



Orion A-D Converter Converts Analog Input Signal User Guide

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Technical Manual & Quick Start Guide

MADRIX® ORION –

Technical Manual & Quick Start Guide

3rd Edition — January 2021

Thank you for purchasing MADRIX® ORION!

Please read this manual carefully and thoroughly before using MADRIX® ORION. Make sure that you fully understand all information.

This MADRIX® ORION Technical Manual is written in English and German.

Developed and made in Germany

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Package Contents

1x MADRIX® ORION
1x Set of screw terminals (2x 6-pin and 1x 2-pin)
1x USB 2.0 cable (certified)
2x Wall-mount brackets
1x This technical manual / quick start guide

Please note: Check the package contents and the condition of the interface after unpacking! Contact your supplier if something is missing or damaged. Do not use the device if it seems to be damaged!

Safety Instructions And Limited Warranty

Five years of limited manufacturer's warranty are granted to the purchaser of this product with regards to constructional fault, material defect, or incorrect assembly the manufacturer has caused or is to be held responsible for. This warranty will be void if the interface is opened, modified, or damaged through inappropriate handling, wrong usage, overvoltage, or damaged through any other cause. All details are available online at www.madrix.com/warranty

Please follow the instructions below to avoid mishandling, damage to the device, or personal injury:



**THE DEVICE WORKS WITH LOW VOLTAGE (DC 5 V – 24 V).
DO NOT USE ANY OTHER VOLTAGE!**



External USB power supplies: Using non-permissible units poses risk of fire. 5.5 V 500 mA max. output is allowed.



Beware that the interface works with electrical power. Only use the device in dry environments (indoor use). The IP Rating of the device is IP20. Do not use the interface in humid environments and avoid contact with water or any other liquids. Turn off the power if you are not using the device for a long time.

Avoid unwanted voltage on the cables at all times. Do not remove any parts from the unit or connect to an ungrounded circuit. Do not connect the unit to equipment that is switched on. Only connect the unit to equipment that is initially powered off.

There are no user serviceable parts inside or outside the interface. Repair service lies only within the responsibilities of the manufacturer. If the interface appears to be defective, please contact your dealer. After expiration of the warranty period you may contact your supplier or the manufacturer to have the unit repaired against payment of an individual service fee if possible.

The interface has several ports and slots. Only connect or insert devices, cables, and connectors to the individual ports and slots using connectors of the same type as the port. Do not use inapplicable equipment. This device should be used by professionals. The device is not designed to be operated by nonprofessionals or children.

End-Of-Life



This electrical device and its accessories need to be disposed of properly. Do not throw the device into normal trash or household waste. Please recycle packaging material whenever possible.

Usage

In general, this device is designed as a general-purpose input device for analog input and Ethernet-based output over Art-Net or Streaming ACN for remote control and interactivity. Do not use the interface for any other, deviating purpose. Directly connect to a wide range of compatible sensors, potentiometers, switches, and triggers. Easily create interactive projects using sensors for light, temperature, PIR, and many more. The device can be connected to and disconnected from USB or Ethernet network during use and without a reboot (Hot Swapping & Plug and Play). Multiple interfaces can be used at the same time.

Technical Specifications

Supply Of Power: (See p. 6 – p. 9)	DC 5 V – 24 V; over A) 2-pin pluggable screw terminal with 500 mA max. load per port when supplying through to the ports, B) 5 V USB, C) Port 1 or Port 2
Power Consumption:	< 1.5 W (300 mA) during normal operation (500 mA max. fused)
Network Protocols:	Art-Net, Streaming ACN
Input Signals:	0 V – 12 V, analog
Ports:	2x ports (Via 2x 6-pin pluggable screw terminals)
Input Pins:	2x 4 separate pins (8x in total)
Ethernet:	2x RJ45, Auto MDI-X, daisy-chain support, 10/100 MBit/s (Compatible with 1 GBit/s)
Ethernet Switch:	Lookup Table (ALU) for 1024 unicast MAC addresses
USB:	1x port, USB 2.0, type-B female socket
Case:	Non-conductive, V-0 flammability rating (UL94 test method), designed for 35 mm DIN-rails or wall mounting
Dimensions:	90 mm x 70 mm x 46 mm (Length x Width x Height)
Weight:	105 g 120 g incl. screw terminals and wall mounts
Temperature Range:	-10 °C to 70 °C (Operating) -20 °C to 85 °C (Storage)
Relative Humidity:	5 % to 80 %, non-condensing (Operating / Storage)
IP Rating:	IP20
Certificates:	CE, EAC, FCC, RoHS
Warranty:	5 years of limited manufacturer's warranty

IP Address And Other Device Information

You will find the following important information on the side of the device:

- Serial number (**‘Serial’**)
- Hardware revision (**‘Model’**)
- Default and pre-configured IP address (**‘Default IP’**)
(See p. 12 to reset the device to the default IP address if needed.)

