



**CM Refrigeration**

Nanjing Wonfulay Precision Machinery Co., Ltd

***www.cm-green.com***

# **CM-VO19**

# **Vacuum Drying Oven**

## **Operation Manual**

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## **The sign to ensure safety**

**All issues herein are very important, must adhere to that.**

### **1、SIGN OF SAFETY:**

**! Danger (probably cause serious property loss or casualties)**

- 1、 The product must have reliable earth (prohibit to take the null wire or neutral wire as the earth wire).
- 2、 Make sure the voltage of the supply power meet the product requirement before use.
- 3、 Product should has independent power socket, and make sure the socket and plug have good earth.
- 4、 Do not plug or unplug during the product operation without turning off the power switch.
- 5、 Do not freely lengthen or shorten the product power cord.
- 6、 Do not place in flammable, explosive, volatile and corrosive substances for drying, baking.
- 7、 Do not touch the product door, inspection window and the surrounding surface when the product working above high temperature of 80 degrees, in case of burns.
- 8、 Do not repair without authorization, company commissioned repair must be carried out by professional staff.

**! Warning (Repairs carried out without authorization may constitute a property loss or damage to the personnel, at own risk)**

- 1、 Operation can only be carried out before fully read, understand the product specification.
- 2、 When unplugging the power, do not drag the power cord directly.
- 3、 In one of the following circumstances, the power plug of the product must be pulled out:
  - 3.1 When replacing the fuse;
  - 3.2 When product breaks down and holds to repair;

3.3 When product stop use for long time;

3.4 When handling the product;

**! Caution (Otherwise, it's possible to affect the service life cause the product abnormal)**

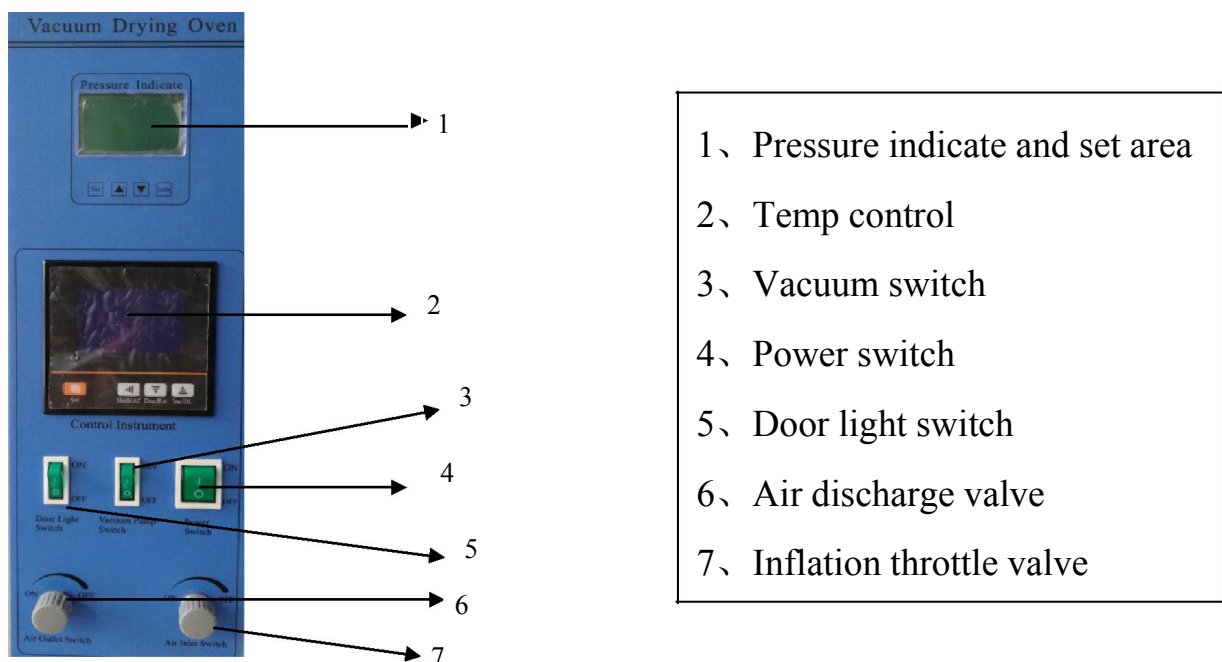
1、 Product should be placed on a solid surface, so that it is maintained in a horizontal state.

