



mRack® DIT





Thank you for purchasing mRack DIT!

mRack DIT is a 1U rack mountable hybrid RAID and LTO tape archiving solution designed to support today's digital workflows. Just connect to your Mac via Thunderbolt .

Welcome to mRack DIT.

For more information contact us at support@mlogic.com or visit us at www.mlogic.com

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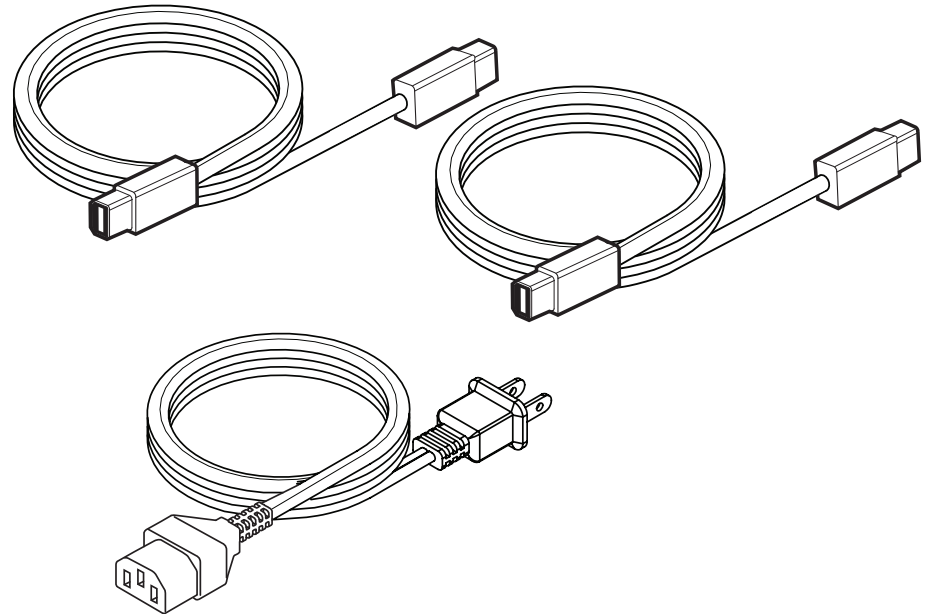
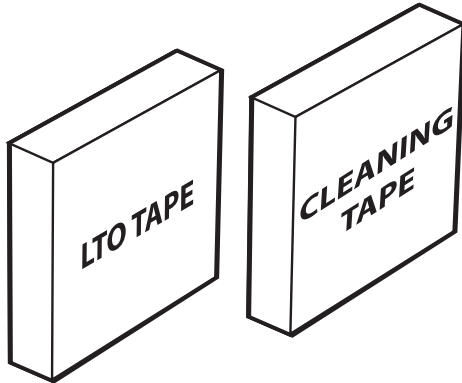
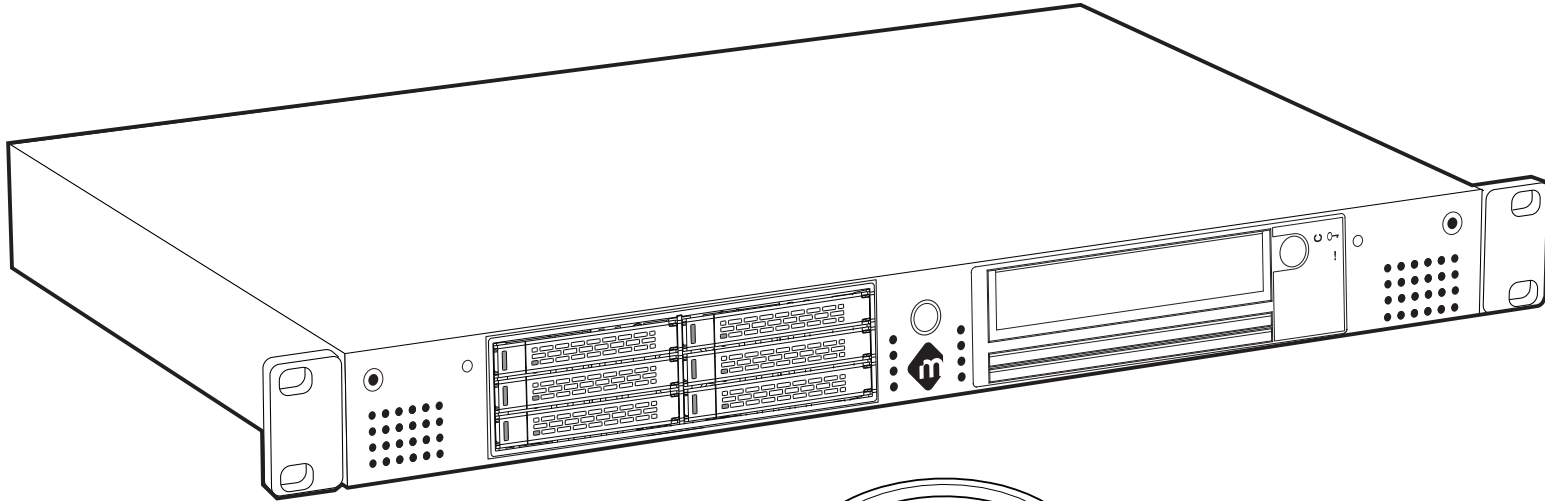
System Requirements

- 1) A Mac running macOS 10.10.x or above with a Thunderbolt port.
- 2) Two Thunderbolt cables (included).
- 3) Six Hard Drives or SSD's for RAID operation (not included).
- 4) Compatible tape backup/archive software.

Note: If running a system with Thunderbolt 3, it is necessary to use the Apple Thunderbolt 3 to Thunderbolt 2 adapter (sold separately).



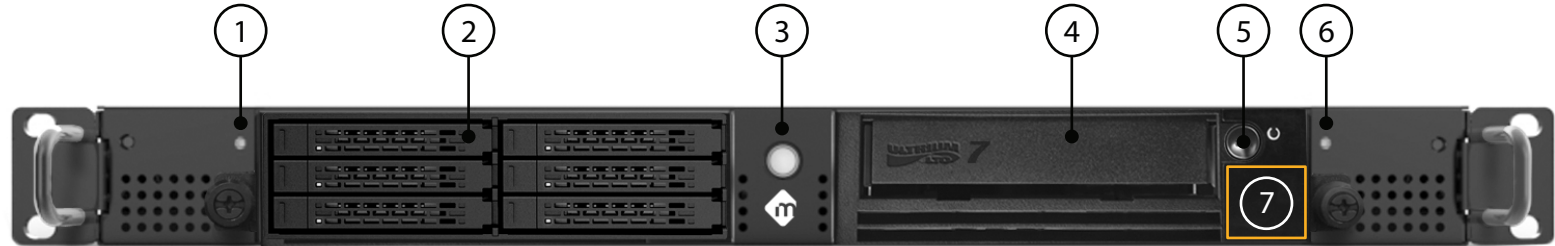
Unpack your mRack DIT



(12) M3x4mm screws

mRack DIT Features.

