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Y OFF	In Motion ICu	ed Homing Drill Cycle Active rent Off Hardware Fail wer Fail Comm Fail	Check For Errors Pringram limes
Z OFF Feed rate 0 U/Mn Spinde 20000 CW CCW	In Path Motion Brown Path Started Ha In Stop Mode So In Teach Mode In Initialize E Home All Axis Leave	Setup Internal Setup Parameters Driver X axis Y axis Z axis A a Driver parameters Velocity override 100.	
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Program Progress	Work     20000.00     Unit/Sec       Set     0     0       Postions     0     Units       Y     0     Units       Z     0     Units	Communication parameters Comm p Baud ra Interfac	te 1250000 V
		English v	Cancel

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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:

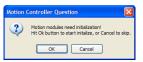
Mctl\_Logosol1.dll is a motion driver supporting up to 9 servo axes.

**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.

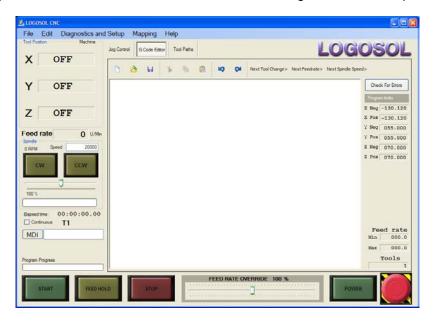
- Start the software by clicking the icon on the desktop. The following dialog box will appear on the screen.



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

Login	
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.



### Setting up the machine limits and user units

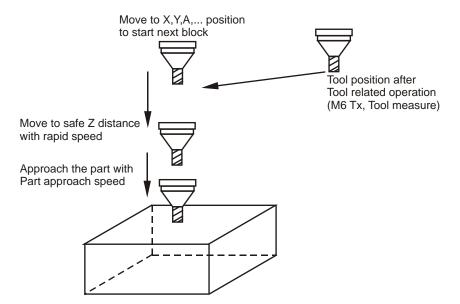
Click Diagnostics and Setup on the main menu and select Machine. The Machine Setup dialog box will be displayed:

Machine Se	tup				
Axes trave	el limits				
	Negative	Po	sitive		
x	-016.000	340	000	Milmeters	
Y	-065.000	015	000	Milmeters	
Z	-120.000	015	000	Milimeters	
A	-300.000	560	000	Milimeters/E	egrees
в	000.000	000	000	Milimeters/E	)egrees
С	000.000	000	000	Milimeters/E	)egrees
	User un			*	
Linear	0.0	Jog sp I/Min 5	eed lotary	90.0	Deg/Min
				00.0	olog/ mill
Linear 2	0.0	Rapid I/Min F	speed lotary	190.0	Deg/Min
Linear 2	.0.0	izimini a	otary	100.0	Deg/Min
1	Part approa	sh speed 5	.0	U/Min	
Safe Z p	position to	approach t	he par	t 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.

### **Spindle settings**

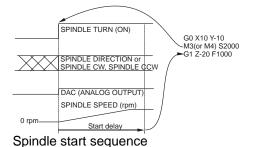
If the spindle is controlled by the software, it should be set up as follows.

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

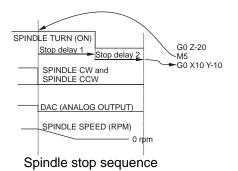
🖶 Spindle Settings		X
Spindle parameters		
Minimum RPM	5000	
Maximum RPM	60000	
Default RPM	20000	
Start delay	3001	
Statt delay	3001	
Stop delay 1	8002	
Stop delay 2	0	
Cancel	ок	

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.



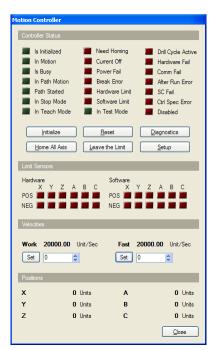
**Stop delay 1** is the delay between zero speed command and disabling the spindle. **Stop delay 2** is the delay between disabling spindle output and starting the next command.



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 X axis Y axis Z axis A axis
Driver parameters
Velocity override 100. Number of axes 4
Work acceleration 300. mm/s/s Reference order ZXY
✓ Reference run output 13 Value 1
Controller error output 0 Value 0
Communication parameters
Comm port
Baud rate 1250000 💌
Interface SERIAL V
English V Cancel DK

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.

- **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 Manager<sup>1</sup>.

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 MHz<sup>1</sup>.

<sup>1</sup> 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 Mo	tion Control	
Driver Xaxis Yaxis Zaxis Aaxis		
Axis Parameters		
Address 1 Type Linear 🗸	Lead screw pitc	h 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 LO 🗸	Deceleration	100. mm/s/s
Positive software limit 🔽 465. mm	Acceleration jerk	10000.
Negative software limit 🔽 -120. mm	Deceleration jerk	10000.
Homing parameters		
Limit switch None 💌	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	OK

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.

