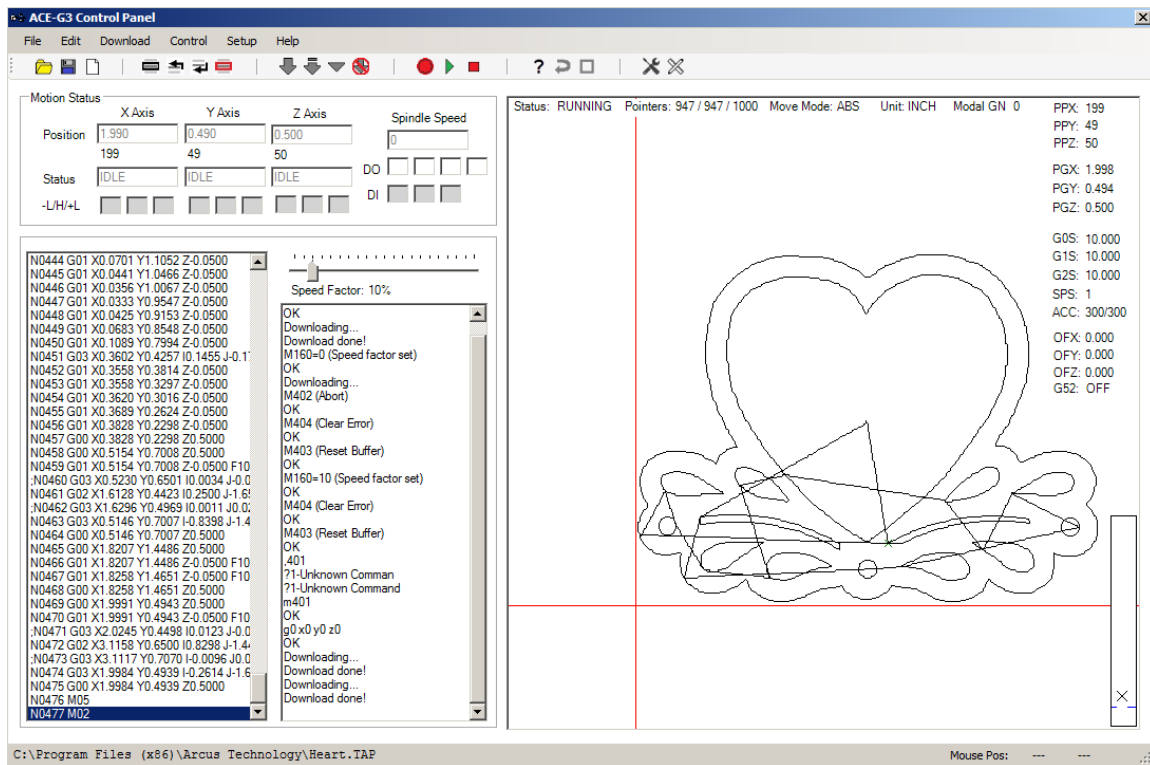


ACE-G3-Win

Windows[®] Software for ACE-G3 Motion Controller



COPYRIGHT © 2015 ARCUS,
ALL RIGHTS RESERVED

First edition, February 2015

ARCUS TECHNOLOGY, INC. copyrights this document. You may not reproduce or translate into any language in any form and means any part of this publication without the written permission from ARCUS.

ARCUS makes no representations or warranties regarding the content of this document. We reserve the right to revise this document any time without notice and obligation.

Table of Contents

1. Introduction	4
2. Software Installation.....	5
<i>DOWNLOAD AND RUN THE ACE-G3-WIN INSTALLATION PROGRAM AND FOLLOW THE STEPS TO INSTALL THE SOFTWARE ONTO THE HOST WINDOWS PC.</i>	5
3. Starting ACE-G3-Win program.....	8
4. Using ACE-G3-Win Program	10
<i>ACE-G3 CONTROL PANEL</i>	10
<i>CONTROLLER CONFIGURATION</i>	11
<i>LOADING AND STREAMING G-CODE</i>	12
<i>SENDING COMMANDS MANUALLY</i>	15
<i>USING THE TEMPORARY COORDINATE SYSTEM OFFSET</i>	15
Appendix.....	19
<i>G-CODE LIST</i>	19
<i>M-CODE LIST</i>	20

1. Introduction

ACE-G3 is a 3-axis motion controller with USB communication that supports the commonly used G-code and M-code language.

ACE-G3 uses HID Device Class for USB communication and does not require a special USB driver installation. HID is supported by all major operating systems such as Windows, Linux, and Mac, and enables immediate use of ACE-G3.

ACE-G3 supports streaming of the G-code and M-code commands from host PC through USB communication. The streamed commands are buffered in 1K lines of buffer space so that G-code can be continuously streamed from the host PC through USB to ACE-G3 for continuous motion.

Linear interpolation motion is supported on XYZ axes. Arc/circular interpolation is supported on XY axes. Limit and home switches are available each axis as well as general purpose 3 digital inputs and 4 digital outputs and encoder inputs for XYZ axes. Additional pulse/direction output signals are available for controlling the spindle.

ACE-G3 comes with Windows program to easily test all the features of the controller. Sample source codes are available for customizing the software for various applications.

2. Software Installation

Download and run the ACE-G3-Win installation program and follow the steps to install the software onto the host Windows PC.

The following screen will appear when the installation program is started.



Figure 1

Click the **Next** button and the following screen will appear.

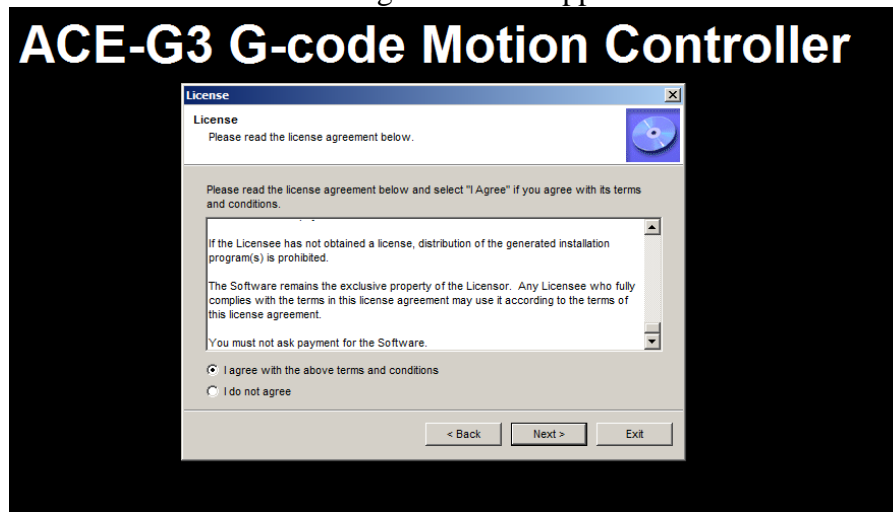


Figure 2

Select the agreement and click the **Next** button. The following screen will appear.

