



# RoboLabs

Incredible machines for fastfood & funfood

## Vortex popcorn machine Robopop 60 (VPM-RM4)

### Technical service manual



**Read this manual before use and keep for future reference!**

PDF version of this manual is available on [www.robolabs.pro](http://www.robolabs.pro)

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## Safety requirements



This is the safety alert symbol. It is used to alert you to potential physical injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

### **DANGER**



- **THIS MANUAL IS FOR SKILLED TECHNICIANS ONLY!**
- **DO NOT** open electric panels unless you are qualified for this.
- **Electric shock hazard!** High voltage inside electric panel. **DO NOT** touch bare terminals and/or wires.
- **ALWAYS** unplug the machine before servicing, unless you need it to be energized for performing setup procedures.

### **WARNING**



- **Burn hazard!** Some parts of machine are very hot. Wait until machine is cooled down before working with those parts.

### **WARNING**



- **ALWAYS** wear eye protection while servicing this equipment to avoid possible injury.

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## 1 Backlight

### **DANGER**



- **Electric shock hazard!** Unplug the machine before servicing.

### **WARNING**



- **Burn hazard!** Wait until machine is cooled down.

1. Unplug the machine. Wait until it cools down.
2. Open the chamber. Locate the backlight (Fig.1).
3. Remove two screws that holds protective screen (1); take the screen off. If it is stuck, carefully insert flat screwdriver under the metal frame of the screen and turn it gently to detach the screen.
4. The lightbulb (3) is held by two spring loaded sockets (2). Take the bulb firmly and press towards one of the socket (2), release the opposite end of the bulb from the socket, and finally release the second end of the bulb and take the bulb out.
5. **DO NOT TOUCH THE NEW BULB WITH BARE FINGERS!** Skin grease will significantly reduce the lifetime of the bulb. Use a soft clean cloth or gloves to take and install the new bulb.
6. Insert the bulb in the sockets in the same way.
7. Close the protective screen and fix it with screws.
8. Close the chamber.

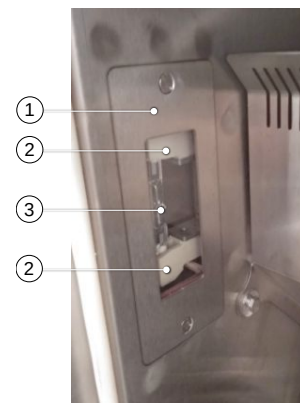


Figure 1: Backlight

## 2 VFD (inverter)

### DANGER



- **Electric shock hazard!** High voltage inside electric panel. DO NOT touch bare terminals and/or wires.

**NOTE 1:** VFD setup must be performed only when the drive is stopped.

**NOTE 2:** After setting parameter 02.00 to 9, VFD displays **End**, and gets back to the main indication mode. After this, continue setup process from parameter 00.03.



Figure 2: VFD control panel

### Parameters changing procedure

1. Locate the VFD control panel, see Fig 2.
2. To change or view parameter value, press **ENTER**, the display shows **00.00**.
3. Press **▲** or **▼** to choose the first two digits of the parameter (for example, 02).
4. Press **ENTER** again, display shows **02.00**.
5. Press **▲** or **▼** to choose the second two digits of the parameter, for example, **02.11**.
6. Press **ENTER** again to see the current value of the parameter. Change value, if needed, with **▲** or **▼**.
7. Press **ENTER** to confirm and save the new value, the display shows **End**.
8. Press **MODE** to return back to the previous level of selection or to the main mode.

Parameter	Value	Description
00.02	9	Settings initialization
00.03	0	Start-up display selection
01.00	70.00	Maximum output frequency
01.16	4	Auto accel/decel
02.00	3	Source of first master frequency command: RS-485
02.01	4	Source of first operation command: RS-485
02.04	0	Motor direction control
02.07	1	Up/Down mode
02.09	0	Source of second frequency command
02.10	1	1st and 2nd master frequency command combination
02.11	40.0	Keypad frequency command
09.00	5	VFD communication address
09.01	1	Transmission speed: 9600 bps
09.02	3	Transmission fault treatment:keep operating
09.04	1	Communication protocol: ASCII 7, E, 1

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### 3 Fiber amplifier

#### DANGER



- **Electric shock hazard!** High voltage inside electric panel. DO NOT touch bare terminals and/or wires.

