Optoma THD and FHD
User manual

Installation and User Manual

Version 1.0

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Introduction

The THD system from Optoma is a modular system for the construction of ultra-THD, wall mounted LED video screens. Often used as an upgrade or replacement to locations where projectors may have traditionally been used, Optoma LED brings all the high-brightness, high contrast benefits of LED to locations where previously there wouldn't have been sufficient space to install a screen.

Offering HD or greater resolutions with a pixel pitch suitable for close viewing, Optoma LED replaces installations where previously, Flat panel bezel-edged LCD monitors or videowalls may have been needed.

Figure 1 – a wall mounted Optoma LED screen

Copyright and Legal

Safety Considerations

Optoma equipment should only be used by competent and qualified personnel.

Screen construction activities should only be undertaken by competent technicians with screen rigging experience. Screen cabling activities should only be undertaken by technicians with suitable electrical and wiring experience.

All personnel involved in the screen construction process must be of sound health and drug and alcohol free.

If in doubt about any part of the screen cabling or construction, work should be stopped.

Advice should be sought until the query has been resolved as per Optoma technical advice and support.

Terminology

It is a known industry problem that there is no international standard for naming the components of an LED screen.

This document is written in accordance with the Optoma standard of component names. Please take note of the definition of phrases such as "Tile", "Module" and "Panel" as described below. Please see Glossary for further information.

In This Manual

This manual is one of three documents pertaining to the THD range (Including the FHD range) of products from Optoma.

It contains information about the setup and day-to-day use of the Optoma THD LED screen system.

For the complete guide on THD , two accompanying manuals should be downloaded in addition to this document:

- Optoma THD Mounting Guide
- Optoma - Nova MARS LED Control Software - User Manual v1.1

The Optoma LED Mounting Guide document details methods by which the screen can be safely and correctly mounted to a wall.

The Nova MARS document details the programming of THD and FHD screens.

Please note - This document has an interactive table of contents when delivered in electronic form. Clicking on a Table of Contents entry will jump to that section of the document.

Components & Parts Description

Introduction

The Optoma THD system comprises of two main components

- **The LED Tile**
- **The Panel**

The LED tile is the optoelectronic display device that displays the video image on its SMD LED pixels

The Panel is the mounting system and containment for all of the supporting equipment to make the LED tile operate (Power Supplies, receiving cards etc)

LED Tile

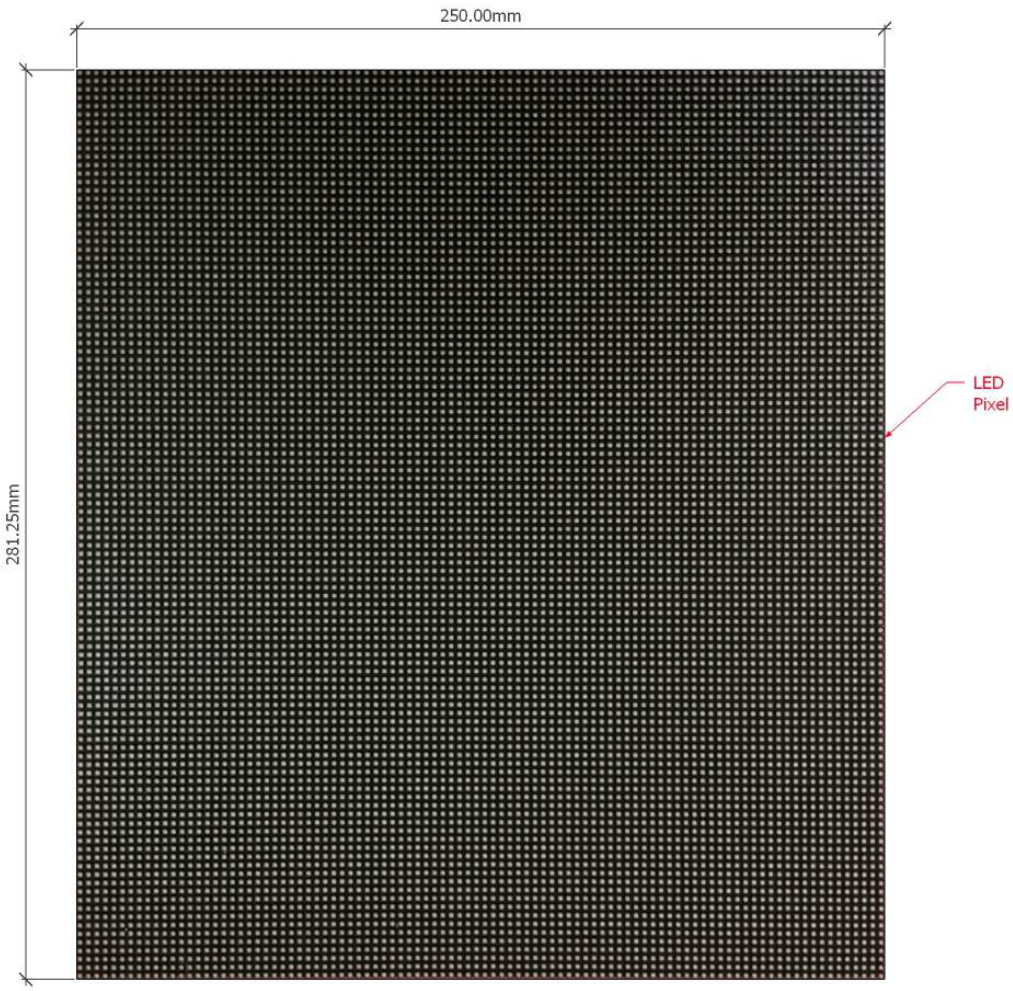


Figure 2 - Optoma LED Tile Front View

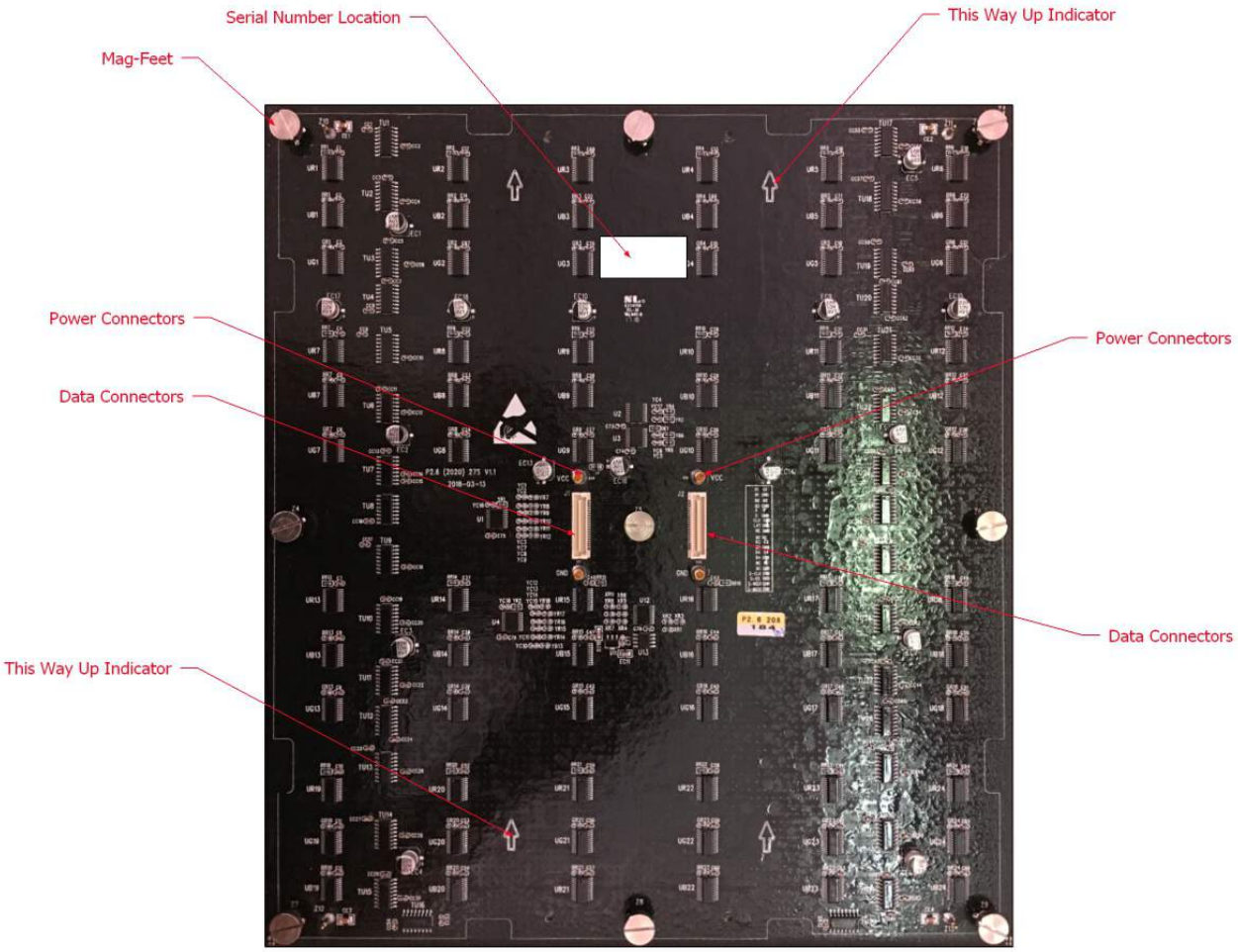


Figure 3 – Optoma LED Tile - Back View

Panel

The panel of Optoma THD is a di-cast aluminium casing, precision machined to create the precise and flat backbone of an Optoma LED screen.

Mounted wiTHD the panel are all of the power supply and control components of THD required for operation.

