



# Duo<sup>3</sup>

*Performance  
Comfort  
Choice*

# The building-wide lighting solution

Duo<sup>3</sup> is designed to meet the needs of the whole of tomorrow's workplace. Whether in offices, transitory or signature areas, Duo<sup>3</sup> can provide the highest quality lighting, coupled with a cohesive aesthetic that can be carried through an entire building.



## Duo<sup>3</sup> for offices

Duo<sup>3</sup> meets the demands of modern office spaces; low energy, low glare, high performance luminaires with a host of features designed to create comfortable, flexible office spaces.



## Duo<sup>3</sup> for social and transitory spaces

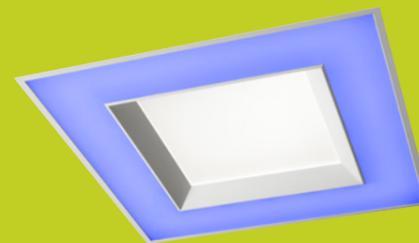
Duo<sup>3</sup> allows a lighting theme to be continued throughout a building, from office space to transitory areas and social spaces. Visual clues can help delineate spaces within open areas, whilst allowing each area to have its own identity.



## Duo<sup>3</sup> for signature areas

When more impact is required, Duo<sup>3</sup> can provide feature lighting that really makes a statement. Illuminated feature panels can be combined with inset spot lighting to create individual solutions that still blend seamlessly with a building-wide design theme.

A wide range of configurations



# Duo<sup>3</sup> for offices

## A choice of light engines and configurations

Duo<sup>3</sup> can be specified with a range of light outputs. For office applications, there are two versions available, a 3300 lumen version which can be used as a direct replacement for a typical fluorescent luminaire, or a more powerful 4000 lumen version which can significantly reduce the number of installed points in a typical open plan area whilst still delivering excellent uniformity throughout the space.

Duo<sup>3</sup> Office also offers a choice of aesthetic, with the option of an inner louvre to give a more technical appearance without compromising performance.

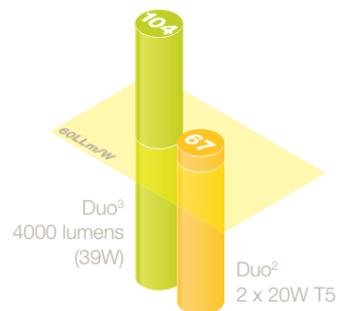
Typical open plan office lit to 500 lux

Luminaire	Spacings	No. of fittings	w/m <sup>2</sup>	w/m <sup>2</sup> /100 Lux
Duo <sup>2</sup> 3 x 20W T5	2.4m x 2.4m	70	11.39	2.22
Duo <sup>3</sup> 3300 lm	2.4m x 2.4m	70	5.56	1.12
Duo <sup>3</sup> 4000 lm	2.4m x 3.0m	56	5.42	1.08

Room: Open plan office, 400m<sup>2</sup>

## The latest generation of LED technology

Duo<sup>3</sup> includes the latest in LED lighting technology, ensuring unparalleled efficiency. The unique configuration used in Duo<sup>3</sup> means that the LEDs are densely distributed, allowing them to be run at lower power. This results in increased efficiency and LED lifespan. Due to this innovative LED arrangement, Duo<sup>3</sup> delivers over 100 LLm/W.



## Duo<sup>3</sup> for offices



# Maximising comfort

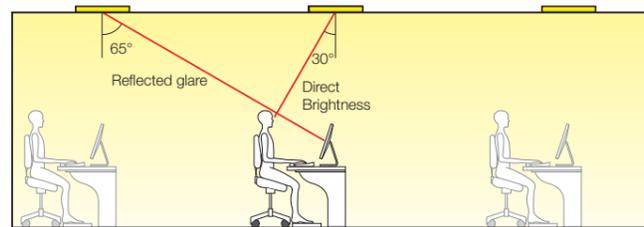
## Creating comfortable office spaces

Duo<sup>3</sup> enhances the appearance of any lit environment. Freed from the restraints of linear lamp technology, Duo<sup>3</sup>'s distinctive 360 degree symmetry brings a visual uniformity to the space. The optimised lighting distribution gives outstanding cylindrical illuminance. This enhances both facial recognition and even room surface illumination, creating a more effective working environment.