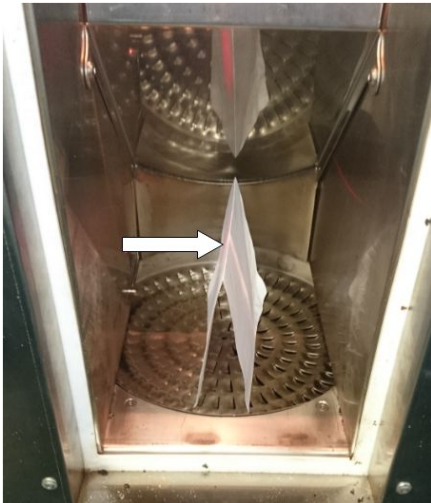


Figure 3: Paper screen

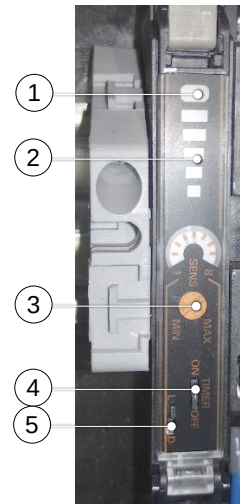


Figure 4: Fiber amplifier

1. Put a folded sheet of white paper in the chamber as shown on Fig.3, so the light ray of the sensor is screened.
2. Locate fiber amplifier in electric panel, see Fig.4.
3. If operation indicator (1) is off, go to the next step. If indicator (1) is on, rotate the screw (3) counter-clockwise, until indicator (1) turns off.
4. Set timer switch (4) to OFF.
5. Set operation mode selector (5) to L.
6. Slowly rotate the screw (3) clockwise until indicator (1) turns on.

## 4 Voltage control relay

### DANGER



- **Electric shock hazard!** High voltage inside electric panel. DO NOT touch bare terminals and/or wires.

Voltage control relay (Fig.5) is intended to protect the machine from improper connection and from voltage deviations in the service grid.

### Set-up procedure

1. Locate the relay, see Fig.5
2. Set the knob (1) at 260 V.
3. Set the knob (2) at 180 V.
4. Set the knob (3) at 2 s.

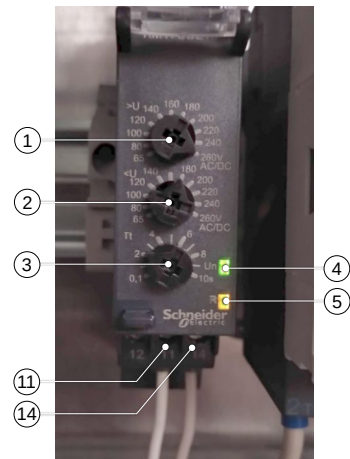


Figure 5: Voltage control relay

### LED indicators status

#### green on, yellow on

Voltage is ok. Check if mains voltage present at terminal (14).

#### green on, yellow blinks

Voltage is beyond allowed range. Check the voltage in the mains.

#### green flashes, yellow flashes

Voltage exceeds both high and low limit because of improper set up.

## 5 Temperature limiter

### ⚠ DANGER



- **Electric shock hazard!** High voltage inside electric panel. DO NOT touch bare terminals and/or wires.

TC4SP unit (Fig.6) has three setting groups: 1st setting group, 2nd setting group, and SV setting group (the main indication mode). The settings must be changed in the same order as they appear in the list. Note that after changing [In-t] (temperature sensor type) or [UnI-t] (temperature unit) values, parameters [H-Su], [L-Su], [AL1], [AL2], [AHYS] must be set again. The regulator has more parameters than listed below; if you see a parameter not from the list, skip it and move to the next one.

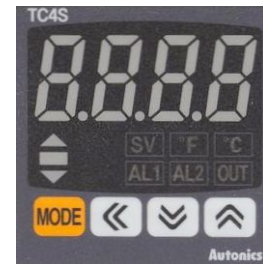


Figure 6: TC4SP panel

### Parameters changing procedure

1. To access the 2nd group of parameters press and hold **MODE** for 4 seconds; once display reads [PAr2], release **MODE**.
2. To access the 1st group of parameters, press and hold **MODE** for 2 seconds; once display reads [PAr1], release **MODE**.
3. Press **MODE** to go through the parameters. Press **<<** to see current value of the parameter.
4. Press **<** or **>** to change the value.
5. Press **MODE** to move to the next parameter.

Group	Param	Value	Meaning
2nd	LoC	oFF	Unlock all settings for changing
2nd	In-t	YCA	Temperature sensor type
2nd	L-Su	250	SV low-limit value
2nd	H-Su	400	SV high-limit value
2nd	C-nd	onoF	Control type
2nd	oUt	rLY	Control output
2nd	AL-1	An1._	AL1 alarm operation mode
2nd	AHYS	50	Alarm output hysteresis
1st	AL1	0	AL1 alarm temperature
1st	HYS	50	Hysteresis
2nd	LoC	LoC2	All settings locked, except SV
SV	SV	350	Default temperature

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## 6 Chamber deep cleaning

Over time, corn dust and husk might be accumulated in hidden areas of the chamber. This negatively affects normal airflow in the corn supply tube. If corn supply tube clogged with popcorn frequently, then it is necessary to clean those areas of the chamber.

