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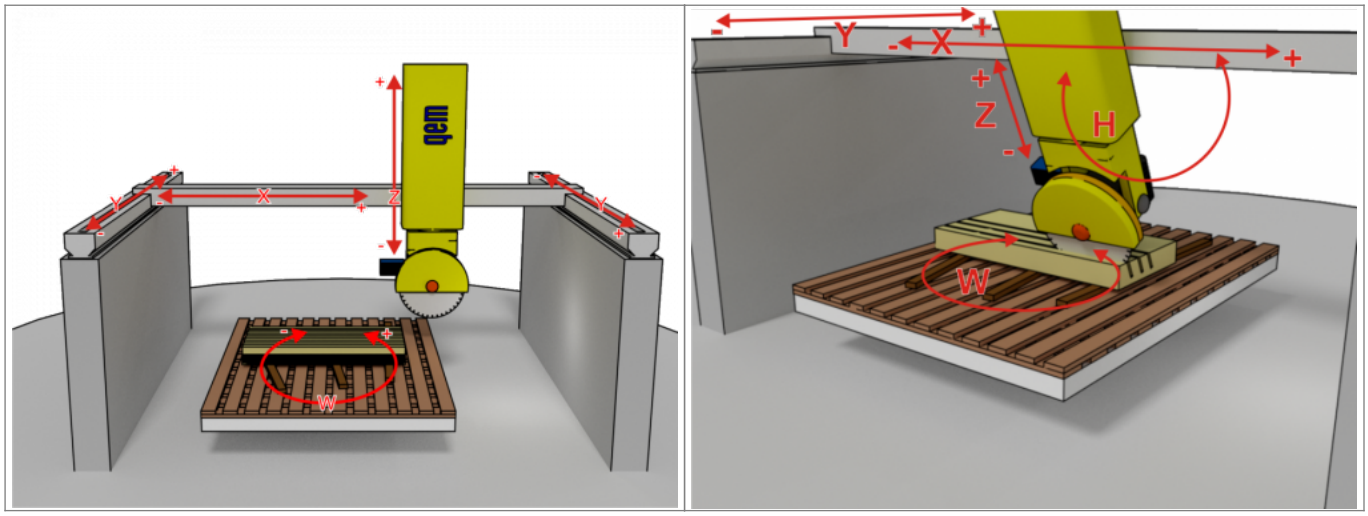
MDO_P1P44F-010: Operator Manual



1. Informations

1.1 Release

Document:	**mdo_p1p44f-010**
Description:	p1p44f-010 Operator Guide
Editor:	Michele Sandri
Approver	Gabriele Bazzi
Link:	http://www.qem.eu/doku/doku.php/en/strumenti/qmoveplus/j1p44/p1p44f-010/mdo_p1p44f-010
Language:	English

Document Release	Description	Note	Data
01	New Manual		27/08/2019
02	Add Description and Y-Axis Calculation Function Page		31/03/2021

1.1.1 Specifications/Copyright

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Trademarks:

- QEM® is a registered trademark.

2. General features

2.1 Description

The *J1-P44-FB20* innstrument with the P1P44F-010 software, it's suitable for automating a machine type: **„cutter for stone processing“**.

2.2 Workings

- single cut
- tile cutting
- tilt cut [1)]
- profiling
- drawing profiles with Mini Cad inside
- profile drawings with Cad on PC and importing on the instrument with „ Profile Importer 8“ program with USB or LAN key
- table flattening

[1)] with parameters, you can define whether the inclined cut will be done with the tilt of the beam, or with the tilt of the disk

2.3 Options

- the W table can be motorized or manual
- the H-axis may or may not be there, if present it can be manual or motorized or only mechanical (without encoder)

2.4 Features

- The axes can be controlled with:
  - normal positioning
  - with the conclusion of the positioning with „pulse technique“, which allows you to achieve greater accuracy, if mechanical inertia tended to make the positioning wrong.
    If due to the mechanics and type of inverter, the final part of the positioning was incorrect, the tool to overcome this problem, provides this functionality.
    Typically, it is used on the Table or W-axis, on which very different weights can be loaded between them...causing a NOT constant space of inertia .
  - Bridge lifting alarm: If the Z-axis were to happen, pressing down would lift the bridge, the limit switch installed on the bridge and connected to the I67 input will activate the alarm.
  - Manage of X Y Z + W (Table rotation) axes + H (disk tilt).

> The H encoder is connected to the J1-P44-FB20 instrument, while the X Y Z-W encoders are connected to the RMC1S modules

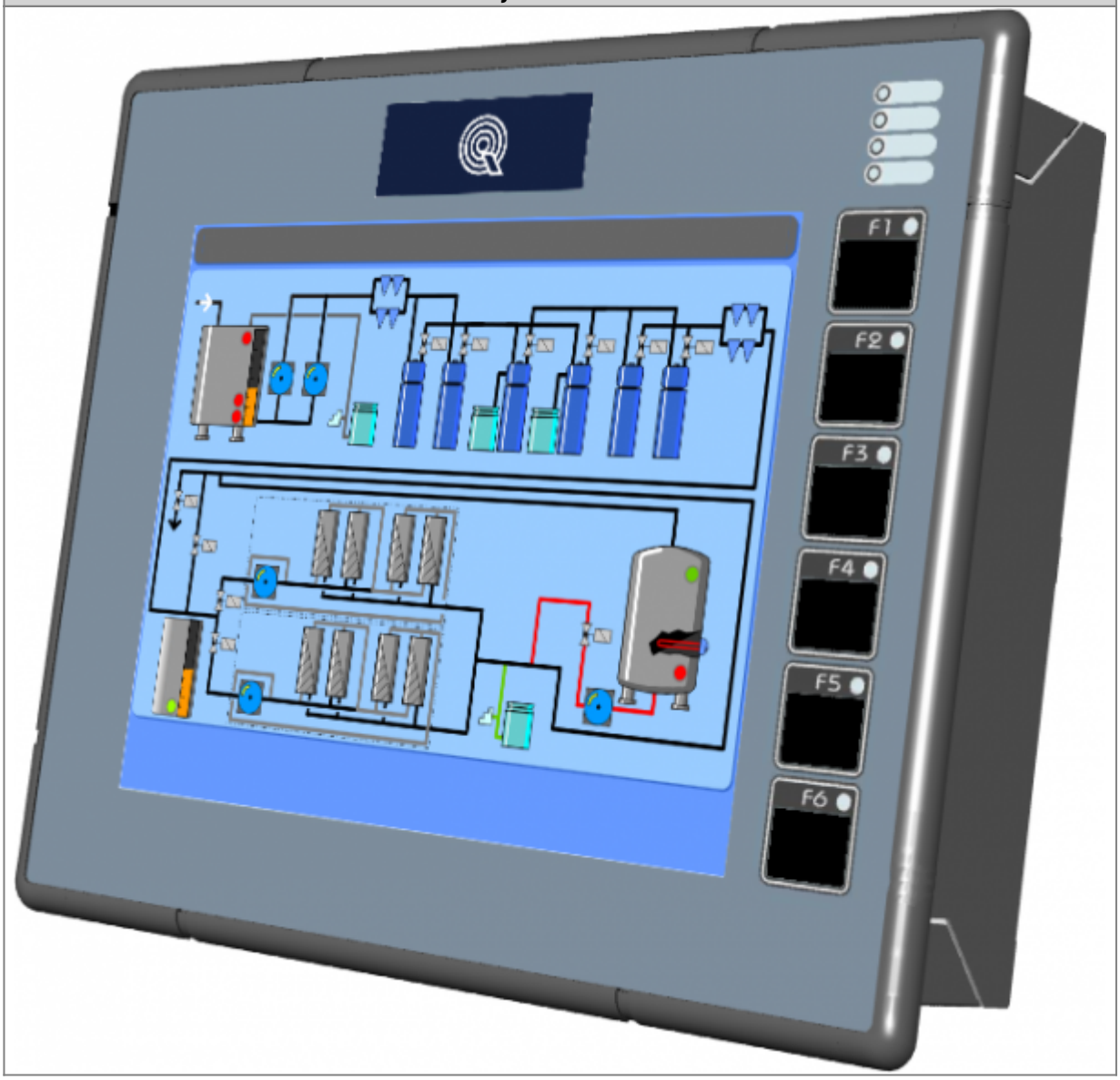
- Errors in the mechanics of the W and H axes can be corrected by providing no.8 linearization sectors.
- There is a table in which you can set the maximum diameter and turns of the cutting disk.
- Measuring and displaying the current of the cutting disc; the maximum current setting is allowed.

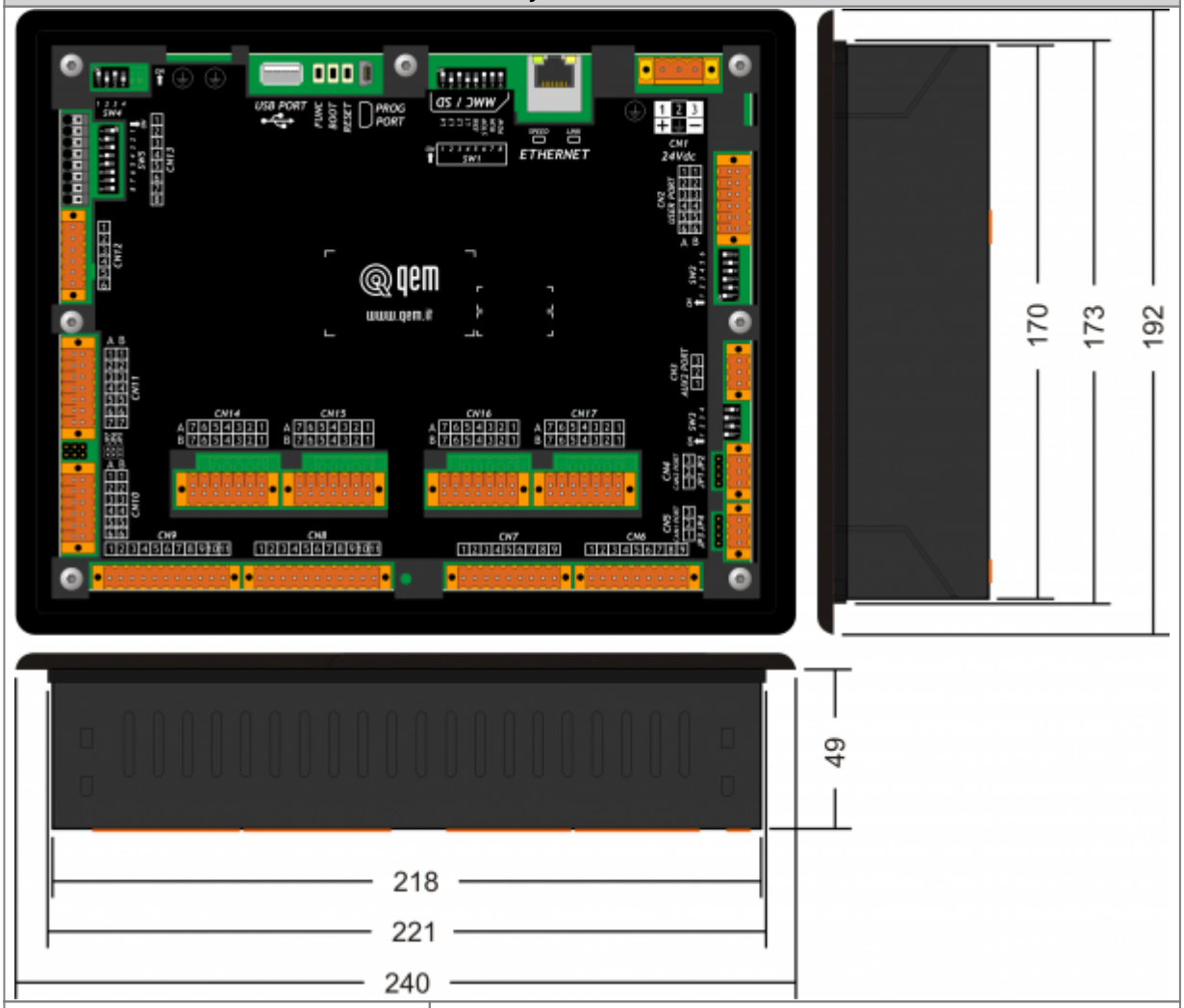
2.5 Executable working

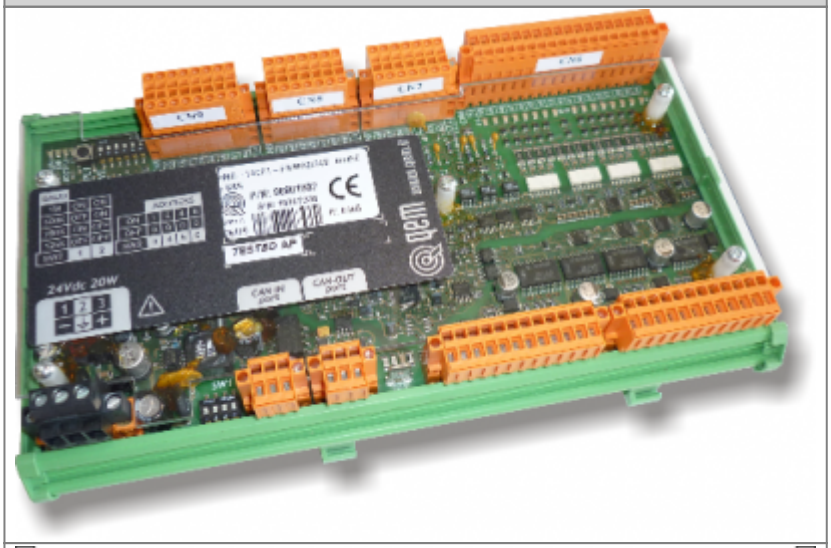
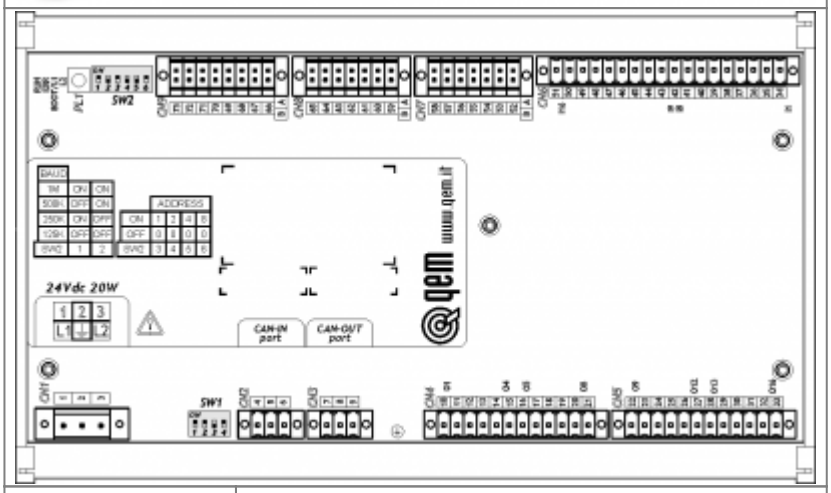
Multiple Cut	Tile Cut	Tilted cut

