

# MaNima Extensa / Recepta / Tricepta

## Highlights

- Extend digital LED data fixtures **up to 100 meter**
- No additional external power supply required
- Recepta's **small form factor** fits inside LED extrusion profile
- Tricepta's DIN rail enclosure allows **remote junction box** build for industrial designs
- Extensa's **DIN rail enclosure** fits perfectly next to MaNima Magnus or Pollux
- **Up to 3 LED data lines per cable** (using Tricepta as receiver)
- Extensa uses **DIP switches** for easy set up
- LED power indicator for debugging
- All device have a flexible wide input voltage, **12-50VDC**
- Extensa optionally extends Pollux **NTC analog lines** to measure temperature of digital LED lines
- Recepta can be bought with or without connectors for an ever smaller footprint: **45.6x21.5 mm**

## Description

The Extensa converts digital data from the MaNima Magnus into a robust differential signal, which can be transmitted via shielded CAT6 cables to a Recepta or Tricepta. These devices then convert the differential signal back into digital data, making it suitable for use with digital LEDs

The Tricepta can handle up to three differential LED data lines simultaneously, converting them into three separate LED outputs, which is equivalent to directly connecting three LED lines to the MaNima Magnus driver. The Recepta allows you to select one of the three data lines for conversion using a rotary switch.

Additionally, both the Recepta and Tricepta support temperature monitoring of the LED through an NTC sensor. The Recepta can directly send the temperature data back to the Extensa and the Pollux. The Tricepta can also connect to an external NTC sensor for measuring the temperature of a remote LED fixture.

The Recepta can also function as a transmitter when placed at the end of a digital LED line. In this mode, it generates a differential signal to extend the cable distance between LED lines, without requiring an external power supply. This differential signal can then be received and processed by another Recepta configured as a receiver.

## Applications

- Projects with central technical cabinets
- LED lines with long distance breaks in between
- Remote limited space LED lines
- Measure LED line temperature on far away LED lines (> 30m)

## Contents

Highlights.....	1
Applications.....	1
Description .....	1
Revision history .....	3
Electrical specifications .....	4
Extensa .....	4
Absolute maximum ratings .....	4
Powering the Extensa.....	4
Recepta.....	5
Absolute maximum ratings .....	5
Powering the Recepta .....	5
Tricepta .....	6
Absolute maximum ratings .....	6
Powering the Tricepta .....	6
Pinout .....	7
Extensa .....	7
Recepta.....	9
Extensa settings .....	10
DIP switch settings .....	11
Recepta settings .....	11
Tricepta settings .....	12
NTC connections.....	12
Tricepta .....	12
Recepta.....	12
Typical applications.....	13
3 remote LED fixtures with Extensa and Recepta’s .....	13
6 remote LED fixtures with remote junction box.....	14
2 remote LED fixtures with temperature measurement .....	15
Extending LED strips .....	16
Mechanical specifications .....	17
Extensa .....	17
Tricepta .....	17
Recepta.....	17

Ordering information ..... 18  
Disclaimer ..... 18

## Revision history

Revision	Change	Author	Reviewer	Date
1.0	Initial release	MvdH	NOo	August 2024

# Electrical specifications

## Extensa

### Absolute maximum ratings

Applying ratings above the following figures might lead to permanent damage which is not covered by warranty.

Table 1 Absolute maximum ratings for Extensa

Absolute maximum rating	Min	Max	Unit
Power supply input	9	50	V
Digital input levels	-0.3	6.0	V
Differential output voltage	-15	+15	V
Differential output current		250	mA
NTC output voltage	0	3.3	V
NTC output current		30	mA

Table 2 Electrical ratings for Extensa

Specification	Min	Max	Unit	Condition
Power supply	12	48	V	
Idle supply input current <sup>1</sup>		100	mA	12V
		66	mA	24V
		33	mA	48V
Idle power consumption <sup>1</sup>		1.2	W	12V
		1.4	W	24V
		1.6	W	48V
Operating temperature	10	50	°C	
Humidity	20	80	%	
IP rating	IP52			
Long line ESD protection IEC 61000-4-2	8/15		kV	Contact/air
Long line EFT <sup>2</sup> protection IEC 61000-4-4	2		kV	
Long line surge protection <sup>3</sup> IEC 61000-4-5	1		kV	

<sup>1</sup>Idle means no outputs or inputs are driven, only power being supplied

<sup>2</sup>EFT = Electrical Fast Transients

<sup>3</sup>Surges can come from switching transients from nearby devices or nearby lightning strikes

## Powering the Extensa

The Extensa can be connected to the same power supply as the Magnus or Pollux it is connected to.

