



PTR304 & PTR304B Recoaters with Manual Recoat Assemblies (100 mm Length)

User Guide



Mold Assembly Purchased Separately

















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Chapter 1 Warning Symbol Definitions

Below is a list of warning symbols you may encounter in this manual or on your device.

Symbol	Description
	Direct Current
	Alternating Current
	Both Direct and Alternating Current
	Earth Ground Terminal
	Protective Conductor Terminal
	Frame or Chassis Terminal
	Equipotentiality
	On (Supply)
	Off (Supply)
	In Position of a Bi-Stable Push Control
	Out Position of a Bi-Stable Push Control
	Caution: Risk of Electric Shock
	Caution: Hot Surface
	Caution: Risk of Danger
	Warning: Laser Radiation
	Caution: Spinning Blades May Cause Harm

Chapter 2 Safety



WARNING



Appropriate eye protection should always be used when staring at a mold to prevent unwanted exposure to UV light, especially when the mold lid is open.



WARNING



UV curable acrylate recoat materials can be hazardous to your health if not handled properly. Read the Material Safety Data Sheet provided in: 5.3.9Appendix A: Material Data Safety Sheet, and make sure to follow all precautionary guideline when working with this material.



WARNING



Prior to handling the UV acrylate material, be sure to read the Material Safety Data Sheet provided in Chapter 9: Material Data Safety Sheet.



WARNING



Do not look directly at the recoat assembly while the recoat lamps are on. The recoat lamps emit ultraviolet radiation which can cause damage to the eyes. The mold top must be closed during recoat lamp operation.



CAUTION



Do NOT clean the V-groove insert with solvent when the PTR-200 is turned ON. The solvent will be drawn into the vacuum system and will cause internal damage. If the V-groove inserts appear to be damaged, replace the inserts.



WARNING



Do not inspect the UV lamps while the top of the recoat mold assembly is closed, as the UV lamps will be powered for a cure process when pressing the CURE button.

Chapter 3 Description

3.1. Introduction

The PTR304 and PTR304B are extended length optical fiber recoaters which restore a flexible protective polymer coating to a stripped section of fiber. They are designed for fiber gratings and similar applications where longer sections of bare (stripped) fiber need to be recoated.

Vacuum V-groove fiber holding blocks are used to position the fiber at the recoat station. A split quartz recoat mold is manually closed around the fiber to form the mold cavity.

3.2. Parts Checklist

When unpacking the PTR304/PTR304B for the first time, check to make sure that you have the following:

- PTR304 or PTR304B Recoater
- 12V Power Supply
- AC Line cord
- Tablet controller
- Stand for tablet controller
- Canvas zipper bag containing:
 - Two USB cables
 - Eye dropper
 - Cotton swabs
 - 0.035" hex key
 - 3/32" hex key
 - Lens tissue
 - Quartz mold cleaning brush
 - Two (2) replacement bulbs
 - Small bottle with cap
- Mold assembly (purchased separately)
- Bottom inserts for fiber holding blocks (purchased separately)
- Top inserts for fiber holding blocks (purchased separately)
- UV-curable acrylate recoat material (purchased separately)
- For PTR304B only: remote injection system
- If ordered separately: injection syringes and cap

If you are missing any of the above or need replacements, please contact Thorlabs.

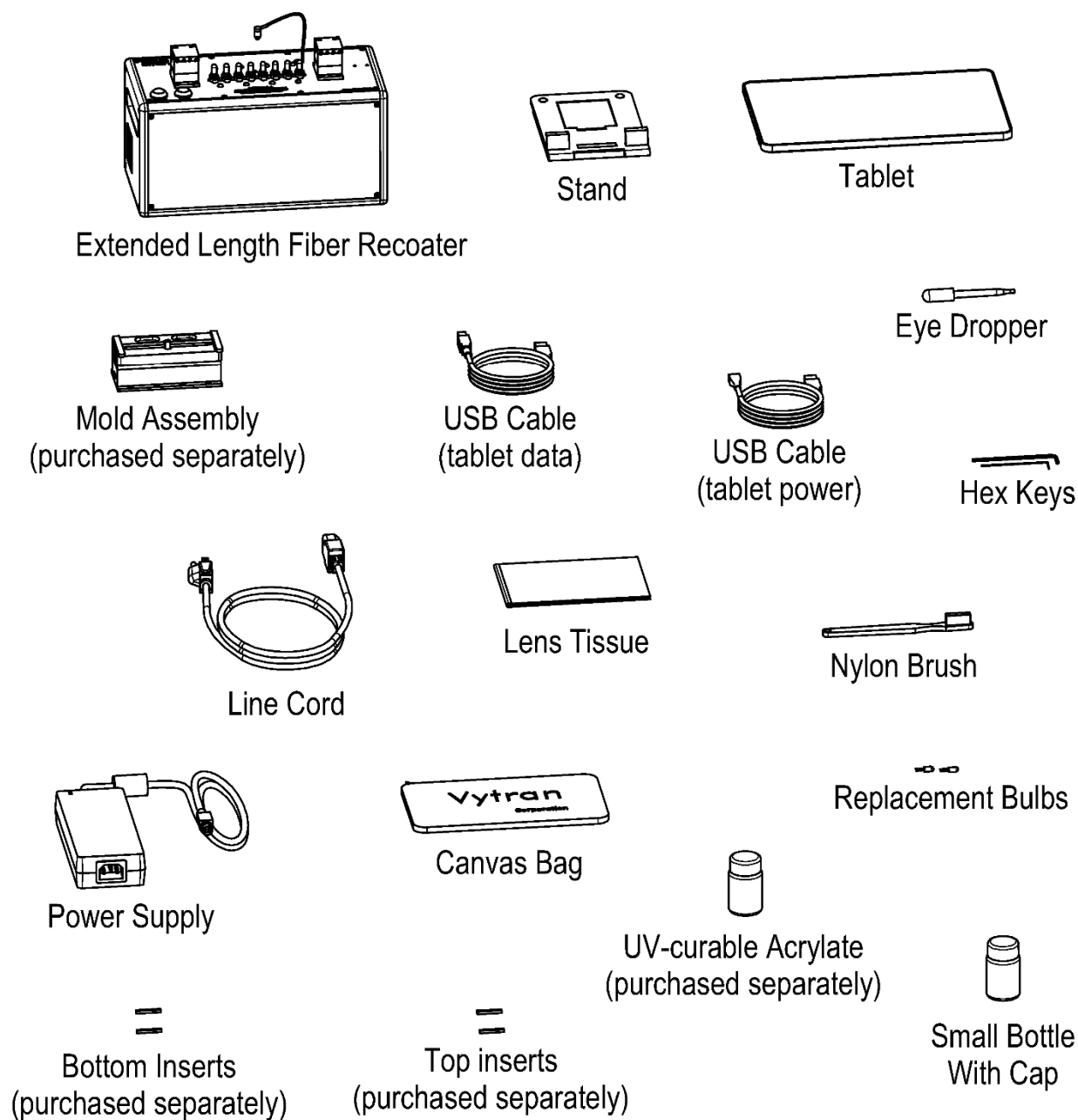


Figure 1 System Components

Chapter 4 Device Selection

When purchasing a PTR304 or PTR304B, it is necessary to select a mold assembly and fiber holding block inserts that best match the desired coating diameters of your fiber.

4.1. Automatic and Remote Manual Injection System

The PTR304 and PTR304B are both manual fiber recoaters, the major difference comes in the type of injection system utilized by the device. The PTR304 comes with the automatic recoat injection pump fitted inside the unit. This pump system can be activated either by the “Inject” button on top of the unit, or with the Tablet controller. An automatic injection system will inject a predetermined volume of recoat material into the mold assembly. It is compatible with high-index recoat material only.

The PTR304B comes with a manual injection system. This pump system provides a method of manually dispensing recoat material directly from the recoat bottle into the injection port. This system consists of a syringe with a knurled dispensing screw, which is fitted to a distribution valve with a two-position selection lever. It is compatible with both high- and low-index recoat material.

4.2. Mold Assemblies

The Mold Assemblies are composed of split quartz mold plates which, when closed, form the cylindrical mold cavity around the exposed section of the fiber being recoated. When purchasing the recoater for the first time, it is necessary to choose a mold assembly that is appropriate for the desired fiber coating diameter. They are available for Ø280 µm, Ø430 µm, or Ø600 µm fiber coatings. Custom mold sizes up to Ø900 µm are available; please contact Thorlabs for more information. Additional mold assemblies may also be purchased and swapped out by the user. The assembly simply screws to the top of the device, making the removal and install simple and easy.

Item #	Coating Diameter
RM280L	280 µm
RM430L	430 µm
RM600L	600 µm

4.3. Inserts for Fiber Holding Blocks

When purchasing a PTR304/PTR304B, the proper set of inserts need to be selected. A total of four inserts (two top and two bottom) are required for a full unit. The inserts are seated in and secured to the fiber holding blocks. They can easily be swapped out for different sizes, allowing our recoaters to adapt quickly should different fiber coating sizes be desired. The VHH Series inserts are compatible with fiber coating sizes ranging from Ø90 µm to Ø990 µm.

Item #	Top or Bottom	Nominal Diameter	Min Diameter	Max Diameter
VHH000	Top	-	90 µm	660 µm
VHH900	Top	900 µm	700 µm	1000 µm
VHH100	Bottom	100 µm	90 µm	110 µm
VHH125	Bottom	125 µm	113 µm	137 µm
VHH160	Bottom	160 µm	144 µm	176 µm
VHH250	Bottom	250 µm	225 µm	275 µm
VHH500	Bottom	500 µm	450 µm	550 µm
VHH600	Bottom	600 µm	540 µm	660 µm
VHJ900S	Bottom	900 µm	810 µm	990 µm

Chapter 5 Set-Up and Control

The PTR304/PTR304B can be operated using either the two buttons on the unit, or via the Tablet Controller.



Figure 2 Tablet Controller

5.1.1. Unit Control Buttons

The PTR304/PTR304B has two Unit Control Buttons that enable the user to inject and cure recoat material. The inject button is only enabled on the PTR304. All parameters are preset and cannot be changed without the Tablet Controller in conjunction with the Unit Control Buttons (see below).

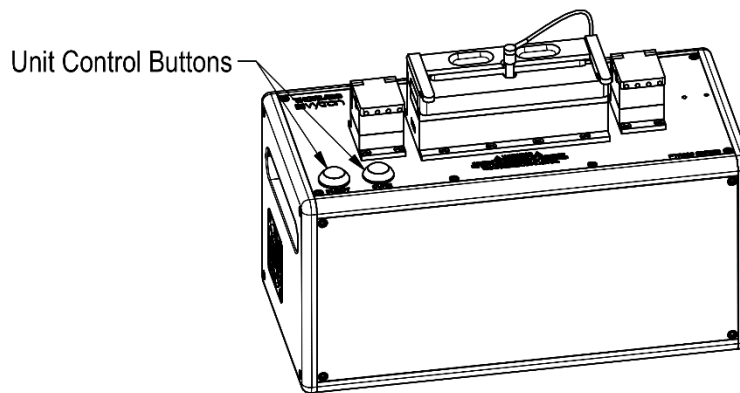


Figure 3 Unit Control Buttons

- Inject Button:** Injects recoat material while button is depressed (PTR304 Only). Note that pressing the Inject button on the Tablet Controller causes the PTR304 to inject a predetermined inject quantity.
- Cure Button:** With recoat mold lid closed, this button turns on the UV lamps for the preset cure time. With Recoat lid open, it performs a bulb check (low intensity illumination of the lamps to verify that all lamps are working correctly).

5.2. Tablet Controller

5.2.1. Set-up

Make sure power to the unit is turned off.

5.3. Connecting the Wires

1. Plug in the AC power cord. The power supply accepts an AC input of 100 - 240 VAC; 47 - 63 Hz.
2. Connect the AC power cord to the external power supply.
3. Connect the DC power cable to the unit.
4. Locate the USB cable that has a microUSB Type B plug. Plug it into the power socket of the tablet.



5. The other USB cable has one end that is USB Type A. Plug that end of that cable into the USB socket of the tablet.



6. Plug the USB Type B plug into its socket on the back of the unit.



7. Plug the USB Type A plug (on the first USB cable) into its socket on the back of the unit.



5.3.2. Power Up

With the Tablet Controller properly connected to the unit:

- Turn on the external power supply using the switch above the output cable.
- Turn on the PTR304/PTR304B using the switch located at the back of the unit.

The system will go through an initialization process that takes up to 90 seconds, during which time it will home and fill the internal recoat pump (if so equipped). During initialization the Tablet Controller will auto-detect the PTR304/ PTR304B and display the main screen. From here the User can start injecting, curing, view / edit Parameters and select items on the toolbar

The Tablet Controller provides a simple, easy to use interface for configuring, controlling and monitoring PTR series machines. The following sections contain a quick start guide followed by a more detailed view of the features and capabilities of the Tablet Controller.

5.4. A Quick Start Guide to Using the Tablet Controller

Once the Tablet Controller has recognized a PTR304/PTR304B, the Main Screen is displayed.



Figure 4 PTR304 Main Screen

A: Status Bar

B: Inject Button

C: Inject Parameter View/Edit

D: Cure Button

E: Cure Parameter View/Edit


F: Widget


G: Toolbar

(Note that the main screen differs slightly when the Tablet Controller detects PTR304B, Inject functionality is disabled.)

To start Injecting, press 'Inject' (B). This performs the same action as pressing the blue 'Inject' button on the PTR304.

To start Curing, press 'Cure' (D). This performs the same action as pressing the blue 'Cure' button on the PTR304/PTR304B.

To view and/or edit Inject, Cure Parameters, touch the respective view/edit  button (C, E)

If the User has insufficient access permission to edit Parameters, a view only  icon is displayed.

After pressing a view/edit button, the relevant parameters (along with the current value) will be shown on the Parameter Select screen. Swipe the list to scroll up / down, touch a parameter to select it for editing.

Note:



Yes, OK, Apply .



No, Cancel, Close

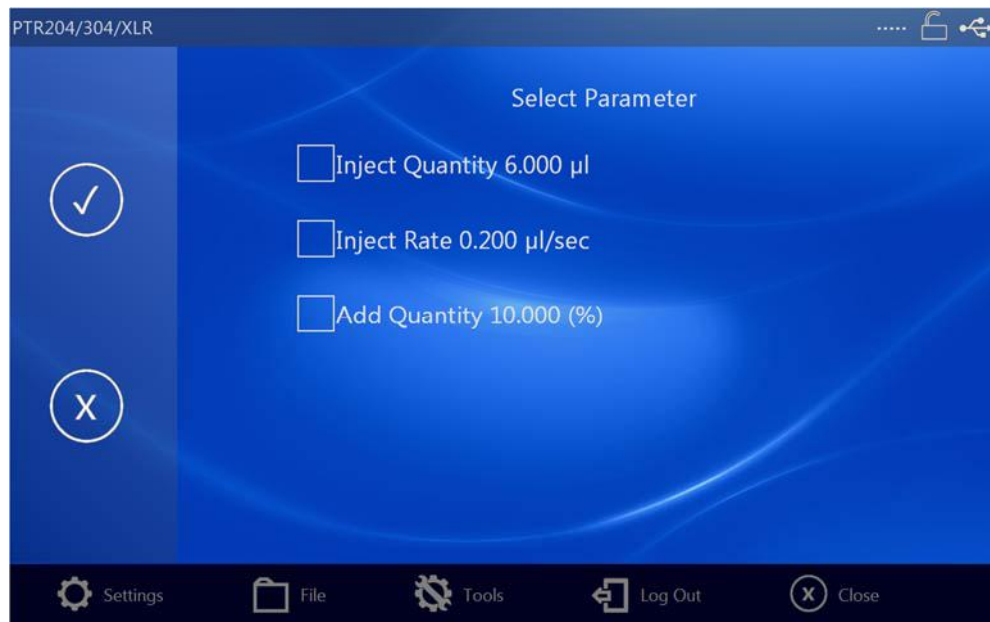


Figure 5 *Parameter Select Screen (Cure)*

In the edit / viewing screen, touch the value to enable the On-Screen-KeyBoard and edit the value. Touch ✓ or X to return to the Parameter Select Screen.

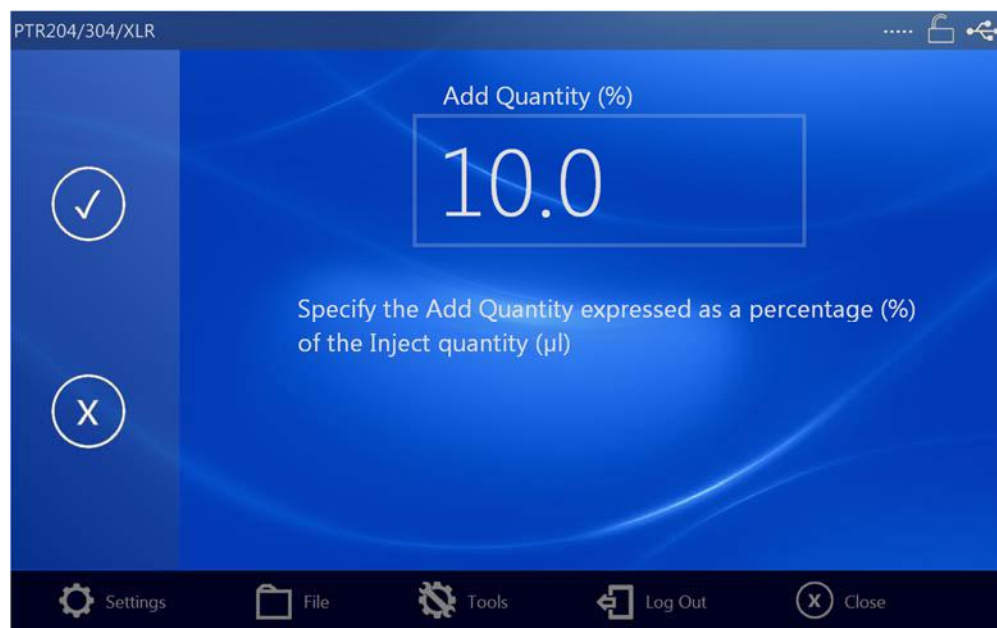


Figure 6 Parameter Edit Screen

The parameter list indicates that an item has been changed by displaying a different icon

 Add Quantity 8.000 (%)

The User must select ✓ when leaving the Parameter Select Screen in order for all changes to be committed to the PTR304/PTR304B.

5.5. PTR304 / PTR304B Parameters

The following sections describe the parameters that control PTR304 / PTR304B.

