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EDH0314En1040-01/25

User's Manual

# **G-Code CONVERTER**

For XPS Controllers V3.00

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Bead G-Code File	(11/29/2008 1:11:14 PM ) (T0:0.001) G20 G30 G30	
🖺 Save G-Code File	G0020125 (MOPProfile T0: 0.0001 Files Initialization Maintenance Setup Help Reduced view	
Create XPS Files	MUG 10         6-Code File in use :         6-Code File in use :         6-Code TCL PVT Show 30           G01 X-0.29:         BEDA EXAMPLE.bt         600 X-0.29:         600 X-0.29:         600 X-0.29:	
<b>G⊭]</b> ⊻erify all PVT files	G00 20.122 G00 X0.28 G01 F1 2.0	
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	G01 F1 Z-0. G02 F0.3X G02 N0.33 G02 × 0.93	
SIMILATION	G11 X-0.83 G02 X-117 G02 X-17 G02 X-17 G02 X-17 G02 X-17 G02 X-17 G02 X-17 G02 X-17 G02 X-17 G02 X-15 G02 X-14 G02 X-15 G02 X-14 G02 X-15 G02 X-17 G02 X-17	
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1771 Deere Avenue Irvine, CA 92606 United States +1 (949)-863-3144 FAX: +1 (949)-253-1680

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MKS Instruments, Inc. warrants that this product will be free from defects in material and workmanship and will comply with MKS published specifications at the time of sale for a period of one year from date of shipment. If found to be defective during the warranty period, the product will either be repaired or replaced at MKS option.

To exercise this warranty, write or call your local MKS office or representative. You will be given prompt assistance and return instructions. Send the product, freight prepaid, to the indicated service facility. Repairs will be made, and the instrument returned freight prepaid. Repaired products are warranted for the remainder of the original warranty period or 90 days, whichever occurs last.

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# Preface

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#### **SERVICE INFORMATION**

The user should not attempt any maintenance or service of the present product and its accessories beyond the procedures outlined in this manual. Any problem that cannot be resolved should be referred to MKS I Newport. When calling MKS I Newport regarding a problem, please provide the Tech Support representative with the following information:

- Your contact information.
- System serial number or original order number.
- Description of problem.
- Environment in which the system is used.
- State of the system before the problem.
- Frequency and repeatability of problem.
- Can the product continue to operate with this problem?
- Can you identify anything that may have caused the problem?

#### NEWPORT CORPORATION RMA PROCEDURES

Any product being returned to MKS I Newport must have been assigned an RMA number by Newport. Assignment of the RMA requires the item serial number.

#### PACKAGING

Materials being returned under an RMA must be securely packaged for shipment. If possible, reuse the original factory packaging.



# 1 XPS-GCODE G-Code CONVERTER for the XPS Controller

# **1.1 Introduction**

**XPS-GCODE** was developed to enable the use of G-Code files on a 2 or 3-axis positioning system controlled by Newport XPS Controller/Driver.

**XPS-GCODE** reads and converts G-Code commands, allowing 3-dimensional objects to be previewed and generated according to routines defined by the source G-Code.

This includes multi-axis motion, defined along lines and arcs, as well as tool (on/off) control, speed control and Digital/Analog output control, with process calculations. TheG-Code is read, filtered and optimized for the XPS Controller. See the <u>G-Code Command List</u> chapter for supported commands (all other commands are not included).

**XPS-GCODE** converts G-Code files into XPS native file formats. These formats "\*.Tcl" and "\*.PVT", can be easily edited in standard text editing software and allow the software to take full-advantage of XPS advanced capabilities such as Trajectory Mode.

**XPS-GCODE** default Graphic User Interface offers efficient and simple access to necessary commands. The extended view gives access to parameter setup, file editing and trajectory viewing.

A built-in TCP-IP Server allows XPS-GCODE to be controlled from a TCP-IP Client. An example of TCP-IP client is provided.

# **Note** G-Code files have been primarily developed for CNC machines. Although the Newport XPS controller does not behave exactly like a CNC machine, most motion commands will be converted and executed. The XPS-GCODE allows G-Code files editing to take advantage of XPS features.

# **1.2 Environment**

**XPS-GCODE** works in Windows 7, 8 and 10 operating environments.

Note

- As XPS-GCODE is a 32-bit application, XPS-GCODE.EXE file properties must be set to:
  - Run this program in compatibility mode for Windows XP (service Pack 3)
- Run this program as an administrator

(Right click on XPS-GCODE.EXE, select Properties, Compatibility tab and then change settings for all users)



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### **1.3 Requirements**

#### 1.3.1 Computer

PC compatible computer with 2 GB RAM and at least 20 MB free hard disk space, Windows 7, 8 or 10.

#### 1.3.2 Motion Controller

**XPS-GCODE** software supports the Newport/MICRO-CONTROLE XPS types: "C", "Q", "RL", "RL-D" and "D" Universal Motion Controller.

**Note** XPS controller must be configured with at least one "multi" type of group containing 2 or 3 axes. Refer to Chapter 7.3 (motion Groups) of the XPS Controller User's Manual.

#### 1.3.3 License Key Number

**XPS-GCODE** software requires a valid license key number (LKN). One LKN is required per XPS controller. The LKN is issued by Newport tech support.

**Note** Several PCs can run XPS-GCODE using the same LKN if they control the same XPS.

#### 1.3.4 Software Installation

From the Newport Website:

- Download the compressed XPS\_GCODE Software Package.
- Extract the G-CODE directory to your preferred location (recommended path is: C\Newport\XPS-GCODE).

## 1.3.5 Connections

- Ethernet link: PC computer to Newport XPS controller (Host).
- Newport stages to XPS controllers: Consult the XPS User's Manual.
- XPS-GCODE will automatically detect the MAC address of the attached XPS and prompt a License Key Entry (LKN).
- License Keys are provided by Newport Tech Support after purchase.
- Enter Key to access full-feature set of XPS-GCODE.



# 2 Launching XPS\_GCODE

Using XPS-GCODE is very simple. However, it requires some parameters to be set when used for the first time (see chapter below). Once these parameters are set, just proceed as follows:

- Connect the XPS controller to the PC, power on and wait for the controller to complete the boot process (approximately one minute, the XPS emits a final beep).
- Launch XPS-GCODE and wait for communication to be established.

**Note** With Windows-7, XPS-GCODE has to be given rights to communicate with the Ethernet port. To do so, right click on XPS-GCODE icon and then select "Run as administrator", then click "Yes" to proceed.

## 2.1 Setting Parameters

Using **XPS-GCODE** EXEC on a Newport XPS controller for the first time requires several steps to set some parameters.

# **Note** These parameters must be set only once as they are memorized by XPS-GCODE.

- Computer Ethernet TCP/IP communication setting.
- Establishing communication with Newport XPS controller.
- XPS-GCODE License Key Number (LKN) setting.

**Note** XPS-GCODE LKN is granted for the use with ONLY ONE XPS controller. However, it can be installed on multiple computers.

- XPS Communication DLL date verification.
- XPS group and axes name settings in XPS-GCODE.

NoteXPS controller must be set with a "multi" type of group containing three axes.Add dummy stages to the XPS as needed since XPS-GCODE requires 3 stages to run.

# 2.2 Computer TCP/IP Address

To establish communication with the XPS controller, the computer Ethernet TCP/IP address must be set correctly according to hardware communication configuration.

**Note** User must have computer administrator right to modify these parameters. Refer to the XPS manual as needed.

#### 2.2.1 Computer linked directly to XPS "Remote" port.

In this case, a cross-over Ethernet cable must be used.

Computer TCP/IP address must be set at "192.168.254.X" (with X different from 254). Subnet mask must be set at "255.255.255.0".

#### 2.2.2 Computer linked directly to XPS "Host" port.

In this case, a cross-over Ethernet cable must be used.

