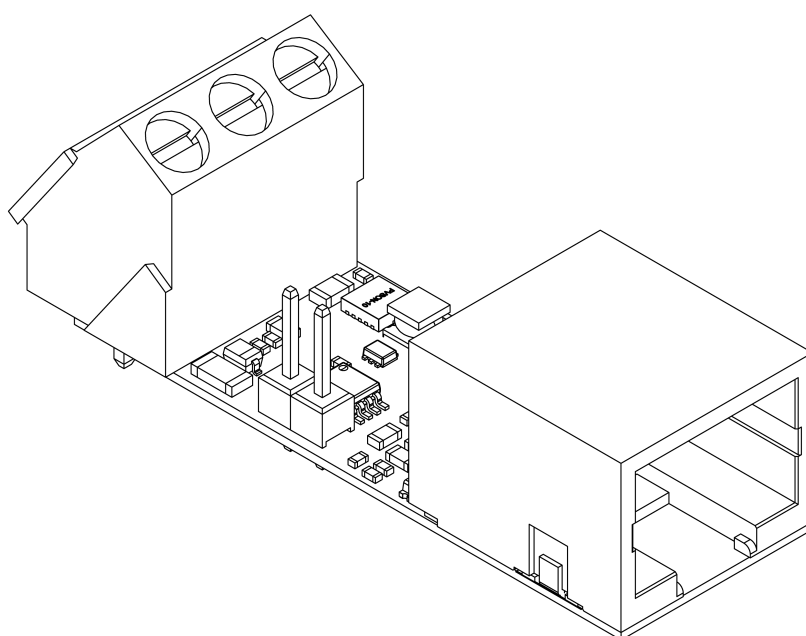




# PXLNET TRANSCEIVER 2 RJ45+ST

Art.#2035304

## USER MANUAL



# THANK YOU FOR CHOOSING DIGIDOT!

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DiGidot offers powerful products and solutions to control LED pixels. The DiGidot Controllers are the heart of our control system and offers great flexibility. In order to benefit from all our system advantages and to keep your infrastructure easy, we offer some innovative accessories like our PxLNet range extending equipment.

These products allow you to send high speed SPI protocols over large distances. This that you can install the DiGidot Controllers in a central place and drastically decreases the amount of hardware.

Have fun creating mesmerising lighting installations!

**Your DiGidot team**

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# INTRODUCTION

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SPI protocols are sensitive to data distortion and often only work reliably for up to 2 meters (6.5 ft) of cable distance between the controller and first SPI IC/LED. The DiGidot PxLNet Transceiver is a small sized module that can be used as receiver or transmitter to extend the range of an SPI signal.

The PxLNet Transceiver converts PxLNet, which is sent from a DiGidot PxLNet Transmitter or a Transceiver in transmit mode, based on the original SPI protocol that is sent from a SPI controller. A DiGidot PxLNet Transmitter or Transceiver converts sensitive SPI protocols to PxLNet which can cover huge distances, up to 250 meters (820 ft). Any SPI protocol can be received or be transmitted with this module.

Connect the same amount of universes as to the connected SPI controller can send per port.

Installation is easy thanks to the well laid out screw terminals and RJ45 connector. The output side can be easily connected with the help of a simple flathead screwdriver. No need to solder here.

When this module is connected to the end of an LED strip or pixel controlled product, it can be used as a transmitter when the jumper is removed.

A PxLNet Transceiver in Transmit mode can also be connected to a DiGidot Controller output port to convert the SPI signal to PxLNet.

The PxLNet Transceiver can also be used to convert a DMX signal to DMX TTL or vice versa.

## CONTENTS

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- DiGidot PxLNet Transceiver module (PCB only, quantity depends on the order)
- Header jumper (pre installed)

### NOTE

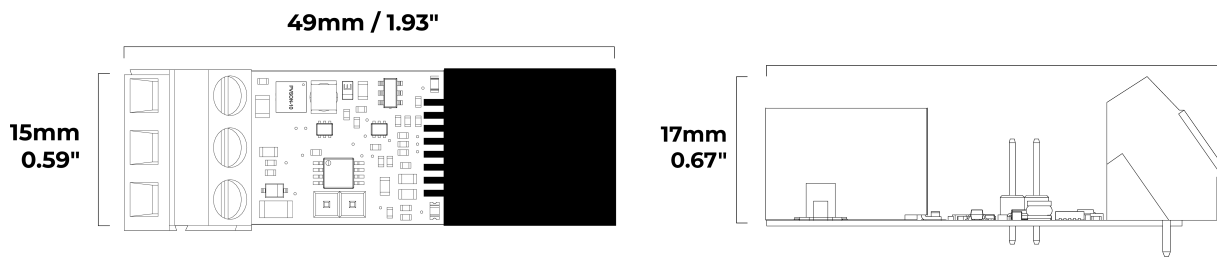
We put great care in our products and have a high quality control standard. Nonetheless we advise to double check for missing or damaged items. In case of any missing or damaged items, please contact your supplier immediately. Never use damaged products!