5.5.1. Inject Parameters (PTR304 only)

The Inject parameters are defined as follows:

- Quantity:** The volume of recoat material in microliters (µl) injected into the mold.
- Rate:** The speed at which recoat material is injected into the mold in microliters per second (µl/sec). The maximum inject rate is 1.8 µl/sec.
- Add Quantity:** The percentage of Inject Quantity that can be manually injected to the mold after the Inject sequence is complete. The Tablet Controller displays the Add Button in the Inject Screen once the Inject sequence is complete. The Add feature is especially useful in situations where there is variability in the position of strip shoulders / length of recoat required.

5.5.2. Cure Parameters

The Cure parameters are defined as follows:

Cure Time:	The duration of the recoat material cure (1 to 480 seconds)
Lamp Operation:	Can be set to Sequenced or PWM. Sequenced mode turns on the lamps in the specified sequence determined by the Lamp Set parameters accessed from Tools-Advanced Parameters. In this mode, the Lamp Power value is ignored. PWM mode lights all lamps simultaneously and turns them on at the specified power level. In this mode, Lamp Set parameters are ignored.
Lamp Power:	The cure lamp power level expressed as a percentage of maximum power (PWM mode only).
Cooldown Time:	The cure lamp can be continuously on for up to 2 minutes, after this time the lamp is switched off for the Cooldown Time (in seconds). If the total Cure Time is greater than 2 minutes, the cycle of Lamp On / Cooldown is repeated until the lamp has been on for the total Cure Time.



Warning



Do not look directly at the recoat assembly while the recoat lamps are on. The recoat lamps emit ultra-violet radiation which can cause damage to the eyes. The mold must be closed during recoat lamp

5.5.3. Advanced Parameters (PTR304 only)

Advanced parameters are accessed from the toolbar since they are rarely modified. The PTR304 advanced parameters are defined as follows:

Shrink Factor:	The Shrink Factor is the amount of material injected into the recoat mold during the early stages of curing. This is entered as a percentage of the initial Inject volume, and is intended to compensate for material shrinkage during cure. Typical values for Shrink Factor are 3 to 6%.
Shrink Time:	Shrink Time specifies the time period over which any additional material is injected into the mold during cure. It is expressed as a percentage (%) of Cure Time.
Lamp Set 1 Start:	Specifies the switch-on time of Lamp Set 1 as a percentage (%) of Cure Time (Sequenced mode only).
Lamp Set 1 Stop:	Specifies the switch-off time of Lamp Set 1 as a percentage (%) of Cure Time (Sequenced mode only).
Lamp Set 2 Start:	Specifies the switch-on time of Lamp Set 2 as a percentage (%) of Cure Time (Sequenced mode only).
Lamp Set 2 Stop:	Specifies the switch-off time of Lamp Set 2 as a percentage (%) of Cure Time (Sequenced mode only).
Lamp Set 3 Start:	Specifies the switch-on time of Lamp Set 3 as a percentage (%) of Cure Time (Sequenced mode only).
Lamp Set 3 Stop:	Specifies the switch-off time of Lamp Set 3 as a percentage (%) of Cure Time (Sequenced mode only).

Lamp Set 4 Start:	Specifies the switch-on time of Lamp Set 4 as a percentage (%) of Cure Time (Sequenced mode only).
Lamp Set 4 Stop:	Specifies the switch-off time of Lamp Set 4 as a percentage (%) of Cure Time (Sequenced mode only).
Momentary Injection:	This can be enabled or disabled. When enabled, pressing the Inject button on the PTR304 causes the machine to inject recoat material for as long as the Inject button is down. When disabled, pressing the Inject button causes the predefined Inject Quantity to be injected. Note that pressing the Inject button on Tablet Controller will always deliver the predetermined Inject Quantity.

5.6. Injecting and Curing.

The tablet will display an appropriate screen whenever one of these operations is invoked. The Cure screen will close itself at the end of the Cure sequence, Inject (PTR304 only) Screen remains open for user input (add material). These screens are common to all PTR class Recoaters & Proof Testers.

5.6.1. Inject Screen (PTR304 only).

Once the Inject sequence has started (either by pressing 'Inject' on the Tablet or on the PTR304 the Inject Screen is displayed.

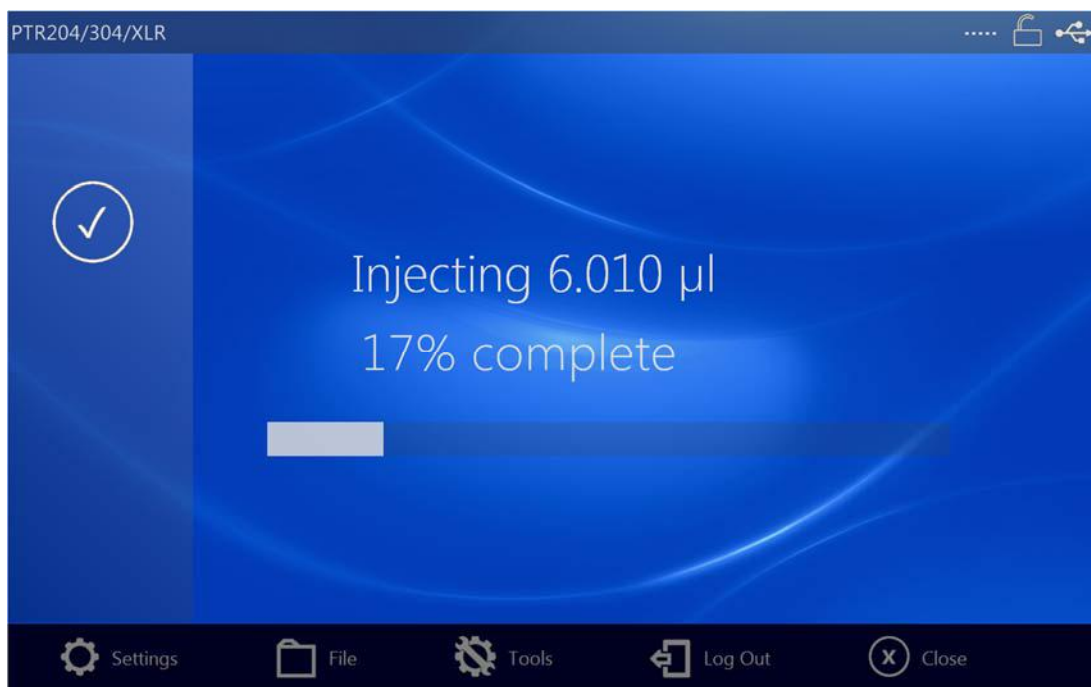


Figure 7 Inject Screen

If the PTR304 is configured for 'Momentary Injecting' (material is injected while the Inject button on PTR304 is held down) the Inject screen displays the amount of material injected so far. Note that pressing Inject on the Tablet Controller will always inject the quantity specified by the 'Inject quantity' parameter.

When configured for 'Auto-Injecting', the Inject screen displays the target Inject Quantity and a progress indicator.

5.6.2. Cure Screen.

Once the Cure sequence has started (either by pressing 'Cure' on the Tablet or on the PTR304/PTR304B the Cure Screen is displayed.

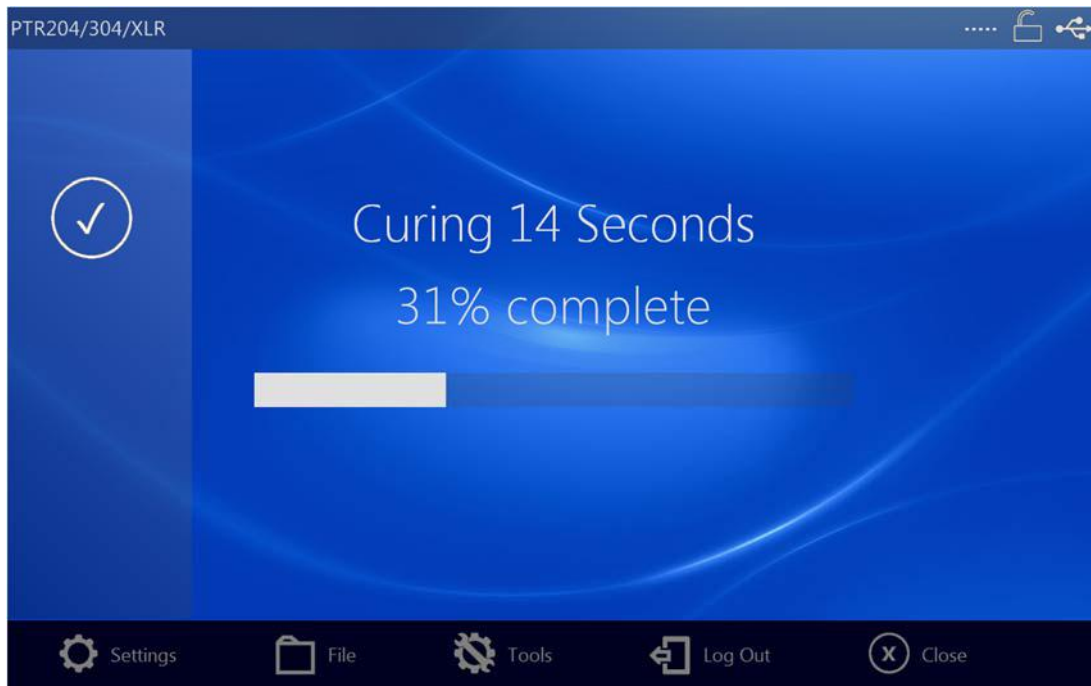


Figure 8 **Cure Screen**

The cure screen displays the target Cure Time and a progress indicator (% complete). Once the Cure is complete, the Tablet Controller returns to the PTR304 / PTR304 main page.

5.7. Tablet Controller Reference

The Tablet Controller is a fully featured Windows 10 Tablet. The controller application (VytranCX.exe) is launched automatically on Windows startup. After a few seconds of displaying a master Home Screen, a discovery process is launched which detects any Vytran PTR modules connected. If a module is found and recognized, the controller configures itself for that module, in this case the PTR304 / PTR304B.

It is recommended that the Tablet Controller remains connected to a single machine in order to benefit from machine status monitoring built into the controller. The PTR304/PTR304B can, however, operate without the Tablet Controller attached, and through use of the blue buttons will carry out Inject and Cure using the last set of parameters that were uploaded to it.

At startup, Tablet Controller will always read parameters from the PTR304/PTR304B meaning that the parameters that appear on the screen will always be the parameters that have been uploaded to the unit connected.

The Tablet Controller provides an 'offline' mode in which files can be modified and uploaded later.

5.7.1. PTR304/307B Main Screen

The PTR304/PTR304B Main Screen, much like the Main Screen for any other Vytran PTR module, shares a common theme. It has a status bar, one or more control (action) buttons, a view / edit button to access parameters related to that control or action, a Widget (for displaying the most relevant current parameters) and a toolbar. During operation, runtime messages are displayed.



Figure 9 PTR304/PTR304B Main Screen – Status Bar

From left to right, the status bar indicates the type of module detected (in this case PTR304 Manual Recoater), the file currently open (blank if none) and three icons to indicate file status (unprotected or read-only), current user access status and USB connection.

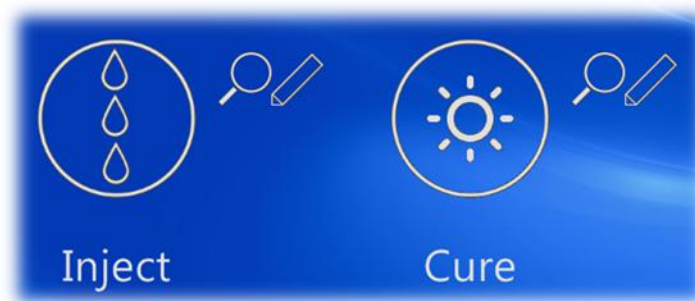


Figure 10 PTR304/PTR304B Main Screen – Action & Parameter View / Edit

The control buttons on the PTR304/304B Main Screen will perform the same function as the respective buttons on the PTR304/307B, invoking either Inject or Cure. Each view / edit button will bring up the Parameter Select list that's relevant to the button.

PTR304: The Widget provides an instant overview of the most relevant current parameters. From left to right it shows:

- Inject Quantity / Mold Size
- Material in Syringe (μl)
- Recoat Material remaining in bottle / Expiration Date.
- Cure Time
- Recoat Length

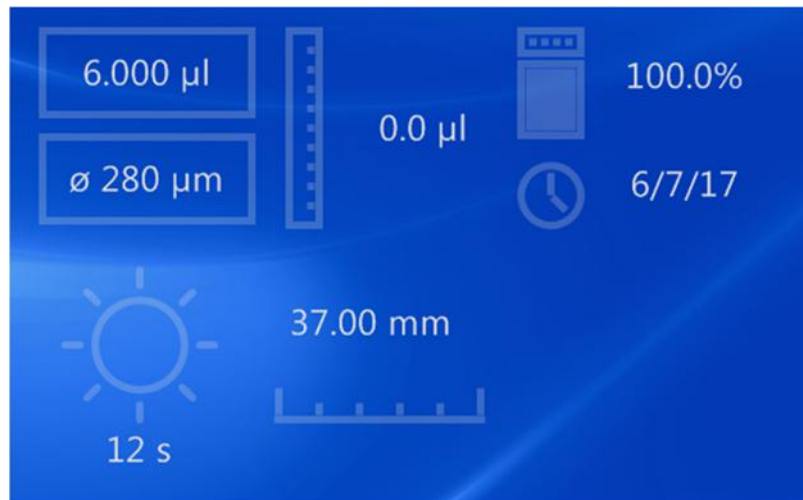


Figure 11 PTR304 Main Screen – Widget

PTR304B: The Widget does not display Material in Syringe.

Runtime messages are displayed on the PTR Home screen when something important is happening such as reading parameters from the PTR and uploading new parameters to the machine.



Figure 12 PTR Main Screen – Toast Messages

The toolbar provides access to Tablet Controller settings, the file system, PTR304/PTR304B specific tools, a fast Log-Out feature and a close button to allow the user to exit the PTR304 Main Screen.



Figure 13 PTR304/PTR304B Main Screen – Toolbar

5.7.2. Settings

Touch the toolbar Settings button to bring up the Settings Screen. These options are for configuring the Tablet Controller and are generally not system dependent.

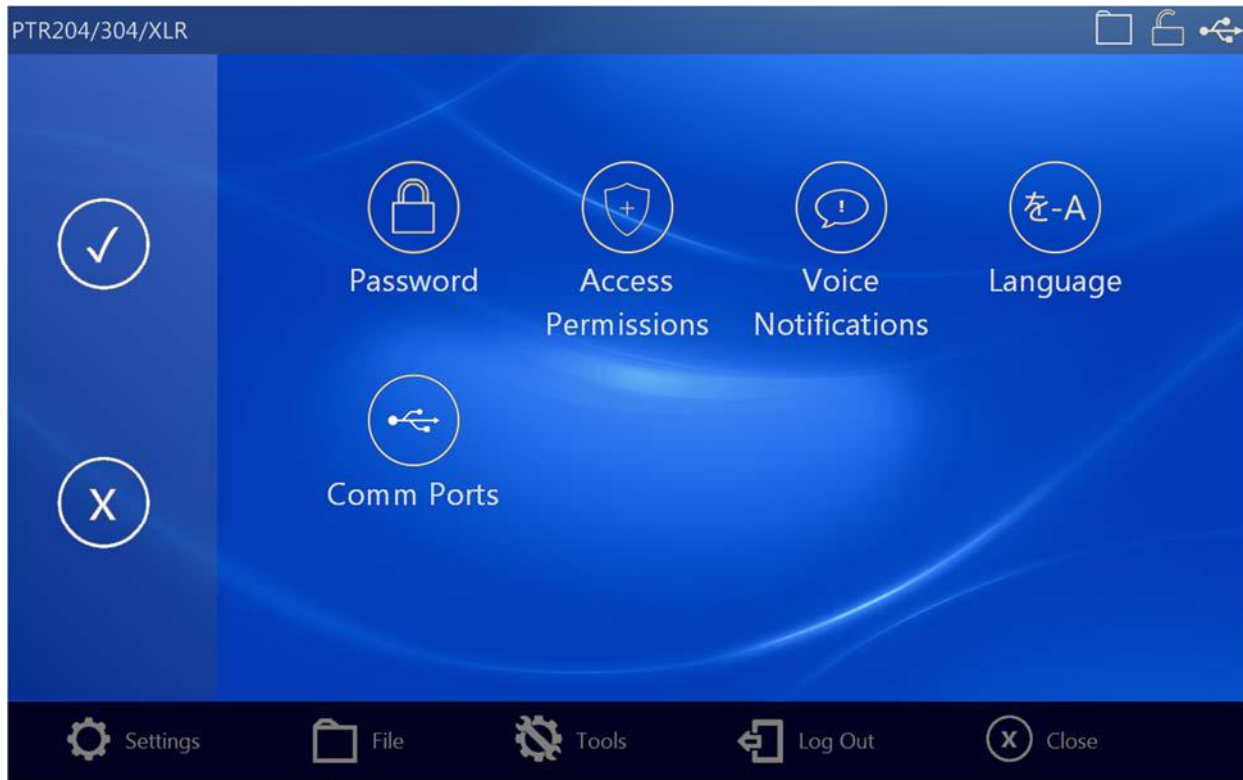


Figure 14 Toolbar – Settings Screen

From this screen the user can setup or enter a password, control user access permissions, enable or disable voice notifications, select the user interface language, view and manage communication ports.

5.7.3. Password

- With a password, users can protect the controller and its files from unauthorized access / modification.
- Passwords are recoverable from a configuration xml file so can be retrieved if lost or forgotten. The controller defaults to No Password, Full Permission enabled.
- If a password has been setup and entered, the user can quickly log out using Log-Out from the toolbar.
- A password is required (only if one has been set) to change Access Permissions. These permissions are the actual mechanism for protecting files and parameters.

