macro footer Generate	- ▼ 5 ÷ 99 ÷ 99 ÷ 1000 Gap Speed 1000 60 0 ✓ (*)default is: M131 mg X)	Macro preview G10 L80 P5521 Q1 G10 L80 P5525 Q1 M89 L1 P2(Quick stop when sensor triggered) G91 G0 X -200.0000 F 600.00 G04 P0.1 G91 G0 X 200.0000 F 30.00 G04 P0.1 G90 G10L70 P0 X #5451 G10 L80 P5521 Q0 G10 L80 P5525 Q0 G10 L80 P7391 Q0 (Homing Flag)

3. Select the **Homing direction** for the machine. This is selected depending on where your sensor is located in relation to the working bit of the machine. If the machine will have to move in the negative x, y or z direction to find it, select -. If the machine will have to move in the positive x, y or z direction, select +.

Last update: 2022/10/21 13:54 Unfo Support Camera Config C Support X	t:mycnc-quick-start:homing	g_setup http://docs.pv-automa	tion.com/quickstart/mycnc-quick-start/homing_setu
CNC Settings MPG through binary inputs Jog through ADC inputs I/O Expand cards mapping ADC Mapping Connections Network Motion PLC Hardware PLC Templates Hardware P	Homing direction Sensor Number/Type Encoder Index/Z home detection Index/Z input number Distance to Encoder Z Sensor Ignore Limits Soft stop Distance to Home Sensor Gap 5 Speed, Slow Speed Position After Homing Reset Work position Macro filename M131 Macro header Macro footer Generate	- ▼ S Normally closed ▼ S P P Normally opened ▼ P T O O Gap Speed 500 1000 60 O O V Y (*)default is: M131 ing X) Save_macro	G10 L80 P5521 Q1 G10 L80 P5525 Q1 M89 L1 P2(Quick stop when sensor triggered) G91 G0 X -200.0000 F 600.00 G04 P0.1 M89 L0 P2(Quick stop when sensor triggered) G91 G0 X 200.0000 F 30.00 G04 P0.1 G90 G10L70 P0 X #5451 G10 L80 P5522 Q0 G10 L80 P5525 Q0 G10 L80 P7391 Q0 (Homing Flag)

4. Select your sensor number (depending on the input number to which you have connected the sensor) and its type (normally opened or normally closed).

Info Support Camera Config					CFG
CNC Settings	Homing direction	-	*		Macro preview
Axes/Motors				. 1	
 Inputs/Outputs/Sensors 	Sensor Number/Type	5	Normally open	ied 🗾	G10 L80 P5521 Q1
Alarms	En en den in deu (7 herree	data stira			G10 L80 P5525 Q1
X-Alarms	Encoder Index/2 nome	detection 🔀			M89 L1 P2(Quick stop when sensor triggered)
Limits Triangers (Timesus	Index/Z input number	99	🔶 Normally open	ned 👻	G91 G0 X -200.0000 F 600.00
MBG through binany inputs	Distance to Encoder 7.9	ancor			G04 P0.1
log through ADC inputs	Distance to Encoder 2.3	ensor			M89 L0 P2(Quick stop when sensor triggered)
I/O Expand cards mapping	Ignore Limits	v			G04 P0 1
ADC Mapping	Soft stop				G90 G10I 70 P0 X #5451
Connections	Solitistop				G10 L80 P5521 O0
Network	Distance to Home Sensor	1000			G10 L80 P5525 Q0
Motion	Con E		nood E00		G10 L80 P7391 Q0 (Homing Flag)
▼ PLC	Gab 2		peed 500	_	
Hardware PLC	Speed, Slow Speed	1000	60		
Hardware PLC Templates	Desition After Lleming				
Hardware PLC: XML configs	Position After Homing	U			
PLC Configuration	Reset Work position				
Software PLC	Macro filename	v131 -	(*)default is: M131		
G-codes settings		_	()=-j==		
DXF Import settings	Macro header	M131 Homing X)			
Macro List	Macro footer				
Homing X					
Homing Y	Generate 🖌	Sav m	e acro		
Homing Z					
Homing A					
Homing B					
Homing C					
Homing U					
Homing V					
Homing XY					
Gantry Alignment					

