

Unscrew/Decapper Machine DCR5/USR5-8Q User Manual



COMPATIBLE RACK TRAYS:

Decapper Racks:

White: US-RK10H

- Able to accept 10 tubes of the same height 13x100mm



Black: US-RK10L

- Able to accept 10 tubes of the same height 13x75mm



Decapper Rack Tray: Metal US-RT08

- Able to carry 8 US-RK10H/L racks
- Easy to carry multiple racks to analyzer

Message from RayStar Health



Welcome, and thank you for choosing this high-quality product.

This technical manual has been provided to ensure you get the most out of your device. Please note that this manual has been translated from its original Mandarin to better serve you. While we have strived for accuracy, some minor translation inconsistencies may occur. If any part of the documentation is unclear, please do not hesitate to contact us for immediate clarification.

As the authorized sales and support agent for this product, RayStar Health is your dedicated partner throughout its lifecycle. We bridge the gap between our international suppliers and you, our valued customer. Our services are designed to provide a seamless experience, which includes:

- **Direct Fulfilment:** Managing order processing and drop-shipping to ensure you receive your product efficiently.
- **Ongoing Support:** Providing continuous technical service and support directly in your local language.
- **Expert Liaison:** Serving as your advocate and translator for any communication with the manufacturer, ensuring all questions and issues are resolved promptly and accurately.

Our role is to ensure that your experience with this product is supported by expert, localized assistance from purchase through to operation.

Should you require any assistance, please do not hesitate to contact our support team.

Sincerely,

The Team at RayStar Health

www.RayStarHealth.com

Support@RayStarHealth.com

Safety Precautions

Please read this manual before using the product. Although this product is designed and manufactured to ensure safe use, improper use or failure to follow instructions may result in personal injury or property damage. To ensure correct usage, please read this manual carefully before operating the product. Do not discard this manual and keep it in an easily accessible location.

Safety instructions in this manual are marked with standardized symbols. For your safety, please strictly follow the instructions associated with these symbols.

Warnings	Interpretation
	Electric Shock Hazard Warning: Ignoring instructions marked with this symbol may result in severe injury or death.
	Do not ignore instructions marked with this symbol which may result in personal injury or property damage.
	Biohazard warning: To avoid biohazards, do not touch contaminated components with bare hands. Handle contaminated parts according to bio-safety standard procedures to prevent adverse consequences.
	Pinch warning: Ignoring this warning and placing fingers/hands into moving mechanical parts may cause personal injury.

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1. Overview

1.1 Purpose Description

This unscrew/decapper is designed for opening vacuum blood collection tubes while effectively reducing aerosol contamination in the laboratory environment during the process. This also reduces repetitive strain injury and improves staff satisfaction.

1.2 Equipment Inspection

To ensure the product was not damaged during purchase or transportation, please inspect the following:

- Visually check for any external damage or scratches;
- Ensure no screws are loose or missing;

If any of the above issues are found, please contact the distributor for resolution.

1.3 Storage Environmental Conditions

- Store in a clean, dry location.
- Ambient temperature must be between 0°C and +45°C.
- Relative humidity must be between 0% and 90%, with no condensation.
- Avoid storage in environments with corrosive gases or liquids.

1.4 Equipment Installation

- Use a 220V AC power supply.
- Ensure the power outlet is properly grounded.

1.5 Precautions

- Before use, verify that the voltage matches the requirements and ensure the power outlet is properly grounded. Turn off the power when not in use and keep the machine clean.
- Do not insert fingers or other objects into the inlet/outlet while the power is on to avoid injury.
- This machine is designed for opening disposable vacuum blood collection tubes made of PET material. Do not use glass tubes.
- This machine is not suitable for opening threaded caps or film-sealed disposable vacuum blood collection tubes.

- If caps fall inside the machine, turn off the power and clean them promptly.
- If a tube gets stuck, press the STOP button. After resolving the issue, press the START button.
- Tubes of the same height **MUST BE** loaded into the correct rack. **WHITE** rack for 100mm height tubes and **BLACK** rack for the 75mm height tubes.
- The first position of the sample rack must not be empty; other positions may remain empty.