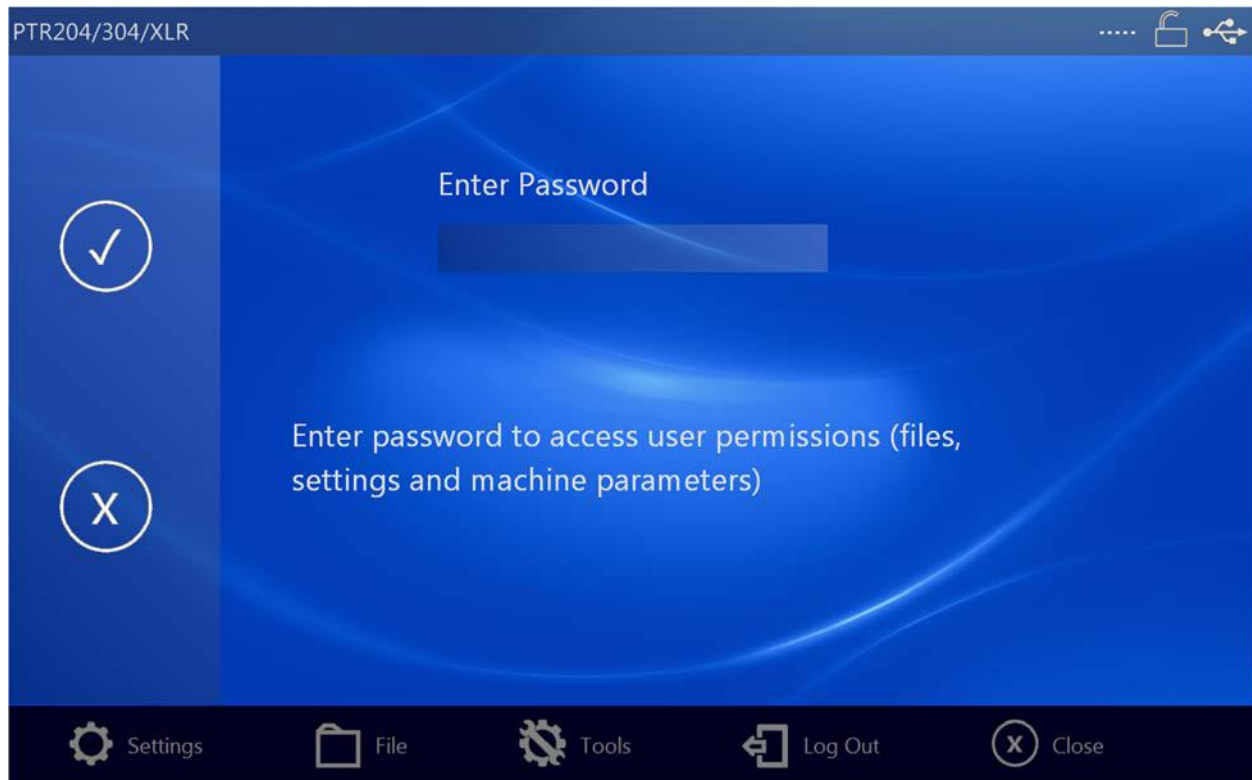


Figure 15 **Toolbar – Password Screen**

If no password has been setup yet, the password is effectively an empty string. Touch the password box and press the enter key to continue. If a password has been setup, enter the password. Passwords can be any characters, any length and are case sensitive. Whenever an incorrect password is entered, a message appears to inform the user. The Password is in effect until the user touches Toolbar-Log-Out.

Once the correct password has been entered (in this case 1234), it can be changed by touching the Change Password text to continue.

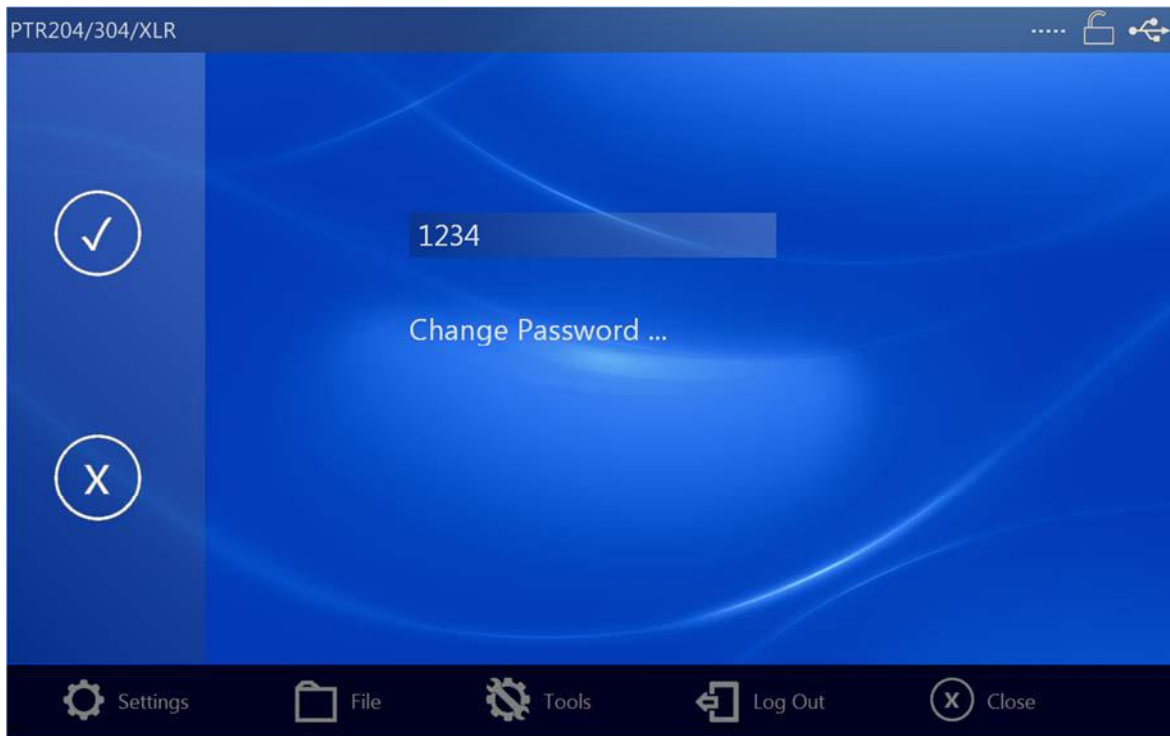


Figure 16 Toolbar – Change Password Option

Touch the Enter New Password box and enter the new password, repeat in the confirmation box.

The password is in effect until the user touches Toolbar-Log-Out.



Figure 17 Toolbar – New Password Screen

5.7.4. Access Permissions

Tablet Controller can be setup to prevent unauthorized access of files and parameters which can be read-only or read-write in any combination. In addition, files can be saved as read-only and can only be overwritten by a user with Full Access Permission. Tablet Controller will warn the user when attempting to overwrite a read-only file.

Tablet Controller defaults to No Password, Full Permission enabled. A password is required (if one has been set) to change Access Permissions.

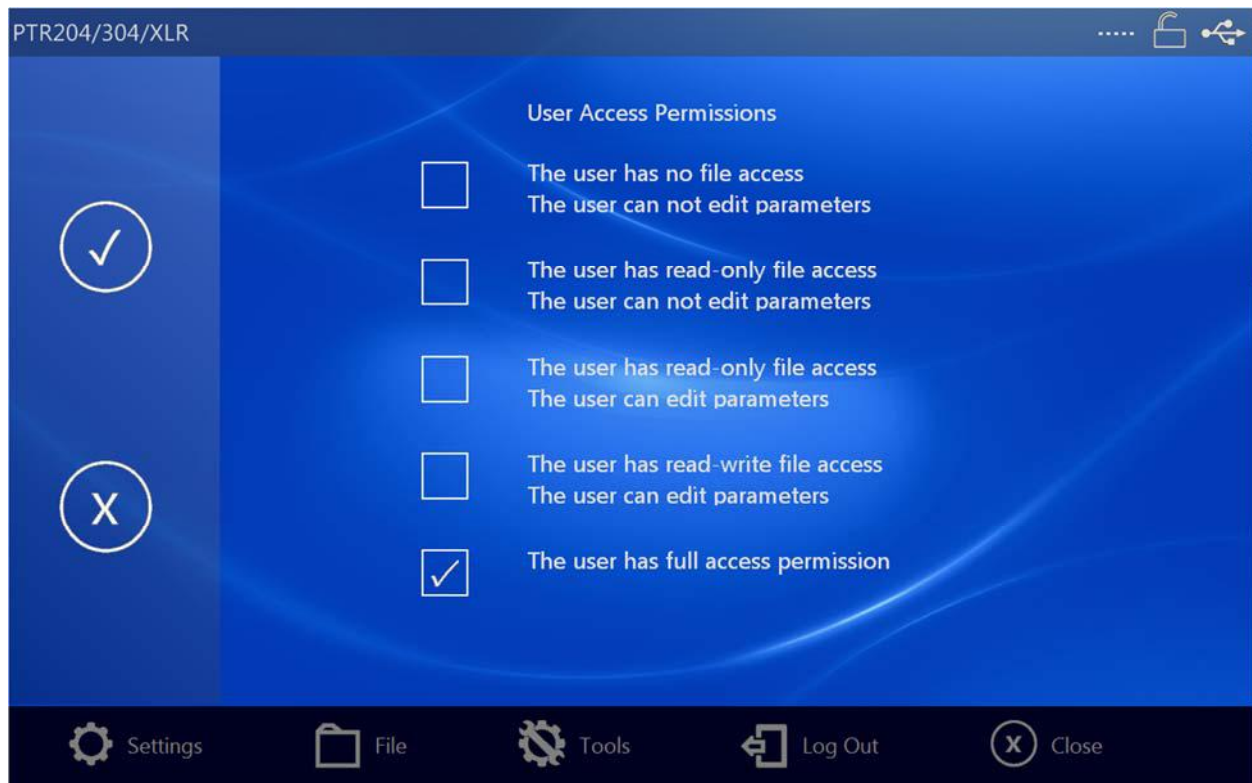


Figure 18 Toolbar – User Access Permissions Screen

The Access Permissions are self-explanatory except for Full Access Permission.

Full Access Permission allows full read-write access of parameters and files, the ability to change User Access Permissions and the ability to overwrite a file that has been saved as read-only. If a read-only file contains an error, it's possible to correct it. If a password has been setup, the user must enter it before being allowed to change User Access Permissions.

5.7.5. Voice Notifications

Enable audible notifications in spoken language when a process has begun and whether it completed successfully or failed. Voice notifications will attempt to load an appropriate Text-To-Speech (TTS) voice for the current language selection. This requires a suitable (TTS) Voice has been installed. Contact Thorlabs / Vytran for more details.

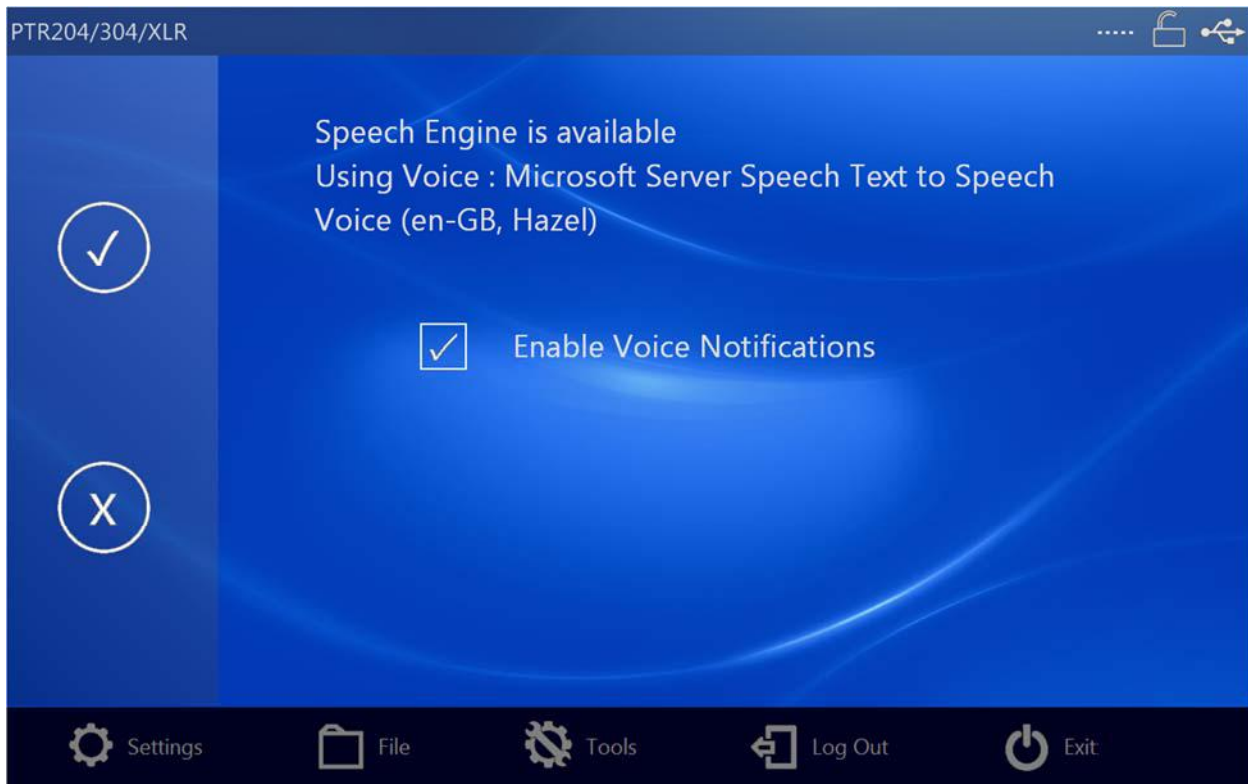


Figure 19 Toolbar – Voice Notifications (current language – English)

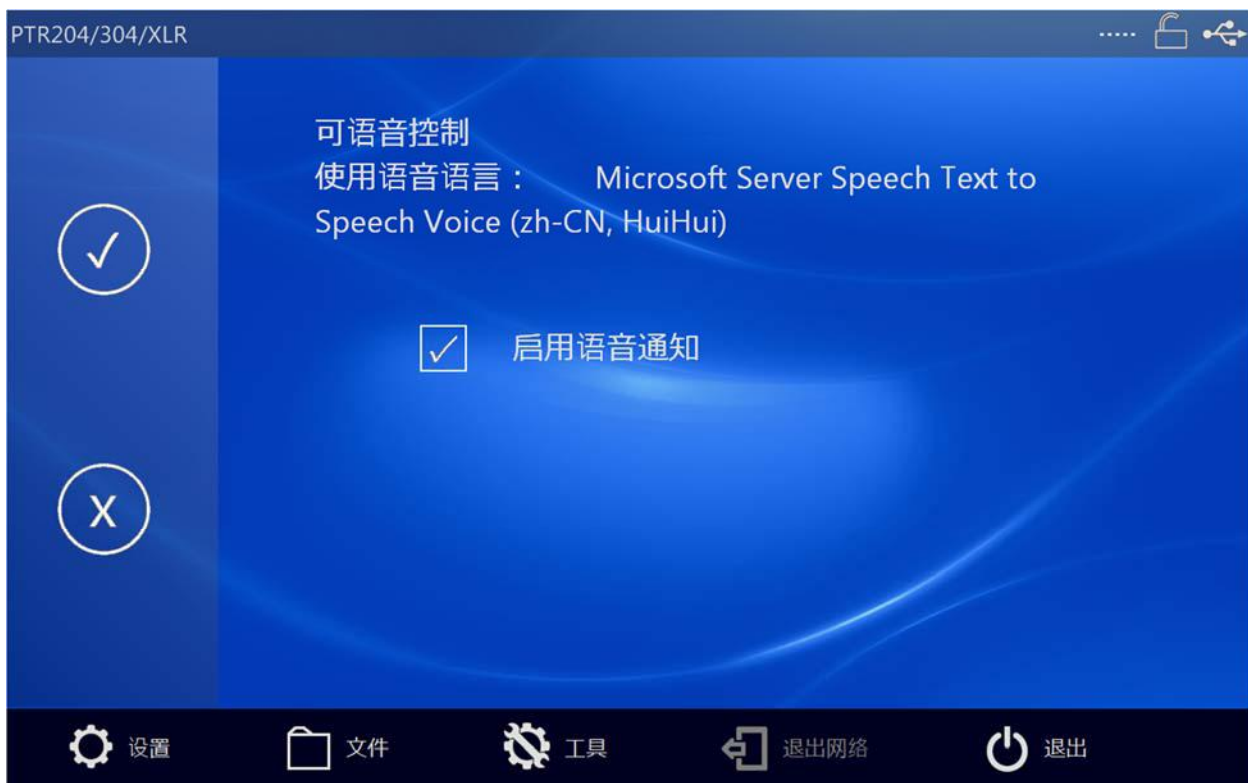


Figure 20 Toolbar – Voice Notifications (current language – Chinese)

5.7.6. Language

The user can select the preferred user-interface language. Language selection is independent of computer locale or computer language packs installed.

Complete translations are available in English, French and Russian and Chinese, more will be available in the future. In the event that a piece of translated text is missing, the controller will default to English for that text. Future translations are installed by simply copying a resource-only dll file into a sub-folder of VytranCX controller.



Figure 21 Toolbar – Language Selection

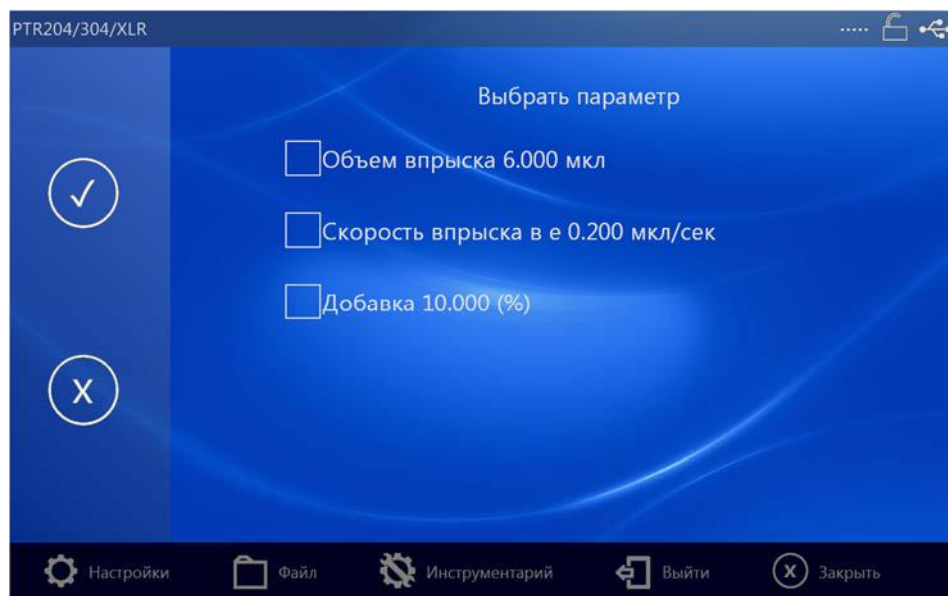


Figure 22 PTR Parameter Select in Russian

5.7.7. Comm Ports

The Comm Ports screen lists all communications ports detected by Tablet Controller which can be useful when fault-finding a missing connection. Tablet Controller will normally auto-detect the correct USB serial Comm Port to communicate with the module.

5.8. Files

Files are opened, saved or saved-as from Toolbar-File. The user is presented with those options. Note that if no file is open, selecting Save File will open the Save File As screen and the current machine parameters will be saved to the file specified. Open File and Save File As will open a file selection screen.

