



Light Engine

Design Guide

Comprehensive retrofit or new LED lighting,
from 300 – 25000lm

AUGUST 2019



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Welcome

An introduction to this guide

Thank you for considering our range of light engine solutions. In this guide you will find in-depth technical information and guidelines, intended to help you select the right solution. So whether you're looking to retrofit LED into an existing luminaire or installing new products, this guide has been designed to support you during the design phase of your project.


Further information and support

Please visit www.dwwindsor.com/retrofit
call **01992 474600** or email
light@dwwindsor.com




Types of light engines


Performance LED light engine

	Description Modular LED light engine with high power LEDs and performance optics. Providing optimal efficacy and optical flexibility for maximised energy savings.
	Lumen range 300 – 25000lm
	Power range 4-198W
	Number of optics 23
	Distribution options A / B / C / D / Z Diamond+ optics available
	Colour temperature 4000K / 3500K / 3000K / 2700K
	Colour rendering index >70Ra (4000K) >80Ra (3500K / 3000K / 2700K)


Performance CoB light engine

	Description Chip on board (CoB) LED light engine, with a large silicone lens; providing performance lighting distributions from a single light source. Offers a highly efficient LED alternative where the aesthetic of a larger single light source, closer to the appearance of a lamp, is preferable to a multichip board.
	Lumen range 1590 – 9930lm
	Power range 17-55W
	Number of optics 4
	Distribution options A / B / C / D Diamond+ optics available
	Colour temperature 4000K / 3500K / 3000K / 2700K / 2200K
	Colour rendering index >65Ra (2200K) >70Ra (4000K) >80Ra (3500K / 3000K / 2700K)

Comfort CoB light engine

	Description Chip on Board (CoB) light engine providing low glare, symmetrical lighting distribution for pedestrian areas. Uses a special silicone optic that mimics a traditional lamp distribution and a glass dome refractor to minimise glare. For an authentic representation of a lamped lantern with all the benefits of LED.
	Lumen range 1000 – 3200lm
	Power range 12-39W
	Number of optics 1
	Distribution options Symmetric only
	Colour temperature 3000K / 2700K
	Colour rendering index >80Ra

Gas Effect light engine

	Description Braun® LED solutions, by DW Windsor, offer specifiers a traditional gas mantle aesthetic while harnessing the energy and maintenance saving benefits of LED.
	Lumen range 350 – 3500lm
	Power range 3-54W
	Number of optics 1
	Distribution options Symmetric only
	Colour temperature 3000K / 2700K
	Colour rendering index >85Ra

Performance LED light engine

Why choose Performance LED?

For maximum energy and maintenance savings.

Our Performance LED light engine utilises the same high power LEDs as our highly efficient Kirium Pro functional road lighting range. It also features the same precision optical system, Diamond+.

We have a number of different sized boards with varying quantities of LEDs offering huge lighting flexibility (the number boards which can be used in each of our luminaires is determined by the physical size of the lantern and its thermal capabilities).

Each board size has an LX designation (LX3, LX4 and LX6) and each of these can be furnished with different numbers of LEDs.



Optical distributions

Introducing Diamond+

Our Performance LED light engine offers a wide range of optical solutions for ultimate flexibility in scheme design and precise control of light distribution.

Retrofitting a DW Windsor lantern with LED

Use the below table to specify the Diamond+ Optic setting which most closely replicates your lantern’s existing distribution.

Old Optic	New Optic
A (5/35)	A3
B (10/10) & Footpath	B1
C (31/35) & Area	C1
D (5/25)	D2

Diamond+ A optic

Applications

Wide roads

What does this cover?

- >14m overall road widths
- M class lighting solutions
- Higher P class solutions
- Dual carriageways

Options



A1



A2



A3



A4



A5

Diamond+ B optic

Applications

Narrow road and path

What does this cover?

- <4m overall road widths
- Footpath
- Cycle path
- Platform lighting

Options



B1



B2



B3



B4



B5

Introducing Diamond+ continued

Diamond+ C optic

Applications

Area lighting

What does this cover?