Profiling	Flattening	

3. Hardware

J1-P44-FB20


J1-P44-FB20	
	
	J1-P44-Fx:Installation and Maintenance Manual

RMC-1SC01E1/DP1/24Vdc


RMC-1SC01:Installation and Maintenance Manual

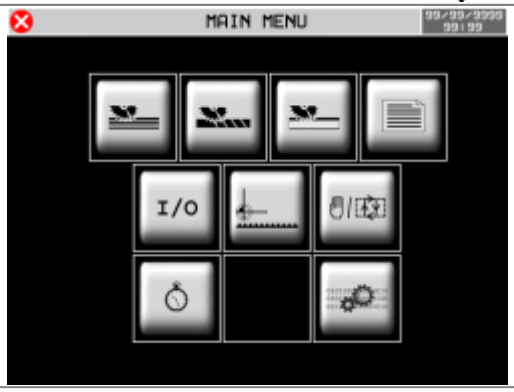
• 3.1 Function and LED keys

Key	Icon	Function	Led	Key	Icon	Function	Led
F1		**Start Cycle**	-	F4		**Semi-automatic = ON**	Active semi-automatic
F2		**Stop Cycle**	-	F5		**Alarm = ON**	Alarm
F3		**Restart**	-	F6		**Exit**	-
- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -

3.2 Symbols and keys

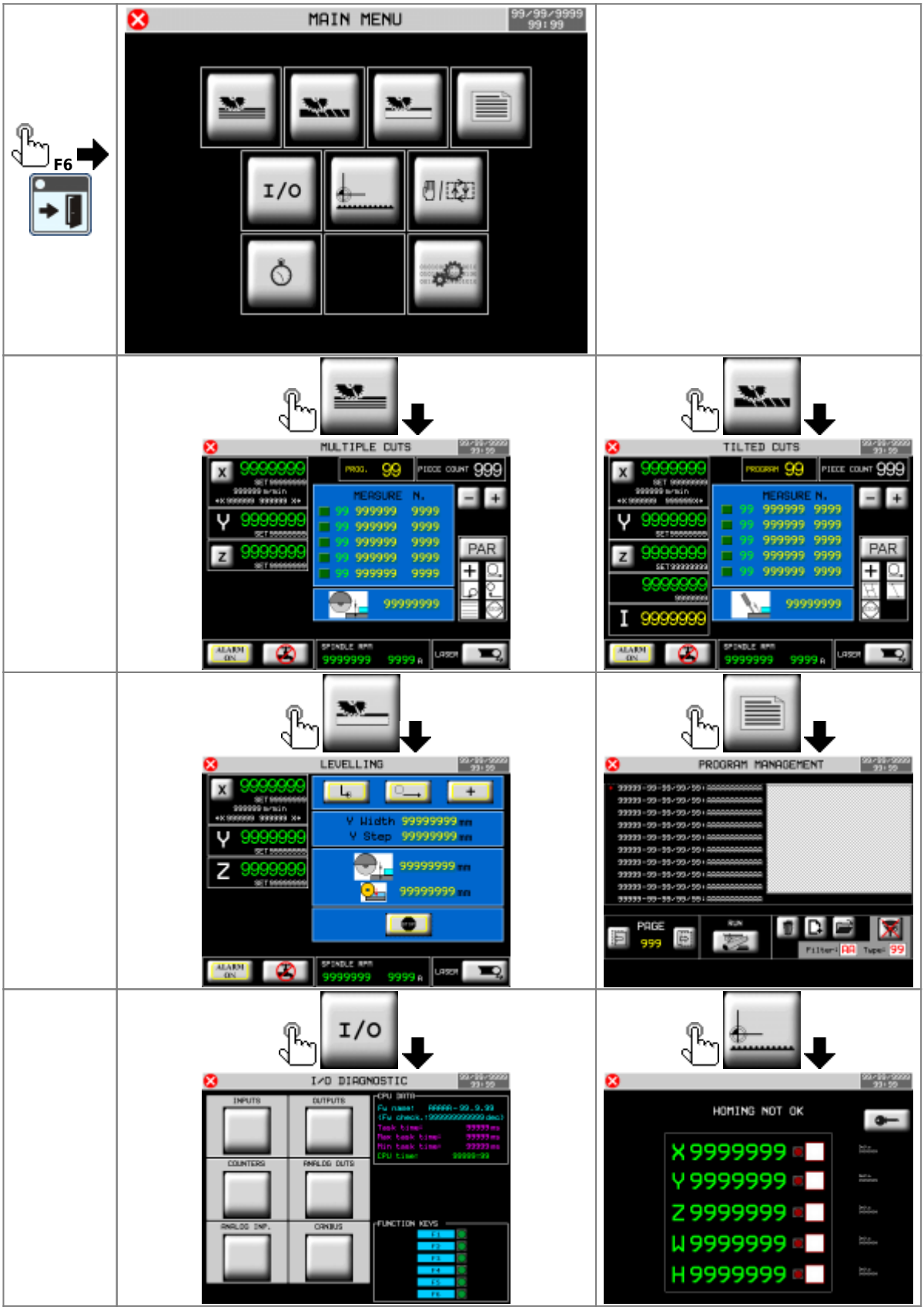
Key	Description	————————-	Top bar symbols	Description
	Press to confirm			Initialization
	Selection			Emergency
	Previous page			Manual
	Next page			Homing active
	Reserved area			Semi-automatic
	Open file from USB			Automatic - cycle OFF
	Save			Automatic - cycle ON
	Working preview			Calibration mode
				Protected/Unprotected Setup
	The yellow data is editable			

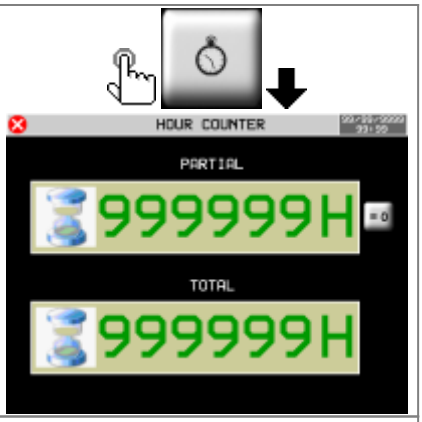
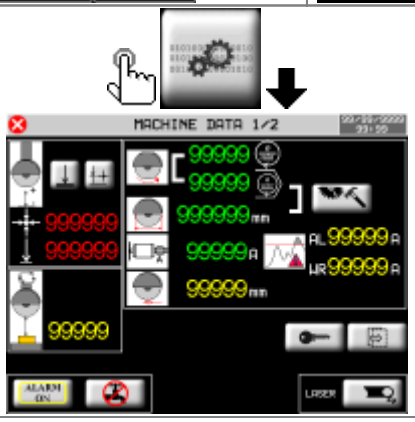
• 3.3 Startup

START		The instrument waiting the input to be activated **„activated auxiliaries“**[1] to automatically go to the next page **Important**: pressing the button you can navigate the HMI, with the **machine stationary**
HOMING		**OR** **F6** for exit
MAIN MENU		

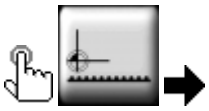
[1] These are the 24 Volt dc power supplies of the RMC1S modules, limit switches, encoders, relays, etc.

• 4. Main menu


F6
MAIN MENU
I/O
MULTIPLE CUTS
TILTED CUTS
LEVELLING
PROGRAM MANAGEMENT
I/O DIAGNOSTIC
HOMING NOT OK

	MANUAL BASE X Y Z 9999999 999999 ALARM ON SPINDLE RPM LASER	 HOUR COUNTER PARTIAL 999999H TOTAL 999999H
	 MACHINE DATA 1/2 99999 999999 99999 ALARM ON LASER	

- ## 5. Homing

			
	Axis enabled for homing procedure		Homing OK
	Axis not enabled for homing procedure		Homing not OK
Delta 99999999	Delta error compared to previous homing		
	ALWAYS homing before moving to the MANUAL page. **If homing is missing, it affects the functionality of the machine.**		

5.1 Homing procedure

1. Activate the MANUAL
2. Check that there are no ALARMS
3. Select the axes to homing
4. Press **START** (I10) or **F1**
5. If the Homings procedure was successful, the green led is turned on
6. If an error occurred during the Homing process, the red is turned on
7. Verify that the error delta (number that appears next to each axis) is = 0 (about)

• 5.2 Error Delta

This data indicates the **Error Delta compared to previous homing**, with this value you can easily check if an encoder is good or is broken.

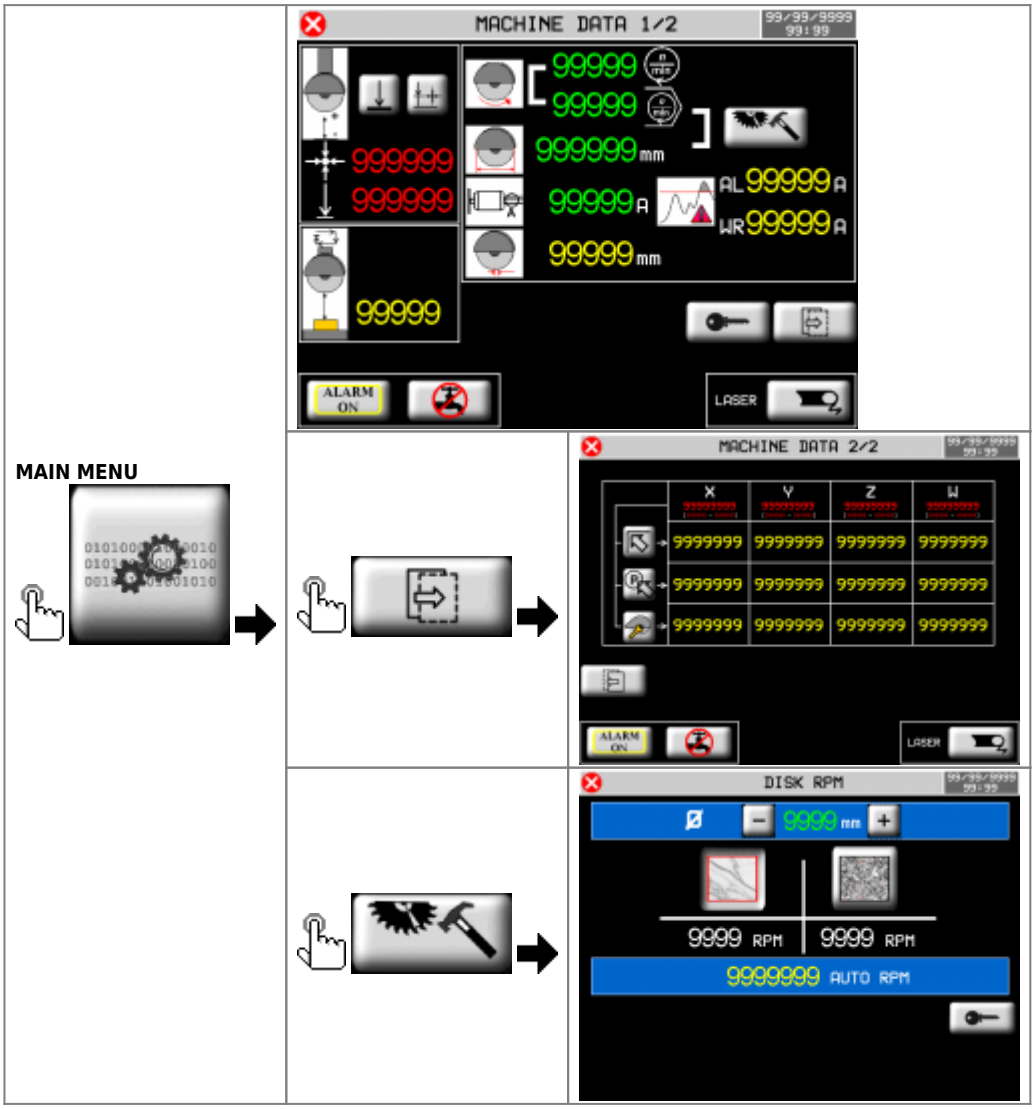
Procedure:

1. Execute an homing [1)]
2. Move the axis in manual, numerous times forward and backward
3. Then, without turning off the machine, re-execute the homing
4. The second homing will make it take on an **„important“** meaning to this number: will show us how much is the offset of the count compared to the actual physical position of the machine
5. If the encoder counts well, this offset must be = 0
6. Then, in practice, this number probably won't always be just = 0 due to the tolerance of limit switch used to do homing
7. Repeating the homing several times, you will be able to realize if the number shows a faulty encoder, or an error given by the tolerance of the limit switch
8. A small error not always repetitive, evidence the tolerance of the limit switch
9. A big error, it will show clearly, a problem to the encoder

---

[1)] The first time you execute an homing (after the instrument is turned on), this number doesn't have a utility

