



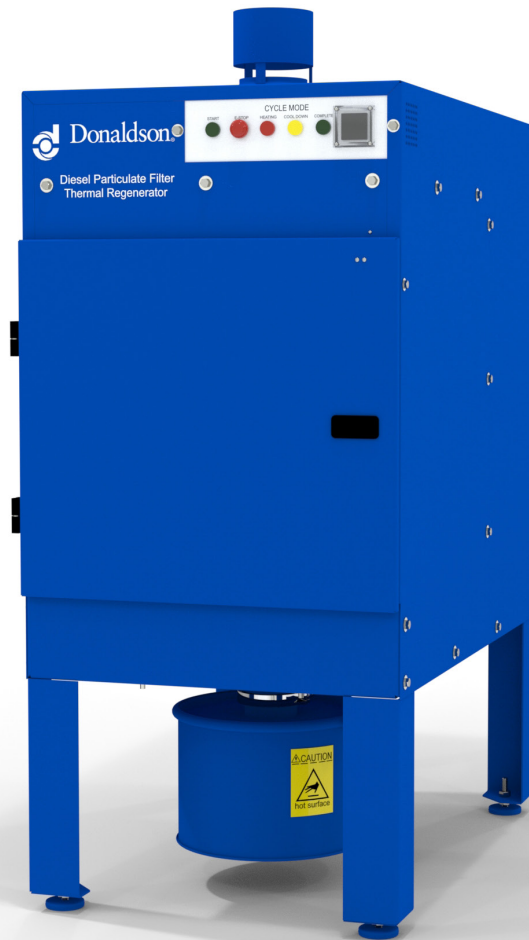
Donaldson  
FILTRATION SOLUTIONS

## OWNER'S MANUAL

Installation, Operation, and Maintenance Information

### DPF Thermal Regenerator

Cleaning System Part No. X007955



This manual is property of the owner. Leave with the unit when installation and start-up are complete. Donaldson Company reserves the right to change design and specifications without prior notice.

Do not make any system modifications or adjustments that would alter the original retrofit installation. Modifications may not meet California ARB Executive Order requirements, be considered illegal devices and may result in denial of warranty coverage.

Consult your Donaldson certified emissions dealer if you have questions regarding the installation, operation, maintenance or warranty.

Illustrations are for reference only as actual product may vary.



**This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.**



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### Introduction

Thank you for purchasing the Donaldson DPF Thermal Regenerator!

Donaldson markets two separate cleaning cabinets for routine cleaning and regeneration of diesel particulate filters (DPFs). The first stage is the DPF Pulse Cleaner.

The DPF Thermal Regenerator cabinet is the second stage of our DPF Cleaning System – designed to remove hydrocarbons and unburned particulate matter within the filter channels. This unit is designed for Donaldson DPFs, but accommodates multiple sizes of DPFs (up to 14" in diameter and up to 20" in height, 14" w/Thermal wrap).

The DPF Thermal Regenerator provides vehicle maintenance facilities an enclosed, automated cabinet that burns diesel particulate matter (PM) on a highly loaded (or plugged) diesel particulate filter.

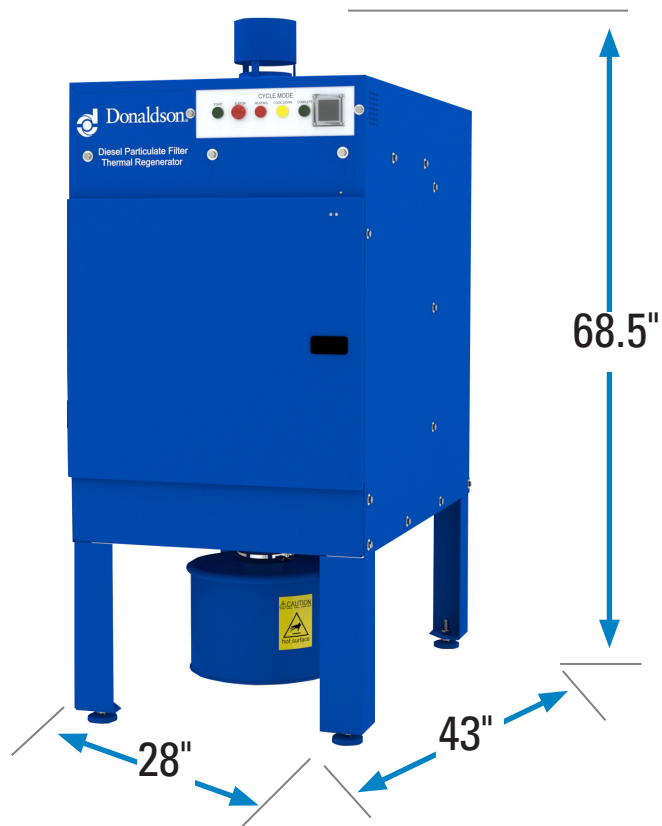
The thermal regeneration process for a diesel particulate filter is required for one of two situations; (1) routine service as required in the owners manual or (2) as indicated by your on-board service monitor. The length of time required to clean one diesel particulate filter with the DPF Thermal Regenerator is seven (7) hours.

