PHILIPS

Fortimo

LEDFlex
Continuous Light G1

Design-in Guide

Fortimo LEDFlex Continuous Light

July 2021

Contents

Important

Please take the time to read this installation guide before you install this Philips LED product and driver. The guide contains important information regarding installation and operation.

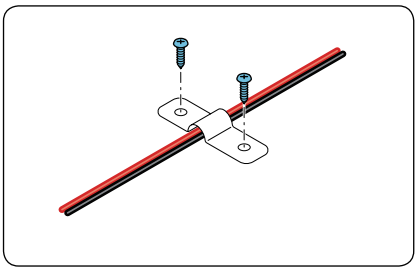
Warranty

Warranty only applies when the appropriate Philips LED driver and Philips cabling (as described in this guide and leaflets)
are used. Please visit our website www.philips.com/OEM or contact your local sales office for more information.

⚠ Warnings and system restrictions

In order to provide information in the best possible way, Philips' philosophy on product documentation is the following.

- This product is for built-in use only. (Its required to cover the LEDFlex)
- More detailed information on design-in can be found on our website: www.philips.com/oem
- Do not switch on the LEDFlex when on the reel.
- This product may require a heatsink.
- The installation guide does not supersede local or (inter)national regulations for electrical installations.
- This Philips LED product and LED driver must be installed by a professional electrician in accordance with the applicable and appropriate electrical codes and the instructions provided by Philips.
- Do not connect this LED product directly to mains voltages.
- This is a 24 V DC product and should always be connected to a SELV (Safety Extra Low Voltage) driver. Ensure proper routing of the cable to avoid cable damage.
- Do not load the power driver beyond 90% of its rated maximum power.
- Before installation, maintenance or cleaning, always first switch off or disconnect the power and follow the appropriate safety procedures.
- Do not apply force on the electrical components when applying the LEDFlex.
- These modules are designed with ESD protection but please take into account the max level indicated in the datasheet.
- Do not make sharp bends with electrical wires.
- Avoid contact between cables and sharp edges.
- Due to the variety of designs and brands in which the Philips LED products can be installed, you may need to use customized mounting accessories to fit the specific design you are using.
- This product is designed for dry locations only.
- The fixing/cooling surface must be cleaned before installing the LEDFlex modules to remove all dirt, dust and grease.
  Please refer to the instructions of 3M™ for best tape fixation (tape type: 9495LE)
- Do not mount on Plasticized Vinyl, EVA, Polyethylene, Polypropylene, PVF, Silicone, and PTFE. For an indication of materials that are suitable for mounting refer to the extensive information from 3M™ (tape type: 9495LE)
- None of the components of the LEDFlex (substrate, LED, electronic components etc.) may be exposed to tensile or compressive stresses.

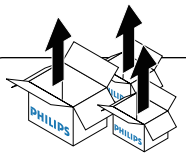


1) Strain relief

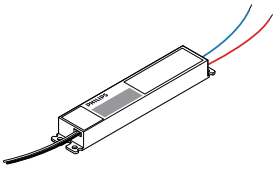
- Use a strain relief to prevent shear- and peel forces on the LED module though the connector and/or wiring.
- Disclaimer: Philips has chosen the the best suitable tape in the market at the time of product release. Philips is not liable for loosening of the tape over time and/or its consequences. The Datasheet of the 3M™ Double Coated Tape 9495LE can be found here: https://www.3m.com/3M/en_US/p/d/b40060169/
- If you require further support, please contact your local Philips sales organization.

System disposal

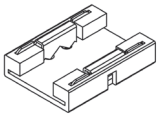
We recommend that the Fortimo LEDFLex C module and its components are disposed of in an appropriate way at the end of their (economic) lifetime. The modules are in effect normal pieces of electronic equipment containing components that are currently not considered to be harmful to the environment. We therefore recommend that these parts are disposed of as normal electronic waste, in accordance with local regulations.



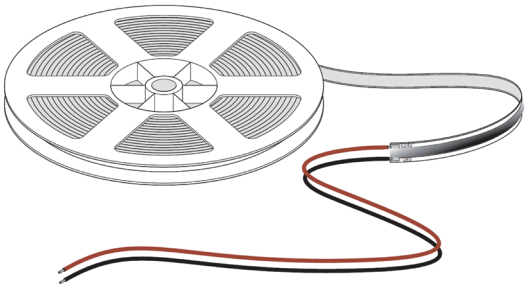
Delivered by Philips



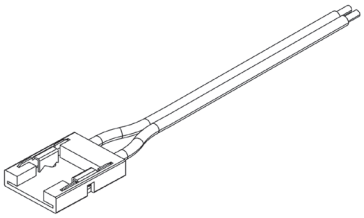
Philips
LED Power Driver or
LED Transformer