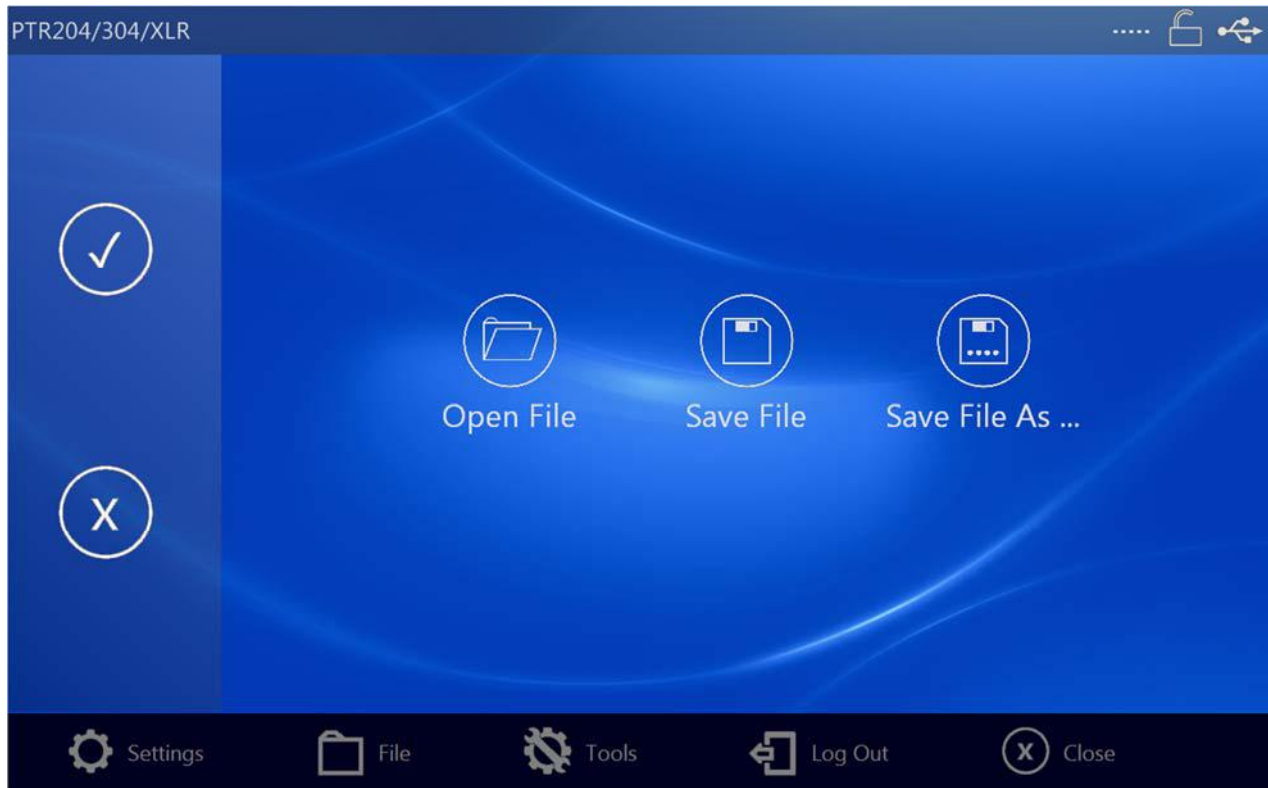


Figure 23 *Toolbar – File Options Screen*

5.8.1. Open File

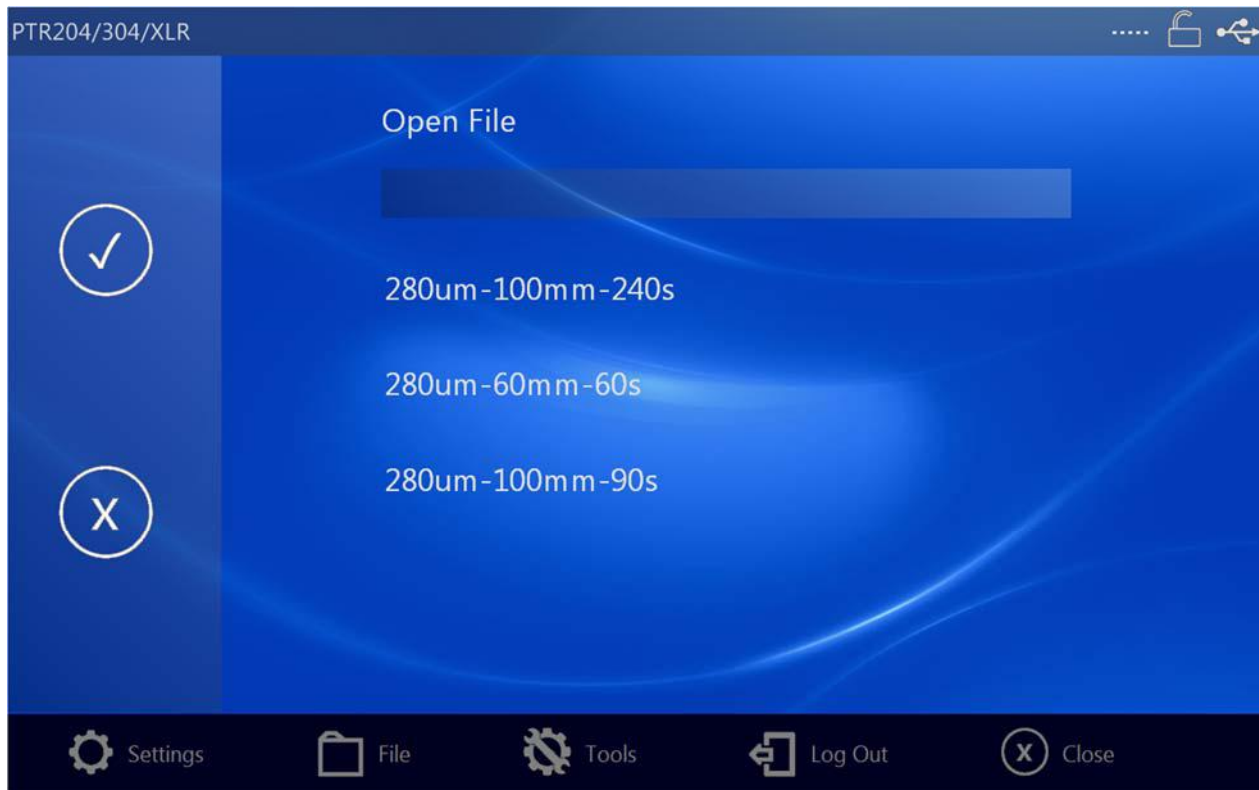


Figure 24 *Toolbar – File Open Screen*

In both File Open and Save File As screens, the existing files are listed in order of Most Recently Used (MRU). Any file that has been saved as a read-only file will display the small lock symbol next to the file name.

Only files specific to a particular type of Vytran equipment are displayed in the list. E.g., if the User is working with a PTRMRL/206/306, only files suitable for that machine are accessible. Each machine type has its own dedicated folder and files can only be saved in that folder.

Touch the file in the list to select to it for opening. Swipe the list to scroll up or down.

5.8.2. Save File As

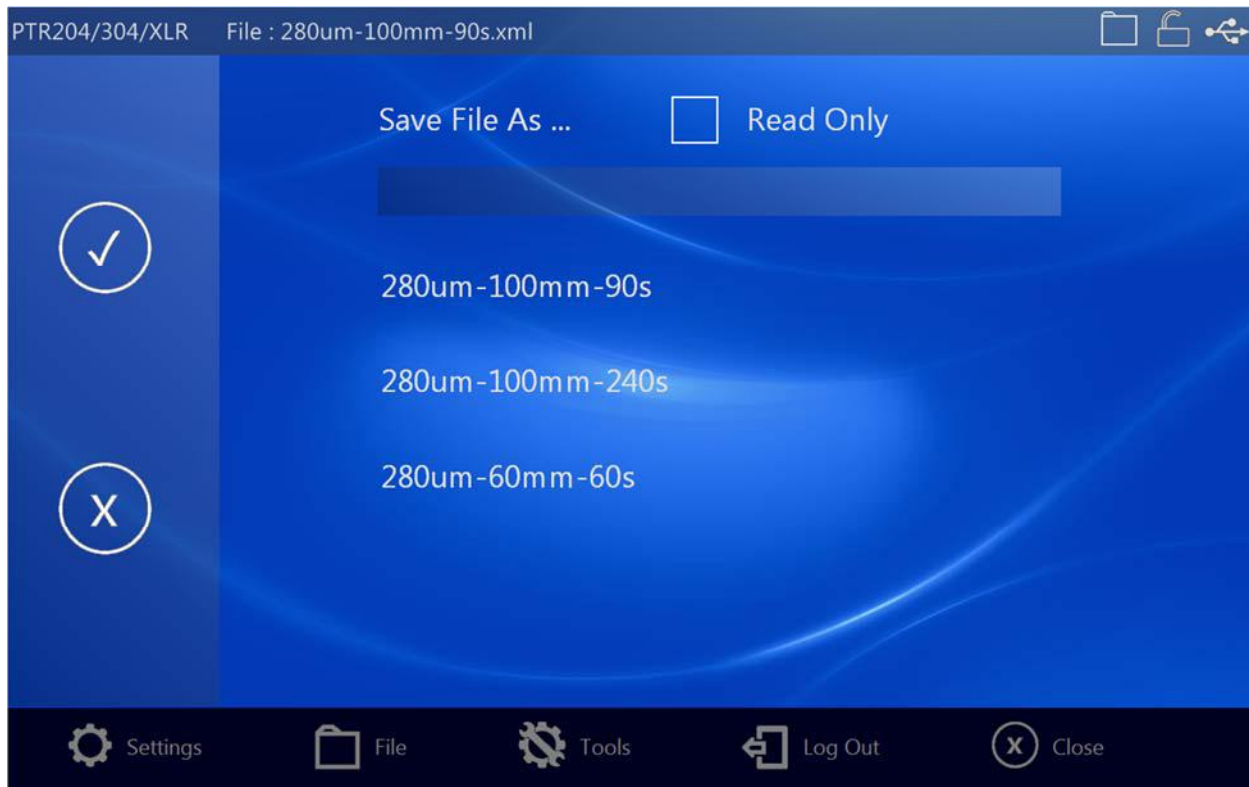


Figure 25 *Toolbar – Save File As ... Screen*

To select an existing file to overwrite, select it by touching it in the list. Alternatively, type in a filename to create a new file. Files can be saved as read-only. A read-only file can be overwritten but only if the user has Full Access Permission. It might at first seem strange to be able to overwrite a read-only file. Consider how frustrating it would be if files contained errors that were impossible to correct. The current machine parameters can always be saved to file using Save File As.

5.8.3. Save File

Save File instantly saves the current open file to disk. There is no Save File screen.

5.9. Tools

Each Vytran machine type has its own suite of tools, designed to simplify certain tasks. Some of the tools are common to multiple machine types, others are unique to just one. Touching Toolbar – Tools brings up the Tool Selection Screen.

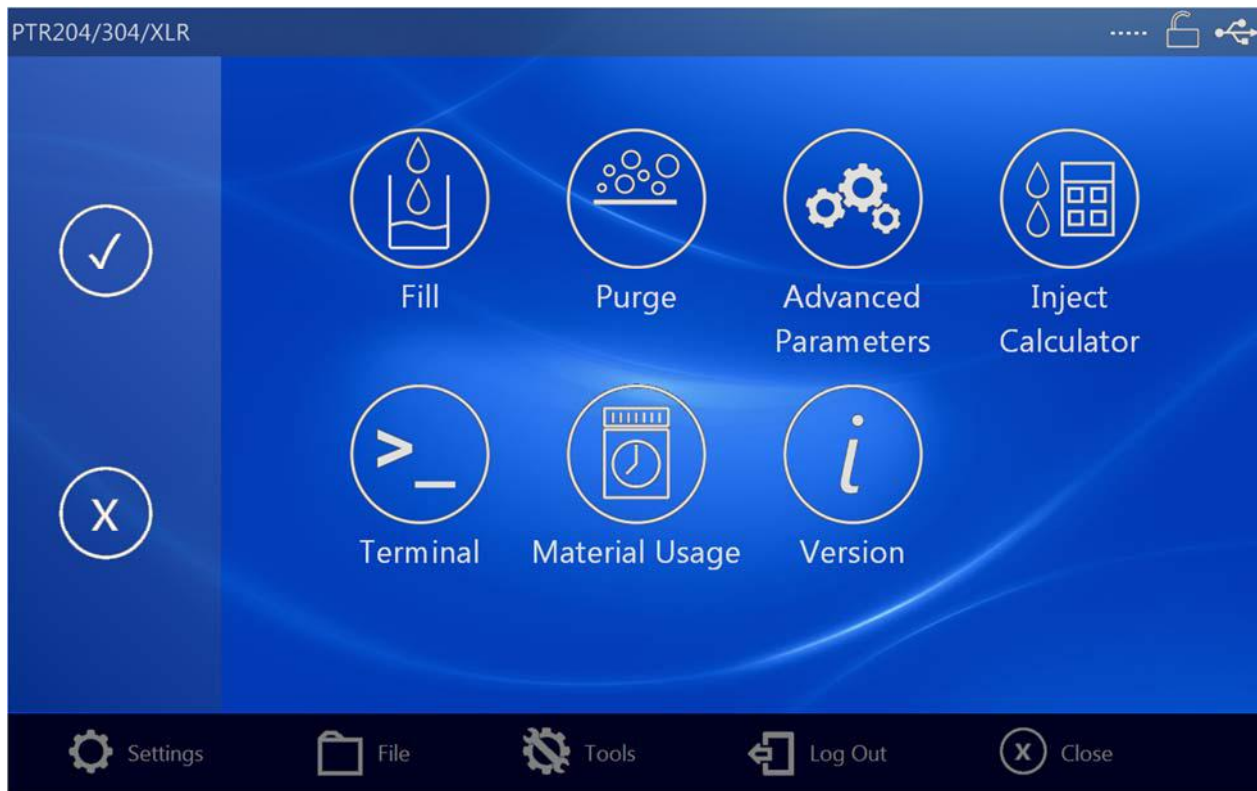


Figure 26 Toolbar – Tool Selection Screen

The set of tools currently available for PTR304/PTR304B include:

- Syringe Fill Tool (PTR304 only)
- Syringe Purge Tool (PTR304 only)
- Advanced Parameters (PTR304 only)
- Inject Calculator Tool
- Terminal Client (direct command language communication with PTR304/PTR304B)
- Material Usage Monitor (PTR304 only)

5.9.1. Fill (PTR304 only)

Allows the user to perform a fill operation. If an Inject sequence is initiated and the pump syringe has insufficient material to perform the inject operation, the machine will automatically fill the syringe from the material bottle. In many situations, the user may prefer to initiate the fill sequence while working away from the machine. Note that the machine cannot be used for any operation while performing a fill operation.



Figure 27 Tools – Fill Screen

5.9.2. Purge (PTR304 only)

Allows the user to initiate a Purge sequence. Purging is a method of removing air bubbles or voids from the inject mechanism. The system should be purged whenever a new bottle of material is installed.



Figure 28 Tools – Purge Screen

5.9.3. Advanced Parameters (PTR304 only)

The Advanced Parameters Screen gives the user access to parameters that would not be modified except under fairly unusual conditions. On PTR304, these parameters are Shrink Time and Cure Lamp Sequence.

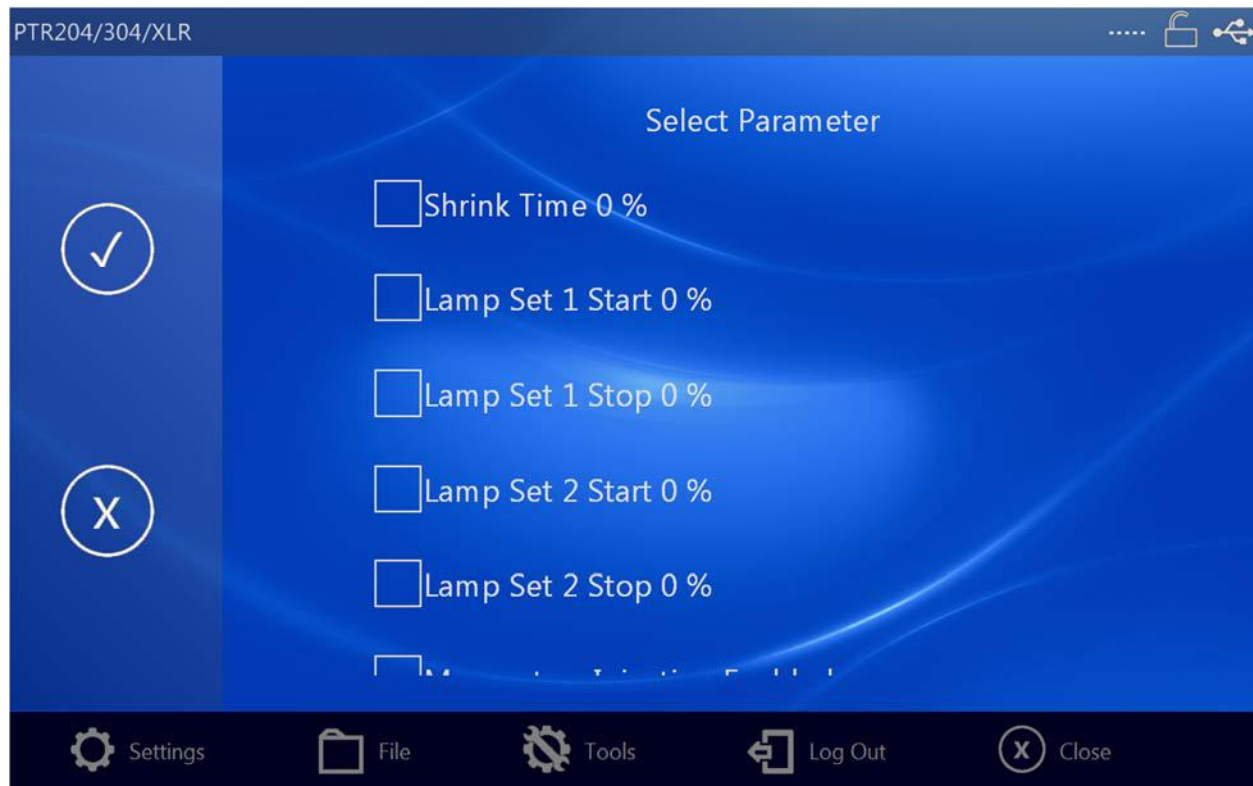


Figure 29 Tools – Advanced Parameters Screen

5.9.4. Inject Quantity Calculator

The Inject Quantity Calculator provides a useful approximation of the recoat material required for a given mold size, fiber diameter and recoat length. Note that the volume is calculated on the assumption of no overlap with the fibers outer jacket. Touching a parameter on the right will bring up the Parameter Edit screen (provided the user has sufficient access rights).