Computer TCP/IP address must be set at an address corresponding to XPS "Host"TCP address. The first 3 sets of numbers must be the same, but the last one different. i.e.: "150.10.23.45" for XPS and "150.10.23.44" for computer.

Subnet mask must be set to "255.255.255.255".

**Note** Consult XPS user's manual for XPS "Host" port address setting.

#### 2.2.3 Computer linked to XPS "Host" port though a network.

In this case, a straight through Ethernet cable must be used.

Computer and XPS TCP/IP addresses must be set at different addresses compatible with the current network settings (consult your network administrator).

Recommended Subnet mask setting is: "255.255.255.0".

# 2.3 Establishing communication with Newport XPS controller

Double click XPS\_GCODE.EXE to launch G-CODE (When XPS\_GCODE is launched for the first time, Windows may prompt you to set permissions). The connection window appears.

#### 2.3.1 Connection established:

When XPS\_GCODE can establish the connection with the XPS controller using the saved parameters (in the XPS\_GCODE.INI file), the connection window appears displaying the detected XPS controller type and allowing:

- Connection to the detected port and address
- Running the program in simulation mode
- Quit XPS\_GCODE

Controller Type Detection and Connection × Controller Type Found C XPS-RL XPS-C н. C XPS-Q XPS-D
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 X
 X
 S-D
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 Connection 🔁 Continue 192.168.1.154 port, Address: A Ignore Continue in Simulation mode <u>C</u>lose Quit program Do not show this window age

**Note** Checking the "Do not show this window again" box allows skipping this step when running XPS\_GCODE the next time. It must be checked when using window direct commands.

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#### 2.3.2 Connection not established:

When launching XPS\_GCODE for the first time or when the connection with the controller cannot be established with the last used parameters (saved in the XPS\_GCODE.INI file), afte an error message (acknowledge it), a new window appears allowing the following:

- Connection through the HOST port after entering its address
- Connection through the REMOTE port
- Running the program in simulation mode
- Quit XPS\_GCODE

#### 2.3.3 Troubleshooting:

Although the Port 5001 communication channel will be ultimately use by XPS\_GCODE, there is a possibility to change the detection method to verify that any firewall or anti-virus is not blocking the communication.

A right click on the Connection panel allows:

- Selecting the Detection method (Never, Always, Ping, FTP, TELNET, Port 5001 or Port 80)
- XPS Present? verifies the presence of a controller at the selected address through the selected method. A message window informs:
  - o If the controller cannot be reached an error message appears. Check IP address...
  - Once the controller is detected, press the "Connect" button to access XPS-GCODE main window.

**Note** Controller can be determined only using the "Port 5001" method.

Detection method is memorized in the XPS-GCODE.INI file and will be used at the next start

Set a delay for the program to wait for controller rebooting is not used in XPS-GCODE

#### a) XPS-D Particularity:

XPS-D controller scripts can be accessed directly from windows (7 and higher) through a mapped drive.

After detecting and connecting to an XPS\_D, XPS-GCODE will ask for the letter associated to the mapped drive through a new window (default: "Z:"). Enter the correct letter and press "OK".

OK C	ncel
Dialog	
XPS seen as Z:	< >
<u>0</u> K	
Dialog	
with this XPS	copy ^
<u>D</u> K	

Define Nelwork Drive associated to XPS Controller

If the drive can be accessed, XPS-GCODE starts.

**Note** A message reminds you that this version of GCODE\_XPS does not communicate through SFPD protocol therefore XPS configuration files cannot be accessed for maintenance purpose

	Dialog	
	Abnormal XPS Response CODE = -1	^
er	<u>K</u>	Ý
ntroller Type De	etection and Connection	×
Controller Type F	ound	i
C XPS-C	C XPS-RL C Simulation	
C XPS-Q	C XPS-D	
Connection		4
Connect	HOST port, Address: 192.168	.0.254
Connect	REMOTE port, Address: 192.168	254.254
📌 Ignore	Continue in Simulation mode	
Lose	Quit program	
Do not show th	is window again	

Controller Type De	tection and	Connection		×
Controller Type Fo	und C XPS-RL	. C Sim	ulation	
C XPS-Q	C XPS-D		ŀ	
Connection				
Connect	HOST port	, Address:	192.168.1.	154
Never		Detectio	on Method	>
Allways		XPS pre	sent ?	
- Ping FTP		Delai at	reboot	
TELNET	1	nue in Simulation	n mode	
Port 80				
	Quit progra	m		
Do not show this	s window aga	in		
Dialog				
XPS not	t detected			0

ОК

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Otherwise, an error message appe	Image: Second Converter for Newport XPS Controller         Eles       Initialization         Image: Second Converter for Newport XPS Controller         Image: Second File         Image: Second Converter for Newport XPS Controller         Image: Second File         Image: Second Converter for Newport XPS Controller         Image: Second File         Image: Second Fi	XPS type and mapped         XPS Type: D(2)         P. Speet         10000         TACE:         2000
<b>Note</b> In case of error of connect it (Esp	check the mapped drive state on your file pecially when the controller has been reb	e explorer, you may have to re- booted…)
Wapping a XPS         Image: the the second of the second	Disconnected Drive	Image: State of the state
Note License Keys are	e provided by Newport Tech Support afte	r purchase.
Click OK to access the License Ke	y	SERIAL KEY X License Key control. The current License Key Number (LKN) does not marks to simulation mode UKN) without a license Key (LKN) does not marks to simulation mode To avail of the functions of MS-6CODE, places and include the More address shown below in your order. An LKN will be forwarded threading. XPS MACADORESS Serial Key Distribute (1228)
<b>Note</b> Give the XPS Ma purchase the Lic	ac address to Newport Tech Support to cense Key and get the Key.	SERIAL KEY Lizens Key control. The current License Key Nueber (LKHI des net match the current MPS Mac address. Without a license key, XPS GCODE defaults to simulation mode. To avail of the functions of XPS-GCODE, please and end XPS-GCODE and include the Mac address shyrm, below in your order. An LSM with be forwarded therealist VPS NAC ADDRESS Serial key Vogocq22cq225J34 V DK



Type the Key to access all features of XPS-GCODE.

Code File in use :	G-Code TCL PVT SCT Display	30
		P. Speed: 12.2300
Bead G-Code File		W. Speed: 10.0000
		T. Acc.: 100.0000
Save G-Code File		
Create XPS Files		
ræ] ⊻erify all PVT files		
ode: SCT		
Execute XPS Files		ୀୟ <u>D</u> elete a line
	, 	Ģ Addaline
		Dr Insert a line
STOP		😒 <u>M</u> odify a line
	Axes Arrows Colors: X-Red Y-Blue Z-G	reen Arrows Size 1.0000

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# 3 Main Window Description

# 3.1 Extended View



## **Note** A click on the "Reduced view" menu switches back to XPS-GCODE basic features.

Extended view can be re-sized by grabbing and dragging the bottom right corner of the main window.

If the command "Use Feed Rate Codes ("F")" in the setup menu has been checked, positioning and working speeds will be set by the G-code file and are not displayed.



# 3.2 Reduced View

Note

A click on "Extended view" menu provides access to XPS-GCODE editing and displays features.





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# 3.3 Main Menu Description

3.3.1 Files

This menu provides access to basic features such as:

Edit:	To read, edit and save any text file through XPS-GCODE editor.
Print G-Code File:	To print the current G-Code file.
Print TCL File:	To print the current TCL file.
Exit:	To Quit XPS-GCODE software.

#### 3.3.2 Initialization

This menu launches XPS stage initialization and group homing sequence.