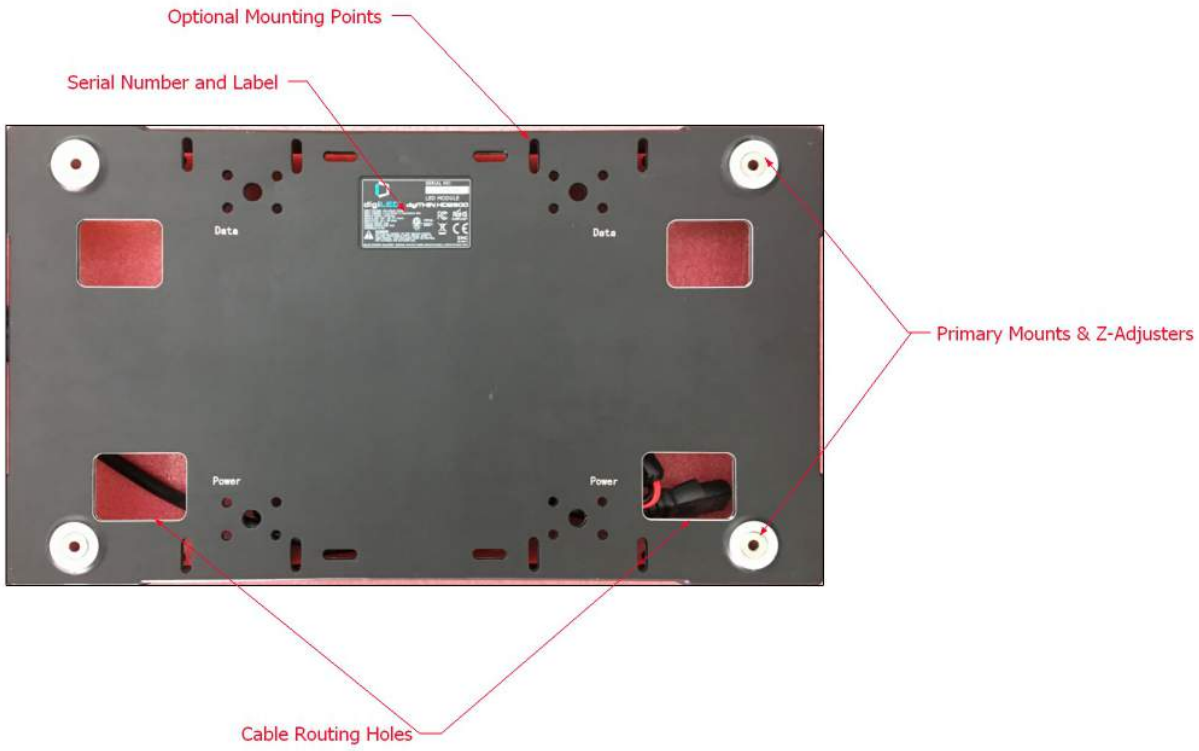


Figure 4 - Panel Rear

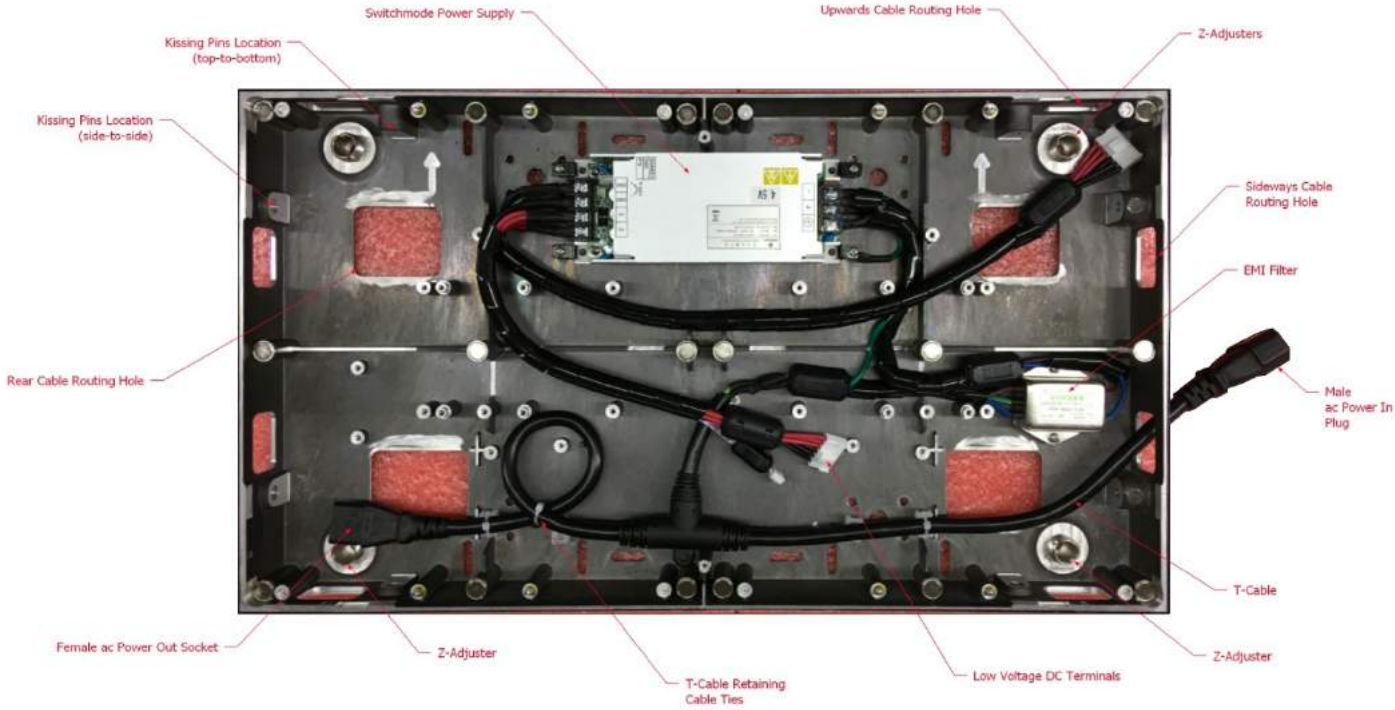


Figure 5 – Panel Front (shown without Hub card or data electronics)

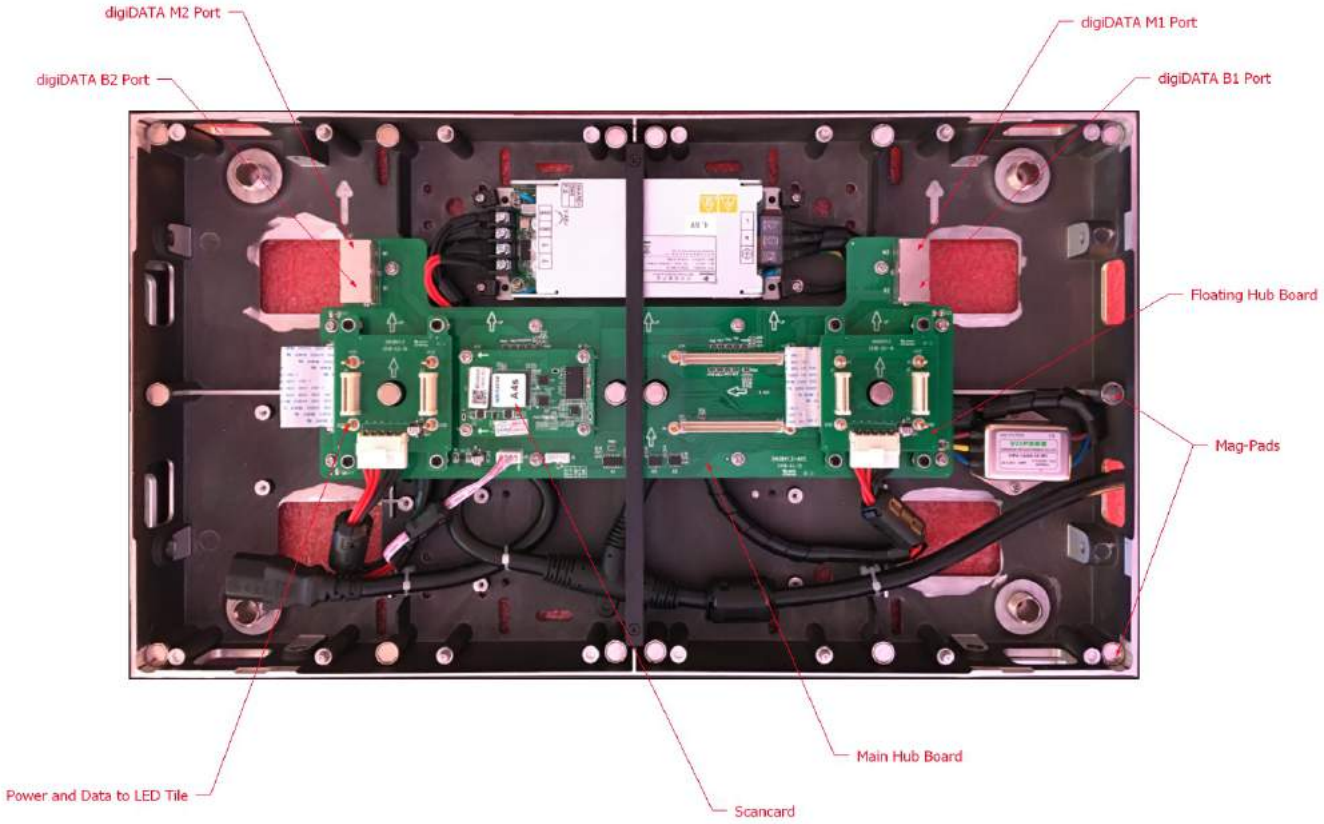


Figure 6 - Panel Front and Internals

Handling and Safety

The display surface components of a Optoma LED system is an extremely delicate, precision engineered low voltage, optical device. No hazardous voltages are used in the operation of the LED surface. Electrical working experience is therefore not necessary for any persons handling / working with the THD component provided that instructions with in this document are followed.

It is extremely important that all persons handling THD's understand how fragile the optical face of the product is and that correct handling is essential for continued correct operation of the THD.

Please pay particular attention to the front surface of the Optoma LED Tile and the array of SMD LEDs soldered there.