After a diesel particulate filter has completed the thermal regeneration process in the cabinet, the DPF must be pulse cleaned a final time (using a DPF Pulse Cleaner) to remove ash remaining on the filter.

### Pre-Installation

#### DPF Thermal Regenerator Location

- Unit weight: 500 lbs.
- Rests on foot levelers
- Install indoors only and on a hard flat surface
- Allow a minimum 12" clearance on all sides
- Consider placing near a DPF Pulse Cleaner and on level ground
- Do not place on second floor of building

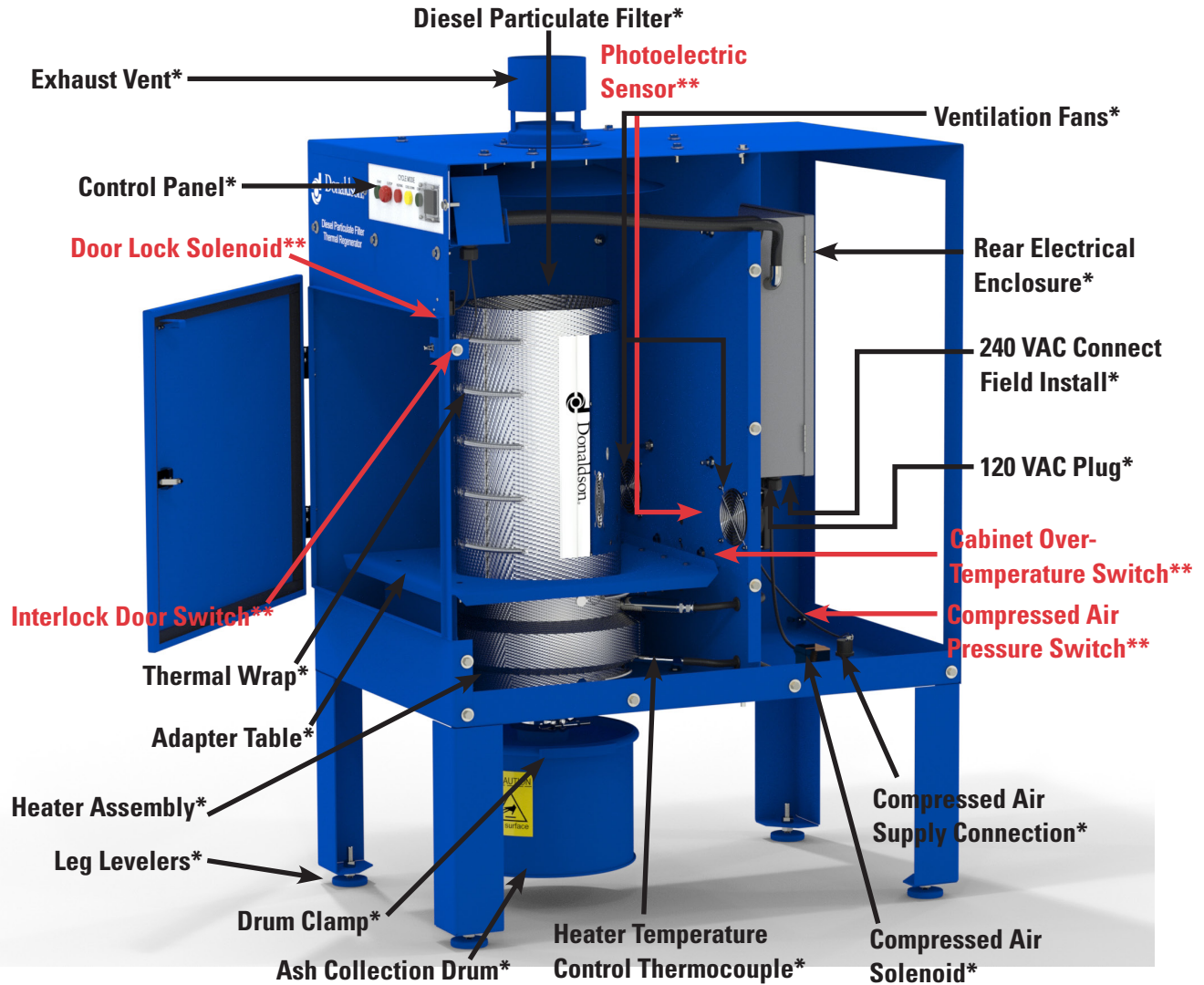


Cabinet Dimensional Foot print: 28"W x 43"D x 68.5" H  
Clearance Requirement: 12" open space on all sides (52"W x 67"D x 80.5" H) Works with DPF Sized: up to 15" in diameter and up to 20" in height.

