ELECTRIC AUTOCLAVE EA 2E 07/60

INSTRUCTION MANUAL

ELGI Rubber Company Limited

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Foreword

Bonding of precured treads to the tyre at a temperature much lower than the conventional system can be achieved by using the electric tyre curing chamber. Electrical heaters provided inside the chamber heat up the compressed air, which in turn heats the special low temperature cushion gum in between the tyre and the tread, causing a perfect bond.

The efficient heating, controlling and insulating system in this equipment, helps greatly in reducing the processing cost. It is also possible to maintain the cure parameters like temperature and pressure more accurately to produce quality retreads.

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Introduction

ELGI Rubber Company Limited is a pioneer in Tyre Retreading, providing one stop solutions for the Tyre Retreading Segment.

Thank you for purchasing our product Electric autoclave Machine.

Company Profile:

ELGI Rubber Company Limited has its headquarters in India with subsidiaries in Australia, Brazil, Kenya, Netherlands, Sri Lanka and the United States of America. ELGI manufactures a comprehensive range of raw material, equipment, tools and accessories used in the 'Rubber Industry', predominantly in the 'Tyre sector'. With state of the art manufacturing facilities, testing laboratories and R&D centers around the world, ELGI is able to deliver products to the most demanding users.

ELGI's products are sold under the following brands:

Jet

Retread and Repair Systems

CRS

Cincinnati Retread Systems

Expandable Rims & Hubs

Armonas

Retread Process Equipment

Pincott

Rasp Blades, Hubs & Spacers

Carbrasive

Brazed Carbide Tools

Midwest Rubber

Midwest Rubber

Gums, Adhesives & Sealants

Westernweld

Tyre & Tube Repair Products

Rubber Resources

Ecorr® Reclaim Rubber from Rubber Resources

Reclaim Rubber

1. General Information / Contact Information

Contact information

Our Head Office is located at Coimbatore, Tamil Nadu,

India.Address : ELGI Rubber Company Limited,
Super A Unit,
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Kurichi, Coimbatore - 641021

Phone : (91)-422-2321000

E-Mail : enquiry@in.elgirubber.com

Website : www.elgirubber.com

Technical Support

ERCL's Technical team will answer your technical queries regarding the installation, use, troubleshooting, and maintenance of our products. You may also email your queries to enquiry@in.elgirubber.com

Reference materials

Upon email request to enquiry@in.elgirubber.com, reference materials including Outline, Mounting drawings, Operator's Manuals, Technical Bulletins, Pneumatic schematics, Electrical schematics, Troubleshooting procedures and Spare parts details will be provided.

Warranty

Warranty of the equipment is applicable for a period of 6 months from the date of commissioning or 9 months from the date of Invoice whichever is earlier, against manufacturing defects only. Warranty for bought out Electrical Pneumatic items etc., will not be governed by the manufacturer's warranty.

1. General Information / Limitation of Liability

Limitation of Liability

The manufacturer assumes no liability for damage resulting from:

- Disregard / non-observance of the operating manual
- Intentional misuse
- Use other than as intended
- Operation by untrained personnel
- Operation by lay persons (to carry out maintenance work, etc)

Technical modifications to the unit have not been agreed with the manufacturer

Use of replacement parts that have not been approved by the manufacturer

Responsibilities of the operator

The unit is used for commercial purposes. The operator of the unit is therefore subject to the statutory obligations relating to occupational safety. In addition to the safety instructions in this instruction manual, theregulations on safety, accident prevention and environmental protection that apply to the unit's field of use must be complied with.

In particular, the following apply:

- The operator must be familiar with the applicable occupational safety regulations.
- The operator must ensure that all employees who use the unit have read and understood thisoperating manual.
- The operator must also train personnel at regular intervals and inform them of the dangers that canarise when using the unit.
- The operator must provide personnel with the necessary protective equipment.
- The operator must have all safety devices checked regularly for operability and completeness.

Documentation

Content and structure

This instruction manual is an essential part of this unit. It contains instructions and information on how to use the unit safely and must be available to all users throughout the unit's service life. This instruction manual is intended for use by trained operating personnel.

2. Safety

Safety

The Electric Autoclave is a commercial machine, used in Tyre retreading facilities for curing the build tyre.

Requirements for personnel

Trained and qualified personnel who know how to use the unit and whose specialist training, skills, experience and knowledge of the relevant regulations enables them to carry out the tasks assigned to them independentlyand recognize and avoid potential hazards.

Hazard information

Hazard information includes terms, symbols, and instruction used in this manual or on the equipment to alert both operating and service personnel to the recommended precautions in the care, use and handling.

Labeling scheme for integrated text boxes and references

The following safety notices are used in this manual.

Certain terms are used throughout this manual or on the equipment labels. User need to familiarize with their definitions and significance.

Danger:

Imminent hazards which, if not avoided, will result in fatal or serious injury.

Warning:

Potential hazards which, if not avoided, could result in fatal or serious injury.

Caution:

Potential hazards or unsafe practices which, if not avoided, may result inminor or moderate injury.

Caution:

Potential hazards or unsafe practices which, if not avoided, may result inProduct damage.

Important:

Important information or recommendation concerning the subject underdiscussion.

Note:

Point of interest for more efficient or convenient equipment operation;additional information or explanation concerning the subject under discussion.

2. Safety / Symbols and Definitions

Symbols and Definitions

Earth / PE:

Earth or PE connection to be made to avoid the earth leaked shock

Warning:

Disconnect Power supply before Servicing or Cleaning

Warning:

No Loose Connection

Warning:

Foot Protection Required

Warning:

Crush Hazard - Keep feet clear

Warning:

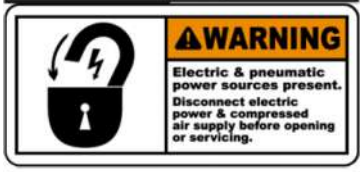
Finger protection on rollers

Warning:

Electric Shock Hazard

Danger:

Electrical Shock or Burn Hazard
Turn off power supplying this equipment before working inside.



Warning:

Electric & Pneumatic power sources present. Disconnect electric power and compressed air supply

Danger:

Crush Hazard
Keep Hands Clear, Follow lockout procedure before servicing

2. Safety / General Hazards

General hazards

Following are description of general hazards and unsafe practices that could result in fatal, severe injury, or product damage. Specific warnings and cautions not appearing in this section are found throughout the manual.

Danger Serious personal injury 	This is Electrical Class 1 product which runs with 415 V AC, 3 Phase, 50 Hz, AC Supply. Do not allow or Direct or indirect contact with Electrical Parts without proper PPE and safe procedure. Direct or indirect contact with Electrical part inflict severe corneal injuries leading to permanent disability or fatal accident. This product is not intended for use in explosive, or potentially explosive, atmospheres.

Warning Serious personal injury 	This Machine has Moving Lock rings operated by pneumatic Cylinder. Do not allow or Direct or Indirect contact with Moving Lock rings. Don't Try or alter the safety protection at Handle mounting Direct or indirect contact with Moving Lock rings parts may leading to permanentdisability or finger loss.

2. Safety / General Hazards

Caution Minor or moderate injury 	This Machine has rotating shaft which run with product running speed Do not allow or Direct or Indirect contact with rotating shafts. Don't Try or alter the safety protection at rotating shaft section. Direct or indirect contact with rotating shaft may leading to minor or moderate injury.

Danger Serious  personal injury	This Machine has Power and Control circuit electrical panel which is operate 415 V, 3 Phase AC, 50Hz, source. Do not operate the machine at Electrical panel at open condition. Always ensure that, the electrical panel is completely in locked condition. Direct or indirect contact with electrical panel components or conductive foreign materials or dust deposition may cause highly flammable in and around the machine area. It may lead to serious personal injury to the Operator.

2. Safety / Hazard Information

Hazard information

EA 2E should be installed and operated in manufacturing or laboratory facilities by trained personnel only. Due to the considerable risks and hazards associated with the installation and operational use of any equipment incorporating automated functions, the operator must follow product warning labels and instructions to the user regarding safety. To prevent exposure to direct or indirect hazards, following all safety precautions specified throughout this manual and exercise safe operating practices as per electrical safety standards.

Lock Out Tag Out (LOTO)

This Machine designed with LOTO concept as per OSHA standards. Whenever the machine undergoes any Electrical or Mechanical or Cleaning activity, turn OFF the main ISOLATOR switch and follow LOTO procedure.

List of Hazards Associated with this Machine

- Electrical hazards.
- Pneumatic hazards.
- Sharp Edge hazards.
- Rotating and pinch point hazards.

Use standard safety procedure while working with respective source and use proper recommended PPE's.

Grounding

This machine needs additional body protecting grounding or Earth, which needs to be connected with the Machine to Ground / Earth with Copper wire or conductor or rod.

Other Hazards

The following hazards are typical for this product family when incorporated for intended use:

a) Risk of injury when lifting or moving the unit;
b) Risk of exposure to hazardous Electrical energy through unauthorized removal of access panels, doors or protective barriers;
c) Risk of exposure to hazardous Electrical Energy and injury due to failure of personnel to use proper PPE while involving in maintenance or troubleshooting;
d) Risk of exposure to hazardous or lethal voltage through unauthorized removal of cover, doors, oraccess panels;
e) Risk of exposure to hazardous when connected with non-standards voltage source apart from mention specification in machine electrical name plate.

Disposal

This product contains components that are considered hazardous industrial waste. If a situation occurs where the machine is non-functional and cannot be repaired, it may be returned to ELGI Rubber Company Limited who,for a fee, will ensure adequate disassembly, recycling, and/or disposal of the product.

2. Safety / Personal Protecting Equipment

Personal Protecting Equipment

Caution Serious personal injury	Personal Protecting Equipment listed below to be used wherever applicable. Failing to use may cause serious personal injury

Industrial Safety Shoes to be used to protect thefoot from impact due to Tyre rolling on the foot. Electrical Safety Shoes to be used to protect from any Electrical Shock.

Industrial Heat resistant Gloves to be used to protect the hand from hot cured tyre .

3. Getting started

Chapter Overview

Use information in this chapter to prepare your Electric Autoclave EA 2E for operation. The order of information presented in this chapter is the same as the order of task that you will need to perform. The best way to get your machine ready for operation is to start at unpacking and work your way through connection.

This chapter contains the following information:

- Introduction- Introduces the Electric Autoclave EA 2E, lists important feature, and describes about machine function.
- Unpacking- Provides important information about unpacking the Electric Autoclave EA 2E.
- Package Contents- Displays and describes all components shipped with this machine may vary as per the optional features purchased.
- Mounting- Describes how to assemble the Electric autoclave Machine parts
- Connections- Explains how to connect power, control cables and pneumatic connections of this machine.

Introduction

The Introduction section includes subsection:

- About EA 2E
- Electric Autoclave Machine nomenclature
- Unpacking
- Package Contents

About EA 2E

The Electric Autoclave EA 2E consists of the following major components

Chamber

The electric tyre curing chamber is a well insulated horizontal vessel. This contains heaters to heat compressed air and a fan driven by a motor to circulate the hot air inside the chamber. Manual locking pins lock the clamps that secure the door to the electric chamber. The locking pins will not allow the clamps to open when the chamber is under load. The chamber is fitted with control devices for temperature and pressure.

The door is locked by a pneumatic device which is easy to handle, safe and foolproof. The handles of the locking pins also actuate the exhaust valves of the chamber. When the pins are not locked, the exhaust remains open, thus preventing the chamber from becoming pressurised. There is a specially designed forced air circulation system for maintaining uniform temperature throughout the autoclave

Automation Kit

This is a provision made for auto inflation / deflation of the chamber and tyre pressure. It can be controlled by the PLC.

MEP System

The modulated envelope pressure (differential pressure system – or dual pressure system) is the third pressure given to the envelope. This can be selected on the PLC touch screen and the machine can be set on vacuum / vent / MEP.

3. Getting started / Electric Autoclave

Electric Autoclave - Nomenclature

Electric Autoclave EA 2E major sections

Figure 3-1 Electric Autoclave

1	Safety Valve	6	Main shell assembly
2	Operator panel board	7	Door
3	MEP / Vacuum System	8	FRP Cover
4	Header – Vacuum Pressure	9	Header –Tyre Pressure
5	Base Frame	10	Recorder Frame

3. Getting started / Unpacking

Unpacking

The unpacking section includes the below:

- Incoming inspection.
- Un-Packaging guidelines.

Incoming inspection

Upon arrival, inspect all shipping containers for singles of damage. If you discover shipping damages, document the damage (photographically if possible), then immediately notify the shipping carrier and ELGI Rubber Company Limited.

The shipping carrier is responsible for any damage occurring during transportation from ELGI Rubber Company Limited to your receiving dock.

Packing guidelines

Unpacking

- To prevent equipment damage or loss of small components, use care when removing packaging materials.
- After unpacking, review the Package Contents section and verify that all components are available (optionalitems would be available only if purchased).
- Lift the machine only at the indicated locations of the machine.
- Save all shipping containers and packaging materials, including cover and plugs. Use these specialized packing materials when shipping the machine to another location.