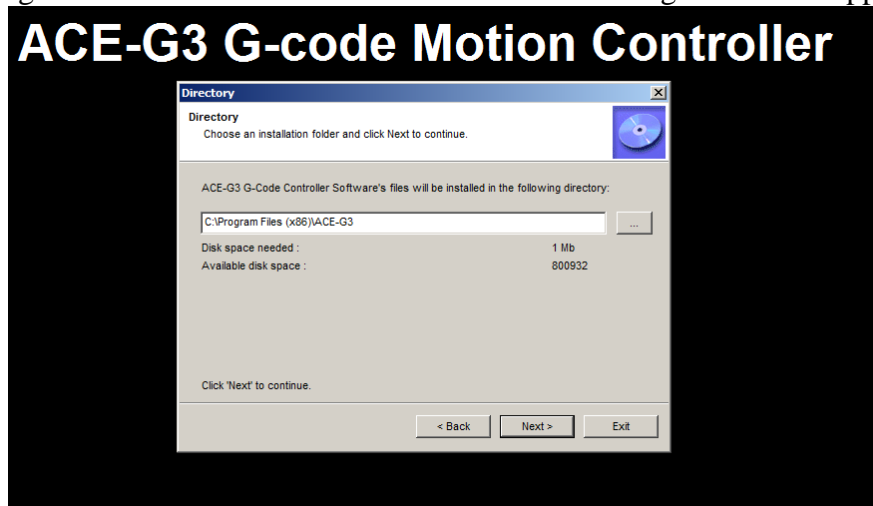


Figure 3

Select the location where the program files will be installed and click the **Next** button.

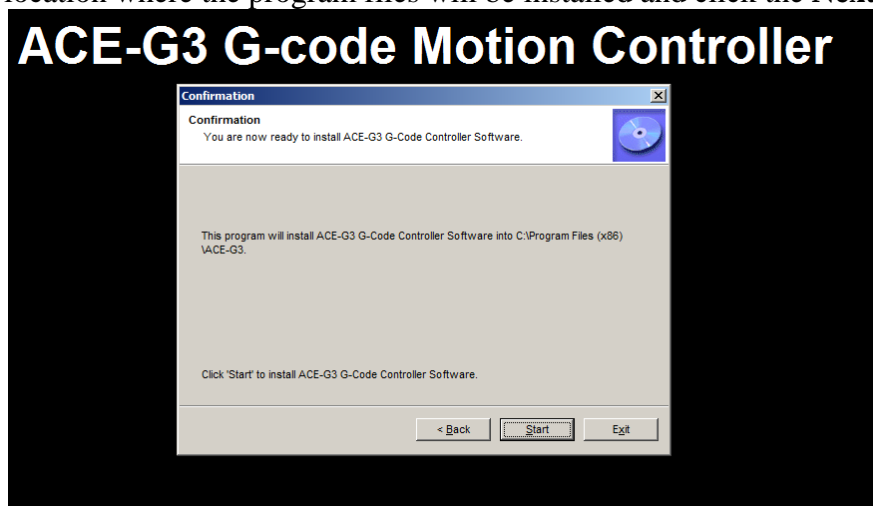


Figure 4

Click the **Start** button to start the installation.

After a successful installation, the following screen will appear.

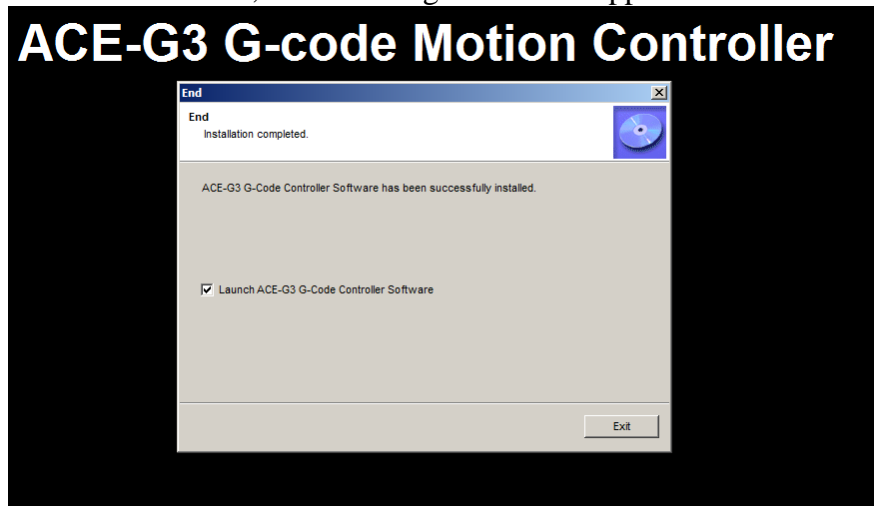


Figure 5

ACE-G3-Win program is now installed on your PC and ready for testing with the ACE-G3 controller.

Program File

On your program file ACE-G3 directory or under ACE-G3 Apps directory, an ACE-G3-Win program shortcut will also be available for starting the program.

Desktop Shortcut

On your desktop, a shortcut to the ACE-G3-Win will be placed with following icon.



Figure 6

Sample G-code Files

Under user Documents directory, a directory called “ACE-G3 Sample G-code Files” is created and various sample G-codes will be available for testing from the software.

3. Starting ACE-G3-Win program

Before starting the program, connect the ACE-G3 controller to the PC. If the controller is connected for the first time, HID driver installation may take less than a minute for Windows to recognize the ACE-G3 HID device. Once the ACE-G3 is connected, start the ACE-G3-Win program. The following screen will appear.

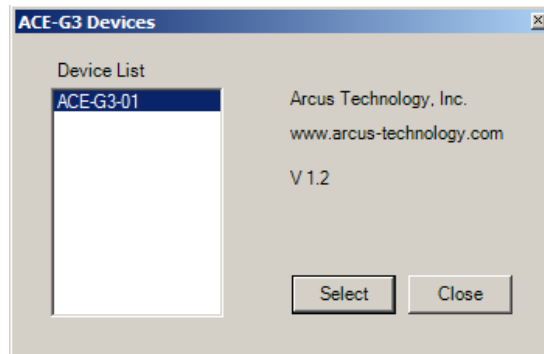


Figure 7

If more than one ACE-G3 is connected, the list will show all the devices currently connected and recognized by Windows.

Select a device from the Device List and press **Select** button. The following screen will appear.