## Recepta

### Absolute maximum ratings

Applying ratings above the following figures might lead to permanent damage which is not covered by warranty.

Table 3 Absolute maximum ratings for Recepta

Absolute maximum rating	Min	Max	Unit
Power supply input (LED fixture side)	9	50	V
Power supply input (cable side)	4.0	6.0	V
Digital input levels	-0.3	6.0	V
Differential input voltage	-15	+15	V
LED data output current		+/-25	mA

Table 4 Electrical ratings for Recepta

Specification	Min	Max	Unit	Condition
Power supply	12	48	V	
Idle supply input current <sup>1</sup>		50	mA	12V
		30	mA	24V
		20	mA	48V
Idle power consumption <sup>1</sup>		0.6	W	12V
		0.72	W	24V
		0.96	W	48V
Operating temperature	10	50	°C	
Humidity	20	80	%	
IP rating	IP52			
Long line ESD protection IEC 61000-4-2	8/15		kV	Contact/air
Long line EFT <sup>2</sup> protection IEC 61000-4-4	2		kV	
Long line surge protection <sup>3</sup> IEC 61000-4-5	1		kV	

<sup>1</sup>Idle means no outputs or inputs are driven, only power being supplied

<sup>2</sup>EFT = Electrical Fast Transients, coming from capacitive coupling to the wiring

<sup>3</sup>Surges can come from switching transients from nearby devices or nearby lightning strikes

### Powering the Recepta

Power is fed through the data cable, but can also be obtained from the LED fixture. When both are connected, the Recepta will automatically select a power supply for its own logic.

Note that the Recepta cannot output power to the LED fixtures, these have to be powered externally.

## Tricepta

### Absolute maximum ratings

Applying ratings above the following figures might lead to permanent damage which is not covered by warranty.

Table 5 Absolute maximum ratings for Tricepta

Absolute maximum rating	Min	Max	Unit
Power supply input (LED fixture side)	9	51	V
Power supply input (cable side)	4.0	6.0	V
Digital input levels	-0.3	6.0	V
Differential input voltage	-15	+15	V
LED data output current		+/-25	mA
NTC output current		+/-25	mA

Table 6 Electrical ratings for Tricepta

Specification	Min	Max	Unit	Condition
Power supply	12	48	V	
Idle supply input current <sup>1</sup>		100	mA	12V
		66	mA	24V
		33	mA	48V
Idle power consumption <sup>1</sup>		1.2	W	12V
		1.4	W	24V
		1.6	W	48V
Operating temperature	10	50	°C	
Humidity	20	80	%	
IP rating	IP52			
Long line ESD protection IEC 61000-4-2	8/15		kV	Contact/air
Long line EFT <sup>2</sup> protection IEC 61000-4-4	2		kV	
Long line surge protection <sup>3</sup> IEC 61000-4-5	1		kV	

<sup>1</sup>Idle means no outputs or inputs are driven, only power being supplied

<sup>2</sup>EFT = Electrical Fast Transients, coming from capacitive coupling to the wiring

<sup>3</sup>Surges can come from switching transients from nearby devices or nearby lightning strikes

### Powering the Tricepta

Power is fed through the data cable, but can also be obtained from one or all of the LED fixture outputs. When all are connected, the Tricepta will automatically select a power supply for its own logic.

Note that the Tricepta cannot output power to the LED fixtures, these have to be powered externally.

# Pinout

## Extensa

The connectors on the Extensa are layout like this.

*Table 7 Extensa input connector 1 pinout*

Pin	Signal	Values
<b>CN1.1</b>	Ground	
<b>CN1.2</b>	Ground	
<b>CN1.3</b>	Power input	12-48V
<b>CN1.4</b>	Ground	
<b>CN1.5</b>	Data input port 1	5V data input
<b>CN1.6</b>	Ground	
<b>CN1.7</b>	Data input port 2	5V data input
<b>CN1.8</b>	Ground	
<b>CN1.9</b>	Data input port 3	5V data input

*Table 8 Extensa input connector 2 pinout*

Pin	Signal	Values
<b>CN2.1</b>	Ground	
<b>CN2.2</b>	Ground	
<b>CN2.3</b>	Power input	12-48V
<b>CN2.4</b>	Ground	
<b>CN2.5</b>	Data input port 4	5V data input
<b>CN2.6</b>	Ground	
<b>CN2.7</b>	Data input port 5	5V data input
<b>CN2.8</b>	Ground	
<b>CN2.9</b>	Data input port 6	5V data input

The outputs of the Extensa are shielded RJ45 to protect the signal integrity from external influences.