2、 Product should be kept around a certain gap.

3、 Product must be used under certain conditions.

4、 Do not hard open / close the door, otherwise it is easy to cause the door fall off, and product damage, resulting in injury accident.

## 2、 SCHEME OF PRODUCT OPERATION PARTS



## 3、 SCOPE

CMVO series drying oven can be applied in drying and heat treatment under vacuum conditions widely used for industrial enterprises, colleges, science & research and various labs. It can heat and dry under vacuum conditions especially designed for heat sensitive, labile, easily oxidize substances. Inert gas can be inflated, some substances with complicated ingredients can also be dried quickly. With features as below:

1. Reduce the dry temp (low pressure, low temp);

2. Avoid some substances oxidized when heat;

3. Avoid heat air kill biological cell.
4. No dust particle damage.

#### **4、SUMMARY OF STRUCTURE AND PRODUCT FEATURES**

CMVO series drying oven can be horizontal or vertical, shape is rectangular. The box applies plain coated steel plate, super fine glass wool to be the insulated layer. The drying oven applies double layers glass doors, interior is more tempered glass more than 12mm, exterior is 5mm plexiglass. The oven door can be adjusted. There is molded heat resistant silicone sealing ring between the chamber and exterior door to ensure the air tightness which will bring better vacuum to the unit. Features as below:

- 1、CMVO series drying oven is rectangular which can maximize the effective volume.
- 2、Tempered glass door, and with LED door light for easy to observe the chamber inner.
- 3、The oven door tightness can be adjusted, whole mold silicone sealing ring to make sure the high vacuum inside chamber.
- 4、The working chamber adopts stainless steel with less welding points to make sure the good air tightness. Durable and with good look also easy to clean.
- 5、Built-in vacuum adjust system no need exterior vacuum pump, with features of low noise, small size, high efficiency and first glass. The LCD can indicate the accurate pressure and the pressure can be adjusted the upper and lower limit, the pressure can be compensated automatically, really convenient for the users.
- 6、Inflation joint and throttle valve are equipped, the user can inflate as will anytime.
- 7、Preservation, heat, test and dry can be run under conditions with no oxygen or full of inert gas, it will not cause oxidization.
- 8、Degree Celsius and Fahrenheit can be switched: when FC=0 it indicates ;°C when FC=1 it indicates °F.
- 9、LCD microcomputer temp controller, accurate and reliable, the remote control can be achieved.
- 10、Heating method: tube U type heater, heat from five sides.
- 11、Sensor element: PT100.
- 12、Vacuum range (relative vacuum): 0 ~ -95MPa (adjustable/pressure automatically compensated).

## 5、 TECHNICAL PARAMETERS

Model	CM-VO19		
Power Source	AC220 50Hz / AC 110V 60Hz		
Ambient Temp	+5-+40°C		
Temp Control range	+50°F ~+420°F		
Temp fluctuation	±1°F		
Resolution	±.1°F		
Input(w)	1400W		
chamber	L	415	
	W	345	
size (mm)	H	360	
		5	
Shelves	5		
Note:LC is built-in vacuum control system, LCB is imported vacuum control system.			

## 6、 OPERATIONS

### 1、 Installation:

The drying oven should be placed indoors well ventilated and with no severe vibration. No flammable or explosive subjects to be put around.