## FEATURE LIST PXLNET TRANSCEIVER 2

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- Flexible operating voltage from 5 to 48 Vdc
- **RJ45** bus for PxLNet in/out and **Screw-terminals** for the SPI data in/out
- **Solder pads** for input/output signals on the bottom side
- Status LED indicators for power (**white**) and incoming data (**blue**)
- **Auxiliary** network cable break out solder pads
- Selectable operating mode: Jumper **On?** (default) -> **Receiver** / Jumper **removed?** -> **Transmitter**
- **Over voltage** protection
- **Reverse polarity** protection

# TECHNICAL DRAWINGS

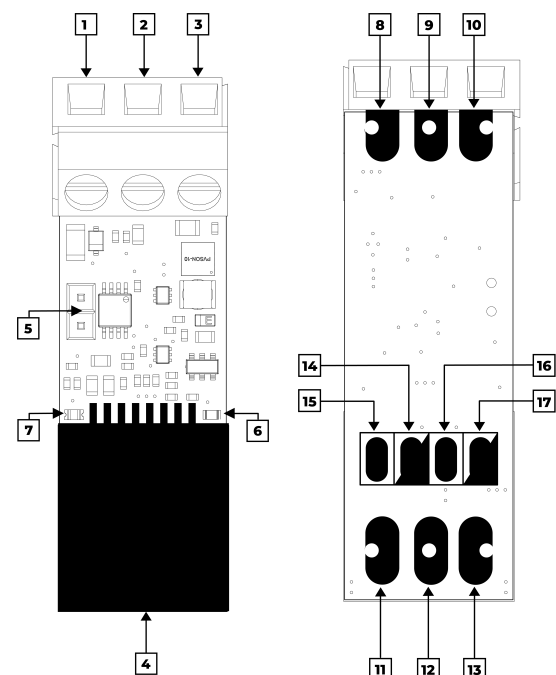


## PRODUCT DESCRIPTION

Topside	Type	Description
1	Power	Vcc / DC+ / 5-48V (same as 10)
2	BUS I/O	Data out/in (same as 9)
3	Power	GND/DC- (same as 8)
4	RJ45 Bus	Data input
Pin 1 (orange/white)	BUS I/O	PxLNet Data + in
Pin 2 (orange)	BUS I/O	PxLNet Data - in
Pin 7 (brown/white)	Power	PxLNet GND/DC-
Pin 8 (brown)	Power	PxLNet GND/DC-
5	Jumper	Rx/Tx selector
6	White LED	Power indicator
7	Blue LED	Data signal indicator

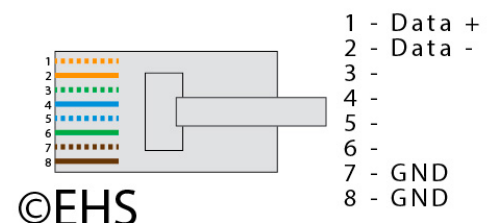
Underside	Type	Description
8	Power	GND/DC- (same as 3)
9	BUS I/O	Data out/in (same as 2)
10	Power	Vcc / DC+ / 5-48V (same as 1)
11	BUS I/O	PxLNet Data in/out +
12	BUS I/O	PxLNet Data in/out -
13	Power	PxLNet GND
14	AUX	Pin 6 (green)
15	AUX	Pin 3 (green/white)
16	AUX	Pin 4 (blue)
17	AUX	Pin 5 (blue/white)

(Wire colors according to T-568B standard)



### ESTA Standard

Our reference: Pinout A



©EHS

# TECHNICAL SPECIFICATIONS

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## Electrical

Input Voltage:	5 - 48 VDC
Max. power consumption:	1 W
Inrush current:	Max. 200 mA @ Ta 20°C
RMS current Rx mode:	5 VDC: 11.5 mA 12 VDC: 5.1 mA 24 VDC: 2.7 mA
RMS current Tx mode:	5 VDC: 81 mA 12 VDC: 31.5 mA 24 VDC: 16.6 mA

## Mechanical

Dimensions:	43,5 x 15,0 x 14,0 mm   1.71 x 0.59 x 0.55" (L x W x H)
Net weight:	10 gr   0.35oz

## Environmental

Ambient Temp. (Ta) in operation:	-20°C - 45°C   -4°F - 113°F
Storage temperature:	-20°C - 50°C   -4°F - 122°F
Max. operating relative humidity:	90% (indoor use only)

## Protection

IP rating:	IP00 (unprotected, indoor use only)
Voltage input:	Overvoltage protection (max. 48 VDC)

## Connectivity

Solder pad wiring:	0,3 - 0,5 mm <sup>2</sup>   20-24 AWG
Screw Terminal wiring:	0,25 - 1,5 mm <sup>2</sup>   16-24 AWG
Screw Terminal wiring data:	Recommended: 0,3-0,5 mm <sup>2</sup>   20-24 AWG

## Quality & compliances

Warranty:	1 year carry in factory warranty
Compliances:	CE, RoHs, all components are UL pending
Certification:	ETL certification pending
Applied standards:	EN60950-1:2006 +A11:2009 + A1:2010 + A12:2011 + A2:2013, IEC60950-1 / EN60950-1, EN61006-6-3, EN55032
HS Code:	85176990

# BEFORE INSTALLATION

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Before installing DiGidot products it is important to take notice of following safety and installation instructions.

