



# ES-200A

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## Convection Heat Shrink Tunnel User Guide





# **ES-200A**

## **Convection Heat Shrink Tunnel**

### **User Guide**

**V2 (240V)**

**V6 (480V)**

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# Safety

When installing, operating, and maintaining the ES-200A Convection Heat Tunnel, follow these safety practices.

- All operators should study this User Guide thoroughly before operating the machine.
- Always follow GMP (Good Manufacturing Practices) when operating this machinery.
- The machine is heavy. While unpacking and setting up the unit, always take care to use proper lifting techniques. Avoid overreaching and leaning over while handling the machine and accessories. Use more than two or more persons to lift and move the tunnel.
- Wear safety shoes and work gloves when moving the machine.
- Beware of uneven spots on the factory floor; the machine could tip over.
- Make sure the electrical power source is properly wired and grounded. The power source should comply with all safety regulations and codes applicable to the installation location.
- Before attempting any service or repair, make sure that the power is turned off and power cable is disconnected from the power source.
- The equipment generates heat, so make sure that the area is properly ventilated.
- Do not place any body parts or tools into a running machine.
- Turn off and unplug the machine while servicing and performing maintenance procedures.

## Warnings

Before operating the machine, inform all personnel of the following warnings:

- Do not tamper with electrical wiring. Use only licensed electricians for maintenance. Always disconnect electrical power before attempting maintenance to any electrical or moving parts.
- To prevent damage to machinery and injury to personnel, do not increase settings on either electrical or mechanical overload safety devices.
- Keep hands away from moving conveyors and assemblies. Conveyor belts that have become worn or frayed can be hazardous and should be replaced promptly.
- Never operate this or any moving equipment without all covers and guards in place. The internal mechanism of most packaging machinery contains numerous pinch, shear, and in-running nip points, many of which are capable of causing severe injury and permanent disfiguration.
- To minimize potential for personal injury, always be sure that machine operators and others working on machinery are properly trained in the correct usage of the equipment and properly instructed regarding the safety procedures for operation.

- Do not make any modifications to either the electrical circuitry or the mechanical assemblies of this machinery. Such modifications may introduce hazards that would not otherwise be associated with this machinery. American Film & Machinery will not be responsible for the consequences of such unauthorized modification.
- The use of certain types of plastic films in sealing and shrinking equipment may result in the release of hazardous fumes due to the degradation of the film at high temperatures. Before using any plastic film in this equipment, the manufacturer or supplier of the film should be contacted for specific information concerning the potential release of hazardous fumes. Always provide adequate ventilation.
- Keep combustible and explosive materials away from this equipment. The equipment may be a source of ignition.
- Do not use with pressurized containers. Exposure to high temperatures can cause pressurized containers to burst, and could cause injury to operators and other personnel nearby.
- Take care when clearing product jams inside the heat tunnel. Do not use anything that could potentially puncture a container. Use an electric lift to raise the tunnel from the conveyor before clearing product from inside the heat tunnel. If containers remain in the heat chamber, turn off power and allow the temperature to drop below 100 °F before clearing. Temperature inside the tunnel can easily cause burns.

## Cautions



**ELECTRICAL HAZARD:** Do not open cover. No user-serviceable parts inside.



**ELECTRICAL HAZARD:** Ensure that unit is properly grounded.



**FIRE HAZARD:** Do not tamper with electrical equipment.



**WATER HAZARD:** Keep the equipment dry and indoors.



**FUME HAZARD:** Some fumes may be a health hazard with prolonged exposure. Ensure that the area has adequate ventilation.

# Introduction

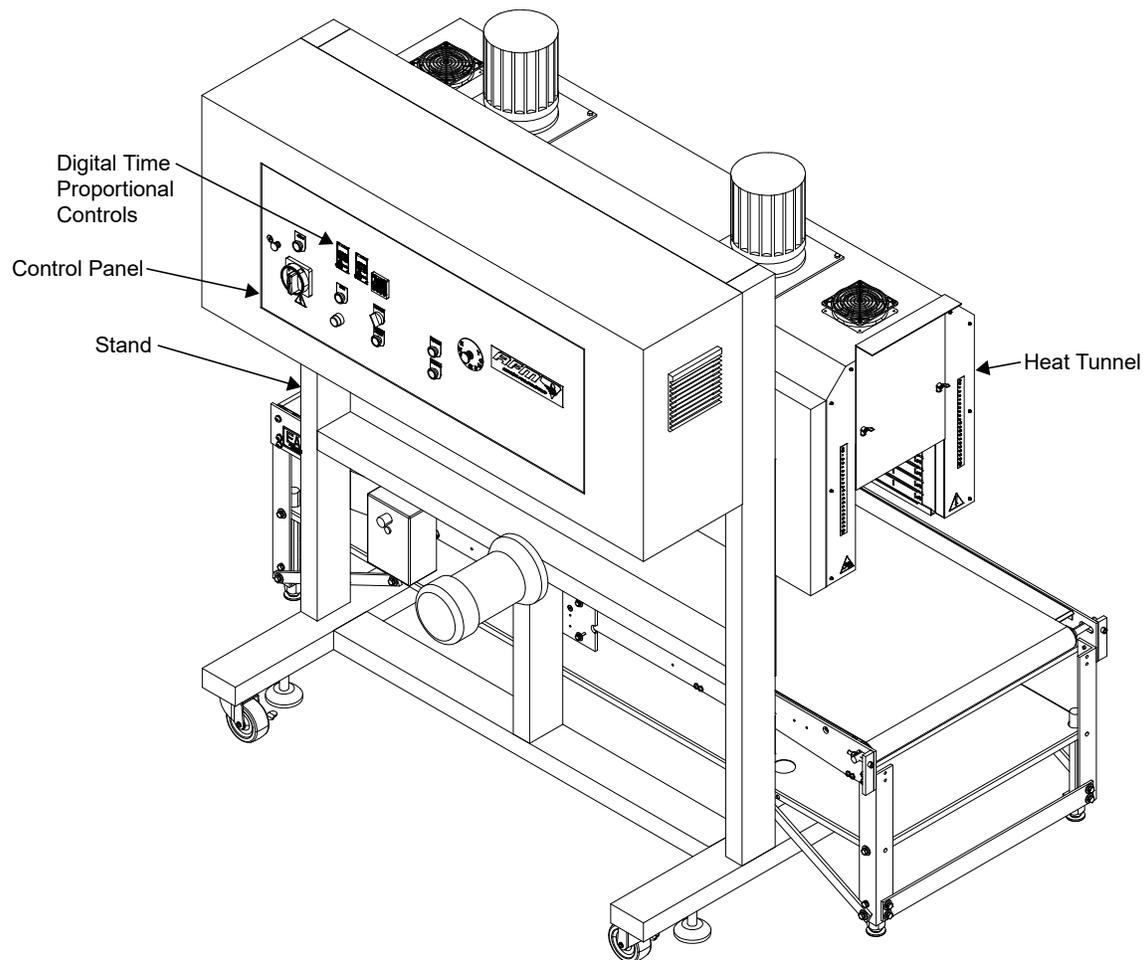
## General System Description

The AFM ES-200A heat shrink tunnel is designed for the shrinking of heat shrink film (labels, tamper bands, multi-pack), on containers over which they have been applied.

AFM shrink tunnels are intended for industrial use only.

## System Components

- Stainless Steel Stand with Motorized Adjustment Height Control
- Electric Heat Tunnel
- Digital Time Proportional Controls
- Operator Controls



## **System Specifications**

**Power:** 3-Phase, AC, 240/480 Volt, 50/60 Hz

**Motor:** 2-230 VAC, 3-Phase, 12 KW ½ HP

**Tunnel Opening Dimensions:** 200 mm W (7.875") x 350 mm H (13.75")

**Machine Dimensions:** 1000 mm W (39.375") x 1650 mm H (65.00") x 1500 mm L (59.00")

**Film Thickness:** 0.035 mm to 0.07 mm

**Temperature:** 400 °F

## **Optional Equipment**

**Conveyor:** The conveyor is customer-supplied. For conveyor options, consider an Easteey conveyor system. Call AFM Customer Service for more information.

**External Controls:** Call AFM Customer Service for more information.

# Installation and Setup

## AC Power

In many locations where the heat tunnel is installed, AC power may be subject to line noise, brownouts, and blackouts. If any of these occur on a regular basis, a good-quality line conditioner or Uninterruptible Power Supply (UPS) should be installed to ensure data integrity. In many cases, these devices may not be necessary. If system lockups occur, the first corrective measure should be to isolate and clean up the AC power.

## Work Area

The ES-200A may require occasional cleaning due to environmental contaminants.