#### The following must be available PRIOR to installing the DPF Thermal Regenerator

- Power Supply: single phase 30 amp 208 or 240VAC and 15 amp 120VAC power
- Clean, dry compressed air source: 90 PSI @ 4 SCFM
- Exterior vent connection (to roof or outside wall) - use standard 6" metal ventilation duct (refer to state & local code)
- Space Requirement: Foot print (see above): 28"W x 43"D x 68.5"H (add 12" clearance to all sides)
- Contact your local disposal company for proper ash disposal regulations and procedures

## Cabinet Schematic



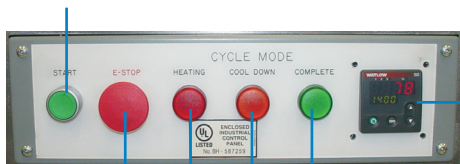
\* Features

\*\* Safety

### Cabinet Control Panel Features

#### Start Button

Initiates the cleaning cycle. Note: This button does not illuminate.



**E-Stop**  
Emergency Stop button

#### Heating/Cool Down Cycle & Complete Indicators

The entire process will take 7 hours. The lights will illuminate continuously during their respective cycle or until the cleaned filter is removed from the unit.

#### Tamper-proof Temperature Display

The information on this display works with built in safety sensors. Do not tamper or remove the display's protective shield. Damage to the display may void your warranty or disable the cleaning system.

## Installation

1. Install the cabinet on a solid, level surface. Make sure to leave a minimum 12" clearance on all sides. Using the leg levelers, adjust until cabinet is level.
2. Connect the cabinet vent ducting. The vent ducting must be metal, 6" diameter and as short as possible. All horizontal runs should pitch upward at least 1/4" per linear foot. Check local and state codes for proper ventilation.
3. Connect the cabinet air valve assembly to a clean, dry compressed air supply (90 PSI @ 4 SCFM) with a 1/4" I.D. minimum line size. Install a compressed air shut off valve and bleed type air filter upstream of the connection. Follow all local codes.
4. Hard-wire a single phase 208 or 240 VAC/30A branch circuit and service disconnect to the cabinet rear enclosure as indicated in the Control Circuit electrical schematic in this manual. Follow all local electrical codes.
5. Soft-wire a single phase 120 VAC/15A electrical cord with a grounded female connector to the cabinet rear enclosure 120 VAC plug. Follow local electrical codes. Refer to the Power Circuit electrical schematic in this manual.

## Explanation of Operation

A diesel particulate filter must be pulse cleaned before cleaning in the thermal regenerator. After pulse cleaning the filter, wrap the filter with the supplied thermal wrap, place the filter (dirty side [inlet] down) inside the cabinet centered on the heater assembly. Verify the "shiny" part of the thermal wrap is facing towards the back/rear of the machine and lock the cabinet doors before starting the DPF Thermal Regenerator.

The cleaning cycle duration is seven (7) hours. During the cleaning process the filter goes through a pre-heating stage, a controlled combustion air pulse heating cycle,



	<b>CAUTION!</b> <b>Do Not Regenerate Fuel/Oil Soaked Cores.</b>
Regenerating fuel/oil soaked cores will damage the DPF section. Contact Donaldson Technical Services for further information.	

followed by a cool down cycle to slowly lower the temperature of the filter and reduce the potential of filter damage from thermal shock.

After the cool down cycle is completed, the diesel particulate filter can be removed from the Thermal Regenerator cabinet and reinstalled in the Pulse Cleaner for a final cleaning of the ash residue.

The DPF Thermal Regenerator has six safety devices. They are denoted by a double asterisks (\*\*) on page 4 and include:

1. An open door alert switch that prevents the cleaning process from starting if the door is not properly closed.
2. An electric door lock that prevents the door from opening during the cleaning process.
3. A filter placement sensor checks if the dirty filter and heat blanket is properly positioned and placed on the heater assembly. The cleaning operation will not start if the filter heat blanket is not installed correctly.
4. An air pressure safety switch - detects improper air pressure.
5. A high-heat cabinet sensor shutdown. If the filter does not have the proper thermal wrap protection excessive heat in the cabinet is generated and this sensor shuts down the cleaning cycle.
6. An emergency stop (E-Stop) button.

## Filter Tracking

Donaldson recommends that a tagging system be used to track the filter during the entire cleaning system.

<b>NOTE</b>	<b>Re-install the Filter in the Same Vehicle from Which It Came.</b>
Diesel particulate filters come in different sizes (e.g. 10.5" vs 11.25" vs. 12" dia.) and the filtering capabilities may also be different; (e.g. 100 cpsi vs. 200). In most cases a retrofit system has been carefully matched to the vehicle's engine and duty cycle. If the same DPF is not put in to the same vehicle, emissions system and engine performance may be compromised and void the diesel particulate filter muffler warranty.	



## How to Regenerate A "Dirty" Diesel Particulate Filter

A diesel particulate filter removes particulate matter and inorganic ash from diesel exhaust. Under normal operating conditions the filter collects and burns particulate matter. However, inorganic ash from the oil does not burn so it slowly accumulates in the filter. This makes it necessary to remove the ash from the filter on a periodic basis.

Diesel particulate filters capture all particulate matter and other volatile compounds generated from a diesel engine. Proper protection gear is recommended for the individual handling the filter during the service procedure.

