Opal Lock
by Fidelity Height

# User Guide

# Contents

# GETTING STARTED

## 1. INTRODUCTION AND OVERVIEW

Opal Lock is a drive security management application for self-encrypting drives (SEDs) with built-in full-disk encryption. Self-encrypting drives use specifications developed by the Trusting Computing Group (TCG), and we will refer to these drives as TCG drives. Using Opal Lock, users can utilize full-disk encryption to protect the data on their TCG drives.

When setting up a drive using Opal Lock, a password for the drive is set and locking is enabled. After setting the password, the mode of unlocking the drive can be set up by setting up the preboot image, which is the environment used for pre-boot authentication.

To lock a drive after it has been set up with Opal Lock, the system must be powered down completely. Once the drive has been locked, the drive’s data will be encrypted and inaccessible until it is unlocked. The next time the system is powered up, it will boot into the preboot environment for pre-boot authentication. After successful authentication, the drive can be accessed by rebooting the system.

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# 2. SYSTEM REQUIREMENTS

## Before getting started, you will need:

- ✓ Windows 10, Windows 11, or Windows Server 2019 or Server 2022
- ✓ SATA or NVMe (Windows 10, Windows 11 or Server 2019 or Server 2022 only) Opal SED drive
- ✓ MyFidelity1.exe installation file and license key
- ✓ Internet connection for license validation

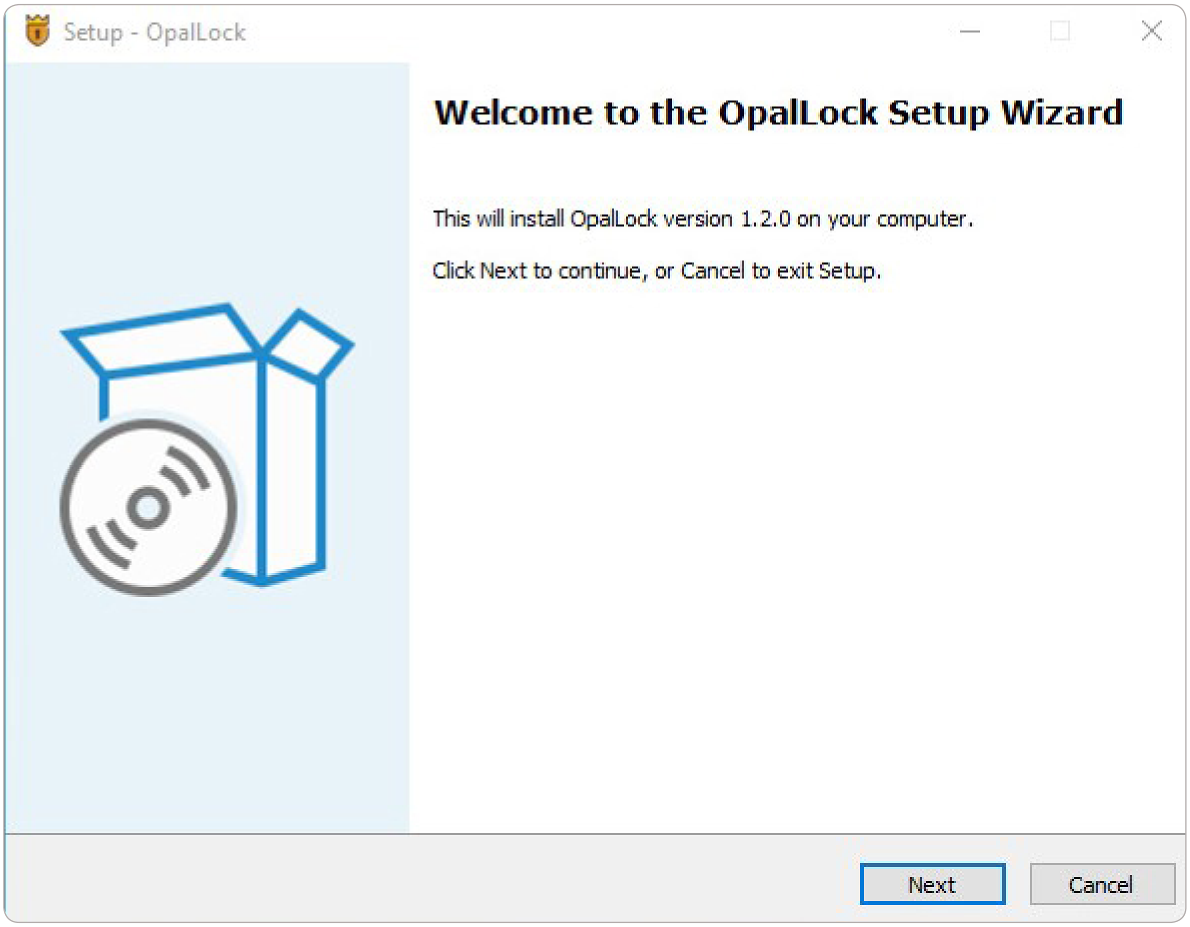
## Other system requirements:

- ✓ CPU: Hyper-threading CPU; Core 2 processor and above is recommended
- ✓ RAM: 1GB or above; 2GB is recommended for Windows 10 and above
- ✓ Video Card: 32MB; 64MB and above is recommended
- ✓ System Drive: minimum 500MB free space
- ✓ BIOS: Secure Boot must be off/disabled

## 3. INSTALLATION

After purchasing the License, License key and Opal Lock Application exe will be received on the email

- Download the application file (exe)
- Double click on the Application downloaded exe icon
- Click on Allow button to give permissions to Application to make changes in the system for smoother operations. It will open the **Setup Wizard**
- Click on the **Next** button on Setup Wizard screen



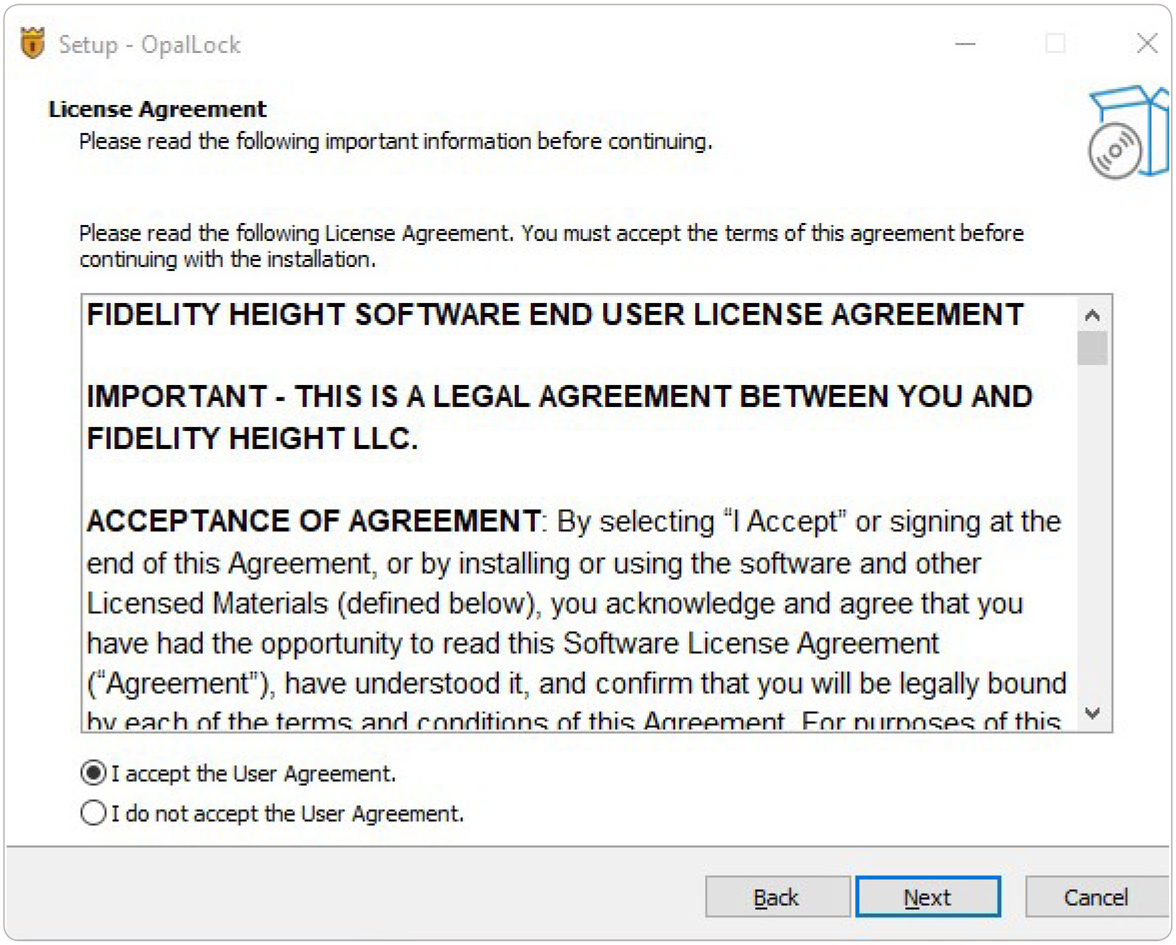
Welcome to the OpalLock Setup Wizard

This will install OpalLock version 1.2.0 on your computer.

Click Next to continue, or Cancel to exit Setup.

*Installation welcome screen.*

- **License Agreement screen,** select the **“I accept the User Agreement” radio button** and click on **Next button**



**License Agreement**

Please read the following important information before continuing.

Please read the following License Agreement. You must accept the terms of this agreement before continuing with the installation.

**FIDELITY HEIGHT SOFTWARE END USER LICENSE AGREEMENT**

**IMPORTANT - THIS IS A LEGAL AGREEMENT BETWEEN YOU AND FIDELITY HEIGHT LLC.**

**ACCEPTANCE OF AGREEMENT**: By selecting “I Accept” or signing at the end of this Agreement, or by installing or using the software and other Licensed Materials (defined below), you acknowledge and agree that you have had the opportunity to read this Software License Agreement (“Agreement”), have understood it, and confirm that you will be legally bound by each of the terms and conditions of this Agreement. For purposes of this

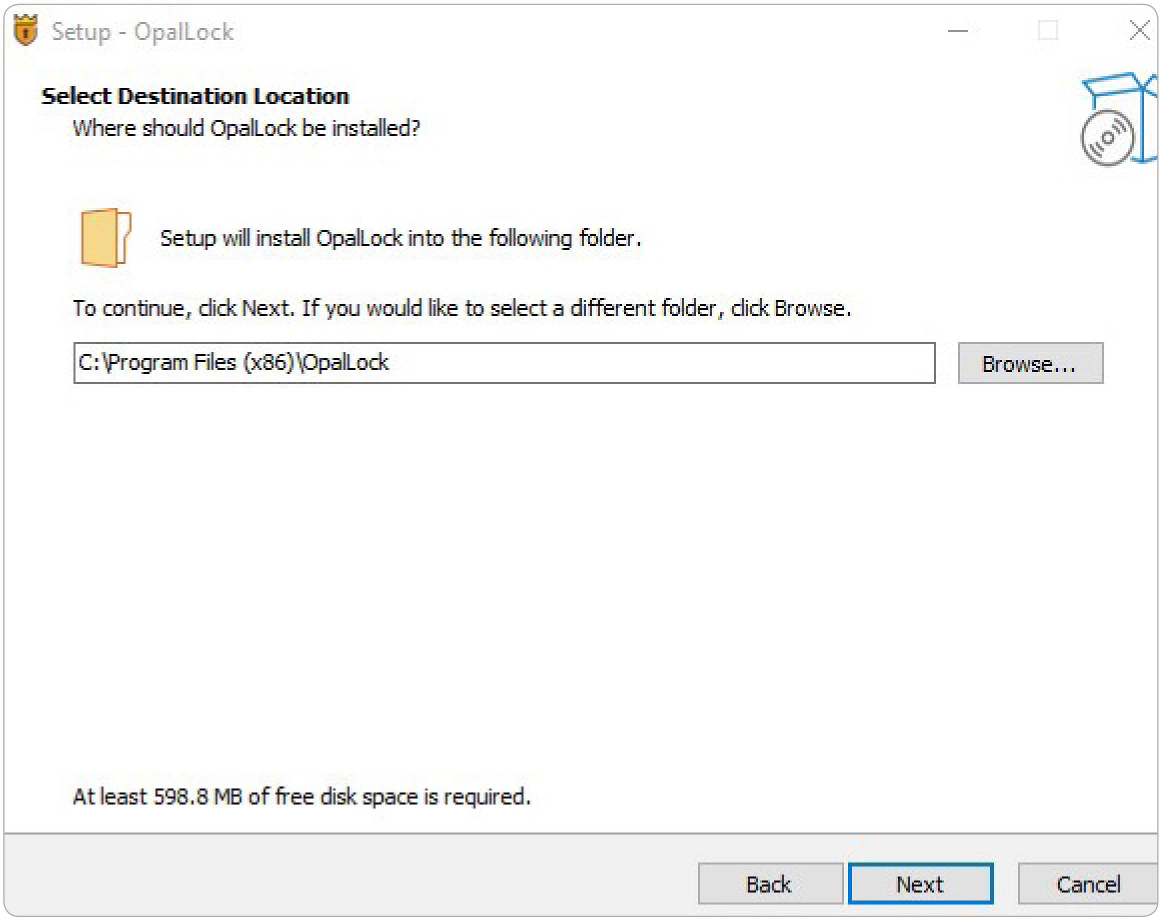
● I accept the User Agreement.

○ I do not accept the User Agreement.

*Accept the License Agreement*

- Select **Destination Location screen,** default location will come selected.To change the destination location, click on **Browse button**

- Once destination location is selected, click on **Next button**



Setup - OpalLock

**Select Destination Location**

Where should OpalLock be installed?

Setup will install OpalLock into the following folder.

To continue, click Next. If you would like to select a different folder, click Browse.

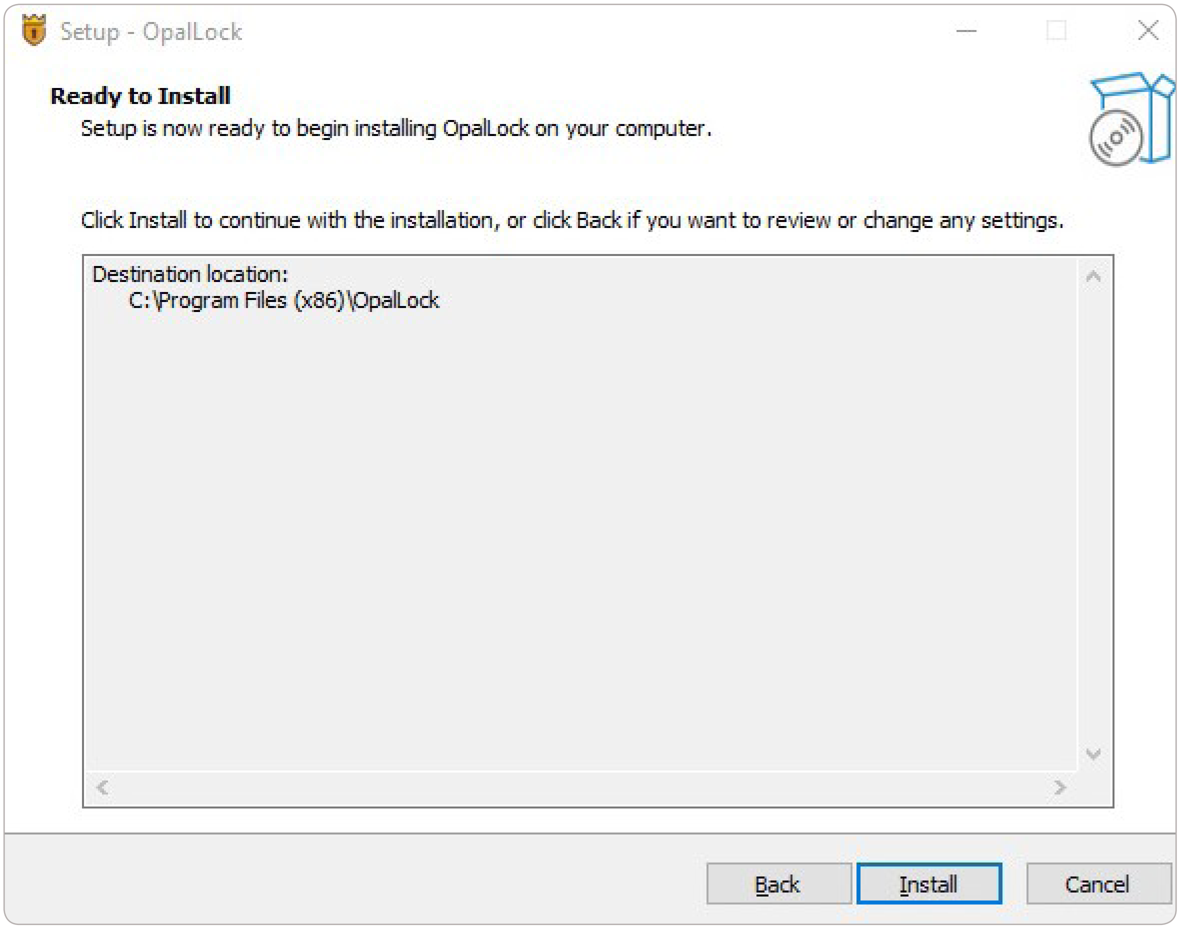
C:\Program Files (x86)\OpalLock

At least 598.8 MB of free disk space is required.

*Select a destination location*

*Go to Table of Contents*

- **Ready to Install** screen, click on **Install button** to start with the installation process



Setup - OpalLock

**Ready to Install**

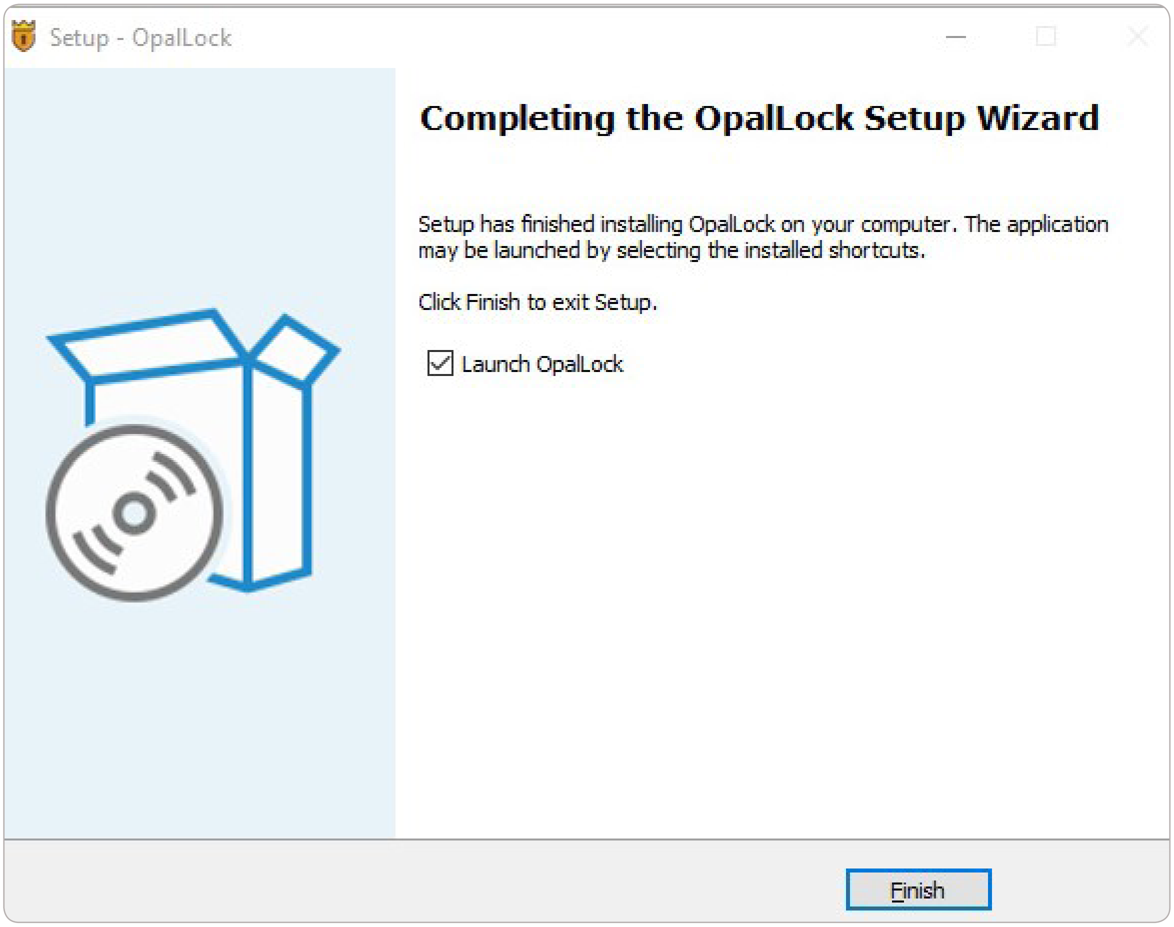
Setup is now ready to begin installing OpalLock on your computer.

Click Install to continue with the installation, or click Back if you want to review or change any settings.

Destination location:
C:\Program Files (x86)\OpalLock

*Click Install to begin installing OpalLock*

- **Setup Completed and Launch the application,** setup has been completed successfully.
- Check the **Launch OpalLock checkbox** if you want to launch the application on clicking **Finish button**



Completing the OpalLock Setup Wizard

Setup has finished installing OpalLock on your computer. The application may be launched by selecting the installed shortcuts.

Click Finish to exit Setup.

☑ Launch OpalLock

*Click Finish. You have successfully installed Opal Lock*

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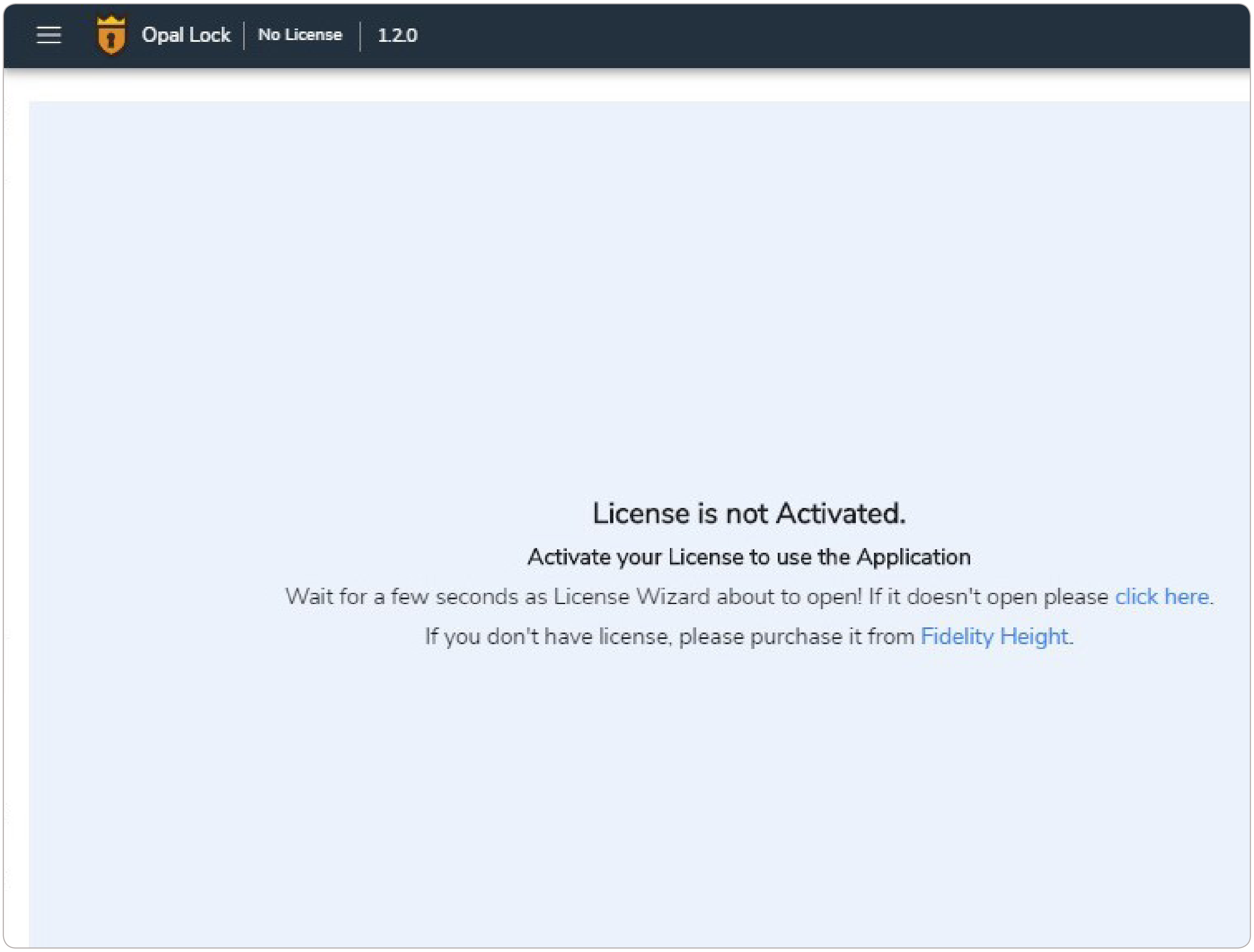
## 4. LICENSE ACTIVATION

- Application will be launched successfully on clicking the **Finish** button once installation is completed

- Application will ask to activate the License and will open the **License Wizard** tool

- Click on the **Click here** link if license Wizard tool does not open by default on launching the application



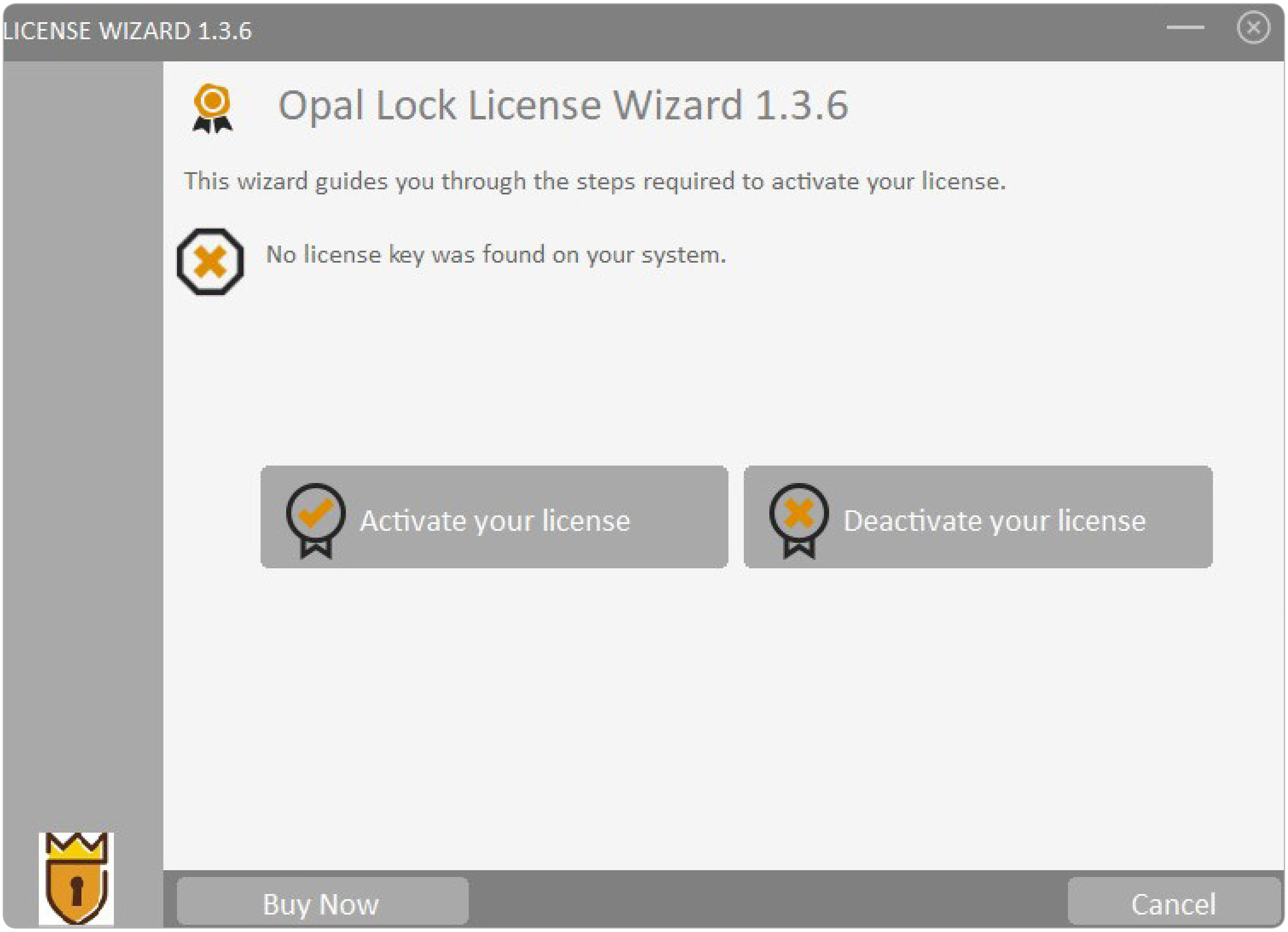
License is not Activated.