2. Functional Introduction

The DCR5 Automated Tube Decapper (also designated USR5-8Q) is a dedicated instrument designed to safely and efficiently remove screw-on and push-on caps from standard 75mm and 100mm sample tubes. It automates a manual, repetitive task to increase laboratory throughput and standardize sample processing.

Core Function: The system automates tube decapping by utilizing a pneumatic gripper to unscrew caps. Processed caps are contained within the system, and decapped tubes are returned to their racks, ready for downstream analysis.

Operational Workflow: Operators load color-coded tube racks onto weighted metal trays. The instrument's software interface allows for process initiation, real-time status monitoring, and batch tracking. A key safety interlock ensures the system is in a "READY" state before operation can begin.

Integrated Safety & Containment: The decapper is engineered as a containment device. An active negative-pressure system with HEPA filtration captures aerosols generated during decapping, and an optional UV-C cycle provides chamber decontamination, protecting both the operator and the laboratory environment.

Summary: The DCR5 transforms tube decapping from a manual, exposure-prone task into a secure, automated, and trackable process, supporting workflow efficiency and laboratory safety. The unscrew/decapper can open 80 tubes per load within 4 minutes which equates to a decapping speed of 3 seconds per tube.

3. Technical Specification

Product	DCR5/USR5-8Q	Tube Diameter	13mm
Model	Floor-standing	Tube Length	75mm, 100mm
Depth	68.5 cm	Tube Material	PET
Width	71.0 cm	Accepted Rack Tray	Metal US-RT08
Height	133.0 cm	Accepted Rack Type	White: US-RK10H Black: US-RK10L
Weight	150 kg	Throughput/Hr	1,200 Tubes, 15 Loads
Accepted Tube Height	Identical	Throughput/Load	4 mins / 80 Tubes
Maximum Tubes per Load	80 Tubes	Voltage	AC 220V 50HZ
WARNINGS	Physical Hazard / Biological Hazard		

- HEPA Filtration Efficiency:
 - ≥ 99.999% for 0.3µm particles; ≥ 99.999% for 0.12µm particles
- Noise Level: ≤ 60dB

4. Operation Instructions



Image of the DCR5 / USR5-8Q

4.1 Operational Instructions

- Plug in the power and turn on the switch; the device will enter standby mode.
- Place centrifuged sample tubes (with caps) onto the sample rack.
- Load racks onto the rack tray.
- Press “START” bottom to begin the unscrew/decapping operation;
- The machine will automatically pull the rack tray into the cap-opening mechanism. After opening, the caps will be ejected into the waste bin, and the rack will be conveyed to the output area for retrieval.

4.2 Button Functions

- **STOP Button:** Press in emergencies to halt all operations. The red light indicates the power is on.
- **UV Button:** Press to initiate UV chamber decontamination process. For optimal pathogen inactivation, a 30-minute sterilization cycle is recommended post-processing.
- **START Button:** Press to initiate self-check. Once completed, the indicator light will turn on, signaling readiness for operation. If no samples are loaded within 40 seconds, the device will return to standby mode.

5. System Overview



5.1 RackTray System

5.1.1 Purpose and Design

The instrument utilizes weighted metal rack trays to ensure tube stability during loading and processing. This design prevents tube sway and secures their position during system motion, enabling reliable unscrew/decapping.

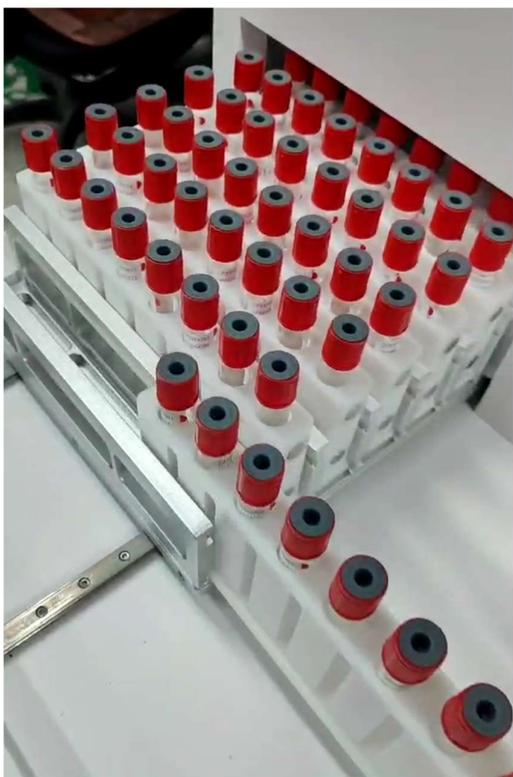
5.1.2 Configuration and Handling

The system includes four (4) rack trays by default. This configuration facilitates efficient workflow by allowing a full set of capped tubes to be prepared for processing while another set is being decapped ("swap-in/swap-out").