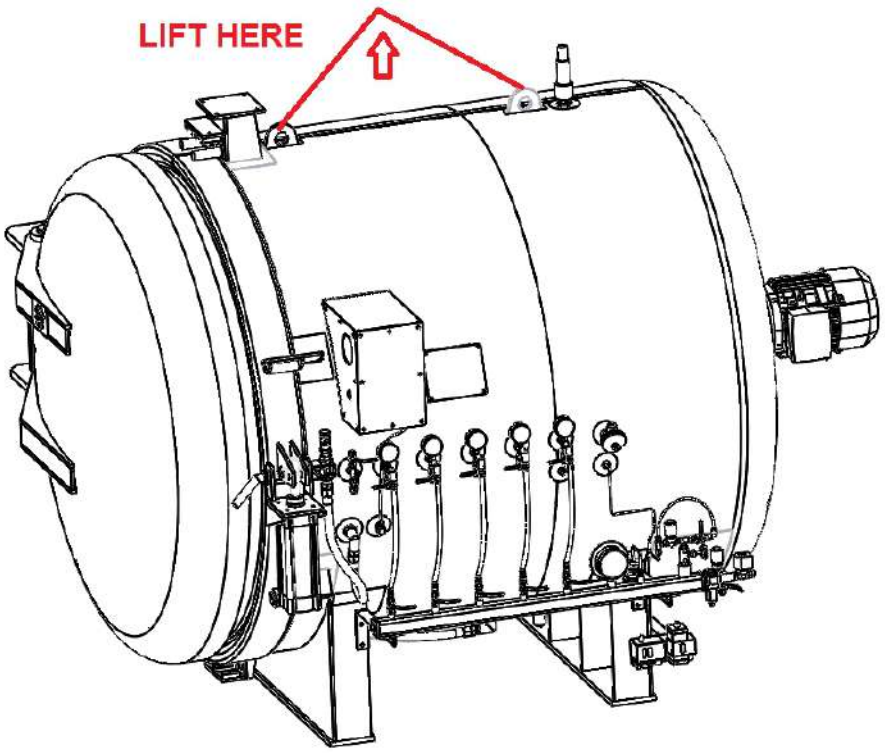


Figure 3-2 Lifting Lug

3. Getting started / Unpacking

Figure 3-3 Shipment Arrangements

Packing

- When packing a machine for shipment, be sure to remove all accessory items not originally attached to the machine including external electrical and pneumatic incoming connections.
- Refer to Electric autoclave Machine packaging instruction drawings and image in the technical reference chapter fordetails on packaging the machine using ELGI Rubber Company Limited supplied shipping materials.
- When shipping machine, release the stored energy like pneumatic supply locked in cylinder.
- The Electrical Autoclave EA 2E Dispatched by 3 Major units

    1. Main Shell Assembly with all accessories.
    2. Operator panel board (Packed inside the Autoclave or Separate Box)
    3. MEP / Vacuum System

3. Getting started / Package Contents

Package Contents

S.No	Shipping Box Contents	Qty
1	Electric Autoclave main Assembly	1 No
2	Operating Panel	1 No
3	MEP / Vacuum system	1 No
4	Autoclave Loading system (Optional)	1 No

Contents description

Each item listed in Table1 is described below

1. Electric Autoclave main Assembly : A complete mechanical assembly of the Electric Autoclave main assembly consist of Blower fan assembly with electric motor, Electric Heater, Pneumatic cylinders and control valves, Door assembly.
2. Operating Panel – This to control the operation of the machine and contains all the control electronics, PLC etc.
3. MEP / Vacuum system - This sub assembly contains Vacuum pump with motor and tank, Pressure switch and On/Off valve and Lubricant Oil for Vacuum pump.
4. Autoclave Loading system – It is a Tyre handling System consist of Post with rail and Pneumatic cylinder for Loading & Unloading of tyres. It is to be attached with Electric Autoclave.

3. Getting started / Specifications of the Product

Specifications of the product:

Model	EA 2E
Machine	Electric Autoclave 60”
Capacity (Based on No.of Tyre)	2 / 4 / 7 / 11 / 24
Power Requirement KW - 2 / 4 / 7 / 11 / 24	~15.75 / 23.6 / 25.5 / 43.5 / 87
Machine Control System	Siemens Logo PLC – 0BA8
Blower Motor Power Hp - 2 / 4 / 7 / 11 / 24	5/7.5/10/10/20
Method of Curing	Semi Automatic
Monorail Compatibility	Compatible
Automatic Inflation & Exhaust and Alarming	Available
Automation and Modulated Envelop pressure (MEP) System with vaccume pump	Available
Working Temperature	50° C to 150° C
Operating Panel	Analog
Cure law cycle recorder	Optional
Machine Dimension - Model – LxWxH	~2T - 3900 x 1900 x 2100 / 4T - 4650 x 1900 x 2100 / 7T - 5650 x 1900 x 2100 / 11T - 7800 x 1900 x 2100 / 24T - 12100 x 1900 x 2100
Machine Weight - 2 / 4 / 7 / 11 / 24	~1800 / 2700 / 3600 / 4400 / 8000 Kg
Supply Voltage	3PH 415V / 50Hz
Control Voltage	220 V AC
Air Pressure Requirement	8-10 Bar
Loading System Type	Optional
Minimum Tyre Size	6.50 - 14
Maximum Tyre Size	12.00 - 24.5
Installation	To be grouted

Description

The Electric Autoclave EA 2E consists of the following major components:

1. **Main shell Assembly:** The electric tyre curing chamber is a well insulated horizontal vessel. This contains heaters to heat compressed air and a fan driven by a motor to circulate the hot air inside the chamber. Manual locking pins lock the clamps that secure the door to the electric chamber. The locking pins will not allow the clamps to open when the chamber is under load. The chamber is fitted with control devices for temperature and pressure. The door is locked by a pneumatic device which is easy to handle, safe and fool proof. The handles of the locking pins also actuate the exhaust valves of the chamber. When the pins are not locked, the exhaust remains open, this preventing the chamber from becoming pressurized. There is a specially designed forced air circulation system for maintaining uniform temperature throughout the autoclave. An overhead monorail system makes it easy for loading and unloading the tyres. A pneumatic cylinder is provided in the monorail to lift the tyre and rim assembly, thus reducing manual operation. The monorail has a provision to accommodate tyres which are to be cured on one side as well as tyres which have already been cured and taken out on the other side simultaneously.

2. **Operating Panel:** This provides the controls on operating the machine. Consist of Logo PLC for automatic operations.

3. **Vacuum System:** This Vacuum System creates higher vacuum to hold the tread on the tyre with the help of outer envelope during the Curing preparation Process. (Check with ELGI Technical Support team for Vacuum Sealing System technologies). This vacuum function can be selected thru main operator panel to be set on vacuum / vent / MEP.

4. **Airline Assembly:** Ball valves, Regulators, Non-Return Valves, Solenoid valves and hoses provided to maintain various pressure values in the autoclave tyre curing process such as chamber pressure, Tyre pressure and the envelope Pressure.

3. Getting started / Assembly and Commissioning

Assembly and Commissioning Tools

1 Accessories

Optional	Vacuum Pump Unit
Optional	Tyre Lift / Loading system.

2 Tools

- Spanners – 1Set
- Double End 10 – 22 - 1 Set
- Ring End 16 - 19 - 1 Set
- Box bit 24" with Extn. Rod - 1 No
- Screw Driver - 6” & 8” - 1 No. Each
- Line tester - 1 No.
- Allen Keys - mm - 1 Set
- Combination Pliers - 8", 10” - 1 No. Each
- Nylon Hammer - 1 No
- Cir-clip Pliers - Internal & External - 6” - 1 No Each
- Ball Peen Hammer (500 Gr) - 1 No.

3 Materials

- Anchor Bolt M16 x 150L - 4 Nos.
- Airline - ¾” air line with a minimum pressure of 10.0 kg/cm2 from the nearest tapping point
- Silicon grease – 1Kg
- Electrical cable - For 102/60,104/60 and 107/60 - 4core, 10 sq.mm
- Electrical cable - For 111/60 and 124/60 - 125A, 4 core, 16 sq.mm
  UG electrical cable from the distribution board to the chamber with suitable earthing and protection devices

3. Getting started / Preparing Product for Use

Preparing Product for Use: Installation and CommissioningUnloading

Unload the machine only by using eye bolt provision given in the machine. Take out panel in the wooden box

Positioning

The machine does not need any foundation. Machine should be grouted to the floor, at the indicated anchoring points. Position the machine in the desired location on a level surface. The area where the machine is located should be well illuminated and free of noise.

- Rear side of the machine should be provided with the clearance of 1.25 m, to do maintenance and service onthe panels.
- Right side and left side of the machine should be provided with the clearance of 1.25 m from the Panels.
- Front side of the machine should be provided with the clearance of 1.6 m to bring and load the Tyre ontothe machine.

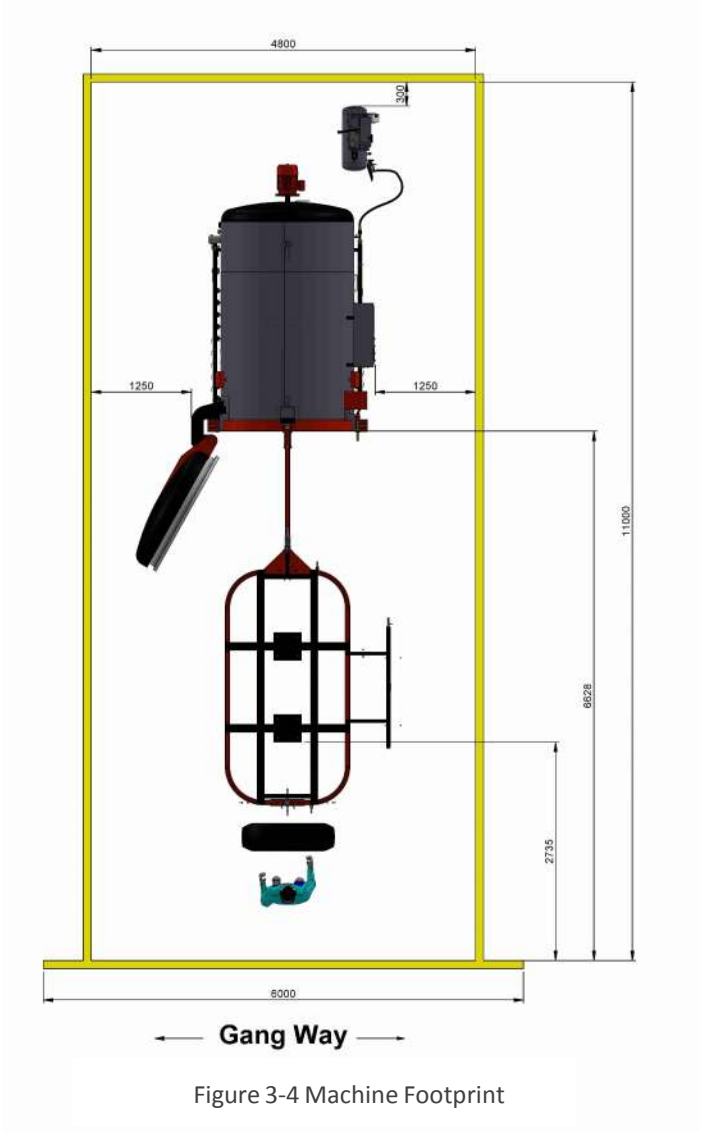


Figure 3-4 Machine Footprint

3. Getting started / Connection Layout

Connection Layout

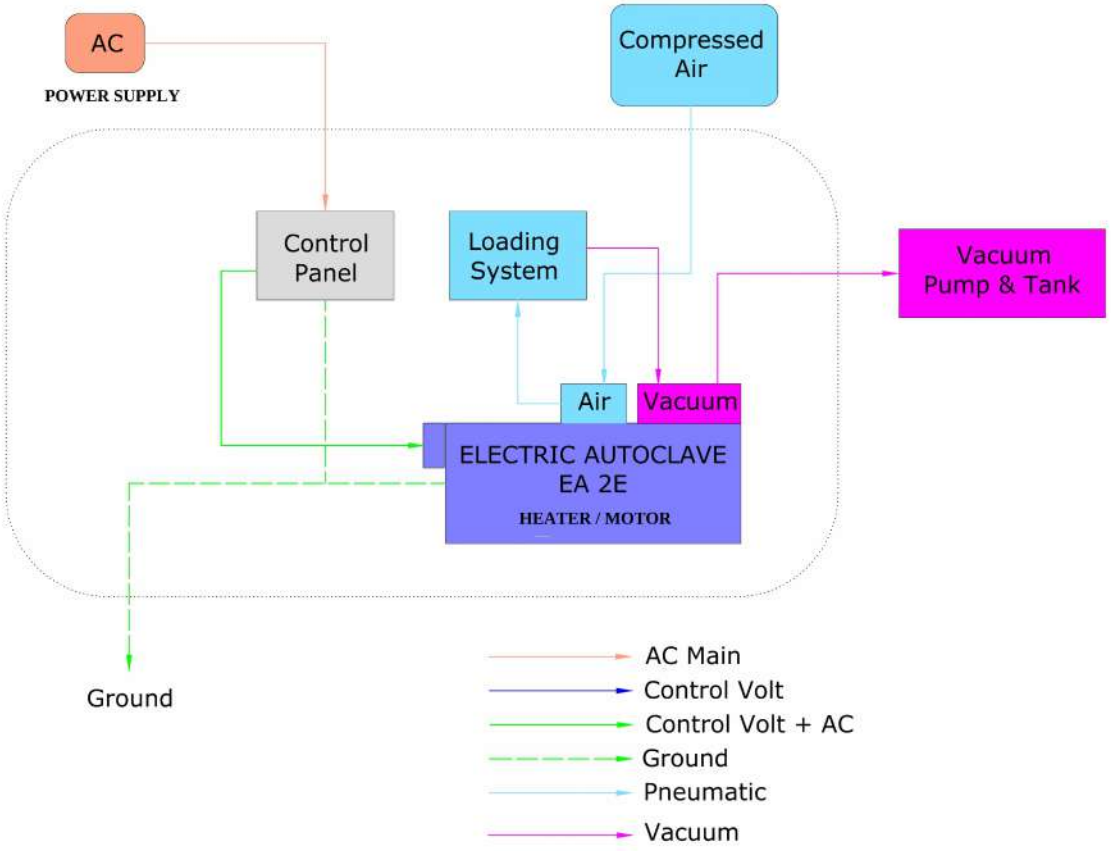


Figure 3-5 Connection Layout

Connections

Connections section describes the below:

- Electrical Connection
- Grounding
- Pneumatic connection

Caution Possible equipment damage	The Pneumatic connections and Electrical connections should be made after completion of mounting instruction. After the connection, don't turn on the energy sources until understand the Operation Instructions. Failing of above caution will lead to machine damage or non-recoverable parts damage.