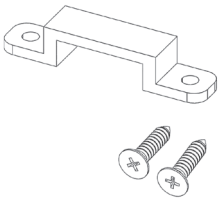
LEDFlex C connector
PCB-PCB



LEDFlex

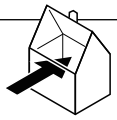


LEDFlex C connector
Wire-PCB

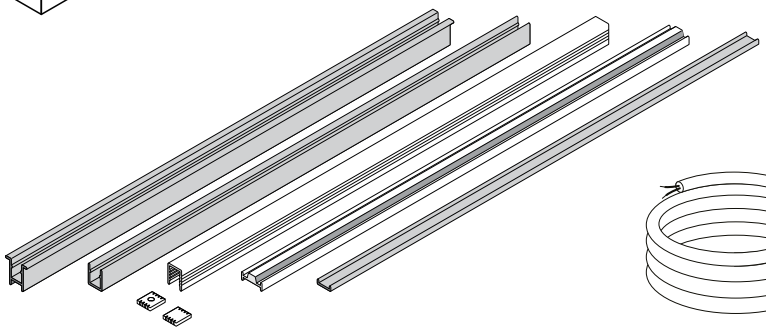


LEDFlex Clip

1



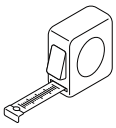
Organized by you



Housing materials

Extension cable

Cutting pliers



Tape measure

2

Introduction

Attention needs to be paid to thermal design-in for LED-modules and drivers to ensure optimum performance and life time of the luminaire. The critical thermal management items for the LED module are set out in this chapter in order to facilitate the design-in. If these thermal items are taken into account, this will help to ensure optimum performance and lifetime of the LED system.

Relevant definitions are explained along with guidance on how and where to measure the temperatures.

Key Definitions:

Module temperature: This is the temperature measured at the specified Tcase or Tc point of the module. This temperature is directly related to the LED junction temperature, which is the critical parameter for operation.

Ambient temperature: This is the temperature of the air surrounding the luminaire in the test environment or application. The module and driver temperature increases, by approximation, linearly with the ambient temperature. This relation can be used to predict module and driver temperatures at a different ambient temperature.

Tc nominal: This is the module temperature at which the performance is specified.

Tc life: This is the module or driver temperature (equal or higher than Tc nominal) at which the lifetime of the module (e.g. lumen maintenance of LxxByy) is specified.

Tc max: This is the maximum module or driver temperaturethe specific design you are using. (equal or higher than Tc life) to stay within safety limits. This temperature must not be exceeded, even in case of fan failure. The specified Tc nominal, Tc life, and Tc max are listed in the relevant datasheets that can be found on our website philips.com/oem

Test Requirements

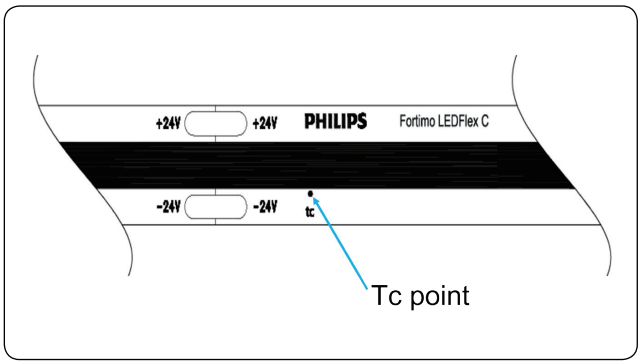
Measurements shall not be taken until the luminaire has stabilized thermally, i.e. temperatures are changing at a rate less than 1 °C per hour (see also the relevant clauses in IEC 60598-1). A temperature is considered constant if:

a) The test has been running for at least 3 hours, and

b) Three successive readings, taken at 15-minute intervals, are within 1°C of one another and are still not rising.

Module Tcase point location

The Tcase point of the LEDFlex module is located on the top side of the module. Please refer to the datasheet for the exact location Driver Tcase point location. The Tcase point on the driver is indicated by a point or an asterisk with the Tc caption. Please refer to the driver datasheet for the exact location. The thermocouple can be attached with a high temperature glue or Kapton tape.



2) Indication of Tc measurement point

Cooling

The LEDFlex modules have a relatively small footprint in relation to their electrical and thermal power. A good thermal contact via the 3M™ tape to an adequate heat sink, is a necessity for a good luminaire. To make good contact a certain pressure should be applied during installation. When applying pressure to the LEDFlex take care not to damage the electronics by exerting force on them and avoid ESD of more than 2kV. The heat sink surface must be smooth and free of burrs to obtain optimal contact. The heat sink should not be locked up in a confined space. It should be in contact with the ambient air for optimal heat transfer to the ambient.

Drivers

If placed in the luminaire drivers are preferably placed as far away as possible from the modules to prevent heating interaction. If placed in a separate driver compartment they are preferably mounted on the inner surface of the compartment. Do not place the driver on a heat sink that is used for cooling the modules. If so, it will be heated by the thermal losses of the LED-modules.

