PHILIPS

Fortimo

LEDFlex S system

Design-in Guide

Fortimo LEDFlex S system

November 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

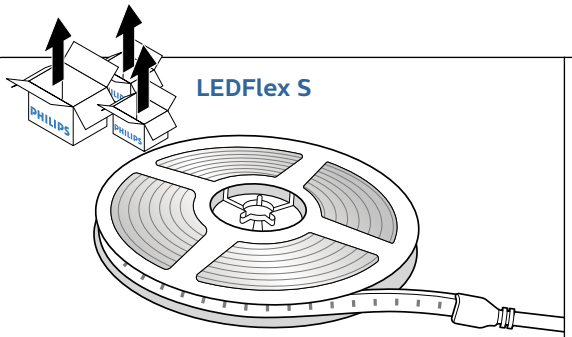
- Do not switch on the LEDFlex S when on the reel.
- This product may require a heatsink.
- The installation guide does not supersede local or (inter)national regulations for electrical installations.
- This Philips LED product and LED driver must be installed by a professional electrician in accordance 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 S.
- 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.
- The fixing/cooling surface must be cleaned before installing the LEDFlex S modules to remove all dirt, dust and grease. Please refer to the instructions of 3M™ for best tape fixation (tape type: 5915 of 5952 family).
- 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: 5915 of 5952 family).
- None of the components of the LEDFlex S (substrate, LED, electronic components etc.) may be exposed to tensile or compressive stresses. Use a strain relief to prevent shear- and peel forces on the LED module though the connector and/or wiring.
- Connectors can only be used with our Philips Fortimo LEDFlex S family.
- These connectors are single use.
- 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™ VHB™ Tape 5915 can be found here: https://www.3m.com/3M/en_US/p/d/b40072037
- If you require further support, please contact your local Philips sales organization.

System disposal

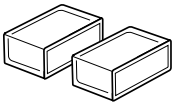
We recommend that the Fortimo LEDFlex S module and its components are disposed of in an appropriate way at the end of their (economic) lifetime. The modules are in effect normal pieces of electronic equipment containing components that are currently not considered to be harmful to the environment. We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

Products and tools

LEDFlex S



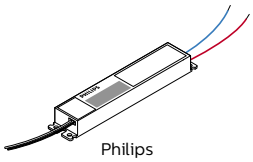
LEDFlex S



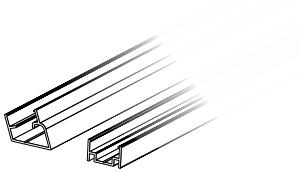
2x Fortimo LEDFlex S end cap IP67

1

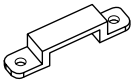
LEDFlex S driver/ transformer and accessories



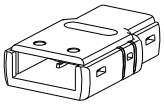
Philips LED Power Driver or LED Transformer



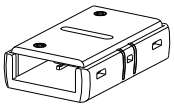
Housing materials



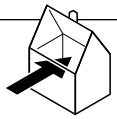
LEDFlex S mounting clip T



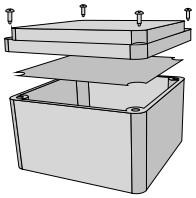
LEDFlex S cable connector IP65



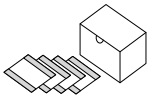
LEDFlex S strip connector IP65



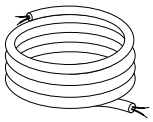
Organized by you



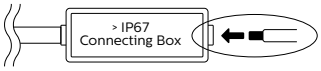
Example IP67 driver box



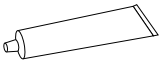
3M™ VHB™ Surface Cleaner Sachets



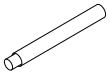
Extension cable



IP67 connecting wire box

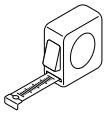


Glue



3M™ primer 94

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 temperature
(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

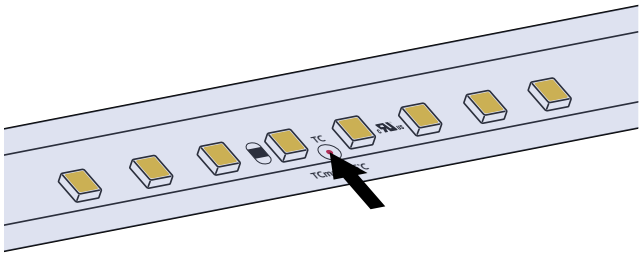
Measurements shall not be taken until the luminaire has stabilized thermally, i.e. temperatures are changing at a rate less than 1 °C per hour (see also the relevant clauses in IEC 60598-1). For ANSI/UL 8750 the test is to continue until constant temperatures are obtained. A temperature is
considered 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 (1.8°F) of one another and are still not rising.

Module T ambient

The LEDFlex S is a self-cooling product when used between an ambient temperature of -35 to 50 degrees Celsius, and the light beam of the LEDFlex S is not covered.

Module Tcase point location

The tc point is located on the accessible silicone surface of the LEDFlex S module. The thermocouple can be attached with a high temperature glue or Kapton tape.



Indication of Tc measuring point

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. For the thermal measurements a thermocouple can be attached with a high temperature glue or Kapton tape.

Thermal design

Cooling

The LEDFlex S is a self-cooling product when used between an ambient temperature of -35 to 50 degrees Celsius, and the light beam of the LEDFlex S is not covered. Below you find an indicative table of self cooling LEDFlex S products when mounted as can be seen in picture 3. The self cooling values are an indication only and should alway be verified by a T case measurement. The self cooling indication is given for a setup indicated in the below picture (picture 3). Where the optical efficiency of the cover is 85%.

To warrant the lifetime of the LEDFlex module, two parameters are key:

1. Ambient operating temperature. The ambient operating temperature is given in the self cooling table
2. Tc life: The temperature measured at the Tcase point located on the accessible silicone surface on the LEDFlex module. Please refer to the datasheet for the exact Tc life value.

Drivers

Need to be IP67 rated or build in a IP67 rated driver compartment. The connection between the driver and LEDFlex S should be IP67 rated. 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 driver is located on the top side. Please refer to the datasheet for the exact Driver Tcase point location and Tc life value.

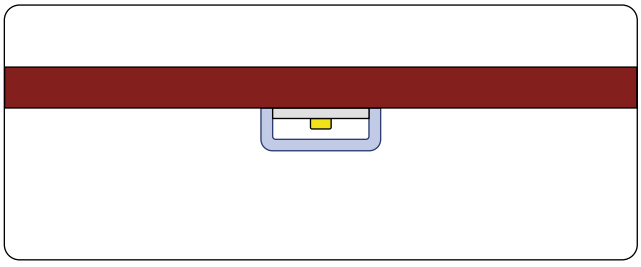
Note:

The self cooling values are an indication only and should always be veriefied by Tc measurement. The self cooling indication is given for a setup indicated in the below picture. Where the optical effciency of the cover is 85%

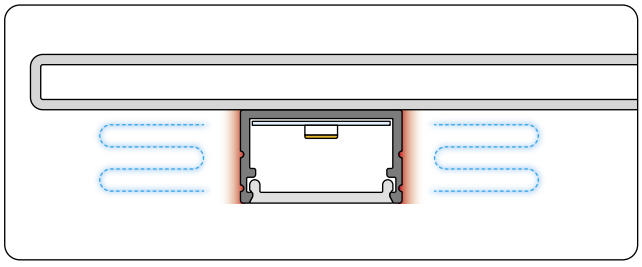
Self cooling table*

Commercial product name	Ta 25	Ta 30	Ta 35	Ta 40	Ta 45	Ta 50
Fortimo LEDFlex S 10m 500lm/m 8xx C5 G1	self cooling	self cooling	self cooling	self cooling	self cooling	self cooling
Fortimo LEDFlex S 10m 1000lm/m 8xx C5 G1	self cooling	self cooling	self cooling	self cooling	self cooling	self cooling
Fortimo LEDFlex S 6m 1500lm/m 8xx C5 G1	self cooling	self cooling	self cooling	self cooling	self cooling	self cooling
Fortimo LEDFlex S 6m 2000lm/m 8xx C5 G1	self cooling	self cooling	self cooling	self cooling	self cooling	self cooling

* The self cooling values are an indication only and should always be veriefied by Tc measurement. The self cooling indication is given for a setup indicated in the below picture. Where the optical effciency of the cover is 85%



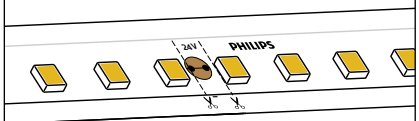
3) Orientation and luminaire type of LEDFlex S for selfcooling definition.

