Doc # 710231003 / Rev. F, 12/10/2010

🖄 LOGOSOL CNC	
File Edit Diagnostics and Setu	up Mapping Help
X OFF	orded
Y OFF	Is Initialized Need Homing Dril Cycle Active In Motion Currert Off Hardware Fail Is Busy Power Fail Comm Fail Program limits
Z OFF	In Yeah Notion En Setup Setup In Started Setup In Started So Internal Setup Parameters for the Motion Control
Feed rate 0 U/Mn Speed 20000 CW CCW 100 % 0:00:00:00.00 Continuous T1 MD1 100	In Teach Mode Intelize Intel
Program Progress	Work 20000.00 Units Set 0 Postions X 0 Y 0 Z 0 Units Z 0 Units Interface SERIAL
	English 🗸 Cancel OK

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Configuring Logosol CNC

In order to provide reliable operation setting up the software should be done by experienced personnel with detailed knowledge of the machine.

Logosol CNC is a CNC software package that allows users to load and execute G code files on CNC machines controlled by Logosol multi axis servo controllers. It supports integrated or external spindle drives, supervisor safety I/O controller, and general purpose inputs and outputs nodes. The software can be easily customized for specific machine configurations with up to 6 axes.

Logosol CNC consists of a system executable implementing a G code interpreter and user interface, motion driver and I/O driver, designed as separate DLL files. These files are located in the C:\MCTL folder:

Mctl_Logosol1.dll is a motion driver supporting up to 9 servo axes.

IO_Logosol1.dll and **IO_Logosol2.dll** are IO drivers each supporting a single Logosol I/O controller or safety module. Depending on the IO configuration, one or both can be used.

LS_Serial.dll is a communication driver providing the link between all of the drivers mentioned above and the actual hardware.

The following sequence should be followed in order to activate the advanced functions.

- Start the software by clicking the icon on the desktop. The following dialog box will appear on the screen.



- Click the Cancel button. On the main menu, click File and select Login.

ogin	
Current User :	Operator
User :	Admin 👻
Password :	••••
	Ok Cancel

- Type the password "1234" and click OK. This will enable Diagnostics and Setup and Mapping menu items.

Sector 2010		
Tool Position Machine	Setup Mapping Heip Jog Control G.Code Editor Tool Paths	osol
A OFF	🗅 👌 🔛 🖕 🐘 👔 🗳 Next Tool Change> Next Feedrate> Next Spindle Spee	d>
Y OFF		Check For Errors Program limits
Z OFF		X Neg -130.120
Feed rate 0 U/Min		Y Neg 055.000
Spindle 0 RPM Speed 20000		Z Neg 070.000
cw ccw		2 Pos 070.000
100 %		
Elapsed time: 00:00:00.00		
Continuous T1		Feed rate Min 000.0
		Max 000.0 Tools
		1
START FEED HO	LD STOP POWER	

Setting up the machine limits and user units

Click Diagnostics and Setup on the main menu and select Machine. The Machine Setup dialog box will be displayed:

Machine Se	tup		
Axes trav	el limits		
	Negative	Positive	
х	-016.000	340.000	Milimeters
Y	-065.000	015.000	Milimeters
Z	-120.000	015.000	Milimeters
A	-300.000	560.000	Milimeters/Degrees
в	000.000	000.000	Milmeters/Degrees
С	000.000	000.000	Milmeters/Degrees
	_		
Linear	User un	Jog speed	0.0 Deg/Min
Linear	20.0 U	Rapid speed I/Min Rotary 1	80.0 Deg/Min
Safe Z	Part approac	th speed 5.0	U/Min 10.000 Milimeters
			Qk Qancel

Enter the negative and positive machine travel limits for each axis. These limits are applied to the data entered in G code program and are measured from machine zero point. For linear axes specify the limits in the selected user units (inches or millimeters).

From the **User units** drop down box select the desired linear units – inches or millimeters. Enter the desired speeds for jogging linear axes in the specified units per second. The rotary axes speed should be specified in angular degrees per second.

Part approach speed parameter is used to determine the speed approach the detail after M6 TX command end. **Safe Z distance to approach the part** is the safe distance to the part from where Z axis approaches the part with part approach speed.



Part approach speed and Safe Z distance to approach the part

Click OK when done.

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Spindle settings

If the spindle is controlled by the software, it should be set up as follows.

Click Diagnostics and Setup on the main menu and select Spindle. The Spindle Settings dialog box will be displayed:

💀 Spindle Setting	s 🗖 🗖 🛛
Spindle parameters	
Minimum RPM	5000
Maximum RPM	60000
Default RPM	20000
Start delay	3001
Stop delay 1	8002
Stop delay 2	
Cancel	ок

Enter the minimum and maximum spindle speed according to the spindle manual. Set the default spindle speed to a "standard" value according to the machine purpose.

Start delay is the time needed for the spindle to accelerate from 0 to the maximum rpm.



Spindle start sequence

Stop delay 1 is the delay between zero speed command and disabling the spindle.Stop delay 2 is the delay between disabling spindle output and starting the next command.



Set **Stop delay 1** and **Stop delay 2** to guarantee complete spindle stop when running at full rpm. Click OK when done.

Setting up the Motion parameters

Click Diagnostics and Setup on the main menu and select Motion Control. The Motion Controller dialog box will be displayed:



To Setup the motion driver click Setup button.

Setup
Internal Setup Parameters for the Motion Control
Driver Xaxis Yaxis Zaxis Aaxis
Driver parameters
Velocity override 100. Number of axes 4
Work acceleration 300. mm/s/s Reference order ZXY
Reference on the 12 March 1
Controller error output 0 Value 0
Communication parameters
Comm port
Baud rate 1250000 💌
English V Lancel UK

Under Driver parameters enter the following:

- Velocity override default velocity override. Set to Velocity override=100.
- Work acceleration in machine units per second.
- **Number of axes.** Total number of axes installed on the machine.
- **Reference order**. According to the picture Z axis will go to its reference point first, X second, and Y third.

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- **Reference run output**. For machines controlled by Multi axis CNC servo controller such as CNC-1120/0680, this output should be enabled as output 13 and its active value should be 1 as shown above.
- **Controller error output**. This output, if used, will be turned on if any motion or hardware error happens during a working session of the software. It could turn off the power to some custom external devices or activate an alarm.

Under communication parameters enter the following:

- **Com port** used to communicate to the controllers.
- **Baud rate**. Depends on the type of communication port and on the controller. It is recommended to set this to the highest possible value for better throughput.
- Interface. The options are SERIAL, USB, or HS SERIAL.

SERIAL should be selected if a standard PC communication port is being used, or high-speed PCI (ISA) LDCN plug-in card is used and frequency of 20 MHz is specified in COM port properties in Windows Device Manager¹.

USB should be selected if an USB to LDCN adapter is used.

HS SERIAL (high-speed) interface should be selected if a high-speed PCI or ISA LDCN plug-in card is used and LDCN communication port is configured with the standard PC crystal frequency of 1.8432 MHz¹.

