
TM.....

TECHNICAL MANUAL

MODEL

USN-50
150F-440VMN

DESCRIPTION

Fryer, Deep-Fat, Electric w/Solid State Controls
440 Volt, 60 HZ, 3 Phase

NSN: _____

The logo for Lang, featuring the word "Lang" in a bold, italicized, sans-serif font. The letters are black with a white outline, and a registered trademark symbol (®) is located at the top right of the letter 'g'. The logo is set against a white background with a thin black border.

Table Of Contents

Table Of Contents	0
Warnings	1
Specifications	2
Installation Instructions	3
DATAPLATE.....	3
ELECTRICAL SERVICE ENTRANCE.....	3
SAFETY CIRCUIT CONNECTIONS	3
Operating Instructions	4
FILL LEVELS.....	4
CONTROLS.....	4
Operating Instructions cont'd	5
LIMITING CONTROL TEST SWITCH.....	5
Operating Instructions cont'd	6
HEATING ELEMENTS	6
DRAINING THE FRYER OIL.....	6
Maintenance Instructions	7
FRYER CLEANING.....	7
TEMPERATURE CONTROL.....	7
OVER-TEMPERATURE PROTECTION	7
MAINTENANCE INSTRUCTIONS CONT'D	8
THERMOSTAT BULBS CHECK	8
COMPONENT ACCESS	8
TECHNICAL SUPPORT	8
CALIBRATION	8
Maintenance Instructions cont'd	9
A. <i>CHECKING TEMPERATURE</i>	9
B. <i>ACCESSING THE TEMPERATURE CONTROL COMPONENTS</i>	9
Maintenance Instructions cont'd	10
C. <i>TESTING TEMPERATURE SENSE PROBE</i>	10
Maintenance Instructions cont'd	11
D. <i>TESTING TEMPERATURE SELECTOR SWITCH</i>	11
E. <i>CALIBRATION OF TEMPERATURE CONTROL BOARD</i>	11
Wire Diagram	12
Parts List	13

Star Manufacturing

265 HOBSON ST. SMITHVILLE, TN 37166

For Parts And Technical Support Call:

Direct Line: PH: 314-678-6303

Fax Number: PH: 314-781-2714

Warnings

DANGER: THIS APPLIANCE MUST BE GROUNDED AT THE TERMINAL PROVIDED. FAILURE TO GROUND THE APPLIANCE COULD RESULT IN ELECTROCUTION AND DEATH.

WARNING: INSTALLATION OF THIS LANG FRYER MUST BE DONE BY PERSONNEL QUALIFIED TO WORK WITH ELECTRICITY. IMPROPER INSTALLATION CAN CAUSE INJURY TO PERSONNEL AND/OR DAMAGE TO THE EQUIPMENT. THE UNIT MUST BE INSTALLED IN ACCORDANCE WITH ALL APPLICABLE CODES.

ALWAYS KEEP THE AREA NEAR THE APPLIANCE FREE FROM COMBUSTIBLE MATERIALS.

BEFORE PERFORMING ANY WORK ON INTERNAL COMPONENTS, DISCONNECT THE APPLIANCE FROM THE ELECTRIC POWER SUPPLY.

KEEP WATER AND SOLUTIONS OUT OF CONTROL AND ELECTRICAL EQUIPMENT. NEVER SPRAY WATER ON THE APPLIANCE WHICH MAY PERMIT LIQUID TO GET INTO THE CONTROL AND ELECTRICAL EQUIPMENT AREAS.

CAUTION: KEEP FLOOR IN FRONT OF EQUIPMENT CLEAN AND DRY. IF SPILLS OCCUR, CLEAN IMMEDIATELY, TO AVOID THE DANGER OF SLIPS OR FALLS.