Note that the normally opened or normally closed does not depend on the particular sensor or sensor type you are using, but rather on the way it has been set up in myCNC software. In case of this example, Sensor 5 is used, with it being normally opened as can be seen in the System Diagnostics window:

		T1 T2 G54: 5.252 330.246 330.246 T3 T4 G54: -317.310 T99 G54: -32.923 G54: -32.923 G54: -32.923 G54: -317.310 G54: -32.923 G54: -32.923 G54: -32.923 -229.18 -229.18
		$ \begin{array}{c} \bullet & \bullet & \bullet \\ \bullet & \bullet & \bullet \\ \bullet & \bullet & \bullet \\ \bullet & \bullet &$
Jog over speed.[%] Over Speed.[%] 100 120 120	Spindle Speed, [rpm] Tool Length, [rmm] 0.000 Tool Tool T1 15600 Z correction, mm 0.000	
Camera G-code Mill Log	x ← Flood,[ml/hr] G54 G56 G58 ★ M01 0 G55 G57 G59 ► 0 ◄ M06 ₩ M07	

	Binary Input	5				ADC input	ts	Encoders		Machine Homing
	IN00 🔘	IN16 🔘	IN 32 🔘	IN48 🔘	IN64 🥯	ADC 0	0	Enc Slow #0	1	
	IN01 🥌	IN17 🥌	IN 33 🔘	IN49 🔘	IN65 🥯	ADC 1	0	Enc Slow #1	1	
	IN02 🧼	IN18 🝚	IN 34 🔘	IN50 🝚	IN66 🝚	ADC 2	2108	Enc Slow #2	9	
	IN03 🔘	IN19 🥌	IN 35 🔘	IN51 🔵	IN67 🔵	ADC 3	2160	Enc Slow #3	276	Y− Y+ T 152.451 T
	IND4	IN20 🔵	IN 36 🔵	IN52 🥌	IN68 🔵	ADC 4	0	Enc #0	0	
$ \vee $	IN05 💭	IN21 🥌	IN 37 💭	IN53 🥌	IN69 🥮	ADC 5	0	Enc #1	0	7 7 1 1
	IN06	IN22 🥌	IN 38 🔵	IN54 🥌	IN70 🝚	ADC 6	0	Enc #2	0	
	IN07	IN23 🝚	IN 39 📟	IN55 🝚	IN71 🔴	ADC 7	0	Enc #3	0	
	IN08	IN24 💭	IN40 🥌	IN56 🔵	IN72 🔴					A- A+229.183
	IN09 🝚	IN25 🝚	IN41	IN57 🔵	IN73	PWM out	puts	ſ		
	IN10	IN26	IN42	IN58 🔵	IN74 🥌	PWM 1		0		
		IN27 💛	IN43	IN59	IN75			ļ	\leq	
	IN12	IN28	IN44		IN 76	PWM 2		0		
	IN13	IN29	IN45					2	\leftarrow	
						PWM 3		0		
	11413	11131	11947	INOS T	11473				\leq	
						PWM 4		0		
										Gantry Alignment Correction 0.000
	JBINARY OUTPL					PWM 5		•		(#7525)
	00 08		24	32 📢	40 📢	Durin c		, i		(#97) 0.000
						PWM 6		•		Assign tool number
	01 09	() 17 (25 代) 33 🔿	41	DW/M 7		•		
		E C	I 🖳	ਹ ਦਿਸ	<u>e</u>	1 00141 /		, v		
	02 10	R) 18 F	Z) 26 R	34	42 R	PWM 8		0		Tool offset X 0.000
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						G54 G5	5 G56 0	357 G58 G59	'	1 Changes stored to
	07 🔣 15	23 (31 代) 39 🔣	47 📢	CE0.1 CE0	12650.2			flash memory
						659.1659	.2 059.3			

As can be seen from the System Diagnostics window, Sensor 5 is normally open as the indicator light is not on. However, that behaviour can be inverted in **CNC Settings > Config > Hardware > Common Hardware Settings**, so it is always recommended to check the System Diagnostics window to find out what the normal behaviour of the sensor has been set up as.

