
USER MANUAL

# VeroDry

## CLOSED LOOP EVAPORATOR

Has been designed as a standalone unit so that it can be used in conjunction with most leading models of coulometric and volumetric Karl Fischer titrators and to comply with the requirements of ASTM method D6304.

TABLE OF

# CONTENTS

TECHNICAL

# SPECIFICATION

# SPECIFICATION


*Figure 1: VeroDry Closed-Loop Evaporator*

| | |
|---|---|
| Model | VeroDry - Closed Loop Evaporator |
| Methodology | ASTM D6304 |
| Monitoring | Chamber and sample temperature |
| Heating Capacity | From ambient to 200 °C (392 °F) with the ability to reach 150 °C (302 °F) in 2 minutes |
| Peristaltic Pump Capacity | 50 mL/min to 500 mL/min (1.69 fl oz/min to 16.91 fl oz/min). |
| Test Chamber | Stainless steel, Teflon, Glass material |
| Evaporator Chamber | Pyrex glass – Teflon with a maximum capacity of 50 mL (1.69 fl oz) |
| Device Operating Environment | 10 °C to 50 °C (50 °F to 122 °F) |
| Power Requirement | 220 VAC – 50 Hz |
| Power Output | 200 W |
| Dimensions | Width: 23 cm (9 inches)<br>Depth: 32 cm (12.6 inches)<br>Height: 31 cm (12.2 inches) |
| Weight | 8 kg (17.6 lbs) |

*Table 1: Device Specification Table*

CONTROL

# ELEMENTS AND ACCESSORIES

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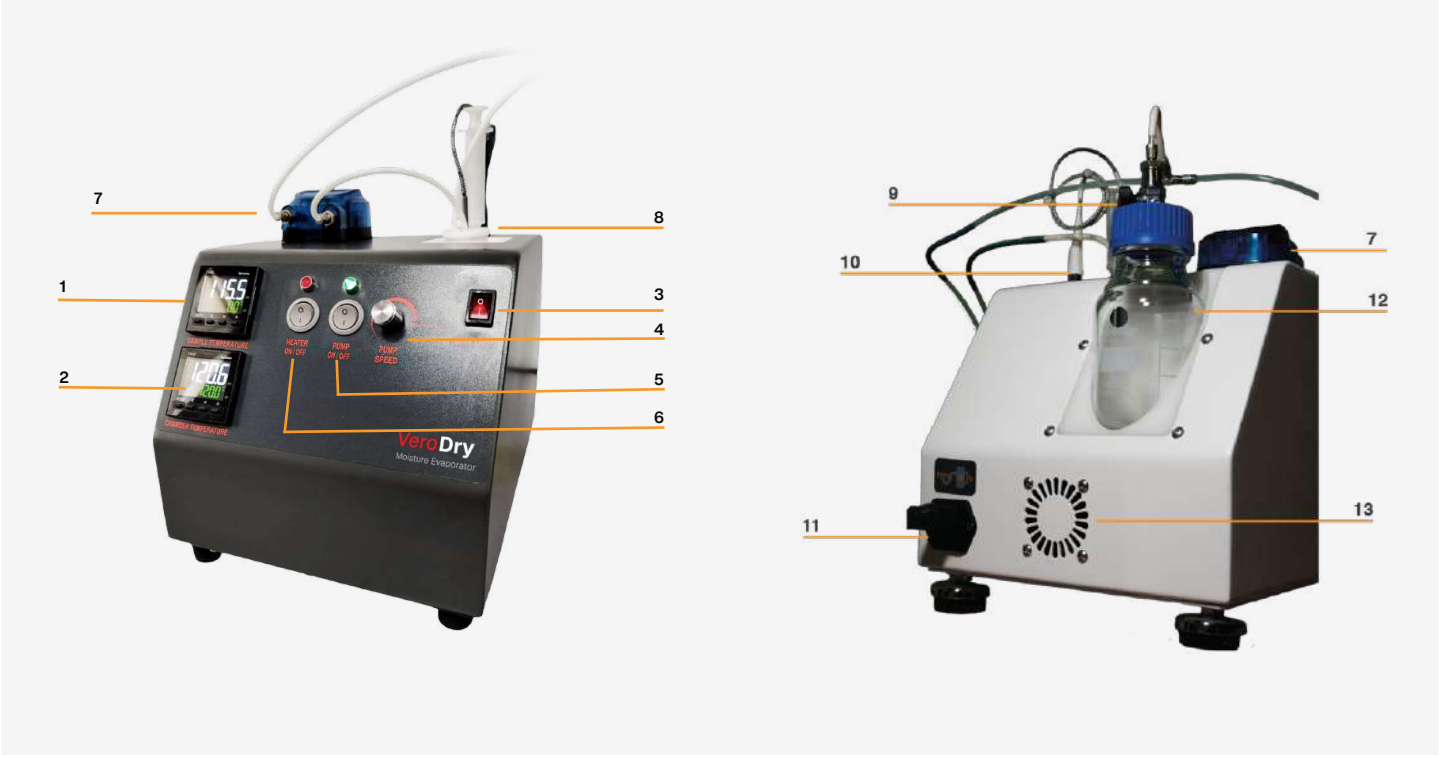