## Maintenance Access

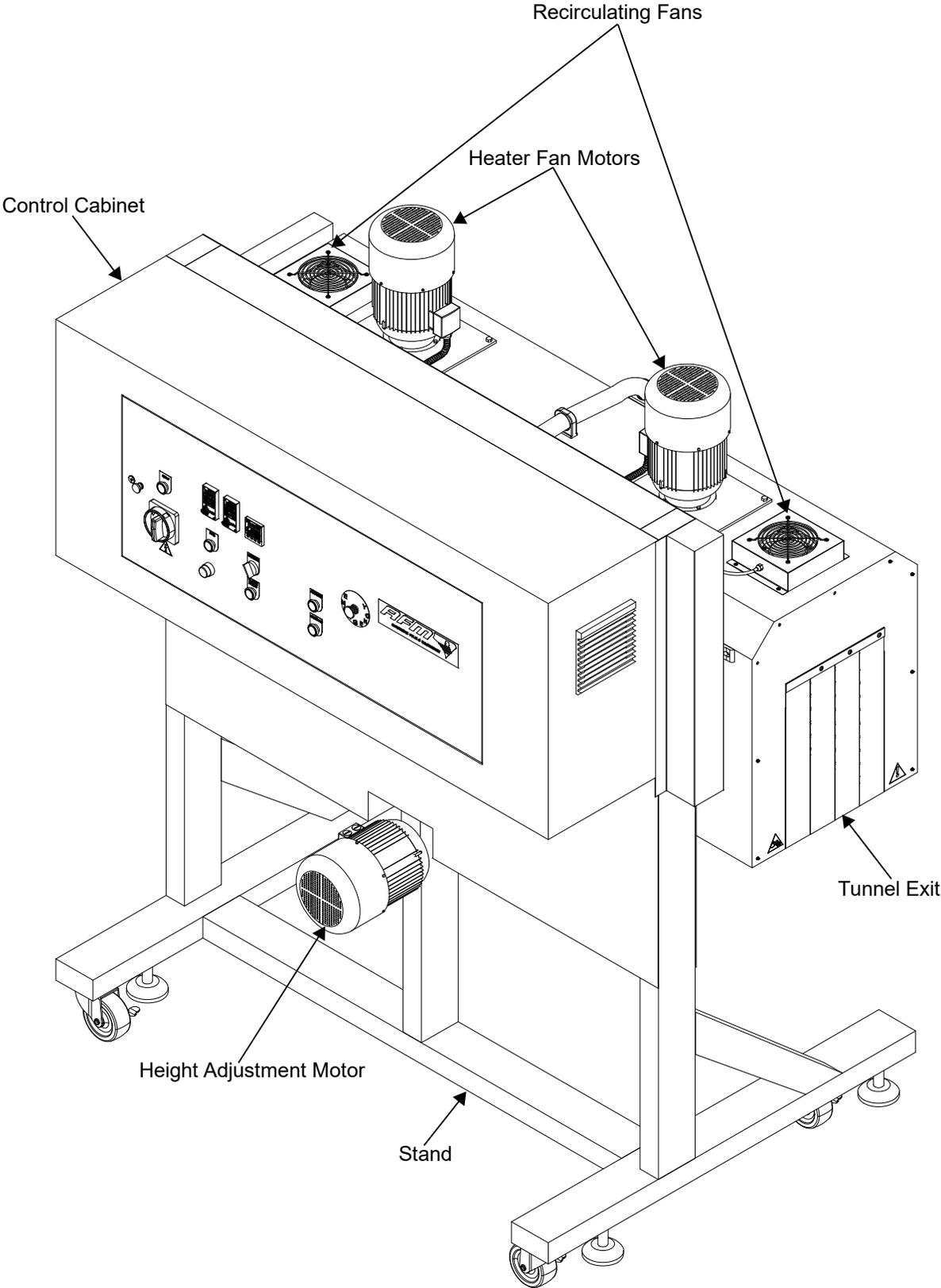
When planning the installation, allow for easy access to the tunnel for convenient cleanup, maintenance, and repair.

**IMPORTANT:** Turn off power and allow the heat tunnel to cool before cleanup, maintenance, and repair.

## Unpacking and Placement

1. Open the box.
2. Roll the tunnel assembly out of the box on its casters.
3. Examine the tunnel exterior for damage.

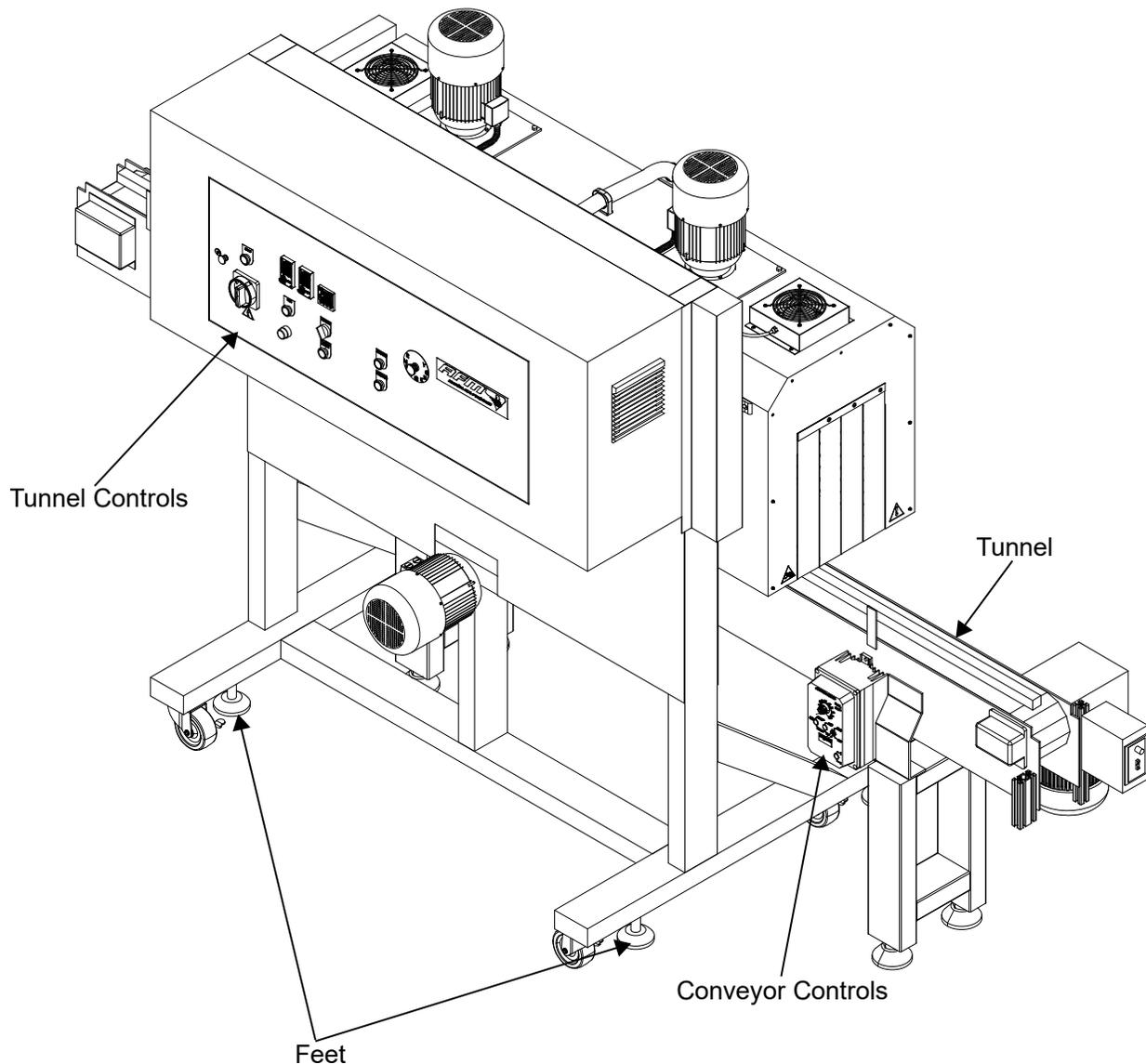
# ES-200A Heat Tunnel Major Components



## Tunnel Placement

A conveyor must be used with the tunnel to move the product while it is being sleeved.

1. Position the tunnel next to the conveyor, considering product size and location on conveyor.
2. Ensure that all controls on both control panels are easily accessible.
3. Set the conveyor height.
4. If the tunnel height needs adjustment, connect the heat tunnel to AC power. Refer to the “Connecting Power” section on page 14.
5. Press the **Ascend** or **Descend** buttons as required to raise and lower the heat tunnel.
6. When the tunnel and conveyor have been properly positioned, unscrew the leveling feet to keep the tunnel from moving.

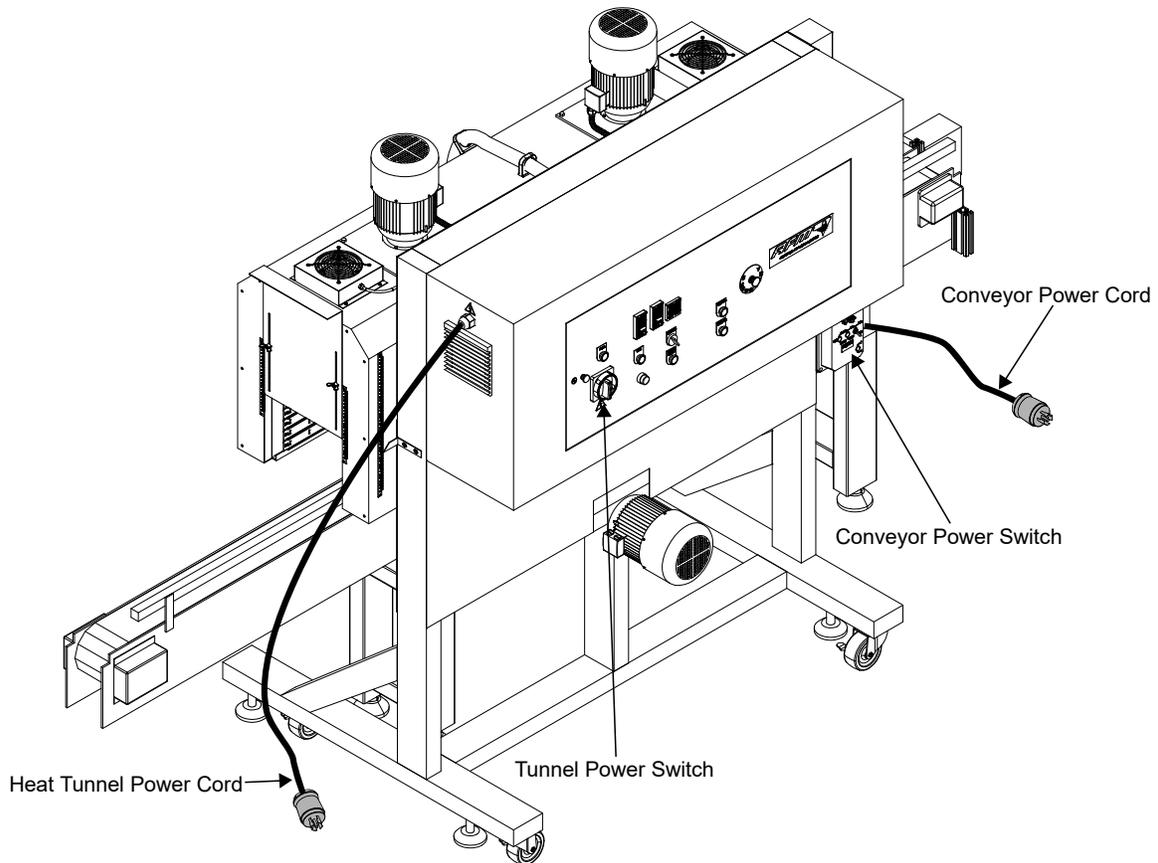


## Connecting Power

 **CAUTION:** Before connecting power, verify that the power switches are in the OFF position.

Connect an appropriate electrical plug to the end of the cord.

