

INSPIRED INNOVATION

Despatch
INDUSTRIES

STACKABLE LCC/LCD OVEN OWNER'S MANUAL

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Revision History

Revision	Date	Author	Description
1	3/2012	K. Livingston	Revise for Protocol 3. Revised images for LCC-4.
1.1	8/2012	K. Livingston	Miscellaneous revisions and additions including LCC/LCD1-52V & 1-51NV Oven Door update and HEPA filter installation update.

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1. About This Manual

1.1. Important User Information


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Printed and bound in the United States of America.

The information in this manual is subject to change without notice and does not represent a commitment on the part of Despatch Industries. Despatch Industries does not assume any responsibility for any errors that may appear in this manual.

In no event will Despatch Industries be liable for technical or editorial omissions made herein, nor for direct, indirect, special, incidental, or consequential damages resulting from the use or defect of this manual.

	<p><i>Values displayed on screens are examples only. Though those values may be typical, contact Despatch Industries for the final value.</i></p>
---	--

	<p><i>Users of this equipment must comply with operating procedures and training of operation personnel as required by the Occupational Safety and Health Act (OSHA) of 1970, Section 6 and relevant safety standards, as well as other safety rules and regulations of state and local governments. Refer to the relevant safety standards in OSHA and National Fire Protection Association (NFPA), section 86 of 1990.</i></p>
---	---

	<p><i>Danger!</i></p> <p><i>Only fully-trained and qualified personnel should setup and maintain this equipment. Improper setup and operation of this equipment could cause an explosion that may result in equipment damage, personal injury or possible death.</i></p>
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The information in this document is not intended to cover all possible conditions and situations that might occur. The end user must exercise caution and common sense when installing or maintaining Despatch Industries products. If any questions or problems arise, call Despatch Industries at 1-888-DESPATCH or 1-952-469-5424.

1.2. **Manufacturer & Service**


The Stackable LCC/LCD Oven is manufactured by Despatch Industries.

Despatch has specialized in thermal processing for over 100 years. Technical expertise gained over those years helps provide innovative solutions to critical applications in vertical markets and cutting edge technology worldwide. Despatch products are backed by a drive for long-term customer satisfaction and a strong sense of responsibility. The worldwide network of factory-trained Service Professionals is available to support your Despatch equipment. From full service preventive maintenance to routine repair and certified calibration and uniformity, the Despatch service network is positioned to respond to your business needs. Our service programs are customized to meet your specific needs using our Advantage Service Assurance Program (ASAP). For more information on ASAP, visit www.despatch.com.



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1.3. **Organization of this Manual**

This owner's manual contains the most comprehensive set of information for the Despatch Stackable LCC ovens, including installation instructions, theory of operation, operating instructions, among other things.

	<i>Danger!</i> <i>Failure to heed warnings in this instruction manual and on the oven could result in personal injury, property damage or death.</i>
---	---

1.4. Conventions

	<i>This icon signifies important information.</i>
	<i>This icon signifies information that describes an unsafe condition that may result in death, serious injury, or damage to the equipment.</i>
Danger!	<i>A condition that may result in death, serious injury, or damage to equipment.</i>
Warning!	<i>A condition that may result in serious injury or damage to equipment.</i>
Caution!	<i>A condition that may result in damage to equipment or product.</i>
LOG OUT	<i>Reversed-out, Bold, 10pt Arial typeface indicates a specific key or button on screen to click.</i>

1.5. Specifications

1.5.1. Model Numbering and Naming Conventions

Table 1 lists the model numbers and follows these conventions:

Model Number	L			1	-					-	4
Position in Number	1	2	3	4	5	6	7	8			

Table 1. Model Number Key.

Position in Model Number	Letter / Number	Letter Meaning
2	C	Model has a HEPA filter
2	L	Model does not have a HEPA filter
3	C	Model operates at 260°C
3	D	Model operates at 350°C
5 & 6	16	1.6 cubic foot model
5 & 6	51	5.1 cubic foot model
7 & 8	N	Model uses a nitrogen atmosphere
7 & 8	V	Model uses Viton [*] synthetic rubber (Silicone-free option)

Example: **LLD1-51NV-4**


This 5.1 ft³ model does not have a HEPA filter, operates at 350°C, uses nitrogen and is silicone-free.

* Trademark of E. I. Du Pont De Nemours & Company Corporation.

1.5.2. Dimensions

Models	Chamber Size inches (cm)			Capacity ft ³ (liters)	Overall Size inches (cm)			Maximum number of Shelves
	W	D	H		W	D	H	
LCC1-16-4 LCD1-16-4 LCC1-16N-4 LCD1-16N-4	15 (38)	14 (36)	14 (36)	1.6 (45)	32.5 (83)	35.5 (90)	20.75 (53)	5
LCC1-51-4 LCD1-51-4 LCC1-51N-4 LCD1-51N-4	23 (58)	20 (51)	20 (51)	5.1 (144)	40.5 (103)	42.5 (108)	27 (69)	8

*LLC & LLD models have same dimensions.

	<p><i>The LCC/LCD oven is not intended to process solvents or other volatile or flammable materials. Oven exhaust is intended for cooling purposes only.</i></p>
---	---

1.5.3. Capacities

Model	LCC1-16-4 & LCD1-16-4 LCC1-16N-4 & LCD1-16N-4	LCC1-51-4 & LCD1-51-4 LCC1-51N-4 & LCD1-51N-4
Maximum Load (Lbs)	200	200
Maximum shelf load (Lbs)	50	25
Recirculating fan (CFM) (H.P.)	240 1/4	435 1/4
Net weight (Approximate) (Lbs) (KG)	250 114	380 172
Shipping weight (Approximate) (Lbs) (KG)	350 159	525 238
Exhaust capacity (forced exhaust) (CFM)	35	73
Exhaust Outlet (Inch) (mm)	1.88 x 2.88 (48.0 x 73.4)	1.88 x 2.88 (48.0 x 73.4)

1.5.4. Power

If the line voltage for your LCC/LCD Oven varies more than 10% from the oven voltage rating, electrical components such as relays and temperature controls may operate erratically.

- If the line voltage is lower than the oven voltage rating, heat-up time may be significantly longer and motors may overload or run hot

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- If the line voltage is higher than the nameplate rating, motors may run hot and draw excessive amperage

Model	Volts *	Amps	Hertz	Heater Phase	KW	Cord and Plug
LCC1-16-4 LCD1-16-4	240	14.8	50/60	1	3	None, hardwired
LCC1-16N-4 LCD1-16N-4	240	14.0	50/60	1	3	None, hardwired
LCC1-51-4 LCD1-51-4	240	27.7	50/60	1	6	None, hardwired
LCC1-51N-4 LCD1-51N-4	240	27.7	50/60	1	6	None, hardwired

*The LCC/LCD Oven is designed for 240 volts (see oven nameplate) will operate satisfactorily on a minimum of 208 Volts, but will result in 25% reduced heater output. If your power characteristic is lower, contact Despatch Industries.

1.5.5. Temperature

Model		LCC1-16-4 LCD1-16-4	LCC1-16N-4 LCD1-16N-4	LCC1-51-4 LCD1-51-4	LCC1-51N-4 LCD1-51N-4
Time to Temperature (approximate minutes) (no load)	40°C – 100°C	7 min.	7 min.	5 min.	5 min.
	40°C – 200°C	30 min.	30 min.	27 min.	27 min.
	40°C – 260°C	45 min.	45 min.	35 min.	35 min.
	40°C – 350°C [†]	60 min.	60 min.	50 min.	50 min.
Cooling Time to Temp Minutes (No Load) [‡]	100°C – 55°C	35 min.	30 [§] min.	40 min.	25 [§] min.
	200°C – 55°C	65 min.	55 [§] min.	75 min.	40 [§] min.
	260°C – 55°C	75 min.	60 [§] min.	85 min.	45 [§] min.
	350°C – 55°C [†]	130 min.	80 [§] min.	115 min.	50 [§] min.
Temperature Uniformity at**	100°C	±1°C	±1°C	±1°C	±1°C
	200°C	±2°C	±2°C	±2°C	±2°C
	260°C	±3°C	±3°C	±3°C	±3°C
	350°C	±4°C	±4°C	±4°C	±4°C
Maximum Operating Temperature	LCC	260°C	260°C	260°C	260°C
	LCD	350°C	350°C	350°C	350°C
Operating Range w/20°C Ambient	LCC	40°C-260°C	35°C-260°C ^{††}	45°C- 260°C	35°C-260°C ^{††}
	LCD	40°C-350°C	40°C-350°C ^{††}	40°C-350°C	40°C-350°C ^{††}
Control Stability		+/- 0.5°C	+/- 0.5°C	+/- 0.5°C	+/- 0.5°C

[†] For LCD & LLD only, LCC & LLC maximum temperature: 260°C.

[‡] Minimum operating temperatures and cooling times are based on a 20°C ambient temperature measured at the fresh air inlet.

[§] Based on cooling water supplied at 2 GPM (7.6 LPM), 16°C for nitrogen atmosphere units.

** Uniformity figures are based on a nine-point test conducted in an empty oven with thermocouples connected at 3 inches (7.6 cm) from walls after the oven temperature has reached stabilization. Uniformity can vary slightly depending on unit and operating conditions. Class 100 HEPA filtration will limit ramp rates.

^{††} Requires water cooling be activated for minimum temp rating and operation below 85°C.

2. Safety

2.1. Safety Information

Do not work on the Stackable LCC/LCD Oven without reading and understanding this section which contains important information and warnings. Ignoring these warnings can result in death, serious injury or damage to the machine and product.

2.1.1. Lockout

Machine lockout places the Stackable LCC/LCD Oven into a zero energy state and prevents accidental machine start up. Always follow the Lockout Procedure described in this Section before cleaning, maintaining or repairing the Stackable LCC/LCD Oven. An accidental start-up, while working on the Stackable LCC/LCD Oven, can result in serious injury or death.

2.1.1.1. Lockout Requirements

1. Every power source that can energize any element of the Stackable LCC/LCD Oven must be shut off at the closest possible power source. This includes air, water and electricity, including the Disconnect Switch.
2. After energy sources are locked out, test to ensure circuits are de-energized.

2.1.1.2. Lockout Procedure

Personnel authorized to lockout equipment must have the necessary locks to perform the lockout.


1. Physically disconnect all electrical power to the machine or lockout the appropriate breaker or disconnects.
2. Close all valves and bleed off any pressure.
3. Test for power by attempting a start with the machine controls.
4. Identify the Lockout Condition with a tag on the electrical disconnect and pneumatic shut off valve.
5. When work is complete, remove all tags and restore the machine to its working state.



Danger!

Electrical panels contain high voltage. Disconnect and lock out the power supply before working inside any electrical panels. Failure to lock out the power supply can result in death or injury.

2.1.2. Door and Panel

	<p>Danger!</p> <p><i>Electrical panels contain high voltage. Disconnect and lock out the power supply before working inside any electrical panels. Failure to lock out the power supply can result in death or injury.</i></p>
---	---

The door and rear panel on the Stackable LCC/LCD Oven protect against hazards. Power is required to open the door and the oven heater is OFF when the door is open. Operation without these safety devices in place creates hazards that the doors and covers are intended to render safe for personnel.


The door requires a Manual Override Key for use when power is off. The door and panel that require a tool to open are part of the safety system of the Stackable LCC/LCD Oven. Do not open the door while the machine is running.

2.2. Maintenance

Only qualified and trained personnel should perform maintenance or repair.

2.3. Electrical Power

Only qualified and trained personnel should perform electrical maintenance or electrical repair.

	<p>Danger!</p> <p><i>Contact with energized electrical sources may result in serious injury or death.</i></p>
---	--

- Before performing maintenance, disconnect all electrical power from the machine. Use a padlock and lockout all disconnects feeding power to the machine.
- Never clean, or repair the oven when in operation.
- Unauthorized alterations or modifications to Stackable LCC/LCD Oven are strictly forbidden. Never modify any electrical circuits. Unauthorized modifications can impair the function and safety of the Stackable LCC/LCD Oven.


2.4. Fire

Keep the Stackable LCC/LCD Oven clean and free of scrap materials, oil or solvents to prevent the possibility of fire. In the event of fire, use a fire extinguisher as follows.

1. De-energize the machine immediately by turning OFF the **DISCONNECT SWITCH**.
2. Turn off the remote main disconnect (customer supplied disconnect).
3. Extinguish the fire.

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	<p><i>Danger!</i></p> <p><i>Always disconnect all power before extinguishing a fire. Attempting to extinguish a fire in a machine connected to electrical power can result in serious injury or death!</i></p>
---	--

2.5. Equipment Lockout Requirements

To prevent injury or equipment damage during inspection or repair, the Stackable LCC/LCD Oven must be locked out.

2.5.1. Emergency Stop

When a risk of personal injury or damage to the Stackable LCC/LCD Oven exists, turn OFF the **DISCONNECT SWITCH** on the front of the oven. This shuts off all electrical power to the oven.

3. Theory of Operation

3.1. The Stackable LCC/LCD Series Oven

The Stackable LCC/LCD Series Oven (Figure 1) offers HEPA (High Efficiency Particulate Air) filtration for processes where minimized contamination is essential. The removable HEPA filter is designed to provide a constant flow of 99.97% clean air to the product being heated. The HEPA filter with silicone seal provides 99.99% filtration.

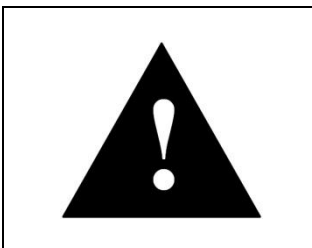
The oven operator interface is located on the hinged control panel at the front of the oven (Figure 1). Power components are located on the equipment panel, behind the hinged control panel, for easy access (Figure 8). Electrical components are either touch-proof or are shielded with Lexan⁷ material to prevent accidental exposure during maintenance and troubleshooting.

The cooling fan is controlled on/off by an event relay in the Protocol 3 Control. The cooling fan is used for rapid cool-down at the end of the process cycle, or to maintain low temperature setpoints during process cycle. It may also be turned on at the start of a process cycle to assure that starting temperature is less than 70°C.

The nitrogen models have stainless steel water coil which permits rapid cool down and lower temperature operation. The nitrogen oven comes with an adjustable flowmeter a for adjusting purge rate, and needle valve for setting maintain rate, separate solenoid valves for purge and maintain operation and a pressure relief exhaust port. An exhaust fan which powers ON whenever the oven is running maintains consistent chamber pressure control with varied exhaust stack conditions.



Figure 1. Stackable LCC/LCD Series Oven.



Danger!

Use care when working with nitrogen. Nitrogen presents an asphyxiation hazard. Handle nitrogen according the safe handling procedures listed in the material safety data sheet.


The oven has a type 304-2B stainless steel interior and a type 304-#4 stainless steel interior. All interior seams are continuously welded on the insulation side. This protects the work chamber from contaminated air and permits chamber washing without damaging the insulation. Interior

⁷ Trademark of SABIC Innovative Plastics.

ductwork may be easily removed for cleaning. Heater frame, fan wheel and motor shaft are constructed of stainless steel.

Two electropolished stainless steel wire shelves are provided. The shelves are removable and adjustable on two inch centers.

The LCC/LCD series design offers a stackable oven body. Multiple oven systems of two or three oven stack options are available. When operating multiple ovens, network the Despatch Protocol 3 controllers together with a Modbus communication option. Use the optional Despatch Protocol Manager software to enable customer PC control of multiple ovens.

	<p>Stackable units are available in air or nitrogen atmosphere models. Nitrogen atmosphere models are noted with an N suffix. Model numbers beginning with "LL*1-*" do not use a HEPA filter.</p>
---	--

3.2. The Protocol 3 Controller

The Protocol 3 is a microprocessor based digital temperature controller designed for simple and flexible oven operation (Figure 2). The Protocol 3 controller operates as a dual-functioning controller/high limit instrument. The control portion utilizes a time-proportioning voltage signal to control heating devices with minimal temperature fluctuations.

The high limit portion protects the product and/or the oven from overheating. If the product being processed has a critical high temperature limit, the high limit setpoint should be set to a temperature somewhat below the temperature at which the product could be damaged. If the product does not have a critical high temperature limit, the high limit setpoint should be set 5 to 15 degrees higher than the maximum programmed setpoint at which the oven will operate.

The Protocol 3 controller provides three primary operating modes:

- Manual: Oven operates continuously at a fixed temperature until turned off.
- Timer: Oven operates at a fixed temperature for a user-selected time period, and then automatically turns off.
- Profile: Temperatures increase or decrease as defined by 255 segments that can be allocated to 64 ramp and soak profiles. The profiles can be linked to provide additional temperature combinations.

Review the Protocol 3 Controller Owner's Manual for more information.

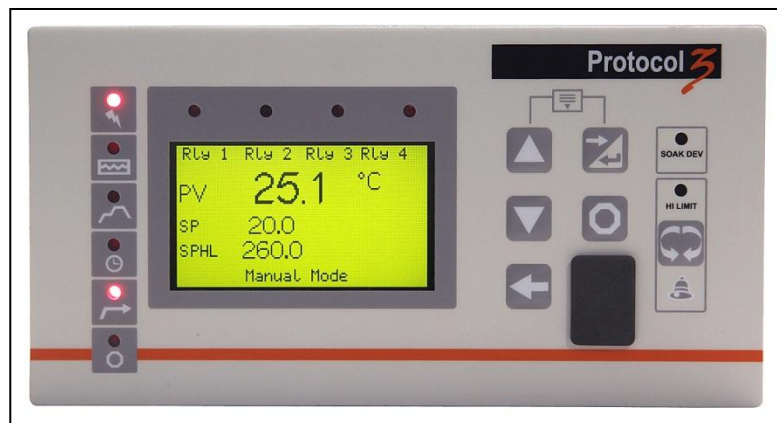



Figure 2. Protocol 3 Operator Interface.


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3.3. HEPA Filters

The Stackable LCC/LCD Ovens use HEPA (High Efficiency Particulate Air) filters limit particulate size in the work chamber to 0.3 microns or less. Two different types of filters are typically used. While both filters are high-temperature filters in that they are designed for use in thermal processing equipment, the “standard” HEPA filter is rated to 260°C (500°F) while the “high-temperature” HEPA filter is rated to 350°C (662°F).