Figure 2: **EVA 101 Device Control Elements**

| NO | DEFINITION |
|---|---|
| 1 | Sample Temperature Controller |
| 2 | Chamber Temperature Controller |
| 3 | Device On/Off Button |
| 4 | Pump Speed Controller |
| 5 | Pump On/Off Controller |
| 6 | Heater On/Off Controller |
| 7 | Pump |
| 8 | Sample Chamber |
| 9 | Silica Gel Chamber Valve |
| 10 | PT 100 Temperature Sensor |
| 11 | Power Connector |
| 12 | Silica Gel Chamber |
| 13 | Device Ventilation |

Table 2: **VeroDry Control Elements Table**

DEVICE

# BASICS AND SAFETY

# DEVICE BASICS AND SAFETY

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## INTRODUCTION

The VeroDry Closed-Loop Evaporator removes moisture from samples dissolved in a heated base oil. It is primarily used for moisture measurements in lubricating oils, grease, tar products, paint, and other viscous liquids.

### Features

A: VeroDry enables moisture titration through an indirect method without requiring solvents. It allows for up to 30 consecutive measurements without the need to discard waste after each run.

B: The transparent evaporation bottle provides a clear view of sample progress within the chamber.

C: Precise and stable temperature control is achieved through a PID temperature regulation system.

D: The design conforms to ASTM D6304, the standard method for determining water content in petroleum products, lubricating oils, and additives using coulometric Karl Fischer titration.

E: The base oil can be easily removed using a specifically designed drainage system.

F: Safety measures to prevent overheating are ensured by digitally controlled temperature settings supported by thermal semiconductor devices.

## PROPER USE

Before operating the machine, always read and fully comply with all instructions in this manual. Keep the manual readily available near the VeroDry and, if appropriate, provide it to the next user.

This device has been specifically designed and manufactured for use in laboratory environments. It should only be used with samples that the instrument is capable of analyzing. Any use beyond the specified purposes will be considered improper.

The device must only be operated according to the instructions outlined in this manual. Any usage outside the described parameters constitutes unintended use. The device should only be operated within the specified performance limits, and it must be used exclusively with original accessories and components.

# DEVICE BASICS AND SAFETY

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## FOR YOUR SAFETY

The VeroDry Closed-Loop Evaporator removes moisture from samples dissolved in a heated base oil. It is primarily used for moisture measurements in lubricating oils, grease, tar products, paint, and other viscous liquids.

Alerts the operator to situation that may cause injury.

Alerts the operator to conditions that may damage the device

Yellow and red warning signs are used in the user manual to draw the user's attention to important details prior to performing a procedure.

### Please read and note carefully the following important safety information

By adhering to these guidelines, you can prevent personal injury and damage to the device:

1. **Never use a device that has been damaged or has a defective power cable.**
2. **In the event of an electronic or mechanical issue with the device, disconnect it from the power supply and contact the authorized service provider.**
3. **If you encounter any unclear instructions or missing information in this manual, contact your local sales representative.**
4. **Never open or repair the device yourself. Do not modify the device in any way not specified in the user manual. The device contains live parts; opening it poses a serious risk of injury. Repairs must only be conducted by approved service centers using original spare parts and accessories.**
5. **Ensure the VeroDry and its power cable are not placed near hot surfaces.**
6. **Make sure the power cable does not become tangled or rub against sharp edges.**
7. **Avoid contact with any hot parts of the device.**
8. **Never allow the power cable to hang loosely. A dangling cable can be tripped over or damaged.**
9. **Do not immerse the VeroDry or its connections in water.**
10. **Do not place the VeroDry or any of its components in a dishwasher.**
11. **Connect the device only to a power supply that complies with the specifications on the rating plate. The rating plate is located on the back of the device. Further technical information can be found in the "Specifications" section.**



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VeroDry

# INSTALLING AND SETTING UP

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This chapter provides the necessary information to ensure the proper setup of your VeroDry. Please follow the guidelines below when setting up the device:

- Place the VeroDry on a horizontal surface that is not sensitive to water.
- Choose a location that is protected from overheating. Ensure that the ventilation slot of the device remains unobstructed.
- While performing these operations, ensure that the device is turned off.