5. Choose your Limits behaviour in the **Ignore Limits** field. Set the check mark to ON if the sensor you are using for homing is the same as the one you are using for your limits (most common case), and set it to OFF if you are using multiple sensors.

Info Support Camera Config Image: Config Image: Config Image: Config Image: Config Image: Config Image: Config	/21 13:54 quickstart:mych	<pre>start:homing_setup http://docs.pv-aut</pre>	comation.com/quickstart/mycnc-quick-start/homing_setu
	Info Support Camera Config		SAVE CFG
CNC Settings 2 Marris inputs/Outputs/Sensors Alarms Sensor Number/Type XAlarms Encoder Index/2 home detection Limits 99 → Normally opened MFS through blanzy inputs 99 → Normally opened Jg through ADC inputs U/O Expand cards mapping ADC Mapping Connections Network Marto Soft stop Moring P Soft stop Hardware PLC Speed, Slow Speed Hardware PLC Speed, Slow Speed Hardware PLC Position After Homing Macro Itist Macro Itist Macro Itist Macro Itist Homing X Macro footer Homing X Save Homing V Homing V Homing V Homing X Homing X Save Homing X Save	ngs Actors // Outputs/Sensors // Outputs/Sensors // Sensor Sensor // Sensor Sensor // Sensor // Encod Index. Distant // Sensor // Encod Index. Distant // Sensor // Encod Index. Distant // Sensor /	Image: second secon	Macro preview G10 L80 P5521 Q1 G10 L80 P5525 Q1 M89 L1 P2(Quick stop when sensor triggered) G91 G0 X -200.0000 F 30.00 G04 P0.1 G91 G0 X 200.0000 F 30.00 G04 P0.1 G10 L80 P5525 Q0 G10 L80 P5525 Q0 G10 L80 P7391 Q0 (Homing Flag)

6. The **Soft Stop** setting allows for a gradual stop after the sensor has been passed (especially useful with optical sensors). It is highly beneficial to use the soft stop setting in order to not damage the machine moving at a high homing speed that's coming to an abrupt stop due to triggering the sensor.

Info Support Camera Config			SAVE CFG
CNC Settings	Homing direction		Macro preview
Axes/Motors	Homing direction		
 Inputs/Outputs/Sensors 	Sensor Number/Type	5 🔶 Normally opened 👻	G10 L80 P5521 Q1
Alarms			G10 L80 P5525 Q1
X-Alarms	Encoder Index/Z home detection	X	M89 L1 P2(Quick stop when sensor triggered)
Limits	Index/Z input number	99 🔶 Normally opened 👻	G91 G0 X -200.0000 F 600.00
Triggers/Timers			G04 P0.1
MPG through binary inputs	Distance to Encoder Z Sensor		M89 L0 P2(Quick stop when sensor triggered)
Jog through ADC inputs			G91 G0 X 200.0000 F 30.00
I/O Expand cards mapping	Ignore Limits		G04 P0.1
ADC Mapping	Soft stop		G90 G10L70 P0 X #5451
Connections	Distance to Home Sensor	1000	G10 L80 P5521 Q0
Network			G10 L80 P5525 Q0
	Gap 5	Gap Speed 500	G10 L80 P7391 Q0 (Homing Flag)
V FLC	Speed Slow Speed		
Hardware PLC Templates	speed, slow speed	1000	
Hardware PLC Templates	Position After Homing	0	
PLC Configuration	Peset Work position		
Software PLC	Reset Work position		
G-codes settings	Macro filename M131	 (*)default is: M131 	
DXF import settings	Macro header (M131 Hom	ing X)	
Macro List			
🔻 Macro Wizard	Macro footer		
Homing X	Domorroto I	Save 📣	
Homing Y	Generate	macro 💙	
Homing Z			
Homing A			
Homing B			
Homing C			
Homing U			
Homing V			
Forming At			
	I		