FRONT VIEW

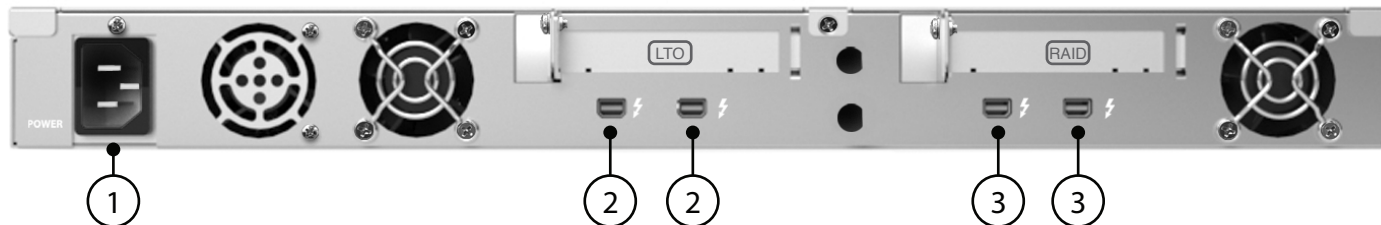


- ① RAID Power Indicator
- ② 6-Bay Hardware RAID
- ③ Power Button
- ④ LTO Tape Drive
- ⑤ Cartridge Unload button
- ⑥ LTO Power Indicator
- ⑦ LTO Single Character Display - SCD and Green Ready light

WARNING: DO NOT ATTEMPT TO REMOVE THE RAID OR LTO FROM THE ENCLOSURE. THIS WILL RESULT IN DAMAGE TO THE UNIT AND WILL VOID THE WARRANTY.

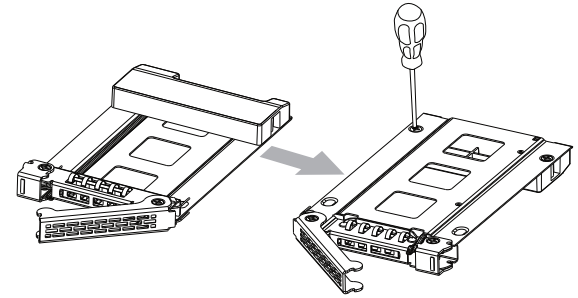
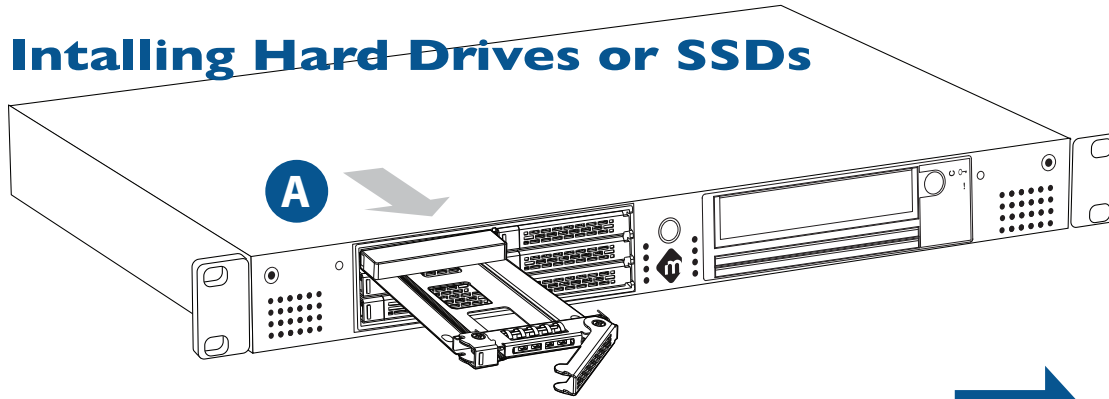
- ① A/C Power Jack
- ② Thunderbolt ports for LTO
- ③ Thunderbolt ports for RAID

REAR VIEW



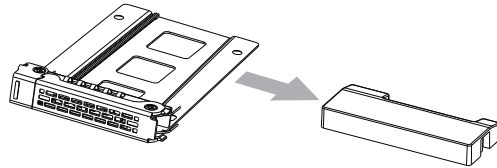
Intalling Hard Drives or SSDs

5



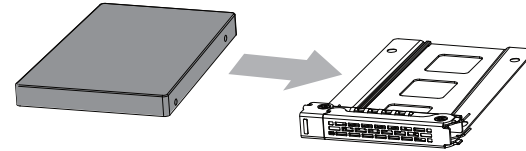
A.1

Remove plastic insert from drive tray. Do not discard the screws as they will be use to mount the HDD/SSD.



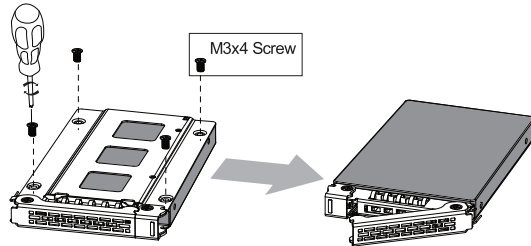
A.2

Discard plastic insert



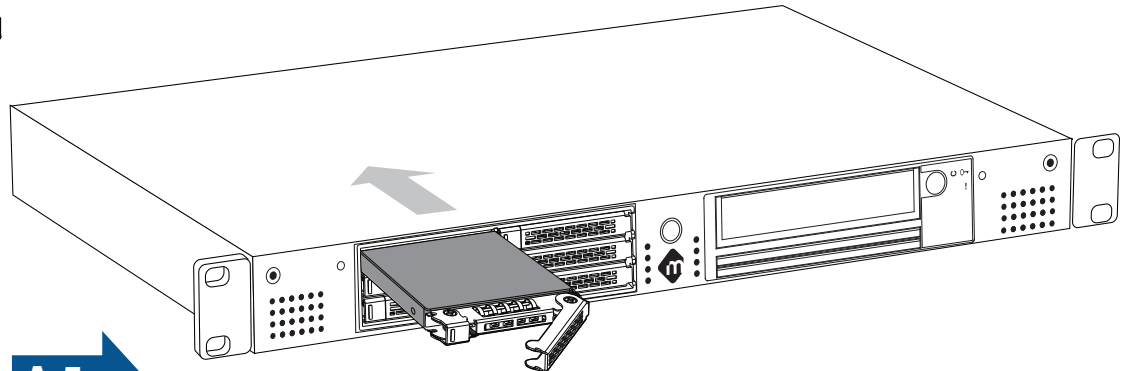
A.3

The tray accommodates HDD/SSD drives up to 9.5mm in height.