### 2、 Pressure set

Press“SET”in the pressure indicate area to enter the pressure lower limit set menu, use“▲”or“▼”to get the required value, then press “SAVE” to save the lower limit. Press again “SET” to enter the pressure upper limit set menu, use“▲”or“▼”to get the required value, then press “SAVE” to save the upper limit, Press again “SET” to enter stand by status.

### 3、 Pumping vacuum

Turn on the vacuum switch the vacuum pump starts to run, it will stop when reached set upper limit. When vacuum decrease to set lower limit the pump activates go on to run to automatically compensate the pressure.

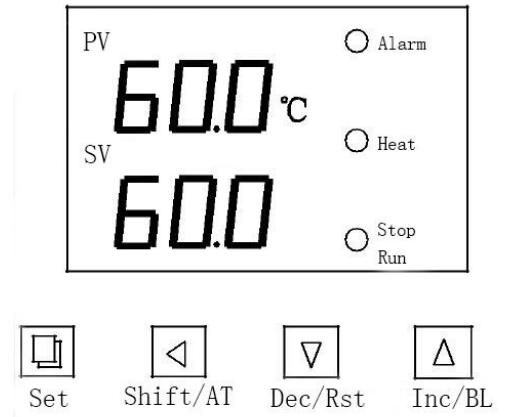
### 4、 LED light

When it needs to observe the chamber interior during operation, just turn on the light switch on the panel.

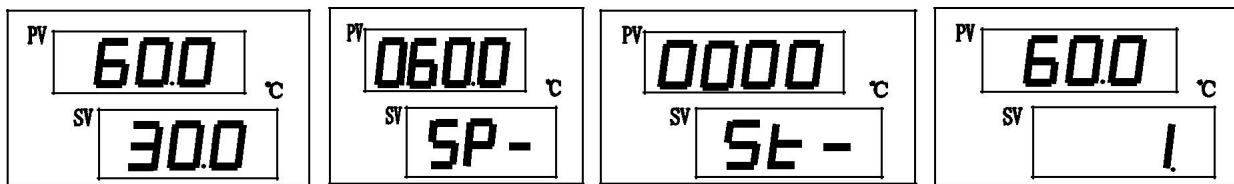
### 5、 Operation of temperature and constant temperature time

5.1 The controller get energized, upper row display the "indexing (P,C,K,S) ", lower row display the "measuring range value", get into normal display after about 3 seconds.

5.2 Observation and setting of temperature and constant temperature time



Click "Set" key, enter to the temperature setting state, lower row display the prompt "SP", upper row display temperature set value (first single digit flash), adjust the required value by add, reduce and shift key. Then press the "set" key again, enter to constant temperature time setting state, lower row display the prompt "ST", upper row display constant temperature time set value (first single digit flash). Then press the "set" key again, exit the setting state, the revised set value will be saved automatically.



When ET=0, there is no timing function, set time does not display. When constant temperature time set is "0", means there is no timing function, the controller continue running. Lower row display temperature set value. When ET=1, lower row display run time, and decimal point flash, after instrument get energized, the timer begin to count. When ET=2, lower row display run time, and decimal point flash, when measured temp reached the set value, the timer begin to count.

When En=0, time up, running over, lower row display "End", the buzzer sounds 30 seconds, turn off all outputs.

When En=1, time up, running over, display run time, the buzzer sounds 30 seconds, temp go on constant. After running over long press the "shift/restart" key for 3 seconds to rerun timer.

5.3 When over temperature alarm, buzzer sounds, "ALM" alarm light on. If over temperature alarm due to changing the temperature set value, "ALM" alarm light on but the buzzer does not sound.

5.4 Can press any key to mute when buzzer sounding.

5.5"Shift/AT" key: Click this key under non set status for 6 seconds to enter or quit system self-adjust. Click this key under set status to adjust the set value.

5.6"Dec/Rst" key: under non set status, when running over, long press this key for 3 seconds to reboot. Click this key under set status to reduce the set value, long press this key can continuously reduce the set value.

