Roblon

XPO-led

Roblon XPO-led is a conduit luminaire expressly designed for professional lighting applications that require both high light quality and long-term sustainability.

The LED-based conduit luminaire can be customised to different lengths and heights. It is available with multiple mounting options and in multiple forms.

The lighting intensity requirement in any individual situation determines how many LED modules are used, where they are placed along the conduit, and how the overall solution is shaped, directed and designed.

XPO-led can therefore be customised to meet lighting requirements for any type of showcase and for many other indoor lighting applications too.

The XPO-led luminaire guarantees very high colour rendering in all colour spectra, this being crucial for ensuring superior white light quality. Its very high luminaire colour rendering is achieved using high quality LEDs and through Roblon's special thermal and optical design.

Because the LEDs are recessed, they are almost never seen directly and glare is very limited. The luminaire's lighting direction can be adjusted during and after installation.

High efficacy is achieved through the efficient thermal and optical design. The LED modules have inbuilt electronic protection. They have a very long lifetime with highly consistent light quality throughout.

To extend sustainability even further, any one LED module in an XPO-led system can be replaced individually on-site without any of the others having to be replaced too.

LED lighting solutions from Roblon are infused with the wide-ranging lighting experience and detailed technical expertise that already differentiate Roblon lighting solutions worldwide.

XPO-led is LED technology handled in a superior way, then modestly hidden away in a long-life luminaire that is easy to customise and install, uncomplicated to handle and which never overshadows the quality light it creates.
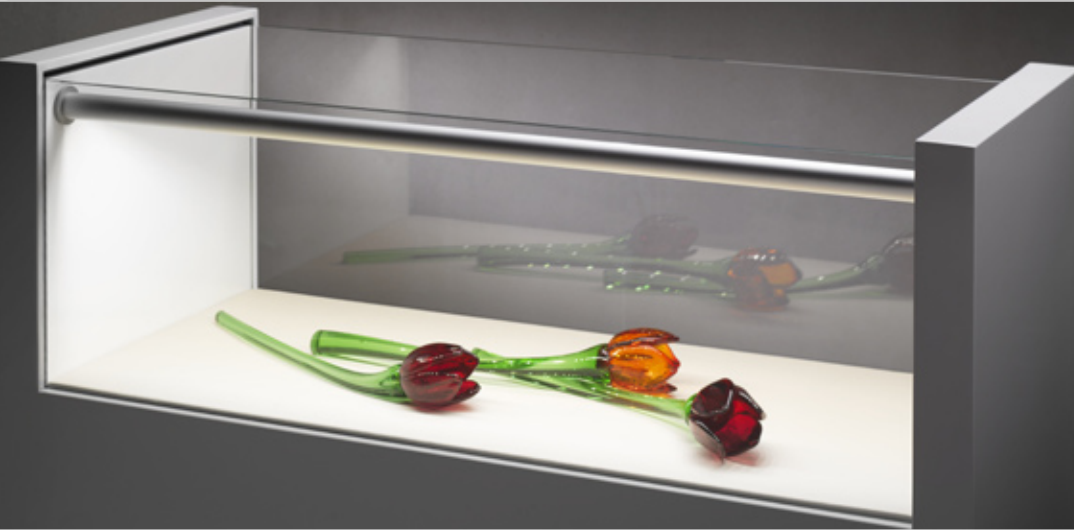
It is available in 'easy' and 'advanced' custom models for which all features, functionality, photometric data and lifetime performance are meticulously documented.

Vertical XP0-led
(3,000 K)

Wall-to-wall XP0-led
(4,500 K)

Horizontal XP0-led Ø8 mm legs
(4,500 K)
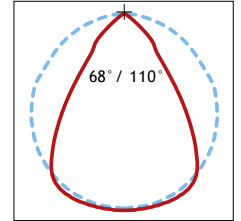
Horizontal XP0-led Ø26 mm legs
(3,000 K)

XPO-led fundamentals

Property

<table>
<tr><td rowspan="6">Optical</td><td>CCT</td><td>3,000</td><td>4,500</td><td>K</td></tr>
<tr><td>Beam angle</td><td>68/110</td><td>68/110</td><td>°</td></tr>
<tr><td>Conduit luminous flux</td><td>44</td><td>50</td><td>lm/LED</td></tr>
<tr><td>Max. conduit luminous flux</td><td>1,250</td><td>1,425</td><td>lm/m</td></tr>
<tr><td>CRI$_8$</td><td>92</td><td>93</td><td></td></tr>
<tr><td>UV (200-400 nm)</td><td>8</td><td>10</td><td>µW/lm</td></tr>
</table>

<table>
<tr><td rowspan="3">Efficacy</td><td>LED efficacy</td><td>67</td><td>77</td><td>lm/W</td></tr>
<tr><td>Conduit efficacy</td><td>41 - 45</td><td>47 - 51</td><td>lm/W</td></tr>
<tr><td>Wall-plug efficacy</td><td>26 - 40</td><td>30 - 45</td><td>lm/W</td></tr>
</table>

