C-139
P/N 119501
REVISION 6/04

ROLLING THIN FILM OVEN
INSTRUCTION MANUAL

Prepared by:
Despatch Industries
P.O. Box 1320
Minneapolis, MN 55440-1320
Customer Service 800-473-7373

NOTICE

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.

CAUTION

Setup and maintenance of the equipment should be performed by qualified personnel who are experienced in handling all facets of this type of system. Improper setup and operation of this equipment could cause an explosion that may result in equipment damage, personal injury or possible death.

Dear Customer,

Thank you for choosing Despatch Industries. We appreciate the opportunity to work with you and to meet your heat processing needs. We believe that you have selected the finest equipment available in the heat processing industry.

At Despatch, our service does not end after the purchase and delivery of our equipment. For this reason we have created the Service Products Division within Despatch. The Service Products Division features our Response Center for customer service. The Response Center will direct and track your service call to ensure satisfaction.

Whenever you need service or replacement parts, contact the Response Center at 1-800-473-7373: FAX 612-781-5353.

Sincerely,

Despatch Industries

Despatch
Benchtop and Laboratory Oven
Product Warranty

Products Covered by this Warranty

This warranty (the "Warranty") applies to the following Despatch products if scheduled for shipment on or after July 1, 2000: LEB, LBB, LAC, LCC, RAD1-42, RFD1-42, LND, RTFO.

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 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 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;
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.

THE REPRESENTATION AND WARRANTIES SET FORTH HEREIN ARE EXCLUSIVE AND IN LIEU OF, AND CUSTOMER HEREBY WAIVES AND DISCLAIMS RELIANCE UPON, ALL OTHER REPRESENTATIONS AND WARRANTIES OF EVERY KIND WHATSOEVER, WHETHER EXPRESS OR IMPLIED, OR ARISING BY OPERATION OF LAW OR IN EQUITY, OR BY COURSE OF PERFORMANCE OR DEALING OR USAGE OF TRADE, INCLUDING, WITHOUT LIMITATION, ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR OF FITNESS FOR A PARTICULAR PURPOSE.

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
Worldwide Phone 612-781-5356; Worldwide Fax 612-781-5485; North American Phone 800-473-7373
www.despatch.com

Please see reverse side for other service offerings

Despatch Industries
Advantage Service Assurance Program (ASAP)

PLEASE CONTACT: Despatch Service Agreements Specialist at 800-473-7373

Despatch continues to deliver exceptional products backed by a strong sense of responsibility and drive for long term customer satisfaction. Your partnership with Despatch can offer even higher value through your subscription to one of Despatch's Advantage Service Assurance Program(ASAP).

Warranty

Despatch's exclusive, comprehensive service programs start with the 1 year parts only warranty which is described on the other side of this document. This warranty can be expanded immediately to meet your most stringent service needs. Despatch Service Products Group will be able to answer your service questions and provide a quotation for the immediate expansion of your product warranty. Call 800-473-7373.

Immediate Service Response

The key to an effective service program is response. Wherever your location, Despatch is only a phone call away. Our U.S. and Canadian customers can reach Despatch at 1-800-473-7373. Worldwide customers can call 1-612-781-5356 or FAX 1-612-781-5485. Our Customer Service Technicians have over 150 years combined experience and access to detailed design and manufacturing documentation specific to your Despatch unit(s). This exacting level of service is a benefit only Despatch can provide and means that you can expect speedy, accurate and the most cost effective response.

Field Service Network

A worldwide network of factory trained Service Professionals is available to support your Despatch equipment. From routine repair to certified instrument calibration, the Despatch service network is positioned to respond to your needs. As a manufacturer of custom equipment, our service programs are customized to meet your specific needs regarding:

1. Service scope
2. Response time
3. Preventive maintenance frequency and content
4. Payment method

Sustained Service Support

At Despatch, long term customer satisfaction means more than just responding quickly and effectively to our customers' service needs. It means offering comprehensive customer support well beyond the scope and duration of our initial warranty. Despatch offers two basic service packages which are customized to each individual customer's need. These service packages are titled Full Service and Preventive Maintenance Plus+ service agreement products. Each is unique in the industry and offer the following benefits:

1. Priority response for minimum production interruption
2. Preventive maintenance for longer product life
3. Discounts on parts and services
4. Various payment plans to ease budgeting and recording expenses
5. Reduce purchase ordering costs

→PLEASE CONTACT: DESPATCH SERVICE AGREEMENTS SPECIALIST, 800-473-7373

PREFACE

This manual is your guide to the Despatch oven. It is organized to give you the information you need quickly and easily.

NOTE:
Read the entire manual before installing the oven.

An efficient way to learn about the oven would be to read the manual while working with the corresponding oven control system. This will give you practical hands-on experience with information in the manual and the oven.

While reading this manual, if a term or section of information is not fully understood, look up that item in the appropriate section to familiarize yourself with that item. Then go back and reread that section again. Information skipped, not understood or misunderstood could create the possibility of operating the equipment in an unsafe manner. This can cause damage to the oven or personnel or reduce the efficiency of the equipment.

WARNING:
Failure to heed warnings in this instruction manual and on the oven could result in personal injury, property damage or death.

Revision 5/02: Corrections, updated format

Revision 6/04: Change high limit instrument

TABLE OF CONTENTS

INTRODUCTION

This section provides an overview of the Despatch Rolling Thin Film Oven. This oven is specifically designed for the rolling thin film oven test in accordance with ASTM D2872-88.

Special Features

The sturdy construction of the Despatch Rolling Thin Film (RTF) Oven contributes to long term reliability and performance. Other special features include:

- Digital TEMPERATURE instrument to control chamber temperature fluctuations.
- HI-LIMIT instrument with manual reset to protect the workload as well as the oven itself.
- Welded double wall construction to reduce heat loss. Silicone rubber gaskets further minimize heat leakage.
- Rapid response heater with a five year warranty.
- Scratch-resistant Silver-Clay baked enamel exterior and stainless steel interior.
- One set of 8 glass containers.
- Leveling legs to assure the glass containers are level.
- Easily removed interior baffles and carriage wheel to make cleaning easier.
- Large observation window in the door for easy inspection.

Specifications

Dimensions

Dimensions

Model	Chamber Size* in (cm)			Capacity	Overall Size* in (cm)		
	W	D	H		W	D	H
RTF Oven	16 (41)	17½ (44)	13½ (34)	8 bottles	38½ (98)	28 (71)	37 (94)

* Approximate

Power

Line voltages may vary in some geographical locations. If your line voltage is much lower than the oven voltage rating, warm-up time will be longer and motors may overload or run hot. If your line voltage is higher than name plate rating, the motor may run hot and draw excessive amps.

If the line voltage varies more than 10% from the oven voltage rating, some of the electrical components such as relays, temperature controls, etc. may operate erratically.

Power Requirements

Model	Volts	Amps	Hertz	Phase	Heater (KW)	Connection
RTF Oven	208	14.7	60	1	2.0 KW	Plug connector
	240	13.2				

Ovens designed for 240 volts will operate satisfactorily on a minimum of 208 volts. Refer to the electrical schematic supplied with this manual for 208 volt line connection modifications. If your power characteristics are lower, contact Despatch Industries.

