



## **Endeavor™ 5000 Series**

EN

**Open Air Shaker, e-E51LD0420**

**Open Air Shaker, e-E51LD0403**

**Microplate Shaker, e-E51LDMP03**

**Instruction Manual**



## Change History

| # | Date      | Version | Descriptions |
|---|-----------|---------|--------------|
| 1 | 2023.7.27 | A       | New release  |
|   |           |         |              |
|   |           |         |              |

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# 1. INTRODUCTION

This manual contains installation, operation, and maintenance instructions for the Ohaus Endeavor 5000 Series. Please read the manual completely before using.

## 1.1. Safety Information

Safety notes are marked with signal words and warning symbols. These show safety issues and warnings. Ignoring the safety notes may lead to personal injury, damage to the instrument, malfunctions and false results.

**WARNING** For a hazardous situation with medium risk, possibly resulting in severe injuries or death if not avoided.

**CAUTION** For a hazardous situation with low risk, resulting in damage to the device or the property or in loss of data, or minor or medium injuries if not avoided.

**ATTENTION** For important information about the product. May lead to equipment damage if not avoided.

**NOTE** For useful information about the product.

### Warning Symbols



General hazard



Electric shock hazard

### Safety Precautions



**CAUTION:** Read all safety warnings before installing, making connections, or servicing this equipment. Failure to comply with these warnings could result in personal injury and/or property damage. Retain all instructions for future reference.

Always operate unit on a level surface for best performance and maximum safety

**DO NOT** lift unit by the tray.

Disconnect unit from the power supply prior to maintenance and servicing.

Spills should be removed promptly.

**DO NOT** immerse the unit for cleaning.

**DO NOT** operate the unit if it shows signs of electrical or mechanical damage.

**WARNING!** The protection provided by the unit may be impaired if used with accessories not provided or recommended by the manufacturer or used in a manner not specified by the manufacturer.

**WARNING! DO NOT** use the unit in a hazardous atmosphere or with hazardous materials for which the unit was not designed.



**CAUTION:** To avoid electrical shock, completely cut off power to the unit by disconnecting the power cord from the unit or unplugging from the wall outlet.



Earth Ground – Protective Conductor Terminal



Alternating Current

## 1.2. Intended Use

This instrument is intended for use in laboratories. It must only be used for processing materials as described in these operating instructions. Any other type of use and operation beyond the limits of technical specifications, without written consent from OHAUS, is considered as not intended. This instrument complies with current industry standards and the recognized safety regulations; however, it can constitute a hazard in use. If the instrument is not used according to these operating instructions, the intended protection provided by the instrument may be impaired.

## 1.3. Package Contents

- Light Duty Shaker or Microplate Shaker
- Power cord
- Power supply
- Non-skid rubber mat (Light Duty Shaker only)
- V-clips and springs to secure microplates (Microplate Shaker only)

## 1.4. Installation

Upon receiving the Ohaus Light Duty/Microplate Shaker check to ensure that no damage has occurred during shipment. It is important that any damage that occurred in transport is detected at the time of unpacking. If you do find such damage, the carrier must be notified immediately.

After unpacking, place the Light Duty/Microplate Shaker on a level bench or table, away from explosive vapors. Secure to an immovable work surface by pressing down on the four (4) corners of the unit, creating a strong suction to the work surface (DO NOT place on a bench mat or press on the tray). Do not position the equipment such that it is difficult to disconnect the power cord during use. Always place the unit on a clean and sturdy work surface.

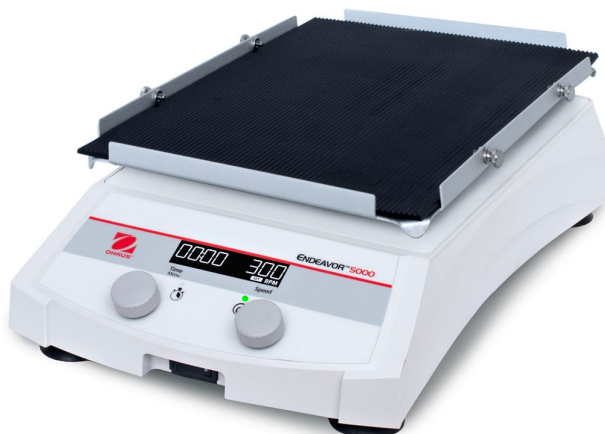
Plug the power supply provided with the Light Duty/Microplate Shaker into the power jack on the back of the unit. Only use the power supply provided with the unit. The Light Duty/Microplate Shaker is supplied with a 3 conductor, grounded power cord. Connect to the provided power supply to the power cord and plug the power cord into a standard grounded outlet.

If the cord supplied does not meet your needs, please use an approved power cord that has ratings equal to or exceeding those of the originally provided cord and that complies with the local/national regulations of the country in which the equipment is to be used.

## 1.5. Overview

### 1.5.1 Specifications

#### Endeavor™ 5000 Light Duty Shaker, 20 mm Orbit (e-E51LD0420)

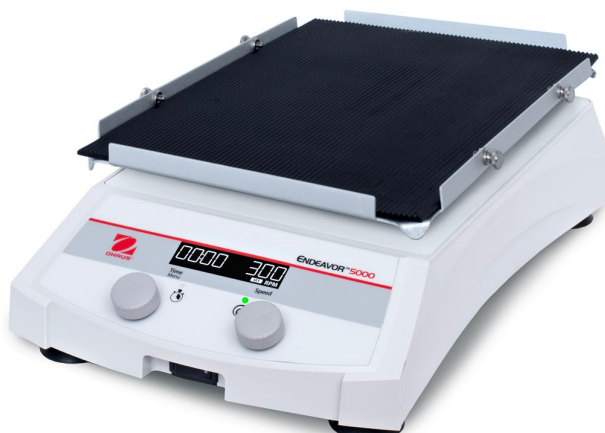


|                        |                                                                                                            |
|------------------------|------------------------------------------------------------------------------------------------------------|
| Dimensions (L x W x H) | 42.0 x 26.2 x 11.9 cm (16.5 x 10.3 x 4.7 in.)                                                              |
| Tray dimensions        | 30.0 x 22.2 cm (11.75 x 8.75 in.)                                                                          |
| Tray material          | Aluminum tray with 11 mounting points for accessories and non-slip rubber mat                              |
| Electrical             | 24VDC / 1.25A                                                                                              |
| Motion                 | Orbital 20 mm (0.8 in.)                                                                                    |
| Speed range            | 50 – 300 rpm                                                                                               |
| Speed increments       | 1 rpm                                                                                                      |
| Speed Accuracy**       | Above 100 rpm $\pm$ 2% of set speed<br>Below 100 rpm $\pm$ 2 rpm                                           |
| Timer                  | Up to 99 hours 59 minutes                                                                                  |
| Tray capacity          | 4.0 kg (8.8 lb.)<br>4 x 500 mL flasks<br>6 x 250 mL flasks<br>6 x 125 mL flasks<br>Up to 3 x 1 L flasks*** |
| Drive System           | Brushless DC Motor, Triple Eccentric                                                                       |
| IP Rating              | IP21                                                                                                       |
| Net weight             | 7.5 kg (16.5 lb.)                                                                                          |
| Ship weight            | 9.9 kg (21.8 lb.)                                                                                          |

\*\*Conditions permitting. Variations in measurement process, vessel(s), and sample(s) will impact actual performance.

