CT/Toroidal Transformer Winding Machine Controller
(CNC-05SG)

USER MANUAL

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INTRODUCTION:

CT/Toroidal winding machine controller is multi-purpose designed controller, to meet various requirements. Additional settings can be configured to provide flexibility for related applications. It contains integral stepper motor drive, DC motor drive, brake and power supply control circuit in a single control box. It is a product of winding machine controller series, generally used in CT/Toroidal Transformer winding machines.

This controller is a simple “connector to connector” replacement of WEY HWANG, LEADER, TEEMING and SHINING SUN made imported CT/Toroidal Transformer winding machines and a replacement for all INDIAN made machine’s controller.

FEATURES:

- Microcontroller based controls, easy to program and operate.
- Password protected controls for Manufacturer, Manager and Operator.
- Winding speed can also be controlled.
- Universal design to meet various requirement of machine manufacturers.
- Multi program storing capability.
- Each program provides independent operation mode selections.
- Program protection function on power fail, helps to continue the unfinished work when the power restored.
- Easy customized calibration options for machine manufacturer.
- It’s speed controller is useful for minor winding.
- Controls holding and running current.
- Regulated DC drive for winding motor.
- Single Logic board for all drives and functions.

SPECIFICATIONS:

- **Model:** CNC-05SG.
- **Winding Steps:** 999
- **Wire diameter:** .100 to 9.999 mm.
- **No. of possible turns:** 9999.9 & 99999
- **Control Panel:** Membrane keyboard.
- **Display:** A 3digit and two 5digit 7 segments displays with 27 LED indicators.
- **Weight:** 2.5Kg.
- **Dimensions:** 244 (d)*274(w)*114(h) mm
- **Winding motor:** 180V DC, 1HP
- **Brake:** 24V DC, 2 amps.
- **Array Traverse:** Stepper motor, 2 amps phase current.

INTERFACES:

- **Input supply:** 220V AC, 50Hz.
- **DC Motor Supply:** + and - / 180V DC/ 1 HP.
- **Brake Supply:** 24V DC, 2 amp.
- **Stepper Motor connections:** A ~ A and B ~ B
- **Control Switches:** Start/Stop/Reset with indicator.
- **Sensor:** Turn counting and home position.
- **Stepper motor:** manual movement of stepper motor.
FRONT PANEL DESCRIPTION:

![Front Panel Image]

### Keys Description:

<table>
<thead>
<tr>
<th>Key</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>PROCESS SETTING</td>
<td>To enter numeric values.</td>
</tr>
<tr>
<td>OUTPUT SELECTION</td>
<td>Set target production.</td>
</tr>
<tr>
<td>INPUT</td>
<td>Not in use</td>
</tr>
<tr>
<td>CLR</td>
<td>To enter data in to memory.</td>
</tr>
<tr>
<td>COPY</td>
<td>To enter start step number.</td>
</tr>
<tr>
<td>START PROCESS</td>
<td>To enter end step number.</td>
</tr>
<tr>
<td>END PROCESS</td>
<td>To enable/disable auto home position.</td>
</tr>
<tr>
<td>AUTO HOME</td>
<td>To enable/disable auto start.</td>
</tr>
<tr>
<td>AUTO START</td>
<td>To select parameter.</td>
</tr>
<tr>
<td>DATA OPTION</td>
<td>To monitor winding speed in RPM.</td>
</tr>
<tr>
<td>FEED DRL.</td>
<td>To enter data input mode.</td>
</tr>
<tr>
<td>WIND. DRL.</td>
<td>To select wire feed direction.</td>
</tr>
<tr>
<td>LENG TURNS</td>
<td>To select winding direction.</td>
</tr>
<tr>
<td>START</td>
<td>To enable/disable pause winding after each layer.</td>
</tr>
<tr>
<td>STOP</td>
<td>To start/resume winding.</td>
</tr>
<tr>
<td>RESET</td>
<td>To pause winding.</td>
</tr>
<tr>
<td>BACK</td>
<td>To reset the machine.</td>
</tr>
<tr>
<td>SKIP</td>
<td>To move to previous step.</td>
</tr>
<tr>
<td>BRAKE</td>
<td>To move to next step.</td>
</tr>
<tr>
<td>AUTO</td>
<td>Enable/disable break in stand by mode.</td>
</tr>
<tr>
<td>CLR.</td>
<td>Enable/disable auto running mode.</td>
</tr>
<tr>
<td>RPM</td>
<td>Clear display to zero.</td>
</tr>
<tr>
<td>ZERO</td>
<td>Reset current production reading to zero.</td>
</tr>
</tbody>
</table>

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CNC-05SG USER MANUAL
**Status LED indicators:**

