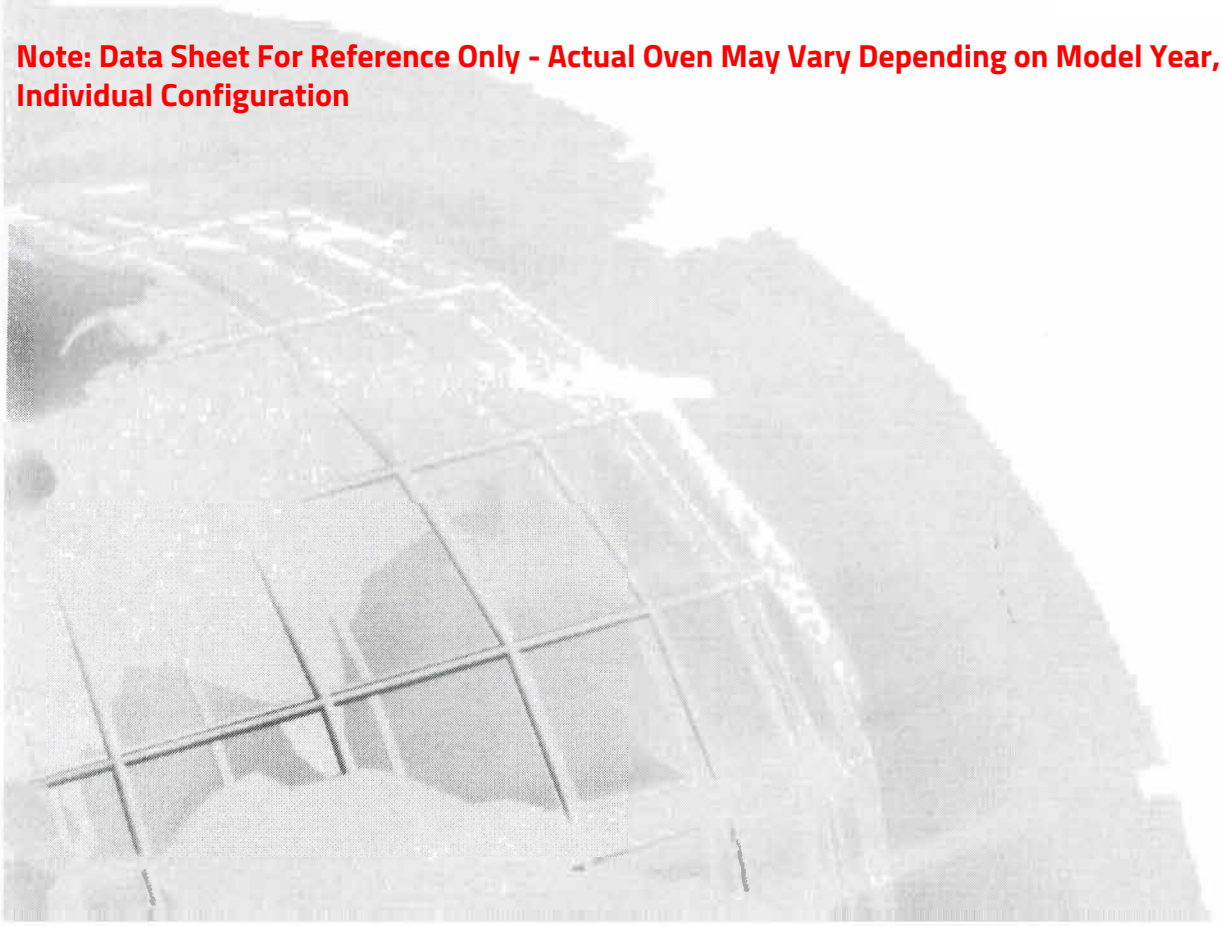
LAD SERIES
WITH PROTOCOL *PLUS*

Note: Data Sheet For Reference Only - Actual Oven May Vary Depending on Model Year, Options, Controllers, and Individual Configuration