\*\*\*Universal Platform 30770938 required for 3 x 1 L flasks capacity

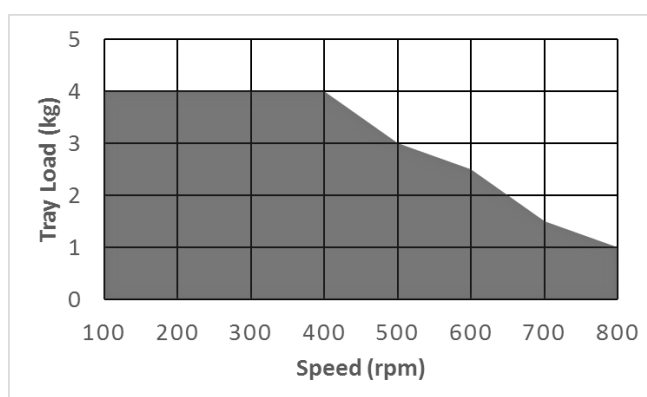


**Endeavor™ 5000 Light Duty Shaker, 3 mm Orbit (e-E51LD0403)**

|                        |                                                                                                            |
|------------------------|------------------------------------------------------------------------------------------------------------|
| Dimensions (L x W x H) | 42.0 x 26.2 x 11.9 cm (16.5 x 10.3 x 4.7 in.)                                                              |
| Tray dimensions        | 30.0 x 22.2 cm (11.75 x 8.75 in.)                                                                          |
| Tray material          | Aluminum tray with 11 mounting points for accessories and non-slip rubber mat                              |
| Electrical             | 24VDC / 1.25A                                                                                              |
| Motion                 | Orbital 3 mm (0.1 in.)                                                                                     |
| Speed range            | 100 – 800 rpm                                                                                              |
| Speed increments       | 1 rpm                                                                                                      |
| Speed Accuracy**       | Above 100 rpm $\pm 2\%$ of set speed<br>Below 100 rpm $\pm 2$ rpm                                          |
| Timer                  | Up to 99 hours 59 minutes                                                                                  |
| Tray capacity          | 4.0 kg (8.8 lb.)<br>4 x 500 mL flasks<br>6 x 250 mL flasks<br>6 x 125 mL flasks<br>Up to 3 x 1 L flasks*** |
| Drive System           | Brushless DC Motor, Triple Eccentric                                                                       |
| IP Rating              | IP21                                                                                                       |
| Net weight             | 7.5 kg (16.5 lb.)                                                                                          |
| Ship weight            | 9.9 kg (21.8 lb.)                                                                                          |

\*\*Conditions permitting. Variations in measurement process, vessel(s), and sample(s) will impact actual performance.

\*\*\*Universal Platform 30770938 required for 3 x 1 L flasks capacity

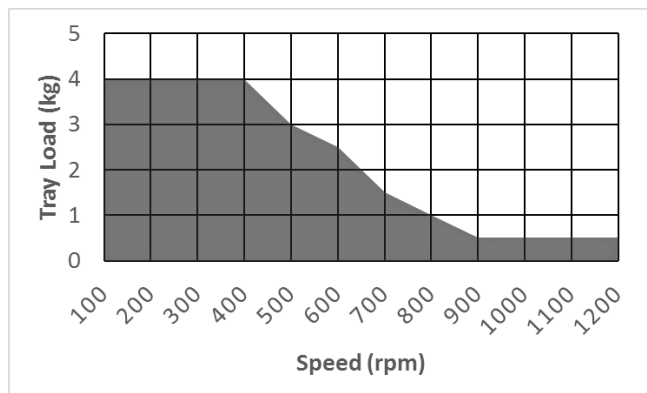


**Endeavor™ 5000 Microplate Shaker, 3 mm Orbit (e-E51LDMP03)**

|                        |                                                                   |
|------------------------|-------------------------------------------------------------------|
| Dimensions (L x W x H) | 42.0 x 26.2 x 11.9 cm (16.5 x 10.3 x 4.7 in.)                     |
| Tray dimensions        | 28.0 x 19.7 cm (11 x 7.75 in.)                                    |
| Tray material          | Aluminum                                                          |
| Electrical             | 24VDC / 1.25A                                                     |
| Motion                 | Orbital 3 mm (0.1 in.)                                            |
| Speed range            | 100 – 1200 rpm*                                                   |
| Speed increments       | 1 rpm                                                             |
| Speed Accuracy**       | Above 100 rpm $\pm 2\%$ of set speed<br>Below 100 rpm $\pm 2$ rpm |
| Timer                  | Up to 99 hours 59 minutes                                         |
| Tray capacity          | 4 Microplates                                                     |
| Drive System           | Brushless DC Motor, Triple Eccentric                              |
| IP Rating              | IP21                                                              |
| Net weight             | 7.5 kg (16.5 lb.)                                                 |
| Ship weight            | 9.9 kg (21.8 lb.)                                                 |

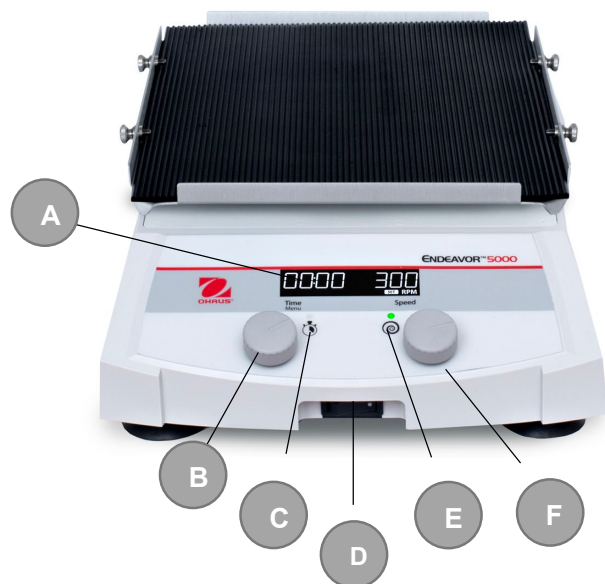
\*Microplates and deep well plates are available with a variety of skirt styles. Depending on the skirt style the maximum speed may need to be reduced.

\*\*Conditions permitting. Variations in measurement process, vessel(s), and sample(s) will impact actual performance.



## 1.5.2 Device Setup

### Light duty/microplate shaker



A. LCD

B. Timer Adjustment Knob

C. Timer Status Indicator

D. Power Switch

E. Run/Speed Status Indicator

F. Speed Adjustment Knob



G. RS232 Port

H. DC Power Connector

## 1.5.3 Standard Tray Configurations

The Light Duty Shaker is supplied with a tray designed to hold a variety of accessories (available separately).