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

MODULE	Loganol SK I	Nodule									
DCN I/O 1 DCN I/O 2 SB I/O PT I/O XIS 1 I/O		abled, use these files to initi VMCTL/IO_Logoeol1.dll	alize the	moduli	0					Select	
XIS 2 1/0 XIS 3 1/0	INI File C	MCTL\PARMS\JO_Logo:	sol1.INI							Select	
XIS 4 1/0	1/O to "Mad	hine Actions" Mapping		B	utton				1	LED	
XIS 5 I/O XIS 6 I/O	Output 0	PROGRAM_RUN	~	0	*	^	Input 0	PROGRAM_RUN	0	~	ŀ
	Output 1	PROGRAM_STOP	~	0	~		Input 1	PROGRAM RUN PROGRAM STOP	0	~	
	Output 2	SPINDLE_TURN	~	0	*		Input 2	PROGRAM_CHECK INPUT_OK	0	×	
	Output 3	NONE	*	0	×		Input 3	INPUT_CANCEL SPINDLE_STOPPED SPINDLE_RUNNING	0	۷	
	Output 4	NONE	~	0	٣		Input 4	SPINDLE_READY SERVO_FAULT	0	٧	
	Output 5	SPINDLE_TOOL_LATC	~	0	×		Input 5	PROBE	0	~	
	Output 6	NONE	<b>~</b> ]	3	~		Input 6	NONE	2	*	
	Output 7	COOLANT_FLOOD	~	0	۷		Input 7	NONE	1	×	
	Output 8	COOLANT_MIST	Y	0	۲	~	Input 8	NONE	0	*	
	Analog Output 0	SPINDLE_SPEED			P	~	Analog Input 0	SPINDLE_SPEED			~
	Analog Output 1	NONE				Analog Input 1	NONE				
	Analog Output 2	NONE	NONE Analog NONE							~	
	Analog Output 3	NONE			1	*	Analog Input 3	NONE			Y

Program execution control:

- PROGRAM\_RUN Program start same as main screen START;
- PROGRAM\_STOP When program is running FEED HOLD. When FEED HOLD is active STOP;
- PROGRAM\_CHECK reserved;
- INPUT\_OK reserved;
- INPUT\_CANCEL reserved.

#### 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 and if used SPINDLE STOPPED function should be assigned to Input 2;
- SPINDLE\_READY Expected to be "on" during the program execution. The G-code execution program will be stopped when 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 G-code program execution will be stopped.

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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Probe interface:

PROBE\_IN – probe input. The transition to active (on) state causes the axes position to be transferred to the corresponding variables (#5061 to #5066).

#### Outputs

KMODULE	Lognool S	K Module										
DCN I/O 1 DCN I/O 2 SB I/O	Enable When e	mabled, use these files to initi	alize th	e modul	le							
T I/O IS 1 I/O	DLL File	DLL Fie C:/MCTL/IO_Logosol1.dl										
IS 21/0	INI File	C:\MCTL\PARMS\JO_Logo	ol1.IN						Select			
3S31/0 3S41/0	1/0 to "M	achine Actions" Mapping		B	utton				1	EED)		
3S 5 I/O 3S 6 I/O	Output 0	PROGRAM_RUN	~	0	~	^	Input 0	PROGRAM_RUN	0	*		
	Output 1	PROGRAM_STOP	~	0	*		Input 1	PROGRAM_STOP	0	~		
	Output 2	SPINDLE_TURN	~	0	٧		Input 2	SPINDLE_STOPPED	0	*		
	Output 3	NONE	~	0	~		Input 3	SPINDLE_READY	0	~		
	Output 4	NONE	~	0	~		Input 4	SPINDLE_RUNNING	0	~		
	Output 5	SPINDLE_TOOL_LATC	~	0	×	-	Input 5	PROBE_IN	0	~		
	Output 6	NONE	~	3	~		Input 6	NONE	2	*		
	Output 7	COOLANT_FLOOD	~	0	×		Input 7	NONE	1	¥		
	Output 8	NONE SPINDLE_TURN SPINDLE DIRECTION		0	~	~	Input 8	NONE	0	*		
	Analog Output 0	SPINDLE_ORIENT SPINDLE_TOOL_LATC SPINDLE_FORCE	н			~	Analog Input 0	SPINDLE_SPEED			~	
	Analog COODANT_FLOOD Output 1 COODANT_MIST					~	Analog Input 1	NONE			¥	
	Analog Output 2	PROGRAM_RUN PROGRAM_STOP SPINDLE CCW DIR				~	Analog Input 2	NONE			v	
	Analog Output 3	SPINDLE_CCW_DIR CLAMP				¥	Analog Input 3	NONE			Y	