A.4

Mount the drives using the included M3x4 screws ONLY.



A.5

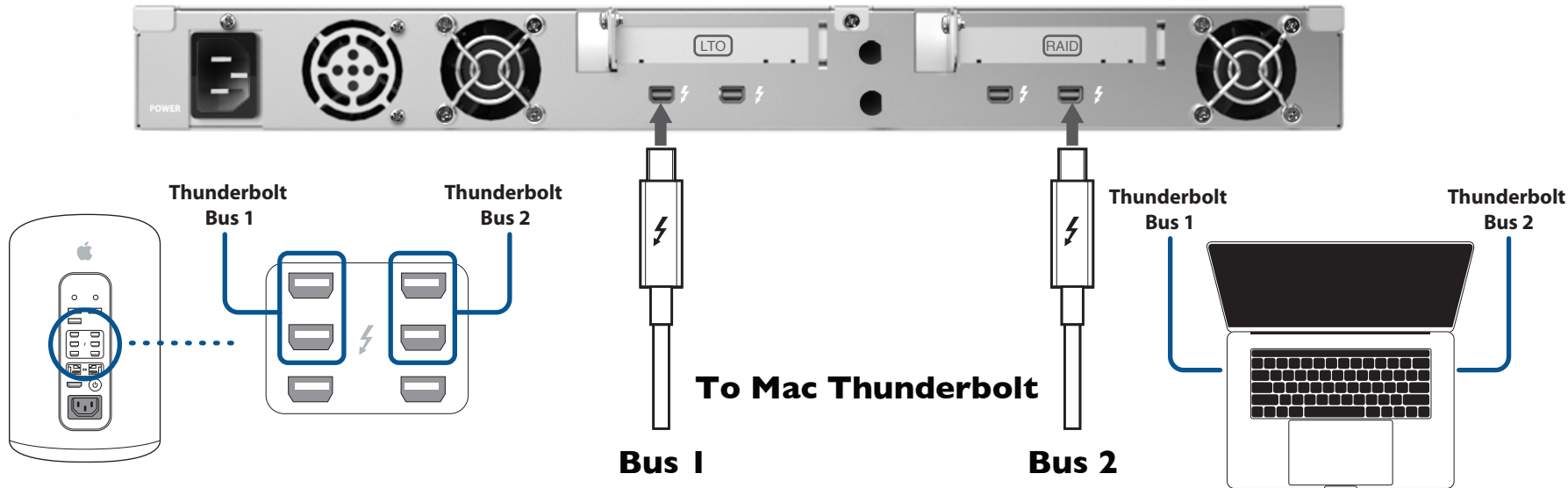
Carefully insert the populated drive trays into mRack DIT. Engage latch to lock trays in place.

Connecting mRack DIT to your Mac

mRack DIT features two distinct Thunderbolt buses; one for the RAID and one for the LTO.

Configuration A

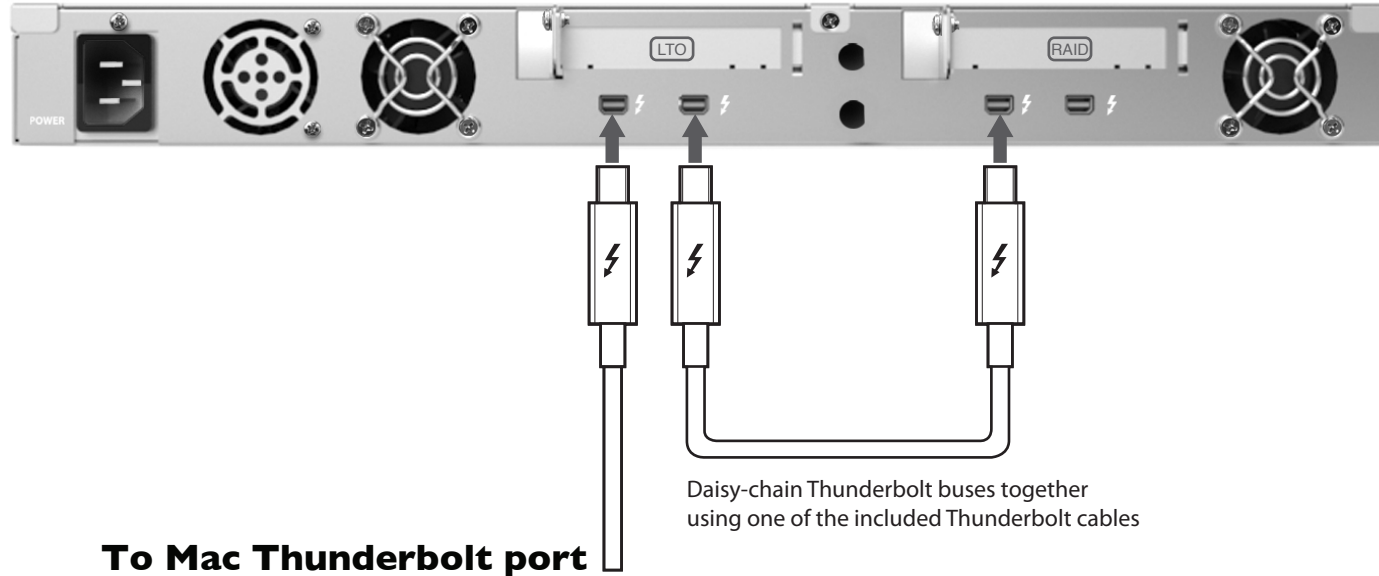
For Macs with two Thunderbolt buses (Late 2016 MacBook Pro and Mac Pro cylinder).