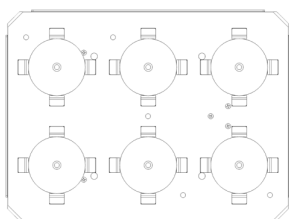
1. Flat containers can be shaken by placing them on the non-skid rubber mat provided with the unit.
2. The tray also has mounting holes ready for use with flask clamps or test tube racks. See below examples of tray configurations.

### Installation of Flask Clamps - e-E51LD0420 and e-E51LD0403

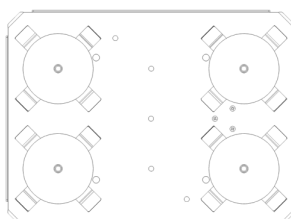
1. Turn unit off with power switch.
2. Remove non-skid rubber mat.
3. Line up the hole(s) in the flask clamp to the hole(s) in the tray. Using the screw(s) provided, hand tighten into place using a flathead screwdriver. DO NOT over tighten.
4. Insert flask/media bottle into clamp and wrap the spring around the neck of the clamp to hold secure. For PVC flask clamps, simply place vessel in clamp.

### Installation of Test Tube Racks – e-E51LD0420 and e-E51LD0403

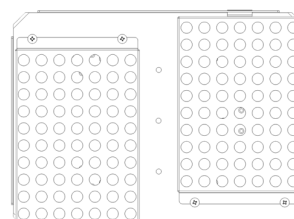
1. Turn unit off with power switch.
2. Remove non-skid rubber mat.
3. Align the clip on the rack to the side of the tray.
4. Line up the holes in the test tube rack to the holes in the tray. Using the screws provided, hand tighten into place using a flathead screwdriver. DO NOT over tighten.



(6) Erlenmeyer Flask Clamps  
125 ml – 250 ml



(4) 500 mL Erlenmeyer Flask  
Clamps

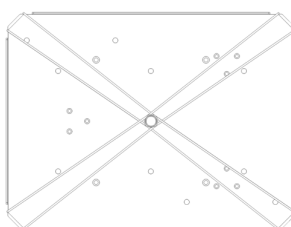


(2) Tube Racks

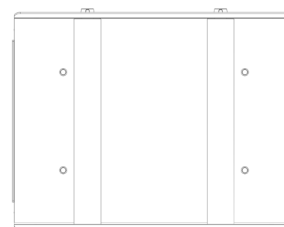
### 1.5.4 Standard Tray Accessories for e-E51LD0420 and e-E51LD0403 (available separately)



Sticky Mat  
30770939



Universal Harness e-E51LD  
(4 short bands, 2 long bands)  
30770940



Adjustable Platform  
30400121

### Installation of Sticky Mat

Sticky mats are recommended for flat bottom vessels with a wide base at low speeds. Sticky mat performance may diminish over time due to spills, dirt and debris.

1. Turn unit off with power switch.
2. Remove non-skid rubber mat.
3. Place sticky mat directly on tray, then place sample on sticky mat. The sticky mat can be repositioned simply by peeling from the tray.
4. Vessels can be removed by tilting to the side

### Installation of Universal Harness

The Universal Harness attaches to tray to secure low profile plates.

1. Turn unit off with power switch.
2. Remove non-skid rubber mat.
3. To use the short bands, install the center post thumbscrew on the tray. Hand tighten into place DO NOT over tighten,
4. Place sample(s) on tray.
5. Place the short band under the bent down corner of the tray and stretch the short band over the sample(s) and then place on the center post thumbscrew.
6. To use the long bands, place sample on tray, place the long band under the bent down corner of the tray and stretch diagonally over the sample and secure to the opposite bent down corner.

### Installation of Adjustable Platform

The Adjustable Platform has a non-skid rubber surface with adjustable clamping bars to accommodate various vessel types. Stainless steel construction.

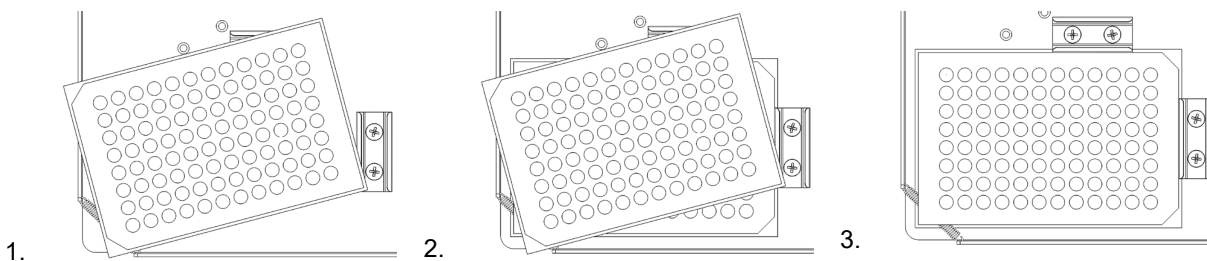
1. Turn unit off with power switch.
2. Remove non-skid rubber mat.
3. Line up the holes in the Universal Platform to the holes in the tray. Using the screws provided, hand tighten into place using a flathead screwdriver. DO NOT over tighten.
4. Add glassware. Adjust rollers by loosening each of the thumbscrews. Slide the padded rollers to the desired position and retighten the thumbscrews.

#### 1.5.5 Microplate Shaker Tray Setup

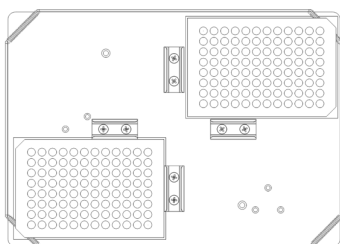
The Microplate Shaker is designed to hold two (2) or four (4) microplates, or two (2) Micro-Tube Racks.

1. Turn unit off with power switch
2. Place two (2) microplates or deep well blocks diagonally on the tray, or place four (4) microplates or deep well blocks on the tray. The plates/blocks do not have to be filled.
3. Place the corner of the plate/block under the spring located at each corner of the tray.
4. Slide plate/block into place. You are ready to use.

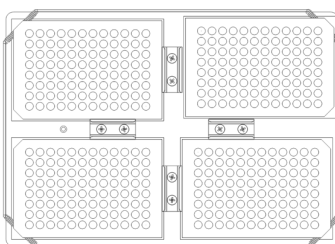
**NOTE:** The tray on the Microplate Shaker is not designed to hold flask clamps



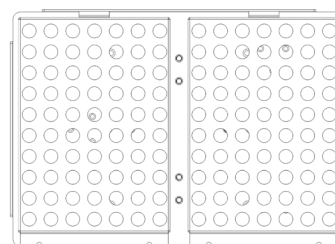
### 1.5.6 Microplate Shaker Tray Configurations



(2) Microplates



(4) Microplates

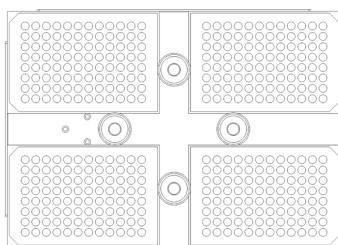


(2) Micro-Tube Racks

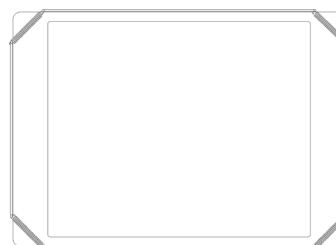
#### Installation of 1.5 to 2mL Micro-Tube Rack - Microplate Shaker e-E51LDMP03

1. Turn unit off with power switch.
2. Align the Micro-Tube Rack side-to-side on the tray.
3. Press the Micro-Tube Rack in place, you will hear the Micro-Tube Rack clip into position. No mounting screws are required.