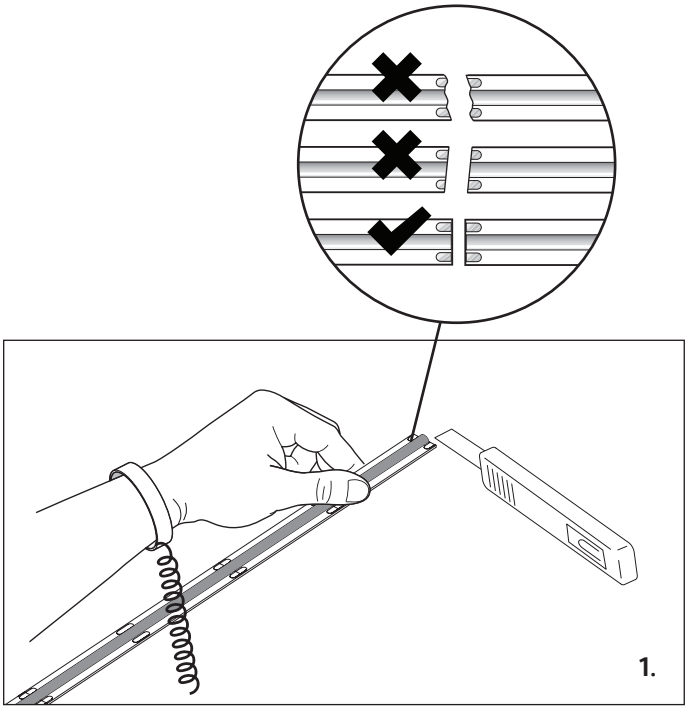
To warrant the lifetime of the driver, two parameters are key:

1. Ambient operating temperature. The ambient operating temperature is given in the product datasheet.
2. Tc life: The temperature measured at the Tcase point of the LEDFlex module is located on the top side. Please refer to the datasheet for the exact Driver Tcase point location and Tc life value.

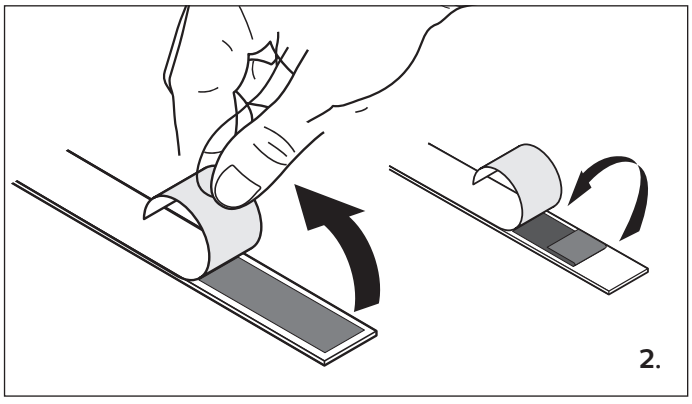
LEDFlex Continuous Light support high design freedom by cut-options every 4.5cm. Below you find how these products should be cut to size , connected to the connector and mount on the base material with the adhesive tape.