- ## 6. Machine datas

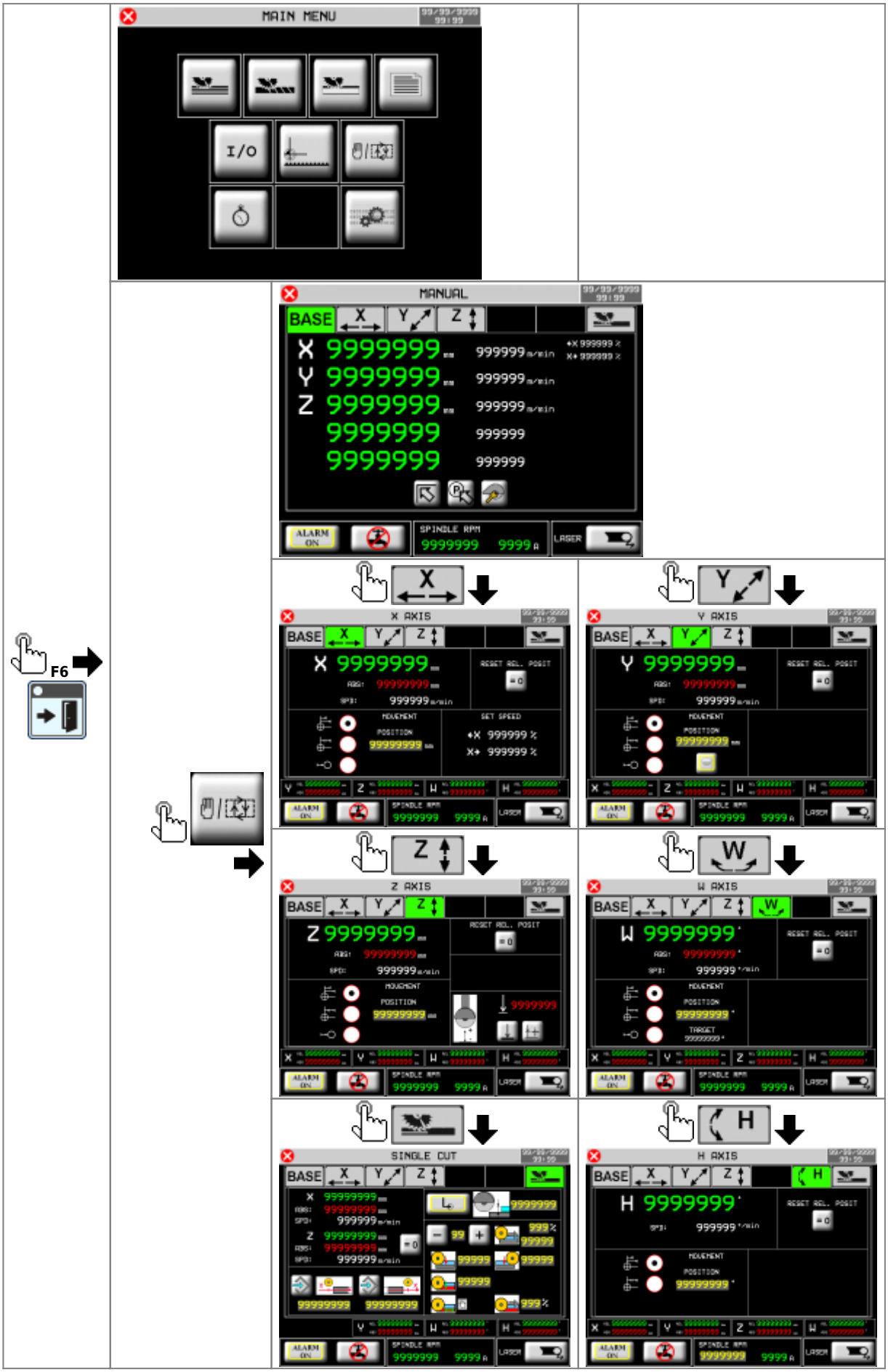


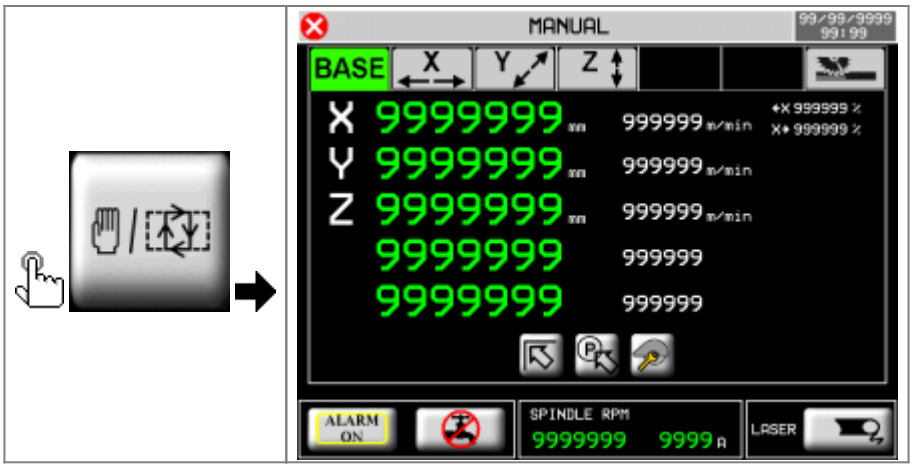
Setting **Minimum location Z**	Automatic setting **Minimum location Z**	SECURITY QUOTE setting
Disk RPM	Disk diameter	Diameter and RPM setting
Current Disk Absorption	AL : Maximum current setting WR : Early warning threshold setting	Disk thickness setting
Out-of-clutter position	Parking position	Tool change position
DISK DIAMETER AND RPM		
9999 mm Disk diameter	Marble	Granite
9999999 AUTO RPM Automatic RPMs based on disk diameter - Setting an RPM Override		

• 7. Bottom bar

	: Active Stateflow Alarm : Off Stateflow Alarm	
	: EV water deactivates : EV active water	
SPINDLE RPM		**Ø** : Current diameter **RPM** : Set the desired rounds **MIN RPM** : Minimum setable value **MAX RPM** : Maximum setable value
99999 A	Instantaneous absorption of spindle current.	If the **WRN** symbol appears above the current absorption indication, it means that the pre-alarm threshold has been exceeded.
	: EV laser disables : EV laser active	

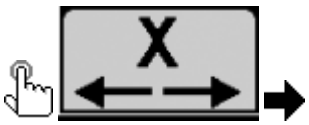
- **8. Manual/Semi-Automatic**





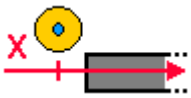
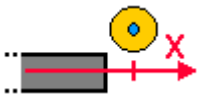
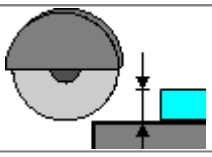
•

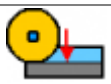
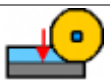
	Out-of-clutter position		Parking position		Tool change position

		
TARGET POSITION SET	- **ABSOLUTE TARGET POSITION** - **INCREMENTAL TARGET POSITION** - **0 TARGET POSITION**	Reset Relative Position = 0
		Disk Compensation **OFF** **ON**

Minimum Z Position

Z Minimum Position Self-Learning

	X positions self-learning		**X** START Cut Position		**X** END Cut position
	Single Pass		Greek cutting		Cut Depth

Set dati del taglio a greca (max 10) 01		% Reducing the speed of the first cut		
		Forward lowered (X+)		Backward lowered (X-)
Last Cut Direction		Last lowered depth		% Reducing the speed of the last cut

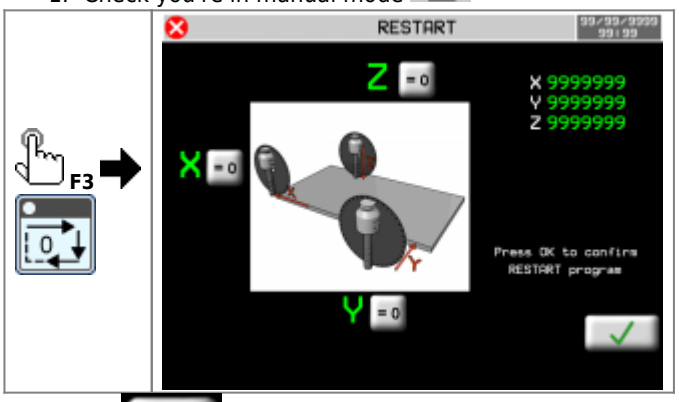
- ## 8.1 Semi-Automatic Execution

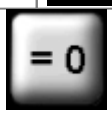
1. Check that you are in manual
2. **F4** →
3. external **START** key (I10) or **F1**
4. the axis reaches the set dimension or single-cut is executed.

• 9. Reset axes

The reset axes function **reset RELATIVE quotas**

1. Check you're in manual mode

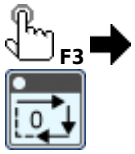


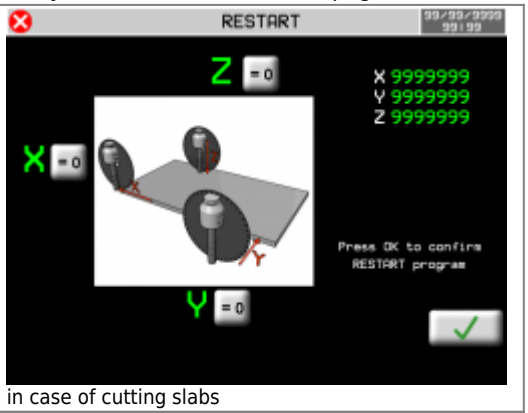
1. **X** -  : hold to reset the X-axis count
2. **Y** - : hold to reset the Y-axis count
3. **Z** - : hold to reset the Z-axis count
4. **F6** - Exit from the page

• 10. Restart working

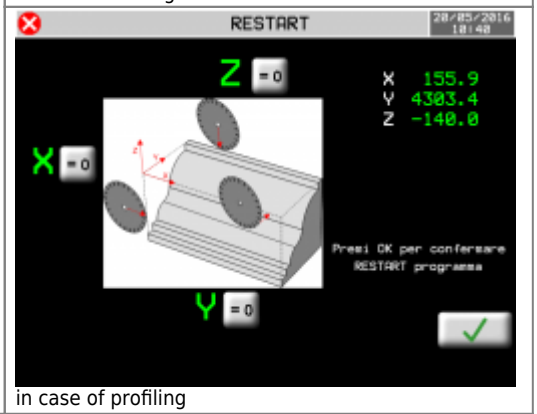
The restart function **restarts the loaded working from the beginning**

1. Check that you're in manual mode
2. Check that you're on one of the work pages





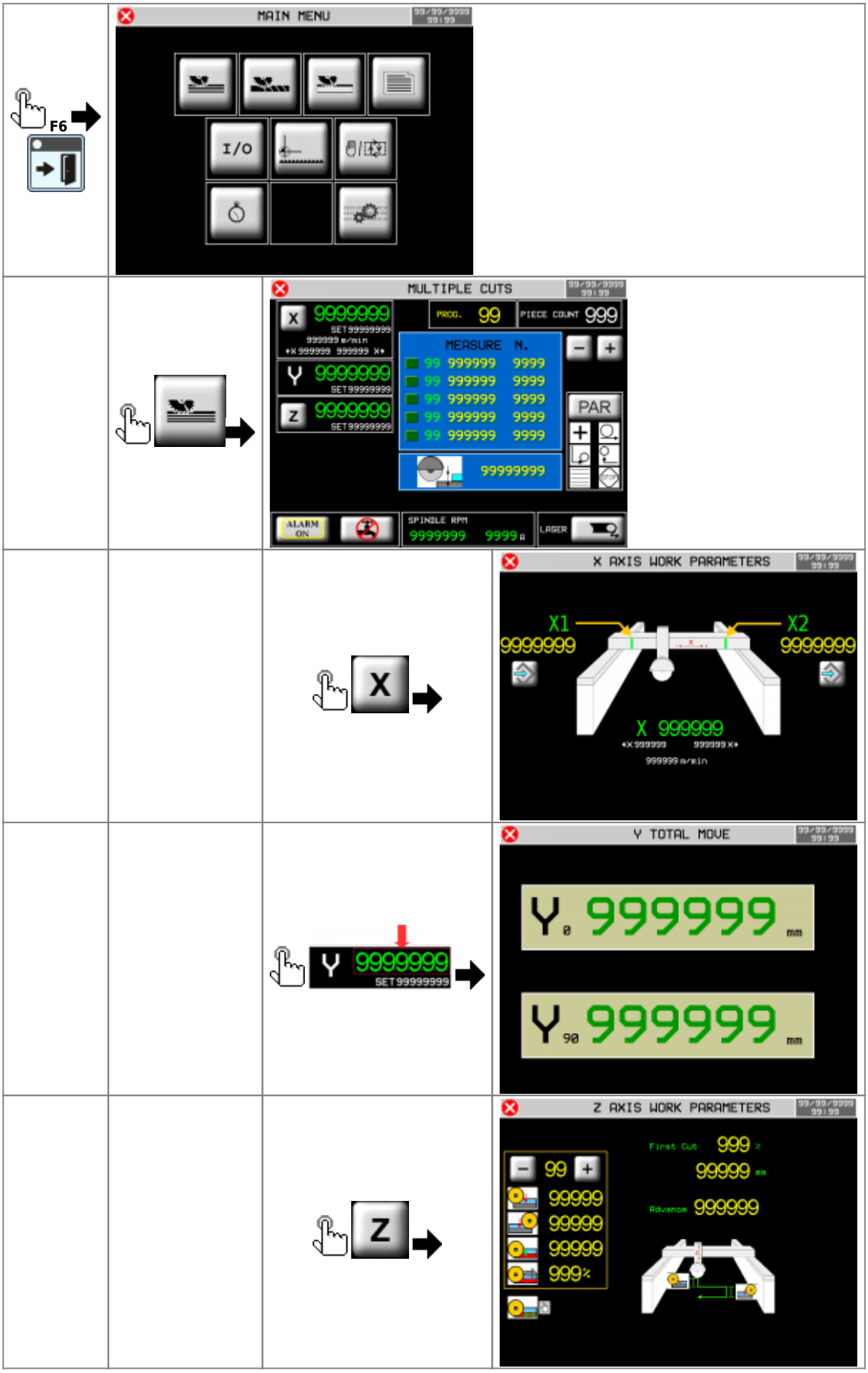
in case of cutting slabs

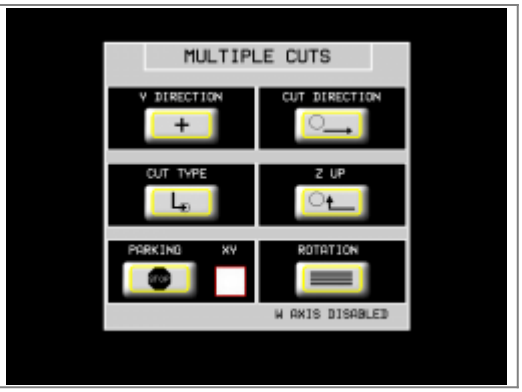


in case of profiling

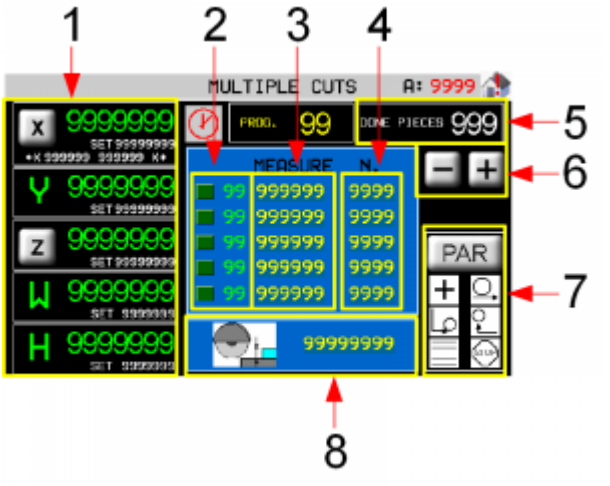
1. **OK** - : press to confirm the restart and exit the page
2. **F6** - Exit from the page without confirmation