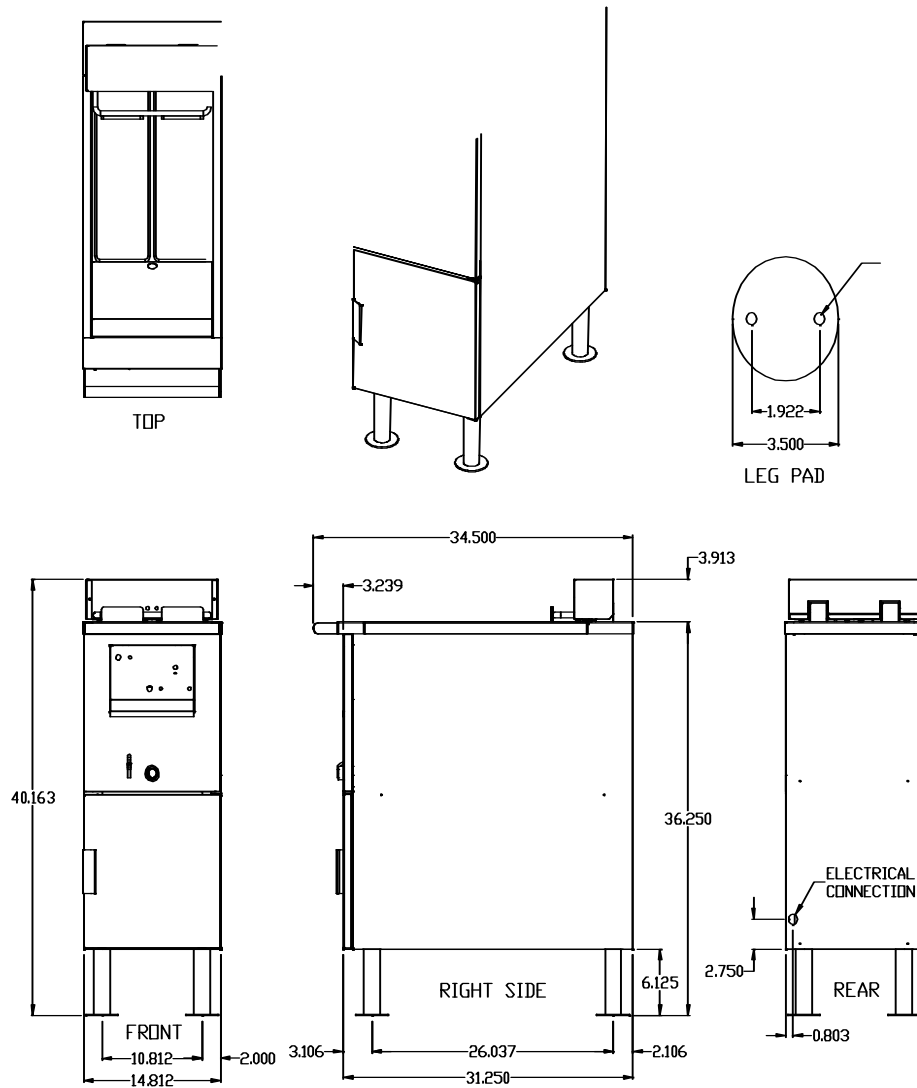
MOST CLEANERS ARE HARMFUL TO THE SKIN, EYES, MUCOUS MEMBRANES AND CLOTHING. PRECAUTIONS SHOULD BE TAKEN TO WEAR RUBBER CLOVES, GOGGLES OR FACE SHIELD AND PROTECTIVE CLOTHING. CAREFULLY READ THE WARNING AND FOLLOW THE DIRECTIONS ON THE LABEL OF THE CLEANER TO BE USED.

USE OF ANY REPLACEMENT PARTS OR OTHER THAN THOSE SUPPLIED BY LANG OR THEIR AUTHORIZED DISTRIBUTOR CAN CAUSE BODILY INJURY TO THE OPERATOR AND DAMAGE TO THE EQUIPMENT AND WILL VOID ALL WARRANTIES.

NOTICE: NEVER LEAVE A CHLORINE SANITIZER IN CONTACT WITH STAINLESS STEEL SURFACES LONGER THAN 10 MINUTES. LONGER CONTACT CAN CAUSE CORROSION.

IMPORTANT: SERVICE PERFORMED BY OTHER THAN FACTORY AUTHORIZED PERSONNEL WILL VOID ALL WARRANTIES.