5.1.3 Rack Types and Compatibility

Racks are color-coded by tube size to ensure correct placement and proper height alignment within the decapper:

- White Rack: Designed for standard 100mm tubes.
- Black Rack: Designed for 75mm tubes. This rack incorporates a built-in riser to elevate shorter tubes so their cap height matches that of the 100mm tubes when loaded.



5.2 Rack Loading Procedure & Safety

- 5.2.1 **Mixed Processing:** Rack trays can be loaded with any combination of white and black racks at any time. The instrument processes tubes of both heights concurrently; no specific loading order or uniform rack type is required.
- 5.2.2 **Orientation:** Each rack tray features a keyed, failsafe design that permits racks to be loaded in only the correct orientation.
- 5.2.3 **Security:** An integrated locking mechanism prevents loaded racks from sliding or falling out during transport and operation, ensuring they remain securely seated.
- 5.2.4 **Height Verification:** Always verify that the correct color-coded rack is used for the corresponding tube size. When loaded, all tube caps must be aligned at the same height for the decapping mechanism to function correctly.



↑ **Behind the Front Access Panel:**
Waste Bin and Compressor Drain Line

← **Instrument Rear: Air Compressor**
The instrument's pneumatic system is powered by an integrated air compressor, located at the rear. This compressor provides the motive force for the decapping motor.

5.3 Instrument Components & Maintenance

5.3.1 Front Access Panel

Opening the front service door provides access to two key maintenance points:

5.3.2 Decapped Cap Waste Bin

- **Function:** Collects all decapped tube caps.
- **Maintenance:** To prevent overflow and instrument contamination, empty the waste bin daily. Replace the inner plastic liner with a new bag.

5.3.3 Compressor Drain Line

- **Function:** The attached drain line and collection bag capture liquid waste from the air compressor. This waste is a mixture of condensed water vapor, trace lubricating oil, and airborne particulates.
- **Maintenance:** Periodically inspect the collection bag. When the bag is half-full (or at a minimum interval of every two weeks), seal the bag at the neck, detach it from the drain line, and dispose of it as hazardous/industrial laboratory waste according to your laboratory's protocols. Install a new, empty collection bag onto the drain line fitting.



5.4 Decapper Process:

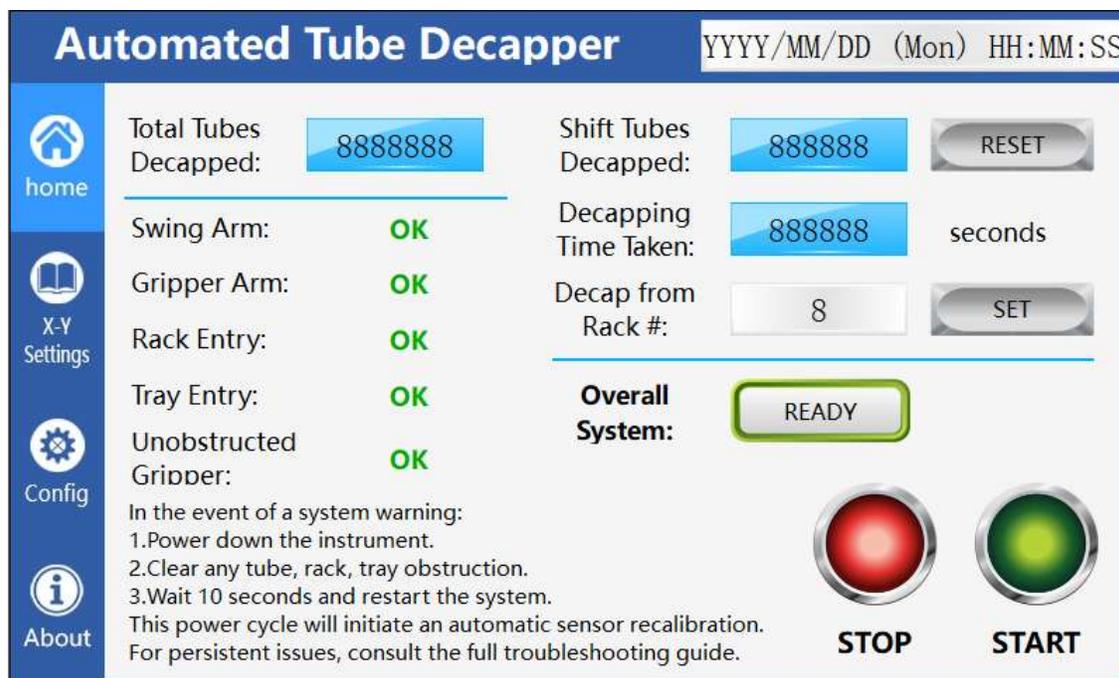
The decapper removes caps via a two-step motion: a counterclockwise rotation to break the seal, followed by a vertical extraction.