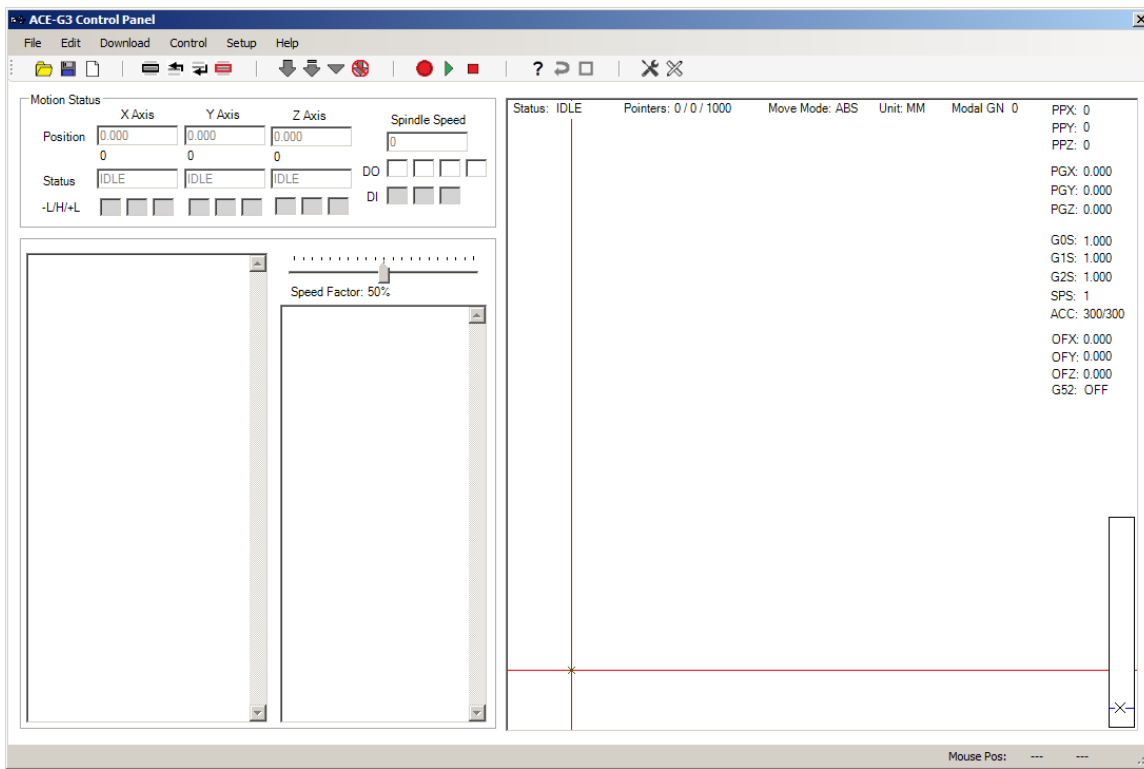


Figure 8

4. Using ACE-G3-Win Program

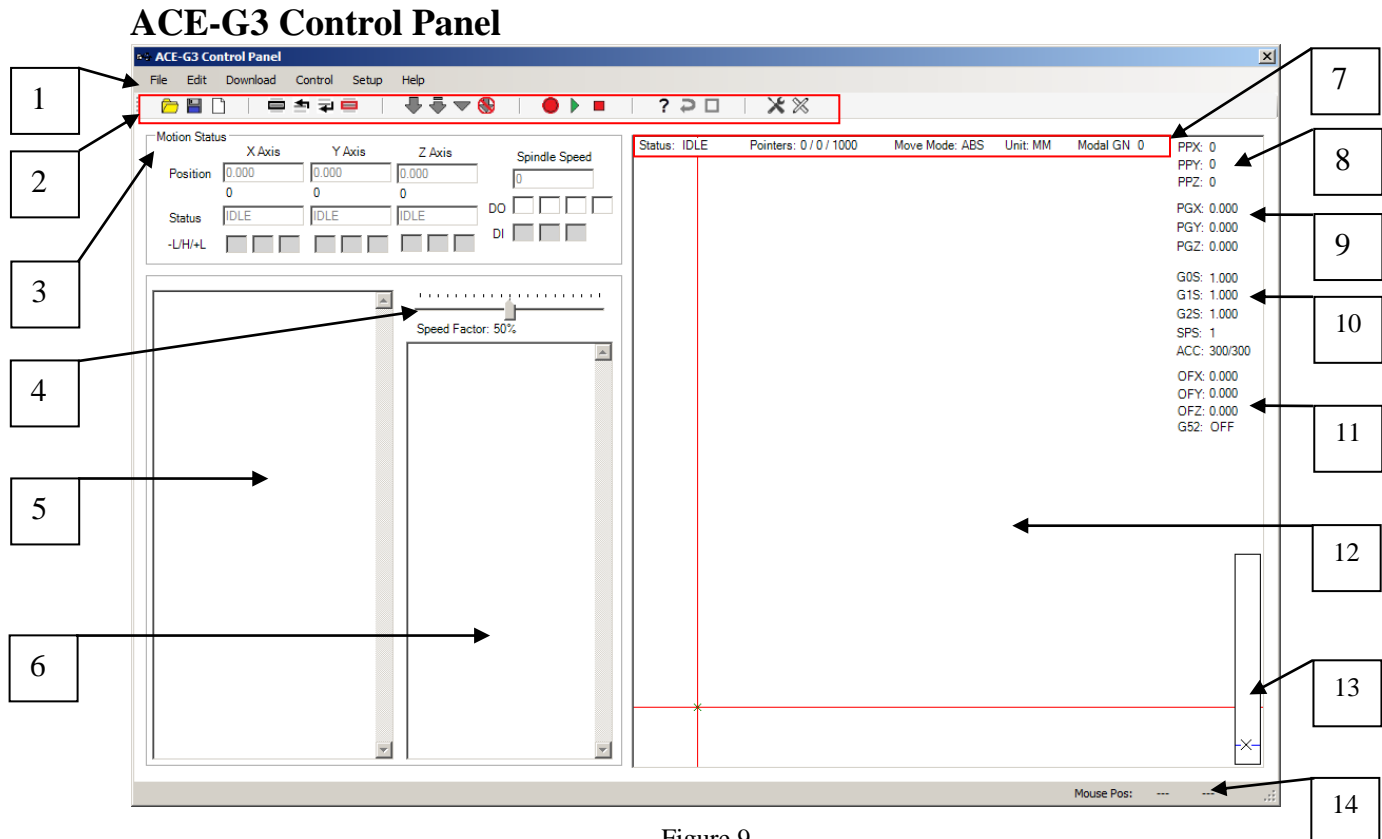


Figure 9

- 1. Menu Bar** – gives you various tools to use such as File, Edit, Download, Control, Setup, and Help.
- 2. Shortcut Toolbar** – contains the same features as the menu bar.
- 3. Motion Status Box** – tells you the position, status, spindle speed, digital output status, digital input status, and –L/H/+L status of the XYZ axes.
- 4. Speed Factor** – adjusts the speed of the drawing on the board. Also used to adjust the speeds of the movements.
- 5. Code Area** – Imported file’s G-code will be placed here. You can also edit, insert, and delete lines.
- 6. Terminal Box** – can be used to manually send G-codes or M-codes. Also used to receive ACE-G3 replies and error messages.
- 7. Board Statuses** – gives the status of the motor (RUNNING, IDLE, ERROR, COM ERROR), the value of the head/tail pointer as well as free buffer (head/tail/freespace), move mode (ABS, INC), unit (INCH, MM) and Modal GN.
- 8. PPX/PPY/PPZ** – Modal pulse positions for each axis.
- 9. PGX/PGY/PGZ** – Modal unit positions for each axis.
- 10. G0S/G1S/G2S/SPS/ACC** – Modal speeds for G0, G1, G2/G3. Modal spindle speed. Acceleration for G0 and Spindle.
- 11. Position Offset** – Axis offset. Position of new “origin”.