°Specifications

Dimensions

Model	Chamber Size in (cm)			Capacity feet^3 (liters)	Overall Size in (cm)			Maximum Number of Shelf Positions
	W	D	H		W	D	H	
LAD 1-42	20 (50)	18 (46)	20 (51)	4.2 (120)	33 (84)	34 (86)	45 (114)	9
LAD 2-11	38 (96)	20 (50)	26 (66)	11.0 (310)	54 (137)	35 (88)	69 (175)	6
LAD 2-24	48 (122)	24 (61)	36 (91)	24.0 (680)	66 (166)	38 (98)	81 (206)	9

Capacities

Model		LAD 1-42	LAD 2-11	LAD 2-24
Maximum Load	Lbs	150	180	300
Maximum Shelf Load	Lbs	30	60	100
Exhaust at 177°C (350°F)	CFM	Adjustable to 12	Adjustable to 19	Adjustable to 80
Recirculating Fan	CFM HP	300 1/4	1,000 1	1,500 2
Approximate Weight Net KG	Lbs.	350 159	745 339	1,015 461
Approximate Shipping Weight	Lbs. KG	480 218	1,045 475	1,415 643

Temperature

Model		LAD 1-42	LAD 2-11	LAD 2-24
Time to Temperature (approximate minutes with no load)	25°C - 100°C 25°C - 200°C 25°C - 343°C	6 21 56	5 14 32	3 12 30
Recovery Time Door Open 1 Min. (approximate minutes with no load)	100°C 200°C 343°C	<1 3 10	<1 2 7	<1 2 4
Temperature Uniformity at	100°C* 200°C* 343°C*	±1°C ±2°C ±3°C	±1°C ±2°C ±3°C	±1°C ±2°C ±3°C
Minimum Operating Temperature (Approximate w/20EC ambient)		40°C	30°C	30°C
Control Stability		±0.3°C	±0.3°C	±0.3°C
Repeatability		±0.5°C	±0.5°C	±0.5°C
Cooldown Time (approximate minutes with no load)	343 - 50°C dampers open 343 - 75°C dampers closed	108 130	56 150	26 200

* Figures are based on actual tests in an empty oven. Uniformity can vary slightly depending on unit and operating conditions.

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 electrical components such as relays, temperature controls, etc. may operate erratically.

Power Requirements

Model	Volts	Amps	Hertz	Phase	Heater KW
LAD 1-42	240*	15.6	50/60	1	3
LAD 2-11	208	29.8	60	3	9
	240	26.1	60	3	9
	480	13.1	60	3	9
LAD 2-24	208	52.4	60	3	16
	240	46.0	60	3	16
	480	23.0	60	3	16

* Oven designed for 240 volts (see name plate on oven) will operate satisfactorily on a minimum of 208 volts, but with a 25% reduction in heater power. If your power characteristics are lower, contact Despatch Industries. An option is available to regain the full heater power when operating on 208V.

THEORY OF OPERATION

This section details the function and operation of assemblies and subassemblies on the Despatch LAD Series Ovens. These ovens have the most effective heat distribution system and the fastest processing time of any lab ovens their size. They are especially useful for testing, preheating, sterilizing, drying, aging and curing as well as other production applications. Horizontal airflow with precision digital control delivers uniform, fast processing. The overall result is efficient productivity under strenuous conditions.