Temperature

Temperature Specifications

Model	RTF Oven
Control Stability	±1°F at 325°F
Recovery Time 302°F Door Open 2 Min.*	<10 minutes
Operating Range	30°F over fresh air inlet temperature to 400°F

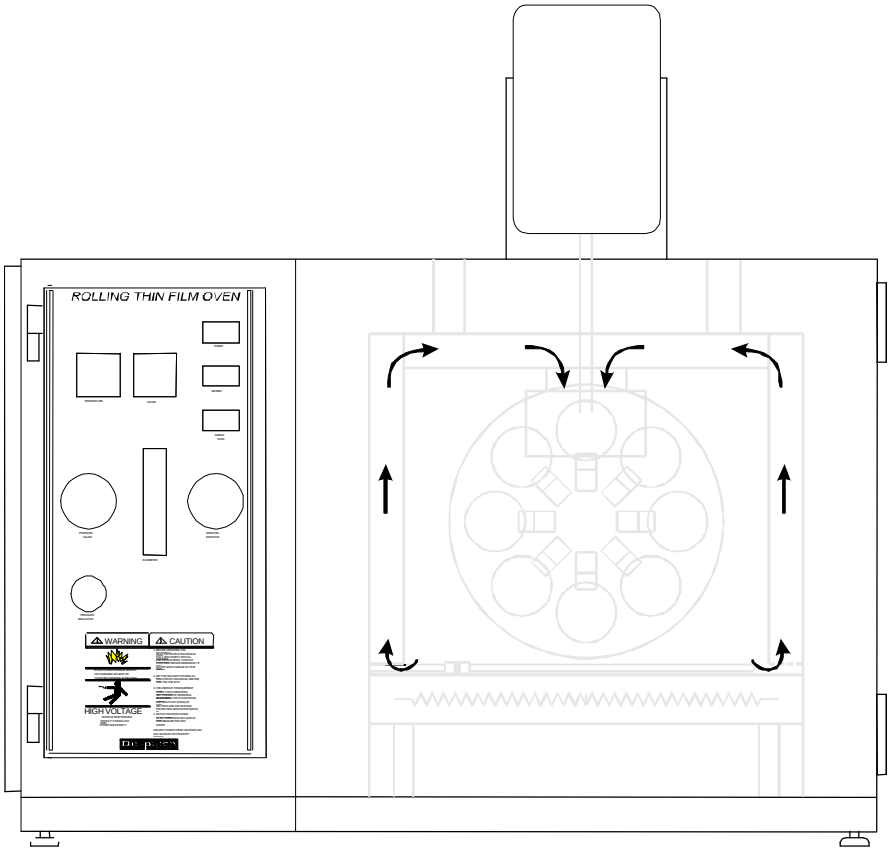
Capacities

Capacities

Model	RTF Ovens
Maximum carrier load	8 bottles
Carriage wheel RPM	15 ±0.2
Fan RPM H.P.	1,725 ¼
Approximate net weight lbs KG	305 138

OVEN OPERATION

The OVEN OPERATION section details the function and operation of assemblies and subassemblies on the Despatch Rolling Thin Film (RTF) Oven.



Forced Circulating Airflow in Despatch RTF Oven

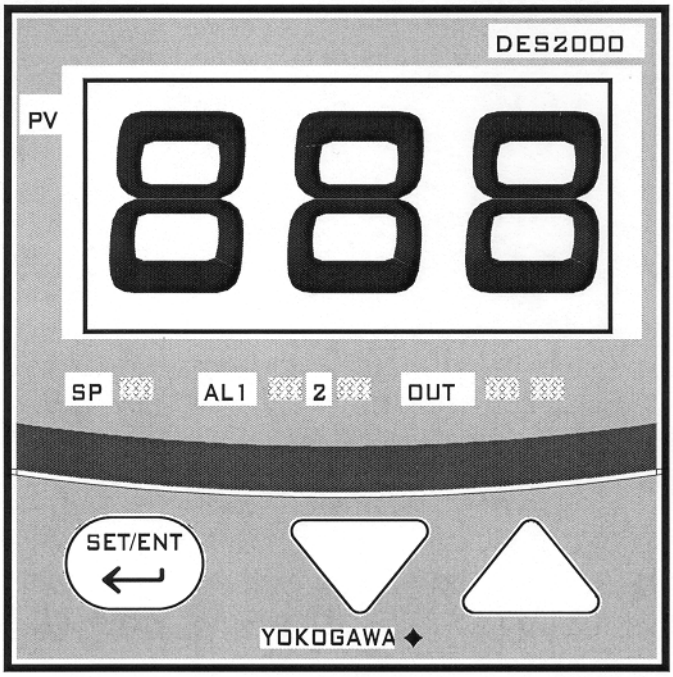
The Despatch RTF Oven is specifically designed for the asphalt thin film oven test as specified in ASTM D2872. The Despatch RTF Oven incorporates solid state heater control with a precision digital TEMPERATURE instrument to deliver quick response with minimal overshoot. The overall result is efficient productivity under strenuous conditions. Despatch RTF Ovens are precise yet practical.

The asphalt rolling thin film oven test is used to simulate changes in the properties of asphalt during conventional hot-mixing at 302°F. Asphalt samples are placed in glass sample bottles. The glass bottles are placed in the rotating carriage in the pre-heated oven.

The oven is equipped with a recirculation fan and air plenums covering the side walls and ceiling. Air flows from the floor, through the side plenums, and through the fan to the oven chamber. Repeatability of test results is achieved by accurate temperature control and rapid temperature recovery.

CONTROL Instrument

The oven is equipped with a microprocessor based digital control instrument. The Despatch CONTROL instrument has been configured as a proportional controller and set to its optimum operating values. Initially the CONTROL will allow the heater to operate at full power. However, as the actual oven temperature reaches the setpoint, the Proportional Control will cycle the heater on and off, minimizing process temperature fluctuations.



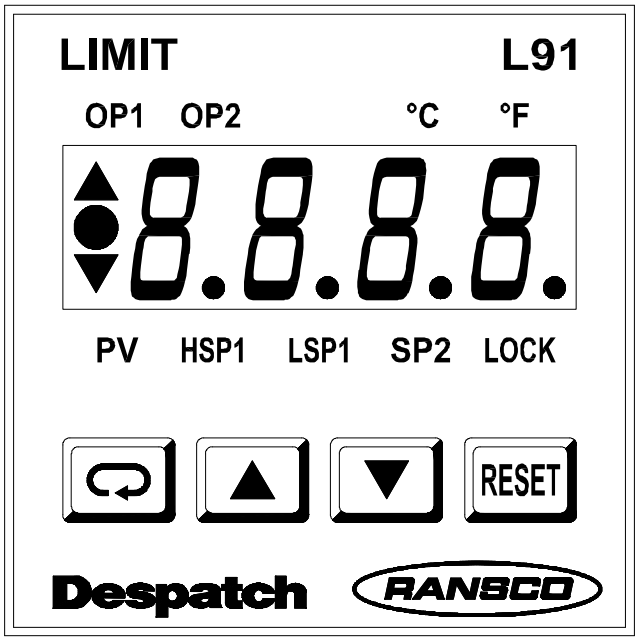
CONTROL Instrument

Features	Description
Main (PV) Display	Displays the actual oven temperature or displays the setpoint when the set key is pressed. Displays parameter code and value.
SET/ENT Key	Switches between PV and SP displays. Enters the data changed by the ▲ or ▼ keys. Switches through parameter displays.
Down Key ▼	Decreases a setpoint or mode parameter.
Up Key ▲	Increases a setpoint or mode parameter.
LED SP Indicator	Lights when the setpoint value is displayed.
LED OUT Indicator	Lights when the control is calling for heat.
LED AL1–2 Indicator	N/A

HI-LIMIT Instrument

The oven is equipped with a HI-LIMIT instrument. The purpose of the HI-LIMIT instrument is to provide a protective measure for the product and/or the oven itself. If the setting on the HI-LIMIT is exceeded, the heating process will discontinue, thus protecting the product and/or the oven.