*Figure 3:* **VeroDry Rear Panel**

The device will be delivered in a wooden box. Please remove the plastic and wooden packaging to access the unit. Carry the cardboard box from the bottom, ensuring the system remains upright to avoid any damage. Retain all packaging materials until the instrument has been connected and is functioning properly. Unpack the device and place it in its permanent location on a stable laboratory bench or table.

The package includes two silica gel packs, one orange and one white. Carefully remove the silica gels from their packaging, open the cap of the glass bottle attached to the back of the device, and place the gels inside. Once this process is complete, ensure that the cap of the glass bottle is tightly closed.

*Figure 4:* **VeroDry Top View**

*Figure 5:* **VeroDry Power Supply Connection**

There are two hoses connected to the device:

- White hose (Hose 1)
  This hose extends from the sample chamber on the VeroDry. It should be placed such that it is immersed in the Karl Fischer chemical.
- Black hose (Hose 2)
  This hose connects to the T-connection from the silica gel cell. It should be placed such that it connects to the Karl Fischer chemical bottle but does not touch the chemical inside.

Finally, connect the VeroDry's main power cord to the outlet at the back of the electronics drawer. Ensure that the outlet matches the electrical specifications indicated on the label located at the rear of the instrument.

Never use a device with a defective power cable.

Random cuts in the power supply may damage the device's electronic components.

SAMPLE PREP AND

# VeroDry OPERATION

# SAMPLE PREPARATION

## SAMPLE PREPARATION

The VeroDry Closed-Loop Evaporator evaporates moisture from samples dissolved in a heated base oil. It is primarily used for moisture measurements in lubricating oils, grease, tar products, paint, and other viscous liquids.

*Figure 6:* Sample Preparation

1. **Ensure that the sample preparation vessel is clean.**
2. **Place the sample preparation vessel on a precision balance and tare the balance.**
3. **Add 5 g (0.18 oz) of the sample to the sample preparation vessel.**
4. **Add n-Hexane to the vessel until the total volume reaches 10 mL (0.34 fl oz).**
5. **Securely close the sample preparation vessel and shake the prepared sample for 1–2 minutes.**
6. **Prevent contact between the prepared sample and air until the measurement is conducted.**

## USING VeroDry

1. Before starting the device, ensure that the Heater and Pump On/Off buttons, as well as the Silica Gel Chamber Valve, are in the OFF position.
2. After plugging in the device, press the ON/OFF button located on the front panel.
3. Using the Teflon lid of the glass sample cup, carefully remove the cup from the instrument and add 10 mL (0.34 fl oz) of base oil. After securing the lid of the glass sample cup, return it to its chamber.
4. Verify that the black and white hoses are correctly connected to the Karl Fischer setup.
5. Adjust the Chamber Temperature Controller to the desired temperature (the recommended setting is 140°C [284°F]). Then, switch the Heater to the ON position.


*Figure 7:* VeroDry Control Panel

6. Wait for the temperature to stabilize.
7. Turn the pump to the ON position and adjust the pump speed to approximately 150–200 mL/min (5.07–6.76 fl oz/min). The full speed of the pump is 500 mL/min (16.91 fl oz/min).
8. Using a newly opened syringe, extract 1 mL (0.034 fl oz) of the previously prepared sample.
9. Once the Karl Fischer instrument reaches the "Add Sample" state, proceed to the next step.
10. Add 1 mL (0.034 fl oz) of the sample into the Sample Chamber over 5–10 seconds, as illustrated in the figure.
11. Allow the Karl Fischer device to complete the test.
12. If the Karl Fischer device does not complete the test and the results continue to increase slightly, residual moisture in the environment may be affecting the process. Turn off the pump on the EVA101 for faster results.
13. After turning off the device, ensure the Silica Gel Chamber Valve remains in the open position.

**Figure 8:** *VeroDry Sample Chamber*

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# MAINTENANCE

**Figure 9:** *VeroDry Sample Chamber Glass Holder*

**Figure 10:** *VeroDry Changing Septa*

- The VeroDry performs moisture titration using an indirect method that eliminates the need for solvents. It supports up to 30 consecutive measurements without requiring waste disposal after each run.
  If cleaning of the glass sample holder is necessary, use n-Hexane as the cleaning agent, and ensure that the glass holder is thoroughly dried before reuse.

- The septa located in the Teflon mouth of the glass sample holder may need replacement after 200–250 uses. To replace the septa, remove the three screws on the cover using the Allen key provided with the device. Once the replacement is complete, ensure the screws are properly tightened to secure the assembly.

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Vero Scientific

As Vero Scientific, we provide advanced measurement technologies, preventive maintenance solutions, and cloud-based analytics for oil and fuel analysis. Our mission is to empower industries with precise, reliable, and sustainable solutions.