Cutting LEDFlex and preparing for wiring

1. Cut the LEDFlex neatly along the scissor mark on the module, keep the whole pad remain

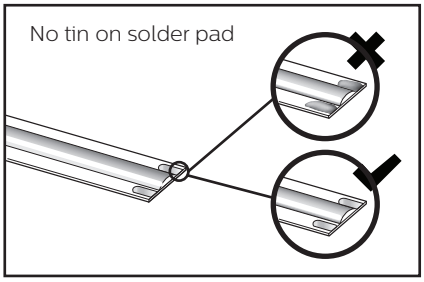


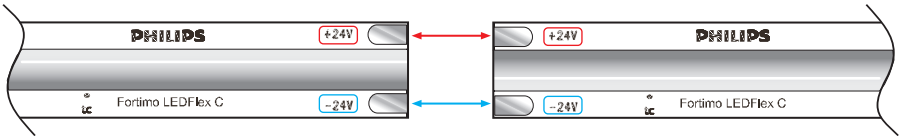
2. Remove the release paper and tape



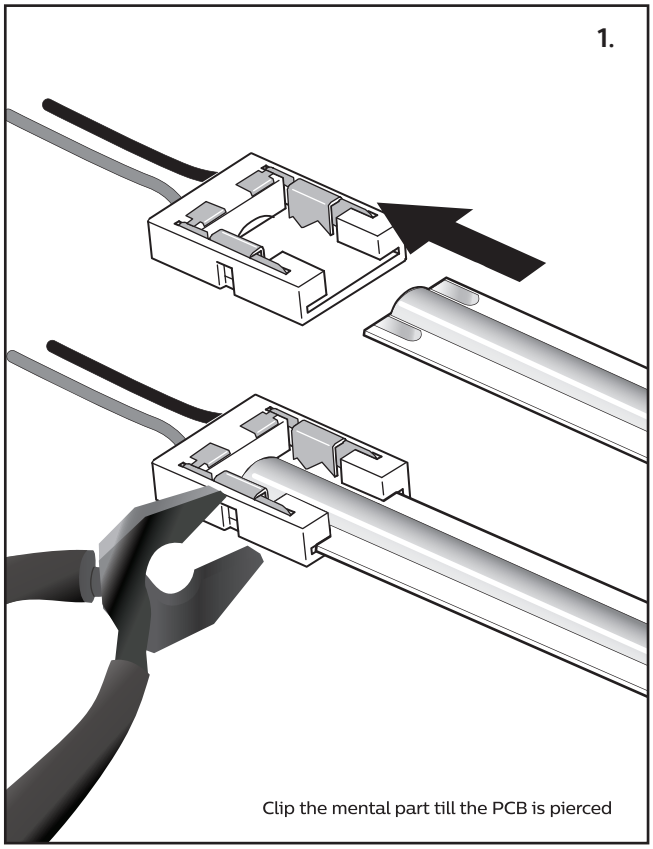
Wiring with connector

Two different kinds of connector are supplied by Philips as accessories. For good connection, please make sure no tin on the solder pad. Please also notice that there is a soldering point on each 50cm LEDFlex which is not suitable to install the connectors, please choose the nearest segment to do the connection.
When connect two LEDFlex together(PCB-PCB), Please pay attention to the right connection for positive and negative anodes on the module.

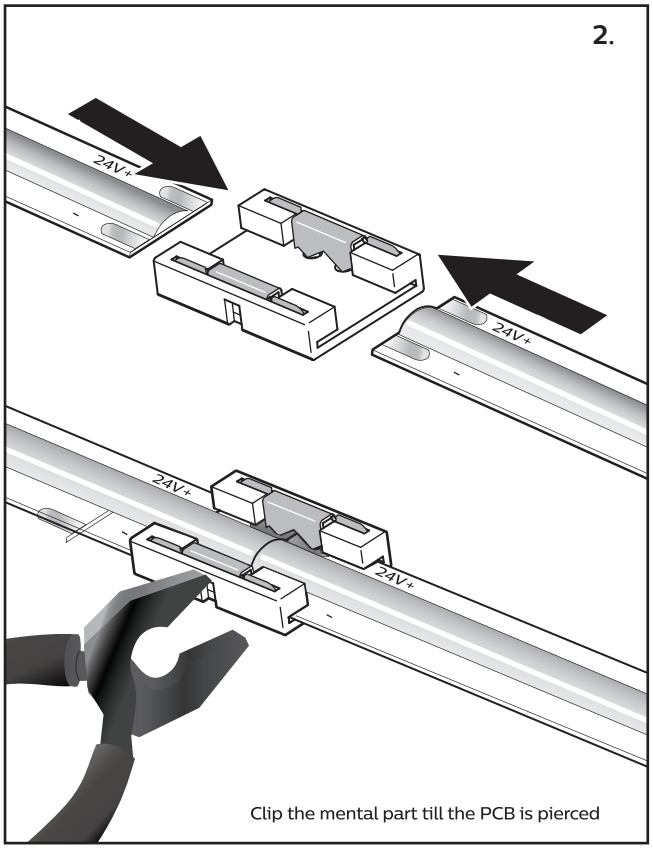




1. Connector wire-PCB



2. Connector PCB-PCB



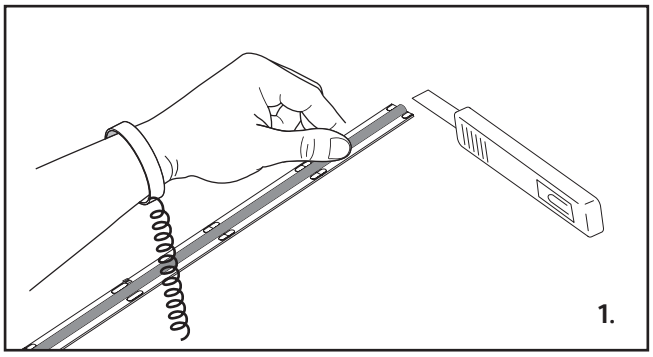
Soldering Process

Besides using connector, wires can be directly soldered onto the LEDFlex emitter. The following supplies are needed to do so:

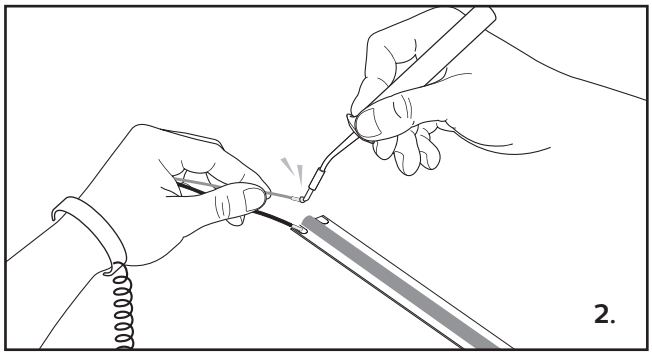
- Grounded soldering iron, capable of reaching 350°C
- Stranded or solid copper wire – 24 gauge or larger
- Low-flux Sn96Ag4 solder wire
- Hot-plate, capable of reaching 100°C (optional)

Follow these steps to attach the wires to the LEDFlex emitter:
Please note: The light emitting surface is highly recommended to be covered when wires are soldered to the LEDFlex Continuous Light emitter. If solder flux or debris lands on the light emitting surface, it will lead to performance impact and will void the warranty.