Using A 3rd-Party Controller

MADRIX® ORION is a standard network node for Art-Net or Streaming ACN. You can use the device with any compatible software, console, or controller.

Using The MADRIX® 5 Software

MADRIX® 5 is a professional and advanced LED lighting control tool. It is recommended to use the MADRIX® 5 Software in order to access all features of MADRIX® ORION, including the USB connection which requires MADRIX® 5. Support for Art-Net / Streaming ACN is already available with previous versions.

MADRIX® 5 Minimum System Requirements And Supported Operating Systems

For the latest information, please check the website www.madrix.com

The minimum system requirements for the MADRIX® 5 Software are as follows. Optimal system specifications will often be higher.

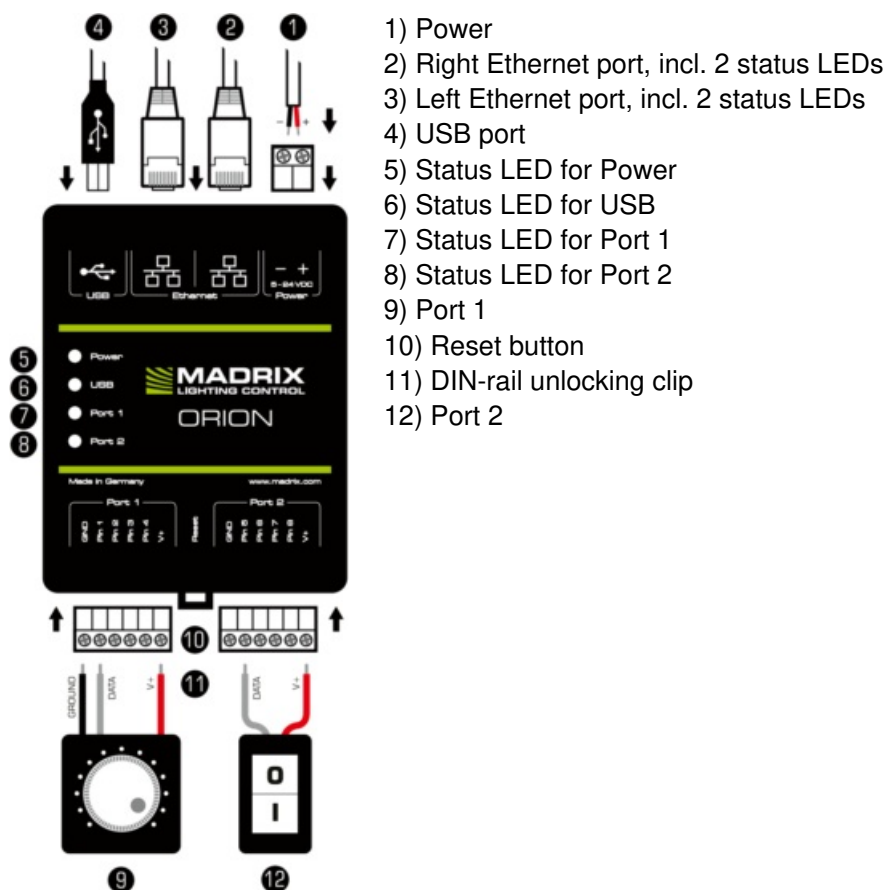
- 2.0 GHz dual-core CPU, OpenGL 2.1 graphics card (NVIDIA recommended), 2 GB RAM, 1 GB free harddisk space, 1280 x 768 screen resolution, network card, sound card, USB 2.0

The MADRIX® 5 Software supports the following operating systems:

- Microsoft® Windows® 10
64 bit only

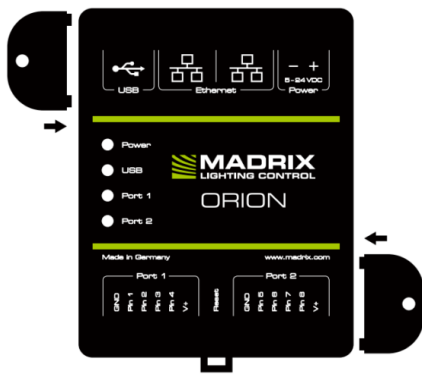
Please keep the system, drivers, and updates up to date.