Set the HI-LIMIT instrument to a temperature 10°C - 14°C higher than the CONTROL instrument setpoint or a temperature that should not be exceeded in the process. If the setting on the HI-LIMIT instrument is exceeded the heater will shut down. The HI-LIMIT instrument must be manually reset by pushing the **RESET** button on the HI-LIMIT instrument.



HI-LIMIT Instrument

Features	Description
OP1	Output 1 status value. (OP2 normally not used for LBB Ovens).
°C/°F	Degree indicator.
PV	Process value.
HSP1	High limit setpoint 1. (LSP1 normally not used for LBB Ovens).
SP2	Setpoint 2 for output 2 (normally not used for LBB Ovens).
LOCK	Lock status indicator.
↻	Scroll Key, used for advancing available displays.
Up Key ▲	Increases a setpoint or mode parameter.
Down Key ▼	Decreases a setpoint or mode parameter.
RESET	Reset the high limit, return to normal display.

Product HI-LIMIT Instrument

If the product being processed has a critical high temperature limit, the HI-LIMIT instrument should be used as a product HI-LIMIT instrument. The HI-LIMIT instrument should be set to a temperature somewhat below the temperature at which the product could be damaged.

Oven HI-LIMIT Instrument

If the product does not have a critical high temperature limit, the HI-LIMIT can be used as an oven HI-LIMIT instrument. An oven HI-LIMIT instrument protects oven equipment. The HI-LIMIT should be set at 204°C

INSTRUCTIONS

The INSTRUCTIONS section provides directions on unpacking, installation, operation and maintenance of the Despatch Rolling Thin Film (RTF) Oven.

Unpacking and Inspection

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

- See whether the crate and plastic cover sheet inside crate are still in good condition.
- Look at all outside surfaces and corners of the oven for scratches and dents.
- Check the oven switches 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.
- Check to see that the leveling pads are secure and in good condition.
- Check the oven thermometer for air bubbles prior to placing it into use. Failure to do so may result in incorrect temperature indications and may complicate rejoining of the column later. If there are air bubbles, go to the **Rejoining Fluid in the Thermometer** section of this manual for instructions.

If there is damage, and it could have happened during shipment follow these instructions.

1. Contact the shipper immediately and file a written damage claim.
2. Contact Despatch Industries to report your findings and to order replacement parts for those that were damaged or missing.
3. Please send a copy of your filed damage claims to Despatch.

Next, check to make sure you have received all the required materials. Your shipment should include:

- one (1) Despatch RTF Oven,
- one (1) Instruction manual,
- one (1) Warranty card,
- eight (8) glass bottles,
- one (1) thermometer.

If any of these items are missing from the packaged contents, contact Despatch Industries to have the appropriate materials forwarded to you.

Finally, to protect the warranty on your new Despatch RTF Oven, complete the warranty card and mail it to Despatch within 15 days after receipt of the equipment.

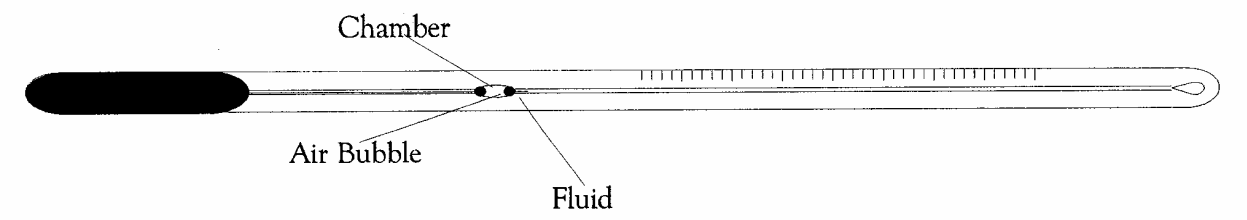
Rejoining Fluid in the Thermometer

All thermometers are subject to separations of the fluid in transit due to rough handling. Air bubbles are not a defect, and can easily be rejoined.

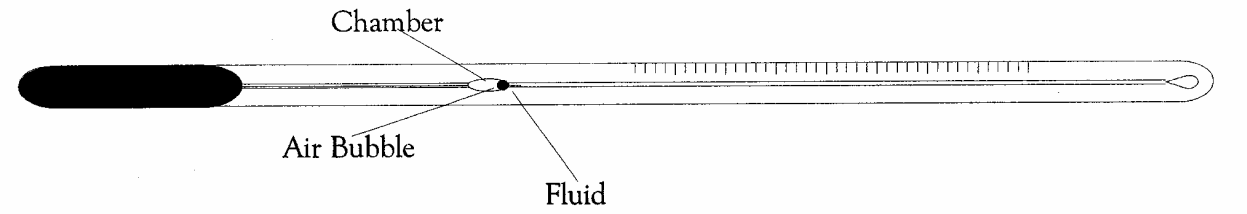
1. Place the thermometer on a flat surface with the bulb to the left and examine it carefully. The fluid should be continuous up to where it ends within the contraction chamber. Watch for droplets of fluid separated within the chamber and/or in the capillary immediately above or immediately below. If found, determine how the separation is configured.

    - If it is a simple separation go to step 2.

    - If the fluid is wedged in the upper end of the chamber and/or extends up into the capillary:



Simple Air Bubble

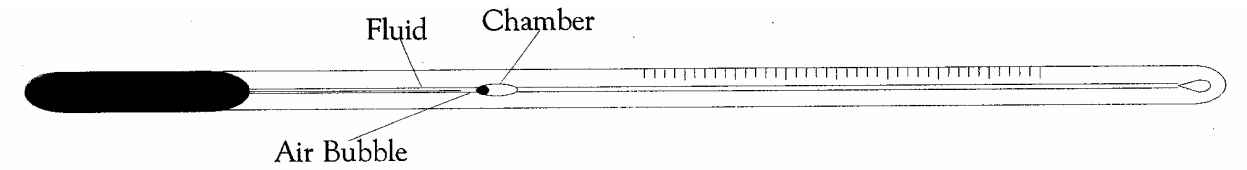


Fluid in the upper end of the chamber and up into the capillary

a. Cool the bulb by dipping it into a cold water and ice mixture a few seconds at a time until the wedged fluid retreats into the chamber and forms a droplet. A much colder solution can be obtained with crushed ice and normal alcohol. In extreme cases, dry ice or a slurry of dry ice and alcohol may be needed.

b. Proceed to paragraph step 2.

- If the separation is at the lower end of the chamber and/or in the capillary below the chamber:



Fluid in the lower end of the chamber and an air bubble below the chamber

c. Heat the bulb gradually until the separation rises higher into the chamber and forms a loose droplet.

> CAUTION:
> Never use a sharp flame such as a propane flame and never place the thermometer bulb directly in the flame. Instead, use the heated air stream rising above the flame (at least 1 inch above the tip of the flame).

   i. Immerse the bulb into a hot liquid for two seconds. You may use a SOFT flame such as the one produced by an alcohol lamp.

   ii. Withdraw the bulb for 2 seconds

   iii. Alternate immersing the bulb in a heat source and withdrawing it at 2 second intervals.

d. Proceed to step 2.

2. Hold the thermometer in a vertical position and tap it gently but firmly downward onto a padded surface such as a magazine, newspaper or like surface. Repeat if necessary. The force generated by this tapping will drive the separated droplet(s) further down the chamber to rejoin with the main column.

> CAUTION:
> Closely observe the upward progress of the column. Never allow the fluid to fill the expansion chamber more than halfway, as breakage of the bulb will result!

3. Verify thermometer reading at a known temperature to be certain that the rejoining was successful and the thermometer is now ready for service.

   a. Suspend both thermometers side by side in a liquid.

   b. Heat or cool as required to a temperature appropriate for the range of the thermometer(s).