- 1) Connect the included Thunderbolt cables to your mRack DIT as shown above. Connect the free ends of the cables to Thunderbolt Bus 1 and Thunderbolt Bus 2 on your Mac as shown above.
- 2) Attach the included power cord to the power receptacle on the rear of mRack DIT and plug the other end in to a power outlet.

Configuration B

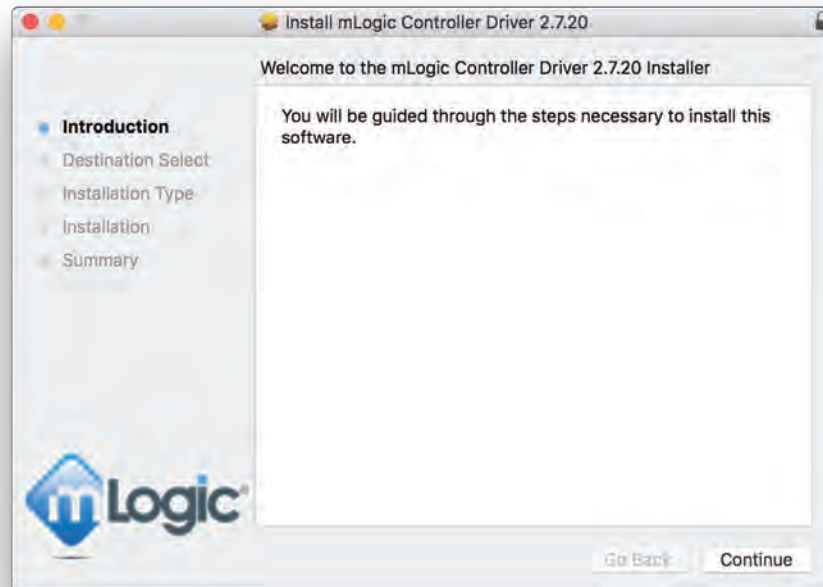
For Macs with a single Thunderbolt bus (all other Macs).



- 1) Connect the included Thunderbolt cables to the mRack DIT as shown above. Connect the free end of the cable to a Thunderbolt port on your Mac.
- 2) Attach the included power cord to the power receptacle on the rear of mRack DIT and plug the other end in to a power outlet.

Installing the mRack DIT driver and RAID GUI

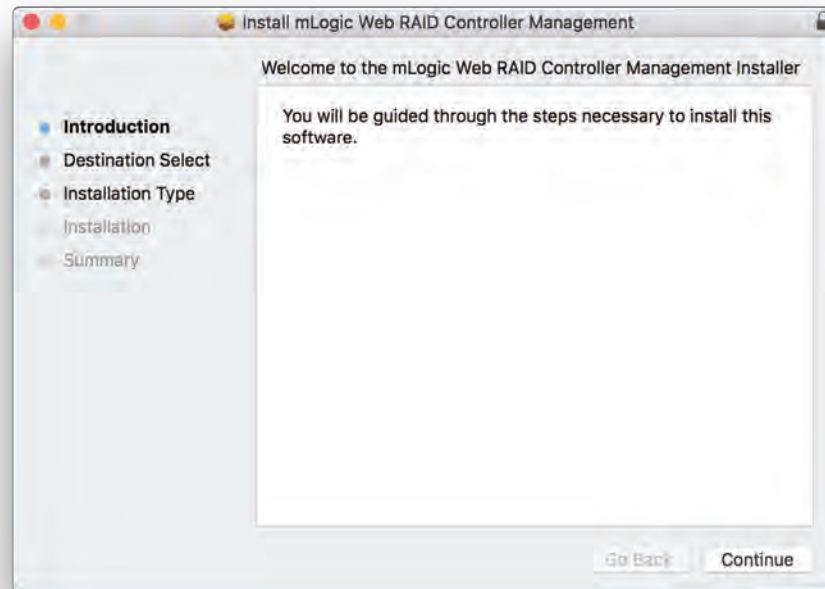
- 1) Double click on the mLogicDITv2.dmg package to start the installer. Click the “Continue” button and follow the prompts to install the driver. Please note that a restart will be required.



Note: The mRack DIT Driver and RAID Management GUI can be downloaded at <https://mlogic.desk.com>

Installing the mRack DIT driver and RAID Management GUI (continued...)

- 2) Double click on the mLogicWebGUIv2.dmg package to start the installer.
Click the “Continue” button and follow the prompts to install the RAID Management GUI.



Powering on mRack DIT

- 1) Press the power button located on the front of the unit. Wait for the Green Ready Light on the front of the LTO to glow steady green.
- 2) Power on your computer

Note: When initially powered on, mRack DIT will perform a hardware Power On Self-Test (POST). The POST checks to make sure that the LTO drive is functioning properly. During POST, the Single Character Display (SCD) flashes several segmented characters. Each character represents a test performed during POST. When POST finishes, the SCD will momentarily light all segmented characters and will then go blank. POST takes approximately 12 seconds. The system is ready when the Green Ready Light on the LTO is steady on.

Note: If mRack DIT is powered on with a tape cartridge installed in the LTO drive, the system will perform a much more intensive POST while the system verifies the integrity of the data on the tape. Never leave a tape in the LTO drive with the unit powered off!