#### 3.3.3 Setup

This menu allows setting XPS-GCODE parameters with:

XPS IP Address setting:



#### **XPS Axes** / G-Code name association:

Y-Axis   Positioner Name   Z-Axis   Positioner Name   LEFT.Z   Positioner Name MULTI.Z Cancel X Cancel X Cancel X Cancel
Note       XPS-GCODE version 3.00 controls 2 or 3 motorized axes which MUST be in a "Multi" type of group.         With a 2-axis configuration, The Z-axis name selection disabled

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G-Code "M" Commands / XPS Output association:

Command	GPIOxDO (	Jutput Numbe	r Active Leve
Activate tool	1 🜲	1 🜲	© 0 C 1
M03 / M05	1 🜲	2	© 0 © 1
M04 / M05	1 🜲	3 🚖	© 0 C 1
M07 / M09	1 🜲	4 🜲	© 0 © 1
M08 / M09	1 🜲	5 🜲	0 0 C 1

Default values: are shown in the picture.

Note

Available GPIO ports depend on XPS\_C, Q, D, RL or RL-D type

- M3 and M4 set outputs which are reset by M5.
- M7 and M8 set outputs which are reset by M9.
- XPS outputs are associated with Tool Activation (A) G-Code "M" commands through the outputs window of setup menu.
- Purple color of an indicator corresponds to a level "1" of the XPS output Examples:
- Tool activated (GPIO1.DO1 and level set at 1)



M3 activated (GPIO1.DO2 and level set at 1

Conversion Mode:	"SCT", "TCL/PVT" or "XPS Direct" (see <u>Conversion Modes Description</u> chapter for details).
Positioning Speed:	To set the default speed for "G0" commands.
Trajectory acceleration:	To set trajectory acceleration/deceleration for "G1", "G2" and "G3" commands.
Default Working Speed:	To set the default speed for "G1", "G2" and "G3" commands.
Use Feed Rate codes (F):	To enable/disable the use of "F" commands (speed on trajectory).
Max Angular discontinuity:	To set the discontinuity threshold in trajectories.
Angular Step Size:	To set the angular value of the arc element used in circular parts of trajectories.
Number of Digits for PVT:	To set the number of digits used in "PVT" files creation.
Language:	To select the display language (French, English or other).
Display:	To select the display parameters with:

# User's Manual EDH0314En1040-01/25 Number of Displayed Digits: To set the number of digits displayed in the status bar. Sample Rate: To set the XPS position feedback reading period. Background Color: To set the 3DShow tab background color. Zoom (Max & Min) : To set trajectories display zoom limits. Erase Step by Step: To erase the wire frame as soon as it's executed. Parameters values are memorized and reloaded when restarting XPS-GCODE. When using Note XPS-GCODE for the first time, parameters default values are: Positioning Speed: 10 (XPS axes unit/s) Trajectory acceleration: 100 (XPS axes unit/s) Default Working Speed: 1 (XPS axes unit/s) • Max Angular discontinuity: 2 degrees Angular Step Size: 5 degrees Number of Digits: 4 Sample Rate: 100 ms Server TCP-IP: To Enable/Disable TCP-IP control (see chapter 7.0) Server Port: To Select TCP-IP port # (default : 8000)

TCP-IP SERVER		
Port used by server :	8000	
	ОК	Cancel

# 3.3.4 Maintenance

This menu allows saving all current files (SCT, TRJ and PVT) into the XPS through the

Save all files command. This is especially critical after file modification.

## 3.3.5 Help

This menu provides information on XPS-GCODE current version with:

About: To display: XPS-GCODE Software version information. XPS MAC address License Key

User's manual: To open this file.





# 4 Simulation Mode

Three conditions are required to access all XPS-GCODE executable features: An established Ethernet communication, correct setting of XPS controller parameters and valid License Key Number.

If one of these conditions is not met, XPS-GCODE will automatically switch to 'SIMULATION" mode with limited features.

Mode Features	Executable	Simulation	Notes for sim. mode
Parameters setting	Yes	Yes	May require restart
XPS controller dialog	Yes	No	
Reduced/Extended views	Yes	Yes	With a limited command set
Reading G-Code files	Yes	Yes	
"SCT" conversion mode	Yes	Yes	
"Tcl/Pvt" conversion mode	Yes	Yes	
"XPS Direct" conversion mode	Yes	No	
Editing files	Yes	No	
"SCT" trajectories display	Yes	Yes	
Executed trajectories display	Yes	No	
Saving converted files	Yes	No	In PC Computer
TCP-IP Server	Yes	Limited	No trajectory execution
Status bar information	Full	Limited	File line number only



# **5** Conversion Modes Description

**XPS-GCODE** reads, filters (unrecognized commands are ignored) and converts all G-Code file types for up to 3 axes of motion on the Newport XPS controller.

One of the Newport XPS Multi-axis controller's great features is to allow 3-axis trajectory execution while controlling the speed vector. This can be done using "PVT" motion files.

To take full advantage of Newport XPS Multi-axis controller capabilities, XPS-GCODE provides THREE conversion modes which can be selected depending on the G-Code file's content (size, type of motion, etc.). The three modes are named: **"SCT**" mode, **"TCL/PVT**" mode and **'PVT Direct**" mode.

# 5.1 "SCT" Mode

In "SCT" mode, G-Code file conversion is done through 2 steps:

- Line per line conversion into an "SCT" text file.
- Multiple line conversion of the "SCT" file into XPS compatible text files ("TCL" and "PVT").

During conversion, a "TCL" script is created, containing sequentially:

- Tool control (change from "G0" to "G1, G2 or G3" and back) and Output control("M") commands are converted into XPS controller output control commands ("GPIOxSet...").
- Inactive tool motion commands ("G00") are converted into standard single or multi-axis "Relative" motion. ("GroupMoveRelative").
- Active tool commands ("G01, G02 and G03") are converted into corresponding "PVT" trajectories files.
- **Note** In case of an angular discontinuity between consecutive elements higher than the value set in "<u>Setup</u>/Angular discontinuity", the current trajectory will continue but with a "0" speed point.

A change in working speed ("Fx" command) will be included in the trajectory. The TCL script name is always: "GCODE\_Converted.TCL".

After transferring all files ("TCL" and "PVT"s) to the XPS, the "TCL" script can then be launched from XPS-GCODE or from any other program connected to the XPS.

**Note** In SCT mode, all motions in TCL and PVT files are converted in relative mode.



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## 5.2 "TCL/PVT" Mode

Note

G-Code includes two type of tool state:

- Inactivated tool state ("G0" command) with motions executed at default speed.
- Activated tool state ("G1, G2 or G3" commands) with motions executed at feed rate speed.

In "TCL/PVT" mode, G-Code file conversion is done in a single step. XPS\_GCODE analyzes the G-Code file commands and creates **a** '**TCL**'' script sequentially containing three types of XPS commands:

- Change in tool state and Output control ("M") commands are converted into XPS controller output control commands ("GPIOxSet...").
- Inactivated tool motion commands ("G00") are converted in standard single or multi-axis "Relative" or "Absolute" motion. ("GroupMoveRelative...", "GroupMoveAbsolute...").
- Activated tool consecutive commands maintaining angular continuity ("G01,G02 and G03") are converted into corresponding "PVT" trajectories files.

**Note** In case of angular discontinuity between consecutive elements higher than the value set in <u>Setup</u>/Angular discontinuity", the current trajectory ends and a new one is created.

A change in working speed ("Fx" command) will be included in the trajectory. The TCL script name is always: "GCODE\_Converted. TCL"

After transferring all files ("TCL" and "PVT"s) to the XPS, the "TCL" script can then be executed from XPS-GCODE or from any other program connected to the XPS.

# 5.3 "XPS Direct" Mode

In "Direct" mode, the conversion principle is similar as in "TCL/PVT" mode. However, each converted XPS command (Tool control, Absolute or relative move and output control) and Trajectories ("PVT" files) are executed immediately.