Activate your License to use the Application

Wait for a few seconds as License Wizard about to open! If it doesn't open please click here.

If you don't have license, please purchase it from Fidelity Height.

*License is not activated*



LICENSE WIZARD 1.3.6

Opal Lock License Wizard 1.3.6

This wizard guides you through the steps required to activate your license.

No license key was found on your system.

*QLM License Wizard*

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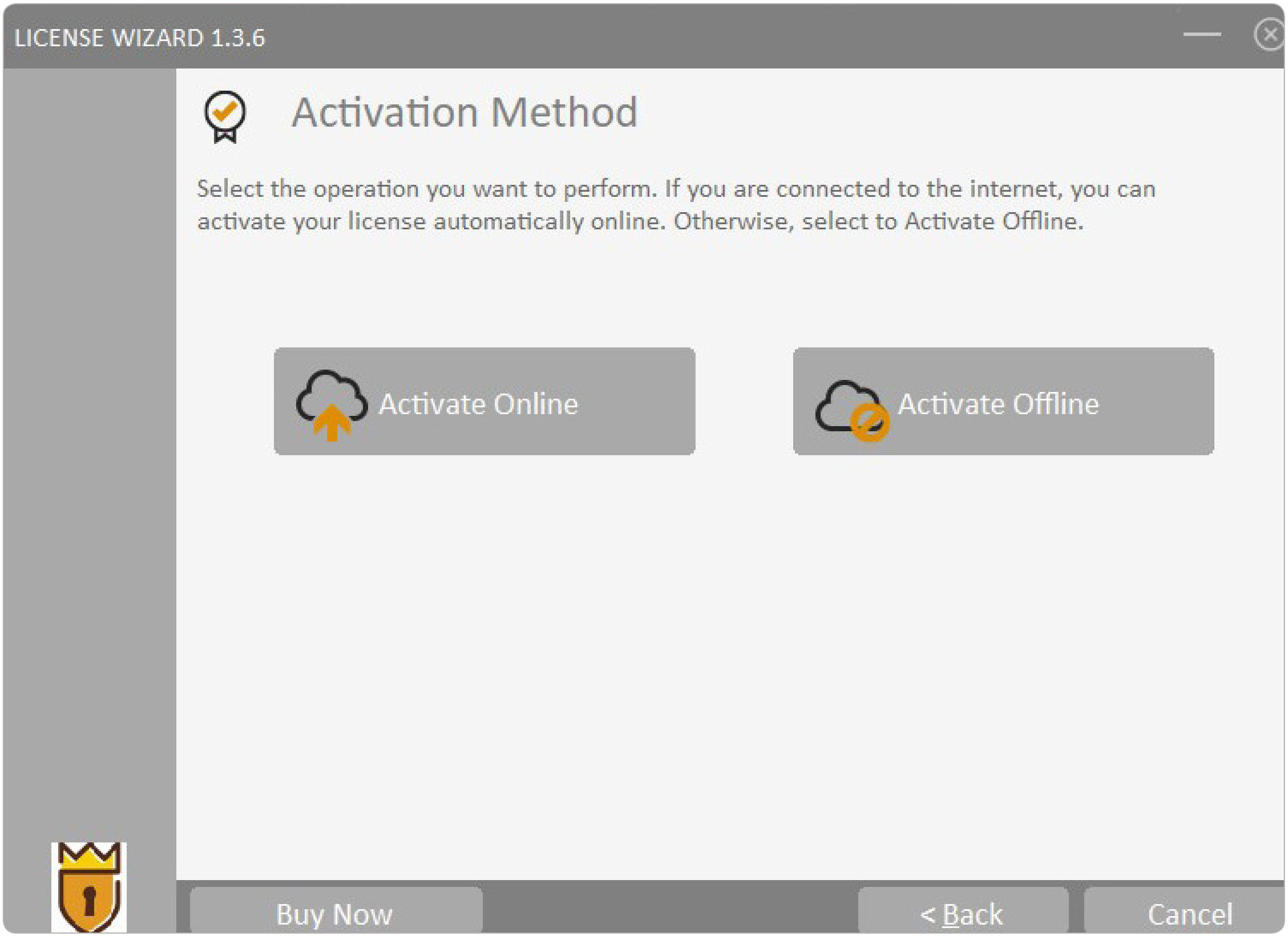
- **Activation Method screen,** choose whether to Activate Online or Offline

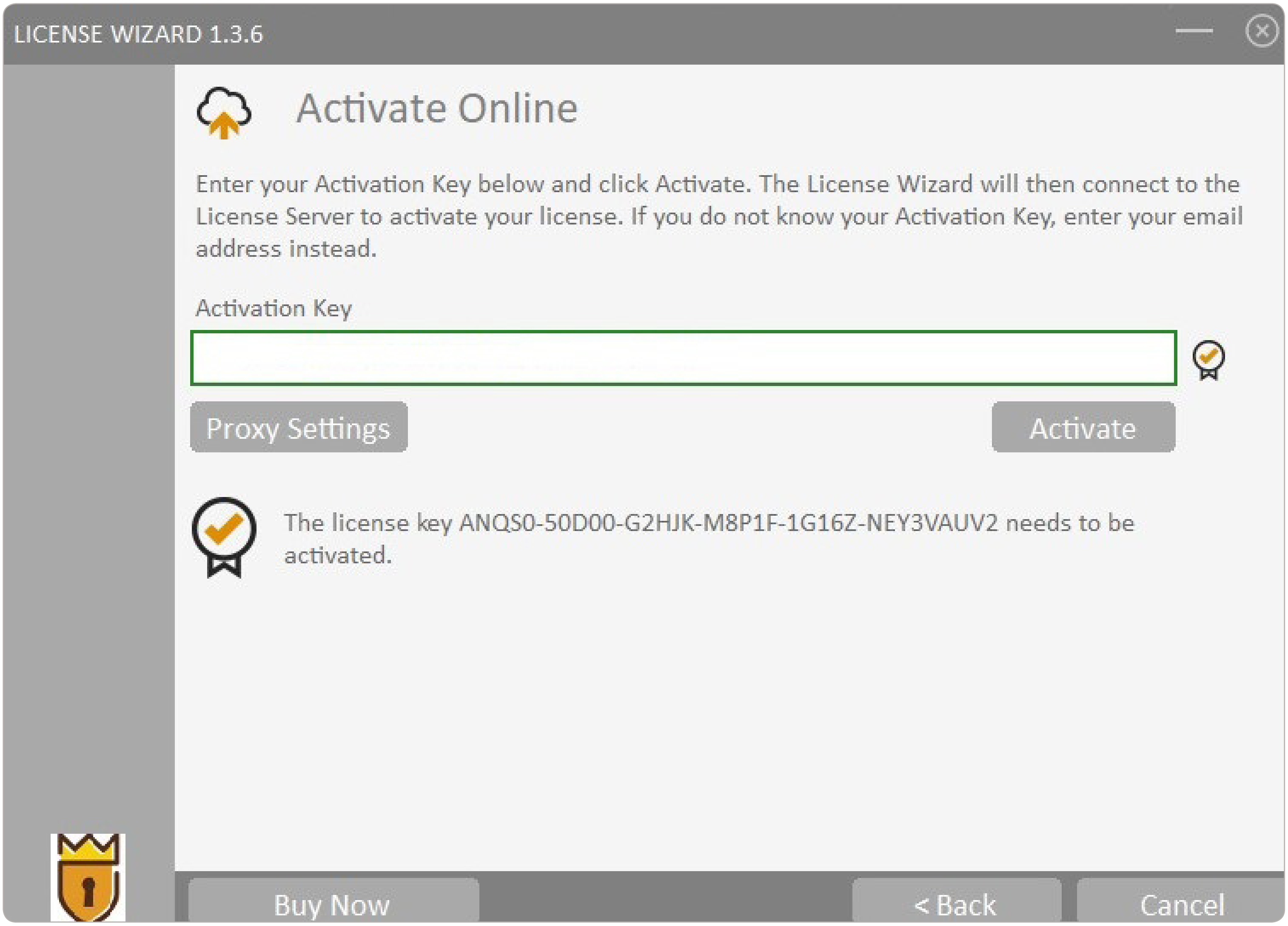


Activation Method

Select the operation you want to perform. If you are connected to the internet, you can activate your license automatically online. Otherwise, select to Activate Offline.

*Select your activation method*

- Click on **Activate Online** if internet is connected and enter the License key received in the email on completing the License Purchase and then Click on the **Activate** button to activate the License



Enter your Activation Key below and click Activate. The License Wizard will then connect to the License Server to activate your license. If you do not know your Activation Key, enter your email address instead.

The license key ANQS0-50D00-G2HJK-M8P1F-1G16Z-NEY3VAUV2 needs to be activated.

*Enter your activation key*

- On Clicking the **Activate button,** License will be activated and user can then use the features on respective activated License

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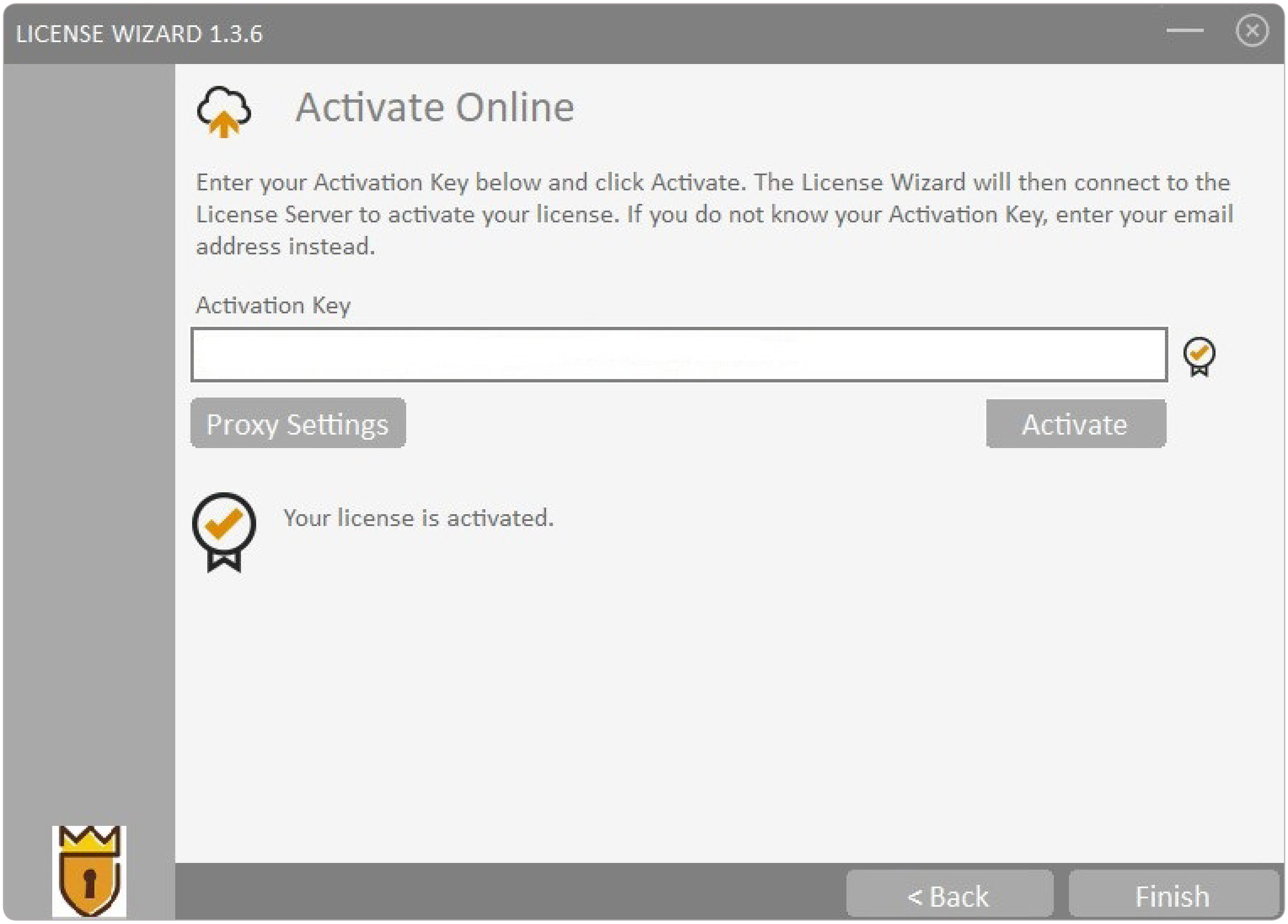


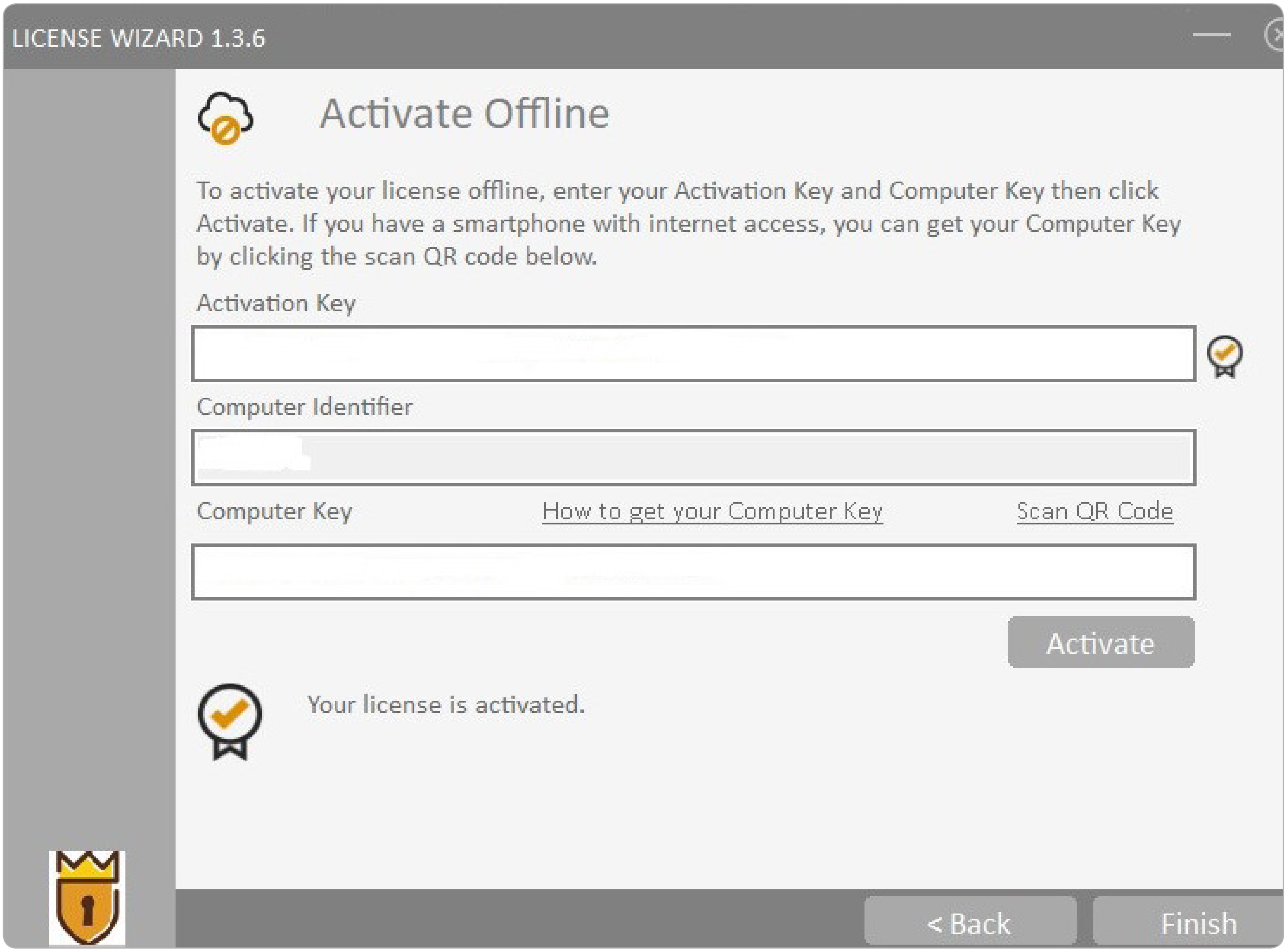
Enter your Activation Key below and click Activate. The License Wizard will then connect to the License Server to activate your license. If you do not know your Activation Key, enter your email address instead.

Activation Key

Your license is activated.

*Your license is activated*

**To activate the License in offline mode,** enter the Activation Key, Computer Identifier and Computer key in respective fields and click on **Activate** button


LICENSE WIZARD 1.3.6

Activate Offline

To activate your license offline, enter your Activation Key and Computer Key then click Activate. If you have a smartphone with internet access, you can get your Computer Key by clicking the scan QR code below.

Activation Key

Computer Identifier

Computer Key

Your license is activated.

*Activate your license offline*

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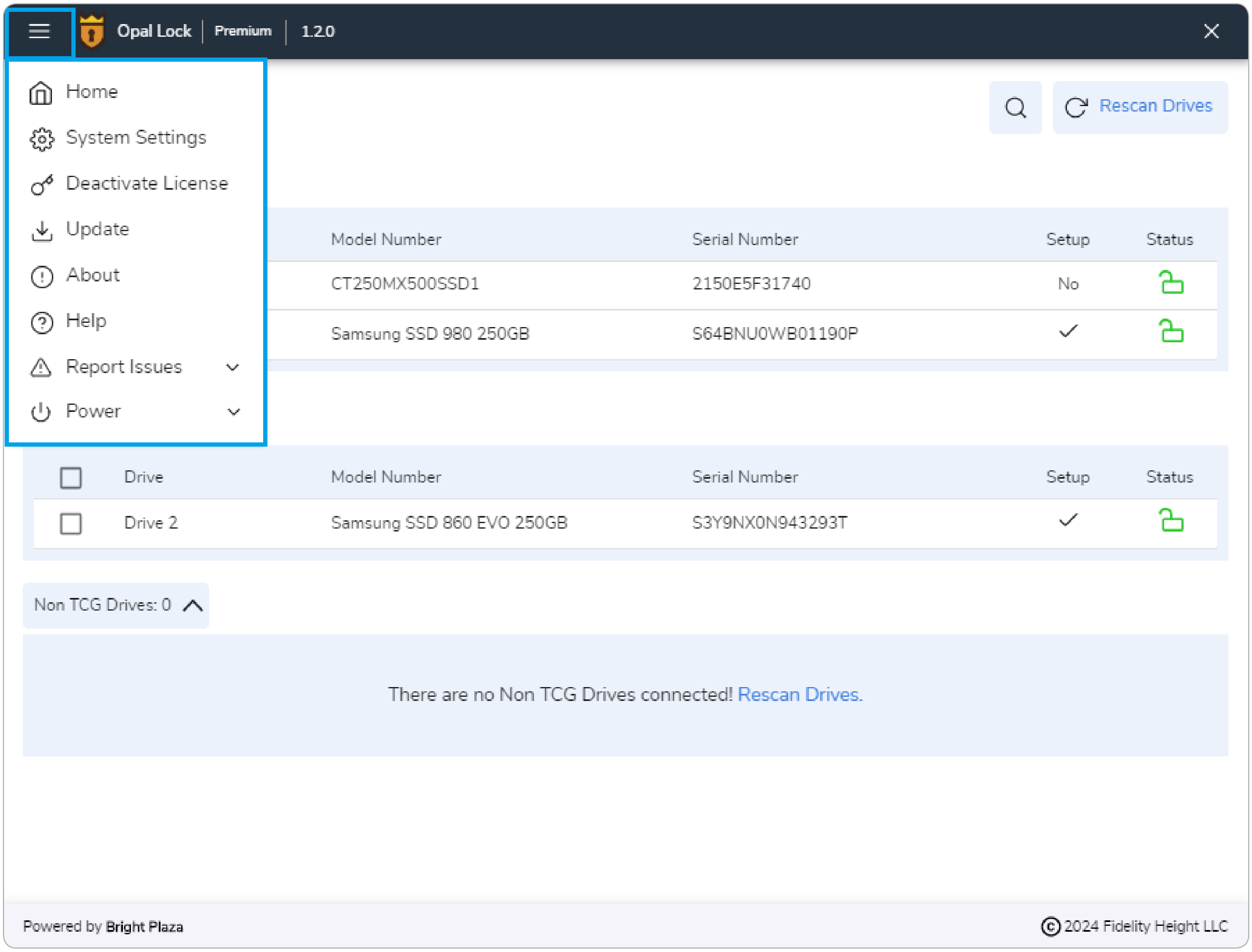
## 5. LICENSE DEACTIVATION

- Click on Hanburger icon to open the Menu
- Click on the “Deactivate License” option



| Model Number | Serial Number | Setup | Status |
|---|---|---|---|
| CT250MX500SSD1 | 2150E5F31740 | No | 🔓 |
| Samsung SSD 980 250GB | S64BNU0WB01190P | ✓ | 🔓 |

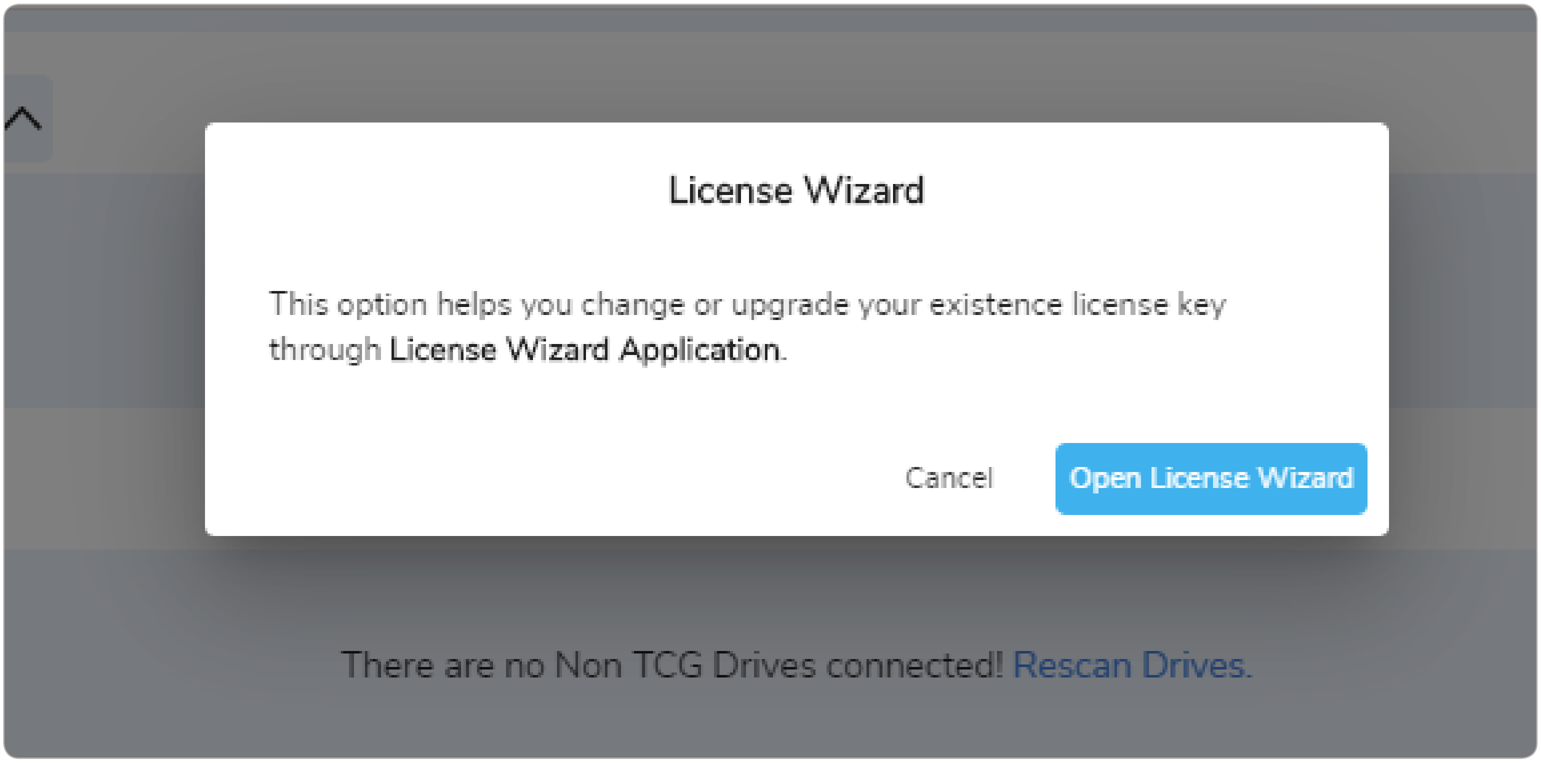
| □ | Drive | Model Number | Serial Number | Setup | Status |
|---|---|---|---|---|---|
| □ | Drive 2 | Samsung SSD 860 EVO 250GB | S3Y9NX0N943293T | ✓ | 🔓 |

There are no Non TCG Drives connected! Rescan Drives.