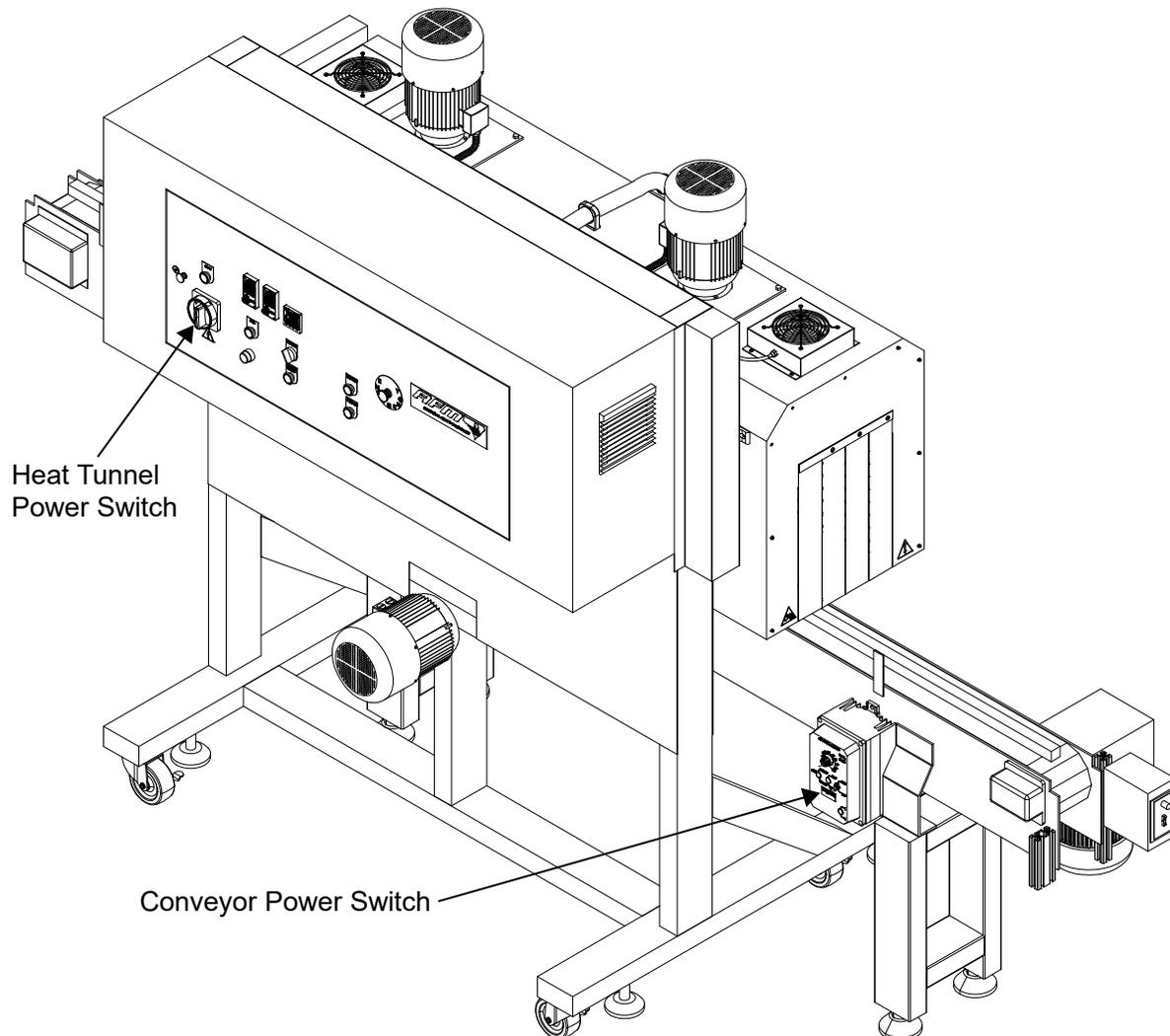
Plug the power cords from the conveyor and tunnel into properly wired and grounded electrical outlets.



# Operation

## Startup

1. Before starting the ES-200A Heat Tunnel, double-check the installation.
2. Verify that all power cables are properly connected.
3. Turn the Heat Tunnel Power Switch located on the front of the Control Cabinet to the ON position.
4. Turn the conveyor power switch to the ON position.

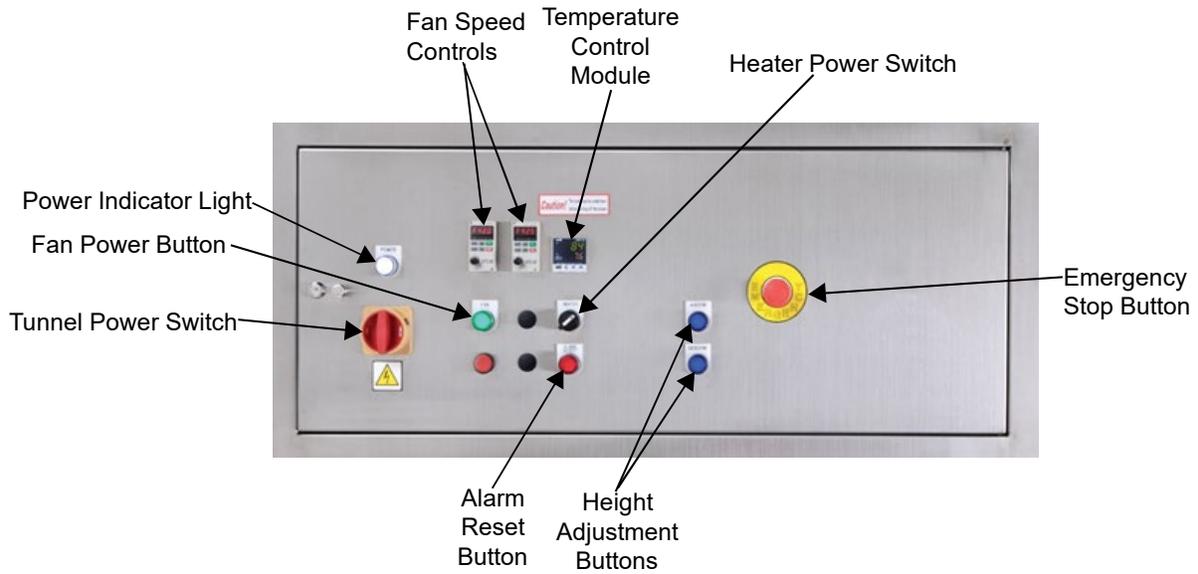


## Control Cabinet Overview

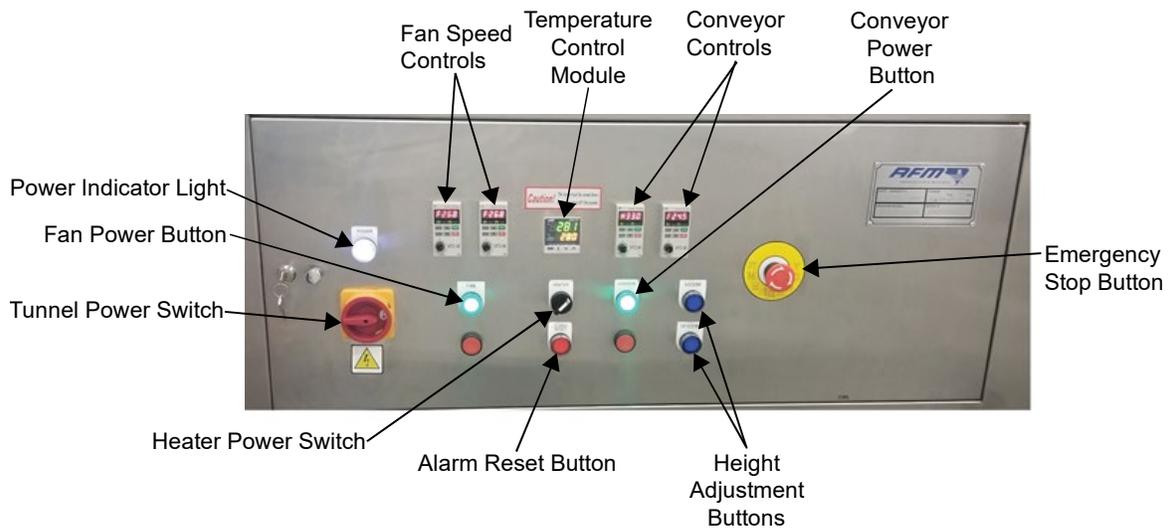
**⚠ CAUTION:** The control cabinet is not a watertight enclosure. Do not splash the cabinet with liquid.