**Note** No TCL is created and only one "temporary" trajectory is loaded in the XPS and executed immediately.





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# 5.4 Conversion Modes Comparison

Mode	Advantages	Limits
SCT	SCT file creation allows:	May take a little bit longer due to the 2 steps
	Keeps an image of the converted file	Relatively large trajectories
	Compatible with 3rd party software GOL3D	(more difficult to troubleshoot/modify)
	3D display (option)	
	Can be re-launched from XPS	
	Allows verification before execution	
TCL/PVT	Multiple shorter trajectories	No image of the trajectory
	(easier to troubleshoot/modify)	
	Can be re-launched from XPSAllows verification	
	before execution	
XPS Direct	Faster	No verification before execution.
		Cannot be re-launched from XPS.

# 5.5 Conversion Errors

In case of incoherence in G-Code file arc definition an error message will be displayed.

XPS_GCODE.exe		
Incoherence in G-Code file, line : 6		
Ok I		



# 6 Using XPS-GCODE

# 6.1 XPS Address in XPS-GCODE

In the case of an incorrect TCP/IP address setting, XPS-GCODE displays an error message.



After error acknowledgment, XPS-GCODE automatically starts in "SIMULATION" mode.

In "Extended View" select "XPS Address" command of the "Setup" menu.

les	Initialization	Maintenance	Setup	Help	Reduced view	
C	XPS Address	s		SCT	Show 3D	
	Axes Outputs Conversion Positionning Trajectory a Default Woi	Mode g speed cceleration rking speed es	•			P. Speed: 5.000 W. Speed: 4.000 T. Acc.: 1.000
-	Max angula Angular Ste Nb Digits Language	r discontuinity p Size	•			
E	xecute XPS Files					ৰ <b>া</b> য় <u>D</u> elete a line
						🖗 🛆 da líne
						Dr Inseit a Ine
(	о STOP					🔄 Modify a line
D M	30 M40 M70 M	80				

Enter the current XPS address.

IP ADDRESS (XPS)		192.168.2.12
	ок	Cancel

Then exit and re-launch XPS-GCODE software (to memorized parameters).

	anual	EDH0314En1040-01/25
.2 Axes	configuration	
Note	XPS-GCODE requires th containing 3 axes.	ne XPS to be configured with (at least) one "multi" type of group
a "multi" 3-	axis group is not detected, an	error message appears. Consult the XPS User's Manual for group setting
-	<b>3 1</b> <i>i</i>	XPS_GCODE.exe
		evr-s not set with a Jaxes "multi-group
		<u>k</u>
Note	When using XPS-GCOD appears, XPS axes grou contain several "multi"	E for the first time with an XPS, even though no error message up and positioner names must be set in XPS- GCODE. (XPS may groups…).
o do so pro	ceed as follows:	
<ul> <li>Selection</li> </ul>	t "Extended View" to access	the "Setup/Axes" command of the "Setup"menu.
<ul> <li>In the lists.</li> </ul>	newly opened window, select Fhen click " <mark>Ok</mark> ".	the desired group name and axis names in the corresponding drop-down
Note	Axes color matches arro	ow color in the 3D show tab.
Note	Axes color matches arro	ow color in the 3D show tab.
Note	Axes color matches arro	∞ Axes Configuration
Note	Axes color matches arro	ow color in the 3D show tab. State Axes Configuration ■ ■ X Axes Configuration
Note	Axes color matches arro	The second secon
Note	Axes color matches arro	Axes Configuration  Axis  Positioner Name  EFTX  Axis  YAxis
Note	Axes color matches arro	Axes Configuration
Note	Axes color matches arro	Axes Configuration
Note	Axes color matches arro	Axes Configuration
Note	Axes color matches arro	Axes Configuration
Note	Axes color matches arro	Source     Source     Source     Source     Source     Source     Source
Note	Axes color matches arro	Axes Configuration     Positioner Name     Positioner Name     EFT.Z     Y Cancel     Y Cancel
Note	Axes color matches arr	Axes Configuration     Positioner Name        Z-Axis     Positioner Name        EFT.Z     Cancel     V Cancel
Note	Axes color matches arr	Axes Configuration     Y-Axis   Positioner Name   LEFT.Y     Z-Axis   Cancel   V OK

User's Ma	anual	EDH0314En1040-01/25
Note	In case of incorrect axis number setting, an error messa	age is displayed.
	XPS_GCODE       Axis Name Error       OK	

# 6.3 XPS Stages Initialization

To be able to be controlled, all 3 axes need to be initialized. If XPS axes are not initialized, XPS-GCODE status bar color turns red indicating the need for initialization which can be done by clicking on "**Initialization**" in the main menu.

# Warning

Ensure that stages are not obstructed and can move freely before launching initialization.



The initialization sequence depends on an XPS parameter setting (together at the same time or one after the other, consult XPS user's manual for more information).

During initialization, the status bar displays "Initialization in Progress".

After completion, the status bar color is set to light grey.

# 6.4 Basic Use

Although XPS-GCODE also offers advanced features such as editing G-Code and converted files, XPS trajectory file verification and Trajectories display, basic use requires only 2 or 3-step processes: <u>Loading</u> and <u>Direct Execution</u> steps or <u>Loading</u>, <u>Converting</u>, and <u>Executing XPS Files</u> steps.

#### 6.4.1 Setting Parameters

Prior to reading and converting G-Code files, various parameters must be set. These are located in the "Setup" menu accessible in the "extended view" mode: Positioning speed, Trajectory acceleration, Default working speed, Use "F" codes, Maximum angular discontinuity and Angular step size. See <u>Setup</u> chapters for details.

6.4.2 Loading a G	G-Code File bde File" to open the file to open	file selection window, and then select Open ook in: GCODE GC	the file (".nc").
Note Def	Code Converter for         Files Initialization M         G-Code File in use :         Alien Face lent.nc         Elect G-Code File         Beed G-Code File         Beed G-Code File         Elect G-Code File         Beed G-Code File         Mode:       XPS Direct         Execute XPS Files         Block/block       Whole file         Next       Abort         STOP       A& M3@ M4@ M7@ M6@         A@ M3@ M4@ M7@ M6@       102 Lings	directory: C//XPS_Code/GCODE aintenance Setup Help Reduced view GCode PVT Show 30 [This file was created automatically using CamBan ] [This file was created automatical using CamBan ] [This f	P. Speed: 5000 W. Speed: 4000 T. Acc: 1000
Selected G-Code file <b>Note</b> Thi	is displayed in the e	ditor window. Code File" and "Create XPS files" t	outtons.

#### **User's Manual**

Note

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#### 6.4.3 Direct Execution

"XPS Direct" <u>Conversion Modes Description</u> is part of the 2-step process allowing simultaneous G-Code file "block" conversion and execution.

