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> RWRAPS REX-C100 Digital PID Temperature Controller User Manual

## RWRAPS REX-C100

# RWRAPS REX-C100 Digital PID Temperature Controller User Manual

Model: REX-C100

## INTRODUCTION

This manual provides comprehensive instructions for the installation, operation, and maintenance of your RWRAPS REX-C100 Digital PID Temperature Controller. This device is designed for precise temperature control in various industrial and laboratory applications, featuring universal input and a 0-20mA current output.

## KEY FEATURES

- **Dual Display:** Simultaneous display of set temperature (SV) and process temperature (PV) in Celsius or Fahrenheit.
- **Universal Input:** Supports 10 types of thermocouples (K, E, S, R, J, T, B, WRe3-WRe25) and RTD inputs (Pt100, Cu50).
- **PID Control:** Advanced PID control mode with auto-tune function for optimal parameter setting.
- **Current Output:** 0-20mA current output for precise control.
- **Compact Design:** 1/16 DIN size (48mm x 48mm x 110mm) for space-efficient installation.
- **Wide Application:** Suitable for kilns, furnaces, ovens, incubators, and various industrial temperature control systems.

## TECHNICAL SPECIFICATIONS

Input Type	TC: K, E, S, R, J, T, B, WRe3-WRe25; RTD: Pt100, Cu50
Input Range	K (-200~+1300°C), S (-50~+1600°C), R (-50~+1600°C), T (-200~400°C), E (-200~900°C), J (-200~1200°C), B (350~1800°C), Pt100 (-99.9~600.0°C or -200~+600°C), Cu50 (-50~150°C)
Display	Dual line, Four digits, °C/°F selectable

<b>Display Resolution</b>	1°C, 1°F, or 0.1°C, 0.1°F (with Pt100)
<b>Accuracy</b>	±0.5% or ±1 unit of full input range
<b>Control Mode</b>	PID, On-Off
<b>Output Mode</b>	Current: 0-20mA (Non-linear output: 0mA when PV is close to SV, 20mA when PV varies significantly)
<b>Alarm</b>	Upper-limit bias alarm
<b>Power Supply</b>	85~260VAC / 50~60Hz
<b>Power Consumption</b>	<2 Watt
<b>Dimensions</b>	48mm x 48mm x 110mm (1/16 DIN)
<b>Item Weight</b>	10.6 ounces

## SETUP AND INSTALLATION

### 1. Front Panel Overview



**Figure 1: Front Panel.** This image displays the front face of the REX-C100 controller. It features a dual digital display, with the

upper red display showing the Process Value (PV) and the lower green display showing the Set Value (SV). Control buttons for 'SET', 'Up', 'Down', and 'Left/Right' navigation are located at the bottom. Indicator lights for 'OUT1', 'AT' (Auto-Tune), 'ALM1', and 'ALM2' are visible on the left side.

The front panel (Figure 1) provides the primary interface for monitoring and adjusting the controller's settings. The upper display (PV) shows the current measured temperature, while the lower display (SV) shows the target temperature. The buttons allow for navigation through menus and parameter adjustments.

## 2. Wiring Terminals



**Figure 2: Rear Wiring Terminals.** This image shows the back of the REX-C100 controller, revealing the screw terminals for electrical connections. There are ten clearly labeled terminals (1 through 10) arranged in two columns, designed for secure wiring of power, sensor input, and output.

Figure 2 illustrates the rear wiring terminals. Ensure all connections are made securely to prevent operational issues. Refer to the wiring diagram for correct terminal assignments.

## 3. Wiring Diagram



**Figure 3: Wiring Diagram (Side View).** This image displays the side of the REX-C100 controller with a detailed wiring diagram

label. It shows connections for power supply (terminals 1 & 2, 100-240VAC), 0-20mA output (terminals 3 & 4), alarm output (terminals 6 & 7), and sensor input (terminals 8, 9, 10 for RTD or Thermocouple). The model number REX-C100 and supply voltage range are also visible.