Specifications



Power	22 kW	Capacity	50 Lb. Oil
Voltage	440 VAC	Weight	138 lb.
Amps (1 phase)	50 Amps	Ship Weight	170 lb.
Amps (3 phase)	43.3; 25; 25	Ship Dimensions	41" X 36" X 18"

Installation Instructions

Data plate

Check the data plate located on the back of the machine for fryer electrical rating. Check power source to insure that it is the correct voltage and current rating.

Electrical Service Entrance

Electrical service may be made through a standard 1¼ inch conduit. A hole is provided through the rear panel. A knockout is also provided in the bottom rear of the fryer, so that power may be brought in from below the unit. Plug the hole on the rear panel when using bottom power entry. Check the National Electrical Code for fuse for circuit breaker requirements.

Safety Circuit Connections

Fire Control Shutoff

A four pole terminal block is provided behind the rear access cover for connection to an external fire control system if required. A jumper is provided across two of these terminals when the fryer leaves the factory. The jumper on this terminal block is in series with the power switch circuit. If connection to a fire control system is required, remove this jumper and supply a relay contact closure to maintain this closed circuit. If the fire control system does not have this type output, a separate relay must be provided to interface the system. **DO NOT APPLY VOLTAGE TO THIS CONNECTION.**

Shunt Trip Circuit

Two terminals are provided on the four pole terminal block for a shunt trip circuit. Connect your 115 volt shunt trip circuit to these terminals.

Phasing And Ground Connection

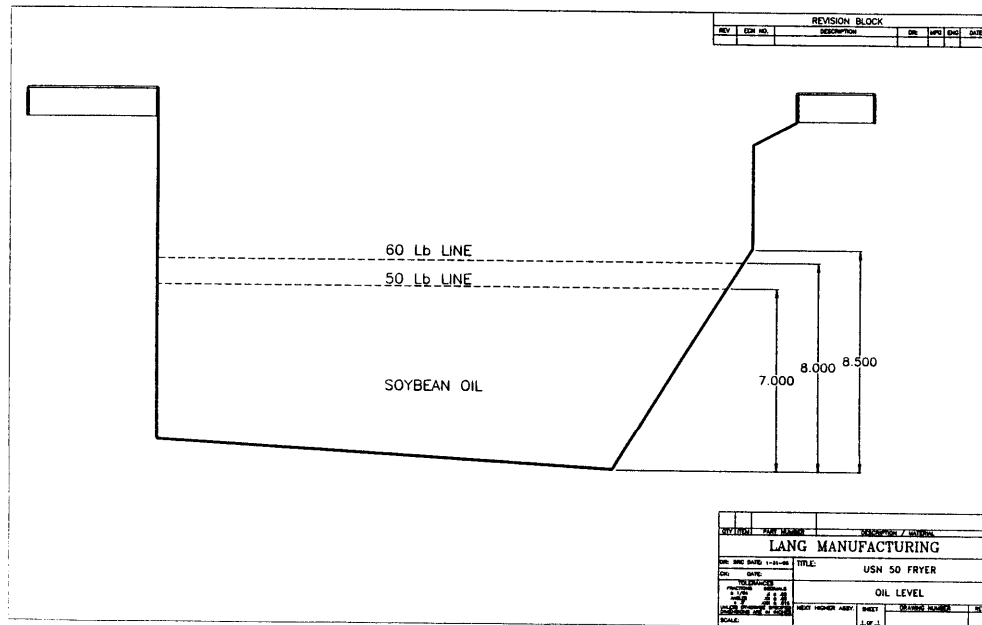
Connect a ground lead to the green ground lug provided in the rear compartment. These fryers may be connected to either single or three phase power as indicated in the table below:

SERVICE CONNECTION			AMPS PER LINE @ 440VAC		
			L1	L2	L3
Three	L1	1 & 4			
Phase	L2	2 & a	43.3	25	25
	L3	3 & B			
Single	L1	1, 3, a	50	50	
PHASE	L2	2, 4, B			

Operating Instructions

Fill Levels

There are two fill marks on the sides of the fryer kettle. The lower level indicates 50 pounds of oil; the upper level indicates 60 pounds of oil. Fill and maintain the oil level between the upper and lower levels.