### 1.5.7 Microplate Shaker Tray Accessories e-E51LDMP03 (available separately)



Deep Plate Kit, set of 4  
30772733



Sticky Mat  
30770939

#### Installation of Deep Plate Kit, set of 4

1. Turn unit off with power switch
2. With a screwdriver remove V-Clips from top plate
3. Line up the Deep Plate Adapter with the openings on the top plate and screw in with the thumbscrew.
4. Place deep well plates on tray. If more tension is required tighten the thumbscrew to secure the deep well plate.

### 1.5.8 Universal Platform and Accessory Configurations for e-E51LD0420 and e-E51LD0403

The optional Universal Platform 30 x 22 cm e-E51LD (30770938) accessory is required for configurations listed below. All flask clamps, medial bottle clamps and tube racks are sold separately.

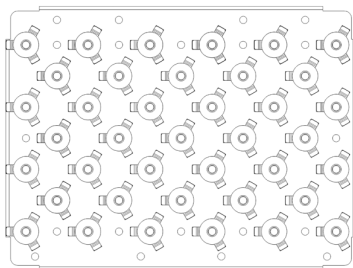
#### Installation of Universal Platform

1. Turn unit off with power switch.
2. Remove non-skid rubber mat.
3. Loosen the four (4) thumbscrews on the shake tray.
4. Place the universal platform on the shaker tray by aligning the slots on the two sides of the platform over the four (4) screw knobs.
5. Allow the platform to rest on the screws.
6. When aligned and seated on the screws hand tighten the four (4) thumbscrews. DO NOT overtighten.

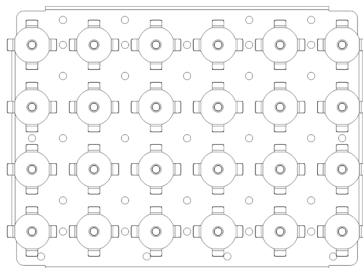


## Flask Clamp, Media Bottle and Tube Rack Configurations for Universal Platform

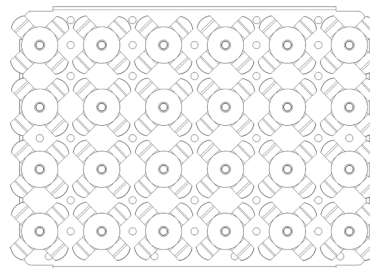
Turn unit off with power switch before installing accessories on the Universal Platform. See below examples of Universal Platform configurations.



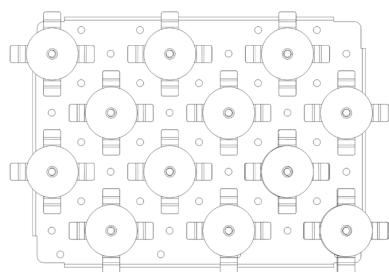
(39) 10mL Erlenmeyer Flask Clamps



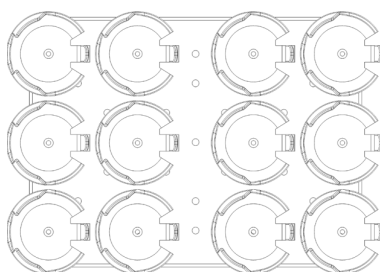
(24) 25mL Erlenmeyer Flask Clamps



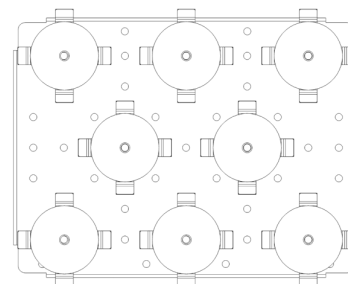
(24) 50mL Erlenmeyer Flask Clamps



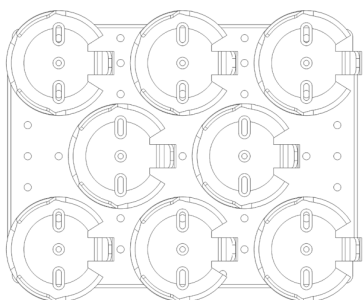
(12) 125mL Erlenmeyer Flask Clamps



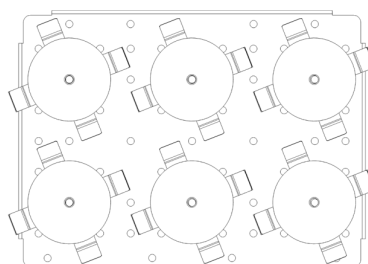
(12) 125mL Erlenmeyer PVC Flask Clamps



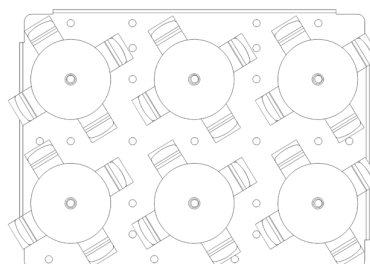
(8) 250mL Erlenmeyer Flask Clamps



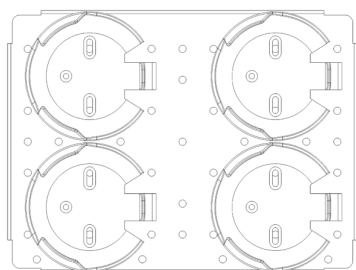
(8) 250mL Erlenmeyer PVC Flask Clamps



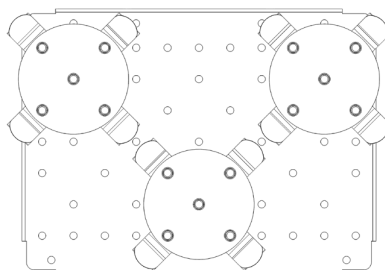
(6) 500mL Erlenmeyer Flask Clamps



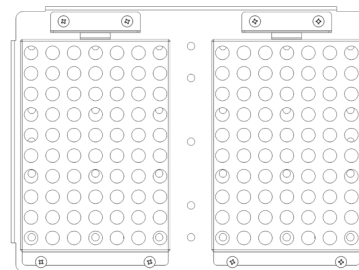
(6) 500mL Media Bottle Clamps



(4) 500mL Erlenmeyer PVC Flask Clamps



(3) 1L Erlenmeyer Flask Clamps



(2) Tube Racks

**Installation of Flask Clamps and Media Bottles (Stainless Steel)**

1. Turn unit off with power switch
2. Line up the opening(s) in the clamp to the openings in the platform. Hand tighten screw(s) with a Phillips head screwdriver.
3. Insert the flask or media bottle into the clamp and wrap the supplied spring around the neck of the clamp to hold secure

**Installation of Flask Clamps (PVC)**

1. Turn unit off with power switch
2. Line up the opening(s) in the clamp to the openings in the platform. Hand tighten the screw(s) on top of the washer with a flat head screwdriver.
3. Insert the flask into the clamp.