	<p><i>Each LCC/LCD oven uses one of two types of HEPA filters, depending on the oven's maximum temperature. Ovens that can be heated to 260°C (500°F) use the Standard HEPA filter. Ovens that can be heated to 350°C (662°F) use the High-Temperature HEPA filter.</i></p> <p><i>However, customers requiring a higher ramp rate while operating equipment below 260°C (500°F) may still choose to use the high-temperature HEPA filter:</i></p> <ul style="list-style-type: none"> • <i>Standard HEPA filter ramp rate: 1.25°C (34.25°F)/minute</i> • <i>High-Temperature HEPA filter ramp rate: 5°C (41°F)/minute</i>
---	--

	<p><i>LCC oven chamber temperature transitions must not exceed 1.5°C/minute to maintain class 100 chamber conditions. For ramp rates greater than 1.5°C/minute and up to 5°C/minute, the LCD model will maintain class 100 chamber conditions.</i></p>
---	---

3.3.1. Definitions

- **Binder:** Organic substance used in filter construction to provide the media with structural strength
- **Burn-Off:** Process for eliminating the binder and D.O.P. contained in the filter from the manufacturing and testing function.
- **D.O.P.:** Dioctyl Phthalate - Aerosol particles of submicron size used in testing phase to spot defects or measure filter efficiency.
- **HEPA:** High Efficiency Particulate Air

Filter Packaging, Shipping and Handling

Packaging practice varies among the filter unit manufacturers. Filter units are typically packaged in cardboard cartons with varying approaches for strengthening the container and making it impact-resistant. Shipping cartons are typically marked with a vertical arrow and "This Side Up" (Figure 3). A filter unit is placed in the carton so the pleated folds are vertical (running from top to bottom), versus side to side.




THIS SIDE UP

Figure 3. This Side Up Graphic.

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	<p>Ship, handle, store and install HEPA filters with pleats positioned vertically. Horizontally-positioned pleats risk breaking at the adhesive line of the filter medium. Horizontally-positioned pleats also collect entrapped material on “shelves.” The accumulated weight of the entrapped material may cause sag and lead to early failure of the filter unit.</p>
---	---

The filter is typically shipped in the original carton or package provide by the filter manufacturer. This carton or package provides good storage and maximum protection from dirt and moisture. Store and move HEPA filters upright in the shipping carton. Minimize handling of the filter. During installation, remove the filter from the shipping carton and install directly into the oven.


If an unpackaged HEPA filter unit must be placed with its face on the floor or other surface, clear the surface entirely of every object or irregularity which might damage the filter pack.

3.3.2. HEPA Filter Validation Testing

Despatch Industries guarantees the HEPA filters will meet specified efficiency ratings when the following recommendations are followed:

- The filter is properly installed
- The filter is run at or below 200°C, at a constant temperature
- The filter is run before burn-in

3.3.2.1. D.O.P. Testing

	<p>Caution!</p> <p><i>Despatch does not recommend D.O.P. filter testing.</i></p>
---	---

D.O.P. testing uses aerosol particles of submicron size to spot defects or measure filter efficiency. Degenerative by-products of this test are distributed throughout the oven chamber upon heat-up. Despatch does not recommend D.O.P. filter testing.

3.3.2.2. Class 100 Testing

Despatch guarantees a Class 100 environment within the oven. This classification is based on measurement of the particulate level within the oven work chamber.

Class 100 testing may be performed before or after a proper filter burn-in procedure has been performed. Despatch guarantees Class 100 condition measurements based on two methods of test. The direct method employs an extraction-type particulate analyzer. The indirect method involves particle settling over a specified period of time onto a clean disk.

3.3.2.3. Validation Testing

Despatch recommends the following test sequence for pharmaceutical Class 100 ovens.

1. Proper installation of the HEPA filters (Section 0).
2. Ambient air challenge to determine integrity of oven chamber and filter gaskets.
3. Proper filter burn-off procedure.
4. Class 100 testing inside the work chamber.

3.3.2.4. HEPA Filter Burn-off Process Not Necessary

HEPA filters contain a binder material which protects the filter media during production and shipping. Smoke produced from burning this binder at elevated temperatures is undesirable during normal oven operation. Burning off the binder will ensure a clean process at elevated temperatures.

However, when the binder is burned out of the filter media, the filter becomes very fragile: too fragile to withstand normal shipping and handling. For this reason, Despatch does not perform the burn-off procedure. The burn-off process is not necessary at temperatures under 200°C.

3.3.3. HEPA Filter Unit Replacement

Periodic replacement the HEPA filter unit due to:

- Resistance, or pressure drop, across the filter unit. Maximum level of resistance in inches (water gauge) will vary depending upon the operation of the filter and the available fan capacity. Adequate fan capacity must be available.
- Loss of efficiency (leakage), determined from air-sampling measurements made downstream of the filter unit.
- Visible damage or rupture of the filter media in a unit.
- Change in process application.
- Excessive build-up of lint or combustible particulate matter on the filter unit.
- Water droplets in airstream through filter, free water (RH = 100%), will saturate filter very quickly and may cause burnout or holes in burned off filter media.
- High level of radiation in the vicinity of the filter unit.

3.3.4. HEPA Filter: Magnehelic Pressure Gauge

The LCC Series oven is equipped with a Magnehelic pressure gauge which measures the pressure in front of the HEPA filter (Figure 4). As the filter becomes dirty, pressure increases. Despatch

recommends changing the filter when the pressure is 1” w.c. greater than when the filter was first installed (Refer to section 4.3 for filter replacement).

Since pressure can be affected by many factors involved in the installation, it is important to record the pressure of a new filter as a baseline. Recorded pressure readings allow for new readings to be periodically checked against this baseline. Use Table 2 for recording this information (See Section 8.1 for a blank worksheet).

For a nitrogen atmosphere oven, pressure readings also give an indication of the integrity of the seals. If the pressure recorded in Columns D or E decrease over time, inspect the oven seals.



Figure 4. Magnehelic Pressure Gauge Measures Pressure in front of the HEPA filter.

Table 2. HEPA Filter Pressure Reading Worksheet.

A	B	C	D	E	F
Date	Comments	Pressure (inches of water) ⁸	Pressure with: 150 SCFH (LCC1-16); 200 SCFH (LCC1-51) nitrogen purge ⁹	Pressure with: 75 SCFH (LCC1-16); 150 SCFH (LCC1-51) nitrogen maintain ⁹	Oven Temperature
	Typical Values	2-3”	1.5-2” above value in Column C	0.5-1” above value in Column C	60°C
	Filter first installed				

⁸ With Purge and Maintain valves off for a nitrogen atmosphere oven. Cooling fan off for an air atmosphere oven.

⁹ For a nitrogen atmosphere oven only.


4. Assembly & Setup


Assembly and Setup provides directions for unpacking and installing your LCC/LCD.

4.1. Unpack & Inspect The LCC/LCD Oven

Remove all packing materials and thoroughly inspect the oven for any damage that might have occurred during shipment.

- Note whether the carton and plastic cover sheet inside carton are still in good condition
- Observe all outside surfaces and corners of the oven for scratches and dents
- Check oven controls and indicators for normal movement, bent shafts, cracks, chips or missing parts such as knobs and lenses
- Check the door and latch for smooth operation (Figure 5)
- Check the filter carton for damage

	<p>Warning!</p> <p><i>The LCC door requires a Manual Override Key for use when power is OFF. The door and panel that require a tool to open are part of the safety system of the Stackable LCC/LCD Oven. Do not attempt to permanently mount the Manual Override Key.</i></p>
---	--

	<p>Do not remove torx screw from door release mechanism. Manual Override Key cannot be permanently mounted.</p>
---	--

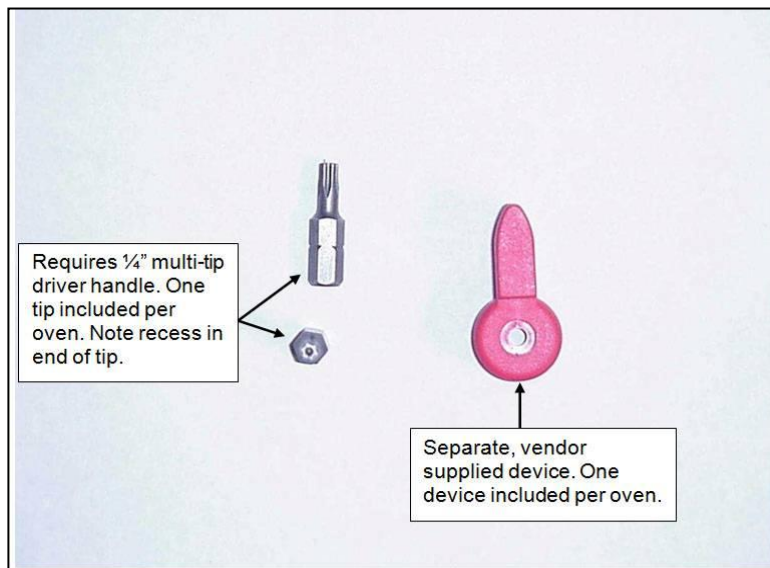


Figure 5. Door Lock Manual Override Key (LCC/LCD/LLC/LLD).


4.1.1. *If Damaged During Shipping*

If damage occurred during shipping:

1. Contact the shipper immediately and file a written damage claim.
2. Contact Despatch Industries (1-800-473-7373 or 1-952-469-8230 or service@despatch.com) to report your findings and to order replacement parts for those damaged or missing. Send a copy of your filed damage claims to Despatch industries (Despatch Industries, 8860 207th Street, Lakeville, MN 555044, USA).
3. Check the packing list to ensure you received all the specified components of the oven system. If any items are missing, contact Despatch Industries to have missing products forwarded to you.
4. Complete the warranty card and mail it to Despatch within 15 days after receipt of the equipment.

4.2. *Set-up The LCC/LCD Oven*

4.2.1. *Select Oven Location*

	<p>Warning!</p> <p><i>Do not use the oven in wet, corrosive or explosive atmospheres unless this oven is specifically designed for a special atmosphere.</i></p>
--	---

4.2.1.1. *Single Oven Placement Requirements*


- Bench top (or other framework) capable of holding at least 250 Lbs (113.4 Kgs).
- A minimum of three (3) inches (7.6 cm) available in the rear of the oven for proper ventilation.
- Leave room at the oven sides and rear for maintenance.
- Oven exhaust opening is at the rear of the left side of the oven. Allow at least two (2) inches (5.1 cm) clearance here as well. The oven may be placed next to another cabinet on its right, or next to another oven, with three-quarters of an inch (19 mm) clearance (measure with door open).
- Plumb and level the oven to assure proper heat distribution and operation of all mechanical components.

4.2.1.2. *Multiple Oven Placement Requirement*

- Stack up to three ovens vertically, with or without the optional framework (base) supplied by Despatch.

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	<p><i>For the LCC1-51 oven model, only two ovens may be stacked vertically.</i></p>
---	--

- Supporting surface must be capable of holding three ovens (750 Lbs or 340.2 Kg) or the weight of two LCC1-51 oven models.
- Use the holes in the rear oven feet to bolt the ovens together by removing the hole plugs in the top of the mating oven beneath.

4.2.2. Oven Utility Connections


Utility connections vary slightly on different LCC/LCD models. Table 3 lists the connection purposes and parameters. Refer to Figure 6 for visual reference.

Table 3. Oven Utility Connections.

Connection (Figure 6)	LCC/LCD Air Atmosphere with optional Water-Cooled Models	LCC/LCD Nitrogen Atmosphere Models with standard water-cooling
NITROGEN INLET	<ul style="list-style-type: none"> • Clean Dry Air Inlet (70-80 psi (4.83-5.52 bar)) • Purge water from coil prior to heating oven • 1/4" NPT female brass connections provided 	<ul style="list-style-type: none"> • Nitrogen Inlet (70-80 psi (4.83-5.52 bar)) • Purge nitrogen, clean dry air and water from coil prior to heating the oven • 1/4" NPT female brass connections provided.
WATER OUTLET	<ul style="list-style-type: none"> • During cooling cycle, water flows through the water coil and out this connection • 3/8" NPT female brass connections provided • Piping must be rated for up to 250 °F (121°C) 	
WATER DRAIN	<ul style="list-style-type: none"> • At the end of a cooling cycle, Nitrogen or Clean Dry Air is purged through the water coil. Water and pressurized nitrogen/air exit this connection for 30 seconds. Must be connected to gravity style drain (no backpressure). • 3/8" NPT female brass connections are provided. • Piping must be rated for up to 250 °F (121 °C) 	
WATER INLET	<ul style="list-style-type: none"> • Water Inlet for cooling • 3/8" NPT female brass connections provided • Requires 2 GPM flow at 61 °F (16°C) to meet published cooling rates. • Maximum Pressure 100 PSI (6.89 Bar) 	<ul style="list-style-type: none"> • Water Inlet for cooling • 3/8" NPT female brass connections provided • Requires 3 GPM flow at 61 °F (16°C) to meet published cooling rates. • Maximum Pressure 100 PSI (6.89 Bar)

4.2.2.1. Nitrogen With Water-Cooled Models

1. Connect nitrogen supply line to **NITROGEN INLET** at the connections panel (Figure 6).

	<p>Nitrogen pressure supplied should be greater than 70 psi (4.83 bar) but not more than 80 psi (5.52 bar).</p>
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2. Install water connection for cooling coils to **WATER INLET** (Figure 6). Verify the valve on the flowmeter is turned OFF, that is, fully clockwise.

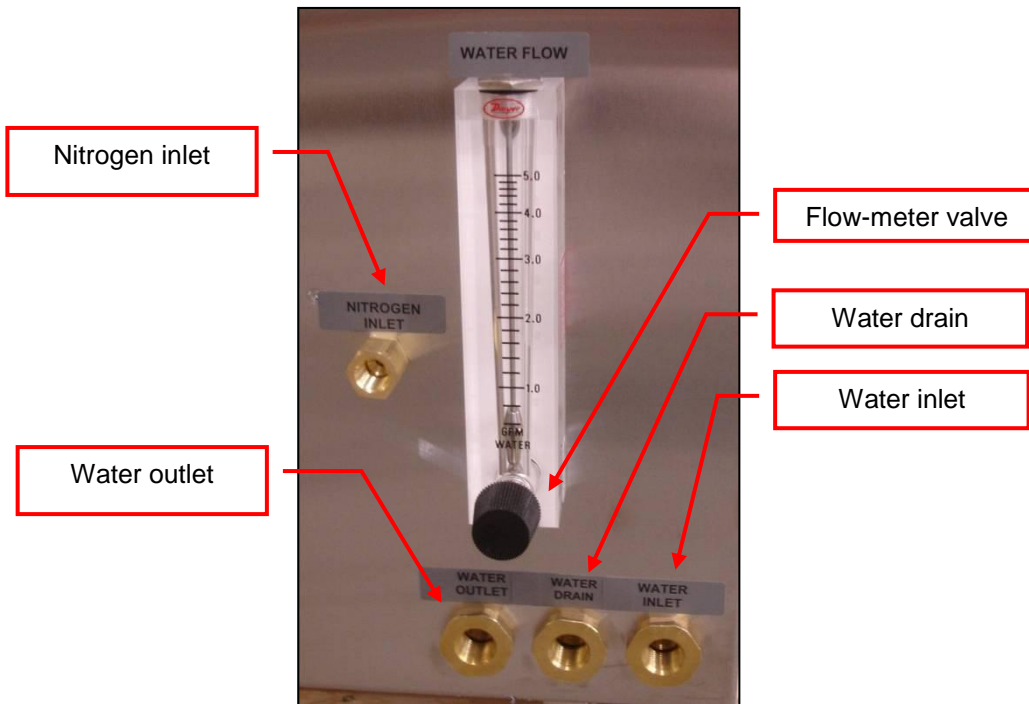





Figure 6. LCC/LCD Connections Panel.


	<p>Water pressure supplied to the oven must not exceed 100 psi (6.89 bar). Despatch recommends installing a regulator to prevent surging.</p>
---	--


3. Check for leaks by slowly opening the valve on the flowmeter and allowing any air to bleed out.

	<p>Caution!</p> <p>Failure to allow air to bleed from the flowmeter may damage the flowmeter. Bleed air from the flowmeter after every instance of shutting off the water supply.</p>
---	---

4. Adjust the flowmeter to the recommended 3 gpm (11.4 lpm).
5. Complete the drain connection on oven side by connecting **WATER OUTLET** to the closed loop system (Figure 6).


	WATER DRAIN must be left open-to-atmosphere. Make closed-loop connections using WATER OUTLET (Figure 6).
---	---


	Warning! <i>Never allow WATER DRAIN to be plugged. A hot oven generates a small amount of steam when the water is first turned on. Steam can burn skin.</i>
---	---

	Caution! <i>Design the drain system to prevent operator injury from high temperature or pressure buildup. Piping must withstand short periods of up to 500 °F (260°C) temperatures (662 °F (350°C) for LCD ovens). Insulate drain lines or install warning labels stating the potential high temperature or pressure hazard.</i>
--	--


4.2.2.2. Air Atmosphere with Optional Water Cooling Model

1. Connect Clean Dry Air (CDA) line to **DRY AIR 100 PSI** at the connections panel (Figure 6).
2. Install water connection for cooling coils to **WATER INLET** (Figure 6). Verify the valve on the flowmeter is turned OFF, that is, fully clockwise.


	Clean Dry Air pressure supplied should be at 100 psi (6.9 bar).
---	--


	Water pressure supplied to the oven must not exceed 100 psi (6.9 bar). Despatch recommends installing a regulator to prevent surging.
---	--


3. Check for leaks by slowly opening the valve on the flowmeter and allowing any air to bleed out.

	<p>Caution!</p> <p><i>Failure to allow air to bleed from the flowmeter may damage the flowmeter. Bleed air from the flowmeter after every instance of shutting off the water supply.</i></p>
---	---

4. Adjust the flowmeter to the recommended 3 gpm (11.4 lpm).
5. Complete the drain connection on oven side by connecting **WATER OUTLET** to the closed loop system (Figure 6).

	<p>WATER DRAIN <i>must be left open-to-atmosphere. Make closed-loop connections using WATER OUTLET (Figure 6).</i></p>
---	---

	<p>Warning!</p> <p><i>Never allow WATER DRAIN to be plugged. A hot oven generates a small amount of steam when the water is first turned on. Steam can burn skin.</i></p>
--	--

	<p>Caution!</p> <p><i>Design the drain system to prevent operator injury from high temperature or pressure buildup. Piping must withstand short periods of up to 500 °F (260°C) temperatures (LCD ovens: 662 °F (350°C). Insulate drain lines or install warning labels stating the potential high temperature or pressure hazard.</i></p>
---	---

4.2.3. Exhaust Connections

The LCC/LCD Exhaust port is located on the left side of the oven (Figure 7). Table 4 lists the requirements for the exhaust stack for the LCC/LCD Oven.