The front panel of the control cabinet includes the following:

### ES-200A V2 Control Cabinet



### ES-200A V2 with Conveyor Controls

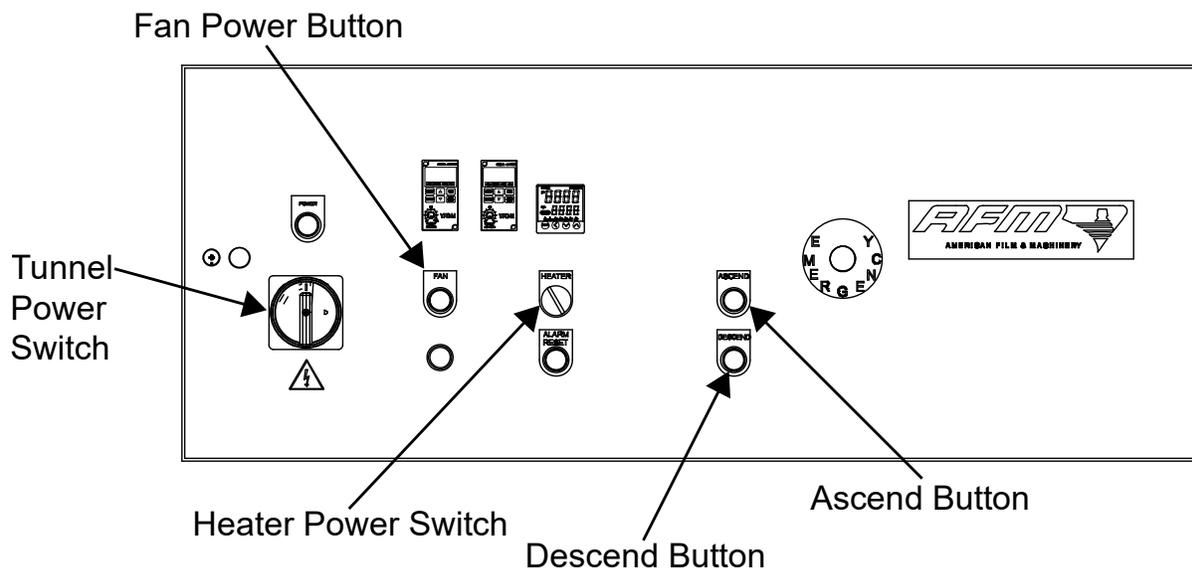


## Running Product

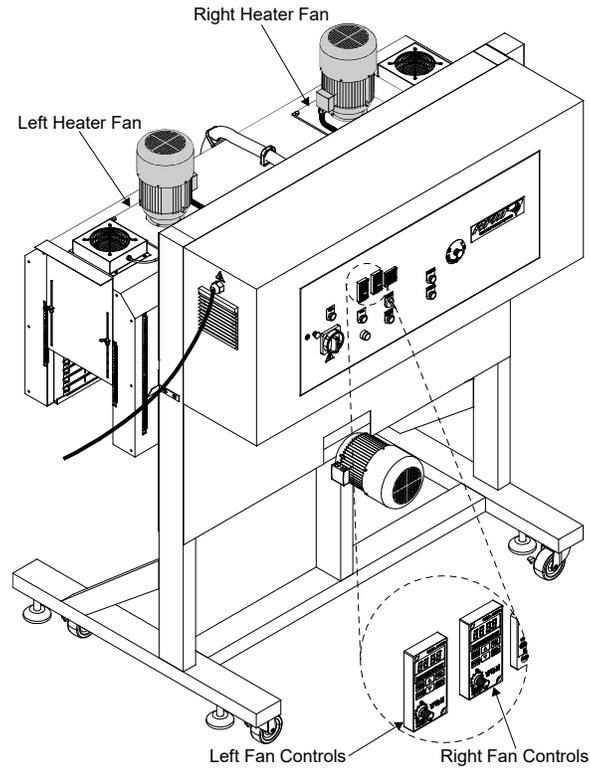
1. Turn the Tunnel Power Switch to the ON position.
2. Press the **ASCEND** and **DESCEND** height adjustment buttons on the tunnel to set the correct height for the product.

**NOTE:** In Manual Mode, press the **ASCEND** button to raise the tunnel. Press the **DESCEND** button to lower the tunnel. In Auto Mode, the tunnel rises when the conveyor has stopped. To use Auto Mode, the Conveyor Input wire must be connected.

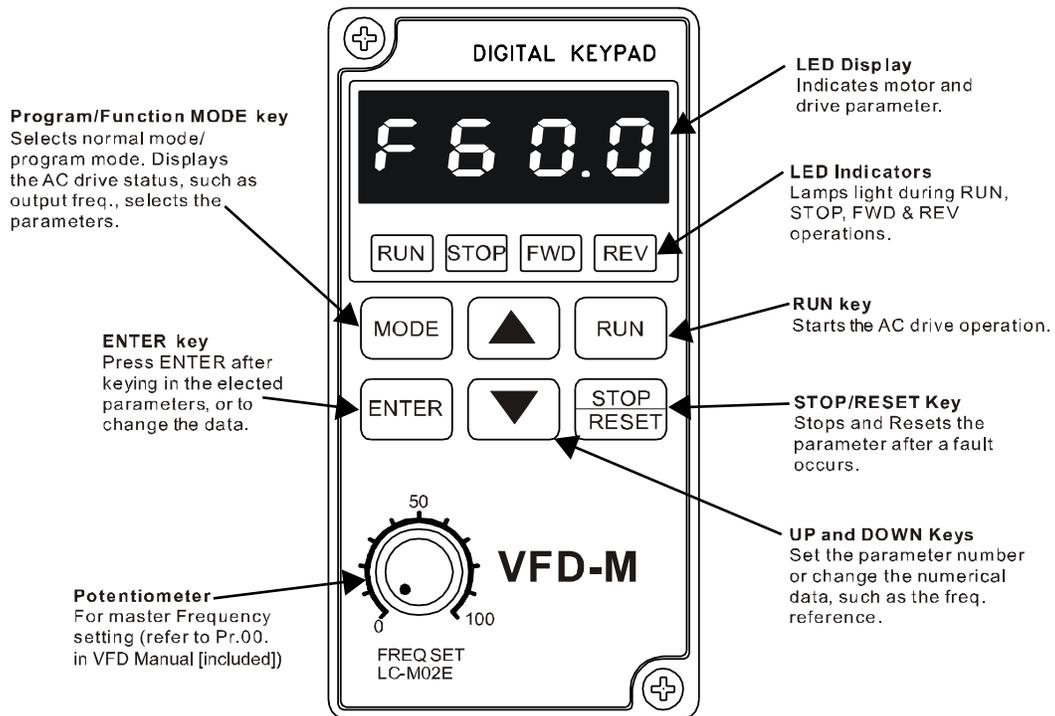
3. Turn on the Conveyor.
4. Turn on the **Fan** power button.
5. Turn on the **HEATER** power switch.



## Fan Control Module



## Fan Control Keypad



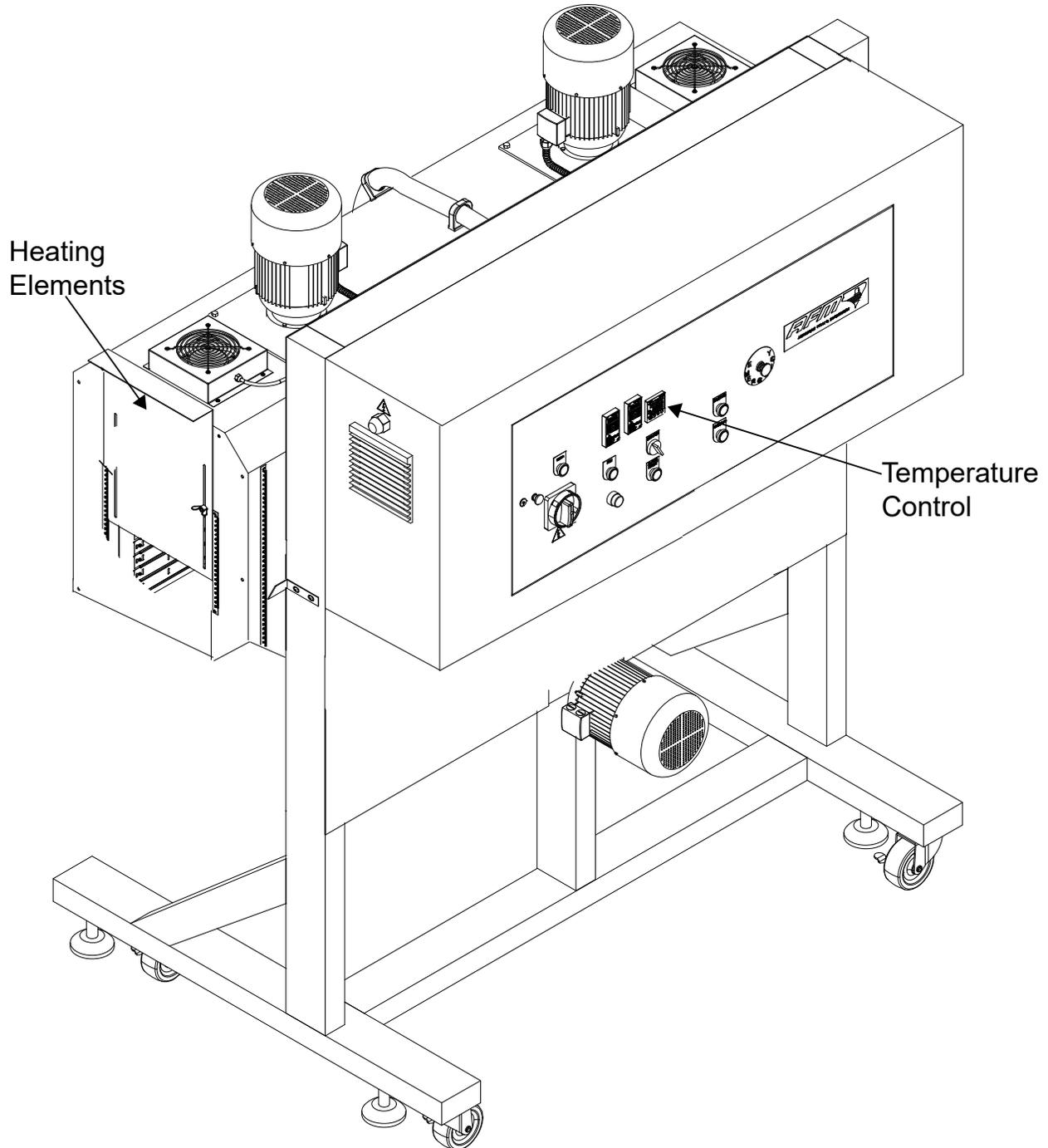
The VFD-M fan control modules control each large fan motor speed. The smaller fans on the top outer edges of the tunnel begin running automatically when the Tunnel power Switch is turned to the ON position.

The tunnel is shipped with the fan controls set at F60.0, which equals 60 Hz or full power of the fans.

Control	Function
Program/Function key	Used to change parameters and display amperage, hertz, frequency, and counter.
LED Display key	Displays settings.
LED Indicators	Lamps light up for each operation.
<b>RUN</b> key	Not used
<b>STOP/RESET</b> key	Not used
<b>ENTER</b> key	Saves settings and changes to settings.
<b>UP</b> and <b>DOWN</b> keys	Used to raise fan speed (no higher than 60) and to lower fan speed to slow down airflow through the inside vents of the tunnel.
Potentiometer	Refer to the <i>VFD-M Digital Keypad Manual</i> for more information.