12. Board – Drawing board. A visual representation of your motor movements will appear here.

13. Z-Axis Indicator – shows the current position of the Z-axis.

14. Mouse Position – shows the mouse position relative to the board.

Controller Configuration

The controller configuration for the ACE-G3 can be accessed by pressing the icon represented in Figure 10.



Figure 10

Upon doing so, a Configuration window will pop up.

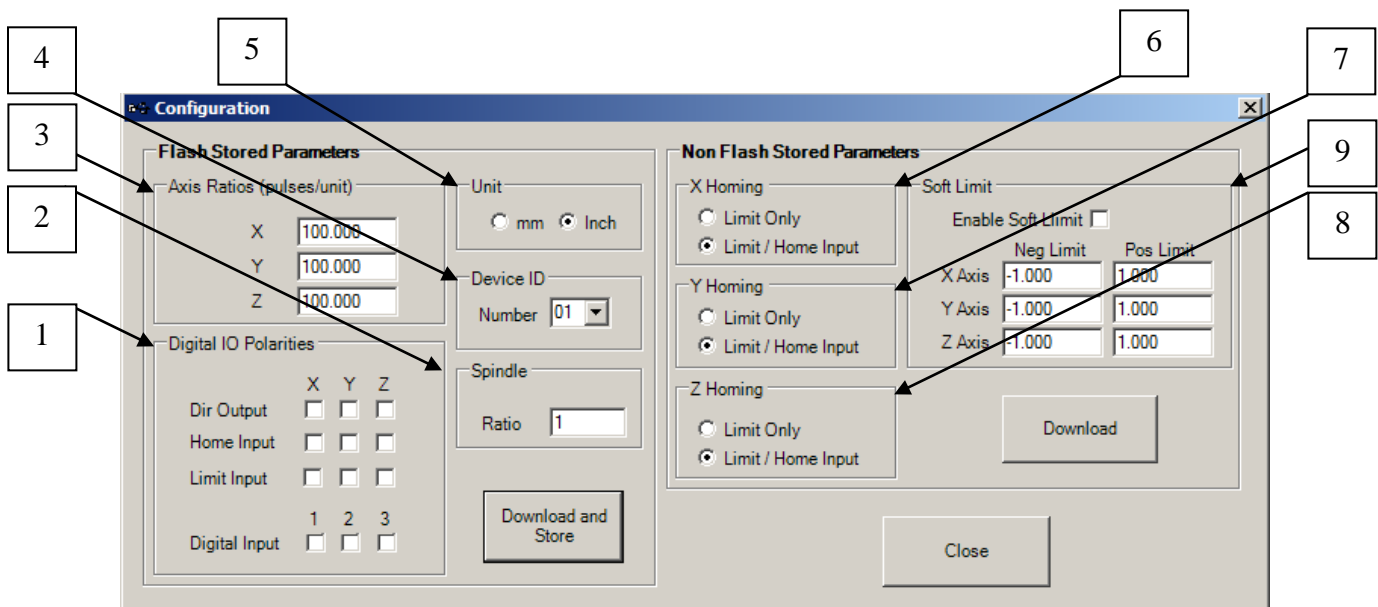


Figure 11

1. Digital IO Polarities – changes the polarities of the XYZ axes' directional output, home input, limit input, and digital input.

2. Spindle – changes the spindle ratio, number of pulses per revolution.

3. Axis Ratios (pulses/unit) – number of pulses per unit.

4. Device ID – used to assign the controller a unique device ID so that multiple ACE-G3 can be connected to a single host PC.

5. Unit – can select the working system unit in inch or millimeter.

6. X Homing – can select between using Limit Only or Limit/Home Input during homing routines for X axis.

7. Y Homing - can select between using Limit Only or Limit/Home Input during homing routines for Y axis.

8. Z Homing – can select between using Limit Only or Limit/Home Input during homing routines for Z axis.

9. Soft Limit – function to limit the movement of XYZ with the preset range of motion.

Loading and Streaming G-code

The ACE-G3 is capable of both loading and streaming G-code. To load a previously saved G-code file, press **File** and then **Open** (Figure 12).