Connectivity



Please note:

The package contents do not include network cables, power cables, or input equipment.



2x Mounting Brackets:

Put each bracket in the pre-drilled holes on the device's left and right side. Safely secure the assembled unit only on solid surfaces using screws with $\varnothing = 3.5$ mm.

1) Connecting Your Input Equipment

See chapter '**Connection Diagram Examples**' on p. 8 for more information.

Step 1) Completely switch off your supply of power before connecting your input equipment to the device!

Step 2) Connect your input equipment to the provided 6-pin screw terminals:

- » You may connect only to Port 1, only to Port 2, or to Port 1 and Port 2.
- » For each pin, connect GND (GROUND) and V+ to the same port as the pin.
- » Pay attention where to connect GROUND, DATA, and V+; as indicated on the device as well as required by the diagram.
- » Insert each individual wire consecutively and tighten the corresponding screw with a suitable screw driver.

Step 3) Plug the 6-pin screw terminals into the device. The screws must face upwards.

Step 4) Continue with '**2) Connecting To Power And Data**' below.

2) Connecting To Power And Data

See chapter '**Connection Diagram Examples**' on p. 8 for more information.

Step 1) Be careful when handling the device and electrical power! Completely switch off your supply of power before connecting to the device!

Step 2) Connect your power cables to the provided 2-pin screw terminal:

- » Pay attention where to connect + and – ; as indicated on the device.
- » Insert each individual wire consecutively and tighten the corresponding screw with a suitable screw driver.

Plug the 2-pin screw terminal into the device. The screws must face upwards. You can also supply 5 V power over USB.

Step 3) Connect to USB or to Ethernet network to send data as required.

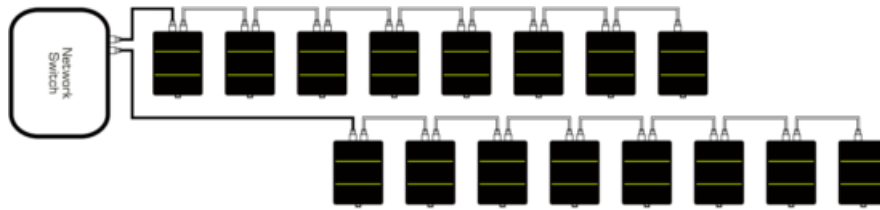
Step 4) Do not switch on your supply of power until all required power cables are connected to MADRIX® ORION.

Step 5) Continue by configuring your device as described in chapter '**3) Device Configuration**' on p. 11.

Daisy-Chain Support

MADRIX® ORION features 2 separate Ethernet network ports. Either one is fully functionally for IN and OUT and

can be used for the data connection without using a separate network switch or router. It is recommended to connect a maximum of 8 units after one another in a row.



Connection Diagram Examples

You can connect your input equipment, MADRIX® ORION, supply of power, and data cables in different ways. The following pages show several examples. These schemes are to be seen independently of the direction, position, and mounting method. Please see p. 6 and p. 7 for further information.



SUPPLY POWER TO ORION ONLY ONCE! DO NOT CONNECT V+ MULTIPLE TIMES BY CONNECTING IT VIA PORT 1/2 AND POWER.

Legend

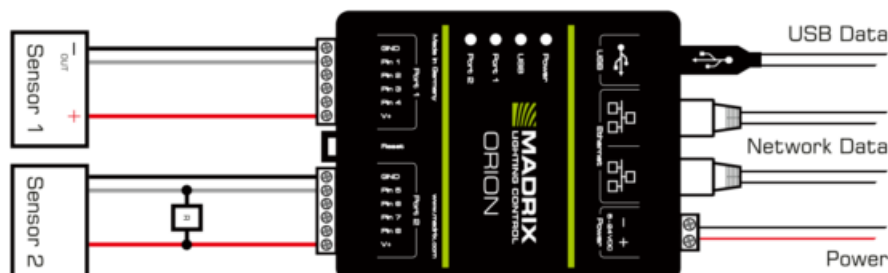
- Connection required for GROUND.
- Connection required for DATA.
- Connection required for V+.

