

EvenLED™

RGB LED Panel

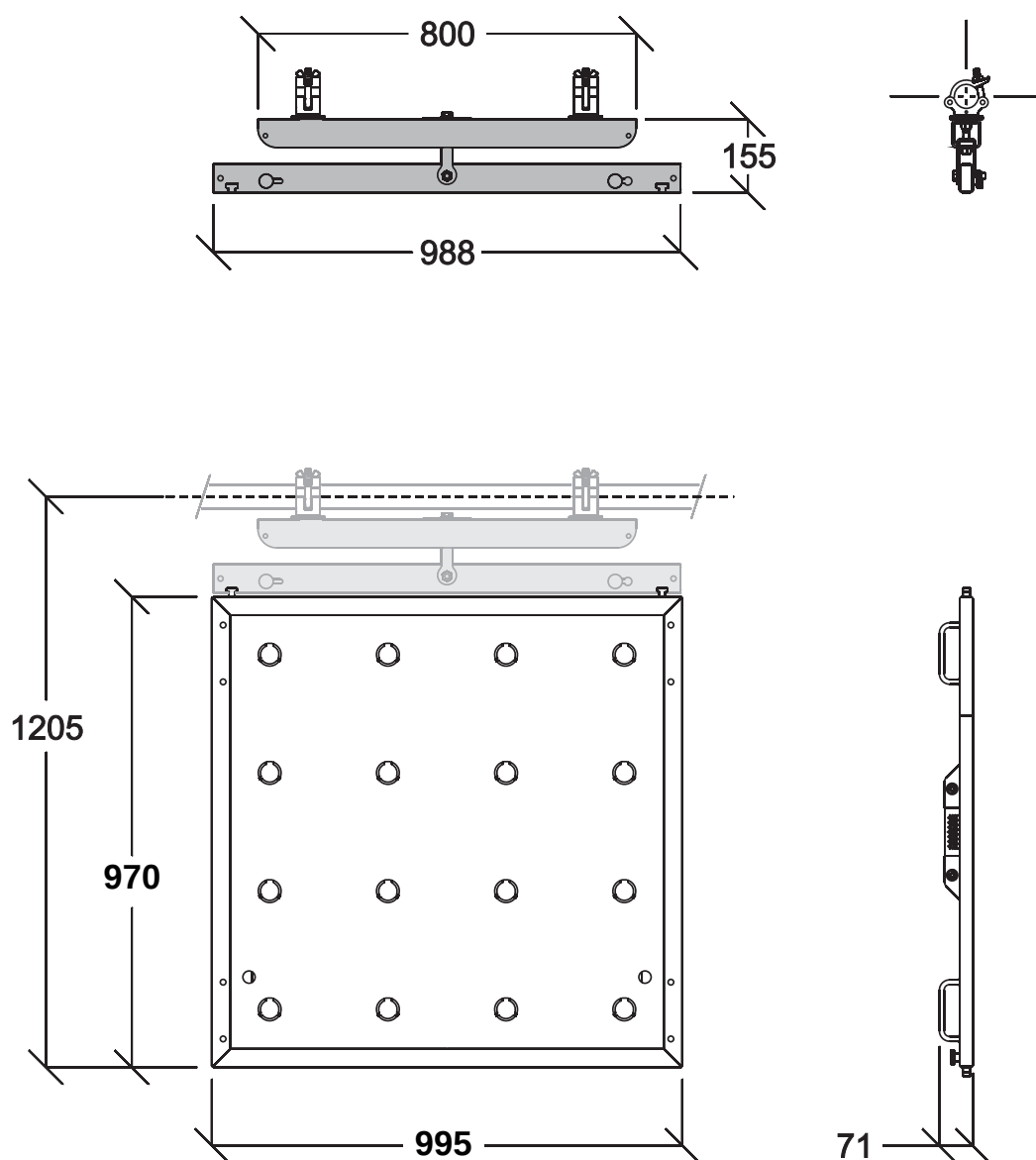
User Manual



Martin®

Dimensions

All dimensions are in millimeters



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P/N 35000222, Rev. C

Safety Information



WARNING!

Read the safety precautions in this section before installing, powering, operating or servicing this product.

The following symbols are used to identify important safety information on the product and in this manual:



DANGER!
Safety hazard.
Risk of severe injury or death.



Warning!
Hazardous voltage. Risk of lethal or severe electric shock.



Warning!
LED light emission. Risk of eye injury.



Warning!
Fire hazard.



Warning!
Refer to user manual.



Warning! Class 3B LED product. Do not look at exposed LEDs from a distance of less than 40 cm (16 inches) from the front surface of the product. Do not view the light output with optical instruments or any device that may concentrate the beam.

If the LED output is diffused (by a back projection screen, for example) to the extent that it is impossible to identify individual LEDs, the output is harmless to the naked eye.



This product is for professional use only. It is not for household use.

This product presents risks of severe injury or death due to fire hazards, electric shock and falls.



Read this manual before installing, powering or servicing the EvenLED, follow the safety precautions listed below and observe all warnings in this manual and printed on the EvenLED. Install and operate the EvenLED only as described in this manual and in accordance with local laws and regulations. Refer any operation not described in this manual to a qualified technician.

If you have questions about how to operate the EvenLED safely, please contact your Martin dealer or call the Martin 24-hour service hotline on +45 8740 0000, or in the USA on 1-888-tech-180.



PROTECTION FROM ELECTRIC SHOCK

- Connect the product to AC mains power within the range 100 - 240 V nominal at 50 or 60 Hz only.
- Disconnect the entire installation from power and ensure that power cannot be reconnected accidentally, before carrying out any installation or maintenance work.
- Disconnect the product from power before removing or installing any cover or part and when not in use.
- Ensure that the EvenLED is electrically connected to ground (earth).
- Use only a source of AC power that complies with local building and electrical codes and has both overload and ground-fault (earth-fault) protection.
- Connect EvenLED panels to AC power and to each other using the 20 amp rated, UL-listed, 12 AWG cables supplied by Martin as accessories for this product. Replacement power cables from other sources can be used as an alternative, but they must be 3-conductor, approved for a current of 20 A and temperature of 90° C (194° F) minimum. Replacement cables must also be minimum 12 AWG and UL-listed in North America or have conductor size minimum 4 mm² in other regions. Cable jacket type must be SJT or better.

- Before using the EvenLED, check that all power distribution equipment and cables are in perfect condition and are rated for the current requirements of all connected devices.
- Isolate the EvenLED from power immediately if any cable, cover or other component is damaged, cracked, wet or deformed. Do not reapply power until all damaged items have been repaired by a qualified professional.
- Do not expose the panel to rain or moisture.
- Refer any service operation not described in this manual to an authorized Martin Service partner.



PROTECTION FROM BURNS AND FIRE



- The exterior of the EvenLED becomes hot, up to 80° C (176° F) during normal operation. Avoid contact by persons and materials. Allow the EvenLED to cool for at least 20 minutes before handling.
- Install the EvenLED in a well-ventilated area only.
- Install the EvenLED in a vertical orientation the correct way up (i.e. with the arrow on the back of the panel pointing up and the mounting T-hooks at the top of the frame as shown on the cover of this user manual) only. Do not install horizontally or at any angle from the vertical.
- Provide a minimum clearance of 5 cm (2 inches) from adjacent surfaces and ensure unrestricted airflow around the air vents in the rear panel.
- Do not illuminate surfaces less than 5 cm (2 inches) from the front surface of the EvenLED.
- Keep all combustible materials (e.g. fabric, wood, paper) at least 5 cm (2 inches) away from the EvenLED.
- Keep flammable materials well away from the EvenLED.
- Do not operate the EvenLED if the ambient temperature (Ta) exceeds 40° C (104° F).
- Do not modify the EvenLED in any way not described in this manual or install other than genuine Martin parts. Do not stick filters, masks or other materials directly onto LEDs. Use only Martin-approved accessories to mask or modify the light beam.
- Do not attempt to bypass thermal or current overload protection systems or fuses. Replace defective fuses with ones of the specified type and rating only.
- If you relay power from one panel to another using **POWER THROUGH** sockets, do not connect more than 9 panels in total to each other in an interconnected chain if AC mains power is 100 - 120 V, 50/60 Hz. Do not connect more than 16 panels in total to each other in an interconnected chain if AC mains power is 200 - 240 V, 50/60 Hz.
- Connect only EvenLED panels to **POWER THROUGH** sockets. Do not connect any other type of device to these sockets.