- **11. Muliple Cuts/Automatic**



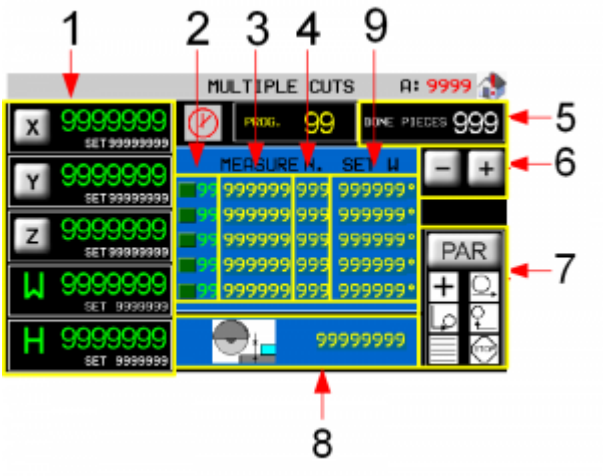
		PAR	 MULTIPLE CUTS Y DIRECTION CUT DIRECTION CUT TYPE Z UP PARKING XY ROTATION W AXIS DISABLED

- **11.0.1 Without table rotation**



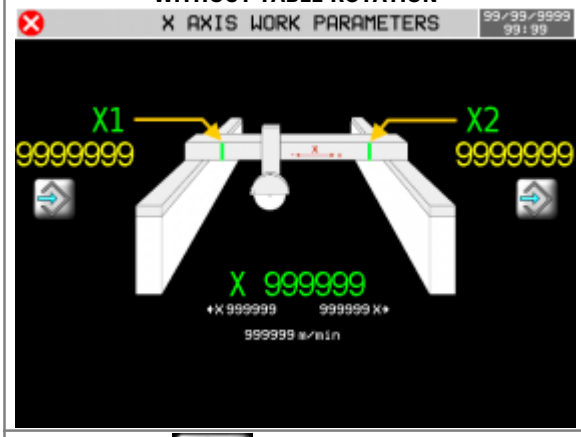
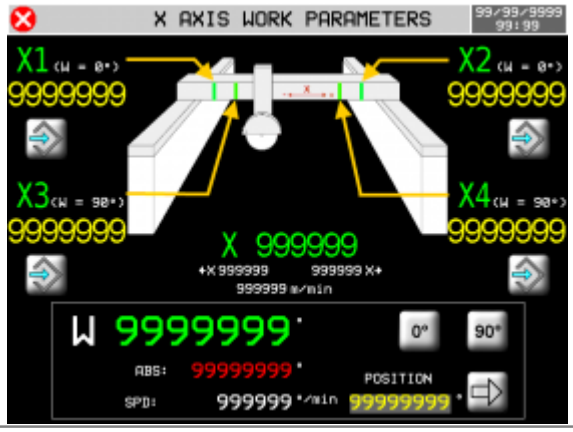
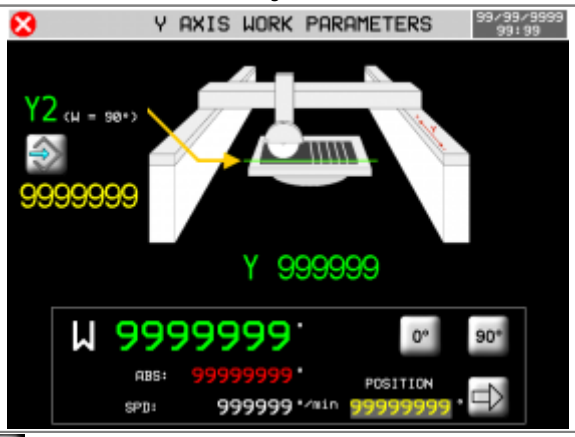
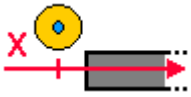
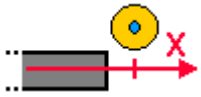
1 Current positions and axis target dimensions
2 Current work step
3 Size of the cut (Y)
4 Number of cuts to be execute
5 Pieces counter
6 Cuts list scroll (1-10)
7 Working parameters
8 Cutting Depth (Z)

11.0.2 With table rotation



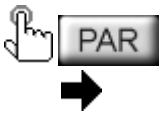
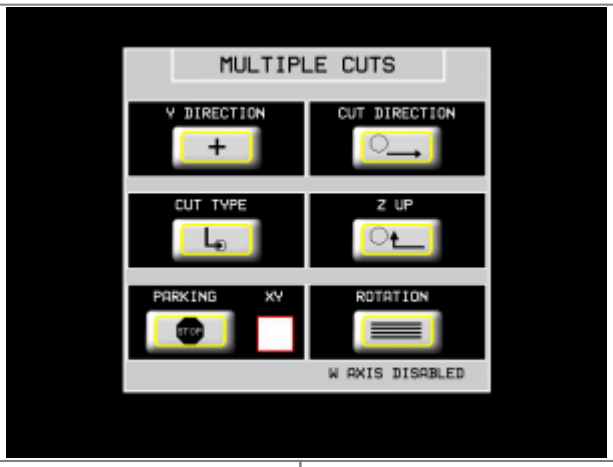
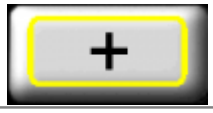
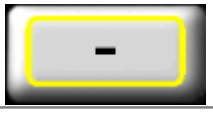
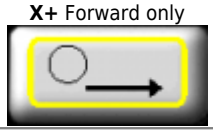
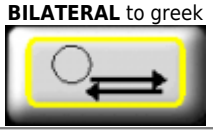
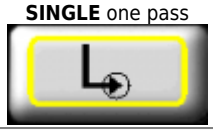
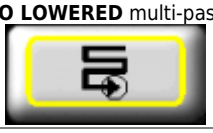
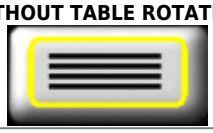
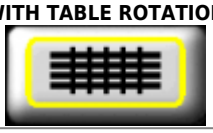
1 Current positions and axis target dimensions
2 Current work step
3 Size of the cut (Y)
4 Number of cuts to be execute
5 Pieces counter
6 Cuts list scroll (1-10)
7 Working parameters
8 Cutting Depth (Z)
9 Table rotation (W)

- **11.0.3 Axes parameters**

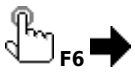
<table>
<tr><td rowspan="2">
X</td><td>WITHOUT TABLE ROTATION
 
</td><td>WITH TABLE ROTATION
 
</td></tr>
<tr><td colspan="2"> Self-learning positions X1 + X2 = Table (W) to 0°.....X3 + X4 = Table (W) to 90°
N.B. the disc must exit the slab before learning the X1 - X2 dimensions or X3 - X4 dimensions.</td></tr>
<tr><td rowspan="5">
Y</td><td colspan="2"> 
</td></tr>
<tr><td colspan="2"> Self-learning position Y2 = Start position with Table (W) to 90°</td></tr>
<tr><td> 
</td><td>Start of cut X</td><td> 
</td><td>End of cut X</td></tr>
<tr><td colspan="4">W</td></tr>
<tr><td>Quick Move the Table</td><td>
</td><td colspan="2">Immediate position : 0°
Immediate position : 90°
Immediate position set</td></tr>
</table>

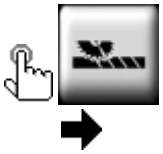
<table>
<tr><td rowspan="7">Z</td><td colspan="4">
</td></tr>
<tr><td>Input data set
0 ~ 10</td><td colspan="3">Last Cut Direction</td></tr>
<tr><td></td><td>Forward lowered (X+)</td><td></td><td>Backward lowered (X-)</td></tr>
<tr><td></td><td>Last Cut Depth</td><td></td><td>% Reducing last cut speed</td></tr>
<tr><td colspan="4">First cut
% Reducing first cut speed
Position of first increment of passes cut.</td></tr>
<tr><td colspan="4">Advance
Space before FC software X when Z begins the lowered</td></tr>
</table>

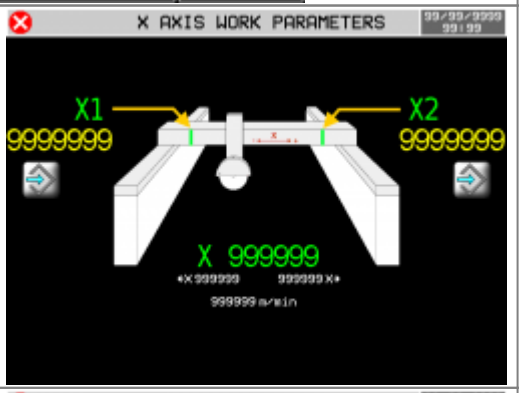
- **11.0.4 Working parameters**

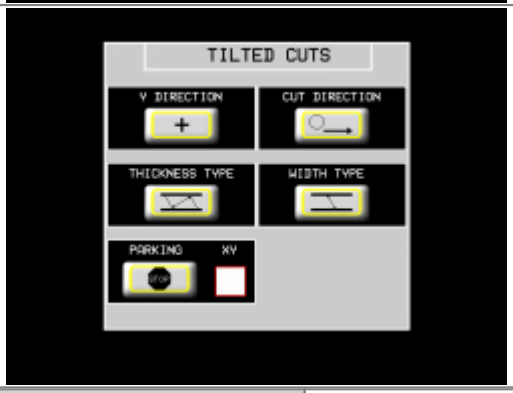
		
Y DIRECTION	**POSITIVE** The piece thickness is made with Y that increment 	**NEGATIVE** The piece thickness is made with Y that decrements 
CUT DIRECTION	**X+** Forward only 	**BILATERAL** to greek 
CUT TYPE	**SINGLE** one pass 	**TO LOWERED** multi-pass 
Z LIFT	Z lift when X is in the **FORWARD POSITION**	X and Z come out **TOGETHER** from the slab
END CYCLE	The axes **STOPPED** when the cycle is end	The disk goes to **PARKING** at the end of the cycle
XY	X and Y axes in parking one after another	X and Y axes in the parking lot at the same time
ROTATION	**WITHOUT TABLE ROTATION** 	**WITH TABLE ROTATION** 

- **12. Tilted Cuts/Automatic**

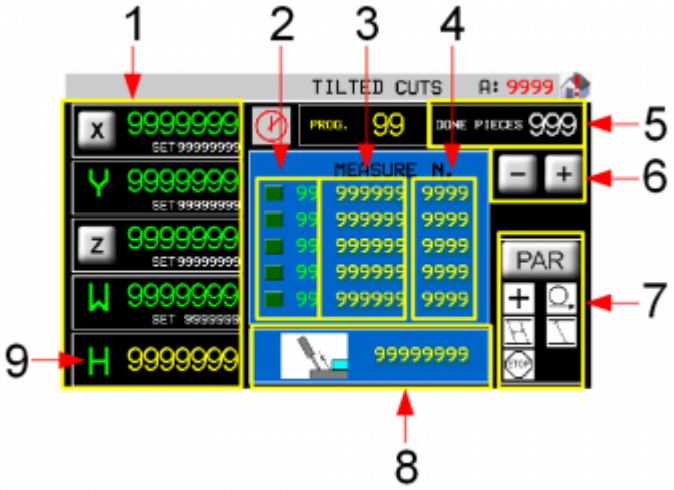








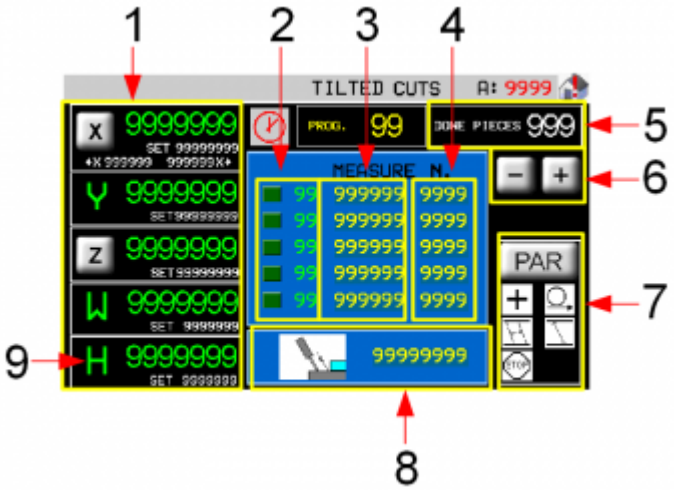
H axis without ENCODER



1 Current positions and axis target dimensions
2 Current work step
3 Size of the cut (Y)
4 Number of cuts to be execute
5 Pieces counter
6 Cuts list scroll (1-10)
7 Working parameters
8 Cutting Depth (Z)
9 Settable cut angle (I)