- Car parks
- Open areas
- Perimeter lighting
- Public realm spaces

Options



C1



C2



C3



C4



C5

Diamond+ D optic

Applications

Road lighting

What does this cover?

- <14m overall road widths
- Road and residential applications
- Single carriageways
- P class solutions

Options



D1



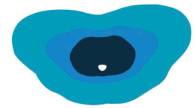
D2



D3



D4



D5

Diamond+ Z optic

Applications

Pedestrian crossing

What does this cover?

- Pedestrian crossings

Options



ZR




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



ZF

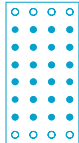
Light engine specifications

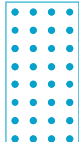
Light engine mechanical compatibility matrix

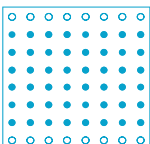


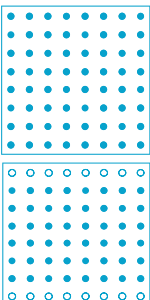












	LX6 (4)	LX6 (8)	LX6 (16)	LX3 (24)	LX3 (32)	LX4 (48)	LX4 (64)
Strand C	✓	✓					
Strand B	✓	✓	✓		✓ 700mA		
Strand A	✓	✓	✓	✓	✓	✓	✓ 700mA
Strand A +	✓	✓	✓	✓	✓	✓	✓ 900mA
Ely C	✓	✓	✓				
Ely B	✓	✓	✓	✓	✓ 700mA		
Ely A	✓	✓	✓	✓	✓	✓	✓ 550mA
Windsor Street	✓	✓	✓	✓	✓ 700mA	✓ 700mA	✓ 650mA
Windsor Avenue	✓	✓	✓	✓	✓		
York Family*	✓	✓	✓	✓	✓ 650mA		
Lancaster	✓	✓	✓	✓	✓ 700mA	✓ 700mA	✓ 650mA
Berkeley & Portland	✓	✓	✓				
Knightsbridge	✓	✓	✓	✓	✓		
Pall Mall & Westminster	✓	✓	✓	✓	✓ 700mA		
Iffley	✓	✓	✓				
Optima* 450	✓	✓	✓	✓	✓	✓ 700mA	✓ 600mA
Optima* 500	✓	✓	✓	✓	✓	✓	✓
DW400	✓	✓		✓ 850mA	✓ 750mA		

Key

✓	Compatible up to 1000mA
✓ 1000mA	Compatible up to stated driver current

*York Family comprises the following products – Braemar, Henley, Newport, Salisbury, Warwick, Waterford, York
*Optima comprises the following products – Dover, Excel, Rico, Stratum, Cradle, Polar

Product lumen packages and wattages matrix

The same lumen packages can be achieved in a number of ways, dependant on your driving factors. For the lowest capital cost choose the fewest LEDs, run at a higher output. For the most efficient option, with reduced lifetime costs, choose more LEDs and run at a lower drive current.

The light engine data below is based on 4000K and is meant as a guide only. For accurate lumen outputs for specific lanterns, please download the photometry.

Number of LEDs		Drive current (mA)																
		200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000
4	Im	385	484	578	669	759	844	930	1012	1095	1172	1249	1323	1399	1470	1540	1606	1674
	W	4	4	5	6	6	7	8	8	9	9	10	10	11	12	13	14	15
8	Im	770	967	1156	1337	1517	1687	1858	2024	2189	2343	2497	2648	2798	2939	3080	3214	3348
	W	7	8	9	11	12	13	15	17	18	20	21	23	24	26	28	29	31
16	Im	1516	1890	2263	2616	2969	3303	3637	3961	4285	4586	4887	5182	5477	5753	6028	6291	6554
	W	12	15	17	20	22	24	27	30	33	35	38	41	44	46	49	52	55
24	Im	2314	2885	3455	3993	4531	5024	5517	5985	6475	6896	7338	7750	8160	8757	8944	9294	9643
	W	17	20	24	27	31	35	39	42	46	50	54	58	62	66	70	74	79
32	Im	2901	3615	4330	5005	5680	6320	6958	7578	8198	8775	9351	9915	10480	11008	11535	12037	12540
	W	22	26	31	36	41	46	51	56	61	66	72	77	82	87	93	99	105
48	Im	4382	5462	6541	7561	8581	9546	10511	11447	12383	13254	14125	14978	15830	16628	17424	18183	18942
	W	32	39	46	53	60	67	75	83	91	98	105	112	120	128	137	146	155
64	Im	5793	7218	8645	9995	11343	12618	13893	14950	16369	17521	18671	19798	20925	21978	23031	24035	25038
	W	41	50	59	68	78	87	97	107	117	127	137	147	158	168	179	188	198

