ULTRA OPTICS

54R 2.0

OPERATION AND

MAINTENANCE MANUAL



Introduction

This manual is intended for use by Ultra Optics customers. It is important to read and understand the information in this manual before installing or operating the system. This manual is provided by Ultra Optics to its customers as a courtesy and, except as expressly provided in this manual, **ULTRA OPTICS MAKES NO WARRANTIES, EXPRESS OR IMPLIED, REGARDING THE CONTENTS IN THIS MANUAL. ULTRA OPTICS ASSUMES NO RESPONSIBILITY FOR ANY OUTCOMES AS A RESULT OF USING THIS MANUAL.**

Any information contained in other manuals for equipment supplied by third party manufacturers (including, but not limited to the PLC, robot, motors, etc.) shall take precedence over information contained within this manual with respect to that third party equipment.

Thank You

The employees of Ultra Optics wish to thank you for your business. The 54R 2.0 is Ultra Optics' latest innovation in a rich history of designing and manufacturing the most accurate and robust lens coating machines available. If, after reading this manual, you are not confident in carrying out any task, please call Ultra Optics' technical service team at 763.488.6030.

Symbols

Symbols and statements used throughout this manual include:

 Text following this symbol needs extra attention.

NOTE: Text like this is extra information that may be helpful to the situation.

CAUTION: Text like this is information to help avoid damage to the machine and/or property.

**WARNING!**: **Text like this is information to help avoid serious personal injury and/or death.**

Service

The 54R 2.0 automated back-side coating unit was designed and manufactured for many years of safe and dependable operation. In the event service is required, please contact Ultra Optics at:

Ultra Optics
9200 Wyoming Avenue North, Suite 360
Brooklyn Park, MN 55445
TechnicalSupport@ultraoptics.com
763.488.6030

Design Modification

DO NOT use this product in any manner not consistent with the instructions outlined in this manual!

NEVER alter the design, or perform service that is not consistent with the instructions outlined in this manual, without the prior written approval of Ultra Optics.

ALWAYS refer to the manual supplied by the component manufacturer for the most accurate and current information regarding that item and its particular use. Any information in the component manufacturer's manual shall take precedence over information contained in this manual.

Additional Copies

Additional copies of this manual are available online at www.ultraoptics.com, or by contacting Ultra Optics by phone at 763.488.6030. No part of this document may be reproduced or copied in any form, or by any means, without the prior written permission of Ultra Optics.

©2023
Ultra Optics

Safety

SAFETY FIRST!

The 54R 2.0 is a complex piece of equipment that contains various safety hazards. Some of these hazards include, but are not limited to:

- Ultra Violet light – UV-light is used to cure the coating on the lens. Exposure to this light can damage the eyes. The UV-light also produces extreme heat and high temperatures. These temperatures could cause skin burns. All flammable materials, including cleaning agents, must be kept away from these temperatures due to the risk of fire.
- High pressure hot water wash – hot water (~140°F) is sprayed at high pressure to provide a thorough cleaning of the lens. This water could cause burns or injury if directed on bare skin.
- Air jet drying – compressed air is blown at the lens surface to dry it after being washed. This compressed air could contain particles and cause damage to the eyes.
- Moving components – the machine contains several moving components that could cause damage and/or serious injury.
- Chemicals[1] – the chemicals used in this machine can cause skin/eye irritation and damage clothing.

Because of these issues, it is important that only trained and qualified technicians operate and work on these machines. When doing so, in addition to following the guidelines in this manual, appropriate personal protective equipment (PPE) should be worn. The PPE may include, but is not limited to safety glasses, face shield, protective gloves, lab coat or smock.

[1] All Safety Data Sheets (SDS) for Ultra Optics coatings are available by visiting our website at www.ultraoptics.com

WARNING! **This machine uses high voltage electrical power. The access panel to the electrical control panels should only be opened and worked in by a qualified technician. Failure to take proper precautions could result in serious injury or death.**

WARNING! **This machine uses hot water at high pressure. The water heater could burn the skin if the surface is touched. Extreme caution should be used when performing any work or maintenance on or around the wash components.**

WARNING! **An extremely intense ultraviolet light source is used to cure the coating on the lenses. Service work should not be performed on the 54R 2.0 while this lamp is energized. Direct exposure to the lamp could result in severe or permanent vision loss. The ultraviolet light source also produces extremely high temperatures. Touching objects in this area (above or below the deck) could result in a burn. All flammable materials (such as alcohol) MUST be kept away from these temperatures due to risk of fire.**

WARNING! **The coating chemicals applied in this machine could cause significant health risks if ingested or if it gets into the eyes. The SDS for the coatings being used can be found at www.ultraoptics.com.**

This document constitutes the Original Instructions for the Ultra Optics 54R 2.0 Lens Processing System in accordance with Annex I, Section 1.7.4.1 of Directive 2006/42/EC. Where translated into other official EU languages, such versions shall be marked 'Translation of the Original Instructions.'

The Ultra Optics 54R 2.0 complies with the applicable provisions of Directive 2006/42/EC (Machinery Directive), as well as the relevant requirements of the EMC Directive and the RoHS Directive. Conformity has been assessed in accordance with the prescribed procedures, and a signed EU Declaration of Conformity is supplied with the machine. The supporting Technical File is maintained by Ultra Optics in accordance with regulatory requirements.

The Ultra Optics 54R 2.0 bears the **CE marking** in accordance with the requirements of Machinery Directive 2006/42/EC and other applicable European Union legislation. The CE marking indicates that the manufacturer has assessed the machine and determined that it complies with all relevant essential health and safety requirements.

The CE marking is affixed visibly, legibly, and indelibly to the machine nameplate. It signifies that the 54R 2.0 may be placed on the market and put into service within the European Economic Area (EEA), provided it is installed and operated in accordance with these instructions.

The CE marking confirms that:

- A conformity assessment procedure has been carried out.
- A Technical File has been compiled and is maintained by the manufacturer.
- An EU Declaration of Conformity has been issued and signed by the authorized representative of the manufacturer.
- Applicable harmonized standards have been applied, providing presumption of conformity with relevant essential health and safety requirements.

The CE marking does not eliminate the responsibility of the installer, operator, or employer to ensure that the machinery is installed, operated, and maintained safely and in accordance with all applicable local regulations.

Unauthorized modifications to the machine, safety systems, or control logic may invalidate the CE marking and void the Declaration of Conformity.

The Ultra Optics 54R 2.0 is intended exclusively for the automated washing, drying, coating, and ultraviolet curing of ophthalmic lenses within controlled indoor industrial environments by trained personnel.

In accordance with the risk assessment performed under EN ISO 12100, the manufacturer has evaluated reasonably foreseeable misuse of the Ultra Optics 54R 2.0. Although the machine is designed for professional industrial use, certain predictable behaviors or deviations from instructions could occur. The following actions are considered foreseeable misuse and are strictly prohibited:

- Operating the machine with guards removed, interlocks defeated, or access doors open.
- Reaching into processing areas while the machine is in automatic or motion-enabled mode.
- Using unapproved coatings, cleaning agents, or chemicals.

- Operating the machine outside the specified utility limits (electrical, compressed air, or water supply).
- Processing materials other than ophthalmic lenses.
- Adjusting safety-related parameters or modifying control logic without manufacturer authorization.
- Bypassing safety alarms or continuing operation after critical fault warnings.
- Using flammable solvents (e.g., alcohol-based cleaners) in proximity to an energized UV lamp.
- Performing maintenance without isolating electrical and pneumatic energy sources.
- Improper placement of trays or work tickets that interfere with automated handling systems.

The machine has been designed to mitigate many of these risks through interlocking guards, protective devices, safety-related control functions, and warning labeling. However, safe operation depends on adherence to the instructions provided in this manual and proper training of operators and maintenance personnel.

Use of the Ultra Optics 54R 2.0 in a manner not consistent with the intended use or the instructions contained in this manual may result in serious injury, equipment damage, or loss of warranty coverage.

Residual Risk Summary

Despite the implementation of protective measures, guarding, interlocks, and safety-related control systems, certain residual risks remain. These risks are considered acceptable when the machine is used as intended and in accordance with this manual.

All residual risks identified through the risk assessment process have been reduced to an acceptable level through design measures, safeguarding, and administrative controls. Operators and maintenance personnel must follow all procedures outlined in this manual and wear appropriate personal protective equipment (PPE) when required.

Hazard Category	Residual Risk Description	Risk Condition	Required Protective Measure
Ultraviolet Radiation	Exposure to UV radiation if safeguards are bypassed during cure cycle	Guard defeated or improper servicing	Do not bypass interlocks; wear eye protection during service
High Temperature	Burn risk from hot water components or UV chamber surfaces	Maintenance after recent operation	Allow cooling time; wear protective gloves

High-Pressure Water	Injury from high-pressure wash system	Servicing wash system without depressurizing	Follow energy isolation and pressure relief procedure
Electrical Energy	Electric shock hazard from control panels	Access by unqualified personnel	Isolate power; qualified technicians only
Moving Mechanical Parts	Pinch/crush hazards from robot arm, conveyor, spindle rotation	Access during operation	Interlocked guards; operate only in safe modes
Compressed Air	Eye injury from air jets or hose failure	Air system maintenance	Depressurize system; wear eye protection
Chemicals	Skin/eye irritation from coating materials	Handling coatings or cleaning	Follow SDS; wear PPE
Noise	Exposure to operational noise levels	Extended operation	Hearing protection if required by site policy
Slips/Spills	Slip hazard from water or coating residues	Poor housekeeping	Clean spills promptly; maintain floor conditions
Maintenance Intervention	Risk of unexpected movement	Servicing without proper isolation	Apply lockout/tagout procedures

Safety Warnings

The 54R 2.0 contains hazards that can cause serious injury or death if proper precautions are not followed.

Ultraviolet Radiation

An extremely intense ultraviolet light source is used during curing. Direct exposure can result in severe or permanent eye injury. The UV lamp must never be viewed directly and must be de-energized before servicing.

High Temperature

The UV curing system and wash components generate high temperatures. Surfaces may remain hot after operation and can cause burns. Allow sufficient cooling time before maintenance.

High-Pressure Water

The wash system operates at elevated pressure and temperature. Servicing must not be performed until pressure has been relieved.

Electrical Hazard

The machine operates on high-voltage electrical power. Electrical panels shall only be opened by qualified technicians after isolation and lockout.

Moving Mechanical Parts

Robotic motion, conveyors, and rotating spindles present pinch and crush hazards. Access doors are interlocked and must not be bypassed.

Chemicals

Coating materials and cleaning agents may cause irritation or injury. Refer to applicable Safety Data Sheets (SDS) and wear required PPE.

Noise Emission

The manual does not currently include declared noise emission values.

Vibration declaration

“The machine does not expose operators to hazardous whole-body or hand-arm vibration under intended operating conditions.”

Formal decommissioning/disposal

The Ultra Optics 54R 2.0 must be decommissioned in a controlled and safe manner to prevent injury and environmental harm. Prior to decommissioning, all energy sources shall be isolated, including electrical power, compressed air, water supply, and any auxiliary systems. Lockout/tagout procedures must be applied in accordance with the instructions provided in this manual to ensure that all hazardous energy has been removed. Residual pressure within pneumatic and water systems shall be safely relieved before any dismantling activities begin.

All coatings, cleaning agents, and other process chemicals shall be removed from reservoirs, lines, and containers and disposed of in accordance with applicable local, national, and international environmental regulations. Safety Data Sheets (SDS) shall be consulted for proper handling and disposal methods. UV lamps must be handled as controlled waste where required by regulation.

During dismantling, machine components shall be removed using appropriate lifting equipment and safe handling methods. Materials such as metals, electrical components, wiring, and electronic assemblies should be segregated for recycling where possible. Electrical and electronic components must be disposed of in compliance with applicable waste electrical and electronic equipment (WEEE) regulations where such legislation applies.