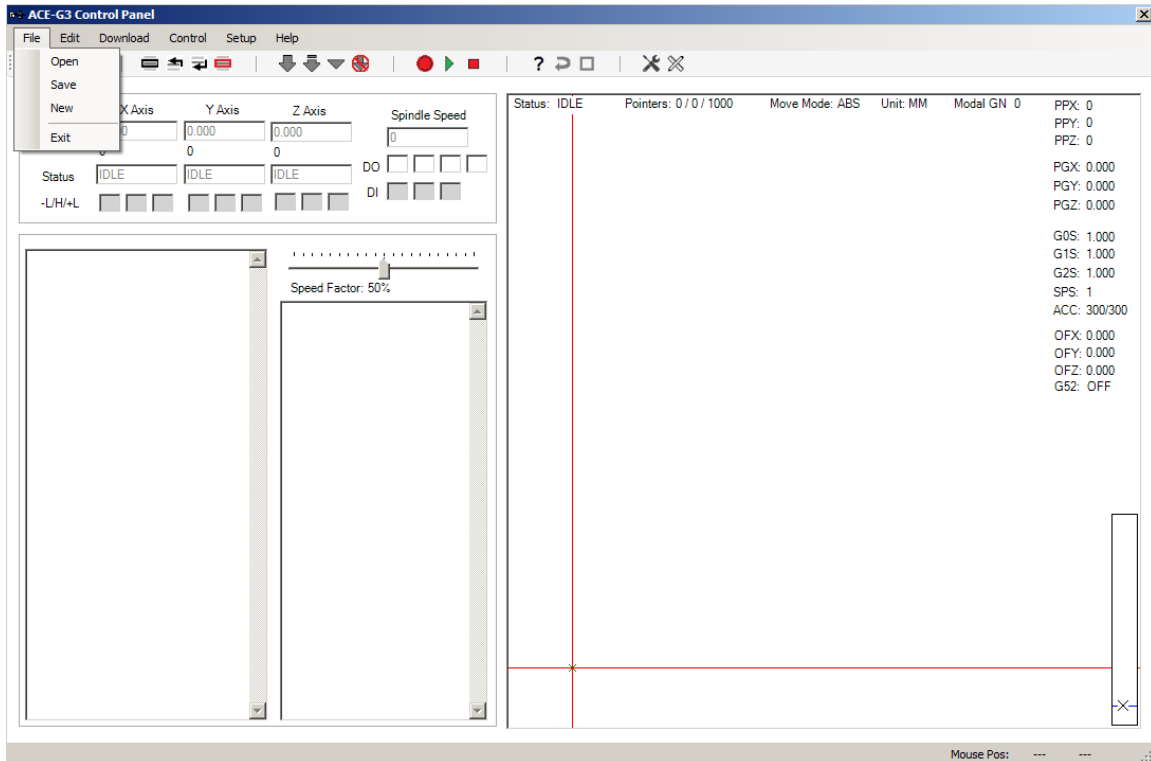


Figure 12

Alternatively, the shortcut shown in Figure 13 can also be pressed.



Figure 13

Once you have loaded in a program, it is ready to be streamed to the ACE-G3 controller. To do this, open the **Download** menu (Figure 14), and select either **Download All**, **Download from Current Line**, or **Download Current Line**.

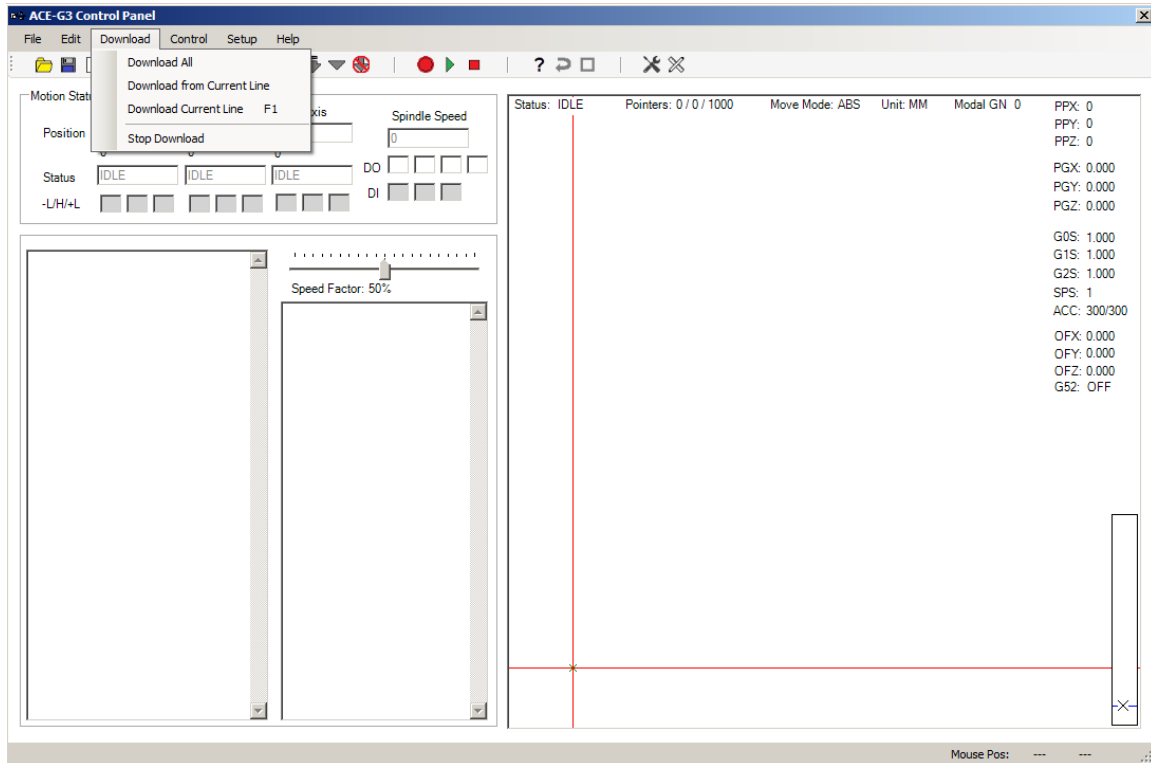


Figure 14

These shortcuts can also be used.



Download All – Downloads the entire program from the beginning into the ACE-G3 buffer.

Download from Current Line – Downloads the program from the current line until the end into the ACE-G3 buffer.

Download Current Line – Downloads only the current line into the ACE-G3 buffer.

Stop Download – This stops the download process.

As soon as you press download, the code will begin to stream into the ACE-G3 buffer (if space is available). You can press run (Figure 15) immediately as well. You do not have to wait for the program to finish downloading.



Figure 15

Figure 16 shows the completed stream and run of a scorpion.