Figure 7. Exhaust Port on the Left Side of the LCC/LCD Oven.

Table 4. Exhaust Connection Requirements.

	LCC/LCD1-16 Models	LCC/LCD1-51 Models
Size	1.88" x 2.88" (4.8 cm x 7.3 cm)	
Flow	35 cfm (991.5 lpm)	73 CFM (2067 lpm)
Temperature	LCC and LLC series: 500 °F (260°C)	LCC and LLC series: 500 °F (260°C)
	LCD and LLD series: 662 °F (350°C)	LCD and LLD series: 662 °F (350°C)

4.2.4. Wiring & Power Connections

	<p><i>The oven must be hardwired directly to the disconnect switch on the equipment panel (Figure 9).</i></p>
---	---

	<p><i>Danger!</i></p> <p><i>All grounding and safety equipment must be in compliance with applicable codes, ordinances and accepted safe practices.</i></p>
---	--

- Run line voltage power through the conduit from rear of oven to front (Figure 9). Consult electrical drawings included with the oven for details.
- Access the conduit and **Disconnect Switch** by opening the front panel (Figure 8).

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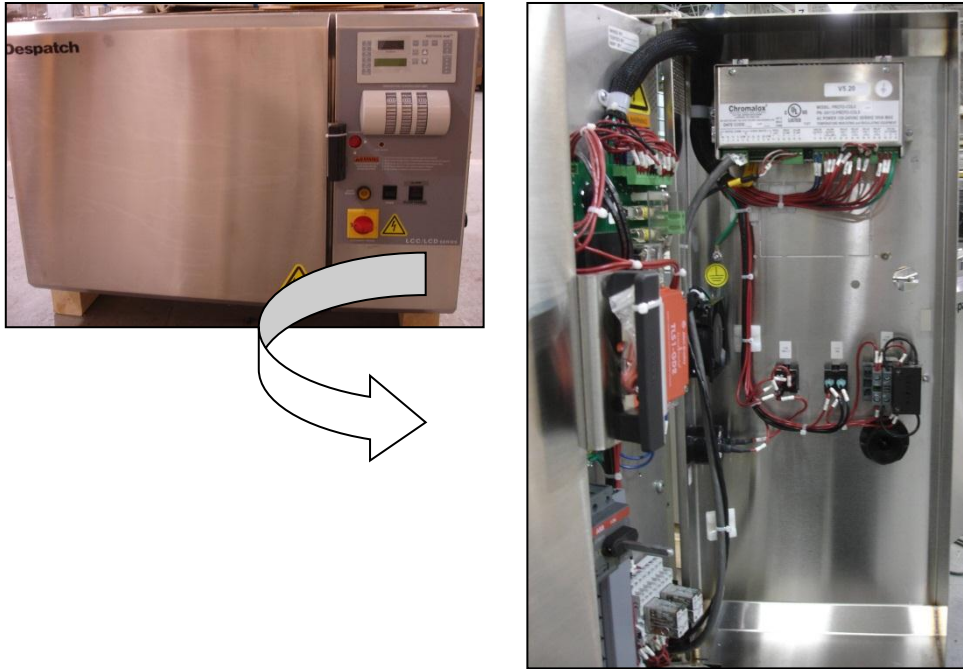


Figure 8. Open the front panel for access.

- Connect the line voltage power to the disconnect switch labeled **LINE CONNECTION** (Figure 9).

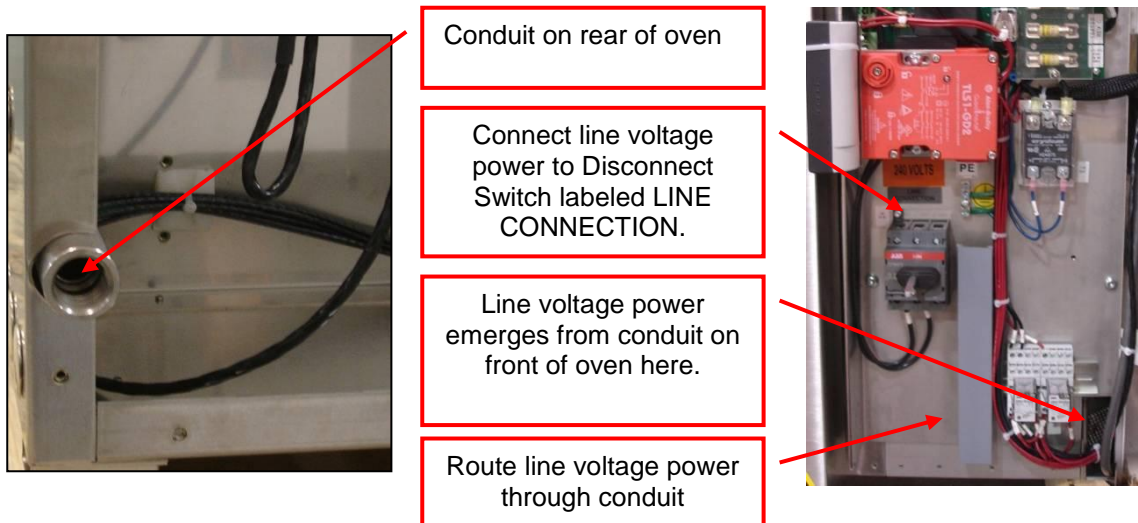


Figure 9. Conduit entrance at rear of oven and open front panel.


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4.3. HEPA Filter Installation


Not all LCC/LCD ovens come equipped with a HEPA filter. This HEPA filter installation section applies only to ovens designed for ISO Class 5 (Class 100) use, which are equipped with a HEPA filter. For a complete explanation of model numbers, refer to Section 1.5.1.


Two different types of filters are typically used. While both filters are high-temperature filters in that they are designed for use in thermal processing equipment, the “standard” HEPA filter is rated to 260°C (500°F) while the “high-temperature” HEPA filter is rated to 350°C (662°F).

	<p>Each LCC/LCD oven uses one of two types of HEPA filters, depending on the oven's maximum temperature. Ovens that can be heated to 260°C (500°F) use the Standard HEPA filter. Ovens that can be heated to 350°C (662°F) use the High-Temperature HEPA filter.</p> <p>However, customers requiring a higher ramp rate while operating equipment below 260°C (500°F) may still choose to use the high-temperature HEPA filter:</p> <ul style="list-style-type: none">• Standard HEPA filter ramp rate: 1.25°C (2.25°F)/minute• High-Temperature HEPA filter ramp rate: 5°C (9°F)/minute
---	---

	<p>Warning!</p> <p>Make certain power is disconnected from the oven before removing or replacing the HEPA filter. Observe all applicable safety procedures.</p>
---	---

	<p>Caution!</p> <p>The HEPA filter is fragile and care must be taken to avoid damage during installation. If a filter unit is dropped, whether in the carton or not, examine it carefully for damage.</p>
---	---

	<p>Caution!</p> <p>The HEPA filter must be installed so that unfiltered air cannot leak past the unit.</p> <p>Refer to installation instructions provided by filter manufacturer for additional details..</p>
---	--

	<p>Sweep floor clear of nuts, bolts and other protrusions which may damage the unit.</p> <p>Do not drop or jar the filter carton.</p>
---	---

1. Remove new filter from carton

Notice	<p>Do not attempt to repair a damaged filter unit—particularly the medium. Any unit so repaired must be retested to assure that hidden damage does not exist which might reduce filtering efficiency. Repair and retest is not economical for most users.</p>
---------------	--

- a. Place carton on floor.
 - b. Tilt the carton on one corner. Handle the carton at opposing corners.
 - c. Remove sealing tape and fold back flaps of carton.
 - d. Gently unpend the filter to place the exposed end of the filter on the floor. Do not jar the filter.
 - e. Pull the carton from the filter unit. Be careful to not pull the filter from the carton.
2. Inspect the filter.
 - a. Visually inspect the new gasket(s) for damage during handling.
 - b. Use a strong lamp to examine the exposed areas of both faces for evidence of breaks, cracks, or pinholes (Figure 10). If a strong lamp is unavailable, use a flashlight in a darkened room.
 - c. Look for visible defects with the light projected along the full length of each channel created by the separators. Translucent spots may not necessarily indicate holes or cracks but may simply be variations in thickness of the filter medium.
 - d. Check that the adhesive seal around the filter unit faces are complete and unbroken.
 - e. Check frame corner joints for adhesive sealing and tightness.
 - f. Check that gaskets are cemented firmly to the filter frame and that gasket pieces are undamaged and butted or mated at the joints.

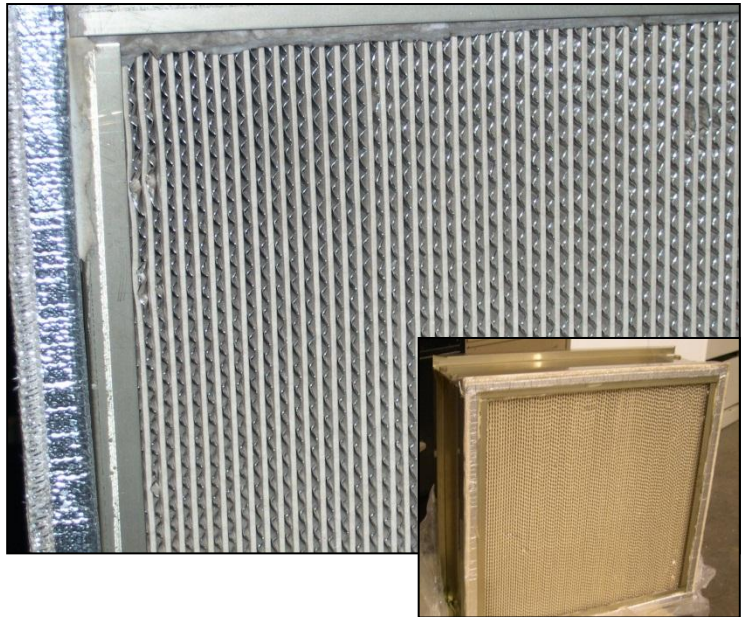


Figure 10. Example HEPA Filter (Silicone-free) and Close-Up.



Opened pleats in the filter media are normal and result from the tempering process.

3. Pull shelves from the oven and set aside (Figure 11).



Danger!

Make certain power is disconnected from the oven before removing or replacing the HEPA filter.

4. Loosen the three screws at the upper and lower corners of the right rear of the chamber (Figure 11).
 - a. Pull out the shelf support/duct as a single unit and set it aside.
5. Remove the brass nuts and washers from the rods that hold the filter frame in place.
 - a. Set aside and reuse these nuts to hold the new filter in place.
 - b. Discard the old filter in accordance with your company's disposal policies.

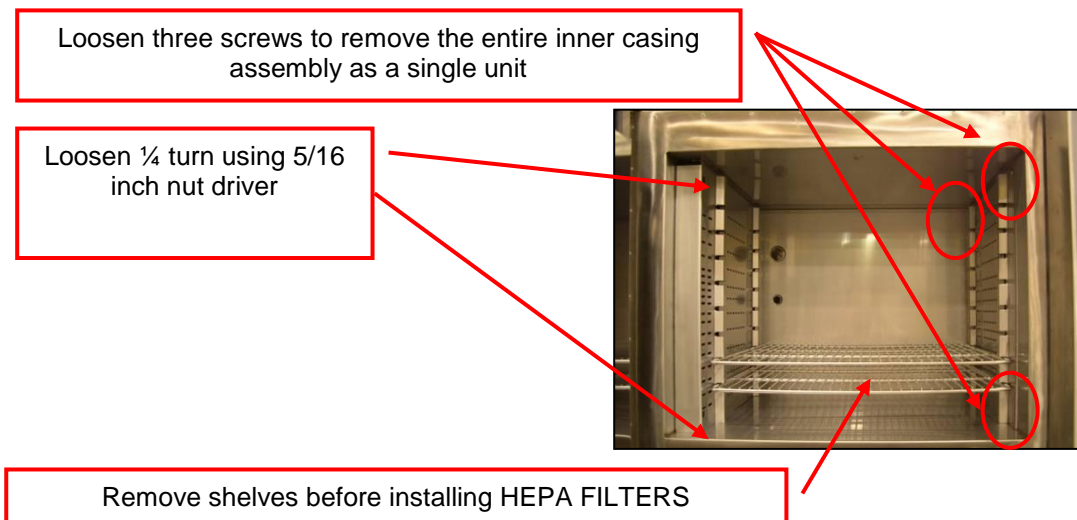


Figure 11. Remove inner casing to install HEPA filter.

6. **LCC1-16 only:** remove the filter frame, which will be reinstalled after filter installation.
7. For all LCC/LCD Ovens: Install HEPA filter:
 - a. For the High-temperature HEPA filter:
 - i. Place the filter with the triangular gasket set against the oven wall and the glass braid set against the clamping plate (Figure 12).
 - ii. Tighten the nuts until the triangular gasket is compressed to a thickness of 0.16 inch (0.4 cm).
 - b. For the Standard HEPA filter:
 - i. Place the filter with the gasket set against the oven wall (Figure 13).
 - ii. Tighten the four nuts alternately for a torque of 28 (+/- 3 in-lbs.).
 - iii. Be careful not to over tighten.
6. Reinstall the inner casing assembly using the three screws removed earlier.
7. Reinstall the oven shelves.

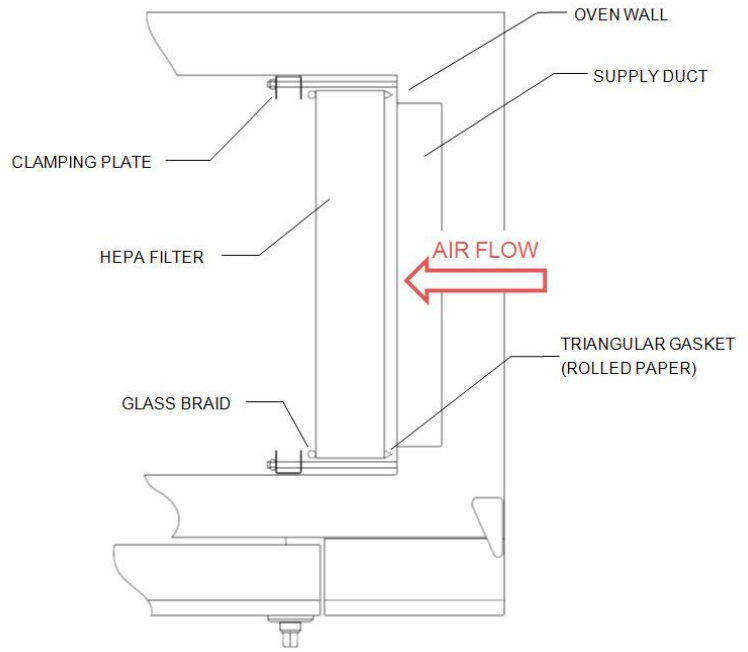


Figure 12. Install HEPA high-temperature filter.

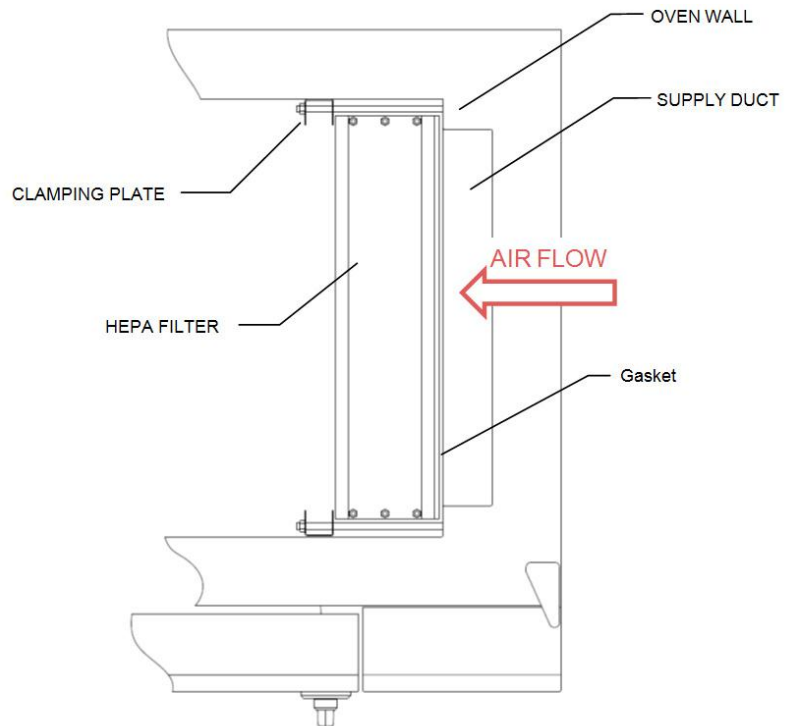


Figure 13. Install HEPA standard filter.

4.3.1. HEPA Filter Burn-Off

4.3.1.1. HEPA Filter Burn-Off Process

The burn-off process takes place in any equipment where a new HEPA filter is used at temperatures above 180°C / 356°F. Expect smoke, possibly a pungent odor and a light residue on interior surfaces. This results from oxidation of the binder. Most of the binder will leave the filter after running at a temperature of 260°C/500°F for 48 hours. Check the oven for particles or the exhaust for smoke and odor to determine that the process is finished.



While the High-temperature filter has undergone tempering treatment at the factory, smells and/or fumes may be released during the first use at temperature.

4.3.1.2. Location of HEPA Filter Burn-Off Process

Select a location for the burn-off process where generated smoke and odor will be ventilated with the least amount of interruption and inconvenience. Ideally this will be in the final location for the oven. However, it may be a receiving dock, some well ventilated space or even outside if the weather is acceptable. If this location is a very clean area, pay special attention to an exhaust hook-up that fully captures the smoke and odor produced. The post-Burn-off cleaning (that is, oven wipe down) may also generate dust. So take care if in a clean room.

4.3.1.3. Recommended HEPA Filter Burn-Off Process



LCC oven chamber temperature transitions must not exceed 1.5°C/minute to maintain class 100 chamber conditions. For ramp rates greater than 1.5°C/minute and up to 5°C/minute, the LCD model will maintain class 100 chamber conditions.

