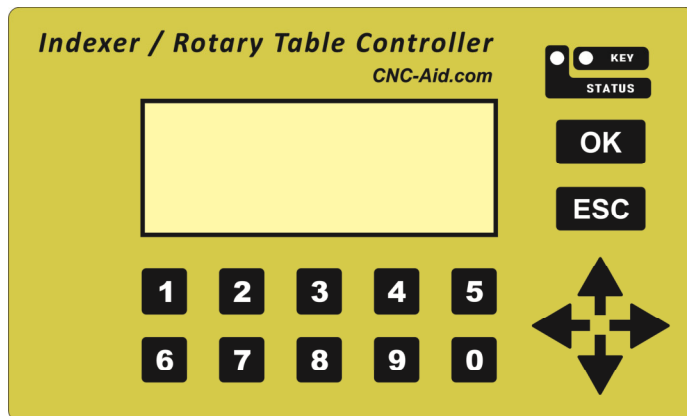


CNC-Aid.com

Single Axis Indexing Controller – TNC-G01



*Document: Operation Manual
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Product: TNC-G01
(Single Axis Indexing Controller)
Product Rev: 2.1
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This manual contains information for installing and operating the following product:

- TNC-G01 , Single Axis Indexing Controller

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General Description

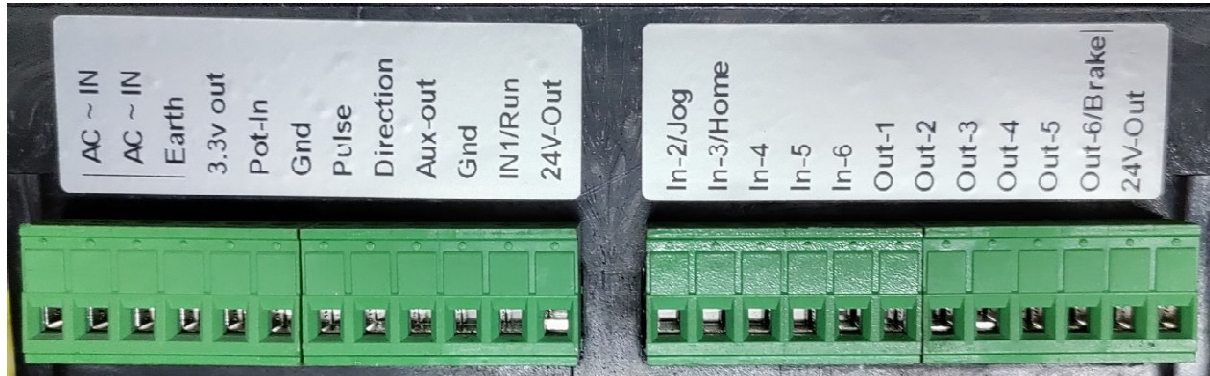
CNC-AID motion controller intended to be used in rotary table applications. It can be used to control continuous rotary motion or in Indexing applications.

In Indexing mode (i.e. division mode), there is no accumulation of error and the error is distributed along whole circular motion if the programmed movement cannot be achieved exactly due step angle not exactly divisible.

Specifications

- **Supply Voltage:** 90V to 250V AC 50Hz/60Hz
- **Pulse Rate:** 100 KHz
- **Overall Size:** 165mm x 102mm x 76 mm
- **Mounting:** Panel Cutout 155mmx92mm
- **Inputs:** Four NPN NO Inputs, 1 Analog Potentiometer Input
- **Outputs:** Three Outputs for Motors Step, Direction and Reserved
Six Open collector 24V relay driver
- **Display:** 20x4 Line alphanumeric
- **Temperature:** 55 Degree C Max operation temperature

Connection



1-3	Power Supply Input (90V to 230V) AC 50Hz/60Hz & Earth
4-6	External Potentiometer Connection
7-10	Step, Direction, Reserved and Gnd Connection for Motor Driver
11	In-1 Active Low input, Run/Jog
12	24VDC supply output, can be used for relays/Sensor etc, Max current 200 mA
13	In-2 Active Low input, Run/Jog
14	In-3 Active Low input, Genral purpose / Home
15-17	In-4,4,6 Active Low inputs, Genral purpose
18-22	Out-1,2,3,4,5 Open Collector Drivers for Driving Relays etc
23	Out-6 Open Collector Driver for Driving Relays etc, Also Brake Output
24	24VDC supply output, can be used for relays/Sensor etc, Max current 200 mA