PROTECTION FROM INJURY



- Do not look at exposed LEDs from a distance of less than 40 cm (16 inches) from the front surface of the panel without suitable protective eyewear. At less than this distance, the LED emission can cause eye injury or irritation. At distances of 40 cm (16 inches) and above, or if the LED output is diffused so that it is impossible to identify the individual LEDs, the LED emission is harmless to the naked eye.
- Do not look at LEDs with magnifiers or similar optical instruments that may concentrate the light output.
- Ensure that all external covers, components and installation fittings are securely fastened.
- Install the EvenLED panel suspended vertically the correct way up from a truss or other supporting structure as described in this manual only. Do not mount, stand or stack on a surface.
- Do not suspend more than ten EvenLED panels fastened to each other in a vertical chain.
- Block access below the work area and work from a stable platform whenever installing, servicing or moving an EvenLED panel.
- Use two clamps installed as described in this manual to suspend the EvenLED from rigging structures. Do not use only one clamp.
- Ensure that all supporting structures, surfaces, fasteners and lifting equipment can bear ten times the weight of all the devices they are intended to support, and that they conform to local building and safety regulations.
- Install as described in this manual a secondary attachment (e.g. a safety cable) that is approved by an official body such as TÜV as a safety attachment for the weight of all the fixtures it secures. The safety cable must comply with EN 60598-2-17 Section 17.6.6 and be capable of bearing a static suspended load ten times the weight of the fixture.

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Introduction

Thank you for selecting the EvenLED™, an LED-based color-changing panel luminaire from Martin Professional™. This product features:

- Proprietary 6 W LEDs
- RGB (red, green, blue) color mixing
- DMX 512 control
- Auto-sensing power supply unit with 100 - 240 VAC nominal, 50/60 Hz operating range
- Product interlocking in vertical suspended columns
- Even illumination of back projection screens or other diffusers using fine 16-bit or 8-bit control RGB color mixing
- Various options for grouped LED control

For the latest software updates, documentation, product specifications and other information about this and all Martin Professional™ products, please visit the Martin website at <http://www.martin.com>

Comments or suggestions regarding this document may be e-mailed to service@martin.dk or posted to:

Service Department
Martin Professional A/S
Olof Palmes Allé 18
DK-8200 Aarhus N
Denmark

Unpacking

The EvenLED is supplied with this user manual. This manual is also available for download from the Martin website at www.martin.com.

As soon as you remove the product from its packaging, remove the foam inserts from the corners of the product and remove the cardboard strips that are wedged between the mounting frame and panel for protection during shipment. Keep these items if you intend to pack the product again in its original packaging material.

Using for the first time

Before applying power to the panel:

- Carefully review "Safety Information" on page 3.
- Check that your local AC mains power voltage is within the range listed on the panel's serial number label.
- Install the panel as described in this manual.

Physical installation



Warning! Read "Safety Information" on page 3 before installing the EvenLED.

Warning! The safety and suitability of lifting equipment, installation location, anchoring method, mounting hardware and electrical installation is the responsibility of the installer. All applicable safety regulations and legal requirements must be observed when installing and connecting the EvenLED. Installation must be carried out by qualified professionals only.

Contact your Martin supplier for assistance if you have any questions about how to install this product safely.

Location and orientation



Warning! The EvenLED must be securely anchored to a suitable supporting structure such as a truss. Do not mount, stand or stack on a surface. Suspend in a vertical column only. Do not install at any angle from the vertical. Ensure that all rigging equipment and the supporting structure can bear ten times the weight of all installed devices. Do not hang more than ten EvenLED panels in a vertical chain. Install as described in this user manual safety attachments that can hold a static load at least ten times heavier than the total weight they must secure and are approved for this weight by a technical standards organization such as TÜV.



Warning! Maintain a distance of minimum 5 cm (2 inches) from adjacent surfaces. Make sure that there is unrestricted airflow around the air vents in the rear surface of the panel.

Warning! Make sure that it is impossible for LEDs to be viewed from a distance of less than 40 cm (16 inches) unless a diffuser or back projection screen is installed in front of them.

If a diffuser front or back projection screen is installed in front of the LEDs such that it is impossible to distinguish individual LEDs, there is no eye hazard at any distance.

The EvenLED is rated IP20 and is for indoor use only. Do not expose it to water or moisture.

The EvenLED requires free and unobstructed airflow around it to ensure adequate cooling:

- Do not use the panel in a confined or unventilated space
- Allow 5 cm (2 inches) free space around the panel

Install the panel at least 5 cm (2 inches) away from any combustible materials (wood, paper, etc.) and well away from any flammable materials.

Panels reach temperatures up to 80° C (176° F). Restrict public access or locate panels so that they cannot accidentally be touched.

Assembly and mounting

Assembling the panel and frame

To assemble the EvenLED panel and frame:

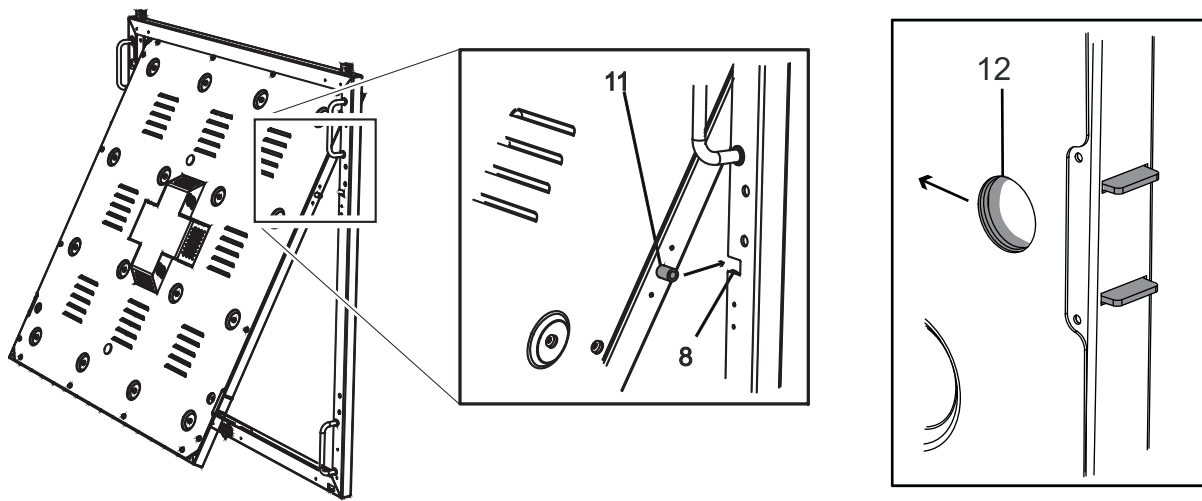


Figure 1: Panel mounts

Panel locks

1. See Figure 1. Slide the panel mounts (11) into the panel mounting slits (8).
2. Retract the panel locks (12) by pushing them towards the centre of the panel.
3. Align the panel with the frame and release the panel locks (12) to lock the panel into the frame.

Mounting the EvenLED

One frame mounting bar and two rigging clamps approved for the total weight to be suspended are required for each suspended vertical column of EvenLED panels.

To mount the EvenLED system:

1. Check that the pipe or truss onto which you are mounting the EvenLED system is horizontal.
2. See Figure 2. Loosen the clamp position locking rings (3) and slide the clamps (1) as wide apart as possible but making sure they will still match up with the supporting truss or other structure.

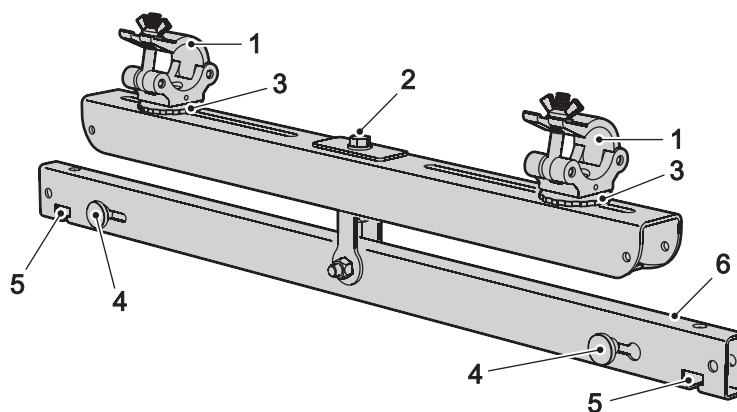


Figure 2: Mounting hardware

3. Lock the clamp position locking rings (3) to secure the clamps in position.
4. Adjust the height of the frame mounting bar so that it can move freely by turning the height adjustment bolt (2) counter-clockwise to lower the frame mounting bar, clockwise to raise it.
5. Loosen the frame mount locking knobs (4) and slide them towards centre of the frame mounting bar (6) to open the locks in the frame mount holes (5).

