



SURFACE GRINDER CONTROLLER



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THIS MANUAL CONTAINS INFORMATION FOR INSTALLING AND OPERATING THE FOLLOWING PRODUCT:

- **SURFACE GRINDER CONTROLLER**

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TINY CONTROLS PRIVATE LIMITED
C-55, NISHAT PARK, KAKROLA MOR, NEW DELHI, INDIA – 110078
WEB: <http://www.tinycontrols.com>
PHONE: +91-11-2533-1567, +91-991-119-3210

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GENERAL DESCRIPTION

The Tiny Controls surface grinder controller is a new concept for grinding operations. It is a versatile and economical solution designed to automate the repetitive grinding tasks. It features automated longitudinal and cross feed. This compact 2-axis surface grinding controller utilizes a simple and intuitive operator interface and three selectable patterns mode to help automate repetitive grinding tasks delivering the best results.

The following commands are supported: (see Setup section for more details)

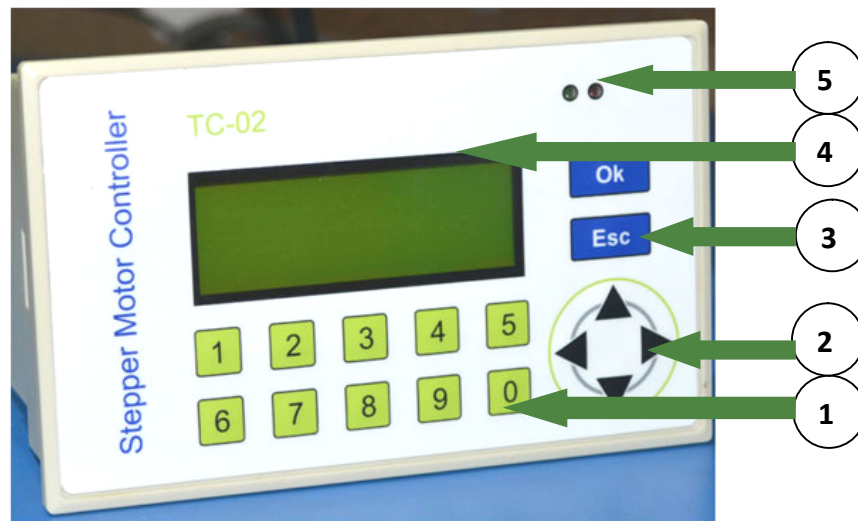
Motion setup: M1Speed, M2Speed, M1Dir: CCW/ CW, M2Dir: CCW/ CW, M1Accel, M2 Accel, M1HSpeed, M2HSpeed

Motion commands: M1Steps/ Rev, M2 Steps/ mm

SPECIFICATION/FEATURES:

- **Supply Voltage:** 90V to 250V AC 50Hz/60Hz
- **Max Pulse Rate:** 40 KHz
- **Overall Size:** 165mm x 102mm x 76 mm
- **Mounting:** Panel mount: 155mmx92mm
- **Locomotion:**
 - Longitudinal (X): Automatic setting
 - Cross feed (Y): Set manually
- **Control:**
 - Automatic mode select: 3 modes
 - Jogging
 - Longitudinal and cross feed speed control
 - Emergency stop
 - Speed control by potentiometer
- **Inputs:** 3 NPN Proxy (X limit, Y limit and Emergency input) + 1 On-Off switch for start-stop
- **Outputs:** 4 for motor1 and motor2 (STEP and DIR) +two 12 V outputs (for NPN proximity type sensor) + 5 V (for POT connections).
- **Display:** 20x4 LINES alphanumeric LCD
- **Operating interface:** User friendly keys
- **Max Operating Temperature:** 55 deg C

LOCATION OF COMPONENTS: Major components of the Controller



The description of these components is as following:

1. NUMERIC KEYS (0-9)

Numeric keys are used for entering the numeric values in Setup screen. These are also used to select the modes or jogging screen.

2. NAVIGATION KEYS PANEL (UP, DOWN, RIGHT, LEFT)

In Setup screen, these keys are used to navigate the cursor. However, these are used to alter the speed and feed value in home screen.

3. OK & Esc

Press OK to enter in Setup screen of different modes. In Setup screen, pressing this key saves the modified values in EEPROM. Press Esc to back out of Setup screen.