The Soft Stop time can be specified in **CNC Settings > Config > Preferences > Start/Stop**. Note that there must be some clearing after the sensor has been passed, as to allow for the Soft Stop to take place without crashing into an obstacle (such as a wall).

Info Support Camera Config		SAVE CFG
CNC Settings	Cutting ON commands	M20; M71; M03;
G-codes settings	Cutting OFE commands	M21: M74: M05:
Macro List	Column of Commands	
 Macro Wizard 	Soft stop time,s	0.05
Homing X	Limit stop time s	0.05
Homing Y	Enne stop enne,s	
Homing Z		Deceleration time, if "Stop" pressed
Homing A	After Chen Handler	Net defined
Homing B	Alter Stop Handler	
Homing C	On Start	
Homing U		
Homing V	Check Soft Limits for the full toolpath	
Gantry Alignment	Teclesth Decition should be aver	
Back to Path	Toolpath Position checking, axes	M X M Y X Z X A X D X C X U X V
Surface Measure		Current position & Toolpath position should be equal in given
Tool Length Measure		axes
Tool Change	Goto Toolpath Position for axes	34 x 34 v 34 z 34 a 34 b 34 c 34 u 34 v
▼ Probing Wizard		
Probing Config		Cutting/Spindle ON & tool moves to toolpath
Probing Macro Wizard		position on start for given axes
 Preferences 		Direct Move 💌
Common	Lift Height	10
Start/Stop	Littingit	
Shape Library Settings	Move-to-Toolpath speed	6000
Colors		
Popup Messages	Current position as Start ((*)Disabled by default)	×
3D Visualisation	Reset work Position on "Reset-NC", "Tie" pressed.	
Work Offsets		
Parking Coordinates		
 Technology 		
Plasma Cutting		

7. The Distance to Home Sensor should be set to be slightly higher than the maximum length that the working piece will have to travel to find the homing sensor. This depends on the particular size of your machine.

Info Support Camera Config		SAVE CFG
CNC Settings Axes/Motors Inputs/Outputs/Sensors Alarms X-Alarms Limits Triggers/Timers MP6 through binary inputs Jog through ADC inputs I/O Expand cards mapping ADC Mapping Connections Network Motion PLC Hardware PLC Hardware PLC Templates Hardware PLC Configs PLC Configuration Software PLC G-codes settings DXF import settings Macro Uist Macro Wizard Homing X Homing Z Homing C Homing U Homing V Homing V Homing V Homing Y Gantry Alignment	Homing direction Sensor Number/Type Encoder Index/Z home detection Index/Z input number Distance to Encoder Z Sensor Ignore Limits Soft stop Distance to Home Sensor Gap 5 Speed, Slow Speed Position After Homing Reset Work position Macro filename M131 Macro header (M131 Homi Macro footer Senerate:	Macro preview (10 L80 P5521 Q1 (10 L80 P5525 Q1 M89 L1 P2(Quick stop when sensor triggered) (691 G0 X -200.0000 F 600.00 (604 P0.1 M89 L0 P2(Quick stop when sensor triggered) (691 G0 X 200.000 F 30.00 (604 P0.1 (690 G10L70 P0 X #5451 (10 L80 P5521 Q0 (10 L80 P525 Q0 (10 L80 P7391 Q0 (Homing Flag))

8. It is sometimes desirable to set the homing position to be slightly further away from the edge at which the sensor is located, so that the Home position is not right at the very edge of the working space. Using the Gap setting, the user can add a gap between the sensor position and the new software Home position (5 mm in case of this example). The Gap Speed will describe the speed with which the machine moves between the sensor (located at the edge) and the gap end (located closer to the centre):