5.5 Safety Containment System:

An integrated negative-pressure air flow system actively aspirates aerosols produced during decapping, providing primary containment for operator protection.

6. Operation - Touch Screen User Interface



6.1 Home Screen Overview

The Home Screen provides a centralized dashboard for monitoring system status and initiating key functions.

6.1.1 Component Readiness

A status panel displays the operational condition of all major system components. The system's overall readiness is determined by the status of all individual components.

6.1.2 Normal Operation Status When all components are functional, each will display an OK status and the "Overall System" indicator will show a green READY state (see Figure above). This is the required condition to begin operation.

6.1.3 Fault Status: If any critical component malfunctions, it will display a FAULT status. This will cause the "Overall System" indicator to show a red NOT READY state (see Figure below). Operation is prevented until the fault is resolved and the system returns to a READY state.

6.1.4 Fault Response Procedure: If a fault or "NOT READY" status is present, perform the following basic troubleshooting:

1. Power down the instrument.
2. Visually inspect and clear any tube, rack, or tray obstructions.
3. Wait 10 seconds and restart the system.

This power cycle will trigger an automatic sensor recalibration. If the fault or "NOT READY" status persists, please email support.

6.1.5 Status Information

Real-time and historical statistics displayed for operational tracking:

- **Lifetime Total:** Cumulative count of all **Total Tubes Decapped**.
- **Shift Total:** Number of **Tubes Decapped** in the current **Shift**.
- **Shift Duration:** Total elapsed **Decapping Time Taken** (in seconds) for current shift.