¹ Note: For the Windows Device Manager right click on My Computer, select Manage, and click Device Manager.

After setting the Driver control parameters, the parameters for each axis should be set in their respective pages:

Setup	
Internal Setup Parameters for the Motion Control	
Driver X axis Y axis Z axis A axis	
Axis Parameters Address 1 Type Linear Lead screw pil	tch 4. mm
Encoder resolution 2000 Gear factor	1 : 1
Invert direction Maximum speed	100. mm/s
Positive hardware limit 🔽 Active LO 💌 Acceleration	100. mm/s/s
Negative hardware limit 🔽 Active LD 🗸 Deceleration	100. mm/s/s
Positive software limit V 465. mm Acceleration jerk	10000.
Negative software limit 🔽 120. mm Deceleration jerk	10000.
Homing parameters	
Limit switch None Vote Home speed	10. mm/s
Use index 🗹 Invert direction Finding index speed	5. mm/s
Home offset -5. mm Home acceleration	0.5 mm/s/s
Servo Parameters	
KP 20 IL 40	EL 2000
KD 6000 OL 255	SR 1
KI 10 CL 129	DBC 0
English 🗸 Cancel	ОК

Most of these parameters are self explanatory. The servo parameters depend on many factors including the type of servo controllers and motor as well as the machine mechanics. The parameters shown above are example only and might not work well on all systems.

Positive software limit and **Negative software limit**. When the axis position is equal or greater than one of the software limits the axis will decelerate and stop. The motion opposite to the limit will be the only motion allowed at this point.

All motion parameters are stored in C:\MCTL\Mctl_LogosolX.ini. Up to 100 such files (X=0, X=1, ... X=99) can be supplied. G code program can switch between parameters sets using M32 Px. By default X=1. Click OK and Close the Motion Controller dialog when done.

I/O mapping

Click Mapping on the main menu and select Machine. The I/O Setup dialog box will be displayed:

I/O Setup									
SK MODULE LDCN I/O 1 LDCN I/O 2 USB I/O	Logosol SK I Enable When ena	Module abled, use these files to initialize the	e module		-				
LPT I/O	DLL File C	:\MCTL\IO_Logosol1.dl		_				Select Select	
	I/O to "Mad	hine Actions" Mapping	Button					LED	
	Output 0	NONE	0 🗸	•	Input 0	PROGRAM_RUN	0	٧	
	Output 1	NONE	0 🗸		Input 1	PROGRAM_STOP	0	*	
	Output 2	SPINDLE_TURN	0 🗸		Input 2	SPINDLE_STOPPED	0	۷	
	Output 3	SPINDLE_DIRECTION	0 🗸		Input 3	SPINDLE_READY	0	٧	
	Output 4	NONE	0 🗸		Input 4	SPINDLE_RUNNING	0	۷	
	Output 5	NONE	0 🗸		Input 5	NONE	0	٧	
	Output 6	NONE	0 🗸		Input 6	NONE	0	~	
	Output 7	NONE	0 🗸		Input 7	NONE	0	*	
	Output 8	NONE	0 🗸	•	Input 8	NONE	0	~	~
	Analog Output 0	SPINDLE_SPEED	*		Analog Input 0	SPINDLE_SPEED			*
	Analog Output 1	NONE	~		Analog Input 1	NONE			~
	Analog Output 2	NONE	~		Analog Input 2	NONE			~
	Analog Output 3	NONE	~		Analog Input 3	NONE			~
						Save		Cance	

In most cases, only one I/O controller should be configured (the first one on the list to the left). All others should be disabled – the Enable check box should be unchecked. The first I/O controller should be set to use IO_Logosol1.dll driver and IO_logosol1.ini configuration file. Other I/O controllers that may need to be used should be configured with IO_Logosol2.dll / IO_Logosol2.ini and so on. Note that you need to have the actual files. If you do not have some of the files you need, please contact Logosol Inc. support.

For each of the I/O modules up to 16 outputs and 16 inputs could be specified. The description of the Inputs/Outputs should be specified using the drop down boxes for selecting their purpose and/or button/LED number. NONE and Button/LED=0 should be used if the input or output is not used.

Inputs

Program execution control:

- PROGRAM_RUN – Program start;

- PROGRAM_STOP – When program is running – FEED HOLD. When FEED HOLD is active – STOP. Spindle status safety control:

During the program execution the spindle status inputs can be used to prevent the cutting when the spindle is not turning because of spindle or other hardware related failure.

- SPINDLE STOPPED The input should be "off" when spindle is running. PROGRAM_STOP command will be issued if this input is "on" when Spindle CW/CCW (M3 or M4) command is active. Spindle safety control circuit uses by default Input 2. If used SPINDLE STOPPED function should be assigned to Input 2.
- SPINDLE READY Expected to be "on" during the program execution when M3 or M4 is active. The program will be stopped if the input is "off".
- SPINDLE RUNNING When spindle is running "on" indicates that the spindle speed is within the limits of the spindle velocity command (according to the spindle drive settings). If spindle speed does not match to the spindle velocity command the output is turned "off" and the program execution will stop.

Servo safety control:

SERVO FAULT – If used this function should be assigned to Input 10 (connected to servo drives "FAULT" output). If the input is "on" the program execution will stop.

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Outputs

The following functions used by the CNC program should be assigned to control the outputs if needed.

- SPINDLE_TURN active when spindle command is active (M3, M4). Cleared by M2, M5 and M30. The use of Output 2 (CNC-SK-2310) is strongly recommended because of the implemented spindle safety control circuit;
- SPINDLE_DIRECTION active with M3, cleared by M4;
- SPINDLE_CW active when M3 is executed, cleared by M4, M5, M2, M30;
- SPINDLE_CCW active when M4 is active, cleared by M3, M5, M2, M30;
- COOLANT_FLOOD active when M8 is active. Cleared by M9;
- COOLANT_MIST active when M7 is active. Cleared by M9;
- PROGRAN_RUN active when program is started;
- PROGRAM STOP blinking when FEED HOLD is active.

The analog inputs and outputs can be specified the same way. Note that specifying an analog input to be used for feed rate override or spindle speed override will set it up to control the feed rate override or spindle speed override sliders (refer to the screen below). In this case, the sliders cannot be controlled using the mouse.

Customizing Jog Control screen

Selected inputs and outputs could be setup to appear on the Jog screen of Logosol CNC as buttons controlling the state of the outputs and labels showing the state of the inputs. For example, Output 5 (previous page) can be controlled by custom Button 3 on the Jog screen as shown bellow.



Customer supplied images can be placed on the buttons and labels on this screen. Supported image formats are Portable Network Graphics (PNG) and Bitmaps (BMP) sometimes called Device Independent Bitmap (DIB). All these images should be places in C:\MCTL\BITMAPS folder. Recommended size for the buttons images is 64 by 64 pixels. Recommended size for the labels images is 64 by 32 pixels.