WARNING

NEVER ENERGIZE THE HEATING ELEMENTS WITH NO OIL IN THE KETTLE OR WITH THE OIL LEVEL MORE THAT 3 INCHES FROM THE LOWER FILL LEVEL.

Controls

The power switch, located on the control box at the front of the fryer, energizes the control circuits. When this switch is on, the "power" pilot lamp will be illuminated.

Turn the temperature selector dial to the desired temperature setting. This control is located next to the power switch. The "heat" pilot lamp will illuminate indicating power is applied to the heating elements.

The lamp marked "over-temp" will illuminate if the oil reaches an over-temperature condition. The over-temperature thermostat shuts off the fryer before the oil reaches a dangerously high temperature.

Operating Instructions cont'd

Limiting Control Test Switch

WARNING

1. If the shunt trip is not properly connected to the ships power a fire hazard exists even with proper operation of the thermostat during test. Ensure proper connection to the shunt trip terminal block.
2. The flash point for cooking oil decreases with age. This test is accomplished bi annually, and it is recommended that the oil be changed prior to test.
3. This test should be accomplished in three steps. First test the operating thermostat, second test the over-temp thermostat, and third test the shunt trip bypass. Do not test the shunt trip bypass until the operating thermostat, and over-temp thermostat has first been successfully tested.
4. Use a calibrated pyrometer when performing this test. In no case allow the oil temperature to exceed 470° F. It is recommended that the pyrometer be tested (measure boiling water at 212° F) prior to the test.
5. Continuously monitor oil temperature throughout the test. The USN 50# Fryer uses two 11KW heating elements, and temperature rise can be fast.

The limiting control test switch, located at the front control panel is a spring loaded, single pole double throw switch for testing the over-temp thermostat. Activating this switch is accomplished by pulling up and holding the toggle. During this time, the solid state controller is bypassed, and the heat light is on. When the oil temperature reaches approximately 425° F. the heat light goes out the audible alarm will sound and the over-temp light will come on.

A second, spring loaded over-temp bypass switch is located in the compartment located under the control panel for testing the neg. bias shunt trip thermostat. Activating this switch is accomplished simultaneous with the limit control test switch. When both test switches are simultaneously pulled and held, the solid-state controller and the over-temp thermostat are bypassed, and the heat light comes on. When the oil reaches approximately 450° F., the normally open negative bias shunt trip closes, causing a “shunt trip” and a total loss of power.

Operating Instructions cont'd

HEATING ELEMENTS

The elements may be raised and locked in the up position. The latch is located on the rear top surface of the fryer and may be activated by lifting the handle at either side of the fryer.

DRAINING THE FRYER OIL

WARNING

ALWAYS TURN THE FRYER POWER SWITCH OFF BEFORE LIFTING THE HEATING ELEMENTS OUT OF THE FRYER OIL.

A drain valve is provided inside the cabinet behind the front panel. A lever to the left of the drain pipe is connected to the drain valve for ease of opening the valve.

To drain the cooking oil remove the steel cap from the drain pipe located at the front of the fryer. Connect a drain pipe extension to the drain pipe. Lift the lever located to the left of the drain pipe, and pull the lever forward. Push the lever back to close the drain valve before refilling the fryer.

WARNING

BE SURE TO DRAIN THE HOT OIL INTO A SUITABLE CONTAINER.

Maintenance Instructions

Fryer Cleaning

Daily Cleaning

It is recommended the fryer oil be kept as clean as possible by straining regularly (several times a day) and filtering daily. This will lengthen the life of your oil and improve the performance of the fryer.

Weekly or As Required

1. Turn power switch off
2. Remove the baskets, let baskets drain and then set aside.
3. Raise heating elements out of oil and lock in up position.
4. Remove cap from oil drain pipe in front of fryer.
5. Attach a drain pipe extension to drain pipe and place other end in suitable container.
6. Pull drain valve lever forward to open drain valve.
7. Remove loose food particles from heating units with spatula and wire brush.
8. Flush out scrapings and sediment with a small quantity of hot oil, and allow to drain thoroughly.
9. Close drain valve and fill with a trade fryer cleaning agent or soapy solution of non-corrosive grease dissolving cleaner.
10. Set selector switch to 250° F. and boil solution for 15 to 20 minutes.
11. Drain solution from well. Refill with water and add 1/2 cup of white vinegar to neutralize alkaline left by soap. Bring solution to a boil and allow to stand for a few minutes.
12. Drain well and rinse with clear, hot water. Dry well and heating units thoroughly, and close drain valve.
13. Refill fryer with oil, and lower heating elements slowly
14. Operate fryer as normal.