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

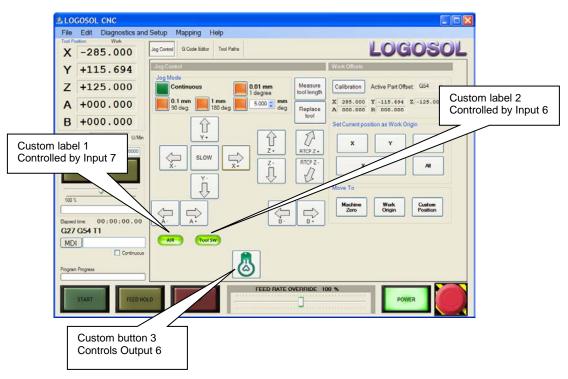
- SPINDLE\_TURN active when spindle command is active (M3, M4). Cleared by M2, M5 and M30. The use of Output 2 (CNC-SK-2310) is strongly recommended because of the implemented spindle safety control circuit;
- SPINDLE\_DIRECTION on when M3 is active, cleared by M4;
- SPINDLE\_ORIENT reserved;
- SPINDLE\_TOOL\_LATCH controlled by custom button. The output is disabled (force to off state) when spindle is running, or during G-code program execution, except during tool change sequence;
- SPINDLE\_FORCE reserved;
- COOLANT\_FLOOD on when M8 is active. Cleared by M9;
- COOLANT\_MIST on when M7 is active. Cleared by M9;
- PROGRAN\_RUN on when program is started;
- PROGRAM STOP pulse when FEED HOLD is active.
- SPINDLE\_CCW\_DIR on when M3 is active, cleared by M4, M5, M2, M30;
- SPINDLE\_CW\_DIR on when M4 is active, cleared by M3, M5, M2, M30;
- CLAMP axis clamp M26-on M27-off;
- POWER\_STATUS\_OK on when homing is done and axes are on, off otherwise;
- PROBE\_OUT on during G38.2 execution, off otherwise;

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.

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#### **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 6 (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), 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. I5 INPUT Bits I5
	Device Global Status           Is Initialized         Control Fail         Power Fail         Comm. Fail           Is Busy         Hardware Fail         SC Fail         Disabled
	VO Config
	Qlose

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 🛛
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
Power-up state           Number of outputs         16         0 <t< td=""></t<>
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 ID 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 ID Control Comm port COM1  Baud rate 1250000 Address 6 Dinital Inputs Dinital Outputs Analog Outputs Pw/M Outputs
Digital Inputs     Digital Outputs     Analog Inputs     Analog Outputs     Pw/M Outputs       ✓ Analog Output 1     Power up     0     0     0       Min value     0     Max value     60000     Invert
Analog Output 2 Power up 0 Min value 0 Max value 1000 Invert
English 💌 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.

### User defined procedures

User defined procedures are used to control the machine interface. All procedures must be included in USERPROC.SETUP file located in C:\MCTL\PARAMS directory.

Each procedure could be executed in one of the following modes:

- <Proc\_Mode>0</Proc\_Mode> time interval mode. The procedure is executed based on time interval parameter ( <Interval>240000</Interval>);
- <*Proc\_Mode>1</Proc\_Mode> –* the procedure is executed every time when the G-code file is started;
- <Proc\_Mode>2</Proc\_Mode> the procedure is executed after the G-code program successful end ;
- <Proc\_Mode>3</Proc\_Mode> the procedure is executed when error occurs or G-code program is stopped during execution.

#### Example:

<?xml version="1.0" encoding="utf-8"?> <USER\_PROCSxmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xmlns:xsd="http://www.w3.org/2001/XMLSchema"> <UserProcs>4</UserProcs> <Procs> <USER PROC> <Proc ID>0</Proc ID> : Procedure ID <Proc Mode>0</Proc Mode> : Mode – time interval <Proc Name>Name</Proc Name> : Procedure name <Enabled>true</Enabled> : Enabled <Interval>240000</Interval> ; Time interval in ms (260000=240sec=4min) <StopOnError>false</StopOnError> ; False - the procedure will continue when error is detected <CanStopGCode>true</CanStopGCode> ; True - the procedure will stop G-code execution if error occur <ErrMessage>Error</ErrMessage> ; Procedure error message - displayed when error occur : Procedure body <Body> <string>OUT 4 1</string> <string>WAITIN 4 1 15000</string> ; Generate an error when INPUT 4 remains 0 after 15 sec <string>OUT 4 0</string> </Bodv> </USER\_PROC> <USER\_PROC> <Proc ID>3</Proc ID> <Proc\_Mode>3</Proc\_Mode> ; Mode - This procedure is executed when error occurs or STOP is pressed during G-code execution <Proc Name>Name</Proc Name> <Enabled>true</Enabled> <Interval>60000</Interval> : Ignored but should be included <StopOnError>false</StopOnError> <CanStopGCode>false</CanStopGCode> <ErrMessage>Error</ErrMessage> <Body> <string>OUT 6 1</string> </Bodv> </USER PROC> </Procs> </USER PROCS>

The procedures are executed in order they appear in the USERPROC.SETUP file. The procedures are executed only one at a time. The active procedure must be completed before starting the next.