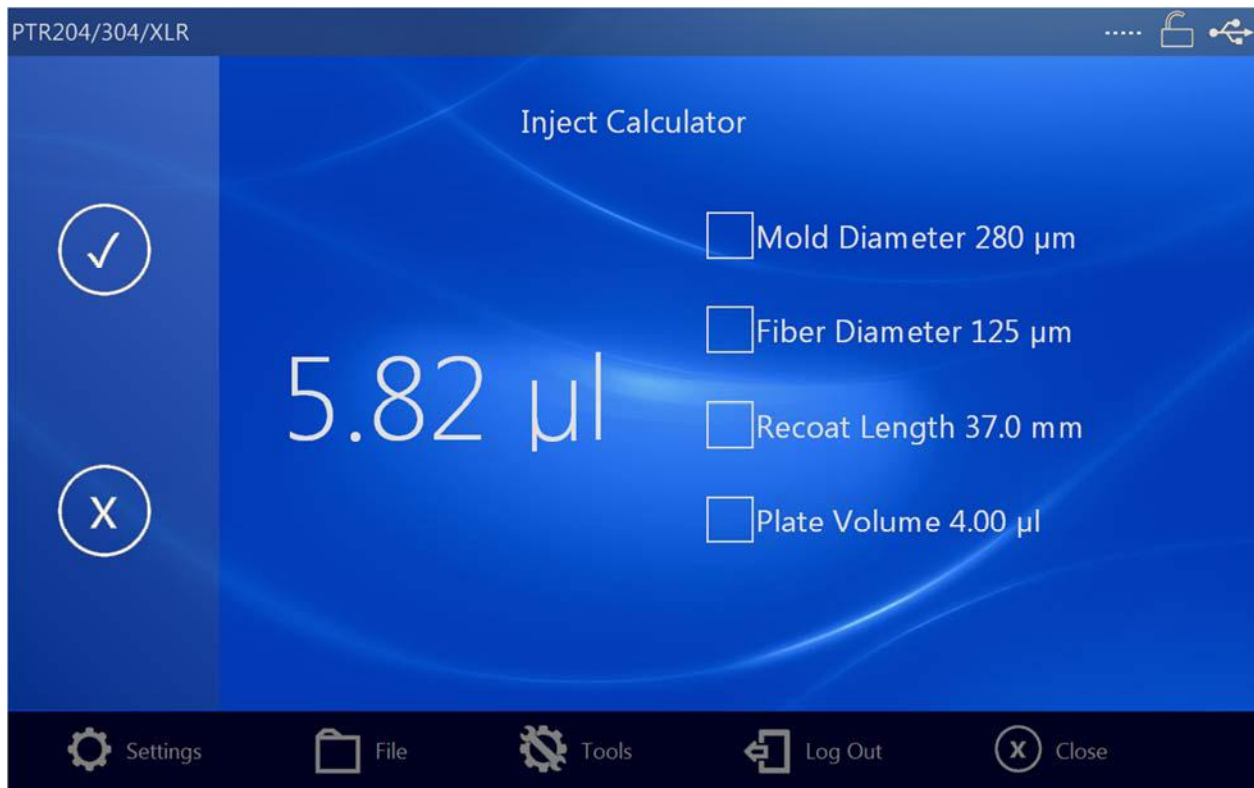


Figure 30 Tools – Inject Calculator Screen

5.9.5. Terminal

The Terminal Screen provides a box (top left) where a command can be entered for transmission. Below that is a list of the most recent commands sent. Touch a command in the list to select it for re-transmission. On the right is the received communications traffic.

Terminal is available for all module types.

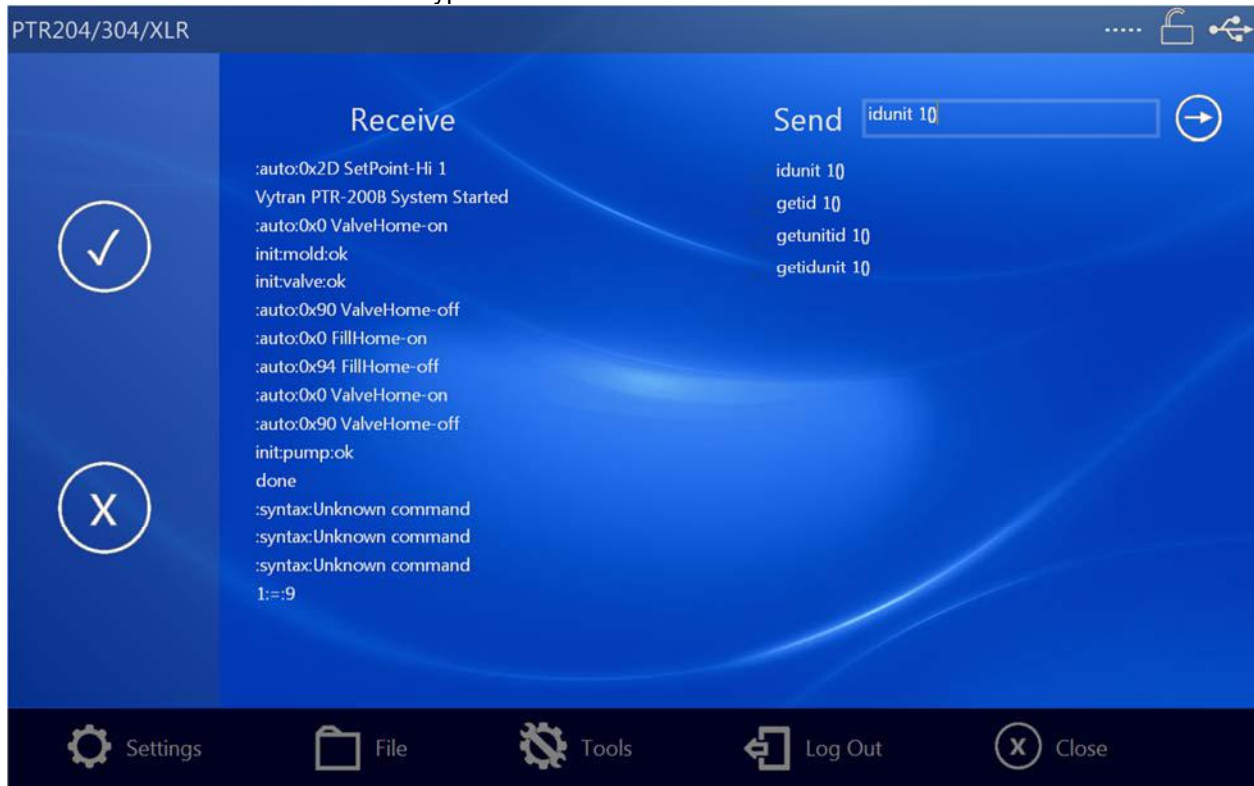


Figure 31 Tools – Terminal Screen

5.9.6. Material Usage (PTR304 only)

The Material Usage Tool allows the user to enter the material bottle volume and expiration date. Click on the Edit button edit the bottle volume and expiration date. The Tablet Controller will then monitor material usage as it is injected into the mold and provide feedback in the Widget after each inject sequence. The Tablet Controller must be connected to the PTR for the material usage monitor to keep track of usage.

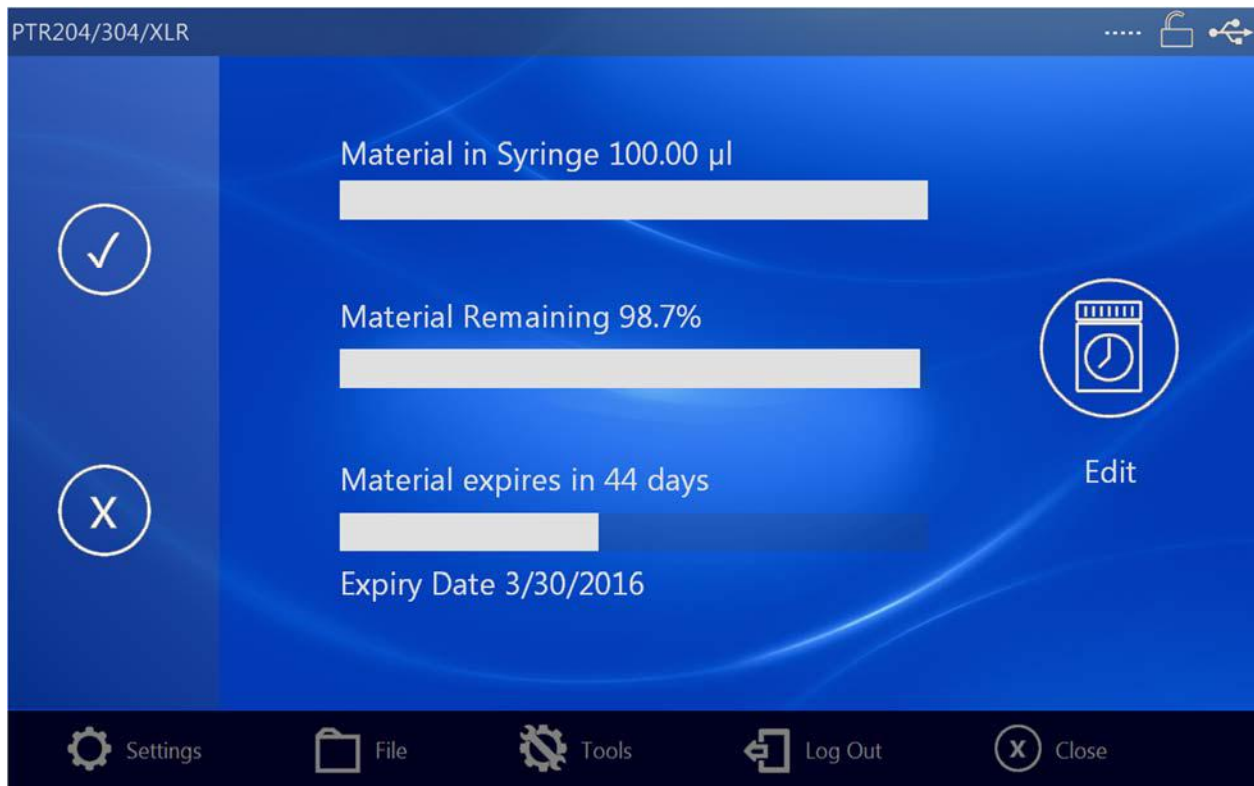


Figure 32 Tools – Material Usage Screen

5.10. Log Out

When the user enters a password, the user is considered 'logged in' with full access permission. The Log Out button provides a quick method of returning to the normal access permission level. If no password has been setup, the Toolbar-Log Out button is permanently greyed. If a password has been setup, the Toolbar-Log Out button is enabled whenever the user has 'logged in' by entering the password.

5.11. Exit / Close

In the default Home Screen, the final toolbar button displays Exit. This will close the Application. When the Tablet is connected to a Vytran module, the button displays Close, this allows the user to return to the default Main Screen so the Tablet can be connected to a different Vytran module.

Chapter 6 Priming the PTR304/PTR304B

The recommended recoat material for use in this system is a high-index UV-curable acrylate material manufactured by Angstrom Bond (item # AB950200, available on the Thorlabs website). Do not attempt to use alternate recoat materials without first consulting Thorlabs on compatibility with this device.

Note: UV Curable recoat materials do have a limited shelf life of approximately 18 months from date of manufacture. Using material that has passed its expiration date may cause both pump performance and recoat quality issues.



WARNING



UV curable acrylate recoat materials can be hazardous to your health if not handled properly. Read the Material Safety Data Sheet provided in: 5.3.9Appendix A: Material Data Safety Sheet, and make sure to follow all precautionary guideline when working with this material.

6.1. Cleaning Recoat Mold

The recoat mold assembly contains two very flat quartz plates, each with a semi-circular channel running longitudinally down the center of their mating surfaces. One plate is mounted in the hinged top which, when closed, forms a circular mold cavity with the bottom plate. In order for the top and bottom plates to mate flush together, they must be cleaned of all dirt and/or coating particles.

The quartz mold plates can be cleaned with a cotton swab wetted with acetone or isopropyl alcohol. Acetone cleans more thoroughly than alcohol and will also soften and lift away any cured recoat material. Do not use excessive scrubbing or scraping action to clean the mold plates. Typically a single wipe from left to right across both top and bottom mold plate is sufficient to clean the plates.

If the recoat mold does have an accumulation of cured recoat material stuck to the plates, allow the cleaning solution (preferably acetone) time (60 - 90 seconds) to soften and lift any cured material. The soft Thorlabs “toothbrush” provided can be used occasionally to clean the mold channels of any cured coating particles.

Note: The top surface of the bottom mold plate has an optical coating that blocks UV light. Great care must be taken not to scratch or abrade this coating. Do not rub any hard objects across the surface of the plates as this could scratch the optical coating or chip the edges of the mold channel and degrade the quality of the recoat.

6.2. Priming the Injection System

Both the PTR304 and PTR304B can be injected manually if necessary. The PTR304B comes standard with the remote manual injector, whereas the PTR304 comes standard with the automatic injector.

For priming the injection system go to the appropriate chapter below.



WARNING



UV curable acrylate recoat materials can be hazardous to your health if not handled properly. Read the Material Safety Data Sheet provided in: 5.3.9Appendix A: Material Data Safety Sheet, and make sure to follow all precautionary guideline when working with this material.

6.2.1. Priming a Manual Injection System (PTR304 & PTR304B)

The top quartz plate contains an injection port, which must be filled with UV acrylate material prior to placing the fiber in the recoat mold. The injection port can be filled by using a syringe (supplied) to dispense the UV material. Care must be taken to prevent the formation of bubbles in the UV material when loading both the syringe and the injection port.

To load the injection port, use the following procedures (see Figure 33):

1. Fill the syringe by inserting the tip into the bottle of UV material. Make sure that the tip is immersed in the material and slowly draw out the plunger.
2. If an air bubble gets trapped within the syringe, turn the syringe upside down for several minutes to allow the bubble to rise to the tip. Gently push in on the plunger to force out the air bubble.
3. Remove the threaded plunger from the injection port.
4. Slowly dispense material from the syringe into the injection port. Make sure not to trap or inject air bubbles in the port. A good procedure is to dispense a small drop of recoat material at the tip of the syringe and then touch the drop to the inside back surface of the injection port. Give the material time to flow down into the inject port – repeating with additional drops until material almost reaches the top. Some room should be left at the top in order to insert the O-ring plunger. If too much material is dispensed into the port such that it protrudes above the top, insert a small scrap piece of fiber into the port to remove some material.
5. Raise the recoat top slightly and press the O-ring of the injection plunger into the port.
6. Rotate the plunger clockwise until the threads just catch.
7. Raise the recoat top and wipe away any excess UV material that may have injected out through the top. Once the recoat port has been filled, it should contain enough UV material for several recoats.
8. Clean the mold plates of all excess recoat material.

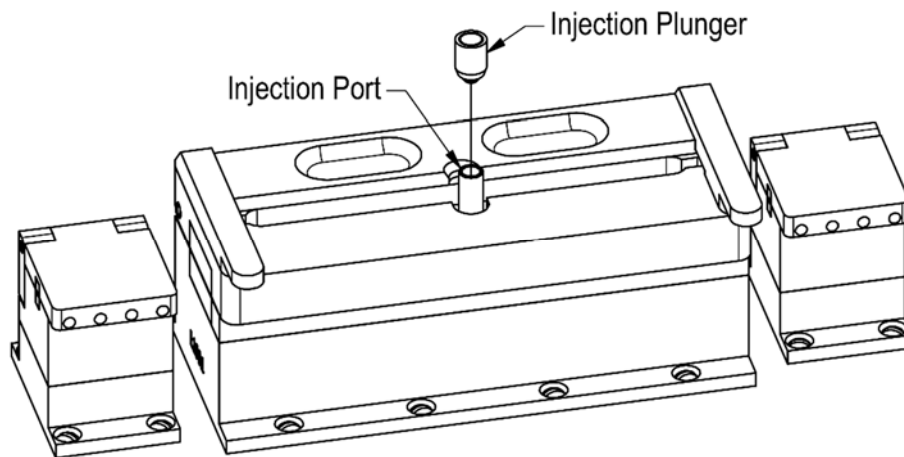


Figure 33 Loading the Manual Injection Port

6.2.2. Priming a Remote Manual Injection System (PTR304B)

The PTR304B comes standard with a remote manual recoat injector, which is fitted to the right side of the unit. This injection system provides a method of manually dispensing recoat material directly from the recoat bottle into the injection port. This system consists of a syringe with a knurled dispensing screw which is fitted to a distribution valve with a two-position selection lever. The lever can be positioned downward (toward the recoat bottle) to draw up material from the recoat bottle, or horizontally (toward the syringe) to inject material into the mold. The knurled syringe screw is unscrewed (turned counterclockwise) to fill the syringe, and screwed in (turned clockwise) to inject material. The selection lever must always be in the correct position for the desired operation (see table below).

OPERATION	LEVER POSITION	TURN SYRINGE SCREW
Fill syringe with recoat material	Down (toward recoat bottle)	Counter-clockwise (unscrew)
Inject recoat material into mold	Horizontal (toward syringe)	Clockwise (screw in)

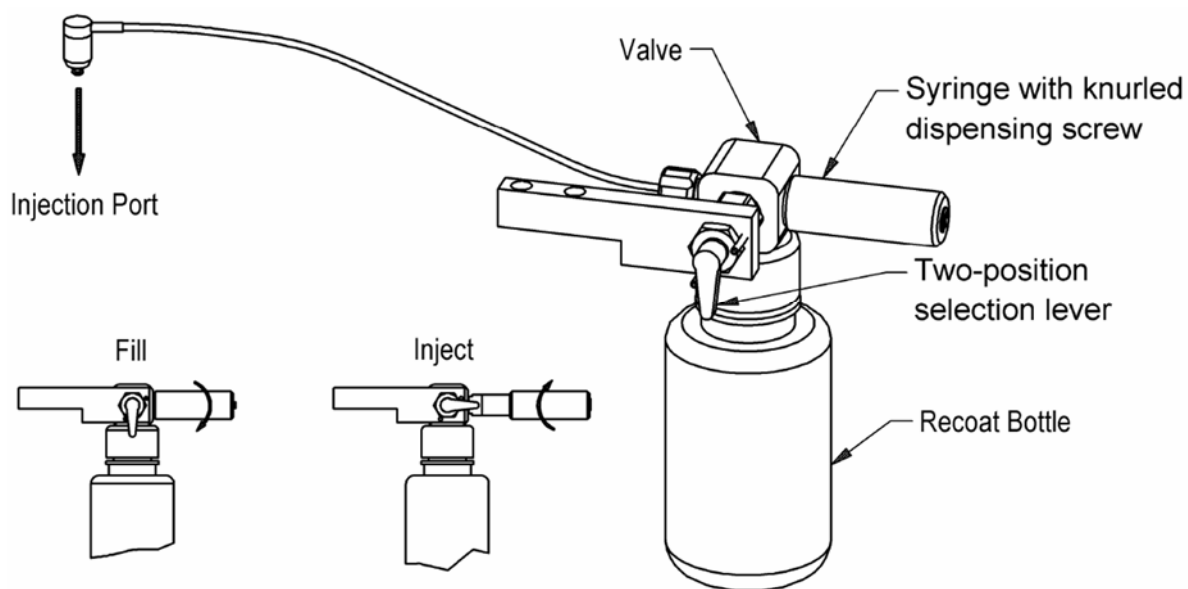


Figure 34 Remote Manual Injector

Prior to first use, the following steps must be followed to load the system with recoat material and purge all air from lines.