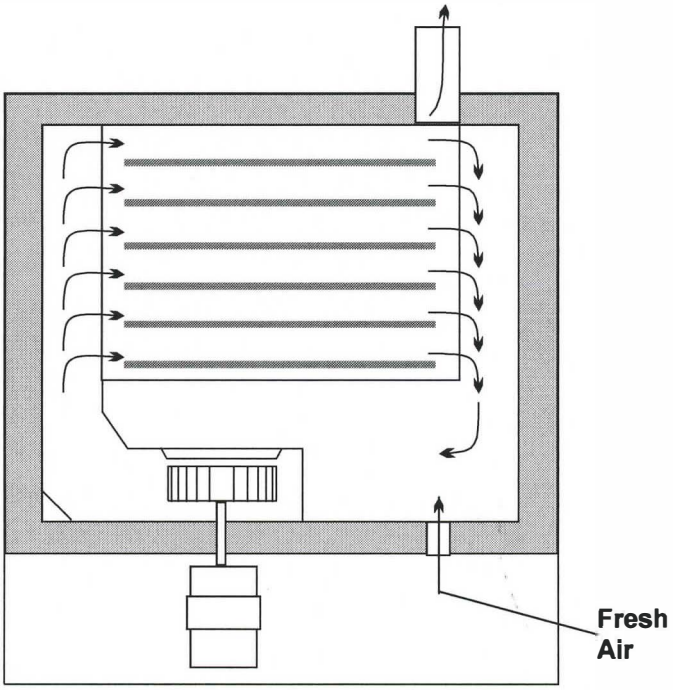


Figure 1. Horizontal Airflow

The unique Despatch computerized design, moves forced convected heat through perforated stainless steel walls. The air is recirculated with a high volume fan. Despatch LAD Series Ovens employ higher volume fans than any competitive model. The chamber can be densely loaded without interfering with the process. The LAD series air delivery temperature is within 1/2°C of the number appearing on the digital display. Also, fresh air intake is regulated by a panel-mounted damper control. The exhaust rate is regulated by an adjustable control on the exhaust stack (LAD2-11 and LAD2-24). The exhaust opening is fixed on the LAD1-42. The exhaust port, located on the back of the LAD1-42, is covered by a hat bracket. For safety reasons, do not remove the hat bracket.

Damper Control

The oven is equipped with a manually adjustable damper mechanism. The damper control arm is located on the front panel of the oven. The damper adjustment controls the flow of fresh air into the chamber. If the damper is in the full open position, the maximum amount of fresh air is distributed into the chamber.

Determining Damper Settings

The optimum setting for the amount of fresh air that should be distributed into the chamber depends on several factors. These factors include ambient environment temperature, load conditions, load distribution, heat up rates, cool down rates, desired temperature uniformity and most importantly the desired operating temperature. To consider all of these variables at any one point in time is not practical and there are engineering tradeoffs that should be considered. Therefore guidelines should be used to determine the fresh air damper setting.

In general, the damper should be set so that the amount of fresh air flowing into the chamber agrees with the desired operating temperature conditions. The following outline shows the considerations involved with various damper position settings.

Full Closed Position

When the fresh air damper is in the full closed position, the chamber will be able to achieve the maximum attainable heat up rates for the chamber. In addition, the chamber will use the minimum amount of power to operate at the desired temperature. In almost all cases, the fresh air damper should be in the full closed position in order to efficiently operate at the maximum operating temperature for the chamber.

WARNING:
This oven is not designed for use with flammable material. If your process involves flammable material, see the LFD Series.

Full Open Position

When the fresh air damper is in the full open position, the chamber will operate at its minimum operating temperature.

Friction heat from the air recirculation system builds up in the chamber. This causes chamber temperature to rise slightly even though the heating system is not turned on. After the recirculation motor has been on for an extended period of time, the chamber will reach a thermal equilibrium temperature.

When the damper is not set to the full open position, the chamber has no way to readily dissipate the heat generated by the friction. With the fresh air damper fully open, the thermal equilibrium temperature is the minimum operating temperature of the chamber.

Other Damper Settings

The damper can be set to several other distinct operating positions. In most cases the damper setting is influenced by two specific performance factors. The two performance factors are uniformity and cool down rates.

The uniformity of the chamber is influenced by the inside chamber pressure of the system. The pressure inside the chamber is dependant on the amount of fresh air flowing into the chamber. When a large volume of fresh air is flowing into the chamber, the chamber becomes slightly pressurized and the overall temperature uniformity improves. The slightly pressurized chamber produces the effect of "pushing" the air to the corners of the chamber. Typically the corners of the chamber will improve with respect to temperature distribution while the core of the chamber will maintain excellent uniformity characteristics regardless of the damper position. Therefore, the pressurization of the chamber typically is a factor when the chamber is loaded heavily. Adjusting the exhaust damper will aid in pressurizing the chamber. The best uniformity results, with respect to the product, are achieved when no more than two-thirds of any inside chamber dimension are used. The best overall results are achieved when the product(s) are located in the center of the chamber.