See XPS Files Generation chapter for details

X S G-Code Converter for Newport XPS Controller Files Initialization Maintenance Setup Help Reduced view G-Code PVT Show 3D G-Code File in use : (This file was created automatically using CamBam.) (http://www.brusselsprout.org/CAMBAM.) (11/29/2008.1:11:14.PM.) 5.000 Alien Face lent.nc P. Speed: 4.000 W. Speed: (T0:0.001) G20 G90 G64 Read G-Code File T. Acc.: 1.000 
 664
 600 20125
 (MOPPhotie\_2)

 (MOPPhotie\_2)
 (T0:0.001)
 M05 T0

 M05 T0
 600 ×0.299635 Y-2.672109
 600 F1 2.0.001

 601 F1 2.0.001
 601 F1 2.0.001
 600 ×0.24283

 600 ×0.281184 Y-0.761984
 600 ×0.261184 Y-0.761984
 603 F0 3.20.090095 Y-0.9533
 Save G-Code File 401 F1 2-0.001 G03 F0.3 %0.090095 Y-0.953059 I-0.022534 J-0.168553 G00 2%0.25 G00 X-0.324529 Y-0.753101 G01 F1 2-0.001 G02 F0.3 % 0.132217 Y-0.945379 I0.022666 J-0.169545 G00 Z0 125 G00 X-0.12517 Y-0.945379 I0.022666 J-0.169545 Mode: XPS Direct Execute XPS Files 📬 Delete a line G00 X-0.475024 Y0.265282 G01 F1 Z-0.001 G02 F0.3 X-0.600539 Y0.198916 I-0.145025 J0.122407  $\begin{array}{c} 602 \pm 70.3 \times 0.600539 \ \mbox{vol}{0} 1 89316 \ \mbox{l}{0} 1 45025 \ \mbox{J}{0} 1 122 \\ 602 \times 0.8867 \ \mbox{vol}{0} 210.4824 \ \mbox{l}{0} 1.0 \ \mbox{s} 655 \ \mbox{J}{0} 1 838 \\ 602 \times 1.17323 \ \mbox{vol}{0} 343422 \ \mbox{l}{0} 452748 \ \mbox{J}{1} 7.21514 \\ 602 \times 1.47307 \ \mbox{vol}{0} 343422 \ \mbox{l}{0} 45555 \ \mbox{J}{0} 83245 \\ 602 \times 1.78868 \ \mbox{vol}{0} 855145 \ \mbox{l}{0} 6555 \ \mbox{J}{0} 83245 \\ 602 \times 1.78833 \ \mbox{vol}{1} 1 6559 \ \mbox{l}{0} 453952 \ \mbox{J}{0} 283245 \\ 602 \times 1.784333 \ \mbox{vol}{1} 1 6559 \ \mbox{l}{0} 43952 \ \mbox{J}{0} 283245 \\ 602 \times 1.78474 \ \mbox{vol}{1} 285138 \ \mbox{l}{0} 0.00457 \ \mbox{J}{0} 200058 \\ 602 \times 1.78474 \ \mbox{vol}{1} 285138 \ \mbox{l}{0} 0.243525 \ \mbox{J}{0} 1 97547 \\ 603 \times 1.587295 \ \mbox{vol}{1} 397777 \ \mbox{J}{0} 0.00073 \ \mbox{J}{0} 0.00045 \\ 602 \times 1.41952 \ \mbox{vol}{1} 1 0.64552 \ \mbox{J}{0} 0.00452 \\ 602 \times 1.41952 \ \mbox{vol}{1} 1 0.00073 \ \mbox{J}{0} 0.00045 \\ 602 \times 1.41952 \ \mbox{vol}{1} 1 0.00073 \ \mbox{J}{0} 0.00045 \\ 602 \times 1.41952 \ \mbox{vol}{1} 1 0.00073 \ \mbox{J}{0} 0.00045 \\ 602 \times 1.41952 \ \mbox{vol}{1} 1 0.00073 \ \mbox{J}{0} 0.00045 \\ 602 \times 1.41952 \ \mbox{vol}{1} 1 0.00073 \ \mbox{J}{0} 0.00045 \\ 602 \times 1.41952 \ \mbox{vol}{1} 1 0.00073 \ \mbox{J}{0} 0.00045 \\ 602 \times 1.41952 \ \mbox{vol}{1} 1 0.00073 \ \mbox{J}{0} 0.00045 \\ 602 \times 1.41952 \ \mbox{vol}{1} 1 0.00073 \ \mbox{J}{0} 0.00045 \\ 602 \times 1.41952 \ \mbox{vol}{1} 1 0.00073 \ \mbox{J}{0} 0.00045 \\ 602 \times 1.41952 \ \mbox{vol}{1} 1 0.00073 \ \mbox{vol}{1} 0.54552 \\ 602 \times 1.41952 \ \mbox{vol}{1} 0.00073 \ \mbox{vol}{1} 0.54552 \ \mbox{vol}{1} 0.555 \$ Block/block 🖗 Add a line Whole file 🕼 Insert a line STOP 付 Modify a line Stop AO M3O M4O M7O M8O 102 lines

To launch this step, proceed as follows:

- Select the execution mode: "Block/Block" or "Whole File".
- Then click on "Execute XPS Files" to launch the execution.
- In "Block/Block" mode, the first block will be converted and executed while the conversion of the next block starts.
- When both tasks are completed, "Next" button allows execution of the converted block and conversion of the next one.
- In "Whole File" mode, each block is executed as soon as it is converted.
- "Abort" button stops the current process.

**Note** Execution mode "Block/Block" or "Whole File" can be changed during process execution.

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During conversion, status bar displays the number of the first line of the block being converted and the total number of lines.

In extended view mode, the display area provides the following information:

- G-Code file tab: the current block will be highlighted during execution.
- 3D Display shows the current block frame and the executed trajectory (see Trajectories Display chapter).



#### 6.4.4 Converting

Note

"SCT" and "TCL/PVT" <u>Conversion Modes</u> are part of the 3-step process allowing display, editing and saving converted files before launching the execution.

To create converted files, proceed as follows;

Click on "Create XPS Files" to launch the conversion.

Status bar displays several messages indicating on-going conversion steps (including line number).

and 5 PVT Files cre	ated	

Wait until a message announces the end of conversion and provides information on how many files have been created.

> Type and number of files created depends on the conversion mode. See <u>XPS Files</u> <u>Generation</u> for details.

Display area tabs show the created files: TCL and PVT files (if any).

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#### If several PVT files are created, selection is done by the drop down menu (upper right corner of the display area):



or

#### 3D Show tab can display either the converted:

#### Trajectory (SCT mode)





Wire frame (TCL/PVT mode)

After conversion "Verify All PVT files" and "Execute XPS Files" buttons are enabled.

**Note** Number of elements in a trajectory file is limited to 500000.

#### 6.4.5 Verifying XPS Files

Click on "Verify all PVT files" to verify the compatibility of the converted files with the XPS axes parameters (Range, speed. Acceleration, etc...).

If compatible, a message informs the user that all PVT files have been checked successfully and the files can be executed by the XPS controller.

XPS_GCODE.exe	
5 "PVT" files successfully Verified	



In case of incompatibility, a new window appears providing information on:

- Trajectory number (TRJx.PVT)
- XPS reported error number and description
- For each axis: Min and Max position, Max Velocity and Max acceleration with:
  - Extrema : Trajectory extremes values
  - o Limit: XPS Axes parameters.

IBJLEVI		Elfor-631 A	cceleration on trajectory I	s (dio big	
Axis	Code	Min. Pos.	Max. Pos.	Max. Vel.	Max. Acc.
×Extrema	0	19.6380	21.9562	4.0153	36063.6000 ERROR !!!
X Limit	0	-154.0000	154.0000	250.0000	500.0000
YExtrema	0	18.8138	20.9965	4.0137	36608.1000 ERROR !!!
Y Limit	0	-154.0000	154.0000	250.0000	500.0000
Z Extrema	0	0.0000	0.0000	0.0000	0.0000
Z Limit	0	-154.0000	154.0000	250.0000	500.0000

The trajectory value exceeding the corresponding axis parameter is highlighted by an "ERROR !!!" message

The "Next" button allows verifying other trajectories (if the G-code conversion created more than one). The "Cancel" button exits the verification mode.

#### **TROUBLESHOOTING:**

- In case of Min and Max position error:
  - o Verify the G-code file to ensure the size of the expected work fits within the stage mechanical limits
  - Change the starting point to re-center the work.
- In case of Max velocity error:
  - o If G-code "F" commands are not used, reduce the Working speed parameter
  - o If G-code "F" commands are used, modify the G-code file.
- In case of Max acceleration error:
  - Reduce the Trajectory acceleration parameter
  - o If G-code "F" commands are not used, reduce the Working speed parameter

If G-code "F" commands are used, modify the G-code file.