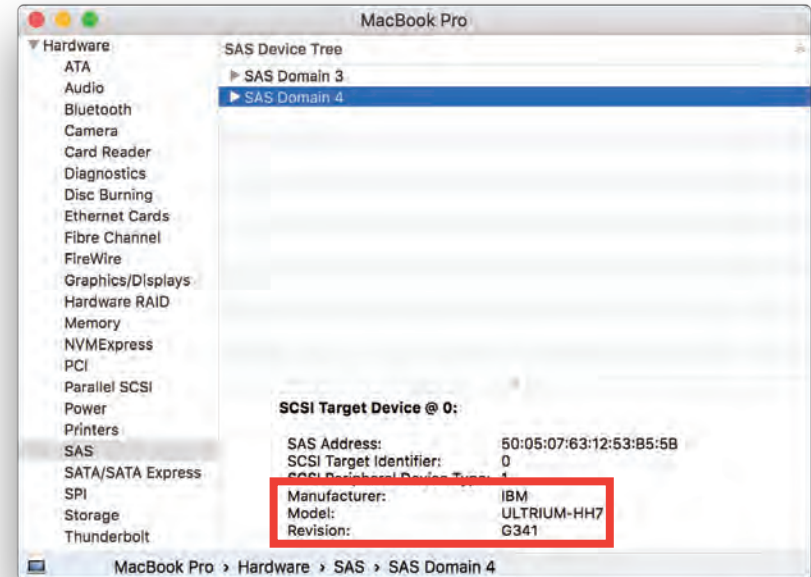
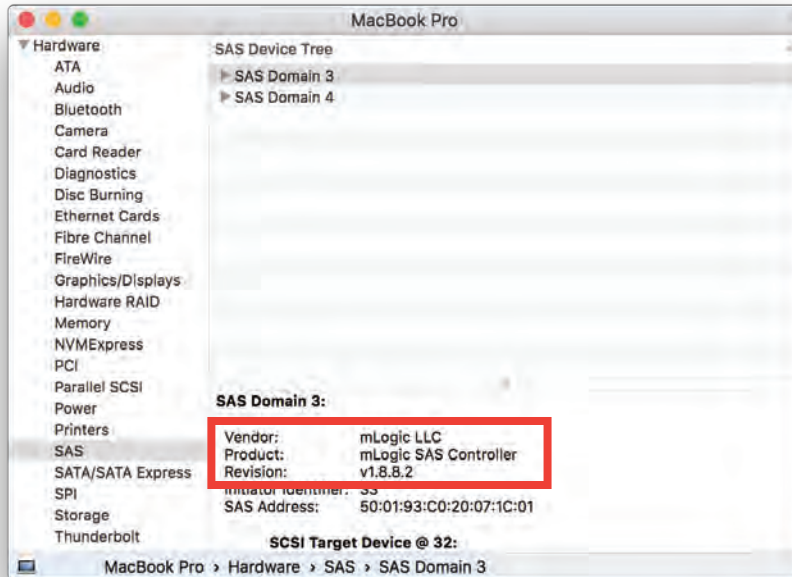
Note: The power button located on the front panel turns the Hard Drives/SSDs and LTO tape drive on and off. Power to the Thunderbolt electronics inside mRack DIT are controlled by the host computer. When mRack DIT is attached to a computer that is powered on the mRack DIT electronics are on. When the computer is powered off, the electronics inside also power off.

Note: Never remove power from mRack DIT during read, write, load and unload activities.

Verify your mRack DIT is recognized by your Mac



1) Under “About this Mac” > “System Report...” verify that the mLogic SAS Controller and ULTRIUM-HH inside of mRack DIT are displayed under the “SAS” entry as shown below.



If the mLogic SAS Controller is not displayed, make sure you have installed the mLogicDITv2.dmg driver. Once mRack DIT is powered on, it takes approximately 20 seconds for the ULTRIUM-HH to show up in the “SAS” entry.

If you have issues with mRack DIT being recognized by your system, please contact support@mlogic.com.


Configure the RAID

- 1) Power on mRack DIT.
- 2) It is recommended that mRack DIT be configured in one of the following RAID Levels:
 - RAID 0:** Data Striping - Increases performance but data will be lost in the event of a single drive failure. Storage capacity of all drives.
 - RAID 5:** Data Striping with Parity - Increases performance and protects data in the event of a single drive failure. Storage capacity of five drives.
 - RAID 6:** Data Striping with Double Parity - Increases performance and protects data in the event one or two drives fail. Storage capacity of four drives.
 - JBOD:** "Just a Bunch of Disks" - Each drive shows up individually. No performance increase or data protection. Storage capacity of all drives.
- 3) Navigate to Applications > MLOGICWEBGUI and drag the mLogic RAID Management.webloc icon to the dock.






Configure the RAID (continued...)

4) Launch the mLogic RAID Management GUI. The following window will appear.

Controller(1): SAS 

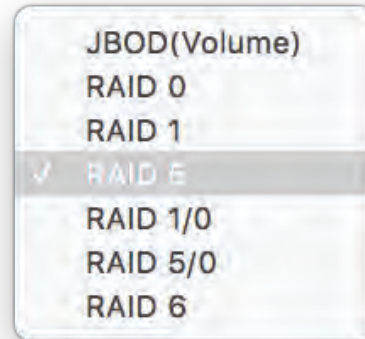
Global View Physical **Logical** Setting Event SHI Recover Logout Help

Create Array
Spare Pool
Logical Device
Rescan
Beeper Mute

| Logical Device Information | | | | | | | |
|---|------------------------------|----------|-----------|------------|----------|--------|--|
| Name | Type | Capacity | BlockSize | SectorSize | OS Name | Status | |
| Physical Device Information | | | | | | | |
| Location | Model | | | Capacity | Max Free | | |
|  1/1 | TOSHIBA MQ01ABD100-836IPOQNT | | | 1.00 TB | 1.00 TB | | |
|  1/2 | TOSHIBA MQ01ABD100-836APWUKT | | | 1.00 TB | 1.00 TB | | |
|  1/3 | TOSHIBA MQ01ABD100-836ZTBILT | | | 1.00 TB | 1.00 TB | | |
|  1/5 | TOSHIBA MQ01ABD100-836EP6CGT | | | 1.00 TB | 1.00 TB | | |
|  1/6 | TOSHIBA MQ01ABD100-836IPOQ1T | | | 1.00 TB | 1.00 TB | | |
|  1/7 | TOSHIBA MQ01ABD100-836IPOQBT | | | 1.00 TB | 1.00 TB | | |

Configure the RAID (continued...)

5) Click on "Create Array". Select the RAID level from the dropdown menu as shown below.



Note: Choose the appropriate RAID level for your workflow. You can set up multiple RAID sets of different types if you wish.

Configure the RAID (continued...)

- 6) Select “Quick Init”. Click on "Select All" to enable all drives to be part of the RAID. Click on the “Create” button.