Disposal or recycling of the machine shall be carried out by qualified personnel in accordance with environmental protection requirements and workplace safety regulations.

Transport weight and lifting instructions

The machine must be lifted only at the designated lifting points identified on the frame and in this manual. During transport, it shall be properly secured to prevent shifting, tipping, or uncontrolled movement. Installation must be carried out on a stable, level foundation capable of supporting the full operating weight of the equipment, and the machine shall be anchored where required to ensure stability and prevent vibration or displacement during operation. The machine weight is: **1,888 lbs**.

Applied Harmonized Standards

The Ultra Optics 54R 2.0 has been designed and constructed in accordance with the following harmonized European standards, as applicable, to demonstrate conformity with the essential health and safety requirements of Directive 2006/42/EC and other relevant directives:

- **EN ISO 12100** – Safety of machinery – General principles for design – Risk assessment and risk reduction
- **EN 60204-1** – Safety of machinery – Electrical equipment of machines – Part 1: General requirements
- **EN ISO 13849-1** – Safety of machinery – Safety-related parts of control systems – Part 1: General principles for design
- **EN ISO 13850** – Safety of machinery – Emergency stop function – Principles for design
- **EN ISO 11202** – Acoustics – Noise emitted by machinery and equipment – Determination of emission sound pressure levels at a workstation
- **EN ISO 14120:2015** – Safety of machinery – Guards – General requirements for the design and construction of fixed and movable guards
- **EN 614-2:2000+A1:2008** – Safety of machinery – Ergonomic design principles – Part 2: Interactions between the design of machinery and work tasks
- **EN ISO 14118:2018** – Safety of machinery – Prevention of unexpected start-up
- **EN 61326-1:2013** – Electrical equipment for measurement, control and laboratory use – EMC requirements – Part 1: General requirements

  Application of these standards provides presumption of conformity with the relevant essential health and safety requirements addressed by each standard.

Table of Contents

Introduction i

Thank You i

Symbols i

Service i

Design Modification ii

Additional Copies ii

Safety iii

Required Utilities 1

System Overview 1

General Overview 1

Lens Conveyor 2

Lens Load/Unload 2

Wash process 2

Dry process 4

Coating application 4

Cure process 5

System Operation 6

Start-up Procedure 6

Communication With Lab Management System 7

Priming the Wash System 8

Priming the Coating System 11

Work Feed into the Machine 13

Adjusting the Conveyor Speed 15

Loading Re-Work 15

Blocked Conveyor Exit 16

Recipes 16

How to Use the Recipe System 16

How to Program a Recipe 16

Recovery from Alarm Fault 19

Maintenance 22

Scheduled Maintenance 22

Replacing Consumable Parts 25
Hepa Pre-filter 25
Hepa Filter 25
UV Light bulb and Reflectors 25
Spindle Suction Cups 27
Robot Suction Cups 27
Air Filter Packs 28
Replacing sensors 28
Prox Sensors Index, Spindle Clocking and Lamp Home and Extend 28
Conveyor position proximity sensor 28
Coating sensor 28
UV sensor 28
Conveyor blocked sensor 29
Water sensor 29
Lift cylinder up and down sensor 29
Vacuum Sensor 29
Replacing the Spindle Motor Assembly 29
Replacement/Adjustment of the Robot 180 Degree Actuator 30
Adjusting Speed Settings 30
Conveyor 30
Station Lift Cylinders Up/Down 30
Spindles 31
Lamp 32
Air Regulator Adjustment 33
Replacement/Adjustment of the Conveyor Drive Belt 33
Alarm Codes 34
Alarm Log Files 38
Spare/Replacement Parts 39

Required Utilities

The following facility utilities are required to operate the 54R 2.0. The provisions for these facilities are the responsibility of the customer and are not included in the scope of supply for this machine.

Electrical Power: 220 VAC, single phase, 4-wire (NEMA L14-30), 30 amp circuit.

Compressed Air: 80 psig, 18 cfm. The connection on the machine is a 1/4" quick connect

Deionized Water: Consumption of 7.6 L/hr at periodic rates of 0.3 L/min of deionized water flow rate with ≥ 1 megaohm resistivity. The connection on the machine is 3/8" barbed fitting.

Water Drain: Accessible floor drain required within 30 feet of machine.

Internet Connection

System Overview

General Overview

The 54R 2.0 is the latest back-side hard coat machine from Ultra Optics and represents a state-of-the-art solution for the optical industry. The system's basic functions are based on the highly-touted robustness of our long-running MR3. The MR3 has been reliably coating lenses for over 20 years.

In addition to the MR3's well-proven coating process technology, the 54R 2.0 brings system automation. This innovative system utilizes a robotic arm to automatically load/unload lenses from the trays into the coating machine. Lenses are brought into the machine via standard job trays on a conveyor system. Incoming trays can have a work ticket with a bar code that the 54R 2.0 system will read. The 54R 2.0 will communicate with the LMS system to allow custom coating operations for each job by utilizing customized recipes. Automated loading processes reduce work handling, increase through-put, reduce breakage, and will significantly reduce over-all operating costs.

The yield of the process is improved by incorporating several process improvements, such as:

- **Hot water wash** – using hot water to wash the lens improves the system's ability to remove any contaminants such as dirt, dust or residual polish material. A completely clean lens is a fundamental requirement to obtaining a successful coating application.
- **Water quality monitoring** – our many years of experience have taught us that if the quality of the de-ionized water starts to diminish, so does the effectiveness of cleaning the lens. Rather than wait for evidence of poor water to show up in the form of lens breakage, the 54R 2.0 system continuously monitors the quality of the wash water and alerts the user when problems start to arise. This allows servicing the equipment before the issue gets worse and the production yield goes down.
- **Measured UV light intensity** – the coating applied to the lens will only properly cure if it has received sufficient energy from the UV light source. It is well understood that the intensity of the UV light source diminishes over time. The 54R 2.0 actively monitors this intensity level and will alert the user when the intensity is getting too low to produce reliable curing of the coating.

- **Enhanced compressed air filtration** – a well cleaned lens can quickly be spoiled if it is dried with contaminated air. In order to reduce lens breakage during the drying step of the process, the 54R 2.0 makes use of multi-stage air filtration to deliver ultra-clean air during the drying of the lens.
- **Precise spindle speed control** – the spindle motors on the 54R 2.0 are all controlled with precise digital processes. Each motor contains feedback to the controller which allows the controller to make appropriate adjustments when needed to achieve the desired spin speeds. This improved control will produce consistent results every time.

Lens Conveyor

The front of the 54R 2.0 machine contains an automated conveyor. This section is designed to take incoming trays and feed them into the processing area of the machine. A motor-driven belt is used to advance the trays across the front of the machine. There are several stop locations for the trays to wait, and they are controlled by stop pins mounted beneath the trays. These stop pins are controlled pneumatically by the system PLC. The machine can be configured to run the conveyor for either right-to-left or left-to-right operation as viewed from the front of the machine. The conveyor is uniquely designed to reduce friction, noise and wear on the job trays. When the tray is stopped, the conveyor beneath that individual tray will not be in motion. This unique feature will create less dust and debris, which further helps reduce lens breakages due to pits on lenses.

Lens Load/Unload

Lenses are loaded and unloaded into the machine by making use of a robotic arm. The motion of the arm is controlled by the system PLC. As the system's PLC controls the over-all process, it controls the servo motors of the robot arm through the large servo drives in the control panel. The machine's arm assembly will transport the lens from one processing station to the next (i.e. from the wash station to the dray station, then to the coating station, etc) without any action required from the robot. The 54R 2.0 is able to be configured to process lenses either on or off the block. The lenses are picked and held by use of vacuum pressure at each of the suction cups.

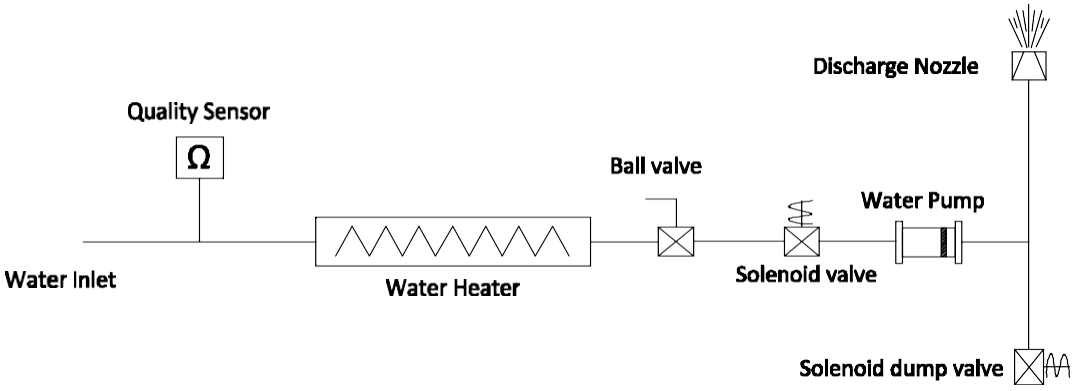
If the 54R 2.0 is configured to run on-the-block, the suction cup is applying vacuum to the block, not the lens directly, reducing the amount of stress on the lens during processing. Further, the mass of the block provides heat dissipation during the curing stage, reducing the temperature of the lens during curing. The benefit of these design considerations is significant reductions in lens warping during processing.

If the 54R 2.0 is configured to run off-the-block, the machine will take the un-blocked lens out of the tray and then place it in a centering device. After the machine centers the lens, the machine will pick the lens again and place it into the processing portion of the machine. This centering action helps provide consistent, quality results. The 54R 2.0 has been designed so that it does not touch the back side of the lens when processing off-the-block lenses.

Wash process

The lens is washed with high pressure, heated deionized water. As shown in the schematic below, the deionized water passes through a water heater where it is heated to approximately 140°F. The hot water then flows through a manual ball valve and a solenoid valve into the pneumatically driven pump. The pump increases the pressure of the water to 2000 psig. The hot, high pressure water is then sprayed through a nozzle onto the back-side of the lens. The lens is spinning during the wash process to help assure a complete

surface cleaning. The spent water is collected in the bottom of the wash bowl and drained through a tube to the pump-out box. At the end of the wash cycle, the water pump stops, and any residual water downstream of the pump is emptied through the dump valve.

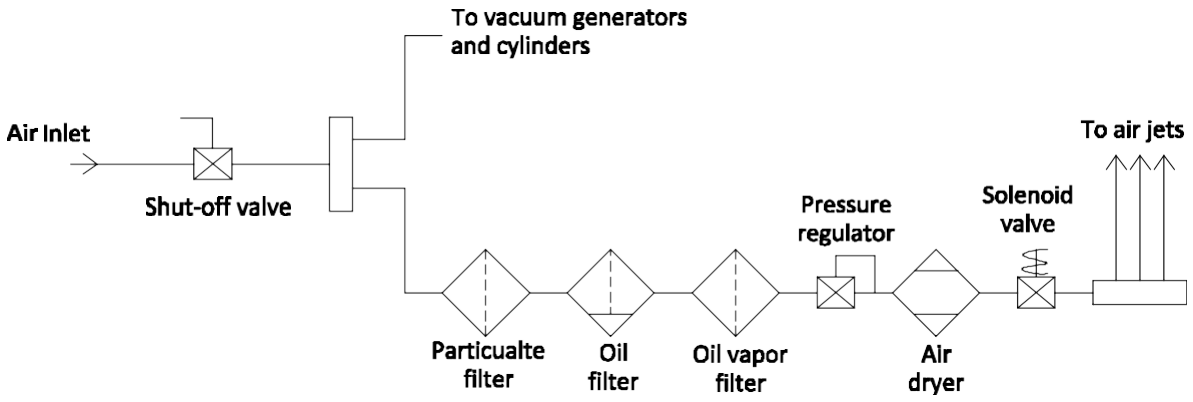


The system PLC actively monitors input from the water quality sensor and all system sequencing to control the water pump and solenoid valves. The temperature of the water is controlled by the machine's PLC by reading a temperature sensor and controlling the heating unit.