**Installation of Tube Racks on Universal Platform**

1. Turn unit off with power switch.
2. Place one (1) adaptor bracket on the Universal Platform with the screw hole openings side facing the side of the platform. The flat wall side of the adapter bracket will be on the inside.
3. Place the tube rack with the clip side facing the flat wall side of the adaptor bracket.
4. Align the two (2) adaptor bracket screw hole openings and the two tube rack screw hole openings with four (4) compatible openings in the platform.
5. Ensure there is tension on the tube rack so it will stay in position. If the tension is too tight or too loose, bend the clip accordingly.
6. Using the four (4) 3/8" screws, first secure the adaptor bracket.
7. Ensure there is tension on the test tube rack clip and then install the two (2) screws to secure the tube rack to the platform.

### 1.5.9 Digital Control Panel

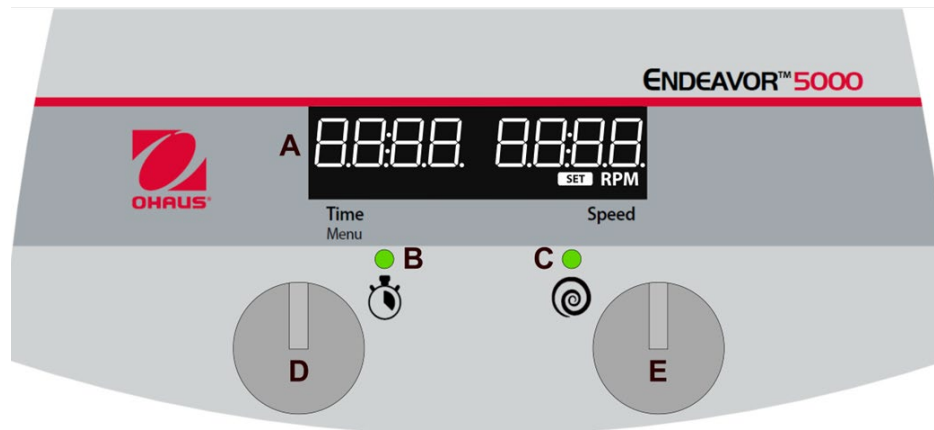


Figure 1: Endeavor 5000 Digital Control Panel

#### A. LCD Display for Time and Speed

**Time Display:** Displays accumulated time (continuous mode) or how much time is remaining (timed mode). The display range is from 0 to 99 hours 59 minutes. The display will indicate minutes and seconds until the timer reaches 59 minutes and 59 seconds (59:59), then the display will automatically display hours and minutes up to 99:59.

**Speed Display:** Displays the speed of the shaker. Turn the right knob (E) for setpoint control. Press knob (E) starts/stops shaking function. The run/speed indicator light (C) will be illuminated when the unit is shaking.

#### B. Timer Status Indicator Light

**Timed Mode:** Indicator light will be illuminated while the time display is counting down. If the unit is paused while shaking with the timer set, then the indicator light will blink.

**Continuous Mode:** Timer is not set, the indicator light will be off during shaking while elapsed time counts up.

#### C. Run Status Indicator Light: Illuminates while shaker is running.

#### D. Timer/Menu Adjustment Knob

#### E. Speed Adjustment Knob

## 2 OPERATION

### 2.1. Getting Ready

1. Connect the provided power supply to the unit.
2. Plug the female end of the provided power cord into the power supply and plug the male end of the power cord into a matching standard grounded outlet.
3. Toggle the power switch to the ON ( • ) position.
4. Allow unit to complete the start-up sequence:
  - a. LCD Test – all display icons illuminate
  - b. Model Type, software version
  - c. Function Units  
Timer [Hours : Minutes], Shake Speed [RPM]
5. The main operating screen will return, and the previous timer and shaker settings will be displayed.

### 2.2. Idle Mode

#### Timer

1. By default, the timer will be set to 00:00 and count upwards when the shaking function is turned on.
  - a. The timer begins in MM:SS mode
  - b. Once the timer reaches 59:59 it will automatically switch to HH:MM mode at 01:00.
2. When the timer is set to any time between 00:01 and 99:59, the timer will count downwards from the set time once the shaking function is turned on and the **Timer Status Indicator Light (B)** will be illuminated.
  - a. The timer can only be set in HH:MM mode.
  - b. Once the timer reaches 01:00 in HH:MM mode, it will automatically switch to MM:SS mode at 59:59.
  - c. Once the timer reaches 00:00 in the countdown mode shaking functions will shut off, the unit will beep 1 time and “End” will appear on the display (A, Figure 1).

#### Adjust Timer

1. Rotate the Time Adjustment Knob (D, Figure 1).
  - a. The minutes will blink on the display.
  - b. Rotate the knob to adjust the minutes value
  - c. Quick press the **Time Adjustment Knob (D)** to select the minutes value
  - d. The hours will now blink on the display.
  - e. Rotate the **Time Adjustment Knob (D)** to adjust the hours value
  - f. Quick press the **Time Adjustment Knob (D)** to confirm hours value and the timer setting

#### Reset Timer to Zero

1. Rotate **Time Adjustment Knob (D)** so either minutes or hours are blinking
2. Press and hold **Time Adjustment Knob (D)** until 00:00 is on timer display

#### Adjust Set Speed

1. Rotate the **Speed Adjustment Knob (E, Figure 1)** to the desired setting

### 2.3. Shake Mode

- Start Shake Function
  1. Press and hold the **Speed Adjustment Knob (E)** until the unit beeps and the **Run Status Indicator (C, Figure 1)** illuminates.
- Adjust Speed while shaking
  1. Rotate the **Speed Adjustment Knob (E)**
  2. The **Run Status Indicator Light (C)** will blink indicating the unit is ramping to the new speed setting.
  3. Once the unit reaches the new speed setting the **Run Status Indicator Light (C)** will be illuminated and stop blinking
- Adjust Remaining Time (count down only when timer is set)
  1. Rotate the **Time Adjustment Knob (D)** to adjust the minutes value. The minutes value will blink while making adjustment.
  2. Quick press the **Time Adjustment Knob (D)** to confirm the minutes value, and now the hours value will blink.
  3. Rotate the **Time Adjustment Knob (D)** to adjust the hours value
  4. Quick press the **Time Adjustment Knob (D)** to confirm hours value and the new timer setting

**NOTE:** When making adjustments and the minute or hour is blinking; if the time setting remains idle without confirmation for 6 seconds it will reset to the current setting.