6. Insert the frame mount T-hooks (7 in Figure 3) into the frame lock holes (5 in Figure 2).
7. Slide the frame mount locking knobs (4 in Figure 2) fully out from the center towards the ends of the hanging bracket and tighten them. Make sure that they are locked as shown in Figure 5 on page 9. The frame is now secure.

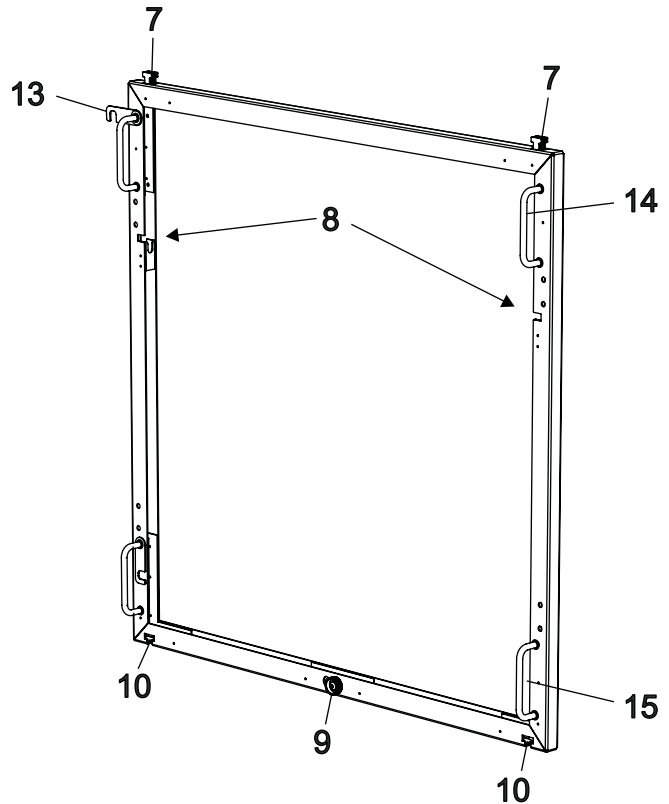


Figure 3: Frame

8. See Figure 4. Attach one end of a safety wire around the truss/pipe and the other end through the top handle (14) of the frame.
9. Connect DMX and power cables.

Adding panels vertically

To add panels underneath the first panel:

1. See Figure 3 on page 9. Loosen the panel-to-panel locking knob (9) and slide it to your right to open the latches in the panel-to-panel mounting holes (10).
2. Insert the frame mount T-hooks (7 in Figure 3) of the second panel into the frame mounting holes (5 in Figure 2) of the first panel.

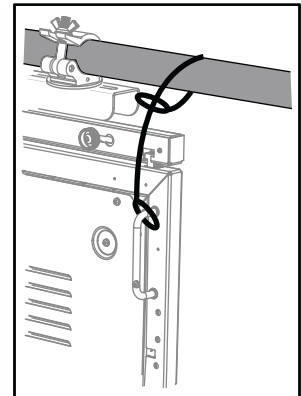


Figure 4: Safety wire attachment

3. See Figure 5. Slide the panel-to-panel locking knob (9 in Figure 3) fully to the left and tighten it. The panel is now secure.

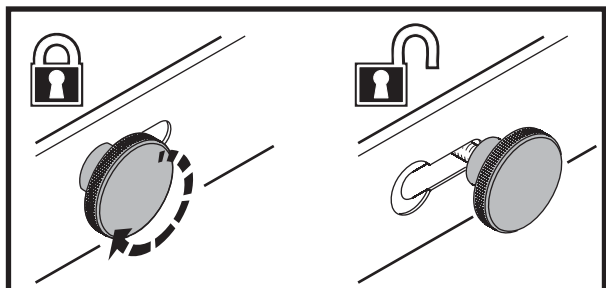


Figure 5: Securing frame lock knobs

- See Figure 6. Attach one end of the safety wire through *both* the top handle (**14** in Figure 3) on the first frame *and* the already mounted safety wire. Attach the other end of the safety wire through the top handle (**14** in Figure 3) of the second frame to secure it below the first frame.

Warning! *Do not suspend more than 10 panels in a vertical chain.*

- If desired, continue suspending panels beneath each other following the instructions given in points 1. to 4. above. Check that all safety wires are attached exactly as shown in Figure 6 and described above.

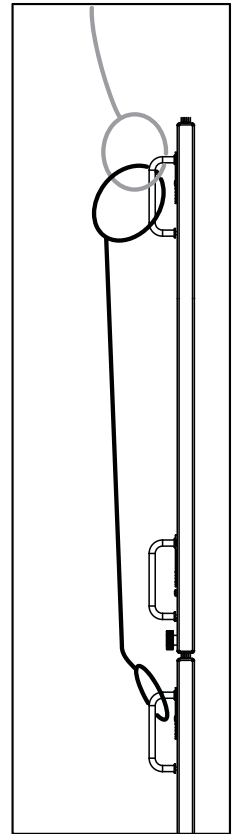


Figure 6: Additional safety wire

Adding panels horizontally

To add a panel beside a panel that is already installed:

- Suspend the additional panel as described under "Adding panels vertically" on page 9.
- See Figure 7. Rotate the side-to-side locking latch (**13**) into place to fasten panels together.

Warning! *The side-to-side locking latch (13 in Figure 7) is not designed to support weight. All panels installed beside existing panels must be suspended as described under "Mounting the EvenLED" on page 8 and "Adding panels vertically" on page 9.*

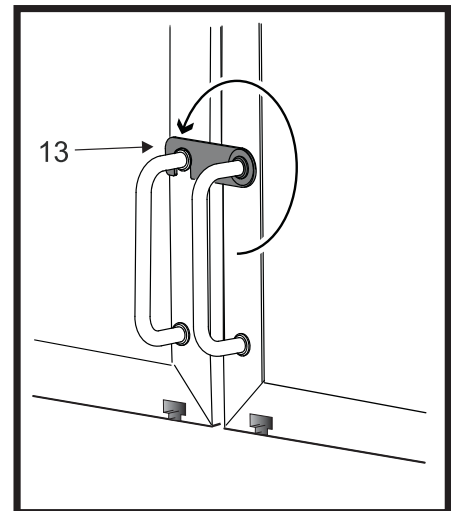


Figure 7: Side-to-side locking

Planning the DMX control system

EvenLED panels can be controlled using any standard DMX-512 control device via a DMX link. This section explains the control options available and how to plan the DMX link accordingly.

Grouped and independent panel control

In the following explanations, we will assume that all the EvenLED panels in an installation are 1 x 1 m and set to 16-bit mode, in which each of the 16 LEDs in a panel is controlled using 6 DMX channels. This means that each panel uses $16 \times 6 = 96$ DMX channels.

EvenLED panels will only respond to commands they receive on DMX channel 1 and the channels immediately above it. For the purposes of this explanation, this means that a panel will respond to commands it receives on DMX channels 1 - 96 only.

We will also assume that commands from the DMX controller to the first EvenLED panel on the DMX link are sent on channels 1 - 96 (other channels can be used if a Martin DMX Thief™ is connected on the control data link).

Grouped control using DMX THROUGH

All EvenLED panels connected using **DMX THROUGH** outputs respond to the same DMX commands and behave identically. The **DMX THROUGH** output relays the DMX signal exactly as it is received by the panel without any processing. This lets you relay identical DMX commands from one panel to the next so that all connected panels can be controlled as a group using DMX channels 1 - 96.

Independent control using DMX OUT

EvenLED panels connected using **DMX OUT** outputs respond to DMX commands on different channels and behave differently.

To explain how this works, let us assume that you have two EvenLED panels on the DMX link. To send separate commands to the second panel so that you can control this panel independently of the first, connect the second panel to the first panel's **DMX OUT** output. The controller can then send commands to the first panel on channels 1 - 96 and to the second panel on channels 97 - 192. Because the second panel – like all EvenLED panels – will only respond to commands it receives on channels starting at channel 1, the DMX signal at the first panel's **DMX OUT** output is processed by 'subtracting' 96 channels and re-addressing the commands sent from the controller on channels 97 - 192 so that they are relayed to the second panel on channels 1 - 96.

To sum up, the **DMX OUT** output relays the DMX signal after subtracting the number of channels used by the panel and address-shifting the remaining DMX channels so that they start at channel 1. This lets you relay different DMX commands from one panel to the next so that panels can be controlled independently.

Maximum number of panels on the DMX link

Identical grouped control

In identical grouped control using **DMX THROUGH** outputs, up to 32 panels can be connected in one chain on the DMX link. The limit of 32 panels is a function of the electrical characteristics of DMX512. If more than 32 panels are to be used in a single DMX512 universe, the chain can be extended using an amplifier-splitter such as the Martin Opto-Splitter.