68° / 110°

<table>
<tr><td rowspan="11">Mechanical</td><td>Lit conduit diameter</td><td>Ø26</td><td>mm</td></tr>
<tr><td>Ø26 leg diameter</td><td>Ø26</td><td>mm</td></tr>
<tr><td>Lit conduit / Ø26 leg mounting hole</td><td>Ø33</td><td>mm</td></tr>
<tr><td>Ø8 leg diameter</td><td>Ø8</td><td>mm</td></tr>
<tr><td>Ø8 leg mounting hole</td><td>Ø17</td><td>mm</td></tr>
<tr><td>LED spacing on module</td><td>35</td><td>mm</td></tr>
<tr><td>Weight, lit conduit</td><td>0.8</td><td>kg/m</td></tr>
<tr><td>Materials</td><td colspan="2">Aluminium, ABS</td></tr>
<tr><td>Finish</td><td colspan="2">Anodised</td></tr>
</table>

Options

Colour	Grey or black	
Lit conduit length	150 - 2,110	mm
Ø26 leg height	50 - 2,152	mm
Ø8 leg height	50 - 500	mm
LEDs per module	4 or 5	(Default 5)
Number of LED modules	1 to 12	
Wire length	0.5 - 5 m	(Default 3)
LED spacing between modules	min. 35 mm	

<table>
<tr><td rowspan="6">Electrical</td><td>Electrical driver mode</td><td>Constant Voltage</td></tr>
<tr><td>Conduit input voltage</td><td>24 V DC</td></tr>
<tr><td>Applied LED</td><td>Nichia NS6x083y-H1</td></tr>
<tr><td>Power, 5-LED module</td><td>4.9 W</td></tr>
<tr><td>Power, 4-LED module</td><td>4.3 W</td></tr>
<tr><td>Wall-plug power consumption</td><td>6 - 67 W</td></tr>
</table>

<table>
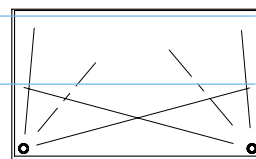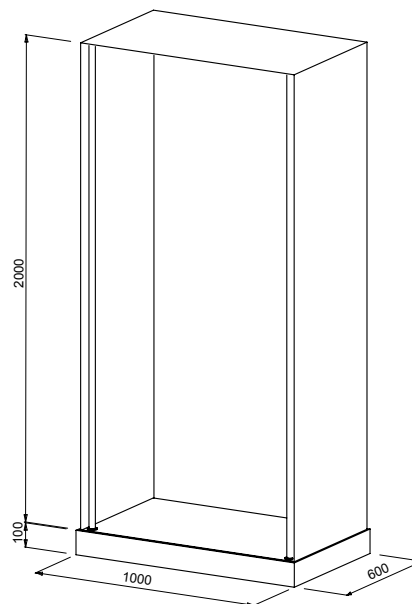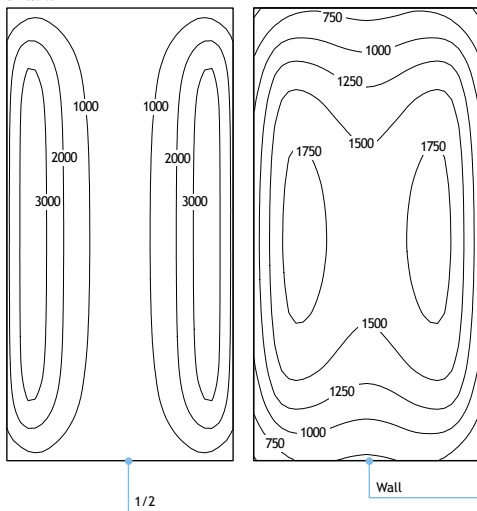<tr><td rowspan="2">Safety</td><td>c-UL-us (pending)</td><td>UL 2108</td></tr>
<tr><td>CB (pending)</td><td>EN 60.598</td></tr>
</table>

CE

Units: mm
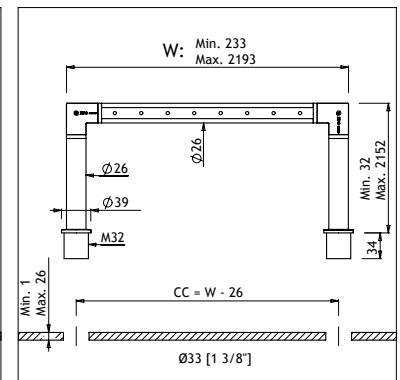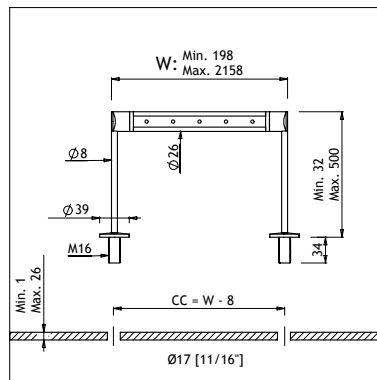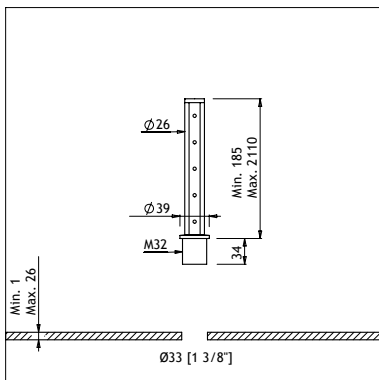
XPO-led planning

Vertical XPO-led

Easy order guide definition of each conduit

Item no.	1117 01xx	LED Layout	Evenly spaced
CCT	4,500 K	No. of 5-LED modules	10
Height (H)	2,000 mm		