For the jog buttons, the following file names are being used: JOGXPOS.PNG (JOGXPOS.BMP), JOGXNEG.PNG (JOGXNEG.BMP), JOGYPOS.PNG (JOGYPOS.BMP), JOGYNEG.PNG (JOGYNEG.BMP), JOGZPOS.PNG (JOGZPOS.BMP), JOGZNEG.PNG (JOGZNEG.BMP), JOGAPOS.PNG (JOGAPOS.BMP), JOGANEG.PNG (JOGANEG.BMP), JOGBPOS.PNG (JOGBPOS.BMP), JOGBNEG.PNG (JOGBNEG.BMP),

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JOGCPOS.PNG (JOGCPOS.BMP), JOGCNEG.PNG (JOGCNEG.BMP).

For the Fast speed and Slow speed buttons:

JOGFAST.PNG (JOGFAST.BMP) and JOGSLOW.PNG (JOGSLOW.BMP).

Two images should be supplied for each custom button - one for ON and one for OFF state:

OUTPUTxON.PNG (OUTPUTxON.BMP) and OUTPUTxOFF.PNG (OUTPUTxOFF.BMP), where x is the number of the button and should be between 1 and 8. For example, OUTPUT3ON.PNG and OUTPUT3OFF.PNG could be supplied for custom button 3.

Two images should be supplied for each custom label - one for ON and one for OFF state:

INPUTXON.PNG (INPUTXON.BMP) and INPUTXOFF.PNG (INPUTXOFF.BMP), where x is the number of the label and should be between 1 and 8.

I/O setup

Click Diagnostics and Setup on the main menu and select Inputs/Outputs. The I/O Diagnostics dialog box will be displayed:

I/O Diagnostics - Logos	ol SK Module
SK MODULE LDCN I/O 1 LDCN I/O 2 USB I/O LPT I/O	L/O Control OUTPUT Bits - Click on LED to change state. 15 INPUT Bits 15
	Device Global Status Is Initialized Control Fail Is Busy Hardware Fail VO Config Initialization Reset Comm. Diag Setup
	Qose

Click the Setup button. The Setup dialog of the motion driver will be displayed.

Setup 🛛
Internal Setup Parameters for the IO Control Comm port COM1 Baud rate 1250000 Address 6 Digital Inputs Digital Outputs Analog Inputs Analog Outputs PWM Outputs
Number of inputs 16
English V Cancel OK

The communication parameters should not be changed here since they are already set in the motion driver setup. The address of the IO controller should be set accordingly to the order of all servo and I/O controllers connected to the PC.

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In Digital Outputs page, the number of outputs of the IO controller should be set as well as their desired power-up state.

Setup		×
Intern Comm port COM1 V Digital Inputs Digital O	al Setup Parameters for the IO Control Baud rate 1250000 V Address 6 utputs Analog Inputs Analog Outputs PW/M Outputs	
Number of outputs	Power-up state 16 0	
	English V Cancel OK	

In Analog Inputs page, the analog inputs of the I/O controller should be enabled and their range of user values should be specified. For example, if an analog input is used for measuring the actual spindle speed, its range should be from 0 to the maximum spindle speed.

Setup 🛛
Internal Setup Parameters for the IO Control Comm port COM1 V Baud rate 1250000 V Address 6
Digital Inputs Digital Outputs Analog Inputs Analog Outputs PWM Outputs
Analog Input 1 Min value 0 Max value 60000 Invert
Analog Input 2 Min value 0 Max value 1000 Invert
Analog Input 3 Min value 0 Max value 1000 Invert
English Cancel OK

In Analog Outputs page, the analog outputs of the I/O controller should be enabled and their range should be specified. For example, if an analog output is used for controlling the spindle speed, its range should be from 0 to the maximum spindle speed.

Setup 🔀
Internal Setup Parameters for the IO Control Comm port COM1 V Baud rate 1250000 V Address 6 Digital Inputs Digital Outputs Analog Inputs Analog Outputs PWM Outputs
Analog Output 1 Power up 0 Min value 0 Max value 60000 Invert
Analog Output 2 Power up U Min value 0 Max value 1000 Invert
English V Cancel OK

In PWM Outputs page (similar to Analog outputs page), the PWM outputs of the I/O controller should be enabled and their range should be specified.

Click OK on the Setup dialog and Close on the I/O Diagnostics dialog when done.

Tools control

📤 LOGOSO	OL CNC											
File E	dit Diagnostics and	Setup	Mapping H	lelp								
Tool Position	•100.000	Jog Contra	G Code Editor	Tool Pa	ths To	ols Table	Work O	ffsets		LC	GOSO	L
Y + Z +	-010.150 -070.300	Tools: Tool No: Group: Tool Ta	20 Checking	5.000 300 Clear eck length	Diamet Use Time le interval (m	ter: 0.000 d: 300.2 eft: 81.1 hin): 15	Des Time	cription: e left: 0.1	Tool 1 is C Me Re ference:	K easured position: -175.291 ference position: -175.291 0.500 to: 0.500	Length offset: 0.000 Actual difference: 0.000	
		No	Switch pos	Life	Used	Left	Group	Left	Diamete	Description		~
A +	-000.000	01	-175291.0	300.0	300.2	-0.2	01-01	81.1	0.000	Tool 1 is OK		
		02	-142570.0	200.0	31.8	168.2	02-02	168.2	0.200	Tool 2 is OK		
Feed ra	ate 000.0 U/Min	03	-86837.0	Drig Help ode Extor Tool Paths Tool Table Work Offsets LOCGOSOL 1 Length; 5:00 Dameter: 0:00 Description: Tool 1 is OK 2 Length; 5:00 Dameter: 0:00 Description: Tool 1 is OK 2 Length; 5:00 Used: 5002 Time left: 0:0 Measured position: -175:231 Length offset: 0:000 4 Details Oteck length interval (imit); 15 Allowed difference: 0:500 Actual difference: 0:500 <								
0 RPM	Speed 20000	04	-244266.0	400.0	325.9	74.1	05-04	374.1	1.000			Ξ
)		05	-181341.0	100.0	0.0	100.0	05-05	374.1	2.000			
CW	CCW	06	0.0	100.0	0.0	100.0	05-06	374.1	1.500			
		07	03 -68837.0 100.0 18.9 81.1 01.03 81.1 0.500 44 -264266.0 40.0 325.9 74.1 0504 374.1 1.000 56 -181341.0 100.0 0.0 0.595 374.1 2.000 66 0.0 100.0 0.0 100.0 0.595 374.1 2.000 77 0.0 0.0 0.0 0.567 374.1 1.000 88 -714331.0 100.0 0.0 0.578 374.1 0.000 98 0.0 0.0 0.0 5.598 374.1 0.000									
		08	-174331.0	100.0	0.0	100.0	05-08	374.1	0.000			
100.8	<u> </u>	09	0.0	0.0	0.0	0.0	05-09	374.1	0.000			
100 %		10	0.0	0.0	0.0	0.0	05-10	374.1	0.000			
		11	0.0	0.0	0.0	0.0	05-11	374.1	0.000			
Elapsed tim	e: 00:00:00.00	12	0.0	0.0	0.0	0.0	05-12	374.1	0.000			~
Continu	JOUS G54 T3	<					111				>	
MDI		Autor	natic length measurem	ient after g	et 🔲 Sy	ntax test o	nly (no mot	ions)] Always us	e Tool 1 sequences		
Feed Buffer		P coord	linates Tool ler	ngth	0	Get too	k			Put tool	Home changer	
Program Pro	gress	Q coord	dinates Toolcha	nger			C	Save				
ST	ART FEED HOL	D	STOP		 	FEED F	RATE OV	ERRIDI 0	E 100 %		POWER	

Open Tools Table to setup tools parameters and toolchanger control procedures.