## Safety instructions

- ▶ Before installation and using the product, read this manual carefully.
- ▶ Make sure that these instructions are handed over to the end-user and to those responsible for installation and usage.
- ▶ Local electrical and safety rules and guidelines always overrule this manual.
- ▶ DiGidot Technologies B.V. cannot be held liable for improper handling, product installation, usage or storage.
- ▶ Installation should only be carried out by a professional and certified installer who is qualified to work on the electric installation.
- ▶ Do not conduct any repairs of the device (there are no user serviceable parts). Any unapproved repairs and/or product modifications will void product warranty. DiGidot Technologies B.V. cannot be held liable for any consequences.
- ▶ Repairs of this product may only be carried out by the manufacturer DiGidot Technologies B.V.
- ▶ Repairs and maintenance on the installation may only be carried out by qualified technicians.
- ▶ Always disconnect the mains power when working on a high voltage electric installation, not doing so may result in product damage and/or personal injuries.
- ▶ Do not connect or modify this product other than described in this manual.
- ▶ Never use a product that is defective or does not work correctly or when the product is visibly damaged or when the product starts to smoke, or when a crackling/sizzling noise is audible. If this is the case in any way, disconnect power and please contact your supplier immediately.
- ▶ This is a low voltage device. Working voltage is 5-48 Vdc only.
- ▶ The only way to power off this product is to disconnect it from the power source.
- ▶ The product is designed for indoor use (dry locations) only. Exposure to rain or moisture may cause fatal damage.

### **WARNING! TAKE ESD SAFETY PRECAUTIONS!**



This product is ESD sensitive. It is required to work in an ESD safe environment and undertake all necessary ESD protective precautions before installing and soldering this product, to minimise the risk of ESD inflicted product damage.

# MOUNTING OPTIONS

We recommend to place this product in a protected enclosure such as an electrical junction box. Double sided (foam)tape or acid free, non conductive and non corrosive glue/adhesives can be used on the underside of this product, to hold it in place. Please be careful when applying pressure, small components can come off when applying excessive force.

Be sure that none of the conductive parts, including the header pins on the underside, make any contact with conducting surfaces or materials, to prevent malfunctioning and damage.

When using heat shrink, please cover the entire module and be careful when applying heat, especially with heat guns. When overheating this product, components and soldering may come loose, resulting in fatal damage.

## TIP

It's safe to use and cover this product with appropriate electronic protection resin to improve IP rating. Another option to improve IP rating is to use a conformal coating spray for electronics after all wires have been connected/soldered.

## WARNING

- This product should not be subjected to higher temperatures than their specified range (risk of fatal damage)!
- Keep this products away from direct sunlight, rain or other moisture (short circuit risk).
- Do not use this product outdoors or in humid environments (short circuit risk).

# INSTALLATION & WIRING

There are several ways to connect and integrate the PxLNet Transceiver module.

Use the RJ45 bus on the PxLNet input/output side or solder your PxLNet signal wires to the underside of the product. Please refer to the wiring schemes in this manual.

## PxLNet Data in/out

There are two ways to connect the PxLNet data:

1. Use the RJ45 bus to connect a Cat-5E network cable or better.
2. Solder a DMX cable (110Ω impedance STP) or Cat5e (or better) to the D+, D- and GND solder pads [1][12][13] on the underside of the PCB.

## Data in/out & power in

Connect the wires inside the screw terminals with a wire gauge of 0,25 - 1,5 mm<sup>2</sup> | 16-24 AWG, to screw terminals [1][2][3].

## NOTE:

- \* Keep wires between output and LED product within **2 meters** (6.5 ft) in length.
- \* Check the full specifications and recommendations on the **thickness** of the wire on page 6.
- \* Ground output wire from PxLNet Transceiver must be **equal** in length as the Data wire.



## Solder instructions

Soldering this product should be carried out carefully by a trained and certified electronics professional.

- Please pre solder all wires.
- Max. Soldering temperature: 400°C (752°F) for max. 3 seconds.
- Use RoHS compliant lead free solder wire.