Dry process

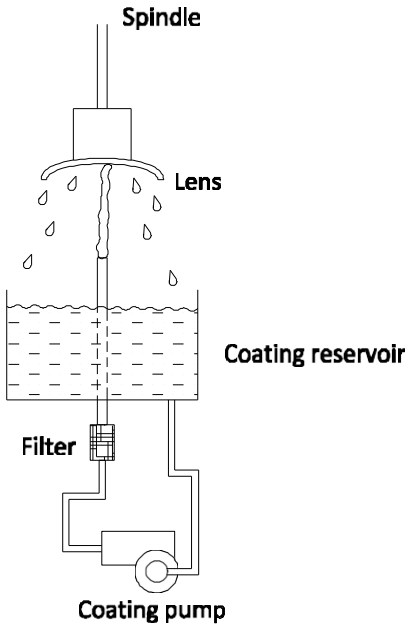
After the wash process is complete, the machine will transport the lens to the drying station. The lens is dried by use of clean, compressed air. In the drying station the air nozzle is articulated in a manner that ensures a complete drying of the entire lens surface. Similar to the wash process, the lens is spun while in the drying station to help remove all of the water.

As shown in the diagram below, the air that is used for drying the lens passes through several filtration and drying stages to obtain the clean and dry air that is used for the drying process. The timing of the drying process is controlled by the system PLC.



Coating application

With the lens down in the coating application station, the coating pump draws coating material from the reservoir and pumps it through a filter, up to the surface of the lens. The lens is being spun during the time of application to ensure a sufficient amount of coating is applied to the entire surface. After the coating has been applied, the pump will stop and the spin speed of the lens changes to a new value which will generate the proper film thickness of coating. The timing and spin speeds are controlled by the system PLC. This process is shown schematically in the following diagram.



The 54R 2.0 utilizes two independent coating application systems. This allows utilizing two different coatings in one machine. In many applications, this can eliminate the need for two different coating machines. This versatility can be used to process tintable coating on jobs that will be tinted, and non-tintable coating on jobs that will not be tinted or will be later coated with anti-reflection (no glare) coating. This could also give the opportunity to utilize a specialized coating such as anti-fog, etc. The system will apply the applicable coating by utilizing the recipe system and LMS integration.

Cure process

The 54R 2.0 is designed to cure Ultra Optics' line of UV-based coatings. After the lens has completed the coating application cycle, the arm assembly will index and then drop down into the curing station. An ultra-violet lamp resides in the curing station. The radiation energy from this lamp is used to effectively cure the coating to the lens with the proper characteristics of adhesion, hardness, etc. The PLC monitors and controls the intensity of the lamp and the timing of the curing process based on the known performance and requirements of Ultra Optics' coatings.

WARNING! **An extremely intense ultraviolet light source is used to cure the coating on the lenses. Service work should not be performed on the 54R 2.0 while this lamp is energized. Direct exposure to the lamp could result in severe or permanent vision loss.**

WARNING! **The ultraviolet light source produces extreme temperatures. Any work on the machine should be done after the ultraviolet lamp has been turned off and sufficient time has passed for it to cool. Leaving the lamp turned on causes risk of burning and injuring the employee.**

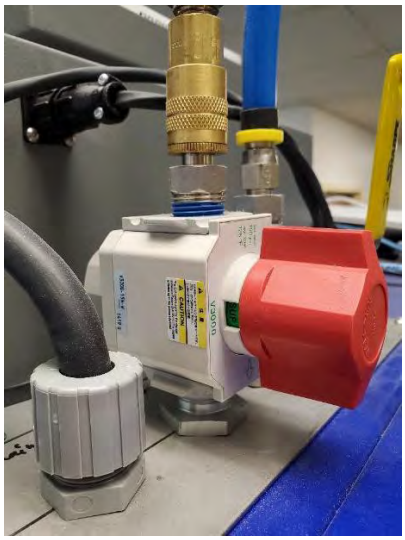
WARNING! **Do NOT use alcohol of any kind to wipe/clean the machine with the ultraviolet lamp turned on. The extreme temperatures of the lamp could cause the alcohol to ignite and start a fire.**

System Operation

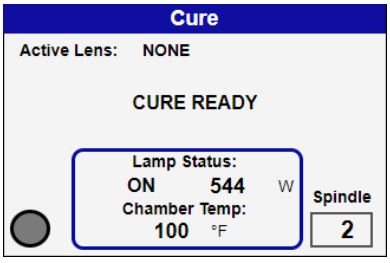
Start-up Procedure

The following procedure should be followed after the 54R 2.0 has been shut-down, but not completely powered down. An example of this situation would be when the machine has been shut-down at the end of the day. This procedure does not apply to the first time the machine is powered-up. Specifically, the following procedure should be followed the next time the system is to be run after it was previously shut-down by turning off the air supply and pressing the Power button near the touchscreen.

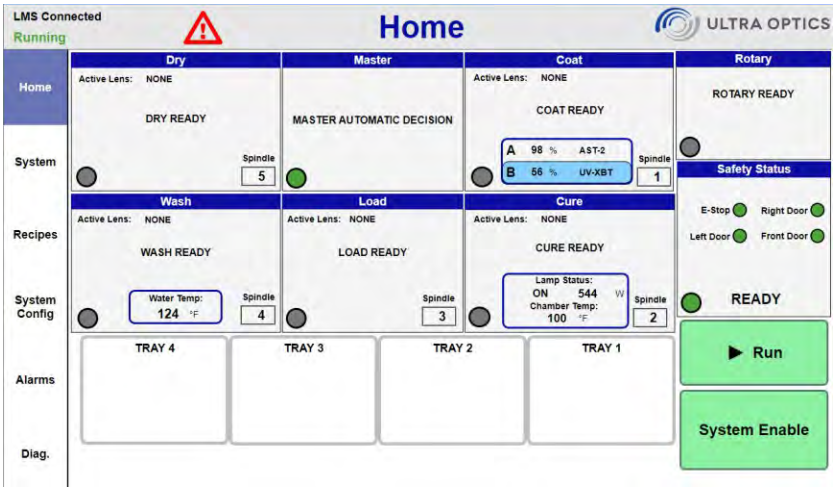
1. Perform all of the daily activities listed in the Scheduled Maintenance section of this manual.
2. Turn on the air supply to the machine. As shown in the photo below, the red handle should be aligned with the direction of air flow.



3. Push the power button to “ON” at the Operator Interface Terminal (OIT).
4. Allow the controller to turn on and configure itself. This may take 1-2 minutes.
5. When able, touch the “System Enable” button. This will cause the machine to do a homing sequence. When the sequence is complete, the “System Enable” button will turn green.
6. Confirm the coating height is properly set.
7. Ensure that the UV lamp has successfully ignited and is on. The HMI should show Lamp Status: ON and “CURE READY” as shown below:



8. Touch the “Run” button. When “Run” mode has successfully activated, the button will turn green as shown below:



9. Begin feeding trays to the system.



Communication With Lab Management System

The 54R 2.0 is designed to integrate into the lens manufacturing system by communicating with the Lab Management System (LMS). Each job tray will have a work ticket containing a barcode. As the tray enters the 54R 2.0, the barcode on the ticket will be scanned. Once the bar code is scanned, the 54R 2.0 controller will communicate with the LMS software to determine how the job should be processed. After passing the job identification number to the LMS, a code which resides in the CPID field will be returned to the 54R 2.0. This code will then determine if the 54R 2.0 should simply wash and dry the lens, or if it should also apply and cure the back-side hard coat.

The 54R 2.0 communicates with the LMS via an Ethernet cable. It is suggested to use a cat6 cable. The cable should connect to the connector on the top of the machine, as shown in the picture below:



It is necessary for the Lab Manager to ensure the CPID field is being populated for all jobs running through the 54R 2.0. If there is not a code in this field, the 54R 2.0 will not be able to automatically process the job. The machine will produce an error and the user will have the opportunity to tell the machine to process that job with a default recipe, or they can remove that tray and resume with the next tray.

The codes to be used are as follows:

CPID Code	54R 2.0 Action
0 (or no code returned)	Error
1	Pass the lenses through the system untouched by 54R 2.0
2	Wash and dry the lens, do not apply coating
3	Wash, dry and coat the lens
XX (any 2-digit code)	Process that job according to the parameters stored in the controller saved as the same recipe number (see section regarding recipes).

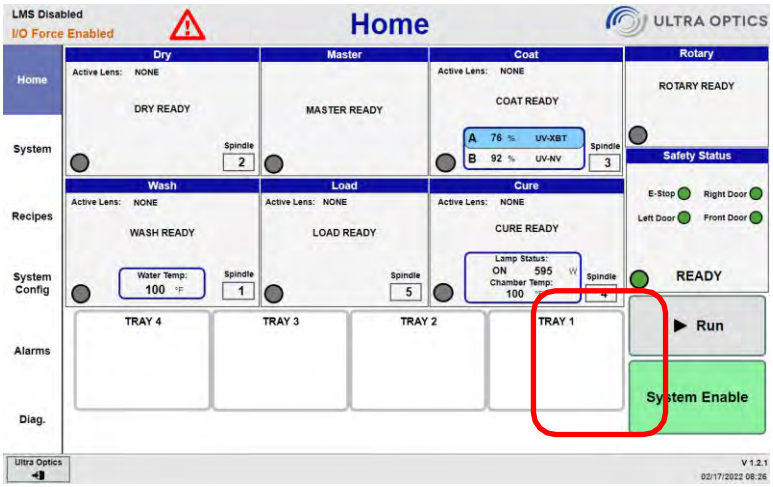
Priming the Wash System

From time to time, it will be necessary to prime the wash system. This does two things, first, it helps ensure all of the air has been removed from the water line so that the wash pump is successfully pumping water to clean the lens and not cavitating due to air bubbles in the system. Second, if there are any impurities in the water system, running the wash prime function for a while can help purge the contamination out of the system.

Note that this process is only done with an off-the-block lens. If the 54R 2.0 is running in on-the-block mode, the wash prime function will be done with a de-blocked lens.

The following procedure should be used to prime the wash system:

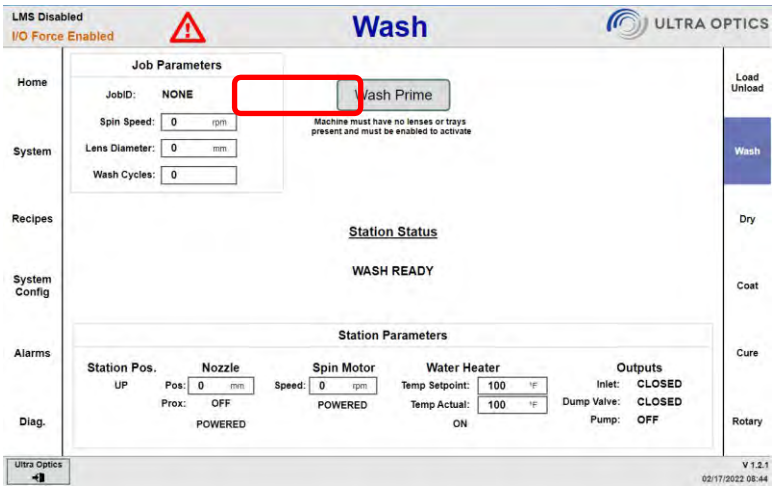
1. Make sure there aren't any job trays on the conveyor in the machine.
2. On the Home screen, make sure the system is enabled. If the "System Enable" is not green, press it and make sure it turns green. Also make sure that the system is NOT in "Run" mode. The "Run" button should not be green. If the "Run" button is green, press it again to turn it grey as shown below.