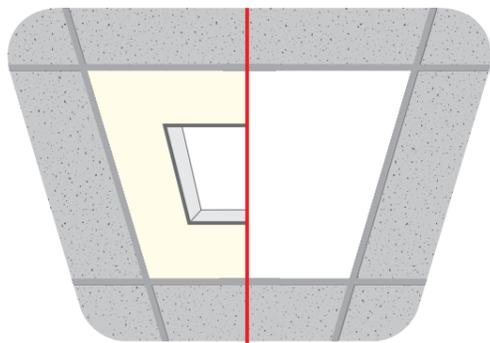
## Controlling glare from all angles of view

The traditional measurement of glare from a luminaire is defined at 65° of elevation and above. This measurement method was developed to eliminate the reflectance of a luminaire on a computer screen which was the foremost cause of glare and discomfort. Duo<sup>3</sup> meets the 3000cd/m<sup>2</sup> glare limit as defined in BS EN12464, as well as the LG7 and BCO guides.

We should perhaps assess the modern luminaire in degrees of comfort rather than glare. With normal ceiling heights luminaires enter our field of vision at a far lower angle of incidence. Although we generally do not look directly at a luminaire from a 30° angle, we are aware of the brightness and will make a subconscious judgement as to the degree of discomfort this causes. Duo<sup>3</sup> employs advanced diffusion materials to eliminate direct LED intensity and Intermediate Brightness Zones to reduce sudden changes in brightness across the ceiling plane.



## Creating contrast



Duo<sup>3</sup> brings visual interest to the ceiling plane with a 5:1 contrast ratio between inner and outer optic

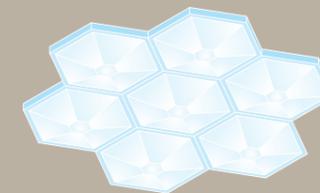
Most LED lighting has no contrast within the optic, giving an uninteresting visual effect

The primary objective in creating a comfortable lighting scheme is to avoid sudden changes in brightness. By illuminating the area surrounding the light source, the differential between object and background is reduced, resulting in a more comfortable field of view. It is the sudden change in brightness, rather than the actual luminance level, which makes the environment uncomfortable. Duo<sup>3</sup> has an Intermediate Brightness Zone that is 20% of the brightness of the central optic, creating a contrasting field between the primary optic and ceiling plane. This also brings contrast to the luminaire, adding interest, unlike the majority of homogenous LED modules.

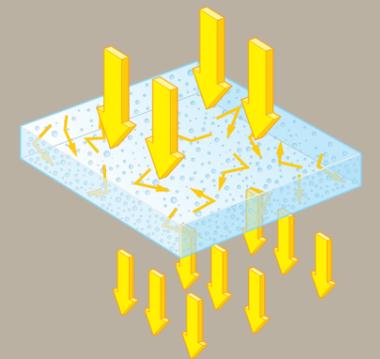


## Optical technology

Duo<sup>3</sup> Office employs two distinct optical controllers to create a comfortable yet high performance luminaire. The inner tile uses a Hexaprism optic which eliminates glare from all angles of view, whilst the outer tile uses a complex polymer which combines microscopic pearls of opal thermoplastic elements in a clear base, resulting in excellent light transmission.



Inner Hexaprism optic



Outer micro polymer optic

# Reducing energy with lighting controls



## Area or localised control

The entire range of Duo<sup>3</sup> luminaires comes as standard with DALI dimmable gear, allowing connection to a fully integrated DALI control system such as Command Elite. This offers complete flexibility in building planning, as groups of luminaires can be configured, commissioned and controlled remotely. Energy savings can be significant, with a 40% reduction in overall energy usage when linked to a typical daylight harvesting controls scheme. Integral DALI or Organic Response<sup>®</sup> Detectors can further enhance building flexibility and ensure rapid installation.

With the adoption of Building Regs 2013 Part L, LENI will become an increasingly important method of assessing the energy effectiveness of a lighting installation. All configurations of Duo<sup>3</sup> Office will easily better the requirements of these regulations.



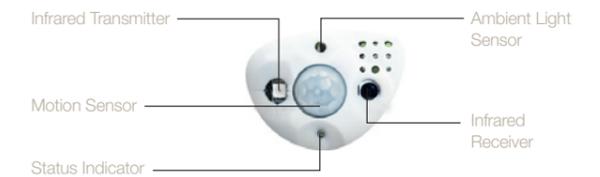
## Typical 500 lux office application control scenarios

Luminaire type	Quantity	KWh/m <sup>2</sup> (LENI)
Duo <sup>2</sup> 3 x 20W T5	70	42.14
Duo <sup>2</sup> 3 x 20W T5 Occupancy & Daylight (All DALI)	70	30.11
Duo <sup>3</sup> 4000 lumen	56	20.04
Duo <sup>3</sup> 4000 lumen Occupancy & Daylight (All DALI)	56	15.70

**Room:** Open Office, 400m<sup>2</sup>  
**Operational Hours** = 3700  
**Lighting Energy Limit** = 30.95 kWh/m<sup>2</sup>  
 (In Accordance with Table 44 - Building Regs Part L 2013.)

