INSTRUCTION MANUAL

AC DRIVE 140Hz /124Hz /100Hz /62Hz /54Hz

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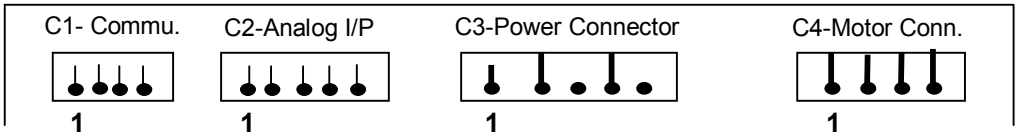
ACD 4.0

INSTRUCTION MANUAL FOR WINDER TENSION CONTROLLER.

The winder tension controller is a sophisticated and state of the art device, designed exclusively for the yarn / tape tension control in cheese winder. It consist of 3 phase drive with PID loop optimized for the winder, 1 analog (0-10 volt) input for tension sensor, 485 Data input from last godet speed ,and mounted on a aluminum sheet with acrylic cover (optional) .

CONNECTORS DETAILS - The controller has four connectors and the details are as under.

Caution:→ Avoid wrong connection of each connector to prevent damage.



AC DRIVE PCB

Connector C3 – Power Connector	
Pin Number 1	+325V DC Power
Pin Number 2	0V GND
Pin Number 3	NC (Cut)
Pin Number 4	+15V DC
Pin number 5	NC (Cut)

Connector C2 – Analog Input	
Pin number 1	White LED (+)
Pin Number 2	White LED (-)
Pin Number 3	+15V
Pin Number 4	Ground
Pin Number 5	Analog Input – Standard: 0 - 10V DC 100Hz (Kabra): 0 - 5V DC

Connector C1 – Communication	
Pin Number 1	NC
Pin Number 2	NC
Pin Number 3	- Data
Pin Number 4	+ Data

Connector C4 – Motor Connector	
Pin Number 1	Motor Ground (Earth)
Pin Number 2	R Phase
Pin Number 3	Y Phase
Pin Number 4	B Phase

LED FUNCTIONS - The controller has 3 LEDS and their functions are as under:-

1. **Orange** – This LED shows that 325V DC is present. Do not touch the PCB or any component till this LED is completely off. Dangerous voltages are present on AC Drive card, when this LED is on.

2. **Green** – This LED shows following indication of Drive. It should keep flickering when winding is in progress. This LED will be 'ON' when dancing arm is at exactly center position. In standby (Dancing arm in released position and winder 'ready to start') condition, this LED will flicker randomly to indicate that communication is OK, and valid line speed is received. Green LED also flickers (at very fast rate) when motor draws excessive current indicating over loading of AC Drive.

3. **Red** – This LED shows status of faults as mentioned under Faults in connection and description diagram**.** When the Ac Drive/Winder is in standby mode, this LED will flash regularly.

4. **White LED on Analog Sensor connector:** - The controller has facility of indicating Bobbin length maturity. The required tape length in meter of the bobbins to be wound is set on synchronizer. Each controller keeps track of length of the tape wound on bobbin, and the bright white LED will start flashing just before maturity, when 3.2% of set tape length is balance to wound. When the bobbin is wound with tape equal to set 'Bobbin length' the white LED will become continuously ON until the bobbin is removed.

NOTE :-

'Power On' LED Sequence: - On power on, Green LED & then Red LED will flash for 2 times and then the AC Drive will be ready for operation with regular flashing of RED Led.

OPERATION – The operation of controller is very simple. Just lift the dancing arm slightly, the motor will start and speed-up to the speed as per the data received through RS485 communication from synchronizer. This speed should be set slightly more than the linear speed of third godet, by adjusting 'Adjust line speed' parameter's value. If no tape is put on winder in 15 seconds, the motor will be switched off by controller automatically. When the tape is put on winder, the dancing arm will move and motor speed will be varied automatically so that dancing arm is at center between the two stoppers. When winding is complete, simply lock the spindle and remove bobbin. Due to blocked motor the controller will trip on motor over load with two flashes, but this is perfectly normal operation. Insert the empty bobbin, and restart the winder by lifting dancing arm.