### **WARNING! TAKE ESD SAFETY PRECAUTIONS!**



This product is ESD sensitive. It is required to work in an ESD safe environment and undertake all necessary ESD protective precautions before installing and soldering this product, to minimise the risk of ESD inflicted product damage.

## Power supply

To power this product, the DC+ and GND must be connected to a SELV rated power supply that provides appropriate power at the required supply voltage.

Before applying power, make sure that the outputs are wired and soldered correctly to avoid short circuits.

### **WARNING!**

Applying, AC power and/or higher voltages can cause fatal damage to this product.

### **IMPORTANT**

Make sure to equalize the ground potentials.

Always connect grounds (DC-) of the DiGidot Controller and every power supply, connected to every product that is controlled by a single DiGidot Controller to each other.

The ground connection between a DiGidot PxLNet Transmitter and a PxLNet Transceiver or multiple Transceivers are automatically established when using the RJ45 bus with a network cable in between.

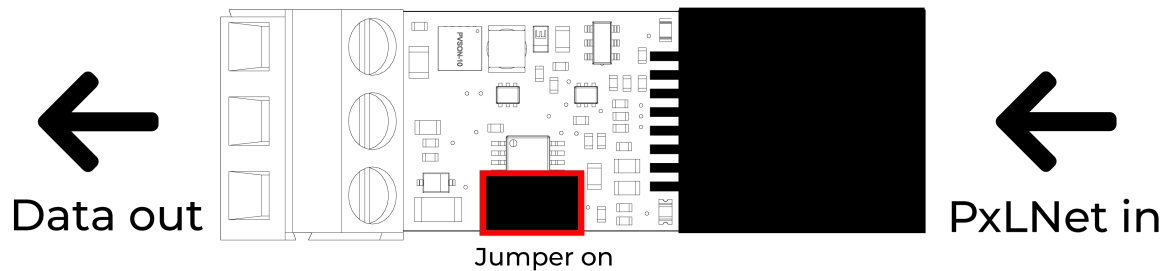
# OPERATING MODES (Rx/Tx)

## Receiver mode (Rx)

The default operating mode of the PxLNet Transceiver is Receiver mode (Rx).

Please make sure that the Rx/Tx jumper [5] is installed.

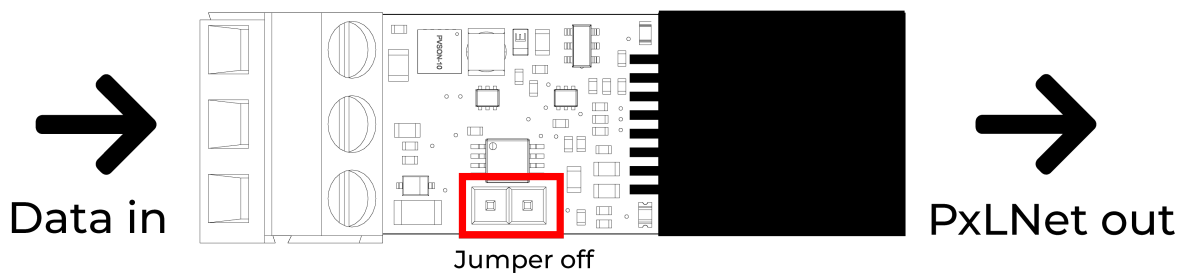
The PxLNet data is received, converted to the original protocol and sent on the output it's data pin.



## Transmit mode (Tx)

In order to use the PxLNet Transceiver as a single channel transmitter, connect the D (center pin of screw terminal [2] or [9] as indicated on page 5) to the incoming SPI Data signal.

Remove the Tx/Rx jumper [5] as indicated, to activate transmit (Tx) mode.



Connect a network cable to the RJ45 bus and connect it to the next PxLNet Transceiver in receiving mode (Rx).

Instead of connecting a network cable to the RJ45 bus, a cable can also be soldered to solder pads [11][12][13] on the bottom side (as indicated on page 5).

The distance between two PxLNet Transmitters is max. 250 meters (820 ft).