Danger Serious personal injury 	Electrical and Pneumatic source should be connected as specified in machine specification. Follow proper safety procedure. Don't Power on the machine until understand the machine operating Procedure. Failing of this may lead to serious personal injury.

Electrical Connection

Follow the below instructions to establish power connection to this machine.

- Connect the machine with the help of Electrical cable as mentioned in above Material Requirement

AC Power supply

1. Verify the input voltage before connecting the power cables to the machine terminals.
2. Recommended input voltage is 415 V AC, 50 Hz, 3ϕ , 25 A (Factory set configuration is 415V AC, 50Hz).

3. Connect the input supply as depicted in Fig 3-6.

Important: The Earth cable (Yellow Green) of the AC input 3 core cable is internally connected to the machine Electrical panel and machine parts. Separate Ground connection to the machine body to be made as described in the Grounding section.

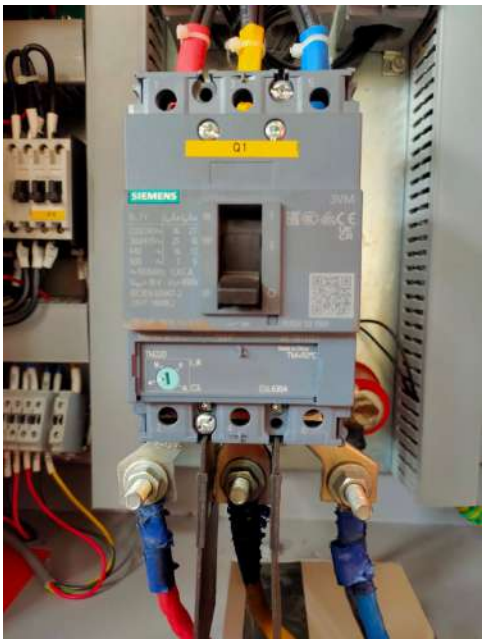


Figure 3-6 Electrical Connection - AC main line input at Control Panel

Caution Possible machine damage	Do not reverse the polarities when connecting the AC electrical power cables to your Electric Autoclave machine. Reversed AC supply connection will damage the electrical components.

Caution Possible machine damage	When relocating the machine to another country, verify the input voltage rating configured in the machine with the Voltage specification of the country where the machine is to be installed and operated. Failing to verify and modifying the configuration may possibly damage the machine.

Grounding

The Electric Autoclave EA 2E metal body needs Ground / Earth to be connected. Use suitable connector and copper wire to make ground connection.

Figure 3-7 PE / Ground connection on Panel and Machine

Pneumatic connection

Follow the below instructions to establish the pneumatic connection to this machine.

1. Connect ½" Rubber hose to the FRC Unit. Input pressure should be in the range of 8-12 bar.
2. Set the regulator at 8 Kg/cm^2 by rotating the knob clockwise and then lock it.

Important: Incoming air pressure should be maintained at 8 bar during machine operation. Impact - when the pressure goes less than 8 bar, it affects the Tyre curing.

Figure 3-8 Pneumatic Connection

Operation

Chapter Overview

This chapter provides the information to start up and control the Electric Autoclave EA 2E.This chapter describes the following sections:

- **Controls and Indicators** - Displays and describes exterior controls and indicators on Control Panel
- **Initial Startup** -Explains how to start the Electric Autoclave and to verify the proper operation and running

4. Operation / Controls and Indicators

Controls and Indicators

The Controls and indicators section describes the below:

Electrical Panel

Control Panel has Isolator / LOTO switch

Panel Door has a white indicator which indicates the presence of electrical power in the Panel.

Connectors provided in the machine

Figure 4-1 Connectors in Panels

ISOLATOR/LOTO:

- ISOLATOR/LOTO is the main Electrical ISOLATOR for this machine to Power ON / OFF.
- It is a two position ISOLATOR switch which has the indication mark ON/OFF.

Danger Serious personal injury 	When the ISOLATOR/LOTO is in OFF position, the electrical energy to the electrical circuit only isolated. However, the incoming electrical supply still exists in input terminals of ISOLATOR/LOTO. The ISOLATOR/LOTO will only isolate the electrical supply to other electrical parts to the machine. It will not isolate the pneumatic energy source. When the ISOLATOR/LOTO is in OFF position, the pneumatic energy still exists in the machine. The pneumatic energy should be released from the machine manually by reducing pressure using regulator in pneumatic section or Closing the Ball Valve.

4. Operation / Controls and Indicators

Operating Panel / HMI - Machine Control

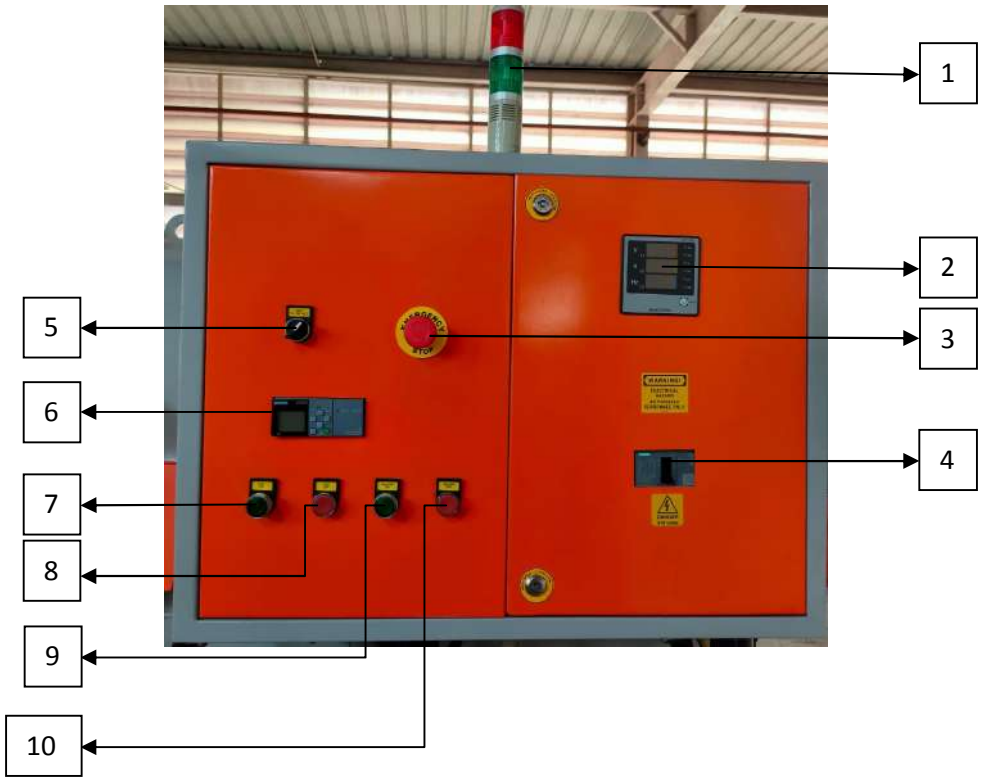


Figure 4-2 Operating Panel / HMI

Control Elements and Descriptions:

1. **Tower Lamp**

   Tower Lamp Indicates Machine operating cycles starting, running and end of Cycle. Green and Red Color lights and Buzzer indication alerts provided for man and machine communications.

2. **Digital Meter**

   Digital Meter is used to monitor the Voltage / Amps of input electric supply.

3. **Emergency Stop**

   Emergency Stop Mushroom Head push button provides machine halt function when it is pressed in emergency condition.

4. **MPCB Switch**

   MPCB Switch is main electric supply On/Off switch.

5. **Vent/Mep/Vacuum selector switch**

   Vent/Mep/Vacuum selector switch is used to enable the option Vent / MEP / Vacuum in the electric chamber.

4. Operation / Controls and Indicators

6. **Logo PLC**

   Logo PLC integrated with motor, Heater, thermo couple, vacuum pump, and solenoid Valves. It controls all the Functions in this machine. Pressure , Temperature , Timing Parameters to be set by using PLC Display and Input buttons.

7. **Fan ON / Cycle Start**

   Fan ON/ Cycle Start - Push Button (Green)

8. **Fan OFF / Cycle Start**

   Fan OFF/ Cycle Start - Push Button (Red)

9. **Heater ON**

   Heater ON - Push Button (Green)

10. **Heater OFF**

    Heater OFF - Push Button (Red)

Caution Serious personal injury 	The Emergency Stop Button is only for stopping the machine function during uncertainty situation. It is not a regular Function Button to Stop the machine. Do not use the Emergency Stop Button as a safety interlock. It will not protect from any accident during machine troubleshooting / operation / maintenance. Use ISOLATOR/LOTO to isolate the electrical energy of machine. Use LOTO while doing troubleshooting or maintenance.

4. Operation / Initial Startup

Initial Startup

Danger Serious personal injury 	Read and familiarize with all the instructions given in this manual. Do not bypass the safety and Operating Instruction which is given in this manual. Do not energize the machine with any out of specification source like over voltage or low-pressure air supply. Failing this will lead to serious personal injury.

Powering the Energy Sources of machine

The Electric Autoclave EA 2E needs two type of energy sources.

1. Electrical Energy Source
2. Pneumatic Energy Source

1. Electrical Energy Source.

- Establish the electrical connection as per Fig 3-6.
- Energize the Electric Autoclave with Three Phase 415 V / 50 HZ AC supply.
- Refer the detailed instructions given in section 3-Getting Started / connections / Electricalconnection.

2.Pneumatic Energy Source.

- Establish the pneumatic connection as per Fig 3-8.
- Energize the Electric autoclave by providing 8 -10 bar air pressure.
- Refer the detailed instructions given in section 3-Getting Started / connections / Pneumaticconnection.

Danger Serious personal injury 	Before turning on the main ISOLATOR/LOTO, ensure that the main electrical panel door in the machine should be in closed condition and the Emergency Button should be in released condition. Failing of this will lead to Serious personal injury.

4. Operation / Pre - Operation Checks

Pre - Operation Checks

- Switch on the mains and check if the indicator lamps are working.
- Check the voltage in each phase using the Digital meter.
- Switch on the Blower motor and check the direction of the rotation. Correct if necessary by interchanging phases.
- Switch on the heaters and check Heating and amperage in the Digital Meter. The amperage should be more or less the same on all phases.
- Check if the incoming air line is 8.1 kg/cm².Operate the hand lever valve of door and see whether the door locks are functioning smoothly. Operate the hand lever valve of door and see whether the door locks are functioning smoothly.
- Check if the temperature controller is connected properly and see if the reading is correct.
- Close the door, operate the 'U' seal and check for any leakage of air.
- Check if all the gauges are functioning without any error.
- Run a dummy cycle trial of the chamber to see if all the controls like pressure regulators, temperature controllers, etc. are functioning.
- Check if there is a leakage of air from the gland packing at the rear side of the chamber.

Important: It is recommended to conduct the above safety checks weekly once and document it. This is to ensure that the human and machine safety functions are working properly. Practicing these safety checks will reduce accidents and these safety check documents can be used for safety audit and quality audit purposes.

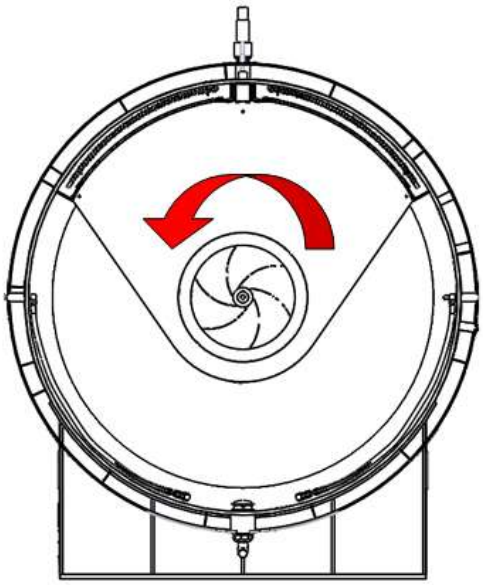


Figure 4-3 Direction of rotation

4. Operation / Operating Instruction

Operating Instruction:

Electric Autoclave

1. **Loading of Tyres :**
   - Link the autoclave loading system and autoclave with bridge rail.
   - Load the tyres into the chamber, connect the tyre and envelope pressure quick couplers, after loading insert a safety pin in the chamber monorail.
   - Close the door and operate the door lock Hand lever valve to clamp it with the chamber. Insert the safety lock handle on both sides and turn through 90 degreed to close the exhaust valves provided in the door locks.
   - Keep all the valves for tyre inflation and envelope exhaust close.
   - Pressurize the door U Seal by opening the valve.
   - Select Mode to MEP.
   - Curing system selection is pre-set based on customer requirements. For any changes in the curing system requirement, contact Elgi.
   - Turn ON the Motor switch.
   - Turn ON the Heater switch.