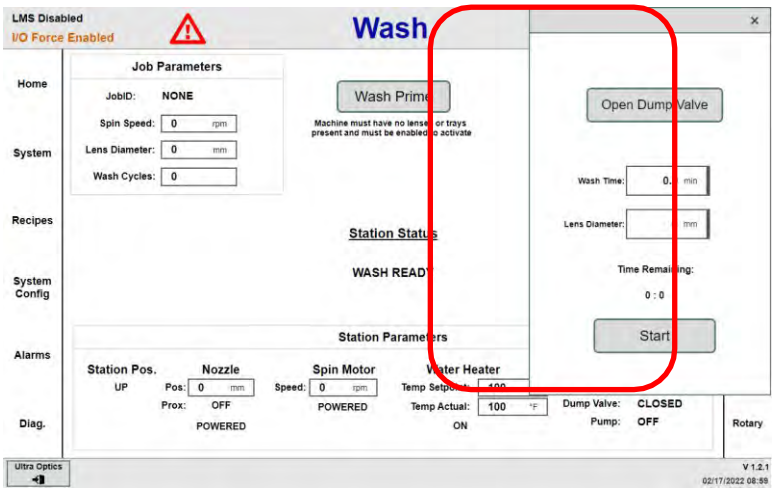
3. From the Home screen, select the “Wash” module by touching in the box



4. In the Wash screen, select “Wash Prime”



5. In the Wash Prime screen:
    a. Enter the duration of time to run the wash prime, in minutes
    b. Enter the diameter of the lens that will be used during the wash prime
        i. Note that this lens should not be a production lens as the wash prime will likely damage the lens surface. It is suggested to use an inexpensive or scrap lens for this process.



6. Select the “Start” button on the Wash Prime screen.
7. Place a test lens (off the block) into the tray with the backside of the lens facing down into the tray.
8. Place the tray with the test lens onto the inlet conveyor of the machine.
9. The wash pump should cycle (“beat”) at a rate that is approximately 70 “beats” per minute. If the pump is cycling significantly faster, it is likely that the pump is not getting water. In that case, press and hold the “Open Dump Valve” button for about five seconds. After releasing the “Open Dump Valve” button check to see if the wash pump returns to a rate of about 70 beats per minute.
    a. Repeat this Dump Valve procedure as often as required to get the wash pump to prime.
10. The machine will continue to pump water through the wash system for the duration of the timer. When the time has elapsed, the machine will place the lens back in the tray.
11. Close the Wash Prime screen by touching the X in the upper right corner.
12. Go to the Home screen and touch the “Release Tray” button.

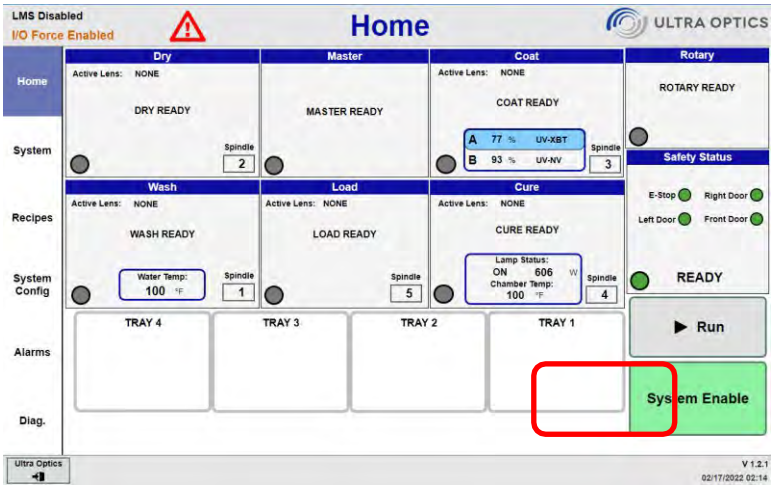
Priming the Coating System

From time to time, it will be necessary to prime the coating system. This can occur after changing the coating filter, or any time there is air in the coating tube lines, etc. This helps ensure a good flow of coating lacquer is getting onto the lens.

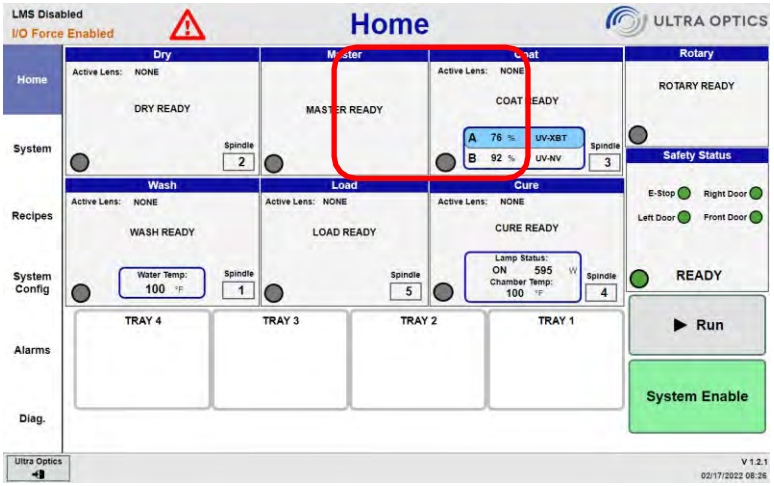
Note that this process is only done with an off-the-block lens. If the 54R 2.0 is running in on-the-block mode, the wash prime function will be done with a de-blocked lens.

The following procedure should be used to prime the coating system:

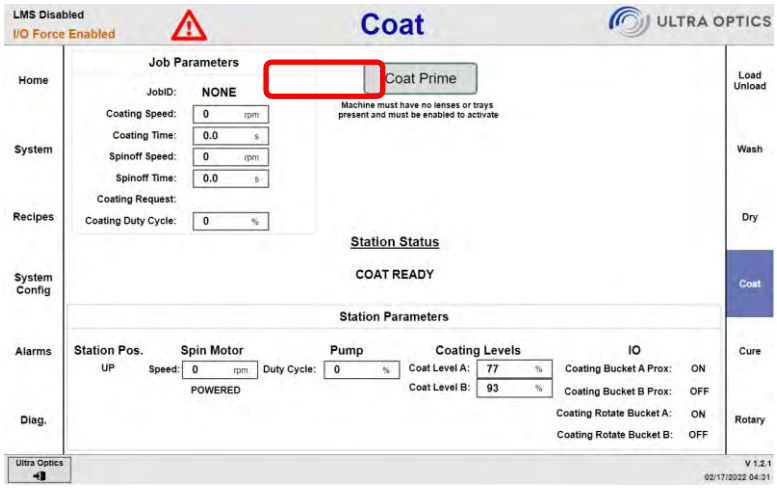
1. Make sure there aren't any job trays on the conveyor in the machine.
2. On the Home screen, make sure the system is enabled. If the "System Enable" is not green, press it and make sure it turns green.



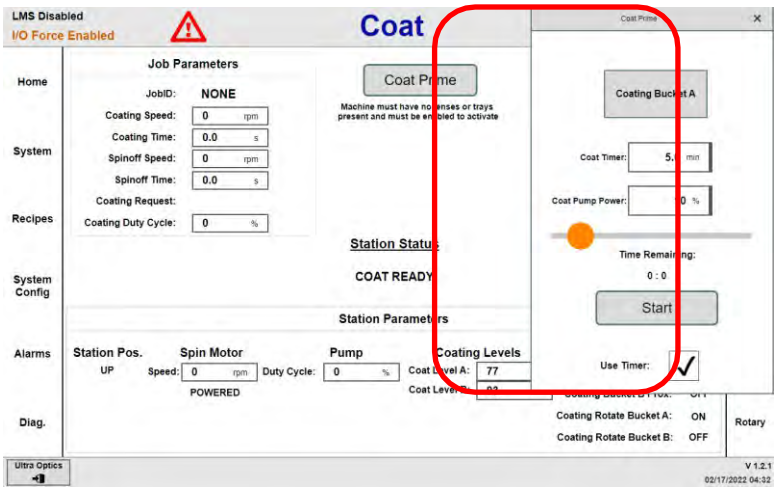
3. From the Home screen, select the “Coat” module by touching in the box



3. Select “Coat Prime”



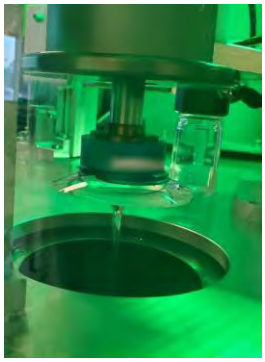
4. In the “Coat Prime” window, enter the following information (see picture below):
    a. Which coating reservoir to prime, A or B
    b. If you wish to have the machine automatically stop the process after a certain period of time:
        i. Check the box “Use Timer”
        ii. Enter the length of time, in minutes, to run the coating pump
        iii. If you don’t do this, the coating pump will run continuously until stopped manually.
    c. Adjust the coating pump power by touching and entering a value in the box, or by moving the orange slider.
        i. It is suggested to start this at a low level such as 10%. Then observe the height of the coating stream. Based on the resulting height, use the input box or the orange slider to adjust the coating pump power to achieve desired height.



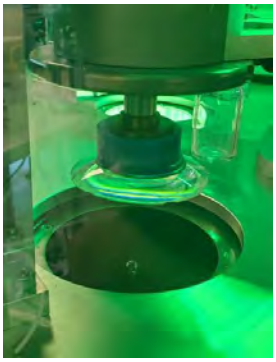
5. The lens will not drop down into the coating station, it will remain up so that you can look through the window of the machine and see the coating height.
6. Adjust the Coat Pump Power so that the coating height comes to the top of the bowl.



(Coating too low)



(Coating too high)

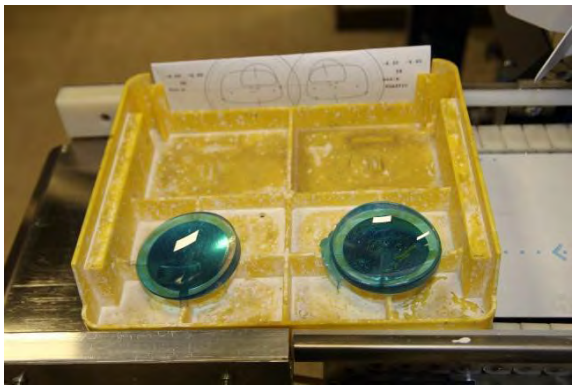


(Coating level good)

7. When the coating pump stops, the machine will index the lens to the cure station and will cure whatever coating may have gotten on the lens.
8. The lens will not be returned to the tray. The machine will hold the tray until the user releases it by selecting the release button on the touch-screen.
9. Repeat this procedure for the other coating bucket if both are being used.

Work Feed into the Machine

Work will be fed into the machine in the standard job trays. The blocked lenses need to rest in the tray with the backside (concave) facing up, and the block properly nested in the tray. If the machine is running off the block lenses, the lenses must be concave (back) side down and must be within the round “pockets” of the tray. The tray needs to have the work ticket in place by double-folding it and placing it into the tray as shown in the following picture:



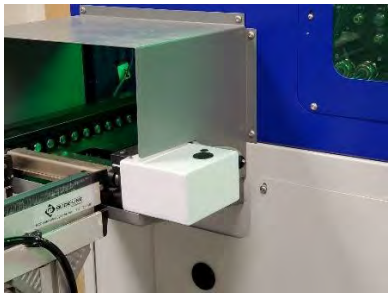
The work ticket/paperwork needs to be in the tray, double folded with the bar code facing away from the lenses. If the paperwork is not double folded, it will interfere with the robotic arm and be dislodged from the tray. If the bar code is facing the wrong direction, the system will not be able to properly process the work.