This means that a too high velocity is requested on too short of a move.



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#### 6.4.6 Executing XPS Files

This is the 3<sup>rd</sup> step of "SCT" and "TCL/PVT" <u>Conversion Mode</u> processes.

After conversion, click on "Execute XPS Files" to launch "TCL" and "PVT" filesexecution.

During execution, the status bar displays:

A © M3© M4© M7© M8©		٠ III			
X:2.460436	Y:0.585936	Z:0.125000	Line 102/102	Run GCode_Converted.TCL	

In extended view mode, the display area provides the following information:

3D Display shows converted trajectory and executed trajectory (see Trajectories Display chapter).



Upon completion, a window notifies the user of the TCL execution result code (0 = NO error).

XPS_GCODE.exe	
Script Executed Result : 0 -> D.K.	
<u>k</u>	



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# 6.5 G7-Code Files Edition



XPS-GCODE allows: deleting, adding, modifying and inserting a line through four buttons as described below:

- **Deleting a line:** In the G-Code display area, click on the line to be deleted. This line is highlighted in the list and copied in the editing line. Then click "Delete a line" button.
- Adding a line: Prepare the line to be added in the editing line, then click "Add aline" button, the line is added at the end of the file.
- **Inserting a line:** In the G-Code display area, click on the line immediately below the point of insertion. This line is highlighted in the list and copied to the editing line where you can modify it, to prepare the line you want to insert.

Then click "Insert a line" button to insert it above the highlighted line in the list.

Modifying a line: In the G-Code display area, click on the line to be modified. This line is highlighted in the list and copied in the editing line where you can modify it. Then click "Modify a line" button to replace the highlighted line.

After modification, a G-Code file must be saved by clicking "Save G-Code file" button before Note starting conversion.

6.6 Converted Files Edition

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After conversion, all converted files (SCT, TCL and PVT) are "text" files. XPS-GCODE allows editing by directly modifying them in the display area.

Select the corresponding tab (SCT, TCL or  $\ensuremath{\mathsf{PVT}}\xspace)$  to access the desired file.

After modification, user will be prompted to save the modified file(s)

# 6.7 Trajectories Display

# 6.7.1 Display Control

Note

3D Display area is controlled by the mouse:

- Left click and drag: 3D display rotation.
- Right click and drag: 3D display translation.
- Scroll: Zoom.
- Left double click shows the extended menu allowing display control with:
  - Erase displayed trajectories and skeletons.
  - Draw SCT trajectory ("Sct" mode only).
  - Center display to 0,0,0 or current position or selected position
  - Extend Z axis zoom (x10).
  - o Set Nodes (points between trajectory elements) size.
  - o Set Axes Arrows size (X=Red, Y=Blue, Z=Green).
  - Set Cone size (representing current stage position during trajectory execution, Green ="G0", Red = "G1").

Erase Wire Frame Draw SCT Center on current position

Erase Executed Trajectories Erase SCT Trajectory

Center on (0,0,0) Zoom Z x 10

XY 2D Display

Node size Arrows size Cone size





No

GC\_EXEC.exe

Yes

TRJ1.PVT modified. Save-it ?

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Note	Background color can be set through Setup main menu Axes arrows colors and sized are displayed at the botton	(display command). m.
	Axes Arrows Colors: X-Red Y-Blue Z-Green	Arrows Size 1.000

#### 6.7.2 General Information

Depending on the conversion mode, the main window display area provides information on conversion results through different tabs.

Note

All converted files (SCT, TCL and PVT) are in a "text" file format.

Frames and Trajectories display as follows:

Mode	Action	Listing tabs	Display tab
SCT	Conversion	Creation of SCT, TCL and PVT	Theoretical trajectory display (through mouse right click/display SCT command) during and after XPS files creation
	Execution	-	Real time executed trajectory display
TCL/PVT	Conversion	Creation of TCL andPVT	Momentary display of converted block skeleton
	Execution		Real time executed trajectory display
XPSDirect	Conversion/Execution	The first line of the current block being converted/executed is highlighted	Converted block skeleton and real time executed trajectory display

**Note** XPS direct mode offers the possibility of executing the file "block by block" (see <u>Direct</u> <u>Execution</u> chapter.



# 6.8 SCT Mode

GO G-Code Converter for Newport XPS Controller Eiles Initialization Maintenance Setup Help Reduced view G-Code | TCL | PVT | SCT Show 30 G-Code File in use : 5.000 Alien Face lent.nc w/. Speed: 4.000 Bead G-Code File T. Acc.: 1.000 Save G-Code File t∰ ⊆reate>0PS Files Del Verily all PVT free Mode: SCT Execute XPS Files VII Delete a line C Addates Cr inset a line STOP VI Modily a line AO M30 M40 M70 M80 X:-2.4505 Y:0.8122 Z:-0.0010 Run GCode\_Converted.TCL Line 102/102

In this mode, as the whole G-Code file has been converted into an "SCT" file, it is possible to visualize the trajectory before execution.

A mouse right click on the "Show 3D" tab displays the trajectory from the newly created "SCT" file.

During execution, the stages' encoder position feedback are used to draw the actualtrajectory executed by the stages.

A cone appears indicating the current position of the stages. The cone color indicates the state of the XPS output associated with the G-Code "G0" and "G1" commands:

- Green: "G0"
- Red: "G1"



Note

Executed trajectory is represented by dots. Distance between dots depends on trajectory speed, sampling rate and available Windows resources. Changing the 3D display with the mouse will interrupt the drawing process and may result in missing dots. However the executed trajectory is correct.



# 6.9 TCL/PVT Mode

In this mode, as the whole G-Code file is converted into a TCL and several PVT files, at the end of conversion, the trajectory wire frame is automatically displayed in the 3D show tab.



During execution, the stages' encoder position feedbacks are used to draw the actual trajectory executed by the stages.

A cone appears indicating the current position of the stages. The color indicates the state of the XPS output associated with the G-Code "G0" and "G1" command:

- Green: "G0"
- Red : "G1"



# Note

Executed trajectory is represented by dots. Distance between dots depends on trajectory speed, sampling rate and available Windows resources. Changing the 3D display with the mouse will interrupt the drawing process and may result in missing dots. However, the executed trajectory is correct.



# 6.10 XPS Direct Mode

In this mode, as the G-Code file is converted "block by block", it is not possible to visualize the whole trajectory before execution.

However, the most recent converted block frame is displayed just before execution.

During execution, the stages' encoder position feedbacks are used to draw the actual trajectory executed by the stages.

A cone appears indicating the current position of the stages. The color indicates the state of the XPS output associated with the G-Code "G0" and "G1" command:

- Green: "G0"
- Red: "G1"



Note

Executed trajectory is represented by dots. Distance between dots depends on trajectory speed, sampling rate and available Windows resources. Changing the 3D display with the mouse may cause interruptions in the drawing process and may result in missing dots. However, the executed trajectory is correct.



# 7 TCP-IP Server

# 7.1 Remote Commands List

A built-in TCP-IP server allows a client to remote control XPS\_GCODE.

