

# G codes

Implemented codes are hi-lighted in yellow.

Missing codes are “Unimplemented” in most Gcodes dialects.

G 00 Rapid movement

G 01 Linear movement with speed programmed by “F”

G 02 Circular interpolation clockwise

G 03 Circular interpolation counterclockwise

G 04 Dwell time specified by the prefix U or P (U=seconds, P=milliSeconds)

G 05 Arrest suspension (hold)

G 09 Exact stop check, non-modal

G 10 Programmable data input

G 11 Data write cancel

G 12 Full-circle interpolation, clockwise

G 13 Full-circle interpolation, counterclockwise

G 16 Axis Selection

G 17 Interpolation plane XY

G 18 Interpolation plane ZX

G 19 Interpolation plane YZ

G 20 Inch programming

G 21 Metric programming

G 22 Coupled movements (+)

G 23 Coupled movements (-)

G 28 Return to home position

G 28.1 Set the Home position

G 30 ... G 32 Secondary Home, or “Print plane test”, or “Skip” (machine depending)

G 33 ... G 35 Threading

G 40 Radius compensation OFF

G 41 Activation radius compensation to the left of the part

G 42 Activation radius compensation to the right of the part

G 43 to G48 Tool length compensations

G 49 Tool length compensation OFF

G 53 Machine coordinates - Cancellation of the offsets

G 54 ... G59 Offsets

G 61 Exact stop check, modal

G 62 Automatic corner override

G 64 Default cutting mode (cancel exact stop check mode)

G 65 ... G 79 Reserved placements

G 70 Inch programming

G 71 Metric programming

G 80 Cancel Canned Cycle

G 81 ... G 89 Drilling fixed cycles, tapping and so on.

G 90 Absolute programming

G 91 Incremental programming

G 91.1 Incremental programming for I, J, K

G 92 Enn - Set the extruder to value nn (without moving the motor)

G 92 - Set coordinates (without physical movements)

Example: G92 X10 E90 sets X=10 and Extrusion=90

Without parameters all the axis are set to zero

G 93 Inverse time mode (F = 1 / movement time in minutes)

G 94 Default Feed Mode (F = mm/min)

G 95 Units per Revolution mode (avancement per revolution of the spindle motor)

G 96 ... G 99 Programming of an absolute zero point

# M codes

Implemented codes are hi-lighted in yellow.

Missing codes are “Unimplemented” in most Gcodes dialects.

M 00 Program stop (Stop)  
M 01 Optional stop (Pause)  
M 02 End of program (Stop)  
M 03 Clockwise rotation of the spindle (Note 1)  
M 04 Counter-clockwise rotation of the spindle (Note 1)  
M 05 Spindle stop (Note 1)  
M 06 Tool change  
M 07 Refrigerant supply 1  
M 08 Refrigerant supply 2  
M 09 Refrigerant stop  
M 10 Pallet clamp ON  
M 11 Pallet clamp OFF  
M 13 Activation refrigerant (supply 1) and clockwise rotation spindle (Note 1)  
M 14 Activation refrigerant (supply 1) and counterclockwise rotation spindle (Note 1)  
M 19 Spindle orientation (rotation on axis Z in degrees defined by C function)  
M 30 End of program (Stop)  
M 31 Suspension (Pause)  
M 41 ... M 44 Ranges of gear speed (M41=1, M42=2, M43=3, M44=4)  
M 50 Refrigerant supply 3  
M 51 Refrigerant supply 4  
M 52 ... M 97 Dialectal commands (highly variable from machine to machine)  
M 98 Subprogram call  
M 99 Subprogram end (Stop)

**(Note 1)** All codes that specify the clockwise or counterclockwise rotation of the spindle, can also be replaced by the parameter "S", that means "rotations per minute". Positive values indicate clockwise rotation, negative values indicate counterclockwise rotation. Read the Theremino CNC instructions.

# Single letter functions

Implemented functions are hi-lighted in yellow – See also the [ThereminoCNC Help](#).

|          |   |
|----------|---|
| <b>A</b> | Position of A axis or rotational axis around X axis   |
| <b>B</b> | Position of B axis or rotational axis around Y axis   |
| <b>C</b> | Position of C axis or rotational axis around Z axis   |
| <b>D</b> | Diameter or radial offset used for cutter compensation  |
| <b>E</b> | Precision feed-rate for threading on lathes   |
| <b>F</b> | Feed rate   |
| <b>G</b> | G-CODES   |
| <b>H</b> | Tool length offset. Incremental axis corresponding to C axis (e.g., on a turn-mill)           |
| <b>I</b> | Arc center in X axis for G02 or G03 arc commands  |
| <b>J</b> | Arc center in Y axis for G02 or G03 arc commands  |
| <b>K</b> | Arc center in Z axis for G02 or G03 arc commands  |
| <b>L</b> | Fixed cycle loop count. Specification of what register to edit using G10                      |
| <b>M</b> | M-CODES   |
| <b>N</b> | Line numbers  |
| <b>O</b> | Program name  |
| <b>P</b> | Defines dwell time value for G04  |
| <b>Q</b> | Peck increment in canned cycles   |
| <b>R</b> | Radius of arc for G02 and G03 arc commands  |
| <b>S</b> | Speed of spindle motor  |
| <b>T</b> | Tool selection  |
| <b>U</b> | Incremental axis corresponding to X axis. Dwell time on some machines (instead of "P" or "X") |
| <b>V</b> | Incremental axis corresponding to Y axis  |
| <b>W</b> | Incremental axis corresponding to Z axis  |
| <b>X</b> | Position of X axis  |
| <b>Y</b> | Position of Y axis  |
| <b>Z</b> | Position of Z axis  |

# 3D printers functions

Implemented functions are hi-lighted in yellow – See also the [ThereminoCNC Help](#).

M 00 - Stop – Machine Stop. Motors and Heaters OFF.

M 01 - Sleep – Machine Pause. Motors and Heaters OFF.

M 82 - Set extruder to absolute mode (default in 3D printers)

M 84 - Disable motors

M 101 - Turn extruder 1 ON

M 103 - Turn all extruders OFF (Extruder Retraction)

M 105 - Read the current temperature (nothing to do)

M 106 - Fan ON

M 107 - Fan OFF

M 108 - Extrusion speed (only used by CubeX)

M 113 - Set extruder PWM (only used by CubeX)

M 104 - Set extruder temperature (Example: M104 S190 - temperature = 190°C)

M 109 - Set extruder temperature and wait (Example: M109 S215 - temperature = 215°C)

M 140 - Set print bed temperature (Example M140 S190 temperature = 190°C)

M 141 - Set chamber temperature (Example: M141 S90 - temperature = 90°C)

M 142 - Set holding pressure (Example: M142 S1 – pressure = 1 bar)

M 190 - Wait the bed temperature