## Organic Response

An Organic Response<sup>®</sup> enabled luminaire delivers high performance lighting control without the need for additional control hardware, wiring or commissioning. All intelligence is contained within the integrated Sensor Node, and shared between neighbouring luminaires using proximity limited wireless infrared communication.



Each Organic Response<sup>®</sup> luminaire continuously makes lighting decisions based on the proximity of occupants to it, and shares this real-time information with other Organic Response<sup>®</sup> luminaires, enabling them to make more intelligent decisions. When used with a dimmable ballast, the Organic Response<sup>®</sup> enabled Duo<sup>3</sup> will dim or brighten in response to occupant activity and levels of ambient light.

Integral Organic Response<sup>®</sup> in Duo<sup>3</sup> is available from Spring 2014. Please consult Whitecroft Controls department.



## Separate switching

Duo<sup>3</sup> can be specified as dual driver to enable separate switching of the inner and outer tiles. This can be used to delineate space within an area, or to deliver optimised task lighting in line with the recommendations of EN12464. When configured in this way, the user-controlled lighting can deliver background illumination from the outer tile with task lighting from the inner tile when required. This will lead to significant energy savings over even the most advanced daylight linking scheme.



# Duo<sup>3</sup> for social and transitory spaces



## Continuing the design theme

Whether a notional corridor in open plan areas, or a separate transitory space, Duo<sup>3</sup> can continue a consistent lighting design throughout any space. By utilising the lower lumen packages available in Duo<sup>3</sup>, the same luminaire design can be used for many different applications. Downlighters can be combined with outer illuminated tiles to add interest and delineate spaces within a building.

## Lowering lighting levels

By illuminating only the outer tile of the 3300 lumen version of Duo<sup>3</sup>, 1300 lumens are generated to effectively light transitory spaces to 100 lux whilst maintaining a consistent design theme. Duo<sup>3</sup> Office can also be specified as a 2200 lumen variant to reduce the luminaire count and optimise energy consumption. Separate switching of the two light engines is also available to add flexibility to open plan areas, enabling transitory spaces to be simply reconfigured.

### Typical corridor lit to 100 lux

Luminaire	Spacings	No. of fittings	w/m <sup>2</sup>	w/m <sup>2</sup> /100 Lux
Mirage 2 x 18W	3.0m centres	5	6.0	4.92
Duo <sup>3</sup> Office 3300 lumen outer tile on only (1300 lm, 16W)	2.4m centres	6	3.2	3.11
Duo <sup>3</sup> Office 2200 lumen, 21W	3.6m centres	4	2.9	2.19

Room: Corridor 30m<sup>2</sup>

## Duo<sup>3</sup> for social and transitory spaces



# Duo<sup>3</sup> for signature areas



## Adding visual impact

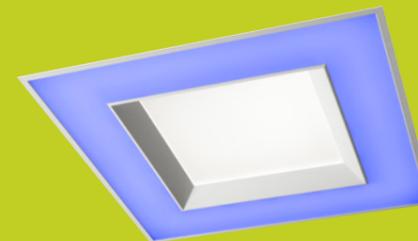
In signature areas such as receptions, board rooms or social spaces, Duo<sup>3</sup> Feature has a variety of creative lighting options that can add visual impact whilst maintaining a consistent design theme. Choose from feature sky or blue LED outer panels, and combine with downlighter or spotlight configurations in the centre to create unique lighting solutions for any project.

## Changing states

By specifying a blue LED outer panel in conjunction with the IBZ light engine, two different effects can be achieved. In normal use, the luminaire delivers optimised office lighting, whilst in feature mode it can create a dramatic effect that can be used for night-time facade illumination, or to signify changes in the use of an area throughout the day.



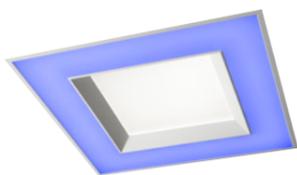
## Duo<sup>3</sup> for signature areas



# Duo<sup>3</sup> in action

Duo<sup>3</sup> can be configured to suit the requirements of the whole office. This allows a consistent design approach whilst still allowing a degree of individuality in different areas.