Colour temperature

In order to account for the reduction in lumen packages caused by warmer colour temperatures, the following reduction factors can be applied to the base lumen packages;

Colour temperature	Light output reduction factor
4000K	1.0
3000K	0.89
2700K	0.78

Comparable products for HID replacements

The table below gives guideline options for narrowing down potential one-for-one replacement options for standard lamp type solutions.

Lamp type	Connected load	Lamp lumens	Approx comparable LED lumens*	Performance LED alternative	Energy saving					
					4000K		3000K		2700K	
					Lowest cost	Most efficient	Lowest cost	Most efficient		
50W SON-T+/ CDO-TT	69W	4400	3300	Spec	16 LED @ 500mA	16 LED @ 600mA	24 LED @ 400mA	16 LED @ 800mA	32 LED @ 300mA	>60%
				W	27	33	31	41	31	
				lm	3550	3320	3430	4160	3680	
70W SON-T+/ CDO-TT	84W	6600	4900	Spec	24 LED @ 500mA	24 LED @ 600mA	24 LED @ 600mA	32 LED @ 500mA	>54%	
				W	39	46	51			
				lm	4800	4890	5070			
100W SON-T+/ CDO-TT	123W	10700	8000	Spec	32 LED @ 650mA	32 LED @ 800mA	48 LED @ 500mA	64 LED @ 400mA	>46%	
				W	66	82	75	78		
				lm	8320	8000	8360	8360		
150W SON-T+/ CDO-TT	180W	17500	13100	Spec	48 LED @ 750mA	64 LED @ 550mA	64 LED @ 650mA	64 LED @ 700mA	>40%	
				W	113	107	127	137		
				lm	13340	13450	13560	13500		
45W CPO-TW	52W	4950	3700	Spec	16 LED @ 600mA	16 LED @ 700mA	24 LED @ 450mA	16 LED @ 700mA	132LED @ 400mA	>37%
				W	33	38	35	36	41	
				lm	3790	3770	3800	3680	4160	
60W CPO-TW	66W	7200	5400	Spec	24 LED at 600mA	24 LED @ 700mA	24 LED @ 700mA	32 LED @ 550mA	64 LED @ 250mA	>30%
				W	46	50	56	50		
				lm	5570	5640	550	5420		
90W CPO-TW	100W	10450	7700	Spec	32 LED @ 650mA	32 LED @ 750mA	48 LED @ 450mA	32 LED @ 850mA	64 LED @ 400mA	>39%
				W	66	77	68	88	78	
				lm	7740	7610	7620	7790	8360	
140W CPO-TW	154W	16500	12300	Spec	48 LED @ 700mA	48 LED @ 800mA	64 LED @ 600mA	64 LED @ 650mA	>47%	
				W	105	121	117	127		
				lm	12630	12380	12290	12690		12710

Example luminaire specifications for given lumen packages

Required lumen package	2700K	3000K	4000K
1,000	16 LED @ 200mA	16 LED @ 200mA	8 LED @ 200mA
2,500	16 LED @ 450mA	16 LED @ 400mA	8 LED @ 300mA
3,000	16 LED @ 550mA	16 LED @ 500mA	16 LED @ 200mA
4,500	32 LED @ 400mA	32 LED @ 350mA	32 LED @ 250mA
5,000	32 LED @ 450mA	32 LED @ 400mA	32 LED @ 300mA
7,000	32 LED @ 650mA	32 LED @ 600mA	32 LED @ 500mA
10,000	64 LED @ 450mA	64 LED @ 400mA	64 LED @ 300mA
12,000	64 LED @ 600mA	64 LED @ 500mA	64 LED @ 400mA
15,000	64 LED @ 750mA	64 LED @ 650mA	64 LED @ 550mA
20,000		64 LED @ 950mA	64 LED @ 750mA

Performance CoB light engine

Why choose Performance CoB?