Agreement within standard tolerances assures that air bubbles have been successfully removed. If not, go to step 1 and repeat the procedure.

Set-up

1. Move the oven to the installation location. The oven must have a minimum of two (2) inches clearance in the rear to provide proper ventilation. The oven may be placed next to another oven, with 3 inch clearance (the doors will still open). Make sure oven is level and plumb; this will assure proper heat distribution and operation of all mechanical components.

WARNING:
All grounding and safety equipment must be in compliance with applicable codes, ordinances and acceptable safe practices.

2. Identify correct power source indicated on the specification plate.

3. Connect power to the RTF Oven. The oven is supplied with a power cord and plug.

4. Connect a supply of clean, dry air to the oven.

5. Adjust leveling legs so that sample bottles are level with the horizontal axis.

Oven HI-LIMIT Instrument

The oven is shipped with a HI-LIMIT instrument setting of 350° F. Follow these instructions to change the setting.

WARNING:
Never operate the oven at a temperature in excess of the maximum operating temperature of 400° F (204° C).

1. Press the POWER switch to ON.
2. If the LOCK on the HI-LIMIT is lit, press and hold the RESET for four (4) seconds to enable the ▲ and ▼ keys.
3. Press ↻ key, HSP1 will be lit.
4. Use ▲ key and ▼ key to set hi limit temperature.
5. Press RESET or ↻ once to return (also enters the value) to the process variable PV mode.
6. If the HI-LIMIT instrument is exceeded the heater will shut down. Reset the HI-LIMIT by pushing RESET on the HI-LIMIT instrument.

The two temperature control instruments are now set.

Operating

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 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.

WARNING:
Do not use the oven in wet, corrosive or explosive environments. The HI-LIMIT instrument must be reset whenever it is tripped.

Loading the Oven

1. Load the bottles into the carriage locations which are not locked by the fan or the air nozzle.

2. Using the sample rack switch, rotate the carriage wheel so that the remaining slots are accessible.

3. Load the remaining bottles.

When loading the oven avoid spills of anything onto the heater elements or onto the floor of the oven chamber. Do not place the load on the oven chamber floor plate.

NOTE:
If less than 8 bottles are loaded, load them symmetrically -- with an equal number of empty spaces between the bottles. Symmetrical loading will prevent an unnecessary load on the carriage motor.

Pre-Startup Checklist

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

- **Check line voltage.** Voltage must correspond to nameplate requirements of motors and controls. Refer to the section on power connections in the INTRODUCTION of this manual.

- **Fresh air and exhaust.** Do not be careless about restrictions in and around the fresh air and exhaust openings. Under no condition permit them to become so filled with dirt that they appreciably reduce the air quantity. The proper ventilation clearances should be fulfilled at all times. Refer to the Set-up instructions in this manual.

- **Ventilation.** There are two (2) exhaust openings on the top of the unit.

- **Clean dry air.** There is a 1/4” bulkhead tube fitting to connect the air fsupply.

- **Moisture indicator.** The indicator should be blue in color. This unit has an air bypass to sample the air for moisture. It is normal to have a hissing sound as air is leaking through this valve.

Startup/Operation

1. Turn the power switch on. The POWER pilot light will come on.

2. Turn the blower switch on. The BLOWER pilot light will come on, the fan and heater will start and the oven will begin heating.

3. Set the flowmeter airflow rate per ASTM specifications at 4000 +/- 200 ML/min.

4. Verify that the moisture indicator is blue in color.

5. Press any pushbutton on the TEMPERATURE control instrument to light up the pushbuttons.

6. Enter setpoint on the CONTROL instrument.

   a. Press SET/ENT key.

   b. Use ▲ and ▼ key to set operating temperature.

   c. Press SET/ENT key to enter setpoint.

   d. Press SET/ENT key again to display process temperature.

7. Enter setpoint on the HI LIMIT.
   a. If the LOCK on the HI-LIMIT is lit, press and hold the RESET for four (4) seconds to enable the ▲ and ▼ keys.

   b. Press key, HSP1 will be lit.

   c. Use ▲ key and ▼ key to set hi limit temperature.

   d. Press RESET or once to return (also enters the value) to the process variable PV mode.

   e. If the HI-LIMIT instrument is exceeded the heater will shut down. Reset the HI-LIMIT by pushing RESET on the HI-LIMIT instrument.

NOTE:
To make the control readout and the thermometer readings match, it may be necessary to enter an offset value (OFSt) into the protected list parameters. This value is set to zero at the factory. See the Parameter Programming and Calibration sections.

WARNING:
Do not use flammable solvent or flammable material in this oven. Do not process closed containers of any substance or liquid in this oven because they may explode under heat.

NOTE:
The air must be clean and dry. The air pressure to the unit does not have to be 100 PSI, but high enough to achieve the flow rate. The pressure regulator can be adjusted to ensure the proper airflow rate.

8. Load the oven as required.

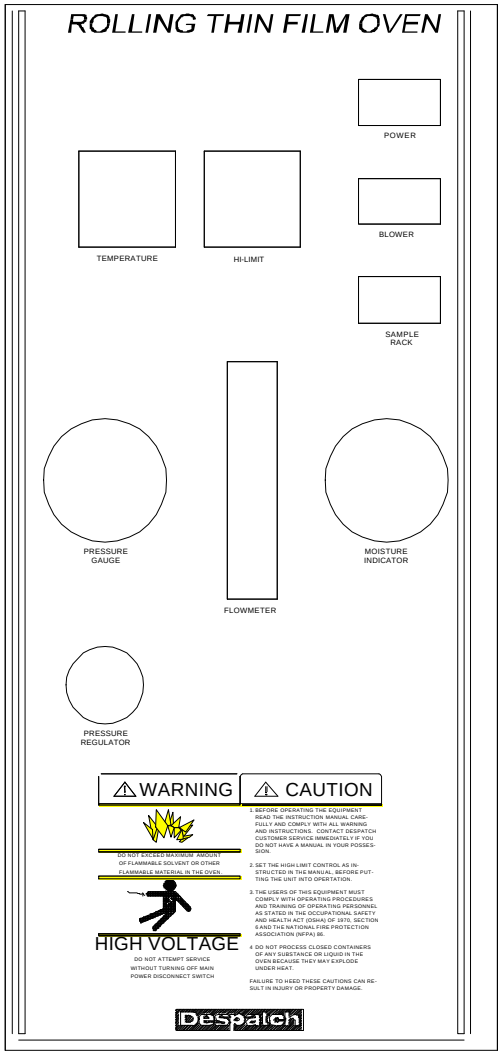
9. Turn the sample rack switch on. The pilot light will come on and the sample rack will begin to rotate.

Shut-down

1. Turn the SAMPLE RACK switch to the OFF position.

2. Turn the BLOWER switch to the OFF position (After oven temperature is below 212° F).

3. Turn the POWER switch to the OFF position.



Oven Control Panel

MAINTENANCE

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

Checklist

- Keep equipment clean. Gradual dirt accumulation retards air flow. A dirty oven can result in unsatisfactory operation such as unbalanced temperature in the work chamber, reduced heating capacity, reduced production, overheated components, etc. 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. This is particularly true of controls, motors or other equipment containing electronic components. Temperatures in excess of 130° F (55° C) should be avoided.

- Establish maintenance & check-up schedules. Do this promptly and follow them 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 JUDGEMENT the safety watchwords for the operation of your oven.

- Lubrication All door latches, hinges, door operating mechanisms, bearing or wear surfaces should be lubricated to ensure easy operation.

- Carousel Run the carousels to ensure the movement is quiet and not jerky.