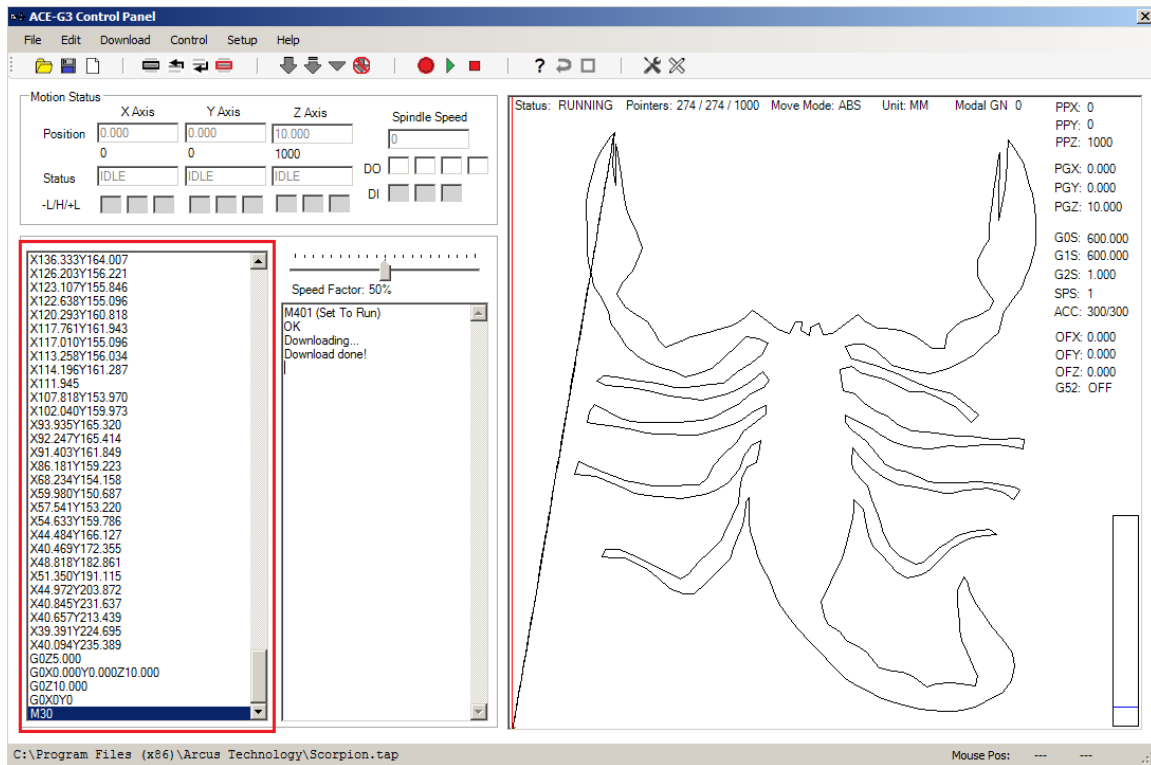


Figure 16

Sending Commands Manually

The ACE-G3 controller is also capable of receiving both G-codes and M-codes manually.

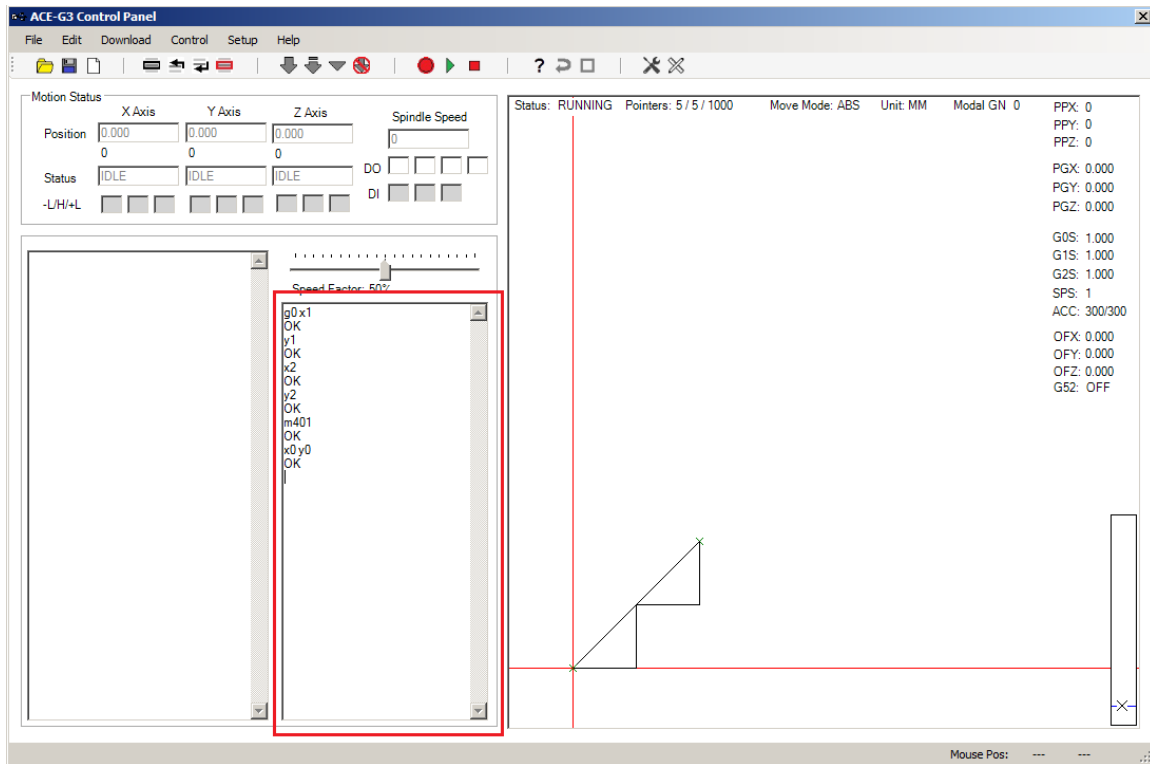


Figure 17

Manual commands can be typed directly into the terminal box (Figure 17). These commands must be formatted the same way as if you were writing a program to be streamed. Once you are done writing your command, you can either press the RUN button or use the appropriate M-code.

Using the Temporary Coordinate System Offset

The ACE-G3's coordinate system can also be temporarily offset. This allows you to create multiple copies of a drawing without having to alter your code. In this example, we will draw four scorpions using the scorpion code and the G52 offset code. A screen Width/Height of 500 will be used.

The first thing to do is to download the scorpion code and run it. This will produce a scorpion drawing on the bottom left of the drawing board. After the drawing is complete, you want to offset the current origin position.