### **Tools control**

X -285.000	Jog Contr	G Code Editor	Tool Pat	tha To	ols Table	Work Of	Feets		LOG	osol
	Tools	20 C Lende	0.000	0	ter: 0 000		cription	_		
Y +115.694	Tool No		1000	Use			left: 1990	11111 A 1117	sured postion: 195.525	
7 +125,000	Group:		Onar	Time k		=	And Long	1000		ength offset: 0.000
2 +125.000	1.000.000	k length before Put t			terval (min)	6		difference:		tual difference: 6.535
A +000.000		sciengin berore Put s ble Tool Details	ooi Uneo	c iengin in	terva (net)	0	Anomeo	unerence.	10.500 10. 0.500 76	tua onerence: [15:555
	_									
B +000.000	No 01	Switch pos.	Lfe 1000.0	Used	Left 990.3	Group 00-01	Left 12566 5	Diameter 0.000	Description	
eed rate 000 0 U/Mn	02	-196526.0	1000.0	31.1	968.9	01-02	968.9	0.000	2	
eed rate 000.0 U/Mm	03	-202172.0	1000.0	550.2	449.8	00-03	12566.5	0.000	3	
ORPM Speed 20000	04	-202089.0	1000.0	568.3	431.7	00-04		0.000	2	
	05	-203051.0	1000.0	385.3	614.7	00-05	12566.5	0.000	Probe	
CW CCW	06	-202114.0	1000.0	649.7	350.3	00-06	12566.5	0.000	6	
	07	-81340.0	1000.0	115.3	884.7	00-07	12566.5	0.000		
	08	-81356.0	1000.0	15.9	584.1	00-08	12566.5	0.000		
100 %	09	-75746.0	1000.0	802.5	197.5	00-09	12566.5	0.000		
	10	-198933.0	1000.0	125.5	874.5	00-10	12566.5	0.000		
Bapsed time: 00:00:00.00	11	-74335.0	1000.0	88.7	911.3	00-11	12566.5	0.000		
G27 G54 T1	12	-77358.0	1000.0	57.2	942.8	00-12	12566.5	0.000		
MDI	<									3
	Auto	natic length measurer	nent after g	et 🗌 Sy	ritax test o	nly (no moti	ons) 🗹	Aways us	Tool 1 sequences	
eed Buffer Continuous	P coor	dinates Tool le	ngh	[	Get too				Put tool	Home changer
Program Progress	Com	dinates Toolch					Save	_		Probe
	4 000	dinases Todich	anger				29A6			- P7000

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.

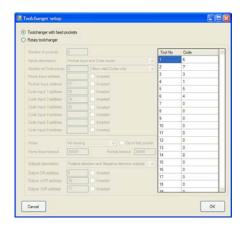
Tool Length Compensation	
O None	
<ul> <li>Standard (Z axis only)</li> </ul>	
<ul> <li>RTCP (Rotating Tool Center Point)</li> </ul>	
Use reference tool for offset calculation	Z tool length
RTCP axis A	↑+Z
Affected axes	+Y
Vertical axis Z	,+X
Horizontal axis X 🔽	
Calibration tool radius 2	Rotation center
Pivot point distance 20	
RTCP measured pos -189.816	
Cancel OK	RTCP Z compensation
	RTCP X compensation

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



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.

LOGOSOL CNC		
File Edit Diagnostics and	d Setup Mapping Help	
X -285.000	Jog Control G Code Editor Tool Paths Tools Table Work Offsets	DGOSOL
Y +115.694	Tools:         20         C         Length:         0.000         Description:         1           Tool No:         1         2         Lfe:         1000         Used:         9.7         Time left:         990.3         Measured postion:         196.52	6
Z +125.000	Group: 0 Cear Time left: 00 Reference position: 156.52	6 Length offset: 0.000
A +000.000	Oneck length before Put tool Oheck length interval (min): 3 Allowed difference. 40.500 to: 0.500     Tool Table Tool Details	
B +000.000 Feed rate 000.0 WMm Spinde ORPM Soeed 2000 CW CCW 100% 100% Bapeed time: 00:00:00.00 G27 G54 T1	Lingth Measuremert Sequence         PAt Ted Sequence           MCSSAGE Measuremert Sequence         PAt Ted Sequence           MCSSAGE Measuremert Sequence         PAT Ted Sequence           MCSSAGE Measuremerts Sequence         MCSSAGE Assurements to length of the Sequence           MCVEABS 22         MCVEABS 22           MCVEABS 24         MCVEABS 22           MCVEABS 24         MCVEABS 24           MCVEABS 25         MCVEABS 25           MCVEABS 25         MCVEABS 26           MCVEABS 25         MCVEABS 27           OUT 8 1         OUT 8 1           OUT 8 1         DELAY 1000           OUT 8 1         DELAY 1000           OUT 8 1         DELAY 1000           MCVEABS 2730         OUT 8 1           DELAY 100         DELAY 100           MCVEABS 2730         OUT 7 5 1           DELAY 100         DELAY 100           MCVEABS 2730         MCVEABS 203           MCVEABS 274         MCMODO           MCVEABS 274         MCMODO           MCVEABS 2740         DELAY 100           DELAY 100         MCVEABS 274           MCVEABS 274         MCMODO           MCVEABS 2740         DELAY 100           MCVEABS 274         MCMODO     <	Tool changer Home Sequence
MDI Feed Duffer Continuous Program Programs	Automatic length measurement after get     Syntax test only (no motions)     Aways use Tool I sequences     Tool length     Get tool     Put tool     Coordinates     Toolchanger     Save	Home changer
START FEED HO		POWER