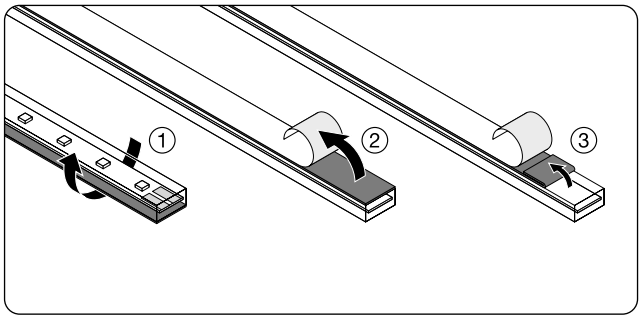


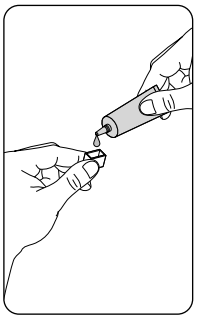
4) Example non-selfcooling heat dissipation.

Cutting and apply end cap

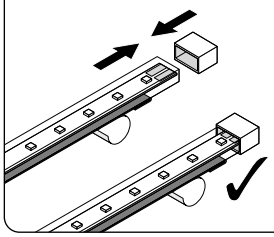
Choose the desired length and cut the strip with scissors. After cutting the silver solder pads should be part of the LEDFlex S without damaging the solder pads

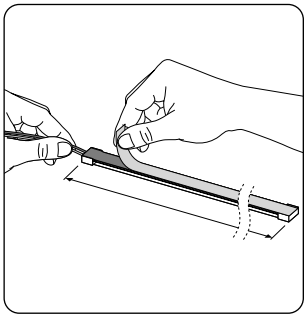


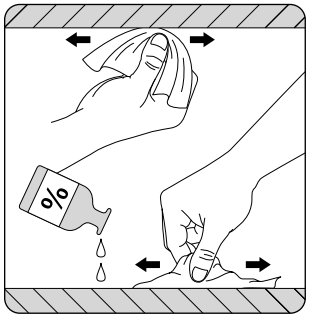


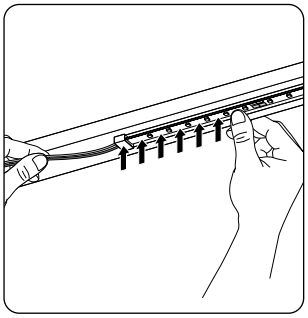


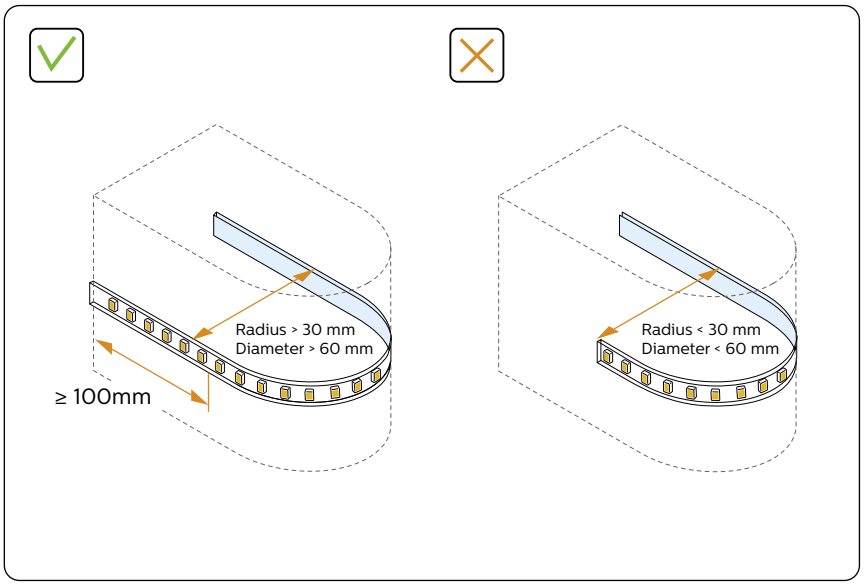
For curing time see instruction manual glue supplier

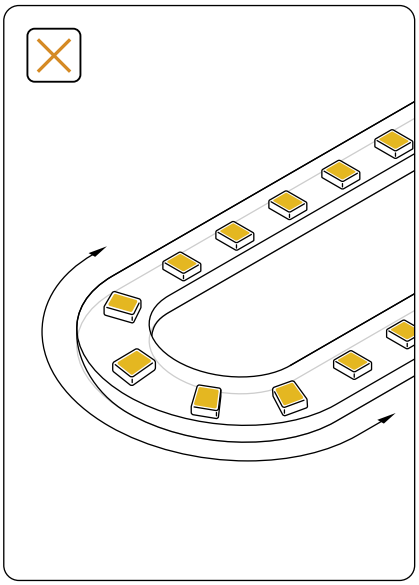


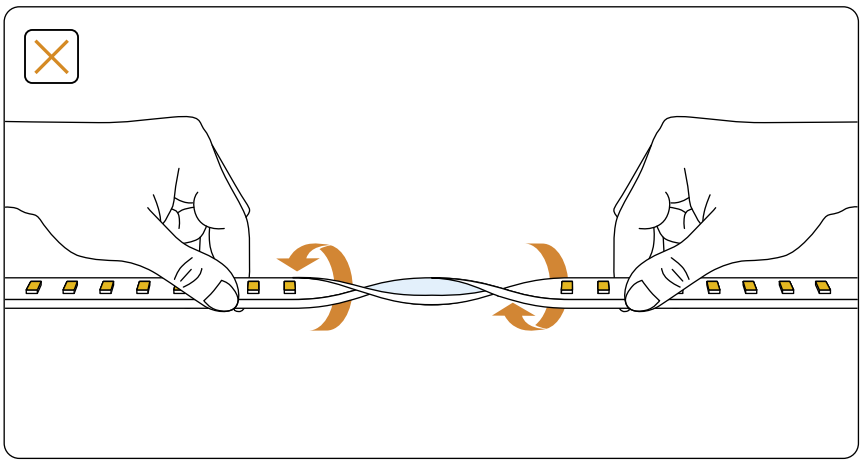






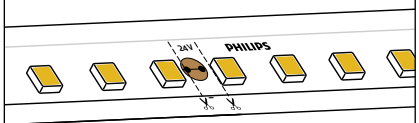


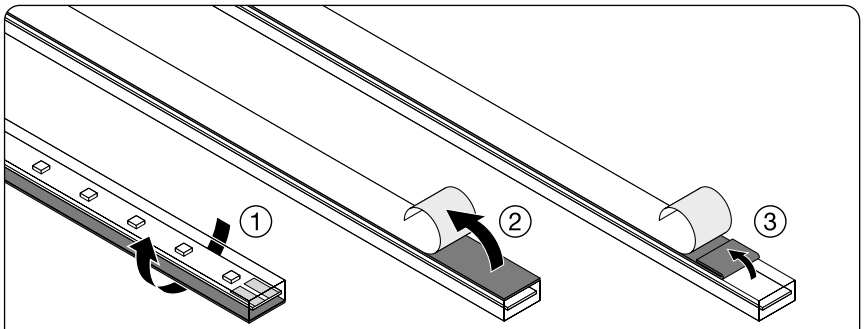




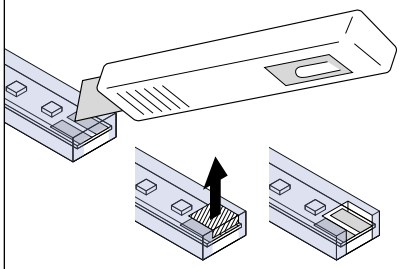
Connecting LEDFlex S strip connector IP65