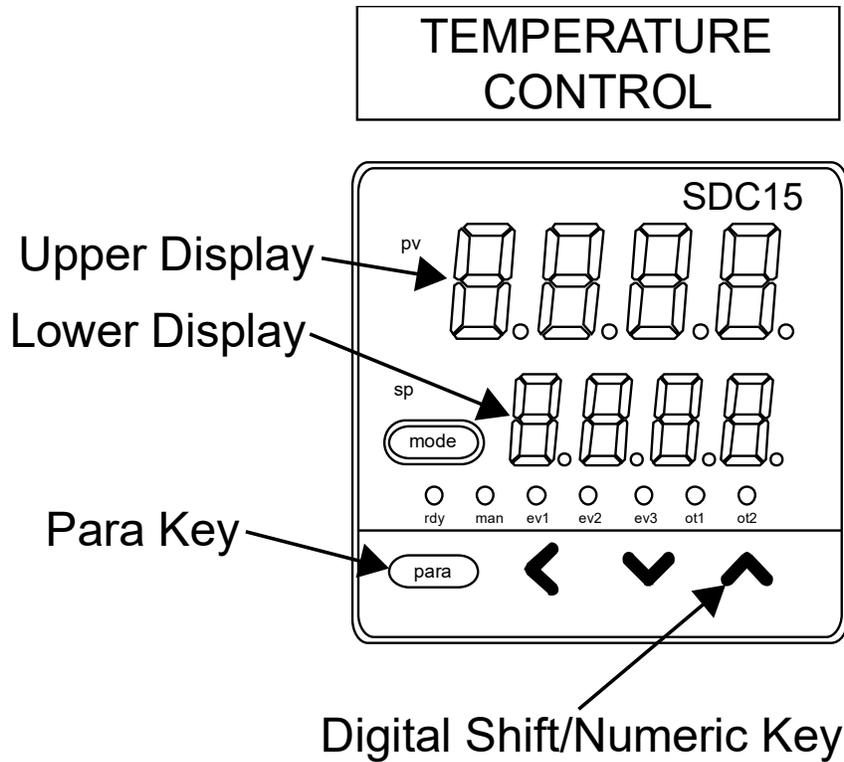
## Temperature Control Module

The SDC15 (Temperature Control) controls the chamber temperature in the heat zone. Heating elements are inside the top of the tunnel and run the length of the tunnel.



After a temperature setpoint has been selected, run some product and observe the results. To adjust the temperature, set the control to the new desired temperature. Always wait for tunnel heat to stabilize before making changes.

The control has an alarm output which is factory set to process high and process low temperatures. The heat turns off if the chamber temperature exceeds 425 °F or falls below the low process temperature setting.

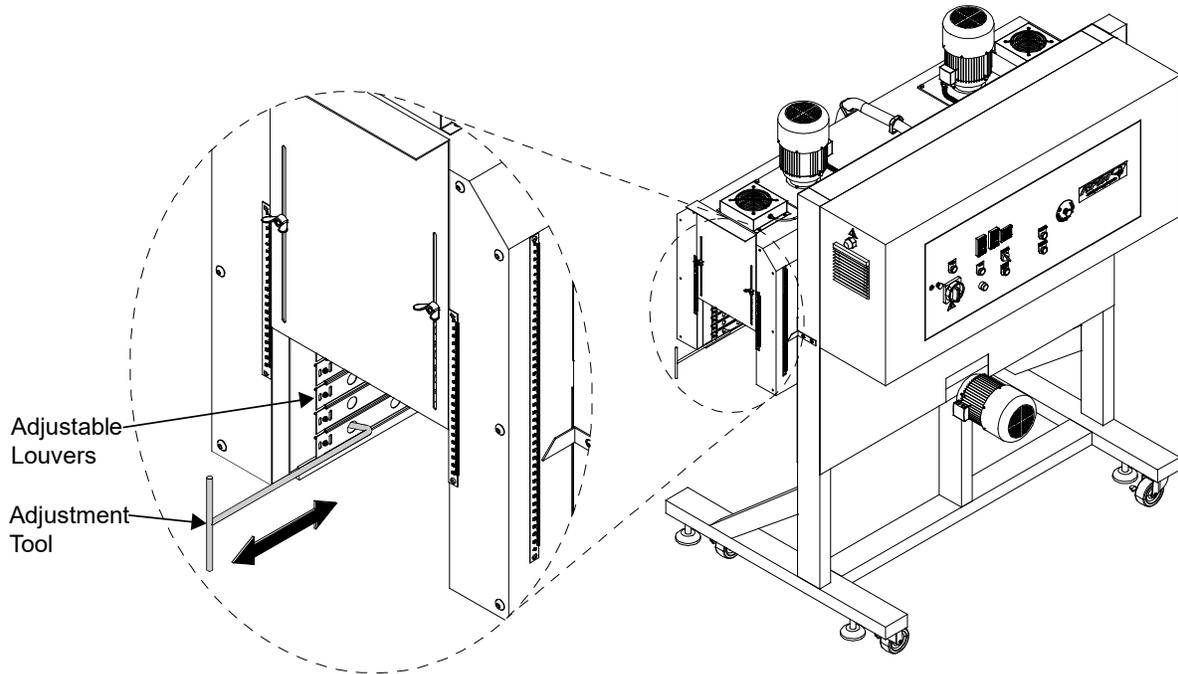


**Current Transformer Input**

Refer to the *SDC Temperature Control Manual* for more information.

## Interior Vents

Inside the heat tunnel, rows of adjustable louvers can be moved using the provided adjustment tool to facilitate variable airflow at different sections throughout the tunnel. Increasing the speed creates more heat pressure in the tunnel. Use the airflow pressure and vent adjustments to achieve the desired shrink for each product.



# Maintenance

The AFM ES-200A tunnel requires very little maintenance during normal operation.

## Mounting Hardware and Connections

Occasionally check the mounting hardware. Retighten any mounting brackets or screws that may have vibrated loose during operation.

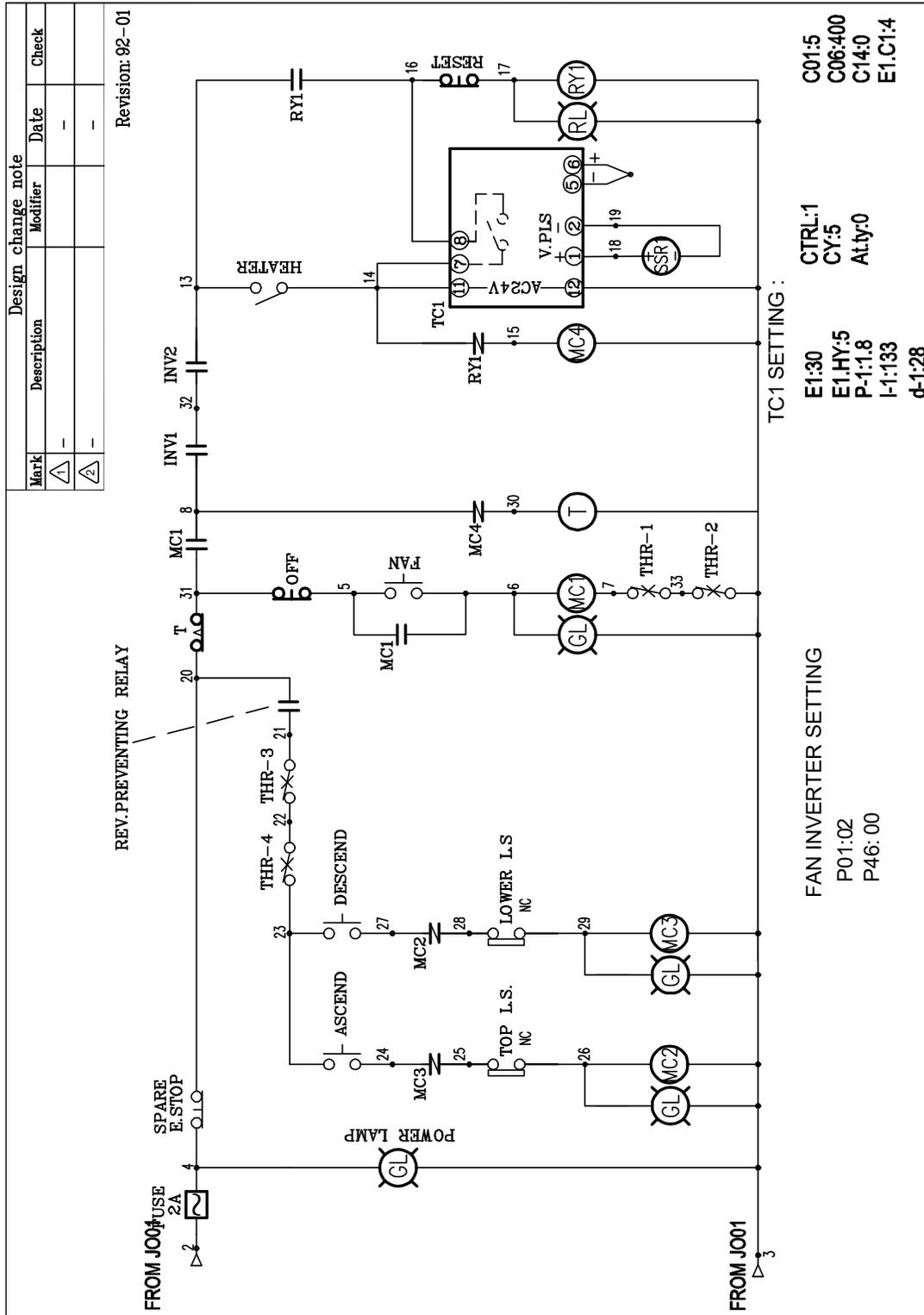
Occasionally verify that the data cable connections between components are secure and properly seated.