Units: lux

1/2

Wall

Horizontal XPO-led Ø8 mm legs

Easy order guide definition

Item no.	1117 03xx	LED Layout	Evenly spaced
CCT	4,500 K	No. of 5-LED modules	4
Width (W)	842 mm	Light direction	0 °
Height (H)	280 mm		

Units: lux

1/3

Floor
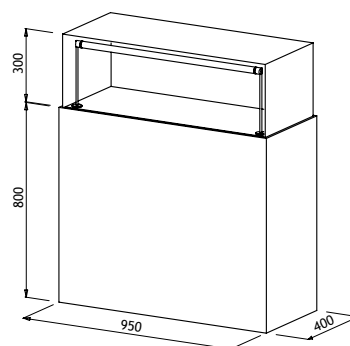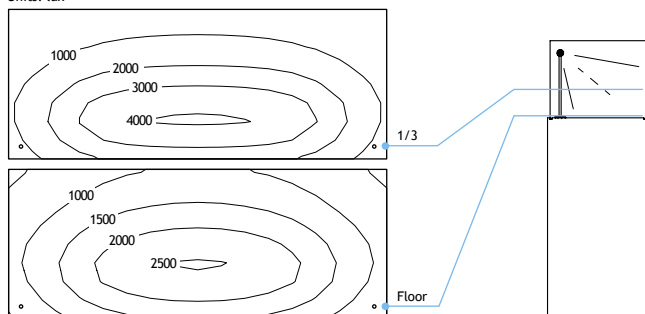
XPO-led easy order guide
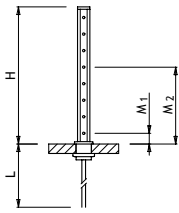
Vertical XPO-led

Type	Item no.	Colour	Rotation
1	1117 0110	Black	360°
	1117 0120	Grey	360°
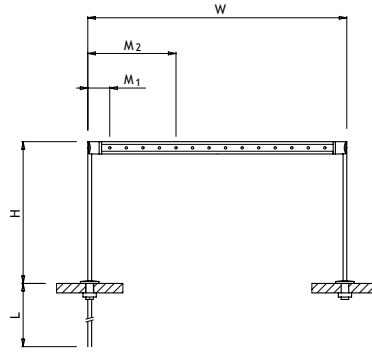
Horizontal XPO-led Ø8 mm legs

Type	Item no.	Colour	Rotation
3	1117 0310	Black	± 150°
	1117 0320	Grey	± 150°
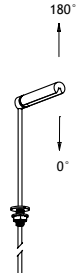
Light direction
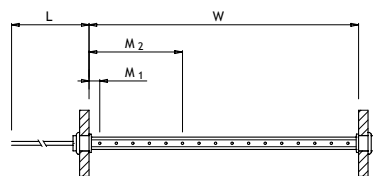
Wall-to-wall XPO-led

Type	Item no.	Colour	Rotation
2	1117 0210	Black	360°
	1117 0220	Grey	360°
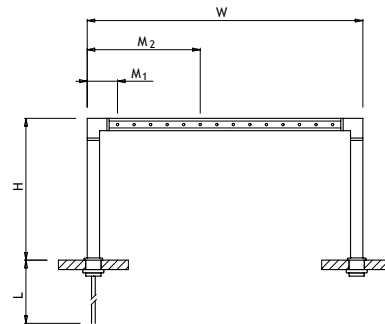
Horizontal XPO-led Ø26 mm legs

Type	Item no.	Colour	Rotation
4	1117 0410	Black	± 80°
	1117 0420	Grey	± 80°
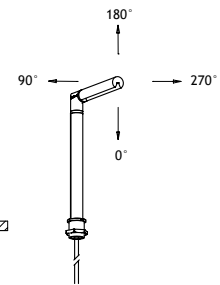
Light direction

Step 1 · Define basic type

Item no.

_____

CCT
□ 3,000 K   □ 4,500 K

_____

Height (H) _____ mm

Width (W) _____ mm
For types 2, 3 and 4 only

Wire length (L) _____ m
Default = 3 m

_____

Customer ref. no. _____

Step 2 · Choose LED layout

□ Max. possible LEDs
   No. of LEDs are driven by conduit length

□ _____ modules evenly spaced
   No. of 5-LED modules evenly spaced

□ Custom layout
   Positions are set in Step 3

Light direction
For type 3 and 4 only

□	□	□	□
0°	90°	180°	270°

Step 3 · Specify custom layout

Module no. (i)	Position M_i [mm]	LED module 5-LEDs	4-LEDs
1	M_1 _____	□	□
2	M_2 _____	□	□
3	M_3 _____	□	□
4	M_4 _____	□	□
5	M_5 _____	□	□
6	M_6 _____	□	□
7	M_7 _____	□	□
8	M_8 _____	□	□
9	M_9 _____	□	□
10	M_{10} _____	□	□
11	M_{11} _____	□	□
12	M_{12}	□	□

For detailed dimensions, see 'Design rules' p9
and 'Fundamentals' p4

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XPO-led advanced order guide