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.

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One of the tools could be assigned as a **Probe tool** (**Probe** should be checked). **Probe tool** is used for calibration. Refer to G38.2 description in Logosol CNC Operators manual and the machine manufacturer description. Probe tool has its own control sequences displayed when the **Probe tool** is selected (Tool No 5 below).



The Tools Sequences uses separate set of commands. Supported commands 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.

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.

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## P Coordinates

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

Example:

	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	

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:

	es		Tool No:2	2 Q4							
	1	2	3	4	5	6	7	8	9	10	1
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 Q 1 1	0	0	0	0	0	0	0	0	0	0	
T4 Q1	0	0	0	0	0	0	0	0	0	0	
T4 Q11	0	0	0	0	0	0	0	0	0	0	
T5 Q 1	0	0	0	0	0	0	0	0	0	0	
T5 Q 1 1	0	0	0	0	0	0	0	0	0	0	
T6 Q1	0	0	0	0	0	0	0	0	0	0	
T6 Q 11	0	0	0	0	0	0	0	0	0	0	
T7Q1	0	0	0	0	0	0	0	0	0	0	
T7Q11	0	0	0	0	0	0	0	0	0	0	
T8 Q 1	0	0	0	0	0	0	0	0	0	0	
T8 Q 11	0	0	0	0	0	0	0	0	0	0	
T9 Q 1	0	0	0	0	0	0	0	0	0	0	
T9 Q 1 1	0	0	0	0	0	0	0	0	0	0	
T10 Q1	0	0	0	0	0	0	0	0	0	0	
T10 Q11	0	0	0	0	0	0	0	0	0	0	
T11 Q1	0	0	0	0	0	0	0	0	0	0	
T11 Q11	0	0	0	0	0	0	0	0	0	0	
T12 Q1	55	65	75	80	0	0	0	0	0	0	

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.

### **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.

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

"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.

Rotary toolchanger						
Number of pockets	6			Tool No	Code	
inputs description	Konel res	a and Pocket input	~	1	6	
Number of Code inputs				2	7	
Home input address	3	inverted		3	3	
Pocket input address	4	inverted		4	1	
Code input 1 address		anatad .		5	5	
Code Input 2 address				6	4	
Code Input 3 address				7	0	_
Code Input 4 address				8	0	_
Code Input 5 address				9	0	_
Code input 6 address				10	0	-
				11	0	
Home	Home in d	egative drectio 👻 🗹 Ga	to first pocket	12	0	-
Home input timeout	25000	Pocket timeout	10000	13	0	-
				14	0	-
Outputs description	Postive d	rection and Negative direction	n outputs 💌	10	0	
Output ON address		in invested		17	0	-
Output +DIR address	17	Invested		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.

Rotary toolchanger						
Number of pockets	6			Tool No	Code	0
inputs description	Home input	I. Pocket input, and Code inputs	4	1	6	
Number of Code inputs	2	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	l Inveted		5	5	_
Code Input 2 address	6	invested		6	4	_
Code Input 3 address	7	T invested		7	0	_
Code input 4 address				8	0	-
Code Input 5 address				9	0	_
Code Input 6 address				10	0	-
				11	0	-
Home	ionemp	costive detailors 👻 🗹 Go to feat p	ocket	12	0	-
Home input timeout	25000	Pocket timeout 1000		13	0	-
				14	0	-
Outputs description	Postive d	rection and Negative direction outputs	٣	10	0	
Output ON address		in invested		17	0	
Output +DIR address	17	liveted		18	0	-
Output -DIR address	18	Inverted		19	0	
Delay before stop	0			20	0	~