## External Cleaning

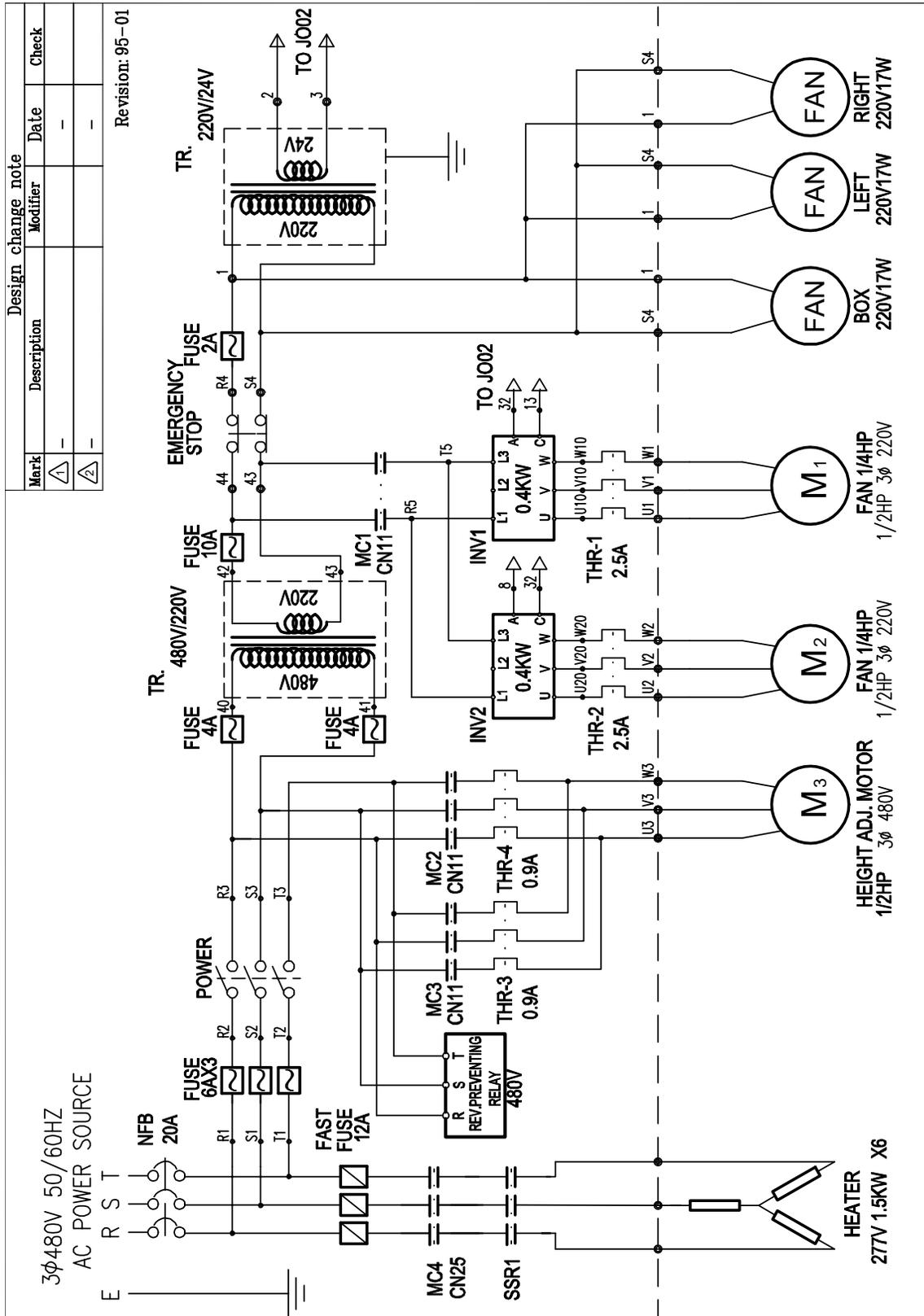
External components may be gently wiped clean using a clean cloth and cleaning spray.