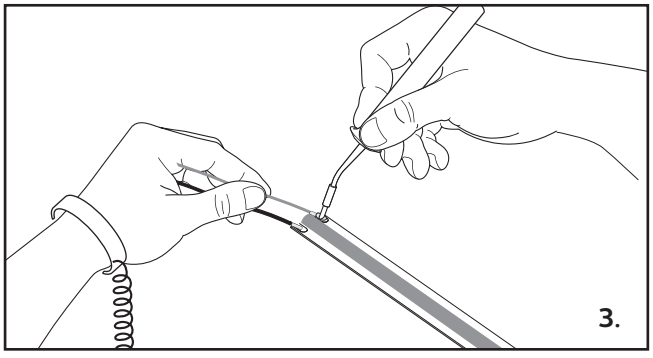
1. Cut the LEDFlex neatly along the scissor mark on the module, keep the whole pad remain.



2. Take soldering pretreatment of bare part of connecting wire.

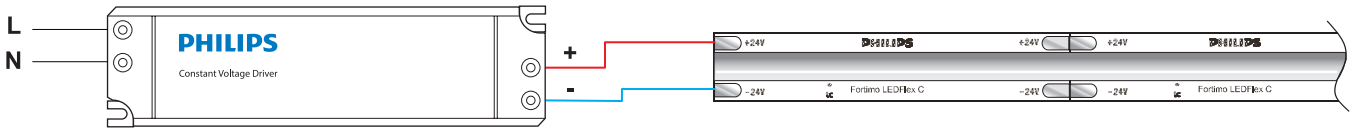


3. Soldering



Drivers for LEDFlex

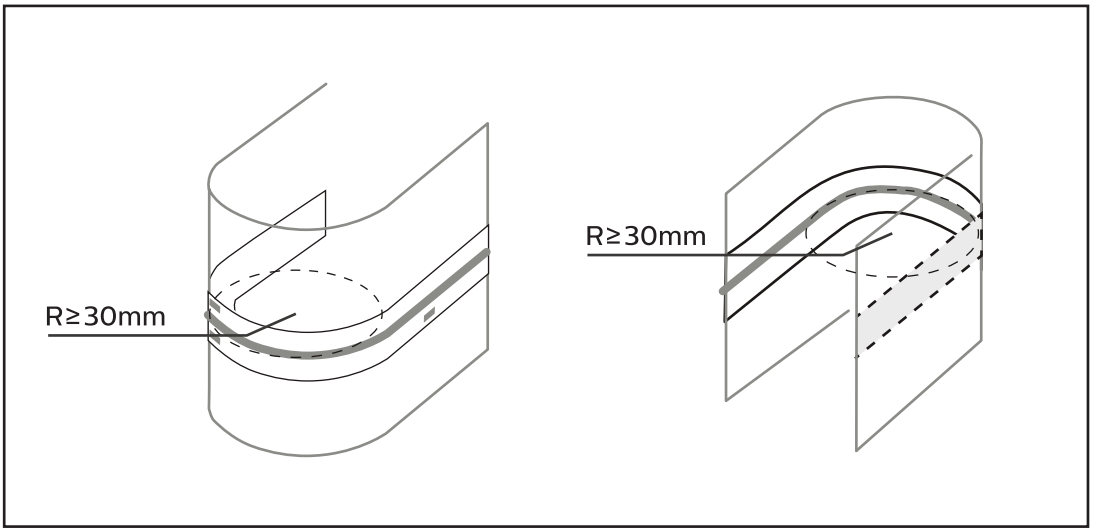
To power the LEDFlex, Philips LED transformers can be used. A list of transformers can be found in driver mapping table below. For more information about Philips constant voltage drivers can be found in the related design in guide and commercial leaflet. In case of queries, please contact your Philips sales representative.



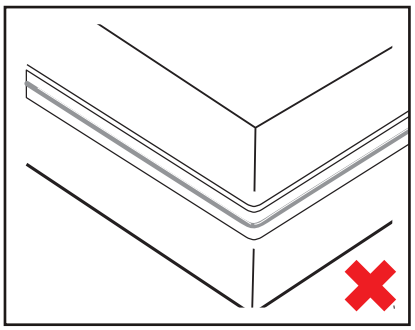
Installation LEDFlex System

Before installing the module, please notice that:

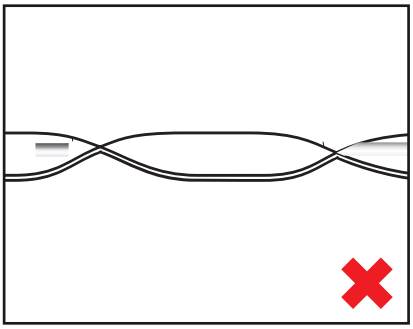
- The bending radius should not be less than 30mm.