2. **Curing :**
   - Check if all the pressure gauges read the correct pressure as given in the curing parameters chart.
   - Check the envelope exhaust drain cocks and the tyre inflation pressure gauges for any leakage in the envelope or curing bag every 15 minutes.
   - If an envelope leaks, air rushes out of the envelope exhaust drain cock. Then that particular drain cock should be closed (noting which tyre is connected to that line - as that tyre will not be properly cured and will need to be rerun).
   - If a curing bag fails, the tyre pressure gauge will show less pressure. Then the particular tyre air inlet valve and envelope exhaust drain cock should be closed. If the failure occurs within 30 minutes of starting, exhaust the chamber and tyre, remove the tyres, replace the failed curing bag or envelope and restart.
   - Curing time starts automatically when the chamber temperature reaches the set curing temperature. The curing time starts from this moment onwards. It may take a little longer to attain set curing temperature in a cold start than in subsequent charges.
   - Check if the temperature controller maintains the set temperature by switching the heaters OFF and ON automatically.

Note: For curing parameters, follow rubber raw material as per manufacturer's specifications.

3. Unloading of Tyres :

- When the curing time is over, the machine will automatically stop. The tower light will glow and the alarm will go off.
- Auto Deflation System - Tyre and Chamber pressure will automatically deflate.
- Turn the chamber and tyre safety lock pin through 90 degrees to exhaust the air pressure.
- Ensure the chamber air pressure is completely exhausted.
- Deflate the door U Seal.
- Remove the safety lock pins and unlock the chamber by operating the door lock air valve.
- Open the door. Remove the safety pin from the chamber monorail. Link the monorail and chamber with bridge rail.
- Disconnect the tyre inflation and the envelope exhaust quick couplers and remove the tyres.

4. MEP – Operating Sequence :

1. Check the envelopes for leakage (vacuum test), this must be done when the tyres are on the monorail.
2. While loading the tyres into the chamber make sure the quick coupler is connected properly to the envelope mouth adaptor. Air inside the envelope will be evacuated through the header, and the vacuum pump may run intermittently maintaining the pressure in the vacuum tank.
3. Close and lock the door and the safety valves.
4. Inflate the door seal.
5. Switch ON the blower and heater.
6. Choose MEP on the Operator panel and this will switch on the pump and evacuate the air in the envelope header. The compound pressure gauge will indicate negative pressure.
7. After the chamber pressure has reached the set pressure (4 kg/cm^2) and approximately 20 minutes from start of blower, the MEP will start and this will pressurize the envelope header and the pressure will be maintained at 4.5 kg/cm^2 (i.e) 1.5 kg/cm2 less than the chamber pressure 6 kg/cm^2. This will continue till end of the curing cycle.
8. On completion of the curing cycle the auto inflation system will automatically discharge the air in the chamber and the tyre. If there is no auto inflation system, then switch OFF the blower and heater and discharge the air manually. During this time the air in the envelope will also be discharged automatically.
9. Open the door and unload the tyres.
10. Repeat the step 1 to 9 for the next curing cycle.

5. MEP – System Description

In an ordinary electric chamber curing system (without MEP), the envelope is pushed into the bottom of the tread grooves by the chamber air pressure.

In MEP System, after the cushion rubber begins to flow, the dual pressure ensures that the envelope isn't pushed into the bottom of the tread grooves. Inside the tread grooves there is a cushion of air over which the chamber air pressure exerts an even distribution of pressure in all directions and all corners of the bottom of the tread grooves and permits the cushion rubber to flow evenly, preventing a condition referred to in the industry as 'peaking'.

6. MEP – Logic

The supply consists of a Chamber and a Vacuum Tank.

The Vacuum Tank consists of a Vacuum Pump, a Vacuum Pressure Switch (VPS), a Starter (Q1 & e2) and a Vacuum Gauge. As seen in the circuit, by switching on the supply (SW3) and keeping the selector (S/S) in position 1 (vacuum) or 3 (MEPC), the vacuum pump will work until it reaches the set point in VPS and it maintains vacuum in the tank.

During the process, if the selector (S/S) is under vacuum, then the Solenoid Valve SV8 (for opening and closing of vacuum line) is always open and the VPS maintains vacuum.

If the selector is in MEP position then the operation is as follows:

The Differential Pressure Switch (DPS) is connected across the chamber and the envelope header. If the pressure difference is above the set pressure (eg. 20 psi) then the contacts of DPS will be switched.

When the Blower motor has been switched ON, the Relay R1 will be energized and the MEPC starts. Until the Pressure Switch PS (set to about 4.5 kg/cm^2) switches and the Timer T1 elapses, the vacuum header will be evacuated and maintained. As soon as these two conditions are met, through the contacts of DPS and Timer T2 (T2 limits the frequency of inflation and deflation in the envelope header), the Solenoid Valve SV10 (SV10 is intended for the inflation of the envelope header) opens and hot air will be let into the envelope header.

Now the pressure in the envelope header increases and hence the pressure difference between the chamber and the envelope header comes down. When this is below the set pressure (say 20 psi), the DPS switches to normal position and this in turn will de-energize the Solenoid Valve SV9 (SV9 is a normal open valve and is used to exhaust the air from the envelope header). The air exhausts from the envelope header. Now the pressure difference builds up and the SV10 energizes and inflates the envelope header. This operation of SV9 and SV10 repeats till the end of the curing cycle. Thus the pressure difference is maintained with fresh hot air. At some point, when the
curing completes the blower motor will switch OFF automatically and the Timer T3 (delay timer for preparation of next curing cycle) switches OFF while SV9 exhausts the air in the envelope header and makes the system ready for the next cycle.

Do’s and Don’ts

Do's

- Always keep the machine and surrounding area clean.
- The moving parts should be well lubricated.
- Keep the filter’s bowl clean.
- Maintain the set pressure for tube inflation and chamber pressure.
- While inserting the quick coupler to the adapters, ensure that they are inserted tightly.
- Replace the washer of the quick coupler weekly or when the leakage starts.
- Open the chamber door only after all the air from inside is released.
- Always keep the drain cocks of the exhaust open while in operation.
- Keep the door closed when the chamber is not in operation.
- Always cure passenger tyres separately. Do not combine with truck tyres and light commercial vehicle tyres.
- Clean and lube the chamber door U seal grooves and U seal regularly.

Don'ts

- Do not inflate the tyres before the chamber door is locked and pressurized.
- Do not over tighten the gland packing.
- Do not change the polarity of the temperature gauge and the setting.
- Do not open the outlet of the seal’s drain cock while the chamber is pressurized.
- Do not open the chamber door while in operation.
- Do not connect a worn out quick couple. Replace the washer.
- Do not adjust the set pressure after the initial setting is done.
- Do not operate the Blower Motor and Heater when voltage is below normal.
- Do not open the electrical panel board without switching off the mains.

5. Maintenance & Troubleshooting

Maintenance &Troubleshooting

Chapter Overview

Use information in this chapter to perform maintenance or troubleshooting Electric autoclave

Machine EA 2E This chapter contains the following information:

- Maintenance - describes typical Electric Autoclave machine maintenance procedures.
- Troubleshooting - explains how to troubleshoot the Electric autoclave cutting machine when problemoccurs.

5. Maintenance & Troubleshooting / Maintenance

Maintenance

The Maintenance section includes the below:

- Disabling the Electric Autoclave Machine.
- Daily inspections.
- Cleaning Machine Parts.

Disabling the Electric Autoclave

Before performing any maintenance on your Electric autoclave, be sure to completely disconnect the machine by disconnecting electrical and pneumatic energy source from the machine.

Daily inspections

Perform the following steps daily to keep your Electric autoclave in optimum operation condition.Except for the procedures described below, no other service is required or should be attempted.

Caution Possible equipment damage	Operating the Electric autoclave Machine without performing the daily check will lead to the possibility of machine parts getting damage or the life time of machine spare parts would reduce.

- Check the Machine Control Panel is in closed condition.
- Check any loose parts in Machine Control Panel (control and indicators).

Cleaning of Machine Parts.

Perform the following steps daily to keep the Electric autoclave machine clean and healthy.

- Avoid keeping any unwanted objects / irrelevant material closer to the Electric autoclave machine.
- Clean the machine with the help of clean cloth. If needed use cleaning agents like IPA for removingstains.

Troubleshooting

Introduction

This section helps to isolate problems in electrical and electro pneumatics parts only. Problems in AC motor, PLC are outside the scope of this guide because they are not user-serviceable assemblies; do not attempt to repair them.

Contact ELGI authorized service person for repair/replacement information. For troubleshooting the Electric autoclave Machine, it is necessary to understand the sequence of events that must happen before turning the machine ON and operate.

Before you attempt to perform any service, we advise you to read the entire documents, troubleshooting guide and review the connection layout diagram, electrical schematics and pneumatic schematics. Symptoms and possible causes are highlighted by dark print and bullet points throughout this document. Information about each symptom and cause can be found in following paragraphs.

Caution Possible equipment damage	Attempting repair of Electric autoclave without the express authorization of ELGI Rubber Company Limited will void the product warranty. If troubleshooting or service assistance is required, please contact ELGI Customer Service.

Danger Serious personal injury 	Read and familiarize with all the instructions which is given in this manual. Don't bypass any safety and Operating Instruction which is given this manual. Use recommended PPE while troubleshooting the machine with electrical and pneumatic energy sources. Failing of this will lead to serious personal injury.

Preventive Maintenance Program - ELECTRIC AUTOCLAVE EA 2E

Month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Sign
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May																																
June																																
July																																
August																																
September																																
October																																
November																																
December																																

Daily

- Clean the Machine thoroughly.
- Drain the water from the filter at the inlet.
- Check the air lines, hoses, couplers, gauges and connectors for leakage.
- Check the set line pressure for tyre &chamber inflation.
- Check the door seal for any leakage.
- Check if the gland packing is leaking.

Weekly

- Check all electrical connections are tight.
- Check the door U seal for proper seating & sealing.
- Open the cover of heater terminal adopter and check for any loose connection / leakage.
- Change the washer of the quick coupler if necessary.
- Grease the lock ring (Apply silicon grease)
- Check for the noiseless & vibration free running of blower fan.
- Clean and lightly apply silicone grease on the door seal and groove.

Monthly

- Check the functioning of all safety valves.
- Check the functioning of all Pressure gauges and replace if error in the gauges
- Calibrate the temperature controller.
- Remove duct and check heater terminal &Fibre glass sleeve and replace if necessary
- Check for proper door alignment.

If required Apply HR 200 ° aluminium paint inside the chamber.

5. Maintenance & Troubleshooting / Troubleshooting

Trouble Shooting

S.No	SYMPTOMS / PROBLEMS	POSSIBLE CAUSES	REMEDIES
1	Machine fails to start (motor not working)	1.No incoming supply 2.Main switch not put 'ON' 3.No supply to contactor 4.Problem in the circuit	1.Check incoming supply 2.Put on main switch 3.Check fuse, contactor, etc. 4.Check electrical circuit and reset the relay
2	Heaters not working	1.Loose connection at terminal block 2.Contactor not working 3. Heaters have failed	1.Rectify loose connections at terminals 2.Check and rectify 3.Replace heaters
3	Motor getting too hot	1. Wrong alignment 2. Motor Bearings are worn out 3. Weak coil 4. Very low incoming voltage 5. Gland packing very tight	1. Check the alignment of the motor 2. Remove motor and check the bearing 3. Check the coil of the motor with a Meter Rewind if necessary. Before refitting, check the connection to the motor. 4. Check incoming voltage and rectify 5. Loosen the gland packing adjustable bolts
4	Temperature controller indicating negative reading	1. Wrong connection at thermocouple	1. Check and rectify connection (interchange polarity) - refer diagram
5	Temperature controller not working	1. No incoming line 2. Relays inside may not be working	1. Check incoming line 2. Remove the cover and check the circuit inside. Do not tamper calibration. Instruments should be checked by only experienced personnel.
6	Chamber pressure gauge indicating	1. Very low pressure 2. Leakages in hoses 3. Defective regulator 4. Chamber outlet valve may be kept open 5. Gauge is defective	1. Check line pressure 2. Check and rectify 3. Check and rectify 4. Check the valve and correct 5. Replace gauge
7	Door locking system not working	1. Air hose leakage 2. Insufficient air pressure	1. Check and replace the hose if required 2. Check incoming air pressure, the pressure should 8.1 kg/cm^2 3. Check and replace 4. Loosen the door fixing bolts on the swivel arm, seat the door against the chamber and tighten the bolts
8	Heavy leakage of air from the envelope	1. Envelope failure 2. Envelope not sealed properly 3. Coupler not inserted properly 4. Quick coupler washer worn out	1. Check and replace 2. Check and rectify 3. Check and insert properly 4. Replace washer
9	Air leaking from the fan shaft at the rear end	1.Gland packing worn out 2. Wrong alignment	1.Check and replace with new ones (while refitting, do not over tighten) 2. Check alignment and rectify
10	Fan running with a lot of noise and vibration	1.Key loose in the fan shaft 2.Fan touching with the body of the Machine 3.Fan is not balanced	1.Remove cover and check the fan Assembly. Check and replace key if required. There should be no play. 2.Remove cover and check and rectify 3.Rotate the fan and allow to stop. If found to oscillate before stopping, balance the fan and then assemble.
11	Takes a very long time to attain the required temperature	1. Excess heat loss - leakage from gland packing or envelope exhaust drain cocks and the 'U' seal 2. Some of the heaters may not be working	1. Check if there is any leakage. There should not be any leakage. 2. Check and rectify the same

6. Technical Reference

Technical Reference

Chapter Overview

Information provided in this chapter are technical references of this Electric autoclave Machine and will be useful in maintenance aspects for the technicians while troubleshooting.