Auto switch off –

a) After startup if no tape is put on winder with in 15 sec, the motor will be stopped. (When winder is started by lifting and releasing the dancing arm very fast & tape is not loaded, winder will stop after 15 seconds delay.)
b) The motor will be switched off in 4 seconds if the tape breaks.(If dancing arm is lifted & released slowly or if tape breaks while winding, then the winder will stop after 4 seconds delay.)
This feature is useful to save power and prevent CAM wear and tear when tape is broken.

PROTECTION - The protection system of controller is very precise and fast. These protections make the tension controller robust and fault free. Following protections are provided on controller. The RED led will indicate these faults with different flashes.

CAUTIONS: Dangerous DC Voltages exist. To be handled by qualified trained person only

Faults:

- **Under voltage protection** – The controller will trip if DC bus voltage is less than 200V DC. This will be indicated by **1 flash** of RED LED.
- **Over voltage protection** – The controller will trip if DC bus voltage is more than 380V DC. This will be indicated by **1 flash** of RED LED.
- **Over load trip** – The controller will trip if the motor is overloaded, and indicated by **2 flashes** of RED LED. This situation will occur when motor is locked.
- **Earth fault** – The controller will trip when any phase gets connected to earth. The fault will be indicated by **2 flashes** of RED LED.
- **Short Circuit trip**. – The controller will trip whenever there is short circuit in the motor or earth fault. This will be indicated by **3 flashes** of RED LED. .
- **Over temperature trip.** – The controller will trip, when the temperature of PCB goes above 70 degree centigrade. This will be indicated by 4 flashes of RED LED.
- **Tension Sensor error** – If the output of tension sensor is more than 0.5 volt during power ON, RED LED will **flash 5** times.
- Current limit- whenever there is excessive friction on motor or winder and if motor current exceeds the set value, the drive will reduce the motor speed so that current is also reduced. This will be shown by the flickering of the Green LED. If motor remain in current limit for more than 5 sec, drive will be switched off by controller automatically.

SETTING OF ANALOG SENSOR

Please follow the following procedure for setting of Sensor:-

1) Install the eccentric bush on dancing arm shaft and sensor in the clamp.

2) When the dancing arm is at lower most position (released position), adjust the sensor gap between eccentric bush and sensor around 4mm, and then slowly move the sensor towards eccentric bush till RED LED starts flashing slowly. At this point 0 volt setting is done. Now tighten the check nut.

3) Now bring the dancing arm in the near center position, the RED LED will remain ON steadily (without flashing). Red LED will become OFF, when the dancing arm moves out of center position.

4) Move the dancing arm in the tension position (up / extreme position), the RED LED will flash rapidly indicating proper setting in this position.(Approximate 10Vdc output) When gap between bush and sensor is maximum

PRECAUTION –

1) The tension controller has dangerously high voltage present inside, during normal operation. Always wait for minimum 30 sec or till the orange LED is completely off before touching the PCB.

2) Always observe polarity of all connectors when inserting the connector. When inserting the connector always insert 5 Pin power connector at the last. Similarly, always remove 5 Pin power connector first and then rest of the connectors.

3) If possible switch off the power supply before removing the connectors. If over load or short circuit fault appears repeatedly, do not connect the controller and return to us for servicing.

4) Power cable should never be opened from power supply side connector. It should be removed only from AC Drive side power connector if required. Before removing power connector always wait for few minutes so that capacitors get fully discharged and Orange led is switched off. LEDs for power indications are provided on both AC Drive and power supply card.

TECHNICAL SPECIFICATIONS – The specifications of the tension controller are as under. These specifications are subjected to change.

TECHNICAL SPECIFICATION	
Input Supply voltage	325V DC
Control Supply voltage	15V DC
Rated Power	200 Watts
Number of phases	3 Phase, star connection
Output frequency	140Hz /124Hz /100Hz /62Hz /54Hz
Control Loop	PID with optimization
Maximum motor RPM	4200 /3720 /3000 /3720 /3240
Motor voltage (3 phase AC)	177V / 177V / 230V / 230V
Motor Pole	4P / 4P / 2P / 2P
Motor Watt	120 Watt max.
Output Voltage	3 Phase 230V AC max.
Controller	16 Bit, 30 MIPS
Tension Sensor	Analog Proximity
Dimensions	125 mm X 85 mm X 20 mm
Weight	70 Grams

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