1. Locate the equipment exhaust opening where chamber air is being expelled.
 - a. If the oven filter is burned off in a clean area, be sure to handle the equipment exhaust appropriately.
 - b. If the equipment is large and the exhaust stack is a permanent service connection, connect the equipment and exhaust stack before the burn-off process.
 - c. If the equipment is small with no permanent exhaust duct required, arrange a temporary connection out of the clean area that will handle the maximum temperature of the equipment. Direct the smoke and odor outside, or to a highly ventilated area.
2. Set the temperature control at the maximum process temperature.
 - a. Silicone: Ramp at 1.25°C/min to 260°C and soak for 48 hours.
 - b. Media Pack: Ramp at 1.25°C/min to 260°C and soak for 48 hours.
 - c. High-temperature (Figure 14):
 - i. Option 1: Ramp at 1.7°C/min (or up to 5°C/min) to 350°C and soak for 48 hours.
 - ii. Option 2: Ramp to process temperature and soak for three consecutive three-hour segments over 48 hours.

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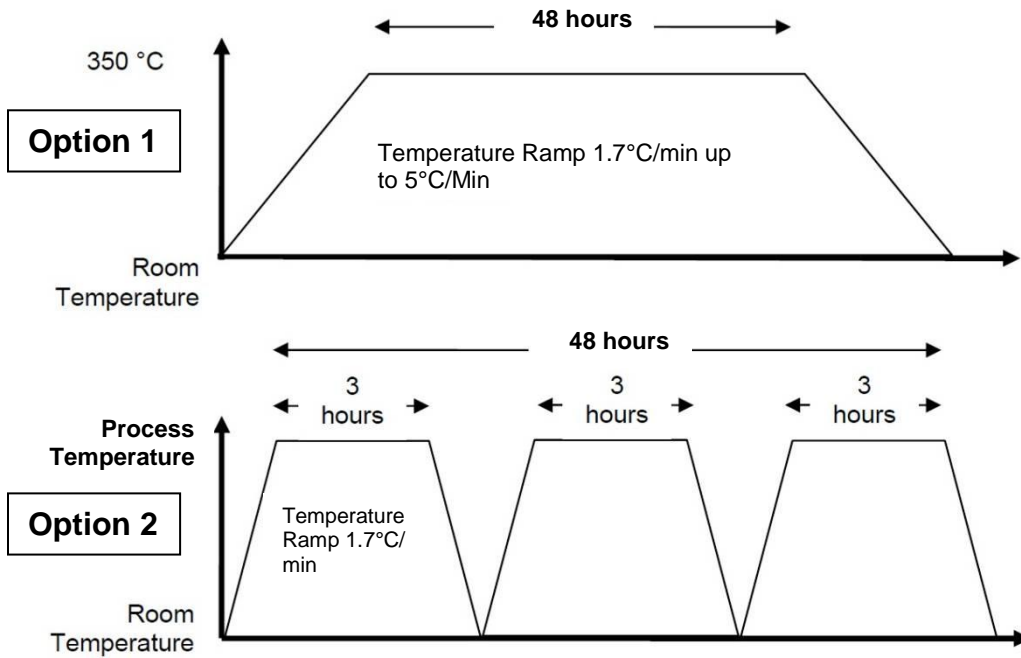



Figure 14. Options for starting high-temperature HEPA Filters

3. Start the fan after making the electrical power connections.
4. Energize the equipment heater.
 - a. Use enough fresh air (or N₂) to remove the smoke, while still being able to achieve and maintain the necessary temperature.
 - b. The completion of the burn-off period should be based on the particle level in the oven or smoke-free exhaust and minimal odor level.
 - c. Check the filter hold-down nuts after burn-off and tightened as necessary.
 - d. For best oven particle control, this step should be repeated on a regular basis.

	<p><i>If the equipment must be moved after the burn-off process, use considerable care.</i></p> <ul style="list-style-type: none"> • <i>The binder which strengthened new filters is now burned-off and the media is very fragile.</i> • <i>Rough handling of either the filter alone or the equipment with the filter installed is not recommended as it may tear the media and lead to reduced filter efficiency.</i> • <i>Removal of the filter after heating can also result in damage to the frame seal, and is only recommended when replacing the filter.</i>
---	---

4.4. MRC5000 Setup (Optional)



Refer to instructions provided recorder manufacturer for more specific installation notes.

Temperature is retransmitted to the MRC5000 recorder from the controller. Set up the recorder by:

1. Ensure hardware jumper JU1 is in place for the 5 VDC setting (Refer to MRC5000 Manual included).
2. Move Mode to **PROG/TEST/CAL** to display **Prog**.
3. Press **▼** twice to display **Inps**. Move to each Parameter Code using **▼** or **▲**. Adjust each Parameter Code using the settings in Table 5.
4. After adjusting all settings, move **Mode** to **RUN**. Display on both the Recorder and controller should read the same.


Table 5. MRC 5000 Settings.

Parameter Code	Degrees C	Degrees F
Inps	18	18
Icor	0	0
diSP	On	On
dPOS	0	0
EUU**	400	752
EUL**	0	32
ChUP	400	800*
ChLO	0	0
DFF	1	1


* Change 0-400 chart paper to 0-800 chart paper. Depending on the equipment used, 0-600 paper may be used if the maximum temperature is 500°F.

** These values must match the settings **sRetOutLo** and **RetOutHi** on the Protocol 3 Control page. For example, if **RetOutLo** is 32, **EUL** must read 32.


5. Operation

	<p>Users and operators of this oven must comply with operating procedures and training of operating personnel as required by the Occupational Safety and Health Act (OSHA) of 1970, Section 5 and relevant safety standards, and other safety rules and regulations of state and local governments. Refer to the relevant safety standards in OSHA and National Fire Protection Association (NFPA), Section 86 of 1990.</p>
---	--

5.1. Load Oven

	<p>Despatch Industries cannot be responsible for either the process or process temperature used, or for the quality of the product being processed. It is the responsibility of the purchaser and operator to see that the product undergoing processing in a Despatch oven is adequately protected from damage.</p> <p>Carefully following the instructions in this manual will help the purchaser and operator in fulfilling that responsibility.</p>
---	---

Avoid spilling on the heater elements or oven floor when loading the oven. Do not place the load on the oven floor plate. Placing the load on the oven floor may cause the load to heat unevenly and the weight may cause shorting out of the heater elements. Use the shelves provided.

	<p>Caution!</p> <p>Always place loads on the shelves provided to avoid possible uneven heating and damage to the oven.</p>
---	--

The two shelves are designed to be pulled out about halfway without tipping. Do not overload the shelves. Distribute the workload evenly so airflow is not restricted. Do not overfill your oven. The workload should not take up more than two-thirds of any dimension of the inside cavity.

5.2. Pre-Startup Checklist

- Know the system. Read this manual carefully. Make use of its instructions and explanations. Safe, continuous, satisfactory, trouble-free operation depends primarily on your degree of understanding the system and your willingness to keep all parts in proper operating condition.

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- Check line voltage. Voltage must correspond to nameplate requirements of motors and controls. A wrong voltage can result in serious damage. Refer to Section 1.5.4 for more information.
- Check fresh air and exhaust openings. Do not be careless about restrictions in and around the fresh air and exhaust openings and stacks. Under no condition can they be permitted to become so filled with dirt that they reduce airflow.

	<p>Warning!</p> <p><i>Do not use flammable solvent or other flammable material in this oven. Do not process closed containers of any substance or liquid in this oven because they may explode under heat.</i></p>
--	---

5.3. Operating Procedure

5.3.1. Start Oven

1. Turn the yellow/red **DISCONNECT SWITCH** to ON.
2. Press the **POWER** to ON.
 - a. The **DOOR RELEASE** pushbutton will illuminate. This means the door can be opened.

	<p><i>During the process cycle, DOOR RELEASE will not be lit, meaning that the oven door may not be opened.</i></p>
--	--

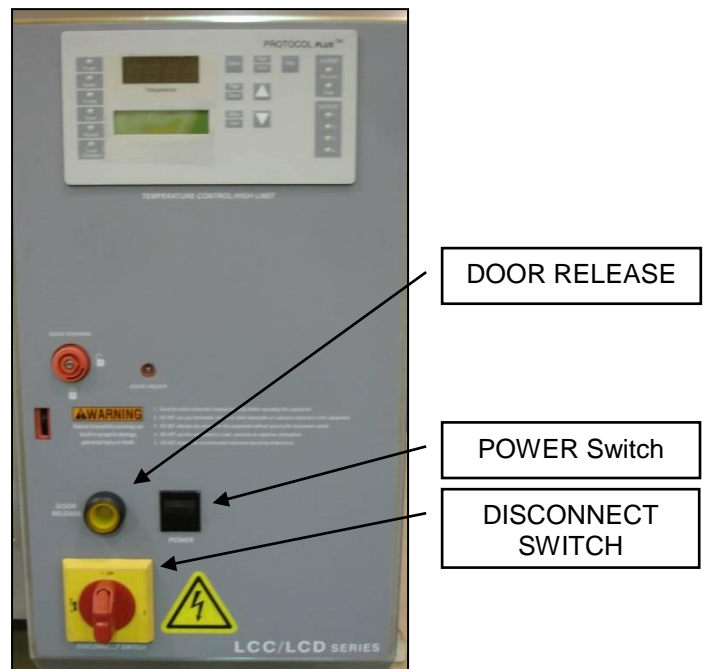


Figure 15. Power the Oven.

- b. **For Optional Beacon Light-equipped Units Only:** The amber (center) beacon light will illuminate, indicating that the oven is ready to receive work to be processed.
3. To open the oven door, press **DOOR RELEASE** while simultaneously pressing on the door. The oven door will unlatch and open.
 4. The heater is wired in series with the door switch. The door must be completely closed and locked to activate the heater.

5.3.2. Working with Protocol 3 Operating Modes


Refer to the Protocol 3 Controller Owner's Manual for specific information for working with the controller.

5.3.3. Operation Sequence when Equipped with Optional Beacon Light


1. After starting the oven (refer to Section 5.3.1), the Protocol 3 controller initializes.
 - a. The oven should be idle, empty, with the door closed and awaiting the next lot for processing.
 - b. The Protocol 3 Controller should not be running a profile.
2. Open the oven door.

	<i>The amber beacon light will be ON (steady) until the profile is started (at the completion of Step 5).</i>
---	--

3. Place the product on the shelf in the oven.
4. Close the oven door.
5. Run the desired profile with the Protocol 3 Controller.
 - a. Press **Select** until **Profile** is displayed.

	<i>Press Run at any time to active the Profile Mode.</i>
--	---


- b. Press **▲** or **▼** to display the desired profile.
 - c. Press **Run** to start the Profile Mode.

	<i>After pressing Run, the display changes from Stop to Run. Segment time remaining and Current Segment number will display.</i>
---	---

6. At this point, the oven profile cycle is in process and the door is locked.
 - a. The green beacon light is ON (steady), the amber beacon light is off.
 - b. When the process is complete, the amber beacon should be ON, and the **DOOR RELEASE** pushbutton light is on.
7. Press **DOOR RELEASE** pushbutton
8. Open the oven door to remove the product workload.
9. Closes the oven door to complete the process cycle. The oven is ready for the next lot.

5.3.4. Sequence of Operation for Ovens Equipped for Inert Atmosphere Oven


1. After starting the oven (Section 5.3.1), the Protocol 3 controller initializes.

	<p>Refer to the Protocol 3™ Controller Owner's Manual for more information on programming event outputs.</p>
---	---

- a. The oven should be idle, empty, with the door closed and awaiting the next lot for processing.
 - b. The Protocol 3 Controller should not be running a profile.
 - c. Make certain the nitrogen flow meter is in the OFF position, that is, fully clockwise (Figure 16).
2. Open the oven door.
 3. Place the product on the shelf in the oven.
 4. Close the oven door.
 5. Run the desired profile with the Protocol 3 Controller.
 - a. Press **Select** until **Profile** is displayed.



Figure 16. Nitrogen Flowmeter.

	<p>Press Run at any time to activate the Profile Mode.</p>
--	---

- b. Press **▲** or **▼** to display the desired profile.
 - c. Press **Run** to start the Profile Mode.
6. The first segment of the program is the PURGE MODE.
 - a. Set the nitrogen flow meter (Figure 16) to the desired setting (Table 6).
 - b. This program energizes the purge solenoid valve.

Table 6. Desired Oxygen Concentration.

Oven Model	Mode	< 100 PPM	<1000 PPM
LCC1-16	Purge	150 scfh	125 scfh
	Maintain	75 scfh	65 scfh
LCC1-51	Purge	200 scfh	175 scfh
	Maintain	160 scfh	140 scfh

7. The second segment is the MAINTAIN MODE:
 - a. The purge solenoid valve is first de-energized and then re-energized to maintain the nitrogen level to less than the purge level.
 - b. Adjust the Nitrogen Maintain needle valve at rear of oven (Figure 17). Leave the maintain valve energized as long as the nitrogen level is maintained (Table 6).

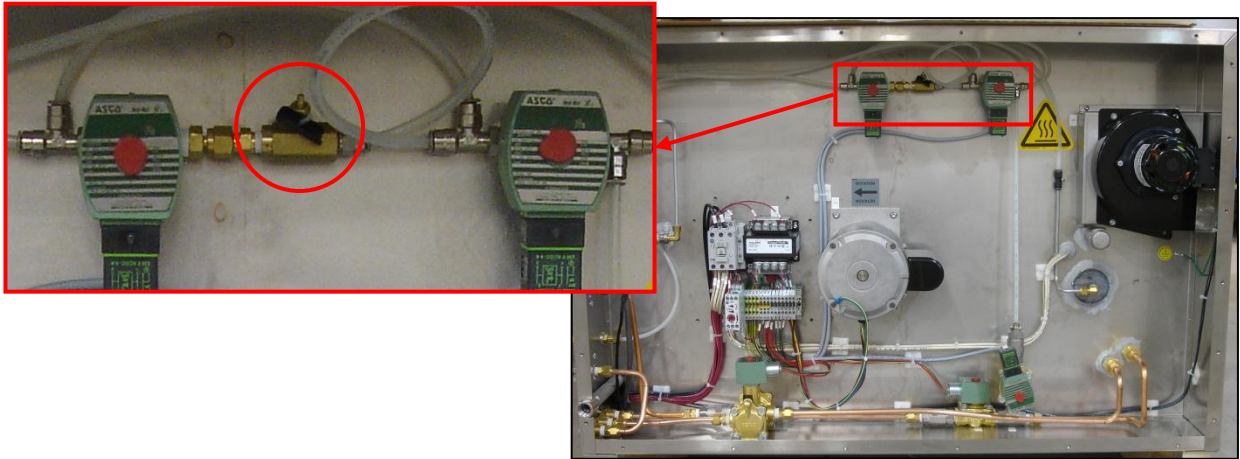


Figure 17. Adjust Nitrogen Maintain Needle Valve.

8. The third and final segment is the COOLDOWN MODE. In Cooldown mode, water valves are energized to bring the chamber to a safe unloading temperature (Figure 18).

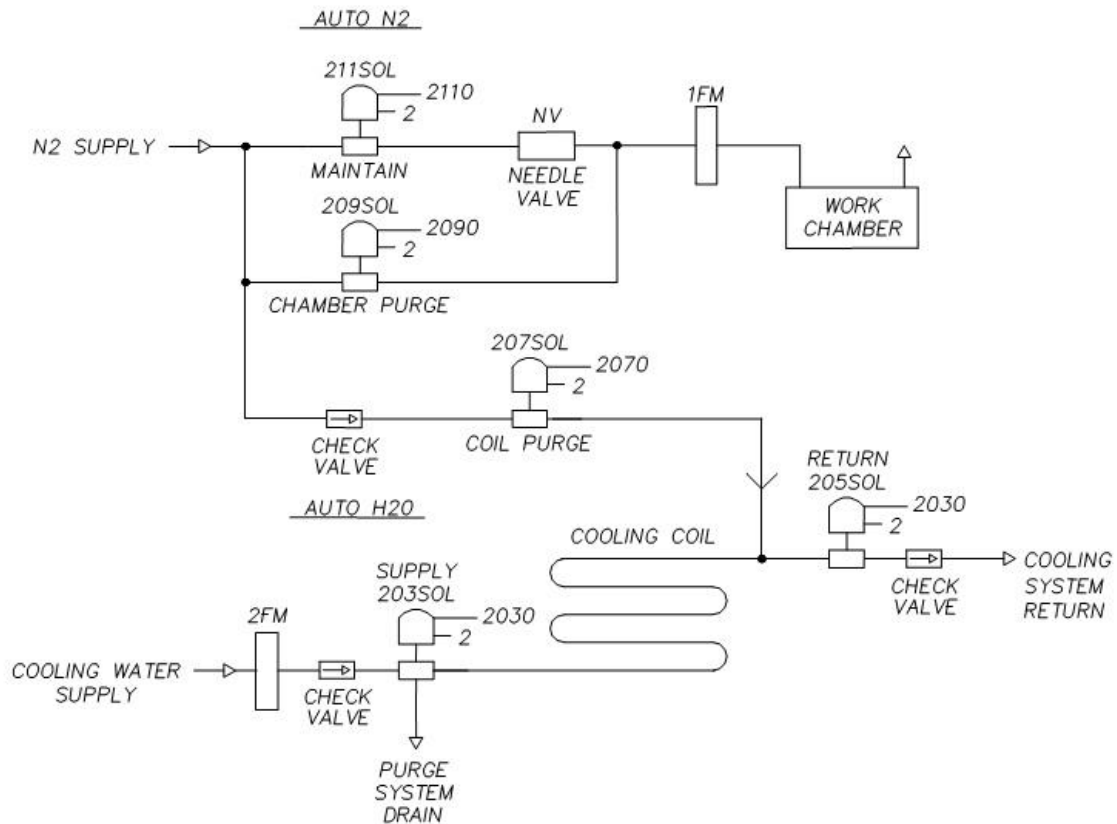


Figure 18. Water and Nitrogen Piping Schematic.

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5.3.5. Manual Unlock and Main Disconnect

5.3.5.1. Manual Unlock

If a power failure occurs insert a torx tip tool (provided) and rotate 90 degrees counterclockwise to allow the chamber door to open. The tool must be turned back to the locked position to allow electrical operation again.

5.3.5.2. Main Disconnect Switch

This disconnect switch (yellow with red knob) is connected to the load break switch behind the panel that disconnects or connects power from the main line.

5.4. Latch Opening for Models LCC/LCD Models 1-51V or 1-51NV

LCC/LCD Models 1-51V or 1-51NV have a different way of opening and closing the oven door.

5.4.1. To Open the LCC/LCD1-52V & 1-51NV Oven Door

1. Press and hold **DOOR RELEASE** (Figure 19).



Figure 19. Press and hold **DOOR RELEASE**.