Tool Life management

Each tool has **Life** and **Group** parameters assigned. The **Life** parameter is the time limit in minutes for active tool use (tool is selected and spindle is turning). The tools belonging to the same group are considered identical. Selected tool will be replaced automatically with tool from the same group when **Time Left** for first tool is 0. Contact the machine and tools manufacturers to set the proper **Life** value.

Tool length compensation

The following options are available:

- None all compensations are turned off.
- Standard option will apply the tool length compensation only to Z axis.
- RTCP (Rotating Tool Center Point) could be used when the tool (spindle) is attached to one of the rotary axes. According to the angle position of the tool the length difference will be transformed into vertical and horizontal axis offset.



RTCP Tool length compensation

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Select the axes according to the machine design. One of the tools is used to measure the RTCP position and to calculate the rotation radius. This data are used by the software to calculate the vertical and horizontal offsets during the machine operation. To measure the RTCP position – go to **Tools Table** / **Tool details** and run **RTCP calibration** sequence. The data for RTCP will be calculated automatically after the calibration. For specific machine designs the **Pivot point distance** could be entered. The value entered is used during the calculation of the actual pivot point distance and depends on the machine design.

Fixed pockets Toolchanger setup

Number of pockets			Tool No	Code	
Inputs description	Pocket inpu	t and Code inputs	1	6	
Number of Code inputs		Allow valid Codes only	2	7	
			3	3	
Pocket Input address			4	1	
			5	5	
			6	4	
			7	0	
			8	0	
			9	0	
			10	0	
			11	0	
Home	No homing	Go to first pocket	12	0	
			13	0	
			14	0	
Outputs description	Positive dire	ection and Negative direction outputs	15	0	
Output ON address		Inverted	16	0	
Output +DIR address		Inverted	17	0	
			18	0	

Toolchanger with fixed pockets should be selected when each tool pocket has fixed coordinates (position) or the tools are changed manually. All operations are performed using set of specific toolchanger I/O and axes movements commands. The tool change sequences should be entered in "Tools Table" screen. This setting should be used also when the tools are changed manually.

state to the second sec	
File Edit Diagnostics and	d Setup Mapping Help
X +049.000	Jog Control G Code Editor Tool Paths Tools Table Work Offsets
Y -085.494	Tools: 0 1 500 Description: Tool No: 3 0 Lfe. 100 Used: 115 Tme left: 111 Measured postor: 566.37 Group: 1 0 Deer Tme left: 111 Reference postor: 119.723 Length offset: 102.851 Check Length reference 0.500 to: 0.500 Actual difference: 0.000
2 001.333	Tool Table Tool Details
A +000.000 Feed rate 000.0 UAte Speed 20000 CW CCW 100 % Bapeed time: 00:00:00.00 Cortruous G54 T1	Length index/length isdex/length isdex/l
MDI Feed Buffer Program Progress	Automatic length measurement after get Syntax test only (no motions) Aways use Tool 1 sequences Coordinates Tool length Get tool RTCP Ge coordinates Toolchanger Save
START FEED HC	

Logosol CNC supports up to 32 tools. For each tool one **Get Tool Sequence** and one **Put Tool Sequence** should be defined. There is an option for use of only T1 Put and Get tool sequences if **Always use Tool 1** sequences is checked. If there is tool measurement hardware one **Length Measurement Sequence** should be defined. This sequence will be used for length measurement of all tools.

Supported commands for these sequences are:

MOVEABS – move one or more axes to the target machine position. This command accepts any number of pairs of axis name (X, Y, Z, A, B, or C) and a target position in machine coordinates. For example, **MOVEABS Z 10.5** will move the Z axis to machine position 10.5.

MOVETOEDGE -

- In Length Measurement Sequence move axis Z a specified distance and stop the motion immediately if a specified input has a specified value. The main purpose is for measuring the tool length using a dedicated switch, which activates when touched with the tool. For example, MOVETOEDGE INP 5 1 Z-10.0 will start relative (-10.0) motion of axis Z and will stop this motion immediately if input 5 becomes 1. If the input does not activate during the motion the whole sequence will be terminated.
- In Put Tool Sequence move axis Z a specified distance and stop the motion immediately if a specified input has a specified value. The main purpose is to check if the tool is still in place. For example, MOVETOEDGE INP 5 1 Z-10.0 will start relative (-10.0) motion of axis Z and if the value of input 5 is 0, Put Tool Sequence will continue without interruption. If input 5 becomes 1 during the motion the will stop the motion immediately and the sequence will be terminated.

FEEDRATE – set the feed rate for the next motion commands. The units are 1/1000 of the user units per second. For example, **FEEDRATE 10000** will set the speed for the next motions to 10 mm/sec or 600 mm/min.

OUT – set or clear a digital output. This command can be used to open or close the tool changer cover or the clamp. For example, **OUT 4 1** will activate output 4 and if output 4 controls the tool changer cover, it will open the cover.

WAITIN – wait for specified input to activate. This command can be used to wait until a sensor activates. For example, **WAITIN 4 1 2000** will wait until input 4 becomes 1 or the 2000 milliseconds timeout expires. If the timeout expires, the sequence will terminate. Otherwise, the next command in the sequence will be executed.

MESSAGE – display a message for the operator in manual mode and wait for input from the operator. For example, **MESSAGE Get Tool completed** will display on the screen a message box with the text "Get Tool completed" and will wait for the operator to click OK. If the operator clicks Cancel, the whole sequence will be terminated. Note that if the get/put tool sequence is activated by an **M** command from the G code file, there will be no message on the screen and the next command in the sequence will be executed without delay.

DIALOG - display a message for the operator. Similar as **MESSAGE** command but displays the dialog box even if activated from a G code file. For example, **DIALOG Please place tool 2** will display the text "Please place tool 2" on the screen and will wait for the operator to change the tool and click OK. Clicking Cancel will terminate the whole sequence.

DELAY – wait specified amount of milliseconds. For example **DELAY 2000** will delay execution of the next command with 2 seconds.

SPINDLE – enables the spindle with specified analog spindle command. **SPINDLE CW 50** (**SPINDLE CCW 50**) will enable and rotate the spindle CW (CCW) direction with analog output value equivalent to 50 rpm. **SPINDLE STOP** or **SPINDLE OFF** will stop and disable the spindle. This command can be used to rotate spindle when spindle orientation is necessary during the "Put Tool" and "Get Tool" sequences.

Before creating the sequences for put tool, get tool, and measure the tool length, make sure all tool positions are known as well as the inputs and outputs numbers and states that control the hardware related to any of the tool change operations.