This surface and its perimeter are extremely fragile. Any mishandling, scrapes, dents or impacts with hard surfaces or neighbouring THD Tiles may damage the LED surface. Physical damage in this manner is not covered by the product warranty and should repairs be possible, would not be warranty-covered.

If possible, wear clean, lint-free gloves whenever handling THD Tiles. Dirt on the surface of the LEDs can only be cleaned with specialist processes. Please try to avoid contamination from hands and handling wherever possible.

The Panel component of a Optoma LED is a power device that contains not only low voltage dc but also high voltage ac.

As such, the device should never be opened by persons unless they are experienced and competent working with ac high voltages.

<u>If in doubt, never open the Panel.</u>

Constructed of tough cast aluminium, the PDP is substantially more robust than the LED Tiles. Even so, care should be taken when handling the device. Treat it much the same way as you would treat similar devices such as PCs or games consoles.

Environment

Optoma LED products are an indoor only device and must ONLY be used in dry locations, indoors.

Optoma LED should be used and stored in a dust-free environment. If the optical surface of the Optoma LED becomes contaminated with dust, this can be extremely difficult to clean. Please avoid dust from the outset.

Given the magnetic mounting of Optoma LED components, it is extremely important that the Tiles are kept away from any environment where metalworking dust / ferrous / magnetic dust may be present.

Ferrous metalworking dust will be attracted to the magnets of the Optoma LED and once adhered, will almost certainly cause short circuits and malfunctions of the electronics, none of which would be covered by the warranty.

Optoma LED Mounting and Assembly

New Optoma LED screens are supplied as a kit of components. In the kit you will find:

- Optoma LED Panel (shipped without the LED Tile surface)
- Optoma LED Tiles
- Associated power and data connectors

To construct a Optoma LED screen, these components need to be assembled on the screen mounting location.

Assembling a Optoma LED screen is a three-stage process. 1st the Panel are mounted onto a supporting wall. 2nd the Panel have power and data connected. Finally, LED Tiles are mounted onto the Panel.

Panel Mounting

The ways and means by which the Panel can be mounted is an in-depth subject and is covered extensively in the sister document to this manual "Optoma LED Mounting Guide". This and other Optoma documentation is available for download from Optoma website .

For the purposes of this document it is assumed from this point on that the Optoma LED wall has been correctly mounted and fettled.

Power and Data Connection

Both ac power and digiDATA are designed to loop-through Optoma LED Panel; ac connecting via IEC connectors and Cat5 digiDATA connecting via RJ45 Ethernet ports.

PLEASE NOTE - There are limits to the maximum number of panels that both power and data can safely loop-through. Please read and understand the following before connecting the power to the Panel of your screen.

Power

ac Power

Each Panel is fitted with a "T-Cable" featuring a male IEC power plug designed to take ac power in on the RHS of the Panel. On the other side of the T-Cable is an IEC female connector designed to forward ac power out to the next Panel in the chain.

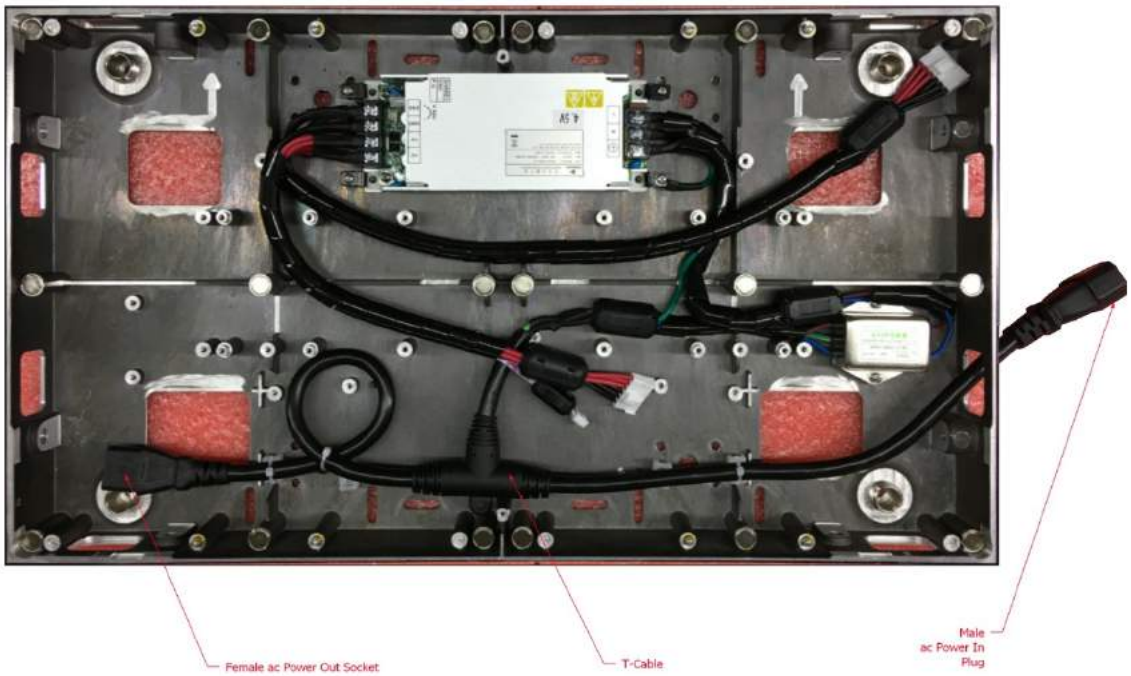


Figure 7 - ac Power T-Cable

Power chains of panels are built up by connecting male to female, male to female etc.

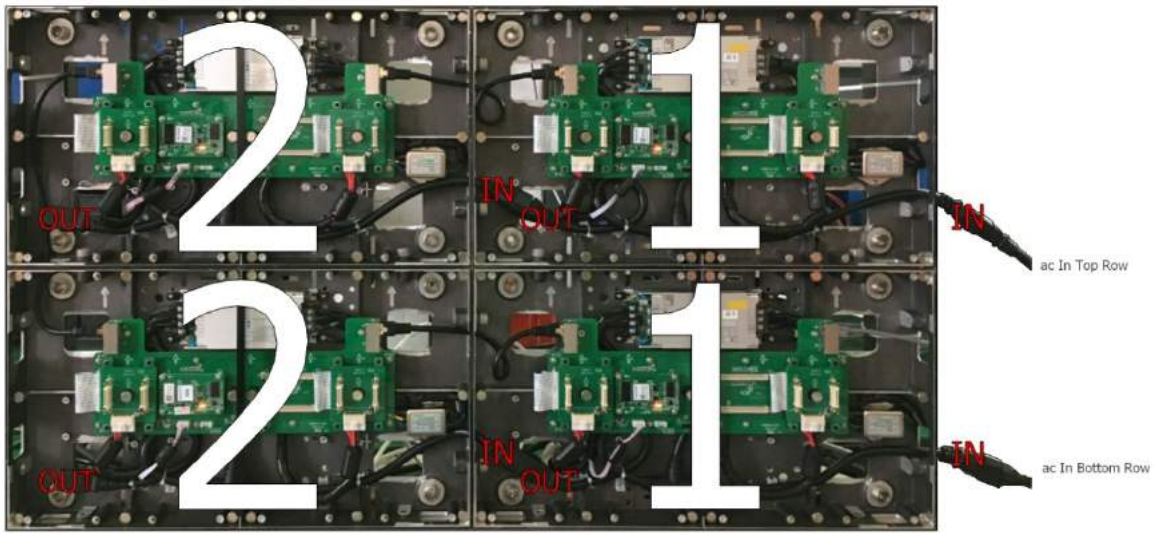


Figure 8 - Power In / Out from Right to Left

By default[1], ac power is fed into the screen from the RHS of the screen (when viewed from the front)

The maximum safe number of Panel that can be connected in a chain will vary depending on

- The ac voltage of your region
- The pixel pitch of the Optoma LED model
- The LED type for that pixel pitch

The governing factor in all these considerations is this:

----- The maximum operating current of an IEC connector is 10 Amps -----

Consequently, chains of panels must never be created that cause the current demand to exceed 10 Amps.

The following table shows panel-chain maximums for a number of operating environments:

	Japan / US 110vac	Japan / US 208vac	Europe 220vac
Optoma LED 2800			
Optoma LED 2000			
Optoma LED 1530			

If in doubt, please consult your Optoma sales person for further information on your particular project and it's maximum power draw.

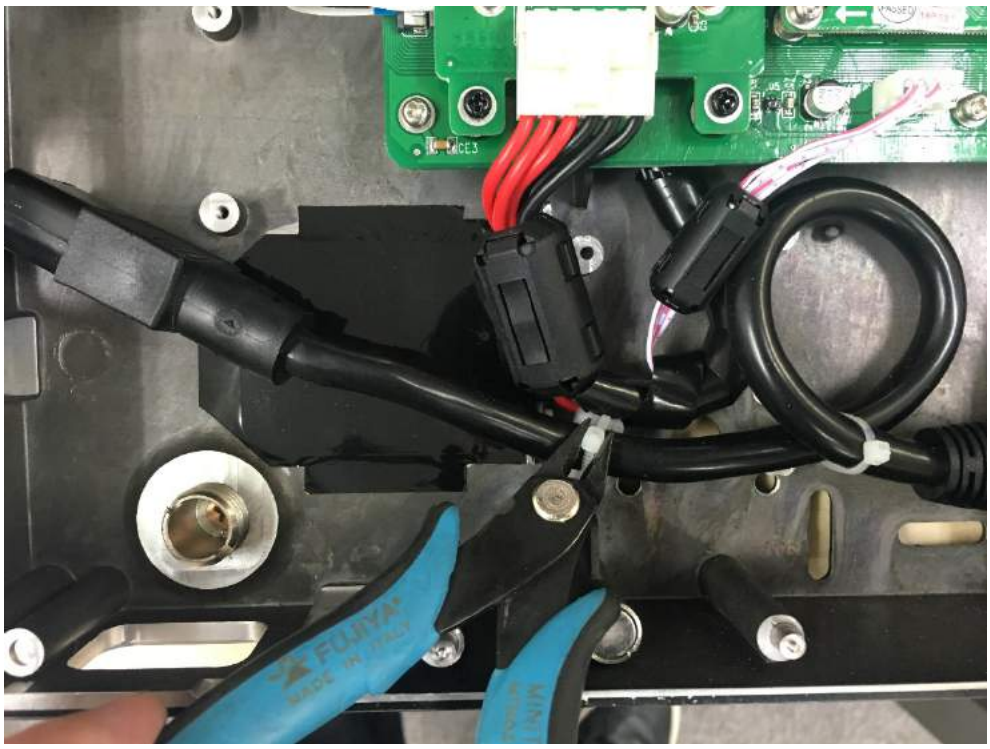
Reversing Right-Left Power Flow

By default, the T-Cables in a Optoma LED Panel are designed to carry the power from the Right to the Left (when viewed from the front)

It is possible however to reverse this direction when needed.