#### 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.

Number of pockets	6		Tool No.	Code	1
inputs description	Home area	t and Code inputs		6	
	3	Codes other not controlled	2	7	
Home input address	13	C Inverted	3	3	
Pocket input address	G.	Investor	4	1	
Code input 1 address	5	D Inveted	5	5	
Code Input 2 address	6	C kveted	6	4	
Code input 3 address	7	C Invested	7	0	
Code Input 4 address	1	I known	8	0	
Code input 5 address			2	0	
Code input 6 address			10	0	_
Code reck e aboress			11	0	_
Home	Home in p	ostive direction 🐱 🗹 Go to first pook	et 12	¢	_
Home input timeout	25000	Pocket timeout 10000	13	0	_
			14	0	_
Outputs description	Postve d	rection and Negative direction outputs	<ul><li>15</li></ul>	0	_
Output ON address			16	0	_
Output -DIR address	17	inverted	17	0	_
			18	0	_
Output -DIR address	18.	kveted	15	0	_
Delay before stop	0		20	0	

#### **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 tookchanger						
Number of pockets	6			Tool No	Code	14
inputs description	Focket re	sut and Code inputs	~	1	6	
Number of Code inputs	3	Codes order not controlled	~	2	7	
Home input address				3	3	
Pocket input address	4	inveted		4	1	
Code Input 1 address	5	inveted		5	5	
Code Input 2 address	6	I Inveted		6	4	_
Code Input 3 address	7	T inverted		7	0	_
Code Input 4 address				8	0	-
Code Input 5 address				5	0	-
Code Input 6 address				10	0	-
				11	0	-
Hone	Horre in p	celtive direction 💌 🗹 Go to first	pocket	12	0	-
Home input timeout	25000	Pocket timeout 100	00	13	0	-
				16	0	-
Outputs description	Postive d	rection and Negative direction output	<u>н ж</u>	12	0	-
Output ON address		in invested .		17	0	-
Output +DIR address	17	inverted		18	0	-
Output -DIR address	18	inveted		19	0	-
Delay before stop	0			20	0	
Delay before stop	10			69	9	2

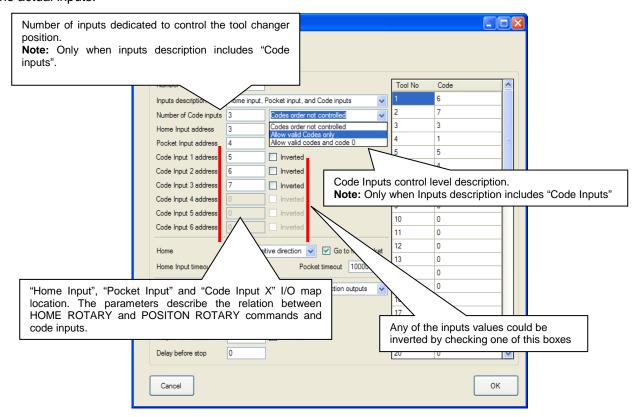
### **Code Inputs only**

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.

Toolchanger with fixed p Rotary toolchanger						
Number of pocketa	6			Tool No	Code	1
Inputs description	Dode input	ta proje	-	1	6	
Number of Code inputs	3	Codes order not controlled	~	2	7	
Home input address				3	3	
Pocket input address				4	1	
Code input 1 address	5	Inverted		5	5	
Code Input 2 address	6	L Inverted		6	4	_
Code input 3 address	7	I Invested		7	0	_
Code Input 4 address		- Invested		8	0	_
Code input 5 address		in Inverse		9	0	-
Code Input 6 address				10	0	-
				12	0	-
Home	Home in p	ostive direction 👱 🗹 Go to first	pocket	12	0	-
Home input timeout	25000	Pocket timeout 100	10	14	0	-
Outputs description	Distance of	rection and Negative direction output		15	0	
				16	0	-
Output ON address		in investigat		17	0	-
Output +DIR address	17	liveted		18	0	
Output -DIR address	18	liveted		15	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     O Rotary toolchanger	
	Namber of pockets     6       Inputs description     Rocket inputs       Namber of Code inputs     3       Code order not controlled     2       Home input address     7       Provide     3       Pocket input defess     6       Code input 2 address     6       Code input 3 address     7       Inverted     6       Code input 4 address     7       Code input 5 address     7       Inverted     0       Code input 5 address     7       Order input 5 address     7       Provintig     6 to find to pocket       Pocket tempodet     1000	
(Code Input 1)x1 + (Code In Example: Number of Code I	into a number by the formula: put 2)x2 + (Code Input 3)x4+(Code Input 4)x8 + (C nputs=3, Code Input 1=0, Code Input 2=1, Code I x4=4 => Toolchanger is positioned at the Tool No	nput 3=0 (Code inputs 4 to 6 are ignored)
	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 Inputs description	6 Pocket input and Code inputs	
	Code ander not controlled     Prevend     Prevend	If this box is checked HOME ROTAR command will require active "Pocket Input state in addition active "Home Input".
	None in negative direction Peatrix direction and liegative direction outputs 10 invented 17 invented 18 invented 9	

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.