Keypad

Numeric keys are used to enter values in editing or menu settings, alternate functions assigned to the numeric keys are explained below:

- 1:** Division mode, use this for indexing purpose
- 2:** Degree mode, use this for arbitrary step movements
- 3:** Continous mode, use this for Continuous motion
- 4:** Jog mode, Controls motor movement in response to keys or inputs
- 5:** PgmRun, Run Program (a sequence of commands)
- 6:** Home Machine, need a sensor connected to In-3 input
- 7:** PgmEdit, Edit a program
- 8:** Setup, all settings are available in here
- 9:** Toggle Brake output
- 0:** Rests Current position to Zero without moving the motor
- Arrow Keys:** Moves motor inJog mode or used for cursor movement while editing
- OK /ESE:** Confirm/Discard values and settings, cancels movements etc

Operation Modes

Main Screen:



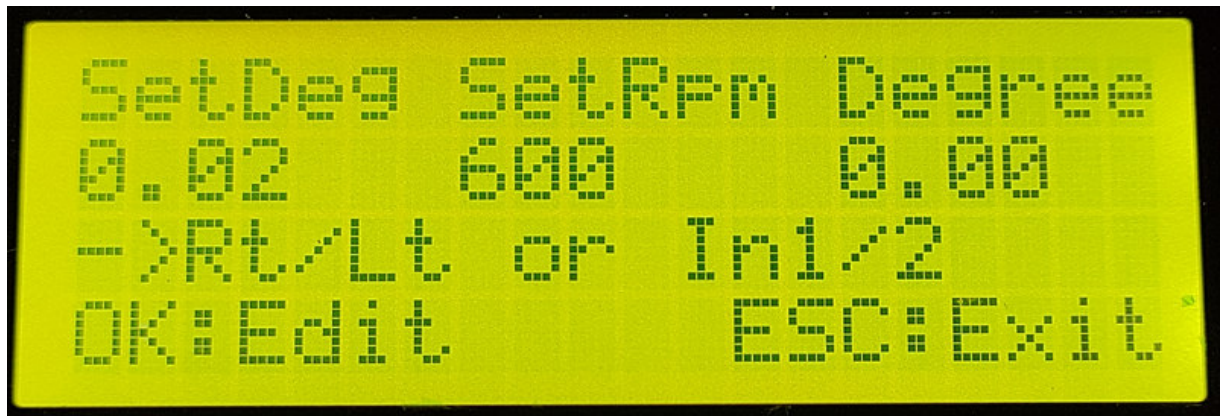
- Use corresponding key to enter the mode required.
- Controller boot to Home Screen unless set otherwise in the Setup Menu.

Division mode:



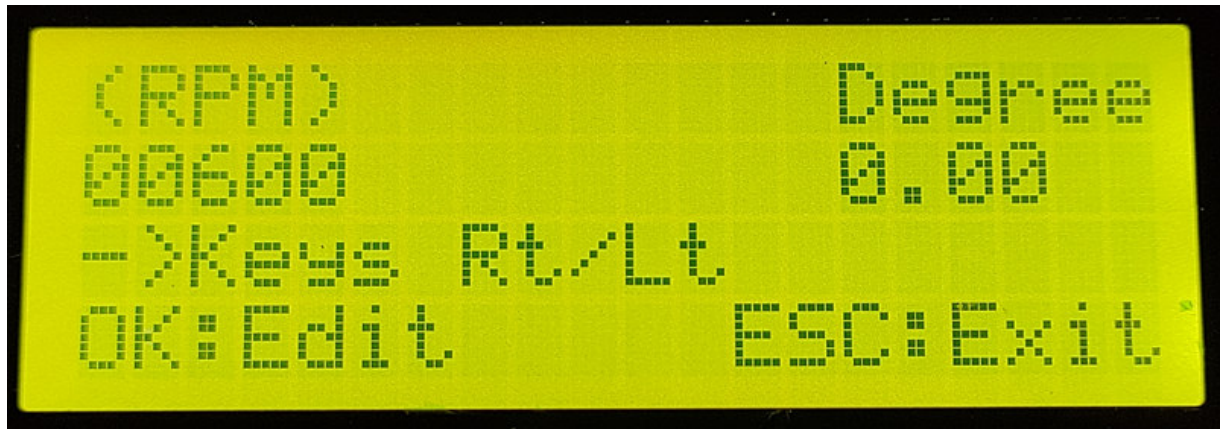
- Use arrow keys or inputs to move to next or previous division position.
- Ok to edit "number of divisions" or/and speed of the motor