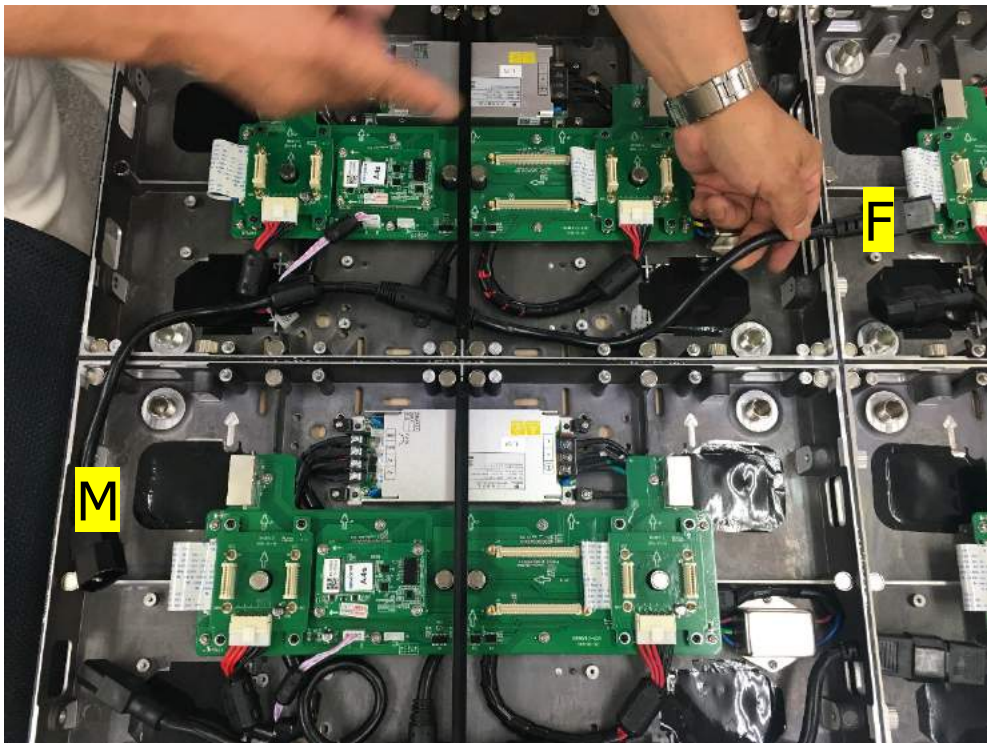
To change the direction of the T-Cables, first snip the white nylon cable ties that hold the T-Cable in place.

[1] Although this is the default, Left to Right is also possible. Please see chapter on "reversing T cables"



Now thread the Female connector (F) underneath the centre-bar of the Panel and feed to the RHS of the panel.

At the same time, feed the Male IEC connector (M) on the right over to the LHS of the panel.



If needed, secure the reversed cable back in place using fresh cable ties.

The Optoma LED Panel is now ready for power-feed from the Left to the Right.

Up / Down Cable Routing

The T-Cable of Optoma LED is also designed to be long enough to route ac power in an up / down direction.

This may be useful where screens are taller than they are wide – sometimes causing 2 or more rows of Panel to be cabled together on a single feed.

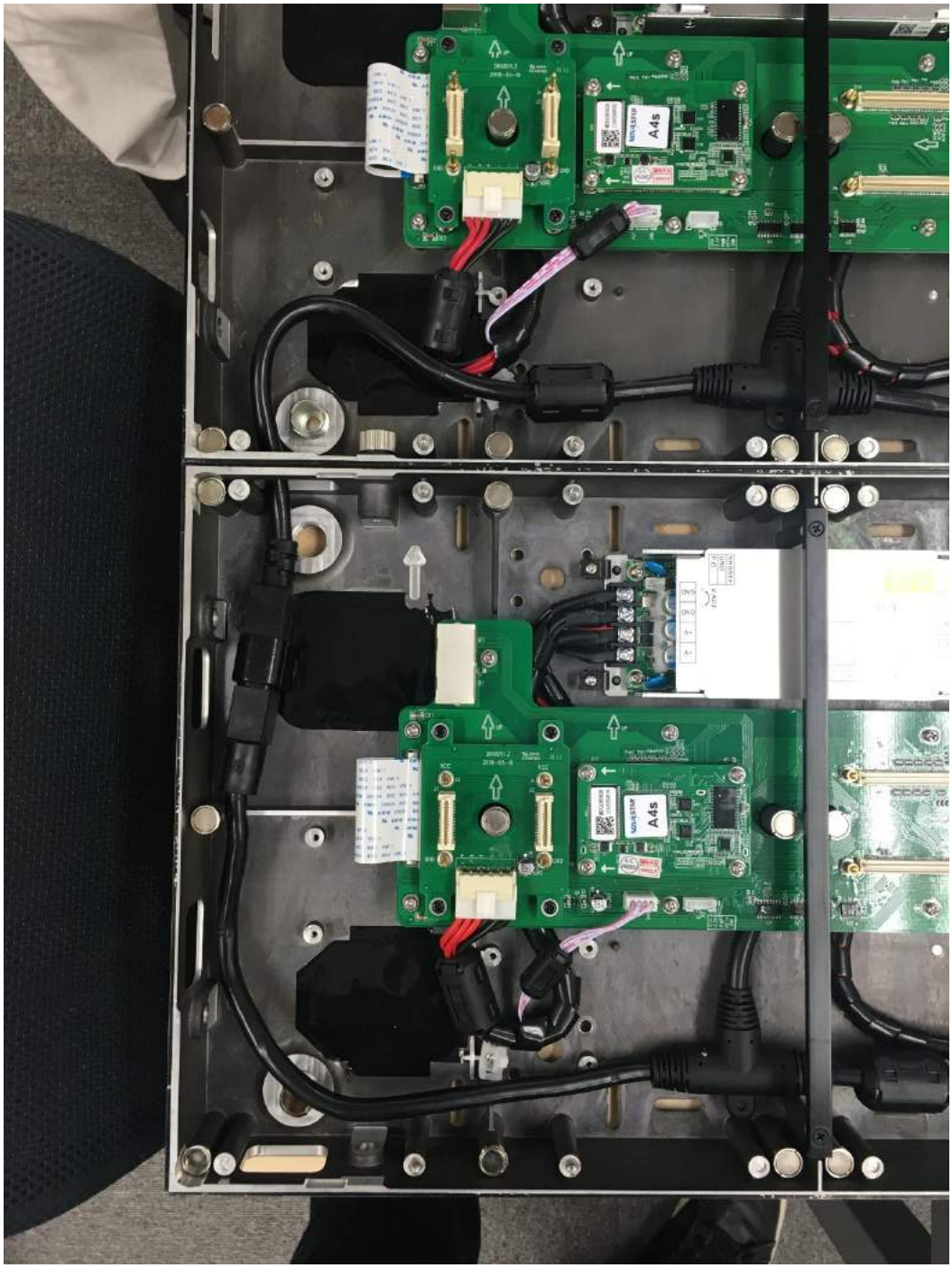


Figure 9 - IEC T-Cable for Up/Down Connection

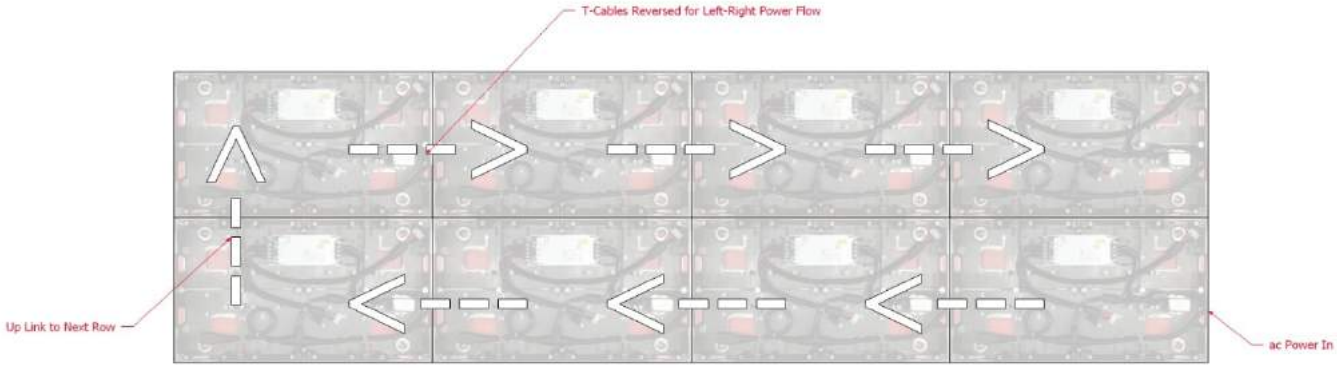


Figure 10 - T-Cable Direction Change and Up Link

Main Feeder Cables

Main feeder cables are the cables that carry ac power from the distribution board / power box to the Optoma LED screen.

Figure 11 - Main Feeder Cable

With every project, Optoma supplies an appropriate number of IEC main feeder cables for the project.