Choose the desired length and cut the strip with scissors. After cutting the silver solder pads should be part of the LEDFlex S without damaging the solder pads.

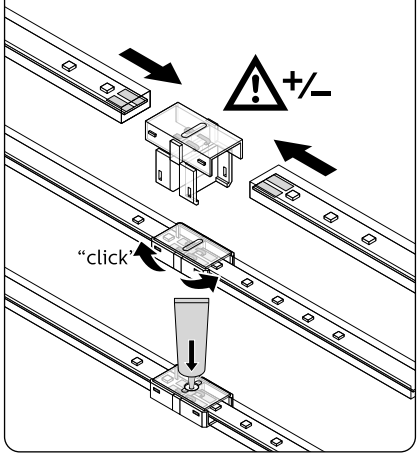




Cut silicone sleeve so that the pads become accessible.
Take care not to damaging the LED or PCB.

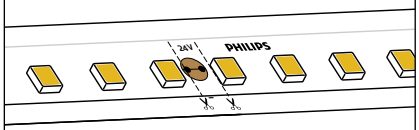


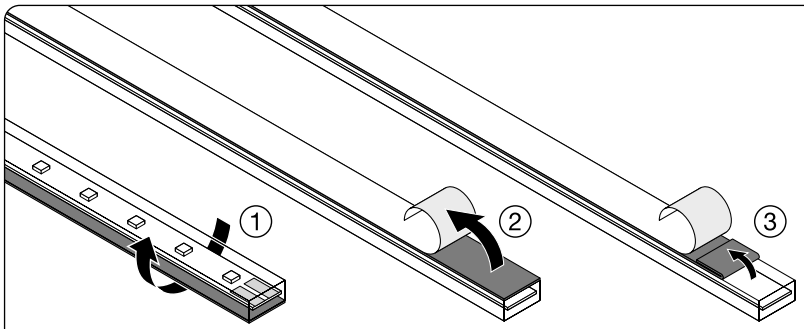
Align polarity when connecting strips
For curing time glue see instruction manual glue supplier.



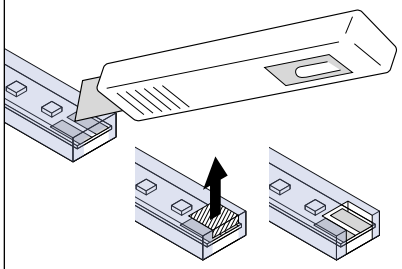
Connecting LEDFlex S cable connector IP65

Choose the desired length and cut the strip with scissors. After cutting the silver solder pads should be part of the LEDFlex S without damaging the solder pads.

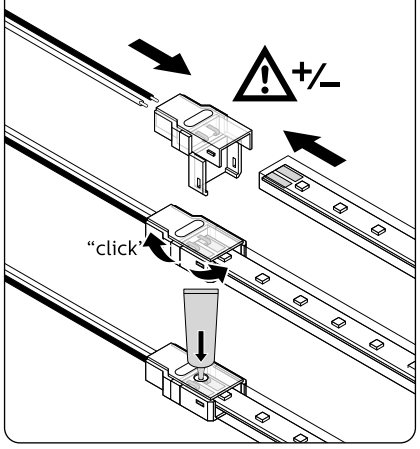




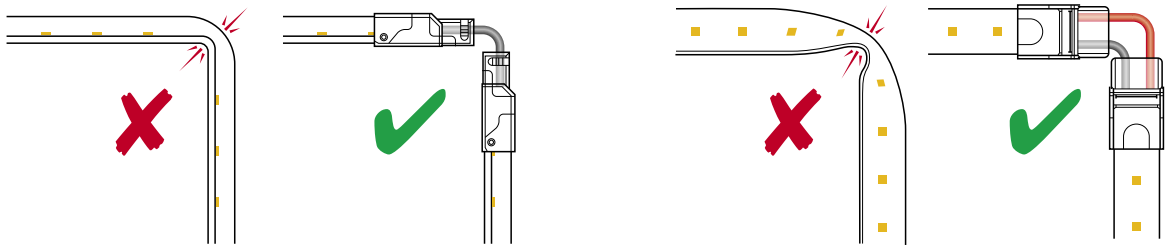
Cut silicone sleeve so that the pads become accessible.
Take care not to damaging the LED or PCB.



Align polarity when connecting strips
For curing time glue see instruction manual glue supplier.