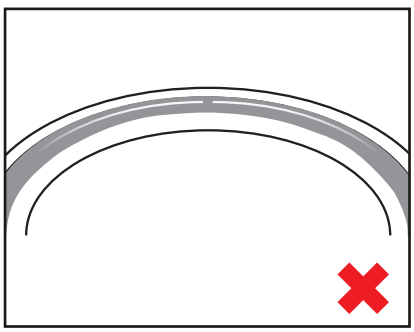
- Do not bend the LEDFlex at right angle



- Do not twist the LEDFlex

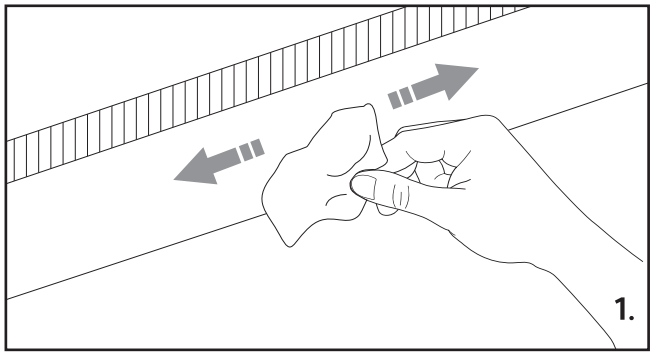


- Do not bend the LEDFlex horizontally

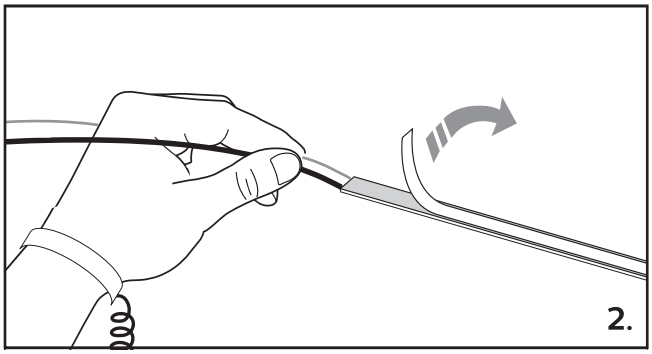


Follow these steps to install LEDFlex:

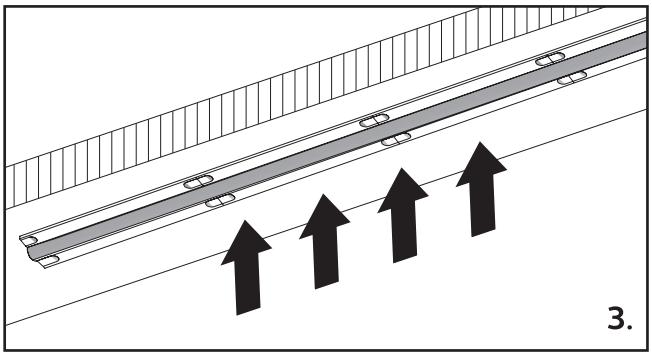
1. Clean up the mounting surface

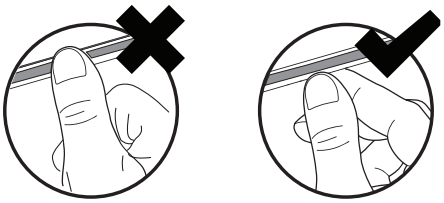


2. Reveal release paper



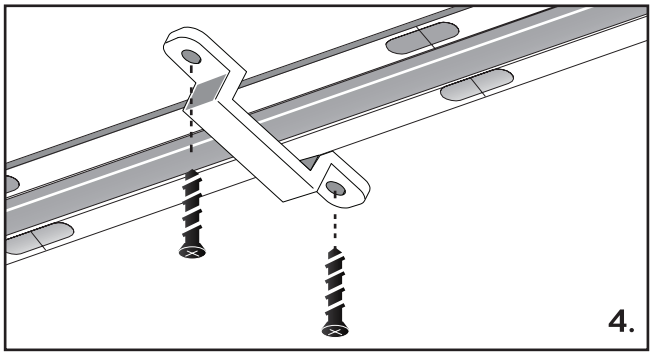
3. Stick LEDFlex

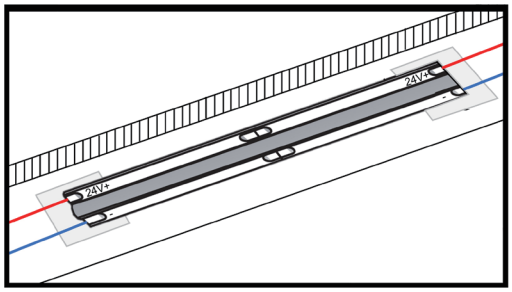




Do not touch the surface of the LED with fingers or any other material. Do not apply pressure on the top or sides of the LED.

4. A clip is recommended to be installed at each meter LEDFlex to strengthen the fixation





If the wires are soldered, it is highly suggested to add the insulation pad between the back of LEDFlex module and mounting surface.