# Wiring schemes

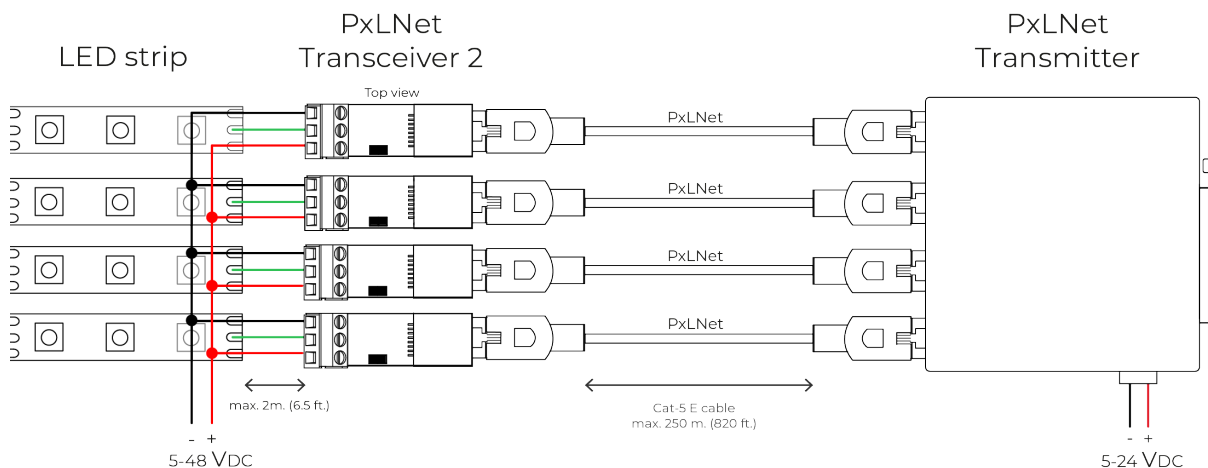
Following wiring schemes show various options to connect this product. There are many more connection options and combinations possible which may not be listed in this manual. As long as following wiring principals are followed, a wide range installation options can be created.

- ▶ PxLNet Transceivers must be powered properly as indicated.
- ▶ If LED products need to be powered at other voltages than 5-48 Vdc, separate powering is required. In this case all grounds must be connected at any time.
- ▶ Use proper network cables or DMX cables as indicated on page 8. Thicker wires and higher cable impedance may result in unstable or corrupted data.

## Wiring scheme 1 option 1

## Convert PxLNet to SPI Data

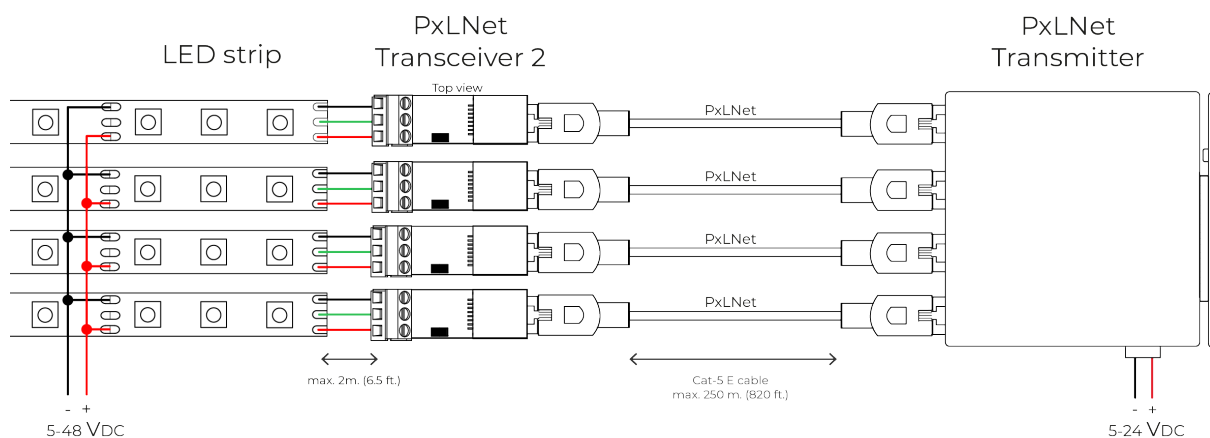
DiGidot Controller with PxLNet Transmitter connected by Cat-5E network cables to PxLNet Transceivers. The wires from the LED strips are screwed in on the other side to the Screw Terminals.



## Wiring scheme 1 option 2

## Supply power at a different location

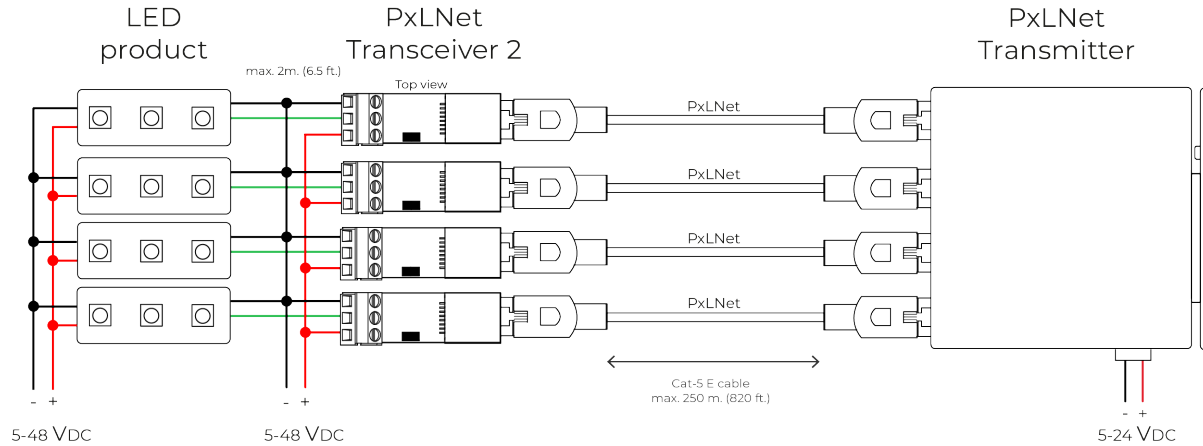
Same as #1 but the power supply is connected further on the LED strip and then the power travels through the LED strip to feed the Transceiver.