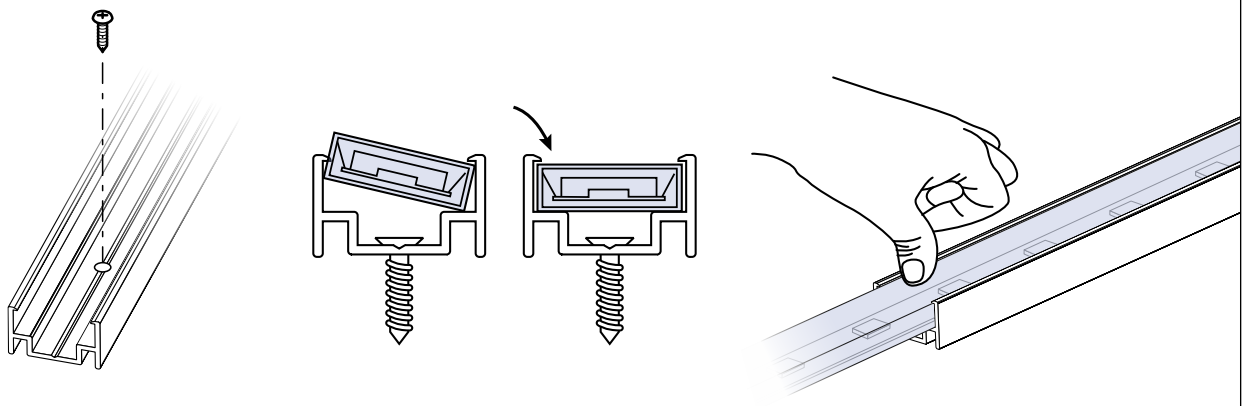


Cable connectors used at sharp corners

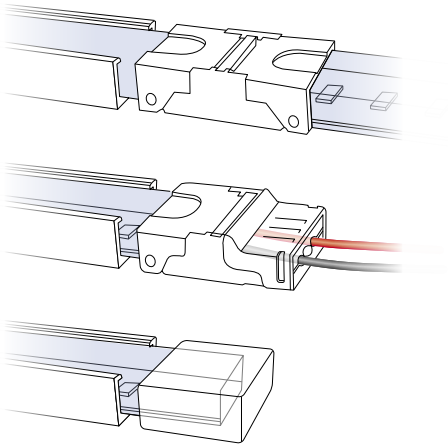


Mounting housing material

Example installing mounting profile

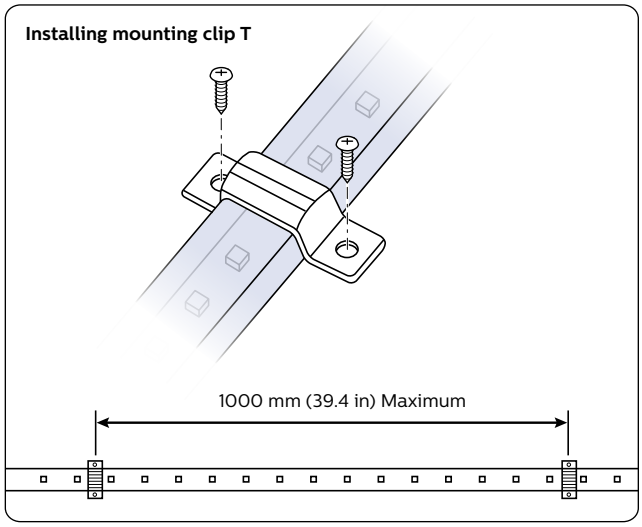


Note: Install strip connectors, cable connectors and end caps outside mounting profile



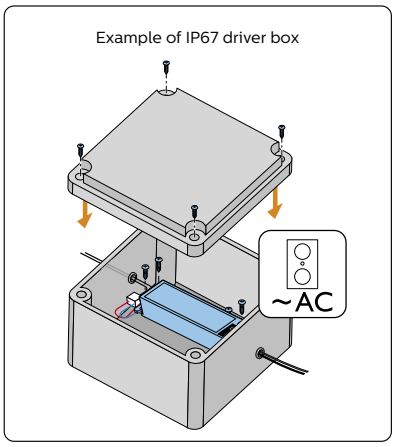
Mounting clip T

Installing mounting clip T



Drivers for LEDFlex S

To power the LEDFlex S, two types of power sources can be used:
· Philips LED transformers
· Philips LED Power drivers
· A list of drivers and transformers can be found driver mapping overview



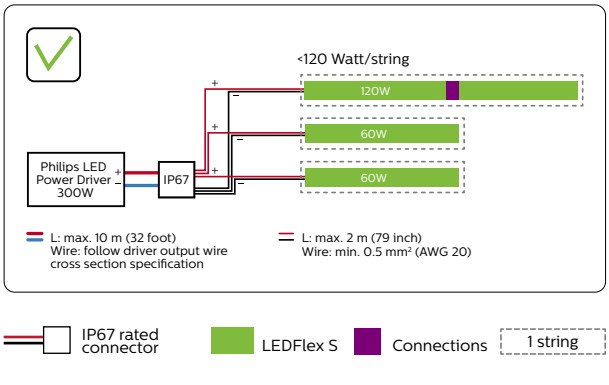
Note:

The drivers and transformers must always be placed in an IP67-IP65 resistant housing.
The drivers and transformers must always be connected to the LEDFlex S module in an IP67 - IP65 resistant manner

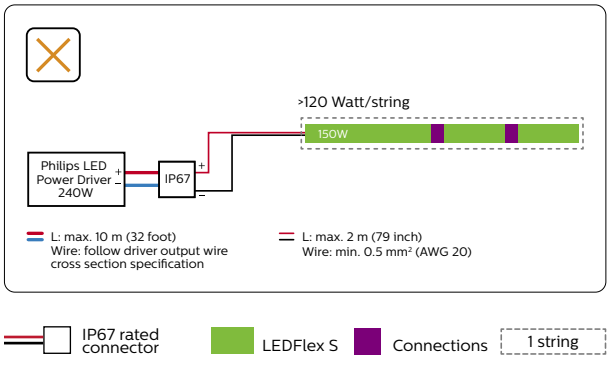
Series and Parallel connections

You can make any combination of LEDFlex S but take into account all of the below restrictions:
• For the maximum length of a series connection, follow table 1: maximum length of LEDFlex S at Ta
• Never exceed 5 A and/or 120Watt for a series connection. (one string)
• Do not exceed 90% of the maximum load indicated on the driver
• Choose extensions cables that match the current to prevent overheating
• Use IP rated Philips driver/transformer or install driver in IP67 rated box
• Use always IP67 rated connections between cabling

Example parallel connections (more strings)



Example series connections (one string)



Maximum length of a series connection

Please find in the tables below the maximum length of the LEDFlex S in different configurations, and at two Ta points for your indication of temperature dependency. The maximum string length depends on:
1) type of LEDFlex S
2) ambient temperature
3) The length of the LEDFlex S may not exceed the maximum load of the chosen driver.

Table 1. maximum length of LEDFlex S at Ta

Commercial product name	**Fortimo LEDFlex S Ta= 50˚C**	**Fortimo LEDFlex S Ta= 30˚C**
	Max Length (m)	Max Length (m)
Fortimo LEDFlex S 10m 500lm/m 8xx C5 G1	12	11.5
Fortimo LEDFlex S 10m 1000lm/m 8xx C5 G1	10	10
Fortimo LEDFlex S 6m 1500lm/m 8xx C5 G1	7	7
Fortimo LEDFlex S 6m 2000lm/m 8xx C5 G1	6	6

Remark: If you have a question on a specific combination, please contact your local sales representative.

Driver mapping

Maximum meters LEDFlex S per driver type with 90% driver load. If this value is bigger than the maximum allowed string length (see table x); create a parallel connection!		Description	LED Transformer 150W IP67 24VDC 220-240V			LED Transformer 300W IP67 24VDC 220-240V		
		12NC	929001485580			929001485680		
		extension wire length (m)	0	5 (-5%)	10 (-10%)	0	5 (-5%)	10 (-10%)
12 NC	Discription	Power LEDFlex S (W/m)	max. LEDFLex S length (m)	max. LEDFLex S length (m)	max. LEDFLex S length (m)	max. LEDFLex S length (m)	max. LEDFLex S length (m)	max. LEDFLex S length (m)
929003396980	Fortimo LEDFlex S 10m 500lm/m 830 C5 G1	4,2	32,1	30,5	28,9	64,3	61,1	57,9
929003397080	Fortimo LEDFlex S 10m 500lm/m 840 C5 G1	3,9	35,1	33,3	31,6	70,1	66,6	63,1
929003397180	Fortimo LEDFlex S 10m 500lm/m 865 C5 G1	3,9	35,1	33,3	31,6	70,1	66,6	63,1
929003397480	Fortimo LEDFlex S 10m 1000lm/m 830 C5 G1	8,5	15,9	15,1	14,3	31,9	30,3	28,7
929003397580	Fortimo LEDFlex S 10m 1000lm/m 840 C5 G1	7,8	17,4	16,5	15,7	34,8	33,1	31,3
929003397680	Fortimo LEDFlex S 10m 1000lm/m 865 C5 G1	7,8	17,4	16,5	15,7	34,8	33,1	31,3
929003397880	Fortimo LEDFlex S 6m 1500lm/m 830 C5 G1	12,8	10,5	10,0	9,5	21,0	20,0	18,9
929003397980	Fortimo LEDFlex S 6m 1500lm/m 840 C5 G1	11,7	11,5	10,9	10,4	23,0	21,9	20,7
929003398080	Fortimo LEDFlex S 6m 1500lm/m 865 C5 G1	11,7	11,5	10,9	10,4	23,0	21,9	20,7
929003398280	Fortimo LEDFlex S 6m 2000lm/m 830 C5 G1	17,3	7,8	7,4	7,0	15,7	14,9	14,1
929003398380	Fortimo LEDFlex S 6m 2000lm/m 840 C5 G1	15,8	8,6	8,1	7,7	17,1	16,3	15,4
929003398480	Fortimo LEDFlex S 6m 2000lm/m 865 C5 G1	15,8	8,6	8,1	7,7	17,1	16,3	15,4