Once enabled in the Setup/TCP-IP Server menu, this communication enables the following command list:

Command	Action	Description
INIT	XPS axes initialization	Initialization [§ 3.3.2]
HIDE / SHOW	Hide/ show XPS-GCODE	
REDUCE / EXTEND	Displays XPS-GCODE in Reduced or Extended view(if in	Extended View/Reduced View [§ 3.4]
	SHOW and EXTENDED view modes)	
3D	Displays the 3D tab (if in SHOW and EXTENDED	Direct ExecutionD Display [§ 6.4.3]
	view modes)	
MODE x	Conversion mode selection with:	Conversion Modes [§5]
	x = 1: SCT, x = 2: TCL/PVT, x = 3: Direct	
READ name.ext	Reads "name" GCode file with "ext" extension. (Gcode file	Loading a File [§ 6.4.2]
	must be placed in the Gcode subdirectory)	
CREATE	Converts current and creates XPS file	Converting [§ 6.4.4]
EXECUTE	Launch converted files execution	Executing [§ 6.4.6]
DRAW name.ext	Reads "name" GCode file with "ext" extension, Converts,	
	Creates and then Execute XPS file	
VERIFY	Verify all current PVT files	Verifying [§ 6.4.5]
STOP	Aborts any motion and Kills all XPS axes (requires INIT	<u>Stop</u> [§ 3.5.1]
	command)	

Note

TCP-IP Client must be connected prior to send any command

XPS-GCODE Server IP address is defined by the network board installed in the PC or by the local address (127.0.0.1) if the client is in the same computer as XPS-GCODE. Recommended default communication port# is 8000.

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Note

# 7.2 Remote Commands List

A "CLIENT\_GCODE.EXE" is provided to demonstrate XPS-GCODE TCP-IP remote control.

As CLIENT\_GCODE is a 32-bit application, CLIENT\_GCODE.EXE file properties must be set to:

- Run this program in compatibility mode for: Windows XP (service Pack 3)
- Run this program as an administrator

(Right click on CLIENT\_GCODE.EXE, select Properties, Compatibility tab and then Change settings for all users)

To use CLIENT\_GCODE, proceed as follow:

- Launch XPS-GCODE
- In XPS-GCODE Setup menu, check "TCP-IP Server
- Launch CLIENT\_GCODE.EXE.
- Verify Server IP address and port# compatibility with XPS=GCODE settings
- Click "Connect"
- Client window enlarges and message "connected" appears
- Select a command in one of the drop down lists and then click on the corresponding"SEND" button
- After completion of a command, XPS-GCODE returns DONE or FAILED in case of any error

P-IP Client for XP.	S-GCODE TEST			CO G-Code Converter to	rewport XF3 Controller		
				Files Initialization M	aintenance Setup Help Reduced view		
Server IP Address	Port	Time out (mSec)	Connect	G-Code File in use : NEWPORT_REL.NC	G-Code   TCL   PVT   SCT Display 30	P. Speed W. Speed	5.000
127.0.0.1	8000	100000	Disconnect	Bead G-Code File		T. Acc.	80.000
onnected				Pa Seve G-Code File			
eceived from 127.0.0.1 eceived from 127.0.0.1 eceived from 127.0.0.1	: INIT DONE : HIDE DONE : SHOW DONE			Deale XPS Files	J		
eceived from 127.0.0.1 eceived from 127.0.0.1	: MODE DONE : READ DONE			Dr] ⊻eity al PVT files		-	
eceived from 127.0.0.1 eceived from 127.0.0.1	: VERIFY DONE : EXECUTE DONE						
		Clear				<u></u>	
Commands		Clear	Sand			)	
Commands NIT SHOW		Clear	Send Send	Evenue XPS Files			elete a line
Commands INIT SHOW MODE1		Clear	Send Send Send	Evenue XPS Files			jelete a line Add a line
Commands INIT SHOW MODE1 READ Newport_Rel.nc	2	Clear	Send Send Send Send	Evenue XPS Film		(10) (10) (10) (10)	jelete a line Add a line nsert a line
Commands INIT SHOW MODE1 READ Newport_Rel.nc EXECUTE	3	Clear	Send Send Send Send Send Send	Execute XPS Films			elete a line Add a line nsert a line fodity a line

Note

As execution time depends on the command, Time out value must be set accordingly prior to send the command. In case of time out too short, the response might be displayed with the following command response.



Language

Display





## 7.3 Windows Direct Command

The following tasks can be automatically executed when launching XPS-GCODE:

- Setting parameters:
  - Positioning speed: V=
  - o Drawing speed: U=
  - Acceleration: A=
  - o Discontinuity: D=
  - o Angular Step: A=
- Setting conversion mode:
  - o SCT: /S or /1
  - o Direct: /X or /3
  - TCL: /T or /2
- Display mode
  - Hide messages: /H
  - Display extended view: /E
  - o Display reduced view: /R
  - o Keep Display after drawing completion: /V
- Gcode file reading, conversion and execution
  - o Gcode.file\_name

#### Exemple : XPS\_GCODE "Test Jeff.nc" /V /X /R V=12.23 A=2456.

Launches Gcode, reads « GcodeFileName », converts it in TCL Mode and executes it in the reduced view while hiding messages and keeps the display after completion.

- XPS IP address must have been set correctly prior to use these commands and the "Do not show this window again" box in the connection window must be checked.
  - « GcodeFileName » must be located in the "Gcode" subdirectory
  - Separator can be "space" or ";"
  - Sending "/V=20" is equivalent to send "/V" and "V=20"



# 8 Appendix

# 8.1 G-Code Command List (Version 3.00)

G codes	Description	Notes
G0	Rapid Linear Motion	Default speed
G1	Linear Motion at Feed Rate	-
G2 & G3	Arc at Feed Rate	-
G4	Dwell Time in seconds	i.e., G4P1 for 1 s delay
G28	Return to Home	Move absolute 0,0,0
G53 &G90	Absolute Mode	-
G91	Relative Mode	-

M codes	Description	Notes
M3	Selectable XPS output ON	Reset by M5
M4	Selectable XPS output ON	Reset by M5
M5	Reset XPS outputs	M3 and M5
M7	Selectable XPS output ON	Reset by M9
M8	Selectable XPS output ON	Reset by M9
M9	Reset XPS outputs	M7 and M8

Other codes	Description	Note
F	Set Feed Rate	-
VARIABLES and	Almost all mathematical	-
calculations	functions	
N	Line numbers	No effect
()	Comment	No effect

Note

In case of missing parameter in a command, the last value will be taken in account

In case of multiple "G" commands on the same line, XPS-GCODE will separate them into different lines. It is then recommended to save the Gcode file for future use.

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## 8.2 Variables

XPS-GCODE understands G-Code variables (I.e.: "#A25", "[A]) and calculation on variables (almost all mathematical functions...)

# 8.3 TCL Format (SCT & TCL/PVT) Modes

During conversion in "SCT" and "TCL/PVT" modes, a TCL is created with a default name **GCODE\_Converted.TCL**". This file includes 3 parts:

- A first part includes:
  - o Comments (TCL name, G-Code file name, date and time).
  - o Variable definitions (XPS group name, GPIO number, etc...).
  - o Procedures (enable/disable tool output, Change speed, Relative displacement, Close socket, etc.).
  - o Setting tool inactive mode (equivalent to "G0" command" ).
  - o Loading X, Y and Z default position speed into XPS.
  - Mode absolute to position 0,0,0.
- A third part including all G-Code converted commands which will call the procedures defined in the first part.

This format simplifies reading the TCL while minimizing its size.

# 8.4 Default Speed on Trajectory

Setup Menu includes following parameters: "Positioning speed", "working speed", "Trajectory acceleration" and "Use F codes".

By default, Positioning speed is used for all "G0" commands and working speed for all "G1", "G2" or "G3" commands and "**Trajectory acceleration**" is used for all commands.

If "Use F codes" is checked in the setup menu, and an "F" command is included in a trajectory, the current working speed will be modified to reach the new speed using "Trajectory acceleration" parameter

# 8.5 XPS Files Generation

XPS-GCODE converts G-Code files using the following rules:

A "TCL" is created including 3 types of commands:

- "Absolute move": If G-Code file includes a "G0" command using "positioning speed" parameter.
- "Output setting": If G-Code file includes an "M" command.
- "PVT execution": for all "G1", "G2" and "G3" commands using default working speed parameter to start with "F" command speeds.