Example A



Description: Power is supplied only once to ORION and also used for the input equipment. Each Port is protected with 500 mA max. For example, a potentiometer is connected to Port 1 via GROUND, DATA at Pin1, and V+, while a switch is connected to Port 2 via DATA at Pin 5 and V+.

Example B



Description: Power is supplied only once to ORION and also used for the input equipment. Each Port is protected with 500 mA max. To Port 1, a PNP output sensor is connected over 0 V – 12 V. To Port 2, an NPN

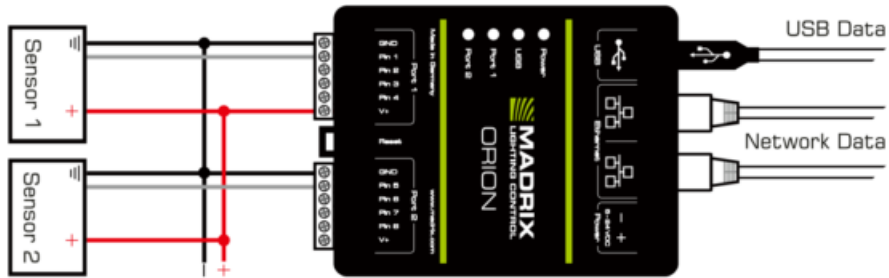
output sensor with an open collector is connected plus a $1k\ \Omega - 10k\ \Omega$ resistor.

Example C




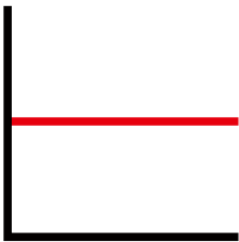



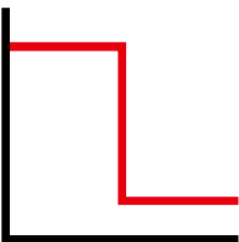

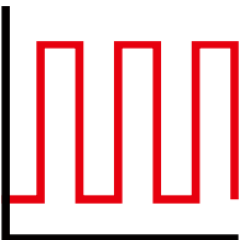
Description: Power is supplied to ORION and supplied separately to the input equipment. The sensor is connected to Port 1 via GROUND and DATA at Pin 1, but not V+!

Example D



Description: 5 V – 24 V power is supplied externally and to all input equipment. For example, a sensor is connected to Port 1 via GROUND, DATA at Pin1, and V+ to supply power to ORION once, while a second sensor is connected to Port 2 via GROUND and DATA at Pin 5, but not V+!

Voltage Characteristic Examples

INPUT EQUIPMENT	VOLTAGE CHARACTERISTICS	ORION PIN INPUT SETTINGS
Resistor 		‘Analog’
Potentiometer 		‘Analog’
Trigger / Switch 		‘Digital’
Propellor 		‘Counter’

How To Update The Firmware

It is highly recommended to update the firmware of MADRIX® ORION should a new firmware version become available. You can do so in different ways. Follow these quick steps to update the firmware in MADRIX® 5 over USB:

Step 1) Connect MADRIX® ORION to your computer over USB.

Step 2) Start the MADRIX® 5 Software.

Step 3) In MADRIX® 5, go to **‘Tools...’** > **‘MADRIX Device Configuration...’**.

A new window will open. Click on the search button (**Loupe** icon) and the software will search for connected devices. Select your device in the list, click on the **‘Firmware’** button, and follow any instructions.

For more information, please read the MADRIX® 5 user manual.

3) Device Configuration

You can access and change specific device settings, including the IP address, Pin Input, DMX Channels, and

Network Output, in different ways.

Please note: In order to put MADRIX® ORION fully into operation, please configure the device according to your requirements and input equipment.

Web Configuration Through A Web Browser

Step 1) Connect MADRIX® ORION and your computer to the same network.

Step 2) Assign correct network settings in the computer's operating system.