**WARNING**

UV curable acrylate recoat materials can be hazardous to your health if not handled properly. Read the Material Safety Data Sheet provided in Chapter 9 Material Data Safety Sheet, and make sure to follow all precautionary guideline when working with this material.

1. Make sure to have lens tissue and cleaning solution (acetone or alcohol) available prior to proceeding.
2. Raise the recoater top.
3. Position the selection lever to the Inject position (lever horizontal) and screw in (turn clockwise) the knurled syringe screw until a slight resistance is felt at the end of travel. Do not use excessive force when turning in the screw once the end of travel is reached. The end of travel point is reached when the leading edge of the syringe screw is approximately level with the step in the syringe body.
4. Fit a recoat bottle with fresh recoat material to the system. The red inject tube should be long enough to just reach the bottom of the recoat bottle. If using a short (30ml) recoat bottle the red tube may need to be trimmed to length.
5. Turn the selection lever to the Fill position (lever down). Unscrew (turn counter-clockwise) the knurled syringe screw to draw recoat material from the bottle into the syringe. Continue unscrewing the syringe screw approximately 3/4" or until it is felt to spin freely. Do not pull on the syringe screw once the end of travel is reached; this will pull the plunger out from the syringe body.
6. Turn the selection lever to the Inject position (lever horizontal) and screw in (turn clockwise) the syringe screw until the inject end of travel point is reached.
Note: If the syringe screw was fully unscrewed until it spun freely, a slight forward pressure may initially be required to re-engage the threads
7. Watch the injection port for signs of recoat material. Make sure to collect the recoat material as it comes out of the mold injection port. Do not allow recoat material to run down the face of the mold and under the mold plate.
8. The above steps of filling and injecting the syringe must be repeated several times to fully displace air from the system. Recoat material should run freely from the mold without bubbles. If bubbles are still present, run additional fill-inject sequences. It may help to turn the recoat plunger back and forth several times during the inject sequence in order to remove air trapped at the O-ring seal. It is also sometimes helpful to fill the syringe and then lift the left side of the unit such as to angle the syringe approximately 45°. Leave the unit angled in this position for approximately 15 minutes. This will allow any air trapped in the syringe to rise up towards the distribution valve such that it can then be injected out.
9. Once the system runs free of air bubbles, clean the mold plates of any excess recoat material.

6.2.3. Priming an Automatic Injection System (PTR304)

The PTR304 comes standard with an automatic recoat injection pump fitted inside the unit. This injection system must first be filled and purged with recoat material prior to operation. Follow the below steps to initialize this system.



WARNING



Prior to handling the UV acrylate material, be sure to read the Material Safety Data Sheet provided in Chapter 9: Material Data Safety Sheet.

1. Remove the front panel by removing four (4) socket head cap screws. A 3/32" hex key is provided in the tool kit.
2. Unscrew the recoat reservoir (brown bottle) shown in Figure 7 and fill 3/4 full with recoat material (ANGSTRÖMBOND® 950-200), being careful not to generate air bubbles.
3. Screw the reservoir bottle back into place and replace the front panel.

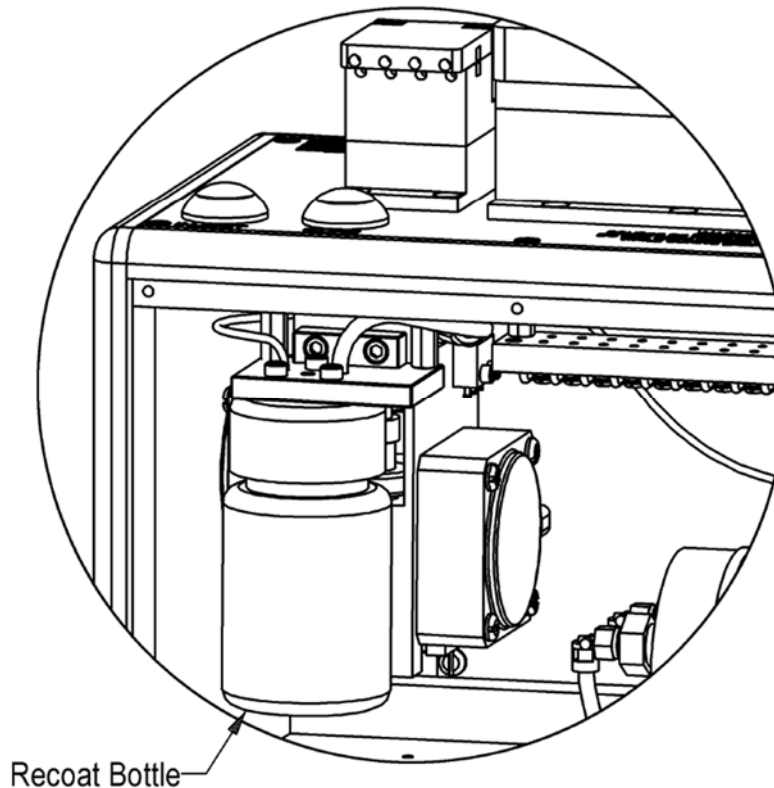


Figure 35 PTR304 Recoat Bottle Access

4. Connect the Tablet Controller.
5. Switch the device on and wait for the system to initialize.
6. Execute 5 purge cycles, which will take approximately 30 minutes. Each purge cycle will draw recoat material from the bottom of the bottle through the red fill tube and inject material back into the top of the bottle through the green purge tube.
7. After completion of the pump purge cycle, the green inject tube that runs from the pump to the inject port of the mold must also be purged. Raise the recoat mold top and make sure to have cotton swabs and cleaning solution (alcohol or acetone) available prior to proceeding.

8. Set the inject rate to 1.8 $\mu\text{l}/\text{sec}$.

9. Inject 50 μl of recoat material.

Note: Make sure to collect the recoat material as it comes out of the mold injection port. Do not allow recoat material to run down the face of the mold and under the mold plate.

10. If the system was “dry” prior to proceeding, it will take 4 “inject 50 μl ” sequences to purge air completely from the inject tube.

Note: The syringe in the recoat pump only holds 100 μl . The pump will need to fill each time 100 μl is used.

11. Once the pump and the inject tube are purged, clean the mold plates of all excess recoat material.

12. Reset the inject rate to the appropriate setting.

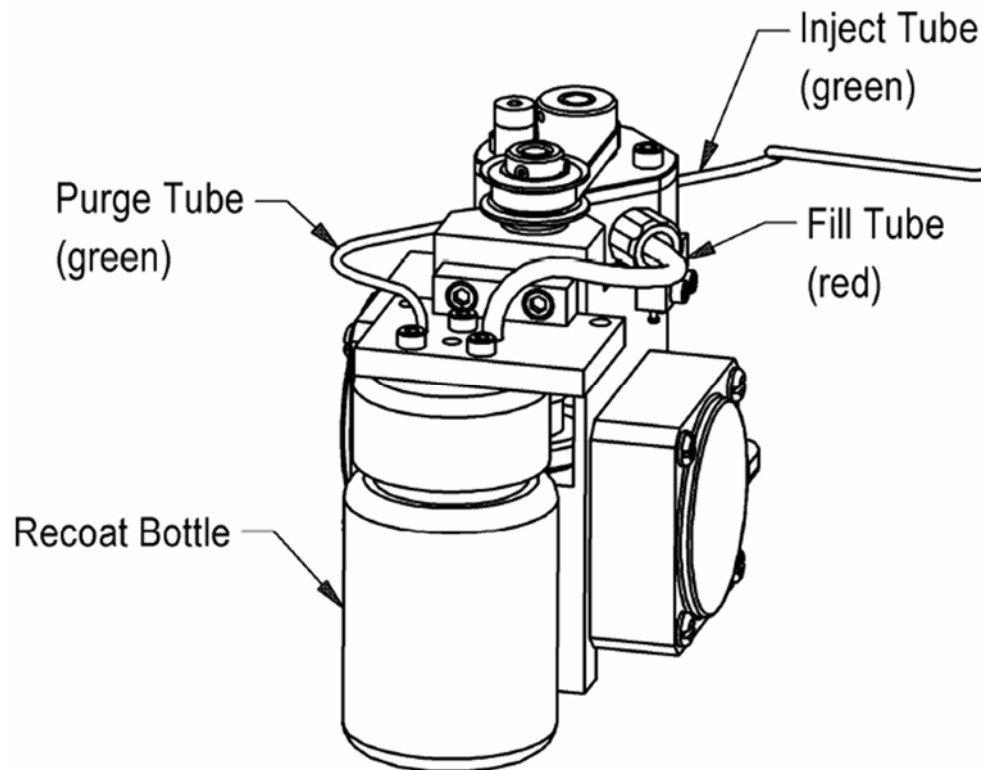


Figure 36 PTR304 Recoat Material Flow

Chapter 7 Recoat Process

The purpose of the recoat is to maintain the strength and flexibility of the fiber or fusion splice by protecting the glass surface from damage. It should be noted that recoating a splice does not make the splice stronger.

To recoat fusion splice, the section of exposed fiber is placed in a quartz recoat mold assembly. External holding fixtures secure the fiber, centering it within the recoat assembly. To allow for tolerance variations from fiber manufacturers, the diameter of the recoat mold cavity is generally specified to be slightly larger than the nominal outside coating diameter (e.g. 280 μm for a nominal 250 μm coating).

The recoat process maintains a near original fiber diameter and delivers a flexible fusion splice that can be handled or tightly coiled as if no splice were present. The integrated fiber holding fixtures ensure that the fiber strength is not degraded by the recoat process.

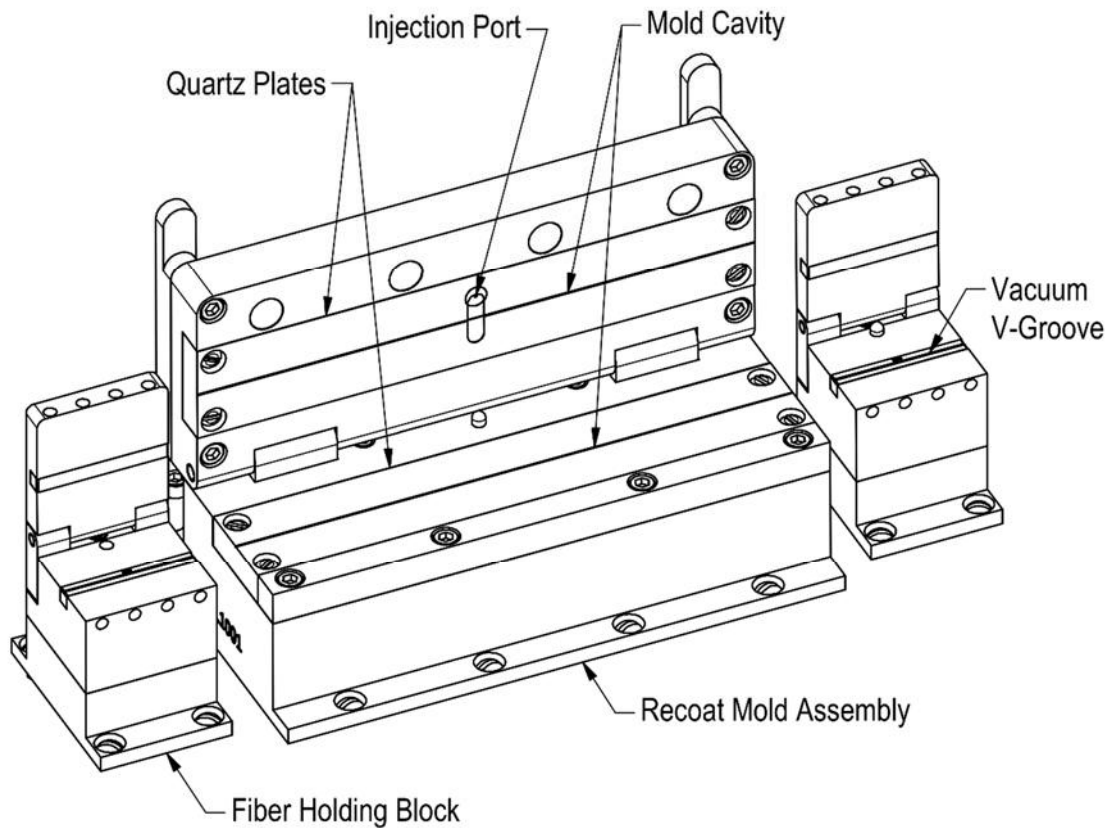


Figure 37 Recoat and Components

7.1. Loading the Fiber

A vacuum V-groove fiber holding block is mounted on each side of the recoat mold assembly to position the fiber in the mold channel. Vacuum to the fiber holding blocks is automatically turned on when one of the holding tops is raised.

To position a fiber for recoating, use the following procedures:

1. Raise the recoat top and both holding block tops.
2. Make sure both quartz plates are clean and that the injection port has enough UV material for the recoat (Manual Injection System) or that the injection system is purged (Automatic Injection System or Remote Manual Injector).
3. Hold the section of fiber to be recoated taut and lower it down over the fiber holding block such that the exposed section (fusion splice) is centered in the recoat mold. The fiber will be drawn by the vacuum into the V-grooves of the holding blocks.

Note: Vacuum to the V-groove holding fixtures will automatically shut off if left on for more than 30 seconds. To restart the vacuum, close both holding fixture tops and then raise one of the tops. It is good practice to keep both holding fixture tops closed when not in use.

4. Double check that the exposed section of fiber is centered in the mold. Lower one of the holding block tops to clamp the fiber.
5. Make sure that the fiber is taut between the holding fixtures and lower the second holding top. The fiber should be held in line with the recoat mold channel.
6. Lower the recoat top **gently** to capture the fiber within the mold cavity.

It is important to keep the fiber taut between the holding fixtures to prevent the fiber from bowing at the recoat interface. It is also important to avoid touching the exposed glass surface as this could significantly lower the strength of the fiber. Care should, therefore, be taken when positioning the fiber in the holding blocks to avoid rubbing the exposed section of fiber against the mold assembly. If proper care is taken when positioning the fiber, the recoat process will not degrade the strength of the fiber.

7.2. Recoating

Proceed to the appropriate section based on the type of injection system being used.

7.2.1. Manual Injection System (PTR304 & PTR304B)

Once the fiber has been captured in the recoat mold assembly, the injection plunger should be turned clockwise to inject the UV acrylate material into the mold cavity. The material will flow from the injection port, down a shallow channel, into the recoat cavity. The plunger should be turned slowly to give the material time to flow smoothly along the injection path.

Use the viewport in the recoat top to watch the material flow into the mold. Continue turning the plunger until the acrylate material reaches both coating interfaces of the exposed section of fiber. A slight migration of the acrylate material outside of the injection path between the two mold plates can be expected. The bottom mold plate has an optical coating that prevents this material from curing and forming a characteristic mold flashing. Excessive flashing flow indicates that the plates did not mate flush together. This is generally caused by dirt particles on the mold plates and/or by trying to recoat a fiber that has a larger coating diameter than the recoat mold.

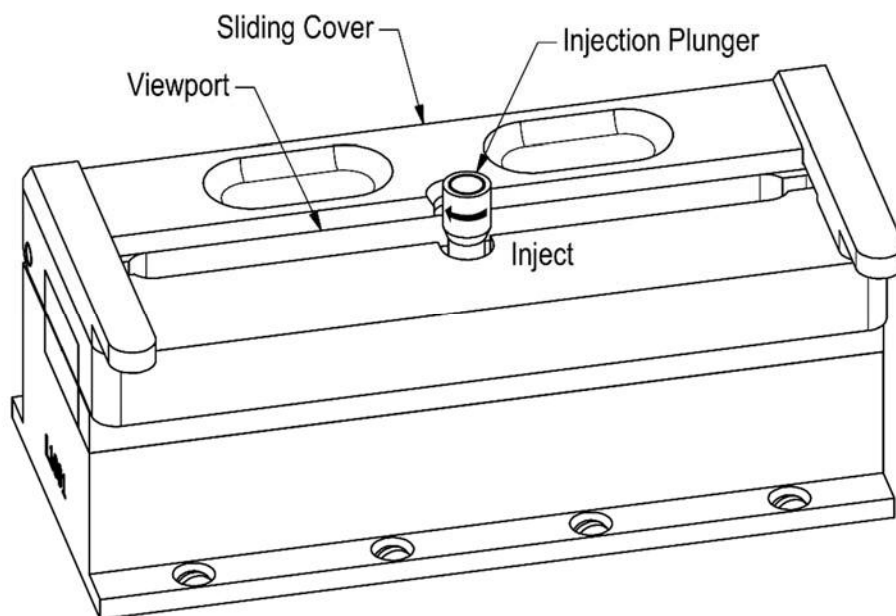


Figure 38 Manual Recoat Injection

7.2.2. Manual Remote Injection System (PTR304B)

Make sure that the selection lever is in the inject position (lever up). Once the fiber has been captured in the recoat mold assembly, the injection syringe should be screwed in (turned clockwise) to inject the UV acrylate material into the mold cavity. The material will flow from the injection port, down a shallow channel, into the recoat cavity. The syringe should be turned slowly to give the material time to flow smoothly along the injection path.

Use the viewport in the recoat top to watch the material flow into the mold. Continue turning the injection syringe until the acrylate material reaches both coating interfaces of the exposed section of fiber. A slight migration of the acrylate material outside of the injection path between the two mold plates can be expected. The bottom mold plate has an optical coating that prevents this material from curing and forming a characteristic mold flashing. Excessive flashing flow indicates that the plates did not mate flush together. This is generally caused by dirt particles on the mold plates and/or by trying to recoat a fiber that has a larger coating diameter than the recoat mold.

NOTE: If the syringe end of travel is reached during the injection process, the syringe can be re-filled mid-process by positioning the selection lever to the fill position (lever down) and un-screwing (turn counterclockwise) the syringe screw. Once filled, re-position the selection lever to the inject position (lever horizontal) and continue injecting material into the mold.