These are normally delivered as 5m cables with a female IEC termination on one end, bare cables on the other.

It is left to client's own choices as to the termination at the Power Box end of the cable. (there are many regional and personal preferences as to this termination type)

Please refer to the following table for the details of your connection type:

	USA	**Europe**
Live	Black	Brown
Neutral	White	Blue
Earth	Green	Green / Yellow

CAUTION – It is essential for safe operation of a Optoma LED screen that a low impedance Earth connection is available.

Never operate a Optoma LED screen unless the Earth connection is present, tested and connected.

Look Out For…
IEC plugs and sockets, when mated, may still make electrical contact even though they are not fully engaged/seated.

Check that all connectors are fully pressed home and seated.

A marginally seated IEC pair may overheat when run at full current capacity! Please check all Male / Female pairs are fully plugged together!

Also look out for…

When T-Cables have been reversed, it's important the cable "lays" comfortably within the Optoma LED Panel. Any twists / kinks in the cable may cause the cable to push forward and prevent the Optoma LED Tile from sitting comfortably on its magnets.

Caution
Where clients choose to make their own power feeder cables for the screen, it is essential that the gender rules of IEC connectors are applied.

- Never make a cable up where "pins" will have a live voltage present.
- Always ensure that an energised cable is terminated in a Female IEC, never a male.

Data

DATA Connections

digiDATA is the video and control signal carried on Cat5e cables from the Sender to the LED screen. With a maximum capacity of 655360 pixels, it is normal to use 4 x DATA feeds when connecting a true HD screen.

Unlike the ac power, DATA can be connected to any corner of the screen as a start point.

DATA can flow from Right to Left or Left to Right through any panel.

If your screen has single Scancards, the RJ45 ports labelled "M" are used for DATA connection.

If your screen has double Scancards, "M" sockets are used for the Main DATA while sockets labelled "B" are used for the Backup DATA signal and the second Scancard.

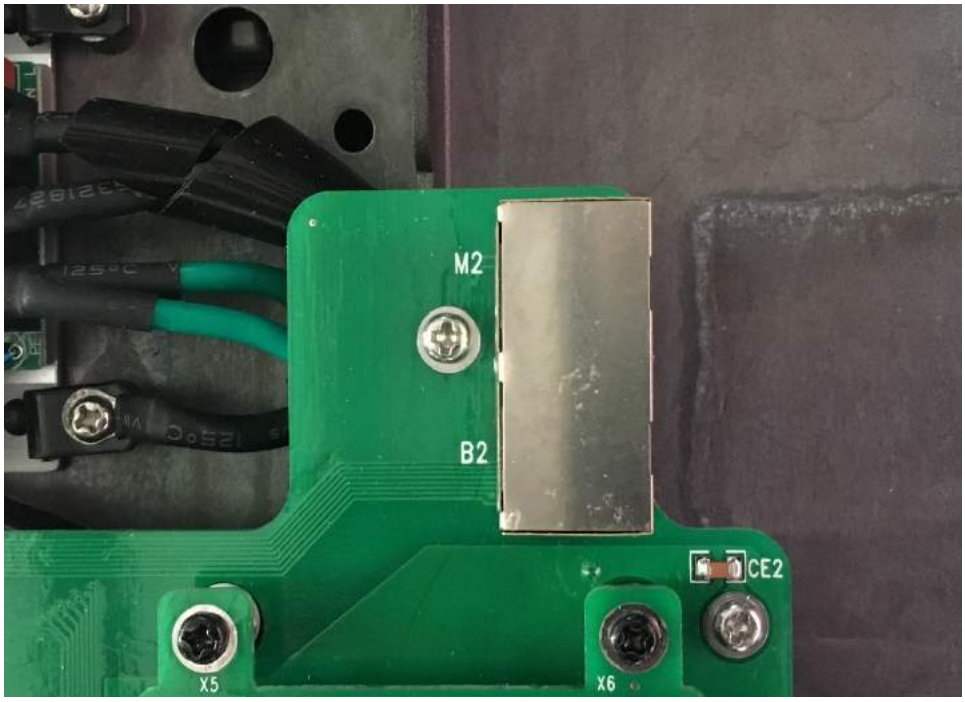
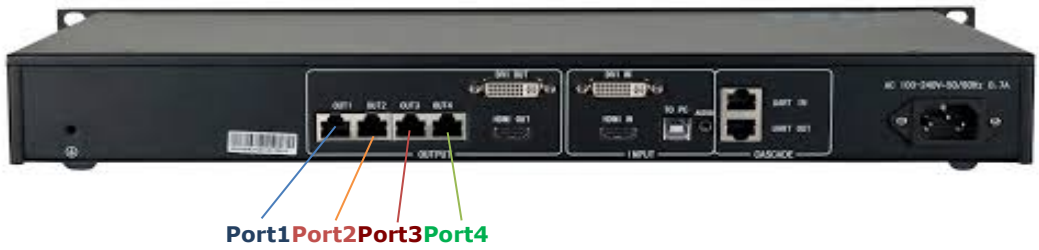


Figure 12 - M and B DATA sockets

When planning your digiDATA connections, as rule of thumb, an HD Optoma LED screen must be split into quarters.

Each of these quarters is then fed from one Port of the Sender.



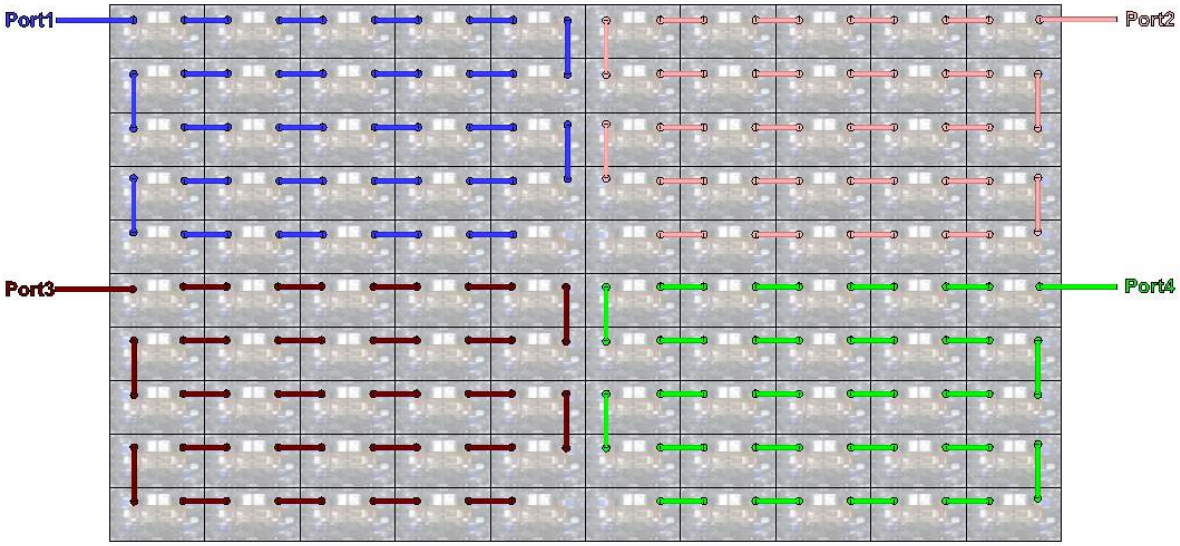
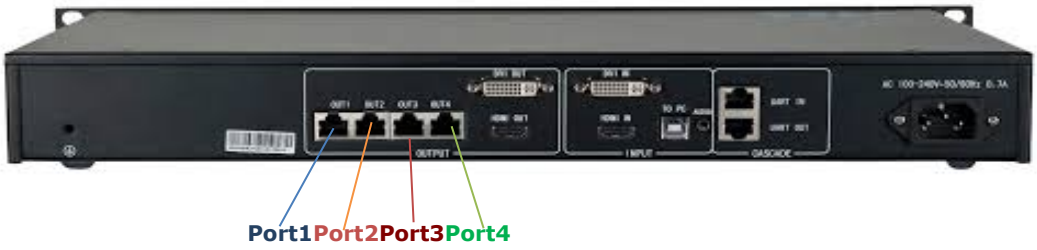


Figure 13 - - a 10x10 screen "quartered" (quads)

Alternatively, the quartering could be done as follows:



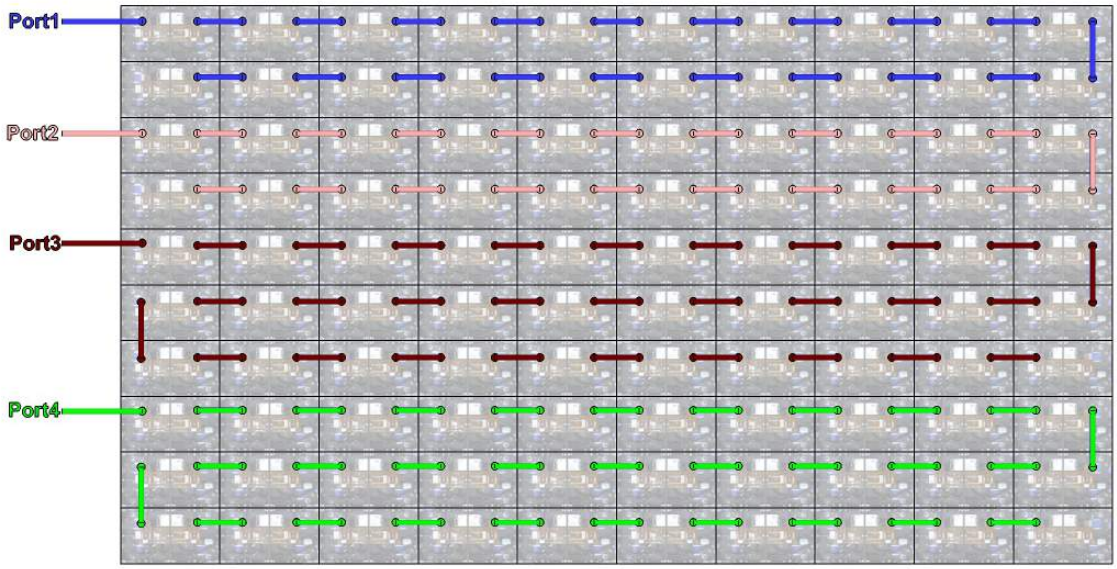


Figure 14 - a 10x10 HD screen "quartered" (stripes)

As you will see above, the term “quarters” is not quite accurate. This is OK however as the total pixel count on every Port remains below the safe threshold.