4. LCD DISPLAY (20x4)

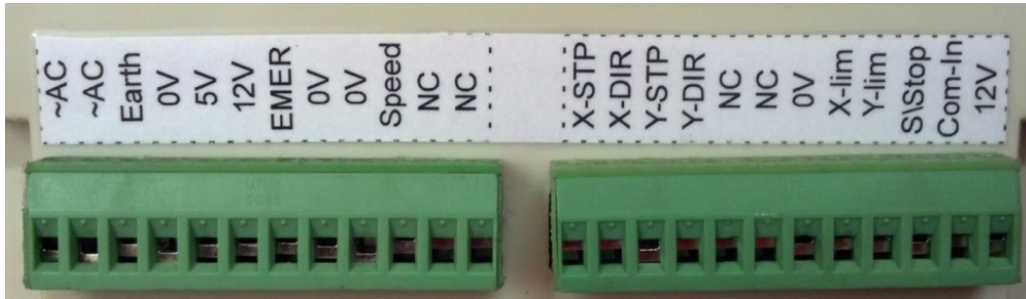
This LCD shows all the information related to MODES and the Home screen.

5. LEDs

RED LED glows on the time of homing and activity and GREEN LED indicates long key press.

TERMINALS

REMOVABLE BLOCK TERMINALS:



PIN NUMBER

1. ~AC (90V to 250V AC 50Hz/60Hz Live, Handle with care)
2. ~AC (90V to 250V AC 50Hz/60Hz Neutral, Handle with care)
3. Earth (To Earth Main line, Handle with care)
4. 0V (Common ground, Connect to POT)
5. 5V OUTPUT (For POT connection)
6. 12V OUTPUT (For NPN type proximity sensors)
7. Emer- EMERGENCY INPUT (Connect output of N/O, NPN type proximity switch)
8. 0V (Common ground, For NPN type proximity)
9. 0V (Common ground, Connect to STEPPER DRIVER e.g. TSTEP-484)
10. Speed (Connect to center of POT for speed input)
11. NC- not connected
12. NC- not connected
13. X-STP- STEP PULSE OUTPUT for motor 1 i.e. motor for X-axis (Connect to STEPPER DRIVER eq. TSTEP-484)
14. X-DIR - DIRECTION output for motor 1 i.e. motor for X-axis (Connect to STEPPER DRIVER eq. TSTEP-484)
15. Y-STP- STEP PULSE OUTPUT for motor 1 i.e. motor for Y-axis (Connect to STEPPER DRIVER eq. TSTEP-484)
16. Y-DIR - DIRECTION output for motor 1 i.e. motor for Y-axis (Connect to STEPPER DRIVER eq. TSTEP-484)
17. NC- not connected
18. NC- not connected
19. 0 V (Common Ground)
20. X- LIM Connect output of NO, NPN type proximity switch)
21. Y- LIM (Connect output of NO, NPN type proximity switch)
22. Start- Stop: Connect the on- off switch here.

23. Com-In (Common for X-Lim and Y- Lim inputs, can be supplied external 12 volt or jumped from 12v output from the controller)
24. 12V OUTPUT (For NPN type proximity)

OPERATING SURFACE GRINDING CONTROLLER

Home Screen:



When the power is applied to the board, a splash screen appears and then Home screen appears. User can change the modes by pressing the respective numeric key. Speed can be adjusted using up- down navigation keys and feed can be adjusted using Left- right navigation keys.

These terms are described in the subsequent section.

NOTE: There is homing feature available on key 8. If user presses key 8 on home screen, motor moves to respective home position and search for home sensor input. The home speed can be adjusted in Set up screen for respective mode.

NOTE: Anytime if Emergency input is received, motion is halted and current operation (even program run mode) is aborted. A message of emergency displayed. Press any key to make the control return to HOME screen.

Modes: Surface grinding controller supports three modes which gives the grinding operations. The grinding pattern for all the modes are shown below:

Mode pattern	Operation	
	Feed at both sides	The grinder feeds in the Y-axis at each end of X-axis stroke.
	Feed at one end only	The grinder feeds in the Y-axis at one end of X-axis stroke.
	No feed	No Y axis grinding. Use this mode for plunge grinding.



MODE 1: The pattern for Mode 1 is shown in the table. When the start key is pressed, X-axis motor M1 moves forward in the direction selected in “Setup menu for mode 1” covering the X-axis distance and simultaneously motor 2 covers the feed in the direction selected in “Setup menu for mode 1” and after getting the X-limit switch triggered, motor 1 move in reverse direction covering X-axis distance and the motor 2 covers the feed on non-grinded surface in same direction.