Degree mode:



- Use arrow keys or inputs to move to next or previous position.
- Ok to edit "Degrees to move" or/and speed of the motor

Continuous mode:



- Use arrow keys or inputs to control the motor movement,
- Ok to edit the submode and speed/direction
- Following submodes are available in Jogging
 - o Keys Rt/Lt (Use Left/right arrow keys for continuous motion)
 - o In1/2 CW Priority (Use Inpit1 and Input 2 for CW/CCW for continuous motion, if both inputs are active, CW direction input takes priority.
 - o In1/2 CCW Priority (Use Inpit1 and Input 2 for CW/CCW for continuous motion, if both inputs are active, CCW direction input takes priority.
 - o IN1/2 Start/Stop (In1 triggers the start and In2 triggers thee stopping of the motor, Dir can be set CW or CCW as required)
 - o In1/2 Start/Start (In1 us used to start as well as stop the motor, same way In2 functions the similar way but direction is reversed)

Jog mode:



- Use Left/Right arrow keys for continuous Jogging.
- Up/Down adjust the speed in 10% increments, max speed is set in the Settings.
- Other keys 1,2,3,6,7,8 are used for step movement as indicated on the screen

Program mode:



Program: Pr91

Ok: SaveToPr9-1

Esc: BackToEdit

Count : 0

Speed : 600

Degree : 169.02°

OP: 000100 IP: 000000

Settings Menu

Press "8" key to enter Setting menu, password is "2626"



Following settings can be changed from this menu:

<i>SN</i>	<i>Setting Name</i>	<i>Description</i>	<i>Range / Allowed Values / Selectable Options</i>
1	<i>Motor Dir</i>	<i>Motor Default Direction</i>	<i>Normal or Invert</i>
2	<i>Home Dir</i>	<i>Motor Homing Direction</i>	<i>Normal or Invert</i>
3	<i>Gearing</i>	<i>Gear Ratio for Motor</i>	<i>0.01 to 9999.99</i>
4	<i>Stp/Rot</i>	<i>Steps per Rotation for Motor</i>	<i>1 to 99999</i>
5	<i>Stp/Sec</i>	<i>Speed Steps per Sec for Motor</i>	<i>1 to 99999</i>
6	<i>Accel</i>	<i>Acceleration for Motor</i>	<i>1 to 99999</i>
7	<i>HomSped</i>	<i>Motor Homing Speed</i>	<i>1 to 99999 Steps per Second (Limited to Motor Speed)</i>
8	<i>HomAccel</i>	<i>Motor Homing Acceleration</i>	<i>1 to 99999</i>
9	<i>JogSped</i>	<i>Motor Jogging Speed</i>	<i>1 to 99999 Steps per Second (Limited to Motor Speed)</i>
10	<i>ClpDly1 ms</i>	<i>Camping Delay</i>	<i>1 to 99999 in mS</i>
11	<i>ClpDly2 ms</i>	<i>Unclamping Delay</i>	<i>1 to 99999 in mS</i>
12	<i>AckWdt ms</i>	<i>Ack. Output pulse width</i>	<i>1 to 99999 in mS</i>
13	<i>ExtPot</i>	<i>External Potentiometer Enable</i>	<i>Enable or Disable Used in Continuous Mode for speed control</i>
14	<i>FactoryRst</i>	<i>Reset Settings or Programs</i>	<i>Select "Settings" or "Programs" to defaults</i>
15	<i>Ucnt</i>	<i>Lifetime Motion Counter</i>	<i>Displays number of programs executed so far (Not resettable by user)</i>
16	<i>TNC-G01 V</i>	<i>Displays Software version</i>	<i>Only of information about the controller</i>

Executing the Program

The selected program number in Settings is executed by asserting IN1-Run input to the controller, if the input is removed program is paused and can be resumed by again giving the IN1-Run input.