This chapter contains the following information.

- Technical Overview - briefly describes the basic concept.
- Parts List
    - Exploded View
    - Ordering Information

6. Technical Reference / Technical Overview

Technical Overview

The Technical overview section includes the below:

- Key features.
- Machine working concept.

Key features

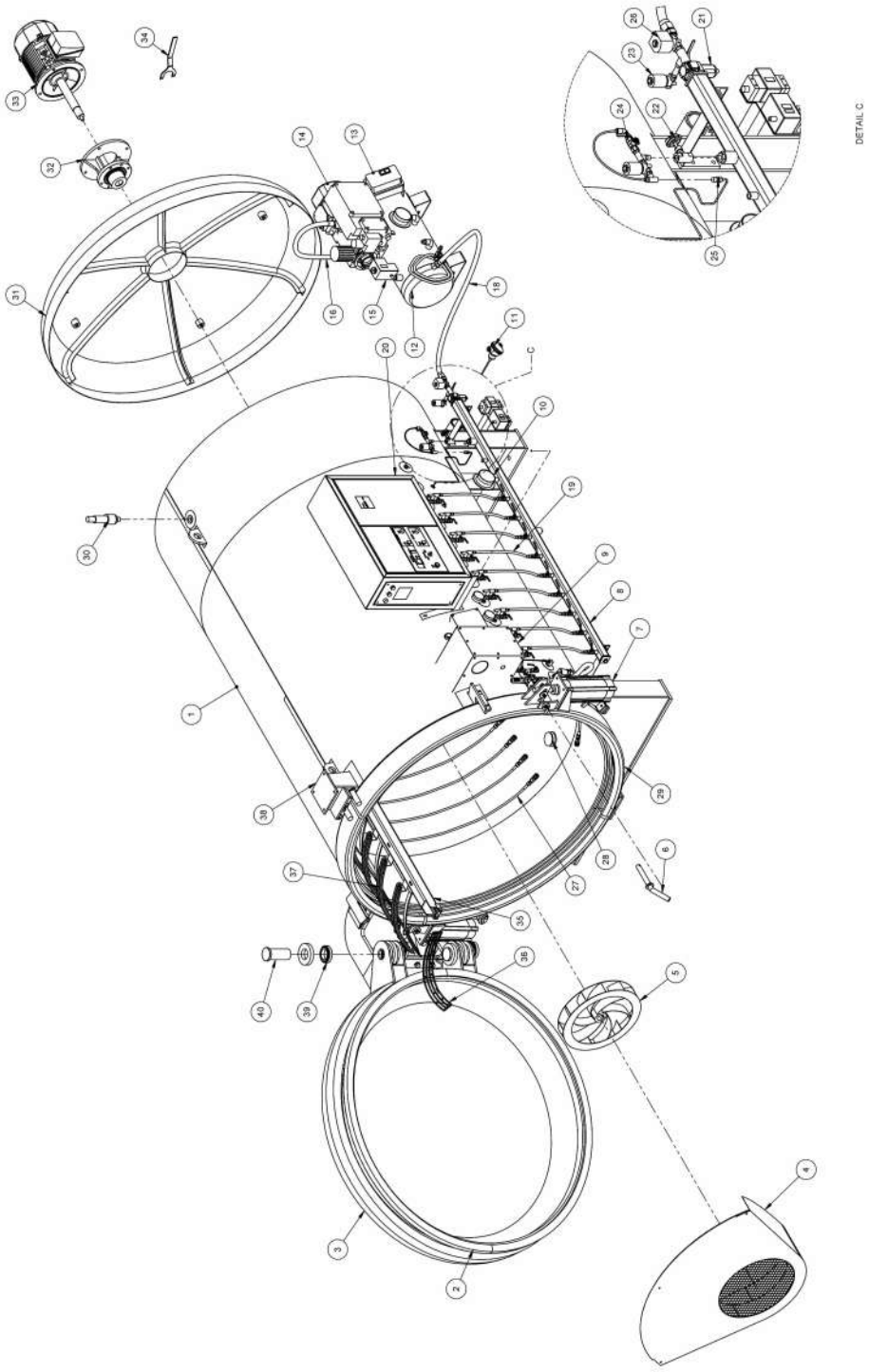
- This machine works with PLC logic with all the necessary safety features required.
- This Machine can work with Three different Modes MEP/ Vent / Vacuum
- Automated Inflation, Exhaust and Curing process.

Machine working concept.

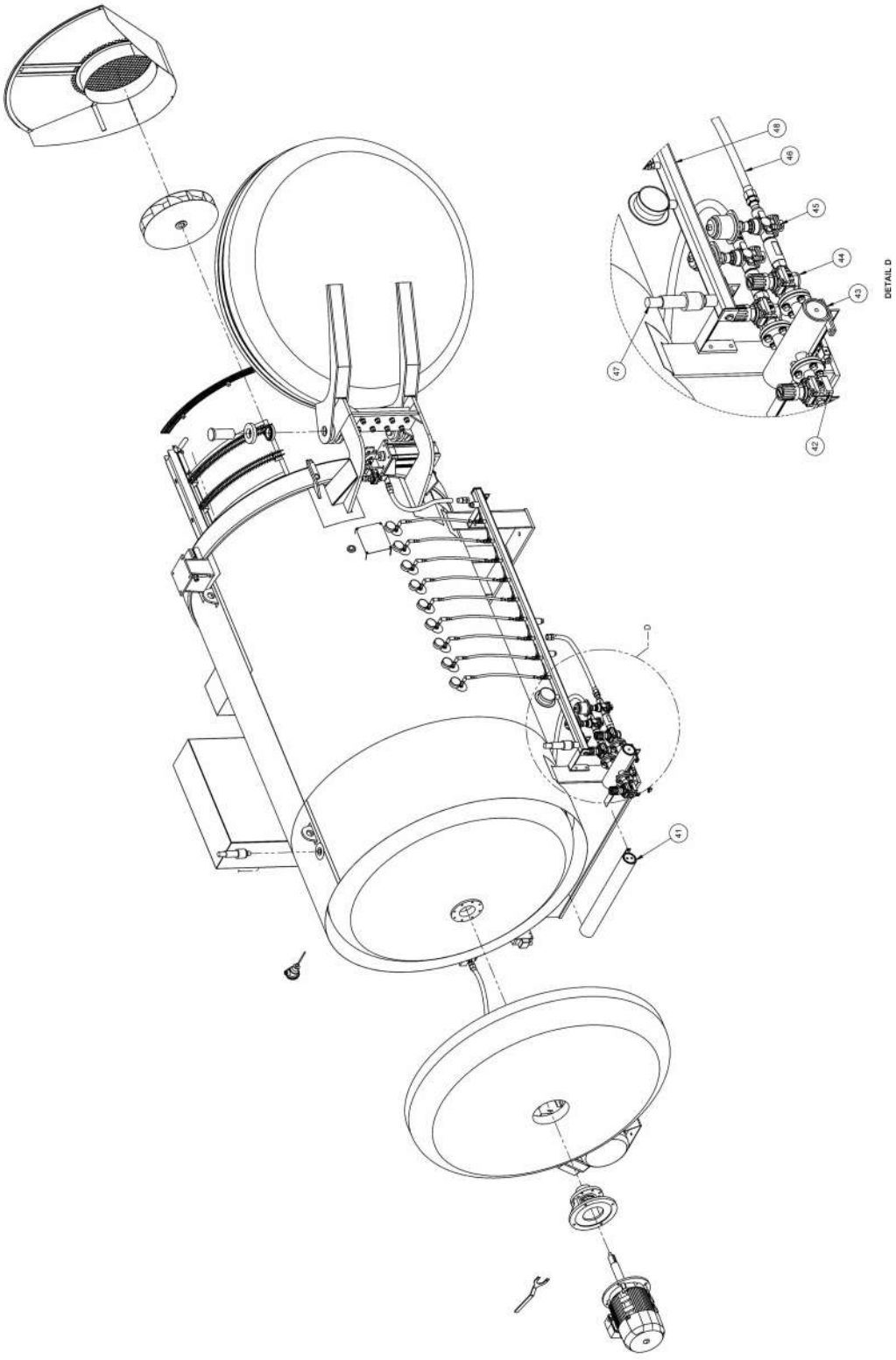
- Electric autoclave is designed to vulcanizing of Tyre for retreading.
- This machine provides and maintain Rubber curing Parameter of Temperature ,Pressure & Time
- Electrical heaters and Blower setup provided for maintaining constant temperature in the chamber.
- All the functions are programmed and controlled by PLC.