Maximum length of a series connection

Considering acceptable lumen decay visually, the maximum length of the LEDFlex Continuous Light module we recommended is 5 meters per chain. The maximum string length also depends on the connector type and the extension wire length, please find the reference information in driver mapping table or contact your local sales representive to get more detail informtion.

Driver mapping

Maximum meters LEDFlex per driver type with 90% driver load. If this value is bigger than 5 meters, create a parallel connection.

		Description	LED Transformer 60W 24VDC 220-240V			LED Transformer 120W 24VDC 220-240V			LED Transformer 150W 24VDC 220-240V		
		12NC	913710032267			913710032567			929002105980		
		extension wire length (m)	0	5 (-5%)	10 (-10%)	0	5 (-5%)	10 (-10%)	0	5 (-5%)	10 (-10%)
12 NC	Discription	Power (W/m)									
929003399480	Fortimo LEDFlex C 500lm/m 927	6.1	8.9	8.4	8.0	17.7	16.8	15.1	22.1	21.0	19.9
929003399580	Fortimo LEDFlex C 500lm/m 930	5.8	9.3	8.8	8.4	18.6	17.7	15.9	23.2	22.1	20.9
929003399680	Fortimo LEDFlex C 500lm/m 935	5.7	9.5	9.0	8.5	18.9	18.0	16.2	23.6	22.5	21.3
929003399780	Fortimo LEDFlex C 500lm/m 940	5.3	10.2	9.7	9.2	20.4	19.3	17.4	25.5	24.2	22.9
929003399880	Fortimo LEDFlex C 500lm/m 965	5.2	10.4	9.9	9.3	20.7	19.7	17.7	25.9	24.6	23.3
929003399980	Fortimo LEDFlex C 1000lm/m 927	12.4	4.4	4.1	3.9	8.7	8.3	7.5	10.9	10.4	9.8
929003400080	Fortimo LEDFlex C 1000lm/m 930	12.0	4.5	4.3	4.1	9.0	8.6	7.7	11.3	10.7	10.1
929003400180	Fortimo LEDFlex C 1000lm/m 930 PW	12.0	4.5	4.3	4.1	9.0	8.6	7.7	11.3	10.7	10.1
929003400280	Fortimo LEDFlex C 1000lm/m 935	11.6	4.7	4.4	4.2	9.3	8.9	8.0	11.6	11.1	10.5
929003400380	Fortimo LEDFlex C 1000lm/m 940	10.8	5.0	4.8	4.5	10.0	9.5	8.6	12.5	11.9	11.3
929003400480	Fortimo LEDFlex C 1000lm/m 965	10.6	5.1	4.8	4.6	10.2	9.7	8.7	12.7	12.1	11.5

Maximum meters LEDFlex per driver type with 90% driver load. If this value is bigger than 5 meters, create a parallel connection.

		Description	CertaDrive LED Transformer 30W 24VDC			CertaDrive LED Transformer 60W 24VDC			CertaDrive LED Transformer 120W 24VDC		
		12NC	929002146280			929002146380			929002146480		
		extension wire length (m)	0	5 (-5%)	10 (-10%)	0	5 (-5%)	10 (-10%)	0	5 (-5%)	10 (-10%)
12 NC	Discription	Power (W/m)									
929003399480	Fortimo LEDFlex C 500lm/m 927	6.1	4.4	4.2	4.0	8.9	8.4	7.6	17.7	16.8	15.9
929003399580	Fortimo LEDFlex C 500lm/m 930	5.8	4.6	4.4	4.2	9.3	8.8	7.9	15.5	14.7	13.9
929003399680	Fortimo LEDFlex C 500lm/m 935	5.7	4.7	4.5	4.3	9.5	9.0	8.1	15.8	15.0	14.2
929003399780	Fortimo LEDFlex C 500lm/m 940	5.3	5.1	4.8	4.6	10.2	9.7	8.7	17.0	16.1	15.3
929003399880	Fortimo LEDFlex C 500lm/m 965	5.2	5.2	4.9	4.7	10.4	9.9	8.9	17.3	16.4	15.6
929003399980	Fortimo LEDFlex C 1000lm/m 927	12.4	2.2	2.1	2.0	4.4	4.1	3.7	7.3	6.9	6.5
929003400080	Fortimo LEDFlex C 1000lm/m 930	12.0	2.3	2.1	2.0	4.5	4.3	3.8	7.5	7.1	6.8
929003400180	Fortimo LEDFlex C 1000lm/m 930 PW	12.0	2.3	2.1	2.0	4.5	4.3	3.8	7.5	7.1	6.8
929003400280	Fortimo LEDFlex C 1000lm/m 935	11.6	2.3	2.2	2.1	4.7	4.4	4.0	7.8	7.4	7.0
929003400380	Fortimo LEDFlex C 1000lm/m 940	10.8	2.5	2.4	2.3	5.0	4.8	4.3	8.3	7.9	7.5
929003400480	Fortimo LEDFlex C 1000lm/m 965	10.6	2.5	2.4	2.3	5.1	4.8	4.4	8.5	8.1	7.6

Maximum meters LEDFlex per driver type with 90% driver load. If this value is bigger than 5 meters, create a parallel connection.