The wiring diagram (Figure 3) is crucial for proper installation. Follow these guidelines:

1. **Power Supply (Terminals 1 & 2):** Connect your 100-240VAC, 50/60Hz power source here.
2. **Current Output (Terminals 3 & 4):** Connect your control device requiring 0-20mA input. Terminal 3 is positive (+), Terminal 4 is negative (-).
3. **Alarm Output (Terminals 6 & 7):** Connect your alarm indicator or relay here.
4. **Sensor Input (Terminals 8, 9, 10):**
  - For RTD (e.g., Pt100): Connect to terminals 8, 9, and 10.
  - For Thermocouple (TC): Connect to terminals 9 and 10. Ensure correct polarity.

**Important:** Always ensure power is disconnected before performing any wiring to prevent electric shock.

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## OPERATING INSTRUCTIONS

### 1. Power On and Initial Display

Upon powering on, the controller will display the current process value (PV) on the upper red display and the set value (SV) on the lower green display. Ensure the sensor is correctly connected and functioning.

### 2. Setting the Target Temperature (SV)

1. Press the **SET** button once. The SV display will begin to flash.
2. Use the **Up** (▲) and **Down** (▼) arrow buttons to adjust the target temperature.
3. Use the **Left/Right** (◀/▶) arrow buttons to move the cursor for faster adjustment of individual digits.
4. Press the **SET** button again to confirm the new SV and exit the setting mode.

### 3. Auto-Tune Function (AT)

The auto-tune function automatically calculates optimal PID parameters for your specific system, ensuring stable and accurate temperature control.

1. Set your desired target temperature (SV) as described above.
2. Press and hold the **SET** button for approximately 3-5 seconds until the 'AT' indicator light begins to flash.
3. The controller will now cycle through heating and cooling to determine the system's characteristics. This process may take some time depending on your system's thermal mass.
4. Once auto-tuning is complete, the 'AT' indicator light will stop flashing and remain off. The controller will then operate with the newly calculated PID parameters.

**Note:** It is recommended to perform auto-tuning whenever the system's thermal characteristics change significantly (e.g., new heater, different load).

### 4. Advanced Parameter Settings

For advanced users, the controller offers individually programmable control parameters (P, I, D, control period, digital filter coefficient, etc.). Accessing and adjusting these parameters typically involves pressing and holding the **SET** button for an extended period (e.g., 5-10 seconds) to enter the parameter menu. Refer to the detailed parameter list in the full technical

manual for specific codes and ranges. Incorrect settings can lead to unstable control.

## MAINTENANCE

- **Cleaning:** Keep the controller's front panel clean using a soft, dry cloth. Avoid abrasive cleaners or solvents.
- **Environmental Conditions:** Ensure the operating environment is within the specified temperature and humidity ranges to prolong the life of the device.
- **Wiring Inspection:** Periodically check all wiring connections for tightness and signs of wear or corrosion.

## TROUBLESHOOTING

Problem	Possible Cause	Solution
No display/Power off	No power supply; Incorrect wiring	Check power connections (Terminals 1 & 2); Verify power source is active.
PV display shows "HHHH" or "LLLL"	Sensor open circuit; Sensor short circuit; Incorrect sensor type selected; Sensor out of range	Check sensor wiring; Replace faulty sensor; Verify sensor type setting matches installed sensor; Ensure temperature is within sensor's measurable range.
Temperature unstable/Overshoot/Undershoot	PID parameters not optimized; Incorrect control mode	Perform Auto-Tune (AT function); Ensure PID control mode is selected for precise control.
Output not activating	Wiring error; Output device fault; SV not reached	Check output wiring (Terminals 3 & 4); Test external output device; Ensure PV is below SV (for heating) or above SV (for cooling) to trigger output.

## SUPPORT AND WARRANTY

For technical assistance or warranty inquiries, please contact your vendor or the manufacturer, RWRAPS. Please have your model number (REX-C100) and purchase details available when contacting support.