As many "PVT" files as necessary:

- As soon as "G1", "G2" and "G3" commands are found, a trajectory file (PVT) is created. Then:
  - o If "G0" or "M" commands are found, this PVT file is ended and a new one is opened.
  - o This is repeated until the end of the G-Code file.



# 8.6 Comments in "PVT" Files

TRJx.PVT tabs include comments to ease trajectory reading.

ichiers Init Mainter	nance Setup Help		
Inuse	Edt Goode Show XPS files SCT		
Alien Face lent.nc	GCode_converted.tcl   TBJ1.PVT   TBJ2.PVT   TBJ3.PVT   TBJ4.PVT   TBJ5.PVT   TBJ5.PVT   TBJ7.PVT	P Speed	5.000
	1; FVT X=0.000000 Y=0.000000 Z=-0.126000 V =0.200000 V begin =	W.C.	4.000
Aead Goode File	x 0.008000 0.000000 0.000000 0.000000 0.000000 -0.000800 -0.20	W. Speed.	14.000
	3 0.622000 0.000000 0.000000 0.000000 0.000000 -0.124400 -0.20	T Acc.	1.000
월 Save Goode File	4 0.008000 0.000000 0.000000 0.000000 0.000000 -0.000800 0.000		1.000
	s; FVT ARC Centre X=0.148522 Y=0.107204 Angle =-34.589430 V =		
Print Goode File	€ 0.008000 -0.000467 -0.116344 0.000650 0.162678 0.000000 0.00		
1	7 0.078414 -0.008566 -0.102007 0.013131 0.172031 0.000000 0.00		
Create XPS Files	<pre># 0.078414 -0.007412 -0.086922 0.013815 0.180124 0.000000 0.00</pre>		
-			
Save XPS Files in PC	10 0.078414 -0.004949 -0.054957 0.014876 0.192301 0.000000 0.00		
12-500 NMM PA 1955	11 0.078414 -0.003659 -0.038312 0.015245 0.196296 0.000000 0.00		
🕞 Copy Files in MPS	12 0.078414 -0.002342 -0.021385 0.015502 0.198853 0.000000 0.00		
1	13 0.078414 -0.001008 -0.004302 0.015646 0.199954 0.000000 0.00		
C Execute XPS Files	14 ; PVT ARC Centre X=-0.000500 Y=-0.000011 Angle =2.179057 V =		
	15; PVT ARC Centre X=0.352559 Y=0.021153 Angle =-17.751773 V =		
	14 0.136786 -0.000581 0.003506 0.027363 0.199969 0.000000 0.000		
		N	
	19 0.136766 0.005733 0.049461 0.026743 0.193767 0.000000 0.0000	100	elete a înc
	20, FVI ARC CENTER A=0.007003 1=-0.210000 Angle =-13.730377 V		ente terrori
	12 0.356591 0.025016 0.077600 0.066766 0.184332 0.000000 0.0000		
		<b>5</b> /	Add a line
	24 : PVT ARC Centre X=1.500537 Y=-0.779950 Angle =-14.102217 V		
	28 0.693732 0.068965 0.106473 0.120348 0.169303 0.000000 0.0000	1	
	26 0.693732 0.078596 0.119989 0.114291 0.160008 0.000000 0.0000	107  r	niert a line
	27 0.693732 0.087698 0.132698 0.107465 0.149637 0.000000 0.0000	-	
	28 ; PVT ARC Centre X=0.967165 Y=-0.835237 Angle =-12.354326 V		
🎯 STOP	29 0.459243 0.062478 0.141253 0.067298 0.141590 0.000000 0.0000+	M N	odily a line
	4		

Note

These comments are not saved in the XPS, nor in the PC computer.



# 8.7 Notes on the Quality of Executed Trajectories

The quality or accuracy of executed trajectories converted by XPS-GCODE depends on several parameters:

- G-Code file quality or accuracy (positioning resolution, line, arcs, etc.).
- Mechanical system quality (stage performance like resolution, maximum acceleration, etc.).
- XPS-GCODE setting parameters such as:
  - Trajectory acceleration: Exceed the mechanical system capabilities will result in overshoot during sharp angle execution.
  - Default working speed: Exceeding the mechanical system capabilities will result in positioning inaccuracy.
  - Max. Angular discontinuity: allowing too large an angular discontinuity may create stage vibrations at "corners".
  - Angular step size: setting a too large angular step size may create angular discontinuity and create stage vibration at "corners".
  - Number of digits: limiting the number of digits displayed and transferred to the XPS may cause positioning values rounding and create inaccuracy.



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# 8.8 "SCT" Format Description

In "SCT" mode, the G-Code file is first converted to an "SCT" format, then to XPS compatible files (SCT and PVT).

richiers Init Mainter	ance Setup Help		
Inuse	Edit Geode Show XPS files SCT		
Alien Face lent.nc	1 DR 0.000000 0.000000 0.125000 2 OM 6 2 OM 5	-	P. Speed: 5.000
Bead Goode File	4 DR -0.299635 -2.672109 0.000000 5 VA 0.200000 1		W. Speed. 4.000
😫 Save Goode File	6 DR 0.000000 0.000000 -0.126000 7 DR 0.541918 0.000000 0.000000		1. Add. 11.000
📇 Print Goode File	8 VA 2.000000 0 9 DR 0.000000 0.000000 0.126000 10 DR 0.038901 1.910125 0.000000	=	
5월 Create XPS Files	1: VA 0.200000 1 12 DR 0.000000 0.000000 -0.126000 13 AN -0.022534 -0.168553 105.225445		
Save XPS Files in PC	14 VA 2.000000 0 15 DR 0.000000 0.000000 0.126000		
Copy Files in MPS	16 DR -0.414624 0.199878 0.000000 17 VA 0.200000 1 18 DR 0.000000 0.000000 -0.126000		
⊘ <sup>™</sup> Execute XPS File:	19 AH 0.022666 -0.169545 -105.224769 20 VA 2.000000 0		
	21 DR 0.000000 0.000000 0.126000 22 DR -0.342708 1.210661 0.000000 23 VA 0.200000 1		
	24 DR 0.000000 0.000000 -0.126000 25 XH -0.145025 0.122407 -43.933610 26 XH -0.065565 0.614393 -22.291629		<b>*C∏</b> _elete a ine
	27 DR -0.000010 0.000002 0.000000 28 AH 0.452748 1.721514 -11.510931 28 AH 0.950370 1.930850 -9.516156		_
	sc AH 0.606555 0.833245 -24.338650 31 AH 0.491952 0.280324 -23.034538 23 AH -0.000497 -0.000058 1.35855		∯ <u>A</u> dd a ine
	39 AH 0.301344 0.041296 -43.584765 34 AH 0.243525 -0.197547 -42.517417 35 AH 0.243525 -0.197547 -42.517417		Ø⊅ jrseit a Irie
STOP	36 AH 0.094434 -0.546530 -17.390601 37 AH -0.115339 -0.888079 -16.446185 38 AH -0.446740 -1.014955 -12.974918		🚮 Modily a line

SCT format is a simple way to describe trajectory elements. Each line represents a move or an action.

A line always starts with 2 letters indicating the type of element, followed by values corresponding to the element parameters.

### List of elements:

Element letters	Element type	Number of parameters
DR	Relative line	3
OM	Set Output	1
VA	Set Velocity	2
AH	Horizontal arc	3



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# **Service Form**

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	Tel.:	
	Fax:	
Name:	Return authorization #:	
	(Please obtain prior to return of item)	
Company:		
Address:	Date:	
Country:	Phone Number:	
P.O. Number:	Fax Number:	
tem(s) Being Returned:		
/lodel#:	Serial #:	
Description:		
Reasons of return of goods (please list any speci	fic problems):	

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