Rotary toolchanger						
Number of pockets	6			Tool No	Code	12
Inputs description	Home rip	ut. 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	D Inverted		7	0	
Code Input 4 address		Threated .		8	0	-
Code Input 5 address	0	T invested		9	0	_
Code Input 6 address		Invested		10	0	_
				11	0	-
Home	Honeinp	ostive direction 🐱 🗌 Go to feet	nocket	12	0	-
Home input timeout	25000	Pocket timeout 100	0	15	0	-
	-		10	14	0	-
Outputs description	Postive d	rection and Negative direction output	5 Y	15	0	-
Output ON address	16.	invested		16	0	-
Output +DIR address	17	inverted		18	0	-
Output -DIR address	18	Inverted		19	0	-
Delay before stop	0			20	0	

#### **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

umber of pockets	6		Tool No	Code	-
puts description	Home inp	.t, Pocket input, and Code inputs	1	6	
umber of Code inputs	3	Codes order not controlled	2	7	
ome input address	3	inverted	3	3	
cket input address	4	I Inverted	4	1	
ode input 1 address	5	C Inverted	5	5	
de input 2 address	6	Inverted	6	4	
ode input 3 address	7	I Inverted	7	0	
ode input 4 address		Invested	8	0	
ode input 5 address			9	0	
de input 6 address	0	Invested	10	0	_
			_ 11	0	
ome	Home in p	ostive direction 🐱 🔲 Go to finit pocke	12	0	
Home input timeout	25000	Pocket timeout 10000	13	0	_
				0	
utputs description	Single Po	stive deection output	15	0	
utput ON address		D Inverted	16	0	_
utput +DIR address	17	Inverted	18	0	
utout -DIR address	18	Invested	19	0	
elay before stop	0		20	0	
and porces with	-				
ancel				1	
Lance				1	ОК
	-				

#### Single Negative direction output

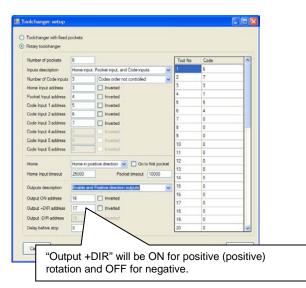
Number of pockets	6		Tool No	Code	
Inputs description	Home inpu	t, Pocket input, and Code inputs	✓ 1	6	
Number of Code inputs	3	Codes order not controlled	✓ 2	7	
Home input address	3	L Inverted	3	3	
Pocket Input address	4	I Inverted	4	1	
Code Input 1 address	5	inverted	5	5	_
Code Input 2 address	6	Inverted	6	4	
Code Input 3 address	7.	I Inverted	7	0	
Code Input 4 address		Invested	8	0	
Code Input 5 address			9	0	
Code Input 6 address		inverted .	10	0	_
			11	0	-
Hone	Home in p	ostive direction 🐱 🔲 Go to first poo	*et 12 13	0	-
Home input timeout	25000	Pocket timeout 10000	14	0	
	(Comparing the		16	0	-
Outputs description	_	gative direction output	15	0	-
Output ON address	16	inverted .	17	0	_
Output +DIR address		i kiveted	18	0	_
Output -DIR address	18	inverted	19	0	
Delay before stop	0		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 Positive direction output	Stop	N.A.	OFF	N.A.
Single Positive direction output	Start	N.A.	ON	N.A.
Cingle 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**

Number of pockets	6			Tool No	Code	1
nputs description	Home inpu	t, 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	kiverted		4	1	
Code Input 1 address	5	inverted		5	5	
Code input 2 address	6	inverted		6	4	
Code Input 3 address	7.	linverted		7	0	
Code Input 4 address		invested		8	0	
Code Input 5 address				9	0	_
Code Input 6 address		Invested		10	0	
				11	0	_
Home	Home in p	ostive direction 🐱 🔲 Go to finit p	ocket	12	0	_
Home input timeout	25000	Pocket timeout 1000		13	0	
				14	0	
Outputs description	Enable an	d Negative direction outputs	~	15	0	
Output ON address	16	inverted		16	0	
Atout +DIR address				17	0	
Output OIR address	18	Inverted		18	0	
	. /	C - manage		19	0	
Delay before stop	0/			20	0	<b>S</b>

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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

			-		
Number of pockets	6		Tool No	Code	
Inputs description	Home inpu	at, Pocket input, and Code inputs	1	6	
Number of Code inputs	3	Codes order not controlled	2	7	
Home Input address	3	liverted	3	3	
Pocket Input address	4	linverted	4	1	
Code Input 1 address	5	D Inverted	5	5	
Code Input 2 address	6	Inverted	6	4	
Code input 3 address	7	inverted	7	0	
Code input 4 address		avvertext	8	0	_
Code Input 5 address		- Inverted	9	0	_
Code Input 6 address		Inverted	10	0	-
			12	0	-
Home	Home in p	ostive direction 👻 🔲 Go to first pocke	13	0	-
Home Input timeout	25000	Pocket timeout 10000	14	0	-
	1		15	0	_
Outputs description		rection and Negative direction outputs	16	0	-
Output ON address	16	- however	17	0	-
Output +DIR address	17	liveted	18	0	
Output -DIR address	18	Inverted	19	0	
Delay before stop	0		20	0	

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.