Setup guide

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Activate the Tools Table page and select tool number 1 or any other tool. Create the put tool sequence in the designated edit box.

MESSAGE Put tool FEEDRATE 10000 MOVEABS Z0 MOVEABS X50.0 Y20.0 FEEDRATE 1000 MOVEABS Z-10.0 OUT 5 1 DELAY 1500 WAITIN 5 1 1000 FEEDRATE 10000 MOVEABS Z0 OUT 5 0 MESSAGE Put tool done!

In the sequence above, it is assumed that activating output 5 releases the tool, input 5 detects the tool, and the machine coordinates of the tool holder are X50, Y20. Then click "Save" button. Check the sequence for syntax errors by checking "Syntax test only (no motions)" checkbox and click "Put tool" button. The software will display several dialog boxes on the screen with information about any existing errors. After fixing any problems, make sure the selected place is empty and perform a live test of the sequence without a tool. Correct any positions if needed and after everything is OK, test the sequence with a tool.

Create and test your "Get tool Sequence" and "Length Measurement Sequence" sequences step by step as described above. Make sure you click "Save" button each time you finish or change a sequence and before testing it.

After finishing with the first tool, create the "Get Tool" and "Put Tool" sequences for all other tools in the machine. You can copy an existing sequence, change the tool number and paste it for the new tool. Then change only the X, Y coordinates of the new tool and check if each sequence works correctly.

After finishing with these tests, test changing the tool using the M6Tx command in the G code editor.

Note: For some CNC machines the sequences for different tools are similar. Replacing the values used with data from **Q Coordinates** and **P Coordinates** tables allows **Put tool**/**Get Tool** sequences to be optimized.

P Coordinates

The data written in this table can be used as coordinate's value in tool changer sequences.

Example:

User De	efined Co	ordinates									
P variat	bles		P10								
	1	2	3	4	5	6	7	8	9	10	^
P1	10.0	20.0	30.0	0	0	40.0	50	0	0	60.0	
P11	-10.0	70.0	0	0	0	0	0	0	0	0	
P21	0	0	0	0	0	0	0	0	0	0	
P31	0	0	0	0	0	0	0	0	0	0	
P41	0	0	0	0	0	0	0	0	0	0	
P51	0	0	0	0	0	0	0	0	0	0	
P61	0	0	0	0	0	0	0	0	0	0	
P71	0	0	0	0	0	0	0	0	0	0	
P81	0	0	0	0	0	0	0	0	0	0	
P91	0	0	0	0	0	0	0	0	0	0	
P101	0	0	0	0	0	0	0	0	0	0	
P111	0	0	0	0	0	0	0	0	0	0	
P121	0	0	0	0	0	0	0	0	0	0	
P131	0	0	0	0	0	0	0	0	0	0	
P141	0	0	0	0	0	0	0	0	0	0	
P151	0	0	0	0	0	0	0	0	0	0	
P161	0	0	0	0	0	0	0	0	0	0	
P171	0	0	0	0	0	0	0	0	0	0	
P181	0	0	0	0	0	0	0	0	0	0	
P191	0	0	0	0	0	0	0	15	0	0	
P201	0	0	0	0	0	0	0	0	0	0	
P211	0	0	0	0	0	0	0	0	0	0	
P221	0	0	0	0	0	0	0	0	0	0	~
Descrip	tion										
Commen	its									Cancel	
											_
										ОК	

The program:

Could be transformed using P coordinates:

MESSAGE Put tool FEEDRATE 10000 MOVEABS Z0 MOVEABS X50.0 Y20.0 FEEDRATE 1000 MOVEABS Z-10.0 OUT 5 1 DELAY 1500 WAITIN 5 1 1000 FEEDRATE 10000 MOVEABS Z 0 OUT 5 0 MESSAGE Put tool done!

MESSAGE Put tool FEEDRATE 10000 MOVEABS Z P4 MOVEABS X P7 Y P2 FEEDRATE 1000 MOVEABS Z P11 OUT 5 1 DELAY 1500 WAITIN 5 1 1000 FEEDRATE 10000 MOVEABS Z P4 OUT 5 0 MESSAGE Put tool done!

Q Coordinates

The data written in this table have similar application as P variables described above. The difference is that each set T1Q1 - T1Q11, T2Q1 – T2Q11.... is assigned to a particular tool number. The data written in T1Qx will be used only in "Put Tool Sequence" / "Get Tool Sequences" for T1, T2Qx will be used in Put Tool Sequence" / "Get Tool Sequences" for T1, T2Qx will be used in Put Tool Sequence" / "Get Tool Sequences" for T1, T2Qx will be used in Put Tool Sequence" / "Get Tool Sequences" for T1, T2Qx will be used in Put Tool Sequences" / "Get Tool Sequences" for T1, T2Qx will be used in Put Tool Sequences" / "Get Tool Sequences" for T1, T2Qx will be used in Put Tool Sequences" / "Get Tool Sequences" for T2, etc.

Example:

User De	fined Coo	rdinates									
Q variabl	es		Tool No:2 Q	4							
	1	2	3	4	5	6	7	8	9	10	^
T1 Q1	10	20	50	-10	0	0	0	0	0	0	
T1 Q11	0	0	0	0	0	0	0	0	0	0	
T2 Q1	60	70	80	-15	0	0	0	0	0	0	
T2 Q11	0	0	0	0	0	0	0	0	0	0	
T3 Q1	0	0	0	0	0	0	0	0	0	0	
T3 Q11	0	0	0	0	0	0	0	0	0	0	
T4 Q1	0	0	0	0	0	0	0	0	0	0	1
T4 Q11	0	0	0	0	0	0	0	0	0	0	
T5 Q1	0	0	0	0	0	0	0	0	0	0	1
T5 Q11	0	0	0	0	0	0	0	0	0	0	1
T6 Q1	0	0	0	0	0	0	0	0	0	0	1
T6 Q 11	0	0	0	0	0	0	0	0	0	0	1
T7Q1	0	0	0	0	0	0	0	0	0	0	1
T7Q11	0	0	0	0	0	0	0	0	0	0	1
T8 Q1	0	0	0	0	0	0	0	0	0	0	1
T8 Q11	0	0	0	0	0	0	0	0	0	0	1
T9Q1	0	0	0	0	0	0	0	0	0	0	1
T9Q11	0	0	0	0	0	0	0	0	0	0	1
T10 Q1	0	0	0	0	0	0	0	0	0	0	1
T10Q11	0	0	0	0	0	0	0	0	0	0	1
T11Q1	0	0	0	0	0	0	0	0	0	0	1
T11Q11	0	0	0	0	0	0	0	0	0	0	1
T12Q1	55	65	75	80	0	0	0	0	0	0	
Descripti	on			-	1	1			-	-	
Other con	nments									Cancel	٦
										ок	

For T1: MOVEABS X Q1	=>	MOVEABS X 10.0
For T2: MOVEABS X Q1	=>	MOVEABS X 60.0

This allows same sequence to be used for different tools.