Independent control

In independent control using **DMX OUT** outputs, the maximum number of panels possible in each chain depends on the number of DMX channels they use out of the 512 available in one DMX universe:

- The EvenLED 1 x 1 m panel uses 96 channels in 16-bit mode. This means that a maximum of five 1 x 1 m panels can be controlled independently in 16-bit mode in one DMX universe. In 8-bit mode, the 1 x 1 m panel uses 48 channels, so ten 1 x 1 m panels can be controlled independently in 8-bit mode in one DMX universe.
- The EvenLED 1 x 0.5 m panel uses 48 DMX channels in 16-bit mode and 24 channels in 8-bit mode. Ten panels can be controlled independently in 16-bit mode and twenty panels in 8-bit mode in one DMX universe.

Each time you reach the limit of 512 DMX channels, you can add more independently-controlled panels to the installation by adding a DMX universe. For example, using a PC with the Martin LightJockey 2™ Windows application and Martin Universal USB/DMX Interface Box package (available from Martin, P/N 90702055) you can control two DMX universes. With an additional Martin Universal USB/DMX Interface Box (P/N 90702045) you can control 4 DMX universes.

Cable and link layout details

EvenLED panels are controlled via the lighting industry standard DMX512 serial data protocol. Installations must follow the standard recommended practices for DMX512. The key points to respect are:

- Use DMX512-compliant cable. Such cables have one or more twisted pairs with nominal characteristic impedance 120 ohms and low capacitance. Single-pair DMX512 cable is suitable for EvenLED panels because they do not use pins 4 and 5 of the DMX connection. The minimum recommended wire size is 0.25 mm² (24 AWG) for runs up to 300 meters (1000 ft.) and 0.32 mm² (22 AWG) for runs up 500 meters (1640 ft.).
- Do not use microphone cable. It does not have the correct characteristics and may cause erratic behavior of the system.
- Shielded (STP) or unshielded (UTP) CAT 5 network cable can be used in fixed installations. For further information see: http://www.esta.org/tsp/working_groups/CP/DMXoverCat5.htm
- Panels must be 'daisy-chained' (i.e. the control data cable must be connected in one single chain of panels). It is possible to split a link into two branches by using the **DMX THROUGH** and **DMX OUT** outputs from one panel at the same time, but note that these outputs relay the DMX signal differently (see "Grouped and independent panel control" on page 11 and see examples in Figure 8).
- Do not connect more than 32 devices in one chain on a DMX512 link without using a splitter-amplifier.
- Do not split a DMX link with a passive "Y" connector. Branching the link with a "Y" will create multiple data reflections that can block or degrade signal transmission.
- Use a dedicated DMX512 splitter-amplifier such as the Martin RS-485 Opto-Splitter™ (P/N 90758060) to extend the chain beyond 32 devices or split it into two or more branches.
- Terminate each chain on the link with a 120 ohm resistor (available from Martin, P/N 04150308) across the data hot (+) and cold (-) conductors (pins 2 and 3 on a 5-pin XLR connector) at the output of the last panel on the chain.
- Avoid long parallel runs of AC power and control data cables, as these may cause interference on the data link.

Mixing EvenLED panels and other types of fixture on a DMX link

Mixing EvenLED panels and other types of lighting fixture on one DMX link is possible but if you add the lighting fixture in the middle of the link, address-setting is complex and is therefore not covered in detail in this manual.

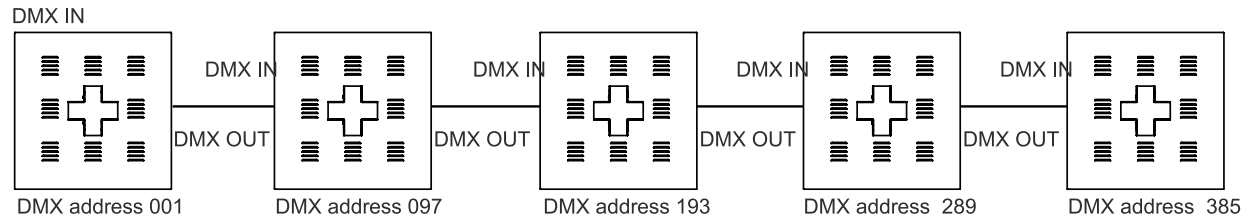
If you need to add a different type of lighting fixture to a link with EvenLED panels, it is easiest to add it at the end of the link using the last EvenLED panel's **DMX OUT** connector. The fixture must be set to DMX address 001, and the controller must send commands to the fixture at the next available address after the DMX channels used by the last panel on the link.

System layouts

Figure 8 gives examples of how systems can be laid out depending on the type of control required. Note the different results of connecting to DMX THROUGH or to DMX OUT. Panels are set to 16-bit mode in all the examples.

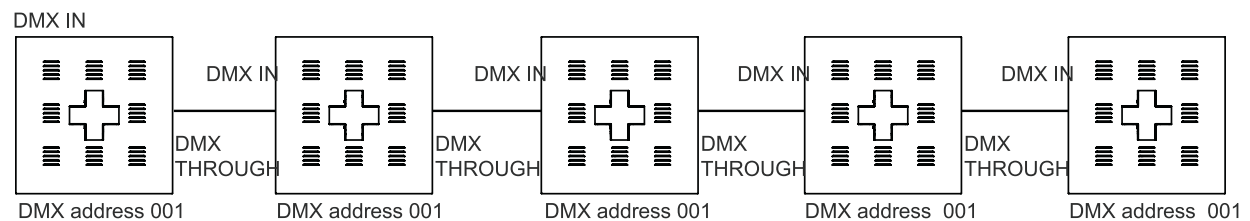
A. Individual control

Panels respond to different commands sent to different DMX addresses and can be controlled independently. Max. 512 DMX channels per chain using **DMX OUT**.



B. Grouped control, one group

Panels have same DMX address and behave identically. Max. 32 panels per chain using **DMX THROUGH** before a splitter-amplifier is required.



C. Grouped control, three groups (6 panels controlled in 3 pairs)

Pairs of panels with same DMX address behave identically. Each pair has a different DMX address and can be controlled independently as a pair. Max. 512 DMX channels per chain using **DMX OUT**.

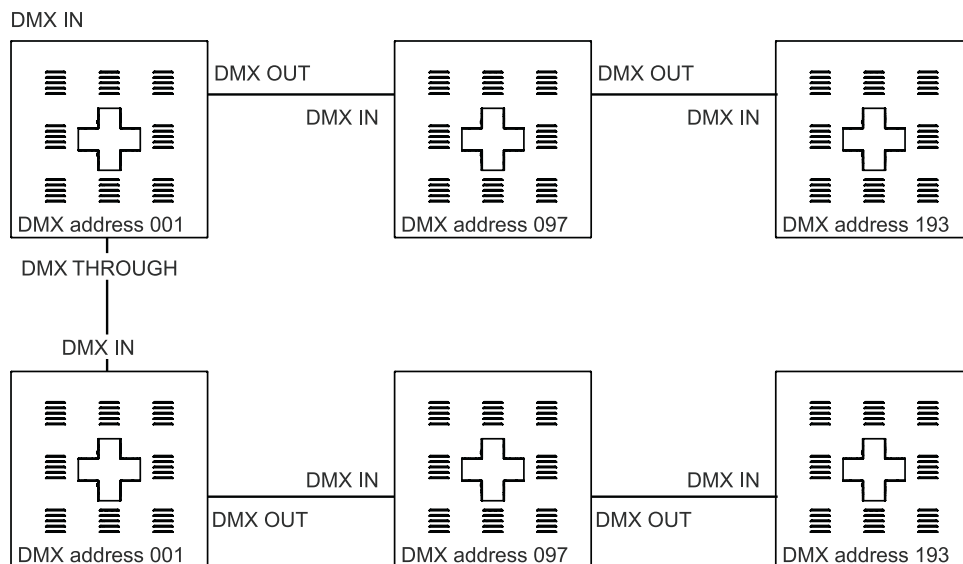


Figure 8: System layouts



Warning! The above diagram and the text in the section that precedes it cover the DMX data link and describe the limitations imposed by the DMX system only. Do not confuse them with power connections, which are subject to maximum current limitations. Refer to “AC power” on page 15 for details of establishing power circuits.