## Wiring scheme 2

## Different operating voltages

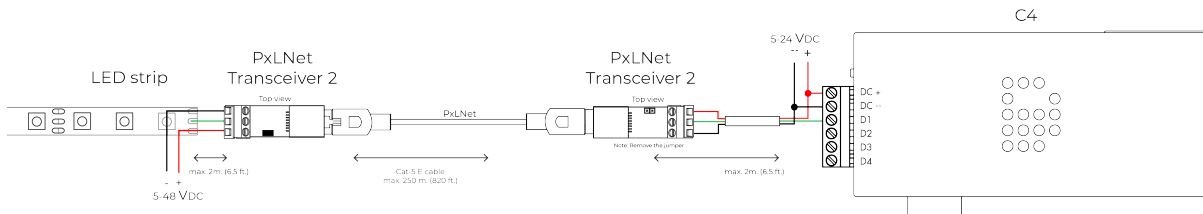
DiGidot Controller with PxLNet Transmitter connected by Cat-5E network cables which are connected to PxLNet Transceivers, which are wired to pixel controlled LED products, that run on another power supply and/or voltage.



## Wiring scheme 3

## Transceiver in transmit mode

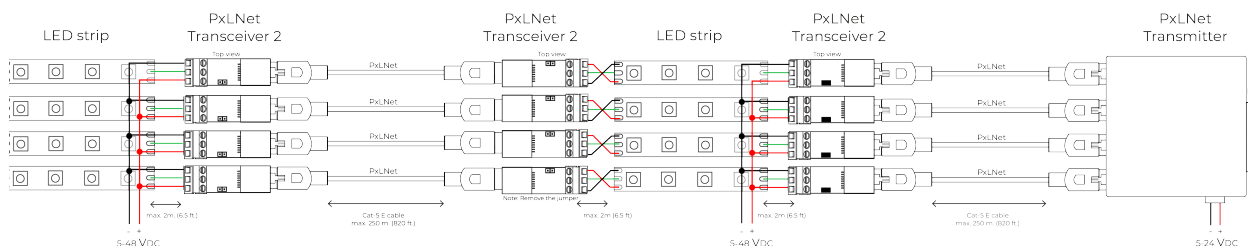
DiGidot Controller with a 3-core wire (max 2 m), to the PxLNet Transceiver in **Transmit** mode and has **no** jumper installed. The PxLNet Transceiver on the other end (left of the image) is in **Receiver** mode and they're connected with a CAT-5E network cable. This same setup of Transceivers can be used between the Controller and the LED tape, but also between 2 LED tapes so the tapes themselves can be further away from each other as shown in the next wiring scheme.



## Wiring scheme 4

## Daisy-chain Transceivers

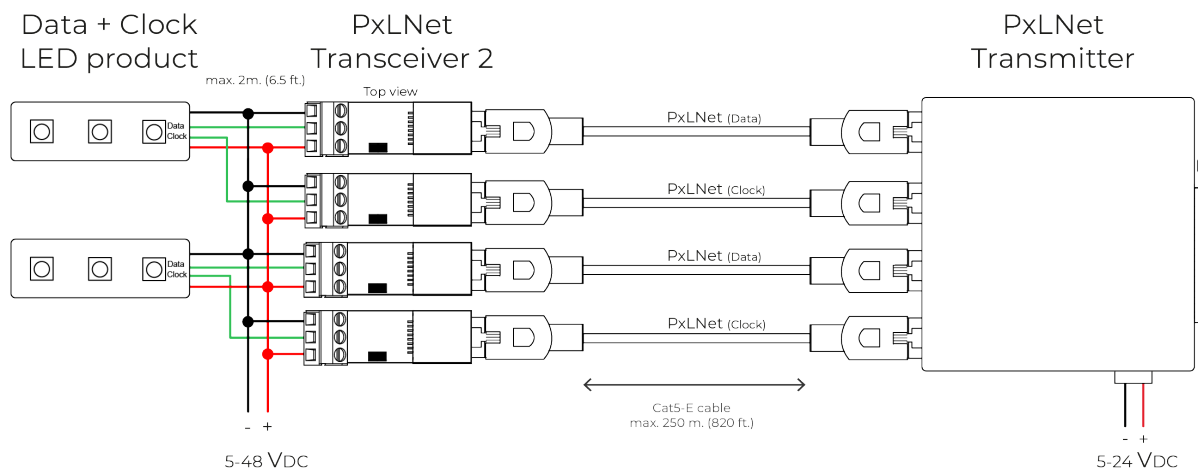
DiGidot Controller with a PxLNet Transmitter connected with a CAT-5 E cable directly to a PxLNet Transceiver. Then the LED strip is connected to the Screw Terminals. At the end of the LED strip, the Transceiver is used in **Transmit** mode (**no** jumper present) to convert the data signal to a PxLNet signal up to 250 meters away to the next PxLNet Transceiver.