Axes parameters - see Multiple Cuts

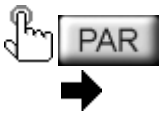
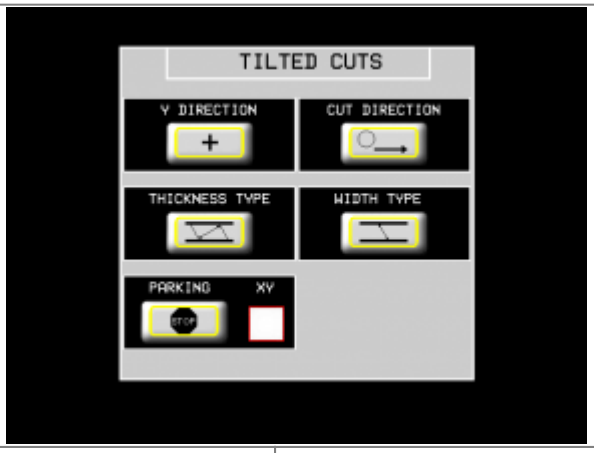
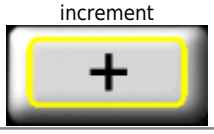
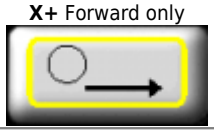
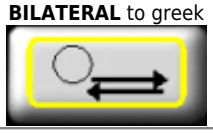
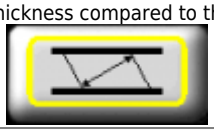
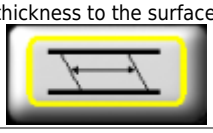
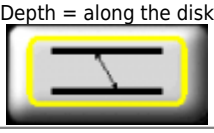
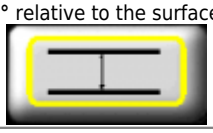
H axis with ENCODER



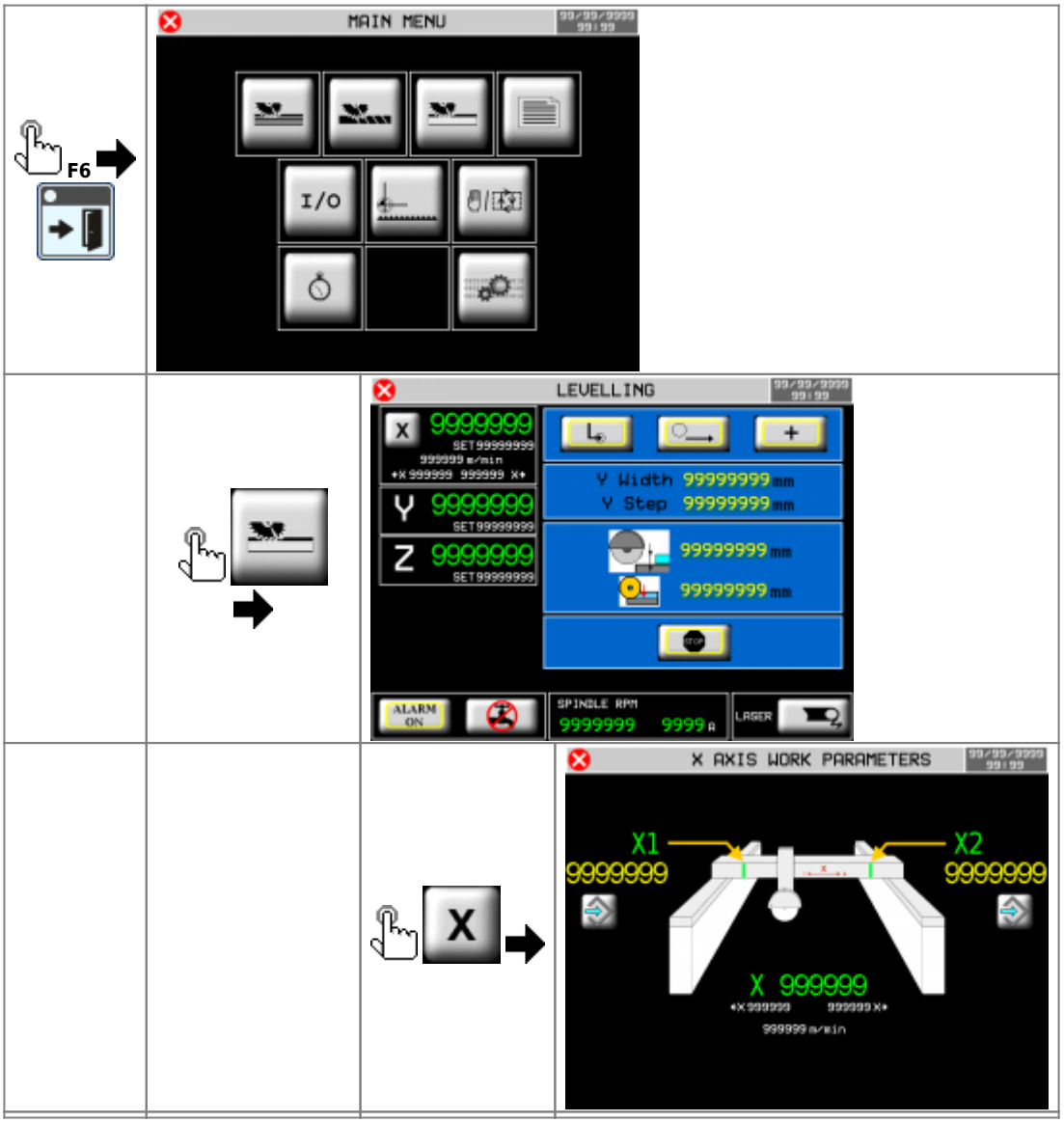
1 Current positions and axis target dimensions
2 Current work step
3 Size of the cut (Y)
4 Number of cuts to be execute
5 Pieces counter
6 Cuts list scroll (1-10)
7 Working parameters
8 Cutting Depth (Z)
9 Settable cut angle (I)

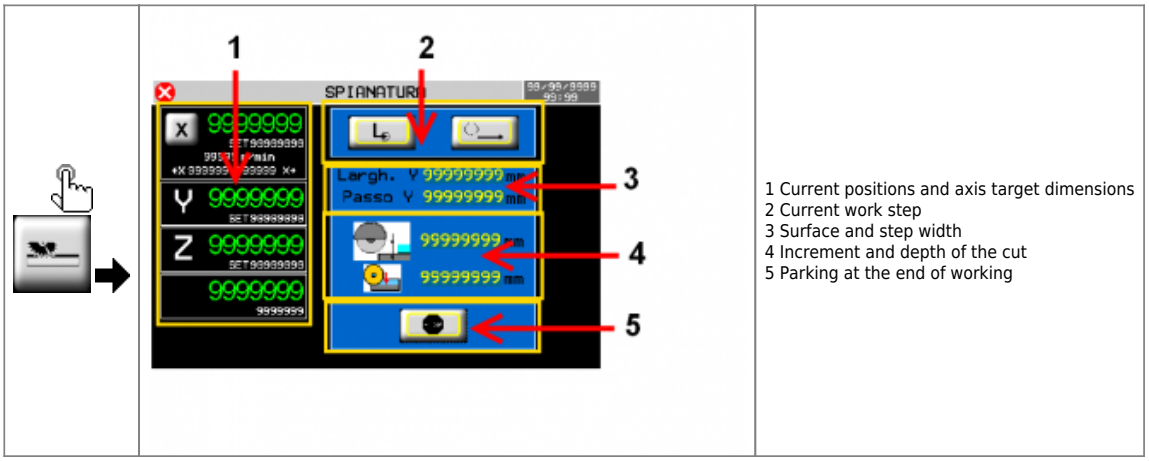
Axes parameters - see Multiple Cuts

- **12.0.1 Working parameters**

		
Y DIRECTION	**POSITIVE** The piece thickness is made with Y that increment 	**NEGATIVE** The piece thickness is made with Y that decrements
CUT DIRECTION	**X+** Forward only 	**BILATERAL** to greek 
WIDTH TYPE	**90°** thickness compared to the cut 	**PARALLEL** thickness to the surface of the plate 
DEPTH TYPE	Depth = along the disk 	Depthà = **90°** relative to the surface of the plate 
END CYCLE	The axes **STOPPED** when the cycle is end	The disk goes to **PARKING** at the end of the cycle
XY	X and Y axes in parking one after another	X and Y axes in the parking lot at the same time

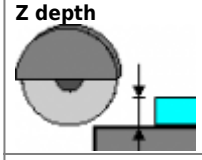
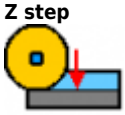
- ## 13. Flattening



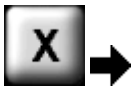
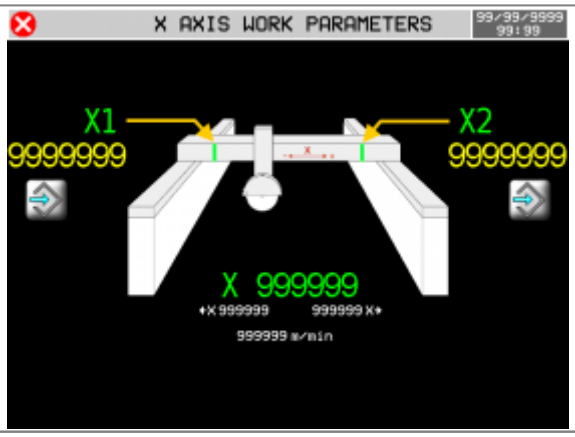


1 Current positions and axis target dimensions
2 Current work step
3 Surface and step width
4 Increment and depth of the cut
5 Parking at the end of working

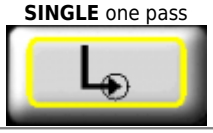
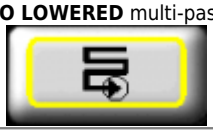
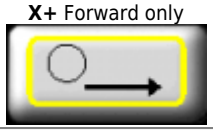
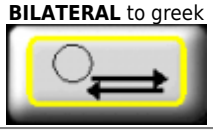
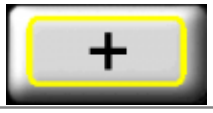
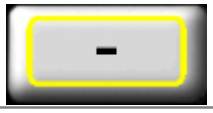
- ## 13.0.1 Working parameters

Y width	Total width of the part to be flattened.
Y step	The value of the pitch that covers the Y axis after each cut.
Z depth 	Cut Depth. **Used if lowered cut is set.**
Z step 	The value of the step that covers the Z axis with each pass. **Used if lowered cut is set.**

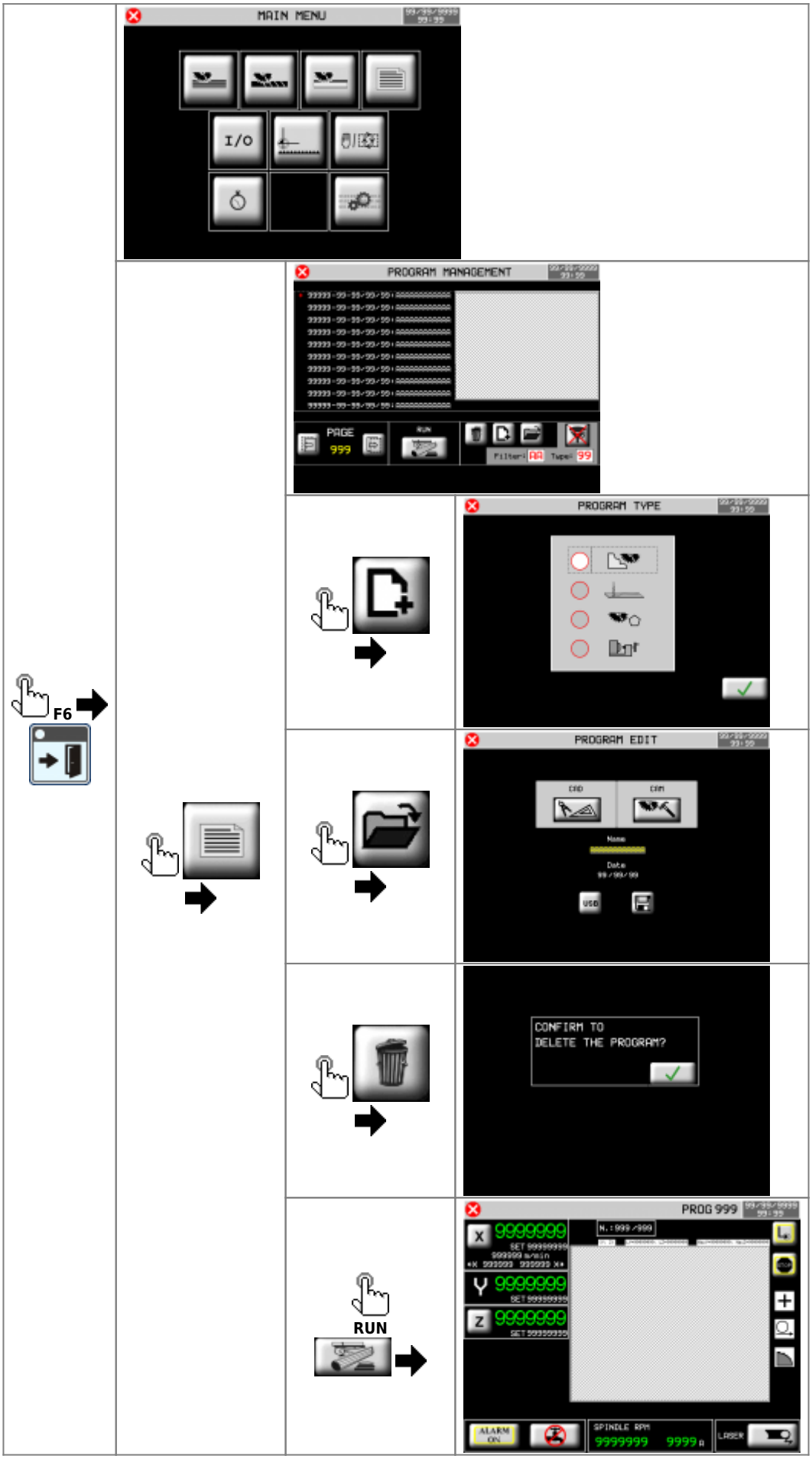
13.0.2 Axes parameters

		
		Self-learning positions **X1 + X2** = Software limit switch of cutting N.B. the disc must exit the slab before learning the **X1 - X2** dimensions