*Hamburger Icon > Deactivate License option*

- License Wizard window will pop up

- Click on the “Open License Wizard” button



License Wizard

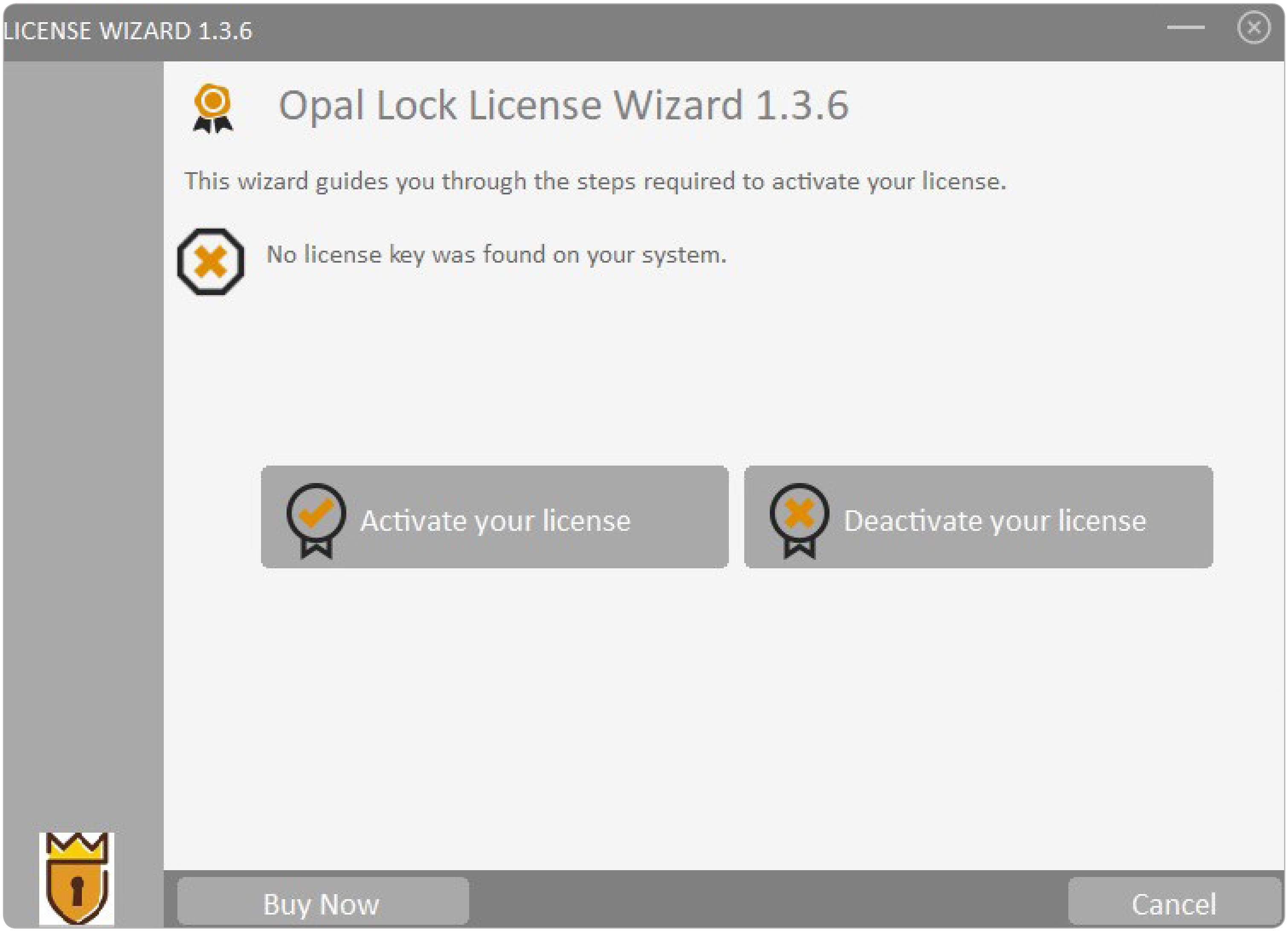
This option helps you change or upgrade your existence license key through **License Wizard Application**.

There are no Non TCG Drives connected! Rescan Drives.

*Open License Wizard*

- “License Wizard” application will open

- Click on the “Deactivate Your License” button


LICENSE WIZARD 1.3.6

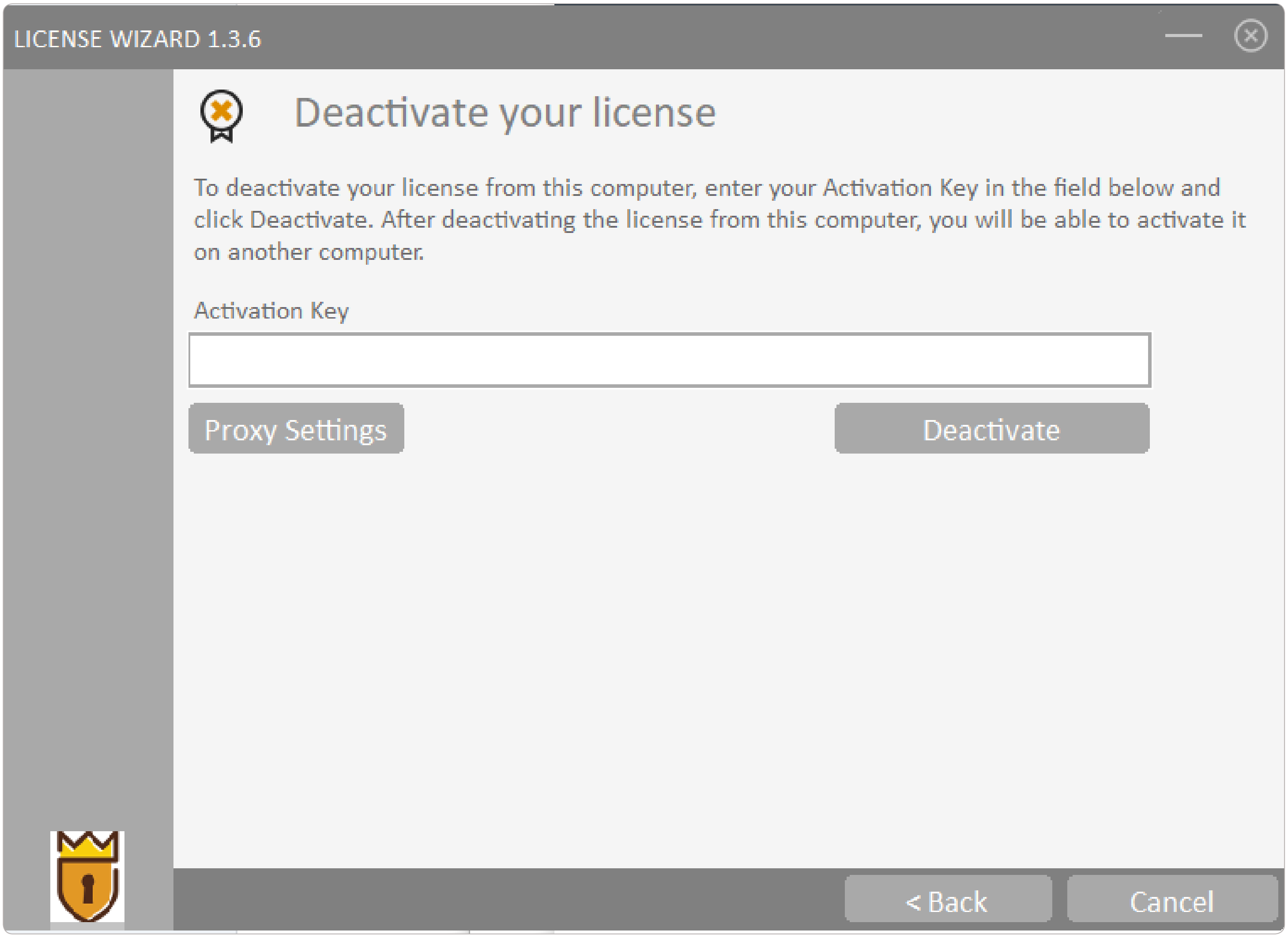
Opal Lock License Wizard 1.3.6

This wizard guides you through the steps required to activate your license.

No license key was found on your system.

*The OpalLock Wizard*

- “Deactivate your License” window will open
- Click on the Deactivate button to deactivate the License



LICENSE WIZARD 1.3.6

Deactivate your license

To deactivate your license from this computer, enter your Activation Key in the field below and click Deactivate. After deactivating the license from this computer, you will be able to activate it on another computer.

*Deactivate your license*

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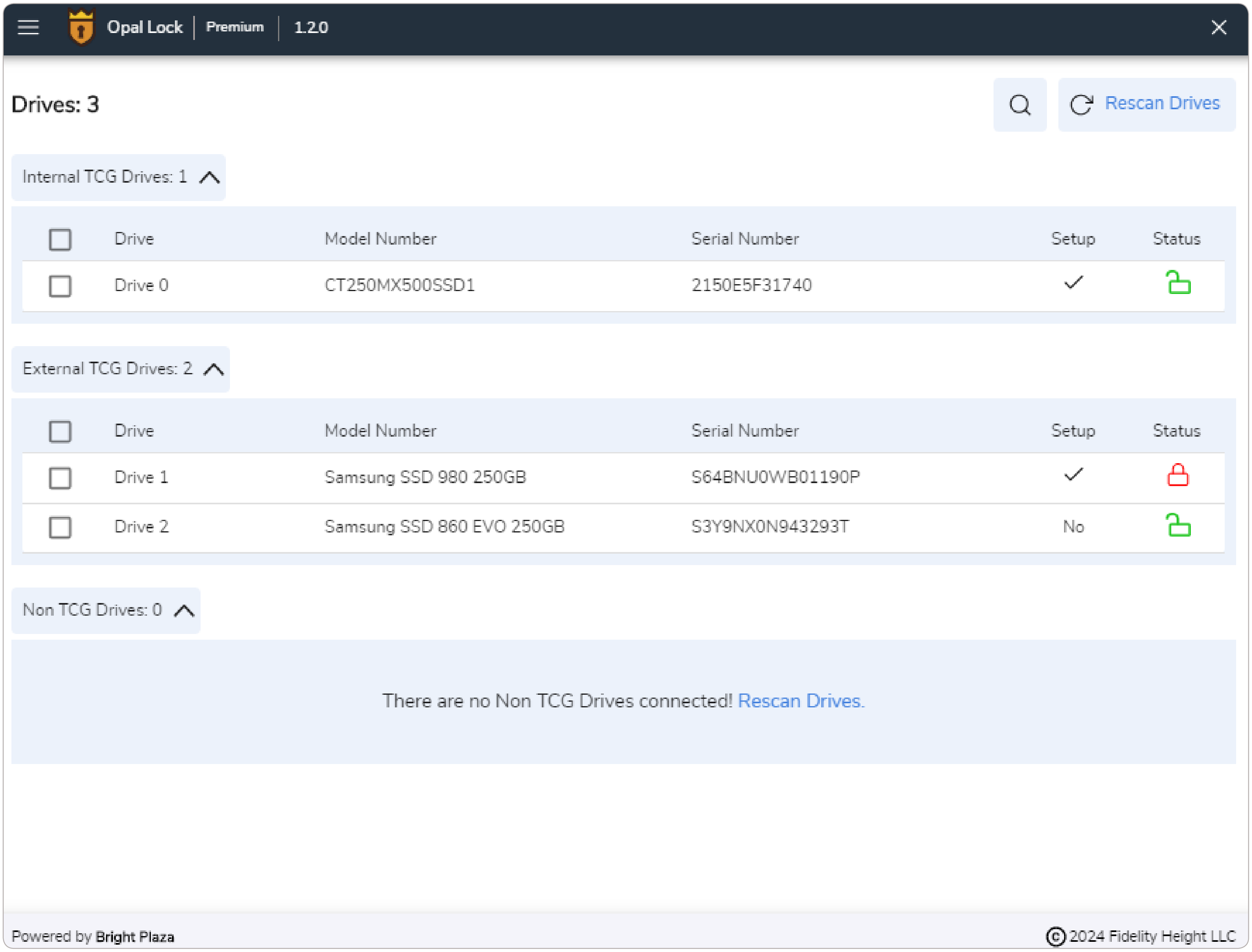
## 6. HOME SCREEN



Drives: 3

Internal TCG Drives: 1

| □ | Drive | Model Number | Serial Number | Setup | Status |
|---|---|---|---|---|---|
| □ | Drive 0 | CT250MX500SSD1 | 2150E5F31740 | ✓ | 🔓 |

External TCG Drives: 2

| □ | Drive | Model Number | Serial Number | Setup | Status |
|---|---|---|---|---|---|
| □ | Drive 1 | Samsung SSD 980 250GB | S64BNU0WB01190P | ✓ | 🔒 |
| □ | Drive 2 | Samsung SSD 860 EVO 250GB | S3Y9NX0N943293T | No | 🔓 |

Non TCG Drives: 0

There are no Non TCG Drives connected! Rescan Drives.

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*Home*

- Opal Lock Home screen displays information about the drives detected on the system. This display is for showing drive Setup status, Lock status, Model Number and Serial Number.

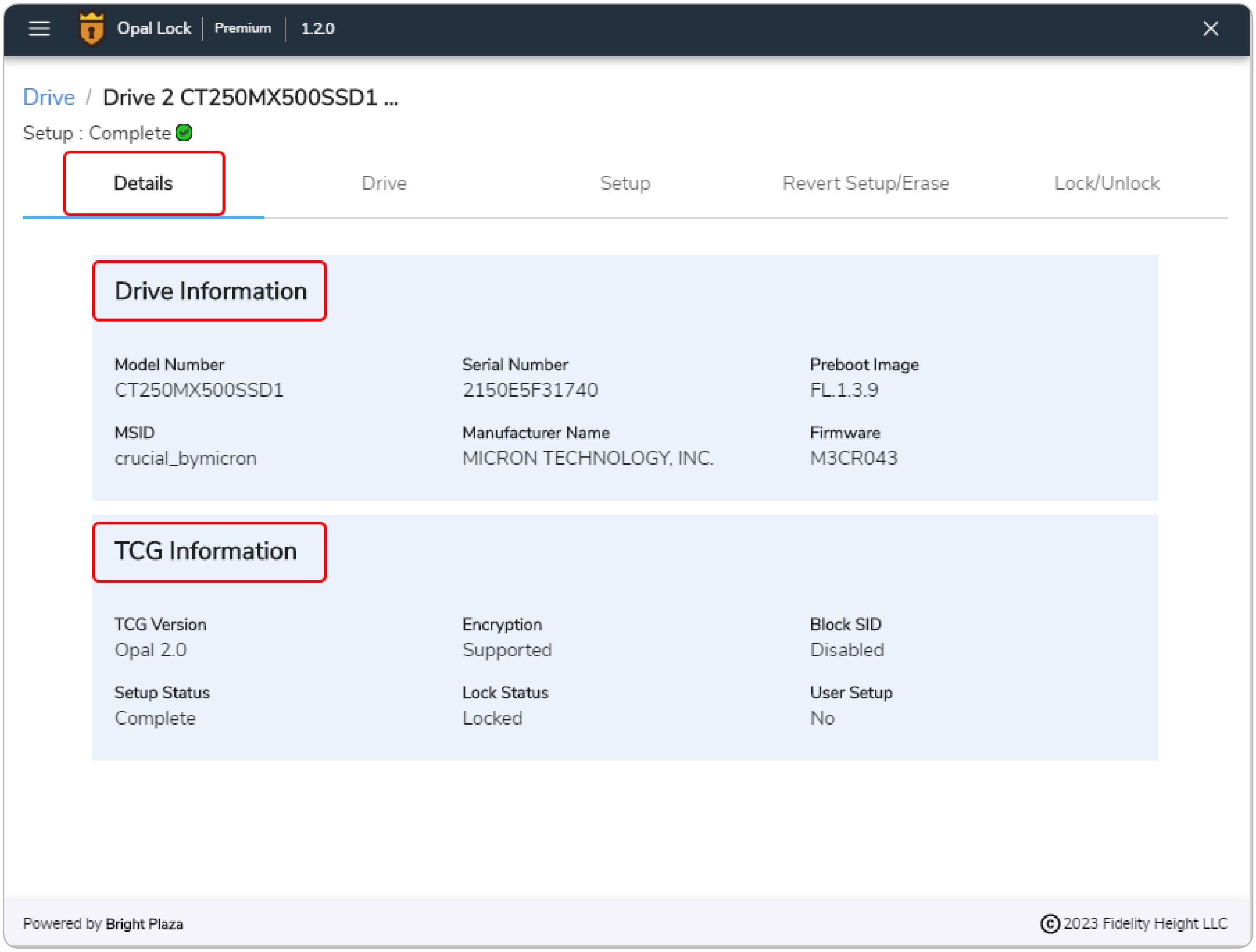
- If the drive is set up then a **tick (√)** will display under the Setup column for that drive. And if the drive is not set up then **"No"** will display under the Setup column for that drive.

- **Red Lock Icon** indicates that the drive is set up and is **Locked**. **Green Unlock icon** indicates that drive is setup and is **Unlocked.**

- Each drive is listed by their drive name according to the system. On Windows, drives are listed as physical drives (e.g. Drive1). TCG drives are listed up to the drive limit determined by the version being used.

- **Rescan Drives button** makes the system rescan the drives that are mounted, and then queries the drives to acquire updated status information to display on the application. In the case that the total number of detected TCG drives exceeds the drive limit, any drives that were previously listed and are still present will be prioritized for listing ahead of other drives.

# 7. DETAILS


Opal Lock | Premium | 1.2.0
Drive / Drive 2 CT250MX500SSD1 ...
Setup : Complete
Details
Drive
Setup
Revert Setup/Erase
Lock/Unlock
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Drive Information

| | | |
|---|---|---|
| Model Number<br>CT250MX500SSD1 | Serial Number<br>2150E5F31740 | Preboot Image<br>FL.1.3.9 |
| MSID<br>crucial_bymicron | Manufacturer Name<br>MICRON TECHNOLOGY, INC. | Firmware<br>M3CR043 |

TCG Information

| | | |
|---|---|---|
| TCG Version<br>Opal 2.0 | Encryption<br>Supported | Block SID<br>Disabled |
| Setup Status<br>Complete | Lock Status<br>Locked | User Setup<br>No |

*Details Locked*

## 7.1 Drive Information

- The drive's **model number** and **serial number** are displayed along with the drive **Manufacturer**. The drive's **firmware** version is manufacturer specific and is displayed for informational purposes. The **MSID (manufacturer secure ID)** is the default password of the drive. This is the drive's authentication key before it is set up. If the previously set up password is reset, then the password will also be reset to the MSID.

- The **Preboot Image** field displays the preboot image version written to the drive's shadow MBR. If the field displays "Not Supported", then the drive does not support MBR shadowing, and the preboot image cannot be written to the drive. If the field displays "Not Available", and the selected drive is a TCG drive, then the preboot image has not been written to the drive.

## 7.2 TCG Information

- The **TCG Version** field displays the TCG specification version that the drive supports. If the drive is not a TCG drive, then this field and the following fields will display "N/A".

- **Setup Status** indicates whether the drive has been set up using Opal Lock. If the drive is not set up using Opal Lock, Setup Status will display **"No"**.

- **Lock Status** indicates whether the drive is locked or not. If drive is Locked then Lock Status will display "Locked" and if it is not Locked then Lock Status will display "Unlocked"

- The **Encryption** field indicates whether the selected drive supports full-disk encryption. Most versions of TCG support full-disk encryption, with the exception of Pyrite, which does not require encryption.

- **Block SID** is a feature present in some TCG drives which, if enabled, blocks any attempt to change the authentication key. If Block SID is enabled, Opal Lock is not able to set up a password for the drive. Therefore, Block SID needs to be disabled before the drive can be set up using Opal Lock. Block SID can be disabled in the BIOS on startup before the Block SID command is executed.

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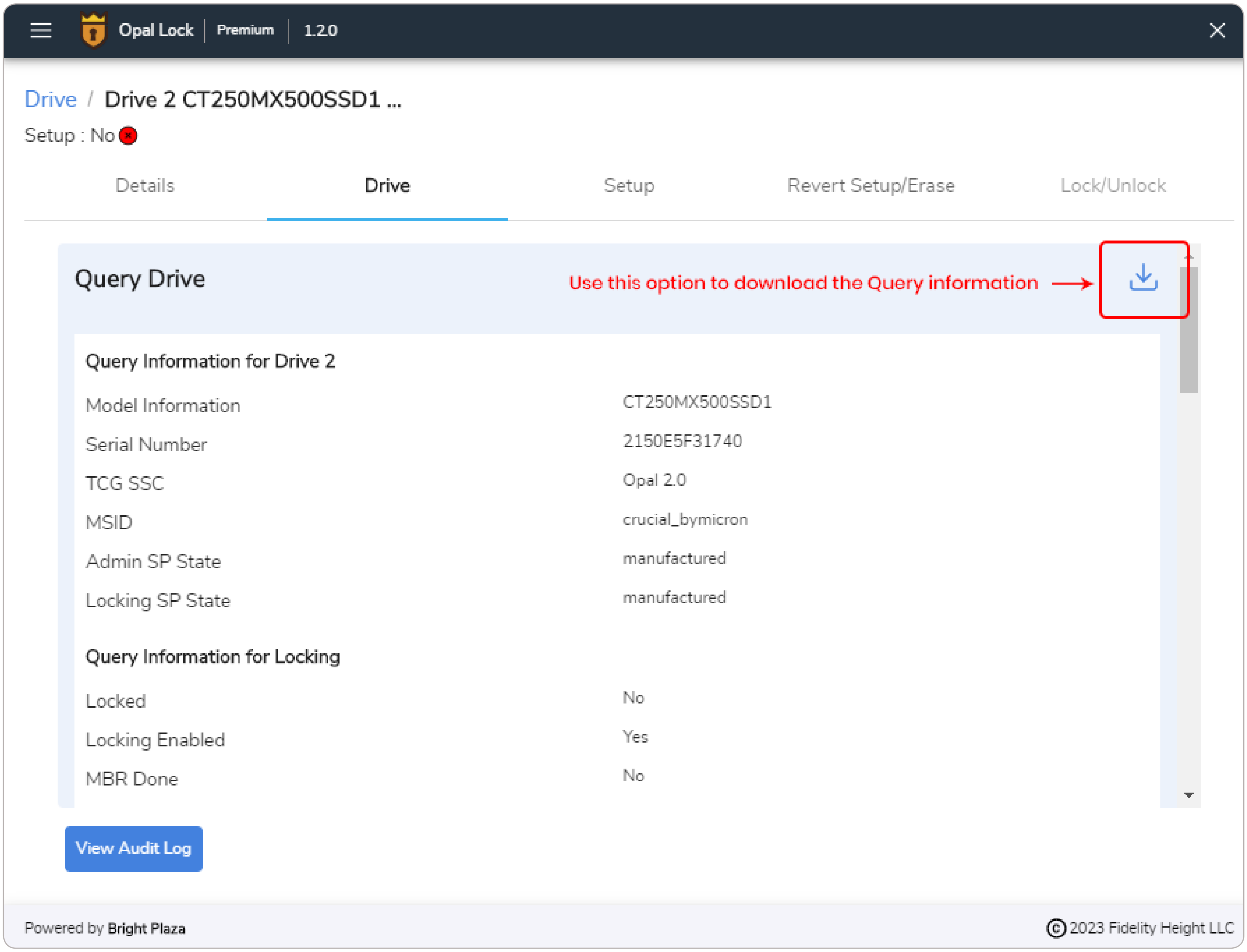
# 8. DRIVE

This section covers features which pertain to viewing and updating information on TCG drives. The easiest way to know whether a drive is a TCG drive is to check whether the drive has a PSID (physical secure ID). All TCG drives have their PSID included on their label. All TCG drives are compatible with Opal Lock, but certain TCG versions such as Pyrite and Enterprise do not support certain operations.