The conveyor on the front of the 54R 2.0 will pull trays into the machine as space permits. The system controller will monitor the presence of trays and allow them to move forward by actuating stop pins located on the bottom of the conveyor.

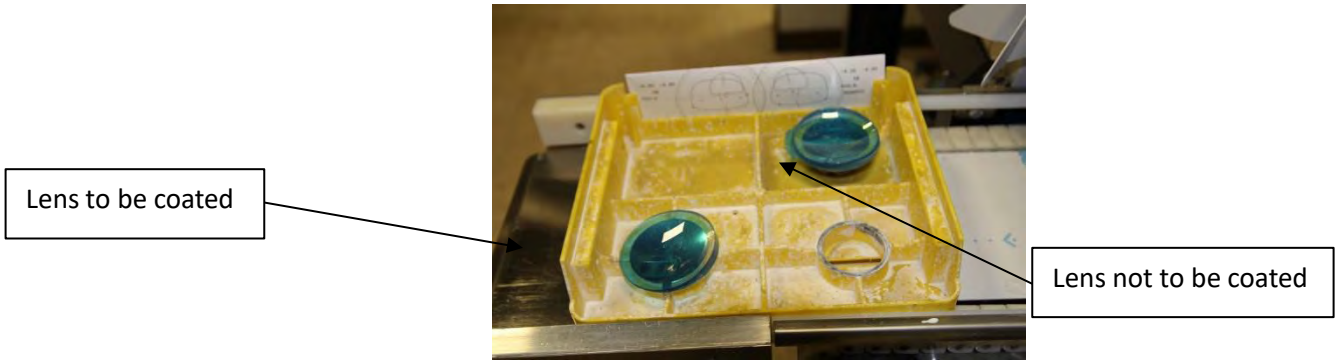
Adjusting the Conveyor Speed

The speed of the conveyor can be adjusted to go faster or slower. Keep in mind that it is not necessary for the conveyor to go very fast. To adjust the speed, located the small white metal box on the end of the conveyor, outside of the machine. There are two round, black plastic plugs on the bottom side of the box (they are just like the black plugs found on the top side of the white box). Remove the smaller of the two plugs on the bottom. With a small potentiometer screwdriver, adjust the speed by turning the potentiometer to the right (clockwise) to slow the conveyor down, or turn it to the left (counter-clockwise) to increase the speed of the conveyor.



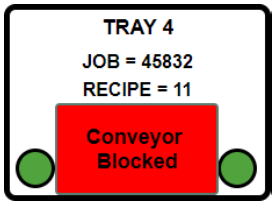
Loading Re-Work

If the need arises to coat just one lens out of a pair on a particular job, simply place the lens that does not need to be coated onto the opposite side of the tray and keep the lens that does need to be coated in one of the standard locations on the tray as shown in the following picture. This allows the processing of a single lens from a pair, without the two lenses being physically separated and risk of misplacement.



Blocked Conveyor Exit

The 54R 2.0 has a sensor to detect if the exit conveyor is blocked. When this happens, the controller will give a warning for the operator. That warning will look like this:



There is no need to do anything on the controller, or acknowledge an alarm. Simply resolve the blocked conveyor condition and the red alert on the screen will go away. It is important to note that the machine will stop processing additional jobs until this condition is resolved.

Recipes

How to Use the Recipe System

The 54R 2.0 utilizes a recipe system for the processing of each job. This method allows users to process each job in a manner that is optimized for the desired results without needing to sort the work and utilize multiple machines. Individual recipes can be created and stored which define which coating to apply, adjust the coating thickness for optimized tinting or AR, adjust the cure power and time, etc. The recipe system can also be used to tell the machine to only wash the lenses, but not apply coating, or even to just allow the job to pass through the machine without any action to the lenses.

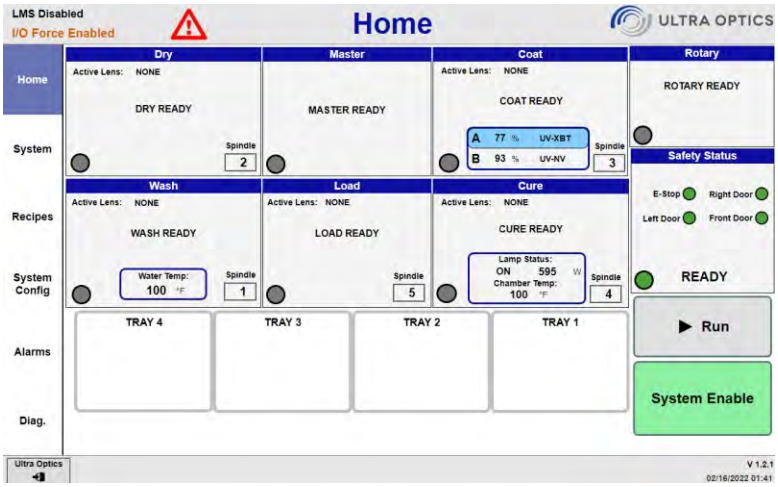
To utilize this system, first make sure that the 54R 2.0 has successfully been connected to your network and your LMS system. The recipe system cannot operate without communication with the LMS system. Next, create and save a recipe in the 54R 2.0 machine controller per the procedure shown below. Next, enter the recipe number into the CPID field of your LMS system for those jobs that should be processed according to that recipe definition.

When the job trays come to the infeed of the 54R 2.0, the barcode scanner will read the barcode on the job ticket. The 54R 2.0 controller will then communicate with the LMS system and retrieve the CPID field associated with that job number. When the lenses from this tray are loaded into the processing modules of the machine, it will utilize the specific parameters as defined in the recipe when processing those specific lenses. The next job tray that enters could well have a different CPID/recipe number and the machine will adjust in real time to those process parameters.

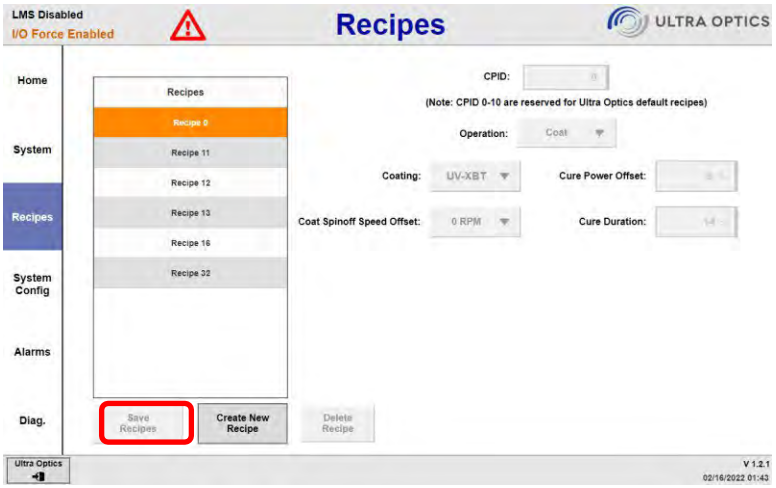
How to Program a Recipe

The following procedure should be used to create/program a recipe into the controller:

1. From the Home screen, select the “Recipes” button on the left side of the screen



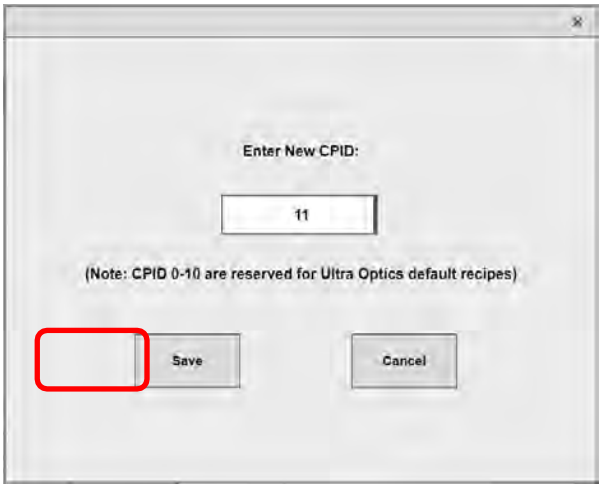
2. Select the “Create New Recipe” button near the bottom of the screen



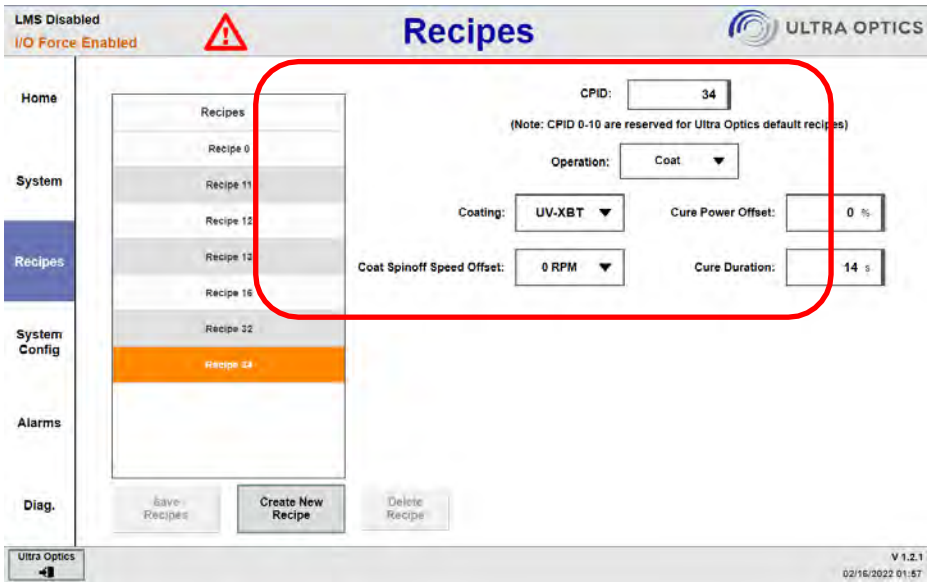
3. Enter a new CPID/recipe number in the white box shown below:
    a. Number must be two numerical digits, greater than 10
    b. Do not pick a number that has already been used
    c. Note that the CPID/recipe number that is selected here will need to be the same value as used in the CPID field of the job record in the LMS.



4. Press the “Save” button


Enter New CPID:
11
(Note: CPID 0-10 are reserved for Ultra Optics default recipes)
Save
Cancel

5. Define the recipe parameters



   a. Operation
      i. Coat – if selected, the lenses for this job will be washed and coated
      ii. Wash – if selected, the lenses for this job will be washed and dried, but will not be coated
      iii. Pass through – if selected, the 54R 2.0 will not do anything to the lenses and just let the tray pass through
   b. Coating – select which coating to be applied to that job.
      i. If you select a coating that is not currently in the machine, the machine will error/alarm whenever a job calling for this coating comes to the machine.
   c. Coat Spinoff Speed Offset – from the list, select the increase/decrease in spin-off speed to use for this job. Generally, increasing the spin-off speed tend to reduce the resulting coating thickness and decreasing the spin-off speed will tend to increase the resulting coating thickness.
      i. Example – if the “Coat Spin off Speed” is set to 2,000 RPM on the “System Config” screen, and the “Coat Spinoff Speed Offset” is set to -200 RPM here, then the machine would use a spinoff speed of 1,800 (2,000 – 200) RPM for this particular job.
   d. Cure Power Offset – enter the amount of increase/decrease to use for the UV cure power.
      i. Example – if the “Cure Percent” cure power is set to 60% in the System Config Screen, and in this recipe the value of 5% is entered in the “Cure Power Offset”, then the machine will increase the power to 65% while curing the lenses for this job. Similarly, if the value of -5% is entered here, then the machine will decrease the power to 55% while curing the lenses for this job.
   e. Cure Duration – enter the amount of time, in seconds, for the cure process
6. When all of the parameters have been entered/selected, the select the green “Save Recipes” button in the lower left portion of the screen.