	<b>CAUTION!</b> <b>PPE for regular handling of filter during cleaning process.</b>
<p>The ash collection drum may contain particulate matter and inorganic ash generated from a diesel engine. Wear proper eye, face (breathing) and hand protection gear when servicing the ash collection drum to prevent exposure or inhalation.</p>	

### Total Filter Regeneration Time

The entire regeneration cycle is seven (7) hours. During this process, the filter goes through a controlled combustion air pulse heating cycle followed by a cool-down cycle that slowly lowers the temperature of the filter to reduce filter damage.

### Remove the Filter from Vehicle and Pulse Clean

1. Remove the diesel particulate filter from the vehicle in accordance with the instructions provided in the owners manual. If there is oil, coolant or fuel found in the exhaust stream while removing the DPF section, DO NOT CLEAN. Please contact Donaldson Engineering for further instruction.

	<b>CAUTION!</b> <b>Do Not Regenerate Fuel/Oil Soaked Cores.</b>
<p>Regenerating fuel/oil soaked cores will damage the DPF section. Contact Donaldson Technical Services for further information.</p>	

2. Pulse clean the filter prior to cleaning the filter in the DPF Thermal Regenerator.  
  
Soot can be packed so tightly in overloaded filters that it will block the combustion air from entering the channels. Pulse cleaning the filter will remove some soot/particulate matter maximizing the effectiveness of the thermal regenerator filter cleaning cycle.

## Wrap the Thermal Shield Around the Filter and Center the Filter on the Heating Unit

<b>NOTE</b>	<b>Installation Note on the Thermal Shield</b>
<p>The thermal shield retains the heat within the filter during thermal regeneration process. If the filter does not have the thermal shield, a high-heat sensor will shut down the cleaning cycle.</p>	

3. Position filter on the heating assembly (inlet, dirty side down). Center the filter over the tapered hole in the table.



4. Using the adjustable thermal wrap supplied, wrap the thermal shield around the filter and secure using the spring-loaded hooks. The thermal wrap is required to keep the temperature down to a safe level inside the cabinet and minimize thermal gradients across the filter. It can be used for filters diameters 9.5" to 14".  
  
The outer reflective surface of the thermal wrap should be clean. Over time, the surface may lose the clean, reflective finish or become dirty. Loss of the reflective surface will prevent operation because the safety photo sensor will not recognize that the thermal wrap is in place. Replacement wraps are available from Donaldson.
5. With filter secured and thermal wrap attached, close and latch the cabinet door and push the cycle start button.

After pushing the start button, the ventilation fans will engage, the "HEATING" light will illuminate and the heating cycle begins.

<b>NOTE</b>	<b>Temperature Display</b>
<p>Do not tamper or remove the display's protective shield. Damage to the display may void your warranty or disable the cleaning system.</p>	

<b>NOTE</b>	<b>Heating Light Does Not Illuminate</b>
<p>There are numerous safety mechanisms that prevent the HEATING CYCLE from starting. If the HEATING light is not illuminated, refer to the trouble shooting guide in this document.</p>	

## Control PLC Indicator Light Display

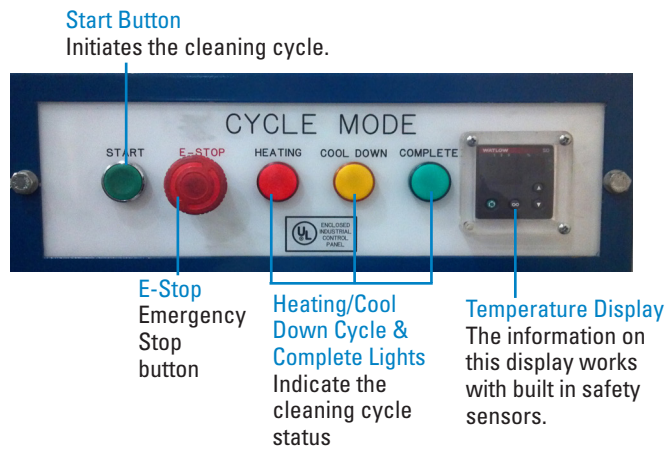
### On Start-Up: PLC Light



### After Pressing "Start"



## Control Panel

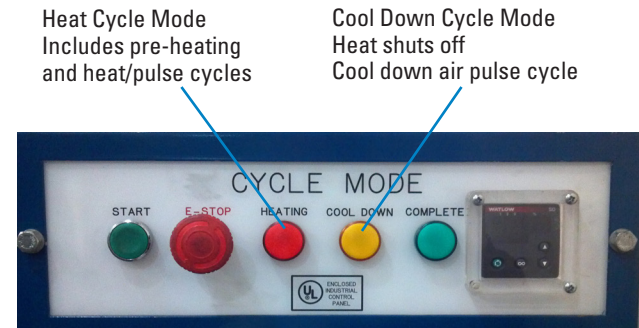


- Open the cabinet door.
- Use protective gloves when you remove the filter from the heating unit.
- Release the spring-loaded hooks from the thermal wrap, rotate and pull the wrap out of the cabinet.
- Remove the filter from the thermal regenerator.
- Pulse clean the regenerated filter with a DPF pulse cleaner.