Temperature Control

Maintenance of the USN #50 series fryers is simple and straightforward. Temperature control is provided by a solid-state controller located inside the control box and a RTD sensor located in the center of the element bank. The temperature controller energizes the "control contactor".

Over-Temperature Protection

The over-temperature thermostat located next to the left heating element provides protection in case of malfunction of the temperature control. It will sound an audible alarm; open both the "control contactor" and the "safety contactor" removing all power from the heating elements.

Maintenance Instructions cont'd

Thermostat Bulb Check

The three thermostat bulbs, (temperature control thermostat bulb, over-temp thermostat bulb and shunt trip thermostat bulb), are all connected to the fryer heating elements. The brackets that hold this bulb in place should be checked on a regular basis for tightness. If any of the brackets/bulbs become loose, the brackets that hold the bulbs should be tightened right away.

Component Access

In the event the fryer is built into a location, all maintenance may be done from the front. Opening the door to the bottom compartment gains access to the 2-control panel mounting screws located directly under the control panel (top front from the compartment). Removing these screws allows the control panel to be removed for access to the solid-state controller and circuitry. A false bulkhead located to the rear of the bottom compartment isolates the safety, and control contactors, terminal block, and 480/24V transformer from the compartment. To gain access to these components, remove the two top screws, and the two bottom screws located on the bulkhead flanges. DO NOT remove the four screws that secure the component-mounting tray to the bulkhead. Slide the bulkhead back and lay on its front side for access to the components. To gain access to the safety thermostats and element terminals remove the four screws from the front of the access cover located above and to the rear of the oil well.

Technical Support

Star Manufacturing has technical support available that can be reached by calling the phone number on page 1 of this manual. This service is available after normal work hours and on weekends. Our on call technician is paged whenever a message is left with the answering service. This answering service can be contacted 24 hours a day, 7 days a week by calling our 800 number listed on page 2 on this manual.

Calibration

The Model USN 50 Fryer calibration procedure consists of accessing and adjusting a pot on the temperature control board. The temperature control board is located behind the front panel of the fryer. **It is highly recommended the oil be drained from the fryer prior to starting this procedure.** When removing the front panel the oil drain valve could easily be opened causing the oil to drain unexpectedly.

An electronic circuit board, 12-position switch and a temperature sense probe control the USN 50 Fryer temperature. It is not expected the fryer should need calibration. However if the temperature of the oil is off by more than 3% when the fryer is set at 360 degrees F. calibration of the fryer may be required.

Maintenance Instructions cont'd

Prior to doing any calibrating of the temperature control board, the temperature sense probe and the temperature selector switch must be checked and replaced if defective.

Failure to check these components could result in incorrect adjustment of the temperature control board and future problems with calibration.

A. CHECKING TEMPERATURE

1. Set the fryer to a temperature of 360° degrees F. Allow the oil to come to temperature and stabilized by verifying the element has cycled on and off at least five times.
2. Using a high quality thermometer, place the sense probe in the center of the oil. The temperature should be within 3 % of the set temperature.
3. If the temperature is within 3 % of the set temperature no calibration is required
4. If the temperature is not within 3 % of the set temperature proceed to the steps below

CAUTION

WHEN REMOVING THE FRONT COVER THE DRAIN VALVE CAN BE ACCIDENTALLY OPENED CAUSING THE FRYER OIL TO DRAIN OUT THE FRONT UNEXPECTEDLY. IT IS THEREFORE RECOMMENDED TO ALWAYS DRAIN THE OIL PRIOR TO REMOVING THE FRONT COVER

B. ACCESSING THE TEMPERATURE CONTROL COMPONENTS

1. Ensure oil valve handle is pushed in so oil drain valve is closed.
2. Remove the cap from the oil drain pipe and connect a drain pipe extension to the drain pipe
3. Pull the oil valve drain handle and drain the fryer oil into a suitable container.
4. Open the door in the front of the fryer and remove the two screws holding the upper front cover. Pull the bottom of the cover forward and guide the oil drain valve handle through the hole in the front panel. When the front panel clears the oil drainpipe, lower and pull the top of the panel forward and down.
5. Lay the front panel on something secure.
6. Push the oil drain valve handle in to ensure the oil drain valve is closed.
7. Reinstall the drainpipe plug.
8. Refill the fryer with oil.