Table 9 Extensa output connector pinout

Output pin	Signal	Output pin	Signal
<b>Output 1.1.1</b>	Data 1 Positive	<b>Output 2.1.1</b>	Data 3 Positive
<b>Output 1.1.2</b>	Data 1 Negative	<b>Output 2.1.2</b>	Data 3 Negative
<b>Output 1.1.3</b>	VDD	<b>Output 2.1.3</b>	VDD
<b>Output 1.1.4</b>	Data 2 Positive / NTC +	<b>Output 2.1.4</b>	Data 4 Positive / NTC +
<b>Output 1.1.5</b>	Data 2 Negative / NTC -	<b>Output 2.1.5</b>	Data 4 Negative / NTC -
<b>Output 1.1.6</b>	Ground	<b>Output 2.1.6</b>	Ground
<b>Output 1.1.7</b>	Data 3 Positive	<b>Output 2.1.7</b>	Data 5 Positive
<b>Output 1.1.8</b>	Data 3 Negative	<b>Output 2.1.8</b>	Data 5 Negative
<b>Output 1.2.1</b>	Data 2 Positive	<b>Output 2.2.1</b>	Data 4 Positive
<b>Output 1.2.2</b>	Data 2 Negative	<b>Output 2.2.2</b>	Data 4 Negative
<b>Output 1.2.3</b>	VDD	<b>Output 2.2.3</b>	VDD
<b>Output 1.2.4</b>	Data 3 Positive / NTC +	<b>Output 2.2.4</b>	Data 5 Positive / NTC +
<b>Output 1.2.5</b>	Data 3 Negative / NTC -	<b>Output 2.2.5</b>	Data 5 Negative / NTC -
<b>Output 1.2.6</b>	Ground	<b>Output 2.2.6</b>	Ground
<b>Output 1.2.7</b>	Data 4 Positive	<b>Output 2.2.7</b>	Data 6 Positive
<b>Output 1.2.8</b>	Data 4 Negative	<b>Output 2.2.8</b>	Data 6 Negative
<b>Output 3.1.1</b>	Data 5 Positive		
<b>Output 3.1.2</b>	Data 5 Negative		
<b>Output 3.1.3</b>	VDD		
<b>Output 3.1.4</b>	Data 6 Positive / NTC +		
<b>Output 3.1.5</b>	Data 6 Negative / NTC -		
<b>Output 3.1.6</b>	Ground		
<b>Output 3.1.7</b>	Data 1 Positive		
<b>Output 3.1.8</b>	Data 1 Negative		
<b>Output 3.2.1</b>	Data 6 Positive		
<b>Output 3.2.2</b>	Data 6 Negative		
<b>Output 3.2.3</b>	VDD		
<b>Output 3.2.4</b>	Data 1 Positive / NTC +		
<b>Output 3.2.5</b>	Data 1 Negative / NTC -		
<b>Output 3.2.6</b>	Ground		
<b>Output 3.2.7</b>	Data 2 Positive		
<b>Output 3.2.8</b>	Data 2 Negative		

The suggested counterpart for the used connector is a shielded RJ45 connector for CAT6(A) which is adjusted for the used cable diameter and conductors diameter.

Use the default color wiring scheme that applies to your area (T568A or T568B). Make sure to use the same color scheme on both ends, or use a premade patch cable.



## Recepta

The RJ45 connector pinout is as follows. If the Recepta without connector is used, the solder pads can be used to connect the cable.