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Last update: 2022/10/21 13:54	Image:	g_setup http://docs.pv-automa	tion.com/quickstart/mycnc-quick-start/homing_setu
Homing Y Homing Z Homing A Homing B Homing C Homing U Homing V Homing XY Gantry Alignment	Generate :/	macro	

9. The **Speed** field specifies the speed at which the machine is moving during its initial movement towards the sensor. After the machine triggers the sensor, it starts to move back in order to find the precise spot at which the sensor has been triggered, at the **Slow Speed**.

CNC Settings → Marrors Marror preview Arrors Alarros Sensor Number/Type 5 >> Normally opened Int US 0 P5521 Q1 Alarros Kalarros Marco Vizard Index/2 Input number 99 > Normally opened G10 L80 P5521 Q1 Marco Wizard Index/2 Input number 99 > Normally opened G40 P0.1 Morto functions Index/2 Input number 99 > Normally opened G40 P0.1 Morto functions Index/2 Input number 99 > Normally opened G40 P0.1 Morto functions Index/2 Input number 99 > Normally opened G51 G0X 200.0000 F 30.00 Gontections Gontections G50 fstop Ø G50 G510.70 P0X #5451 G10 L80 P5521 Q0 Network Byeed, Slow Speed 10000 G00 G10 L80 P5521 Q0 G10 L80 P5525 Q0 G10 L80 P5525 Q0 Nacro fileration Set work position Marco filerame M311 ' ('ydefault is: M131 Marco file Ido P525 Q0 G10 L80 P525 Q0

10. The **Position After Homing** field specifies the value assigned to the position after the homing. For example, if the homing for x-axis took place in the left corner of the workstation, then this x-position will be 0. If, however, the homing sensor was on the right, and the machine is 1000 mm wide, then the homing position will be specified to be 1000.

2023/03/16 20:04		9/13	Homing Procedure Setur
Info Support Camera Config			SAVE CFG
CNC Settings ▲ Axes/Motors ▲ Inputs/Outputs/Sensors ▲ Alarms × X-Alarms ↓ Limits Triggers/Timers MP6 through binary inputs ↓og through ADC inputs ↓/O Expand cards mapping △ △DC Mapping Connections Network Motion ▼ PLC Hardware PLC Templates Hardware PLC Templates Hardware PLC Ge-codes settings DXF import settings Macro Wizard Homing X Homing X Homing B Homing C Homing C Homing C Homing V Homing V Homing V Homing Y Homing X Homing Y	Homing direction Sensor Number/Type Encoder Index/Z home detection Index/Z input number Distance to Encoder Z Sensor Ignore Limits Soft stop Distance to Home Sensor Gap 5 Speed, Slow Speed Position After Homing Reset Work position Macro filename M131 Macro header (M131 Hom Macro footer		Macro preview G10 L80 P5521 Q1 G10 L80 P5525 Q1 M89 L1 P2(Quick stop when sensor triggered) G91 G0 X -200.0000 F 600.00 G04 P0.1 G91 G0 X 200.0000 F 30.00 G04 P0.1 G90 G10L70 P0 X #5451 G10 L80 P5521 Q0 G10 L80 P5525 Q0 G10 L80 P7391 Q0 (Homing Flag)

11. Choose whether you want to reset your Work Position or not after the homing is done.

12. Choose your Macro filename (it is recommended to keep the default macro filenames unless otherwise required). The default macro filenames are as follows:

- M131 for the Homing X procedure
- M132 for the Homing Y procedure
- M133 for the Homing Z procedure
- M138 for Homing XYZ

13. Add any necessary macros to the Macro Header and Macro Footer if so desired. These will be added in the beginning or in the end of the Homing procedure respectively. THESE FIELDS ARE USUALLY LEFT BLANK.