NOTE	Pulse Clean the Regenerated Filter
The regeneration cycle may leave ash on the filter. The ash needs to be removed before use. Run the diesel particulate filter through a DPF pulse cleaner before installing in the vehicle.	

## Reset the Backpressure Monitor (if applicable)

If the vehicle is equipped with an on-board backpressure (or filter service) monitor, reset it using the instructions supplied with the EDM or BPM IOM.



## Cleaning Cycle

The control panel on the cabinet front (shown above) has three cycle modes: heating, cooling and complete. When the COMPLETE light is flashing, the regeneration (cleaning) cycle is over and the filter can be removed from the cabinet.

- After seven (7) hours the COMPLETE cycle mode light will flash. Press the E-stop and release button to reset the system for the next cleaning.

	<b>CAUTION! The Filter will be Hot When the COMPLETE Cycle Light Illuminates</b>
At the end of the cleaning cycle (when the "complete" light flashes), the filter is still hot enough to burn you if touched ( 180°F). Wear thick, heat resistance gloves when handling the filter to prevent burns.	

## Record Filter Service

Regulatory agencies require the following service records be maintained. Consider adding the following information in your vehicle maintenance logs.

- DPF section Part number
- DPF serial number
- Date of filter cleaning
- Mileage at filter cleaning
- Test pressure before and after cleaning
- EDM log file/screen shot of faults
- Frequency (#of time cleaned)



**Filter Cleaning Record Keeping**

Donaldson requires record keeping/tracking for all cleaning occurrences. Donaldson Engineering recommends the following data be tracked:

- Serial Number
- Date
- VIN or Vehicle ID #
- Frequency (if possible)
- EDM Download from Vehicle
- Person completing cleaning


Donaldson Engineering may request these records in a warranty situation.

**Service & Maintenance Procedures**

The DPF Thermal Regenerator requires minimal service. On a routine basis, the ash collection drum will need to be emptied.

**Emptying The Ash Collection Drum**

1. Before proceeding - determine local laws and regulations for the disposal of ash.
2. Move the container for collected ash material close to the ash collection drum for ease of transfer.

	<p><b>CAUTION!</b>  <b>Use Extra Care in Handling The Ash Collection Drum During Service!</b></p>
<p>Take care to support the drum during service. Dropping the drum during service will cause soot/ash to disperse. See CAUTION above for personal protection gear.</p>	

3. Release collection drum from unit by releasing the latch clamp and carefully lower it to the floor.
4. Empty drum contents and dispose of according to local laws and regulations.
5. Replace ash collection drum and reconnect the latch clamp. The drum is designed for reuse, but if you elect to dispose of the drum, for ease of maintenance, replacement parts are available through your Donaldson dealer.

**Spare Parts List**

Description	Part Number
Ash Collection Drum and Clamp	P228053
Heater Assembly	P230184
Door Switch	P228028
Door Lock Solenoid	P228073
Cabinet Temperature Switch	P228067
Photoelectric Sensor	P228068
Ventilation Fan *	P228065
Thermal Wrap	P230194
Compressed Air Pressure Switch	P228062
Compressed Air Solenoid Valve	P228071
Fuse Kit	P225336

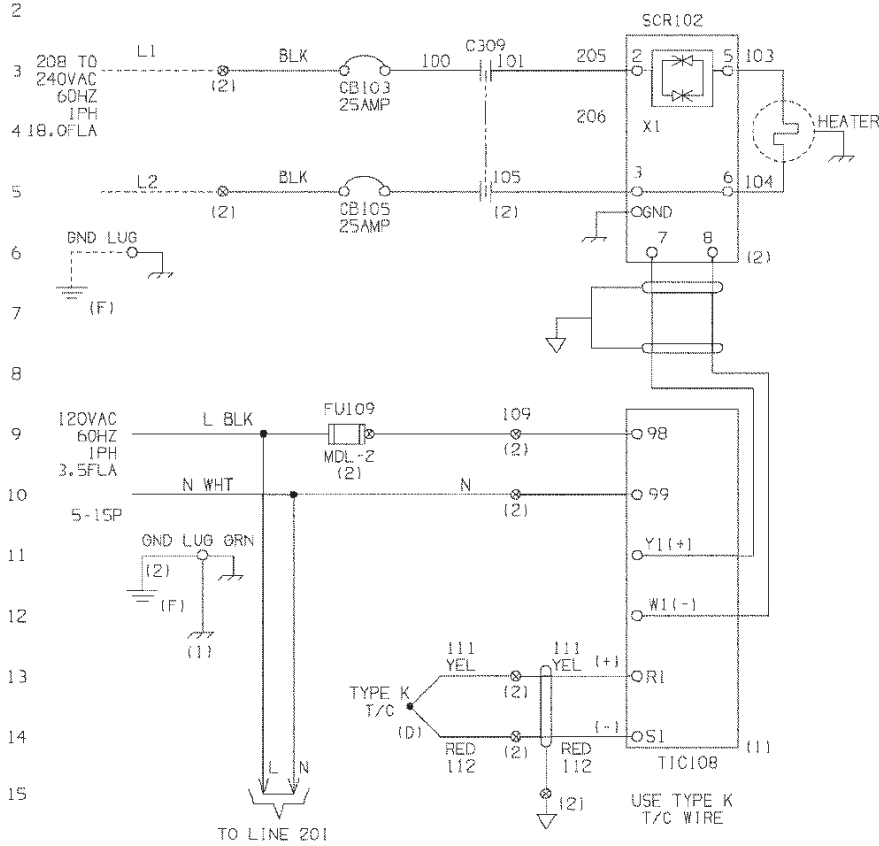
\* Unit has two fans the part number list is for one.