*Table 10 Recepta input pinout*

Pin	Signal	Solder pad
<b>1</b>	Dataline 0 Positive	P1
<b>2</b>	Dataline 0 Negative	P2*
<b>3</b>	Extensa power V+	P3
<b>4</b>	Dataline 1 Positive / NTC	P4
<b>5</b>	Dataline 1 Negative / NTC	P5
<b>6</b>	Extensa power GND	P6
<b>7</b>	Dataline 2 Positive	P7*
<b>8</b>	Dataline 2 Negative	P8

\*These pads are not labeled because of limited space on the board, but are in logical order

The output is 3 pole terminal block, which contains the following signals

*Table 11 Recepta output pinout*

Pin	Signal	Solder pad
<b>1</b>	V+	V+
<b>2</b>	Data output	Data
<b>3</b>	Ground	GND

## Tricepta

The RJ45 connector J1 pinout is as follows.

*Table 12 Tricepta input connector pinout*

Pin	Signal
1	Dataline 0 Positive
2	Dataline 0 Negative
3	Extensa power V+
4	Dataline 1 Positive / NTC
5	Dataline 1 Negative / NTC
6	Extensa power GND
7	Dataline 2 Positive
8	Dataline 2 Negative

The NTC connector J3 pinout can be found below.

*Table 13 Tricepta NTC connector pinout*

Pin	Signal
1	NTC +
2	NTC -

The LED fixture output connector J2 is connected as this.

*Table 14 Tricepta output connector pinout*

Pin	Signal
1	Output 1 V+
2	Output 1 data
3	Output 1 ground
4	Output 2 V+
5	Output 2 data
6	Output 2 ground
7	Output 3 V+
8	Output 3 data
9	Output 3 ground

## Extensa settings

The extensa contains 6 DIP switches which are reachable without opening the enclosure. With these switches, the user can control if the data line should carry a digital data signal or an NTC signal.

### DIP switch settings

Table 15 DIP switch settings on Extensa

Dipswitch	Setting when on	Setting when off
<b>1</b>	Data port 1 is NTC	Data port 1 is digital LED data
<b>2</b>	Data port 2 is NTC	Data port 2 is digital LED data
<b>3</b>	Data port 3 is NTC	Data port 3 is digital LED data
<b>4</b>	Data port 4 is NTC	Data port 4 is digital LED data
<b>5</b>	Data port 5 is NTC	Data port 5 is digital LED data
<b>6</b>	Data port 6 is NTC	Data port 6 is digital LED data

All settings can be used together or mixed.

## Recepta settings

The Recepta contains a rotary switch to select the different modes. The settings are according to the following table.

Each CAT6 cable contains 3 datalines. One of these can also carry the NTC signal.

Table 16 Recepta rotationswitch settings

Switch setting	Mode	Remark
<b>0</b>	Receiving data from dataline 1	No NTC
<b>1</b>	Receiving data from dataline 2	No NTC
<b>2</b>	Receiving data from dataline 3	No NTC
<b>3</b>	Transmitting data to dataline 1	No NTC
<b>4</b>	Transmitting data to dataline 2	No NTC
<b>5</b>	Transmitting data to dataline 3	No NTC
<b>6</b>	Receiving data from dataline 1	NTC enabled on dataline 2
<b>7</b>	Receiving data from dataline 3	NTC enabled on dataline 2
<b>8 to F</b>	Equal to setting 0	Reserved for future use

Setting 0,1 and 2 and 6 and 7 can be changed on the fly. When going from setting 2 to 3 or from 6 to 5 the device needs to be power cycled. Before the power cycle, the device will keep the previous setting (setting 2 when going to 3, or setting 6 when going to 5).

Make sure no Extensa or other transmitting device is on the bus when switching to transmitting modes.

## Tricepta settings

The only setting on the Tricepta is to select if dataline 2 is containing digital LED data or NTC signals.

To do this, a switch is mounted next to the RJ45 input connector. Default setting (away from the edge of the board) means dataline 2 contains LED data. In the other case, dataline 2 contains NTC signals.

An NTC can be connected to the terminal block next to the switch.

## NTC connections

### Tricepta

The Tricepta has a 2 pole terminal block J3 which an NTC can be connected to. To enable this, turn on the switch SW1 next to the terminal. When this is done, output 2 of the Tricepta is disabled. Only output 1 and output 3 are still available.

To determine which input on the Extensa the NTC input of the Pollux should be connected to, refer to Table 9 Extensa output connector pinout. Here also the output connector can be determined.

Make sure to turn the DIP switch on the Extensa to the ON position for the input that is connected to the Pollux NTC port.