Supported Commands

SN	Command	Parameters Supported	Comments
1	Nop	No Operation	Place holder command, to be changed into other command at later stage, or for adding a very small delay in the program.
2	Dir CW , Dir CCW		Set motor direction, affects all future moves.
3	Speed	S, 1 – 99999	Set motor Speed (rpm) for future moves
4	Accel	1 - 99999	Set motor acceleration / deceleration
5	SetDiv	W, 1 – 99999	Set number of divisions per rotation for Rotary. for future “MvDiv” (move by division) moves,
6	MvDiv	D 0.01 – 9999.99	Moves motor by selected Divisions out of total divisions set for per rotation (see example) Please enter whole number only, rounded off to whole number if any decimal value is entered
7	Rst Pos		Resets internal motor position counter to zero, does not move a motor.
8	MT On		Start continuous motion for Motor
9	MT Off		Stops continuous motion for Motor
10	Home		Initiate “Homing” sequence for the motor. “IN3-Home” is sensor input is used for homing
11	Goto	D, 0.01 – 9999.99	Absolute motor movement for motor.
12	Waitfor	IN3, IN4, IN5, IN6 AROWKEY MOTOR	Program is paused and waits for some event : - Wait for one Input (3~6) to be triggered - Wait for an “Arrow Key” to be pressed - Wait till for move to be completed
13	Wait_mS	W, 1 – 99999	Wait for W / time (in millisceonds)
14	Count++		Increment counter displayed on the screen
15	Out Low	OUT1, OUT2, OUT3 OUT4, OUT5, OUT6	Activate Corresponding Output.
16	Out Hig	OUT1, OUT2, OUT3 OUT4, OUT5, OUT6	Deactivates Corresponding Output.
17	In=>Out	I4->O1, I4->O2, I4->O3 I5->O1, I5->O2, I5->O3 I6->O1, I6->O2, I6->O3	Copies/Latches an input state to output pin Example “I4>O1” copies Input 4 state to Output 1
18	LoopFor	L, 1 - 99999	Repeat command till next “Loopend” See Example
19	LoopEnd		Used along with “LoopFor” (See Example)
20	BlokSkp	IN3, IN4, IN5, IN6	Conditional block Skip command (See Example)
21	BlokRun	IN3, IN4, IN5, IN6	Conditional block Run command (See Example)
22	BlokEnd		Used along with “BlokSkp” or “BlokRun” command (See Example)
23	PrgmEnd	Stop Repeat	Marks Program End “Repeat” parameter makes program to reset and repeat over from the beginning “Stop” makes program to run only once

Program Structure and Programs Example

This section explains program structure and later shows small sections of code for achieving a particular function. These small fragments can be combined into a larger program to realize complex custom machines.

Program Structure:

Command 1

Command 2

Command 3

LoopFor XX

Command 4

Command 5

Loop End

Command 8

PrgmEnd Repeat

- Commands are executed from top to bottom
- LoopFor command repeats the command in the “LoopFor” and “Loop End” block, XX times
- In the example on the left :
 - o Command 1, 2, 3 executed once
 - o Command 4,5 executed XX times
 - o Command 8 is executed once, after Loop ends
 - o PrgmEnd with “Repeat” then repeats the whole program again, forever

Example Program :

```
Out Hig      OUT1
Wait_ms      500
Out Low      OUT1
Out Hig      OUT2
Wait_ms      500
Out Low      OUT2
Out Hig      OUT3
Wait_ms      500
Out Low      OUT3
Out Hig      OUT4
Wait_ms      500
Out Low      OUT4
Out Hig      OUT5
Wait_ms      500
Out Low      OUT5
Out Hig      OUT6
Wait_ms      500
Out Low      OUT6
PrgmEnd      Repeat
```

Above program turn ON the outputs sequentially for 500mS endlessly, can be used for testing outputs.