# Electrical Schematics

## Control Circuit

**NOTE**

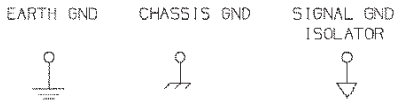
30A BRANCH CIRCUIT PROTECTION AND DISCONNECT MUST BE PROVIDED BY OTHERS AND MUST COMPLY WITH NATIONAL AND LOCAL CODES.



**NOTES**

1. SILICONE BASED PRODUCTS SHALL NOT BE USED ANYWHERE IN THIS ASSEMBLY.
2. ALL FIELD CONTROL WIRE TO BE MINIMUM 14 AWG 75° C COPPER, UNLESS OTHERWISE NOTED.
3. ALL CONDUIT HUB RATINGS MUST BE EQUAL TO OR SURPASS THE ASSEMBLY ENVIRONMENTAL RATING.
4. WHEN ORDERING REPLACEMENT PARTS, PLEASE SUPPLY THE JOB NUMBER AS SHOWN INSIDE THE CONTROL PANEL DOOR.
5. MANUFACTURERS OF COMPONENTS USED IN THIS ASSEMBLY ARE SUBJECT TO CHANGE WITHOUT NOTICE.
6. THIS DOCUMENT IS THE PROPERTY OF THE END USER, PLEASE DO NOT REMOVE FROM THE ELECTRICAL CONTROL ENCLOSURE.