Again on detecting the X- limit switch in reverse direction triggered, X-axis moves forward. This process continues until the limit switch for Y-axis is triggered. Motors for X

and Y axis moves to their home positions when both the switches are triggered and whole process starts again, Press stop button to stop the system.



MODE 2: The pattern for Mode 2 is shown in the table. When the start key is pressed, X-axis motor M1 moves forward in the direction selected in “Setup menu for mode 2” covering the X-axis distance and simultaneously motor 2 covers the feed in the direction selected in “Setup menu for mode 2” and after getting the X-limit switch for forward direction triggered, moves back in reverse direction on same route.

Again on detecting X- limit switch triggered in reverse direction, motor 1 move forward covering X-axis distance and motor 2 covers feed distance in selected direction and grind the job. This process continues until the limit switch for Y-axis is triggered. Motors for X and Y axis moves to their home positions when both the switches are triggered and whole process starts again, Press stop button to stop the system.



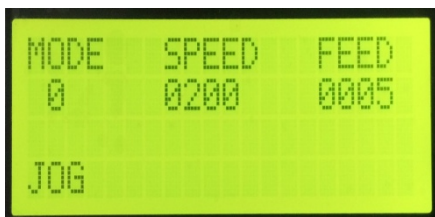
MODE 3: The pattern for Mode 3 is shown in the table. When the start key is pressed, X-axis motor M1 moves forward in the direction selected in “Setup menu for mode 3” covering the X-axis distance and simultaneously motor 2 covers the feed distance in the direction selected in Setup menu for mode 3” and after getting the X-limit switch for forward direction triggered, moves back in reverse direction on same route.

Again on detecting the X- limit switch in reverse direction, X-axis moves forward but the Y-axis remains still. Stop the system using the start- stop button. User can jog the machine at required position and then start the motion from desired position.

SPEED AND FEED:

The Speed and feed are used for controlling the motion of worktable. Speed controls the X-axis motion and feed controls the Y-axis motion. Feed controls how far the table moves in the Y-axis. Use right navigation key to increase and left navigation key to decrease the feed value. Use up navigation key to increase the speed and down navigation key to decrease the speed. Press Ok button to enter in the set up screen of the respective mode selected.

Jogging



Jog: Press key 0 to enter in jog mode when the controller is in home menu.

Homing



Homing feature is available on key 8. If user presses key 8 in home menu, motor moves to respective home position and search for home sensor input. The home speed can be adjusted in Set up screen for respective mode.

Set up menu commands:

LIST OF COMMANDS

Press the OK button on the home screen of respective mode to enter in the setup mode.



M1 Steps/ Rev:

Motor 1 steps/ Revolution. The Number of steps the motor 1 move in one revolution. The range is 0001 to 9999.

M2 Steps/ mm:

Motor 2 steps/ mm. The Number of steps the motor 2 move per mm. The range is 0001 to 9999.

M1 Speed:

Motor 1 speed decides the maximum speed with which the motor moves. It can be 0001 to 9999 RPM. However, the value for maximum speed depends on motor 1 steps/ revolution value.

M2 Speed:

Motor 2 speed decides the maximum speed with which the Y-axis motor moves. It can be 0001 to 9999 RPM. However, the value for maximum speed depends on motor 1 steps/ revolution value.

M1Accel (value) range is 01 to 20

This command is used to set acceleration for motor 1.

M2Accel (value) range is 01 to 20

This command is used to set acceleration for motor 2.

M1 Dir:

This parameter decides the direction whether motor 1 move clockwise or counterclockwise when the start button is pressed.

M2 Dir:

This parameter decides the direction whether motor 2 move clockwise or counterclockwise when the start button is pressed.

Speed_POT:

This parameter enables or disables the use of pot. User can change the speed by using the Pot. However if the pot is enable, user can't set the speed by keys.

M1HSpeed:

This parameter decides maximum home speed in RPM. It is the maximum speed of motor that it achieves for home. Its range is 1 to 9999 RPM however its value depends on the motor 1 steps/ rev value.

M2HSpeed:

This parameter decides maximum home speed in RPM. It is the maximum speed of motor that it achieves for home. Its range is 1 to 9999 RPM however its value depends on the motor 2 steps/ mm value.

Fr reset:

This parameter resets all the parameters to factory defaults.

Emergency

When the emergency is triggered, the adjacent screen is displayed. Restart the system again to exit from emergency.

Connection diagram