Example Program :

```
In=>OUT      I4->O1
In=>OUT      I5->O2
In=>OUT      I6->O3
PrgmEnd      Repeat
```

Above program copies input status to the outputs, I4,I5 & I6 inputs are copied to the O4,I5 & I6 outputs respectively.

Example Program :

```
Speed        20000
Accel        1024
Out Hig      OUT1
MovDeg       1.00
Waitfor      MOTOR
Out Low      OUT1
Out Hig      OUT2
Wait_ms      500
Out Low      OUT2
PrgmEnd      Repeat
```

Above program:

- Sets Motor Speed and Acceleration
- Turn ON output 1
- Move motor by 1 degree and wait for movement to end
- Turns OFF output1 and turns ON output 2
- Waits for 500mS and turns OFF output 2
- Repeats Above sequence

Example Program:

<i>Speed</i>	<i>S</i>
<i>Accel</i>	<i>1024</i>
<i>BlokRun</i>	<i>IN3</i>
<i>Out Hig</i>	<i>OUT3</i>
<i>Dir CW</i>	
<i>Loopfor</i>	<i>3</i>
<i>Movmm</i>	<i>1.00</i>
<i>LoopEnd</i>	
<i>Waitfor</i>	<i>MOTOR</i>
<i>Out Low</i>	<i>OUT3</i>
<i>BlokEnd</i>	
<i>BlokRun</i>	<i>IN4</i>
<i>Out Hig</i>	<i>OUT4</i>
<i>Dir CW</i>	
<i>Loopfor</i>	<i>4</i>
<i>Movmm</i>	<i>1.00</i>
<i>LoopEnd</i>	
<i>Waitfor</i>	<i>MOTOR</i>
<i>Out Low</i>	<i>OUT4</i>
<i>BlokEnd</i>	
<i>BlokRun</i>	<i>IN5</i>
<i>Out Hig</i>	<i>OUT5</i>
<i>Dir CW</i>	
<i>Loopfor</i>	<i>5</i>
<i>Movmm</i>	<i>1.00</i>
<i>LoopEnd</i>	
<i>Waitfor</i>	<i>MOTOR</i>
<i>Out Low</i>	<i>OUT5</i>
<i>BlokEnd</i>	
<i>PrgmEnd</i>	<i>Repeat</i>

Above program illustrate number of loops in the program; also illustrate the use of non-blocking commands BlokRun (BlokSkp works similar way but other way)

Example Program

```
Speed      S
Accel      1024
SetDiv     W

  BlokRun   IN3
  Dir CW
  MvDiv     D
  Waitfor   MOTOR
  BlokEnd

  BlokRun   IN4
  Dir CCW
  MvDiv     D
  Waitfor   MOTOR
  BlokEnd

PrgmEnd    Repeat
```

This is a practical program that can be used for **indexing application** as it is or can be customized further. In defaults state it works as below:

- Motor speed is set from variable "S"
- Acceleration is set to 1024
- Total number of Indexing Divisions are set from variable "W"
- First block of code between "BlokRun" and "BlokEnd" is executed if Input 3 is found **active**. If Input 3 is found **inactive** this block is skipped otherwise following 3 commands are executed: **1)** Motor direction is set to "Clockwise" **2)** Motor is moved by number of division set in variable "D" and **3)** Waits till moment is completed.
- Second block of code between "BlokRun" and "BlokEnd" is executed if Input 4 is found **active**. If Input 4 is found **inactive** this block is skipped otherwise following 3 commands are executed: **1)** Motor direction is set to "Counter Clockwise" **2)** Motor is moved by number of division set in variable "D" and **3)** Waits till moment is completed.
- Program is repeated.

Effectively above indexing program takes 2 inputs (IN3 and IN4) and INDEX the motor in clockwise or counter clockwise direction respectively. Eg if variable "W" is set to 4 and variable "D" is set to 1, on each input IN3 motor will move by 90 degrees clockwise. Or in each input on IN4 motor will move 90 degrees reverse direction.