13.0.3 Working parameters

CUT TYPE	**SINGLE** one pass 	**TO LOWERED** multi-pass 
CUT DIRECTION	**X+** Forward only 	**BILATERAL** to greek 
Y DIRECTION	**POSITIVE** The move of Y takes place in the positive direction 	**NEGATIVE** The move of Y takes place in the negative direction 
END CYCLE	The axes **STOPPED** when the cycle is end	The disk goes to **PARKING** at the end of the cycle

- **14. Programming and executing profiles**



14.1 Program list filtering

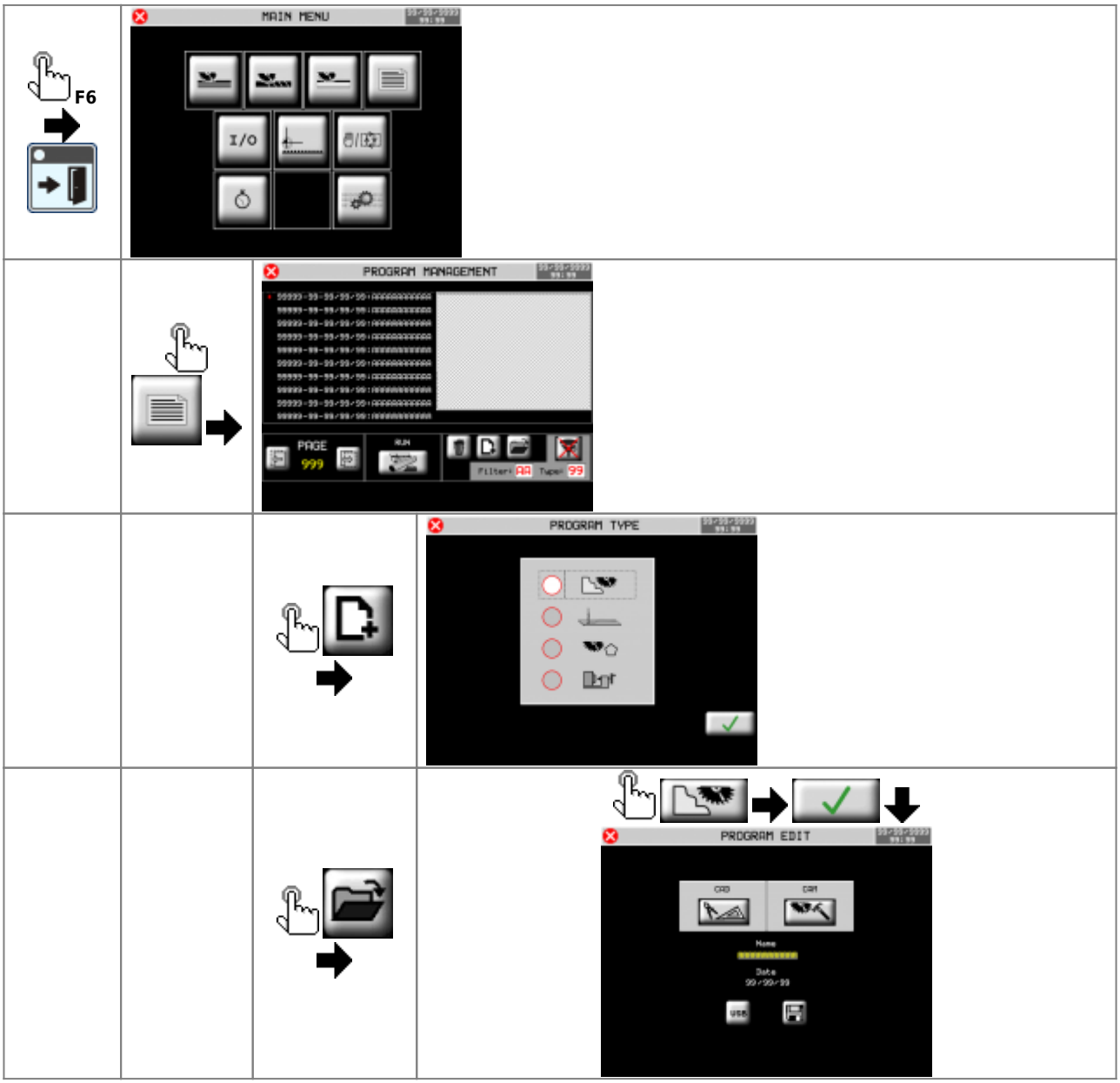
Using the program list filter you can quickly view the desired program, without scrolling through the entire list. The system has two types of filtering that can be combined together:

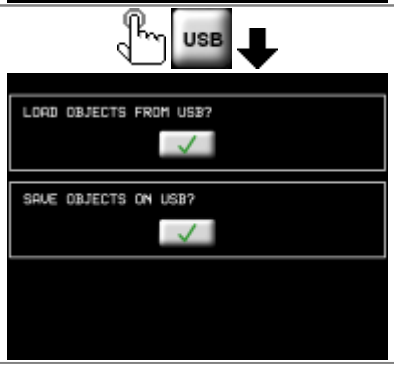
- Program Description Filter
- Program Type Filter

What's a „**Program type**“ :

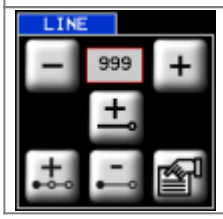
Type	Description
0	Show all programs
1	Show **profiling** programs only
2	Show **milling** programs only **Not enabled in this version**
3	Show **cutting polygons** programs only **Not enabled in this version**

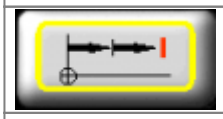
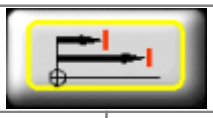
- **14.2 Profiles**

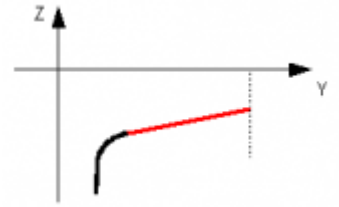
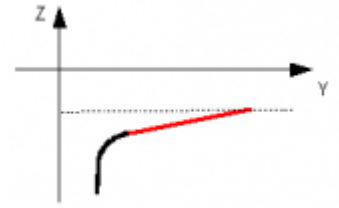
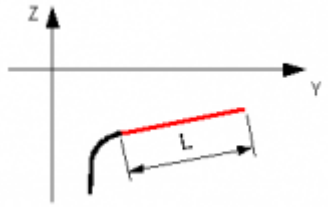
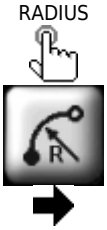
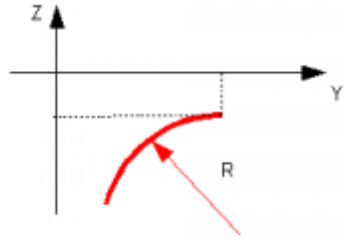
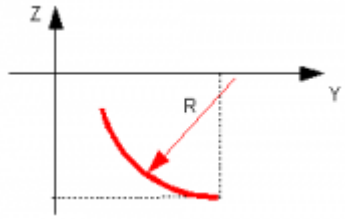


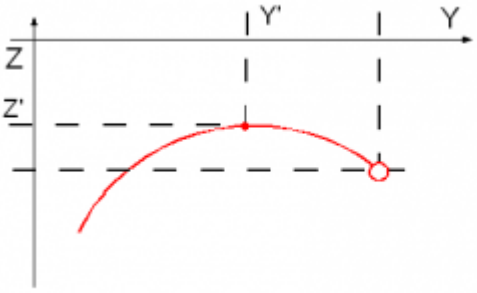
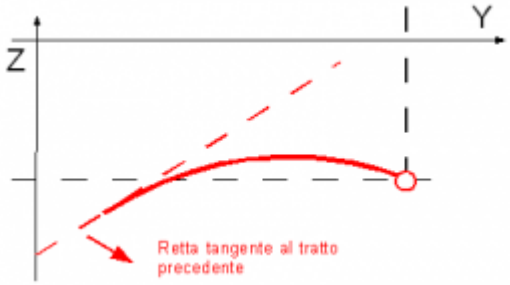
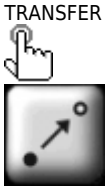
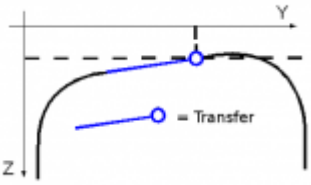
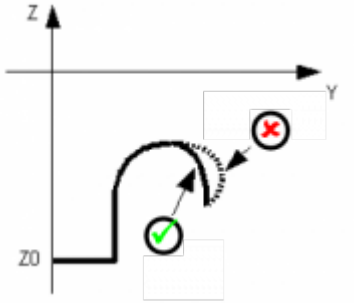
				

14.2.1 Profiles - CAD

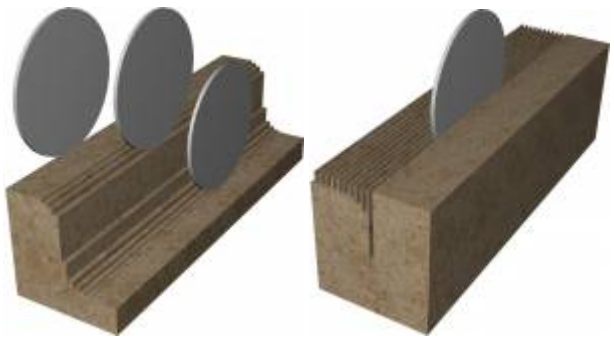
			Repeat Shape		Mirror Shape	**Z0 = origin** Y Coordinate = 0		
			Zoom in		Zoom out		Fit to screen	
		000		Scroll to choose the stroke you want				
			Add a stroke		Insert a stroke		Delete a stroke	Stroke properties

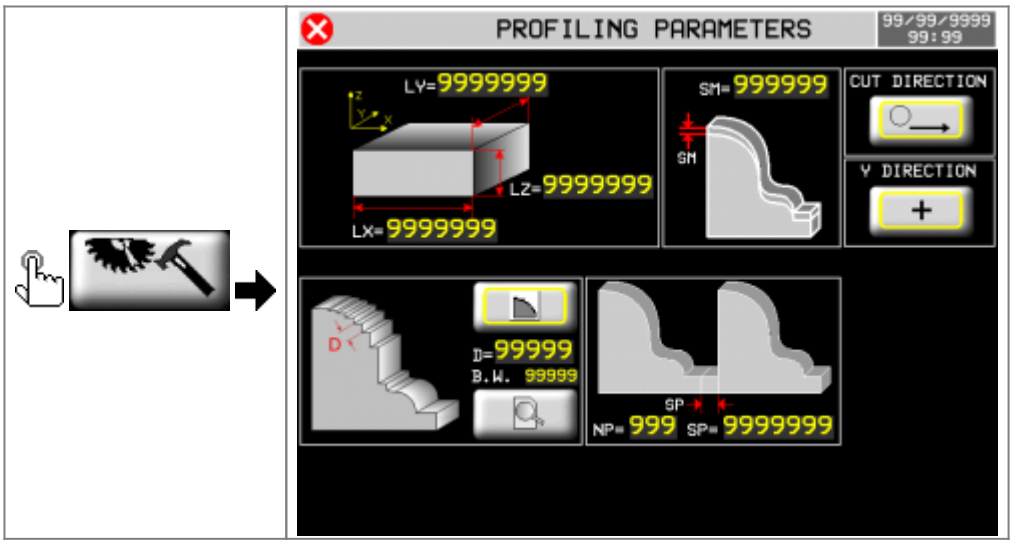
Stroke types								
	**Absolute** final coordinates are absolute relative to the origin				**Incremental** final coordinates are relative to the end of the previous stroke			
- -	- -	- -	- -	- -	- -	- -	- -	- -

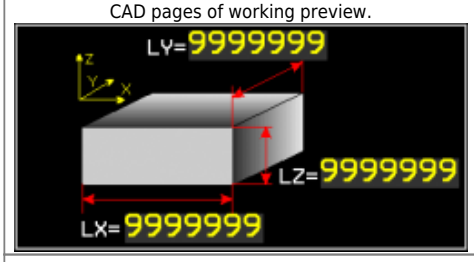
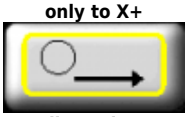
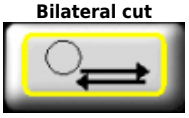
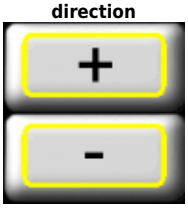
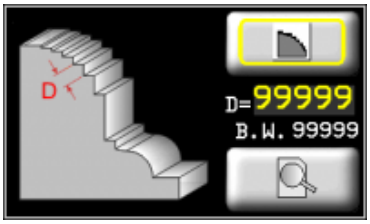
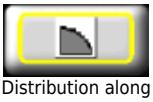
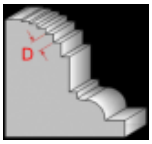
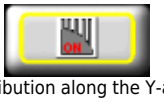
LINE		Insert final coordinates
TANGENT LINE		 Insert Y coordinate  Insert Z coordinate  Insert L = length
ARC WITH RADIUS 		Enter the end coordinates and radius **MINIMUM** it's the least radius possible  clockwise  anticlockwise Choosing the direction of the curve clockwise **OR** anticlockwise short arc **OR** long arc The program shows the lowest possible radius value

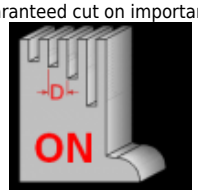
ARC FOR 3 POINTS		Insert the coordinates of the endpoint and midpoint 
TANGENT ARC		Insert the coordinates of the endpoint 
TRANSFER 		**Stroke movement without cuts**. Enter end point coordinates 
		The software automatically corrects the undercut set.