(Recommended: IP address 10.0.0.1 / Subnet mask 255.0.0.0)

Step 3) Open your web browser and enter the IP address of MADRIX® ORION.

(You can find the default IP address on the side of the ORION device.)

Step 4) The built-in web configuration page will be launched. Confirm or change the IP address, Pin Input, DMX Channels, and Network Output. The device then sends out data over network as configured.

Step 5) Change any other settings as required. Apply changes with **'Set'**.

MADRIX Device Configuration In The MADRIX® 5 Software

Step 1) Connect MADRIX® ORION to your computer via USB or via Ethernet.

Step 2a) For the USB connection, Microsoft® Windows® will install the interface drivers automatically. When ready, the status LED for USB will fade between red and green; as described on p. 12. Start MADRIX® 5 and enable USB drivers. Go to **'Preferences' > 'Options...' > tab 'Devices USB'**. Activate **'MADRIX ORION'** and click **'OK'**. (The driver is activated by default.)

Step 2b) For the Ethernet connection, enable network drivers in MADRIX® 5. Go to **'Preferences' > 'Options...' > tab 'Devices Network'**. Activate **'inoage – MADRIX'** and click **'OK'**. (The driver is activated by default.)

Step 3) In MADRIX® 5, go to **'Tools...' > 'MADRIX Device Configuration...'**. A new window will open. Click on the search button (**Loupe** icon) and it will search for connected devices. Select your device in the list and click on the configuration button (**Gear-Wheel** icon).

Step 4) Confirm or change the IP address, Pin Input, DMX Channels, and Network Output and any other settings as required. Apply changes with **'Set'**. The device then sends out data over network as configured.

Description Of Status LED Codes

STATUS	STATUS LED POWER
Powered off	Power not connected. → The device has no power.
Permanently green	Connected to power. → The power is on.
Blinking green	Bootloader activated. → Reset device / upload firmware.

STATUS	STATUS LED USB
Powered off	USB not connected.
Red + blinking green	Communicating over USB. → Sending or receiving data over USB. The USB port works.
Fading between red + green	Connected to USB; Drivers installed correctly. → No data is sent over USB.
Orange	Connected to USB; No drivers installed. → Reinstall software and drivers or try a different USB port.

STATUS	STATUS LED PORT 1	STATUS LED PORT 2
Powered off	No data is sent.	No data is sent.
Blinking green	Receiving data / changes. → The input port works.	Receiving data / changes. → The input port works.

STATUS	STATUS LED ETHERNET PORTS
Green off	10 MBit/s connected.
Green on	100 MBit/s connected.
Orange on	Network connected.
Orange blinking	Sending or receiving data. → The Ethernet port works.

Reset To Factory Default Settings

In rare cases, you might need to do a reset to factory default settings:

Step 1) Disconnect all connections from the device (power, data, input).

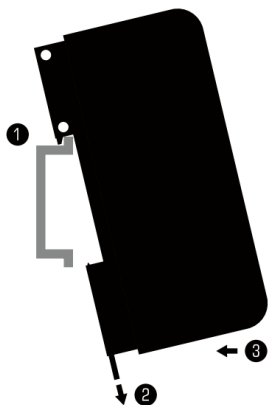
Step 2) Use a suitable tool to press the reset button (between 'Port 1' and '2').

Step 3) Continue to press the reset button and supply power again over 'Power' or over USB.

Step 4) Continue to press the reset button and wait until all status LEDs of the device flash repeatedly or wait 10 seconds.

Please note: Simply repeat these steps should the process fail.

How To Install On DIN-Rails



Mounting (Pictured Left)

Step 1) Hook the device in an angle onto the upper edge of the rail.

Step 2) Pull the unlocking clip.

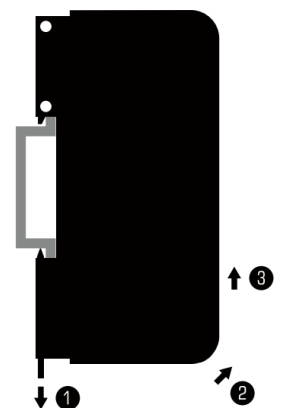
Step 3) Press the lower part of the device against the rail and let the clip snap into position.

Unmounting (Pictured Right)

Step 1) Pull the unlocking clip.

Step 2) Lift the lower part of the device from the rail in an angle.