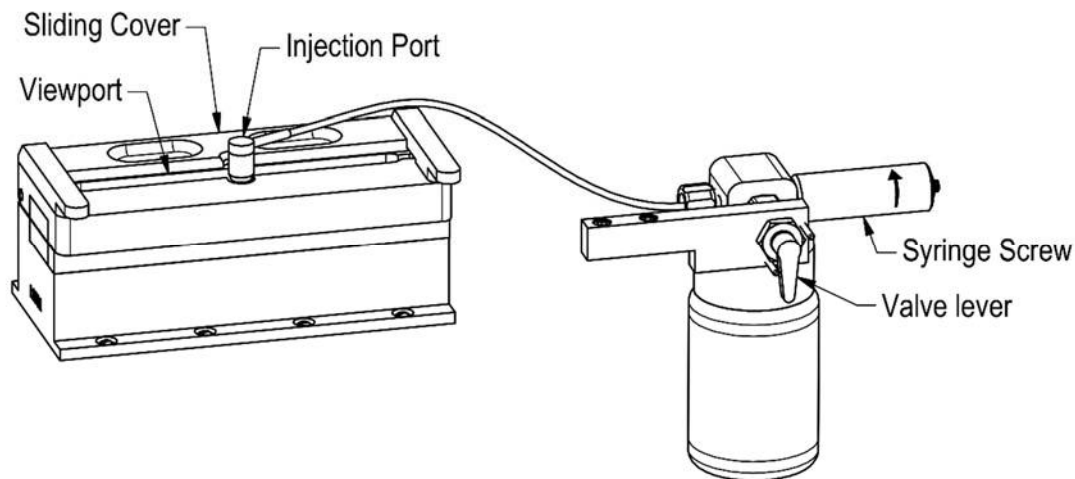


Figure 39 Remote Manual Recoat Injection

7.2.3. Automatic Injection System (PTR304)

Once the fiber has been captured in the recoat mold assembly, press and hold the inject button on the top plate of the unit. This will activate the injection pump and begin dispensing recoat material.

Use the viewport in the recoat top to watch the material flow into the mold. Release the button to stop dispensing material once it has reached the coating interface.

A slight migration of the acrylate material outside of the injection path between the two mold plates can be expected. The bottom mold plate has an optical coating that prevents this material from curing and forming a characteristic mold flashing. Excessive flashing flow indicates that the plates did not mate flush together. This is generally caused by dirt particles on the mold plates and/or by trying to recoat a fiber that has a larger coating diameter than the recoat mold.

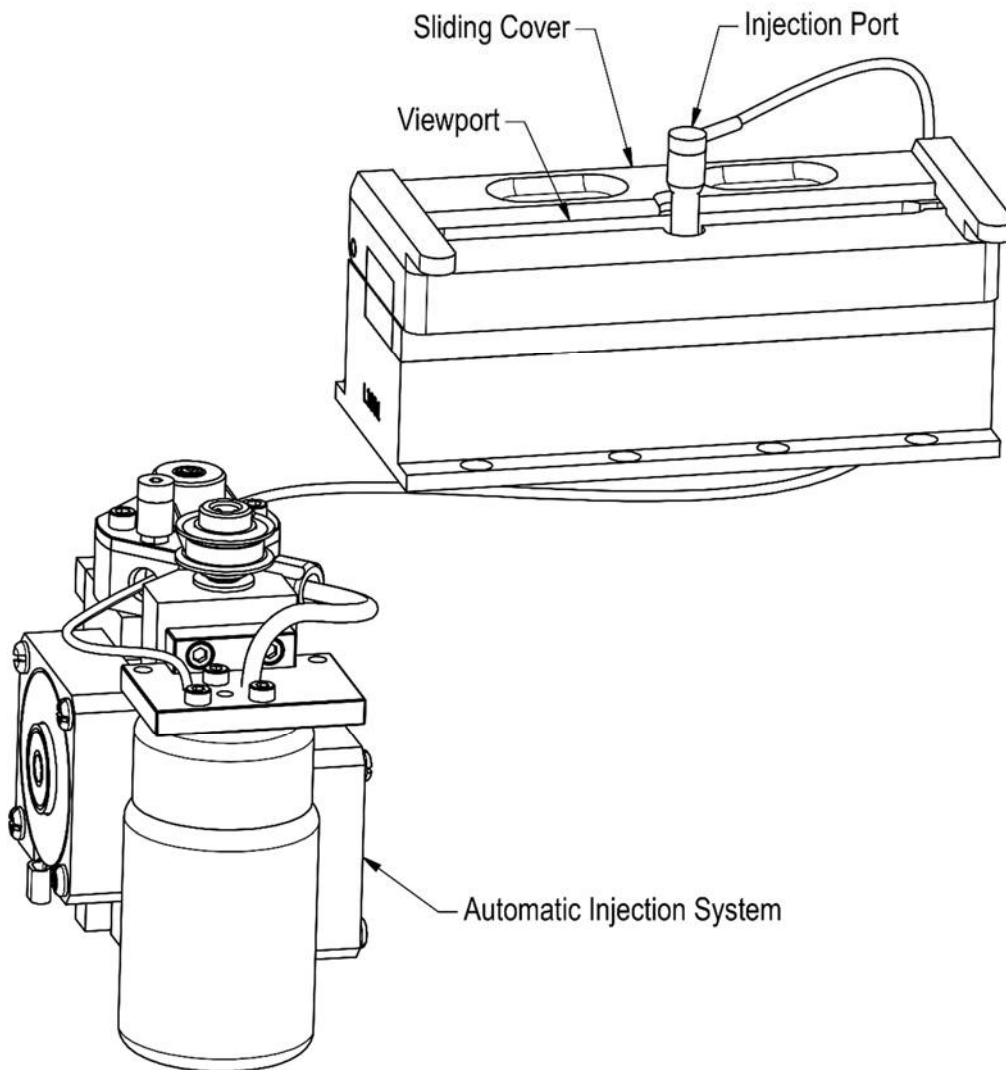


Figure 40 Automatic Recoat Injection

7.2.4. Curing the Coating

The liquid UV acrylate material cures to a solid state when exposed to ultra-violet light. The necessary UV radiation is provided by eight tungsten-halogen lamps located below the bottom mold plate. The optical coating on the bottom plate ensures that any material which flows between the two plates will not cure and form a flashing on the recoated section of the fiber.



WARNING



Do not look directly at the recoat assembly while the recoat lamps are on. The recoat lamps emit ultraviolet radiation which can cause damage to the eyes. The mold top must be closed during recoat lamp operation. It is advised that the sliding cover be slid forwards over the view port during recoat lamp operation.

To cure the fiber coating, use the following procedures:

1. Make sure recoat material has been injected up to or beyond the coating interfaces.
2. Pull the sliding cover forwards to block the UV light.
3. Activate the cure process to turn on the UV lamps. The recoat lamps will shut off automatically after the set cure time.
4. Push the sliding cover back.
5. Raise both fiber holding block tops.
6. Raise the recoat mold top by lifting straight up at the two outside corners of the top. A slight force is typically required to “pop” the top free.

Note: Do not lift by or exert any force on the injection port.

7. The fiber may remain tacked to either the top or bottom mold plate. In this case, it may be necessary to gently pull on the fiber to release it. Try to avoid inducing any sharp bend to the fiber.
8. Visually inspect the recoated fiber to make sure the recoat reached both interfaces and that there are no voids or air bubbles in the recoat. The recoat can be gently wiped with a dry lens tissue to remove any uncured recoat material or light flashing. Do not wipe the recoat with acetone.
9. Clean both top and bottom mold plates with a soft lint-free lens tissue and/or cotton swab soaked in cleaning solution.

Note: Acetone is the preferred solution for cleaning the mold plates. Acetone cleans more thoroughly than alcohol and will also soften and remove cured recoat material. The mold plates can typically be cleaned of excess uncured recoat material with a single wipe from left to right across both top and bottom plates. Take care to avoid contact with the uncured recoat material (read “Chapter 9: Material Data Safety Sheet” before working with recoat material).

Note: The top surface of the bottom mold plate has an optical coating that blocks the UV light. Great care must be taken not to scratch or abrade this coating. Do not rub any hard objects across the surface of the plates as this could scratch the optical coating or chip the edges of the mold channel and degrade the quality of the recoat.

Chapter 8 Maintenance

The purpose of the maintenance section is to define the planned maintenance requirements of the PTR304/PTR304B. Where appropriate maintenance procedures are included.

8.1. Planned Maintenance

The PTR304 and PTR304B fiber recoaters are designed for a production environment to give trouble free operation provided normal planned maintenance is adhered to. Maintenance and repair procedures should only be performed by trained personnel. Improper service and/or repair could result in the safety features being disabled and can also lead to damage that will not be covered under warranty.

Planned Maintenance Schedule

Maintenance	Every Cycle	Every Shift	Daily	Monthly	3 Months	6 Months
Clean Mold ¹	✓	✓	✓	✓	✓	✓
Check/clean FHB Inserts ¹		✓	✓	✓	✓	✓
Check UV Lamps ¹			✓	✓	✓	✓
Run Purge (5 cycles)				✓	✓	✓
Replace UV Lamps ²				✓	✓	✓
Flush Recoat System						✓
Replace Recoat Material						✓

8.2. Cleaning

8.2.1. Clean Mold

Keeping the mold plates clean is vitally important for proper recoat performance and quality. The mold plates should be cleaned of dirt, dust or excessive recoat material before each use. Clean the mold plates only with a soft cotton swab soaked in cleaning solution. Acetone is the preferred solution for cleaning the mold plates. Acetone cleans more thoroughly than alcohol and will also soften and lift away any cured recoat material. Do not use excessive scrubbing or scraping action to clean the plates. Give the cleaning solution time (60 - 90 seconds) to soften and lift any cured material. Excessive cleaning can shorten the life of the mold through damage to the coatings on the mold plates or chipping of the mold channel.

8.2.2. Check/Clean Fiber Holding Block Inserts

Turn OFF the unit and raise the top of both fiber holding blocks. Visually inspect the vacuum V-groove inserts for debris or damage. If debris is present, clean the V-grooves with a cotton swab wetted with acetone or alcohol.



WARNING



Do NOT clean the V-groove insert with solvent when the PTR-200 is turned ON. The solvent will be drawn into the vacuum system and will cause internal damage. If the V-groove inserts appear to be damaged, replace the inserts.

¹ Maintenance Operations can be Performed by the Operator

² Lamp Replacement Schedule Based on 2,000 Recoats/Month at 15 sec/Recoat

8.3. Recoat System Maintenance

8.3.1. Check Recoat Lamps

The PTR304/PTR304B uses tungsten halogen lamps as the UV source for curing the recoat material. These lamps have a useful lifetime of 500 minutes (30,000 seconds) and degrade linearly to 50% of their initial output over this period. For a standard cure time of 15 seconds on a 280 micron mold, this is a useful life of 2,000 recoats. If the lamps collect dirt and/or recoat material due to improper use and/or cleaning, this lifetime can be even further reduced. For production environments, it is recommended that a fixed lamp replacement schedule of 1500 recoats be implemented (shorter if using longer recoat cure times for larger molds). Also note that during this period the cure time will need to be increased to compensate for reduced lamp output.

To check the recoat lamps, open the top of the recoat mold assembly and press the CURE button on the top of the device. This applies low power to the UV lamps for visual inspection. This can also be done from Tablet Controller. Look through the bottom recoat mold plate and check to make sure that all eight recoat lamps are visibly illuminated. Because the lamps are powered in series pairs, if one lamp burns out, two lamps will not illuminate.



WARNING



Do not inspect the UV lamps while the top of the recoat mold assembly is closed, as the UV lamps will be powered for a cure process when pressing the CURE button.

If a lamp is burned out, remove the recoat assembly (see 8.3.8) and replace the burned out lamp (see 8.3.9). Replace the recoat assembly and re-align.

8.3.2. Empty the Manual Injection System (PTR304 and PTR304B)

If the recoat mold assembly is stored for any length of time, the acrylate injector port must be emptied, particularly if it is stored near a fluorescent light source. If it is stored when not empty, the material may cure (harden) in the port. To empty the injector, open the recoat mold top. Turn the injection plunger clockwise to force the UV acrylate material out of the injection port and onto the recoat mold plate. Wipe up the acrylate as it is ejected with a soft lint-free cloth. Clean the mold thoroughly and store with several layers of soft lens tissue between the plates.

8.3.3. Flush the Manual Remote Injection System (PTR304B)

The recoat pumping system should be flushed clean every 6 months as part of the recoat material replacement procedure. Before flushing the system, make sure to have lens tissue and cleaning solution (acetone or alcohol) available prior to proceeding. To flush the system:

1. Raise the recoater top.
2. Position the selection lever to the Inject position (lever horizontal).
3. Screw in (turn clockwise) the knurled syringe screw until a slight resistance is felt at the end of travel. Do not use excessive force when turning in the screw once the end of travel is reached. The end of travel point is reached when the leading edge of the syringe screw is approximately level with the step in the syringe body.

Note: Make sure to collect the recoat material as it comes out of the mold injection port. Do not allow recoat material to run down the face of the mold and under the mold plate.

4. Replace the recoat bottle with one containing clean solvent.
5. Turn the selection lever to the Fill position (lever down).
6. Unscrew (turn counter-clockwise) the knurled syringe screw to draw the solvent from the bottle into the syringe. Continue unscrewing the syringe screw approximately $\frac{3}{4}$ inches or until it is felt to spin freely.

Note: Do not pull on the syringe screw once the end of travel is reached; this will pull the plunger out from the syringe body.

7. Turn the selection lever to the Inject position (lever horizontal) and screw in (turn clockwise) the syringe screw until the inject end of travel point is reached.

Note: If the syringe screw was fully unscrewed until it spun freely, a slight forward pressure may initially be required to re-catch the threads.)

8. Watch the injection port for signs of solvent.
9. The above steps of filling and injecting the syringe must be repeated several times to fully displace recoat material from the system. Repeat until clean solvent flows from the injection port.
10. Clean the mold plates of all excess solvent and recoat material.
11. Remove the bottle containing the solvent and dispose of the solvent according to proper handling guidelines.
12. Repeat step 5 - 7 with no bottle present to purge any solvent from the injection system.
13. Prime the system by following the instructions in 0.

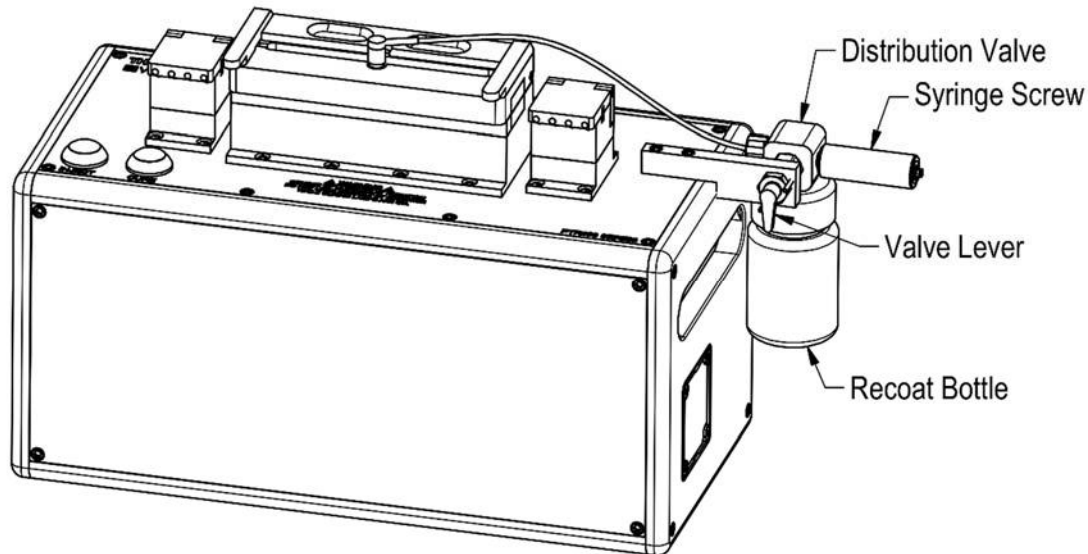


Figure 41 Remote Injection System

8.3.4. Purge the Automatic Injection System (PTR304)

The purge cycle is a process of emptying the recoat material of the Automatic Injector back into the recoat material bottle and refilling the pump with fresh recoat material drawn from the bottom of the bottle.

If the recoater is not used in a high volume application (less than 200 recoats per month), it is recommended that the system be purged monthly in order to circulate fresh recoat material into the pump. Running 5 purge cycles is sufficient to entirely fill the pump with fresh recoat material.

8.3.5. Flush Automatic Injection System (PTR304)

The recoat pumping system should be flushed clean every 6 months as part of the recoat material replacement procedure. Before flushing the system, make sure to have lens tissue and cleaning solution (acetone or alcohol) available prior to proceeding. To flush the system:

1. Remove the internal recoat bottle and clean all exposed tubing and fittings with acetone.
2. Install a bottle filled 3/4 full with acetone on the pump.
3. Run 5 purge cycles.
4. Remove the bottle and fill with clean acetone.
5. Run 5 more purge cycles.
6. Make sure the recoat mold is open.
7. Run several inject 50 μ l sequences until acetone runs clear from the mold inject port.
Note: Make sure to collect material as it comes out of the inject port. Do not allow any material to run under the mold plates.
8. Remove the bottle of acetone from the pump.
9. Run several more inject 50 μ l sequences until no more acetone exits the injection port.
10. Run one purge cycle. Make sure to collect any acetone that comes out of the green purge tube at the top of the bottle fitting.
11. Clean all bottle tubing and fittings with acetone.
12. Prime the system by following the instructions in 0.

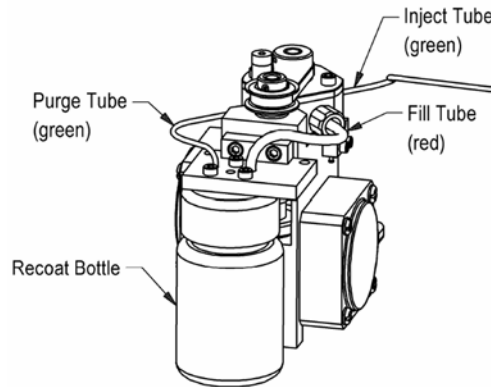


Figure 42 Recoat System

8.3.6. Replace Recoat Material

Recoat material has a finite shelf life and should be replaced every 6 months. To replace the recoat material first flush the system as outlined above. Once the system is flushed, fill a clean recoat bottle 3/4 full with fresh recoat material and follow the procedures above.

NOTE: The one-ounce internal recoat bottle holds approximately 20,000 micro-liters when 3/4 full. The number of recoats per fill and the approximate time before the material needs to be refilled can be determined based on the volume of material per recoat (typically 6.5 micro-liters for a 280 micron mold) and the number of recoats per month. For most applications the material will need to be replaced before it runs out. Even if fresh material is added to the internal bottle prior to the 6-month Preventive Maintenance (PM) schedule, the material should still be replaced since mixing of the old and new materials occurs.