### Recepta

The Recepta has a build-in NTC sensor next to one of the mounting holes. To use it, attach the Recepta to the LED fixture it should measure.

Turn the rotating switch to setting 6 or 7 to enable the NTC. Use Table 9 Extensa output connector pinout to determine which input of the Extensa should be used for data and the NTC connection.

Make sure to turn the DIP switch on the Extensa to the ON position for the input that is connected to the Pollux NTC port.

## Typical applications

### 3 remote LED fixtures with Extensa and Recepta's

In this application it is demonstrated how to configure the Extensa en Recepta to configure a system containing 3 remote LED fixtures.

The global hardware connections are shown below.

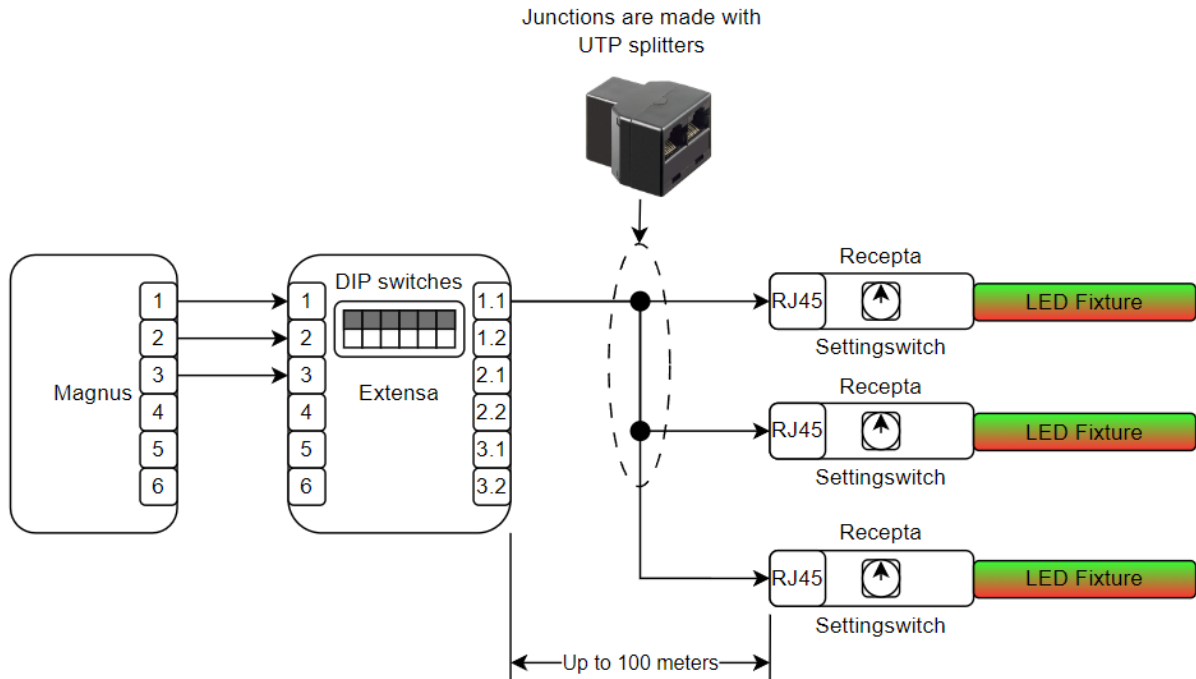


Figure 1 Simplified diagram of 3 remote LED fixture application

Using UTP splitters, the CAT6 cable can be split.

Note that the LED fixtures are not powered by the Recepta and they need an external power supply. When connecting a LED strip to the Recepta, the + and – connections can also be connected. The Recepta will automatically select a proper power supply for its own logic.

The Extensa's DIP switches are all set to the OFF position, since no NTC's are connected.