Maintenance Instructions cont'd

C. TESTING TEMPERATURE SENSE PROBE

1. Set the temperature selector switch on the front panel to 360°F and allow the fryer elements to cycle on and off several times so the oil temperature will be stabilized.
2. Locate the temperature control circuit board and the connector plugs on the board. The two-pin connector with brown wires is the temperature sensing probe connector. Unplug this two-pin connector and check the resistance of the probe by measuring the ohms at the plug pins. The probe resistance table below shows the required probe resistance for the full temperature range of the fryer.
3. Using a high quality thermometer check the temperature of the oil. If the probe resistance is not within ± 5 ohms of the ohms specified for the temperature of the oil, the probe is defective and must be replaced before calibrating the fryer.
4. If the probe resistance is within ± 5 ohms of the ohms specified for the temperature of the oil, (see table below), the probe is within proper tolerance and should not be changed. At this point with the probe resistance correct and the temperature 2% or more off, reconnect the probe plug and proceed to the "Check Selector Switch" section.

Temperature	Ohms	Temperature	Ohms
70°	556	356°	993.2
100°	596	358°	996.7
150°	665	360°	1000.3
200°	739	362°	1003.8
250°	816	364°	1007.3
300°	897	366°	1010.9
350°	982.4	368°	1014.4
352°	986.2	370°	1018
354°	989.7	400°	1072

Maintenance Instructions cont'd

D. TESTING TEMPERATURE SELECTOR SWITCH

1. Remove connector from selector switch
2. Turn temperature selector switch knob counter-clockwise.
3. Using an accurate Ohmmeter record the resistance between pins 2 & 3 at each position from 180°F. through 400°F. (Note: The plug has wires in pins 1, 3 & 4. Pins 2 & 5 are open)
4. Verify the resistance at each position is within 3 ohms of the expected resistance's according to the table below.
5. If resistance readings on any temperature are off more than 3 ohms, replace Temperature control switch. Check temperature of oil at 360°F. to see if now correct.
6. If temperature is not correct and both temperature sense probe and temperature selector switch have been verified good, proceed to calibration.

Temperature Setting	Resistance Reading		Temperature Setting	Resistance Reading
180°	0.00		300°	625
200°	162.2		320°	642
220°	300.8		340°	631
240°	418		360°	590
260°	513		380°	519
280°	582		400°	416

E CALIBRATION OF TEMPERATURE CONTROL BOARD

1. Set temperature control to 360° degrees and allow the elements to cycle several times while recording the temperature at which the elements turn "ON" and "OFF", (Ignore any over or under swing).
2. Average the "ON" and "OFF" temperatures. If the average temperature is within 3 % of the set temperature, the fryer is within specifications and needs no adjustment.
3. If the average temperature is not within 3 % of the set point, adjust the small screw on the temperature control board to get the temperature within 3 %. Turn the setscrew clockwise to lower the temperature, or counterclockwise to raise the temperature. Allow the fryer elements to cycle on and off several times to confirm temperature has stabilized within range.
4. Drain oil and reinstall the front panel.