In every case, a check should be made to ensure the maximum pixel-count of any single screen quarter never exceeds 655360.

Exceeding this value will lead to unaddressed pixels and corrupted data displayed on the screen.

Connection Checking

When a Optoma LED Panel has been successfully connected to ac power and DATA has been fed from a MCTRL660 or similar, the heartbeat LED of the Scancard will indicate if all is well.

A healthy happy signal on the Scancard is shown as an equal "on/off/on/off" heartbeat of 1Hz.

Please see the following YouTube video showing the heartbeat.

https://youtu.be/QudsEyPwg1s

Top Tip – Check that all Receiving Cards are displaying a healthy heart beat before proceeding to the next stage of the assembly: LED Tile mounting. Yes – it is OK to mount the LED tiles onto the Panel with the power turned on.

LED Tile Mounting

Mounting the LED tiles to the Panel can only start when a complete wall of Panel has been hung, levelled and smoothed. For details on all these processes please see the sister document above.

Assuming that a complete wall has been hung, levelled and smoothed, LED tiles can now be added to the Optoma LED wall.

Caution – Static electricity can be an LED killer. Please take care when working in exceptionally dry environments or when working on floors that may build up a high static charge.

If possible, always earth yourself onto the metal parts of the Panel before handling LED tiles.

Start by checking the rear of the LED Tile to confirm which is the right way up. Four arrows are printed on the rear to indicate this direction

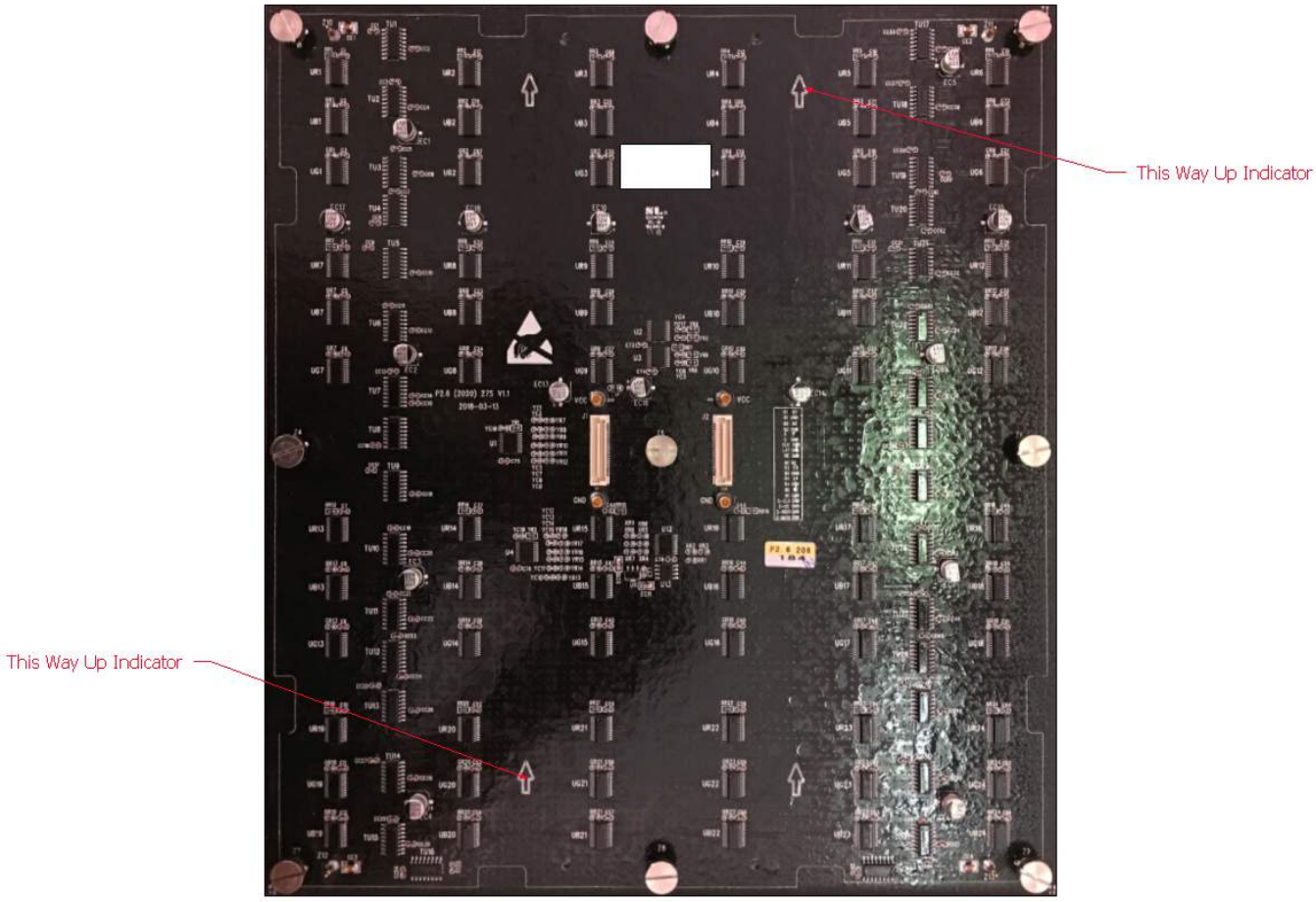


Figure 15 - This Way Up Indicators

Starting at the bottom of the screen, place the bottom edge of the 1st LED tile onto the bottom edge of the 1st Panel.

Ensure the left / right positioning is correct and that the Tile neither protrudes too far or too short of the edge of the Panel. The corer of the Panel should align precisely with the corner of the LED tile.

Now, "fold" the LED tile up and on to the Panel.

As the fold movement nears the vertical, resistance will be felt as the DC and data connectors engage. This is normal

Finally, once the LED tile is "folded" to a complete vertical position, all 9 mag-feet will engage, and the LED tile will be held in place. If completing the "fold" while the screen is powered up, the Tile should now light up and immediately start displaying video.

Watch Out For…

Watch out for the LED tile completely sitting down on the alignment pins as the magnets grab.

4 Alignment pins are built into the Panel, all of which must centre on and sink into the corresponding holes in the PCB.

Diagram

Continue by mounting the LED Tiles to the left and right in the same way.

Take extra care that when two Tiles are placed side-by-side the delicate pixels and PCB to not crunch. The PCBs should be treated as if they were glass!

Once the bottom row of the screen's LED tiles have been mounted, work can start on the second row. Mounting the second row is generally easier than the 1st because the top edge provides a reference point to position the new Tile.

Again, extreme caution must be employed as the two Tiles physically come together. Installers should be trained to imagine they are holding a very thin sheet of glass. Its this level of care and fragility that should always be considered when a new Tile is mounted.

To mount the second row Tile, check the PCB printing to ensure the Tile is the correct way up. Now, hold the new LED tile with a slight forward lean at the top.

Diagram

Now, gently rest the new Tile's bottom edge on top of the LEDs of the ready-mounted 1st row.

The left / right position should align with the same tile position in the row beneath.

Diagram

As before, using a gentle "folding" motion, slowly tilt and press the Tile until it is upright. The magnets and connectors should engage as the Tile begins to fully seat in place.

If performing this operation with the Panel powered and data fed, the LED Tile should illuminate at this point.

Continue the gentle placement and folding in of the LED tiles throughout the entire surface area of the screen.

With each LED Tile added, ensure that the placement on the Panel beneath is square and aligned with neighbours.

Check for any raised areas of the screen surface. These may indicate an incorrectly seated alignment pin or other mis-located component.

Programming / Pixel Mapping the screen

The programming of the panels within a Optoma LED screen is a detailed subject, covered extensively in the sister document to this manual "Optoma LED - Nova MARS LED Control Software - User Manual v1.1"

Please refer to this document for further information on this topic.

LED Tiles – Finalising
Once all the LED tiles have been mounted onto a screen, checks should be made that the fit and flatness of the Tiles has been uniformly applied across the entire screen surface.

Looking at acute angles, check the screen for video playback.

Check that no dark patches have appeared in the screen surface – often caused by lifted Masks where two tiles meet.

Reseating Masks
If any areas of the screen are showing symptoms of lifted Masks, it may be necessary to reseat the Masks onto the LED tile.

To reseat a Mask, two tools are needed

- A fresh Mask from the spares kit
- A Mask roller

The fresh Mask must be used to apply pressure on the lifted Mask. This is done by carefully aligning the LEDs on the screen surface with the small holes in the Mask.

Once aligned, light pressure can be applied on the fresh Mask with eh Mask Roller.

This presses both the fresh Mask and the original Mask down between the LEDs.

Once the original Mask has been fully re-seated between the LEDs, the fresh mask can be removed leaving the original in place.

Calibrating LED Tiles
The LED Tiles of Optoma LED use a technology called "Memory on Module" to store the calibration data inside every Tile.

When a screen has been built up of new LED Tiles, this data must be loaded from Tile to Scancard for the screen to calibrate correctly.

Please refer to the extensive documentation on this subject in the sister document to this manual "Optoma LED - Nova MARS LED Control Software - User Manual v1.1" available for download from the Optoma support website

Bright and Dark Lining
The final stage in a new screen setup is to perform an electronic adjustment called Bright and Dark Lining.

This process optically compensates for sub-millimetre differences in the gap between neighbouring tiles. The issue normally becomes visible as:

- Where two Tiles are too close, the issue is seen as a bright line.
- Where two Tiles are too far apart, the issue is seen as a dark line.