Controller(1): SAS

mLogic

Global View Physical **Logical** Setting Event SHI Recover Logout Help

Create Array

Spare Pool

Logical Device

Rescan

Beeper Mute

Create Array

Array Type: RAID 5

Array Name: Default

Initialization Method: Quick Init

Cache Policy: Write Back

Block Size: 64K

Number of RAID5 member disks: 3

Select All

| | Location | Model | Capacity | Max Free |
|-------------------------------------|----------|---------------------------------|----------|----------|
| <input checked="" type="checkbox"/> | 1/1 | TOSHIBA MQ01ABD100-8361PQNT | 1.00 TB | 1.00 TB |
| <input checked="" type="checkbox"/> | 1/2 | TOSHIBA MQ01ABD100-836APWUKT | 1.00 TB | 1.00 TB |
| <input checked="" type="checkbox"/> | 1/3 | TOSHIBA MQ01ABD100-836ZTBILT | 1.00 TB | 1.00 TB |
| <input checked="" type="checkbox"/> | 1/5 | TOSHIBA MQ01ABD100-836EP6CGT | 1.00 TB | 1.00 TB |
| <input checked="" type="checkbox"/> | 1/6 | TOSHIBA MQ01ABD100-8361PQ1T | 1.00 TB | 1.00 TB |
| <input checked="" type="checkbox"/> | 1/7 | TOSHIBA MQ01ABD100-8361PQQ8T | 1.00 TB | 1.00 TB |

Available Disks:

Capacity: (According to the max free space on the selected disks) Maximum (MB)

Sector Size: 512B

DV Mode: Disable

(Enable special cache policy for DV/sequential write applications)

Disk Cache Policy: Unchange

Margin: (Increasing the margin % will result in more stable performance, but decrease the maximum read/write performance.)

Read: 5% Write: 5%

Create

Configure the RAID (continued...)

7) A window like the following will appear. Click “Close”.



8) The RAID set will now be displayed as shown below.

Controller(1): SAS

mLogic

Global View Physical **Logical** Setting Event SHI Recover Logout Help

Create Array
Spare Pool
Logical Device
Rescan
Beeper Mute

Logical Device Information

| Name | Type | Capacity | BlockSize | SectorSize | OS Name | Status |
|----------|--------|----------|-----------|------------|-------------|------------------------------------|
| RAID_5_0 | RAID 5 | 5.00 TB | 64k | 512B | mRack VD0_0 | Normal Maintenance |

Physical Device Information

| Location | Model | Capacity | Max Free |
|----------|------------------------------|----------|----------|
| 1/1 | TOSHIBA MQ01ABD100-836IPOQNT | 1.00 TB | 0.00 GB |
| 1/2 | TOSHIBA MQ01ABD100-836APWUKT | 1.00 TB | 0.00 GB |
| 1/3 | TOSHIBA MQ01ABD100-836ZTBILT | 1.00 TB | 0.00 GB |
| 1/5 | TOSHIBA MQ01ABD100-836EP6CGT | 1.00 TB | 0.00 GB |
| 1/6 | TOSHIBA MQ01ABD100-836IPOQ1T | 1.00 TB | 0.00 GB |
| 1/7 | TOSHIBA MQ01ABD100-836IPOQBT | 1.00 TB | 0.00 GB |

Configure the RAID (continued...)

9) The following Window will be displayed. Click on the “Initialize...” button.

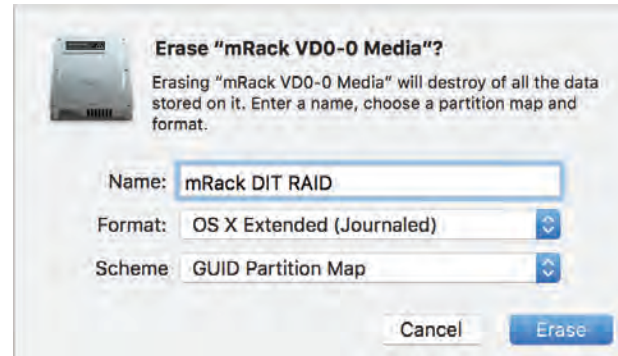


10) Select “mRack VD0-0 Media” and click on “Erase”.

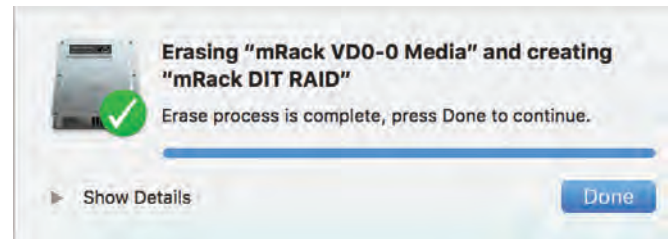


Configure the RAID (continued...)

11) Enter a name and click on the “Erase” button.

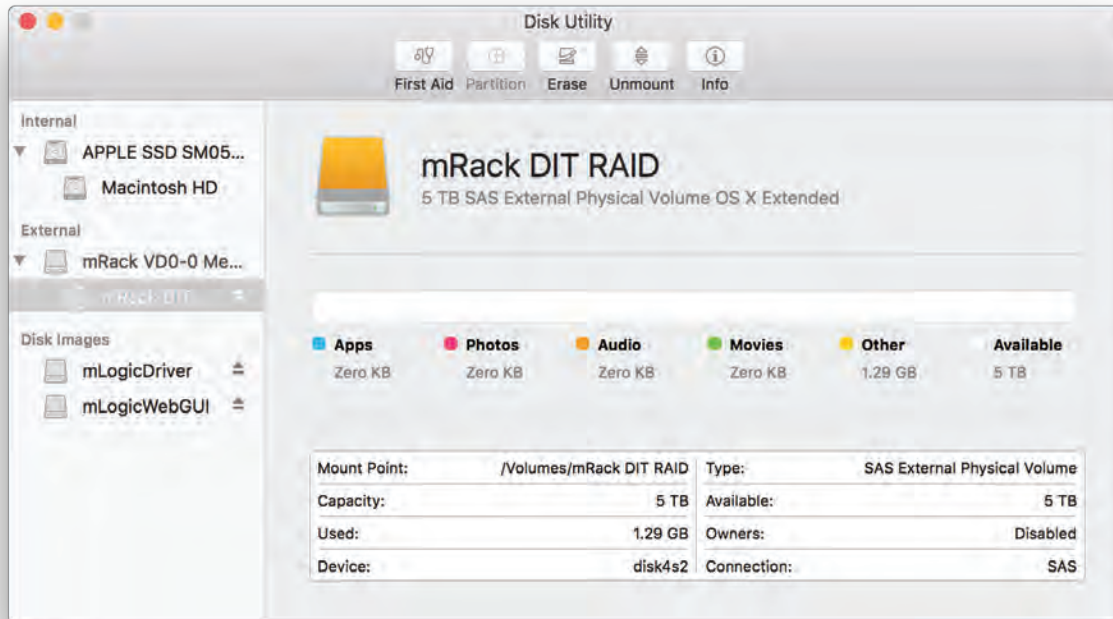


12) Click on “Done” button.



Configure the RAID (continued...)