- Stop Shake
  1. Press and hold the **Speed Adjustment Knob (E)** until the unit beeps and the **Run Status Indicator Light (C)** turns off

## 2.4. Pause Mode

The intent of Pause mode is to allow the user to stop the shaking function while maintaining the runtime/remaining time value. The display (A) will show “PAUS”, the **Run Status Indicator (C)** remains off while the **Timer Status Indicator (D)** blinks to indicate a paused timer.

Pause mode must be enabled within the Settings Menu to allow access to this function.

- Pause Shake (when Pause feature is enabled in the Menu)
  1. Quick press the **Speed Adjustment Knob (E)**
  2. Unit will stop shaking and “PAUS” will appear on the display (A) and stop the timer
- Adjust Remaining Time (count down only)
  1. Rotate the **Time Adjustment Knob (D)** to adjust the minutes value. The minutes value will blink while making adjustment.
  2. Quick press the **Time Adjustment Knob (D)** to confirm the minutes value, and now the hours value will blink.
  3. Rotate the **Time Adjustment Knob (D)** to adjust the hours value
  4. Quick press the **Time Adjustment Knob (D)** to confirm hours value and the new timer setting
- Resume Shake Function
  1. Quick press the **Speed Adjustment Knob (E)**
  2. The unit will start shaking, the **Run Status Indicator Light (C)** and the **Timer Status Indicator Light (B)** will illuminate.
- Stop Shake
  1. Press and hold the **Speed Adjustment Knob (E)** until the unit beeps and the **Run Status Indicator (C)** turns off

### Operating Tips

- Centering your sample and even weight distribution on the tray or platform helps with balance and stability.
- Ensure the unit is secure on a level work surface by pressing down on the four (4) corners of the unit, creating a strong suction to the work surface.
- As a safety feature, a built-in program will shut power off to the motor if the tray is prevented from rotating, or the unit is overloaded beyond its recommended weight capacity and display an E4 error.
- If the load is within specifications and centered on the tray and an E4 error persists, disabling the Overload Detection feature in the Menu may resolve this fault.
- Built-in memory maintains the last used speed and time settings during a power interruption.
- **Avoid cold starts.** Unit is not designed to start after being in a cold room environment. Bring unit into cold room from a room temperature environment, operate and remove unit from cold room as soon as operation is complete

## 2.5. Settings Menu

### Menu Access

- While in Idle Mode, press and hold the **Time Adjustment Knob (D)** until "MENU" is displayed

### Navigation

- Rotate either the **Time Adjustment Knob (D)** or **Speed Adjustment Knob (E)**
- Quick press either the **Time Adjustment Knob (D)** or **Speed Adjustment Knob (E)** to access submenu/select option
- To exit the Menu at any time, toggle the power switch.

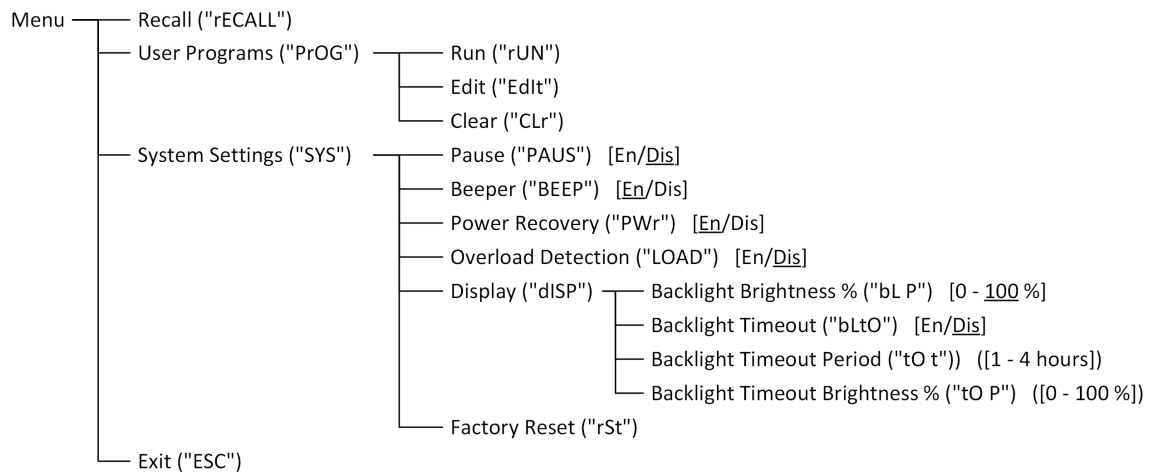


Figure 2: Endeavor 5000 Settings Menu Structure; default settings underlined.

### 2.5.1 Recall

- While in Idle Mode, press and hold the **Time Adjustment Knob (D)** until "MENU" is displayed
- After "MENU" is displayed "RECALL" will appear on the display.
- Recall previous run conditions
  - Quick press either the **Time Adjustment Knob (D)** or **Speed Adjustment Knob (E)**.
  - Rotate either knob to navigate through the previous 5 unique run conditions
  - To select a recall run condition, press and hold the **Speed Adjustment Knob (E)** until the unit beeps and the **Run Status Indicator (C, Figure 1)** illuminates.
  - Unit will now run at the recall timer and speed setting that was selected.

## 2.5.2 User Programs

The User Programs feature allows the user to create, store, delete, and run a series of shaking programs for repeat applications in the lab.

Each program can have a maximum of 5 steps and a time must be entered for each step. To keep the shaking off during a step enter "0" for the speed.

The unit will store up to 8 individual 5-step programs.

To access the Program Feature:

- While in Idle Mode, press and hold the **Time Adjustment Knob (D)** until "MENU" is displayed, after "MENU" is displayed "RECALL" will appear on the display.
- Rotate either the **Time Adjustment Knob (D)** or **Speed Adjustment Knob (E)** until "PROG" appears on the display
- Quick press either the **Time Adjustment Knob (D)** or **Speed Adjustment Knob (E)** to access the Program menu and Quick Press to select an option
- Run program
  - Navigate to the User Program submenu ("PROG")
  - Navigate to the Run option
  - Navigate existing User Programs
  - Press and hold the **Speed Adjustment Knob (E)** until the unit beeps and the **Run Status Indicator (C)**, Figure 1) illuminates
  - **NOTE:** While a program is running, the end user cannot adjust the speed or time settings.
  - To stop a program, press and hold the **Speed Adjustment Knob (E)** until the unit beeps and the **Run Status Indicator (C)** turns off or turn off the power switch
- Create new User Program
  - Navigate to the User Program submenu ("PROG")
  - Select the Edit option
  - Select new program ("Edit PrGn")
  - Select new step ("PrG<X> StPn")
  - Adjust Hours parameter
  - Quick press to select Minutes parameter
  - Adjust Minutes parameter
  - Quick press to select RPM parameter
  - Adjust RPM parameter
  - Quick press to confirm step parameters