8.3.7. Recoat Diagnostics

Problem	Possible Cause	Solution
Fiber snaps when mold top lowered.	Fiber not loaded properly.	See “7.1 Loading the Fiber”.
	Recoat mold not properly aligned to fiber.	Refer to the “8.3.8” Replace and Align Mold Assembly” section for instructions on realigning the recoat mold assembly.
	Channels of recoat mold plate are misaligned..	Contact Thorlabs for recoater servicing.
Material flows excessively outside of mold cavity or does not flow down mold cavity (“puddling”).	Recoat mold plates are dirty.	Dirt between quartz mold plates will not allow them to lay flush, causing the acrylate to flow excessively outside the mold cavity. The recoat mold plates should be cleaned as described in the “8.2.1 Clean Mold” section.
	Channels of recoat mold plate are misaligned.	Contact Thorlabs for recoater servicing.
Plunger turns excessively when injecting acrylate.	Bubbles in injector port.	Empty the recoat injector port (refer to the Maintenance section for instructions) and reload.
Flashing forms along the length of the recoat.	Cure time too long.	This will increase the modulus of the coating and make it stiffer. In the future, decrease the cure time. This flashing can generally be removed by wiping the recoated section with a dry lens tissue. <i>Do not use a solvent!</i>
Recoat feels tacky or can be easily rubbed off by pulling the fiber between fingers.	Cure time too short.	Increase the cure time.
	Recoat lamp(s) burned out or old.	Replace the recoat bulb (refer to the “8.3.9 Replace Tungsten Halogen Lamps” section for instructions).
Fiber sticks to recoat mold consistently.	Recoat mold plates are dirty.	Clean the recoat mold plates as described in “8.2.1. Clean Mold”.
Fiber snaps when lifting the recoat mold top.	Failed to first release the holding fixture tops before lifting the recoat mold top.	If the recoat mold top is lifted with the holding fixture tops closed, the fiber may stick to the recoat mold top and snap or degrade the strength of the fiber. Always open the holding fixtures before lifting the recoat mold top.

8.3.8. Replace and Align Mold Assembly

To remove the recoat assembly, remove the eight (8) flange screws at the base of the assembly. Lift the recoat assembly straight up until it clears the recoat lamps. Keep track of the micro switch actuating post which may slide free of the assembly.

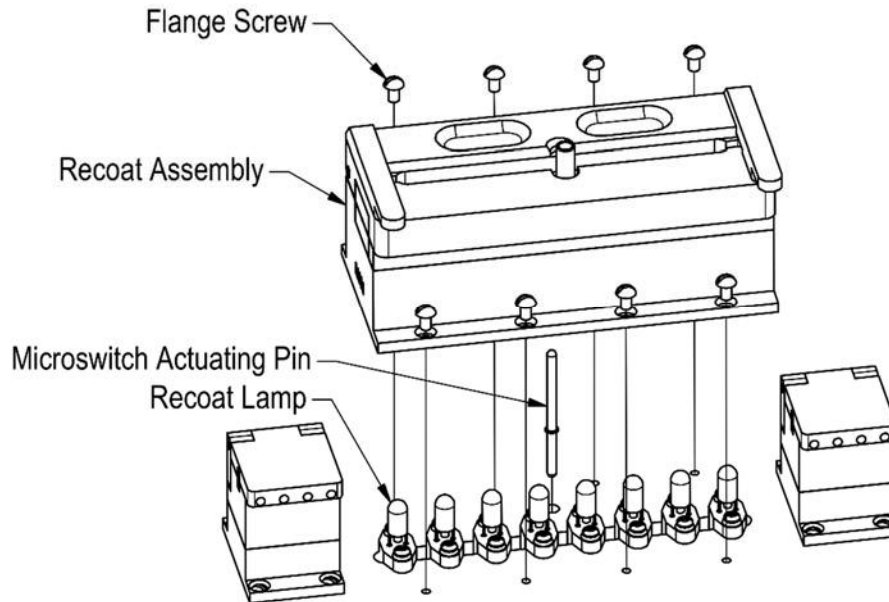


Figure 43 Remove Recoat Assembly

Before replacing the recoat assembly, make sure that the base plate, bottom of the mold assembly and micro switch actuating post are cleaned of any dirt particles. Replace the micro switch actuating post by inserting the long end into the recoat assembly. Verify that the post moves up and down freely.

Lower the assembly straight down over the recoat lamps and replace the eight (8) flange screws. Lightly tighten two diagonal screws only to allow for adjustment of the recoat assembly. Open the recoat station top and the tops of the fiber holding blocks. Clamp a length of coated fiber between the holding blocks such that the fiber is under slight tension. (A fiber nominally smaller than that of the diameter of the recoat mold should be used). Using a 10X magnifying loupe, view the fiber straight down at the right-hand edge of the recoat station, as shown in the Figure 44. Adjust the recoat assembly such that the fiber is centered in the bottom recoat groove. Repeat this procedure while viewing the fiber at the left edge of the recoat station. Tighten the recoat flange screws and re-check the fiber alignment.

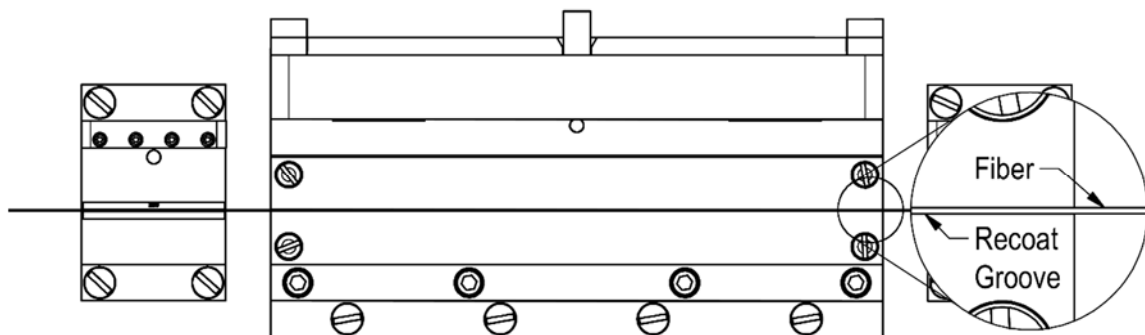


Figure 44 Align Recoat Mold (view is from above)

8.3.9. Replace Tungsten Halogen Lamps

In order to gain access to the lamps remove the recoat assembly as shown in chapter 8.3.8. Remove the lamp by pulling it out of the lamp socket and replacing it with a new one. Avoid handling the glass envelope. Fingerprints left on the envelope could shorten the lamp life. If you do touch the lamp, be sure to clean it with a soft lens tissue wetted with alcohol or acetone. Make sure all of the bulbs are positioned in a straight line. Replace and align the recoat mold assembly.

8.3.10. Replace Vacuum V-Groove Inserts

The fiber holding blocks contain replaceable V-groove inserts which are designed to hold a specific coating size. To change the inserts, loosen the four (4) set screws (using a 0.035" hex key) in the base of each holding fixture and remove the inserts. Install the new insert (V-Groove side up) and gently tighten the four set screws. When clamping large diameter coatings, it may also be necessary to change the inserts located in the top of each holding fixture using the above procedure. Recheck the recoat assembly alignment (see 8.3.8) after changing the inserts.

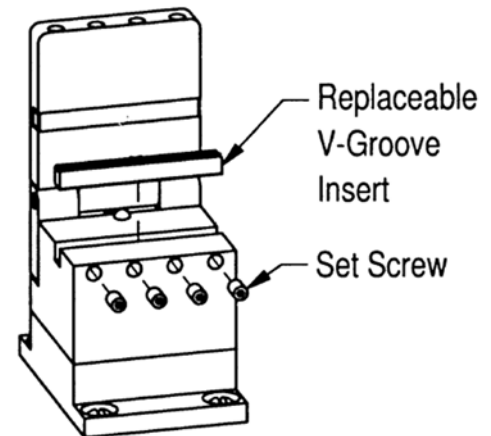


Figure 45 Replace V-Groove Insert

Chapter 9 Material Data Safety Sheet


 950-200 from ÅngströmBond®
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Adhesives

THE ONLY ADHESIVE LINE DEVELOPED EXCLUSIVELY FOR FIBER OPTICS

1. MATERIAL IDENTIFICATION

Product Name:

950-200 from ÅNGSTRÖMBOND®

Emergency Phone:

 For product emergencies involving spill, leak, fire, exposure, or accident call CHEMTREC at (800) 424-9300. For all other inquiries call **Fiber Optic Center™, Inc.** at (800) 473-4237.

2. COMPOSITION

Hazardous Components	CAS No.	Percent	Exposure Limits	
			ACGIH TLV-TWA	OSHA PEL
Multifunctional acrylate(s)		20-80	NE	NE
Monomers		20-80	NE	NE
Photoinitiator(s)		1-10	NE	NE
Additive(s)		0.01-10	ne	NE
Glycol Ether acrylate		28.5	NE	NE
Abbreviations: N.E. = Not Established				

3. HEALTH HAZARDS IDENTIFICATION

Primary Routes of Exposure:

Eyes: yes

Skin: Yes

Inhalation: Yes

Eye Contact: Contact may cause irritation. Inflammation of the eye is characterized by redness, watering, and itching.

Skin Contact: Avoid prolonged or repeated contact with skin. May cause skin irritation or sensitization.

Inhalation: Irritating to respiratory tract, coughing shortness of breath. Vapors and aerosol can produce mucous membrane, nose and throat irritation.

Ingestion: May cause mild gastric irritation, abdominal spasms, nausea and faintness.

4. FIRST AID MEASURES

Eyes: Flush eyes thoroughly with water for 15 minutes while holding eyelids open. Seek medical attention.

Skin: Wipe excess from skin, and flush the affected area with water. Follow by washing with soap and water. Wash contaminated clothing thoroughly before reuse. If irritation persists obtain medical attention.

Inhalation: Remove to fresh air, and provide oxygen or artificial respiration if needed. Obtain medical attention.

Ingestion: Do Not Induce Vomiting. Obtain immediate medical attention.

5. FIRE FIGHTING MEASURES

FLAMMABLE PROPERTIES

Flash Point:	higher than 93.3°C
Explosive Limits:	Not determined
Auto – Ignition Temperature:	Not determined
Hazardous Decomposition Products:	Carbon oxides, nitrogen oxides

EXTINGUISHING MEDIA and FIRE FIGHTING INSTRUCTIONS

When sufficiently large quantities are present, firefighters should be equipped with full bunker gear, including a positive pressure, NIOSH approved, self-contained breathing apparatus. Fire-exposed containers may be cooled with water.

Extinguishing Media: Use water spray, fog, dry chemical powder, or an appropriate foam.

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Rev. A 10/2002

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Website: www.focenter.com



900-200 from AngströmBond®
Page 2 of 3

Adhesives

The only adhesive line developed exclusively for fiber optics

6. ACCIDENTAL RELEASE MEASURES

Ventilate the spill area, and evacuate if necessary. Shut off the source of the leak if it is safe to do so. Remove all ignition sources. Dike and contain large spills. Absorb with clay, sand, or another suitable material, and dispose of properly.

Clean-up personnel should use adequate protective equipment.

7. HANDLING AND STORAGE

Store between 16-27°C, away from ignition sources and high temperatures. Avoid contact with incompatible materials. Wear protective eyewear, chemical-resistant gloves, and other protective clothing as appropriate. Do not breathe fumes. Avoid contact with eyes skin and clothing. After handling always wash hands thoroughly with soap and water.

8. EXPOSURE CONTROLS AND PERSONAL PROTECTION

Engineering / Ventilation Controls: General ventilation may be acceptable under most conditions, although local ventilation is required to control exposure whenever vapors, mists, or dusts are generated.

Respiratory Protection: When local ventilation is unavailable and airborne limits are exceeded, a NIOSH-approved respirator for organic vapors, a supplied-air respirator, or a self-contained breathing apparatus is required.

Skin Protection: Chemical resistant (nitrile) gloves. Lab coat

Eye Protection: Chemical splash goggles or safety glasses with side shields should be worn as appropriate.

9. STABILITY AND REACTIVITY

Chemical Stability: Stable under normal conditions and use.

Conditions and Materials to Avoid: Keep away from direct sunlight or strong incandescent light. Keep away from heat. Incompatible With peroxides, and oxidizing agents.

Hazardous Decomposition Products: Carbon oxides, nitrogen oxides

Hazardous Polymerization: Not likely under normal conditions.

10. PHYSICAL AND CHEMICAL PROPERTIES

Appearance / State: Clear viscous liquid

Odor: not determined

pH: Not determined

Vap. Pressure (mmHG): Not determined

Vap. Density (air = 1): > 1

Boiling Point: Not determined

Freezing Point: Not determined

Specific Gravity: Not determined

Solubility in Water: Not determined

Evaporation Rate: <1 compared to Butyl acetate

11. DISPOSAL CONSIDERATIONS

Keep out of surface waters, sewers, and waterways entering or leading to surface waters. Notify authorities if any exposure to the environment occurs or is likely to occur. Utilize an appropriate disposal facility, in compliance with applicable federal, state, and local environmental control regulations.

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950-200 from AngströmBond®
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ADHESIVES

THE ONLY ADHESIVE LINE DEVELOPED EXCLUSIVELY FOR FIBER OPTICS

12. TOXICOLOGICAL INFORMATION

Toxicity to Animals:

Acute Oral toxicity (LD50): >5000mg/kg[rat] (Multifunctional acrylate)

Acute Dermal toxicity(LD50): >5000mg/kg[Rabbit] (Multifunctional acrylate)

Multifunctional acrylate: chronic health effects information:

This component has been reported to be mutagenic in the mouse lymphoma (in vitro) assay, but negative in the Ames test.. A dermal carcinogenicity study was also negative.

WEEL =1mg/m3,skin 8hours

Based upon physical and chemical properties and the manner in which this product will be used, considering foreseeable emergencies, airborne exposure at or approaching the WEEL is unlikely to occur. Skin contact is possible. Users should take appropriate precautions to prevent skin contact.

Chronic exposure:

Chronic effects to humans:

None classified by IARC, none by NTP, None by OSHA

Acute Effects on humans:

May cause irritation to skin, eyes, and respiratory tract.

13. TRANSPORTATION INFORMATION

DOT/IATA Proper Shipping Name: Not regulated.

14. REGULATORY INFORMATION

TSCA

The chemical components of this product are included in the TSCA Chemical Substance Inventory, as required.

SARA TITLE III

Section 313 – Toxic Chemicals

Pursuant to Section 313, this product contains Glycol Ether 28.5%

HMIS Hazards: Health: 2 Flammability: 1 Reactivity: 1

Fiber Optic Center™, Inc. urges each customer or recipient of this MSDS to study it carefully in order to become aware of and understand the hazards associated with the product. The reader should consider consulting reference works or individuals who are experts in ventilation, toxicology, and/or fire prevention, as necessary to use and understand the data contained in this MSDS.

To promote safe handling, customers and recipients should: 1 – notify their employees, agents, contractors, and others whom they know or suspect will use this material or the information in this MSDS and any other information regarding hazards or safety; 2 – furnish this same information to each of their customers for the product; and 3 – request their customers to notify their employees, customers and other users of the product of this information.

The information contained herein is based on the data available to **Fiber Optic Center™, Inc.**, and is believed to be correct. However, **Fiber Optic Center™, Inc.** makes no warranty, expressed or implied, regarding the accuracy of this data or the results to be obtained from the use thereof. **Fiber Optic Center™, Inc.** assumes no responsibility for injury from the use of the product described herein.

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Chapter 10 Compliance



EU Declaration of Conformity

in accordance with EN ISO 17050-1:2010

We: Thorlabs Inc.

Of: 56 Sparta Avenue, Newton, New Jersey, 07860, USA

in accordance with the following Directive(s):

2006/42/EC	Machinery Directive (MD)
2014/30/EU	Electromagnetic Compatibility (EMC) Directive
2011/65/EU	Restriction of Use of Certain Hazardous Substances (RoHS)

hereby declare that:

Model: **PTR201, PTR203, PTR203B, PTR204, PTR204B, PTR206, PTR206B**

Equipment: **Recoater (w/ Halogen lamps), Linear Proof tester and combinations**

is in conformity with the applicable requirements of the following documents:

EN ISO 12100	Safety of Machinery. General Principles for Design. Risk Assessment and Risk Reduction	2010
EN 61326-1	Electrical Equipment for Measurement, Control and Laboratory Use - EMC Requirements	2013
EN 62471-1	Photobiological Safety of Lamps and Lamp Systems	2008

and which, issued under the sole responsibility of Thorlabs, is in conformity with Directive 2011/65/EU of the European Parliament and of the Council of 8th June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment, for the reason stated below:

does not contain substances in excess of the maximum concentration values tolerated by weight in homogenous materials as listed in Annex II of the Directive

I hereby declare that the equipment named has been designed to comply with the relevant sections of the above referenced specifications, and complies with all applicable Essential Requirements of the Directives.

Signed:

On: 01 August 2016

Name: Ann Strachan

Position: Compliance Manager

EDC - PTR201, PTR203, PTR203B, PTR204,...



Chapter 11 Regulatory

As required by the WEEE (Waste Electrical and Electronic Equipment Directive) of the European Community and the corresponding national laws, Thorlabs offers all end users in the EC the possibility to return “end of life” units without incurring disposal charges.

- This offer is valid for Thorlabs electrical and electronic equipment:
- Sold after August 13, 2005
- Marked correspondingly with the crossed out “wheelie bin” logo (see right)
- Sold to a company or institute within the EC
- Currently owned by a company or institute within the EC
- Still complete, not disassembled and not contaminated



Wheelie Bin Logo

As the WEEE directive applies to self-contained operational electrical and electronic products, this end of life take back service does not refer to other Thorlabs products, such as:

- Pure OEM products, that means assemblies to be built into a unit by the user (e. g. OEM laser driver cards)
- Components
- Mechanics and optics
- Left over parts of units disassembled by the user (PCB's, housings etc.).

If you wish to return a Thorlabs unit for waste recovery, please contact Thorlabs or your nearest dealer for further information.

11.1. Waste Treatment is Your Own Responsibility

If you do not return an “end of life” unit to Thorlabs, you must hand it to a company specialized in waste recovery. Do not dispose of the unit in a litter bin or at a public waste disposal site.

11.2. Ecological Background

It is well known that WEEE pollutes the environment by releasing toxic products during decomposition. The aim of the European RoHS directive is to reduce the content of toxic substances in electronic products in the future.

The intent of the WEEE directive is to enforce the recycling of WEEE. A controlled recycling of end of life products will thereby avoid negative impacts on the environment.

Chapter 12 Thorlabs Worldwide Contacts

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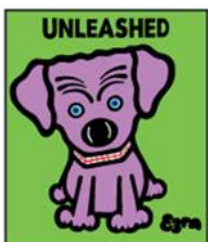
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