Parts List

Exploded View 1



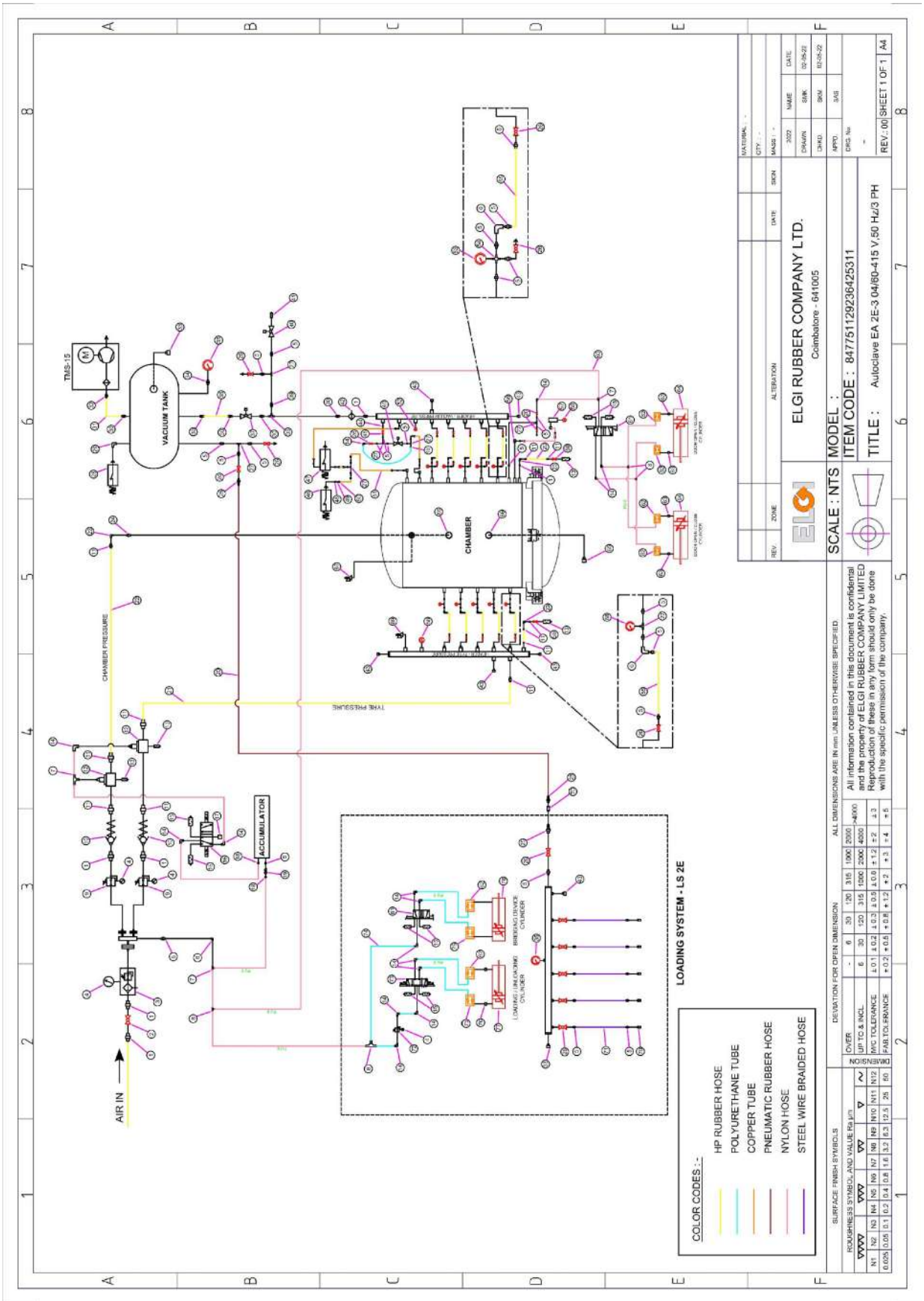
Exploded View 2



Order Information

S.No.	ORDER CODE	DESCRIPTION	UOM	QTY
1	847790429170010170	Chamber Frame Shell – EA 2E 07/60	NO	1
2	847790429030220370	Assembly - EA 2E / 60 - Door	NO	1
3	847790429180112970	Cover - EA 04/07/11/60 FRP Front	NO	1
4	847790429130141170	Blower Fan Duct - EA 2E	NO	1
5	847790429040460270	Blower Fan - EA 2E	NO	1
6	847790429201090270	Safety Valve Handle - EA 2E	NO	2
7	841231909321711000	Pneumatic Cylinder - A28 100 200 O	NO	2
8	847790429210010370	Header - EA 2E 07/60 - Vaccum	NO	1
9	847790429171040170	Recorder Frame - EA 2E	NO	1
10	902620907811030315	Pr.Gau-Bot.En-2-1/2"x1/4"(0 - 10 Bar)	NO	10
11	902519907499011011	Probe-PT100-100L x 6OD Cable Len 2000 mm	NO	1
12	847790429500010170	Vaccum Tank - EA 2E - 50L	NO	1
13	853690903810012071	Starter - Dol - 0.5HP - 415 V / 50 Hz - BE1D1735	NO	1
14	841370906904012404	Oil Lubricated Pump - TMS-15	NO	1
15	903220903813317017	Switch - vaccum - Pressure - -1 - 0 Bar - MA V00 CB 10	NO	1
16	400911901617009338	Hose - High Pressure - 1/2" x 750 mm - With Nipple	NO	1
17	902620908000050006	Vacuum Gauge - 4" Dial (0 - 1 Bar)	NO	2
18	400912901617009405	Hose - High Pressure - 1/2" x 1000 mm L - With Nipple	NO	1
19	400931901617009456	Hose -HP -1/4"x400x1/4" BSP -Swi End+Nip	NO	18
20	853710902721925338	Panel-EA 2E-3 04/07/54/60 -415V, 50/60Hz	NO	1
21	841290930901042005	Air Filter - F1563 3	NO	1
22	848180902018010014	NEEDLE VALVE - SS - 1/4" BSP	NO	1
23	848180918300104501	Valve - Direct Acting - 1/4" BSD - 230 V AC	NO	2
24	848180902001023001	Valve - Ball - Brass - 1/4"	NO	27
25	730690901906010394	Rnd Tube -CU -Bundy -6Dx0.75x6000 mm L	M	4
26	848180918300104502	Valve - Diaphram - 1/2" GSD - 230 V AC	NO	1
27	400942901607500307	Hose -W Brai -PTFE -1/4"x1300	NO	10
27.1	400942901607500309	Hose -W Brai -PTFE -1/4"x2000	NO	4
27.2	400942901607500311	Hose -W Brai -PTFE -1/4"x2600	NO	4
28	847790429370002370	Muffler - EA 04/07/11/22/60	NO	2
29	847790429030260370	Assembly - EA 2E / 60 - Lock Ring	NO	1
30	848140902012224012	Safety Valve -3/4" -95 PSI	NO	1
31	847790429180082970	Cover - EA 04/07/11/60 -FRP Back	NO	1
32	847790429030340270	Assembly - EA 2E – Sealing Hub	NO	1
33	850151915112001916	Motor-FL Mt - 1440 RPM-10 Hp-132F	NO	1
34	847790429470182270	Spanner - C Sealing Hub 54 / 60	NO	1
35	847790429430010270	Inner Rail - EA 2E 07/60	NO	1
36	847790429630010170	Grill - EA 2E - Heater Frame	NO	2
37	851610904403023071	HEATER - FINNED - 1500 W / 230 V - VE	NO	12
38	847790429030320270	Assembly - EA 2E - Locking Ring Stud Guide - Top	NO	1
39	'848220900126660000	Roller Bearing - Taper - 32012 HMT / NBC / ZKL	NO	4
40	847790429620010170	Rod - EA 2E - Door Hinge	NO	2
41	847790429010000270	Accumulator - EA 2E	NO	1
42	'841290930901044007	Air Filter Cum Regulator-1/2"-FRC 156334	NO	1
43	847790429400010170	Pipe - EA 2E - Manifold - End Flange	NO	1
44	842139911310703010	AIR REGULATOR - R15634	NO	2
45	848180902005453016	Control Valve -3/4"-3LCS-20	NO	2
46	400922901617000362	HOSE -3/4"X600 - NIP	NO	2
47	848140902012225012	Safety Valve -3/4"-125 PSI -Ryder	NO	1
48	847790429210000370	Header - EA 2E 07/60	NO	1