1   2   3   4

5   6   7   8

9   10   11
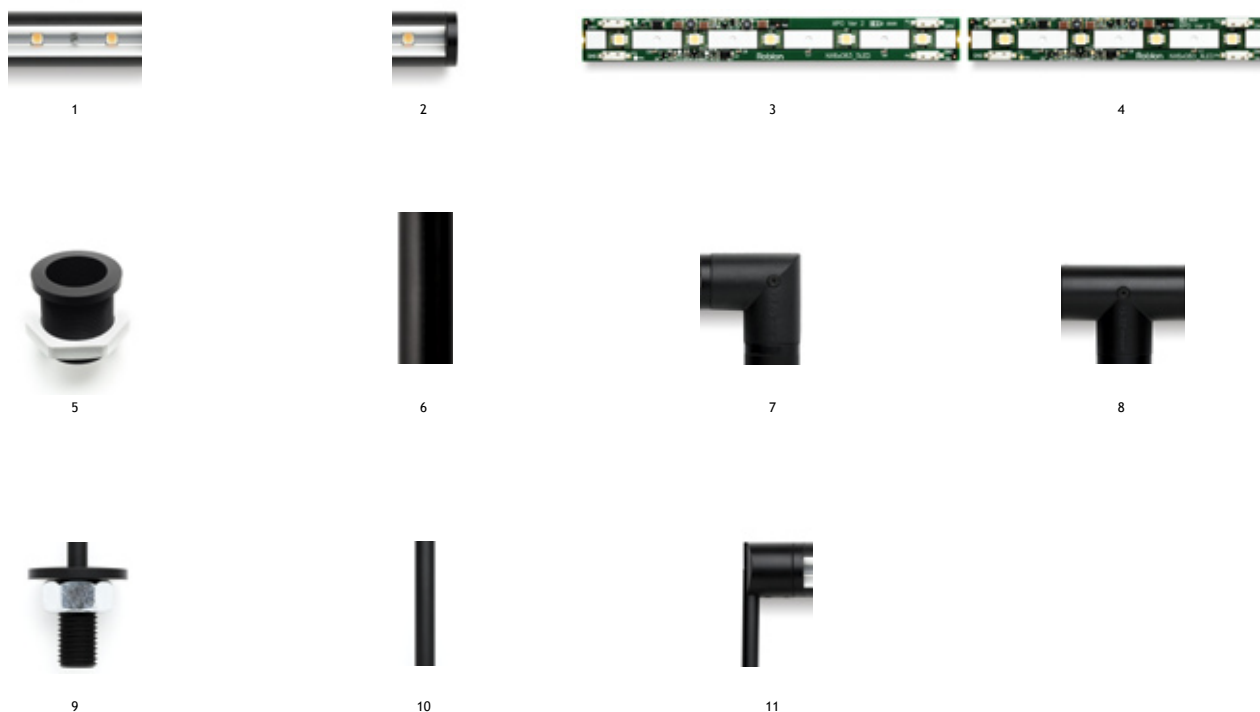
XPO-led system parts

Group	Picture	Type	Black item no.	Grey item no.	Item no.
Lit parts	1	XPO-led lit conduit	1110 0010	1110 0020	
	2	XPO-led end cap	1115 0010	1115 0020	
	3	XPO-led 5-LED module, 3,000 K			1118 0530
	3	XPO-led 5-LED module, 4,500 K			1118 0545
	4	XPO-led 4-LED module, 3,000 K			1118 0430
	4	XPO-led 4-LED module, 4,500 K			1118 0445
	5	XPO-led mounting bush, lit conduit	1112 5010	1112 5020	
Ø26 leg parts	5	XPO-led mounting bush, Ø26 leg	1113 0010	1113 0020	
	6	XPO-led Ø26 leg	1111 0010	1111 0020	
	7	XPO-led Ø26 corner joint 90°	1114 5010	1114 5020	
	8	XPO-led Ø26 T-joint	1115 7010	1115 7020	
Ø8 leg parts	9	XPO-led mounting bush, Ø8 leg	1112 0010	1112 0020	
	10	XPO-led Ø8 leg	1113 5010	1113 5020	
	11	XPO-led Ø8 corner joint 90°	1114 0010	1114 0020	
Supply		XPO-led supply wire. Specify length measured from mounting bush.			1116 9000

XPO-led accessories

Picture	Type	Black item no.	Grey item no.	Dimensions 〖mm〗
1	XPO-led cover flange	1116 0010	1116 0020	Ø65 / cut hole Ø33-Ø50
2	XPO-led cover flange with screws	1116 0110	1116 0120	Ø65 / cut hole Ø33-Ø35
3	XPO-led cover flange 2 parts	1116 0210	1116 0220	Ø65 / cut hole Ø42-Ø45
4	XPO-led mounting clips, 10 pcs	1116 0310	1116 0320	
5	XPO-led mounting bracket, 10 pcs	1116 0410	1116 0420	