2. Lift handle while holding **DOOR RELEASE** (Figure 20).



Figure 20. Pull handle out away from door.

3. Open door and release **DOOR RELEASE** (Figure 21).



Figure 21. Oven door latch and door fully open (latch perpendicular to oven door).

5.4.2. To Close the LCC/LCD1-52V & 1-51NV Oven Door

1. The door latch should be perpendicular to the oven door while in the open position (Figure 21).
2. Close the door and press the door latch all the way closed (Figure 22). Do not forcefully slam the door closed.



Figure 22. Door fully close and latch fully engaged.

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6. Maintenance

Do not attempt any service on this oven before opening the main power disconnect switch.

6.1. Checklist

- Keep equipment clean. Gradual dirt accumulation retards airflow. A dirty oven can result in unsatisfactory operation such as unbalanced temperature in the work chamber, reduced heating capacity, reduced production, overheated components, and the like. Keep the walls, floor and ceiling of the oven work chamber free of dirt and dust. Floating dust or accumulated dirt may produce unsatisfactory work results. Keep all equipment accessible. Do not permit other materials to be stored or piled against it.
- Protect controls against excessive heat—particularly controls, motors or other equipment containing electronic components. Temperatures greater than 51.5°C (125°F) should be avoided.
- Establish maintenance and checkup schedules. Do this promptly and follow the schedules faithfully. Careful operation and maintenance will be more than paid for in continuous, safe and economical operation.
- Maintain equipment in good repair. Make repairs immediately. Delays may be costly in added expense for labor and materials and in prolonged shut down.
- Practice safety. Make it a prime policy to know what you are doing before you do it. Make **caution, patience, and good judgment** the safety watchwords for the operation of your oven.
- Inspect oven seals if pressure readings decrease over time (Refer to Section 3.3.4 as well as Table 2, Columns D and/or E)

6.2. Lubrication

Fan motor bearings are permanently lubricated. All door latches, hinges, door operating mechanisms, bearing or wear surfaces should be lubricated to ensure easy operation.

6.3. HEPA Filter Replacement

Refer to section 4.3 for filter replacement.

7. Troubleshooting: Error Messages and Alarm

Table 7 lists the more common error messages, the possible problems and remedies.

Table 7. Error Messages and Next Steps.

Alarm Status	Possible Problem	Next Step
Hi-Limit LED flashing	<ul style="list-style-type: none"> • Problem with thermocouple • Hi-limit setpoint has been exceeded. 	Once the problem has corrected, press Reset .
Soak LED flashing	Oven temperature has not entered (or dropped out of) the soak band and the soak timer has stopped	Program a slower ramp rate or if oven is not heating check heater circuit.
Top LED displays OPEN and lower LCD displays CONTROL SENS ERR	Control thermocouple is disconnected or broken	Repair or replace the thermocouple.
Lower LCD displays HI LIM SENS ERR	Hi limit thermocouple is disconnected or broken	Repair or replace the thermocouple.
Lower LCD displays HIGH LIMIT ALARM	Hi limit temperature setpoint has been exceeded	Determine if: <ul style="list-style-type: none"> • the setting is too close to the setpoint • the SSR is defective • calibration is incorrect



The lower LCD intermittently displays HL Temp. This is not an error message, but the Hi limit thermocouple temperature reading.

8. Appendices

8.1. HEPA Filter Pressure Reading Worksheet

A	B	C	D	E	F
Date	Comments	Pressure (inches of water) ¹⁰	Pressure with: 150 SCFH (LCC1-16); 200 SCFH (LCC1-51) nitrogen purge ¹¹	Pressure with: 75 SCFH (LCC1-16); 150 SCFH (LCC1-51) nitrogen maintain ⁹	Oven Temperature
	Typical Values	2-3"	1.5-2" above value in Column C	0.5-1" above value in Column C	60°C
	Filter first installed				

¹⁰ With Purge and Maintain valves off for a nitrogen atmosphere oven. Cooling fan off for an air atmosphere oven.

¹¹ For a nitrogen atmosphere oven only.

8.2. Standard Products Warranty



Standard Products Product Warranty

Products Covered by this Warranty

This warranty (the "Warranty") applies to the following Despatch products: LEB, LBB, LAC, LCC, LCD, LLC, LLD, RAD, RFD, LND, TAD, TFD, PN, PTC, PCC, 900 Series.

Parts and Materials

Despatch warrants all parts and materials to be free from defects in material and workmanship for a period of:

1. five (5) years from date of shipment for laboratory oven electric heaters;
2. three (3) years from date of shipment for Protocol Plus, Protocol 3 and DES 2000 temperature controllers; and
3. one (1) year from the date of shipment, or 2,000 hours of operation, whichever occurs first, for all other components of products covered by this Warranty.

During the applicable Warranty period, Despatch will repair or replace, at Despatch's option, parts and materials covered by this Warranty.

Labor

During the first 90 days of the Warranty period, Despatch will pay labor costs incurred to remove defective parts and materials, and to reinstall repaired or replacement parts or materials; provided, however, that Despatch's obligation to pay such labor costs shall be subject to the limitation that the removal and/or reinstallation service must be performed by a Despatch-authorized technician from Despatch's worldwide network of factory-trained professionals at a location within the contiguous United States.

Transportation Costs

All transportation costs to transport defective parts or materials to Despatch, and to transport repaired or replacement parts or materials to Customer, shall be the responsibility of the Customer.

Terms and Conditions

This Warranty shall be deemed valid and binding upon Despatch if and only if the Customer:

1. installs, loads, operates, and maintains the covered product supplied hereunder in accordance with the instruction manual provided upon delivery and product labeling affixed to the subject equipment;
2. if applicable, follows the Emergency Procedure set forth in this Warranty; and
3. contacts Despatch's Helpline at 1-800-473-7373 for assistance in diagnosing and troubleshooting the problem immediately upon discovering any damage or malfunction.

Despatch's reasonable determination as to whether a repair, replacement, or service is covered by this Warranty shall be final and binding.

Exclusions

This Warranty DOES NOT cover:

1. damage or malfunctions, or expenses incurred in the process of diagnosing and/or repairing damage or malfunctions, resulting from any of the following: operator error, misuse, abuse, inadequate preventive maintenance, normal wear and tear, service or modifications by other than Despatch

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THIS WARRANTY IS PERSONAL TO THE CUSTOMER AND MAY NOT BE TRANSFERRED OR ASSIGNED. ALL LIMITATIONS HEREUNDER, HOWEVER, SHALL BE BINDING ON ALL SUCCESSORS AND ASSIGNS OF CUSTOMER.

Service
Phone 800-473-7373; International Phone 952-469-8230; Fax 952-469-8193
e-mail service@despatch.com; www.despatch.com

Please see reverse side for other service offerings

BB7 (12/30/08)

- authorized technicians, use of the covered product that is inconsistent with the operation manual or labeling, acts of nature (including, without limitation, floods, fire, earthquake, or acts of war or civil emergency), internal or external corrosion, or non-conforming utilities (including, without limitation, electrical, fuel supply, environmental and intake/exhaust installations);
2. repair or replacement of parts or materials designed and intended to be expendable or consumable; refrigerants, filters, lamps;
 3. routine maintenance; or
 4. labor costs incurred for troubleshooting, diagnostics, or testing (except for testing required to verify that a covered defective part or material has been repaired).

Limitations of Liability

Despatch shall not, in any event, be liable for indirect, special, consequential, incidental, or punitive damages or penalties of any kind, including, without limitation loss of revenue, profits or business opportunities resulting from interruption of process or production. In no event shall Despatch be liable for damages in excess of the amounts paid by Customer to Despatch with respect to the applicable product(s). This Warranty does not cover, and Despatch shall not be liable for any losses, costs, damages or expenses resulting from delays in diagnosing or repairing the products, supplying or obtaining replacement parts or materials, strikes, labor stoppages or shortages, fires, accidents, government acts or regulations, or any other causes beyond the control of Despatch.

Non-Compliance By Customer

Despatch reserves the right to suspend and withhold service under this Warranty in the event of non-compliance by the Customer to any terms and conditions of this Warranty or the applicable purchase order or invoice. Further, Despatch shall not be liable for any loss of production, expenses, and inconveniences incurred due to such suspension.

Customer Furnished Equipment Warranty Limitation

This Warranty does not cover diagnosis or repairs of defects in or caused by, lack of performance of, or fitness for purpose of customer-supplied parts or equipment unless specifically noted in the Despatch written order acceptance confirmation.

Performance Commitment

Despatch provides no guarantee of process performance or fitness for purpose, unless specifically noted otherwise in Despatch written order acceptance confirmation. Despatch is providing equipment with design parameters specific only to its equipment.

Procedure Upon Discovery of Defects and Emergencies

In the event Customer becomes aware of any defect in the applicable products, Customer must immediately: (a) shut off fuel or energy supply (gas and electricity), (b) call for emergency assistance, if needed, and (c) notify Despatch Service.

8.3. Electrical Schematics

The following pages contain electrical schematics for the LCC1-16, LCC1-16N-4, LCC1-51-4 and LCC1-51N-4 ovens.

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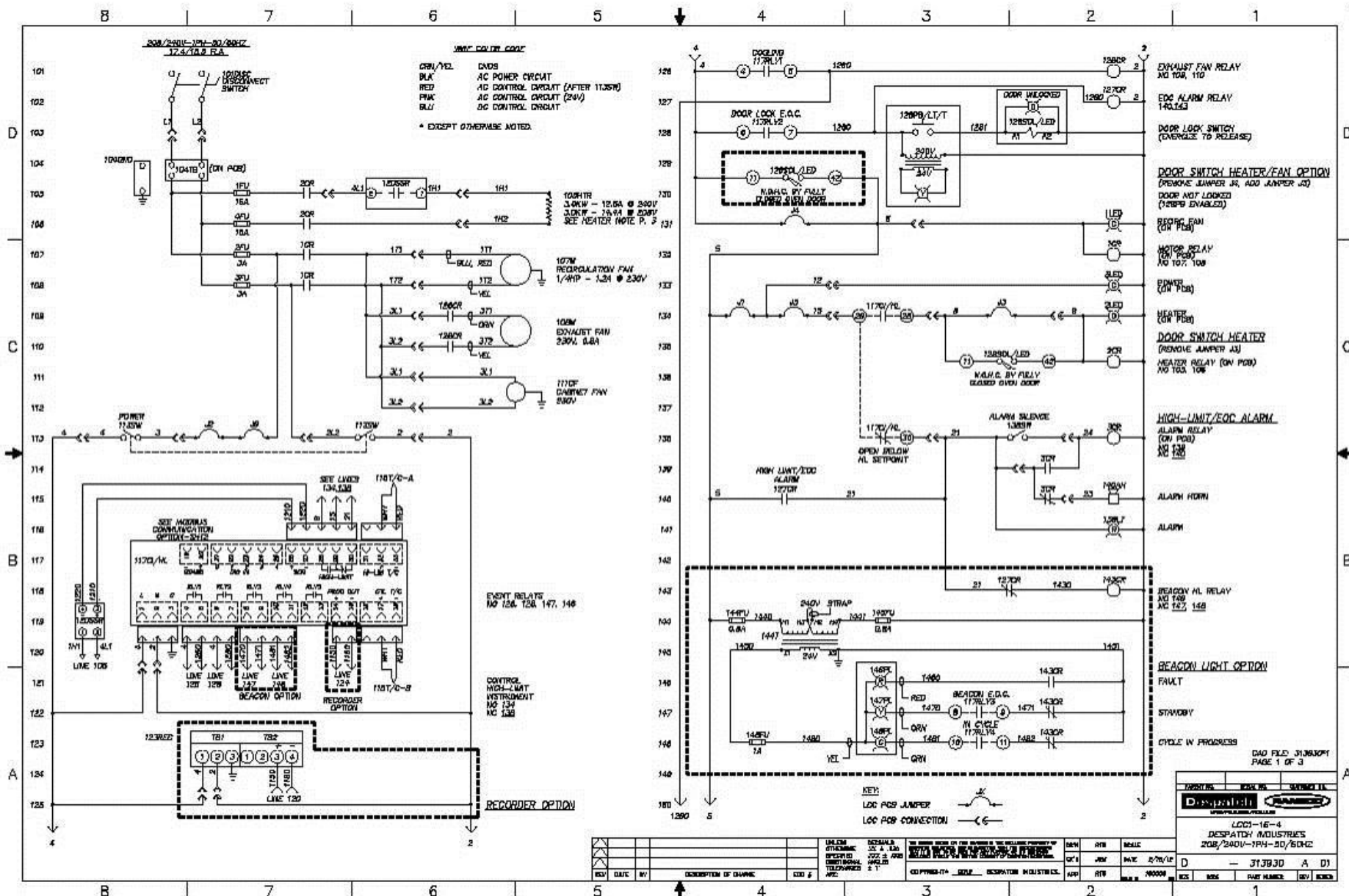


Figure 23. LCC1-16-4 (Drawing 313930-01).

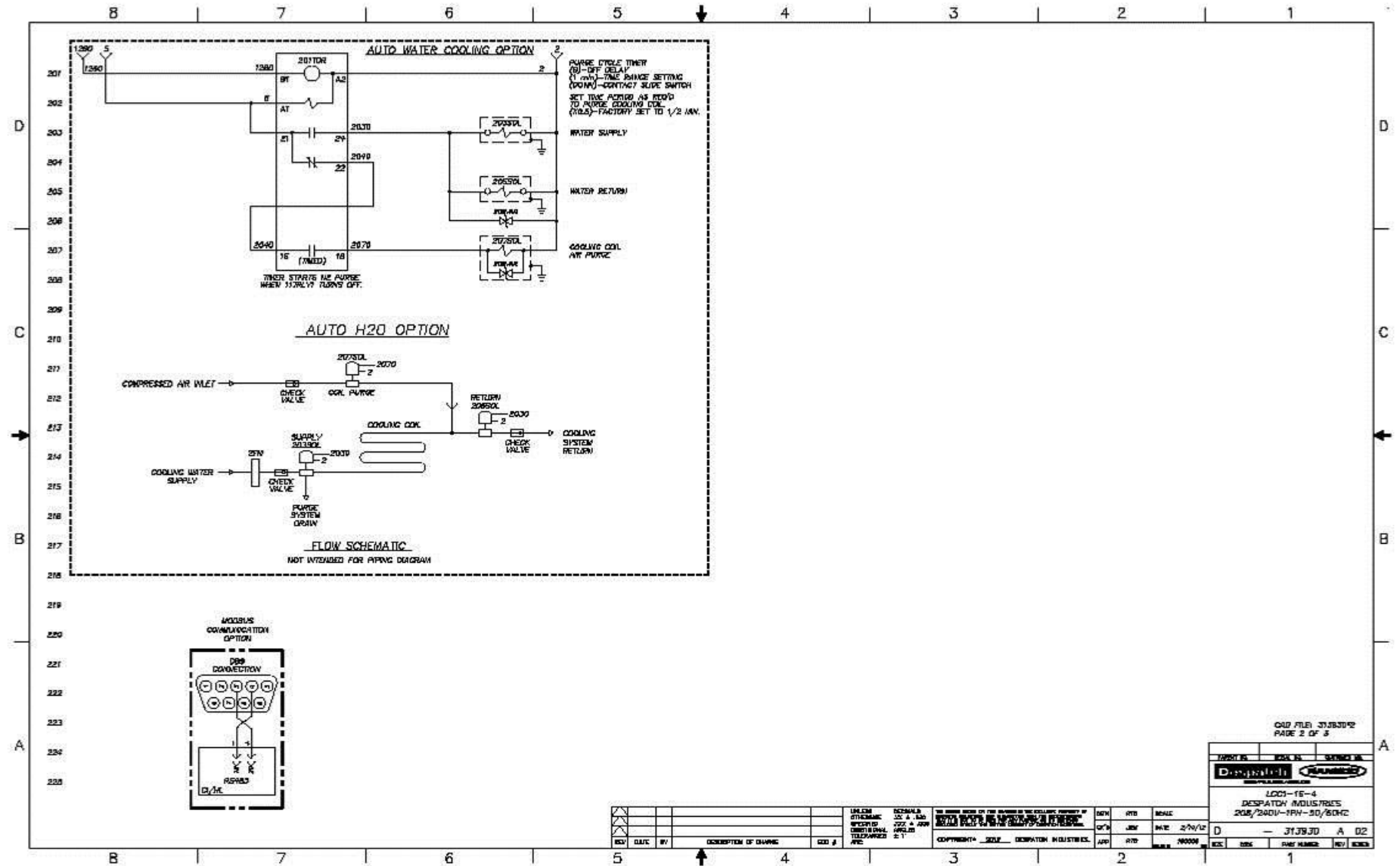


Figure 24. LCC1-16-4 (Drawing 313930-02).