Tests

Tests should be performed carefully and regularly. The safety of personnel as well as the condition of equipment may depend upon the proper operation of any one of the functions of these controls. Test the TEMPERATURE instrument every 40 hours. Check that the TEMPERATURE instrument heater LED is cycling on and off, indicating that the heater is working.

WARNINGS:
Failure to heed warnings in this manual and on the oven could result in death, personal injury or property damage.

Test the HI-LIMIT instrument every 40 hours. With the oven operating at a given temperature, set the HI-LIMIT down to the setpoint operating temperature. The HI-LIMIT instrument has tripped when **OP1** is lit. Push RESET after adjusting the HI-LIMIT instrument back to a higher setting, or letting the oven temperature drop a few degrees based on the hysteresis value of the HI-LIMIT.

WARNING:
Disconnect the main power switch or power cord before attempting any repair or adjustment.

Gearmotor

Test the gearmotors every 40 hours. Verify that the sample rack rotates when the sample rack switch is turned on.

Moisture Indicator

Check the moisture indicator every 20 hours. A blue color indicates that the air supply is dry. A white or pink color indicates that the air supply contains moisture and that the customer supplied desiccant filter should be changed. The indicator will return to blue after the dry air is re-established.

Carousel Shaft Bushing

The bushing which supports the carousel shaft should be cleaned on approximately two month, or 200 hours of usage, intervals. This time interval is only an estimate, and is dependent upon the properties of the binder under test. This cleaning requires the removal of the carousel assembly. Clean bushing surface with 600 grit wet/dry cloth, and wipe clean with mineral spirits.

Replacement

Parts

To return parts contact Despatch Industries to obtain an MRA (material return authorization) number. This number must be attached to the returned part for our identification. If required, a new part will be sent and invoiced to you. When the return part is received, credit will be given, if in warranty.

Be sure that when you are ordering parts or service to give the model, serial and part number. This will expedite the process of obtaining your replacement part.

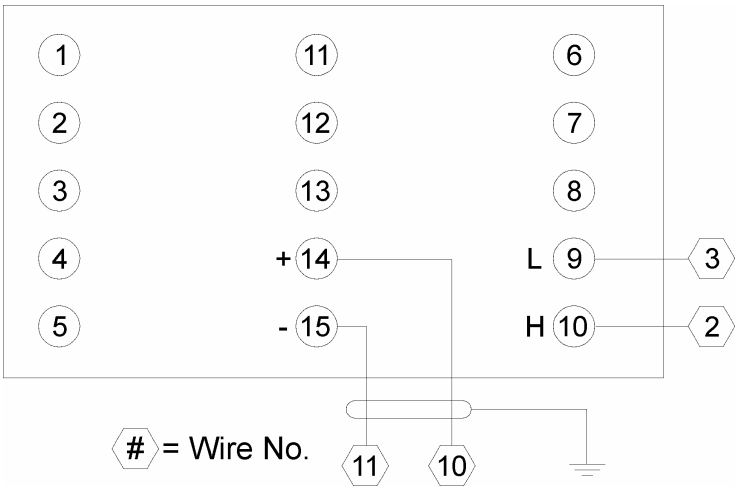
NOTE:
When replacing the TEMPERATURE instrument, the HI-LIMIT instrument and the gear motor, the side access panel may need to be removed. Move the oven to a location to allow this.

TEMPERATURE Instrument

WARNING:
Electric live load condition present.

(Tools needed: standard and Phillips screwdrivers)

1. Disconnect power.
2. Remove screws from the front control panel.
3. Open the front panel.
4. Remove the wire from terminal blocks.



Connections to TEMPERATURE instrument

5. Remove the TEMPERATURE instrument mounting bracket.

6. Remove the old TEMPERATURE instrument from the control panel.

7. Install the new TEMPERATURE instrument into the control panel.

8. Secure the TEMPERATURE instrument mounting bracket.

9. Reconnect the wire to the terminal blocks.

10. Close the front control panel.

11. Replace the front control panel screws.

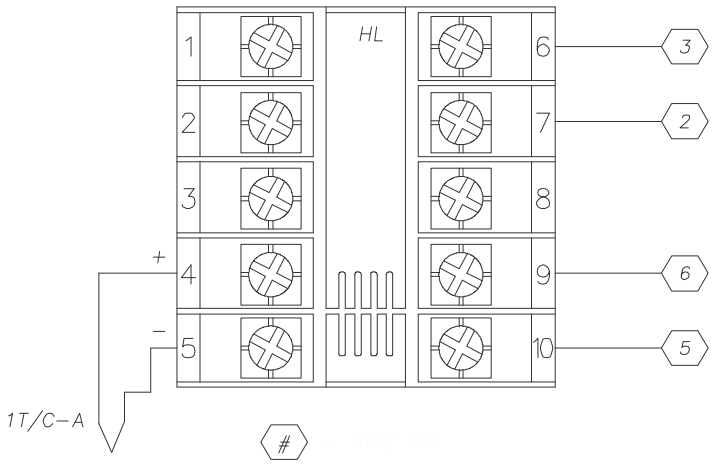
12. Reconnect power to the oven.

13. Turn power switch to the ON position.

14. Set temperature instrument parameter. See the parameter programming later in this manual.

HI-LIMIT Instrument

(Tools needed: standard and Phillips screwdrivers)



Connections to HI-LIMIT instrument

1. Disconnect power.

2. Remove screws from the front control panel.

3. Open the front control panel.

4. Remove HI-LIMIT wires from the HI-LIMIT terminal strip.

5. Press and hold down the tabs holding the HI-LIMIT instrument to the control panel and slide it out.

6. Remove the old HI-LIMIT instrument from the control panel.

7. Install the new HI-LIMIT instrument into the control panel.

8. Re-wire the HI-LIMIT wires to the HI-LIMIT terminal strip (see Figure 9).

WARNING:
Electric live load condition present.

9. Close the front control panel.

10. Replace the front control panel screws.

WARNING:
The gear motor will operate.

11. Reconnect the power to the oven.

12. Turn power switch to the ON position.

13. Test HI-LIMIT operation (see the **Oven HI-LIMIT Instrument** section of this manual).

Fan Motor

(Tools needed: standard screwdriver set, Allen wrench and a socket set)

1. Disconnect the power.
2. Open oven doors.
3. Remove fan wheel
4. Loosen set screws on fan wheel.
5. Remove fan wheel.
6. Remove wires from motor.
7. Remove motor.
8. Remove screws from motor/motor base.
9. Remove motor (motor can be tipped as required).
10. Mount new motor.
11. Insert motor shaft into shaft collar.
12. Secure motor to motor base.
13. Reattach fan wheel.
14. Tighten set screw on fan wheel.
15. Check that the set screw hits the flat machined area of the motor shaft.
16. Reconnect motor lead wires.
17. Close the oven door.
18. Reconnect power.

WARNING:
Electric live load condition present.

Heater Unit

(Tools needed: crescent wrench and socket set)

1. Disconnect power.
2. Open oven door.
3. Remove air coil assembly.
4. Remove chamber bottom access panel.
5. Disconnect heater lead wires.
6. Remove screws from heater frame.
7. Remove and discard heater.
8. Install new heater.
9. Replace screws.
10. Reconnect heater leads.
11. Replace chamber bottom access plate.
12. Replace screws.
13. Replace the air coil assembly.
14. Close the oven door.
15. Reconnect power.

WARNING:
Electric live load condition present.

Gearmotor

(Tools needed: standard screwdriver and socket set)

1. Disconnect power.
2. Open side access panel.
3. Remove gear drive guard.
4. Disconnect gear drive linkage.
5. Disconnect gear motor lead wires.
6. Remove gear motor mounting screws.
7. Remove and discard gear motor.
8. Install new gear motor.
9. Mount gear motor mounting screws.
10. Mount gear drive linkage.
11. Mount gear drive guard.
12. Reconnect gear motor lead wires.
13. Close side access panel.
14. Reconnect power.