5.7"Inc/BL" key: under non set status, click this key to turn on or off the LCD back light (only LCD series have this function). Click this key under set status to add the set value, long press this key can continuously add the set value.

5.8When FC=0 shows Celsius, when FC=1 shows Fahrenheit.

5.9If there is no key press within 1 minute under set status, the controller will automatically return to the normal display.

5.10 If controller upper row display "----", it means the temp sensor or controller failure. Please carefully check the temp sensor and the wiring.

## 6、 System self-adjusting

The system can be self adjusted when the temperature control effect is not ideal. In the process of self adjusting, the temperature will have a big overshoot, user need to fully consider this factor before the system self adjusting.

In the non set state long press "Shift/AT" key 6 seconds to enter into the system self adjusting process, "RUN/AT" light flash, flash will stop after the self adjusting finished, the controller will obtain a set of better PID parameters of the system, the parameter values are automatically saved. In the process of system self adjusting, long press "Shift/AT" key 6 seconds can cease the self adjusting process.

In the system self adjusting process if there is over temperature alarm, "ALM" alarm light off, the buzzer does not sound, but the heating alarm relay will automatically disconnect. "Set" key is invalid in the system self adjusting process.

Whether there is constant time setting in the system self adjusting process, lower row always display the temperature setting value.

## 7、 Observation and setting of temperature parameters

Long press the set key for about 3 seconds, lower row will display the password prompt "Lc", refer to Fig 3, upper row will display the password, by add, reduce and shift key, adjust to required password. Then click the set key again, if the password is not correct, the controller will automatically return to the normal display state, if the password is correct, it will go into temperature internal parameter setting state, click the set key that can modify the parameters. Long press the set key again for 3 seconds to exit the state, parameters are automatically saved.



**Parameter Table -1**

Indicate	Name	Descriptions	(range) factory value
Lc-	Password	When Lc=3 can check and adjust the parameter	0
AL-	over temp alarm	When "temperature measurement value > temperature set value +AL", the alarm light is on, buzzer sound, disconnect the heating output.	(0~100℃)5
T-	Control cycle	Heating control cycle	(1~60 seconds)20
P-	Proportional band	Time proportional action regulation	(1.0~range) 30
I-	Integral time	Integral action regulation	(1~1000 seconds) 400
d-	Derivative time	Derivative action regulation	(0~1000 seconds) 200
Pb-	Zero adjustment	Correct errors caused by sensor measurement (low temperature) Pb= actual temperature value - instrument measurement value	(-50~50℃)0
PK-	Full adjustment	Correct errors caused by sensor measurement (high temperature) PK=1000* ( actual temperature value - instrument measurement value ) / instrument measurement value	(-999~999) 0
Et-	Timing function	When ET=0, there is no timing function, when ET=1 get energized to start timing, when ET=2 reached set value start timing.	(0~2) note 2

**Parameter Table -2**

Indicate	Name	Descriptions	(range) factory value
Lc-	Password	When Lc=9 can check and adjust the parameter	0
Co-	Disconnect heating output deviation	When temperature measurement value $\geq$ set temperature value +Co, disconnect the heating output.	(0.0~50.0℃) 5.0
Hn-	Constant temperature timing mode	0: by minute; 1: by hour	(0~1) 0
En-	Run over constant temp	En=0 run over turn off output En=1 run over go on constant temp	(0~1) 0
Lt-	Max output	Percentage of max heating output	(0~100)100
oP-	Door control function	0: turn off door open judge function 1: turn on door open judge function	(0~1)0
rH-	Range value	Set according to temp measure range	0~400.0℃(300℃)

**Parameter Table -3**

Indicate	Name	Descriptions	(range) factory value
Lc-	Password	When Lc=23 can check and adjust the parameter	0
Fc-	Temp indicate switch	FC=0 shows Celsius, FC=1 shows Fahrenheit	(0~1)0
Ad-	Correspondence address	Correspondence address of this unit	(1~32) 1
P-t	Print interval	p-t=0, no print	(0~9999) 0 second