## Wiring scheme 5

## Convert PxLNet to SPI Data + Clock

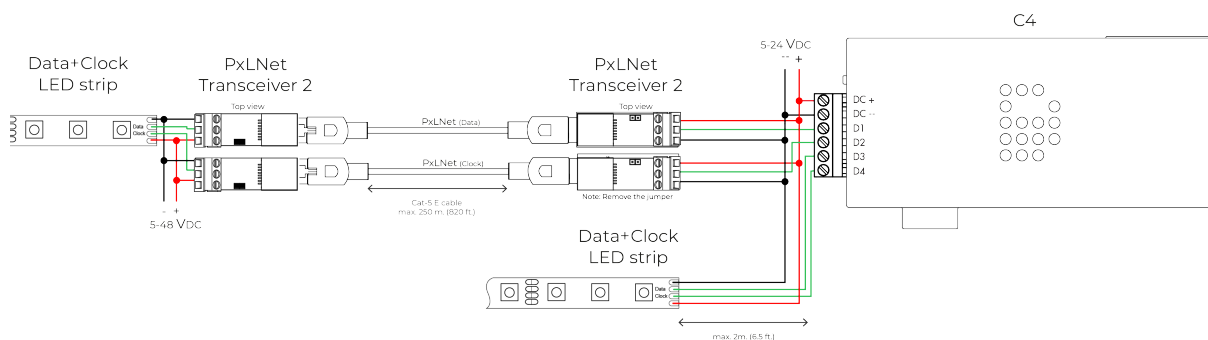
PxLNet Transceivers can also be used to convert two PxLNet data lines to Data + Clock SPI signals. For this option a dual Transceiver setup is required.



## Wiring scheme 6

## Combine short & long range Data + Clock SPI

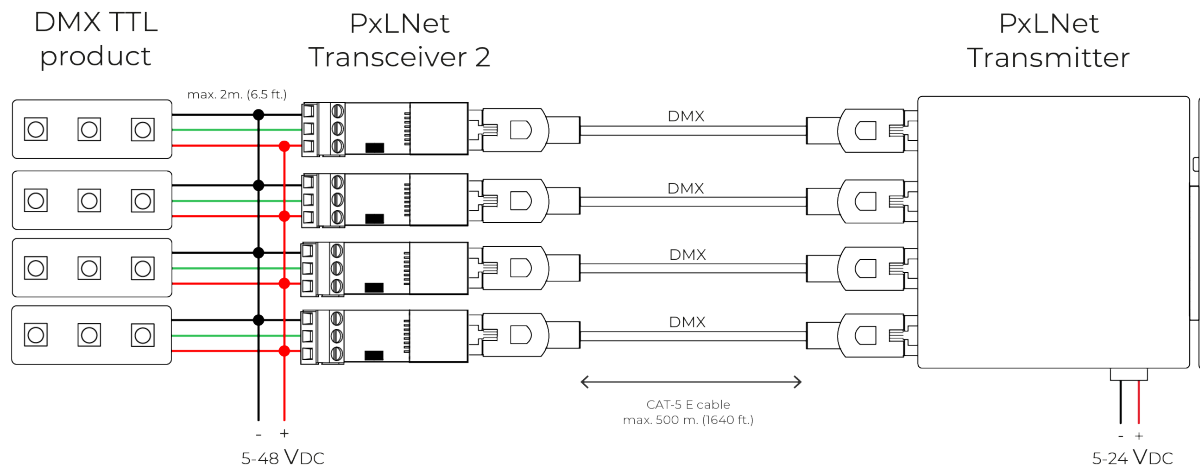
DiGidot Controller with a PxLNet Transmitter connected by Cat-5E network cables to PxLNet Transceivers. The LED strip is connected to the Screw Terminals. The power is separated here into 2 area's so they can run at different voltages.