## 8.1 Query Drive


Opal Lock | Premium | 1.2.0
Drive / Drive 2 CT250MX500SSD1 ...
Setup : No
Details
Drive
Setup
Revert Setup/Erase
Lock/Unlock
Use this option to download the Query information
View Audit Log
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Query Drive

Query Information for Drive 2

| | |
|---|---|
| Model Information | CT250MX500SSD1 |
| Serial Number | 2150E5F31740 |
| TCG SSC | Opal 2.0 |
| MSID | crucial_bymicron |
| Admin SP State | manufactured |
| Locking SP State | manufactured |

Query Information for Locking

| | |
|---|---|
| Locked | No |
| Locking Enabled | Yes |
| MBR Done | No |

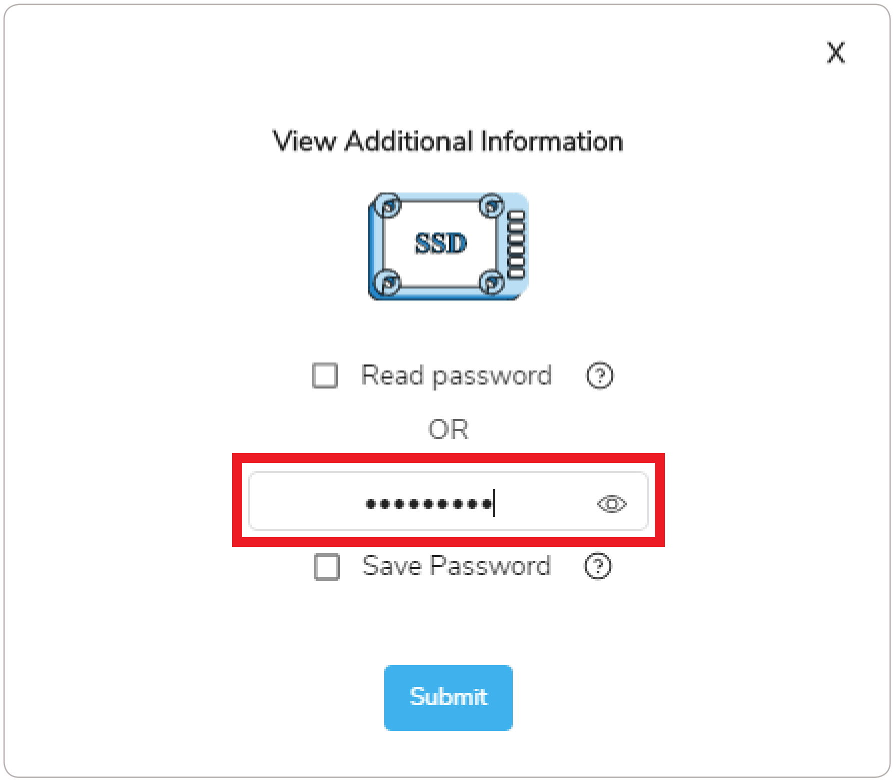
*Query Drive*

- Query brings up a window displaying information about the drive.

- The Query Information can be saved as a CSV file

- The Application also has the option of entering the drive's Admin password to access additional, password-protected information. To access the additional password-protected information, scroll down the screen and click on the **View Additional Information** option displayed at the bottom.

- On clicking the **View Additional Information** option, the application will open a window where additional password-protected information can be accessed with a valid Admin password.



*View Additional Information*

- When drive is not setup, application automatically read the default password (MSID) to view the Additional query information.

- There is an option to save the Query information to a text file.

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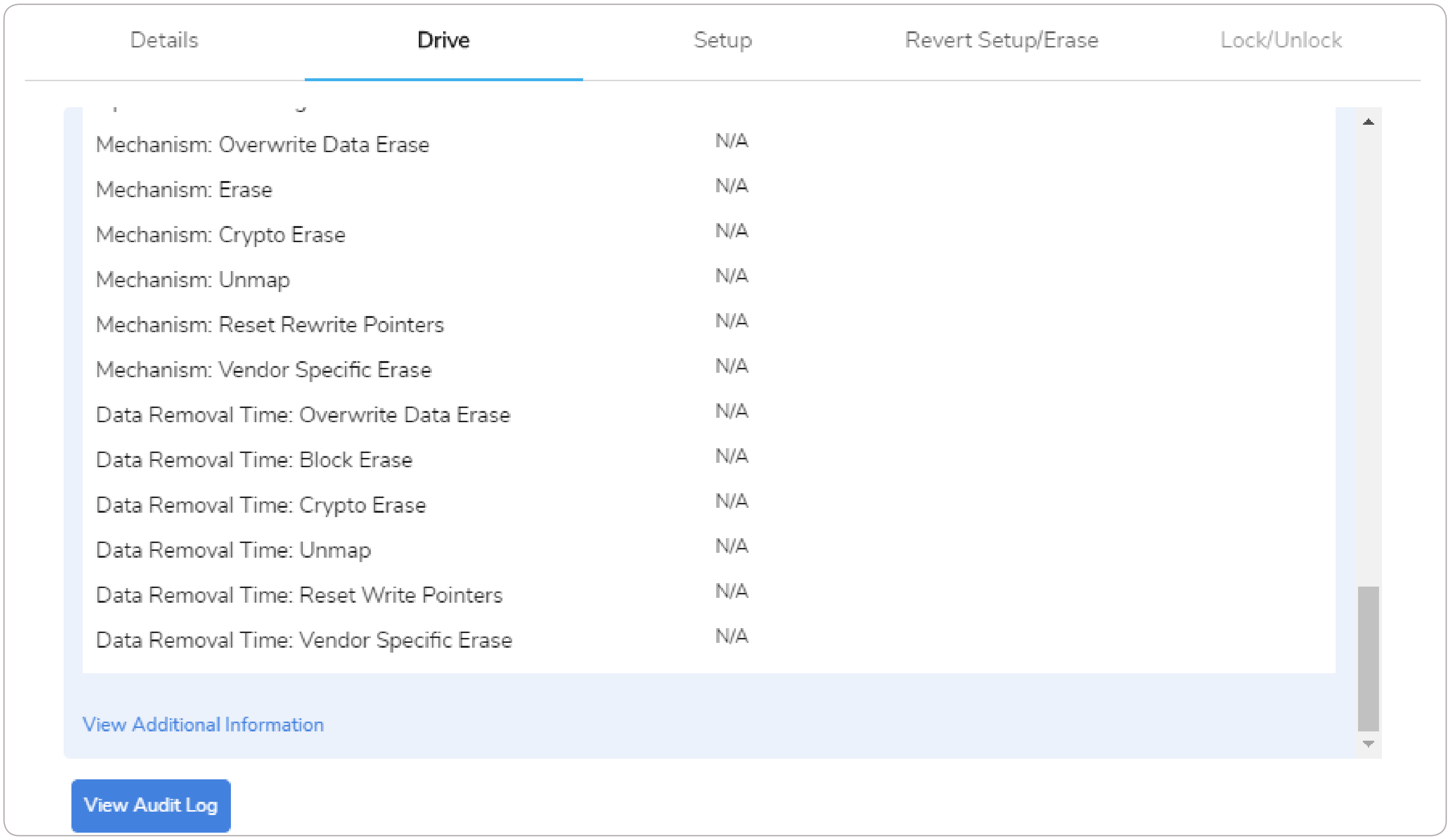
## 8.2 Audit Log

- Opal Lock stores an event log embedded within each drive called the Audit Log which logs operations done on the drive such as setting up the password, authentication attempts, etc.

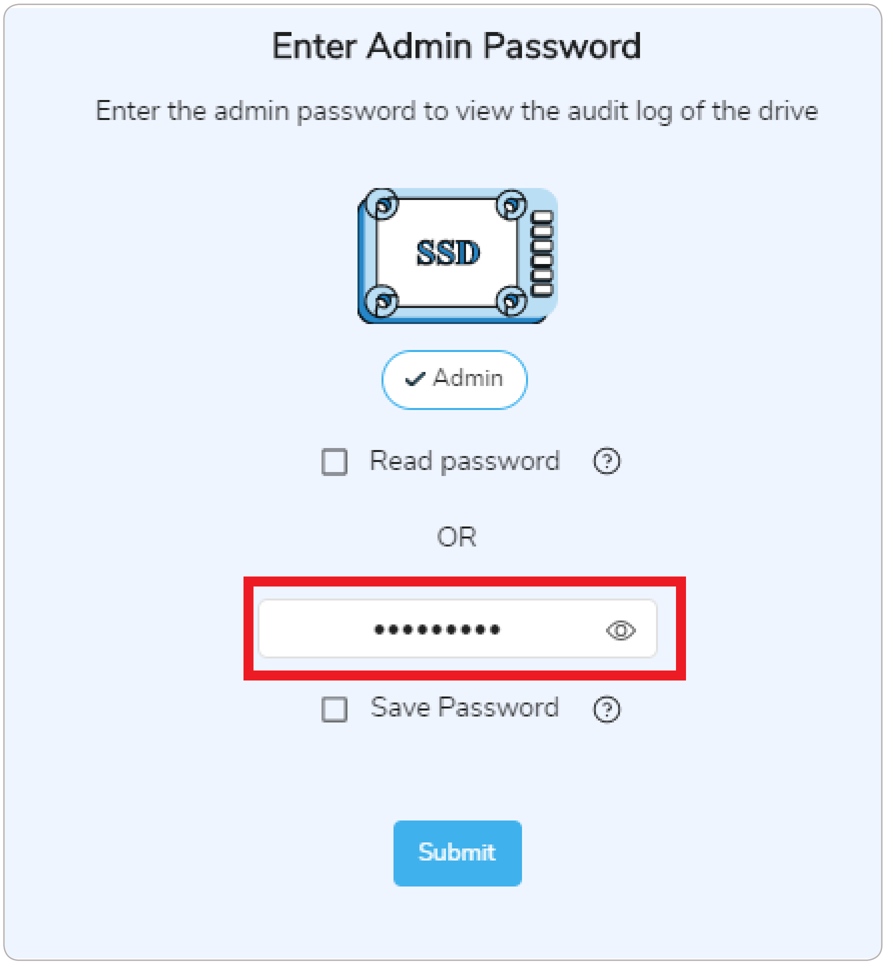
- The Application also has the **View Audit Log** button to fetch the Audit Logs.



| | |
|---|---|
| Mechanism: Overwrite Data Erase | N/A |
| Mechanism: Erase | N/A |
| Mechanism: Crypto Erase | N/A |
| Mechanism: Unmap | N/A |
| Mechanism: Reset Rewrite Pointers | N/A |
| Mechanism: Vendor Specific Erase | N/A |
| Data Removal Time: Overwrite Data Erase | N/A |
| Data Removal Time: Block Erase | N/A |
| Data Removal Time: Crypto Erase | N/A |
| Data Removal Time: Unmap | N/A |
| Data Removal Time: Reset Write Pointers | N/A |
| Data Removal Time: Vendor Specific Erase | N/A |

*View Audit Log*

- On clicking the **View Audit Log** button, the application will open a window where audit log information can be accessed with a valid Admin password.



Enter Admin Password

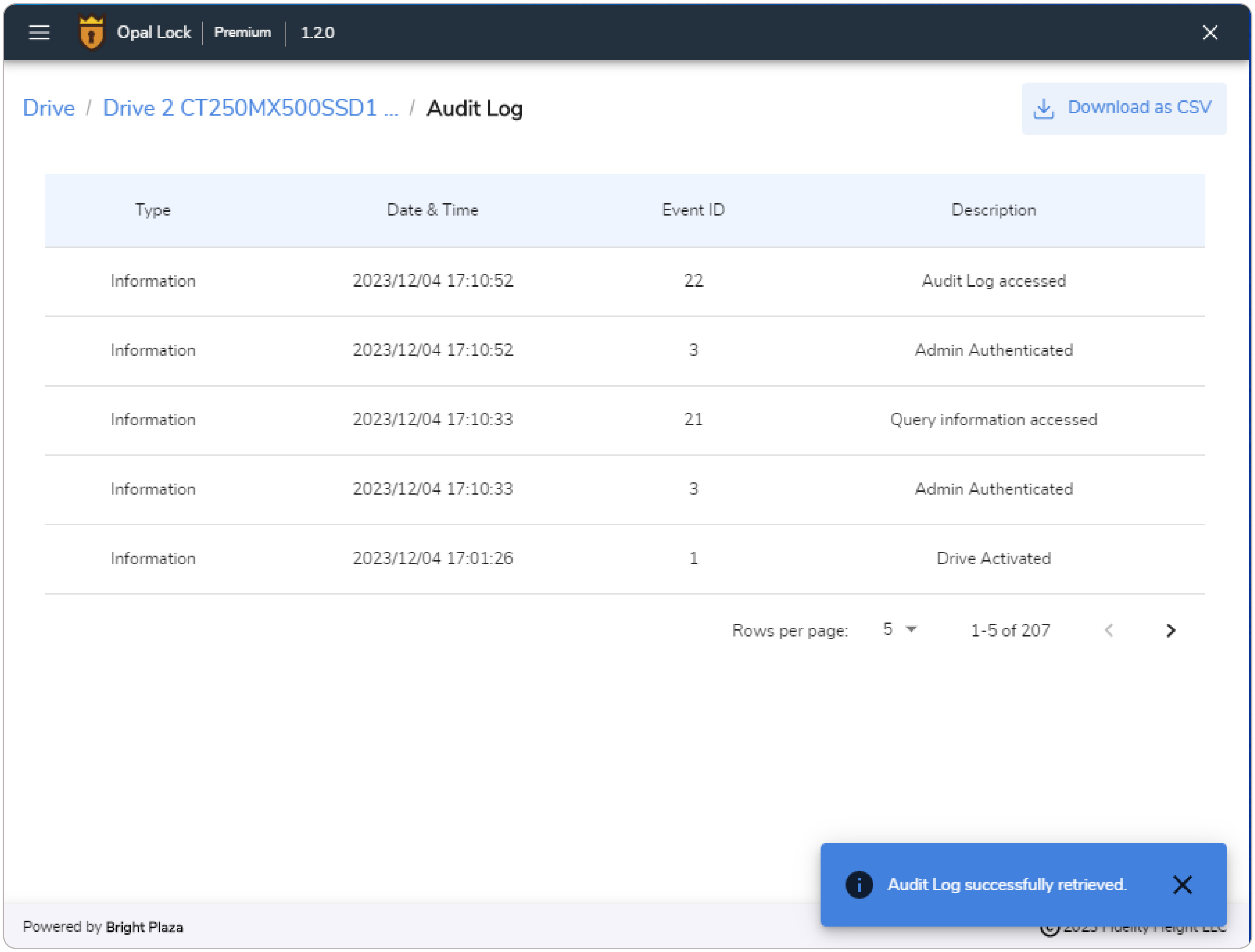
Enter the admin password to view the audit log of the drive

*Enter Admin Password*

Refer to Appendix C for a list of events that are logged. The Audit Log can be saved as a CSV file, refer to Appendix D for a sample of the contents.

***NOTE***

- When drive is not setup, application automatically read the default password (MSID) to view the Audit Logs
- When setting up a drive, Opal Lock also sets up an audit user, which is a separate, internal password that writes events to the audit log.
- Audit Log requires that the drive supports Datastore. Some TCG versions like Enterprise do not support Datastore.



Drive / Drive 2 CT250MX500SSD1 ... / Audit Log

| Type | Date & Time | Event ID | Description |
|---|---|---|---|
| Information | 2023/12/04 17:10:52 | 22 | Audit Log accessed |
| Information | 2023/12/04 17:10:52 | 3 | Admin Authenticated |
| Information | 2023/12/04 17:10:33 | 21 | Query information accessed |
| Information | 2023/12/04 17:10:33 | 3 | Admin Authenticated |
| Information | 2023/12/04 17:01:26 | 1 | Drive Activated |

Rows per page: 5 1-5 of 207

Audit Log successfully retrieved.

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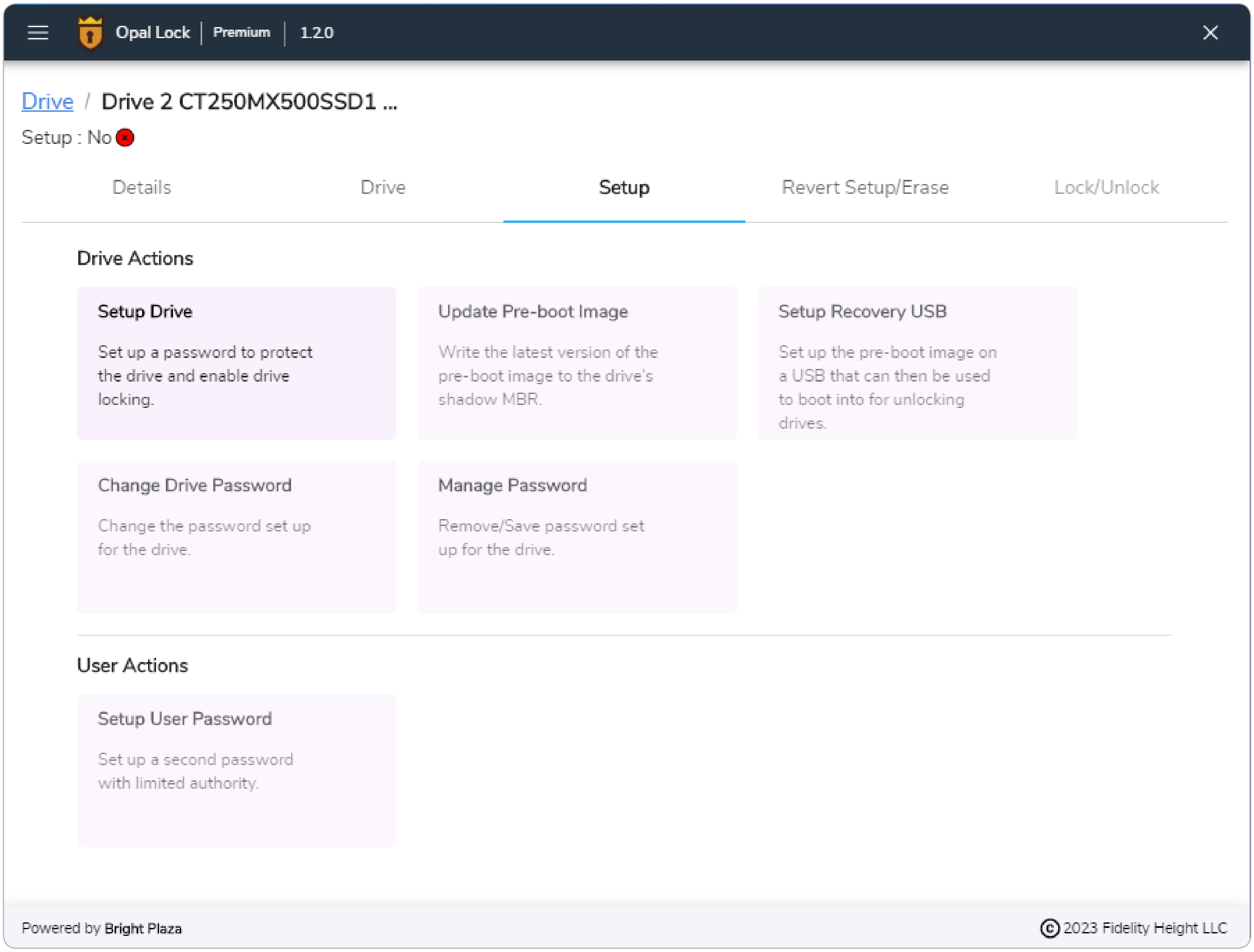
*Audit log*

# 9. SETUP

This section introduces following features:

- **Setup Drive** features for setting up the password and locking/unlocking mechanisms for the drives.
- **Update Pre-boot Image** feature to write the latest version of the pre-boot image to the drive's shadow MBR.
- **Setup Bootable USB** feature to set up the pre-boot image on a USB that can then be used to boot into for unlocking drives.
- **Change Drive Password** feature to Change the password set up for the drive.
- **Manage Password** feature to Save and Remove the password files from the System drive and USB flash drives.
- **Setup User Password** to set up a second password with limited authority.

*Go to Table of Contents*



Opal Lock | Premium | 1.2.0
Drive / Drive 2 CT250MX500SSD1 ...
Setup : No
Details
Drive
Setup
Revert Setup/Erase
Lock/Unlock

Drive Actions

Setup Drive

Set up a password to protect the drive and enable drive locking.

Update Pre-boot Image

Write the latest version of the pre-boot image to the drive's shadow MBR.

Setup Recovery USB

Set up the pre-boot image on a USB that can then be used to boot into for unlocking drives.

Change Drive Password

Change the password set up for the drive.

Manage Password

Remove/Save password set up for the drive.

User Actions

Setup User Password

Set up a second password with limited authority.

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*Setup without setup*

**NOTE**

- Update Pre-boot Image, Setup Recovery USB, Change Drive Password, Manage Password and Setup User Password features can be used only if password for the drive has been set up.

## 9.1 Set up Drive

### 9.1.1 Set up Password

- The first step to setting up a drive is to set a password for the drive. This password is to be used for all Opal Lock operations on the drive, such as unlocking the drive. This password is different from the password you normally enter on your operating system's startup screen. For security purposes, the password must be at least 8 characters long. For verification purposes, the new password must be entered and confirmed twice.

***WARNING***

- If the drive's password is lost/forgotten, the only course for recovery is to revert setup using the drive's PSID, which reverts the drive to manufacturer settings and erases all of the drive's data without any way of recovering it. Therefore, it is of utmost importance that users remember the password that they set.

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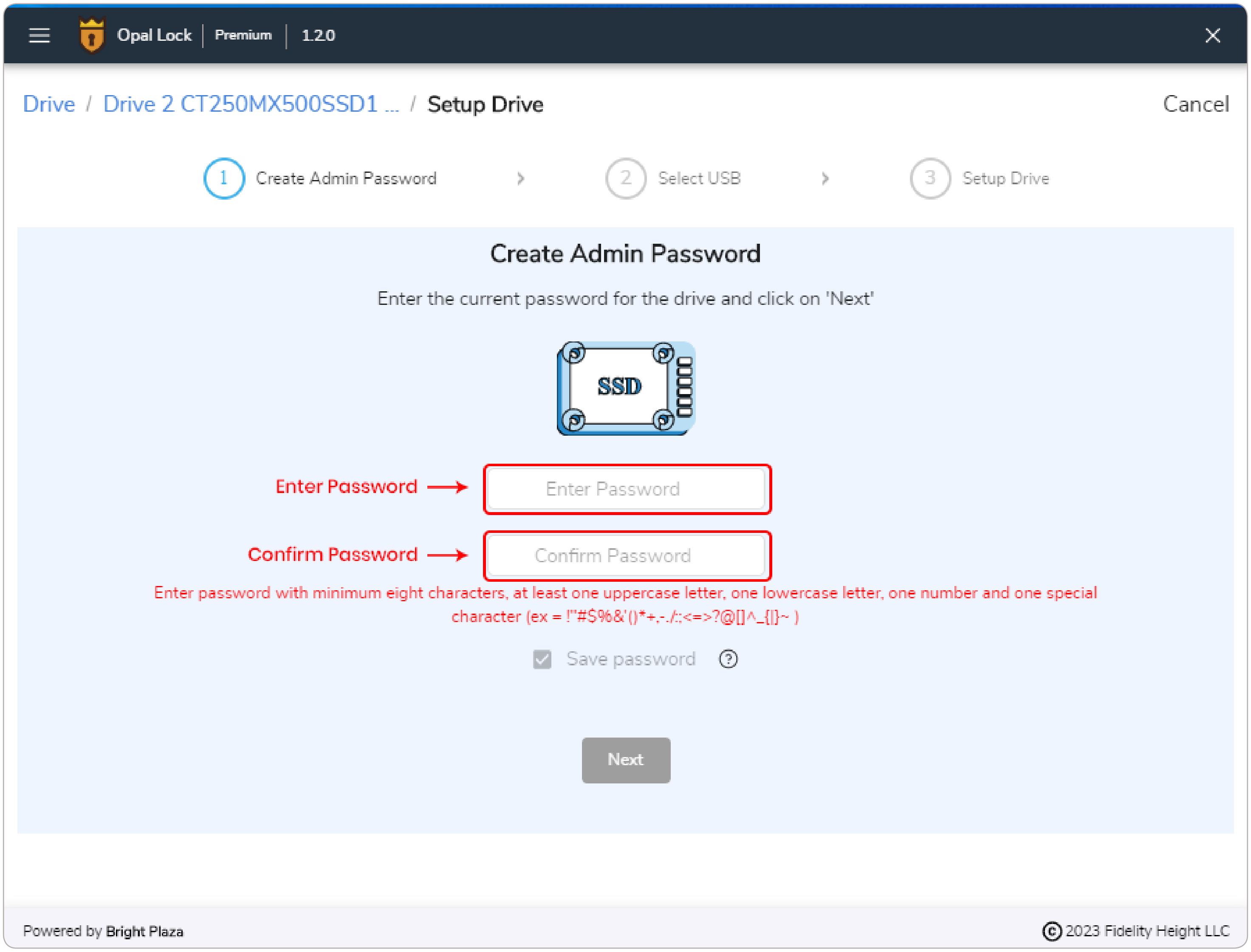


Create Admin Password

Enter the current password for the drive and click on 'Next'

Enter password with minimum eight characters, at least one uppercase letter, one lowercase letter, one number and one special character (ex = !"#$%&'()*+,-./:;<=>?@[]^_{|}~ )

☑ Save password

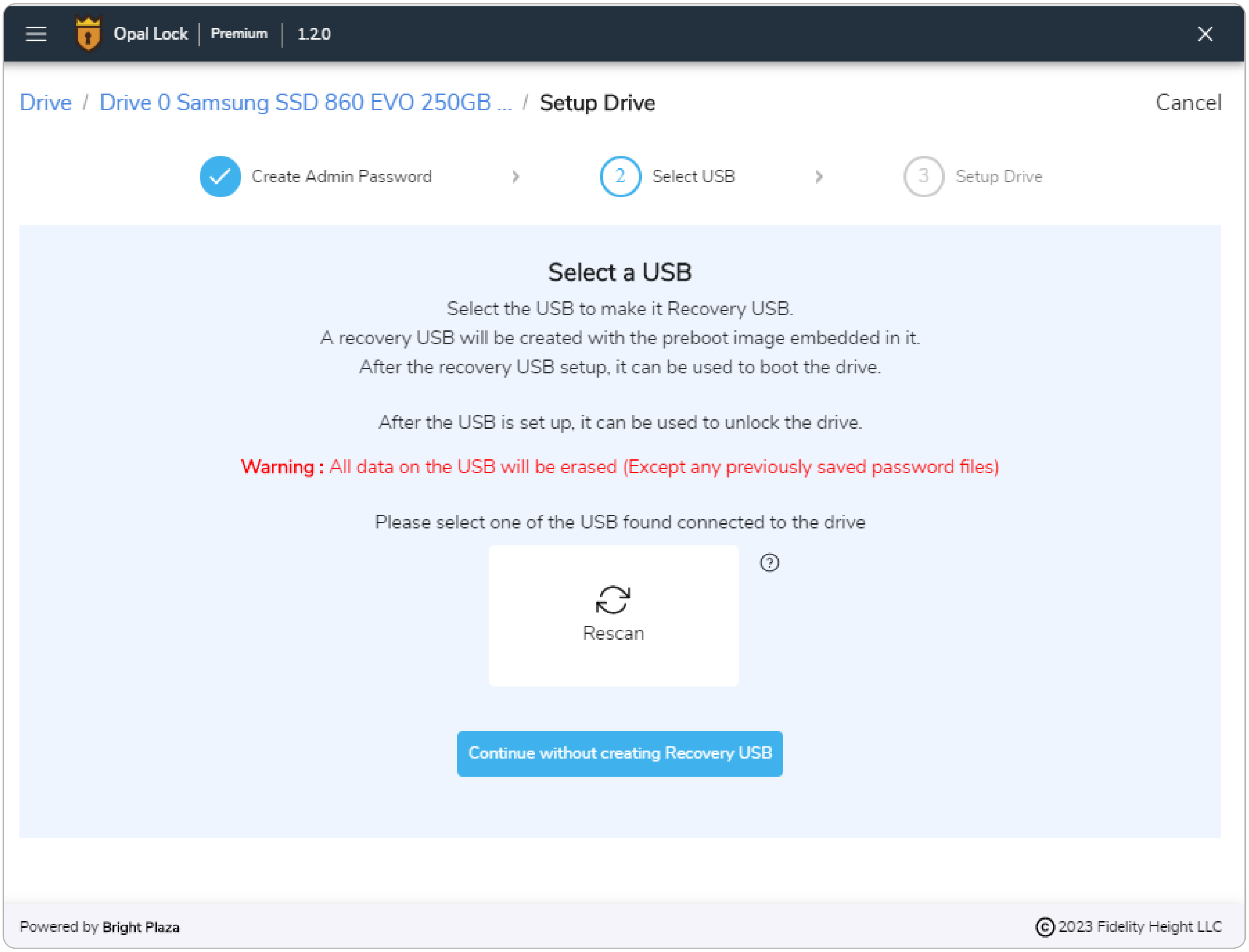
*Create Admin Password*

- "Save Password" checkbox will remain checked and disabled as we recommend you to Save the Password in the USB Flash drive. You can still uncheck the checkbox on the Save Password pop up that will show up with the last step to setup drive

## 9.1.2 Select a USB

- A Recovery USB will be created with the pre-boot image embedded in it. After the USB is set up, it can be used to unlock the drive.