**GROUND SYMBOLS**

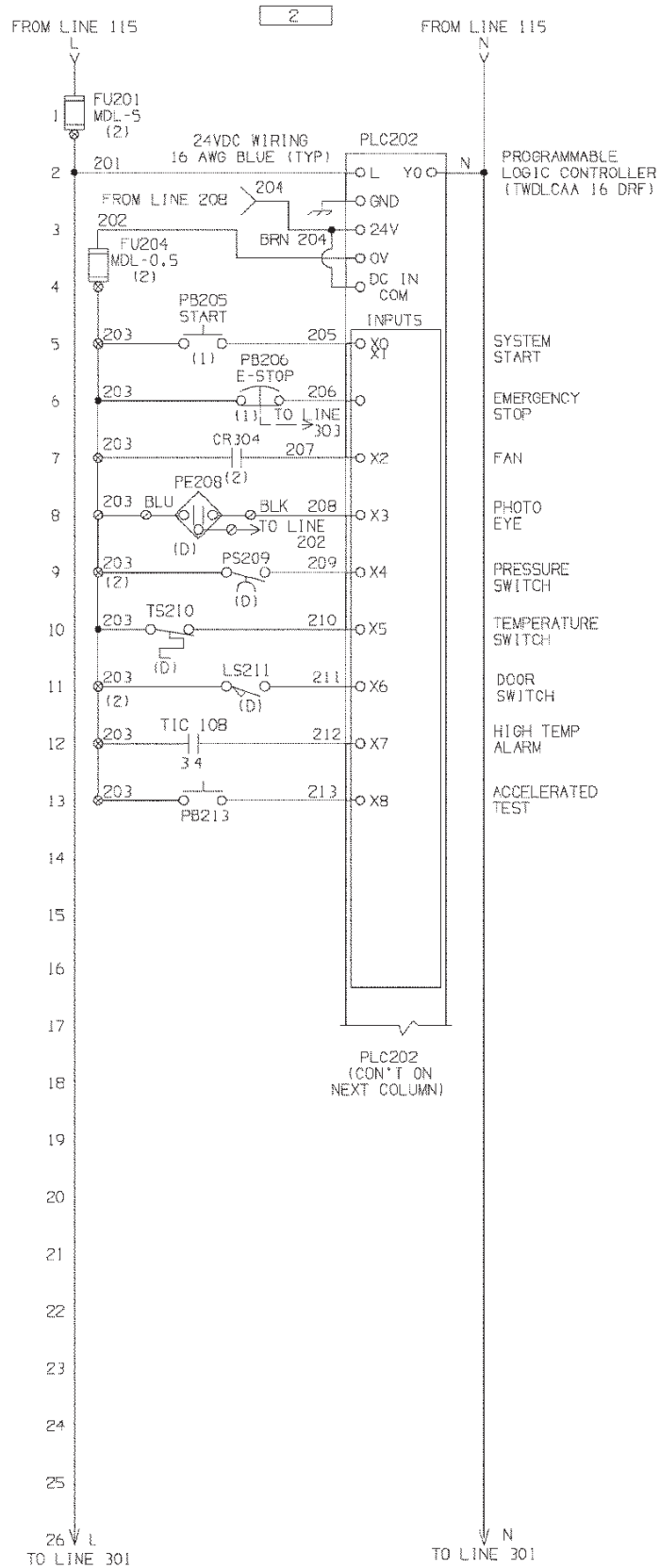


**LOCATION CODES:**

- (1) DEVICE LOCATED IN FRONT ENCLOSURE
- (2) DEVICE LOCATED IN BACK ENCLOSURE
- (D) DEVICE LOCATED IN DONALDSON CABINET
- (F) DEVICE LOCATED IN THE FIELD
- ⊗ TERMINAL IN CONTROL PANEL
- INDICATES FIELD WIRING
- ⊙ SCREW TERMINAL NEAR BOTTOM LEFT OF CABINET