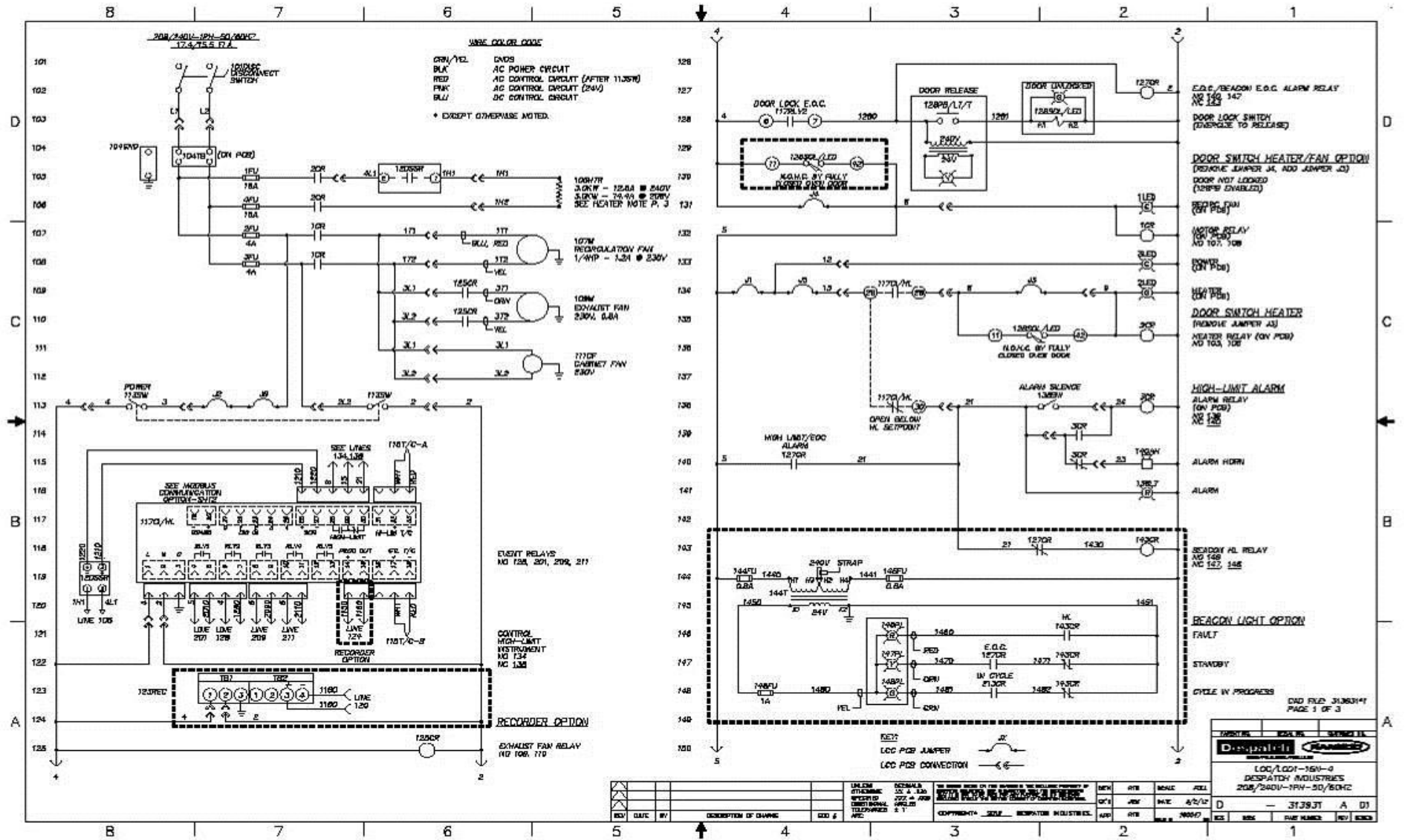


Figure 26. LCC1-16N-4 (Drawing 313931-01).

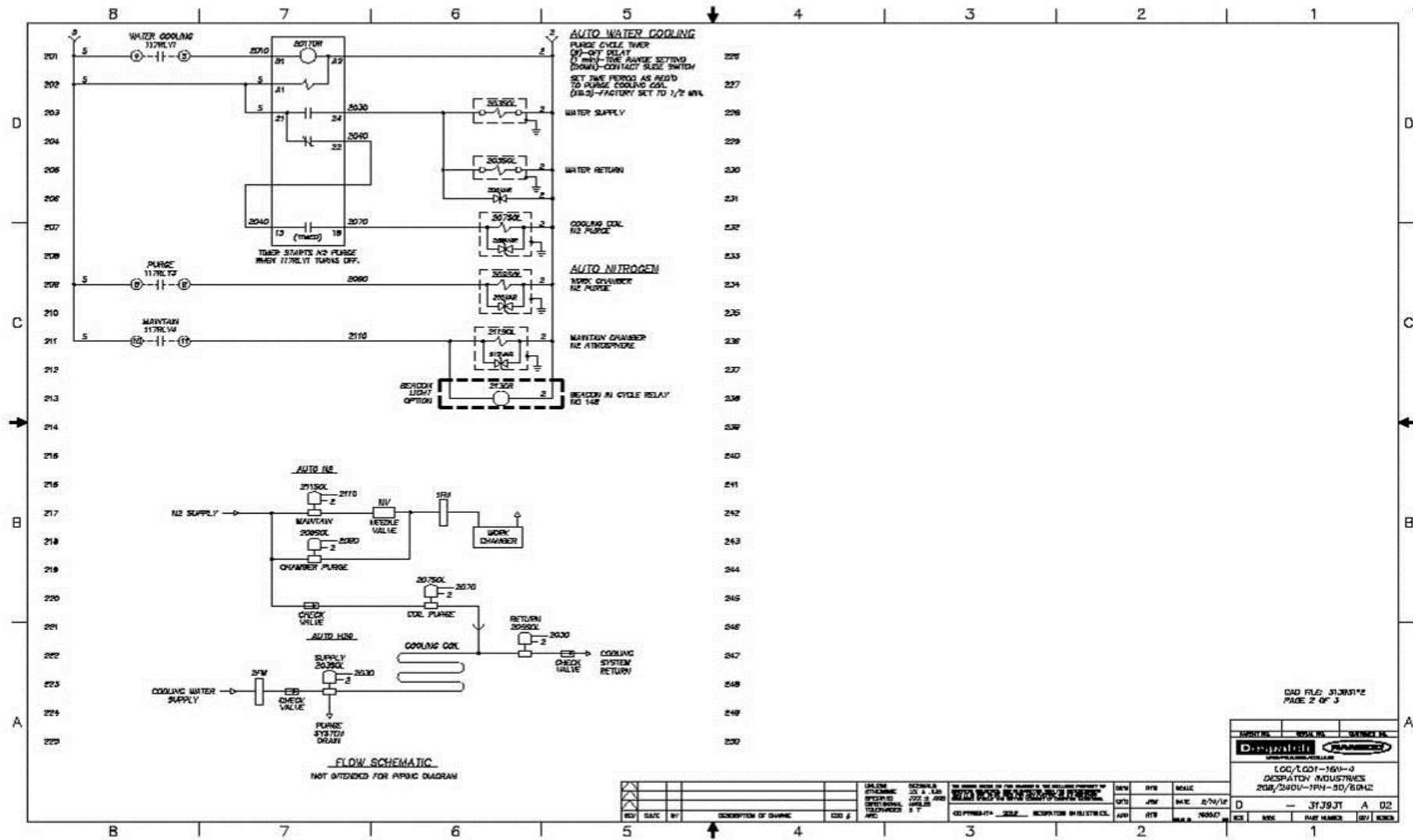


Figure 27. LCC1-16N-4 (Drawing 313931-02).

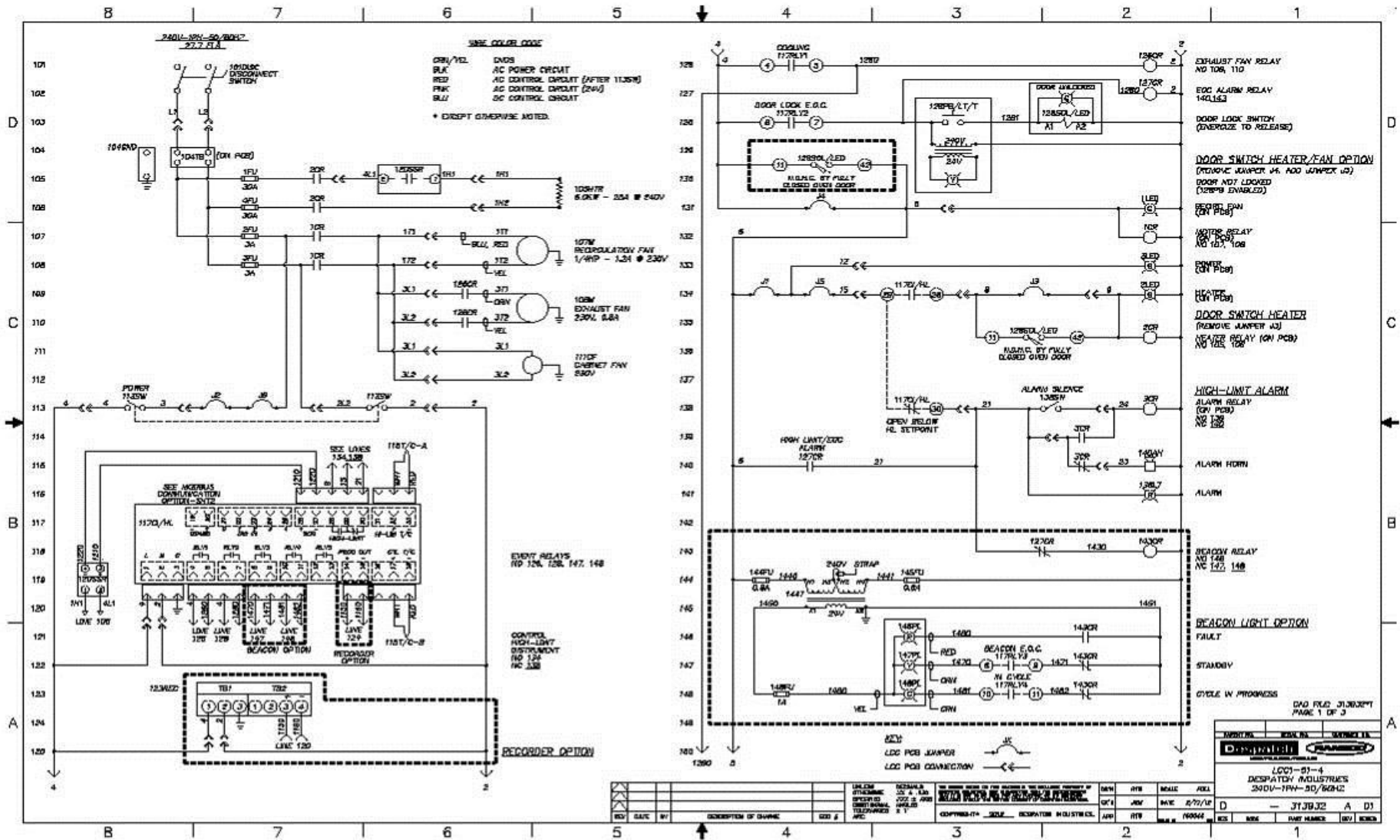


Figure 29. LCC1-51-4 (Drawing 313932-01).

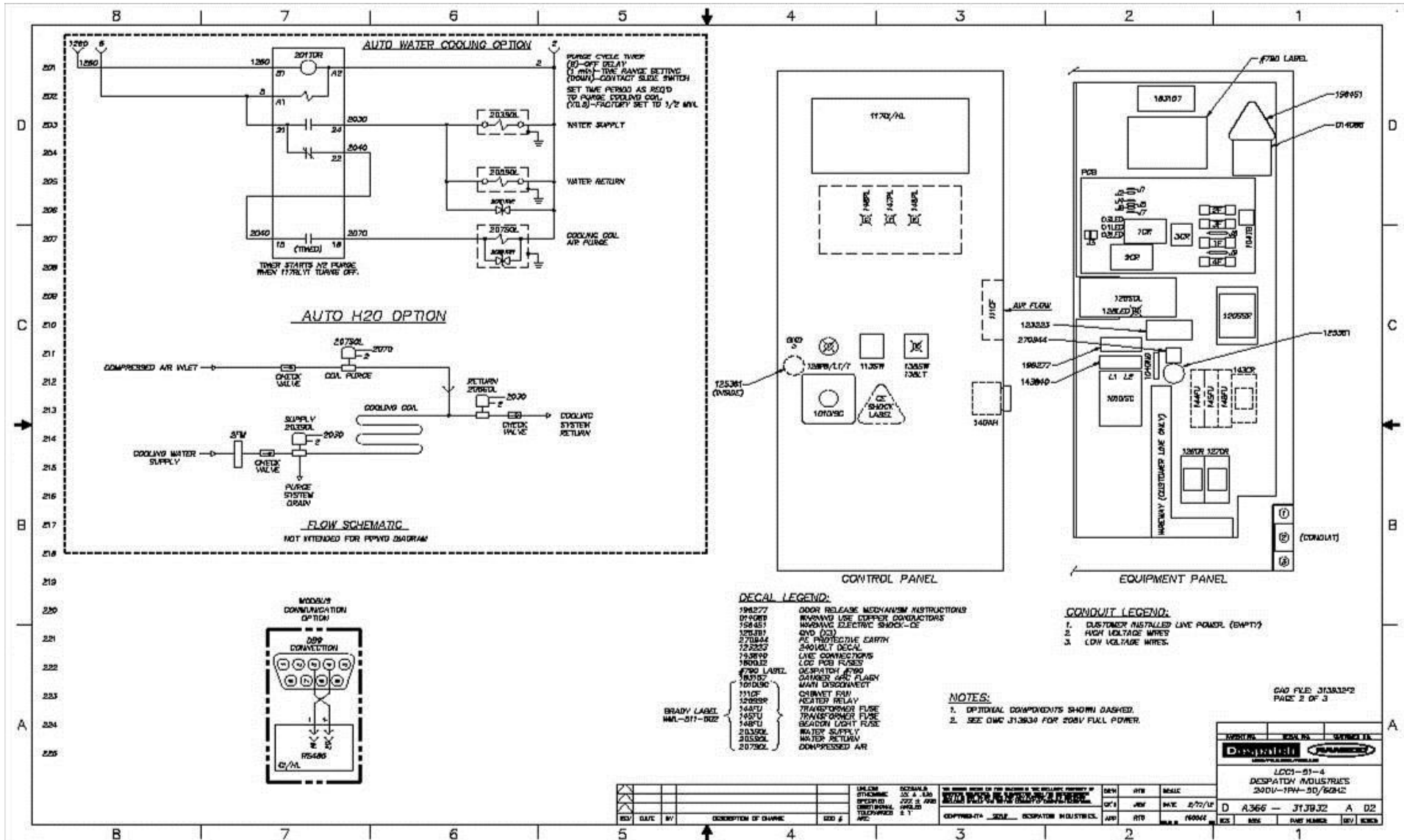


Figure 30. LCC1-51-4 (Drawing 313932-02).

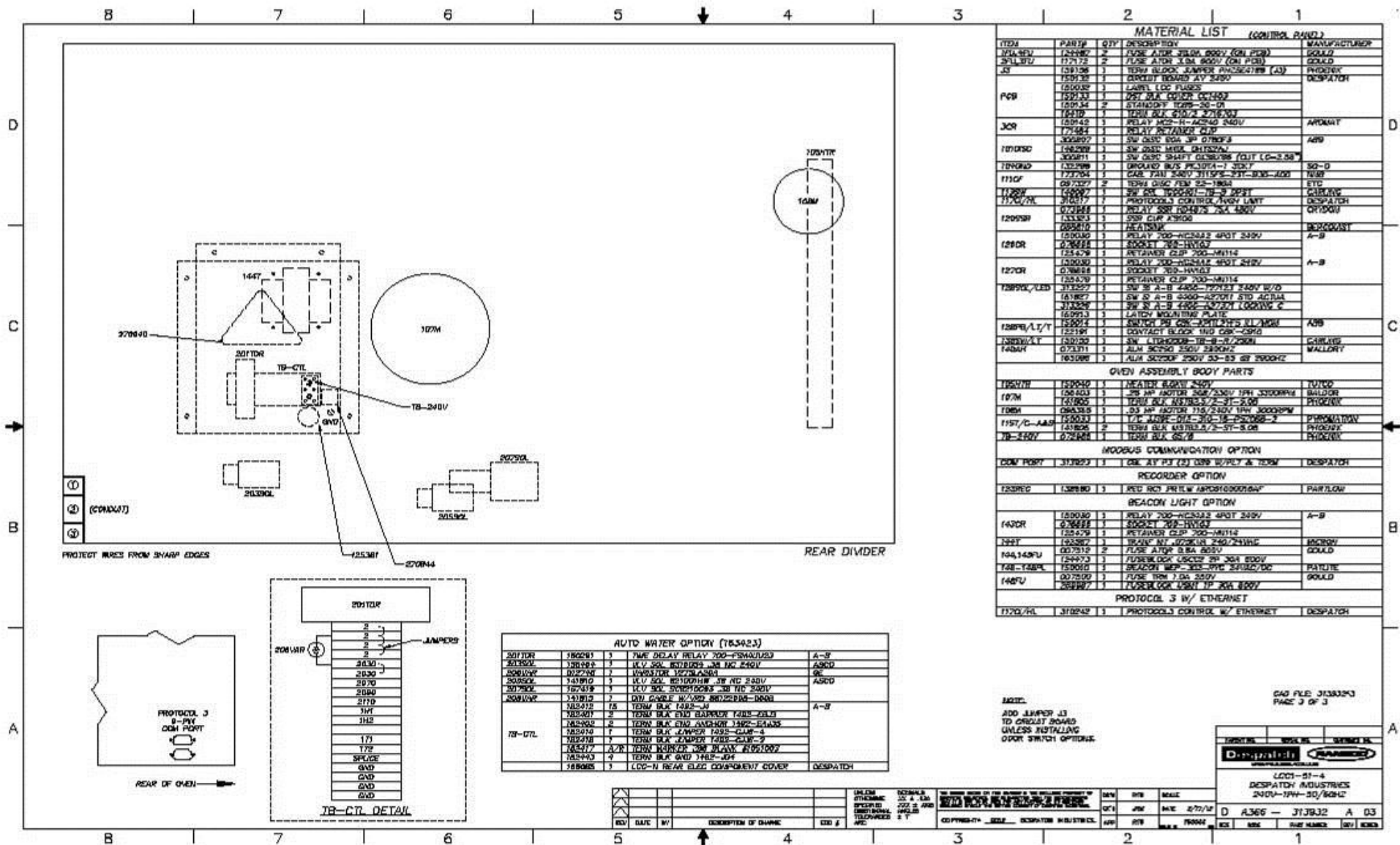


Figure 31. LCC1-51-4 (Drawing 313932-03).