Connecting the system

Connectors – overview

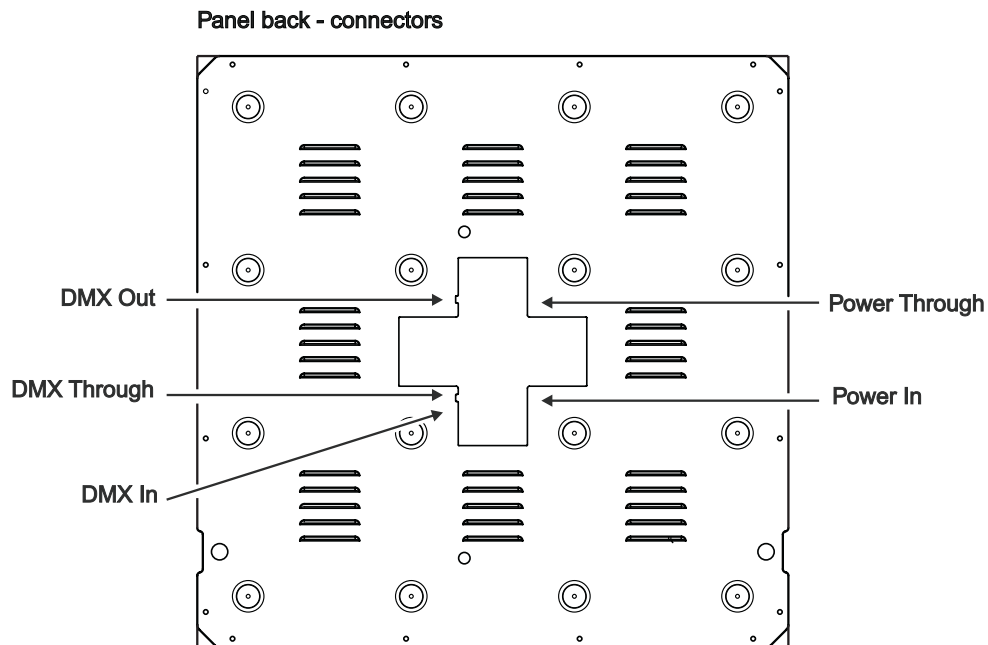


Figure 9: Connections

See Figure 9. The EvenLED panel must be connected to power and to a DMX control data link using the following connectors:

DMX connectors (5-pin XLR)

- **DMX IN** accepts a DMX 512 control signal. It reads DMX commands sent to the first incoming DMX address and assigns that as the starting address for the EvenLED panel.
- **DMX OUT** can be used to continue the DMX link to another EvenLED panel. Use this output for independent control of different panels.
- **DMX THROUGH** can also be used to continue the DMX link to another EvenLED panel, but use this output for grouped DMX control of panels, in which panels share the same DMX address, respond to the same DMX commands and behave identically.

Power connectors

- The blue Neutrik PowerCon **POWER IN** socket is used to apply power to the EvenLED panel via a suitable cable with a blue PowerCon power input connector. It accepts mains power at 100 - 240 VAC nominal, 50/60 Hz.
- The grey Neutrik PowerCon **POWER THROUGH** socket can be used to relay power to the **POWER IN** connector of another EvenLED panel via a suitable cable with a grey PowerCon output connector. It supplies power at the same voltage and frequency as that applied to the **POWER IN** connector.



Warning! Important safety precautions apply when using the POWER THROUGH socket (see “AC power” on page 15).

AC power



Warning! Electrical installation must be carried out by qualified professionals only.



Warning! Read “Safety Information” on page 3 before attempting to install this product. Isolate the entire installation from power and ensure that power cannot be reconnected accidentally before working on cables and connections.



Warning! Connect EvenLED panels to AC power and to each other using the 20 A rated, UL-listed, 12 AWG cables supplied by Martin as accessories for this product. Replacement power cables from other sources can be used as an alternative, but they must be 3-conductor SJT or better jacket-type, approved for a current of 20 A and temperature of 90° C (194° F) minimum. Replacement cables must also be minimum 12 AWG and UL-listed in North America or have conductor size minimum 4 mm² in other regions.

Warning! See Figure 10 below. When linking POWER THROUGH to POWER IN connectors so that EvenLED panels draw power in a daisy-chain from a single source:

- Do not connect more than 9 panels in total to each other when supplying them with AC mains power at 100 - 120 V.
- Do not connect more than 16 panels in total to each other when supplying them with AC mains power at 200 - 240 V.

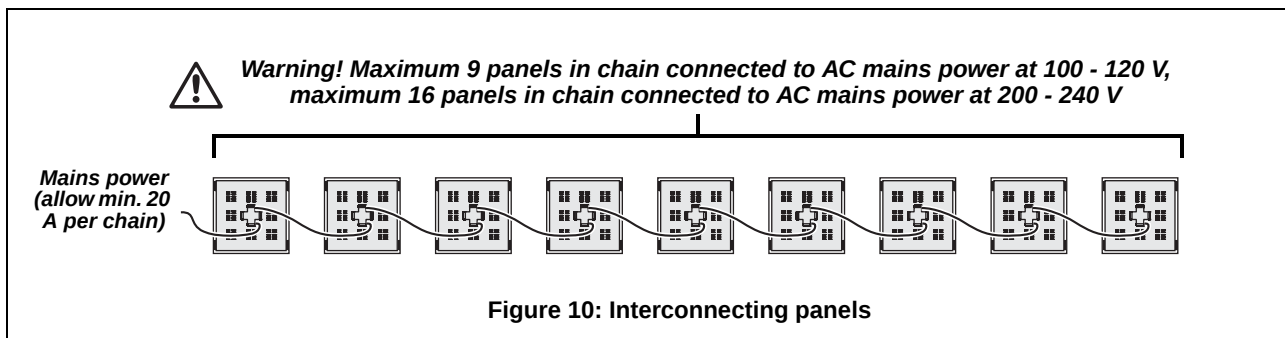
If you do not respect these limits you will overload cables and components and create a serious safety hazard. Each time you reach the maximum permitted number of interconnected panels in one daisy-chain and want to supply more panels with power, you must create a new daisy-chain that draws power from a separate power outlet.

Warning! For protection from dangerous electric shock, the panel must be grounded (earthed). The AC mains power distribution system must be fitted with current overload and ground-fault (earth-fault) circuit breakers. It must also provide a means to isolate panels from power and prevent accidental reconnection during service, and each power distribution circuit must be dimensioned to safely handle a current of 20 A for each chain of EvenLED panels connected to it.

Important! Do not connect the EvenLED to an electrical dimmer system – even if the system is only used to supply 0% and 100% power – as doing so can damage the EvenLED.

The EvenLED accepts AC power at 100 - 240 VAC nominal, 50/60 Hz. Do not connect to power at any other voltage or frequency.

There is no power on/off switch. Power is applied to the EvenLED as soon as it is connected to power.



See Figure 10 for a diagram of power cable layout. If you require help in planning or dimensioning the power distribution system, please contact your Martin supplier for assistance.

Each EvenLED panel “leaks” a maximum total current of 1 mA to ground (earth). Panels must be correctly connected to ground so that this “leakage” current can be absorbed. You must also allow for the “leakage” current when supplying panels with power from a circuit that has an RCD (residual current device) for ground fault protection, as is normally required for safety reasons. If you supply too many panels with power via one RCD, the panels’ combined earth leakage may cause the RCD to trip. RCDs are normally rated at their maximum trip current +0% - 50%, so an RCD rated 30 mA can therefore trip when leakage to ground is as low as 15 mA. If you have created a chain of 16 interconnected panels at 200 - 240 V and the 30 mA RCD trips, you may have a particularly sensitive RCD, and simply replacing it with another RCD with the same rating may solve the problem. If replacing the RCD does not help, or if the installation contains more than 16 panels, distribute power on additional circuits, each protected by its own RCD, or use 3 phases on circuits protected by 3-phase RCDs.

Connecting to power

3 m (9.8 ft.) power input cables for the EvenLED can be ordered separately from your Martin supplier. Cables have a Neutrik PowerCon power input connector installed on one end and are ready for either hard-wiring or installation of a power plug on the other end. Loose PowerCon connectors and daisy-chain power cables with PowerCon connectors for relaying power from one panel to another can also be ordered from Martin (see "Accessories" on page 27).

All Martin cables for the EvenLED are EU color-coded (see Table 1).

Wire color (EU color code)	Wire color (US color code)	Conductor	Symbol	Screw (US)
brown	black	live	L	yellow or brass
blue	white	neutral	N	silver
yellow/green	green	ground (earth)		green

Table 1: Conductor identification

If you choose not to use the EvenLED power cables available from Martin, you must use power cable that is rated 20 A minimum and suitable for the installation environment, SJT or better jacket type, and rated to 90° C (194° F) minimum. In North America power cable must be UL-listed, minimum AWG 12. In other regions it must be minimum 4 mm² conductor cross-section.