**Appendix:**  
**English name and parameter index symbol**

parameter index symbol	SP	St	Lc	AL	T	P	I	d
English name	SP	St	Lc	AL	T	P	I	d
parameter index symbol	Pb	Pk	Co	Hn	oP	rH	En	Lt
English name	Pb	Pk	Co	Hn	oP	rH	En	Lt

## 7、PRODUCT MAINTENANCE AND ATTENTION

### 1、Storage conditions

3.5 Ambient temperature:  $-40\sim+55\text{ }^{\circ}\text{C}$

3.6 Relative humidity:  $\leq 95\%$  ( $25\text{ }^{\circ}\text{C}$ )

3.7 Atmospheric pressure:  $50\sim 106\text{kPa}$

2、For long-term not use, the product must be cleaned inside and outside. Unplug and cover for dust proof.

3、If the storage environment with large humidity, product should be regularly (about 1 month) energized for heating to get rid of the moisture.

4、Check the accuracy of temperature control prior to reuse or process requirements changed.

5、Except for parameters like the changeable temp control and timing, others can only be adjusted by approval of our company tech dept (other parameters can be adjusted upon the correct coded lock LK data).

6、Choose different drying times according to different to be dried substances and different humidity.

7、After dried first press“O”of power switch, screw the air discharge valve to release the vacuum in the chamber, and then take out the substance. (after the vacuum released the sealing ring stick to the glass door, it is hard to open the door, open after a while).

**8、Products have been strictly tested before leaving the factory, when the technical parameters meet the requirements, and running is normal, normally no need to correct, please do not casually click on the control key.**

9、Vacuum oven case must have reliable earth to keep safe.

10、If the dried substance is flammable, it can be put in the air only after cold down to ignition point to avoid the oxidization causing flame.

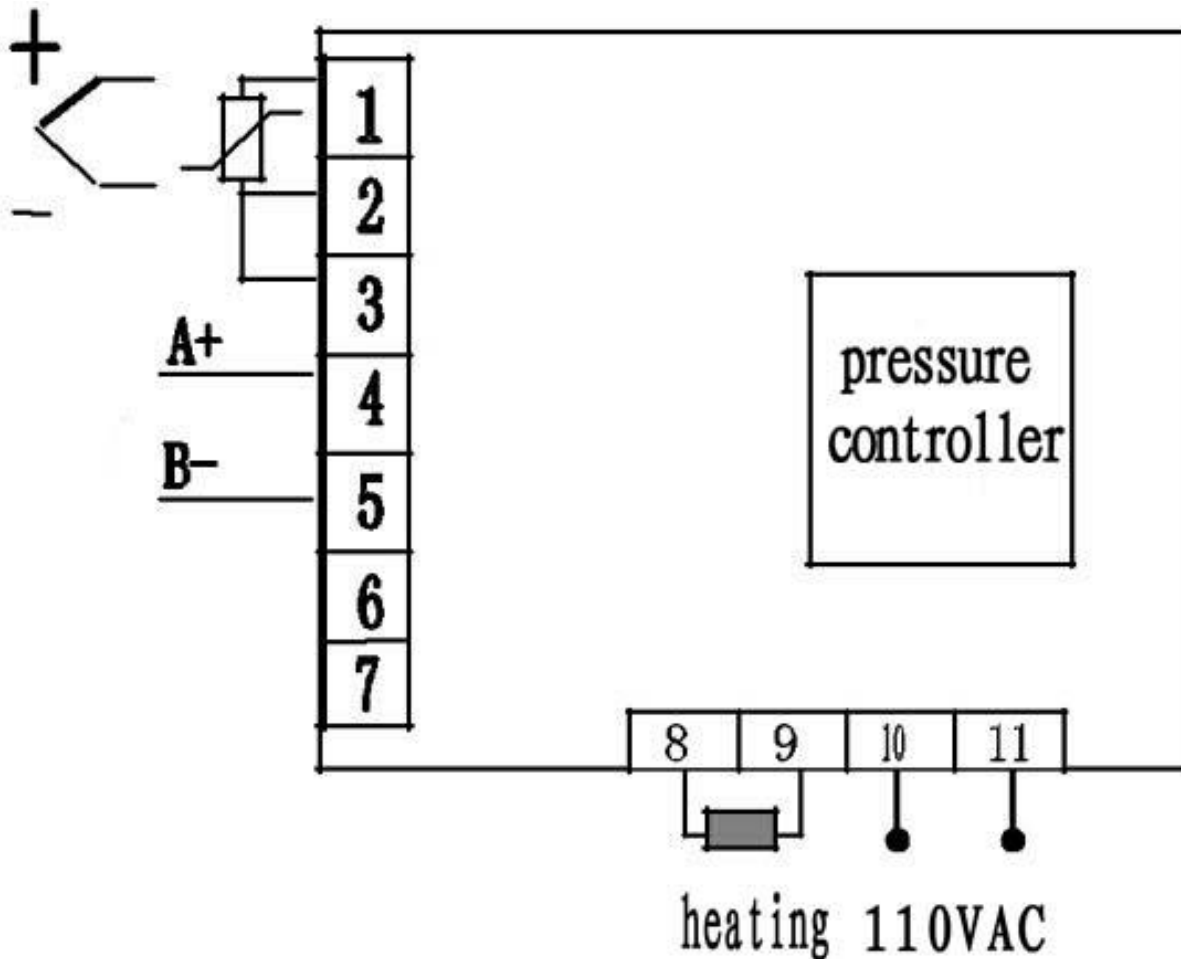
11、This oven has no explosion-proof device, so no explosive can be put for drying.