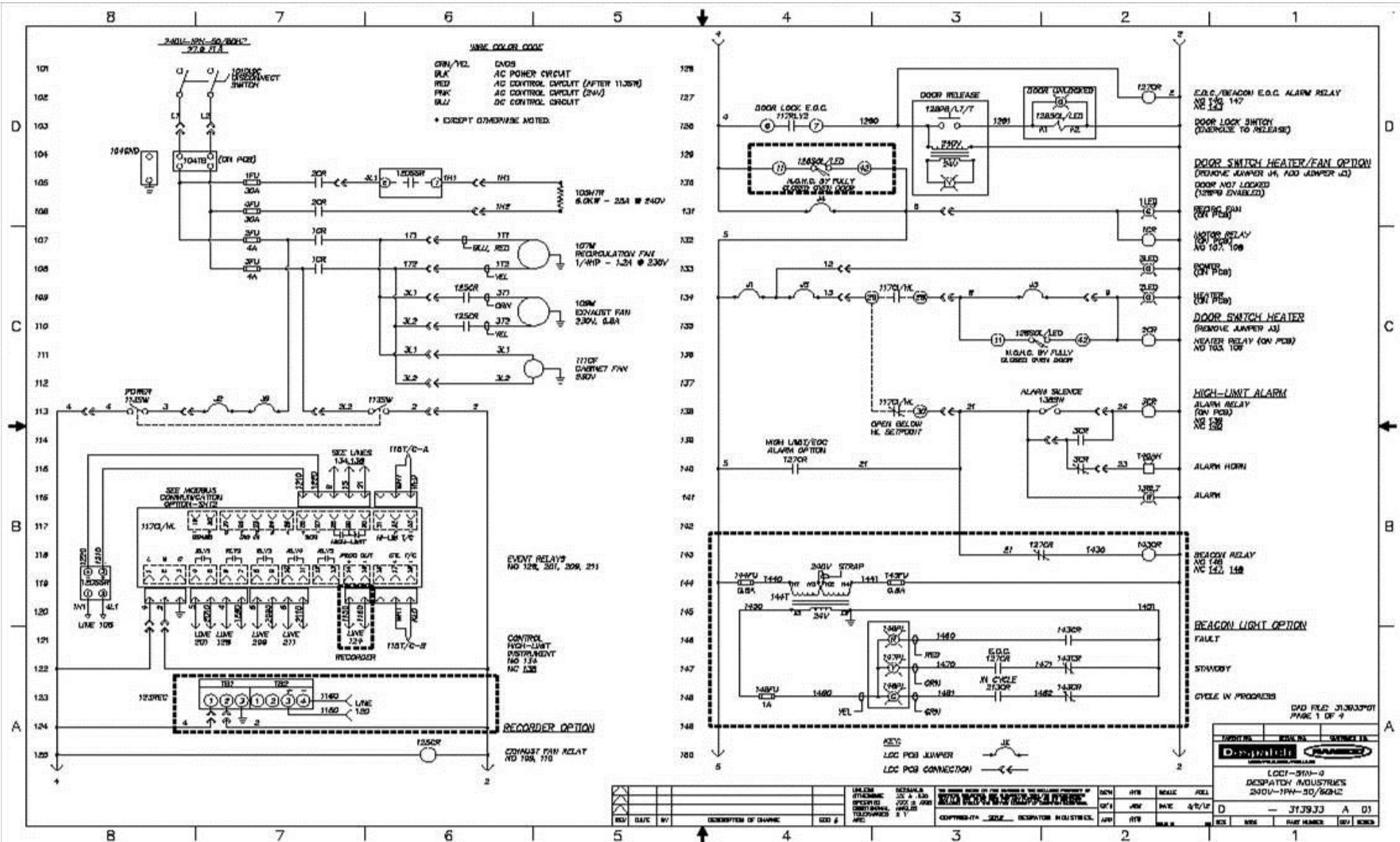


Figure 32. LCC1-51N-4 (Drawing 313933-01).

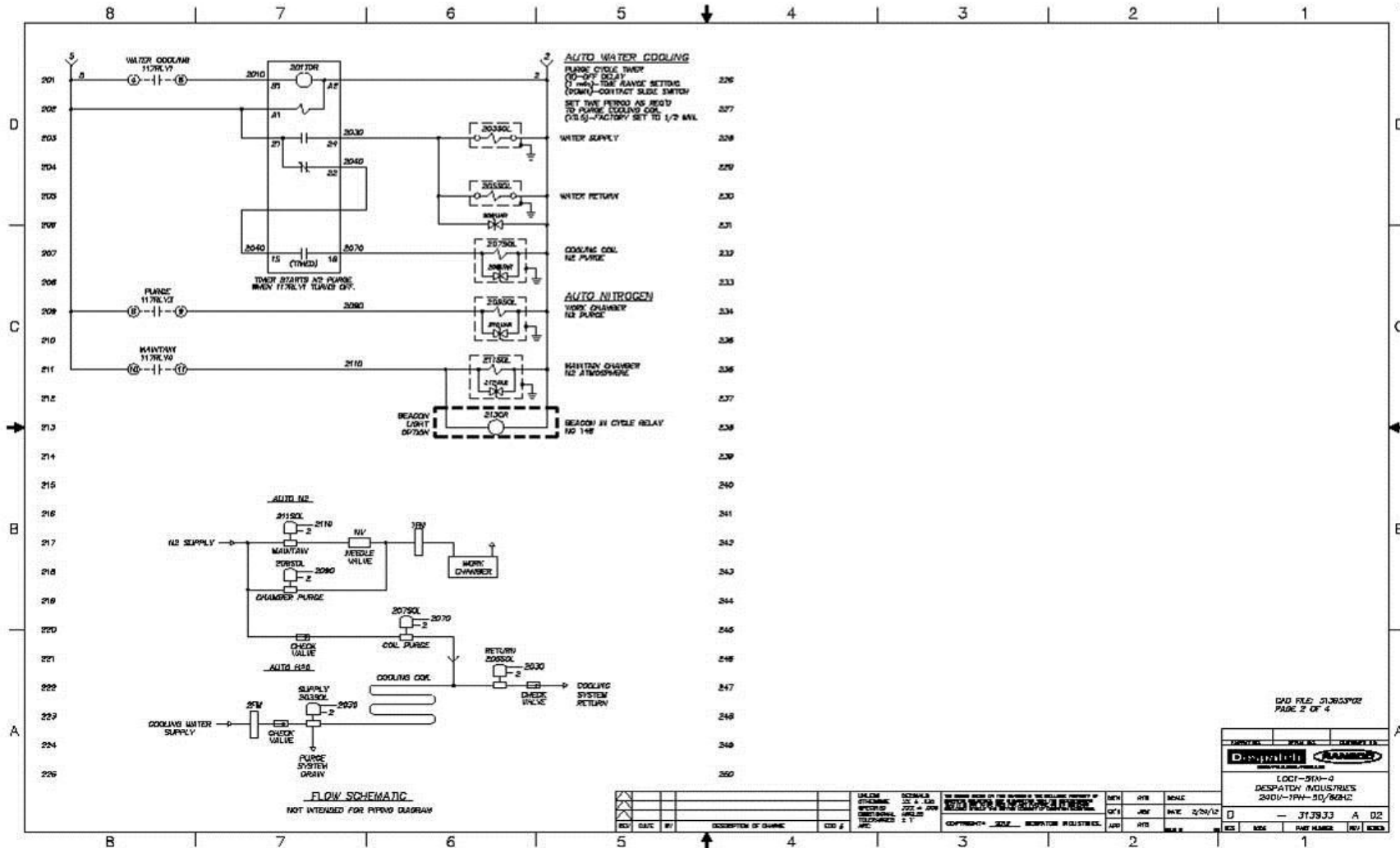


Figure 33. LCC1-51N-4, Drawing 313933-02.

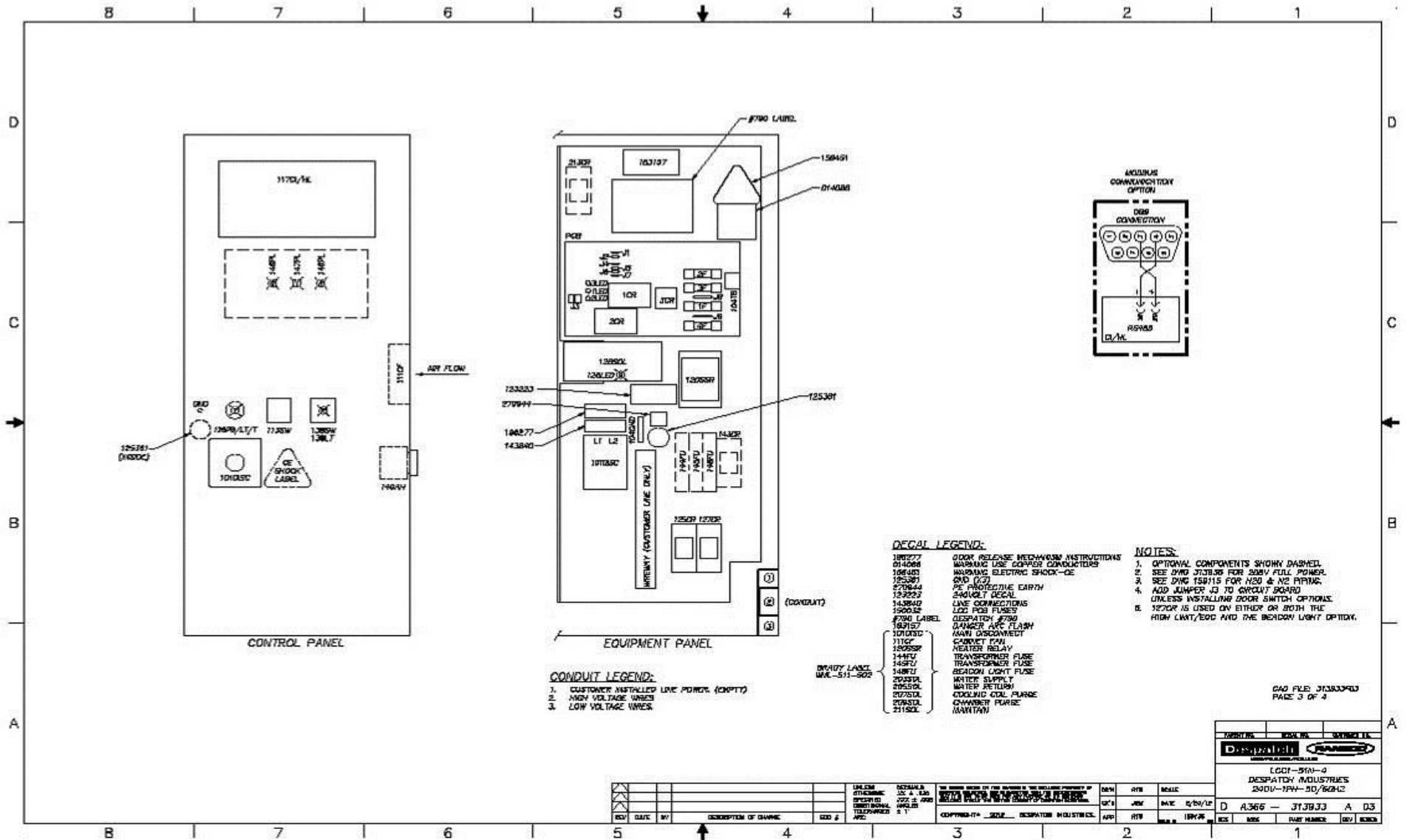


Figure 34. LCC1-51N-4 (Drawing 313933-03).

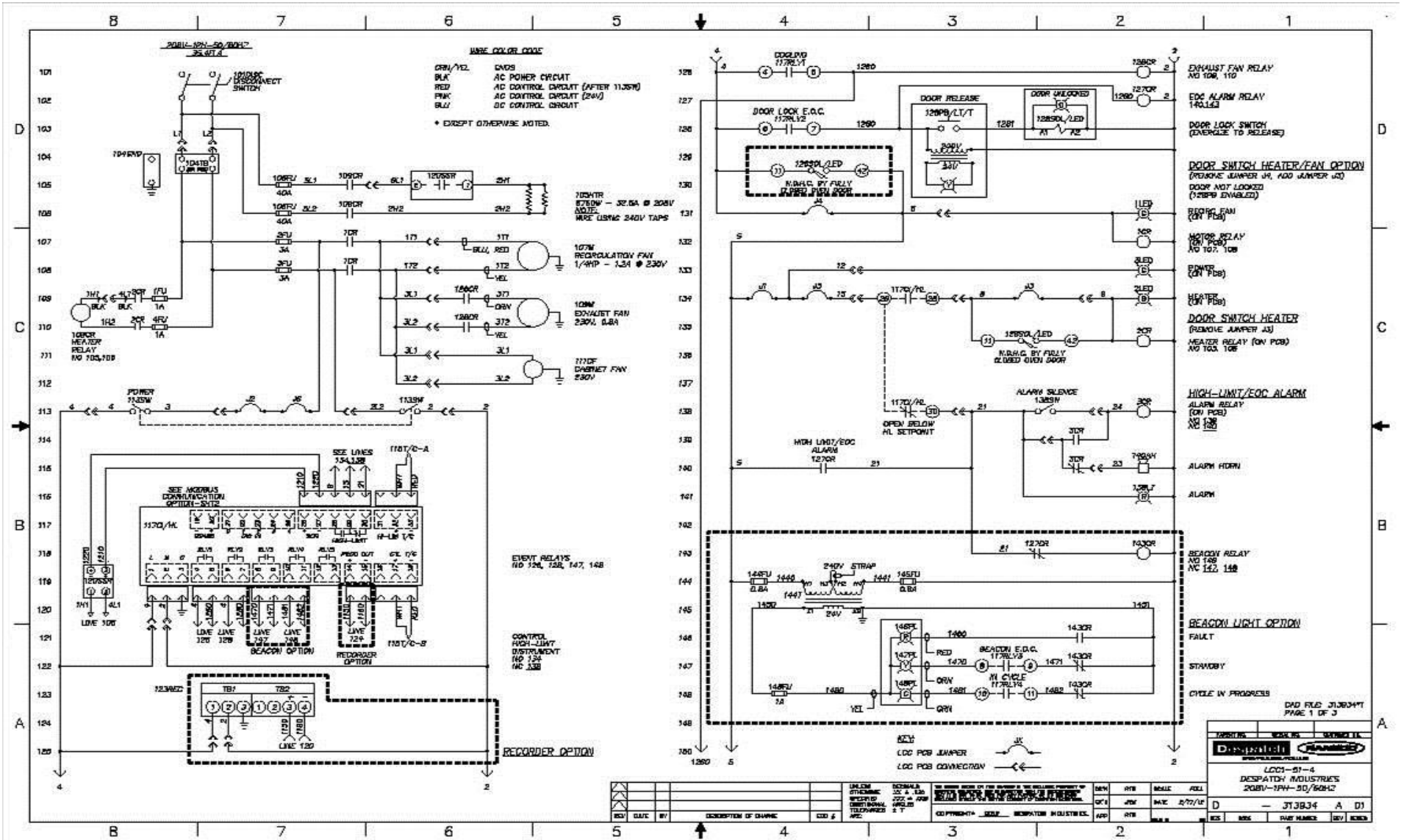


Figure 36. LCC1-51-4 (Drawing 313934-01).

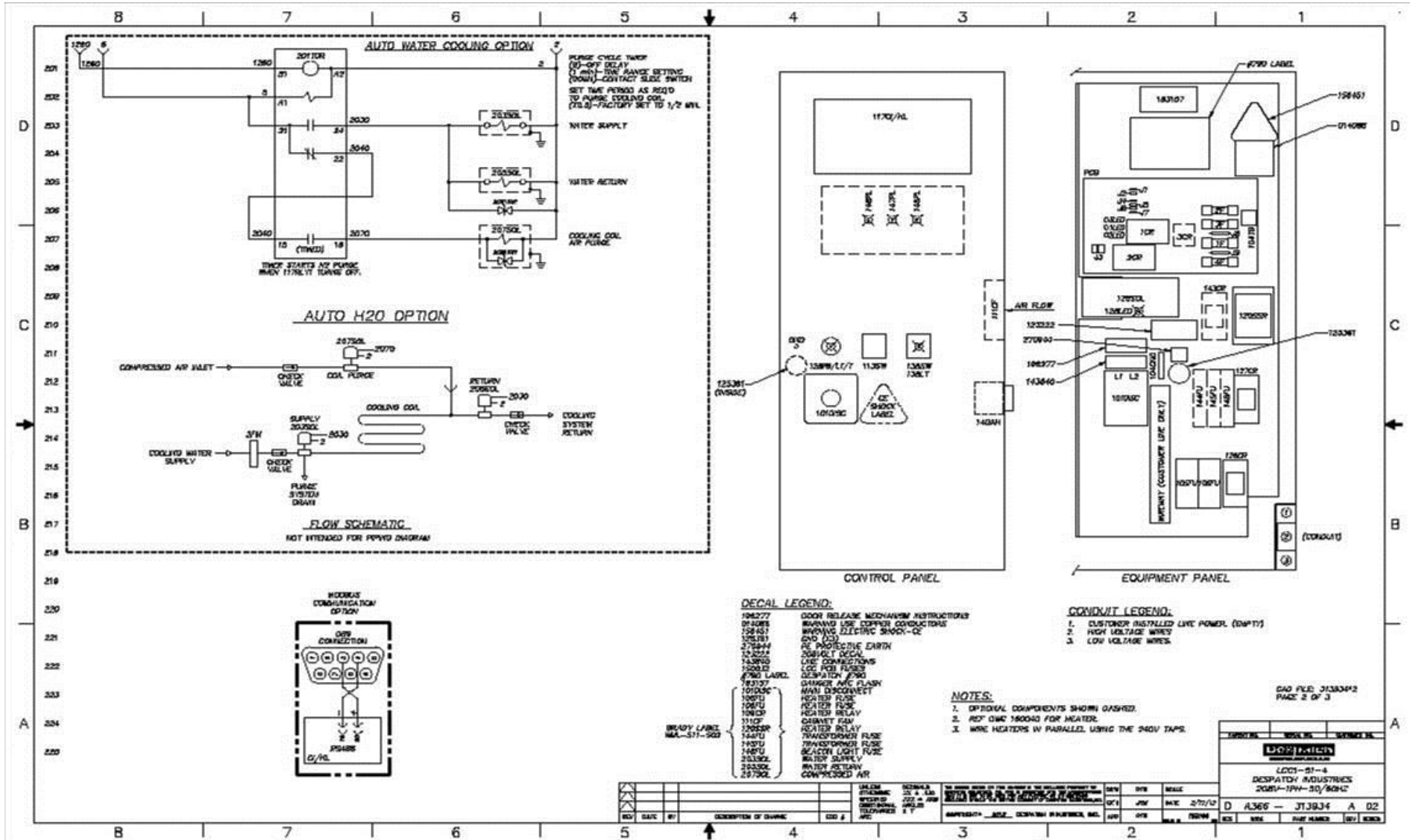


Figure 37. LCC1-51-4 (Drawing 313934-02).