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

Driver mapping

Maximum meters LEDFlex per driver type with 90% driver load. If this value is bigger than the maximum allowed string length (see table x); create a parallel connection!		Description	CertaDrive SPS 200W 24VDC			CertaDrive SPS 350W 24VDC		
		12NC	929002889580			929002889680		
		extension wire length (m)	0	5 (-5%)	10 (-10%)	0	5 (-5%)	10 (-10%)
12 NC	Discription	Power LEDFlex S (W/m)	max. LEDFLex S length (m)	max. LEDFLex S length (m)	max. LEDFLex S length (m)	max. LEDFLex S length (m)	max. LEDFLex S length (m)	max. LEDFLex S length (m)
929003396980	Fortimo LEDFlex S 10m 500lm/m 830 C5 G1	4,2	42,9	40,7	38,6	75,0	71,3	67,5
929003397080	Fortimo LEDFlex S 10m 500lm/m 840 C5 G1	3,9	46,8	44,4	42,1	81,8	77,7	73,6
929003397180	Fortimo LEDFlex S 10m 500lm/m 865 C5 G1	3,9	46,8	44,4	42,1	81,8	77,7	73,6
929003397480	Fortimo LEDFlex S 10m 1000lm/m 830 C5 G1	8,5	21,3	20,2	19,1	37,2	35,3	33,5
929003397580	Fortimo LEDFlex S 10m 1000lm/m 840 C5 G1	7,8	23,2	22,0	20,9	40,6	38,6	36,5
929003397680	Fortimo LEDFlex S 10m 1000lm/m 865 C5 G1	7,8	23,2	22,0	20,9	40,6	38,6	36,5
929003397880	Fortimo LEDFlex S 6m 1500lm/m 830 C5 G1	12,8	14,0	13,3	12,6	24,6	23,3	22,1
929003397980	Fortimo LEDFlex S 6m 1500lm/m 840 C5 G1	11,7	15,4	14,6	13,8	26,9	25,5	24,2
929003398080	Fortimo LEDFlex S 6m 1500lm/m 865 C5 G1	11,7	15,4	14,6	13,8	26,9	25,5	24,2
929003398280	Fortimo LEDFlex S 6m 2000lm/m 830 C5 G1	17,3	10,4	9,9	9,4	18,3	17,3	16,4
929003398380	Fortimo LEDFlex S 6m 2000lm/m 840 C5 G1	15,8	11,4	10,9	10,3	20,0	19,0	18,0
929003398480	Fortimo LEDFlex S 6m 2000lm/m 865 C5 G1	15,8	11,4	10,9	10,3	20,0	19,0	18,0

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

Driver mapping

Maximum meters LEDFlex per driver type with 90% driver load. If this value is bigger than the maximum allowed string length (see table x); create a parallel connection!		Description	Dimmable LED Transformer 75W 24VDC W/F&P			Dimmable LED Transformer 150W 24VDC W/F&P		
		12NC	919002151663			919002151664		
		extension wire length (m)	0	5 (-5%)	10 (-10%)	0	5 (-5%)	10 (-10%)
12 NC	Discription	Power LEDFlex S (W/m)	max. LEDFLex S length (m)	max. LEDFLex S length (m)	max. LEDFLex S length (m)	max. LEDFLex S length (m)	max. LEDFLex S length (m)	max. LEDFLex S length (m)
929003396980	Fortimo LEDFlex S 10m 500lm/m 830 C5 G1	4,2	16,1	15,3	14,5	32,1	30,5	28,9
929003397080	Fortimo LEDFlex S 10m 500lm/m 840 C5 G1	3,9	17,5	16,7	15,8	35,1	33,3	31,6
929003397180	Fortimo LEDFlex S 10m 500lm/m 865 C5 G1	3,9	17,5	16,7	15,8	35,1	33,3	31,6
929003397480	Fortimo LEDFlex S 10m 1000lm/m 830 C5 G1	8,5	8,0	7,6	7,2	15,9	15,1	14,3
929003397580	Fortimo LEDFlex S 10m 1000lm/m 840 C5 G1	7,8	8,7	8,3	7,8	17,4	16,5	15,7
929003397680	Fortimo LEDFlex S 10m 1000lm/m 865 C5 G1	7,8	8,7	8,3	7,8	17,4	16,5	15,7
929003397880	Fortimo LEDFlex S 6m 1500lm/m 830 C5 G1	12,8	5,3	5,0	4,7	10,5	10,0	9,5
929003397980	Fortimo LEDFlex S 6m 1500lm/m 840 C5 G1	11,7	5,8	5,5	5,2	11,5	10,9	10,4
929003398080	Fortimo LEDFlex S 6m 1500lm/m 865 C5 G1	11,7	5,8	5,5	5,2	11,5	10,9	10,4
929003398280	Fortimo LEDFlex S 6m 2000lm/m 830 C5 G1	17,3	3,9	3,7	3,5	7,8	7,4	7,0
929003398380	Fortimo LEDFlex S 6m 2000lm/m 840 C5 G1	15,8	4,3	4,1	3,9	8,6	8,1	7,7
929003398480	Fortimo LEDFlex S 6m 2000lm/m 865 C5 G1	15,8	4,3	4,1	3,9	8,6	8,1	7,7

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

Driver mapping

Maximum meters LEDFlex per driver type with 90% driver load. If this value is bigger than the maximum allowed string length (see table x); create a parallel connection!		Description	LED Transformer 60W 24VDC TD 220-240V			LED Transformer 100W 24VDC TD 220-240V		
		12NC	929002200506			929002200606		
		extension wire length (m)	0	5 (-5%)	10 (-10%)	0	5 (-5%)	10 (-10%)
12 NC	Discription	Power LEDFlex S (W/m)	max. LEDFLex S length (m)	max. LEDFLex S length (m)	max. LEDFLex S length (m)	max. LEDFLex S length (m)	max. LEDFLex S length (m)	max. LEDFLex S length (m)
929003396980	Fortimo LEDFlex S 10m 500lm/m 830 C5 G1	4,2	12,9	12,2	11,6	21,4	20,4	19,3
929003397080	Fortimo LEDFlex S 10m 500lm/m 840 C5 G1	3,9	14,0	13,3	12,6	23,4	22,2	21,0
929003397180	Fortimo LEDFlex S 10m 500lm/m 865 C5 G1	3,9	14,0	13,3	12,6	23,4	22,2	21,0
929003397480	Fortimo LEDFlex S 10m 1000lm/m 830 C5 G1	8,5	6,4	6,1	5,7	10,6	10,1	9,6
929003397580	Fortimo LEDFlex S 10m 1000lm/m 840 C5 G1	7,8	7,0	6,6	6,3	11,6	11,0	10,4
929003397680	Fortimo LEDFlex S 10m 1000lm/m 865 C5 G1	7,8	7,0	6,6	6,3	11,6	11,0	10,4
929003397880	Fortimo LEDFlex S 6m 1500lm/m 830 C5 G1	12,8	4,2	4,0	3,8	7,0	6,7	6,3
929003397980	Fortimo LEDFlex S 6m 1500lm/m 840 C5 G1	11,7	4,6	4,4	4,1	7,7	7,3	6,9
929003398080	Fortimo LEDFlex S 6m 1500lm/m 865 C5 G1	11,7	4,6	4,4	4,1	7,7	7,3	6,9
929003398280	Fortimo LEDFlex S 6m 2000lm/m 830 C5 G1	17,3	3,1	3,0	2,8	5,2	5,0	4,7
929003398380	Fortimo LEDFlex S 6m 2000lm/m 840 C5 G1	15,8	3,4	3,3	3,1	5,7	5,4	5,1
929003398480	Fortimo LEDFlex S 6m 2000lm/m 865 C5 G1	15,8	3,4	3,3	3,1	5,7	5,4	5,1