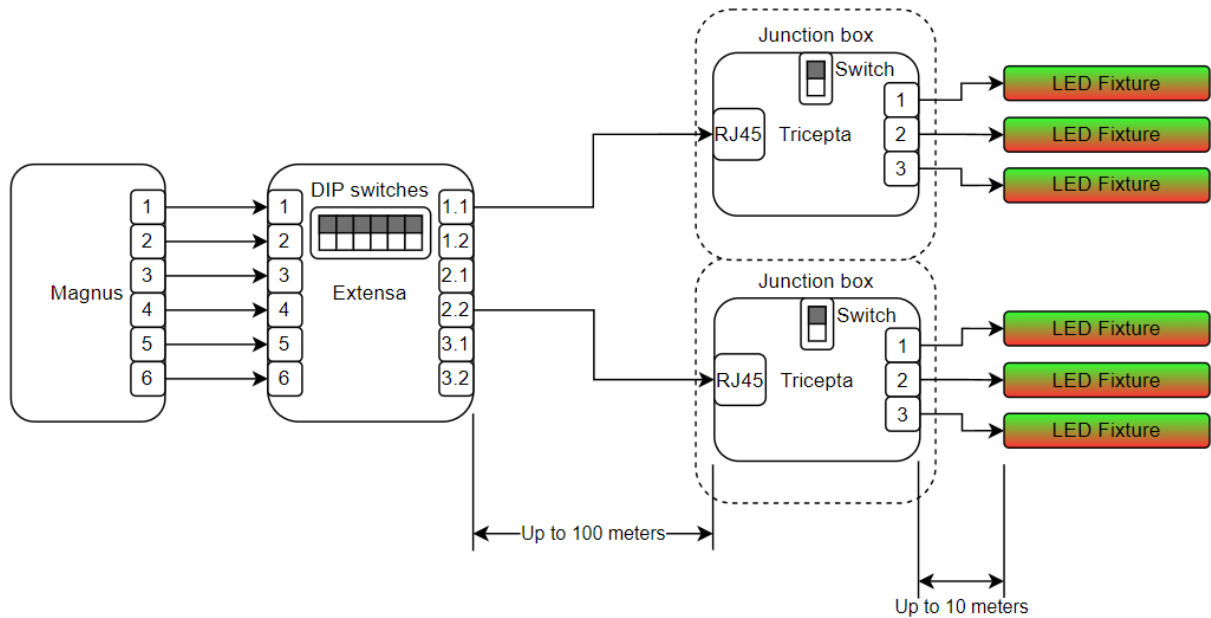
The top Recepta will receive data from Magnus port 1 by setting the rotary switch to "0". According to the table from the Recepta settings chapter, this means receiving data line 1.

The middle Recepta should output port 2 from the Magnus. This is done by setting that rotary switch to "1", Receiving data from dataline 2.

The lower Recepta's rotary switch is set to "2", so it outputs the data received from the Magnus port 3.

## 6 remote LED fixtures with remote junction box

In this application, 6 LED fixtures are driven with only 2 UTP cables. The Tricepta will receive all 3 data lines and outputs them. The global idea is found in the image below.



The Extensa is fully connected to the Magnus, of which all 6 ports are connected. Then, output 1.1 and 2.2 are connected to two Tricepta's. The reason to choose these two ports are found in the table from the pinout Extensa chapter. The output table makes it clear that output port 1.1 contains dataline 1, 2 and 3, and output port 2.2 contains dataline 4, 5 and 6. This means all ports are distributed.

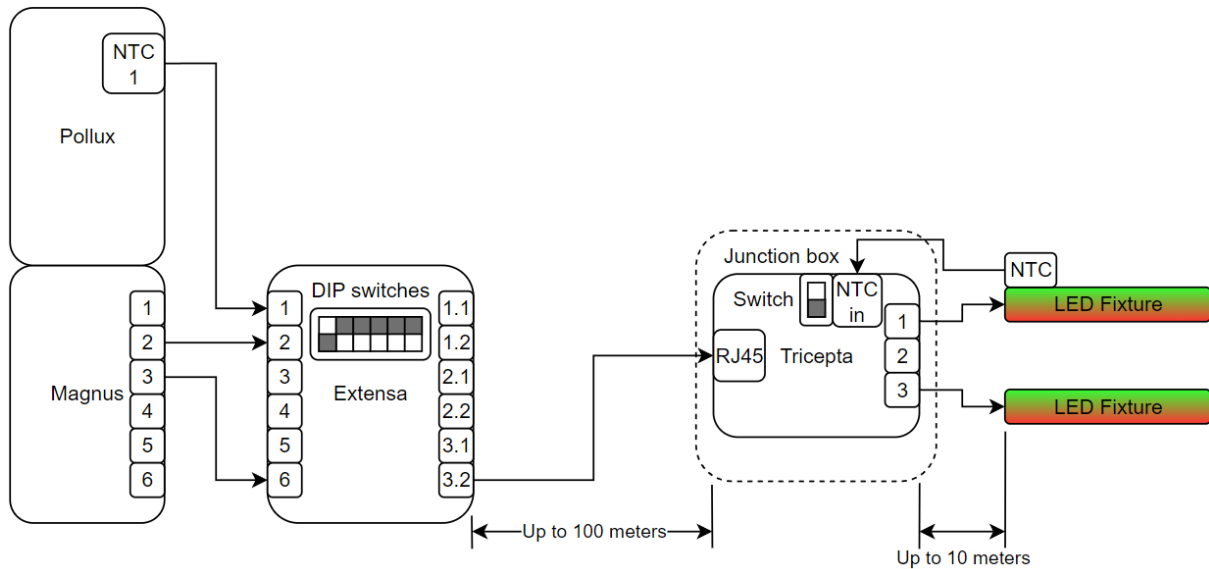
The Extensa's DIP switches are all set to the OFF position, since no NTC's are connected.