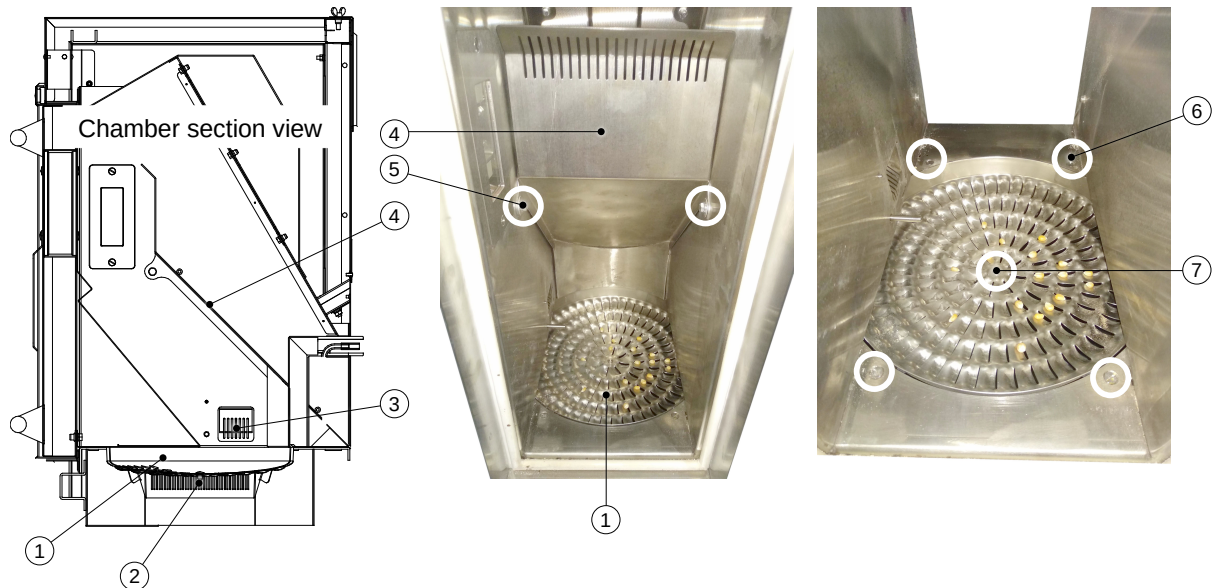


Figure 7: Chamber deep cleaning

1. Open the chamber.
2. Unscrew two bolts (5) (here and below see Fig.7).
3. Take the baffle (4) out from the chamber.
4. Unscrew four bolts (6) that holds perforated bowl (1) in place.
5. Take the perforated bowl (1) out from the chamber.
6. Thoroughly clean griddle (2) and end of the corn supply tube (3).
7. Assemble in back order. HINT: it is recommended to hold the perforated bowl by the central M5 screw (7) while putting it back to place.