WARNING:
Electric live load condition present.

Carriage Assembly

(Tools needed: socket set and 5/32 Allen wrench)

1. Disconnect power.
2. Open oven door.
3. Remove recirculating fan guard.
4. Remove recirculating fan.
5. Remove hex nut from center of carriage assembly.
6. Slide carriage assembly from shaft and remove. This is a tight fit and may require some effort to remove.
7. To reassemble: Perform steps 3 - 6 in reverse order.
8. Reconnect power.

WARNING:
Electric live load condition present.

APPENDIX

Special Instructions

WARNING:
Make sure you understand what you are changing before doing so. Changing parameters will alter the functions of the TEMPERATURE instrument.

The Despatch Rolling Thin Film (RTF) Oven has been tested and preset at the factory for normal operating conditions. In most applications, it will not be necessary to alter the oven's settings. This section contains additional information and reference material to access the TEMPERATURE instrument parameter programming. This section also covers Temperature Scale Conversion and Calibration. Calibration instructions are also covered for the HI-LIMIT instrument.

The Despatch RTF Oven TEMPERATURE instrument includes alphanumeric displays for the programmable capabilities of the instrument. The alpha-numerics in the TEMPERATURE instrument require only a single programming sequence. The programming sequence is called Parameter Programming. Parameter programming selects all the applicable parameters to operate and configure the TEMPERATURE instrument properly.

The Temperature Scale Conversion section provides information needed to convert the TEMPERATURE instrument to °C or back to °F.

The Calibration section covers the procedure necessary to recalibrate the TEMPERATURE instrument. Recalibration may be necessary if the TEMPERATURE instrument does not comply with known standards or to specifically align the TEMPERATURE instrument for a specific operating condition. The Calibration section also covers the procedure for aligning the HI-LIMIT instrument for recalibration.

Control Parameter Programming

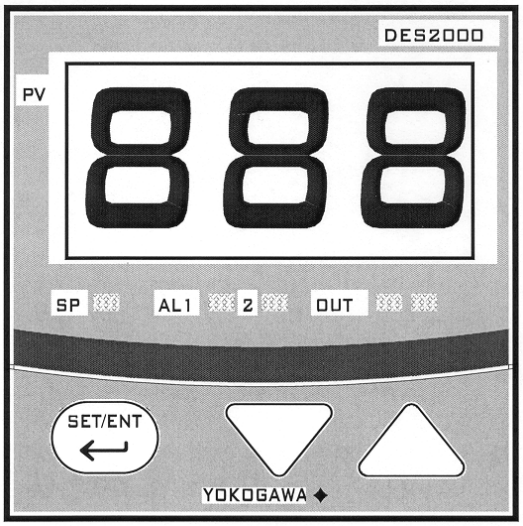
WARNING: Make sure you understand what you are changing before doing so. Changing the program parameters will alter the functions of the CONTROL.

The control parameters are set through the Operating and Set-up modes. In most applications, it is not necessary to alter the oven settings. The following instructions describe how to access, view and, if desired, change the parameters.

Once the Operating and Set-up modes are accessed, the SP LED will start blinking on and off. The CONTROL will not allow the display to be altered improperly.

The CONTROL will automatically exit the Parameter Programming mode if no keys are pressed for about 2 minutes.

1. Press SET/ENT for three (3) seconds.
2. Press the SET/ENT until the desired parameter is displayed. See Operating and Set-up Parameter tables on the following pages.
3. Press the ▲ or ▼ to display value.
4. Use the ▲ or ▼ to the desired setting.
5. Press the SET/ENT to enter the value.
6. Press and hold the SET/ENT for three (3) seconds to return to the display mode.



TEMPERATURE Instrument

Parameter Program Mode Outline

Code	Name	Settings
CtL	Control Mode	PID
At	Auto-tuning	OFF
P	Proportional Band	1
I	Integral Time	110
d	Derivative Time	OFF
nr	Manual Reset (only when I & d are OFF)	0
HyS	Hysteresis (only when CtL is ONF, change CtL to PID)	N/A
Ct	Cycle Time	1
FL	Input Filter	OFF
bS	PV Bias (Offset)	0
LoC	Key Lock	0

*If P is not displayed the Control Mode (***CtL***) must be first set to ***PID***.

CtL Control Mode - This parameter determines whether controller functions as a time proportional or an on/off control.

At Auto-tuning – ***OFF*** for PID tuning, ***ON*** for controller to tune process.

P Proportional Band - Expressed in degrees. This value determines the band width on both sides of the setpoint within which the control provides proportional control.

I Integral Time - Expressed in seconds. This parameter corrects for errors in actual temperature versus the setpoint.

D Derivative Time - Expressed in seconds. This effect of the derivative time is in direct proportion to the time setting.

nr Manual Reset - Expressed in percent. Controller outputs this value when process variable equals setpoint (Only if ***I*** = ***0***).

HyS Hysteresis - Expressed in degrees. When ***CtL*** = ***OFF***, this value determines the change in temperature needed to turn controller output from full off to full on.

Ct Cycle Time - Expressed in seconds. This is the total time for one ON/OFF cycle of the controller output during the proportional action.

FL Input Filter – Expressed in seconds. This function should be used when the PV may fluctuate greatly (i.e. input signal contains noise).

bS PV Bias - Expressed in degrees from –199 to 999. This parameter is used to set the actual oven temperature to the controller display.

LoC Key Lock - This provides levels of access to the controller.
0 = No key lock, full access to controller.
1 = Prevents changing of all parameters except setpoint.
2 = Prevents all parameters from being changed including the setpoint.
-1 = Set to enter the Setup parameter setting display.

When LoC = ***-1***, the parameters are displayed in the order shown in the Set-Up Parameters section, below.

Set-Up Parameters

Set-up Parameter Outline

Code	Name	Settings
In	Input Type	5 (35 if °F)
SPH	Setpoint High	204 (400 if °F)
SPL	Setpoint Low	-18 (0 if °F)
Dr	Direct/Reverse Action	0
DSP	PV/SP Display	0

In Input Type – This parameter is set for type of input and whether PV is in °C or °F.

SPH The maximum setpoint limit for oven. The user cannot set the setpoint above the maximum setpoint.

SPL The minimum setpoint limit of oven. The user cannot change the setpoint below this lower setpoint limit.

dr Direct/Reverse action. This value is set for ***0*** (reverse action).

dSP Priority of PV/SP display. This parameter either displays the PV (process variable) or SP (setpoint).

Calibration

TEMPERATURE Instrument

WARNING:
Maintenance on the Despatch Rolling Thin Film Oven should be completed by only qualified personnel.

The TEMPERATURE instrument is factory tested and calibrated. Under normal operating conditions, recalibration should not be necessary. However, if the instrument does not comply with known standards, OR if the user would like to recalibrate the TEMPERATURE instrument for a specific operating condition, then recalibration is easily accomplished.

(Equipment needed: Heat on loss thermometer ASTM 13C)

1. Verify that the OFFSET programmed is 0. Refer to Instructions on viewing the parameter in the **Parameter Programming** section of this manual.

2. Locate the thermometer at the appropriate position in the chamber.

WARNING:
Failure to heed the warnings in this manual and on the Despatch RTF Oven could result in death, personal injury or property damage.

3. Operate the chamber until it reaches the desired operating temperature and the TEMPERATURE instrument is regulating. The user may wish to have a loaded chamber with a standard amount of product to simulate a specific operating condition. It will take several minutes for the unit to stabilize at the controlled temperature.