XPO-led design rules

Units: mm

For additional dimensions, see 'Fundamentals' p4
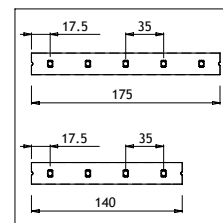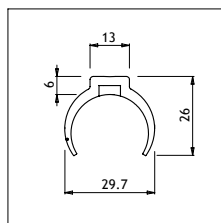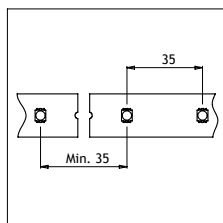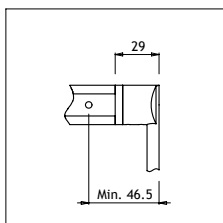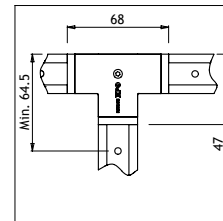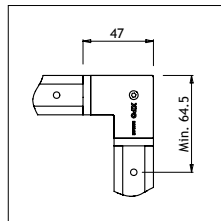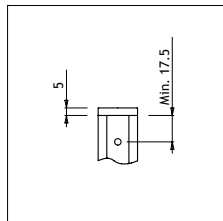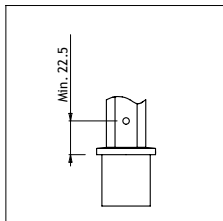
XPO-led driver selection guide

1. Use the 'Driver selector' table to determine conduit consumed power.

2. Select driver type. Type 1 is for normal lighting grade installations. Type 2 is for well-defined industrial or high-end applications. Type 2 optimises driver performance and longevity.

3. It is possible to use other drivers than these, but it is recommended that XPO-led is used with type 1 or type 2 as they have been specifically selected and tested for optimum results.

   If another driver is used, it must be Class 2, Constant Voltage with 24 V DC ± 2V on the secondary side.

4. Use the table on the right to determine the necessary power rating for the given driver type. To ensure optimum wall-plug efficacy, it is important to select the best possible driver rating compared to conduit power consumption.

5. Select the item no. that best meets the required voltage and approvals.

Driver selector

Total LEDs	Min. conduit length [mm]	Conduit consumed power [W]	Driver power rating [W] Type 1	Type 2	Total luminous flux[1] [lm]	Wall-plug efficacy[2] [lm/W]	5-LED modules	4-LED modules
4	150	4.4	10	15	200	30	0	1
5	185	4.9	10	15	250	35	1	0
8	290	8.7	10	15	400	37	0	2
9	325	9.3	10	15	450	39	1	1
10	360	9.8	10	15	500	42	2	0
12	430	13.1	25	15	600	33	0	3
13	465	13.7	25	15	650	35	1	2
14	500	14.2	25	15	700	36	2	1
15	535	14.8	25	15	750	38	3	0
16	570	17.5	25	30	800	36	0	4
17	605	18.0	25	30	850	37	1	3
18	640	18.6	25	30	900	38	2	2
19	675	19.1	25	30	950	39	3	1
20	710	19.7	25	30	1,000	41	4	0
21	745	22.4	25	30	1,050	38	1	4
22	780	23.0	25	30	1,100	39	2	3
23	815	23.5	25	30	1,150	40	3	2
24	850	24.1	25	30	1,200	41	4	1
25	885	24.6	25	30	1,250	42	5	0
26	920	27.3	60	30	1,300	37	2	4
27	955	27.9	60	30	1,350	38	3	3
28	980	28.4	60	30	1,400	39	4	2
29	1,025	29.0	60	30	1,450	39	5	1
30	1,060	29.5	60	30	1,500	40	6	0
31	1,095	32.2	60	50	1,550	39	3	4
32	1,130	32.8	60	50	1,600	39	4	3
33	1,165	33.3	60	50	1,650	40	5	2
34	1,200	33.9	60	50	1,700	41	6	1
35	1,235	34.4	60	50	1,750	41	7	0
36	1,270	37.2	60	50	1,800	40	4	4
37	1,305	37.7	60	50	1,850	41	5	3
38	1,340	38.3	60	50	1,900	41	6	2
39	1,375	38.8	60	50	1,950	42	7	1
40	1,410	39.4	60	50	2,000	42	8	0
41	1,445	42.1	60	50	2,050	41	5	4
42	1,480	42.6	60	50	2,100	42	6	3
43	1,515	43.2	60	50	2,150	42	7	2
44	1,550	43.7	60	50	2,200	43	8	1
45	1,585	44.3	60	50	2,250	43	9	0
46	1,620	47.0	60	50	2,300	42	6	4
47	1,655	47.6	60	50	2,350	42	7	3
48	1,690	48.1	60	50	2,400	43	8	2
49	1,725	48.7	60	50	2,450	43	9	1
50	1,760	49.2	60	50	2,500	44	10	0
51	1,795	51.9	60	72	2,550	43	7	4
52	1,830	52.5	60	72	2,600	43	8	3
53	1,865	53.0	60	72	2,650	44	9	2
54	1,900	53.6	60	72	2,700	44	10	1
55	1,935	54.1	60	72	2,750	44	11	0
56	1,970	56.8	60	72	2,800	43	8	4
57	2,005	57.4	60	72	2,850	44	9	3
58	2,040	57.9	60	72	2,900	44	10	2
59	2,075	58.5	60	72	2,950	45	11	1
60	2,110	59.0	60	72	3,000	45	12	0

1) Total luminous flux is for 4,500 K version. Multiply by 0.88 to get values for 3,000 K version.
2) Wall-plug efficacy values are approximate. Calculate accurate values by following formula. The formula assumes that internal driver losses are constant.

```
Wall-plug efficacy = total luminous flux / ( conduit consumed power + power rating x ( 1 - driver efficiency ) )
```