- Rotate either knob to add a new step ("PrG<X> StPn") to the program
- Repeat above steps to set Hours, Minutes, Speed
- To edit an existing step while creating a new program, rotate either knob and select an existing step to further adjust following the above steps
- Select Back to complete program creation and save the program
- Edit saved program
  - Navigate to the User Program submenu ("PROG")
  - Select the Edit option
  - Select program to be edited ("Edit PrG<X>")
  - Select new step ("PrG<X> StPn") to add a step to a program or select the existing step to be edited ("PrG<X>" "StP<Y>")
  - Adjust step parameters
  - Select Back to complete program edit and save the program
- Clear program step
  - Navigate to the User Program submenu ("PROG")
  - Select the Clear ("CLr") option
  - Select the appropriate program ("Edit PrG<X>")
  - Select the step to be cleared ("PrG<X>" "StP<Y>")
  - Select the "yes" option to verify clear request
- Clear program
  - Navigate to the User Program submenu ("PROG")
  - Select the Clear ("CLr") option
  - Select the appropriate program ("Edit PrG<X>")
  - Select the ALL option ("PrG<X>" "ALL")
  - Select the "yes" option to verify clear request

### 2.5.3 Menu – System Settings

#### Pause Enable/Disable

- Navigate to the System Settings submenu ("SYS")
- Navigate to the Pause setting ("PAUS")
- Quick press to select value
- Rotate knob to select the desired setting (En = Enabled or dIS = Disabled)
- Quick press to confirm value

#### Beeper Enable/Disable

- Disabling the Beeper will silence and prevent beeps in the following scenarios:
  - Starting and stopping shaking
  - When the timer reaches 00:00 in timer countdown mode
- Navigate to the System Settings submenu ("SYS")
- Navigate to the Pause setting ("BEEP")
- Quick press to select value (En = Enabled or dIS = Disabled)
- Rotate knob to select the desired setting
- Quick press to confirm value

#### Power Recovery Enable / Disable

- Power Recovery is an optional feature that allows the unit to automatically restart the shaking functions when power is returned to the unit after a disconnect.
- Navigate to the System Settings submenu ("SYS")
- Navigate to the Power Recovery setting ("PWR")
- Quick press to select value (En = Enabled or dIS = Disabled)
- Rotate knob to select the desired setting
- Quick press to confirm valued

#### Overload Detection Enable / Disable

- Optional load sensing feature which provides protection against improper positioning and excess load conditions.
- The unit will automatically slow to a safe operating speed and display "E4" if a hazardous load is detected. Error may be cleared by interacting with the unit; shake and timer functions will continue operating as standard.
- Navigate to the System Settings submenu ("SYS")
- Navigate to the Power Recovery setting ("LOAD")

- Quick press to select value (En = Enabled or dIS = Disabled)
- Rotate knob to select the desired setting
- Quick press to confirm valued

#### Display Settings

- Adjust LCD brightness and configure the display timeout feature, which dims the LCD to set brightness after a selected period of idle time.
- Navigate to the System Settings submenu ("SYS")
- Navigate to the Power Recovery setting ("dISP")
- Adjust Backlight Brightness
  - Adjust the brightness percentage ("bL P")
  - Range: 0-100 %
  - Quick press to select the back light brightness percentage value
  - Rotate the knob to select the desired setting
  - Quick press to confirm value
- Backlight Timeout Enable/Disable
  - Quick press to select value ("bLtO")
  - Rotate knob to select the desired setting (En = Enabled or dIS = Disabled)
  - Quick press to confirm value
- When Backlight Timeout Brightness is Enabled, adjust Backlight Timeout Period
  - Quick press to select value ("tO t")
  - Range: 1-4 hours
  - Rotate knob to select the desired setting (select number of hours)
  - Quick press to confirm value
- Adjust backlight brightness while timeout is active:
  - Adjust the brightness percentage ("tO P")
  - Range: 0-100 %
  - Quick press to select the back light brightness percentage value
  - Rotate the knob to select the desired setting
  - Quick press to confirm value

## Factory Reset

- Resetting the unit to Factory Default Settings will do the following:
  - Clear all programs
  - Clear all recall parameters
  - Clears all System settings to the default value
- Navigate to the System Settings submenu ("SYS")
- Navigate to the Reset setting ("rSt")
- Quick press to select value (no or yes)
- Rotate knob to select the desired setting
- Quick press to confirm

## 2.6. RS232

RS-232 serial port provides two-way communications for data logging and unit control by means of a PC and a suitable application program.

- Interface connections chosen in accordance with EIA standard RS-232
- Device Connector: RS-232 DB9 Female
- Recommended Cables:
  - DB9 M/M Straight Through Serial Cable
  - USB-A to RS-232 DB9 Straight Through Serial Adapter Cable
- Transmission Procedure
  - Asynchronous character transmission in start-stop mode
- Transmission Type
  - Full Duplex
- Character Format
  - Start Bit(s): 1
  - Character Bits: 8
  - Parity Bit(s): None
  - Stop Bit(s): 1
- Transmission Speed (Baud Rate): 9600
- Data Flow Control: Xon/Xoff
- Syntax
  - Instructions and parameters separated by space (0x20)
  - CR LF termination (0x0D, 0x0A)
  - Max length: 80 characters
- '<command> A' returned if the command is recognized; 'L' returned otherwise.

| RS232 Command Set                             |                                                                                                                                                                                                                                                                                                                                                                          |
|-----------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>ID &lt;xxxx&gt;</b>                        | Set ID<br>$1 \leq \text{xxxx} \leq 9999$                                                                                                                                                                                                                                                                                                                                 |
| <b>ID</b>                                     | Read ID value                                                                                                                                                                                                                                                                                                                                                            |
| <b>MODE</b>                                   | Read mode:<br>0: idle<br>1: shake<br>2: paused<br>99: error                                                                                                                                                                                                                                                                                                              |
| <b>START_SHAKE</b>                            | Start shake function and timer                                                                                                                                                                                                                                                                                                                                           |
| <b>PAUSE_SHAKE</b>                            | Pause shake function and timer                                                                                                                                                                                                                                                                                                                                           |
| <b>STOP_SHAKE</b>                             | Stop the shake function; reset timer                                                                                                                                                                                                                                                                                                                                     |
| <b>TARGET_SPEED &lt;xxxx&gt;</b>              | Set the target speed value                                                                                                                                                                                                                                                                                                                                               |
| <b>TARGET_SPEED</b>                           | Read target speed value                                                                                                                                                                                                                                                                                                                                                  |
| <b>MEASURED_SPEED</b>                         | Read measured speed value                                                                                                                                                                                                                                                                                                                                                |
| <b>TIMER</b>                                  | Read current timer value                                                                                                                                                                                                                                                                                                                                                 |
| <b>TIMER 0</b>                                | Set Timer Mode = Count Up                                                                                                                                                                                                                                                                                                                                                |
| <b>TIMER &lt;hh&gt;:&lt;mm&gt;:&lt;ss&gt;</b> | Set Timer Mode = Count Down;<br>Timer = hh:mm:ss                                                                                                                                                                                                                                                                                                                         |
| <b>TIMER RESET</b>                            | Reset timer to set value; timer continues counting.<br>No change to shake function.                                                                                                                                                                                                                                                                                      |
| <b>LOCK</b>                                   | Lock user interface                                                                                                                                                                                                                                                                                                                                                      |
| <b>UNLOCK</b>                                 | Unlock user interface                                                                                                                                                                                                                                                                                                                                                    |
| <b>PARAM &lt;xxxx&gt;</b>                     | Enable output of comma separated list of parameters, formatted as follows:<br><br><TIMER [hh:mm:ss]>, <ID>, <MODE>, <TARGET SPEED>, <MEASURED SPEED>, <ERROR CODE>,<br><br>Output can be periodic, where xxxx represents the desired time interval:<br><br>xxxx = 0<br><br>Single output<br><br>$1 \leq \text{xxxx} \leq 9999$<br><br>Periodic output every xxxx seconds |