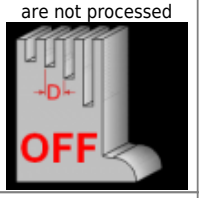
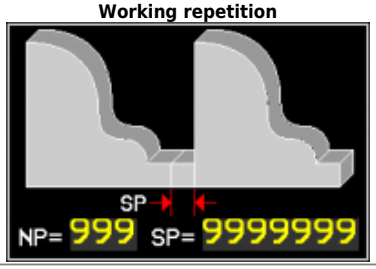
- **14.2.2 Profiles - parameters**





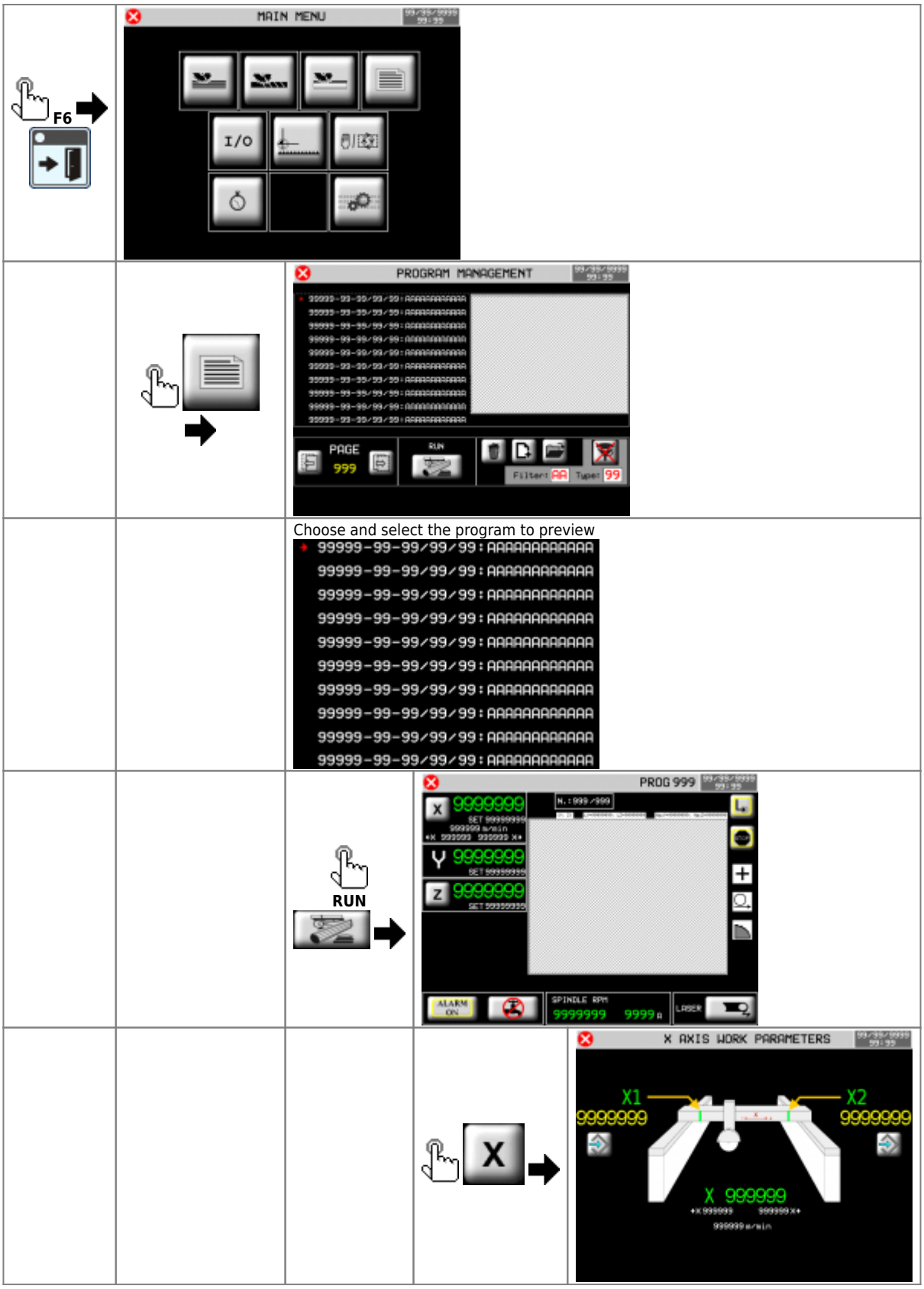
<table>
<tr>
<td>Size of the solid. As an option, you can enter the size of the solid. This will be grayed out in the CAD pages of working preview.
 
</td>
<td colspan="2">Over Material on the profile
</td>
<td>Cutting direction only to X+
 
Bilateral cut
  </td>
<td>Y-axis increment direction
  </td>
</tr>
<tr>
<td rowspan="2">Distribution of cuts
 
</td>
<td>Strategy type
</td>
<td>Disk thickness
</td>
<td>Preview cuts
 </td>
<td></td>
</tr>
<tr>
<td> 
Distribution along the profile
 
</td>
<td colspan="2"> 

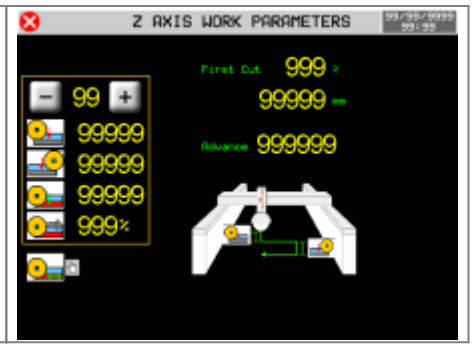
Distribution along the Y-axis
ON: Guaranteed cut on important points
 
</td>
<td>

Distribution along the Y-axis
OFF: notable points are not processed
 
</td>
</tr>
<tr>
<td>Working repetition
 
</td>
<td colspan="4">NP = Number of repetitions
SP = Space between repetitions</td>
</tr>
</table>

15. Execution

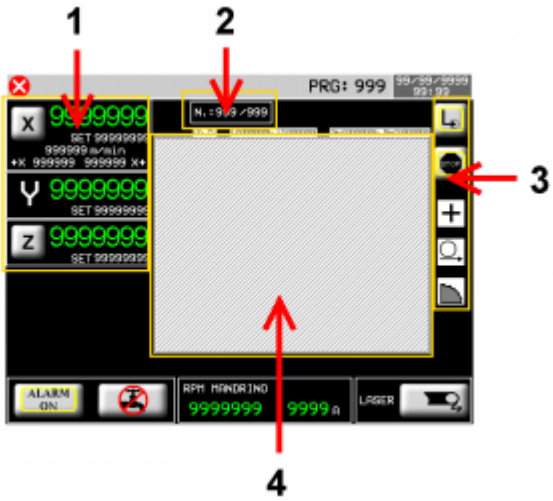
15.1 Program execution



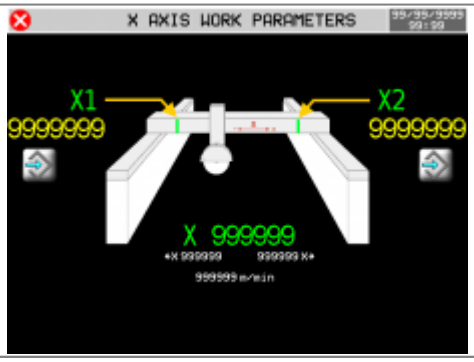
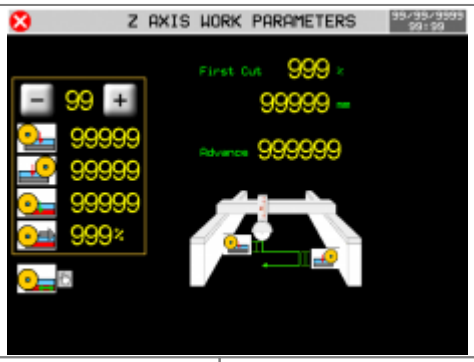
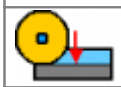
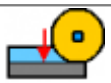
				

Z
Z AXIS WORK PARAMETERS
99
99999
99999
99999
999%
First Cut
999
99999
Advance
999999

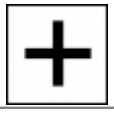
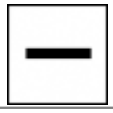
- **15.1.1 Profile execution**

	1 Current positions and axis target dimensions 2 Running shape 3 Working parameters 4 Preview of the drawn shape

15.1.2 Axis parameters

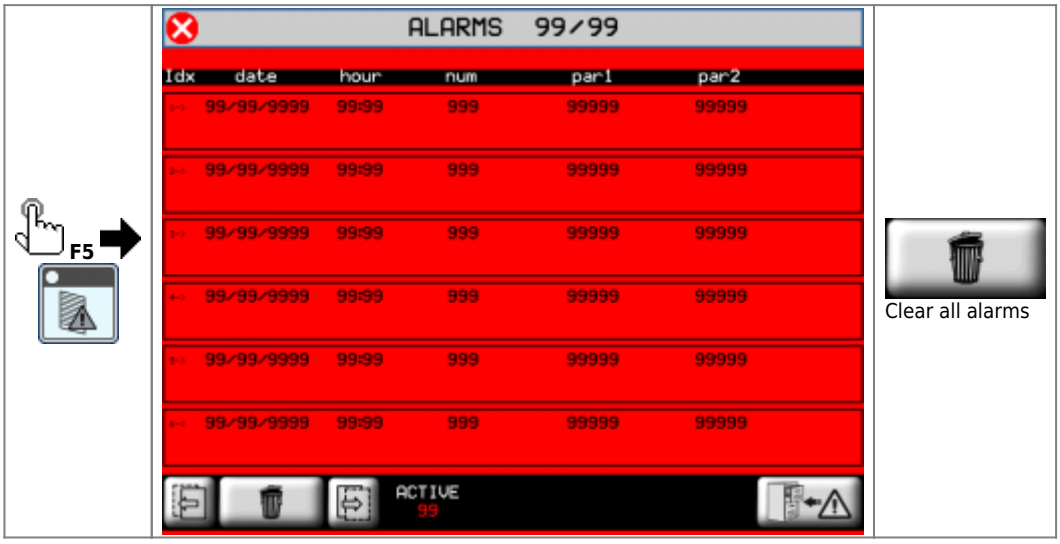
X				
		Self-learning of **X1 + X2** positions = Software limit switch of cutting		
Z				
		Input lowered data set − 0 ~ 10 +	Last cut direction	
		Forward lowered (X+)		Backward lowered (X-)
		Last Cut Depth		% Reducing last cut speed
	First Cut % Reducing first cut speed			
	Advance Space before FC software X when Z begins the lowered			

- ## 15.1.3 Working parameters

CUT TYPE	**SINGLE** one pass	**TO LOWERED** multi-pass	
END CYCLE	The axes **STOPPED** when the cycle is end	The disk goes to **PARKING** at the end of the cycle	
	The following symbols are view-only They are programmed in the appropriate parameter pages.		
Y DIRECTION	**POSITIVE** The next cut is done with Y that increments 	**NEGATIVE** The next cut is made with Y that decrements 	
CUT DIRECTION	**X+** Forward only	**BILATERAL** to greek	
STRATEGY	**CUTS ALONG THE PROFILE**	**CUTS ALONG Y - Notable ON**	**CUTS ALONG Y - Notable OFF**

At the push of the **START CYCLE** key, the machine starts with the working set.

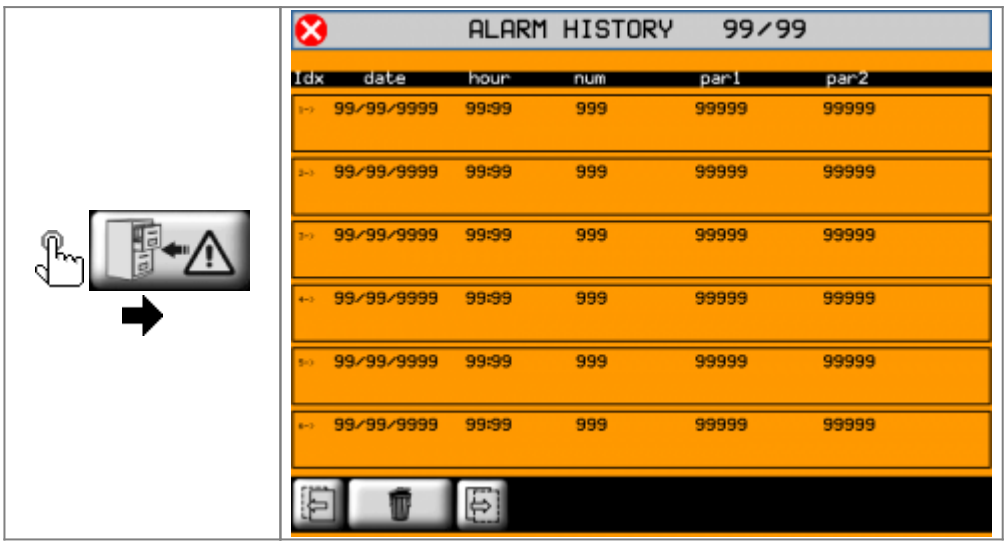
• 16. Alarms



The alarms block all machine operations.