To connect to a single-phase 3-wire (live, neutral, ground/earth) power system:

1. Isolate all power distribution circuits from power and ensure that power cannot be reapplied accidentally.
2. Insert the PowerCon connector on a suitable power input cable into the EvenLED's **POWER IN** socket.
3. Connect the conductors in the power cable to the power distribution circuit as follows:
 - Connect the yellow/green wire to ground (earth)
 - Connect the blue wire to neutral
 - Connect the brown wire to live.
4. Check that all installation work is completed and carry out appropriate tests and safety checks before applying power.

If using **two phases of a three-phase system** to obtain 200 - 240 V between two phases, follow the procedure given above, but connect the blue wire to one phase and the brown wire to the other phase.

Power plug

If you want to install a plug that is suitable for your AC mains power outlets on the power cable, install a grounding-type (earthed) plug with integral cord grip/cable clamp that is rated 20 A minimum, following the plug manufacturer's instructions. Table 1 shows some possible pin/conductor identification schemes. If conductors are not clearly identified, or if you have any doubts about proper installation, consult a qualified electrician.

Relaying power between panels

To ease installation and reduce the number of AC mains power input cables and outlets required, power can be relayed from one EvenLED panel to another, subject to the strict safety limits listed below. Suitable cables for relaying power can be ordered from Martin Professional (see "Accessories" on page 27) and must meet the same specifications as power input cables (see details above).



Warning! See Figure 10 on page 15:

- When connecting to AC mains power at 100 - 120 V, a maximum of 9 EvenLED panels in total may be interconnected in one chain that draws power via the first panel's power input cable.
- When connecting to AC mains power at 200 - 240 V, a maximum of 16 EvenLED panels in total may be interconnected in one chain that draws power via the first panel's power input cable.



To relay power from one panel to another:

1. Connect the grey PowerCon power output/throughput connector on one end of the power relay cable to the grey PowerCon **POWER THROUGH** socket on the first panel.
2. Connect the blue PowerCon power input connector on the other end of the power relay cable to the next panel's blue PowerCon **POWER IN** socket.
3. Continue connecting power relay cables from **POWER THROUGH** to **POWER IN** sockets.
4. When you reach the maximum permitted number of interconnected panels (see Figure 9 on page 12), stop. Do not connect any more panels to this chain. If you need to connect more panels to power, start a new chain connected to a separate power outlet.



Current overload safety



Warning! The **POWER THROUGH** circuit is not protected against current overload. Follow the safety precautions and instructions in this user manual carefully and do not overload this circuit.

EvenLED panels are protected by a current overload protection circuit in the internal PSU (power supply unit) that shuts down the panel if the panel's current draw exceeds safe limits. If a panel shuts down although it is correctly connected to power, this circuit may have been activated by a fault. Disconnect the panel from power and contact your Martin supplier for assistance.

If the current overload protection circuit fails, a 6.3 amp fast-blow fuse in the PSU provides a final total protection. This fuse is not user-replaceable. If you suspect that it has blown, disconnect the panel from power and contact your Martin supplier for assistance.

Connecting the DMX control data link

Connection pinouts

XLR connections

XLR connectors are suitable if DMX cable is used for the DMX link. XLR pin numbers are normally identified with markings on connectors.

The 5-pin XLR connectors required to connect the DMX data cable to an EvenLED must be wired using the standard XLR DMX pin-out:

- Pin 1: Cable shield
- Pin 2: DMX Data 1 - (cold)
- Pin 3: DMX Data 1 + (hot)

Pins 2 and 3 carry the DMX 512 signal. Pins 4 and 5 are available for Data 2 connections in DMX 512-A or similar systems. They must be wired as follows:

- Pin 4: DMX Data 2 - (cold)
- Pin 5: DMX Data 2 + (hot)

Do not connect the shield conductor to ground (earth) or allow it to come into contact with a connector shell, as this may cause interference.

RJ-45 connections

RJ-45 connectors are suitable if CAT 5 cable is used for the data link. XLR-to-RJ-45 adapters will be required for connection to the EvenLED's 5-pin XLR DMX connectors.

RJ-45 cable connector pins are numbered from the left looking at the face of the connector with the locking clip on top (see Figure 11). Connectors must be wired according to the 568-B system using the standard RJ-45 pin-out for DMX applications:

- Pin 1 (White/orange): DMX data hot (+)
- Pin 2 (Orange): DMX data cold (-)

- Pins 7 (White/brown) and 8 (Brown): Common

Pins 3 and 6 are available for Data 2 connections in DMX 512-A or similar systems. They must be wired as follows:

- Pin 3 (White/green): Available for Data 2 hot (+)
- Pin 6 (Green): Available for Data 2 cold (-)

Pins 4 and 5 are not used in currently available lighting control systems but can be wired as follows:

- Pin 4 (Blue)
- Pin 5 (White/blue)

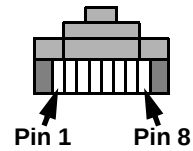


Figure 11: RJ-45 cable connector pins

Making data connections



Warning! *Disconnect the entire installation from power and ensure that power cannot be reapplied, even accidentally, before working on cables and connections.*

See “System layouts” on page 13 for diagrams of possible installations.

To connect a panel to the data link:

1. Connect the DMX data output from the controller to the EvenLED’s **DMX IN** (male XLR) socket.
2. Run the data link from the EvenLED’s **DMX OUT** or **DMX THROUGH** (female XLR) socket to the data input of the next panel (if you are not sure about the different functions of these two sockets, see “Grouped and independent panel control” on page 11).
3. Terminate the data link by connecting a 120 Ohm, 0.25 Watt resistor between the data 1 hot (+) and cold (-) conductors at the data output of the last fixture on the link. If the link is branched (i.e. split into separate links) with an amplifier-splitter, terminate each branch of the link.

Operation



Warning! Class 3B LED product. Do not look at exposed LEDs from a distance of less than 40 cm (16 inches) from the front surface of the panel without suitable protective eyewear. At less than this distance, the LED emission can cause eye injury or irritation. Do not look at LEDs with magnifiers or similar optical instruments that may concentrate the light output.

At distances of 40 cm (16 inches) and above, or if the LED output is diffused so that it is impossible to identify the individual LEDs, the LED emission is harmless to the naked eye.

Powering on and startup

When power is applied to an EvenLED panel, by default it will first reset, then automatically flash its software (firmware) version (see “Software version display” on page 20) and mode settings (see “Mode settings display” on page 21) twice each, then start to calibrate the individual LEDs. When calibration is complete, it will flash all LEDs once. The process normally takes less than one minute.

Software version/mode settings display and automatic calibration at power on can be disabled by sending a sequence of DMX values from a DMX controller (see “Configuring panels using a DMX controller” on page 21).

DMX control

The EvenLED can be controlled using a standard DMX-512 controller.

16- and 8-bit DMX control modes

The EvenLED panel is designed to be used with 16-bit control per color. This ensure smooth and step-free operation and requires 96 DMX channels.

For applications where absolute smooth and step-free operation is not required and/or control channel capacity is limited, EvenLED panels can be set to 8-bit control mode. In 8-bit mode, panels only use 48 channels.

DMX channel requirements in 16-bit and 8-bit modes

The 1 x 1 m EvenLED panel contains 16 individually controllable RGB LEDs:

- 16 LEDs x 6 DMX channels in 16-bit mode = 96 DMX channels required by a 1 x 1 m panel in 16-bit mode.
- 16 LEDs x 3 DMX channels in 8-bit mode = 48 DMX channels required by a 1 x 1 m panel in 8-bit mode.

LED map

By default, the individual LEDs in the EvenLED are mapped for DMX control as shown in Figure 12, seen from the front (light output side) of the panel.

Depending on whether the panel is set to 8-bit or 16-bit control, each LED is controlled using 3 or 6 DMX channels. For example, in 16-bit mode, LED 1 at the bottom left of the panel is controlled on DMX channels 1 - 6, LED 2 is controlled on DMX channels 7 - 12 and so on.

Each LED is controlled as shown in “DMX protocols” on page 20.

LED mapping can be reconfigured – and LEDs can be controlled in groups – using the Martin DMX Thief accessory (see “Using DMX Thief™” on page 23).

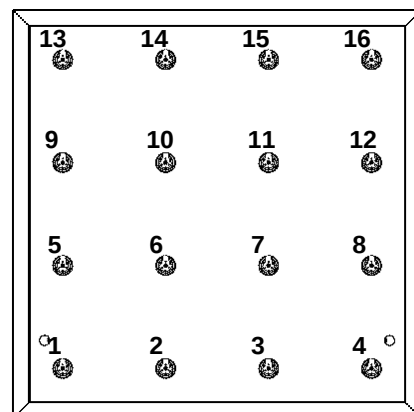


Figure 12: LED mapping

DMX protocols

The tables below give control details for each individual LED in the EvenLED panel.