- A preboot image will also write on the Opal drive's Shadow MBR.



Drive / Drive 0 Samsung SSD 860 EVO 250GB ... / Setup Drive

Select a USB

Select the USB to make it Recovery USB.
A recovery USB will be created with the preboot image embedded in it.
After the recovery USB setup, it can be used to boot the drive.

After the USB is set up, it can be used to unlock the drive.

Warning : All data on the USB will be erased (Except any previously saved password files)

Please select one of the USB found connected to the drive

Rescan
Continue without creating Recovery USB
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*Internal Drive-Create setup-Select a USB*

- **For Internal Opal Drive,** writing preboot image on the Opal drive's Shadow MBR is compulsory because Internal drive can be used for boot purpose.

- **For the External Opal Drive,** writing Preboot Image on the Shadow MBR is optional.

- In order to write the preboot image on the Shadow MBR of the External drive, user has to check the checkbox.

- To select the USB flash drive, attach the USB flash drive to the system and click on the Rescan option and click on the USB flash drive to select.

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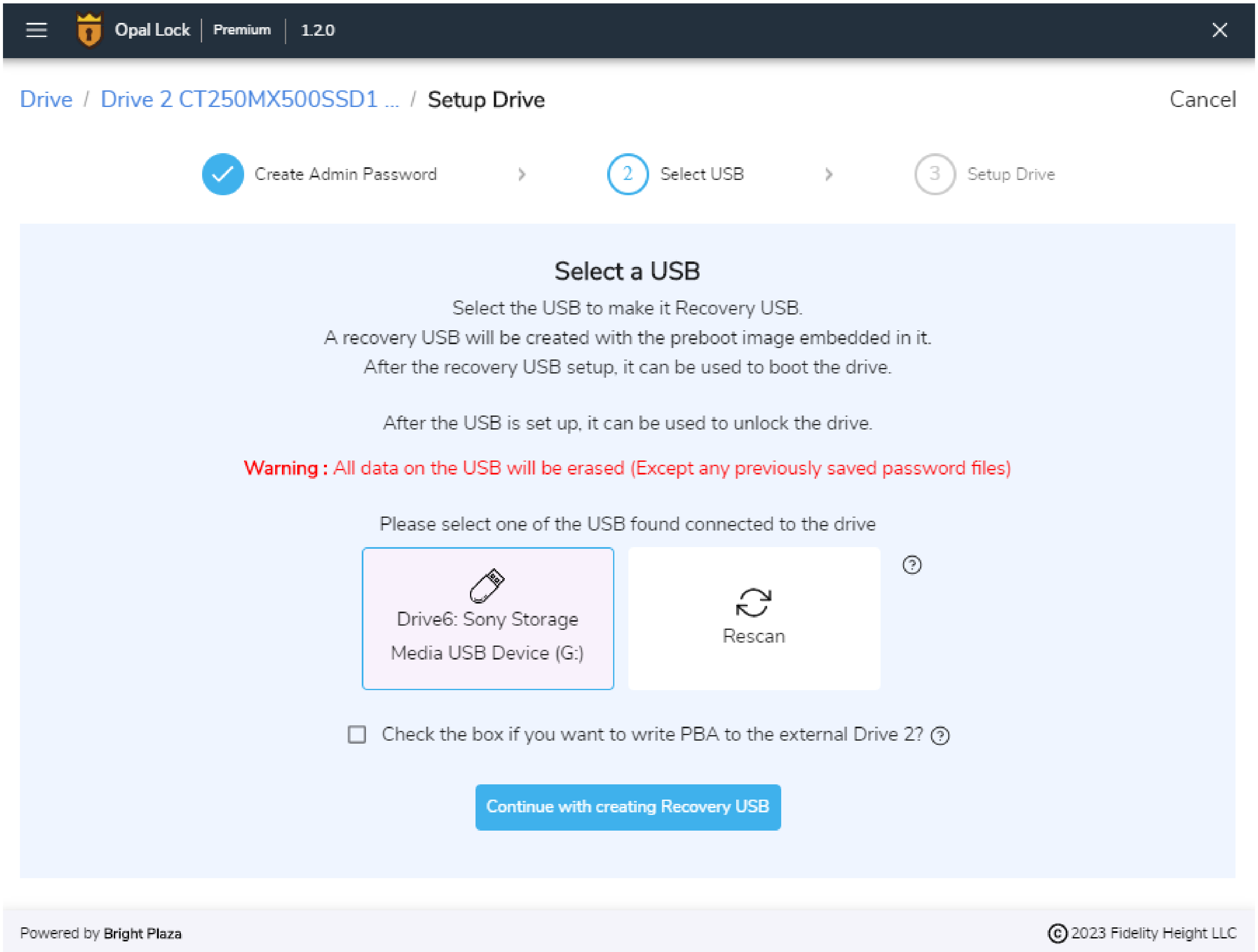

Opal Lock | Premium | 1.2.0
Drive / Drive 2 CT250MX500SSD1 ... / Setup Drive
Cancel
Create Admin Password
2 Select USB
3 Setup Drive

Select a USB

Select the USB to make it Recovery USB.
A recovery USB will be created with the preboot image embedded in it.
After the recovery USB setup, it can be used to boot the drive.

After the USB is set up, it can be used to unlock the drive.

**Warning :** All data on the USB will be erased (Except any previously saved password files)

Please select one of the USB found connected to the drive

□ Check the box if you want to write PBA to the external Drive 2?

Continue with creating Recovery USB
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*Select a USB- USB is selected*

**The preboot image** is a small operating system image with Opal Lock embedded in it that can be written onto a drive's shadow MBR. When a drive is locked, the contents of the drive are encrypted and inaccessible, except for its shadow MBR. When booting into a locked drive with the preboot image written, the system will boot into the preboot image. Upon booting into the preboot image, the embedded Opal Lock application will load and can be used to unlock the drive. After unlocking the drive, the drive's contents can be accessed by rebooting the system.

If Opal Lock is being used to manage multiple drives, the preboot image does not necessarily need to be written to every drive. When booting up to unlock the drives, at least one drive that has the preboot image written to it must be mounted on the system in order to be able to access the preboot environment and use it to unlock all of the drives. If each drive will be managed individually rather than as a group, then every drive will need to have the preboot image written to its shadow MBR.

***WARNING***

- Writing the preboot image to a drive can take up to 15 minutes. Do not power down the system while the preboot image is being written, otherwise the image will not be written, and the drive will be locked with no way of unlocking itself internally.
- Some TCG versions do not support the shadow MBR. If your drive does not support MBR shadowing, then it is not possible for the preboot image to be set up on the drive. The only ways to unlock a drive without a shadow MBR are either using Opal Lock installed on another drive to unlock it, or setting up the preboot environment on a bootable USB. (see section 4.2.3).

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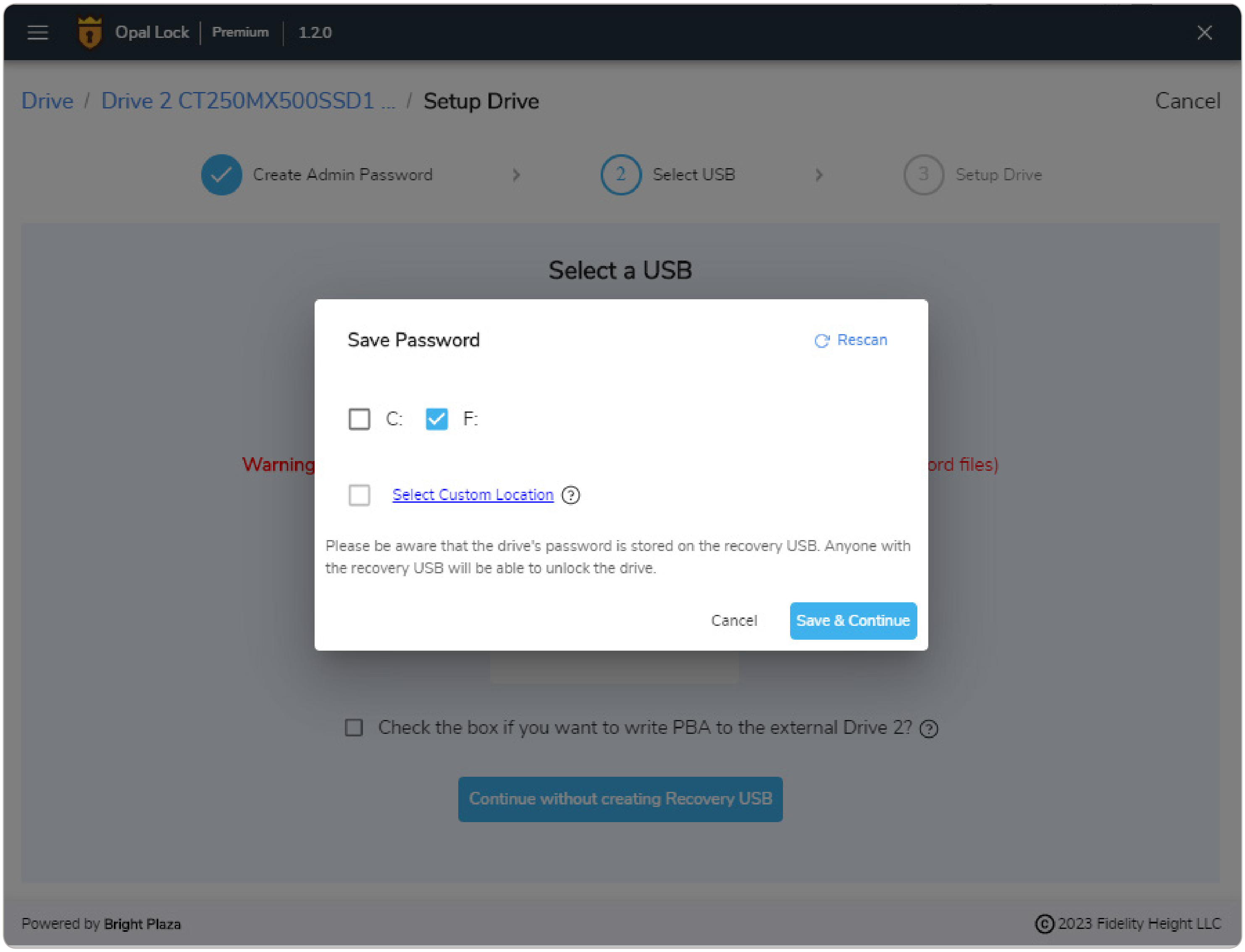
### 9.1.3 Save Password:

Passwords can be saved in the System drive, Recovery USB, other USBs and Custom Location.



Opal Lock | Premium | 1.2.0
Drive / Drive 2 CT250MX500SSD1 ... / Setup Drive
Cancel
Create Admin Password
2 Select USB
3 Setup Drive
Select a USB
Warning
ord files)
Check the box if you want to write PBA to the external Drive 2?
Continue without creating Recovery USB
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Save Password

Rescan

□ C: ☑ F:

□ Select Custom Location

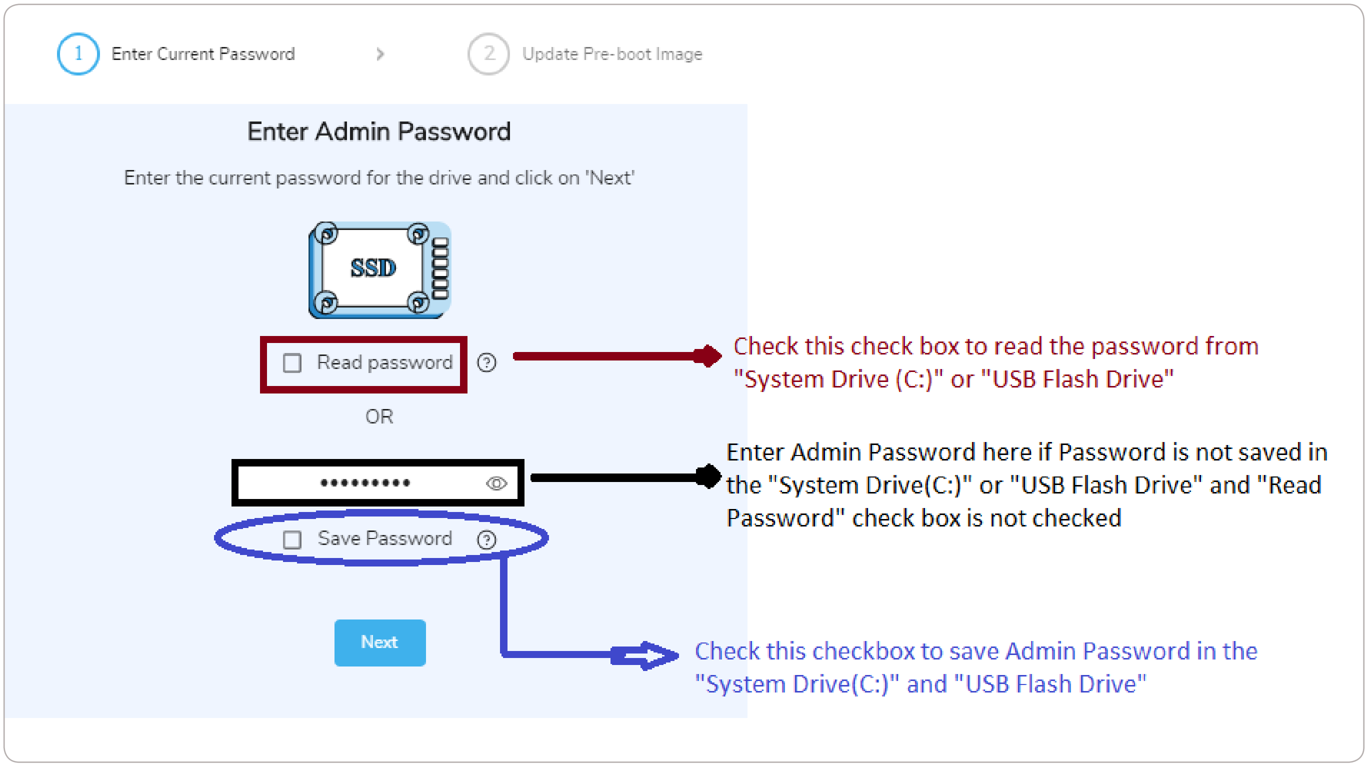
Please be aware that the drive's password is stored on the recovery USB. Anyone with the recovery USB will be able to unlock the drive.

Cancel | Save & Continue

*Save Password*

## 10. UPDATE PRE-BOOT IMAGE

- This feature is to write the latest version of the pre-boot image to the drive's shadow MBR for which password has already been set up



Enter Admin Password

Enter the current password for the drive and click on 'Next'

□ Read password

OR

••••••••••

□ Save Password

Check this check box to read the password from "System Drive (C:)" or "USB Flash Drive"

Enter Admin Password here if Password is not saved in the "System Drive(C:)" or "USB Flash Drive" and "Read Password" check box is not checked

Check this checkbox to save Admin Password in the "System Drive(C:)" and "USB Flash Drive"

*Update Preboot Image*

- After submitting the admin password, click on Update button to update the preboot image

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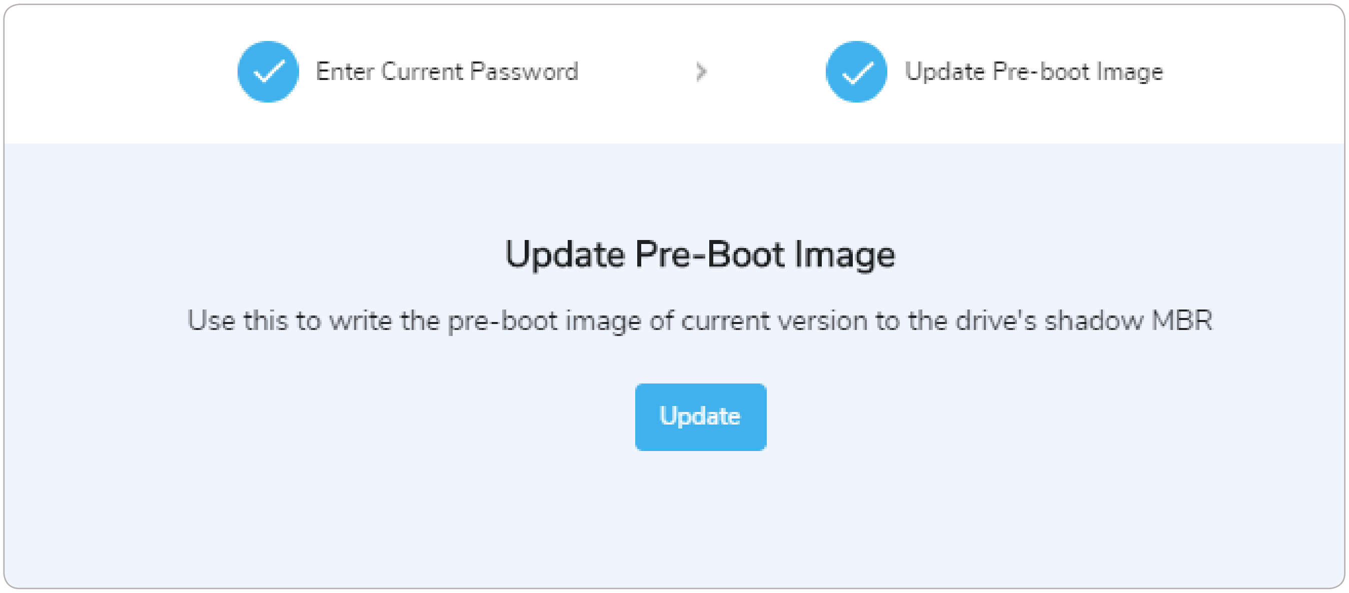


Update Pre-Boot Image

Use this to write the pre-boot image of current version to the drive's shadow MBR

Update Preeboot Image

**WARNING**

- It is essential that a way to unlock the drive is set up immediately. If a drive is locked without any way for unlocking it, then the drive will be in an unusable state and all of its data will be lost if the drive becomes locked.

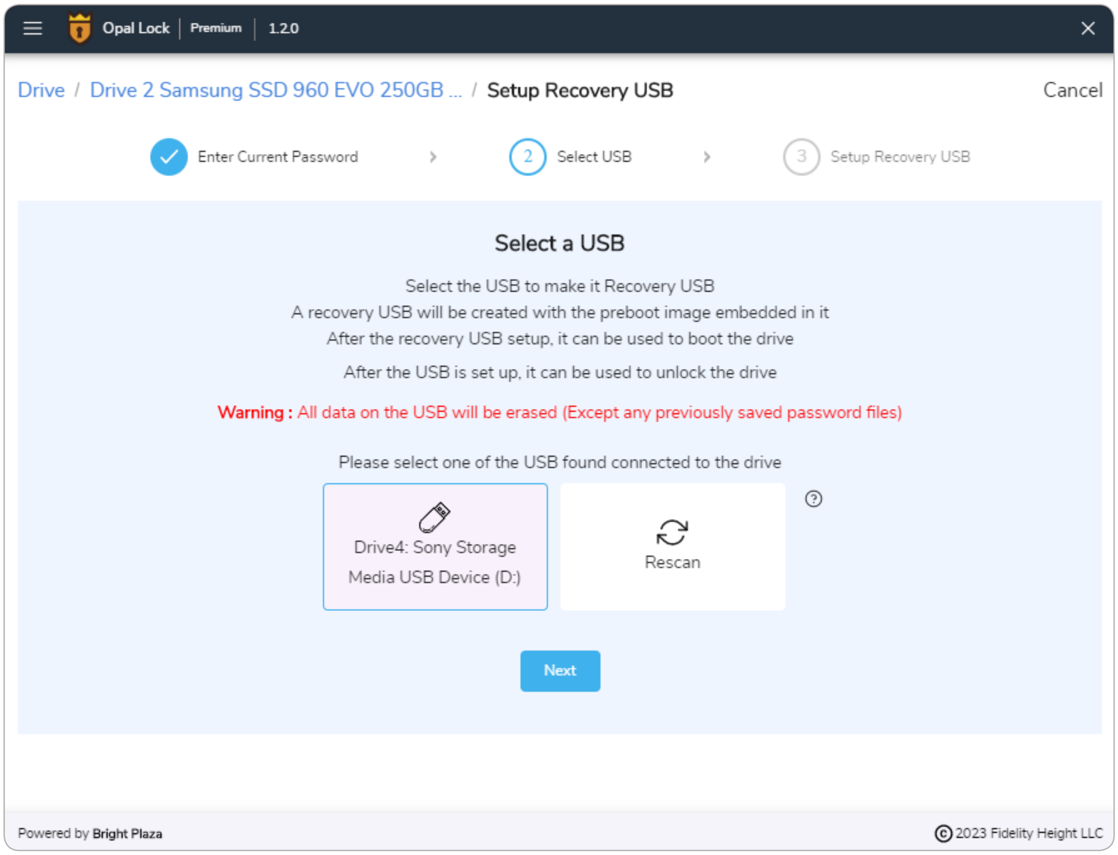
## 11. SETUP RECOVERY USB

The preboot image can also be set up on a USB flash drive, creating a Recovery USB drive that can be an alternative to writing the preboot image to a drive's shadow MBR. This is included as part of initial setup, and is also a separate menu option. Select the drive you want the USB to be set up to unlock and proceed with setting up the USB.

To unlock the drive with the bootable USB, boot into the USB on startup, and proceed with unlocking drives just like if the preboot image is on the shadow MBR. The drive that was selected when setting up the USB must be present in the system when booting into the USB in order for the Recovery USB to be verified and usable.

***NOTE***

- This feature will not remove the already saved password in the USB flash drive that is made Recovery USB.