Bright and dark lining adjusts for these variations via subtle changes in the perimeter brightness of the edge LEDs of a tile.

This process is detailed in the sister document "Optoma LED - Nova MARS LED Control Software - User Manual v1.1"

Final Checks

By this time, your Optoma LED screen should have been

1. Mounted (Panel)
2. Cabled (Power)
3. Cabled (data)
4. LED Tile mounted
5. Programmed (Pixel Mapped)
6. LED Tile Calibrated
7. LED Tile Bright and Dark Lined

One this list is complete the screen is ready for hand-over to the customer.

Please remember that functions such as Brightness, Gamma, Colour Temperature and Colour Gamut are available as user preferences.

Day to Day Operation

Screens constructed from Optoma LED employ a "set and forget" process.

Provided that correct procedures have been used when the screen was initially programmed[2], the screen should always reboot and restart with the same saved settings, ready for near immediate operation.

The following instructions reference the Optoma MCTRL 660 LED Processor. While other processors are available, please refer to the diagram below for instructions from this section.

Figure 16 – Optoma MCTRL 660 Front Panel Controls

Powering Up

Optoma LED Installations can be designed with many Panel and their power supplies connected in a daisy chain of power.

As such, depending on your screen design, it may be necessary to power up each group of Panel relatively slowly.

While Optoma does not provide power distribution boards, it is suggested that each group of Panel is connected to its own, appropriately sized breaker.

These breakers should be energised (turned on) one at a time.

Wait approximately 2 seconds before energising the next breaker.

[2] Since the programming of Optoma LED screens is outside the scope of this manual, if you feel your screen needs reprogramming, please contact your system supplier or consult a competent LED technician – trained in the uses of Nova Mars controlled LED screen systems.

Work through all breakers using the 2 second rule until all breakers are powered.

CAUTION – Under no circumstances should the high capacity main breaker of the distribution board be used to power up an entire screen in one throw.

Always follow the time-delayed, staggered process for each circuit as described above.

Powering Down

No special procedures are required for powering down Optoma LED screens.

Please follow the procedures given by your ac power distribution supplier.

Brightness Control

LED screen brightness is the most common adjustment required when operating a screen. As a high brightness display device, it's important that the screen brightness is adjusted to a suitable level where the audience is not dazzled by the screen. Similarly, if video cameras, mobile phone cameras etc are to be used to view the screen, it is critical that the brightness is set correctly, avoiding over-exposed or too dull images of the screen surface.

Control via Navigator-NV Processor

LED Screen brightness can be adjusted from 0 to 100% using the TCAB controls. To adjust the LED screen brightness, from the home screen of the LCD menu, click the Twist / Click knob two times.

Figure 17 - Brightness Control

The LED screen brightness can now be adjusted using the Twist action of the knob.

LED screen brightness adjustment takes place in real time as the knob is turned.

Once the correct brightness is selected, hit the Back button twice to return to the home screen. Alternatively, if no further button pushes / turns are detected on the TCAB controls, the Navigator-NV will time-out to the home screen after approximately 20 seconds.

Control via Nova Mars Software

Please check prerequisites[3]

[3] This operation assumes a PC running Nova Mars is connected and controlling the Navigator-NV processor. The Mars user may be logged on as either a Basic or Advanced user. For further information on these please consult the Nova Mars manual available from Optoma.

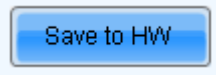
In the main interface of Nova Mars, click the Brightness icon 

.

The brightness can now be adjusted from 0 to 255 (also displayed as a percentage scale just to the right)

Figure 18 - Brightness Slider in Nova Mars

Brightness changes will be instant once the mouse click is released from the slider.

If the user wishes to make the brightness change permanent, finish the process by clicking the SAVE TO HW button at the bottom of the window 

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Contrast Control

Contrast is used to adjust the differences between parts of the video image showing black and parts of the image showing white.

In 95% of situations, the default value of 50% is used.

If, however the user needs to adjust the contrast control, this can be accessed from the front panel of the Navigator-NV processor.

To adjust the contrast, click the TCAB button once to enter the menu on the LCD screen.

Scroll down with the TCAB button to the ADVANCED SETTINGS menu.

Click to enter IMAGE QUALITY. Now scroll down to the CONTRAST menu item.

Single click the TCAB Knob once more. The value of the CONTRAST setting can now be adjusted.

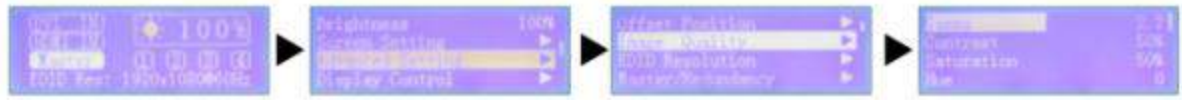

Figure 19 - Contrast Control

Please note. It is not possible to adjust contrast from the Nova Mars software.

Saturation Control

Saturation control is used to adjust how colourful the video image appears. Turned fully down, a saturation of zero will produce a black and white image.

Increasing from zero, will add more and more colour to the video image.

A default value of 50% is recommended.

If, however the user needs to adjust the saturation control, this can be accessed from the front panel of the Navigator-NV processor.

To adjust the saturation, click the TCAB button once to enter the menu on the LCD screen.

Scroll down with the TCAB button to the ADVANCED SETTINGS menu.

Click to enter IMAGE QUALITY. Now scroll down to the SATURATION menu item.

Single click the Twist / Click Knob once more. The value of the SATURATION setting can now be adjusted.

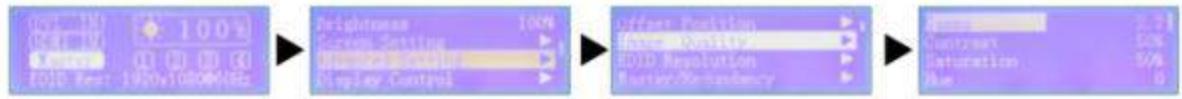

Figure 20 - Saturation Control

Once the correct saturation is selected, hit the Back Button three times to return to the home screen. Alternatively, if no further button pushes / turns are detected on the TCAB controls, the Navigator-NV will time-out to the home screen after approximately 20 seconds.

Gamma Control

Gamma control is used to adjust how the many shades of grey with a video image are visible to the human eye. Traditionally setup to allow a 11-step grey scale pattern to display correctly on the screen, a default value of 2.2 – 2.8 is recommended.

Figure 21 - a Greyscale Test Pattern with correct Gamma. Note all 11 steps of grey can be discerned.

Control via Navigator-NV Processor

If a user needs to adjust the gamma control, this can be accessed from the front panel of the Navigator-NV processor.

To adjust the gamma, click the TCAB button once to enter the menu on the LCD screen.

Scroll down with the TCAB button to the ADVANCED SETTINGS menu.

Click to enter IMAGE QUALITY. The GAMMA menu is first in this list and will now be selected.

Single click the Twist / Click Knob once more. The value of the GAMMA setting can now be adjusted.

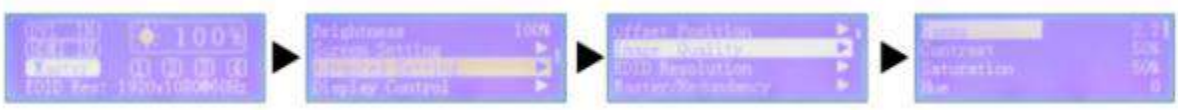

Figure 22 Gamma Control

Control via Nova Mars Software

Please check prerequisites[4]

[4] This operation assumes a PC running Nova Mars is connected and controlling the Navigator-NV processor. The Mars user may be logged on as either a Basic or Advanced user. For further information on these please consult the Nova Mars manual available from Optoma support – www.Optoma.com

To alter the gamma, in the main interface of Nova Mars, click the Brightness icon 

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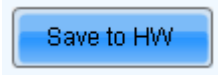
Figure 23 - Gamma Control in Nova Mars

The Gamma can now be adjusted from 1 to 4.

Adjustments to the screen happen a short time after the mouse click is released.

Values of 2.2 to 2.8 are recommended.

If the user wishes to make the gamma change permanent, finish the process by clicking the SAVE TO HW button at the bottom of the window 

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Monitoring

Please check prerequisites[5]

The Nova Mars control software features a system to monitor various parameters of the Optoma LED screen. With this feature, users can check:

- Panel Temperatures
- Panel PSU voltages
- Panel signal health

To use this feature, click the MONITORING icon in Nova Mars.

The following window will open:

[5] As Above

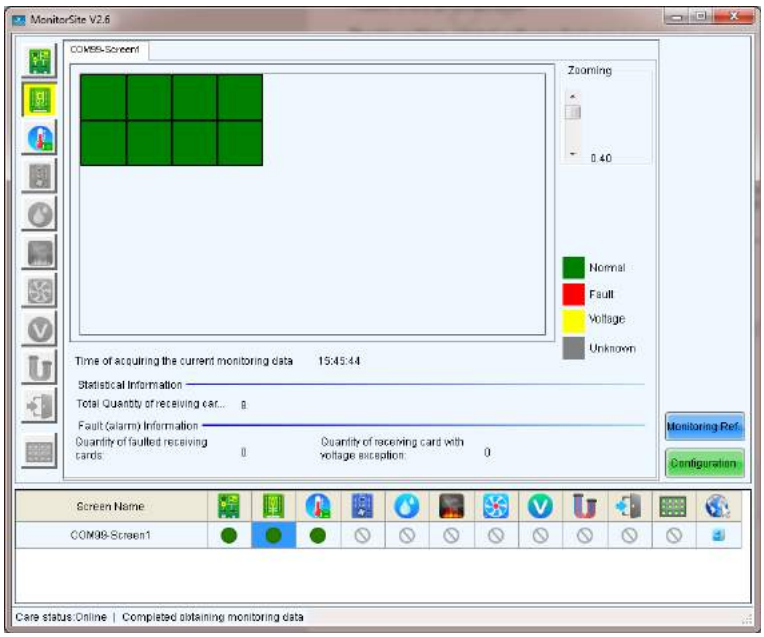

Figure 24 - Monitoring Window in Nova Mars

To check the temperature of the Panel, click the  icon.