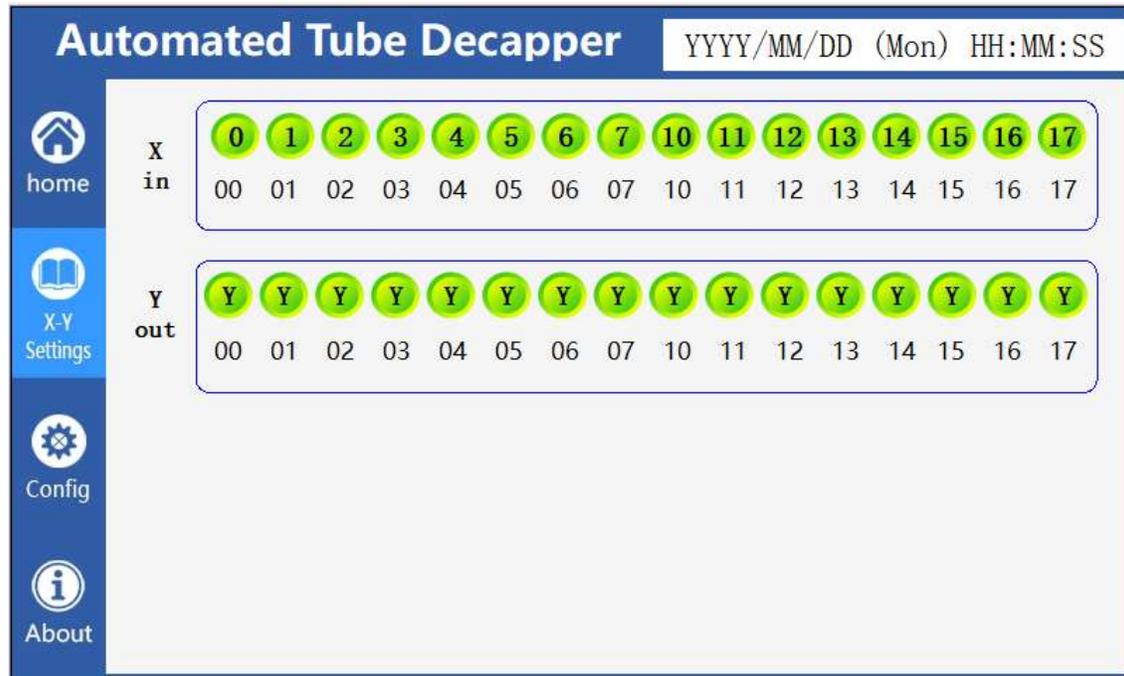
6.1.6 Functional Controls

The following primary functions are accessible:

- **Start / Stop Buttons:** Initiate or halt the decapping process. (Disabled during a "NOT READY" state).
- **Shift Reset:** Reset the shift-specific counters (e.g., Shift Total, Shift Duration) at the beginning of a new operator shift.
- **Starting Row Select:** "Decap from Rack #" Define the specific row (1–8) on a rack tray from which decapping will begin. Row 1 is the position closest to the system's loading point.

The screenshot displays the control interface for the Automated Tube Decapper. At the top, it shows the date and time: YYYY/MM/DD (Mon) HH:MM:SS. On the left, there is a navigation menu with icons for home, X-Y Settings, Config, and About. The main area is divided into several sections:

- Total Tubes Decapped:** A blue counter showing 8888888.
- Shift Tubes Decapped:** A blue counter showing 888888, with a grey RESET button next to it.
- Decapping Time Taken:** A blue counter showing 888888 seconds, with a grey SET button next to it.
- Decap from Rack #:** A white input field showing 8, with a grey SET button next to it.
- Overall System:** A red-bordered box containing the text "NOT READY".
- System Status:** Two circular buttons, a red one labeled "STOP" and a green one labeled "START".
- Fault Indicators:** A list of components with "FAULT" status: Swing Arm, Gripper Arm, Rack Entry, Tray Entry, and Unobstructed Gripper.
- Instructions:** A text block providing instructions for handling system warnings: "In the event of a system warning: 1. Power down the instrument. 2. Clear any tube, rack, tray obstruction. 3. Wait 10 seconds and restart the system. This power cycle will initiate an automatic sensor recalibration. For persistent issues, consult the full troubleshooting guide."