Opal Lock | Premium | 1.2.0
Drive / Drive 2 Samsung SSD 960 EVO 250GB ... / Setup Recovery USB
Cancel
Enter Current Password
2 Select USB
3 Setup Recovery USB

Select a USB

Select the USB to make it Recovery USB
A recovery USB will be created with the preboot image embedded in it
After the recovery USB setup, it can be used to boot the drive
After the USB is set up, it can be used to unlock the drive

**Warning :** All data on the USB will be erased (Except any previously saved password files)

Please select one of the USB found connected to the drive

Drive4: Sony Storage Media USB Device (D:)
Rescan
Next
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*Setup Recovery USB*

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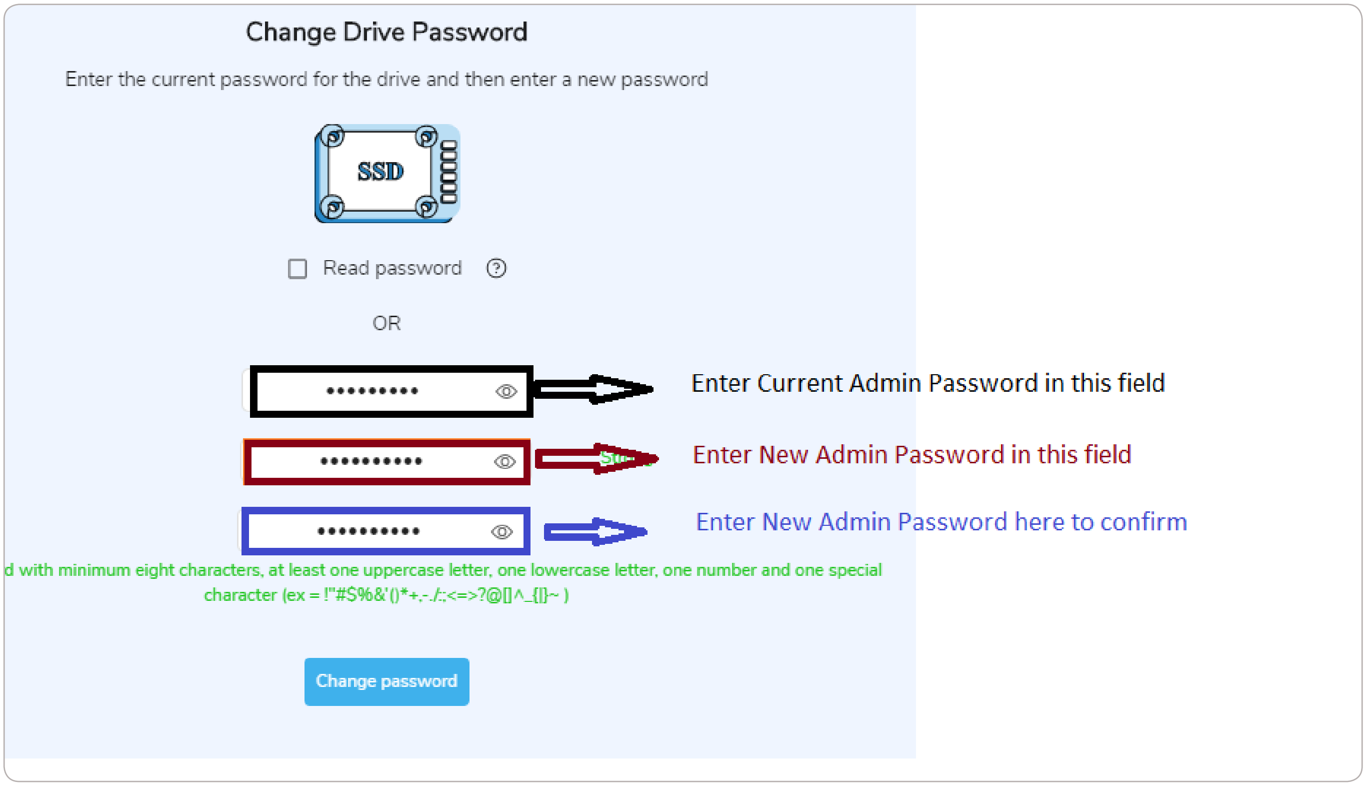
## 12. CHANGE DRIVE PASSWORD

Opal Lock comes with the option of changing the password set up on a drive. Simply enter the current password, the new password, and confirm the new password.

For Premium versions, Change Password can be used to change either the Admin password or the User password. For more information about the User password and how to set up or remove it, please refer to section 5.3.4.



Change Drive Password

Enter the current password for the drive and then enter a new password

□ Read password ⓘ

OR

•••••••••• → Enter Current Admin Password in this field

••••••••••• → Enter New Admin Password in this field

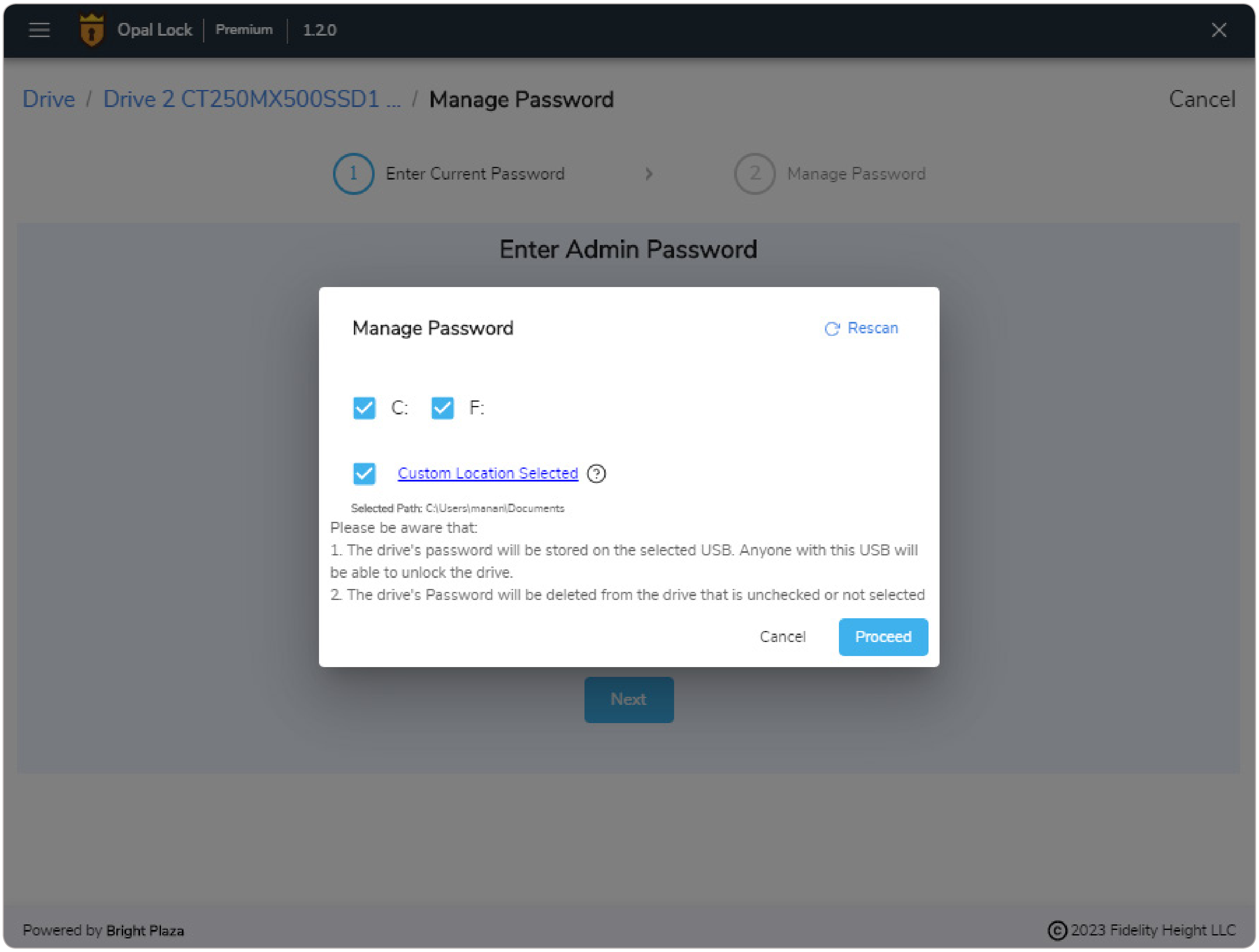
••••••••••• → Enter New Admin Password here to confirm

d with minimum eight characters, at least one uppercase letter, one lowercase letter, one number and one special character (ex = !"#$%&'()*+,-./:;<=>?@[]^_{|}~ )

*Change Drive Password*

## 13. MANAGE PASSWORD

Admin Password can be saved and removed from the USB flash drives and system drive with Manage Password feature.



☑ C: ☑ F:

☑ Custom Location Selected ?

Selected Path: C:\Users\manan\Documents

Please be aware that:

1. The drive's password will be stored on the selected USB. Anyone with this USB will be able to unlock the drive.
2. The drive's Password will be deleted from the drive that is unchecked or not selected

*Manage Password*

*NOTE*

- Unchecking the C: checkbox will remove the password file saved in the System drive

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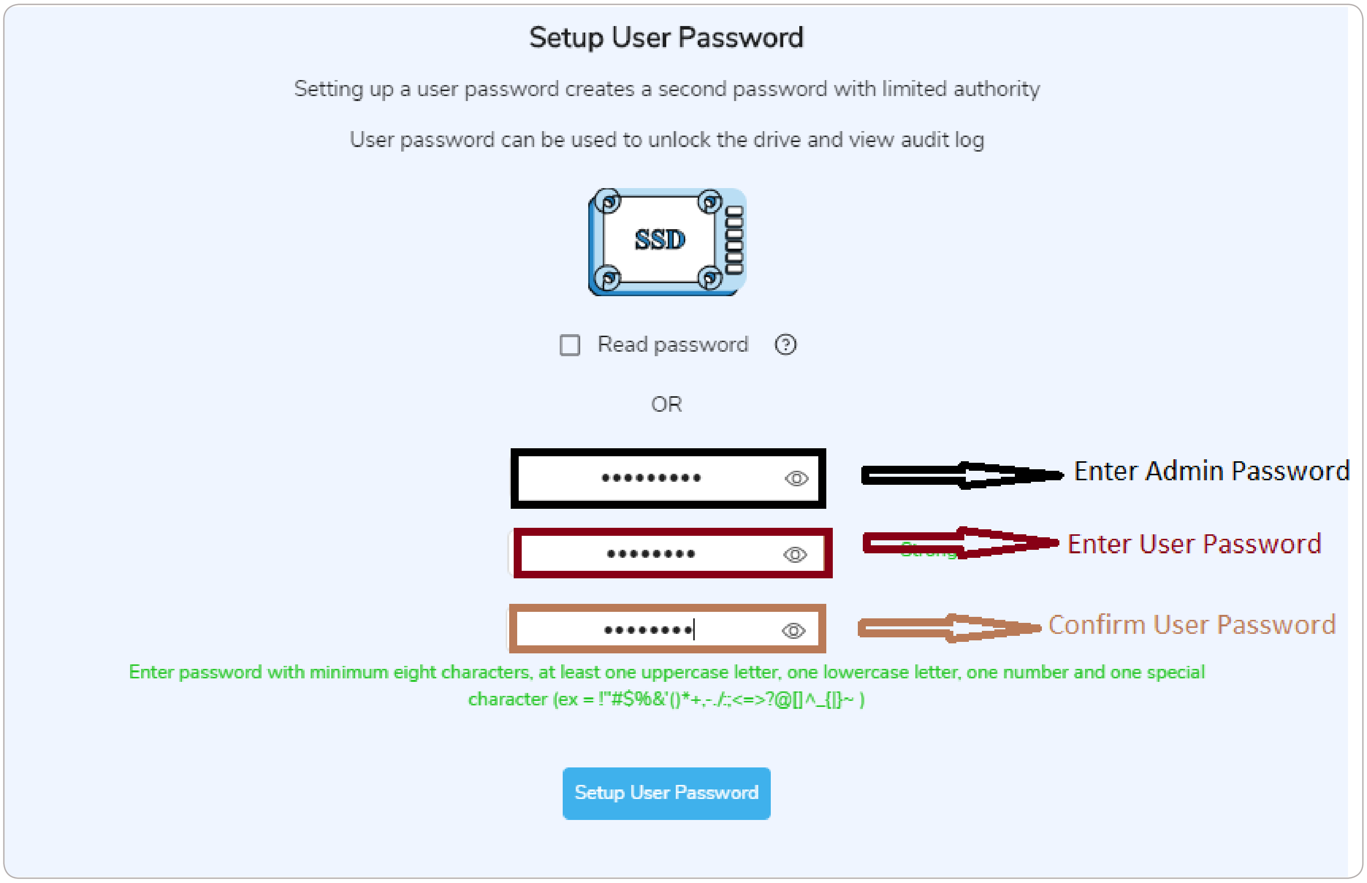
## 14. USER SETUP AND REMOVAL

With the Premium versions, a second password can be set that has limited authority. The main password is referred to as the Admin password, while this second password is called the User password. The User has the authority to unlock the drive, access the drive's Audit Log and to change its own password. Setting up and removing the User password requires the Admin password.



Setup User Password

Setting up a user password creates a second password with limited authority

User password can be used to unlock the drive and view audit log

□ Read password

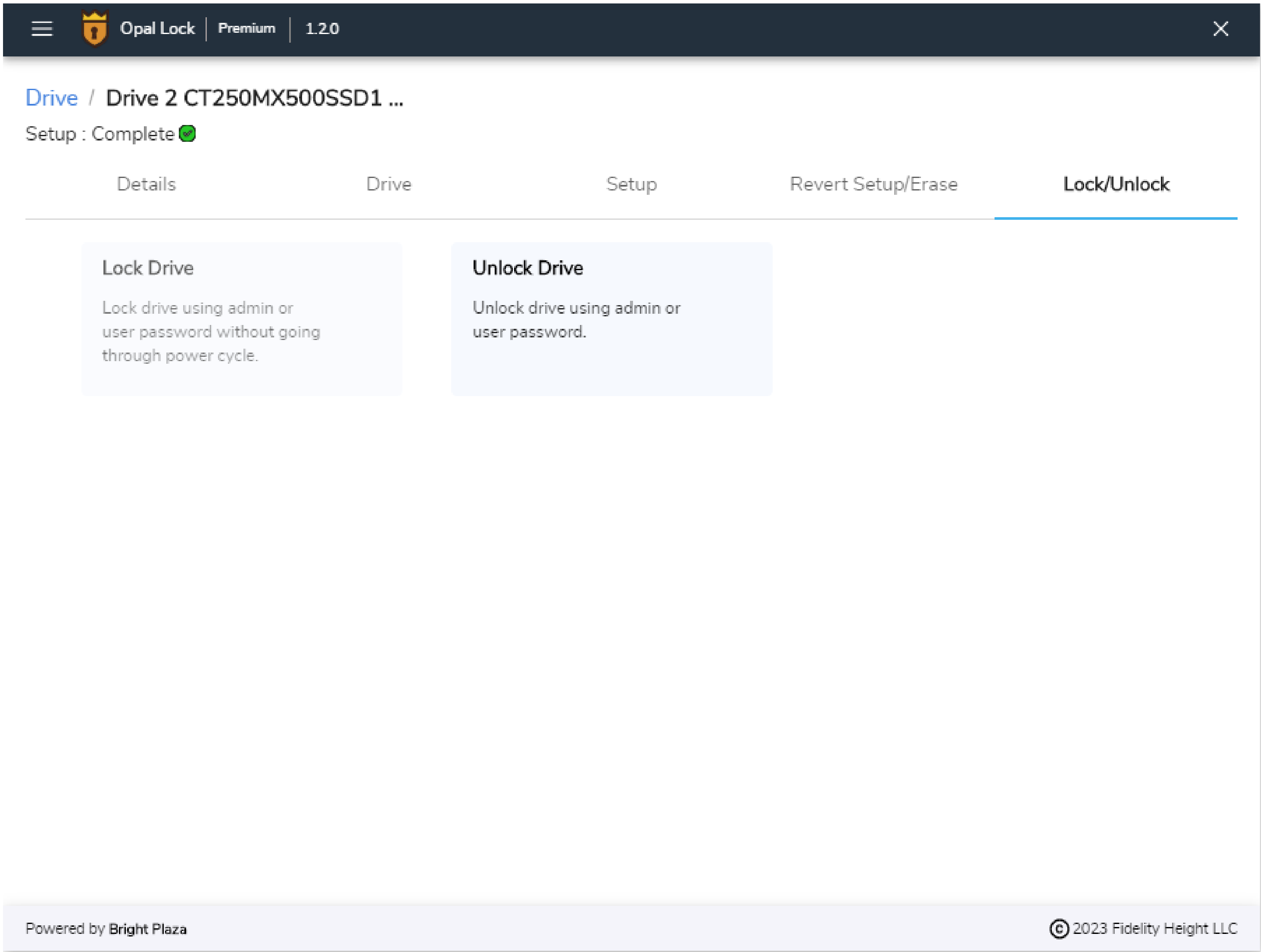
OR

Enter password with minimum eight characters, at least one uppercase letter, one lowercase letter, one number and one special character (ex = !"#$%&'()*+,-./:;<=>?@[]^_{|}~ )

*Setup User Password*

## 15. LOCK/UNLOCK

Once a drive has been set up, then the drive will lock itself upon shutdown, encrypting all of its data and rendering it inaccessible until it is unlocked. Drive can be unlocked by submitting the Password that is setup for the drive or by reading the password automatically from the System drive or attached USB flash drive.


Opal Lock
Premium
1.2.0
Drive / Drive 2 CT250MX500SSD1 ...
Setup : Complete ✓
Details
Drive
Setup
Revert Setup/Erase
Lock/Unlock
Lock Drive
Lock drive using admin or user password without going through power cycle.
Unlock Drive
Unlock drive using admin or user password.
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*Lock & Unlock screen- Drive Locked*

### 15.1 Locking a drive by Power cycle

To lock a drive, the system must be powered down completely. Shut Down and Hibernate are the only two options that completely shut off power to the

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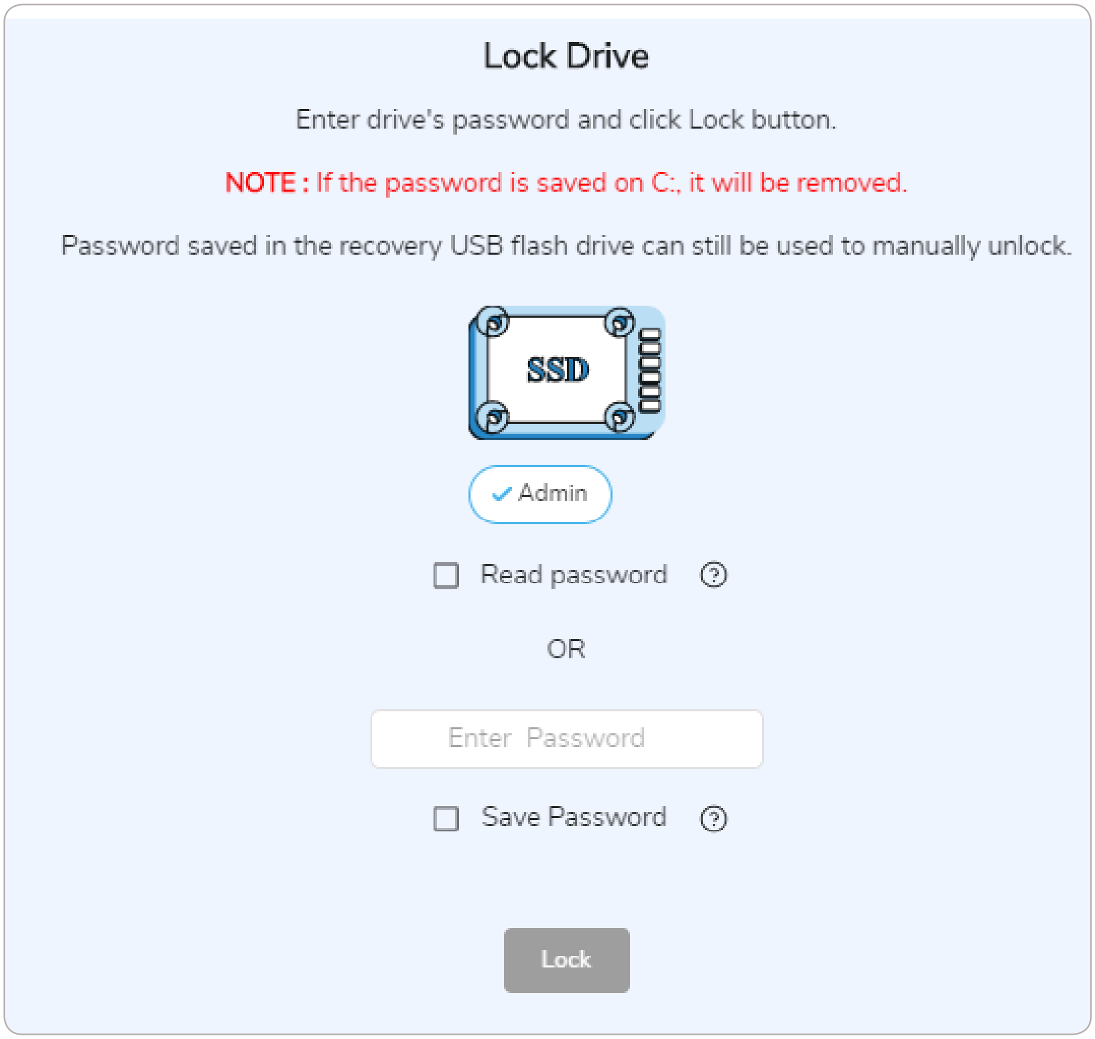
system. Restarting the system does not power cycle the drive, and therefore does not lock the drive.

## 15.2 Locking a drive by submitting the Password (Lock Screen)

To lock the drive without shutting down the system or without power cycling the drive, open the Lock screen and submit the password to Lock the drive.



Lock Drive

Enter drive's password and click Lock button.

NOTE : If the password is saved on C:, it will be removed.

Password saved in the recovery USB flash drive can still be used to manually unlock.

✓ Admin

□ Read password ⓘ

OR

Enter Password

□ Save Password ⓘ

Lock

*Lock Drive*

**NOTE**

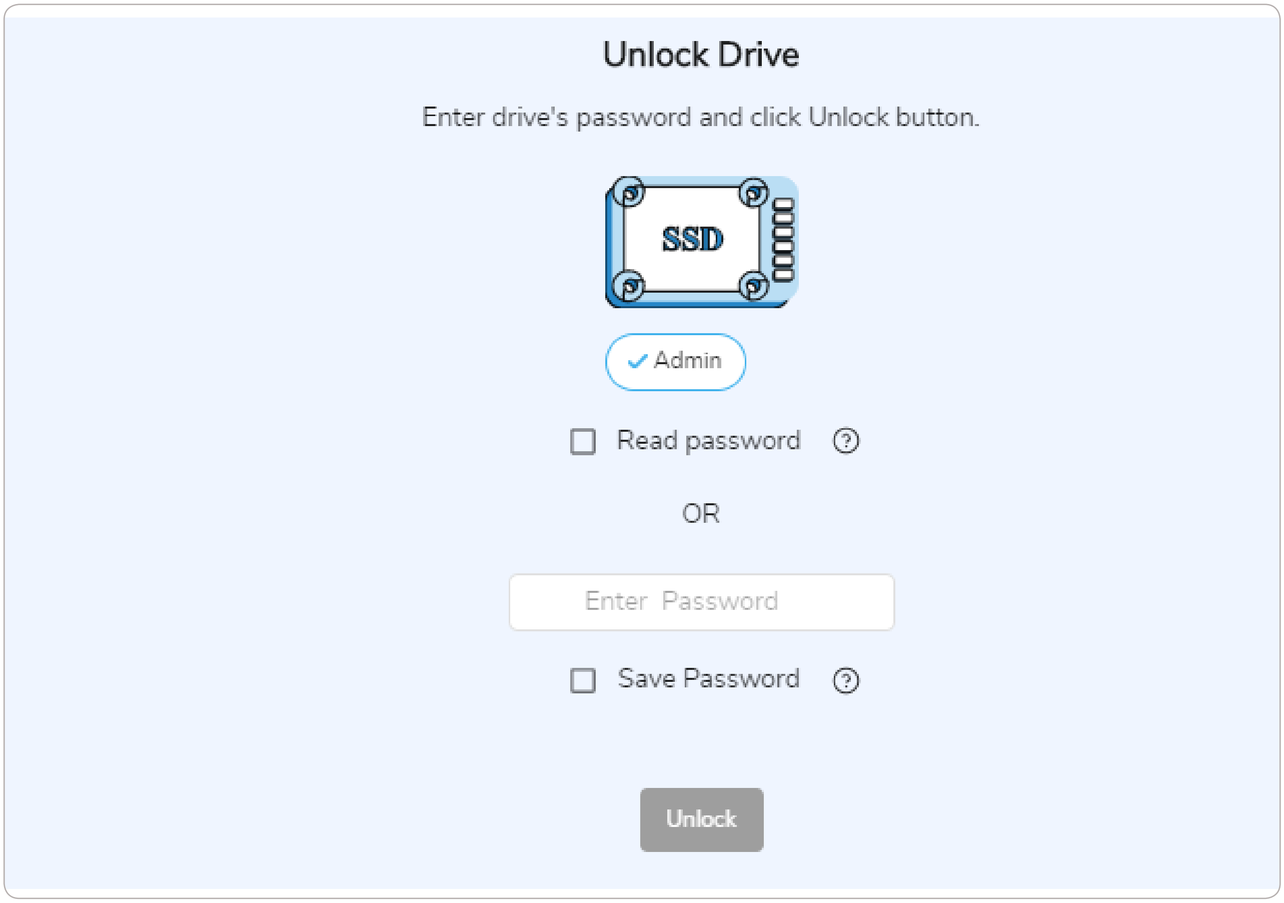
- The password file saved in the system drive will be removed
- Locking the system drive will crash the Windows OS and data will be saved

## 15.3 Unlocking a System drive

If the preboot image is written to the drive's shadow MBR or if the recovery USB is attached to the system, on startup the system will boot into the preboot environment. Upon booting up, Opal Lock will open and load the prompt for unlocking drives. To unlock drives, enter the drive(s) password. Once the drive has been unlocked, complete the process by restarting the system. Shutting down the system will re-lock any drives that had been unlocked.

## 15.4 Unlocking a Secondary Internal drives and External/USB Opal drives

To unlock the Opal drive, open the Unlock screen and submit the password to Unlock the drive.