Info Support Camera Config Config Support Camera Config Support C	_ast update: quickstart 2022/10/21 13:54	art:mycnc-quick-start:homir	ng_setup http://docs.pv-automa	tion.com/quickstart/mycnc-quick-start/homing_set
CNC Settings Axes/Motors Homing direction - Macro preview Axes/Motors Sensor Number/Type 5 + Normally opened * G10 L80 P5521 Q1	Info Support Camera Config	g		SAVE CFG
Alarms Finceder Indev/Z home detection Image: Singer	CNC Settings → Axes/Motors Inputs/Outputs/Sensors Alarms X-Alarms Limits Triggers/Timers MPG through binary inputs Jog through ADC inputs J/O Expand cards mapping ADC Mapping Connections Network Motion → PLC Hardware PLC Templates Hardware PLC Configuration Software PLC G-codes settings DXF import settings Macro Uizat + Homing X + Homing B + Homing C + Homing K + Homing K + Homing W + Homing W + Homing W + Homing K + Homing K +	Homing direction Sensor Number/Type Encoder Index/Z home detection Index/Z input number Distance to Encoder Z Sensor Ignore Limits Soft stop Distance to Home Sensor Gap 5 Speed, Slow Speed Position After Homing Reset Work position Macro filename M131 Macro header (M131 Hor Macro footer Generate	- ▼ 5 ★ 99 ★ 99 ★ 1000 ✓ 1000 60 0 ✓ ✓ (*)default is: M131	Macro preview G10 L80 P5521 Q1 G10 L80 P5525 Q1 M89 L1 P2(Quick stop when sensor triggered) G91 G0 X -200.0000 F 600.00 G04 P0.1 G91 G0 X 200.0000 F 30.00 G04 P0.1 G90 G10L70 P0 X #5451 G10 L80 P5521 Q0 G10 L80 P5525 Q0 G10 L80 P7391 Q0 (Homing Flag)

Any macro in brackets such as this:

(M131 Homing X)

```
is "commented out", disabling its addition to the Homing procedure.
Add the necessary macros without brackets, separated by a semicolon such as
this:
```

M5;M9

14. Press **Save Configuration**, then press **Generate** and **Save macro**.

2023/03/16 20:04

Info Support Camera Config			SAVE
CNC Settings Axes/Motors Inputs/Outputs/Sensors Alarms X-Alarms Limits Triggers/Timers MPG through ADC inputs I/O Expand cards mapping ADC Mapping Connections Network Motion PLC Hardware PLC Hardware PLC Templates Hardware PLC Configuration Software PLC G-codes settings	Homing direction Sensor Number/Type Encoder Index/Z home detection Index/Z input number Distance to Encoder Z Sensor Ignore Limits Soft stop Distance to Home Sensor Gap Speed, Slow Speed Position After Homing Reset Work position Macro filename	. ▼ 5 ◆ 5 ◆ 99 ◆ 99 ◆ 1000 Gap Speed 1000 60 0 ✓ (*)default is: M131	Macro preview (10 L80 P5521 Q1 (10 L80 P5525 Q1 M89 L1 P2(Quick stop when sensor triggered) (91 G0 X -200.0000 F 600.00 (604 P0.1 M89 L0 P2(Quick stop when sensor triggered) (631 G0 X 200.0000 F 30.00 (604 P0.1 (500 G10L70 P0 X #5451 (10 L80 P5525 Q0 (10 L80 P5352 Q0 (10 L80 P7391 Q0 (Homing Flag))
Macro List Macro Wizard Homing X Homing Y Homing A Homing A Homing B Homing C Homing U Homing V Homing XY Gantry Alignment	Macro header (M131 Hom Macro footer	Save macro	

Using Incremental Encoders

These settings allow for a higher accuracy during the homing procedure, however they require using an incremental encoder which might not always be feasible. These settings are located on the same screen, as shown below:

CNC Settings	
Axes/Motors	
sensor Number/Τγρe 5 🛟 Normally opened 🚽 G10 L80 P5521 Q1	
Alarms G10 L80 P5525 Q1	
X-Alarms Encoder Index/Z home detection 🔀 M89 L1 P2(Quick stop when sensor triggered)	
Limits Index/Z input number 99 🔶 Normally opened 🗸 691 G0 X -200.0000 F 600.00	
Triggers/Timers G04 P0.1	
MP6 through binary inputs Distance to Encoder Z Sensor M89 L0 P2(Quick stop when sensor triggered)	
Jog through ADC inputs	
I/O Expand cards mapping lignore Limits V G04 P0.1	
ADC Mapping Soft stop G90 G10.70 PX #5451	
Connections G10 L80 P5521 Q0	
Gap 5 Gap Speed 500 Gib Lav P331 Qu (Homing Flag)	
Hardware PLC Sneed Slow Sneed 1000 60	
Hardware PLC Templates	
Hardware PLC: XML configs Position After Homing 0	
PLC Configuration Reset Work position	
Software PLC	
G-codes settings Macro filename M131 (*)default is: M131	
DXF import settings Macro header (M131 Homing X)	
Macro List	
Macro Wizard Macro footer	
Homing X Save	
Homing Y Generate macro	
Homing Z	
Homing A	
Homing B	
Homing C	
Homing U	
noning v	
Gontry Alignment	

1. Set the checkmark to ON for the **Encoder Index/Z Home Detection** in order to use this setting.

2. As with the sensor from Step 4 of the regular procedure, set your sensor number and its normal

behaviour.

3. Set the **Distance to Encoder Z Sensor** (usually used on Linear Encoders). This is useful when a linear encoder is located some distance away from the sensor, and is set to be slightly smaller (on the scale of nearly a millimeter) than the actual distance to the encoder. This setting is not necessary, however it does allow the user to lower the required time that the machine spends on the Encoder Z Home Detection.

Checking sensor contact at homing start

In certain situations, homing may start while the homing sensor is already "engaged" (i.e. the sensor is in a state that indicates that contact has been made already). This may be due to a faulty sensor/setup, or it may be due to the fact that the sensor is touching the machine. In that case, it is not desireable to continue moving the sensor any further, as this may physically break it.

To prevent this, a Hardware PLC can be used. An example of such a PLC is M286, which is generated automatically for tasks such as Surface Measure. For the Surface Measure procedure, the macro code that includes M286 will look the following way:

M286 P[35] L[256+2] (lift up sensor activated, sensor normally opened)

or

M286 P[256+35] L[256+2] (lift up sensor activated, sensor normally closed)

Note that the 35 part of the code refers to port 35 - this value must be customized depending on the input port used.

The code for M286 Hardware PLC itself is shown below:

```
///// FILE GENERATED AUTOMATICALLY. DO NOT EDIT IT. /////
#define input var00
#define state var01
main()
{
  input=eparam & 0xFF;
                               //P-parameter lo byte
  state=(eparam>>8) & 0xff;
                              //P-parameter high byte
  axis= (eparam>>16) & 0xff; //L-parameter lo byte
  dir=
          (eparam>>24) & Oxff; //L-parameter high byte
  axis mask=0;
  if (axis<6) {axis mask=1<<axis;}</pre>
  else { exit(99); };
  length=100; //1mm
  if (dir==0) { length=0-length; };
```

```
gvarset(7080,1000); //set speed
do {
  a=portget(input);
  if (state==0) { if (a==0) { exit(99); }; };
  if (state!=0) { if (a!=0) { exit(99); }; };
  g0moveA(0, axis_mask, length); //incremental programming;
  timer=200; do{timer--;} while (timer>0); //wait motion started
  //wait motion stopped
  do { code=gvarget(6060); } while (code!=0x4d);
  }while (1);
  exit(99);
};
```

This PLC will check if the input port is "triggered", and will move the machine in 1mm increments until the the conditions are met.

If the port is in its "correct" state, the PLC will exit immediately.

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