Step 3) Lift the device from the rail.



Using The MADRIX® 5 Software

You can mainly use 3 operating modes together with the MADRIX® 5 Software:

- DMX-IN Via Art-Net
- DMX-IN Via Streaming ACN
- DMX-IN Via USB

In MADRIX® 5, make sure to activate the correct drivers first:

- For USB, go to **'Preferences' > 'Options...' > 'Devices USB'**,
- For sACN, go to **'Preferences' > 'Options...' > 'Devices Network'**,
- For Art-Net, go to **'Preferences' > 'Device Manager...' > 'Art-Net'**.

Then, configure your devices and activate input in order to receive the data:

- Go to **'Preferences' > 'Device Manager...' > 'DMX Devices'**,
- Go to **'Preferences' > 'Device Manager...' > 'DMX Input'**.

For more information, please read the MADRIX® 5 user manual.

Updates And Further Information

Digital documentation files are automatically installed with MADRIX® 5. More information about the software and how to connect MADRIX® ORION is provided in the **'MADRIX® 5 Help And Manual'**. You can access this user manual by pressing **'F1'** on your keyboard while using MADRIX® 5, by navigating to the menu **'Help' > 'User Manual...'**, or online at help.madrix.com

The latest technical manual and MADRIX® 5 Software, including drivers, firmware updates, and documentation, are available from www.madrix.com

Support

In case of further questions concerning handling of MADRIX® ORION or technical problems, please read the MADRIX® 5 Help And Manual first, contact your dealer, or have a look at the website www.madrix.com. You can also directly contact info@madrix.com

CE And RoHS Declaration Of Conformity



The device complies with the requirements set forth in the council Directive of the law of the Member States relating to electromagnetic compatibility (2014/30/EU), the Low Voltage Directive (2014/35/EU), and the Directive on the restriction of the use of certain hazardous substances in electrical and electronic equipment (2011/65/ EU) (RoHS). Compliance with these has been evaluated in acc. with the following standards: DIN EN 55011 (2009) + A1 (2010), DIN EN 55015 (2013), DIN EN 55024 (2010), DIN EN 61000-4-2 (2009), DIN EN 61000-4-3 (2006) + A1 (2008), DIN EN 61000-4-4 (2013), DIN EN 61000-4-6 (2014).

FCC Declaration Of Conformity



The device has passed the following tests of compliance:
FCC (2016) – Title 47, Part 15, class A, Radio frequency devices.

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Frequently Asked Questions (FAQs)

What do the blinking LEDs on the device mean?

Please read the chapter 'Description Of Status LED Codes' (see p. 12).

How can I change the IP address?

You can use the built-in web configuration page (see p. 11).

The current IP address cannot be reached. What can I do?

You could perform a reset to factory default settings (see p. 12).

Does the device support RDM?

No. RDM is not supported by MADRIX® ORION at this time.

Is it possible to use more than one MADRIX® ORION?

Yes. Art-Net or Streaming ACN is recommended for large projects by connecting multiple devices to a switch (1 GBit/s) via suitable components to create a network or use the built-in daisy-chain support (see p. 8).

Where can I find the latest firmware update?

The latest MADRIX® 5 also includes the latest firmware (see p. 10).

Can I use other receivers apart from the MADRIX® 5 Software?

Yes. When using MADRIX® ORION as a standard network node, you can use it in combination with other compatible software, consoles, and controllers.

Can I repair MADRIX® ORION myself?

No. Do not attempt any repairs. Any attempt will void your warranty (see p. 3)!

What can I do if my unit does not work anymore?

Please contact your dealer or supplier if the device seems to be defective.



www.madrix.com

Documents / Resources

The image shows the MADRIX ORION device, a small electronic unit with a screen and buttons, and its technical manual cover. The cover is black with the MADRIX logo and the text "ORION" and "Technical Manual & Quick Start Guide".	<p>ORION Orion A-D Converter Converts Analog Input Signal [pdf] User Guide Orion A-D Converter Converts Analog Input Signal</p>
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References

- [MADRIX Documentation](#)
- [MADRIX | LIGHTING CONTROL - Home](#)

-  [MADRIX | LIGHTING CONTROL - Limited Warranty / Eingeschränkte Herstellergarantie](#)

Manuals+.