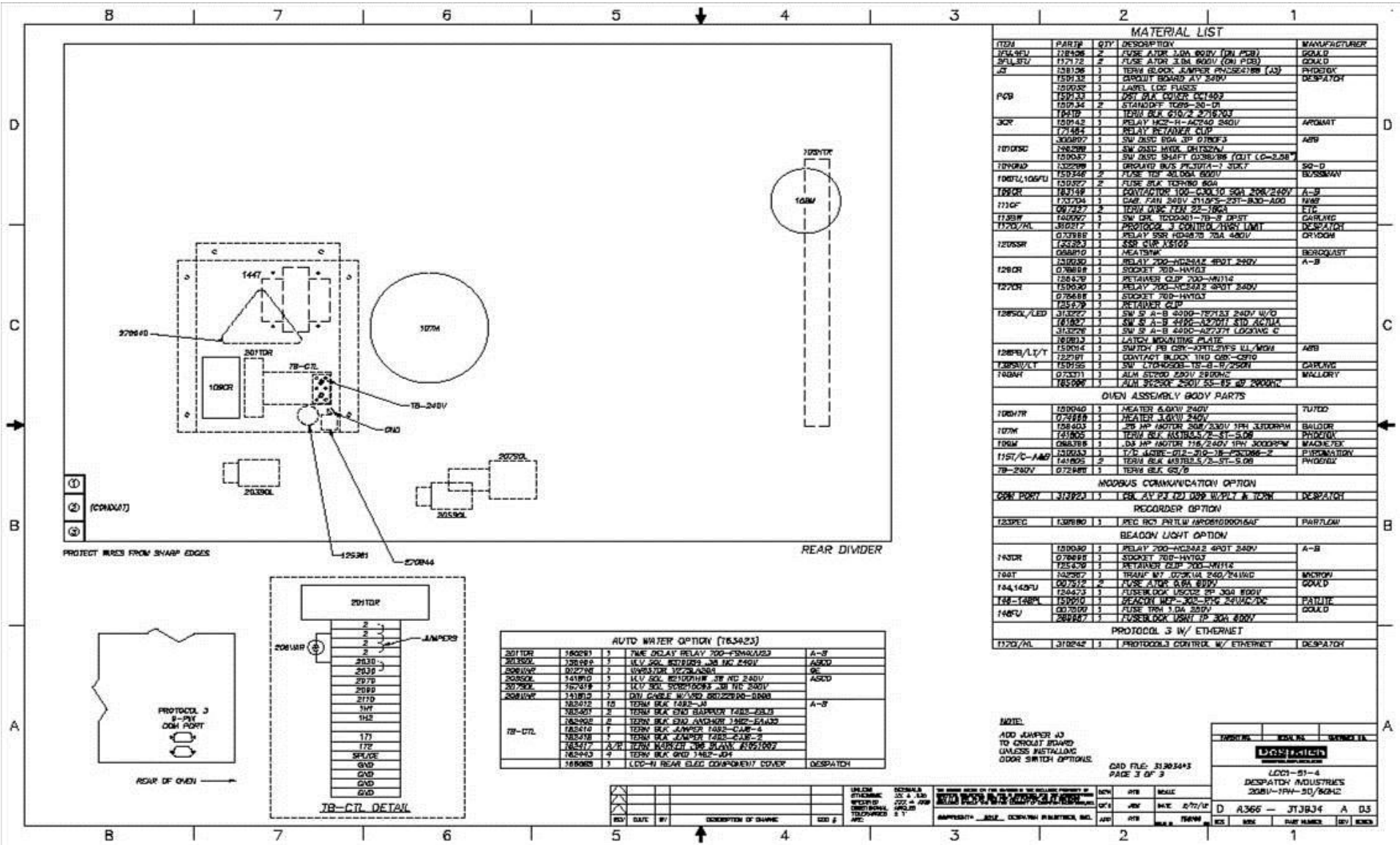


Figure 38. LCC1-51-4 (Drawing 313934-03).

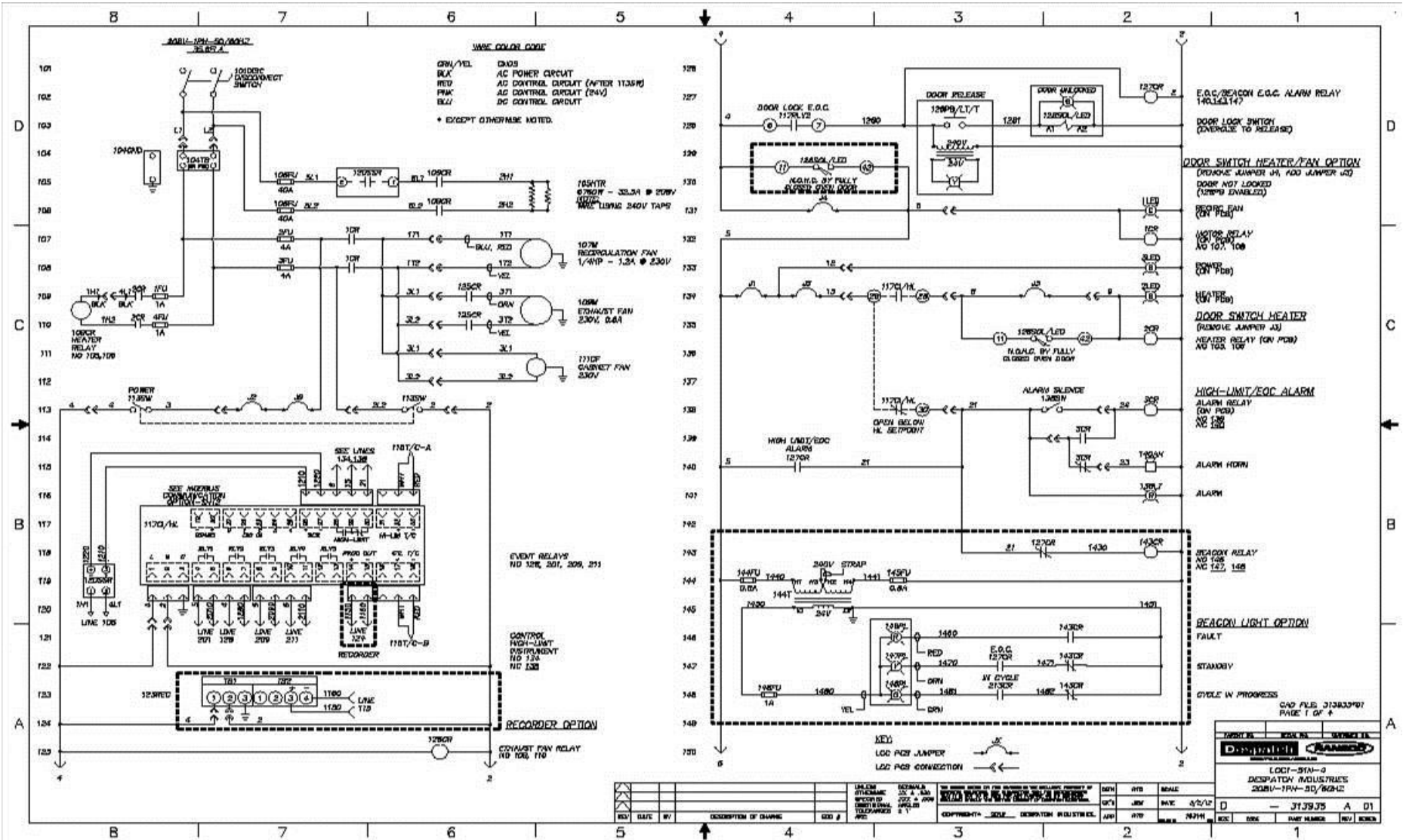


Figure 39. LCC1-51N-4 (Drawing 313935-01).

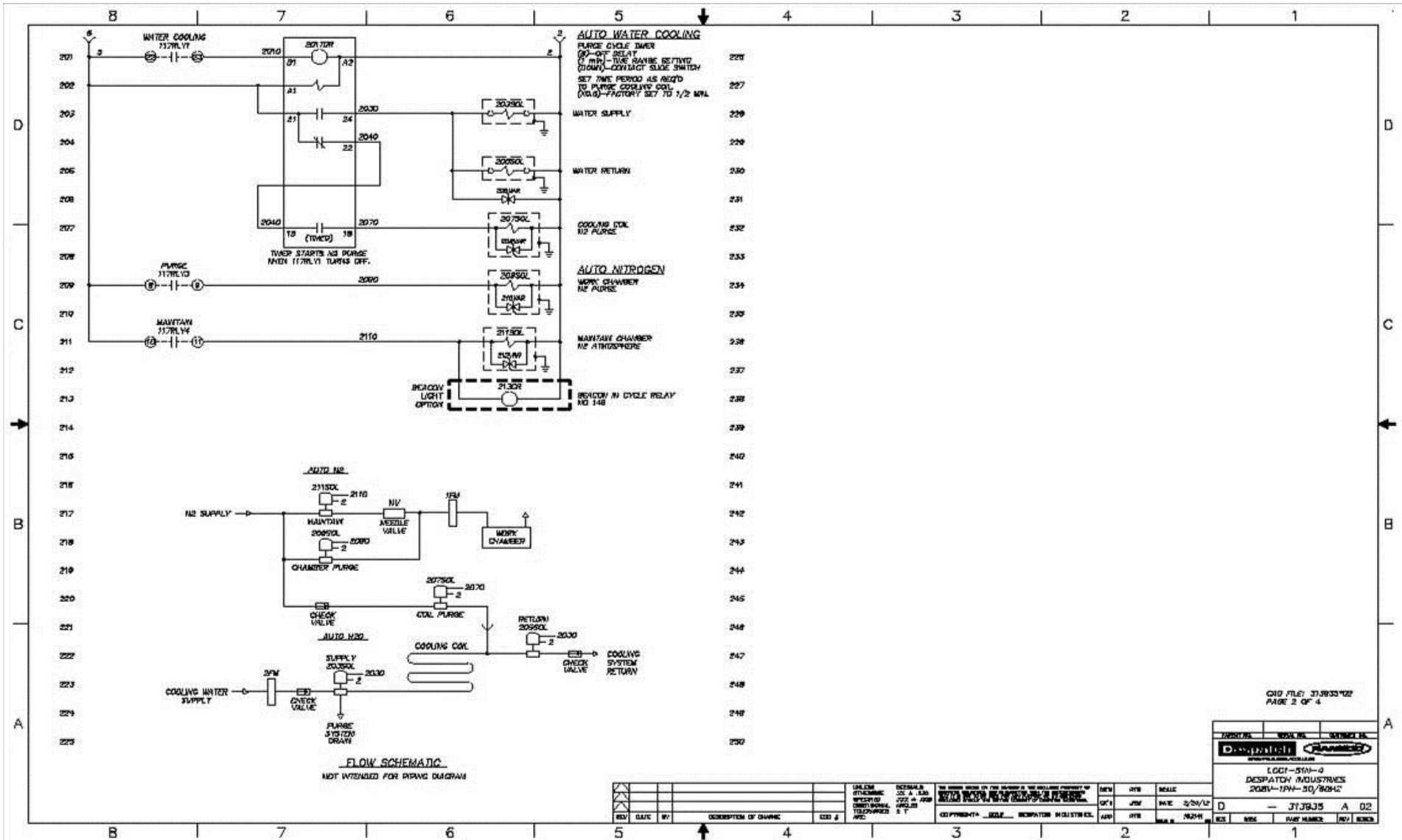


Figure 40. LCC1-51N-4 (Drawing 313935-02).

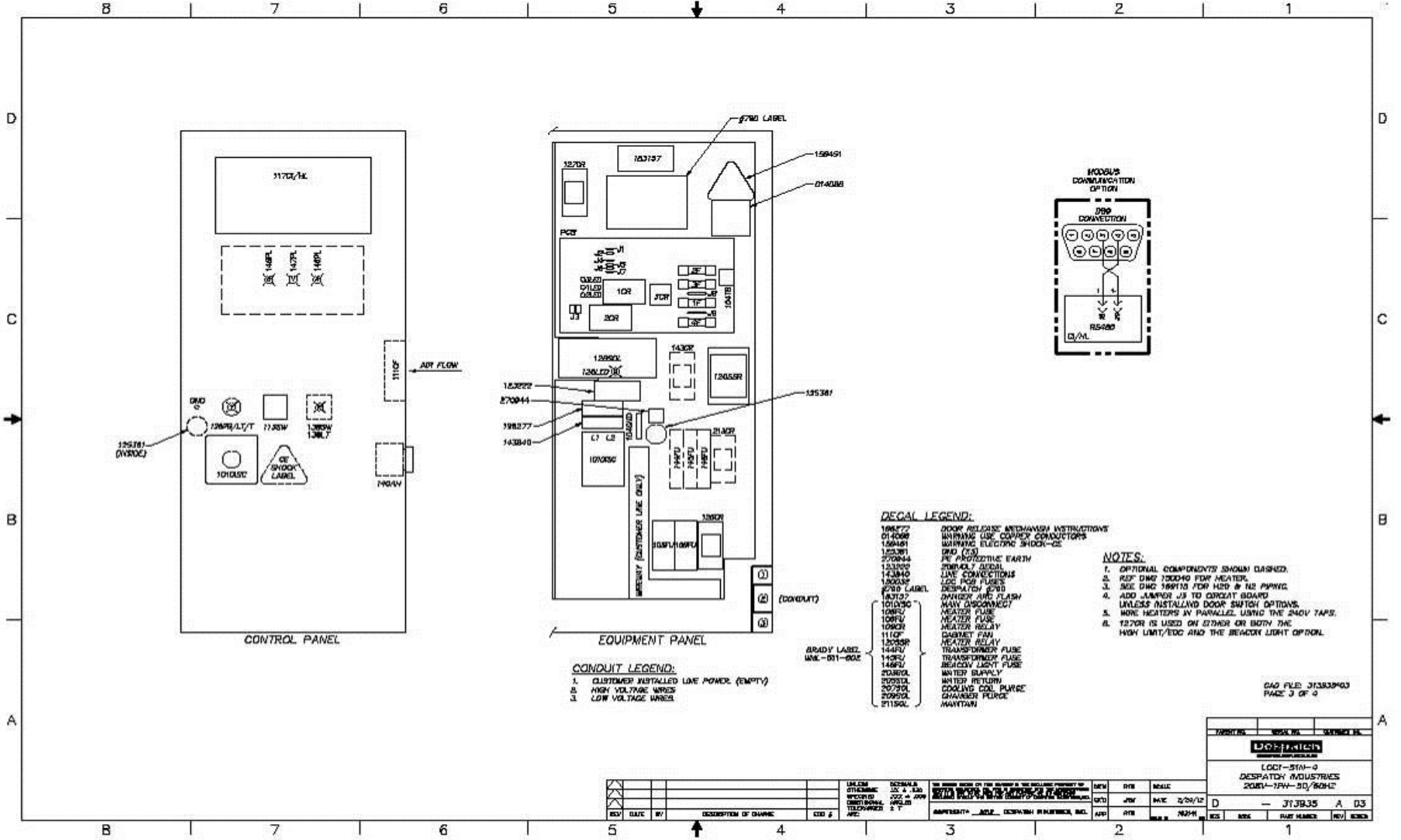


Figure 41. LCC1-51N-4 (Drawing 313935-03).

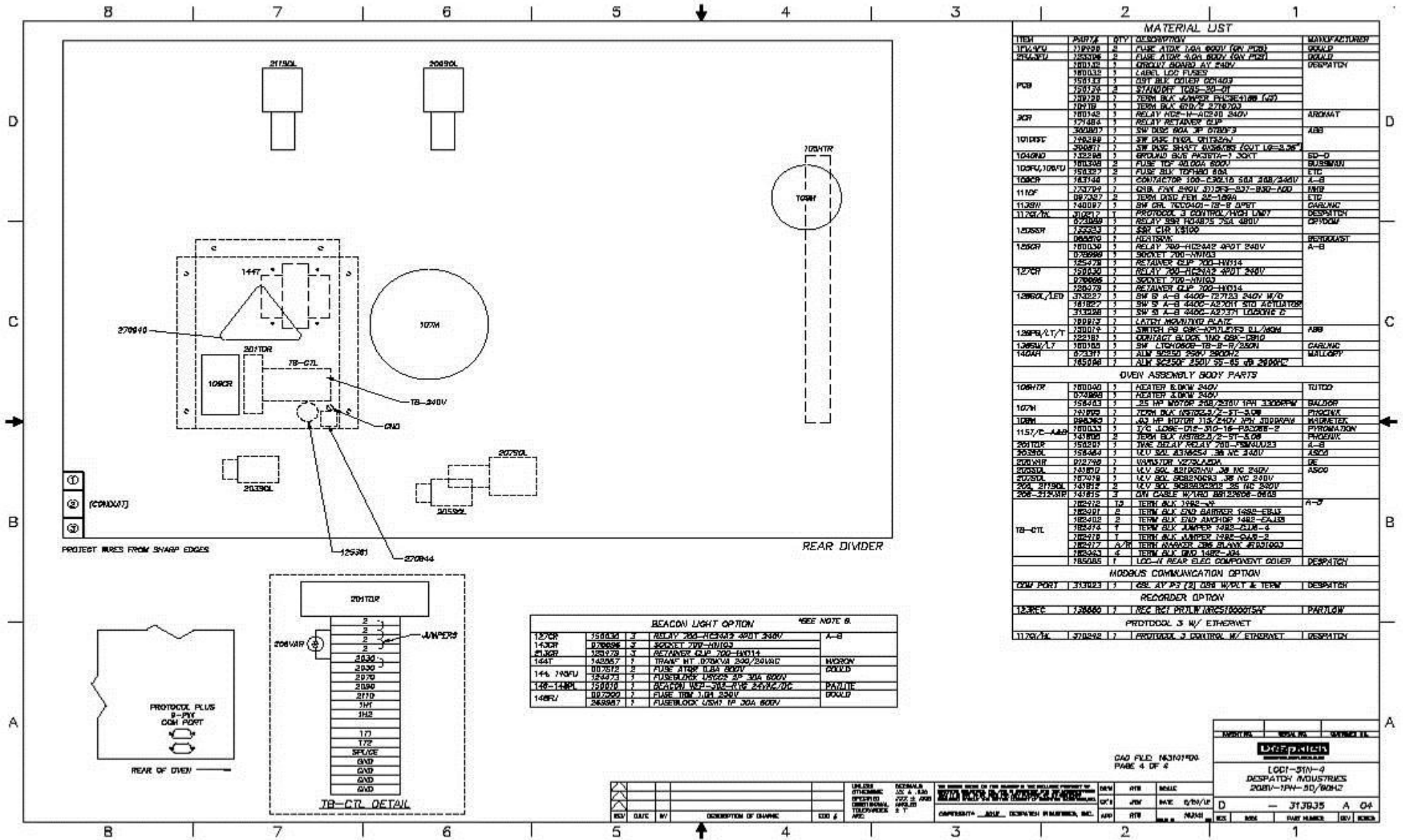


Figure 42. LCC1-51N-4 (Drawing 313935-04).

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