# Schematic Diagrams

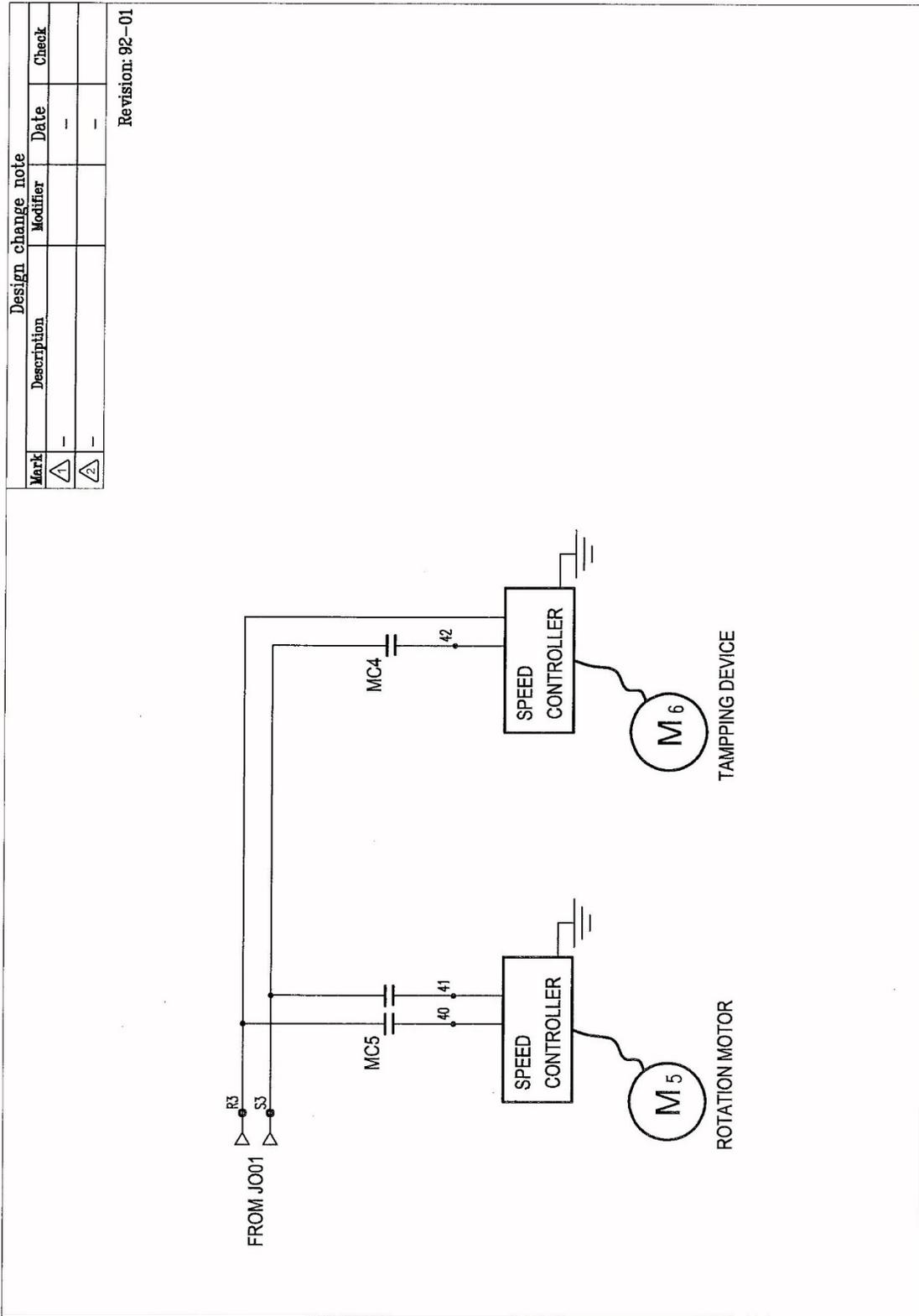
## ES-200 V2 Wiring Diagram

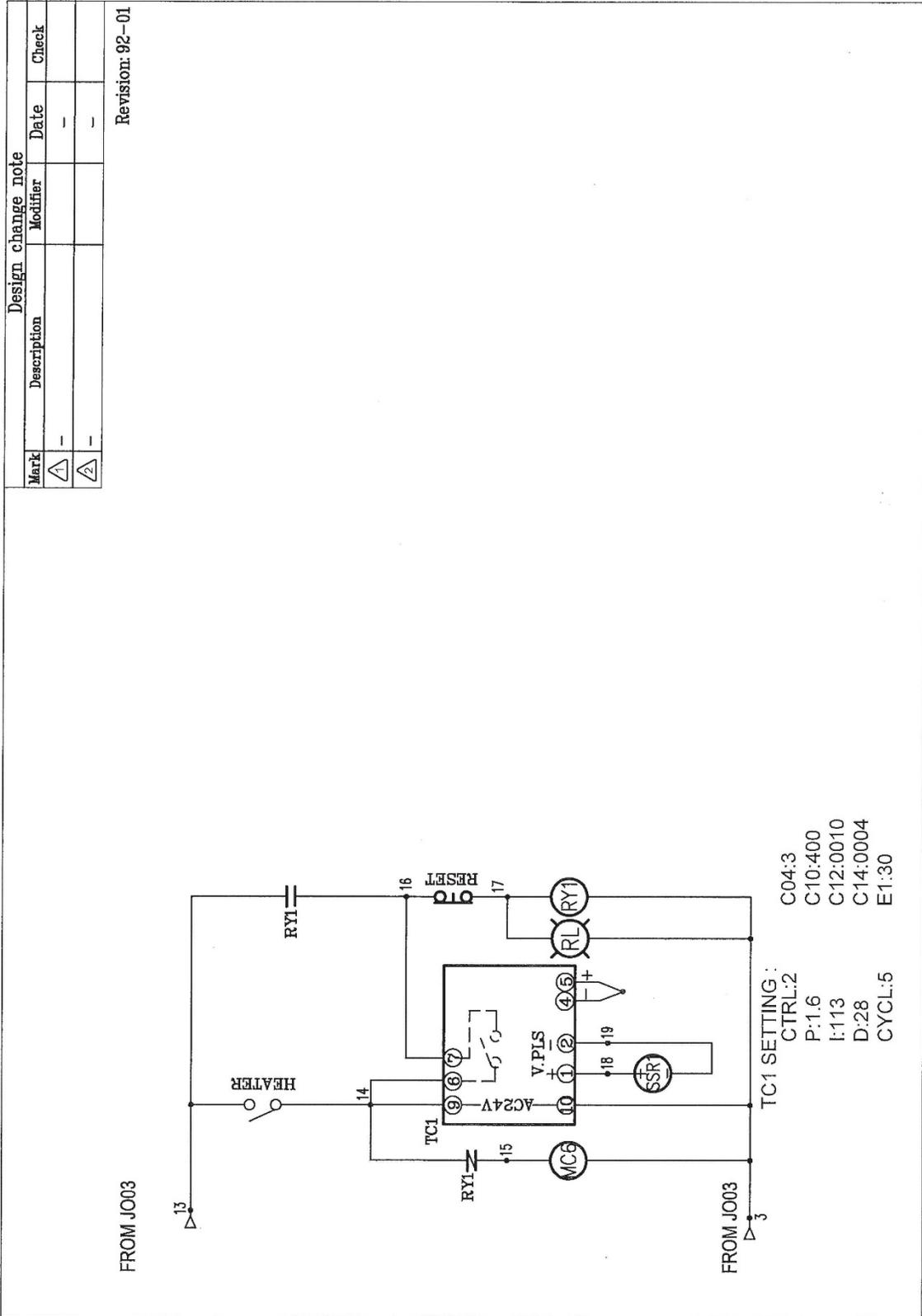


# Fan Inverter Setting



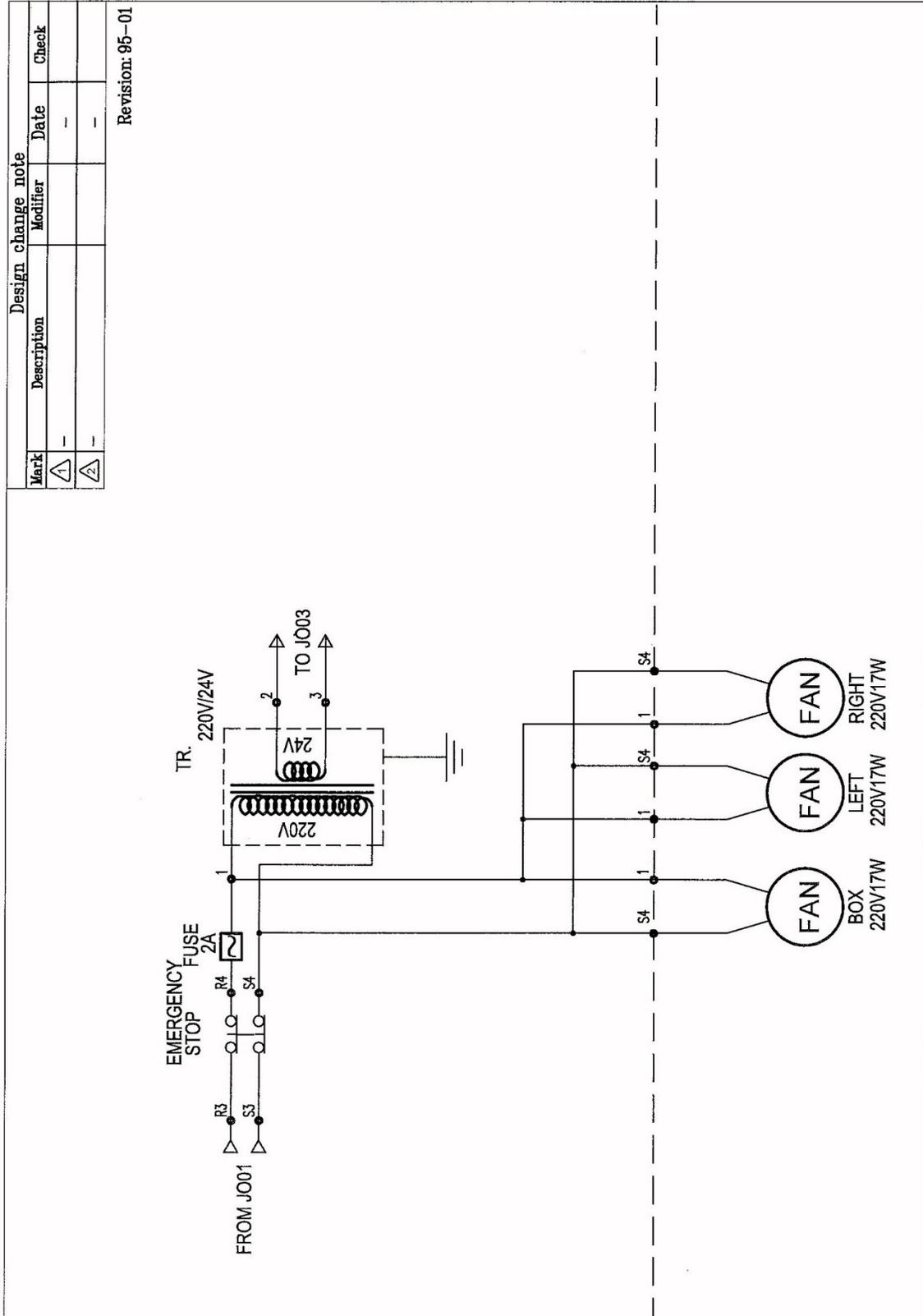
# ES-200A Wiring Diagram





Design change note			
Mark	Description	Modifier	Date
①			
②			

Revision: 92-01



Design change note			
Mark	Description	Modifier	Check
△	-	-	-
△	-	-	-

Revision: 95-01

# Troubleshooting

Problem	Possible Cause	Suggested Solution
Power is off	Circuit breaker switch is off at the machine or the plant main panel.	Turn circuit breaker off, then back on. If circuit breaker keeps tripping, check the fuse. Check the circuit breaker switch.
Heater is not running	Heating coils are open. Thermostat failure. Heater sensor broken.	Replace heater coil. Replace thermostat. Replace heater sensor.
Fan is not running	Overload fuse is blown. Motor has failed.	Check the overload fuse and switch. Replace the motor.
Conveyor is not running	Gear chain is off. Motor is hot and jammed.	Tighten the gear chain. Turn off all power and clear the jam.
Height adjustment controls are not working.	The drop is improperly wired.	Check the phase relay inside the cabinet. Reverse the two drop leads.

# ES-200A Parts Lists

## ES-200A V2 (240V) Parts List

Part Number	Description	Specification	Qty
5AA01C10T6DTD0100	TEMPERATURE CONTROLLER	C15TV0TD0100 24V AC/DC SSR	1
5AA04C12D10A7	MAGNETIC CONTACTOR	C-12D10A7 AC24V 4A	3
5AA04C55D10A7	MAGNETIC CONTACTOR	C-55D10A7 AC24V	1
5AA07BMY2CSLAC24	RELAY	BMY5-2C-SL-AC24V (MY2N)	1
5AA09H3CRA8	TIMER	H3CR-A8 AC24-48/DC12-48V	1
5AA1102AX2/03A026CE	TRANSFORMER	240V/220V 2A, 26V 3A CE	1
5AA31APR3S7	PHASE RELAY	APR-3S AC208-440V	1
5AA72CA1D22	EXTRA CONTACT	CA1-D22 2A2B	4
5AA915MX1	THERMOCOUPLE	5M	1
5AA71NTH2.5	OVER-LOAD RELAY	NTH2.5 1.8~2.5A	2
5AA71NTH6.5	OVER-LOAD RELAY	NTH6.5 4.5~6.5A	1
5AB033PCS50	CIRCUIT BREAKER	3P50A CE	1
5AB07HL5030	LIMIT SWITCH	HL5030	2
5AB16ZHC363	POWER SWITCH	FCH-ZH-C363 3P63A	1
5AB31ABF221B2G	PUSH BUTTON	ABF-22-1B-G 220V	2
5AB33SHAF2212B2R	PUSH BUTTON FOR EMERGENCY STOP	SHAF-221 2B 220V	1
5AB61AC222P1A2B	SELECTOR SWITCH	AC-22-2P-1A-B 1A220V	1
5AB66SHAI2211A7G	ILLUMINATION BUTTON	SHAI-221 1A 24V GREEN	2
5AB66SHAI2211B7R	ILLUMINATION BUTTON	SHAI-221 1B 24V RED	1
5AC04FF1038X02	FUSE	10X38 2A	3
5AC04FF1038X10	FUSE	10X38 10A	3
5AC043NW61121	FUSE	3NW6112-1 32A/500V	3

### 31 Dimensions

Part Number	Description	Specification	Qty
5AC14JK3C55A3FB75	SSR	JK3C55A3FB75 SSR 3φ48-480VAC	1
5AF01A51340XF20	HEATER	5/8 φ X1340M/MX138VX2.0KW	6
5AG017A4X95	FAN WHEEL	7 1/2"X3 3/4" D=14 φ	2
5AG1312X12X2	COOLING FAN WITH COVER	12X12CN 220V UF12A23BWH	3
5CE02VFD004M23A	INVERTOR	VFD004M23A 1/2HP 3PH230V	2
5CF412PBXV6	MOTOR	4P1/2HP3 φ 240/480V60HZ	1
5CF212PAXV6XSL	MOTOR (FAN)	2P 1/2HP3 φ 240/480V 60HZ LONG	2
5AC033NW7131	FUSE HOLDER	NW7131 14X51 3P	1
5AC03ACTCTFB101L	FUSE HOLDER	ACT-CT-FB101L 10X38 1P	6

## ES-200A Recommended Replacement Parts List

Item Number	Stock Number	Description	Manufacturing Number	Qty
000021	4500591	ELEMENT, HEATER 36" 2KW/115V	ELEM754	3.000
000323	4500784	FUSE UL CLASS CC MID. TD, 600	VAC, 5 AMPS, TYPES: LP-CC, ATD	2.000
000322	4501960	FUSE, TYPE J 30A	LPJ35SP	3.000
000358	4501403	RTD 100 OHM 8" LONG		1.000
000331	4501375	RELAY; SSR; ZERO-SW; CUR-RTG	50A; CTRL-V 3-32DC; VOL-RTG 48	1.000
000359	4501098	MOTOR, 3000RPM 115/230V		2.000