For performance LED lighting with a lamp aesthetic

Closer in appearance to a traditional lamp (as a single point light source).

The Performance CoB light engine offers impressive energy savings over traditional lamp technology within an aesthetic more in keeping with a heritage style lantern.



Optical distributions

Introducing Diamond+

Our Diamond+ optic system has been extended to include a number of lenses that can be used with CoB LEDs that offer very similar distributions to the Performance LED options.

Retrofitting a DW Windsor lantern with Performance CoB

Use the below table to specify the CoB Diamond+ Optic setting which most closely replicates your lantern's existing distribution.

Old Optic	New Optic
A (5/35)	AC1
B (10/10) & Footpath	BC1
C (31/35) & Area	CC1
D (5/25)	DC1

Diamond+ A CoB Optic

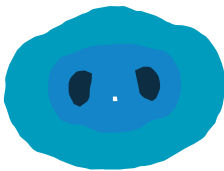
Applications

Wide roads

What does this cover?

- >14m overall road widths
- M class lighting solutions
- Higher P class solutions
- Dual carriageways

Options



AC1

Diamond+ B CoB Optic

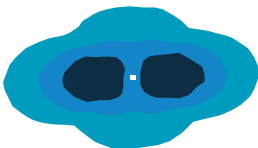
Applications

Narrow road and path

What does this cover?

- <4m overall road widths
- Footpath
- Cycle path
- Platform lighting

Options



BC1

Introducing Diamond+ continued

Diamond+ C CoB optic

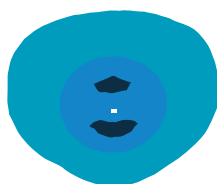
Applications

Area lighting

What does this cover?

- Car parks
- Open areas
- Perimeter lighting
- Public realm spaces

Options



CC1

Diamond+ D CoB optic

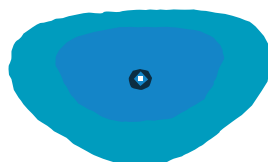
Applications

Road lighting

What does this cover?

- <14m overall road widths
- Road and residential applications
- Single carriageways
- P class solutions

Options



DC1

Light engine specifications

Product lumen packages and wattages matrix

Performance CoB is compatible with all traditional lanterns up to 1000mA.

The light engine data below is based on 4000K and is meant as a guide only. For accurate lumen outputs for specific lanterns, please download the photometry.

	Drive current (mA)							
	300	400	500	600	700	800	900	1000
lm	3215	4231	5242	6235	7213	8142	9060	9933
W	17	23	28	33	38	44	50	55

Colour temperature

In order to account for the reduction in lumen packages caused by warmer colour temperatures, the following reduction factors can be applied to the base lumen packages;

Colour temperature	Light output reduction factor
4000K	1.0
3000K	0.95
2700K	0.90

Comparable products for HID replacements

The table below gives guideline options for narrowing down potential one-for-one replacement options for standard lamp type solutions.

Lamp type	Connected load	Lamp lumens	Approx comparable LED lumens*		Performance CoB alternative			Energy saving
					4000K	3000K	2700K	
50W SON-T+/CDO-TT	69W	4400	3300	Spec	400mA	400mA	450mA	>68%
				W	22	22	25	
				lm	3530	3250	3480	
70W SON-T+/CDO-TT	84W	6600	4900	Spec	600mA	650mA	650mA	>61%
				W	33	35	35	
				lm	5360	5220	4970	
100W SON-T+/CDO-TT	123W	10700	8000	Spec	1000mA			>55%
				W	55			
				lm	8340			
45W CPO-TW	52W	4950	3700	Spec	450mA	500mA	500mA	>52%
				W	25	27	27	
				lm	3970	4060	3870	
60W CPO-TW	66W	7200	5400	Spec	650mA	700mA	750mA	>47%
				W	35	38	41	
				lm	5670	5590	5670	
90W CPO-TW	100W	10450	7700	Spec	950mA	1000mA		>48%
				W	52	55		
				lm	7970	7670		

Example luminaire specifications for given lumen packages

Required lumen package	2700K	3000K	4000K
1,000	200mA	200mA	200mA
2,500	300mA	300mA	300mA
3,000	400mA	400mA	400mA
4,500	600mA	550mA	500mA
5,000	650mA	600mA	550mA
7,000	950mA	900mA	800mA

Comfort CoB light engine

Why choose Comfort CoB?