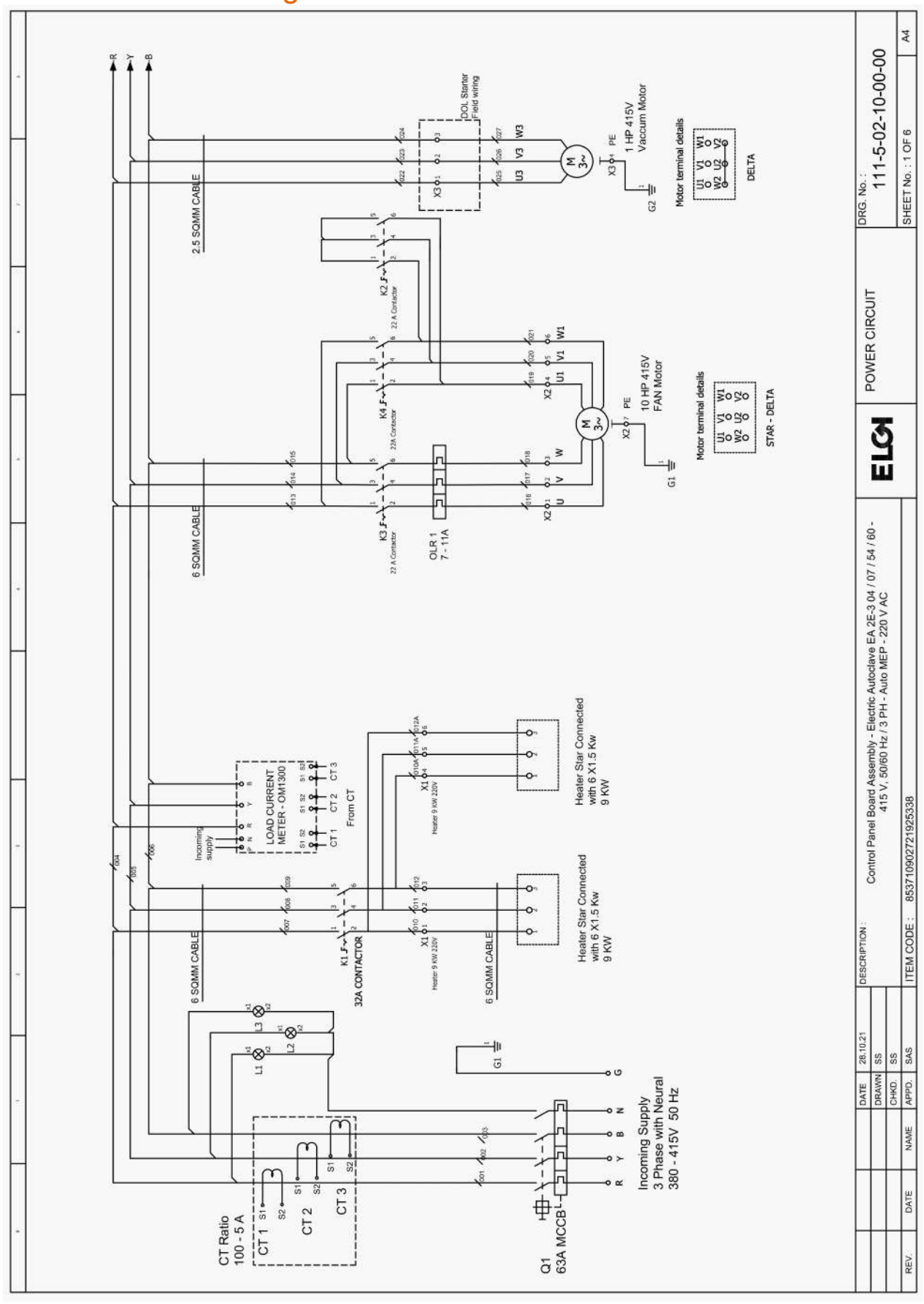
Pneumatic circuit diagram

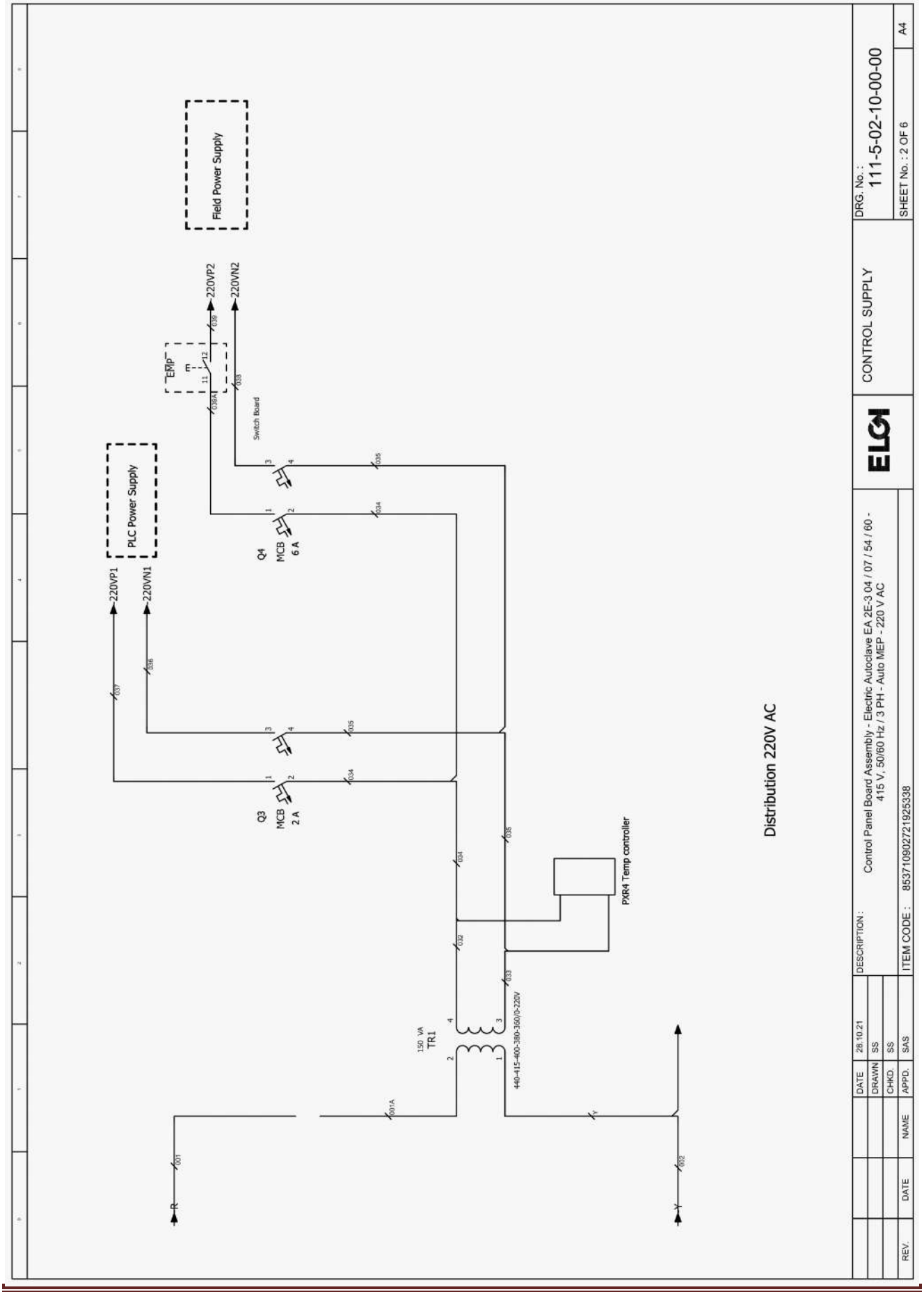


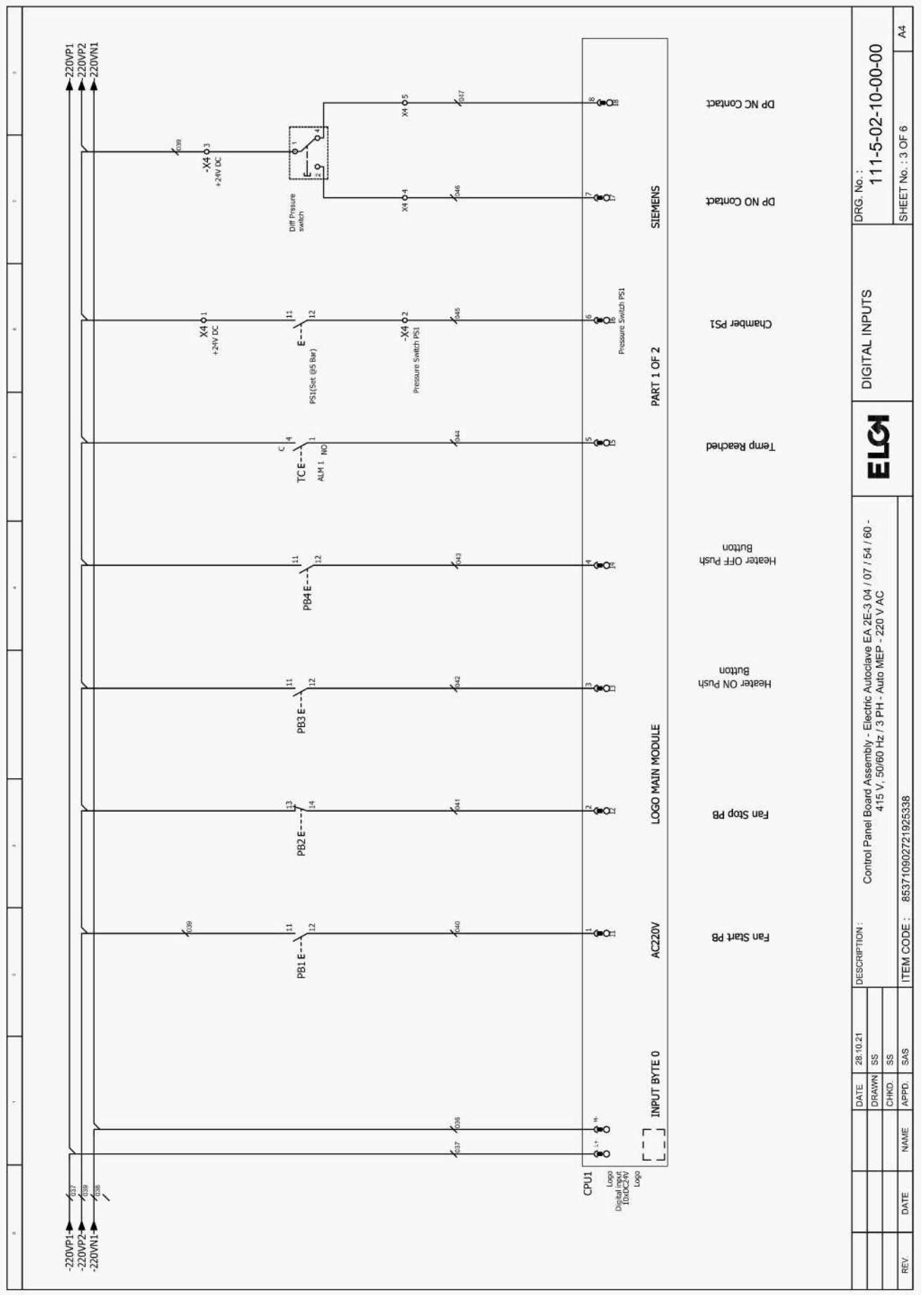
PART LIST – PNEUMATIC ITEMS				
S.NO	**ORDER CODE**	**DESCRIPTION**	**QTY**	**UOM**
1	730799917970061500	Nipple - Reducer -MS -3/4" x1/2"	6	No
2	848180902001023012	Valve - ball - brass - 3/4"	1	No
3	841290930901044007	Air filter cum regulator-1/2"-frc 156334	1	No
4	902620907821510015	Pr.Gauge-42 mm(0-10 Bar)-A2G02	4	No
5	730799917940060300	Nipple - hex -ms -1/4" x1/4"	88	No
6	730792917600095200	Elbow - MS - 1/4"	11	No
7	841290911520452002	Male run tee - wp2330651	3	No
8	841290911635151012	Tee union - wp2300606	4	No
9	842139911310703010	Air regulator - r15634	2	No
10	848130902008000012	Non-return valve - 3/4"	2	No
11	730799917940061600	Nipple - hex -ms -3/4" x3/4"	11	No
12	848180902005453016	Control valve -3/4"-3lcs-20	2	No
13	841290911010205012	Silencer - u-3/4	4	No
14	848790910220302015	Elbow - Male - 6 mm D x 1/4" - WP2210651	15	No
15	841290911010201019	Silencer - button - 1/8" - asb0160	8	No
16	848180918306103035	Solenoid valve - ds255ss61 - a	1	No
17	853890912001023001	Port plug -1/4" bsp -wap061	1	No
18	848790909810302011	Male connector -wp2110651	3	No
19	848130902008000001	Non-return valve - 1/4" - gv161	1	No
20	400911901617014103	Hose Rubber - Pneu - 6 mm	6	M
21	400922901617000362	Hose -3/4"x600 - nip	3	No
22	400922901617009371	Hose -hp -3/4"x1250 - nip	2	No
23	730792917600095500	Elbow - ms - 3/4"	3	No
24	730799917970062600	Nipple - reducer -ms -2" x3/4"	1	No
25	848790917310095200	Connector - hose - mild steel - 1/4"	3	No
26	848180902001023001	Valve - ball - brass - 1/4"	27	No
27	730799917803000952	T joint - ms - 1/4"	10	No
28	903220903813317017	Switch - vaccum - Pressure -1 - 0 Bar - MA V00 CB 10	1	No
29	741220917600025452	Elbow - Brass - 1/2" x 1/4"	1	No
30	730799917940061200	Nipple - Hex - Mild Steel - 1/2" x 1/2"	5	No
31	400911901617009338	Hose - High Pressure - 1/2" x 750 mm - With Nipple	1	No
32	730799917974061400	Nipple - Reducer -Cone -MS -1/2" x1"	1	No
33	730729917502000952	Dummy - pipe -ms - 1/4"	2	No
34	741533900906013276	Bush nut - ms - 3/8" x 1/2"	1	No
35	902620908000050006	Va.Gau-Bot.Con -4"x3/8"(0-760mm.hg)	2	No
36	400912901617009405	Hose - High Pressure - 1/2" x 1000 mm L - Wt Nip	1	No
37	848180918300104502	Solenoid valve - diaphram - 1/2" gsd - 230 v ac	1	No
38	730799917803000954	T joint - ms - 1/2"	1	No
39	730791917945061000	Nipple - Hex - Flare End - Mild Steel - 1/2" x 1/4"	1	No
40	848180918300104501	Solenoid valve - direct acting - 1/4" bsd - 230 v ac	1	No
41	841290911010202020	Silencer - 1/4" - ASB0161	1	No
42	841290930901042005	Air filter - f1563 3	1	No
43	730791917502000955	Dummy - pipe -ms - 3/4"	5	No
44	730799917970063800	Reducer Nipple -MS -3/4" x1/4"	1	No
45	848180902018010014	Needle valve - ss - 1/4" bsp	1	No
46	903220903813019018	Switch - pressure - 1 - 10 bar - me h10 cb	1	No
47	903220903813118016	Switch - differential - pressure - 0.5 - 4 bar - dp h07	1	No
48	730799917920067100	Nipple - ermeto -ms -1/4"	10	No
49	730792918220027100	Cone - ermeto -ms -1/4"	10	No
50	731816900907014003	Ermeto nut - ms zp - 1/4" bsp	10	No
51	730690901906010394	Rnd Tube -CU -Bundy -6Dx0.75x6000 mm L	3	M
52	902620907800050011	Pr.Gau-Bot.Con-4"x3/8"(-1 - 10 Bar)	1	No
53	902620907811030346	Pr.Gau-Bot.En-2-1/2"x1/4"(-1 - 10 Bar)	9	No
54	730792917801050952	Cross joint -female thread -ms -1/4"	18	No
55	400931901617009456	Hose -HP -1/4"x400x1/4" BSP -Swi End+Nip	18	No

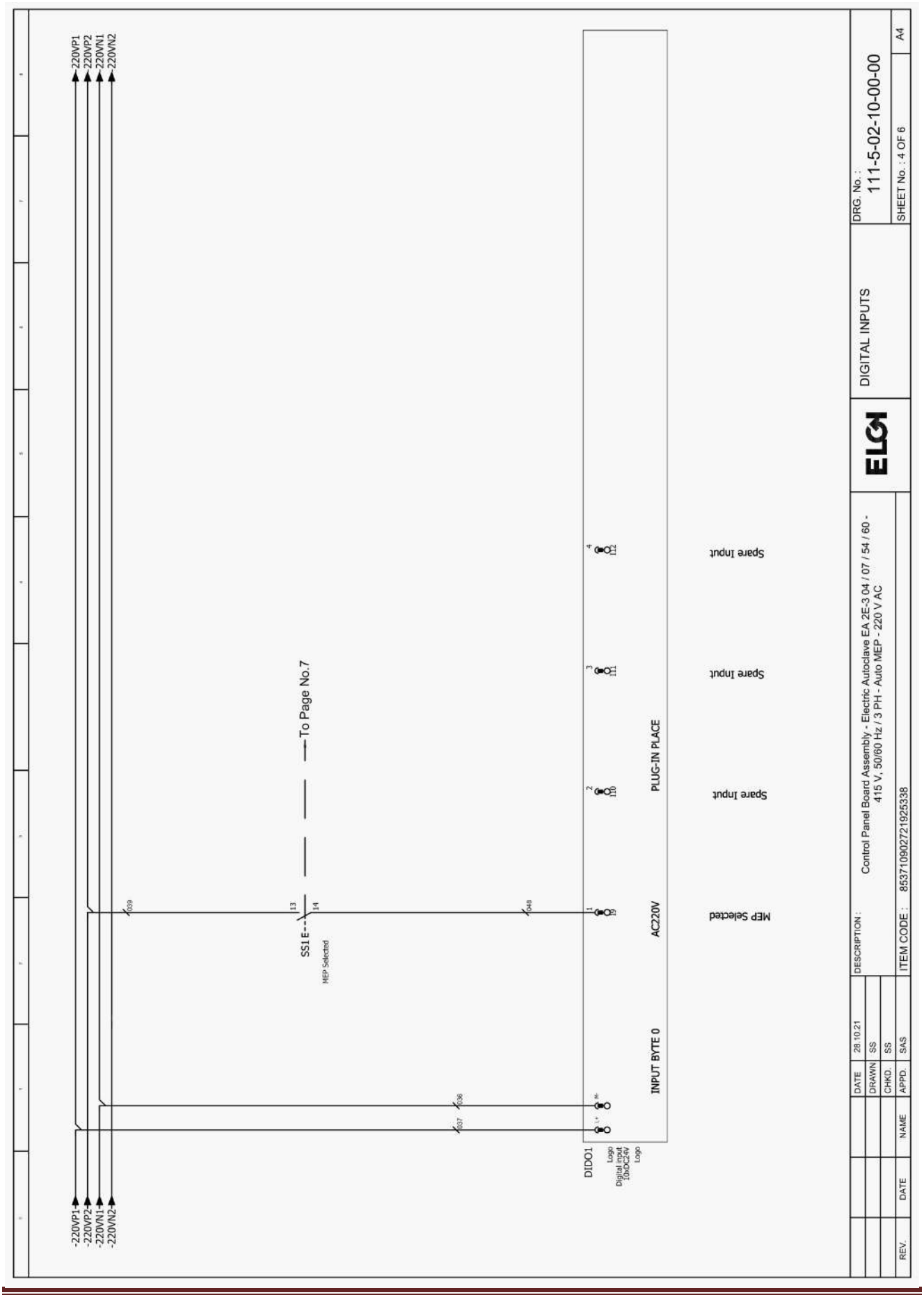
56	847790429610010170	Valve - EA 2E - Adaptor - 1/4"	26.00	No
57	847790429020992470	Adapter - EA 60 - Pressure Gauge 4"	1.00	No
58	902620907800051039	Pr.Gau-Bot.Con-4" x 3/8" (0-10 Bar)	2.00	No
59	848180902001053012	Ball Valve - CS - 3/4"	2.00	No
60	391731901604000103	Hose - Nylon - 6 mm	15.00	M
61	848180902007060603	Valve - Hand Lever - 1/4" - DS255HD61	2.00	No
62	848180902005109308	Valve - Flow Control - 6D x 1/4" - GR5105106	6.00	No
63	741533900902013019	Bush Nut - Brass - 1/2" x 1/4"	2.00	No
64	841231909321711035	Pneumatic Cylinder - A28 100 200 O	2.00	No
65	730791917502000959	Dummy - Pipe -MS - 2"	1.00	No
66	847790429370002370	Muffler - EA 04/07/11/22/60	2.00	No
67	848140902012224012	Safety Valve -3/4" -95 PSI -Ryder	1.00	No
68	902620907811030315	Pr.Gau-Bot.En-2-1/2"x1/4"(0 - 10 Bar)	9.00	No
69	848140902012225012	Safety Valve -3/4"-125 PSI -Ryder	1.00	No
70	741220917406090052	Coupling - Quick - MS - 1/4"	26.00	No
71	400942901607500307	Hose -W Brai -PTFE -1/4"x1300	10.00	No
72	842139911310201008	Regulator - Air - R13614 - 1/4"	1.00	No
72.1	400942901607500309	Hose -W Brai -PTFE -1/4"x2000	4.00	No
72.2	400942901607500311	Hose -W Brai -PTFE -1/4"x2600	4.00	No
73	848180902007062404	Valve - Hand Lever - DS265HC61	1.00	No
74	391729901902092021	Polyurethane Tubing - WH00B06	15.00	M
75	848180902005122301	Valve - Flow Control - 6D x 1/4" - GR1105106	2.00	NO
76	741533900902013022	BUSH NUT - BRASS - 3/8" X 1/4"	2.00	NO
77	841231909321009031	Pneumatic Cylinder - A28 063 700 O	1.00	NO
78	841231909320607184	Pneumatic Cylinder - Double - A28 050 050 O	1.00	NO
79	841290909501150001	Bracket - Clevis Foot - AA1050	1.00	NO
80	841290910210104008	SWIVEL FLANGE - SNCB-50	1.00	NO
81	841290909999030003	Rod End Fork - AF016	1.00	NO
82	841239904208050221	Clamp- MS- Regulator- 1/4"- P.NO:A2C01	1.00	NO
83	848180902005453016	Control Valve -3/4"-3LCS-20	1.00	NO