		Description	CertaDrive LED Transformer 180W 24VDC			CertaDrive LED Transformer 250W 24VDC		
		12NC	929002146580			929002826380		
		extension wire length (m)	0	5 (-5%)	10 (-10%)	0	5 (-5%)	10 (-10%)
12 NC	Discription	Power (W/m)						
929003399480	Fortimo LEDFlex C 500lm/m 927	6.1	40.6	38.6	36.6	29.7	28.2	26.7
929003399580	Fortimo LEDFlex C 500lm/m 930	5.8	38.7	36.8	34.8	28.3	26.9	25.5
929003399680	Fortimo LEDFlex C 500lm/m 935	5.7	38.1	36.2	34.3	27.8	26.4	25.1
929003399780	Fortimo LEDFlex C 500lm/m 940	5.3	35.4	33.6	31.8	25.8	24.6	23.3
929003399880	Fortimo LEDFlex C 500lm/m 965	5.2	34.7	33.0	31.2	25.4	24.1	22.8
929003399980	Fortimo LEDFlex C 1000lm/m 927	12.4	82.6	78.4	74.3	60.4	57.3	54.3
929003400080	Fortimo LEDFlex C 1000lm/m 930	12.0	80.0	76.0	72.0	58.5	55.6	52.6
929003400180	Fortimo LEDFlex C 1000lm/m 930 PW	12.0	80.0	76.0	72.0	58.5	55.6	52.6
929003400280	Fortimo LEDFlex C 1000lm/m 935	11.6	77.3	73.4	69.6	56.5	53.7	50.8
929003400380	Fortimo LEDFlex C 1000lm/m 940	10.8	72.0	68.4	64.8	52.6	50.0	47.4
929003400480	Fortimo LEDFlex C 1000lm/m 965	10.6	70.7	67.2	63.6	51.7	49.1	46.5

If you have a question on a speciÿc combination, please contact your local sales representative.

Chemical compatibility

In the current market medium power LEDs exist, containing a silver-finished (Ag) Lead frame. The lead frame finish is sensitive to pollution and or corrosion when exposed to Oxygen and certain Volatile Organic Components [VOCs]. Examples of VOCs are substances containing Sulfur or Chlorine. In that case parts of the lead frame may blacken, which will impair the lumen output or the color point of the LED light. Materials that are known to have a higher risk to be a source of Sulfur and Chlorine are for example natural rubbers used for cables, cable entries or sealing, or corrugated carton. Also be careful using adhesives, cleaning agents, coatings and applications in aggressive (corrosive) environments. We recommend ensuring that the direct environment of these LEDs in the luminaire does not contain materials that can be a source of Sulfur or Chlorine, for optimal reliability of the LED, LED module and/or LED luminaire. Furthermore, make sure that the products with these LEDs are not stored or used in vicinity of sources of Sulfur or Chlorine, and the production environment is also free of these materials. Also avoid cleaning of the LED products with these types of LEDs with abrasive substances, brushes or organic solvents like Acetone and TCE. Applications of the product in industry and heavy traffic environment should be avoided in case of risk of ingress of Sulfur and Chlorine from the environment. The Philips LEDFlex family makes use of LEDs with above explained type of lead frame. Therefore above recommendations apply for the Philips LEDFlex.
A list of chemicals, often found in electronics and construction materials for luminaires that should be avoided, is provided in the table on the left. Note that Philips does not warrant that this list is exhaustive since it is impossible to determine all chemicals that may affect LED performance. These chemicals may not be directly used in the final products but some of them may be used in intermediate manufacturing steps (e.g. cleaning agents). Consequently, trace amounts of these chemicals may remain on (sub) components, such as heat sinks. It is recommended to take precautions when designing your application. In case of questions on compatibility of materials or applications of the product please contact your Philips representative for application support.

Chemical name	Normally used as
Acetic	Acid
Hydrochloric acid	Acid
Nitric acid	Acid
Sulfuric acid	Acid
Ammonia	Alkali
Potassium hydroxide	Alkali
Sodium hydroxide	Alkali
Acetone	Solvent
Benzene	Solvent
Dichloromethane	Solvent
Gasoline	Solvent
MEX (Methyl Ethly Ketone)	Solvent
MKB (Methyl Isobutyl Ketone)	Solvent
Mineral spirits (turpentine)S	olvent
Tetracholorometane	Solvent
Toluene	Solvent
Xylene	Solvent
Castor oil	Oil
Lard	Oil
Linseed	Oil
Petroleum	Oil
Silicone oil	Oil
Halogenated hydrocarbons	
(containing F, CI, BR elements)M	isc
Rosin flux	Solder flux
Acrylic tape	Adhesive
Cyanoacrylate	Adhesive

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Data subject to change

www.philips.com/oem
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