Comfortable, efficient lighting appropriate for residential and pedestrian applications

Again featuring the energy efficiency and aesthetic benefits of Chip-on-Board LED we use a glass bowl refractor and a special symmetric lens to obscure the light source from view providing efficient yet soft, glare free lighting for pedestrian scale applications such as public realm spaces, parks and residential roads.



Optical distributions

Introducing comfortable LED lighting

For residential areas and pedestrian spaces, the Comfort CoB light engine provides soft, low glare lighting.

Comfort CoB Optic

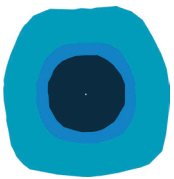
Applications

Area lighting

What does this cover?

- Public realm spaces
- Residential lighting

Options



Symmetric

Light engine specifications

Comparable products for HID replacements

The table below gives guideline options for narrowing down potential one-for-one replacement options for standard lamp type solutions.

Lamp type	Connected load	Lamp lumens	Approx comparable LED lumens*		Comfort CoB alternative		Energy saving
					2700K	3000K	
50W SON-T+/ CDO-TT	69W	4400	3300	Spec	800mA	900mA	>54%
				W	32	36	
				lm	3250	3390	
45W CPO-TW	52W	4950	3700	Spec	950mA	1000mA	>27%
				W	38	40	
				lm	3680	3650	

Example luminaire specifications for given lumen packages

Required lumen package	2700K	3000K
1,000	200mA	200mA
2,500	600mA	550mA
3,000	750mA	700mA

Braun Gas Effect light engine

Why choose Braun Gas Effect?

For the ultimate in authentic heritage lighting

Braun LED solutions, by DW Windsor, offer specifiers a traditional gas mantle aesthetic whilst harnessing the energy and maintenance savings of LED. Due to the specialist nature of this light engine, please call DW Windsor to help create a bespoke solution for your project.

Gas mantles

The gas effect light engine can be supplied with 1, 2, 3, 4 or 6 gas mantles. With the ability to be run at different drive currents, a lumen output range of 350 – 3500lm can be achieved.

Quality of light

To emulate the warmth of natural flame, ensuring all aspects of the light engine are authentic, the gas effect light engine is available with colour temperatures of 2700K and 3000K, both with a high CRI of 85Ra.

Control

The gas effect light engine can be switched by normal photocell, supplied with part-night or pre-programmed dimming, or be integrated into a CMS or Smart City system for ultimate flexibility.

Aesthetic additions

To complete the heritage aesthetic, we can supply columns complete with ladder bars and timer boxes, or even a replica gas timer to be mounted within the lantern itself (as shown below).



Technical data

Photometry

Understanding photometric data

DW Windsor has recently simplified our photometric data codes. All photometry now features a consistent naming format: to give designers detailed product information within the code itself.

Product	Light engine	Colour temperature	Optic	Drive current	UMSUG Code
Windsor Street	LX6 - 16 LED	3K	A1	350mA	UMSUG 42 0012 0000 100

S/P ratios

What is an S/P ratio?

Our eyes respond differently at daytime and night-time lighting levels. These are commonly referred to as Photopic (day) and Scotopic (night) responses. For any artificial light source, the ratio between these outputs is fixed and independent of the intensity of that source.

When utilising LED light sources for street lighting applications, new lighting standards allow for a reduction in the illumination levels required to meet the same perceived light level. The level of illumination required on subsidiary roads and paths may be reduced if the light source has a colour rendering index of 60Ra or higher.