13) The following Window will be displayed. The RAID is now formatted and will mount on the desktop. You are ready to go!



Using the LTO

It is necessary to disable your Mac's sleep mode to ensure your Mac does not go to sleep when archiving content.

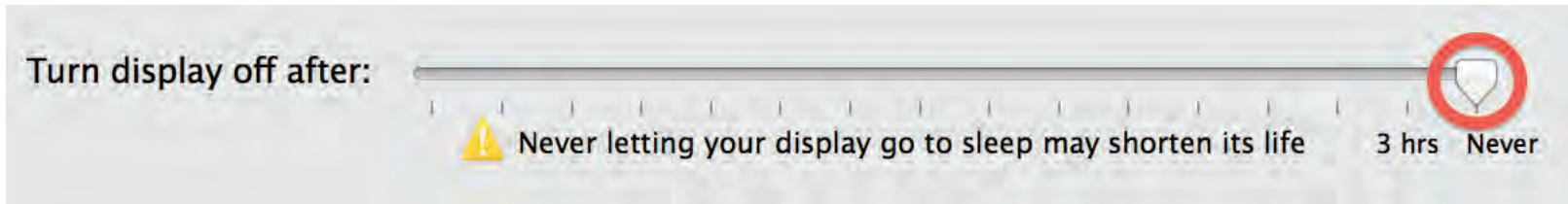


Disable System Sleep when using LTFS

macOS systems can corrupt an LTO tape cartridge if the system goes to sleep or hibernates while an offload is in process.

To turn off sleep mode **macOS**

Go to System Preferences → Energy Saver → Set “Turn display off after:” to **Never**



Loading a LTO Tape Cartridge in to mRack DIT

- 1) Make sure mRack DIT is powered on and the Green Ready Light is illuminated. Do not try to insert a tape cartridge before the Green Ready Light is on and steady.
- 2) Insert the cartridge in to the LTO drive. The cartridge goes in with the arrow pointing upward.
- 3) Apply gentle pressure until the drive engages the cartridge.
- 4) When the cartridge is loaded, the Green Ready Light will glow steady green.

Unloading the LTO cartridge

- 1) Always use the backup/archive application that you are running to unload the LTO tape cartridge. This ensures that the application has finished writing data to the tape before the cartridge is unloaded.
- 2) During the unload process, the drive will complete any current tasks, rewind the tape and unload the cartridge. The Green Ready light flashes while the unload process is under way.
- 3) After the cartridge partially unloads, grasp the cartridge and remove from the drive.

Note: Never leave a tape cartridge inside of a mRack DIT when the unit is powered off. If you forget to remove a tape, simply power on the unit and press the Unload button. There is no need to have mRack DIT attached to a Thunderbolt port during a manual unload.

Linear Tape File System (LTFS)

mRack DIT supports the Linear Tape File System (LTFS). LTFS is an industry standard file system that mounts the LTO tape drive in mRack DIT as a volume on your desktop. LTFS makes it possible to drag and drop content to the LTO as if it were a hard disk.

Backup/Archiving Software

We recommend the applications listed below to assist with the backup/archive process. In addition to creating searchable indexes and verifying archives, these applications optimize how data is written to the LTO tape and manage the entire process so you don't have to.

- Archiware - P5
- Imagine Products - PreRoll Post
- IBM LTFS
- Retrospect, Inc. - Retrospect
- StorageDNA - DNA Evolution
- Tolis - BRU PE
- Xendata - Xendata Work Station
- YoYotta - YoYottaID LTFS

Cleaning the LTO Tape Drive

mRack DIT will alert you when it becomes necessary to clean the LTO tape drive. The SCD will display a “C” to indicate that cleaning is required. To clean, insert the included cleaning cartridge in to the LTO drive. Cleaning is performed automatically. When the cleaning is finished, the cartridge is unloaded and the SCD will be blank.

Note: The drive will automatically unload an expired cleaning cartridge. Cleaning cartridges are valid for 50 uses.

Appendix A: Cartridge Compatibility

mRack DIT can read/write to the current and previous LTO generation and read two generations back.

| mRack DIT | LTO Tape Cartridges | | | |
|-----------|----------------------|----------------------|----------------------|---------------------|
| | 6000GB (Ultrium7) | 2500GB (Ultrium6) | 1500GB (Ultrium5) | 800GB (Ultrium4) |
| LTO 7 | Read/Write | Read/Write | Read Only | |
| LTO 6 | | Read/Write | Read/Write | Read Only |



Appendix B: Status Lights / Error codes

The status of mRack DIT is indicated by the front panel SCD and Status lights as outlined below.

| Mode | SCD | Ready LED (green) | Fault LED (amber) |
|--|-----------------|-------------------|-------------------|
| Operational | Blank | On | Off |
| Activity (tape movement) in Operational mode | Blank | Flashing | Off |
| Error condition | Solid character | Off | Flashing |
| Power is turned on or a reset is initiated | Random segments | Off | On |

| Ready status light | Fault status light | Encryption status light | SCD | SCD dot | Meaning |
|----------------------------------|--------------------|-------------------------|---------------------------|-----------|--|
| Off | Off | Off | Off | Off | The drive has no power or is powered off. |
| Green and solid | Off | On or off | Off | Off | The drive is powered on and in an idle state. |
| Flashing green (once per second) | Off | On or off | Off | Off | The drive is reading from the tape, writing to the tape, rewinding the tape, locating data on the tape, loading the tape, or unloading the tape. |
| Flashing green (once per second) | Off | Off | Off | Off | If the drive contains a cartridge when the drive is turned on, the drive completes POST and slowly rewinds the tape (the process may take up to 10 minutes). The light stops blinking and becomes solid when the drive completes the recovery and is ready for a read or write operation. To eject the cartridge, press the Unload button. |
| Off | Amber and solid | Off | Displaying an error code. | On or off | The drive is displaying an error code on the SCD. See Appendix C for error code information. |




| Ready status light | Fault status light | Encryption status light | SCD | SCD dot | Meaning |
|--------------------|--------------------|-------------------------|--|-----------|---|
| On or off | On or off | On or Off | Displaying random segments, then blank, then displaying random segments, then displaying blank | On or off | <p>During power on, or a drive reset, the drive front panel will display drive progress as follows:</p> <ol style="list-style-type: none"> 1. SCD will display random segments (no LEDs on). 2. SCD will display random segments (LEDs - green on, amber off) 3. SCD will display random segments (LEDs - green off, amber on) 4. SCD will display [8] (LEDs - green off, amber on) 5. SCD will go blank (LEDs - green on, amber off) after the power is turned on or after the drive is reset. <p>If an error is detected when the drive power is turned on or during a reset, the tape drive posts an error code to the SCD. To determine the error, locate the code in Appendix C</p> |

| | | | | | |
|-----|-----------------------------------|-----|--|-----|---|
| Off | Flashing amber (once per second) | Off | Displaying error code | Off | An error occurred and the drive or media may require service, or it may require cleaning. Note the code on the SCD, then go to Appendix C |
| Off | Flashing amber | | Displaying  | Off | The drive needs to be cleaned. |
| Off | Flashing amber (twice per second) | Off | Off | Off | The drive detected an error and is performing firmware recovery. It will reset automatically. |
| Off | Amber and solid | Off | Flashing  | Off | The drive is ready for a cartridge to be loaded. |