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

Driver mapping

Maximum meters LEDFlex per driver type with 90% driver load. If this value is bigger than the maximum allowed string length (see table x); create a parallel connection!		Description	LED Transformer 150W 24VDC TD 220-240V			Xi LED Transformer 30W 1-10V 24VDC		
		12NC	929002200706			929002825880		
		extension wire length (m)	0	5 (-5%)	10 (-10%)	0	5 (-5%)	10 (-10%)
12 NC	Discription	Power LEDFlex S (W/m)	max. LEDFLex S length (m)	max. LEDFLex S length (m)	max. LEDFLex S length (m)	max. LEDFLex S length (m)	max. LEDFLex S length (m)	max. LEDFLex S length (m)
929003396980	Fortimo LEDFlex S 10m 500lm/m 830 C5 G1	4,2	32,1	30,5	28,9	6,4	6,1	5,8
929003397080	Fortimo LEDFlex S 10m 500lm/m 840 C5 G1	3,9	35,1	33,3	31,6	7,0	6,7	6,3
929003397180	Fortimo LEDFlex S 10m 500lm/m 865 C5 G1	3,9	35,1	33,3	31,6	7,0	6,7	6,3
929003397480	Fortimo LEDFlex S 10m 1000lm/m 830 C5 G1	8,5	15,9	15,1	14,3	3,2	3,0	2,9
929003397580	Fortimo LEDFlex S 10m 1000lm/m 840 C5 G1	7,8	17,4	16,5	15,7	3,5	3,3	3,1
929003397680	Fortimo LEDFlex S 10m 1000lm/m 865 C5 G1	7,8	17,4	16,5	15,7	3,5	3,3	3,1
929003397880	Fortimo LEDFlex S 6m 1500lm/m 830 C5 G1	12,8	10,5	10,0	9,5	2,1	2,0	1,9
929003397980	Fortimo LEDFlex S 6m 1500lm/m 840 C5 G1	11,7	11,5	10,9	10,4	2,3	2,2	2,1
929003398080	Fortimo LEDFlex S 6m 1500lm/m 865 C5 G1	11,7	11,5	10,9	10,4	2,3	2,2	2,1
929003398280	Fortimo LEDFlex S 6m 2000lm/m 830 C5 G1	17,3	7,8	7,4	7,0	1,6	1,5	1,4
929003398380	Fortimo LEDFlex S 6m 2000lm/m 840 C5 G1	15,8	8,6	8,1	7,7	1,7	1,6	1,5
929003398480	Fortimo LEDFlex S 6m 2000lm/m 865 C5 G1	15,8	8,6	8,1	7,7	1,7	1,6	1,5

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

Driver mapping

Maximum meters LEDFlex per driver type with 90% driver load. If this value is bigger than the maximum allowed string length (see table x); create a parallel connection!		Description	Xi LED Transformer 60W 1-10V 24VDC			Xi LED Transformer 100W 1-10V 24VDC		
		12NC	929002825980			929002826080		
		extension wire length (m)	0	5 (-5%)	10 (-10%)	0	5 (-5%)	10 (-10%)
12 NC	Discription	Power LEDFlex S (W/m)	max. LEDFLex S length (m)	max. LEDFLex S length (m)	max. LEDFLex S length (m)	max. LEDFLex S length (m)	max. LEDFLex S length (m)	max. LEDFLex S length (m)
929003396980	Fortimo LEDFlex S 10m 500lm/m 830 C5 G1	4,2	12,9	12,2	11,6	21,4	20,4	19,3
929003397080	Fortimo LEDFlex S 10m 500lm/m 840 C5 G1	3,9	14,0	13,3	12,6	23,4	22,2	21,0
929003397180	Fortimo LEDFlex S 10m 500lm/m 865 C5 G1	3,9	14,0	13,3	12,6	23,4	22,2	21,0
929003397480	Fortimo LEDFlex S 10m 1000lm/m 830 C5 G1	8,5	6,4	6,1	5,7	10,6	10,1	9,6
929003397580	Fortimo LEDFlex S 10m 1000lm/m 840 C5 G1	7,8	7,0	6,6	6,3	11,6	11,0	10,4
929003397680	Fortimo LEDFlex S 10m 1000lm/m 865 C5 G1	7,8	7,0	6,6	6,3	11,6	11,0	10,4
929003397880	Fortimo LEDFlex S 6m 1500lm/m 830 C5 G1	12,8	4,2	4,0	3,8	7,0	6,7	6,3
929003397980	Fortimo LEDFlex S 6m 1500lm/m 840 C5 G1	11,7	4,6	4,4	4,1	7,7	7,3	6,9
929003398080	Fortimo LEDFlex S 6m 1500lm/m 865 C5 G1	11,7	4,6	4,4	4,1	7,7	7,3	6,9
929003398280	Fortimo LEDFlex S 6m 2000lm/m 830 C5 G1	17,3	3,1	3,0	2,8	5,2	5,0	4,7
929003398380	Fortimo LEDFlex S 6m 2000lm/m 840 C5 G1	15,8	3,4	3,3	3,1	5,7	5,4	5,1
929003398480	Fortimo LEDFlex S 6m 2000lm/m 865 C5 G1	15,8	3,4	3,3	3,1	5,7	5,4	5,1

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

Driver mapping

Maximum meters LEDFlex per driver type with 90% driver load. If this value is bigger than the maximum allowed string length (see table x); create a parallel connection!		Description	Xi LED Transformer 150W 1-10V 24VDC			Xi LED Transformer 250W 1-10V 24VDC		
		12NC	929002826180			929002826280		
		extension wire length (m)	0	5 (-5%)	10 (-10%)	0	5 (-5%)	10 (-10%)
12 NC	Discription	Power LEDFlex S (W/m)	max. LEDFLex S length (m)	max. LEDFLex S length (m)	max. LEDFLex S length (m)	max. LEDFLex S length (m)	max. LEDFLex S length (m)	max. LEDFLex S length (m)
929003396980	Fortimo LEDFlex S 10m 500lm/m 830 C5 G1	4,2	32,1	30,5	28,9	53,6	50,9	48,2
929003397080	Fortimo LEDFlex S 10m 500lm/m 840 C5 G1	3,9	35,1	33,3	31,6	58,4	55,5	52,6
929003397180	Fortimo LEDFlex S 10m 500lm/m 865 C5 G1	3,9	35,1	33,3	31,6	58,4	55,5	52,6
929003397480	Fortimo LEDFlex S 10m 1000lm/m 830 C5 G1	8,5	15,9	15,1	14,3	26,6	25,2	23,9
929003397580	Fortimo LEDFlex S 10m 1000lm/m 840 C5 G1	7,8	17,4	16,5	15,7	29,0	27,5	26,1
929003397680	Fortimo LEDFlex S 10m 1000lm/m 865 C5 G1	7,8	17,4	16,5	15,7	29,0	27,5	26,1
929003397880	Fortimo LEDFlex S 6m 1500lm/m 830 C5 G1	12,8	10,5	10,0	9,5	17,5	16,7	15,8
929003397980	Fortimo LEDFlex S 6m 1500lm/m 840 C5 G1	11,7	11,5	10,9	10,4	19,2	18,2	17,3
929003398080	Fortimo LEDFlex S 6m 1500lm/m 865 C5 G1	11,7	11,5	10,9	10,4	19,2	18,2	17,3
929003398280	Fortimo LEDFlex S 6m 2000lm/m 830 C5 G1	17,3	7,8	7,4	7,0	13,0	12,4	11,7
929003398380	Fortimo LEDFlex S 6m 2000lm/m 840 C5 G1	15,8	8,6	8,1	7,7	14,3	13,6	12,9
929003398480	Fortimo LEDFlex S 6m 2000lm/m 865 C5 G1	15,8	8,6	8,1	7,7	14,3	13,6	12,9