Following SP ratios apply;

Light engine	2700K	3000K	4000K
Performance LED	1.2	1.2	1.5
Performance CoB	1.2	1.2	1.5
Comfort CoB	1.2	1.2	n/a

UMS Codes

UMS codes are available for the full light engine range, see below or download online [here](#)

	Number of LEDs	Elxon designation	Generic LED Codes: Lower limit	Generic LED Codes: Upper limit
Performance LED	8	LX3-116-08 LED STD	42 0007 0000 100	42 0031 0000 100
		LX3-116-08 LED CLO	42 0006 0000 100	42 0028 0000 100
	16	LX3-116-16 LED STD	42 0012 0000 100	42 0055 0000 100
		LX3-116-16 LED CLO	42 0011 0000 100	42 0049 0000 100
	24	LX3-116-24 LED STD	42 0017 0000 100	42 0079 0000 100
		LX3-116-24 LED CLO	42 0015 0000 100	42 0071 0000 100
	32	LX3-116-32 LED STD	42 0022 0000 100	42 0105 0000 100
		LX3-116-32 LED CLO	42 0020 0000 100	42 0093 0000 100
	48	LX4-116-48 LED STD	42 0032 0000 100	42 0155 0000 100
		LX4-116-48 LED CLO	42 0029 0000 100	42 0138 0000 100
	64	LX4-116-64 LED STD	42 0041 0000 100	42 0198 0000 100
		LX4-116-64 LED CLO	42 0037 0000 100	42 0177 0000 100
	80	LX5-116-80 LED STD	42 0053 0000 100	42 0254 0000 100
		LX5-116-80 LED CLO	42 0049 0000 100	42 0228 0000 100
	96	LX5-116-96 LED CLO	42 0063 0000 100	42 0301 0000 100
		LX5-116-96 LED CLO	42 0057 0000 100	42 0270 0000 100
Comfort CoB	1210	LX5-116-128 LED STD	42 0082 0000 100	42 0394 0000 100
		LX5-116-128 LED CLO	42 0074 0000 100	42 0353 0000 100
Performance CoB	1818	CX2-1210 STD	42 0009 0000 100	42 0040 0000 100
		CX1-1818 STD	42 0012 0000 100	42 0084 0000 100
Performance CoB	1818	CX2-1210 CLO	42 0011 0000 100	42 0075 0000 100
		CX1-1818 STD	42 0012 0000 100	42 0084 0000 100

Elxon have recently introduced a new system of generic codes, specifically for LED products. Learn more about the new 42 charge codes [here](#)

Understanding CE Certification

CE Marking

The CE mark is a requirement for products that are offered for sale on the European market, it indicates that the product meets EU safety, health and environmental regulations.

Manufacturers are required to perform the following actions for CE compliance:

- Undertake a conformity assessment
- Issue the EC Declaration of Conformity (DoC)
- Place CE marking on a product

Last year the rules covering the application of CE marks were changed to state that;

“A product, which has been subject to important changes or overhaul aiming to modify its original performance, purpose or type after it has been put into service, having a significant impact on its compliance with Union harmonisation legislation, must be considered as a new product.”

“If the product is to be considered as new, this person becomes the manufacturer with the corresponding obligations. Furthermore, in this case the conclusion is that it is a new product, the product has to undergo a full conformity assessment before it is made available on the market.”

What does this actually mean?

Any person offering a retrofit gear tray onto the market must ensure that the complete product is re-tested in accordance with the standards and regulations before affixing a CE mark.

In other words, third parties cannot offer a gear tray for retrofit into our lanterns, without invalidating the warranty and unless they have taken each type of lantern, re-tested it and can provide the required documentation as detailed above.

Below is a list of requirements for CE marking and self-assessment to be carried out on each type of product that a retrofit gear tray may be installed into:

- Conformity tests – EMC testing / Photometry / UMSUG coding etc
- Produce instructions and safety information
- Keep technical documentation for 10 years after product has been placed on market
- Manufacturers name and contact details
- Affix CE label
- Certify product and quality system
- Correct labelling to allow for identification



Due to continuous product development the details within this brochure are subject to change at any time, please contact us for the most up-to-date information or visit: dwwindsor.com

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