Driver types

Type	Approvals	Power rating [W]	Roblon item no.	Manufacturer	Model	Voltage rating [V AC]	Life [h]	Efficiency [%]
1	EN	10	1101 2101	Lightech	901010024P-LED	120 - 240	50,000	78
		25	1101 2251		901025024P-LED	100 - 277	50,000	80
		60	1101 2601		901060024P-LED	100 - 277	50,000	87
		100	1101 2951		901100024P-LED	120 - 240	50,000	83
	UL	10	1101 1101		901010024PU-LED	120 - 240	50,000	78
		25	1101 1251		901025024P-LED	100 - 277	50,000	80
		60	1101 1601		901060024PU-LED	100 - 277	50,000	87
	EN, UL	96	1101 0963	Meanwell	CLG-100-24	90 - 264	>35,000	87
2	EN, UL	15	1101 0152	Puls	ML15,241	100 - 240	MTBF 7,165,000	88
		30	1101 0302		ML30,100	100 - 240	MTBF 650,000	88
		50	1101 0502		ML50,100	100 - 240	MTBF 4,362,000	89
		72	1101 0702		ML70,100	100-120 / 220-240	MTBF 600,000	89
		95	1101 0952		ML95,100	100-120 / 220-240	MTBF 500,000	90

XPO-led spare parts

1

2

Picture	Type	Item no.	CCT
1	XPO-led 5-LED spare part module, 3,000 K	1119 5530	3,000 K
1	XPO-led 5-LED spare part module, 4,500 K	1119 5545	4,500 K
2	XPO-led 4-LED spare part module, 3,000 K	1119 5430	3,000 K
2	XPO-led 4-LED spare part module, 4,500 K	1119 5445	4,500 K

NB: when ordering spare part modules, the product serial number or the LED module item number must be quoted.
The product serial number is found on the product label on the lead wires. The unique Roblon LED module number is found on
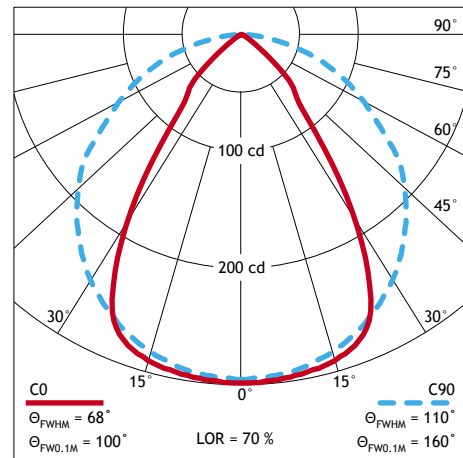the LED module. Either number identifies the specific flux and colour bin.

XPO-led photometrics

The following photometric data was captured using a 525 mm long conduit with three 5-LED modules in 4,500 K and with 35 mm LED-spacing between modules (100% utilised).

Spot image
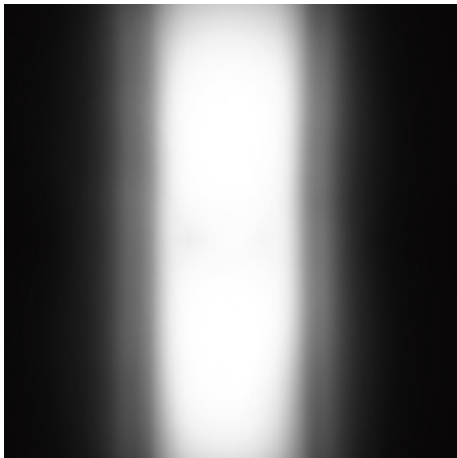
Spatial distribution in polar plot

C0	C90
$\Theta_{FWHM} = 68°$	$\Theta_{FWHM} = 110°$
$\Theta_{FW0.1M} = 100°$	$\Theta_{FW0.1M} = 160°$

LOR = 70 %

Θ_{FWHM} is the full-width beam angle where intensity is half the maximum level. The plot shows Θ_{FWHM}.
$\Theta_{FW0.1M}$ is the full-width beam angle where intensity is a tenth of the maximum level. This is a non-standard measurement that is close to the perceived beam angle.

|	Throw [m]	Illuminance[1] [lux]	Width[2] $_{FWHM}$ [m]	Width[2] $_{FW0.1M}$ [m]
	0.25	1980	0.34	0.60
	0.5	710	0.67	1.2
	1.0	210	1.4	2.4
	1.5	95	2.0	3.6
	2.0	55	2.7	4.8
	2.5	36	3.4	6.0
	3.0	25	4.1	7.2
General terms	Throw [m]		1.35 x throw	2.40 x throw

[1] Illuminance with three 5-LED modules and 100% utilisation. Multiply illuminance in lux by 0.093 to get the value in foot candle
[2] Width refers to the spot width in the C0 plane (across the conduit)