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

Driver mapping

Maximum meters LEDFlex per driver type with 90% driver load. If this value is bigger than the maximum allowed string length (see table x); create a parallel connection!		Description	CertaDrive 35W/24VDC 220-240V			CertaDrive 60W/24VDC 220-240V		
		12NC	929001424006			929001424106		
		extension wire length (m)	0	5 (-5%)	10 (-10%)	0	5 (-5%)	10 (-10%)
12 NC	Discription	Power LEDFlex S (W/m)	max. LEDFLex S length (m)	max. LEDFLex S length (m)	max. LEDFLex S length (m)	max. LEDFLex S length (m)	max. LEDFLex S length (m)	max. LEDFLex S length (m)
929003396980	Fortimo LEDFlex S 10m 500lm/m 830 C5 G1	4,2	7,5	7,1	6,8	12,9	12,2	11,6
929003397080	Fortimo LEDFlex S 10m 500lm/m 840 C5 G1	3,9	8,2	7,8	7,4	14,0	13,3	12,6
929003397180	Fortimo LEDFlex S 10m 500lm/m 865 C5 G1	3,9	8,2	7,8	7,4	14,0	13,3	12,6
929003397480	Fortimo LEDFlex S 10m 1000lm/m 830 C5 G1	8,5	3,7	3,5	3,3	6,4	6,1	5,7
929003397580	Fortimo LEDFlex S 10m 1000lm/m 840 C5 G1	7,8	4,1	3,9	3,7	7,0	6,6	6,3
929003397680	Fortimo LEDFlex S 10m 1000lm/m 865 C5 G1	7,8	4,1	3,9	3,7	7,0	6,6	6,3
929003397880	Fortimo LEDFlex S 6m 1500lm/m 830 C5 G1	12,8	2,5	2,3	2,2	4,2	4,0	3,8
929003397980	Fortimo LEDFlex S 6m 1500lm/m 840 C5 G1	11,7	2,7	2,6	2,4	4,6	4,4	4,1
929003398080	Fortimo LEDFlex S 6m 1500lm/m 865 C5 G1	11,7	2,7	2,6	2,4	4,6	4,4	4,1
929003398280	Fortimo LEDFlex S 6m 2000lm/m 830 C5 G1	17,3	1,8	1,7	1,6	3,1	3,0	2,8
929003398380	Fortimo LEDFlex S 6m 2000lm/m 840 C5 G1	15,8	2,0	1,9	1,8	3,4	3,3	3,1
929003398480	Fortimo LEDFlex S 6m 2000lm/m 865 C5 G1	15,8	2,0	1,9	1,8	3,4	3,3	3,1

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

Driver mapping

Maximum meters LEDFlex per driver type with 90% driver load. If this value is bigger than the maximum allowed string length (see table x); create a parallel connection!		Description	CertaDrive 100W/24VDC 220-240V			CertaDrive 120W/24VDC 220-240V		
		12NC	929001424206			929001424306		
		extension wire length (m)	0	5 (-5%)	10 (-10%)	0	5 (-5%)	10 (-10%)
12 NC	Discription	Power LEDFlex S (W/m)	max. LEDFLex S length (m)	max. LEDFLex S length (m)	max. LEDFLex S length (m)	max. LEDFLex S length (m)	max. LEDFLex S length (m)	max. LEDFLex S length (m)
929003396980	Fortimo LEDFlex S 10m 500lm/m 830 C5 G1	4,2	21,4	20,4	19,3	25,7	24,4	23,1
929003397080	Fortimo LEDFlex S 10m 500lm/m 840 C5 G1	3,9	23,4	22,2	21,0	28,1	26,6	25,2
929003397180	Fortimo LEDFlex S 10m 500lm/m 865 C5 G1	3,9	23,4	22,2	21,0	28,1	26,6	25,2
929003397480	Fortimo LEDFlex S 10m 1000lm/m 830 C5 G1	8,5	10,6	10,1	9,6	12,8	12,1	11,5
929003397580	Fortimo LEDFlex S 10m 1000lm/m 840 C5 G1	7,8	11,6	11,0	10,4	13,9	13,2	12,5
929003397680	Fortimo LEDFlex S 10m 1000lm/m 865 C5 G1	7,8	11,6	11,0	10,4	13,9	13,2	12,5
929003397880	Fortimo LEDFlex S 6m 1500lm/m 830 C5 G1	12,8	7,0	6,7	6,3	8,4	8,0	7,6
929003397980	Fortimo LEDFlex S 6m 1500lm/m 840 C5 G1	11,7	7,7	7,3	6,9	9,2	8,8	8,3
929003398080	Fortimo LEDFlex S 6m 1500lm/m 865 C5 G1	11,7	7,7	7,3	6,9	9,2	8,8	8,3
929003398280	Fortimo LEDFlex S 6m 2000lm/m 830 C5 G1	17,3	5,2	5,0	4,7	6,3	5,9	5,6
929003398380	Fortimo LEDFlex S 6m 2000lm/m 840 C5 G1	15,8	5,7	5,4	5,1	6,9	6,5	6,2
929003398480	Fortimo LEDFlex S 6m 2000lm/m 865 C5 G1	15,8	5,7	5,4	5,1	6,9	6,5	6,2

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

Driver mapping

Maximum meters LEDFlex per driver type with 90% driver load. If this value is bigger than the maximum allowed string length (see table x); create a parallel connection!		Description	CertaDrive LED Transformer 30W 24VDC			CertaDrive LED Transformer 60W 24VDC		
		12NC	929002146280			929002146380		
		extension wire length (m)	0	5 (-5%)	10 (-10%)	0	5 (-5%)	10 (-10%)
12 NC	Discription	Power LEDFlex S (W/m)	max. LEDFLex S length (m)	max. LEDFLex S length (m)	max. LEDFLex S length (m)	max. LEDFLex S length (m)	max. LEDFLex S length (m)	max. LEDFLex S length (m)
929003396980	Fortimo LEDFlex S 10m 500lm/m 830 C5 G1	4,2	6,4	6,1	5,8	12,9	12,2	11,6
929003397080	Fortimo LEDFlex S 10m 500lm/m 840 C5 G1	3,9	7,0	6,7	6,3	14,0	13,3	12,6
929003397180	Fortimo LEDFlex S 10m 500lm/m 865 C5 G1	3,9	7,0	6,7	6,3	14,0	13,3	12,6
929003397480	Fortimo LEDFlex S 10m 1000lm/m 830 C5 G1	8,5	3,2	3,0	2,9	6,4	6,1	5,7
929003397580	Fortimo LEDFlex S 10m 1000lm/m 840 C5 G1	7,8	3,5	3,3	3,1	7,0	6,6	6,3
929003397680	Fortimo LEDFlex S 10m 1000lm/m 865 C5 G1	7,8	3,5	3,3	3,1	7,0	6,6	6,3
929003397880	Fortimo LEDFlex S 6m 1500lm/m 830 C5 G1	12,8	2,1	2,0	1,9	4,2	4,0	3,8
929003397980	Fortimo LEDFlex S 6m 1500lm/m 840 C5 G1	11,7	2,3	2,2	2,1	4,6	4,4	4,1
929003398080	Fortimo LEDFlex S 6m 1500lm/m 865 C5 G1	11,7	2,3	2,2	2,1	4,6	4,4	4,1
929003398280	Fortimo LEDFlex S 6m 2000lm/m 830 C5 G1	17,3	1,6	1,5	1,4	3,1	3,0	2,8
929003398380	Fortimo LEDFlex S 6m 2000lm/m 840 C5 G1	15,8	1,7	1,6	1,5	3,4	3,3	3,1
929003398480	Fortimo LEDFlex S 6m 2000lm/m 865 C5 G1	15,8	1,7	1,6	1,5	3,4	3,3	3,1