The switch on the Tricepta should stay in the default position (in the position where the lid is away from the board edge). Then dataline 2 and dataline 5 are outputted as data to the LEDs.

## 2 remote LED fixtures with temperature measurement

In this application, a Pollux is used to measure the temperature of a remote LED fixture. With the help of Table 9 Extensa output connector pinout, one finds the combination of which NTC input can be used and which inputs should be data inputs.

In the image below the global setup is found.



According to Table 9 Extensa output connector pinout, one can find when using port 3.2, dataline 1 contains data input 6, dataline 2 contains input 1, and dataline 3 contains input 2. Since the input 1 will be NTC, we set the DIP switch channel 1 to its ON position.

Output 3.2 will now contain dataline 6, NTC signal from input 1 and data from input 2.

Input 6 (port 3 of the Magnus) is outputted on the output 1 on the Tricepta. Input 2 is outputted on port 3 of the Tricepta.

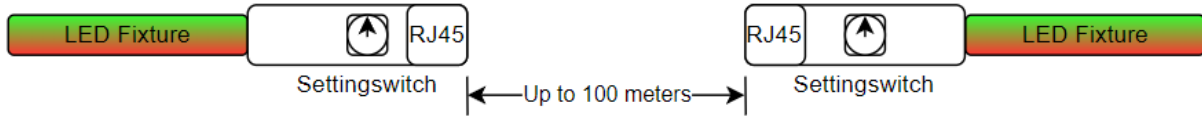
Output 2 of the Tricepta will now do nothing, because the NTC switch on the Tricepta is turned on.

Make sure the switches are in the right positions.

## Extending LED strips

Another application of the Recepta is to extend digital LED strips to reach further distances.

A global image is found below.



Imagine the direction of the data is from left to right. So the left LED fixture will feed data into the left Recepta.

This Recepta should be set to setting mode 3 (found in Table 16 Recepta rotationswitch settings). When setting the Recepta in this mode, make sure to power cycle the Recepta.

Note that the power of the left Recepta will be fed by the LED fixture, so connect the ground and V+ to the Recepta.

On the right Recepta, which is set to setting mode 0 (found in Table 16 Recepta rotationswitch settings), the data is received and send to the LED fixture.

On the receiving side the LED power supply can also be connected to the V+ and ground of the Recepta, it will select the right power supply automatically.

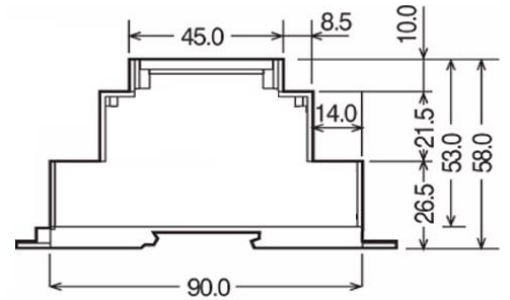


## Mechanical specifications

All devices except the Recepta are fitted inside an DIN rail enclosure.