6.2 X-Y Calibration Screen

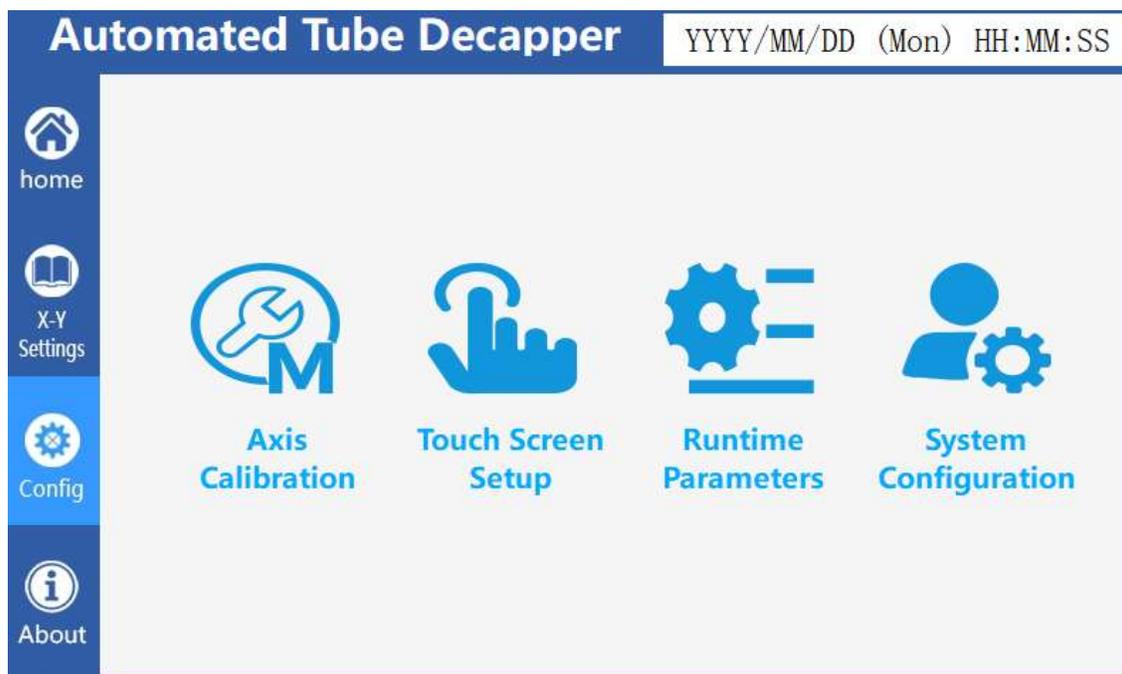
6.2.1 Purpose

The X-Y Settings Screen is a service-level interface used for the precise calibration of the decapper head's spatial alignment relative to the tube racks. It controls the motor coordinates for locating tube positions.

6.2.2 User Notice

This screen is **strictly for calibration and troubleshooting purposes**. The settings should **not be modified during standard operation**.

- **Access Restriction:** Configuration via this screen is intended for qualified service personnel or backend specialists only.
- **Operator Guidance:** Do not adjust any values on this screen. Parameters should only be reconfigured by a specialist in response to a diagnosed alignment problem or as part of scheduled preventive maintenance.



6.3 Configuration Menu

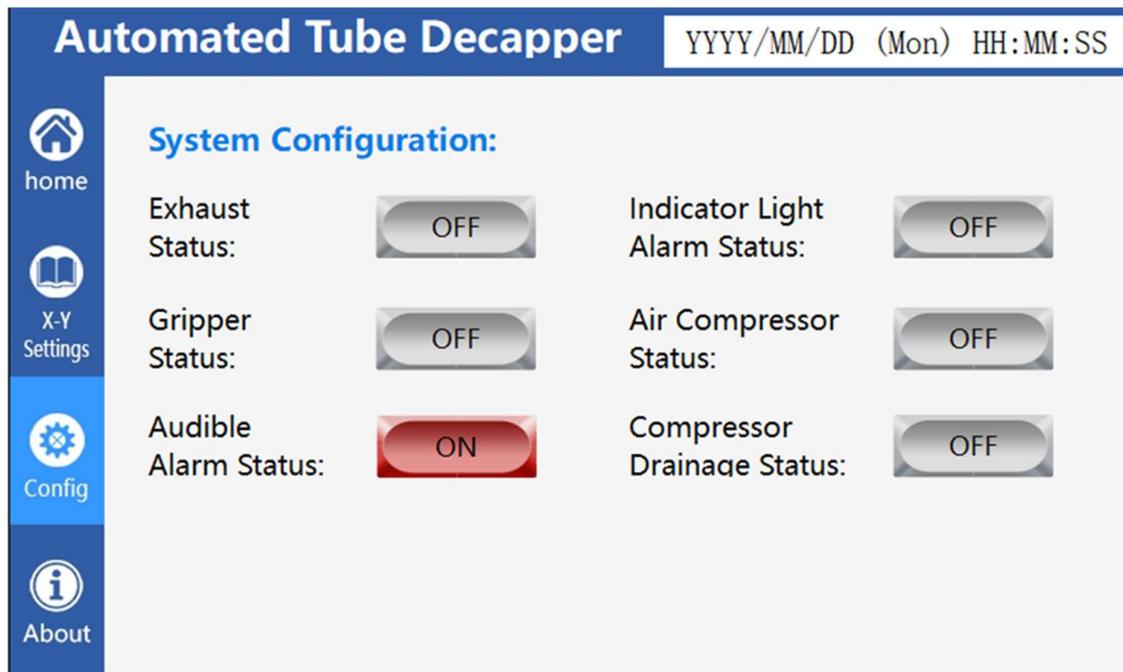
6.3.1 Overview

The Configuration Menu provides access to advanced instrument setup and calibration modules. These options are typically used for initial installation, periodic maintenance, and troubleshooting. Access to certain functions is restricted.