4. Subtract the average controlled temperature (number appearing on the TEMPERATURE instrument display) from the actual chamber temperature (number appearing on the thermometer).

   Actual Chamber Temperature - Controlled Temperature = ?

Because the ASTM 13C thermometer is in ° C, the reading must be converted to ° F to calculate the offset if the control is to read in ° F. Refer to the conversion table.

Temperature Conversion

°C	160	160.5	161	161.5	162	162.5	163	163.5	164	164.5	165	165.5	166
°F	320.0	320.9	321.8	322.7	323.6	324.5	325.4	326.3	327.2	328.1	329.0	329.9	330.8

5. Enter the calculated value from Step 4 as the new bS (PV Bias) value in the instrument.

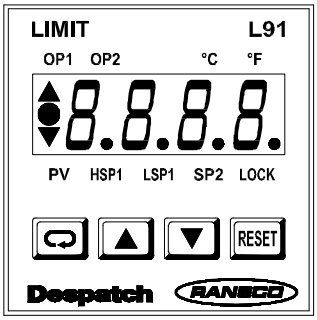
HI-LIMIT Parameter Programming

The HI-LIMIT parameters are set through the Operating and Set-up modes. In most applications, it is not necessary to alter the oven settings. The following instructions describe how to access, view and, if desired, change the parameters.

WARNING: Make sure you understand what you are changing before doing so. Changing the setup parameters will alter the functions of the HI-LIMIT.

If the LOCK on the HI-LIMIT is lit, press and hold the RESET key for four (4) seconds to enable the ▲ and ▼ keys. The HI-LIMIT will automatically exit the Setup mode if no keys are pressed for about two (2) minutes.

1. Press and hold the ↻ key for four (4) seconds, the setup mode has now been entered.
2. Press the ↻ key until the desired parameter is displayed. See the Setup Parameter Table on the following page.
3. The display will alternate between the parameter name and value.
4. Use the ▲ or ▼ to move to the desired setting.
5. Press the ↻ key, this enters the value and advances to the next parameter.
6. To get out of the setup parameters press the RESET key. The HI-LIMIT will automatically exit the Setup mode if no keys are pressed for about two (2) minutes.



HI-LIMIT Instrument

Set-up Parameters

Set-up Parameter Outline

Code	Name	Settings
inPt	Input type.	***J_tC***
unit	Process unit.	°***C*** (or °***F***)
rESo	Display resolution.	***No.dP***
SHif	PV shift value (offset).	***0***
Filt	PV filter.	***0***
out1	Output 1 function.	***Hi.***
o1.Hy	Output 1 hysteresis value.	***2.0***
HSP.L	Lower limit of HSP1.	***0*** (***32*** if °***F***)
HSP.H	Upper limit of HSP1.	***204*** (***400*** if °***F***)
out2	Output 2 function. (N/A)	***None***
Addr	Address assignment for digital communication. (N/A)	***1***
bAud	Baud rate of digital communication. (N/A)	***4.8***
PAri	Parity bit of digital communication. (N/A)	***EVEn***
diSP	Normal display format.	***PV***

Note: When changing between °C and °F, the setup parameters ***Filt***, ***o1.Hy, HSP.L***, and ***HSP.H*** settings convert automatically.

inPt Input type – this selects thermocouple type. LBB ovens use type J thermocouple.

unit Process unit – selects between °C and °F for reading process temperature.

rESo Display resolution – selects the location of the decimal point on process related parameters.

SHif PV shift value (offset) – this moves the display temperature to the oven temperature.

Filt PV filter – if process value is unstable to read, increasing this value will steady the input signal.

out1 Output 1 function – this the function of the output. This must be set to ***.Hi*** for HI-LIMIT control.

o1.Hy Output 1 hysteresis value – the amount of degrees that the temperature must be below the setpoint temperature before the HI-LIMIT can be reset.

HSP.L Lower limit of HSP1 – the minimum temperature that the HI-LIMIT can be set.

HSP.H Upper limit of HSP1 – the maximum temperature that the HI-LIMIT can be set.

out2 Output 2 function. (N/A)

Addr Address assignment for digital communication. (N/A)

bAud Baud rate of digital communication. (N/A)

PAri Parity bit of digital communication. (N/A)

out2 Output 2 function. (N/A)

diSP Normal display format – used to select the display in normal condition.
PV = Process value.
SP1 = HI-LIMIT setpoint.
SAFE = the word safe in normal condition.

Control Temperature Scale Conversion (°C/ °F)

1. Press and hold the SET/ENT for three (3) seconds.
2. The display will read ***CtL***. The SP LED will flash indicating that Operating Parameter mode has been entered.
3. Press the SET/ENT until ***LoC*** appears on the display.
4. Press the ▲ or ▼ to enter the parameter.
5. Press the ▼ to set the value to ***–1***. The SP LED will flash rapidly, indicating that the Set-Up Parameter mode has been entered.
6. Press the ▼ to enter the value. The display will read ***In***.
7. Press the ▲ or ▼ to enter the parameter.
8. Enter a value of ***35***. The right decimal point LED will flash indicating that the Setpoint is being changed. This will stop flashing when the new value has been entered.
9. Press the SET/ENT to enter the value.
10. Press the SET/ENT until ***SPH*** is displayed
11. Press the ▲ or ▼ to enter the parameter.
12. Enter a value of ***400***.
13. Press the SET/ENT to enter the value.
14. Repeat steps 11 –13 for ***SPL***; the value is ***32***.
15. Press and hold the SET/ENT for three (3) seconds to return to the operation mode.
16. Refer to Parameter Programming Mode section earlier in this manual to change tuning parameters, if necessary.
17. The control now reads °F. Enter the desired setpoint.

WARNING: Make sure you understand what you are changing before doing so. Changing the program parameters will alter the functions of the CONTROL.

NOTE: To change from °F to °C, repeat these steps. Enter the following values:
In = 5
SPH = 204
SPL = 0

HI-LIMIT Temperature Scale Conversion (°C / °F)

The HI-LIMIT can be configured for either °C or °F. Use the following steps to change HI-LIMIT from displaying °C to °F (and for changing back to °C).

> WARNING: Make sure you understand what you are changing before doing so. Changing the setup parameters will alter the functions of the HI-LIMIT.

1. If the LOCK on the HI-LIMIT is lit, press and hold the RESET for four (4) seconds to enable the ▲ and ▼ keys.
2. Press and hold the ↻ key for four (4) seconds, the setup mode has now been entered.
3. Press the ↻ key until the ***unit*** is displayed.
4. Press the ▲ or ▼ to display value.
5. Use the ▲ or ▼ to move to the desired setting.
6. Press the ↻ key, this enters the value and advances to the next parameter.
7. Press the RESET, this will return the HI-LIMIT to the normal mode.
8. The HI-LIMIT has been changed, enter the desired setpoint.