Unlock Drive

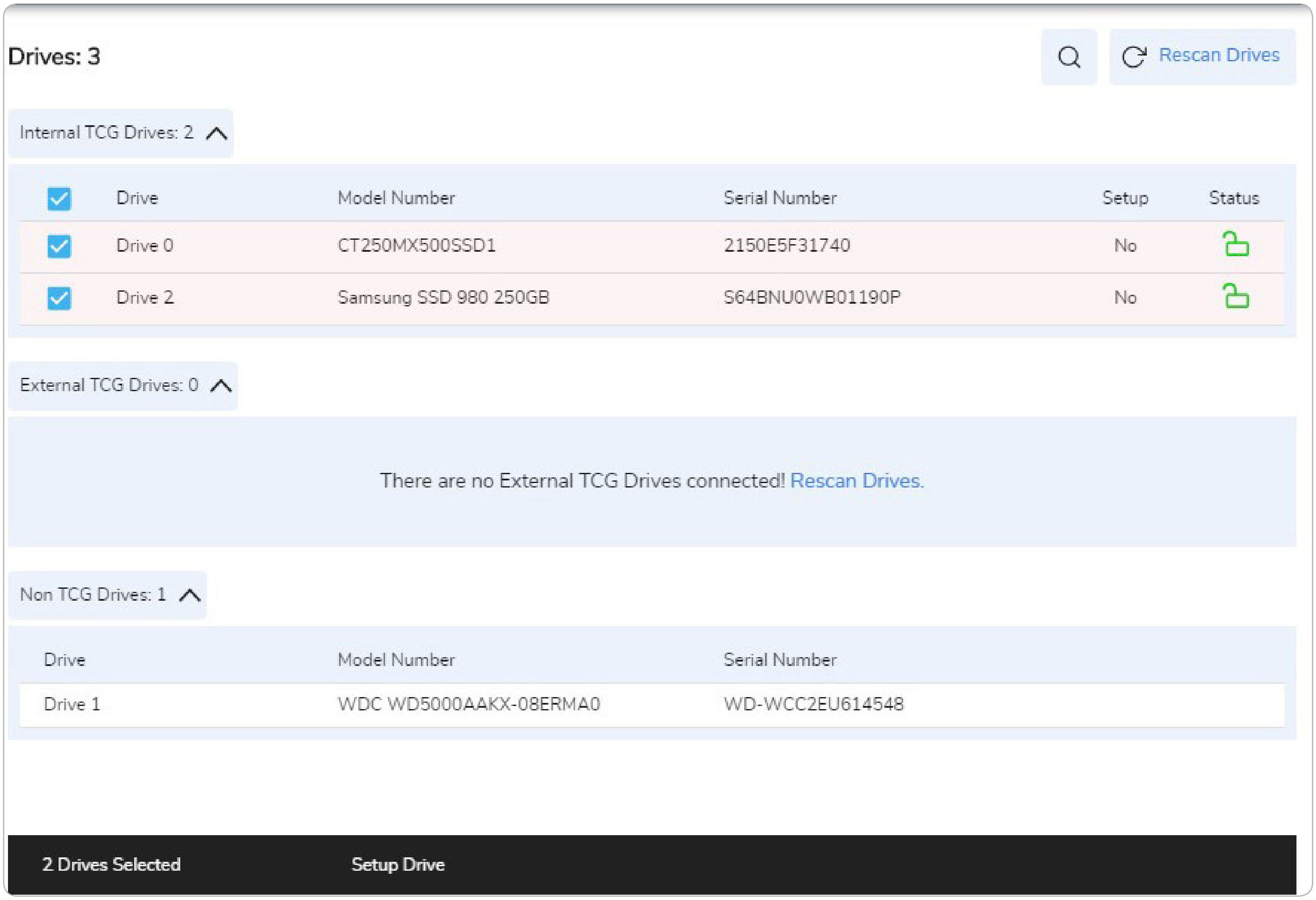
Enter drive's password and click Unlock button.

*Unlock Drive*

## 16. MULTI DRIVE

With the Opal Lock application, users can set up multiple drives together and the Admin Password for all the drives will be the same.

Check the check box of the SSDs listed on the Home screen. Click on the Setup option displayed at the bottom to create the Setup for all the selected SSDs.



Drives: 3

Internal TCG Drives: 2

| ☑ | Drive | Model Number | Serial Number | Setup | Status |
|---|---|---|---|---|---|
| ☑ | Drive 0 | CT250MX500SSD1 | 2150E5F31740 | No | 🔓 |
| ☑ | Drive 2 | Samsung SSD 980 250GB | S64BNU0WB01190P | No | 🔓 |

External TCG Drives: 0

There are no External TCG Drives connected! Rescan Drives.

Non TCG Drives: 1

| Drive | Model Number | Serial Number |
|---|---|---|
| Drive 1 | WDC WD5000AAKX-08ERMA0 | WD-WCC2EU614548 |

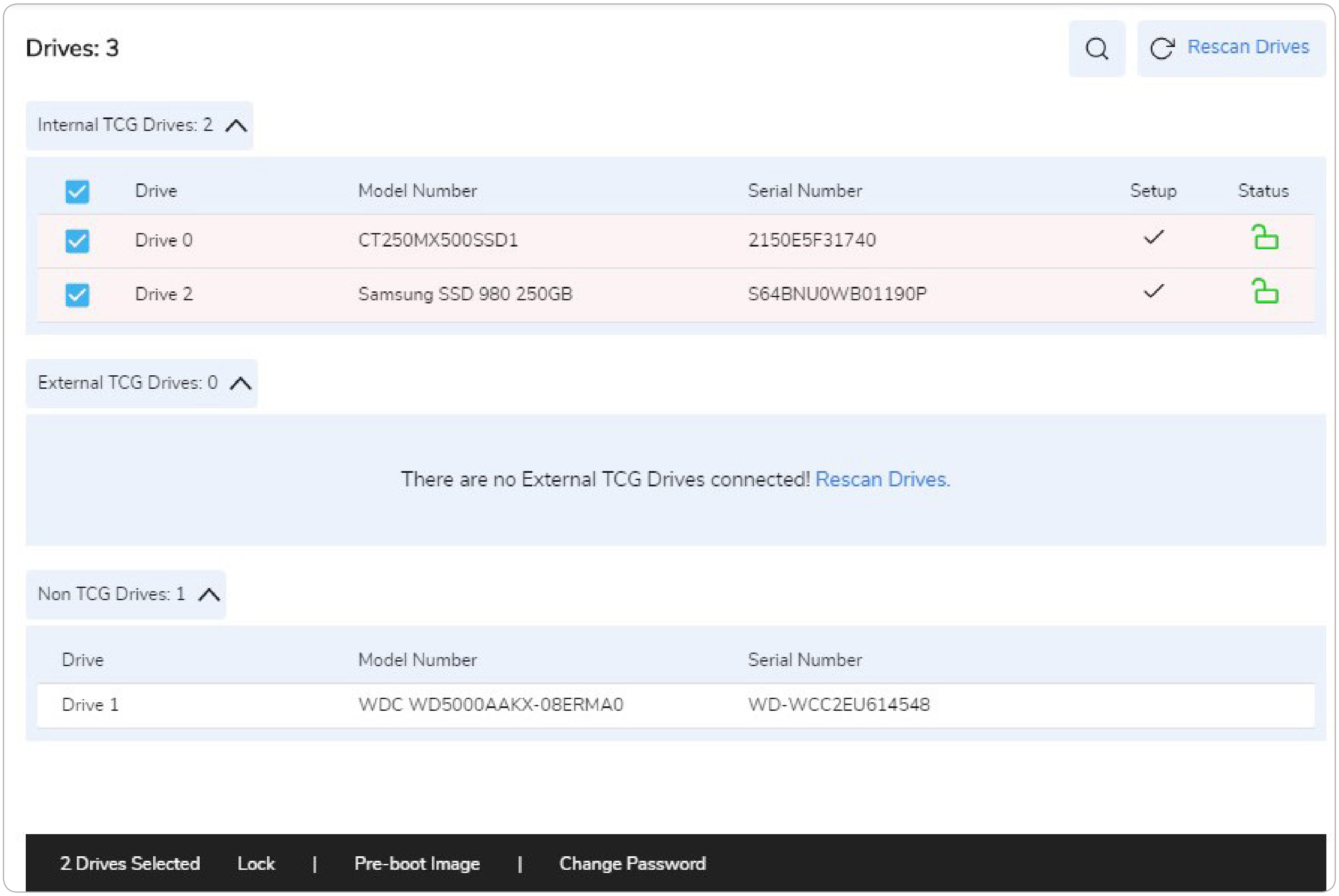
2 Drives Selected

*Multidrive Setup*

User can perform following actions on the multiple drives when setup is created and password for all drives is same:

- Lock Drives
- Unlock Drives

- Change Password
- Update Preboot Image



Drives: 3

Internal TCG Drives: 2

| ☑ | Drive | Model Number | Serial Number | Setup | Status |
|---|---|---|---|---|---|
| ☑ | Drive 0 | CT250MX500SSD1 | 2150E5F31740 | ✓ | 🔓 |
| ☑ | Drive 2 | Samsung SSD 980 250GB | S64BNU0WB01190P | ✓ | 🔓 |

External TCG Drives: 0

There are no External TCG Drives connected! Rescan Drives.

Non TCG Drives: 1

| Drive | Model Number | Serial Number |
|---|---|---|
| Drive 1 | WDC WD5000AAKX-08ERMA0 | WD-WCC2EU614548 |

*Multidrive Lock*

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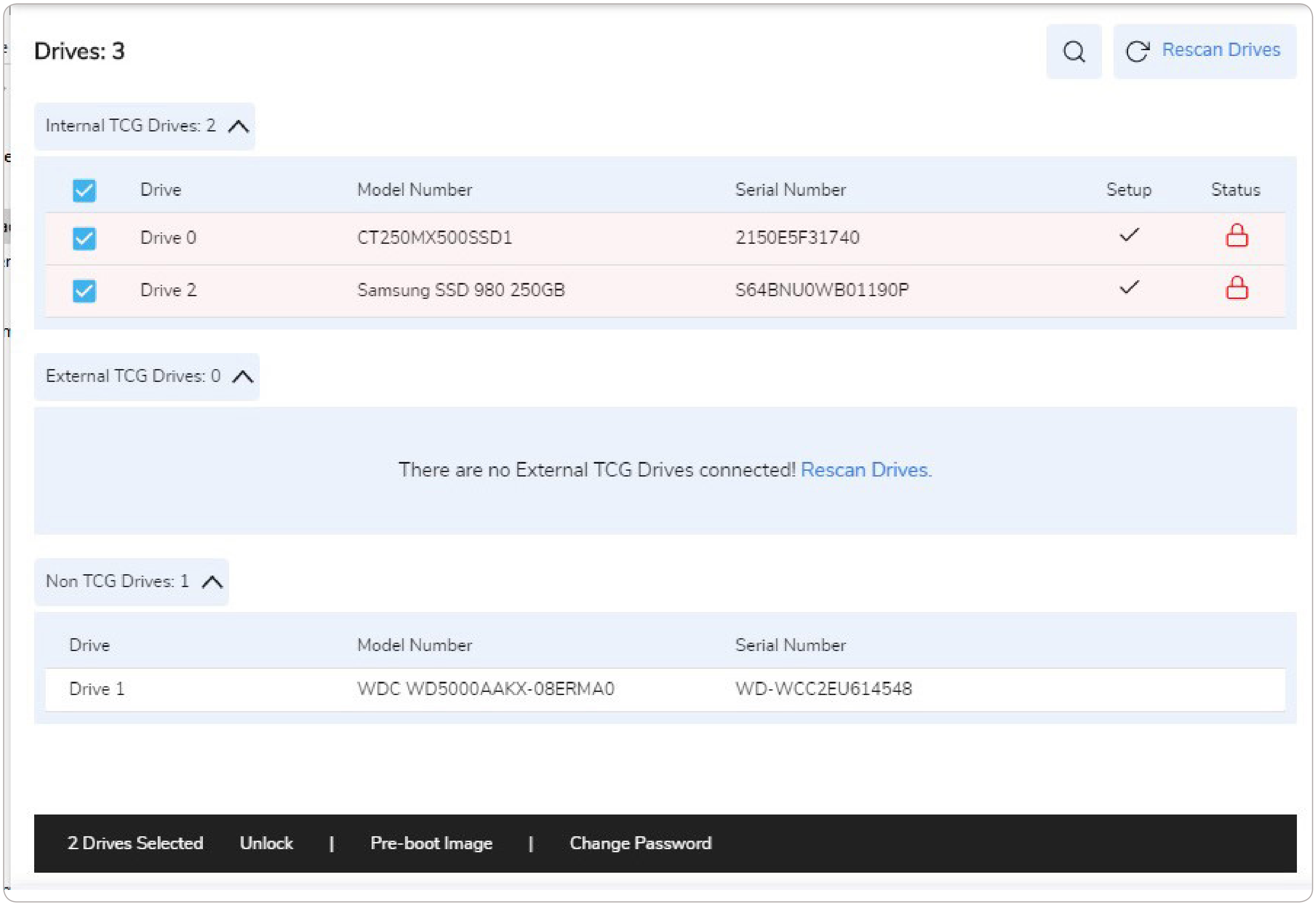


Drives: 3

Internal TCG Drives: 2

| ☑ | Drive | Model Number | Serial Number | Setup | Status |
|---|---|---|---|---|---|
| ☑ | Drive 0 | CT250MX500SSD1 | 2150E5F31740 | ✓ | 🔒 |
| ☑ | Drive 2 | Samsung SSD 980 250GB | S64BNU0WB01190P | ✓ | 🔒 |

External TCG Drives: 0

There are no External TCG Drives connected! Rescan Drives.

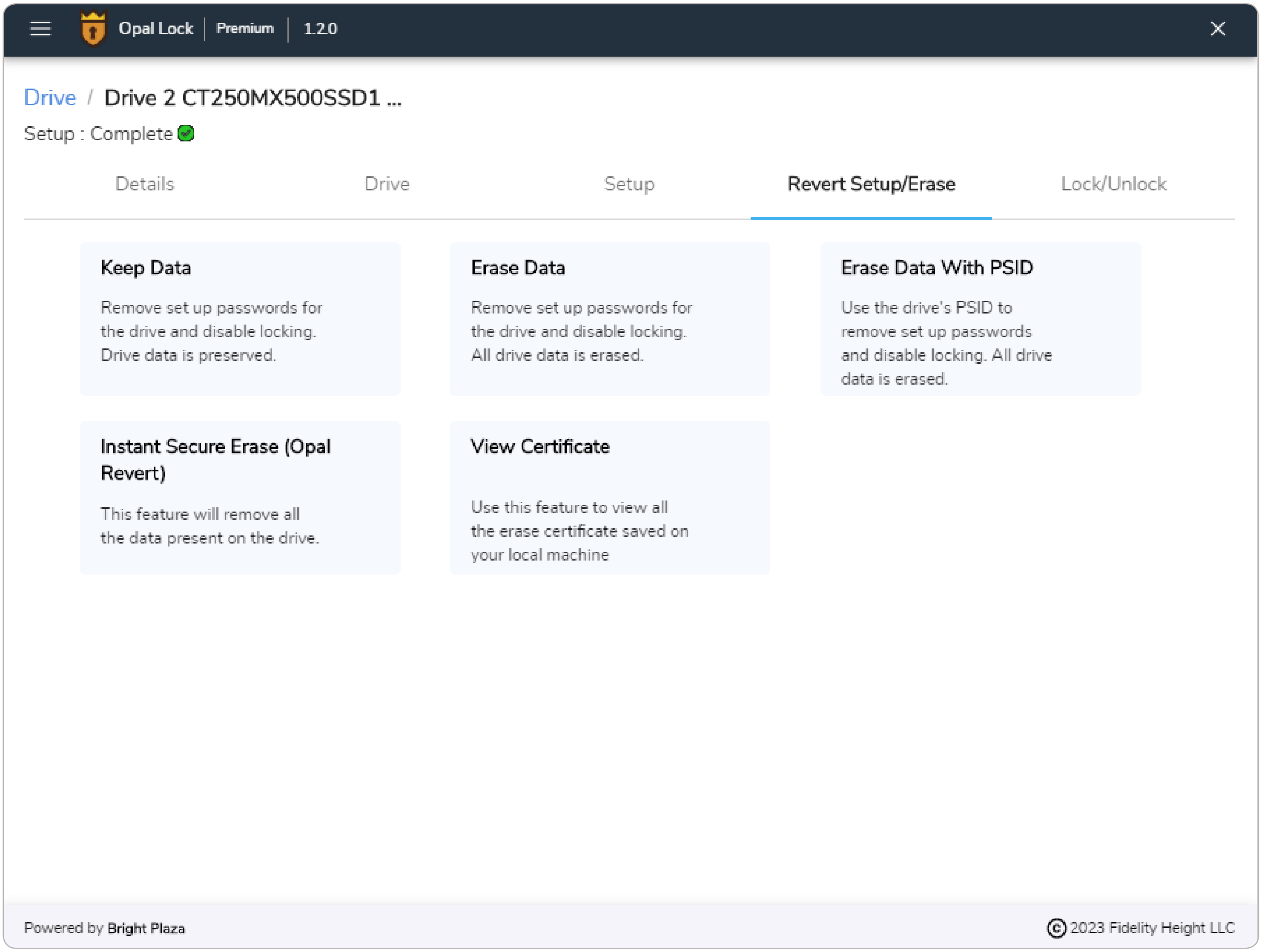
Non TCG Drives: 1

| Drive | Model Number | Serial Number |
|---|---|---|
| Drive 1 | WDC WD5000AAKX-08ERMA0 | WD-WCC2EU614548 |

*Multidrive Unlock*

## 17. REVERT SETUP/ERASE

Revert Setup disables locking and resets the password to the MSID. Once the lock has been removed from a drive, the drive will no longer lock when power cycled and thus will not need to be unlocked on startup. After any of the following options are used, the drive can be set up again. There are three different options for removing the lock.


Opal Lock | Premium | 1.2.0
Drive / Drive 2 CT250MX500SSD1 ...
Details
Drive
Setup
Revert Setup/Erase
Lock/Unlock

Setup : Complete ✓

**Keep Data**
Remove set up passwords for the drive and disable locking. Drive data is preserved.

**Erase Data**
Remove set up passwords for the drive and disable locking. All drive data is erased.

**Erase Data With PSID**
Use the drive's PSID to remove set up passwords and disable locking. All drive data is erased.

**Instant Secure Erase (Opal Revert)**
This feature will remove all the data present on the drive.

**View Certificate**
Use this feature to view all the erase certificate saved on your local machine

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*Revert- Setup created*

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***NOTE***

- **Keep Data** and **Erase Data** will be enabled after setting up the password for the drive. Both these features require Admin Password authentication.
- Some TCG versions (e.g. Pyrite) may only support keeping data or erasing data and not both options.

## 17.1 Revert Setup and Keep Data

With this option, the drive's data will not be touched. The locking mechanism will be disabled and the password will be reset to the MSID. After this has been executed, the drive will not be locked when powered down, all data on the drive will become accessible, and for boot drives, booting into the drive will result in booting into the installed operating system normally.

## 17.2 Revert Setup and Erase Data with Password

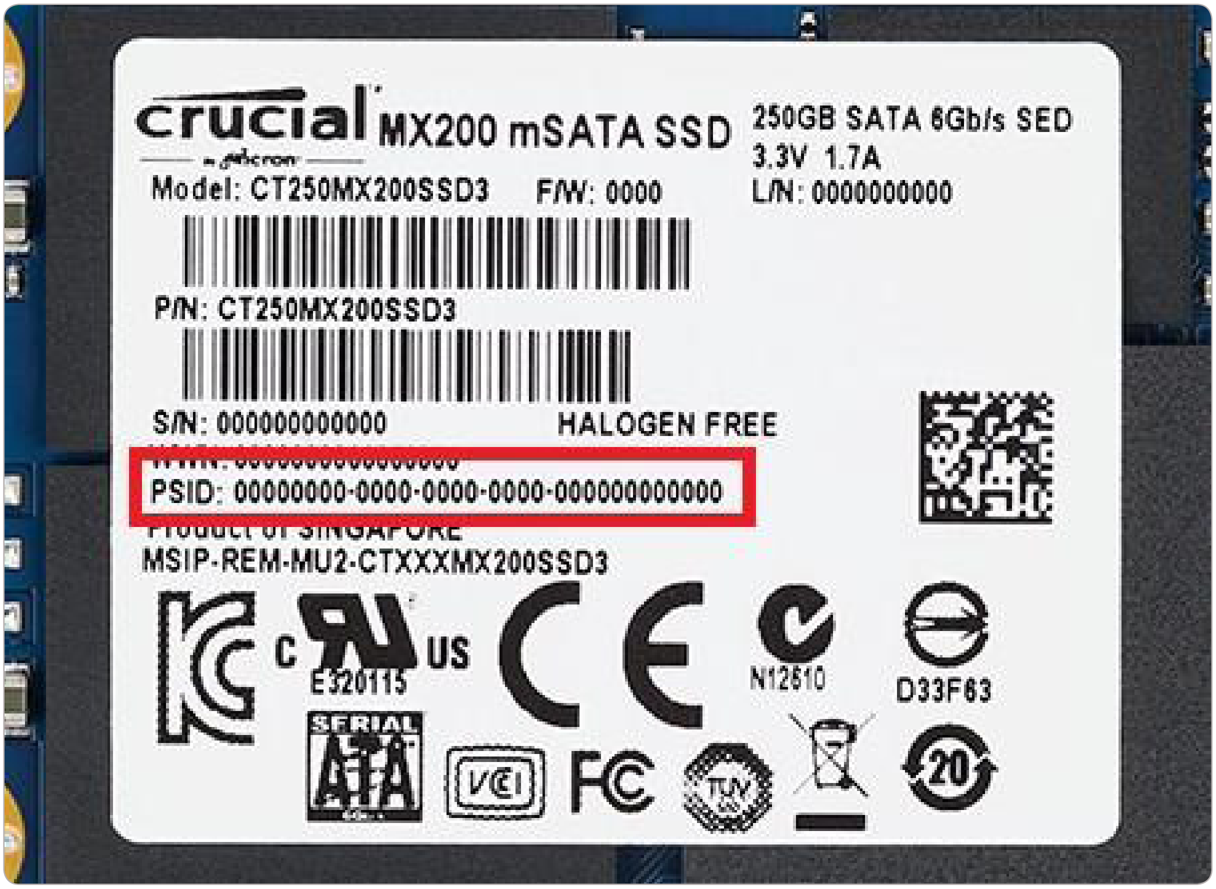
Proceeding with this option resets the password and also has the effect of resetting the drive to manufacturer settings, which will cryptographically erase all data on the drive.

***WARNING***

- Removing lock with erasing data will reset the entire drive to manufacturer settings. All existing data on the drive will be deleted with no way to recover it. Do not use Revert Setup & Erase Data if the drive's data is still needed.

## 17.3 Revert Setup and Erase Data with PSID

The PSID can be used to revert the drive to manufacturer settings if the password has been forgotten or lost. The drive's PSID can be found on the drive label.



*Drive's PSID on the drive label*

## 17.4 Instant Erase

- Instant Secure Erase is the process of completely removing all data from a storage device
- Opal Lock uses the TCG Opal crypto erase method, ensuring that your data is instantly and securely wiped in a matter of seconds.
- Unlike traditional methods that might take hours, Opal Lock completes the process in a few seconds, providing both speed and efficiency.

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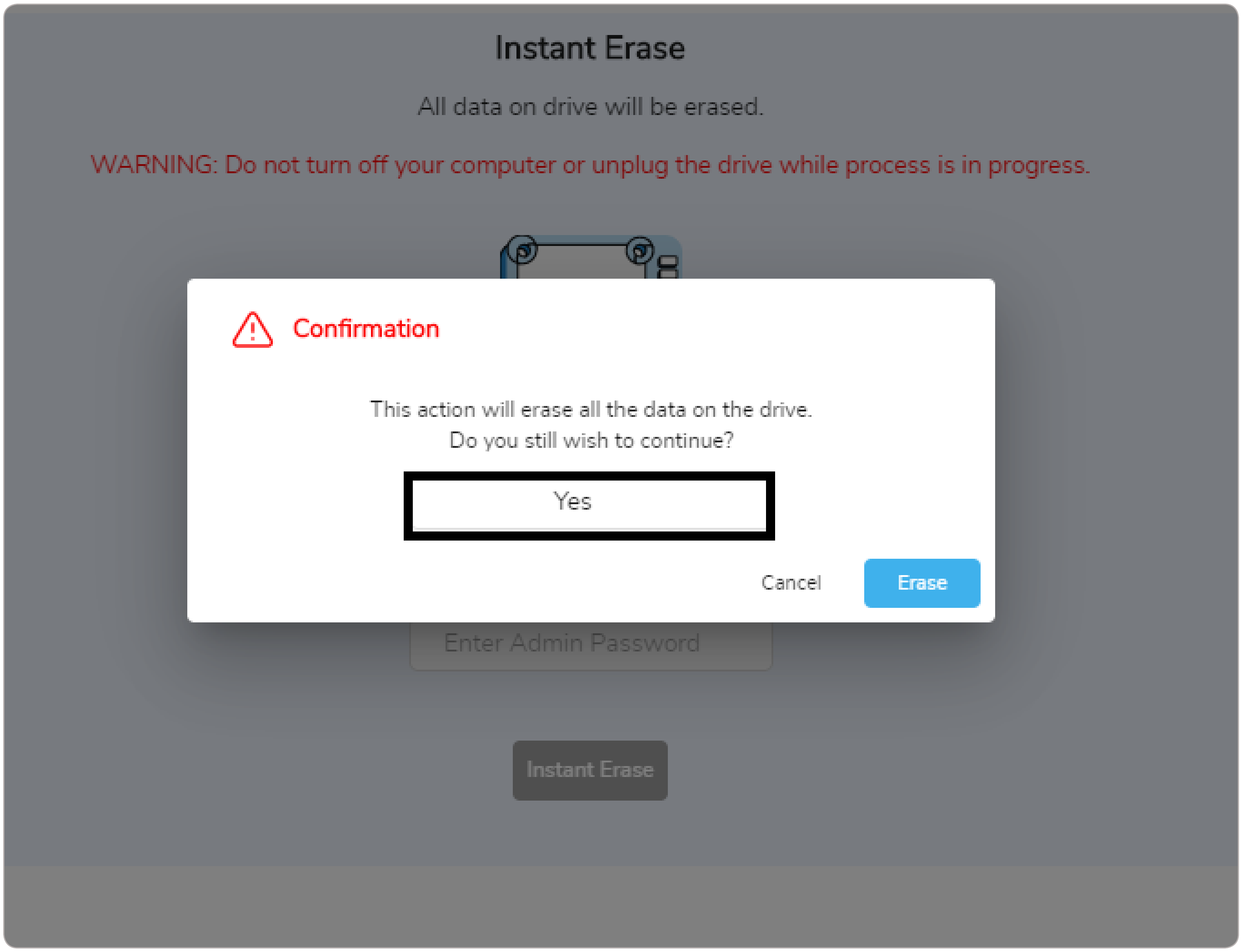
### 17.4.1 Instant Erase when Drive is not Setup



Instant Erase

All data on drive will be erased.

WARNING: Do not turn off your computer or unplug the drive while process is in progress.