16-bit control

Start code = 0			
Channel	Value	Percent	Function
1	0 - 255	0 - 100%	Red Intensity 0 →100%
2	0 - 255	0 - 100%	Red (fine) Fine adjustment
3	0 - 255	0 - 100%	Green Intensity 0 →100%
4	0 - 255	0 - 100%	Green (fine) Fine adjustment
5	0 - 255	0 - 100%	Blue Intensity 0 →100%
6	0 - 255	0 - 100%	Blue (fine) Fine adjustment

8-bit control*

Start code = 0			
Channel	Value	Percent	Function
1	0 - 255	0 - 100%	Red Intensity 0 →100%
2	0 - 255	0 - 100%	Green Intensity 0 →100%
3	0 - 255	0 - 100%	Blue Intensity 0 →100%

*The EvenLED is supplied set up for 16-bit control by default. If you want to reconfigure panels for 8-bit control, see “Configuring panels using a DMX controller” on page 21.

Software version and mode settings display

EvenLED panels show their software versions and mode settings when powered on if they are configured to do so as described under “Configuring panels using a DMX controller” on page 21.

Software version display

EvenLED panels display their software as a binary number on their LEDs. See Figure 13. The top row of LEDs shows the tens and the second row down shows the units (ones) in the version number. The bottom two rows simply repeat the number displayed on the top two rows.

80	40	20	10	10s
8	4	2	1	1s
80	40	20	10	10s
8	4	2	1	1s

Repeat of first two rows

Figure 13: Software version display

Software version display: example

See Figure 14. If a panel is running software version 29:

- 20 (LED 15) lights in the top row
- 1 and 8 (LEDs 9 and 12) light in the second row down
- $20 + (1 + 8) = 29$
- The bottom two rows repeat the number displayed on the top two rows.

80	40	20	10	10s
8	4	2	1	1s
80	40	20	10	10s
8	4	2	1	1s

Repeat of first two rows

Figure 14: Software version 29

Mode settings display

See Figure 15. Mode settings are shown on the first three LEDs from the left in row 1 and repeated on the first three LEDs from the left in row 3. The other LEDs are not used.

Mode settings display: example

For example, if a panel is set to:

- operate in 16-bit mode
- not display its software version at power on
- calibrate at power on,

the LEDs will display the panel's mode settings as follows:

- LEDs 13 (the top-left hand LED) and 5 (two rows down on the left) will light green
- LEDs 14 and 6 will light red
- LEDs 15 and 7 will light green.

8-/16-bit mode Green = 16-bit Red = 8-bit	Show version and mode settings at power on Green = Yes Red = No	Calibrate at power on Green = Yes Red = No	16
9	10	11	12
8-/16-bit mode Green = 16-bit Red = 8-bit	Show version and mode settings at power on Green = Yes Red = No	Calibrate at power on Green = Yes Red = No	8
1	2	3	4

Figure 15: Mode settings display

Configuring panels using a DMX controller

The EvenLED can be set to the following modes by sending values from a DMX controller:

- 8- or 16-bit control mode
- Software version and mode settings displayed at power on
- Calibration at power on

Sequences of DMX values sent from the controller will set modes in all the EvenLED panels that are connected to the controller on the DMX link and interconnected using **DMX THROUGH** connectors. Precise timing of the sequences is important, so we recommend that you pre-program a sequence that you can execute once panels are ready to receive mode-setting values.

Pre-programmed sequences that can be imported into the Martin LightJockey™ Windows PC application and sent to EvenLED panels are available free of charge from the EvenLED's Product Support page on the Martin website at www.martin.com

Note that:

- You must hold steps 1 and 9 constant while panels power on (Step 1) and while you check panel mode settings (Step 9), but steps 2 to 8 must change to the next step at 1 second intervals.
- You only change DMX values for the red LEDs in each step. The green and blue LEDs must be held at a value within the range 122 - 132 (50%) throughout the entire procedure.
- The DMX values you send in each step must not contain fades: the controller must 'snap' immediately from one value to the next.
- You must execute all the 9 steps in the sequence.
- Steps 1 to 5 and Step 9 do not change mode settings. You change modes by sending specific DMX values to the red LEDs in steps 6 to 8. If a mode does not need to be changed in steps 6 to 8, send the 'Ignore' value 0 (zero) in the step concerned.
- Regardless of whether panels are set to 8- or 16-bit mode, you must send the DMX values to the LEDs for the specified colors on the following channels:
 - Send the values for red LEDs on channels 1, 7, 19 and 43.
 - Send the values for blue and green LEDs on channels 3, 5, 9, 11, 45 and 47.
- EvenLED panels must be interconnected using **DMX THROUGH** connectors. The **DMX OUT** connectors do not relay mode-setting data.
- Any Martin DMX Thief™ devices on the DMX link must be bypassed temporarily by disconnecting the DMX cable connectors from their **DMX IN** and **DMX OUT** sockets and connecting the DMX cable connectors directly together.

Mode-setting procedure

To set the modes in EvenLED panels:

1. Power all panels off.
2. See Table 2. Set the controller to send the 'panel configuration enable' DMX values in Step 1.
3. Power panels on. When panels receive the 'panel configuration enable' values at power on, they will display their software versions and their mode settings in an alternating sequence until they receive the DMX values for Step 2 from the DMX controller.
4. Wait minimum 2 seconds, then send the DMX values for Steps 2 to 9. Steps 2 to 8 must last exactly one second before changing to the next step.
5. During steps 6 to 8, panels indicate which mode settings they are acquiring by lighting LEDs red or green as shown in Figure 15 on page 21. If you send an 'Ignore' value for a mode setting that you do not want to change, the LED concerned will light blue.
6. When the sequence reaches Step 9, panels will update their settings – which takes a few seconds – and then again display their software versions and their mode settings in an alternating sequence. Check that the panels' mode settings are correct with reference to "Mode settings display" on page 21. If you are satisfied with the settings, cut power to the panels.
7. Stop sending the DMX values in Step 9 from the DMX controller.
8. Power panels on again. They should now reset and be available for operation in the modes you have set them to.

Mode-setting DMX sequence

Function	Step	% value	Hex value	Setting
Panel configuration enable	Step 1	Reds ¹ : 20%	46 - 56	Hold this value at power on
		Greens and blues ² : 50%	122 - 132	Hold this value at power on and throughout the rest of the procedure
Start code	Step 2	Reds: 40%	97 - 107	
	Step 3	Reds: 60%	148 - 158	
	Step 4	Reds: 80%	199 - 209	
	Step 5	Reds: 20%	46 - 56	
8- or 16-bit	Step 6	Reds: 100%	250 - 255	16-bit mode
		or reds: 50%	or 122 - 132	8-bit mode
		or reds: 0%	or 0	Ignore (keep existing setting)
Show software version and mode settings at power on	Step 7	Reds: 100%	250 - 255	Show version and settings
		or reds: 50%	or 122 - 132	Do not show version and settings
		or reds: 0%	or 0	Ignore (keep existing setting)
Calibrate at power on	Step 8	Reds: 100%	250 - 255	Calibrate
		or reds: 50%	or 122 - 132	Do not calibrate
		or reds: 0%	or 0	Ignore (keep existing setting)
Repeat 'panel configuration enable' values from Step 1	Step 9	Reds: 20%	46 - 56	Hold value for minimum 10 seconds while panels update. Panels then show settings and software version in an alternating sequence.

¹The values for reds must be sent to red LEDs on channels 1, 7, 19 and 43.

²The values for greens and blues must be sent to green and blue LEDs on channels 3, 5, 9, 11, 45 and 47.

Table 2: Mode-setting DMX sequence

Using back projection screens

Installing a back projection screen in front of EvenLED panels gives a uniform panel of light. The ideal distance between screen and EvenLED differs with screen design but is generally within 250 - 500 mm (10 - 20 inches). A distance of approx. 300 mm (12 inches) often gives best results.

Using DMX Thief™

The Martin EvenLED DMX Thief™ (available from Martin, P/N 90758096) is an accessory that gives the following options:

- Complete control of DMX address setting in an EvenLED installation.
- Grouping of LEDs so that they can be controlled in two or four horizontal or vertical strips, four quadrants or one single group in which all LEDs behave identically.
- Panel control Y-axis inversion so that LEDs are numbered from the top of the panel.
- 8- or 16-bit mode DMX output and input configurations

See the user manual supplied with the DMX Thief and available for download from www.martin.com for full details.

Service and maintenance



DANGER! Read “Safety Information” on page 3 before carrying out service or maintenance work on the EvenLED. Disconnect the panel from power before cleaning.