Appendix C: Error codes and messages

If the drive detects a permanent error, it displays the error code on the SCD and flashes the Fault light (Ready light is Off).

- Make note of the SCD error code before a cartridge is removed or the SCD error code is cleared.
- If an error occurred with the cartridge in the drive, push the Unload button to eject the cartridge.
- To clear the SCD error code and power cycle the drive, press the Unload button for 10 seconds.

| Error Code | Cause and Action |
|---|---|
|  | <p>Temperature problem. The tape drive detected that the recommended operating temperature was exceeded. Complete one or more of these actions:</p> <ul style="list-style-type: none"> • Ensure that the cooling fan is rotating. • Remove any blockage that prevents air from flowing freely through the tape drive. |
|  | <p>Power problem. The tape drive detected that the externally supplied power is outside the specified voltage limits (the tape drive is not operating). Complete this action:</p> <ol style="list-style-type: none"> 1. Ensure that the power connector is properly seated. 2. Turn power off/on to the mRack DIT to see whether the problem repeats. |
|  | <p>Firmware problem. The tape drive determined that a firmware error occurred.</p> |

| Error Code | Cause and Action |
|------------|--|
| 4 | Firmware or hardware problem. The tape drive determined that a firmware or tape drive hardware failure occurred. |
| 5 | Tape drive hardware problem. The drive determined that a tape path or read/write error occurred. To prevent damage to the drive or tape, you cannot insert a cartridge if the current cartridge was successfully ejected. The error code might clear when you cycle power to mRack DIT. |
| 6 | <p>Tape drive or media error. The tape drive determined that an error occurred, but it cannot isolate the error to faulty hardware or to the tape cartridge. Ensure that the tape cartridge is the correct media type:</p> <ul style="list-style-type: none"> • Ultrium 1, 2, 3, and 4 cartridges are not supported in mRack DIT LTO-7 models. • Ultrium 1,2 and 3 cartridges are not supported in mRack DIT LTO-6 models. • Drive does not accept an expired Cleaning Cartridge. |
| 7 | <p>Media error. The tape drive determined an error occurred because of a faulty tape cartridge or an invalid tape cartridge. Ensure that the tape cartridge is the correct media type:</p> <ul style="list-style-type: none"> • Ultrium 1, 2, 3, and 4 cartridges are not supported in mRack DIT LTO-7 models. • Ultrium 1,2 and 3 cartridges are not supported in mRack DIT LTO-6 models. • Drive does not accept an expired Cleaning Cartridge. |
| 8 | Interface problem. The tape drive determined that a failure occurred in the tape drive 's hardware or in the host bus. |
| 9 | Tape drive or RS-422 error. The tape drive determined that a failure occurred in the tape drive 's hardware or in the RS-422 connection. |

| Error Code | Cause and Action |
|---|--|
|  | Degraded operation. The tape drive determined that a problem occurred which degraded the operation of the tape drive, but it did not restrict continued use. |
|  | The tape drive must be cleaned. Clean the tape drive. See “Cleaning Cartridge” on page 12 |
|  | Write operation to a write protected cartridge was attempted (includes any attempt to overwrite a WORM protected tape). Ensure that the tape cartridge is the correct media type. If the tape cartridge is the correct media type, check the write-protect switch on the cartridge. The drive does not write to a write-protected cartridge. |

If an error code persists contact support@mLogic.com for assistance

LIMITED WARRANTY

mLOGIC, LLC (the “Company”) warrants its products will be free from defects in material and workmanship for two years from the date of purchase of the product.

This Limited Warranty only applies to the original purchaser of the product, and is not transferable to subsequent owners.

This Limited Warranty is void if the product is subjected to abuse, misuse, abnormal, excessive or improper conditions (including, without limitation, attempts to utilize the product under any condition that exceeds its design capabilities, or any other use beyond the use specified in any product instructions), or if the product is altered or modified in any manner. This Limited Warranty does not cover damage to the product due to external causes (including, without limitation, accident, liquids, chemicals, oxidation, corrosion, or exposure to the elements), or problems caused by use of parts and components not supplied by the Company.

The sole remedy under this Limited Warranty is product repair, replacement, or refund of the purchase price, at the sole discretion of the Company.

In order to make a claim, the purchaser must ship the product to the Company at the purchaser’s expense, together with proof of purchase, and a description of the nature of the defect. The Company will not be held responsible for any product that is damaged or lost in transit to the Company.

PURCHASER AGREES THAT MLOGIC, LLC SHALL NOT BE LIABLE FOR ANY SPECIAL, INCIDENTAL, INDIRECT, SECONDARY OR CONSEQUENTIAL DAMAGES, OR FOR THE DAMAGE, INJURY, OR LOSS OF LIFE, PROPERTY OR OTHER PRODUCTS PURCHASER CONNECTS TO THE PRODUCT, OR LOSS OF REVENUE OR DATA, WHETHER BASED ON CONTRACT, TORT, PRODUCTS LIABILITY OR ANY OTHER LEGAL THEORY, EVEN IF THE DAMAGE, INJURY OR LOSS IS CAUSED BY THE NEGLIGENCE OR OTHER FAULT OF MLOGIC, LLC. THE FOREGOING WARRANTY IS THE ONLY WARRANTY MADE BY MLOGIC, LLC, AND MLOGIC, LLC MAKES NO OTHER WARRANTIES, INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

This Limited Warranty shall be governed by the laws of the State of California. Any dispute under this Limited Warranty shall first be submitted to binding arbitration before the American Arbitration Association in Los Angeles, California.