Confirmation

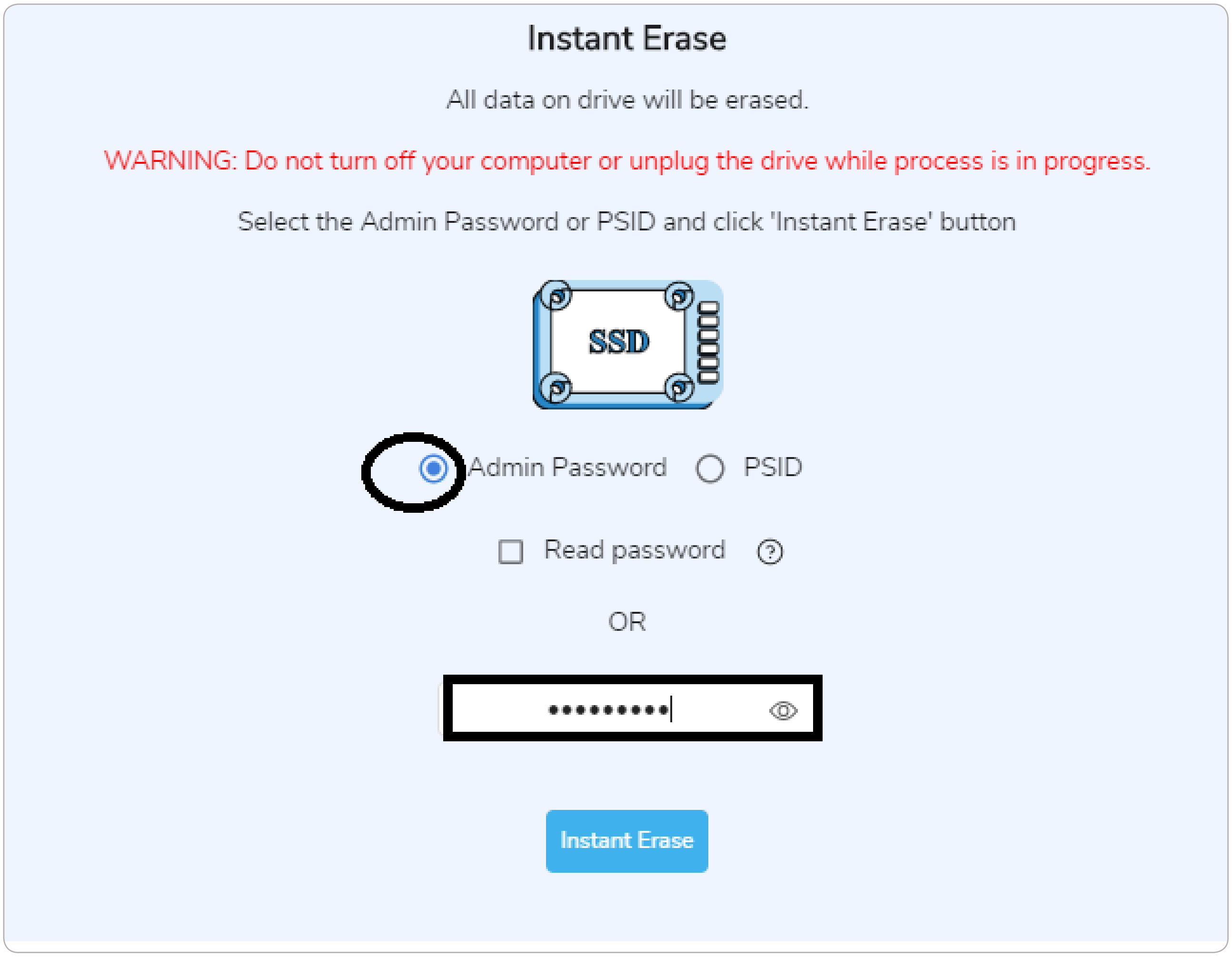
This action will erase all the data on the drive.
Do you still wish to continue?

Yes

*Instant Erase*

- Enter “Yes” key word in the text field and click on “Erase” button

### 17.4.2 Instant Erase when Drive is Setup



Instant Erase

All data on drive will be erased.

WARNING: Do not turn off your computer or unplug the drive while process is in progress.

Select the Admin Password or PSID and click 'Instant Erase' button

● Admin Password ○ PSID

□ Read password ⓘ

OR

••••••••••

*Instant Erase - Admin Password*

- Admin Password radio button will come selected by default.
- Select PSID radio button if Admin Password is not known.
- Enter Admin Password in the text field if “Admin Password” radio button is selected **OR** Enter PSID in the text field if “PSID” radio button is selected.
- Click on **Instant Erase** button.

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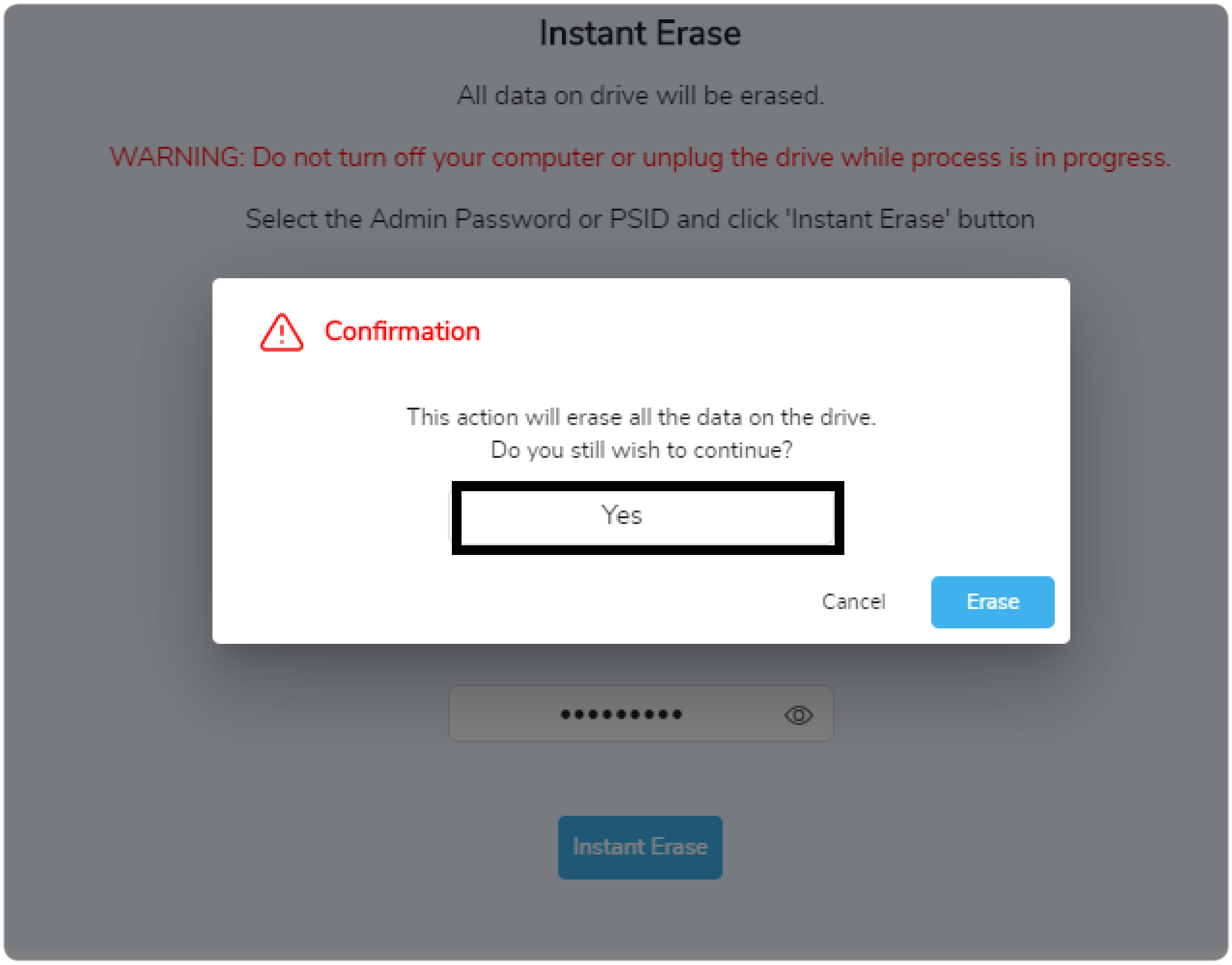


Instant Erase

All data on drive will be erased.

WARNING: Do not turn off your computer or unplug the drive while process is in progress.

Select the Admin Password or PSID and click 'Instant Erase' button

Confirmation

This action will erase all the data on the drive.
Do you still wish to continue?

Yes

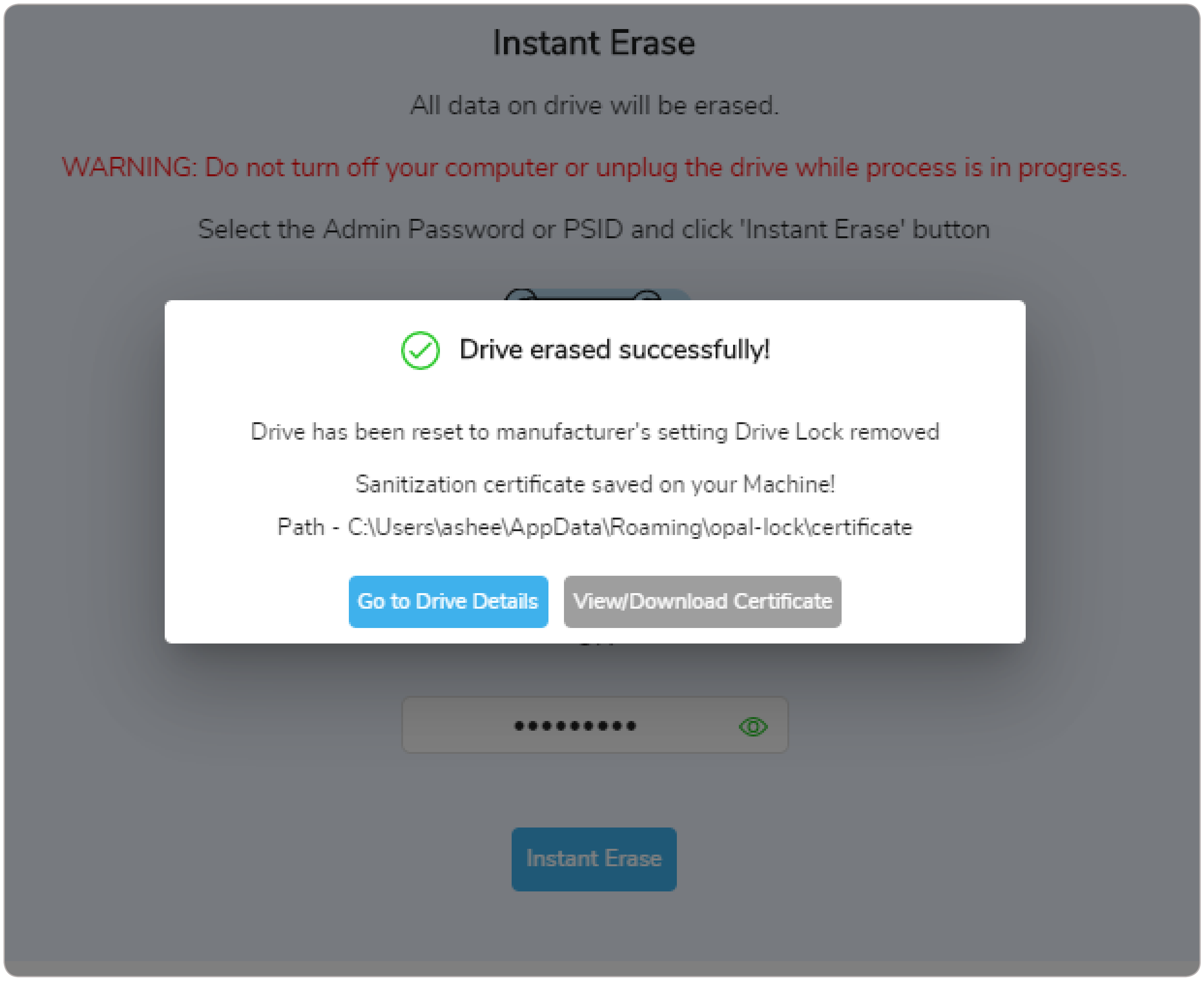
*Instant Erase - Confirmation*

- Type “Yes” keyword in the text field to confirm and click on **Erase** button

## 17.5 Certificate of Sanitization

Opal Lock introduces the Certificate of Sanitization—a feature that generates a verified certificate post-data erasure. This certificate offers you peace of mind by providing concrete proof of the data eradication process and compliance, bolstering trust in your data management practices.

Certificate of Sanitization can be downloaded to the system for future use.



Instant Erase

All data on drive will be erased.

WARNING: Do not turn off your computer or unplug the drive while process is in progress.

Select the Admin Password or PSID and click 'Instant Erase' button

Drive erased successfully!

Drive has been reset to manufacturer's setting Drive Lock removed

Sanitization certificate saved on your Machine!

Path - C:\Users\ashee\AppData\Roaming\opal-lock\certificate

*Instant Erase - Driver erased successfully*

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# 18. VERSION-SPECIFIC INFORMATION

**All of the features mentioned above are available in the Premium version. This section covers information about the other versions available.**

## 18.1 Preboot

This version is embedded in the Preboot Image that can be written into a drive's shadow MBR or the Recovery USB. The Preboot version includes most of the regular features except for the Setup menu. The limit on the number of drives matches the version used to write the preboot image. In the case that the total number of detected drives exceeds the drive limit, the locked drives are prioritized over other drives to be listed in the drive selection menu.

## 18.2 USB

- The USB version supports all basic functionalities of Opal Lock for up to five USB-mounted Opal Drives. The USB version includes features such as setting up drive encryption and password protection, unlocking drives, changing password, and reverting setup.

- USB version only supports USB Opal drives.

- USB version does not support writing preboot image on Opal drive's Shadow MBR.

- A second password (User Password) cannot be set that has limited authority.

- Multiple drives cannot be setup together with single click

## 18.3 Standard

- The Standard version contains all of the features mentioned above, with support for a maximum of five drives.

- A second password (User Password) cannot be set that has limited authority.

- Standard version supports both Internal and External Opal Drives.

- Standard version does support writing preboot image on Opal drive's Shadow MBR.

- Multiple drives cannot be setup together with single click

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## 19. PREBOOT AUTO-UNLOCK AND REBOOT

As an added benefit to saving passwords to a drive, on startup in the preboot environment, Opal Lock scans for password files stored on USBs. If any are found, Opal Lock will notify the user that it will proceed to attempt unlocking all locked drives after 5 seconds unless the user cancels it. If allowed to proceed, Opal Lock will automatically attempt to unlock all drives using detected password files. If all locked drives are unlocked, then the system will reboot automatically

## 20. KEYBOARD NAVIGATION

If there are problems with the mouse in the preboot environment, all operations can be done using the keyboard. The standard keyboard shortcuts apply for navigating the user interface.

| Key(s) | Description |
|---|---|
| F10 | Access the Menu Bar |
| SPACE | Toggle checkboxes |
| Tab | Switch focus to the next GUI feature |
| Enter | Dropdown menus - Open and close menu Buttons - Same as pressing the button |
| Arrow Keys | Menu Bar - Navigate around the menus and subitems Radio buttons - Change selection<br>Dropdown Menus - Up and Down cycles through options |

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# 21. FREQUENTLY ASKED QUESTIONS

## Compatibility

Q: What drives are compatible with Opal Lock?

A: TCG drives are compatible with Opal Lock. TCG versions other than Opal may not support all of the features offered by Opal Lock.

Q: How do I know whether my drive is a TCG drive?

A: All TCG drives have a PSID that can be found on the drive’s label.

## Setup

Q: Why do I need a USB for setup?

A: USB is needed to create a Recovery USB, which acts as a way to unlock or erase your drives if your drive does not support the shadow MBR or if the preboot image somehow becomes inaccessible and you don’t have any other way to access Opal Lock.

## Preboot Image

Q: How do I know whether or not my drive supports shadow MBR?

A: If your TCG drive does not support shadow MBR, the Preboot Image field in the Drive Information section will display “Not Supported”.

Q: My drive does not support the preboot image. Can I still use Opal Lock to set up the drive?

A: The initial setup process includes writing the preboot image onto a newly created bootable USB drive, which you can use as a substitute to having the preboot image on your drive.

Q: When would I need to use Update Preboot Image?

A: Update Preboot Image is primarily meant to be used whenever a new version of Opal Lock is released.

## Recovery USB

Q: What is a Recovery USB?

A: A Recovery USB set up with Opal Lock has the preboot image written into it. When booting up your system, you can boot into the USB and use the preboot image to manage your drives.

## Lock/Unlock

Q: I finished setting up my drive. How do I lock my drive?

A: Once the drive has been set up, the drive will be locked when the system is power cycled. This happens when the system is shut down or put into hibernate, and not when the system is rebooted. External drives can also be power cycled by removing the drive from the system.

Q: My drive is locked. How do I unlock my drive?

A: If unlocking via preboot image on the drive’s shadow MBR: When booting into the drive, the system will boot into the drive’s preboot image written into the shadow MBR. Once bootup is complete, the Opal Lock application will run, displaying the unlock prompt to enter the password. Once successfully authenticated, you can reboot the system which will then boot into the unlocked drive.

If unlocking via preboot image on bootable USB: Similar to unlocking via shadow MBR, except you boot into the USB instead of the locked drive.

## Password

Q: I lost/forgot my password. What should I do?

A: If the password is lost/forgotten, there is no way to recover the password. Once the drive is locked, all data will be inaccessible. The only way to unlock the drive without the password is to use the drive’s PSID to revert setup, which resets the drive to manufacturer settings and erases all data on the drive.

Q: Where can I find my drive’s MSID?

A: If your drive is an Opal drive, then the MSID is displayed in the MSID field in the Drive Information section.

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Q: How do I reset the retry counter? What should I do if Opal Lock says I’m locked out?

A: Anytime that there is a successful authentication, the corresponding retry counter (Admin, User, or PSID) is reset. All retry counters are reset if the system is power cycled.

# 22. GLOSSARY

**Manufacturer secure ID (MSID)**: The default password for the drive. After Revert Setup, the password will be reset to the MSID.

**Physical secure ID (PSID)**: The PSID is a backup option if the password has been forgotten. It can only be used to revert setup and erase data and reset the drive to manufacturer settings.

**Shadow MBR**: A small "hidden" portion of a drive (not all drives) that becomes visible when locked. When a drive is locked, the only portion of the drive that can be booted into is the shadow MBR. The preboot image is written into the shadow MBR so that booting into the locked drive will lead to booting into the shadow MBR.

**Preboot Image**: A mini-operating system image that is written onto a drive's shadow MBR or bootable USB (Premium only). The Preboot version of Opal Lock is embedded into the image and set to automatically run on startup when booting into the preboot environment. The user can then use Opal Lock to unlock the drive.

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# 23. APPENDIX

## Appendix A: Query Save File

**Opal Lock Query information for drive \\.\PhysicalDrive1**

**Drive information**

Model: Crucial_CT275MX300SSD1
Serial Number: 17301819EE97
TCG SSC: Opal 2.0
MSID: AEGIS_ACADIA_MSID_12456789012345
Admin SP State: manufactured
Locking SP State: manufactured

**Locking Information**

Locked: N
Locking Enabled: Y
MBR Shadowing Not Supported: N
Shadow MBR Enabled: Y
Shadow MBR Done: Y

**Single User information**

Single User Mode Support: Y
Number of Locking Ranges Supported: 16

**DataStore information**

DataStore Table Size: 12MB
Number of DataStore Tables: 16 Opal information
Number of Admins: 4
Number of Users: 16
Base comID: 0x1000
Initial PIN: 0x0

## Appendix B: Query Additional Information

Shadow MBR size 0x8000000
MandatoryWriteGranularity 0x1
RecommendedAccessGranularity 0x1000

| | | | |
|---|---|---|---|
| User1 | enabled | = | 0 |
| User2 | enabled | = | 0 |
| User3 | enabled | = | 0 |
| User4 | enabled | = | 0 |
| User5 | enabled | = | 0 |
| User6 | enabled | = | 0 |
| User7 | enabled | = | 0 |
| User8 | enabled | = | 0 |
| User9 | enabled | = | 0 |
| User10 | enabled | = | 0 |
| User11 | enabled | = | 0 |
| User12 | enabled | = | 0 |
| User13 | enabled | = | 0 |
| User14 | enabled | = | 0 |
| User15 | enabled | = | 0 |
| User16 | enabled | = | 1 |
| Admin1 | enabled | = | 1 |
| Admin2 | enabled | = | 0 |
| Admin3 | enabled | = | 0 |
| Admin4 | enabled | = | 0 |

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| | | | | | | |
|---|---|---|---|---|---|---|
| Admin1 | TryLimit | = | 5 : | Tries | = | 0 |
| Admin2 | TryLimit | = | 5 : | Tries | = | 0 |
| Admin3 | TryLimit | = | 5 : | Tries | = | 0 |
| Admin4 | TryLimit | = | 5 : | Tries | = | 0 |
| User1 | TryLimit | = | 5 : | Tries | = | 0 |
| User2 | TryLimit | = | 5 : | Tries | = | 0 |
| User3 | TryLimit | = | 5 : | Tries | = | 0 |
| User4 | TryLimit | = | 5 : | Tries | = | 0 |
| User5 | TryLimit | = | 5 : | Tries | = | 0 |
| User6 | TryLimit | = | 5 : | Tries | = | 0 |
| User7 | TryLimit | = | 5 : | Tries | = | 0 |
| User8 | TryLimit | = | 5 : | Tries | = | 0 |
| User9 | TryLimit | = | 5 : | Tries | = | 0 |
| User10 | TryLimit | = | 5 : | Tries | = | 0 |
| User11 | TryLimit | = | 5 : | Tries | = | 0 |
| User12 | TryLimit | = | 5 : | Tries | = | 0 |
| User13 | TryLimit | = | 5 : | Tries | = | 0 |
| User14 | TryLimit | = | 5 : | Tries | = | 0 |
| User15 | TryLimit | = | 5 : | Tries | = | 0 |
| User16 | TryLimit | = | 5 : | Tries | = | 0 |
| SID | TryLimit | = | 5 : | Tries | = | 0 |

Preboot Image Version: demo.1.16-5-gd04b6ef
Audit Log Version: 1.0

## Appendix C: Audit Event List

| Event ID | Level | Description |
|---|---|---|
| 1 | Information | Drive Activated |
| 2 | Information | Initial Drive Setup |
| 3 | Information | Admin Authenticated |
| 4 | Error | Admin Incorrect Password |
| 5 | Warning | Admin Locked Out |
| 6 | Information | User Authenticated (Premium) |
| 7 | Error | User Incorrect Password (Premium) |
| 8 | Warning | User Locked Out (Premium) |
| 9 | Warning | Potential Intrusion Attempt Detected |
| 10 | Information | Preboot Image written to MBR |
| 11 | Information | User Setup (Premium) |
| 12 | Information | User Removed (Premium) |
| 13 | Information | SID and Admin Password Changed |
| 14 | Information | User Password Changed (Premium) |
| 15 | Information | Drive Unlocked |
| 16 | Information | Preboot Unlock from MBR |
| 17 | Information | Preboot Unlock from USB (Premium) |
| 18 | Information | Lock Removed |
| 19 | Information | Lock Removed and Data Erased using Password |
| 20 | Information | Lock Removed and Data Erased using PSID |
| 21 | Information | Query Information Accessed |
| 22 | Information | Audit Log Accessed |
| 23 | Information | Admin password written to USB |
| 24 | Information | User password written to USB |
| 25 | Information | Admin password read from USB |
| 26 | Information | User password read from USB |

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| | | |
|---|---|---|
| 27 | Information | Cryptographic Erase |
| 28 | Error | Preboot image write to MBR Failed |
| 29 | Error | User Setup Failed |
| 30 | Error | User Removal Failed |
| 31 | Error | SID and Admin password change failed |
| 32 | Error | User password change failed |
| 33 | Error | Drive unlock failed |
| 34 | Error | Preboot unlock from MBR failed |
| 35 | Error | Preboot unlock from USB failed |
| 36 | Error | Revert Setup Failed |
| 37 | Error | Revert Setup and Erase Data with Password Failed |
| 38 | Error | Revert Setup and Erase Data with PSID Failed |
| 39 | Error | Query information access Failed |
| 40 | Error | Audit Log access Failed |

## Appendix D: Sample Audit Log CSV file

```
Drive,\\.\PhysicalDrive1
Model,Crucial_CT275MX300SSD1
Serial Number,17301819EE97
Time,2018/11/19 15:16:53
```

| Level | Date/Time | EventID | Event Description |
|---|---|---|---|
| Information | 2018/11/19 14:52:07 | 3 | Admin Login |
| Information | 2018/11/19 14:51:54 | 16 | Drive unlocked |
| Information | 2018/11/19 14:51:54 | 3 | Admin Login |
| Information | 2018/11/19 14:51:12 | 3 | Admin Login |
| Error | 2018/11/19 14:51:05 | 4 | Failed Admin Login |
| Information | 2018/11/16 16:15:53 | 3 | Admin Login |
| Information | 2018/11/16 16:15:41 | 14 | Admin password changed |
| Information | 2018/11/16 16:15:40 | 13 | SID password changed |
| Information | 2018/11/16 16:15:39 | 19 | Password saved to USB |
| Information | 2018/11/16 16:15:38 | 20 | Password read from USB |
| Information | 2018/11/16 16:02:00 | 3 | Admin Login |
| Information | 2018/11/16 16:02:00 | 20 | Password read from USB |
| Information | 2018/11/16 15:25:06 | 19 | Password saved to USB |
| Information | 2018/11/16 15:24:43 | 14 | Admin password changed |
| Information | 2018/11/16 15:24:42 | 13 | SID password changed |
| Information | 2018/11/16 15:24:42 | 2 | Initial Drive Setup |
| Information | 2018/11/14 01:05:12 | 1 | Activate |
| Information | 2018/11/14 01:05:12 | 24 | Lock removed |

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## 24. ACKNOWLEDGEMENTS

Fidelity Height acknowledges third parties whose open source code has been used in permissible form in Opal Lock.

Drive Trust Alliance
Component: sedutil
Webpage: https://github.com/Drive-Trust-Alliance/sedutil
License: GNU General Public License

Opal Lock

by Fidelity Height