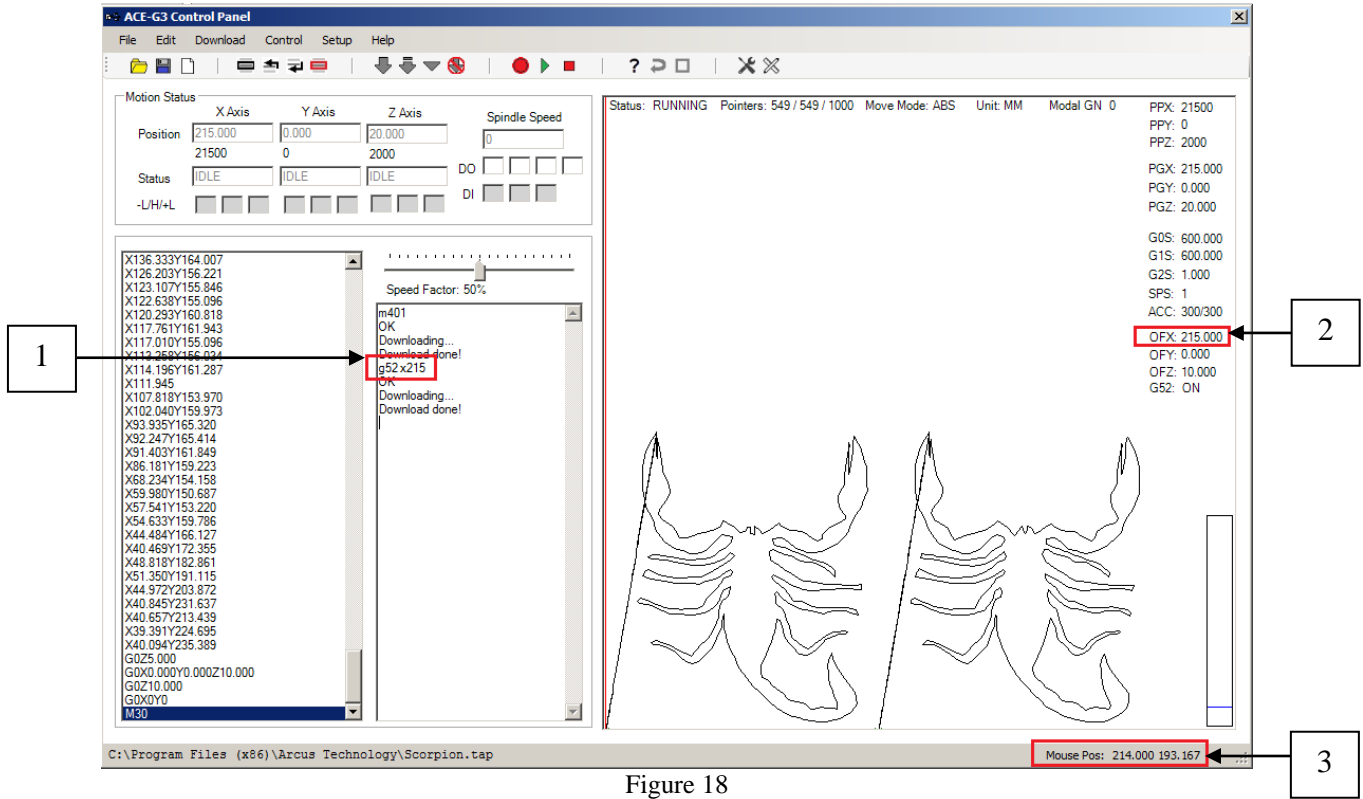


Figure 18

Sending the command “g52 x215” (Figure 18 Square 1) will move to the location x215. This position will be considered the new origin for all following G-codes. The x-offset is displayed in Square 2. Square 3 shows the current mouse position. From this value, you can determine the approximate width of the scorpion in order to draw another one beside it. After reaching position x215, the code can be re-downloaded and another scorpion will be drawn.

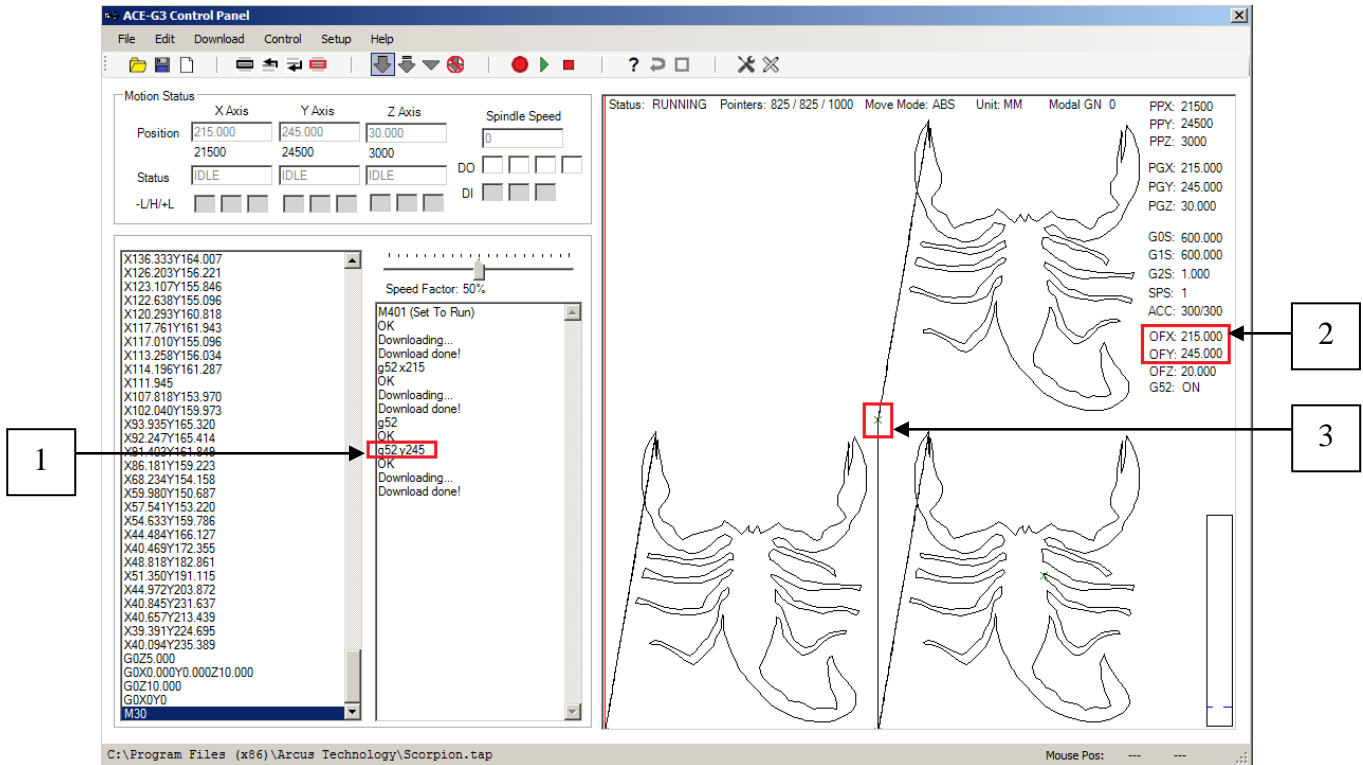


Figure 19

To draw a scorpion above the previous one, you want to move the origin to a point higher than the current drawing. Position y245 is of sufficient height to create another drawing. An empty g52 command must be sent first in order to disable the current coordinate offset. Once finished, sending the command “g52 y245” (Figure 19 Square 1) will move the current coordinate system to point x215 y245 (Figure 19 Square 2). From this new origin (Figure 19 Square 3), the scorpion code can be re-downloaded and drawn.