Recovery from Alarm Fault

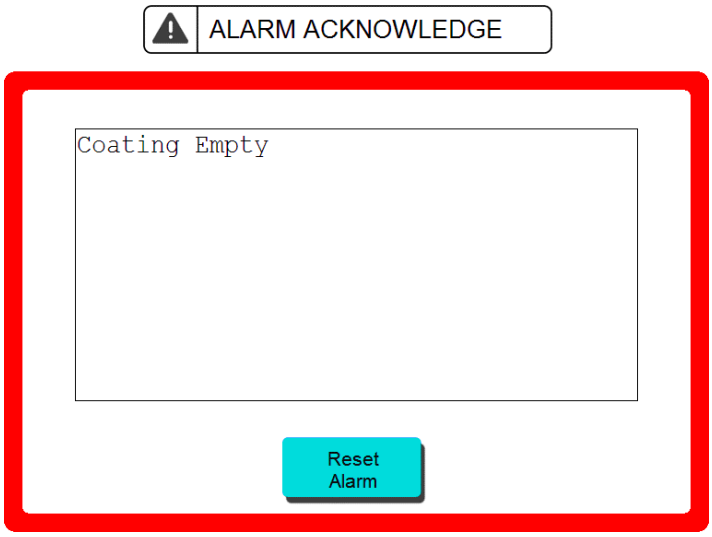
From time to time, the machine may go into an alarm or warning state. Some of the alarms are more serious than others. When an alarm condition exists, the controller will have an indicator on the home screen that looks like this:

You can view details about the alarm by either pressing the red icon at the top of the screen, or selecting the “Alarms” tab on the left side of the screen.

Once the alarm log is opened, additional details about the alarm (if available) will be seen on the bottom-half of the screen by selecting the alarm in the top half of the screen.

The following procedure should be followed if the system experiences an alarm condition that causes the machine to stop processing lenses:

1. Press Reset Alarm



2. If lens is still on the robot, open door and grab the lens.
3. Press the Robot Vacuum button and this will release the lens on the robot suction cup

Maintenance

The 54R 2.0 system is designed to provide many years of reliable and efficient processing of ophthalmic lenses. Its ability to provide this service is significantly enhanced with proper maintenance. Due to the many integrated systems within the 54R 2.0, it is highly recommended that service and maintenance is only done by trained technicians. Failure to do so could result in damaged equipment, increased down time, or injury of personnel.

Scheduled Maintenance

The following table should be used as a guide for performing regular preventative maintenance on the 54R 2.0 to maintain ultimate system efficiency and up-time. It is expected that the user of this machine is capable and performs the following maintenance items at the scheduled intervals.

Frequency	Maintenance Item	Description
Daily	Wipe wash and bowls and bowl deck.	Dampen a clean cloth with Ultra Optics ClearView lens cleaner and wipe and clean. **WARNING Turn ultraviolet lamp off and allow machine to cool before cleaning with any flammable material such as IPA or others.**
	Wipe inside of coating bowl	Use a lint-free rag dampened with acetone or IPA to wipe out the inside of the coating bowl and clean the screen.
	Empty drain tee and clean screen	On bottom of wash bowl is a tee trap. Remove the bottom plug and clean out any debris from the trap.
	Check coating level in reservoir	Refill as needed.
	Check coating fountain height	Fountain should come up to the top edge of coating bowl.
	Confirm wash pump is properly primed	During a wash cycle, count the number of audible “beats” by the wash pump. It should “beat” 30 - 35 times.
	Wipe any sensors	Use ClearView to wipe clean: barcode reader, photo eyes, etc.

Weekly	Inspect suction cups for debris or deterioration	Replace as necessary
	Check UV lamp hours and/or output	Replace at 1,000 hours, or low output.
	Check air pressure regulator	Both regulators should be adjusted to read 80 psig.
	Clean out top Hepa filter housing	Turn machine off before cleaning. Replace top pre-filter as needed • P/N 3923T999
	Check vacuum pressures of all spindles	Go to *Vacuum Diagnostic* screen on HMI.
	Inspect complete vacuum chuck assembly for dried coating or debris	Clean as needed.
	Confirm all fans are operable	Check two HEPA blowers as well as the two fans on UV light box.
	Clean pump-out box	Make sure there is no debris inside as this can cause damage or cause the water to over-flow.
	Check air dryer filters	Replace all three if: • needle points to “change” • filters are moist/dirty • every six months
Bi-Weekly	Replace coating filter	P/N 4404
	Wipe down robot arm	Use Ultra Optics ClearView cleaner
	Change HEPA pre-filters	P/N 3923T999
	Inspect vacuum jars on rotary	Empty/clean as necessary
Monthly	Flush coating reservoir and bowl	Use IPA[2] for first flush and then use acetone for final rinse.
	Inspect and replace suction cups as necessary	• Robot (blue) P/N VC-32W 1/8MPT • On the block spindle (yellow) P/N VC-415 5/8-18 • Off the block spindle (blue) P/N
	Inspect and replace spindle pin o-rings as necessary	There are four o-rings in each engagement pin hole of each spindle. 
	Ensure positive air flow	Hold tissues over openings and confirm the tissue blows out, away from the machine. Hepa fans should be on high setting at all times.
	Lubricate spindles	

[2] Certain coating materials may not be compatible with IPA. Be sure to check coating bottle label.

Yearly	Replace HEPA filters	P/N 1470
	Replace air dryer filter pack	
	Inspect and clean UV light box	**WARNING Be sure power to the machine is turned off and the UV light box has had 15 minutes to cool down before opening. Do not use flammable cleaners in this area.**
3-4 years	Change robot battery	Comau #**CR19220009**

Replacing Consumable Parts

It is expected that the user be capable of changing out the following consumable parts.

Hepa Pre-filter

CAUTION: Do not stick hands down into the blower/filter assembly. If the machine's power is on, the blower will be spinning and could cause injury!

1. Replace with new filters monthly.
2. Pull old filter straight out of the top of the machine.
3. Place new filter into housing with the direction of air flow pointing down into the machine.

Hepa Filter

1. Disconnect power cable from filter unit to the top of the machine
2. Remove filter unit from machine
3. Remove 4 self-tapping screws holding filter onto filter unit
4. Place sealing foam around top edge of new HEPA filter
5. Place filter unit on top of new HEPA filter
6. Screw in self-tapping screws through filter unit into new HEPA filter
7. Place filter unit into machine
8. Connect power cord to top of machine

UV Light bulb and Reflectors

1. Remove left-side lower machine panel (outlined in red below) to gain access to the main power disconnect switch.



2. Rotate disconnect switch to the "OFF" position to remove power from machine.
3. Follow proper Lockout-Tagout procedures.

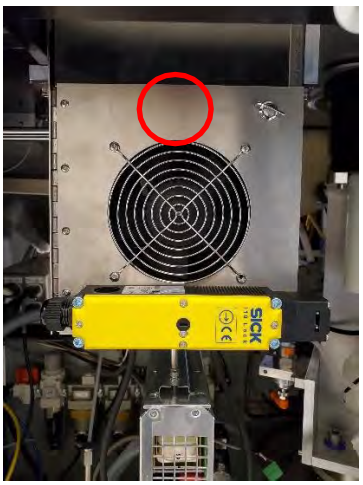


WARNING!: **It is highly recommended to follow proper lock-out/tag-out procedures to ensure safety while changing the UV light bulb and/or reflectors.**

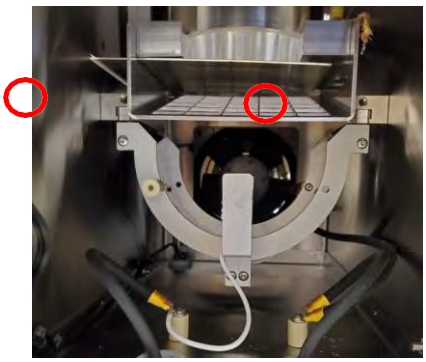
4. Remove right side lower panel from machine.
5. Wait five minutes to allow for UV assembly to cool down.

CAUTION: The UV box and assembly will be very hot when the machine is running. Take care to allow time for these parts to cool down and not be burned. It is advised to wear protective gloves.

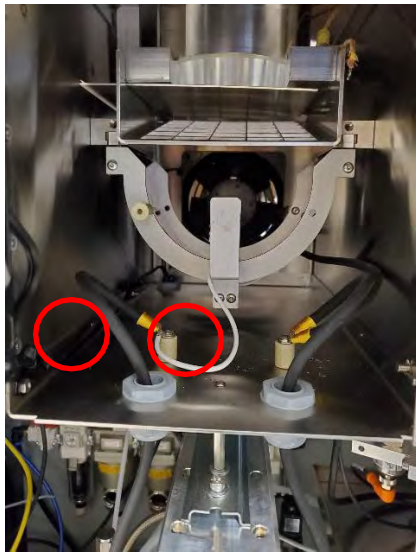
6. Open the cure station door by rotating the knob (circled in red below) and pulling the door open.



7. Remove the two mounting screws. (Screws have been removed in the image below):



8. Remove the two screws circled in red below. This should disconnect the wires and allow the lamp and reflector assembly to be removed.



9. Pull the lamp and reflector assembly straight out of the machine and take the assembly to a work bench.
10. Insert new light module
11. Insert mounting screws into new light module
12. Close cure station door
13. Attach light side panel to machine

Spindle Suction Cups

1. Put machine into manual mode
2. Enter manual control screen
3. Index spindles until the one you want to change is over the drying station
4. Open water side door
5. Hold clocking trip dog at top of spindle and unscrew bad suction cup
6. Screw on new suction cup
7. Tighten disc and coupler
8. Close water side door
9. Index spindles until the next suction cup to be changed is over the drying station
10. Repeat steps 4 through 8 until all suction cups are changed

Robot Suction Cups

1. Put machine into manual mode
2. Enter “robot controls” screen
3. Press “Rbt. Motor” button to turn on motor
4. Press “cup change” button
5. Open water side door
6. Unscrew bad suction cup from robot actuator
7. Screw new suction cup onto robot actuator
8. Close water side door
9. Press “home” button
10. Press “Rbt. Motor” button

Air Filter Packs

1. Turn air to the machine off
2. Press up on the bottom of the air filter canister and turn clockwise
3. Unscrew plastic retainer at the base of filter and remove old filter
4. Install new filters marker “DX” “BX” “000” in this order
5. Screw on plastic retainer
6. Reattach air canister pressing up and turning counter clockwise

Replacing sensors

Prox Sensors Index, Spindle Clocking and Lamp Home and Extend

1. Disconnect Signal cable
2. Loosen jam nut
3. Unscrew sensor
4. Replace with new sensor and jam nut
5. Adjust sensor depth until it is 2mm away from flagging mechanism
6. Tighten jam nut
7. Reconnect signal cable

Conveyor position proximity sensor

1. Two people need remove front cover of machine
2. Remove the 12 screws holding the conveyor plate to the spacers
3. Disconnect Signal cable
4. Loosen jam nut
5. Unscrew sensor
6. Replace with new sensor and jam nut
7. Adjust sensor depth until it is 2mm away from flagging mechanism
8. Tighten jam nut
9. Reconnect signal cable

Coating sensor

1. Disconnect signal cable
2. Mark the position of the top and bottom of the sensor on the coating reservoir
3. Cut zip ties and bad remove sensor
4. Loosely attach new sensor with zip ties
5. Attach signal cable
6. Slide sensor to top of coating bowl above the coating in the reservoir
7. Press in left button and hold for 3-5 seconds until the light flashes twice
8. The light should be off when you release button
9. Slide sensor down to the marks made before removing bad sensor DO NOT tighten zip ties at this point
10. The light on the new sensor should turn on when it is in position
11. Check the input on the touch screen for a check mark
12. If there isn’t a check mark start over at step 6
13. When there is a check mark tighten zip ties