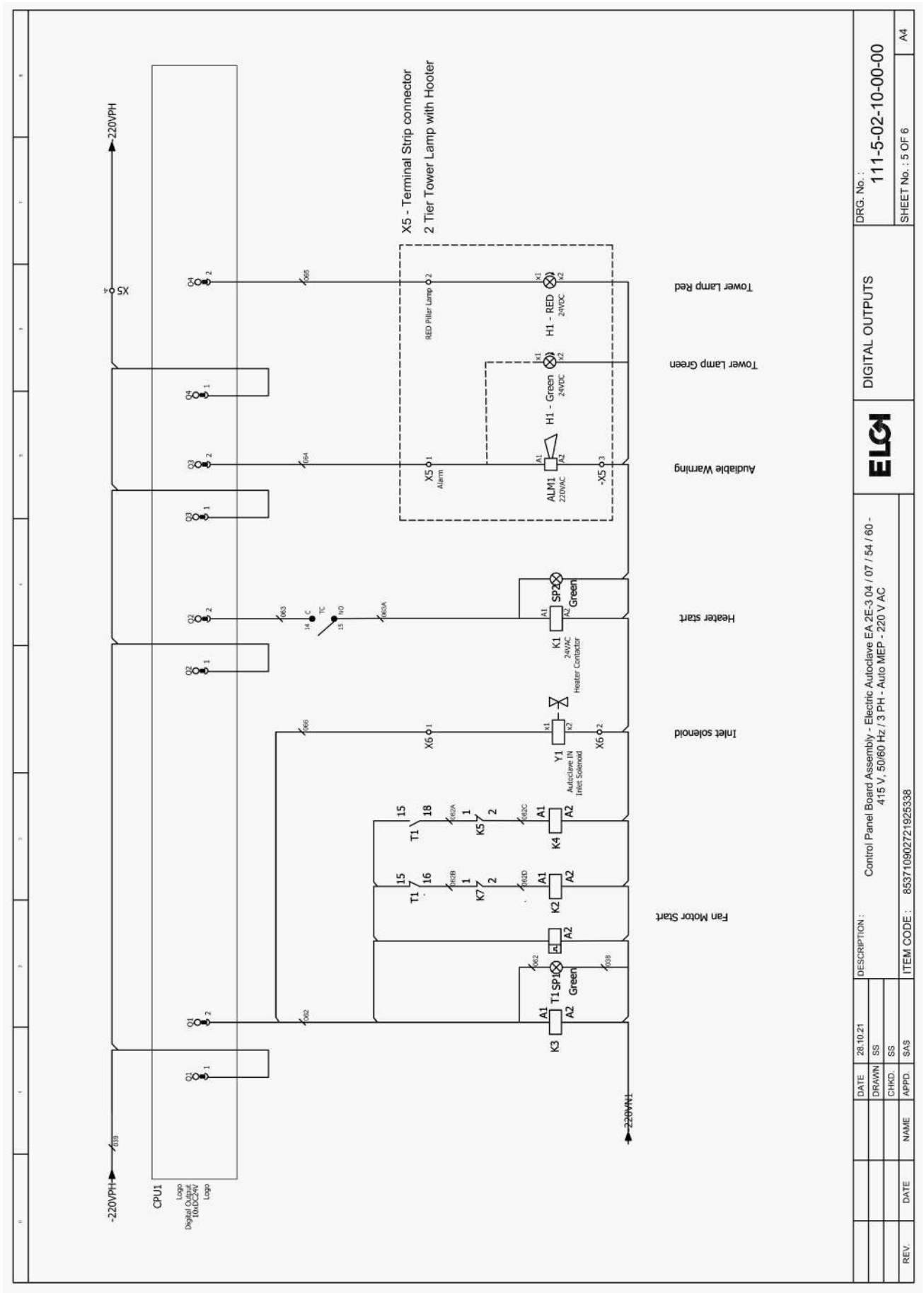
Electrical Circuit Diagram

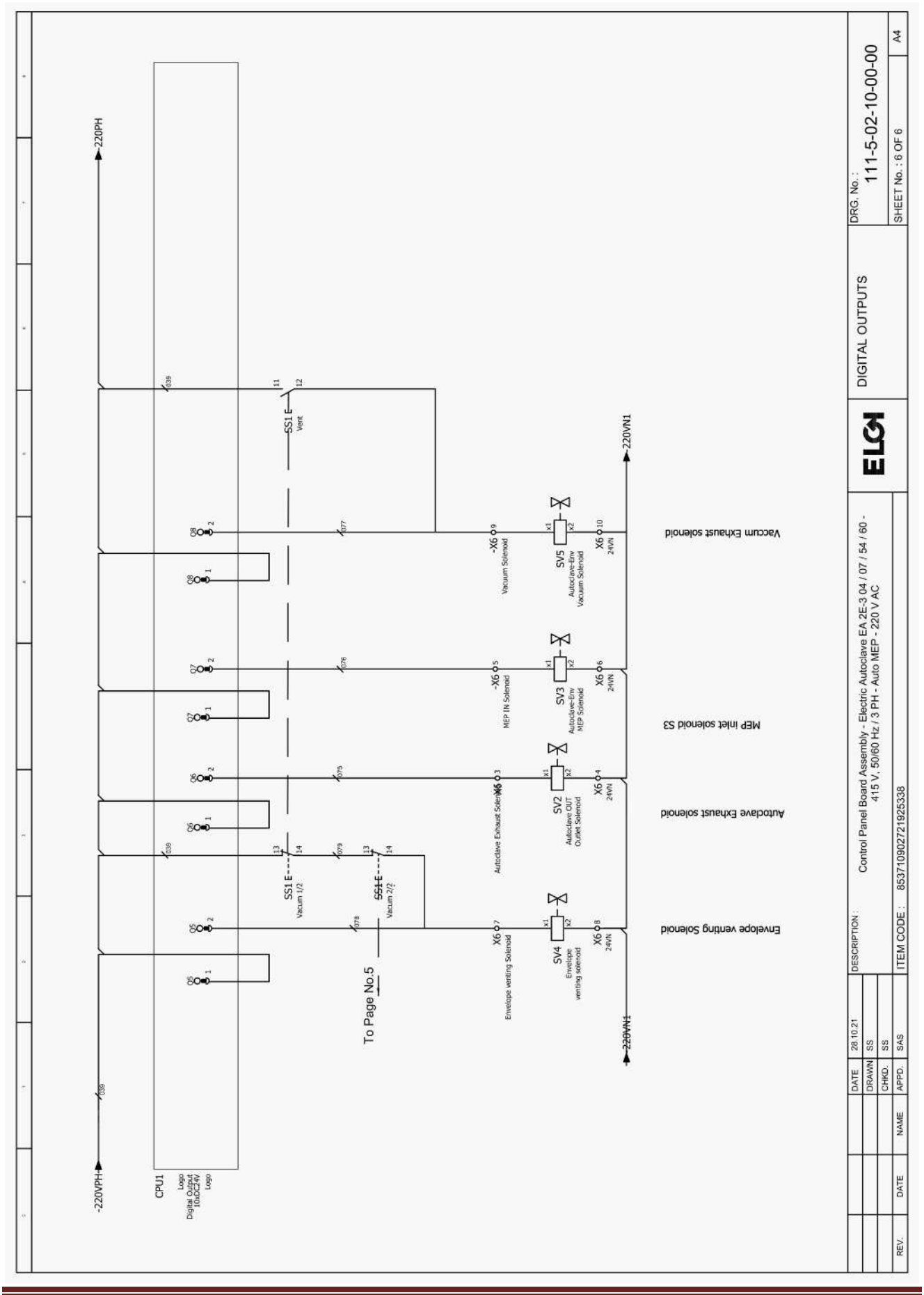



Field Power Supply
220VP2
220VN2
EMP
Switch Board
PLC Power Supply
220VP1
220VN1
Q4
MCB
6 A
Q3
MCB
2 A
150 VA
TR1
440-415-400-380-360/0-220V
PXR4 Temp controller
R
Y
Distribution 220V AC
DRG. No.: 111-5-02-10-00-00
CONTROL SUPPLY
SHEET No. : 2 OF 6
A4
DESCRIPTION : Control Panel Board Assembly - Electric Autoclave EA 2E-3 04 / 07 / 54 / 60 - 415 V, 50/60 Hz / 3 PH - Auto MEP - 220 V AC
ITEM CODE : 8537109027219253 38
DATE 28.10.21
DRAWN SS
CHKD SS
APPD. SAS
REV. DATE NAME


220VP1
220VP2
220VN1
-220VP1
-220VP2
-220VN1
-X4 +24V DC
Diff Pressure switch
X4 +24V DC
PS1(Set @5 Bar)
-X4 Pressure Switch PS1
Pressure Switch PS1
TC
ALM 1
NO
PB4
PB3
PB2
PB1
CPU1
Logo Digital input 10xDC24V Logo
INPUT BYTE 0
AC220V
LOGO MAIN MODULE
PART 1 OF 2
SIEMENS
DP NC Contact
DP NO Contact
Chamber PS1
Temp Reached
Heater OFF Push Button
Heater ON Push Button
Fan Stop PB
Fan Start PB
DIGITAL INPUTS
DRG. No. : 111-5-02-10-00-00
SHEET No. : 3 OF 6
A4
DESCRIPTION : Control Panel Board Assembly - Electric Autoclave EA 2E-3 04 / 07 / 54 / 60 - 415 V, 50/60 Hz / 3 PH - Auto MEP - 220 V AC
ITEM CODE : 8537109027219253 38
DATE 28.10.21
DRAWN SS
CHKD. SS
APPD. SAS
NAME
DATE
REV.


220VP1
220VP2
220VN1
220VN2
-220VP1
-220VP2
-220VN1
-220VN2
To Page No.7
SS1 E--
MEP Selected
DIDO1
Logo
Digital input
10xDC24V
Logo
INPUT BYTE 0
AC220V
PLUG-IN PLACE
MEP Selected
Spare Input
Spare Input
Spare Input
Spare Input
DIGITAL INPUTS
DRG. No. : 111-5-02-10-00-00
SHEET No. : 4 OF 6
A4
DESCRIPTION : Control Panel Board Assembly - Electric Autoclave EA 2E-3 04 / 07 / 54 / 60 - 415 V, 50/60 Hz / 3 PH - Auto MEP - 220 V AC
ITEM CODE : 8537109027219253 38
DATE 28.10.21
DRAWN SS
CHKD. SS
APPD. SAS
REV.
DATE
NAME


X5 - Terminal Strip connector
2 Tier Tower Lamp with Hooter
220VPH
-220VPH
CPU1
Logo
Digital Output
(10 DO 24V)
Logo
RED Pilar Lamp
H1 - RED
24VDC
H1 - Green
24VDC
ALM1
220VAC
Alarm
Tower Lamp Red
Tower Lamp Green
Audiable Warning
Heater start
Inlet solenoid
Fan Motor Start
K1
24VAC
Heater Contactor
Y1
Autoclave IN
Inlet Solenoid
SP1
SP2
Green
K1
K2
K3
K4
K5
K7
T1
220VN1
DIGITAL OUTPUTS
DRG. No. : 111-5-02-10-00-00
SHEET No. : 5 OF 6
A4
DESCRIPTION : Control Panel Board Assembly - Electric Autoclave EA 2E-3 04 / 07 / 54 / 60 - 415 V, 50/60 Hz / 3 PH - Auto MEP - 220 V AC
ITEM CODE : 85371090272192533B
DATE 28.10.21
DRAWN SS
CHKD. SS
APPD. SAS
REV. DATE NAME


220PH
-220VPH
CPU1
Logo
Digital Output
10xDC24V
Logo
SS1 E
Vent
SS1 E
Vacum 1/2
SS1 E
Vacum 2/2
To Page No.5
SV5
Autoclave-Env
Vacuum Solenoid
SV3
Autoclave-Env
MEP Solenoid
SV2
Autoclave OUT
Outlet Solenoid
SV4
Envelope
venting solenoid
-X6
Vacuum Solenoid
-X6
MEP IN Solenoid
-X6
Autoclave Exhaust Solenoid
X6
Envelope venting Solenoid
X6
24VN
220VN1
-220VN1
Vaccum Exhaust solenoid
MEP inlet solenoid S3
Autoclave Exhaust solenoid
Envelope venting Solenoid
DIGITAL OUTPUTS
DRG. No. :
111-5-02-10-00-00
SHEET No. : 6 OF 6
A4
DESCRIPTION :
Control Panel Board Assembly - Electric Autoclave EA 2E-3 04 / 07 / 54 / 60 -
415 V, 50/60 Hz / 3 PH - Auto MEP - 220 V AC
ITEM CODE : 8537109027219253 38
DATE
28.10.21
DRAWN
SS
CHKD.
SS
APPD.
SAS
NAME
DATE
REV.

ELGI Retreading Machinery - Model Plant