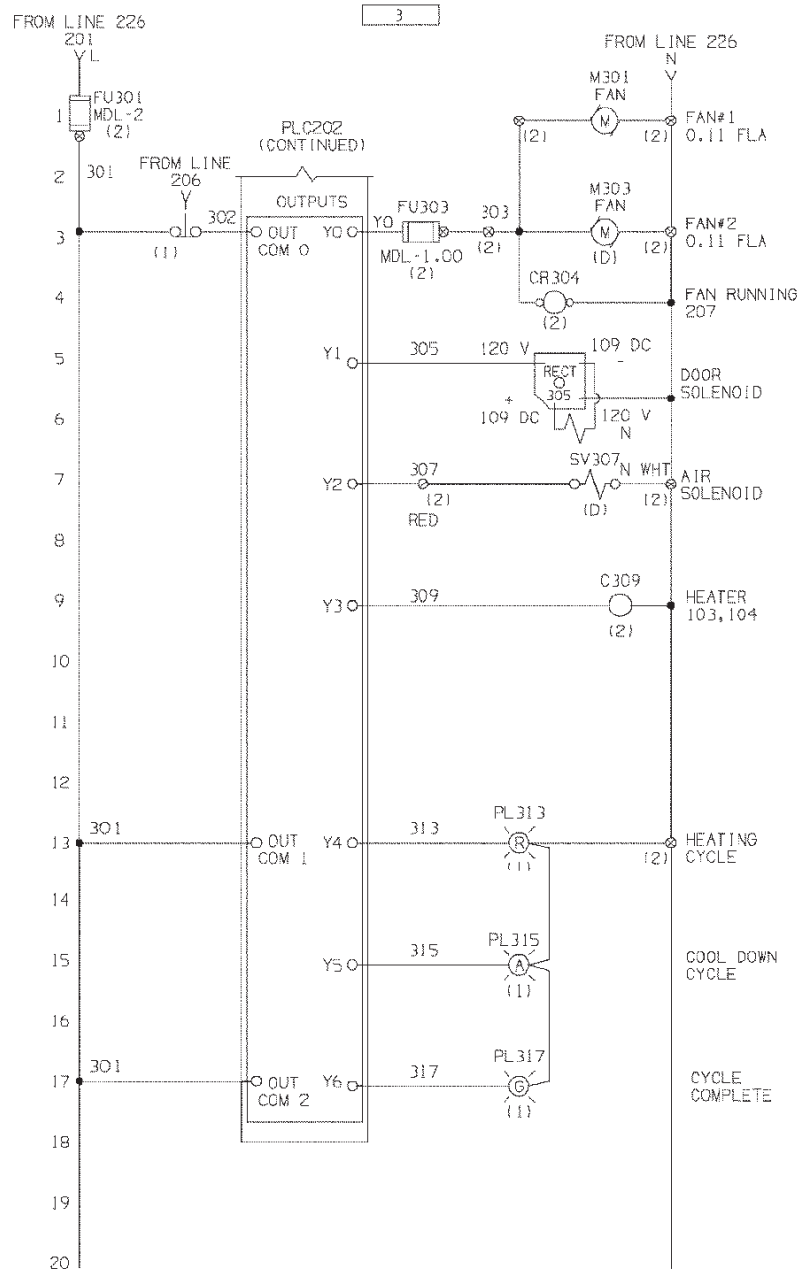
# Electrical Schematics

## Control Circuit



Control Circuit

- continued



## Thermal Regenerator Troubleshooting Guide

Trouble	Possible Cause	Test	Remedy/Actions
<b>1. Unit does not start, no illuminated lights, temperature controller is illuminated</b>	Door not closed properly	Temporarily short circuit door switch.	Check door switch.
	Doors switch has improper contact	Temporarily short circuit door switch.	Check door switch electrical connections.
	Thermal wrap not properly installed on substrate	Look in rear of machine for the red LED on the photoelectric eye located directly below the electrical box. If there is no illuminated LED, follow the "remedy".	Rotate thermal wrap such that the reflective portion is towards the photoelectric eye. The thermal wrap must maintain high luster. Buff shield to a shine near the sensor, if necessary.
	Photoelectric eye failed	Look in rear of machine for the red LED on the photoelectric eye located directly below the electrical box. If there is no illuminated LED, follow the "remedy".	Replace photoelectric eye.
	Cabinet temperature over 140°F	Use thermometer to verify internal lower cabinet temperature.	Allow cabinet temperature to adequately cool.
	Temperature switch failed	Temporarily short circuit temperature switch.	Replace temperature switch.
	Ventilation fans not working	N/A	Check fan operation.
	Short circuited emergency stop button	Do not attempt to disconnect.	Replace emergency stop button.
	Fuse 201 failed	Check LED lights on the back of the PLC. If no lights are illuminated, replace fuse.	Check and replace fuse 201.
	Fuse 301 failed	Check LED lights on the back of the PLC. If no lights are illuminated, replace fuse.	Check and replace fuse 301, door solenoid.
<b>2. Temperature controller is not illuminated</b>	Electrical connection gap to a temperature controller.	N/A	Check connections and repair.
	Fuse 109 failed.	N/A	Check and replace fuse 109
	Temperature controller failed.	N/A	Repair or replace temperature controller.
	No Power (120v)	N/A	Check power supply.
<b>3. Temperature controller output is "ER.il", "Attn"</b>	Thermocouple is disconnected	N/A	Check thermocouple connection
	Thermocouple is miswired	N/A	Check wire orientation
<b>4. Unit does not start, blinking YELLOW light</b>	Air supply disconnected	See installation and operation manual for air supply requirements.	Connect air supply to specification requirements.
	Insufficient air pressure	See installation and operation manual for air supply requirements.	Check air supply is at least 60PSI and no more than 120PSI
	Pressure switch misadjusted	Use multimeter to check continuity in pressure switch. Use set screw to adjust.	Adjust pressure switch to 60PSI
<b>5. Unit does not start, blinking RED light</b>	Check issue 9.	N/A	Check issue 9.
<b>6. Temperature does not increase on display when start button is depressed, solid RED light</b>	No power. (208-240VAC)	N/A	Check breaker and power supply. Verify the heater circuit is at least 208VAC single phase.
	Thermocouple defective.	induce thermocouple to high or low temperature, monitor display.	Repair or replace temperature thermocouple.
	Temperature controller failed.	N/A	Repair or replace temperature controller.
	Heater defective or inoperative.	N/A	Repair or replace temperature heater.

## Donaldson Retrofit Emissions System

<b>7. Unit shuts down during operation, NO illuminated lights</b>	Check issue 1 above.	N/A	Check issue 1 above.
	Elevate cabinet temperature above 1400°F.	N/A	Check environment ambient temperature.
	Exhaust ducting restriction.	N/A	Check exhaust ducting restriction.
	Fan operation.	N/A	Check fan operation.
	Fuse 303 failed.	N/A	Check and replace fuse 303.
<b>8. Unit shuts down during operation, blinking YELLOW light</b>	Check issue 4 above.	N/A	Check issue 4 above.
<b>9. Unit shuts down during operation, blinking RED light</b>	Heater temperature failed to reach 500°F in 3 minutes. 1400°F or exceeded.	N/A	Check circuit breaker.
		N/A	Repair or replace heater or thermocouple.
<b>10. Soot combustion fumes exiting top vent</b>	Exhaust ducting restriction.	N/A	Check exhaust ducting restriction
	Fan inoperation.	N/A	Check fan operation.
		N/A	Check and replace fuse 303.

Note: Cycle power on the machine during each troubleshooting exercise by pushing the EMERGENCY STOP button and then twisting it to reset it. This will reset the Control Panel and give an accurate indication if the troubleshooting test or repair fixed the issue.



## Warranty

Donaldson warrants to the original purchaser that the major structural components of the goods will be free from defects in materials and workmanship for two (2) years from the date of shipment, if properly installed, maintained and operated under normal conditions. Donaldson warrants all other Donaldson built components and accessories for twelve (12) months from date of shipment.

Donaldson does not warrant against damage due to corrosion, abrasion, normal wear and tear, product modification, or product misapplication.

Donaldson also makes no warranty whatsoever as to any goods manufactured or supplied by others including electric motors, fans, heater coils, solenoid valves, switches and control components. After Donaldson has been given adequate opportunity to remedy any defects in material or workmanship, Donaldson retains the sole option to accept the return of the goods, with freight paid by the purchaser, and to refund the purchase price for the goods after confirming the goods are returned undamaged and in usable condition. Such a refund will be in the full extent of Donaldson's liability. Donaldson shall not be liable for any other costs, expenses or damages whether direct, indirect, special, incidental, consequential or otherwise. The terms of this warranty may be modified only by a special warranty document signed by a Director, General Manager or Vice President of Donaldson. THERE EXIST NO OTHER REPRESENTATIONS, WARRANTIES OR GUARANTEES EXCEPT AS STATED IN THIS PARAGRAPH AND ALL OTHER WARRANTIES INCLUDING MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, WHETHER EXPRESS OR IMPLIED ARE HEREBY EXPRESSLY EXCLUDED AND DISCLAIMED.



**Donaldson.**  
FILTRATION SOLUTIONS

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