Troubleshooting

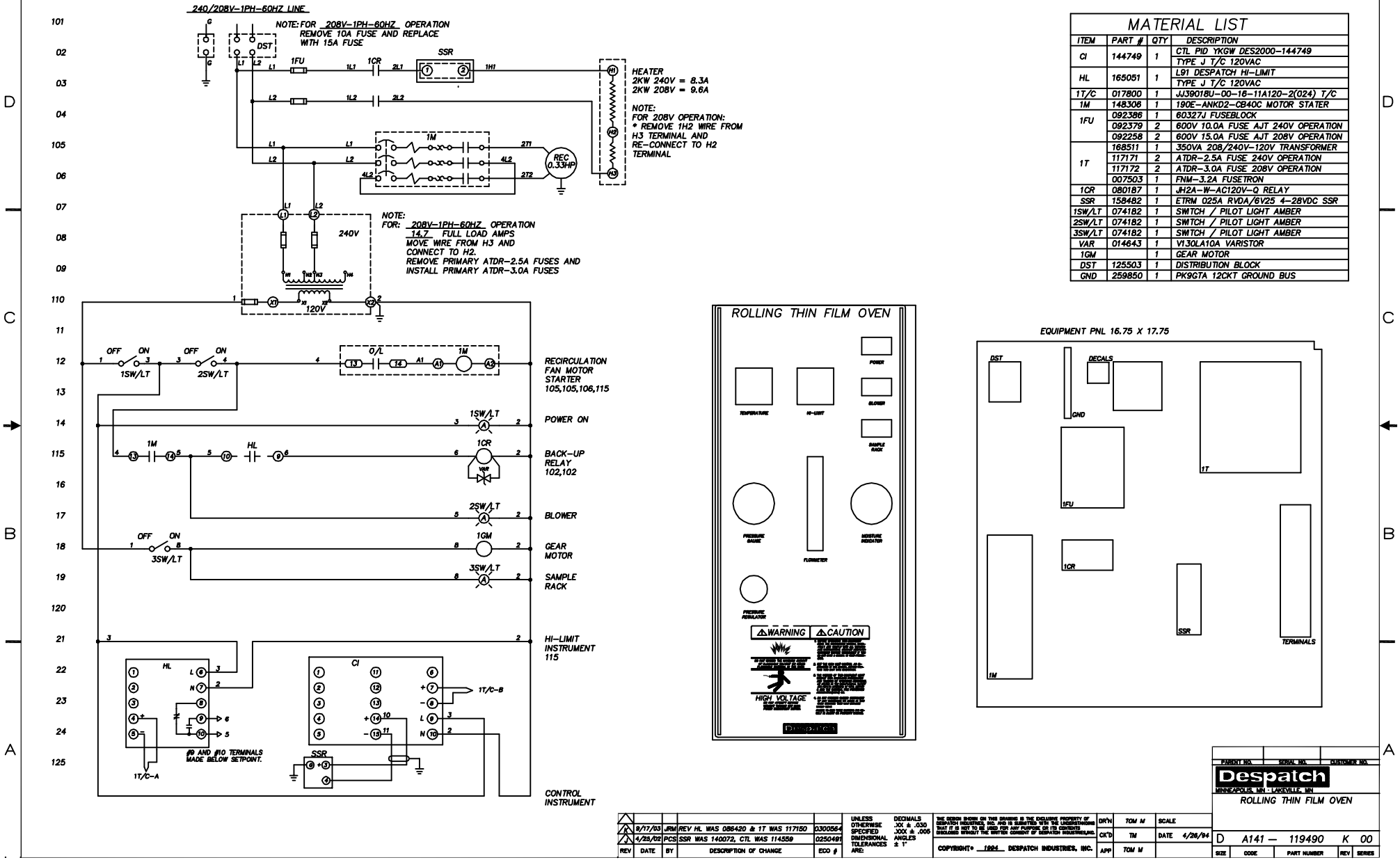
Equipment which operates for long periods of time may develop problems. Below are possible problems and suggested solutions. If you have a problem not listed and do not know what to do, contact Despatch Industries at our toll free Help Line 800-473-7373, FAX 612-781-5353.

Difficulty	Probable Cause	Suggested Remedy
Failure to heat	No power	Check power source and/or oven and wall fuses.
	Broken or frayed cord	Replace with new cord and plug set.
	Burned out heater	Replace heater (see warranty statement).
	TEMPERATURE instrument malfunction	Replace temperature instrument.
	Loose wire connections	Disconnect power and check connections.
Slow heat up	Low line voltage	Supply sufficient power and proper connections
		Check for circuit overload.
Frequent heater element out	Harmful fumes generated by load	Increase vent opening or discontinue process.
	Spillage or splattering of material on heater elements	Disconnect power and clean oven chamber and elements.
	Overheating oven	Check the HI-LIMIT instrument.
Erratic temp.	TEMPERATURE instrument malfunction	Replace TEMPERATURE instrument.
Sample rack does not rotate	Gearmotor burn out	Replace gearmotor.
	Gearmotor fuses	Check and replace if necessary.
	Carousel shaft bushing speed	Clean or replace bushing
Temperature overshooting set point.	Control configuration	Check control parameters
	No load in oven.	Place load in oven when testing.

Difficulty	Probable Cause	Suggested Remedy
Inaccurate temperature	TEMPERATURE instrument offset	Check TEMPERATURE instrument offset adjustment.
	TEMPERATURE instrument misconfiguration	Check programming mode parameters.
	High limit setting	High limit should be 10-25+°F higher than setpoint.
Thermometer doesn't read the same as control	TEMPERATURE instrument offset	Check calibration
Excess surface or door temp	Door seal deterioration	Replace door seal.
Excessive vibration	Dirty fan wheel	Clean fan. Replace fan wheel.
Heater doesn't shut down until temp reaches the Hi-limit setting	Temperature instrument	Replace TEMPERATURE control.
	Relay malfunction	Replace relay.
Carousel bushing squeaks or jerks	Binder build up on the bearing surface	Clean bearing per maintenance section.

Electrical Drawing

The electrical drawing for the Rolling Thin Film Oven is found on the next page.



MATERIAL LIST

ITEM	PART #	QTY	DESCRIPTION
CI	144749	1	CTL PID YKGW DES2000-144749
			TYPE J T/C 120VAC
HL	165051	1	L91 DESPATCH HI-LIMIT
			TYPE J T/C 120VAC
1T/C	017800	1	JJ39018U-00-18-11A120-2(024) T/C
1M	148308	1	190E-ANKD2-CB40C MOTOR STATER
1FU	092386	1	60327J FUSEBLOCK
	092379	2	600V 10.0A FUSE AJT 240V OPERATION
	092258	2	600V 15.0A FUSE AJT 208V OPERATION
1T	168511	1	350VA 208/240V-120V TRANSFORMER
	117171	2	ATDR-2.5A FUSE 240V OPERATION
	117172	2	ATDR-3.0A FUSE 208V OPERATION
	007503	1	FNM-3.2A FUSETRON
1CR	080187	1	JH2A-W-AC120V-Q RELAY
SSR	158482	1	ETRM 025A RVDA/6V25 4-28VDC SSR
1SW/LT	074182	1	SWITCH / PILOT LIGHT AMBER
2SW/LT	074182	1	SWITCH / PILOT LIGHT AMBER
3SW/LT	074182	1	SWITCH / PILOT LIGHT AMBER
VAR	014643	1	V130LA10A VARISTOR
1GM		1	GEAR MOTOR
DST	125503	1	DISTRIBUTION BLOCK
GND	259850	1	PK9GTA 12CKT GROUND BUS

REV	DATE	BY	DESCRIPTION OF CHANGE	ECO #
3	9/17/03	JRM	REV HL WAS 088420 & 1T WAS 117150	0300564
2	4/25/02	PCS	SSR WAS 140072, CTL WAS 114559	0250491

UNLESS OTHERWISE SPECIFIED DIMENSIONAL TOLERANCES ARE: DECIMALS .XX ± .030 .XXX ± .005 ANGLES ± 1°

DR'N TOM M | CK'D TM | APP TOM M | SCALE | DATE 4/26/94

PARENT NO. | SERIAL NO. | CUSTOMER NO.

Despatch
MINNEAPOLIS, MN · LAKEVILLE, MN

ROLLING THIN FILM OVEN

SIZE	CODE	PART NUMBER	REV	SERIES
D	A141 —	119490	K	00

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