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

Driver mapping

Maximum meters LEDFlex per driver type with 90% driver load. If this value is bigger than the maximum allowed string length (see table x); create a parallel connection!		Description	CertaDrive LED Transformer 120W 24VDC			CertaDrive LED Transformer 250W 24VDC		
		12NC	929002146480			929002826380		
		extension wire length (m)	0	5 (-5%)	10 (-10%)	0	5 (-5%)	10 (-10%)
12 NC	Discription	Power LEDFlex S (W/m)	max. LEDFLex S length (m)	max. LEDFLex S length (m)	max. LEDFLex S length (m)	max. LEDFLex S length (m)	max. LEDFLex S length (m)	max. LEDFLex S length (m)
929003396980	Fortimo LEDFlex S 10m 500lm/m 830 C5 G1	4,2	25,7	24,4	23,1	53,6	50,9	48,2
929003397080	Fortimo LEDFlex S 10m 500lm/m 840 C5 G1	3,9	28,1	26,6	25,2	58,4	55,5	52,6
929003397180	Fortimo LEDFlex S 10m 500lm/m 865 C5 G1	3,9	28,1	26,6	25,2	58,4	55,5	52,6
929003397480	Fortimo LEDFlex S 10m 1000lm/m 830 C5 G1	8,5	12,8	12,1	11,5	26,6	25,2	23,9
929003397580	Fortimo LEDFlex S 10m 1000lm/m 840 C5 G1	7,8	13,9	13,2	12,5	29,0	27,5	26,1
929003397680	Fortimo LEDFlex S 10m 1000lm/m 865 C5 G1	7,8	13,9	13,2	12,5	29,0	27,5	26,1
929003397880	Fortimo LEDFlex S 6m 1500lm/m 830 C5 G1	12,8	8,4	8,0	7,6	17,5	16,7	15,8
929003397980	Fortimo LEDFlex S 6m 1500lm/m 840 C5 G1	11,7	9,2	8,8	8,3	19,2	18,2	17,3
929003398080	Fortimo LEDFlex S 6m 1500lm/m 865 C5 G1	11,7	9,2	8,8	8,3	19,2	18,2	17,3
929003398280	Fortimo LEDFlex S 6m 2000lm/m 830 C5 G1	17,3	6,3	5,9	5,6	13,0	12,4	11,7
929003398380	Fortimo LEDFlex S 6m 2000lm/m 840 C5 G1	15,8	6,9	6,5	6,2	14,3	13,6	12,9
929003398480	Fortimo LEDFlex S 6m 2000lm/m 865 C5 G1	15,8	6,9	6,5	6,2	14,3	13,6	12,9

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

Electromagnetic compatibility (EMC)

Electromagnetic compatibility (EMC) is the ability of a device or system to operate satisfactorily in its electromagnetic environment without causing unacceptable interference in practical situations. In general, LED modules have limited effect on the EMC of a luminaire. In some cases EMC needs to be improved.

How to... Improve EMC performance.

As mentioned before, the total amount of parasitic current needs to be minimized. For that reason, the following practical precautions need to be taken into account in a lighting system to minimize EMC:

- Minimize the DM loop area of the lamp wires going from the driver to the light source by keeping the wires close together (bundling). This will minimize the magnetic field and reduce the radiated EMC. Long linear light sources are also part of that loop.
- Keep mains and control wires (DALI, 0-10 V) separated from the output wires (do not bundle).
- Sometimes, radiated EMC compliance cannot be achieved, necessitating the use of a 100 ... 300 Ω axial ferrite bead(s) for either mains or lamp wiring (effective for interference between 30 MHz and 300 MHz), or coupling the wires through ferrite cores within the luminaire may improve the overall EMC performance. However, selection of the type and characteristics of the additional filter depends on what frequency components have to be damped and by how much. Adhering to these rules will help in EMC compliance. For further questions, please contact your local Philips representative. Alternatively, the Philips Lighting OEM Design-In team could be consulted for a possible solution.

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)	Solvent
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)	Misc
Rosin flux	Solder flux
Acrylic tape	Adhesive
Cyanoacrylate	Adhesive

Examples of system calculation

Example 1:

I need a 30-meter line of light of Fortimo LEDFlex S 1000lm/m 840 C5 G1 for a cove lighting application in Germany with a IP67 transformer and 10-meter extension cable.

1. **Determine wattage of the LEDFlex S:**
   See datasheet or driver mapping table in the DIG → 7.8W/m → 30x7.8= 234 Watt
2. **Determine driver:**
   See driver mapping table and pick matching IP67 transformer/driver → LED Transformer 300W IP67 24VDC 220-240V
3. **Determine how many meters can be connected on one driver.**
   See driver mapping table: LED Transformer 300W IP67 24VDC 220-240V+10-meter extension cable → 31.3 meter.
4. **Check the Ta in the luminaire:**
   In this example Ta=30° C.
   See table 1 for the maximum LEDFlex S length at Ta 30 → max. 10-meter LEDFlex S allowed to avoid dimming due to voltage drop.
5. **Check extension cable type (min. 0.5 mm2 (AWG 20):**
   See datasheet of the LED Transformer 300W IP67 24VDC 220-240V → 2.5mm2 (AWG13)
6. **Conclusion:**
   30 meter of **Fortimo LEDFlex S 1000lm/m 840 C5 G1** can be connected on 1x LED Transformer 300W IP67 24VDC 220-240V using a 3-string parallel connection of the 10-meter **LEDFlex S 1000lm/m 840 C5 G1.**

Example 2:

I need a 6-meter line of light of Fortimo LEDFlex S 1500lm/m 830 C5 G1 for an application in Italy with an IP67 driver and 5-meter extension cable.

1. **Determine wattage of the LEDFlex S:**
   See datasheet or driver mapping table in the DIG → 12.8W/m → 6x12.8=76.8 Watt
2. **Determine driver:**
   See driver mapping table and pick matching IP67 transformer/driver → LED Transformer 150W IP67 24VDC 220-240V.
3. **Determine how many meters can be connected on one driver:**
   See driver mapping table: LED Transformer 150W IP67 24VDC 220-240V + 5-meter extension cable → 10.0 meter.
4. **Check the Ta in the luminaire:**
   In this example Ta=50° C.
   See table 1 for the maximum LEDFlex S length at Ta 50 → max. 7 -meter LEDFlex S allowed to avoid dimming due to voltage drop.
5. **Check extension cable type (min. 0.5 mm2 (AWG 20):**
   See datasheet of the LED Transformer 300W IP67 24VDC 220-240V → 2.5mm2 (AWG13)
6. **Conclusion:**
   6 meter of **Fortimo LEDFlex S 1500lm/m 830 C5 G1** can be connected in series on 1x LED Transformer 150W IP67 24VDC 220-240V.

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Data subject to change

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