**Process indicators:**

<table>
<thead>
<tr>
<th>LED</th>
<th>STATE</th>
<th>FUNCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>STAND BY</td>
<td>ON</td>
<td>Controller ready.</td>
</tr>
<tr>
<td>RUN</td>
<td>ON</td>
<td>Winding in progress.</td>
</tr>
<tr>
<td>RESET</td>
<td>ON</td>
<td>Complete machine reset</td>
</tr>
<tr>
<td>L-SPEED</td>
<td>ON</td>
<td>Low speed</td>
</tr>
<tr>
<td>H-SPEED</td>
<td>ON</td>
<td>High speed</td>
</tr>
<tr>
<td>FUNC</td>
<td></td>
<td>Not in use.</td>
</tr>
</tbody>
</table>

**Winding parameter indicators:**

<table>
<thead>
<tr>
<th>LED</th>
<th>STATE</th>
<th>FUNCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>O.DIA</td>
<td>ON</td>
<td>Outer diameter value.</td>
</tr>
<tr>
<td>I.DIA</td>
<td>ON</td>
<td>Inner diameter value.</td>
</tr>
<tr>
<td>WIRE DIA</td>
<td>ON</td>
<td>Wire diameter value.</td>
</tr>
<tr>
<td>TURN NO.</td>
<td>ON</td>
<td>Turn numbers value.</td>
</tr>
<tr>
<td>SLOW START</td>
<td>ON</td>
<td>Slow start value.</td>
</tr>
<tr>
<td>SLOW STOP</td>
<td>ON</td>
<td>Slow stop value.</td>
</tr>
<tr>
<td>DEGREE</td>
<td>ON</td>
<td>To select winding angle.</td>
</tr>
<tr>
<td>WIDTH</td>
<td>ON</td>
<td>To specify winding width.</td>
</tr>
<tr>
<td>SPEED</td>
<td>ON</td>
<td>High/Low speed selection.</td>
</tr>
</tbody>
</table>

**Monitoring indicators:**

<table>
<thead>
<tr>
<th>LED</th>
<th>STATE</th>
<th>FUNCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROTATE SPEED</td>
<td>ON</td>
<td>Winding speed in RPM.</td>
</tr>
<tr>
<td>OUTPUT</td>
<td>ON</td>
<td>Total production.</td>
</tr>
<tr>
<td>COMPLETE</td>
<td>ON</td>
<td>Targeted Production complete.</td>
</tr>
</tbody>
</table>

**DISPLAY INDICATORS:**

To display the step number, in programming the parameters and in winding process.

To display parameter value during programming and to display turns when winding in progress

Displays winding speed (RPM) and set/completed output.
INTERFACE CONNECTIONS:

CN-1
- (+) 24V DC
- START LAMP
- STOP LAMP
- RESET LAMP
- START
- STOP
- RESET

CN-2
- (+) 24V DC
- PULSE
- (-) 24V DC

CN-3
- (+) 24V DC
- PULSE
- (-) 24V DC

CN-4
- REVERSE
- (+) 24V DC
- FORWARD

CN-5
- 220V AC
- MOTOR
- BRAKE
- 180V DC
- 24V DC

CN-6
- STEPPER MOTOR
- 2 AMP.
APPLICATION:

CT/Toroidal Transformers are electronic components, typically consists a circular ring-shaped magnetic core of iron powder, ferrite, or other material, around which wire is coiled to make an inductor. The machine which is used to make this electronics components generally completes the task in two steps; in first step, it loads wire in to the circular spindle of the machine and in second step it unloads this loaded wire over the core. The following parameters are required to specify in the controller to perform it.

PARAMETER DESCRIPTION:

O.DIA: The outer diameter of the core, measured in millimeter.
I.DIA: Inner diameter of the core, measured in millimeter.
WIRE DIA.: Wire diameter measured in millimeter.
TURN NO.: Number of turns to be wounded.
SLOW START: Number of turns to be wounded with slow speed in the beginning of winding.
SLOW STOP: Number of turns to be wounded with slow speed in the end of winding.
DEGREE: This is the starting point of winding. For 1st step of winding it is always zero degree.
WIDTH: Width is the area, in which the winding to be done on core. It is defined it terms of turns.
SPEED: High or Low speed percentage selection. The required percentage of the highest speed of the machine can also be defined for the both (high and low) selection.

CO-PARAMETERS:

FEED DIR.: Wire feeding direction (clock-wise or anti clock-wise) from defined angle. ON state of LED shows clock-wise and OFF state of LED shows anti-clock wise direction.
WIND DIR.: Direction of winding cab be selected by this key. ON state of LED shows the for forward direction and OFF state shows the reverse direction of winding.
AUTO HOME: After completing the winding step, the coil will return to starting angle point if LED is kept in ON state. For OFF state coil will stay at the position where it finishes winding.
AUTO START: ON state of LED indicates that the defined winding steps will start automatically one after another. In OFF state, operator has to start the winding manually for next step of winding.
LENG TURN: Single or double sensor selection

PARAMETER PROGRAMMING PROCEDURE:
The above parameters can be configured in the following way.
START & END PROCESS:

This is the first stage of programming the parameters. It describes the number of windings required in coil including tapping. Any value between 1 to 999 can be START PROCESS & END PROCESS value, but the value of START PROCESS must be less then the value of END PROCESS.