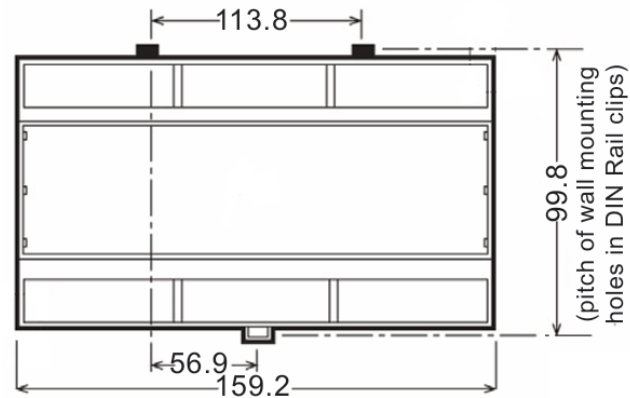
Dimensions are found in the image on the right. The width of the enclosure is found below.

- Desing meet requirements of DIN 43880
- Fits 35mm DIN rail or screwed to flat surface
- Durable Light gray UL94-VO Flame retardant PC material
- 90mm long and 58mm high



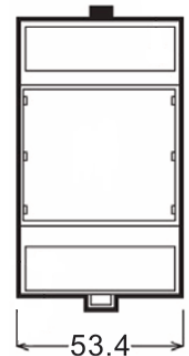
### Extensa

The enclosure of the Extensa is 3 units wide, or 159.2mm.



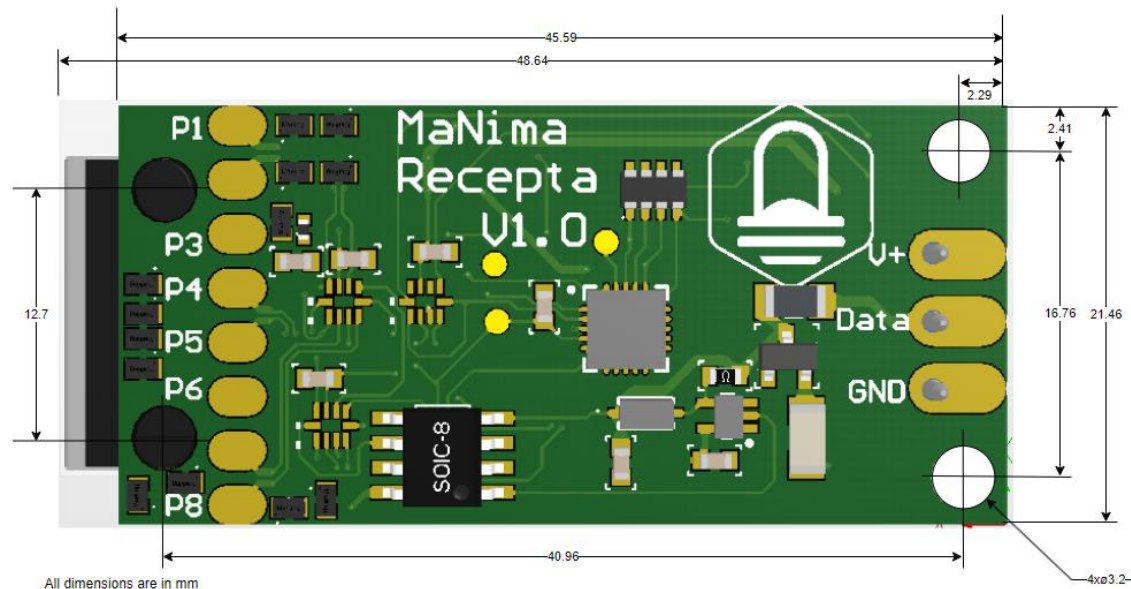
### Tricepta

The enclosure of the Tricepta is 1 unit wide, or 53.4mm. The pitch of the wall mounting holes is 99.8mm, equal to the Extensa enclosure.



### Recepta

The Recepta is a bare PCB without enclosure. The dimensions are found in the image below.



All dimensions are in mm

## Ordering information

Order number	Type	Remark
<b>EXTENSA</b>	MaNima Extensa	In DIN rail enclosure
<b>TRICEPTA</b>	MaNima Tricepta	In DIN rail enclosure
<b>RECEPTA</b>	MaNima Recepta	With connectors
<b>RECEBARE</b>	MaNima Recepta	Without connectors

All products are carefully handled and packaged in ESD safe methods.

## Disclaimer

The information provided in this datasheet is “AS IS” and can change any moment without notice. MaNima Technologies BV can never be held responsible for mistakes, typo’s or other faults that lead to failures or errors in a realization. We advise to regularly check this document for updates by checking the revision on the top left corner of each page.