### 3 MAINTENANCE

The Light Duty/Microplate Shaker is built for long, trouble-free, dependable service. No lubrication or other technical user maintenance is required. It needs no user maintenance beyond keeping the unit clean. Always ensure the power is disconnected from the unit prior to any cleaning. If the unit ever requires service, contact your Ohaus representative.

The Light Duty/Microplate Shaker should be given the care normally required for any electrical appliance. At least every three (3) months you should:

- Unplug the unit.
- Remove any accumulated dirt from the work surface and tray.
- Check all accessory items to make sure they are properly tightened.



Attention. Do not use solvents, harsh chemicals, ammonia or abrasive cleaning agents. The housing may be cleaned with a cloth dampened with a mild detergent if necessary.

Avoid wetting or unnecessary exposure to fumes. Spills should be removed promptly after the unit has cooled down. Before using any cleaning or decontamination method except as noted in this section, users should check with the manufacturer that the proposed method will not damage the equipment. The user is responsible for carrying out appropriate decontamination if hazardous material is spilled onto or into the equipment.

### 3.1. Troubleshooting

During operation, any rattling or ticking sounds may indicate a loose screw on the tray, a tray attachment, or an accessory. All accessories should be sufficiently tightened in place before starting the unit.

The following table lists error codes associated with common problems and possible causes and remedies. If the problem persists, contact OHAUS or your authorized dealer.

| Error* | Cause of Error                                                                    | How to Fix                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|--------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| E3     | Speed Error<br><br>no / low tray speed, excess motor speed                        | Broken drive belt, malfunctioning speed sensor, seized bearing, mechanical obstruction, tray overload.<br><br>Reset the power switch to clear this error. Check for mechanical obstructions.<br><br>If the E3 error persists, remove power from the unit and contact an Ohaus representative for repair. End user should NOT attempt repair.                                                                                                                                                                                      |
| E4     | Load Error<br><br>Uneven / excessive tray loading, high vibration, motor overload | Uneven / excessive loading, loose suction cup foot*, mechanical obstruction<br><br>Toggle the rocker switch to clear this error. Reduction of load / even load distribution may resolve this error.<br><b>Alternatively, disabling the Overload Detection feature may resolve this fault, please see the Instruction Manual for entering the Menu and disabling this feature.</b><br><br>If the E4 error persists, remove power from the unit and contact an Ohaus representative for repair. End user should NOT attempt repair. |

\*In the event a foot (suction cup) has come loose from the bench top, the unit may register an errant E4 error message due to the instability of the unit. Reset the power switch to clear this error. Firmly press down on the four (4) corners of the unit, creating a strong suction to the work surface (do not place on bench mat).

### 3.2. Service Information

Serial Number: \_\_\_\_\_

Date of Purchase: \_\_\_\_\_

Supplier: \_\_\_\_\_

## 4 TECHNICAL DATA

### Equipment Ratings:

- Indoor use only
- Altitude: 0 to 2000m
- Operating temperature: -10°C to 40°C
- Storage temperature: -20 to 65°C
- Operating Humidity: 20 to 80% relative humidity, non-condensing
- Storage Humidity: 20 to 80% relative humidity, non-condensing
- Electrical Supply: 24VDC, 1.25A. (For use with certified or approved power supply, which must have a SELV and limited energy output.).
- Voltage fluctuations: Mains supply voltage fluctuations up to  $\pm 10\%$  of the nominal voltage.
- Overvoltage category (Installation category): II
- Pollution degree: 2
- Avoid cold starts. Unit is not designed to start after being in a cold room environment. Bring unit into cold room from a room temperature environment, operate and remove unit from cold room as soon as operation is complete

## 5 COMPLIANCE

Compliance to the following standards is indicated by the corresponding mark on the product.

| Mark                                                                               | Standard                                                                                                                                                                                                                                                                                   |
|------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|   | This product complies with the applicable harmonized standards of EU Directives 2011/65/EU (RoHS), 2014/30/EU (EMC) and 2014/35/EU (LVD).                                                                                                                                                  |
|   | This product complies with the applicable statutory standards of the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012, UK Electromagnetic Compatibility Regulations 2016 and Electrical Equipment (Safety) Regulations 2016. |
|   | This product complies with the EU Directive 2012/19/EU (WEEE). Please dispose of this product in accordance with local regulations at the collecting point specified for electrical and electronic equipment.                                                                              |
|   | EN 61326-1                                                                                                                                                                                                                                                                                 |
|  | CAN/CSA-C22.2 No. 61010-1, CAN/CSA-C22.2 No. 61010-2-051<br>UL 61010-1, UL 61010-2-051                                                                                                                                                                                                     |

### Global Notice

Warning: This is a Class B product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

### ISED Canada Compliance Statement:

CAN ICES-003(B) / NMB-003(B) FCC Notice

### ISO 9001 Registration

The management system governing the production of this product is ISO 9001 certified.

**FCC Supplier Declaration of Conformity**

Unintentional Radiator per 47CFR Part B

Trade Name: OHAUS CORPORATION

Model: E51

**Party issuing Supplier's Declaration of Conformity**

Ohaus Instruments (Changzhou) Co., Ltd.

Building C, No. 6 Zhengqiang Road, Xuejia Town, Xinbei District, Changzhou

Jiangsu 213125

China

**FCC Compliance Statement:**

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

## LIMITED WARRANTY

OHAUS products are warranted against defects in materials and workmanship from the date of delivery through the duration of the warranty period. During the warranty period OHAUS will repair, or, at its option, replace any component(s) that proves to be defective at no charge, provided that the product is returned, freight prepaid, to OHAUS.

This warranty does not apply if the product has been damaged by accident or misuse, exposed to radioactive or corrosive materials, has foreign material penetrating to the inside of the product, or as a result of service or modification by other than OHAUS. In lieu of a properly returned warranty registration card, the warranty period shall begin on the date of shipment to the authorized dealer. No other express or implied warranty is given by OHAUS Corporation. OHAUS Corporation shall not be liable for any consequential damages.

As warranty legislation differs from state to state and country to country, please contact OHAUS or your local OHAUS dealer for further details.



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