EXAMPLE:
If 02 windings are required in a bobbin, then parameter values will be START PROCESS “1” and END PROCESS “2”.

Procedure:

Switch ON the controller, press START PROCESS key and enter starting step number followed by INPUT key, then press END PROCESS key and enter end step number followed by INPUT key in following way.

PARAMETER ENTRY:

After START PROCESS and END PROCESS value selection of each parameter for every winding step need to be configured in following way.
Procedure:

Parameter entry mode: To enter parameter entry mode press keys; PROCESS SETTING & INPUT. Now define parameters O.DIA, I.DIA, WIRE DIA., TURN NO., SLOW START, SLOW STOP, DEGREE, WIDTH AND SPEED with co-parameters; FEED DIR, WIND DIR., AUTO HOME, LENG TURN and AUTO START for each step of winding simultaneously.

PARAMETER & CO-PARAMETER SELECTION:

After selection of winding steps, parameters and co-parameters for selected steps can be programmed in following way.

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**PARAMETER & CO-PARAMETER SELECTION:**

After selection of winding steps, parameters and co-parameters for selected steps can be programmed in following way.
Now controller switches over to next parameter entry mode “I.DIA.”

This I.DIA (inner dia) value for step-1 (displays on PROCESS display), measured in millimeter. This is generally zero for step-1, as in this step wire is being loading over spindle.

This I.DIA (inner dia) value for step-2 (displays on PROCESS display), measured in millimeter.

Now controller switches over to next parameter entry mode WIRE DIA.

This is wire diameter value (WIRE DIA,) in mm. for step “1”.

Follow same procedure for all reaming parameters and for all the steps of winding up to parameter WIDTH.

Exit parameter entry mode & switch to start winding process.
Note:

1. If same parameter value of previous step is required in current step, press COPY key before INPUT key.

2. It is strongly recommended that, any parameter value should not be more than specification limit of machine.

**OUTPUT SETTING:** To set production target. Press OUTPUT SETTING followed by INPUT key and enter production target again followed by INPUT key. Current production can be monitored on production display.

**OTHER IMPORTANT FUNCTION KEYS:**

a. **CLR.**: To clear current parameter value on the DATA display.

b. **RPM:** To monitor winding speed.

c. **ZERO:** To make current production reading zero.

d. **BRAKE:** To activate brake in standby mode.

e. **SKIP:** To skip current winding step.

f. **BACK:** To move previous winding step.

g. **RESET:** To reset current winding step.

h. **STOP:** To pause winding.

i. **START:** To start winding.

**MACHINE CALIBRATION:**

To calibrate controller with machine’s specification, the following value of parameters need to be entered into the controller. It is recommended that these settings should be done by machine manufacturer or expert having complete understanding of the machine.

1. **Gear ratio calibration:**

Rotate your stepper motor 360 degree and measure the displacement of gear assembly in mm. with resolution of .1 mm and multiply it by 100 and note down. Enter this noted value in to controller in following manner.
Procedure:

2. Speed calibration:

Required speed of Array Traverse, when it moves from home position to specified DEGREE. It is calibrated by defining, % speed of stepper motor’s maximum speed,

PROCEDURE:

3. Brake time calibration:

Brake time (in milliseconds) need to specify, which is required after each step of winding.

PROCEDURE:
4. Bit selection:

Bit selection is used to select turn counting limit 9999.9 or 99999 of the controller. For limit 9999.9 select zero value of right most bit and for limit 99999 selecting one value of right most bit on DATA display.

Procedure:

![Diagram of the procedure for bit selection](image)

**PASSWORD SELECTION:**

Master Password (for machine manufacturer), Manager password and Operator password can be specified to avoid unauthorized access.

**Master password:** This is default master password for machine manufacturer, it is required only when Manager or Operator password is enabled.

**Manager password:** This is for Manager, its zero value means password disabled. This password can be enabled by the following procedure.

Procedure:

![Diagram of the procedure for manager password](image)

**Operator password:** This password is for machine Operator, its zero value means password disabled. This password can be enabled by the following procedure.

Procedure:

![Diagram of the procedure for operator password](image)
**MAINTENANCE:**

1. Check the wire connections between machine and controller periodically, to avoid loose or bad contact

2. Clean up the controller inner accumulate dust periodically

3. The following parts must be maintained and replace if required periodically for smooth functioning and long life of controller and machine. Life of these part depends on operating method and environmental conditions.
   
   a. Turn counter sensor
   b. Array traverse home sensor.
   c. Cooling fan.
   d. Carbon BRUSH of DC motor.

**PRECAUTIONS:**

1. Do not connect or disconnect wires and connectors while power is applied to the controller.

2. Make sure that, all the leads and connectors are connected correctly.

3. Make sure all interface connections are connected correctly.

4. Make sure the machine and controller are properly grounded.

5. Follow instructions given in this document for connections and programming, in case of any difficulties please do contact the customer care.