## Wiring scheme 7

## Extending DMX TTL signals

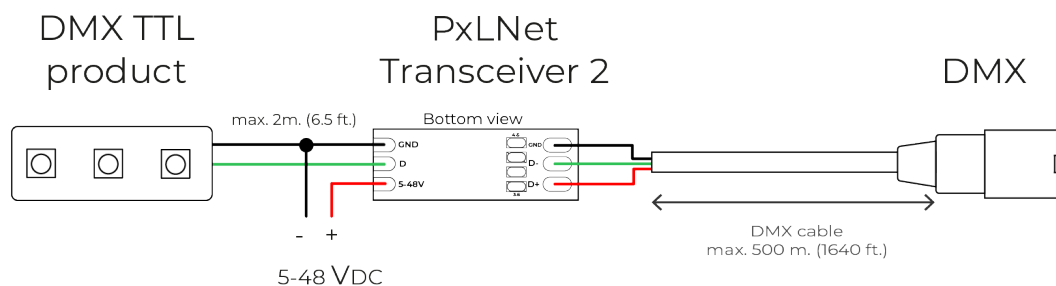
DiGidot Controllers with a PxLNet Transmitter, connected by Cat-5E network cables to PxLNet Transceivers. Please note that DMX TTL must be configured on the DiGidot Controller on the In/out configuration page.



## Wiring scheme 8

## Converting DMX to DMX TTL

Using an external DMX signal, connected to a PxLNet Transceiver which is connected to a DMX TTL controlled LED product. The DMX signal can be soldered, as indicated in the drawing or can be inserted in the RJ45 bus on the top side (DMX pinout according to USITT standard, see page 5)



**Note:** These wiring schemes do not necessarily show correct powering your LED products. All wiring schemes in this manual are for reference only, please refer to the technical information or user manual of your LED product, supplied by the manufacturer.

# PROPAGATION DELAY

The PxLNet Transceiver is designed to relay signals at very high speeds. When multiple PxLNet Transceivers are used to extend the signal, there is a negligible build up of propagation delay of only 1,6  $\mu$ s (micro seconds), which is equal to  $\pm 2$  SPI IC's. This means that large numbers of PxLNet Transceivers (possibly more than 100), can be used without visual decline of performance. It's safe to assume that in case any visual performance decrease, it's most likely due to other (external) factors.

# AUXILIARY BREAK OUT

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The PxLNet Transceiver uses at least 3 wires: Data +, Data - and GND (GND is connected twice) for the PxLNet signal, this means that there are two (blue and green) unused wire pairs inside a network cable (not applicable to DMX cable). These wires can be used for low voltage purpose up to 48 Vdc and a maximum current of 200 mA. Use solder pads [14][15][16][17] to make use of these wires.

## TIPS & TROUBLESHOOTING

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In case you run into any trouble, please check your setup according to following checklist.

### Standard troubleshooting checklist

1. Double check all cables and connections.
2. Double check soldered connections
3. Double check Network cable pinout and any crimped connectors
4. Is the DiGidot Controller powered correctly?
5. Are the LEDs powered correctly?
6. Are all power supplies connected correctly to your mains power supply.
7. Are the Power and data led indicators lit on the PxLNet Transceiver?
8. Are the DiGidot Controllers its input and output configuration correctly?
  - Make sure that the correct IC/SPI protocol is configured.
  - Make sure that input and output matches the system setup.Use the highlight option to test the outputs.
9. Is your DiGidot controller network setup done correctly?
  - Prevent IP Address conflicts
  - Make sure that the subnet mask range is set correctly and that all IP Address are set within the appropriate range.
  - Refer to further trouble shooting tips in the DiGidot Controller its user manual.
10. Is your ground (DC-) from the DiGidot Controller its output terminal connected to all the grounds of the LED products power supplies? The grounds run through the network cables.
11. Is the Rx/Tx jumper installed or removed correctly?

# GENERAL INFORMATION

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## Online resources

For technical specifications, latest documentation, manuals, product information, support and upgrades, please visit [www.digidot.eu](http://www.digidot.eu).

## Remarks

We've put great care in writing this manual. However in case you encounter any discrepancies or unclarities, please contact us.

## Compliances & EU declaration of Conformity



This product is designed and produced by DiGidot Technologies B.V., Amsterdam, The Netherlands. Hereby, DiGidot Technologies B.V. declares that this product complies with and was tested according to essential requirements of all relevant CE directives.

## Warranty



This product is covered by a carry-in manufacturer's warranty of 1 year which covers any design faults, production faults and component failures.

Warranty voids if the product was installed or used incorrectly or not in accordance with this manual and/or if the product was damaged due to external factors, modified or electrically overloaded. Warranty conditions of DiGidot Technologies B.V. apply. Warranty claims have to be issued by email: [support@digidot.eu](mailto:support@digidot.eu).

## Disposal and recycling



This product should not be disposed with other household waste. When you decide to dispose this product, do so in accordance with local environmental and recycling regulations.

## Feedback



Tell us all about your experience with DiGidot!

The continuous development of the DiGidot control platform is only possible thanks to feedback from our users. If you have any suggestions, please contact us by email: [info@digidot.eu](mailto:info@digidot.eu).

## Imprint

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