XPO-led chromatic details

Chromaticity and CCT chart
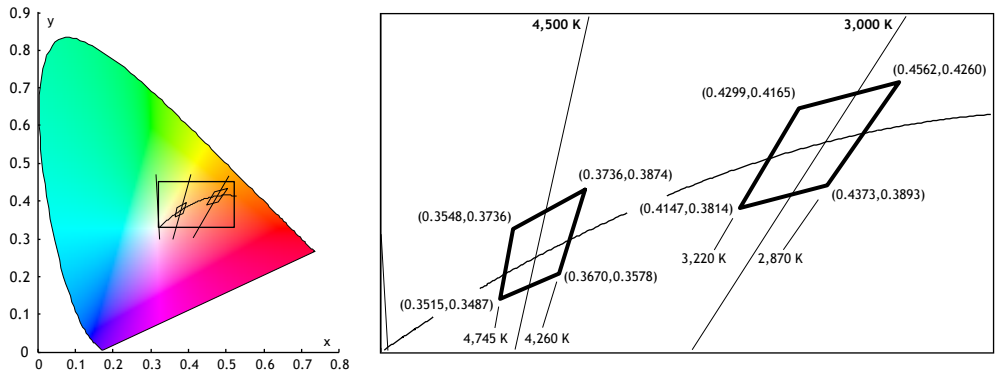
Chromaticity and CCT uniformity
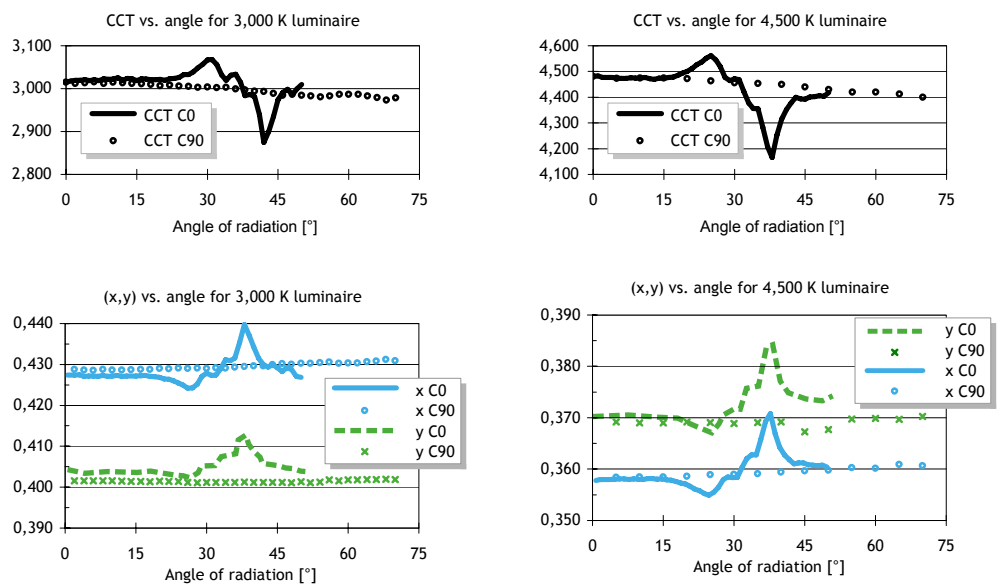
CRI details

Index	x	y	Colour	3,000 K Luminaire	3,000 K LED	4,500 K Luminaire	4,500 K LED
CRI 01	0.3692	0.3291	Light greyish red	93	94	92	93
CRI 02	0.3794	0.3955	Dark greyish yellow	94	94	94	94
CRI 03	0.3772	0.4880	Strong yellow green	93	92	95	95
CRI 04	0.2892	0.3963	Moderate yellowish green	93	93	93	93
CRI 05	0.2578	0.3078	Light bluish green	92	92	91	91
CRI 06	0.2360	0.2365	Light blue	91	91	91	91
CRI 07	0.2770	0.2372	Light violet	94	95	96	97
CRI 08	0.3259	0.2584	Light reddish purple	87	89	89	90
CRI 09	0.5492	0.3045	Strong red	70	72	69	70
CRI 10	0.4376	0.4601	Strong yellow	85	84	86	85
CRI 11	0.2551	0.4162	Strong green	92	93	92	93
CRI 12	0.1517	0.1490	Strong blue	75	74	69	68
CRI 13	0.3690	0.3510	Light yellowish pink (skin)	93	93	93	93
CRI 14	0.3538	0.4284	Moderate olive green (leaf)	95	95	97	97
CRI_8	-	-	**Average level of CRI 01-08**[1]	**92**	**93**	**93**	**93**
CRI_{14}	-	-	**Average level of CRI 01-14**	**89**	**89**	**89**	**89**

1) In accordance with CIE 13.3:1995

XPO-led thermal details

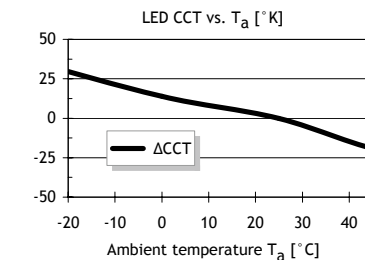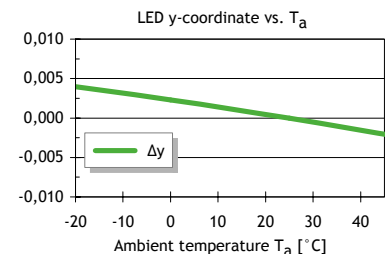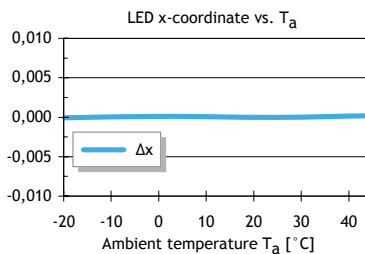| Property	Value
Operating ambient temperature	-20 to +45 °C
Conduit surface temperature increment (ΔT_{CA})	Max. 30 °C
Conduit surface temperature	Max. 75 °C
Conduit Temperature Measurement Point reading (TMP)	Max. 80 °C
LED junction temperature increment (ΔT_{JC})	Max. 25 °C
LED junction temperature (T_J)	Max. 100 °C
Max. operating LED junction temperature (LED manufacturer data)	Max. 120 °C
Internal temperature protection type	Auto reset
Internal temperature protection threshold	TMP = 80 °C
Luminous intensity level when temperature protection is activated	65 %