UV sensor

1. Remove screw that holds bracket to cure tube
2. Disconnect signal cable

3. Remove screw that hold bracket to sensor box
4. Replace with new sensor box
5. Attach to cure tube
6. Return bad sensor and box to Ultra Optics
   THERE IS A CORE CHARGE FOR THIS SENSOR AND BOX

Conveyor blocked sensor

1. Disconnect signal wire
2. Remove bad sensor from bracket
3. Attach new sensor
4. Do not adjust dials on this sensor

Water sensor

1. Turn off water
2. Disconnect power and signal cables to the sensor
3. Unscrew nut at base of sensor DO NOT REMOVE coupler from metal tee
4. Remove bad sensor
5. Install new sensor and hand tighten nut at base of sensor do not over tighten
6. Connect power and signal cables
7. Turn water on

Lift cylinder up and down sensor

1. Make a mark on the lift cylinder at the top and bottom of bad sensor
2. Disconnect signal cable from sensor
3. Loosen set screw on sensor
4. Slide bad sensor to the bottom of groove to remove bad sensor
5. Insert new sensor and slide into position between markings
6. Tighten set screw on sensor
7. Reconnect signal cable

Vacuum Sensor

1. Disconnect air tubes going into sensor
2. Disconnect signal cable
3. Connect signal cable to new sensor
4. Connect air tubes to new sensor
5. Program sensor as per instructions

Replacing the Spindle Motor Assembly

1. Remove the suction cup.
2. Disconnect the spindle motor power cable from the back of the spindle.
3. Disconnect the vacuum tubing from back of the spindle.
4. Loosen the bolt on the front tip of the spindle swing arm.
5. Pull old assembly out through the top of the arm.
6. Remove the vacuum elbow.
7. Reattach the vacuum elbow onto the new assembly.
   a. Add Teflon tape to threads if needed.
8. Slide the new assembly in to the arm making sure to line up the bottom of the vacuum elbow with the bottom of the spindle swing arm.
9. Tighten the bolt on the front tip of the spindle swing arm.
10. Reconnect the vacuum tubing to the back of the spindle.

11. Reconnect the spindle motor power cable on the back of the spindle.
12. Reattach the suction cup.

Replacement/Adjustment of the Robot 180 Degree Actuator

1. Turn off machine power and air.
2. Remove the sensor retaining thumb screw.
3. Label and unplug both sensors.
4. Label and unplug both orange air lines.
5. Remove both flow control elbows.
6. Remove the four bolts on the top of the actuator mounting bracket.
7. Loosen the four bolts on the suction cup tool to separate the tool from the actuator.
8. Slide the new actuator into the suction cup tool and retighten all four bolts.
9. Align the actuator into the mounting bracket and reinsert all four bolts.
10. Reinstall both flow control elbows.
    a. Add Teflon tape on the threads if needed.
11. Reattach both orange air lines according to how they were labeled.
12. Reattach both sensors according to how they were labeled.
13. Lock sensors in place by reattaching the retaining thumb screw.
14. Turn machine power and air back on.
15. Use the two flow controls elbows to adjust the speed of rotation if needed.

Adjusting Speed Settings

Conveyor

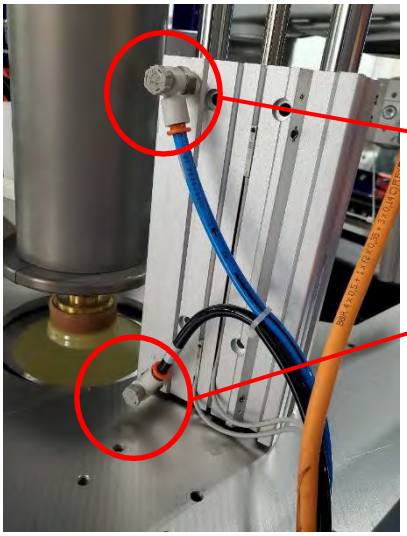
1. Put machine into manual mode
2. Enter “manual Control” screen
3. Remove small access panel from water side panel
4. Locate conveyor potentiometer
5. Press “Conveyor” button to turn on conveyor
6. Turn potentiometer clock wise to increase speed counter clockwise to decrease speed
7. Press “Conveyor” button to turn off conveyor
8. Attach small access panel to water side panel

Station Lift Cylinders Up/Down

Each station (wash, dry, coat, cure) has its own lift cylinder. Each cylinder can have the up and down speed adjusted to be faster or slower. The speed of the cylinder travel is controlled by “speed valves” that control how fast air pressure enters the cylinder. Each cylinder has two speed valves, one that controls the speed of the cylinder going up and one that controls the speed of the cylinder going down (see photos below). The lower speed valve controls the speed of the cylinder going up, and the upper speed valve controls the speed of the cylinder going down.



(Lift cylinder)



(Close up)

For optimum performance, the speed valves should be adjusted so that the cylinders take 1-2 seconds to travel.

Each of the speed valves has a locking cap that needs to be pulled out (away from the cylinder) to allow the valve to be turned/adjusted. When the cap is pushed in, it locks it in place so that it doesn't get turned accidentally. The bottom speed valve (closest to the deck of the machine) controls the speed of the cylinder going up, and the top speed valve controls the speed of the cylinder going down.

To adjust the speed of the cylinder going up, pull the cap out on the lower speed valve and turn the valve/cap clockwise to reduce the speed, or turn the valve counter-clockwise to increase the speed. When the desired speed has been achieved, push the locking cap back down (towards the valve and cylinder) to lock it into place.



To adjust the speed of the cylinder going down, pull the cap out on the upper speed valve and turn the valve/cap clockwise to reduce the speed, or turn the valve counter-clockwise to increase the speed. When the desired speed has been achieved, push the locking cap back down (towards the valve and cylinder) to lock it into place.

Spindles

1. Remove small access panel on left side of the 54R 2.0 and locate the wash, coat, and spin off potentiometers.

2. On the touchscreen, press the Diagnostics tab.
3. Turn on Manual Controls.
4. Press the Spindle RPM Controls menu button.
5. Press the Index 90 degree till the desired spindle is over the Drying bowl.
6. Attach a small sliver of reflective tape on to the suction cup.
7. Turn on the Spindle Coat option for the spindle being tested.

8. Use the tachometer to test the Coat speed for 400 RPM
9. If adjustment needs to be made, use adjustment knob in right panel labeled Coat.
10. With the Spindle Coat option still on, turn on Coat Spin Off.
11. Use the tachometer to test the Coat Spin Off speed for 2000 RPM for UN-NV coating or 1600 RPM for AST-1 coating.
12. If adjustment needs to be made, use adjustment knob in right panel labeled Coat Spin Off.
13. Turn the Coat Spin Off option off.
14. With the Spindle Coat option still on, turn on Wash Speed.
15. Use the tachometer to test the Wash Speed for 1800 RPM.
16. If adjustment needs to be made, use adjustment knob in right panel labeled Wash.
17. Turn off Wash Speed.
18. Turn off Spindle Coat.
19. Repeat for each spindle.
20. Note that when making a change on one spindle with the adjustment knobs that all the spindles will change.
21. Replace access door.

Lamp

1. Remove small access panel on left side of the 54R 2.0 and locate the lamp potentiometer.
2. On the touchscreen, press the Diagnostic tab.
3. Turn on Manual Controls.
4. Press the Manual Controls menu button.
5. Turn on Lamp Cycle and time the movement of the lamp.
6. One complete cycle should be 25 seconds.
7. To adjust lamp cycle time turn the lamp potentiometer left to increase cycle time, right to shorten.
8. Replace access door.

Air Regulator Adjustment

1. Take off the large removable panel on the left side of the 54R 2.0.
2. Locate either of the air regulator mounted on the inner well.
3. Check that the air gauges on the regulators are reading 80 PSI.
4. If an adjustment needs to be made, pull down on the regulator adjustment cap and turn until the air gauge reads 80 PSI.
5. Push adjustment cap back up to lock in place.

Replacement/Adjustment of the Conveyor Drive Belt

1. Remove this section?

Alarm Codes

PLC Tag	Alarm Message	Cause
R0184	Coating Empty	This alarm occurs when 1000 lenses have been coated since the coating low warning first appeared. Until coating is added machine will not run any more lenses.
R022F	E-Stop	Emergency stop button has been pressed.
R0176	Failed To Load Lens Spindle 1	Robot was unsuccessful in loading a lens into spindle 1. Two attempts were made. Check robot pick points for calibration, servo motor indexing for calibration, vacuum readings on spindle 16 or higher with lens, suction cup in good shape. Lenses are in correct tray position.
R0185	Failed To Load Lens Spindle 2	Robot was unsuccessful in loading a lens into spindle 2. Two attempts were made. Check robot pick points for calibration, servo motor indexing for calibration, vacuum readings on spindle 16 or higher with lens, suction cup in good shape. Lenses are in correct tray position.
R0186	Failed To Load Lens Spindle 3	Robot was unsuccessful in loading a lens into spindle 3. Two attempts were made. Check robot pick points for calibration, servo motor indexing for calibration, vacuum readings on spindle 16 or higher with lens, suction cup in good shape. Lenses are in correct tray position.
R0187	Failed To Load Lens Spindle 4	Robot was unsuccessful in loading a lens into spindle 4. Two attempts were made. Check robot pick points for calibration, servo motor indexing for calibration, vacuum readings on spindle 16 or higher with lens, suction cup in good shape. Lenses are in correct tray position.
R0182	Indexing Stopped Out Of Position	Spindle arm is not in position after indexing stopped. Check spindle alignment prox and absence of servo "in position" signal (x302). Either will cause this alarm.
R004A	Lens Processing Stalled	Machine has been processing lenses for too long (60 sec). One or more processes (wash, dry, coat, cure) are likely stalled.
R0028	Machine Request For Rbt. Interaction Failed	Robot has been requested to load, unload, or swap lenses; but hasn't been available to follow through on the request for the past 30 seconds. Check orange power light is lit on robot.
R0008	No Rbt. Ack. Of Load Lens Cmd.	Robot did not acknowledge the PLC's request to load a lens. Is communication cable connected? Check orange power light is lit on robot. Check robot status for any alarms (e-stop) or that enable I/O remote was not activated on Epson software when a laptop was connected to controller.
R000C	No Rbt. Ack. Of Unload Lens Cmd.	Robot did not acknowledge the PLC's request to unload a lens. Is communication cable connected? Check orange power light is lit on robot.
R000A	No Rbt. Act. Of Swap Lens Cmd.	Robot did not acknowledge the PLC's request to swap lenses. Is communication cable connected? Check orange power light is lit on robot.
R0009	Rbt. Failed To Exe. Load Lens Cmd.	Robot did not send confirmation that the load lens command has been completed. Is communication