To check the voltage and heath of the cards inside the Panel click the  icon.

To check the operating condition of the Optoma MCTRL660 processor, click the  icon.

For further information on the interpretation of these monitoring screens please refer to the sister document "Nova MARS LED Control Software - User Manual v1.1" available from www.Optoma.com

Maintenance & Cleaning

Preventative
Optoma LED is a modern optoelectronic device with passively cooled power supplies.

As such there are no moving parts to Optoma LED (fans etc).

Without fans, there are also no filters to maintain.

Preventative maintenance tasks for Optoma LED are therefore minimal.

If the LED Tiles require cleaning, this can be done on the front surface with careful use of a soft, dry brush and a vacuum cleaner to remove any excess dirt / dust.

If ferrous / magnetically attracted dust has contaminated the equipment in any way, the device should be switched off and professional advice sought from your suppler as to the best cleaning process to employ.

Never use water, solvents or wet cleaning materials to clean an LED Tile.

Reactive / Unscheduled Maintenance
The primary tool for checking whether a Optoma LED screen requires maintenance is to examine the quality of the video image displayed.

Any issues with the LED Tiles or Panel will quickly become apparent when sections / areas of the video image start to display incorrectly.

If such faults are observed, please undertake a maintenance / repair of the appropriate component.

Fault Finding and Diagnosis

THD
The main way to examine a faulty Optoma LED is by watching its video display behaviour. A malfunctioning Optoma LED will be easy to spot in a screen and faults such as pixel failures can be easily identified.

Typical faults that may be observed include:

- One or more colours missing from an LED Pixel
- Dim operation of an LED Pixel
- Complete failure of an LED Pixel
- Quadrant faults, often seen as a colour or brightness error on a tile-width grid of pixels
- Scan errors, often seen as a 1:1 of every second line of video missing from the image. Also applies to missing line patterns 2:2, 4:4, 8:8 etc

Unless otherwise instructed, any such faults should be remedied by swapping out the bad LED Tile for a new Tile from the spares kit.

The faulty Tile should then be returned to your supplier for repair or remedial works.

Marking Faults
When a fault occurs, it is extremely useful to the Optoma repair team if the fault can be marked on the LED Tile.

This should be done using a transparent Scotch Tape / Sellotape type adhesive tape.

Stick a small length of tape over the fault and then, using a Sharpie or similar, writing on the surface of the Scotch Tape, colour in the location on the fault.

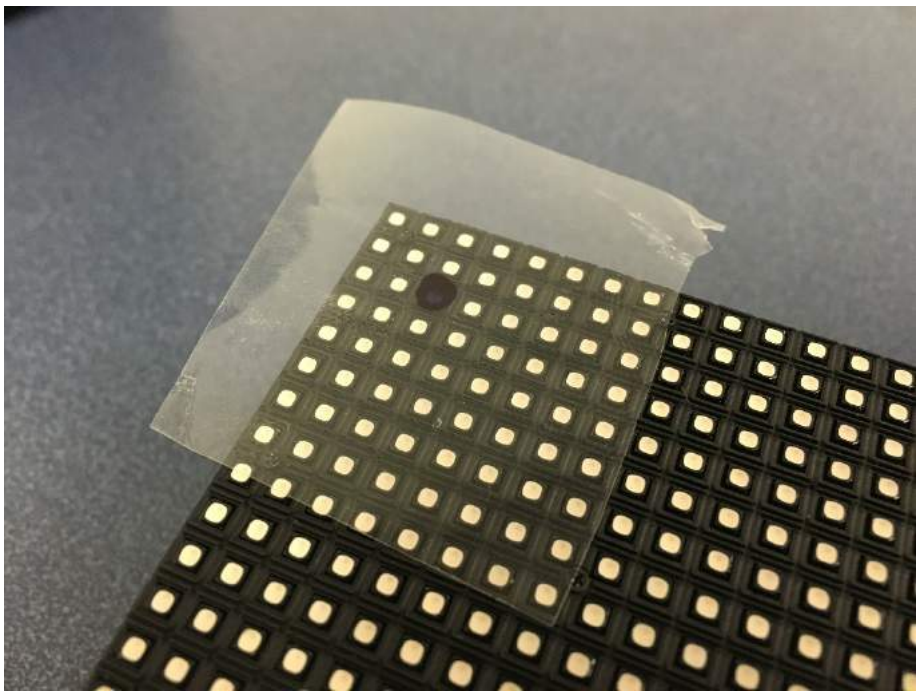

Figure 25 - Scotch Tape and Sharpie marking of faults.

If any further relevant data need to be written down, this can be done using white Gaffa tape on the rear of the LED THD once removed.

Please Note: Do not use Gaffa tape on the surface of the LEDs. After storage, the adhesive of Gaffa Tape can degrade and leave permanent marks or residue on the screen surface.

Optoma LED Tile Swap-Out Procedure

The following tools are required for this process:

- L.E.D.E.

Removal

To remove an LED tile from a Optoma LED panel, first place the L.E.D.E. over the affected tile.

Pull the trigger on the LEDE to activate the vacuum.

Keeping the trigger active, pull the LEDE (and the attached LED tile) out of the screen surface.

Do not release the trigger of the LEDE yet!

Position the LEDE and LED tile so that the LED tile will be placed into the flat of your hand as the vacuum releases.

Release the trigger on the LEDE. This will release the vacuum. The LED Tile should now fall into your hand.

Replacement

TEST Button & Indicator LEDs

Internal test patterns can be generated on the Receiving Card of a Optoma LED by connecting together two pins on the Hub Card.

To use the TEST feature, first ensure DATA is **disconnected.**

The first press of the TEST button will change the THDs from displaying pure Black to pure Red.

Each press of the TEST button will trigger the subsequent pattern on the LED THDs.

Available internal patterns are:

1	All RED LEDs full lit.
2	All GREEN LEDs full lit.
3	All BLUE LEDs full lit.
4	Diagonal scrolling white lines
5	Vertical left to right grey scales.
6	Horizontal Greyscale
	Vertical Greyscale

Test patterns can be cancelled by either de-powering the PDP or by connecting data to the PDP via the RJ45 port. One the controller card detects valid Cat5 data, the pattern will cancel.

Glossary

Cabinet	A complete assembly of Optoma LED Panel and LED tiles
Panel	The metal shell of Optoma LED
LED Tile	The Opto-electronic PCB mounted on the front of the Optoma LED that displays the video image.
PCB	Printed Circuit Board
Fly / Flown	A method of building rental screens where the screen is suspended and forces in the panels are tension forces.
Receiving Card	The small PCB inside every Optoma LED that functions as the "brains" of the panel.
LH	Left Hand
L.E.D. (sometimes LED)	Light Emitting Diode. The semiconductor device on the surface of the screen that produces Red, Green or Blue light.
Mask	The black plastic grid that clips around the LEDs on the surface of the LED Tile. Used to increase the perceived "blackness" of LED Tile surface when LEDs are not illuminated.
S.M.D.	Surface Mount Device – The LED package containing both Red, Green and Blue LEDs. Found on the front face of the THD soldered to the PCB in an array that creates the optical surface of the display.
Module	Caution - One of the most ambiguous words used internationally within the LED Screen Industry. See Panel (Optoma Terminology). Caution - Chinese documents often call an LED THD a 'module'. This is never the case in Optoma documentation though.
Panel	One complete assembly of Frame, LED THDs and PDP creating the building block of the LED screen. Default size = 500x500mm
Pixel	Abbreviation of 'Picture Element'. The single point of light from combined Red, Green and Blue LEDs which, when displayed in a regular grid creates the video image.
Frame	See Panel
PSU	Power Supply Unit - A device to convert high voltage AC power to low voltage DC power for use inside electronic equipment.
RCD	Residual Current Device - A trip or breaker that disconnects an electrical circuit when an earth fault condition is detected.
RH	Right Hand
RJ45	The correct technical name for the plug and socket system used with Cat5e cable. RJ45 plugs are normally found on the end of Cat5 cables. RJ45 sockets are normally found on devices such as the PDP.
R.M.A.	Returned Materials Authorisation
Scalar	A general-purpose video processor that can take in multiple standards of video signal and change their size and position to fit on an LED screen.

Scan board	See Receiving Card
Scancard	See Receiving Card
Hub Card	The printed circuit board that carries the power and data to the LED Tiles.
Sender	The LED processing device that converts and distributes HDMI or DVI video signals to the LED screen
SSD	Solid State Drive. A Computer memory drive that has no moving parts.
Shaders	See Mask
THD	The 256mmx256mm sub assembly of the panel that supports the grid of LED pixels on the face of the screen.
WEEE	Waste Electrical and Electronic Equipment Directive. A new European legal requirement covering the end of life treatment for all electronic goods.
Calibration	Technology to apply levelling to each and every LED in a screen so that the brightness and colour reproduction becomes uniform across the whole screen.
Calibration Bitmap (CB)	The grid of data that applies calibration to all the Pixels within a Panel or Screen
Calibration Coefficients	The data contained within the Calibration Bitmap used to adjust a single Pixel's brightness and colour.
Newtons	A Scientific Standard Unit of Force
'Pozi'	Abbreviation of Pozidrive Screw. An improved version of the Phillips screw drive. Pozidrive was jointly patented by the Phillips Screw Company and American Screw Company. The name is thought to be a portmanteau of the words "positive" and "drive."
Allen Key	A type of hexagonal shaped screwdriver / tool.
X Axis / X Plane	When viewing the front of a screen, X Axis refers to a movement or line from left to right (or right to left)
Y Axis / Y Plane	When viewing the front of a screen, Y Axis refers to a movement or line from top to bottom (or bottom to top)
Z Axis / Z Plane	When viewing the front of a screen, Z Axis refers to the axis where THDs / Panels become more recessed or proud than the neighbouring screen surface i.e. perpendicular to the screen surface.