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Rotary Toolchanger setup

Two specialized commands are implemented to control the rotary Toolchanger in addition to the set of commands described above.

HOME ROTARY command moves the Toolchanger to fixed position (pocket) associated with tool No 1. It is intended to be used in "Toolchanger Home Sequence", but can also be implemented in "Put Tool Sequence" and "Get Tool Sequence".

POSITION ROTARY command moves the toolchanger to a position (pocket) determined by "Put Tool Sequence" and "Get Tool Sequence".

In order to position Rotary Toolchanger at the specific tool pocket **HOME ROTARY** and **POSITION ROTARY** commands must be included in "Put Tool Sequence", "Get Tool Sequence" and "Tool Changer Home Sequence". To determine the exact sequences refer to machine and Toolchanger description. Toolchanger Home Sequence will start automatically after power-up.

O Toolchanger with fixed pockets Rotary toolchanger Number of pockets 6 Inputs description Home input, Pocket input, and Code inputs Codes order not controlled Number of Code inputs 3 Home Input address Inverted Pocket Input address Inverted Code Input 1 address 5 Inverted Code Input 2 address Inverted Code Input 3 address 7 Inverted Code Input 4 address Code Input 5 address Code Input 6 address Home in negative directio 🔽 🗹 Go to first pocket Home Input timeout 25000 Pocket timeout 10000 Outputs description Positive direction and Negative direction outputs Output ON address Inverted Output +DIR address 17 Output -DIR address 18 Inverted Delay before stop Cancel ОК

"Toolchanger setup" menu provides the ability to define the operation of **HOME ROTARY** and **POSITION ROTARY** commands according to the toolchanger design.

Rotary Toolchanger parameters

Number of pockets

Total number of pockets (carousel positions) could be any number between 2 and 50. This parameter should be always set.

Inputs description

This parameter describes all inputs available to control toolchanger position. It is related to the input data interpretation for **HOME ROTARY** and **POSITION ROTARY** commands. Refer to toolchanger design data to select the proper setting.

Home input and Pocket input

The toolchanger position is controlled by using one "Home input" and one "Pocket input". **POSITION ROTARY** command will determine the carousel position by counting "Pocket input" transitions.

Number of pockets	6		Tool No	Code	1
Inputs description	Home input and Pocket input	~	1	6	
Number of Code inputs	3 Codes order not controlled		2	7	
Home Input address	3 Inverted		3	3	
Pocket Input address	4 Inverted		4	1	
Code Input 1 address	5 Inverted		5	5	
Code Input 2 address	6 Inverted		6	4	
Code Input 3 address			7	0	
Code Input 4 address	0 Inverted		8	0	
Code Input 5 address	0 Inverted		9	0	
Code Input 6 address	0 Inverted		10	0	_
			12	0	_
Home	Home in negative directio 🔽 🗹 Go to fi	st pocket	12	0	_
Home Input timeout	25000 Pocket timeout 1	0000	13	0	
			15	0	_
Outputs description	Positive direction and Negative direction out	outs 💌	16	0	
Output ON address	16 Inverted		17	0	_
Output +DIR address	17 Inverted		18	0	
Output -DIR address	18 Inverted		19	0	
Delay before stop	0		20	0	

The inputs parameters to be defined with this input description are "Home Input number" and "Pocket Input number".

Home input, Pocket input and Code inputs

Every pocket is associated with a specific code (combination of "code inputs"). **POSITION ROTARY** command compares the code corresponding to the current state of all code inputs with the target tool code. **POSITION ROTARY** command will end when the two codes match and the "Pocket input" is active.

In addition to the "Code Inputs" = (code assigned to Tool No1) and "Pocket input" active **HOME ROTARY** command will expect "Home Input" to be in its active state.

Number of pockets	6	Tool No	Code	^
Inputs description	Home input, Pocket input, and Code inputs	1	6	
Number of Code inputs	3 Codes order not controlled V	2	7	
Home Input address	3 Inverted	3	3	
Pocket Input address	4 Inverted	4	1	Ξ
Code Input 1 address	5 Inverted	5	5	
Code Input 2 address	6 Inverted	6	4	
Code Input 3 address	7 Invested	7	0	
Code Input 4 address	0 Inverted	8	0	
Code Input 5 address		9	0	
Code Input 6 address		10	0	
		11	0	
Home	Home in positive direction 💟 🗹 Go to first pocket	12	0	
Home Input timeout	25000 Pocket timeout 10000	13	0	
		14	0	
Outputs description	Positive direction and Negative direction outputs	10	0	
Output ON address	16 Inverted	10	0	
Output +DIR address	17 Inverted	19	0	
Output -DIR address	18 Inverted	19	0	
	0	20	0	

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Home Input and Code Inputs

Every pocket is associated with a specific code (combination of code inputs). **POSITION ROTARY** command will end when the combination of "Code Input X" matches the target tool number code. This command does not control "Pocket Input" state.

🖳 T	oolchanger setup						
0	Toolchanger with fixed p Rotary toolchanger	ockets					
	Number of pockets	6			Tool No	Code	^
	Inputs description	Home input a	and Code inputs	~	1	6	
	Number of Code inputs	3	Codes order not controlled	~	2	7	
	Home Input address	3	Inveted	_	3	3	
	Pocket Input address	4	Inverted		4	1	=
	Code Input 1 address	5	Inverted		5	5	
	Code Input 2 address	6	Inverted		6	4	
	Code los et 3 address	7			7	0	
	Code Invet 4 address	0	Inverted		8	0	
	Code Input 5 address				9	0	
	Code Input Coddross				10	0	
	Code input 6 address				11	0	
	Home	Home in pos	tive direction 🐱 🗹 Go to first p	ocket	12	0	
	Home locut timeout	25000	Pocket times # 1000		13	0	
		20000			14	0	
	Outputs description	Positive dire	ction and Negative direction outputs	~	15	0	
	Output ON address				16	0	
	Outrout +DIR addresse	17	Inveted		17	0	
	O day of DIR address	10			18	0	
	Output -Diri address	10	L] invened		19	0	
	Delay before stop	0			20	0	×
	Cancel						ок

Pocket Input and Code Inputs

POSITION ROTARY command will end when the combination of the "Code Input X" matches the target code. By default **HOME ROTARY** command will position the Toolcanger to Tool No 1 pocket. In this configuration "Home Input" is ignored.

Rotary toolchanger						
Number of pockets	6		1	Tool No	Code	~
Inputs description	Pocket input	and Code inputs	~	1	6	
Number of Code inputs	3	Codes order not controlled	~	2	7	
Home Input address	3			3	3	
Pocket Input address	4	Inveted		4	1	
Code Input 1 address	5	Inveted		5	5	
Code Input 2 address	6	Inverted		6	4	
Code Input 3 address	7			7	0	
Code Input 4 address	0	Inveted		8	0	_
Code Input 5 address				9	0	
Code Input 5 address				10	0	
Code input o douless				11	0	
Home	Home in pos	tive direction 🐱 🗹 Go to first poo	ket	12	0	
Home locut times t	25000	Pocket times # 10000		13	0	
			=1	14	0	
Outputs description	Positive dire	ction and Negative direction outputs	~	15	0	
Output ON address				16	0	
O david v DIR addama	17			17	0	
				18	0	
Output -DIR address	18	L Inverted		19	0	_
Delay before stop	0			20	0	~

Code Inputs only

Carousel position is controlled only by "Code Input X". **POSITION ROTARY** command will end when the "Code Inputs" matches the target code. By default **HOME ROTARY** command will position the toolcanger to Tool No 1 pocket. In this configuration "Pocket Input" and "Home Input" are ignored.