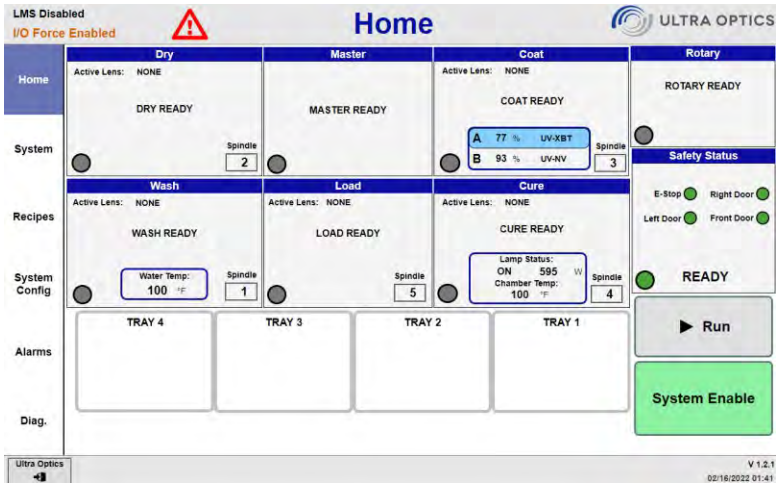
		cable connected? Check orange power light is lit on robot.
R000B	Rbt. Failed To Exe. Swap Lens Cmd.	Robot did not send confirmation that the swap lens command has been completed. Is communication cable connected? Check orange power light is lit on robot.
R000D	Rbt. Failed To Exe. Unload Lens Cmd.	Robot did not send confirmation that the unload lens command has been completed. Is communication cable connected? Check orange power light is lit on robot.
R016C	Robot Failed to Pick New Lens	Robot was unsuccessful in picking a lens. Check robot suction cups, robot pick height, and robot vacuum.
R0237	Robot Lost Lens	Robot has lost vacuum signal. Check robot vacuum, should be over 16 with lens on suction cup, suction cup for tears or damage, and actuator rotation speed.
R012C	Robot Not Ready	The robot "ready" signal to the PLC is not energized. This check occurs when system is starting -up. Check robot status for any alarms (e-stop) or that enable I/O remote was not activated on Epson software when a laptop was connected to controller.
R0007	Robot Not Starting	The robot "running" signal to the PLC is not energized. This check occurs when system is starting -up. Check robot status. Check robot status for any alarms (e-stop) or that enable I/O remote was not activated on Epson software when a laptop was connected to controller.
R000E	Robot Pick Ack. Failed	Robot did not acknowledge the PLC's request to pick the next lens. Is communication cable connected? Check orange power light is lit on robot.
R000F	Robot Pick Cmd. Failed	Robot did not send confirmation that the pick lens command has been completed. Is communication cable connected? Check orange power light is lit on robot.
R0010	Robot Place Ack. Failed	Robot did not acknowledge the PLC's request to place the finished lens. Is communication cable connected?
R0015	Robot Place Cmd. Failed	Robot did not send confirmation that the place lens command has been completed. Is communication cable connected?
R0048	Servo Faulted	The servo drive has faulted. Check the servo drive status and wiring from the servo drive. This is a fail-safe connection; if the circuit opens, fault will also occur.
R004F	Servo Homing Failed	The servo drive has not homed within two minutes of trying. Check spindle alignment prox since those are also read by the servo drive to determine home position.
R0051	Servo Lost Home Position	The servo drive has lost its home position. Check servo drive status and the wiring of the Absolute Position Valid signal from the servo drive to the PLC.
R017D	Spindle 1 Lost Lens	Check spindle vacuum, should be over 16. Check vacuum tubing connections, blocking for incomplete sealing area for suction cup, bad vacuum gauge, or bad wiring connection at vacuum gauge.

R019C	Spindle 1 No Spin	The lens orientation sensor did not read anything. Check that motor is turning, orientation sensor is properly adjusted, and that sensor is working. Will read any steel or magnet.
R017E	Spindle 2 Lost Lens	Check spindle vacuum, should be over 16. Check vacuum tubing connections, blocking for incomplete sealing area for suction cup, bad vacuum gauge, or bad wiring connection at vacuum gauge.
R019D	Spindle 2 No Spin	The lens orientation sensor did not read anything. Check that motor is turning, orientation sensor is properly adjusted, and that sensor is working. Will read any steel or magnet.
R017F	Spindle 3 Lost Lens	Check spindle vacuum, should be over 16. Check vacuum tubing connections, blocking for incomplete sealing area for suction cup, bad vacuum gauge, or bad wiring connection at vacuum gauge.
R019E	Spindle 3 No Spin	The lens orientation sensor did not read anything. Check that motor is turning, orientation sensor is properly adjusted, and that sensor is working. Will read any steel or magnet.
R0180	Spindle 4 Lost Lens	Check spindle vacuum, should be over 16. Check vacuum tubing connections, blocking for incomplete sealing area for suction cup, bad vacuum gauge, or bad wiring connection at vacuum gauge.
R019F	Spindle 4 No Spin	The lens orientation sensor did not read anything. Check that motor is turning, orientation sensor is properly adjusted, and that sensor is working. Will read any steel or magnet.
R0114	Spindle Alignment Error	Spindle arm is not properly aligned when trying to send a down-spindle command. Check spindle alignment prox and/or servo drive programming.
R003B	Spindle Down Cmd. Failed	Spindle down command failed. Spindle was sent down; but the down position prox was never detected. Check the down position prox switch. If cylinder is still in up position check voltage on X5 output on PLC, solenoid down valve. Also check machine has air pressure.
R0183	Spindle Down Sensor Failed	Spindle down sensor did not detect the spindle being in the down position for the entire time the machine was processing lenses (wash, dry, coat, cure). Sensor may have flickered. Sensor is usually adjusted to high. Cylinder activates sensor and then goes past.
R0219	Spindle Out Of Sequence	Spindle arm indexed to an unexpected position. Check spindle alignment prox and/or servo drive programming.
R0181	Spindle Up Cmd. Failed	Spindle up command failed. Spindle was sent up; but the up position prox was never detected. Check the up position prox switch. If cylinder still down check PLC output X4 for voltage, and up solenoid valve. Also check machine has air pressure.
R0191	Spindle Up/Down Prox On	Spindle up & down sensors are both on at the same time. The sensor that is activated that should not be is stuck on.
R018C	Tray 1 Failed To Move	Check that tray 1 is not blocked from moving. Tray stop 1 actuator is working; tray 1 sensor is not stuck on.

R018B	Tray 2 Failed To Move	Check that tray 2 is not blocked from moving. Tray stop 2 actuator is working; tray 2 sensor is not stuck on.
R018A	Tray 3 Failed To Move	Check that tray 3 is not blocked from moving. Tray stop 3 actuator is working; tray 3 sensor is not stuck on.
R0189	Tray 4 Failed To Move	Check that tray 4 is not blocked from moving. Tray stop 4 actuator is working; tray 4 sensor is not stuck on.
R0197	UV Lamp Extended Prox Failed	Failed to detect the "extended" prox when cycling the lamp. Check the "extended" prox switch. Adjust prox switch to read lamp.
R0192	UV Lamp Home Prox Failed	Failed to detect the "home" prox when cycling the lamp. Check the "home" prox switch. Adjust prox switch to read lamp.
R0193	UV Lamp Lost Power	UV lamp intensity did not meet/exceed set point during curing cycle. Check UV lamp and sensor.
R0208	UV Lamp Not Moving	The lamp is not moving off of the prox switch. Check both prox switches. Also check that lamp motor is moving.
R0039	UV Lamp Test Failed	UV lamp has failed to reach proper intensity during start-up on 10 consecutive attempts. Check UV lamp and sensor.

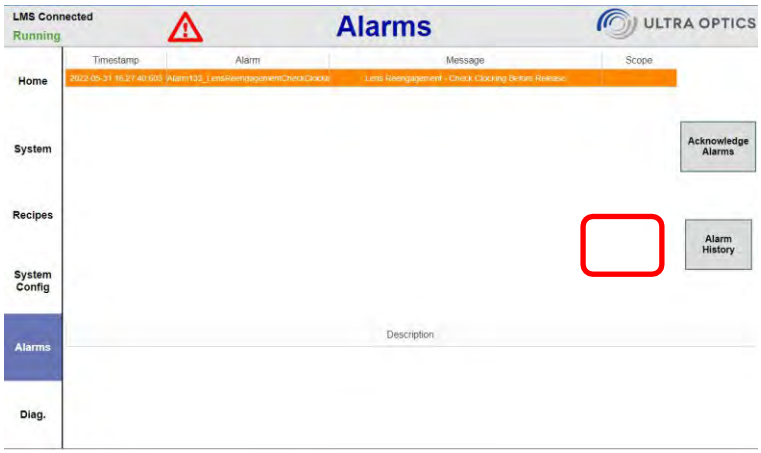
Alarm Log Files

From time the machine will go into various alarm modes. When this happens, the alarm is captured and can be readily viewed on the HMI by touching the “Alarms” button as shown below:

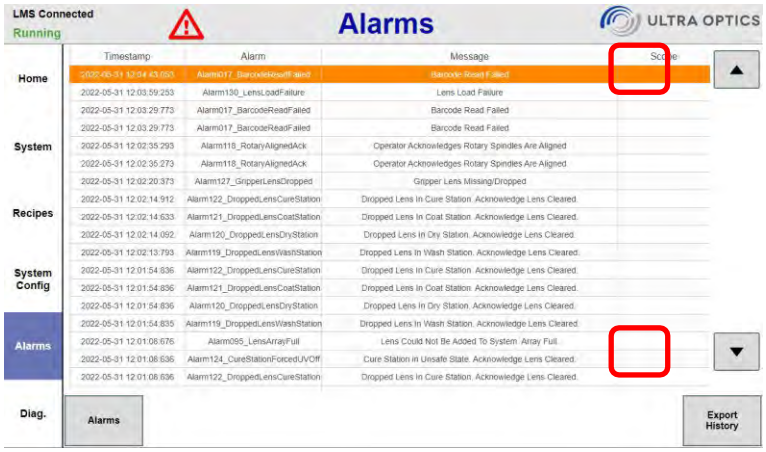


Once at that screen, the user can see the recent alarms.

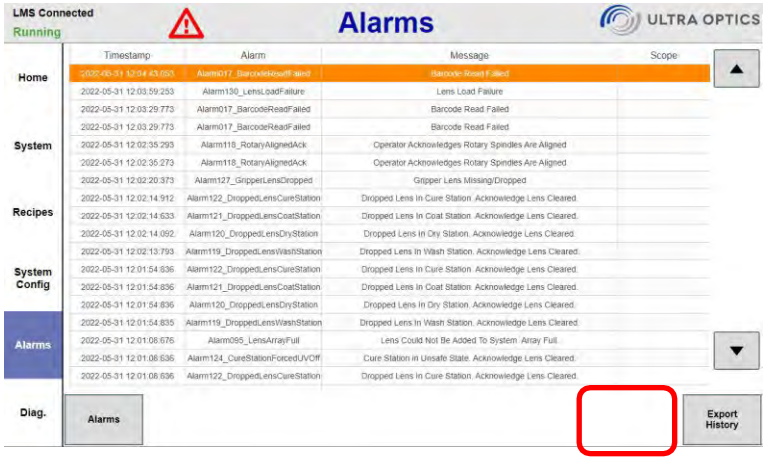
It is possible to see the previous alarm history by touching the “Alarm History” button as shown below:



The alarms will be listed in order based on the time the alarm happened. The most recent alarms will be on the top of the list. The user can scroll through the list of recent alarms by using the up/down arrow keys as shown below:



It is also possible to download the alarm list/log. This is done by touching the "Export History" button shown below:



When this is done, the controller will download all of the available alarms (since the last download) and store that as a file in the controller's memory as a delimited file that could be opened in common spreadsheet applications. To get this file,

Spare/Replacement Parts

Ultra Optics Part Number	Recommended Spare Replacement Quantity (per machine)	Description	Picture
20230		Spindle motor – wash/dry/cure stations	

20104		Spindle motor – coating station	
20184		UV Cure bulb	
80031971		Cure station reflector kit	
20133		Cylinder up/down sensors – used on wash, dry, coat, cure stations	
		FILTERS	
4404		Coating filter	
3923T999		HEPA air pre-filter	

1470		HEPA air filter	
20349		Coating pump	
20380		Barcode scanner	
20281		Station pneumatic lift cylinder – used on wash, dry, coat, cure stations	
CRES-ILB-12-0007-UOPT		Water heater	
		Wash water pump	
VCUR-415 5/8-18		Spindle suction cup for ON the block coating	
20403		Robot suction cup	
20276		Cure box cooling fan	
20136		Cure shutter extend pneumatic cylinder	

HLS 1MEG		Water quality sensor	
20144		Conveyor stop cylinders	
20145		Air ionizer	
9317T111		Coating bowl screen	