6.3.2 Menu Options

- 6.3.2.1 Axis Calibration:** Accesses the X-Y Calibration Screen for fine-tuning the positional alignment of the decapping head. **Access Restriction:** This module is password-protected for technical experts only. It should not be used during routine daily operations. Access is strictly reserved for troubleshooting specific mechanical or alignment issues, such as gripper positioning faults.
- 6.3.2.2 Touch Screen Setup:** Configures the sensitivity and calibration of the touch screen interface.
- 6.3.2.3 Runtime Parameters:** Adjusts operational settings for the decapping process (e.g., motor torque, speed).
- 6.3.2.4 System Configuration:** Manages high-level system settings, including language, date/time, and network preferences.

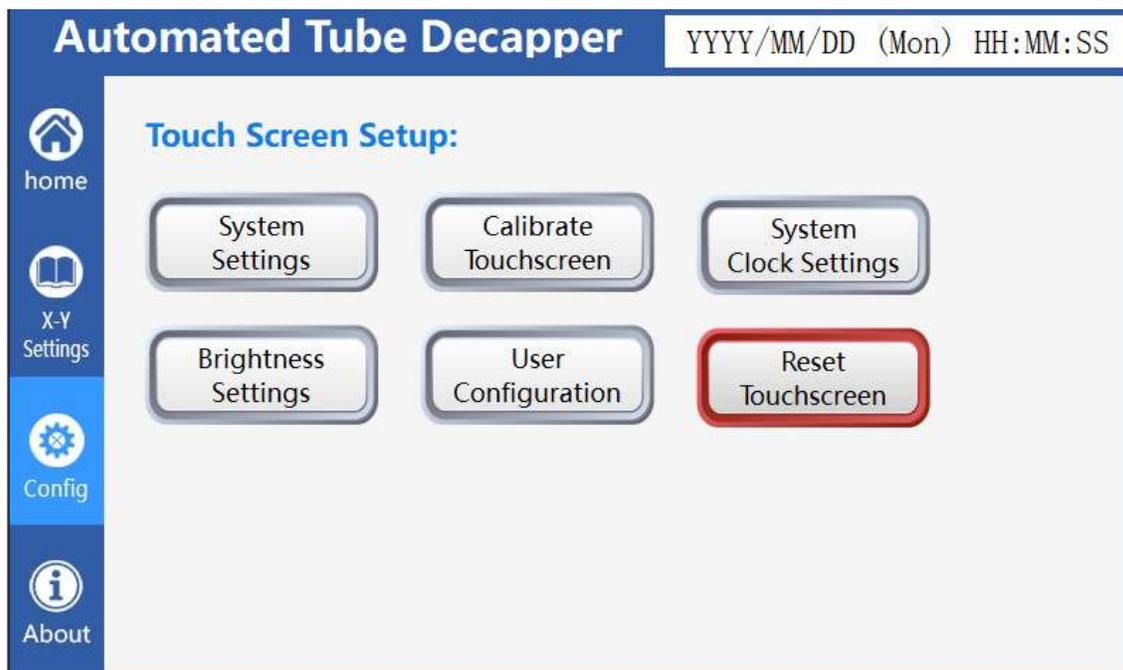
General Access Note: These menus contain critical system parameters. Changes should only be made by authorized service personnel or system administrators.



6.3.3 System Configuration

This dashboard provides an at-a-glance view to troubleshoot essential component states. The status of each listed subsystem is indicated as either **ON** (active/functional) or **OFF** (inactive/faulted).

Subsystem	Description	Normal State
Exhaust System	Indicates the operational state of the negative-pressure aerosol containment system.	ON during operation.
Gripper	Shows the readiness of the tube cap gripping mechanism.	ON when initialized and ready.
Audible Alarm	Displays whether the audible warning system is enabled.	ON (should always be enabled for safety).
Indicator Light Alarm	Displays whether the visual warning light system is enabled.	ON (should always be enabled for safety).
Air Compressor	Indicates the power and operational state of the pneumatic system compressor.	ON during operation; cycles OFF at pressure.
Compressor Drainage	Monitors the state of the automatic condensate drain valve or detection circuit.	Periodically cycles ON/OFF during maintenance.