Important! The EvenLED requires periodic cleaning to maintain reliable operation and protect the investment it represents. Excessive dirt and particle buildup degrades performance, causes overheating and may cause damage that is not covered by the product warranty.

The user will need to carry out periodic cleaning, and it is also possible for the user to update the EvenLED software using the Martin EvenLED Software Uploader device. All other service operations must be carried out by Martin Professional or its approved service agents.

Installation, on-site service and maintenance can be provided worldwide by the Martin Professional Global Service organization and its approved agents, giving owners access to Martin's expertise and product knowledge in a partnership that will ensure the highest level of performance throughout the product's lifetime. Please contact your Martin supplier for details.

It is Martin policy to apply the strictest possible calibration procedures and use the best quality materials available to ensure optimum performance and the longest possible component lifetimes. However, LEDs are subject to wear and tear over the life of the product, resulting in gradual changes in color and overall brightness over many thousands of hours of use. The extent of wear and tear depends heavily on operating conditions and environment, so it is impossible to specify precisely whether and to what extent LED performance will be affected. However, you may eventually need to ask Martin Professional to replace LEDs if their characteristics are affected by wear and tear after an extended period of use and if you require panels to perform within very precise optical and color parameters.

Cleaning

Regular cleaning is essential for product life and performance. Buildup of dust and dirt degrades the panel's light output and cooling ability.

Cleaning schedules will vary greatly depending on the operating environment. It is therefore impossible to specify precise cleaning intervals for the EvenLED. Inspect panels within their first few weeks of operation to see whether cleaning is necessary. Check again at frequent intervals. This procedure will allow you to assess cleaning requirements in your particular situation. If in doubt, consult your Martin dealer about a suitable maintenance schedule.



Warning! Disconnect from power before cleaning. Do not allow the product to become wet. Take care not to damage wiring.

Important! Do not use abrasives, solvents or caustic cleaning products for cleaning.

The EvenLED's aluminum housing can be cleaned with a cloth that is slightly dampened – but not wet – with a solution of water and a mild detergent such as car shampoo. To clean the housing:

1. Isolate the panel from AC power and allow it to cool for 20 minutes.
2. Gently wipe away dirt and dust with the damp cloth.
3. Allow any moisture to dry before reconnecting to power.

Software installation

It may be necessary to upload new software (firmware) to the EvenLED if you believe that the product has a software-related fault or if you want to update to a newer version. Software updates are available from the Martin website (<http://www.martin.com>) and can be installed via the DMX data link with the EvenLED Software Uploader, available from Martin (P/N 90758097). See the separate EvenLED Software Uploader user manual for details.

Troubleshooting

Problem	Probable cause(s)	Remedy
Panel is completely dead.	No power to panel.	Check power and connections.
	Current overload protection circuit activated.	Isolate panel from power. Contact Martin for assistance.
	Fuse blown.	Fuse is not user-replaceable. Isolate panel from power. Contact Martin for assistance.
One or more panels responds incorrectly to control or does not respond at all.	Fault or interference on DMX link.	Inspect connections and cables. Correct poor connections. Repair or replace damaged cables. Trace and eliminate cause of interference.
	Incorrect panel addressing.	Check for correct use of DMX OUT and DMX THROUGH connectors. Check number of channels required by panels in one chain does not exceed 512 if individual control is required.
	Incorrect mode setting.	Check panels are correctly set to 8-bit or 16-bit mode.
	Panel defective.	Bypass panels on DMX link until the faulty device has been identified. Have faulty panel tested and serviced by Martin service technician.
	Other device on DMX link defective.	Bypass devices on DMX link until the faulty device has been identified. Have faulty device tested and serviced by Martin service technician or device supplier.
LEDs cut out intermittently.	Panel is too hot.	Ensure free airflow around panel. Clean panel. Check that ambient temperature does not exceed maximum permitted level. If problem persists, contact Martin for service.

Table 3: Troubleshooting

Specifications

Physical

Length	995 mm (39.2 in.)
Width	71 mm (2.8 in.)
Height	1014 mm (39.9 in.)
Weight	10 kg (22.0 lbs.)

Dynamic Effects

Color mixing	RGB
Red	0 - 100%
Green	0 - 100%
Blue	0 - 100%

Control and Programming

Control	DMX
DMX channels	96 per independently controlled 1 x 1 m panel (48 in 8-bit mode)
Control resolution	16-bit RGB control of each LED
Protocol	USITT DMX512/1990

Photometric Data

Light source	Proprietary 6 W RGB LED array
Resolution, one panel	4 x 4 pixels
Pixel pitch (LED center-to-center distance)	250 mm (9.8 in.)
Pixels per m ²	16
Color resolution	16 bits per color
Viewing angle	112° (+56°, -56°)
Minimum LED source lifetime (to 70% of initial output level)	40 000 hours at full intensity

Construction

Panels	Aluminum
Color	White
Protection rating	IP20

Installation

Orientation	Vertical
Mounting	Suspended using mounting rail and clamps only; max. 10 panels per suspended column

Connections

Power in/out	Neutrik PowerCon
DMX data in	5-pin locking XLR
DMX data out	5-pin locking XLR
DMX data through	5-pin locking XLR

Electrical

AC power	100 - 240 VAC nominal, 50/60 Hz
Power supply unit	Integrated, auto-sensing multi-voltage with integral current overload protection
Standby power	24 W
Earth leakage current	<1 mA
Main fuse (not user-replaceable)	F 6.3 A

Typical power and current

Maximum total power consumption	155 W
100 V, 50 Hz.	151 W, 1.6 A, PF = 0.978
100 V, 60 Hz.	151 W, 1.6 A, PF = 0.988
110 V, 60 Hz.	151 W, 1.4 A, PF = 0.985
120 V, 60 Hz.	151 W, 1.3 A, PF = 0.981
208 V, 60 Hz.	151 W, 0.8 A, PF = 0.915
230 V, 50 Hz.	152 W, 0.8 A, PF = 0.892
240 V, 50 Hz.	152 W, 0.7 A, PF = 0.887

Measurements per panel, made at nominal voltage with all LEDs at full intensity. Allow for a deviation of +/- 10%.

Thermal

Cooling.	Convection
Maximum ambient temperature (Ta max.)	40° C (104° F)
Minimum ambient temperature (Ta min.)	5° C (41° F)
Maximum surface temperature, steady state, Ta=40° C	80° C
Total heat dissipation (calculated, +/- 10%)	530 BTU/hr.

Approvals



EU safety	EN 60598-1, EN 60598-2-17, IEC/EN 60825-1
EU EMC.	EN 55015, EN 55103-1, EN 55103-2, EN 61000-3-2, EN 61000-3-3
US safety	UL 1573
Canadian safety	CAN/CSA E 60598-2-17

Included Items

Panel	
Mounting frame	
3 m UL-listed, 12 AWG, SJT, 20 A power input cable with PowerCon input connector	P/N 11541503
User manual	P/N 35000222

Accessories

Neutrik PowerCon NAC3FCA power input connector, cable mount, blue	P/N 05342804
Neutrik PowerCon NAC3FCB power output connector, cable mount, light grey	P/N 05342805
1.4 m UL-listed, 12 AWG, SJT, 20 A daisy-chain power cable with PowerCon connectors.	P/N 11850099
2.25 m UL-listed, 12 AWG, SJT, 20 A daisy-chain power cable with PowerCon connectors.	P/N 11850100
3.25 m UL-listed, 12 AWG, SJT, 20 A daisy-chain power cable with PowerCon connectors.	P/N 11850101
Six-unit flightcase for 6 x EvenLED, 1 x 1 m	P/N 91515005

Related Items

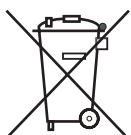
Martin RS-485 Opto-Splitter™ optically isolated 4-way RS485/DMX splitter-amplifier	P/N 90758060
Martin LightJockey 2™ Windows Application (incl. Universal USB/DMX Interface Box)	P/N 90702055

Ordering Information

EvenLED™ Hanging Bracket, 1 m wide, with width-adjustable rigging clamps.	P/N 90602000
EvenLED™ DMX Thief™ Addressing/Configuration Tool	P/N 90758096
EvenLED™ Software Uploader Tool	P/N 90758097
EvenLED™ panel, 1 x 1 m.	P/N 90354500

Specifications subject to change without notice.

Notes



Disposing of this product

Martin™ products are supplied in compliance with Directive 2002/96/EC of the European Parliament and of the Council of the European Union on WEEE (Waste Electrical and Electronic Equipment), as amended by Directive 2003/108/EC, where applicable.

Help preserve the environment! Ensure that this product is recycled at the end of its life. Your supplier can give details of local arrangements for the disposal of Martin products.



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