/ Hotary toolchanger					
Number of pockets	6		Tool No	Code	^
Inputs description	Code inputs only	~	1	6	
Number of Code inputs	3 Codes order not controlled	~	2	7	
Home Input address	3 Inverted		3	3	
Pocket Input address	4 Inverted		4	1	
Code Input 1 address	5 Inverted		5	5	
Code Input 2 address	6 Inverted		6	4	
Code Input 3 address	7 Inverted		7	0	
Code Input 4 address	0 Inverted		8	0	
Code Input 5 address	0 Inverted		9	0	
Code Input 6 address	0 Inverted		10	0	_
			10	0	_
Home	Home in positive direction 🔽 🗹 Go to first	st pocket	12	0	
Home Input timeout	25000 Pocket timeout 10	000	14	0	
O das da da constante a	Death is direction and Newton direction is to	4. 1997	15	0	
Cupus description	Positive direction and negative direction outp	<u>us</u>	16	0	
Output ON address			17	0	
Output +DIR address	17 Inverted		18	0	
Output -DIR address	18 Inverted		19	0	
Delay before stop	0		20	0	

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Number of Code inputs, Home Input address, Pocket Input address, Code Input address The parameters below describe the relationship between HOME ROTARY, POSITION ROTARY commands and the actual inputs.



Tool No / Code table

The table describes the relationship between tool number selected with M6Txx command and the combination of "Code Input X" at this pocket. This table is active when "Inputs description" includes "Code inputs".

The software converts the inputs values (current toolchanger position) into a number and compares it to the target tool code (selected with M6Txx command). According to the result and outputs description the command sets the toolchanger control outputs (move forward, reverse, or stop).

	Toolchanger setup
	Toolchanger with fixed pockets
	Rotary toolchanger
	Number of pockets 6 Tool No Code
	Inputs description Procket input and Code inputs V 1 6
	Number of Code inputs 3 Codes order not controlled V 2 7
	Home Input address 3 inverted 3 3
	Pocket hput address 4 Inverted
	Code input 1 address 5 invested 5 5 c
	Code Input 2 address 6 Inverted
	Code Input 3 address 7 Inverted
	Code Input 4 address 0 9 0
	Code Input 5 address
	Code Ingut Summer 11 0
	Packet timeout 10000 14 0
Inputs states are converted	to a number by the formula:
(Cada Janut 1) v1 L (Cada Ja	(0, a) further by the formula.
(Code input 1)x1 + (Code in	$12x^2 + (Code input 3)x^4 + (Code input 4)x^8 + (Code input 5)x^{16} + (Code input 6)x^{32} = Code$
Example: Number of Code	outs=3, Code Input 1=0, Code Input 2=1, Code Input 3=0 (Code inputs 4 to 6 are ignored)
Code=1x0+0x2+7	4=4 => Toolchanger is positioned at the Tool No 6 pocket.
	Cancel OK

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Homing

This parameter allows excluding the **HOME ROTARY** command. If **HOME ROTARY** command is active (one of the directions should be selected) the system will automatically perform toolchanger homing after power-up. The direction selected with this parameter is effective only when the toolchanger position or homing direction is not known.

Rotary toolchanger		
Number of pockets	6	Tool No Code
Inputs description	Pocket input and Code inputs	
Number of Code inputs	3 Codes order not controlled	If this box is checked HOME ROTAR
Home Input address	3 Inverted	3 3 command will require active "Pocket Input" stat
Pocket Input address	4 Inverted	in addition active "Llame Input"
Code Input 1 address	5 Inverted	
Code Input 2 address	6 Inverted	
Code Input 3 address	7 Inverted	
Code Input 4 address	0 Inverted	
Code Input 5 address	0 Inverted	
Code Input 6 address	0 Inverted	
Users		12 0
nome	No homing	13 D
Home Input timeout	Home in positive direction # timeout 10000	14 0
Outputs description	Positive direction and Negative direction outputs	V 15 0
Output ON address	16 Inverted	16 0
Output +DIR addrage	17 Invested	17 0
		18 0
Output -DIH address	18 Inverted	19 0
Delay before stop	0	20 0

Depending on inputs description **HOME ROTARY** command will control Home input, Home and Pocket inputs, and/or Code inputs.

Home Input timeout, Pocket Input timeout

Time interval between **HOMER ROTARY** or **POSITION ROTARY** command start and next "Home Input" or "Pocket Input" active transition. The timeout expiring will terminate any operations related to the commands.

riotaly toolonango				
Number of pockets	6	Tool No	Code	^
Inputs description	Home input, Pocket input, and Code inputs	1	6	
Number of Code inputs	3 Codes order not controlled	2	7	
Home Input address	3 Inverted	3	3	
Pocket Input address	4 Inverted	4	1	=
Code Input 1 address	5 Inverted	5	5	
Code Input 2 address	6 Inverted	6	4	
Code Input 3 address	7 Inverted	7	0	
Code Input 4 address	0 Inverted	8	0	
Code Input 5 address	0 Inverted	9	0	
Code Input 6 address	0 Inverted	10	0	_
		- 11	0	_
Home	Home in positive direction V Go to first packs	12	0	_
Home Input timeout	25000 Pocket timeout 10000		0	
		14	0	
Outputs description	Positive direction and Negative direction outputs	10	0	_
Output ON address	16 Inverted	17	0	
Output +DIR address	17 Inverted	18	0	
Output -DIR address	18 Inverted	19	0	
		20	0	

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Outputs description

This parameter describes toolchanger rotation control outputs. Starting the **HOME ROTARY** or **POSITION ROTARY** command will activate the outputs. They will remain active until the target inputs state is detected. If the inputs state matches the target state the outputs will be deactivated.