PARTS LIST

MAY 30, 2008, REV B

Model 150F, Fryer, Deep-Fat, Electric w/Solid State Controls

Part No.	Description	QTY	Application
2A-72500-06	LEG 5 1/2W/BOLT DOWN ADJ	4	150F-440VMN
2E-30303-06	SWT TOG ON-ON DPDT BLK	1	150F-440VMN
2E-30303-15	BOOT THREADED BLACK FOR	3	150F-440VMN
2E-30303-16	SWT TOG ON-ON BLK MOM	2	150F-440VMN
2E-30304-18	SWITCH CIR.BD. 180o-400o	1	150F-440VMN
2E-30500-09	TRM BLOCK 3 POLE SMALL 95	1	150F-440VMN
2E-30501-03	TERM STRP 4 POLE W/PUSH	1	150F-440VMN
2E-30701-04	CONTC 2POLE 30A 24VAC	2	150F-440VMN
2E-30701-05	CONTC 2POLE 30A 24VAC P &	1	150F-440VMN
2E-31400-15	XFRMR 480/24VAC	1	150F-440VMN
2E-40101-19	CIRBD SI TEMP CNTRL NO	1	150F-440VMN
2E-41100-19	SENSOR PROOFER450o(CONN	1	150F-440VMN
2E-100-63-1	USN50 BUZZER WITH WIRES, 24VAC	1	150F-440VMN
2J-31601-07	PILOT LT 28V 6 LEAD WHT	3	150F-440VMN
2K-70801-05	SNAP BUSH STRAIN RELIEF	2	150F-440VMN
2M-60301-103	PNLLBL SELCT SWTDIAL 400o	1	150F-440VMN
2M-60301-17	PANEL LABEL C28 PILOT	1	150F-440VMN
2M-60302-01	LBL WARN C28 CAUTION	1	150F-440VMN
2M-60302-38	LBL WARN-CAUTION C28	1	150F-440VMN
2N-11110-48	ELMNT FRYR 440V11KWUSN50	2	150F-440VMN
2R-70701-53	KNOB SPECIAL #2-SET SCREW	1	150F-440VMN
2T-30401-19	STAT FXD TMP NEGBIAS 425o	1	150F-440VMN
2T-30401-21	STAT FXD TMP NEGBIAS 450o	1	150F-440VMN
2V-70400-01	VALVE 1BALL NIC PLTD (NO	1	150F-440VMN

WARRANTY

Lang Manufacturing Limited Warranty to Commercial Purchasers* (Domestic U.S., Hawaii, & Canadian Sales only.)

Lang Manufacturing Equipment (“Lang, periodic adjustments, as specified in Equipment”) has been skillfully manufactured, carefully inspected and packaged to meet rigid standards of excellence. Lang warrants its Equipment to be free from defects in material and workmanship for (12) twelve consecutive months, with the following conditions and subject to the following limitations.

I. This parts and labor warranty is limited to Lang Equipment sold to the original commercial purchaser/users (but not original equipment manufacturers), at its original place of installation, in the continental United States, Hawaii and Canada.

Quartz elements are warranted for ninety(90) days from the date of installation.

II. Damage during shipment is to be reported to the carrier, is not covered under this warranty, and is the sole responsibility of purchaser/user.

III. Lang, or an authorized service representative, will repair or replace, at Lang’s sole election, and Lang Equipment, including but not limited to, safety valves, gas and electric components, found to be defective during the warranty period. As to warranty service in the territory described above, Lang will absorb labor and portal to portal transportation costs (time & mileage) for the first (12) twelve months from the date of installation or eighteen (18) months from date of shipment from Lang Manufacturing, which ever comes first.

IV. This warranty does not cover routine general maintenance, operating instructions or manuals, and consumable parts such as quartz elements, or labor costs incurred for removal of adjacent equipment or objects to gain access to Lang Equipment. This warranty does not cover defects caused by improper installation, abuse, careless operation, or improper maintenance of equipment.

V. THIS WARRANTY IS EXCLUSIVE AND IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, EACH OF WHICH IS HEREBY EXPRESSLY DISCLAIMED. THE REMEDIES DESCRIBED ABOVE ARE EXCLUSIVE AND IN NO EVENT SHALL LANG BE LIABLE FOR SPECIAL, CONSEQUENTIAL OR INCIDENTAL DAMAGES FOR THE BREACH OR DELAY IN PERFORMANCE OF THIS WARRANTY.

VI. Lang Equipment is for commercial use only. If sold as a component of another (OEM) manufacturer’s equipment, or if used as a consumer product, such Equipment is sold AS IS and without any warranty.