6.3.4 Touch Screen Setup

6.3.4.1 Overview

The Touch Screen Setup menu provides centralized control for configuring the instrument's user interface, including display properties, input calibration, and operator preferences. This menu is primarily used for initial setup and corrective maintenance.

6.3.4.2 Menu Options

The following functions are accessible from this view:

Button / Option	Primary Function
System Settings	Returns to the main System Configuration menu dashboard.
Calibrate Touchscreen	Initiates the interactive routine to recalibrate touch input accuracy.
System Clock Settings	Accesses the date, time, and timezone configuration for the instrument.
Brightness Settings	Adjusts the display backlight intensity for optimal visibility.
User Configuration	Manages operator-specific settings (e.g., unit preferences, default views).
Reset Touchscreen	Restores all touch screen and user interface settings to factory defaults.

Automated Tube Decapper

YYYY/MM/DD (Mon) HH:MM:SS

 home

 X-Y Settings

 Config

 About

DCR5 Automated Tube Decapper Overview

The DCR5 is a robust automated decapper designed to handle a broad range of push-on and screw-on capped tubes. It is validated for use with leading tube brands such as BD, Vacuette, and Greiner, providing reliable performance for your laboratory workflows.

Performance & Capacity

- Throughput: Processes approximately 80 tubes in 4 minutes (1 tube/4 secs)
- Tube Rack Compatibility:
 - 75mm Tubes: White Rack
 - 100mm Tubes: Black Rack
- Workflow Flexibility: The system is supplied with one heavy-metal loading rack, plus additional ones that can be used for secure transportation to and from the Decapper.
- Total Capacity: The system can process up to eight racks per load.
- Operation: The system will scan each rack to ensure there are tubes and will come to a stop when it identifies an empty / open tube position.

Safety & Decontamination

- Aerosol Containment: An active negative air pressure system with HEPA filtration creates an inward airflow to contain aerosols, protecting laboratory personnel.
- UV Sterilization: An integrated UV-C light system decontaminates the chamber. For optimal efficacy, a 30-minute cycle is recommended post-processing.

6.4 About Screen

The About Page displays the instrument's key specifications and identification details. It serves as a quick reference for the model name (DCR5/USR5-8Q), performance metrics (80 tubes/4 minutes), compatible tube sizes (75mm and 100mm), and core safety features (HEPA filtration, UV decontamination). This information is useful for verification, troubleshooting, and maintenance documentation.

7. Daily Maintenance

Replacing High-Efficiency Particulate Air (HEPA) Filters: After a certain period of use, the filtration efficiency of HEPA filters may decrease, depending on the cleanliness of the surrounding air. It is generally recommended to replace them once a year. Use the special tool (provided with the HEPA filter) to extract the old HEPA filter and place it in a biohazard bag. Insert a new HEPA filter. During the replacement process, ensure biosafety precautions are taken, and dispose of the old HEPA filter in a harmless manner.

- Store and use the device in suitable environmental conditions.
- Regularly clean the exterior to prevent dust accumulation.
- Do not disassemble mechanical parts during cleaning.
- Periodically check for loose screws in mechanical and connection areas.

8. Troubleshooting

Issue	Possible Cause	Solution
Racks are not being loaded in the loading mechanism	Loading mechanism motor running	Reposition the sample rack correctly
	Loading mechanism motor not running	Check if the device is powered on
System is not de-capping tubes	Motor fault alarm	Power off for 30 seconds, then restart
	Dirty sensor probe	Power off and clean with alcohol swap
	Sample rack not aligned	Power off for 30 seconds, then restart
No power on startup	Power cord disconnected	Replace the power cord
	Fuse blown	Replace the backup fuse

9. Packing List

Default system comes with the following. Your system may come with additional racks / rack trays that were purchased separately.

No.	Item	Quantity
1	Main Decapper USR5-8Q unit	1 unit
2	Metal Rack Tray US-RT08	4 units
3	Sample Racks White (Long tube 100mm) US-RK10H	50 units
4	Sample Racks Black (Short tube 75mm) US-RK10L	12 units
5	Power cord	1 cable
6	Waste bin	1 piece
7	Online User Manual	1 copy
8	HEPA Filter Certificate	1 piece

Maintenance Department

E-mail: support@raystarhealth.com