12、 If possible do not open the side box wall to prevent damage to the electrical System.

13、 This oven should be cleaned at intervals. the door glass should be wiped by soft cloth, no reactive chemical solution should be used for wiping.

14、 For long time disuse, this electroplated parts should be coated with neutral grease or Vaseline to avoid corrosion. And cover for dust proof in dry room to avoid the electrical parts becoming damp.

### 8、 WIRING DIAGRAM (FOR REFERENCE ONLY)



## 9、TROUBLESHOOTING:

<b>Trouble</b>	<b>Analysis</b>	<b>Shootings</b>
no power	plug improper or wire disconnect	plug well or reconnect
	fuse open circuit	replace the fuse
inner temp no increasing	set temp low	adjust the set temp
	heater failure	replace the heater
	temp controller failure	replace the temp controller
	temp sensor loose	tighten the joint
big deviation between the set temp and inner temp	temp sensor failure	replace the temp sensor
	set temp and sensor Measured value error	adjust the process value deviation
over temp alarm	set temp low	adjust the set temp
	temp controller failure	replace the temp controller
Vacuum unavailable to pump	vent valve on panel not off	turn off the vent valve
	throttle valve on panel not well turned off	turn off the throttle valve tight
	vacuum pumping tube not well connected	connect well the tube
	vacuum pump failure	replace the vacuum pump
	door not closed tight	close the door tight
	door seal ring broken	replace the seal ring
	vacuum gauge on panel broken	replace the vacuum gauge
	vacuum gauge on panel broken	replace the vacuum gauge

## **10、 WARRANTY**

1.The warranty period of our company produced drying oven is 12 months from the date leaving the factory, free maintenance services are provided within the warranty period.

The following circumstances do not belong to the scope of free maintenance:

- ※Improper use, storage, maintenance or intentional damage.
- ※Power causes electrical damage.
- ※Damage caused by natural factors (flood, earthquake, fire etc).

2.When the user needs spare parts, please contact with our company to purchase. Do not use alternatives, so as not to affect the normal use of the drying oven.