Temperature [°F] = Temperature [°C] x 1,8 + 32

Conduit temperature readings are for installations where the minimum distance from the conduit to any object is 25 mm.

The conduit TMP is at the centre of the back of the conduit.

Temperature vs. light output

LED x-coordinate vs. T_a

LED y-coordinate vs. T_a

LED CCT vs. T_a [°K]

LED relative output flux vs. T_a [%]
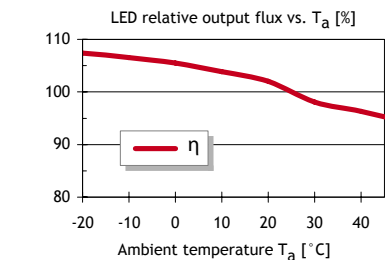
Protection circuits

Each LED module has its own set of protection circuits that prevent damage to the LEDs or to the electrical circuit in the event of an electrical or thermal incident.

Each LED module monitors its own operating temperature. If the TMP reaches 80°C, the thermal protection circuit will activate. It will cut the consumed power to the LEDs by half, which decreases the light output by approximately 35 %.

When the TMP reaches 72°C again, light output will return to 100 %. Both the 8°C gap between activation and deactivation and the relatively limited decrease in emitted light prevent the LED module from flashing. If the thermal protection circuit activates, more free space or ventilation must be created around the conduit in order to bring operating conditions back within the specified limits.

The LED modules are designed to be immune to inverted polarity up to 40 V and to electrical spikes and transients from the low-voltage power supply. The modules are not protected against high voltage, e.g. mains power. The LED modules comply with radio interference suppression and electromagnetic compatibility regulations (EMC) EN 55.015, EN 61.000-3-2, EN 61.547 and FCC part 15.

XPO-led lifetime expectancy and maintenance

Expected lifetime

Relative output flux [%]

Operating hours [H]
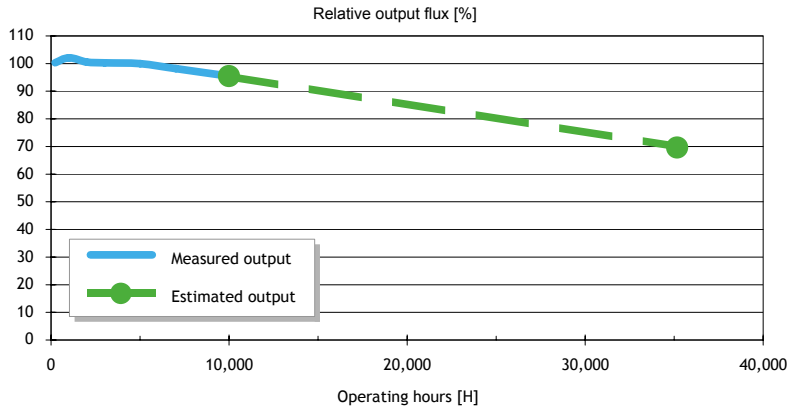
Expected output depreciation at 45°C ambient. Plots are based on the LED manufacturer's ongoing end-of-life tests after 10,000 hours. The 35,000 hours lifetime (L70) is accepted in accordance with IESNA LM 80-08 if the lumen maintenance is minimum 94.1 % after 6,000 hours of operation. The LED manufacturer's measurements show that the actual level is minimum 98.5 %.

Lifetime is defined as the number of operating hours when lumen output reaches 70% of the initial level. The LED modules inside the luminaire (LEDs included) are designed to last minimum 35,000 hours with ambient temperature at or below 45°C.

The LED manufacturer's rating for the LEDs alone corresponds to 35,000 hours at luminaire ambient temperature at or below 75°C.

The values in this section are not exact measurements as data is not yet available from the manufacturer's full end-of-life tests. The values have been determined on the basis of manufacturer specifications, luminaire design measurements and 'short duration' luminaire tests.

Maintenance

Cleaning
Only use a dry cloth to clean. Avoid exposing the LED to any liquid or solvent, as this may reduce LED lifetime.

Operating
There must be a sufficient air gap around the conduit and driver. Keep air and other vents free from obstruction at all times.

If the LEDs operate with a reduced light output or switch light output level during normal operation, the conduit is not situated in a thermally-correct environment and corrective action must be taken.

Service
If the LED module stops operating, it can be replaced by removing the reflector part. (See spare parts, p11)

Only trained or authorised personnel should change the LED module.

Because LED modules can be changed, a different CCT can always be ordered and installed if requirements change.

Consistency
Every luminaire has a unique Roblon identification number that registers the initial flux and colour bin. This ensures that a new LED module ordered as a spare part will perform consistently.

Roblon

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