Single Positive direction output

lumber of pockets	6			Tool No	Code	^
Inputs description	Home input, F	Pocket input, and Code inp	uts 🗸	1	6	
Number of Code inputs	3	Codes order not controlle	d 🗸	2	7	
Home Input address	3	Inverted		3	3	
Pocket Input address	4	Inverted		4	1	=
Code Input 1 address	5	Inverted		5	5	
Code Input 2 address	6	Inverted		6	4	
Code Input 3 address	7	Inverted		/	0	
Code Input 4 address		Inverted		8	0	_
Code Input 5 address		Inverted		9	0	
Code Input 6 address		Inverted		11	0	
				12	0	
Home	Home in posit	ive direction 👻 🔲 Go	to first pocket	13	0	
Home Input timeout	25000	Pocket timeout	10000	14	0	
Outputs description	Single Positiv	e direction output	~	15	0	
0.4	10		(*)	16	0	
Output ON address	16			17	0	
Output +DIR address		Inverted		18	0	
Output -DIR address	18	Inverted		19	0	
Delay before stop	0	\mathbf{X}		20	0	~
Cancel						OK
Gandar	1	\ \			L	- ON
	/					

Single Negative direction output

Number of pockets	6	Tool No	Code	
Inputs description	Home input, Pocket input, and Code inputs	1	6	
Number of Code inputs	3 Codes order not controlled	2	7	
Home Input address	3 Inverted	3	3	
Pocket Input address	4 Inverted	4	1	
Code Input 1 address	5 Inverted	5	5	
Code Input 2 address	6 Inverted	6	4	
Code Input 3 address	7 Inverted	7	0	
Code Input 4 address		8	0	
Code Input 5 address		9	0	
Code Input 5 address		10	0	
Code input 6 address		11	0	
Home	Home in positive direction V Go to first pocket	12	0	
Heme long times at	26000 Resket times t 10000	13	0	
		14	0	
Outputs description	Single Negative direction output	15	0	
Output ON address		16	0	
Outrust - DID and draws		17	0	
Output +DIH address	17 Inverted	18	0	
Output -DIR address	18 Inverted	19	0	
Delay before stop		20	0	
Cancel				ОК

The output is active during the **HOME ROTARY** and **POSITION ROTARY** commands. The direction selected will not affects the tool counting. For Single Positive direction the tool pockets order is assumed to be: 1, 2, 3, 4,...N, 1, 2... For Single Negative direction the tool pockets order is assumed to be: N...4, 3, 2, 1,N...4, 3, 2, 1. N is the Number of pockets parameter.

Outputs control (single direction toolchanger)

Output description		Output ON	Output +DIR	Output -DIR
Single Regitive direction output	Stop	N.A.	OFF	N.A.
Single Positive direction output	Start	N.A.	ON	N.A.
Single Negative direction output	Stop	N.A.	N.A.	OFF
Single Negative direction output	Start	N.A.	N.A.	ON

Enable and Positive direction outputs



Enable and Negative direction outputs

Rotary toolchanger				
Number of pockets	6	Tool No	Code	_
Inputs description	Home input, Pocket input, and Code inputs	1	6	
Number of Code inputs	3 Codes order not controlled V	2	7	
Home Input address	3 Inverted	3	3	
Pocket Input address	4 Inverted	4	1	=
Code Input 1 address	5 Inverted	5	5	
Code Input 2 address	6 Inverted	6	4	
Code Input 3 address	7 Inverted	7	0	
Code Input 4 address	0 Inverted	8	0	
Code Input 5 address		9	0	
Code Input 6 address		10	0	
		11	0	
Home	Home in positive direction 🐱 🔲 Go to first pocket	12	0	
Home Input timeout	25000 Pocket timeout 10000	13	0	
		14	0	
Outputs description	Enable and Negative direction outputs	15	0	
Output ON address	16 Inverted	16	0	
Output +DIR address	17 Inverted	1/	0	
Output -DIR address	18 Inverted	18	0	
Delevision raduless		19	0	_
Delay before stop		20	U	
/			_	

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HOME ROTARY and POSITION ROTARY commands always will activate Output ON.

Commands calculate the shorter distance between current and target positions (tool pocket number) before setting the "Output +DIR" or "Output –DIR".

Positive direction and Negative direction outputs

🐖 Toolchanger setup				
Toolchanger with fixed r	nckets			
 Rotary toolchanger 				
Number of pockets	6	Tool No	Code	^
Inputs description	Home input, Pocket input, and Code inputs	1	6	
Number of Code inputs	3 Codes order not controlled	2	7	
Home Input address	3 Inverted	3	3	
Pocket Input address	4 Inverted	4	1	E
Code Input 1 address	5 Inverted	5	5	
Code Input 2 address	6 Inverted	6	4	
Code Input 3 address	7 Inverted	-	0	
Code Input 4 address	0 Inverted	8	0	
Code Input 5 address	0 Inverted	9	0	- 11
Code Input 6 address	0 Inverted	10	0	-11
		12	0	- 11
Home	Home in positive direction 👻 🗌 Go to first pocket	12	0	-11
Home Input timeout	25000 Pocket timeout 10000	14	0	-11
		15	0	-11
Outputs description	Positive direction and Negative direction outputs	16	0	-11
Output ON address	16 Inverted	17	0	
Output +DIR address	17 Inverted	18	0	-11
Output -DIR address	18 Inverted	19	0	-11
Delay before stop	0	20	0	-
Creat				or
Cancel				UK

Two separate direction outputs. Commands will calculate the shorter distance between current and target positions (tool pocket number) and will activate one of the control outputs.

Output description		Output ON	Output +DIR	Output -DIR
	Stop	OFF	OFF	N.A.
Enable and Positive direction outputs	Start (+)	ON	ON	N.A.
	Start (-)	ON	OFF	N.A.
	Stop	OFF	N.A.	OFF
Enable and Negative direction outputs	Start (+)	ON	N.A.	OFF
	Start (-)	ON	N.A.	ON
	Stop	N.A.	OFF	OFF
Positive direction and Negative direction outputs	Start (+)	N.A.	ON	OFF
	Start (-)	N.A.	OFF	ON

Outputs control (bidirectional toolchanger)

Delay before Stop

If this parameter is different from zero then the outputs inactive state (Stop) will be delayed after the target position is detected.

💀 Т	oolchanger setup					
0	Toolchanger with fixed p	ockets				
•	Rotary toolchanger					
	Number of pockets	6	Tool No	Code		
	Inputs description	Home input, Pocket input, and Code inputs	1	6		
	Number of Code inputs	3 Codes order not controlled V	2	7		
	Home Input address	3 Inverted	3	3		
	Pocket Input address	4 Inverted	4	1	=	
	Code Input 1 address	5 Inverted	5	5		
	Code Input 2 address	6 Inverted	6	4		
	Code Input 3 address	7 Inverted	7	0		
	Code Input 4 address	0 Inverted	8	0	-	
	Code Input 5 address	0 Inverted	9	0		
	Code input 6 address	0 Inverted	10	0		
			11	0		
	Home	Home in positive direction 🐱 🔲 Go to first pocket	12	0		
	Home Input timeout	25000 Pocket timeout 10000	13	0		
			14	0		
	Outputs description	Positive direction and Negative direction outputs	10	0		
	Output ON address	16 Inverted	17	0		
	Output +DIR address	17 Inverted	10	0	20	iums delay
	Output -DIR address	18 Inverted	10	10		
	Delay before stop	200	20	0	~	
ſ	Creat					
	Cancer			UK		

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Rotary Toolchanger sample application with Enable and positive direction output



Note: The sequence above is for sample purpose only and does not represent fully developed Put Tool sequence.

Setup guide

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Rotary Toolchanger sample application (cont)



Note: The sequence above is for sample purpose only and does not represent fully developed Get Tool sequence