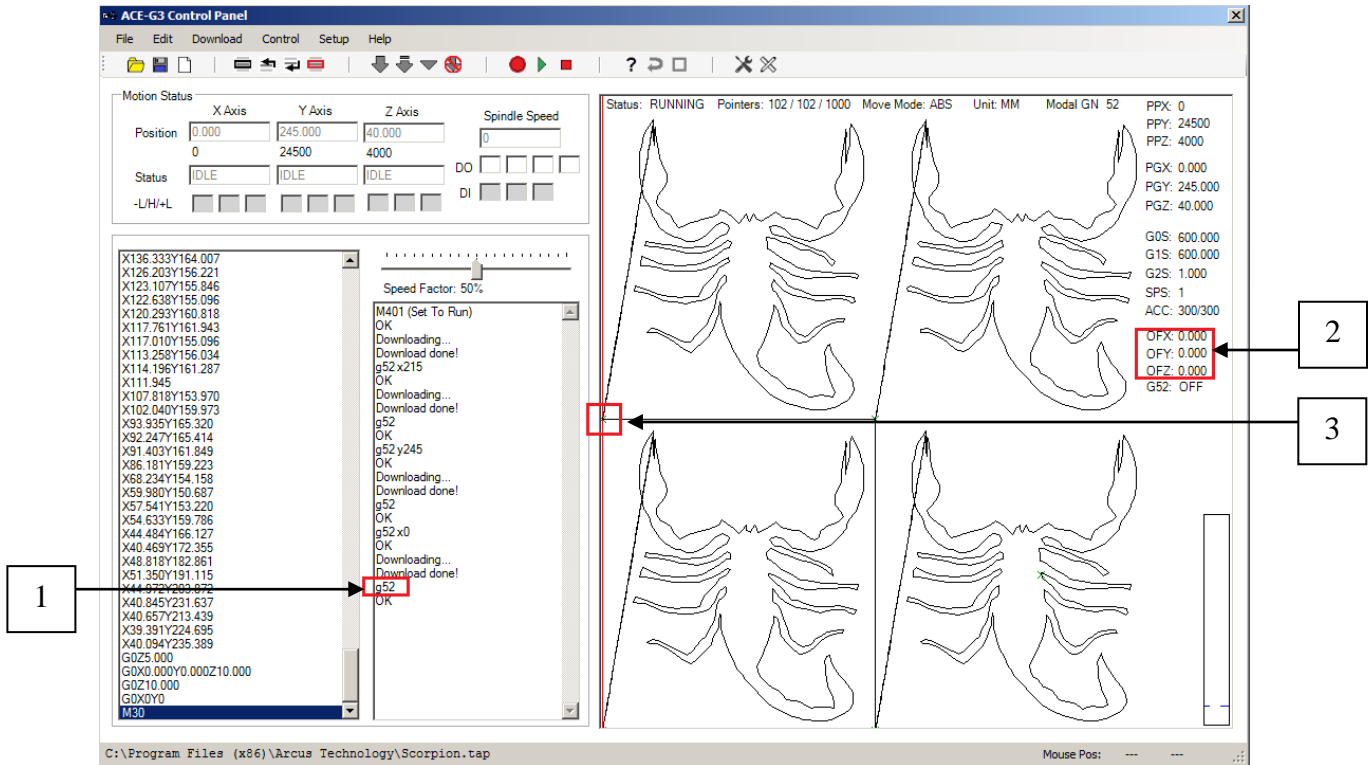


Figure 20

Lastly, to draw a scorpion in the top left corner, you have to first disable the temporary coordinate system offset by sending the command `g52`. Once finished, change the current coordinate system by sending “`g52 x0`”. This moves the origin to position `x0 y245`. The code can be re-downloaded and another scorpion will be drawn. Be sure to send the command `g52` when finished to disable the temporary coordinate system offset.

Appendix

G-Code List

#	Name	Format
G0	Rapid Linear Move	G0 X[value] Y[value] Z[value] F[value] A[value]
G1	Linear Move	G1 X[value] Y[value] Z[value] F[value]
G2	Arc/Circle CW	G2 X[value] Y[value] I[value] J[value] F[value]
G3	Arc/Circle CCW	G3 X[value] Y[value] I[value] J[value] F[value]
G4	Dwell	G4 P[value in milliseconds]
G20	Unit - Inch	G20
G21	Unit - Millimeter	G21
G28	Home Search	G28 X[dir value] Y[dir value] Z[dir value]
G52	Temporary Coordinate System Offset	G52 X[value] Y[value] Z[value]; G52 (to disable)
G68	Set Position	G68 X[value] Y[value] Z[value]
G90	Absolute Mode	G90
G91	Relative Mode	G91
G97	Spindle Speed	G97 S[value in RPM] A[value in msec]

M-Code List

#	Name	Buffered/ Immediate	Read/ Write
M2	Stop Buffer	B	W
M3	Spindle On CW	B	W
M4	Spindle On CCW	B	W
M5	Spindle Off	B	W
M7	Coolant Mist On	B	W
M8	Coolant Flood On	B	W
M9	Coolant Mist Flood Off	B	W
M10	Pallet On	B	W
M11	Pallet Off	B	W
M15	Dispense On	B	W
M16	Dispense Off	B	W
M30	Stop Buffer	B	W
M100	Get All DO	I	R
M101	DO1	I	RW
M102	DO2	I	RW
M103	DO3	I	RW
M104	DO4	I	RW
M110	Get All DI	I	R
M111	DI1	I	R
M112	DI2	I	R
M113	DI3	I	R
M120	Get All Motion DI	I	R
M121	X Motion DI	I	R
M122	Y Motion DI	I	R
M123	Z Motion DI	I	R
M160	Global Speed Percent	I	RW
M190	Get All Temporary Offset Values	I	R
M191	Get X Offset Value	I	R
M192	Get Y Offset Value	I	R
M193	Get Z Offset Value	I	R
M194	Get Offset Status	I	R
M200	Get All Positions	I	R
M201	X Pulse Position	I	R
M202	Y Pulse Position	I	R
M203	Z Pulse Position	I	R
M204	X Position	I	R
M205	Y Position	I	R
M206	Z Position	I	R
M207	X Encoder Position	I	RW
M208	Y Encoder Position	I	RW
M209	Z Encoder Position	I	RW
M210	Get All Motion Status	I	R
M211	Get X Status	I	R
M212	Get Y Status	I	R
M213	Get Z Status	I	R
M214	Get Spindle Speed	I	R
M220	Get All Modal Info	I	R
M221	Get Modal G-code Unit	I	R
M222	Get Modal Positions	I	R

M223	Get Modal Feedrate	I	R
M291	Get Software Version	I	R
M300	Store to Flash	I	W
M301	System Unit	I	RW
M302	Ratio X	I	RW
M303	Ratio Y	I	RW
M304	Ratio Z	I	RW
M305	Limit Polarity	I	RW
M306	Home Polarity	I	RW
M307	Dir Polarity	I	RW
M308	DI Polarity	I	RW
M309	Device ID	I	RW
M310	Spindle Ratio	I	RW
M311	Soft Limit Enable	I	RW
M312	X Neg Soft Limit	I	RW
M313	X Pos Soft Limit	I	RW
M314	Y Neg Soft Limit	I	RW
M315	Y Pos Soft Limit	I	RW
M316	Z Neg Soft Limit	I	RW
M317	Z Pos Soft Limit	I	RW
M318	X Homing Mode	I	RW
M319	Y Homing Mode	I	RW
M320	Z Homing Mode	I	RW
M400	Stop Buffer	I	W
M401	Run Buffer	I	W
M402	Abort Buffer	I	W
M403	Reset Buffer	I	W
M404	Clear Buffer Error	I	W
M405	Get Buffer Error Msg	I	R
M406	Get Buffer Head	I	R
M407	Get Buffer Tail	I	R
M408	Get Buffer Size	I	R
M409	Get Buffer State	I	R
M410	Get All Buffer Status	I	R