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## 7 Heating circuit

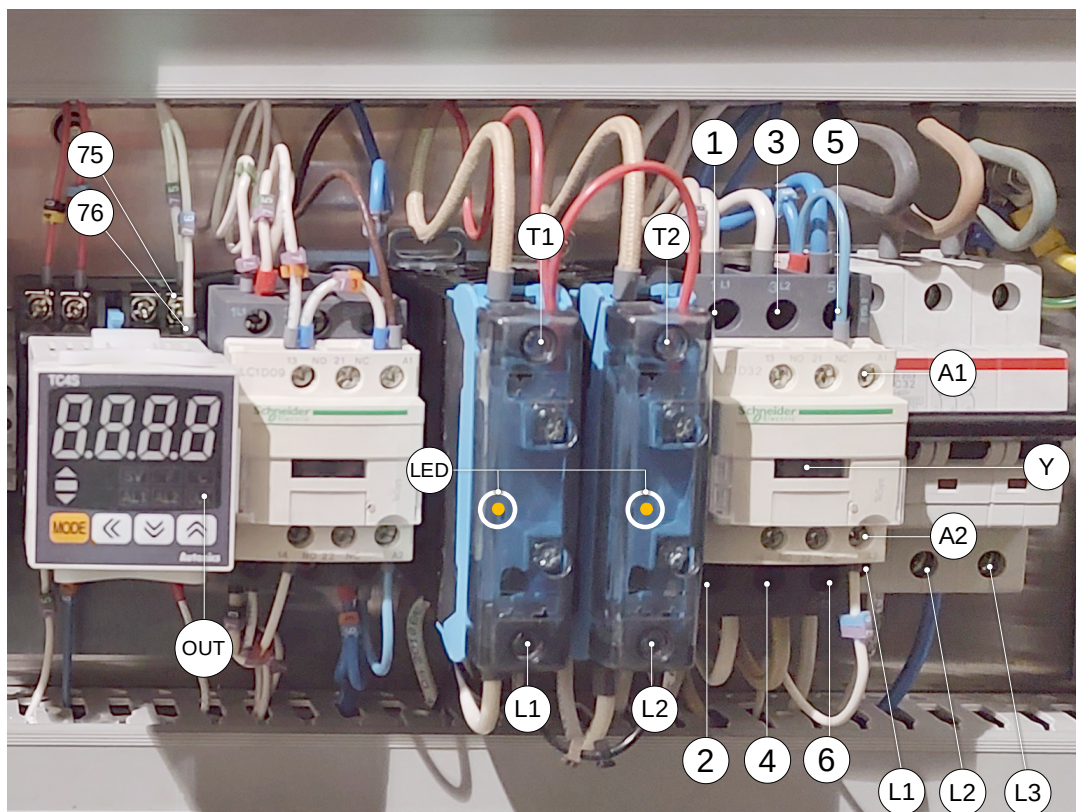


Figure 8: Elements of heating circuit

### 7.1 Heating elements check

1. Unplug the machine and see Fig.8.
2. Measure the resistance between T1 and T2; it must be 20-22 Ohms.
  - (a) If it reads OL, then check heaters wiring, busbars, and the heaters directly.
  - (b) If it reads 30-31 Ohms, then one of the heating elements is fault, see the next steps.
3. Measure the resistance between T1 and 6; it must be 10-11 Ohms.
  - (a) If it reads OL, then check heaters wiring, busbars, and the heaters directly.
  - (b) If it reads 20-22 Ohms, then one heating element is fault. Locate and replace it.
4. Measure the resistance between T2 and 6; it must be 10-11 Ohms.
  - (a) If it reads OL, then check the heaters wiring, busbars, and the heaters directly.
  - (b) If it reads 20-22 Ohms, then one heating element is fault. Locate and replace it.

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## 7.2 Solid-state relays check

1. Turn the machine on.
2. Make sure LED indicators are off.
3. Check to see if the mains voltage (208 Vac) presents at L1.
  - (a) If negative, perform Contactor check, see below.
  - (b) If Contactor check positive, then disconnect the machine and check the consistency between L1 and 1. Tighten the terminals or replace the wire if required.
4. Check to see if the mains voltage (208 Vac) presents at L2.
  - (a) If negative, perform Contactor check, see below.
  - (b) If Contactor check positive, then disconnect the machine and check the consistency between L2 and 3. Tighten the terminals or replace the wire if required.
5. Measure the voltage between T1 and L1; it must be 208 Vac. If it reads 0–5 Vac, and LED indicator is off, and the display of temperature limiter reads increasing values, then the relay is out of order; replace it.
6. Measure the voltage between T2 and L2; it must be 208 Vac. If it reads 0–5 Vac, and LED indicator is off, and the display of temperature limiter reads increasing values, then the relay is out of order; replace it.
7. Run any program (Butterfly or Mushroom).
8. Check T1 to L1 voltage. Whenever LED is on, it must be 0–5 Vac. If it reads 208 Vac while LED is on, then relay is out of order; replace it.
9. Check T2 to L2 voltage. Whenever LED is on, it must be 0–5 Vac. If it reads 208 Vac while LED is on, then relay is out of order; replace it.

## 7.3 Contactor check

1. Turn the machine on. See Fig.8.
2. Make sure OUT indicator is on.
3. Check A1 to A2 voltage; it must be 208 Vac. Otherwise do the following.
  - (a) Unplug the machine, and check A1 to Q3 for open circuit. Tighten the terminals or replace the wire if required.
  - (b) Unplug the machine, and check A2 to 76 for open circuit. Tighten the terminals or replace the wire if required.
  - (c) Check the Temperature limit output check, see below.
4. Check 1 and 3 voltage; it must be 208 Vac.
5. Check 1 and 5 voltage; it must be 208 Vac.
6. Check 3 and 5 voltage; it must be 208 Vac.
  - (a) If no mains voltage presents at 1, 3, 5 then unplug the machine, trace and locate the wires fault.
7. Check 2 and 4 voltage; it must be 208 Vac.
8. Check 2 and 6 voltage; it must be 208 Vac.
9. Check 4 and 6 voltage; it must be 208 Vac.

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- (a) If no mains voltage presents at 2, 4, 6 then unplug the machine, open the plastic hatch covering armature plunger Y; use a suitable tool to press the plunger inside the contactor. While pressed terminals 1,3,5 must be closed to 2,4,6, respectively. If the plunger cannot be moved inside smoothly, or doesn't close the terminals, the contactor must be replaced.

#### **7.4 Temperature limiter output check**

1. Check to see if the mains voltage presents at 75. If not, then trace and locate the wire fault.
2. Check to see if the mains voltage presents at 76 whenever OUT indicator is on. If not, then temperature limiter must be replaced.