Outputs control (bidirectional toolchanger)	

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

#### **Delay before Stop**

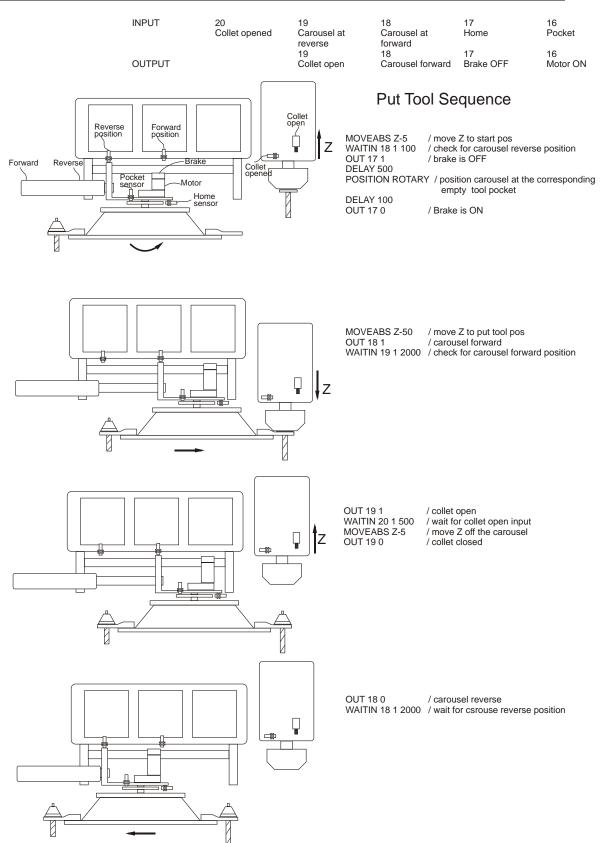
If this parameter is different from zero then the outputs inactive state (Stop) will be delayed after the target position is detected.

Number of pockets	6			Tool No	Code	_	
Inputs description	Home inpu	t, Pocket input, and Cor	de inputs	1	6		
Number of Code inputs	3	Codes order not con	trolled	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		Inverted		8	0		
Code Input 5 address		invested		9	0		
Code Input 6 address		inverted		11	0		
				12	0		
Home	Home in p	pative direction 🔽 🛛	Go to first pocke	13	0		
Home Input timeout	25000	Pocket tir	neout 10000	14	0		
Outputs description	Postius d	rection and Negative dir	action outputs	15	0		
			anter carbona	16	0		
Output ON address	16	invected in the second		17	0		200ms delay
Output +DIR address	17	Inverted		18	0		
Output -DIR address	18	inverted			0		
Delay before stop	200			20	0	2	

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### Rotary Toolchanger sample application with Enable and positive direction output

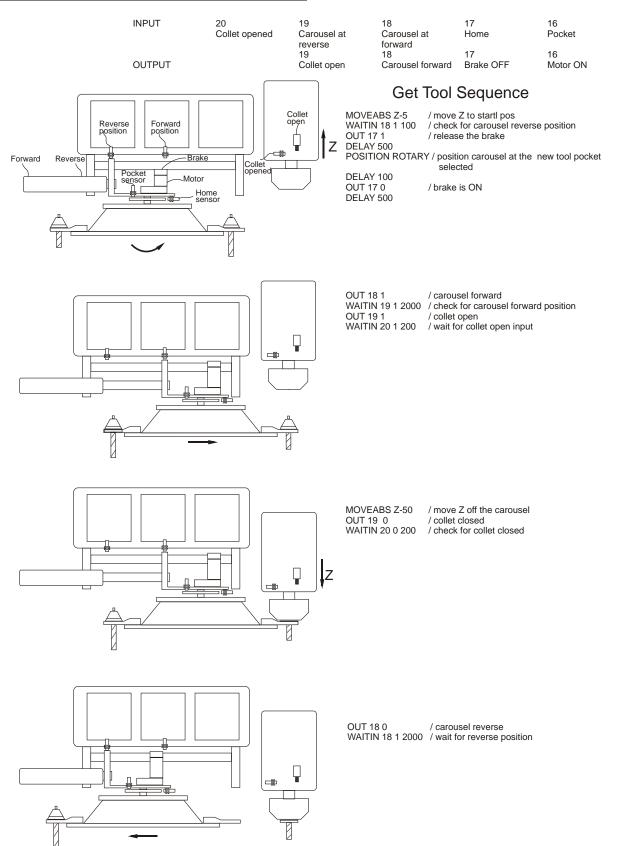


Note: The sequence above is for sample purpose only and does not represent fully developed Put Tool sequence.

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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