Alarm	Cause	Solution
Emergency	Stop for emergency switch	-
Y axis limit switch FW	The Y-axis has encountered the forward limit switch	-
Y axis limit switch BW	The Y-axis has encountered the backrward limit switch	-
Z axis limit switch UP	The Z-axis has encountered the up limit switch	-
Z axis limit switch DOWN	The Z-axis has encountered the down limit switch	-
X axis limit switch FW	The X-axis has encountered the forward limit switch	-
X axis limit switch BW	The X-axis has encountered the backrward limit switch	-
H axis limit switch FW	The H-axis has encountered the forward limit switch	-
H axis limit switch BW	The H-axis has encountered the backrward limit switch	-
Tool not running	The disk must be moving during the automatic cycle	-
No water pressure	Missing of cooling water	Control the water flowstate
Mandrel motor overcurrent	The absorption of the motor disk is over the alarm threshold	-
No oli pressure	Missing of pressure in the lubrication circuit	Check the oil flowstate
X encoder fault	Failure to detect counter	Check the encoder
Y encoder fault		
Z encoder fault		
W encoder fault		
H encoder fault		
Thermal outout tripped	A thermal drive has been activated	-
Fault inverters	Fault of the axes inverter	-
Spindle inverter fault	Fault of the spindle inverter	-
CAN module disconnected	The remote module does not communicate	Check the settings and the cable
CAN2 module disconnected		
X axis out of tolerance	Positioning ended out of tolerance	Check the axis parameters
Y axis out of tolerance		
Z axis out of tolerance		
W axis out of tolerance		
H axis out of tolerance		
Safety enclosure alarm	Perimeter safety protection barriers have been opened	-
No air pressure	Missing of pressure in the air circuit	Check the air flowstate
Wait for power system...	Inactive auxiliary inputs. Communication interrupted with the 2nd RMC1S module at input I74.	Activate auxiliary inputs. Check communication with the 2nd RMC1S module.
No power system	Machine auxiliaries are deactivated	-
Inverter generic fault	Inverters have a non-resetable error	Contact the manufacturer of the inverter
Bride out of guides	Reports that the bridge has lift and the I79 limit switch has intervened.	Reset the alarm and bring the bridge back to the binars

- ## 16.1 Alarms list



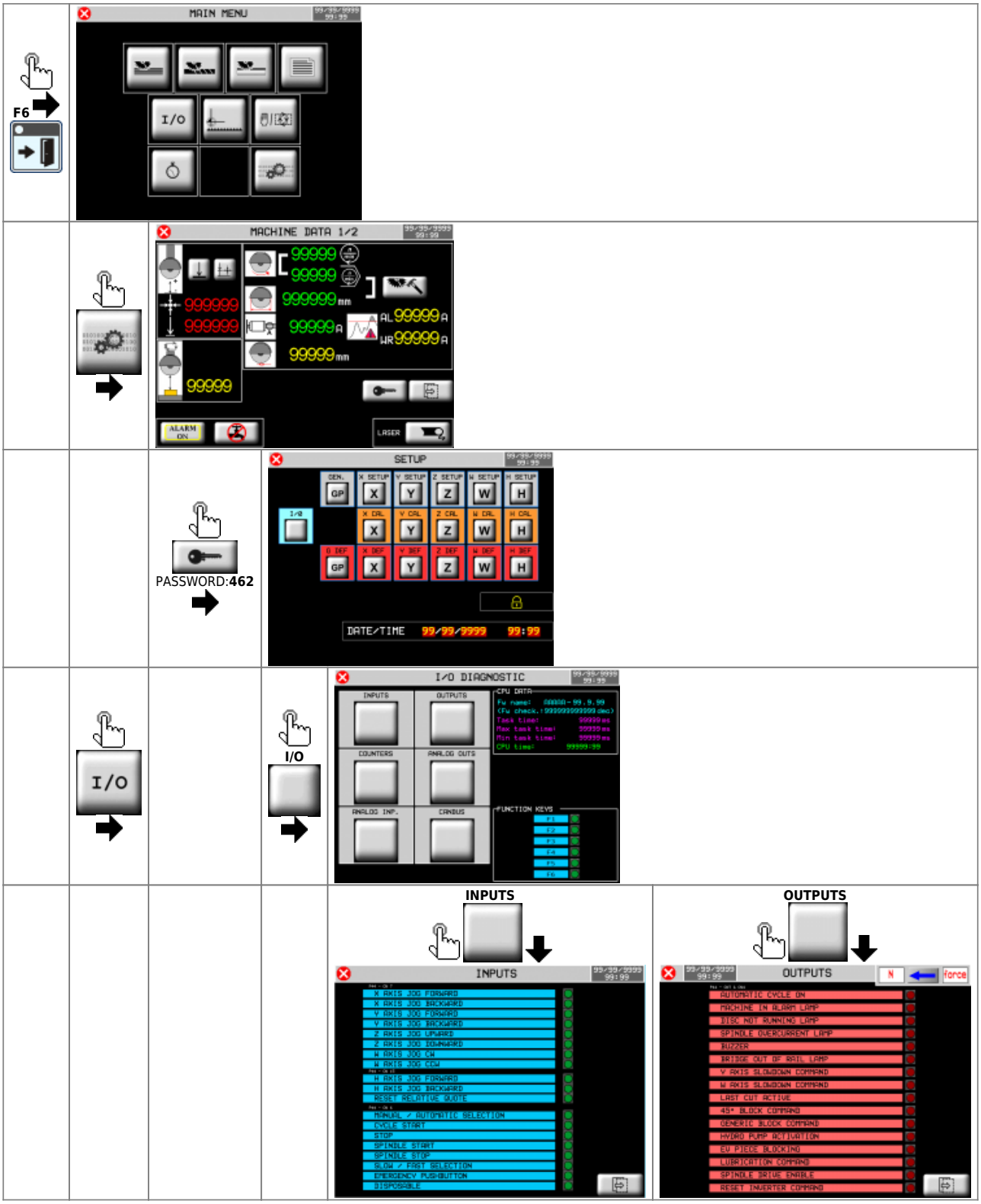
to clear the alarms list

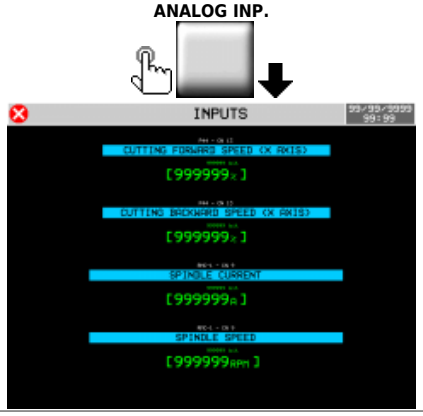
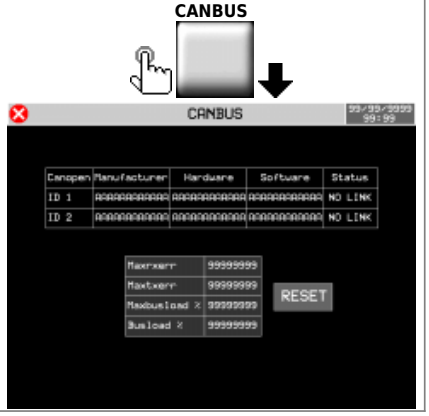
16.2 Messages

The messages do not block machine operations.

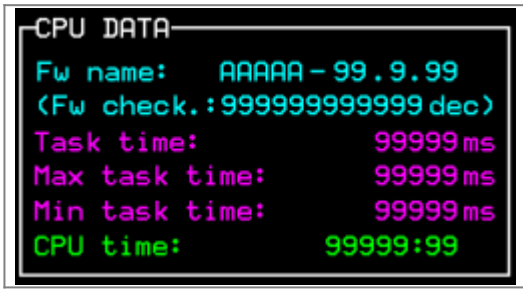
Message	Cause	Solution
PLEASE WAIT...	Data is being processed	-
PATH ERROR	Error calculating axis path	The tool is too wide
ERR: TILTED DISK	Disk tilt is not compatible with the current working	Correct tilt
X OVER MAX LIMIT	The target dimension of the axis is over the maximum limit switch	-
Y OVER MAX LIMIT		-
Z OVER MAX LIMIT		-
X OVER MIN LIMIT	The target dimension of the axis is over the minimum limit switch	-
Y OVER MIN LIMIT		-
Z OVER MIN LIMIT		-
WORK DONE	The automatic cycle has successfully ended	-
X POSITION NOT OK	The X position is incorrect	The position of X is inside the software limit switches
RUN HOMING	Homing was not executed	Run the procedure
NO OBJECT	You try to open a non-existent geometry	-
WAIT FOR START...	The working waits for the START command	-
COMPENSATION ERROR	Error calculating disk compensation	Check the shape design
POWER TOOL ON	Start the disk to start the cycle	-
Y OVER MAX/MIN LIMIT	Processing data requires a Y movement beyond software limits	-
BRIDGE OUT OF RAIL	The bridge is lifted	See **Alarm** Reporting Description

- **17. Diagnostic**

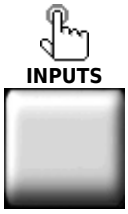
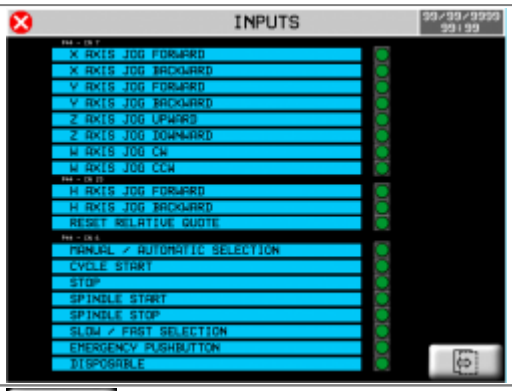


				COUNTERS 	ANALOG OUTS
				ANALOG INP.  	CANBUS 

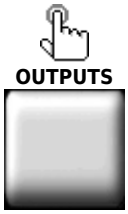
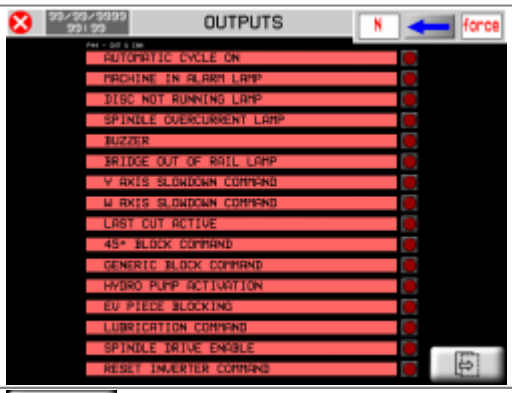
17.1 CPU DATA

 	**Fw name** : firmware code and checksum **Task time** : average time of CPU cycle **Maximum Time** and **Minimum Time** registered limits **CPU time** : total CPU time in RUN state (hh:mm)

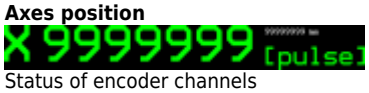
- ## 17.2 Digital inputs

 INPUTS		Status of digital inputs = OFF = ON
		Previous page
		Next page

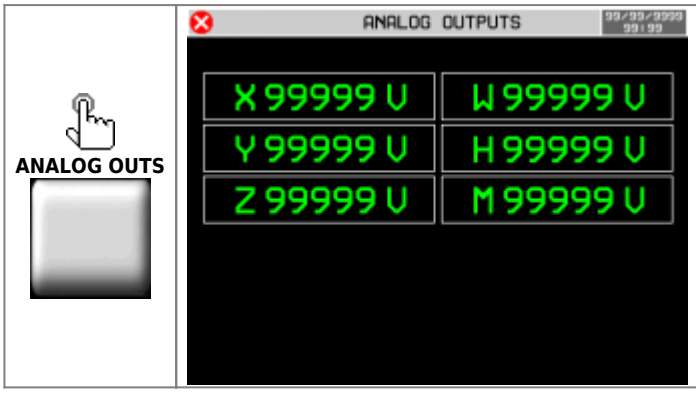
17.3 Digital outputs

 OUTPUTS		Status of digital outputs = OFF = ON
		Previous page
		Next page
		Press to switch to output force mode Press the output that you want to activate.

17.4 Encoder counters

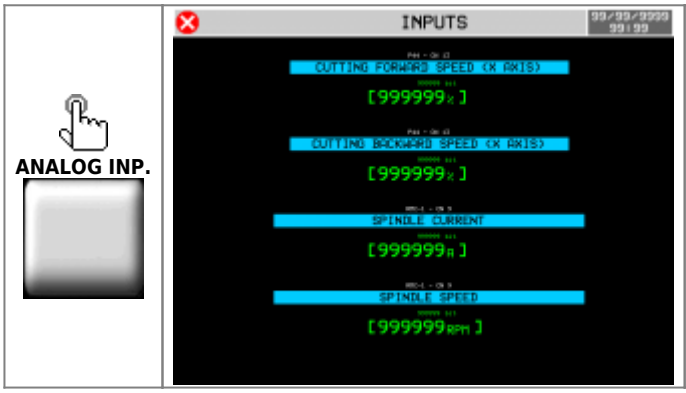
COUNTERS		**Axes position**  Status of encoder channels = OFF = ON

- ## 17.5 Analog outputs



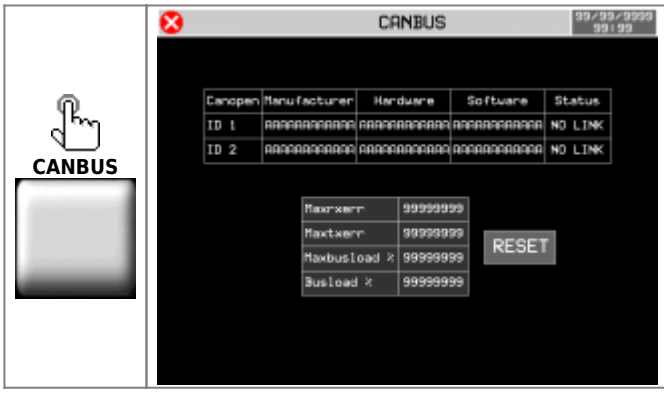
Analog outputs voltage

17.6 Analog inputs



Analog inputs read

17.7 Communication with RMC1S modules



Status of communication with RMC1S modules.

18. Assistance

For supplying you fast service, at the lowest cost, we need your support.

Follow all instructions provided in the MIMAT manual	If the problem remains, fill out the „Request Form for assistance“ on the page Contacts at www.qem.it site. Our technicians will get elements essential for the understanding of your problem.

Repair

To provide you with an efficient service, please read and adhere to the instructions given here

Shipping

It is recommended to pack the instrument with materials that are able to cushion any falls.

Use the original package: it must protect the instrument during transport.	Attach: 1. A description of the anomaly; 2. A part of the electric scheme where the equipment is inserted 3. The planning of the equipment (set up, quotas of job, parameters...). 4. Request a quote for repair; if not required, the cost will be calculated in the final balance.	A full description of the problem, will help identify and resolve your problems fast. A careful packaging will avoid further inconveniences.

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