## ES-200A V6 (480V) Parts List

Part Number	Description	Specification	Qty
5AA01C10T6DTD0100	TEMPERATURE CONTROLLER	C15TV0TD0100 24V AC/DC SSR	1
5AA04C12D10A7	MAGNETIC CONTACTOR	C-12D10A7 AC24V 4A	1
5AA04C25D10A7	MAGNETIC CONTACTOR	C-25D10A7 AC24V 4A	1
5AA07BMY2CSLAC24	RELAY	BMY5-2C-SL-AC24V (MY2N)	1
5AA09H3CRA8	TIMER	H3CR-A8 AC24-48/DC12-48V	1
5AA1105VX2/05A026CE	TRANSFORMERS	CE 480/220V 5A.26V 5A	1
AA31APR3S6	PHASE RELAY	APR-3S 480V	1
AA71NTH04	OVER-LOAD RELAY	NTH-04	2
AA71NTH1.05	OVER-LOAD RELAY	NTH-1.05 0.7-1.05A	2
AA72CA1D22	EXTRA CONTACT	CA1-D22 2A2B	4
AA915MX1	THERMOCOUPLE	5M	1
AB02MSO12DA7N2.5	ELECTROMAGNETIC SWITCH	MSO12DA7N2.5A 1.8-2.5A	2
AB033PCS20	CIRCUIT BREAKER	3P20A CE (604836)	1
AB07HL5030	LIMIT SWITCH	HL-5030 (TZ-8108)	2
AB16ZHC316	POWER SWITCH	FCH-ZH-C316 3P16A	1

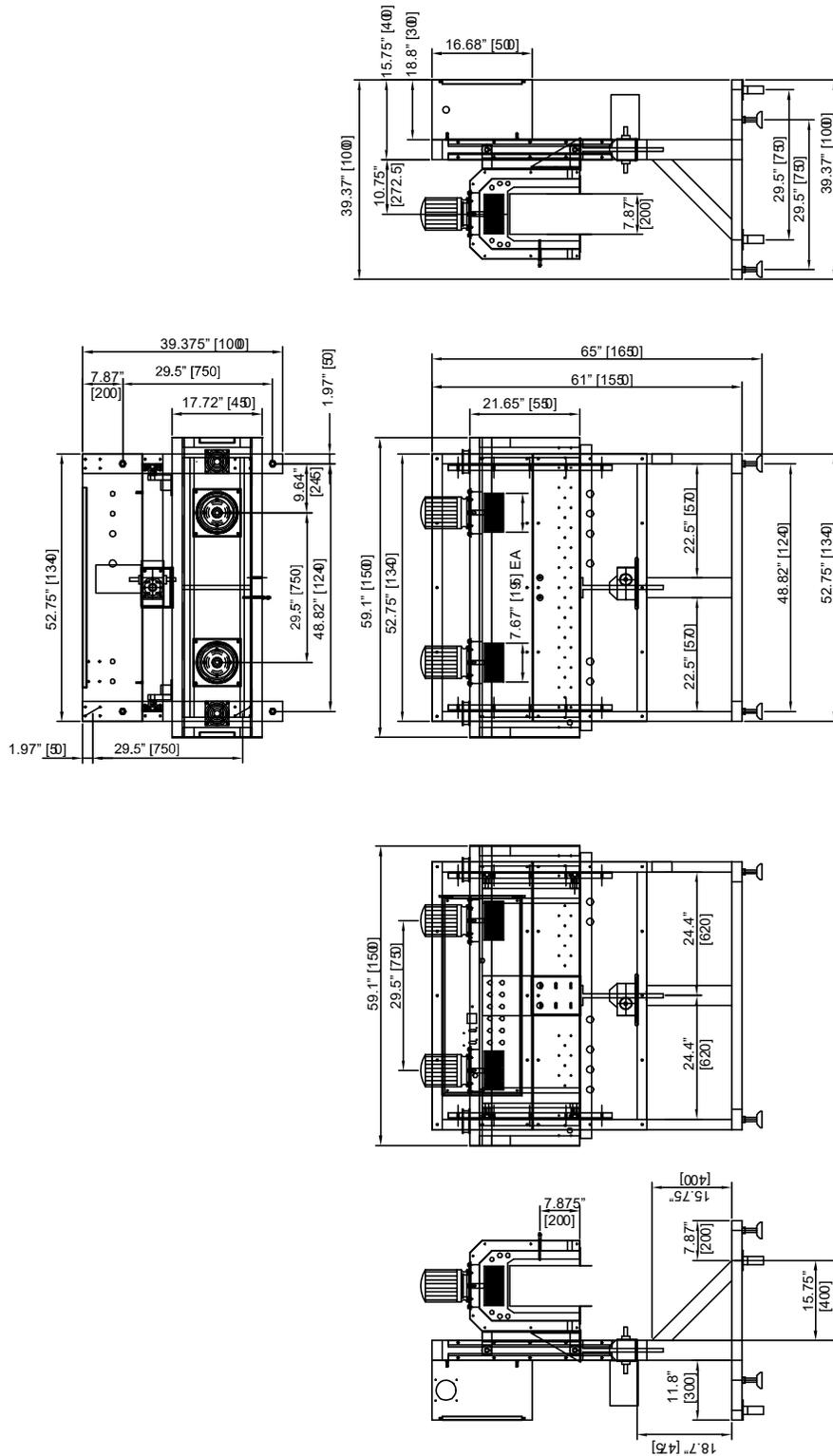
### 33 Dimensions

Part Number	Description	Specification	Qty
AB31ABF221B2R	PUSH BUTTON	FHD-NPB22-F01R 220V	1
AB33SHAF2212B2R	PUSH BUTTON FOR EMERGENCY STOP	FHD-NPB22-R02 2B220V	1
AB61AC222P1A2B	SELECTOR SWITCH	FHD-NSS-22-S210-BK	1
AB66ABLFS221A8BL	ILLUMINATION BUTTON	FHD-NLB22-F10BL-A 1A24	2
AB66ABLFS221A8G	ILLUMINATION BUTTON	FHD-NLB22-F10G-A 1A24V	1
AB66ABLFS221B8R	ILLUMINATION BUTTON	FHD-NLB22-F01R-A 1B24V	1
5AC03ACTCTFB101L	FUSE BLOCK	ACT-CT-FB101L 10X38 1P	11
5AC04FF1038X02	FUSE	ACT-CT-FWC16 10X38 2A	2
5AC04FF1038X04	FUSE	ACT-CT-FWC16 10X38 4A	2
5AC04FF1038X06	FUSE	ACT-CT-FWC16 10X38 6A	3
5AC04FF1038X10	FUSE	ACT-CT-FWC16 10X38 10A	1
5AC04FF1038X16	FUSE	ACT-CT-FWC16 10X38 16A	3
5AC07TBC48P20A	TERMINAL BLOCK	TBC-48P20A	1
5AC11PF083A	REALY SOCKET	PF083AE	2
5AC11PYF08A	REALY SOCKET	PYF08A (E)	1
5AC14JK4C25A3B75	SOLID-STATE RELAY	JK4C25A3B75 SSR 3 PHASE 480V	1
5AC207P	COPPER-GROUND-BAR	7P	1
5AE02AE2224G	LIGHT	NLD22 24V GREEN AC/DC	1
5AE02AE2224W	LIGHT	NLD22 24V WHITE AC/DC	1
5AF01A51340XE20	HEATER	5/8 PHASE X1340M/MX277VX2KW	6
5AG1312X12X2	COOLING FAN WITH COVER	12X12CN 220V ACIU120B2+FG120	3

## 34 Parts List

Part Number	Description	Specification	Qty
5CE02VFD004M21A	INVENTOR	VFD004M21A 1/2 1PH>3PH	2
5CE91EG3010A	EXTENSION	EG3010A (3 M)	2
5CF07TM03TATM244004PBPV	MOTOR	TM3TATM-1/24-400 3 phase 240/480V	1
5CF212PAXP4XSL	MOTOR (FAN)	2P 1/2HP 3 phase 220/380V	2

# Component Dimensions





## **Warranty Statement**

American Film & Machinery (AFM) warrants that all the products it ships will be in good working order and free from defects in material and workmanship for a period of one year from the date of shipment by AFM and will conform to the published specifications for that product.

### **Limitations**

The warranty of AFM is contingent upon installation, operation, and maintenance of equipment under normal operating conditions. The warranty is void on equipment or parts: damaged by corrosion, improper use, accident, negligence or not operating within the specifications provided; damaged by fire, flood, earthquake, or such other causes beyond the control of AFM; that have been altered or repaired in any way changing the original performance and; that are normally expendable in the usual course of operation. Expendable items include, but are not limited to, heater elements, cutter blades and belts. The warranty period on each replacement equipment or part in fulfillment of the warranty on new equipment or parts shall be for the unexpired portion of the original warranty.

### **Repairs**

All in-house repairs are rigorously tested for optimum operation and performance and warranted to be, under normal and proper use, free from defects in material and workmanship for a period of 90 days from the date of service.

### **Shrinking Quality**

Shrinking quality achieved in a given application is dependent on the film, product, installation, material handling, and the maintenance provided. AFM makes no warranty that the shrinking quality achieved in an application will be the same as that achieved on a test piece in our demo facility.

### **Shipping Policy**

Customer pays all incoming shipping charges for replacement components. If the item is defective and under warranty, AFM will pay all return shipping charges via the least costly method. If expedited shipping is desired, the customer must furnish their shipping account number and shipping fees will be charged to that account.

### **Exclusions**

Damage due to tampering, abuse, improper adjustment, electrical interference, or the use of non-approved components will void any and all warranties by AFM and its distributors.



## **Warranty Verification**

If you believe that a product or component may be defective and may be covered by warranty, obtain a Return Material Authorization number by contacting AFM Technical Support (Phone: 714-974-9006, Fax: 763-795-8867, or Email: [info@afmsleeves.com](mailto:info@afmsleeves.com)). Based on the recommendation from AFM technical support, replacement components may be shipped out via UPS Ground or similar method. If expedited shipping is desired, customer must furnish their shipping account and shipping fees will be charged to that account.

Customer is required to return the defective component to AFM. If, after 30 days, AFM has not received the defective component, the customer will be invoiced for the replacement component. If the returned component is found to not be eligible for warranty, AFM will contact the customer, and the customer will be invoiced for the replacement component.

## **Warranty Eligibility**

The warranty provided by AFM is only to the original buyer.

## **Limited Warranty**

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## **AFM Technical Support**

For assistance with installing, operating, or maintaining the ES-200A Shrink Tunnel, contact your authorized AFM reseller or AFM Technical Support.

Phone: 714-974-9006

Fax: 763-795-8867

Email: [info@afmsleeves.com](mailto:info@afmsleeves.com)

Web: [www.afmsleeves.com](http://www.afmsleeves.com)

Thank you for your purchase of AFM products. We are pleased to be a part of your shrink sleeving requirements.