## Social space



Duo<sup>3</sup> Feature  
Outer: Blue LED  
Inner: Hexaprism optic

## Corridor



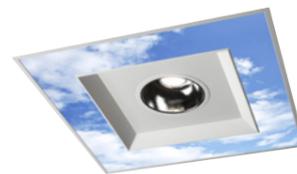
Duo<sup>3</sup> Feature  
Outer: Micro polymer optic  
Inner: Blank plate

## Open plan office



Duo<sup>3</sup> Office  
Outer: Micro polymer optic  
Inner: Hexaprism

## Reception



Duo<sup>3</sup> Feature  
Outer: Sky  
Inner: Downlight (Mirage LED)

## Meeting room



Duo<sup>3</sup> Feature  
Outer: Micro polymer optic  
Inner: Spotlight (Concert SE)

## Cellular office



Duo<sup>3</sup> Office  
Outer: Micro polymer optic  
Inner: Hexaprism with louvre



Dual driver functionality: inner off

Dual driver functionality: outer off

Inner louvre

Air handling

### Optics

- Light Output Options:
  - 2200 lumens (21W)
  - 3300 lumens (32W)
  - 4000 lumens (39W)
- Highly efficient 4000K LEDs that reach up to 104 l/cw
- Hexaprism inner tile optic for optimum diffusion, glare control and to enable an LG7 compliant space
- Micro polymer optic outer tile for visual comfort and uniformity
- Optional white louvre fitted in front of inner Hexaprism is available for alternative aesthetic
- Light output distribution is 60% for the inner tile and 40% for the outer. For example the 4000 lumen product emits approx. 2400 lumens from the inner tile and 1600 lumens from the outer. The 3300 lumen product emits approx. 1980 lumens from the inner tile and 1320 lumens from the outer.
- LED chips are densely distributed within the inner tile to achieve maximum output and efficiency
- LED chips are spaced further apart within the outer tile for excellent uniformity, visual comfort and surface luminance

### Body

- Steel body finished in highly reflective white
- Robust extruded aluminium frame finished white
- For 600 x 600mm grid ceilings. See ceiling compatibility matrix on Whitecroft website
- Available with or without air handling. Air handling of 30 litres per second (refer to Whitecroft Technical Desk)
- Choice of integral emergency options; 3hr and COMEUPS (can be wired as Easytest if required)
- Complete visual symmetry from all angles
- DALI as standard
- Dual driver option available for separate switching of the inner and outer tiles
- IP44 from below and IP20 from behind
- Optional integral Command Plus DALI COMPL4 detector mounted in the outer tile for standalone functionality or connection to a Command Plus system
- Optional integral Command Elite DALI COMD1 detector mounted in the outer tile for a complete DALI addressable controls system

### Order Codes

Hex Inner, MP Outer	DALI	3 hr Emergency
2200 lumens (21W)	D3MAY1XT	D3MAY1XTEM
3300 lumens (32W)	D3MAY2XT	D3MAY2XTEM
4000 lumens (39W)	D3MAY3XT	D3MAY3XTEM

### Options

COMEUPS	Add suffix /EP	i.e. D3MAY1XT/EP
LOUVRE OVER INNER HEXAPRISM	Replace M with L	D3LAY1XT
SPRING T INTEGRATION	Replace XT with ST	D3MAY1ST
AIR HANDLING	Add A after T	D3MAY1XTA
DUAL DRIVER*	Replace Y with U	D3MAU1XT
INTEGRAL COMPL4	Add Q4P before Y	D3MAQ4PY1XT
INTEGRAL COMD1	Add Q1 before Y	D3MAQ1Y1XT
PLASTERBOARD FRAME**		SFTPBFB

\*Dual driver option is not available in conjunction with integral controls or emergency

\*\*Must be used with XT product



Command Elite integral COMD1



Command Plus integral COMPL4

### Ceiling Integration

Refer to common ceiling compatibility matrix on website

### Exposed T Grids

T25 Lay in  
T15 Lay in  
T15 Tegular (Bracket kit required)

### Alugrids

SAS AL – 15/16  
SAS AL – 15/08

### Spring T Grids

SAS – 150/120  
Armstrong – Orcal 1800/3000  
Burgess Clip in/A bar

### Plasterboard

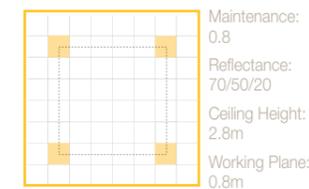
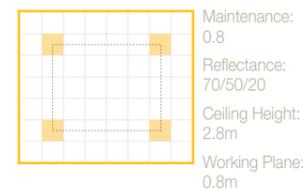
Prepared aperture (requires installation frame)

### Equivalent Lamp Types

<b>2200 Lumen Output</b>	
T5	2 x 14W
<b>3300 Lumen Output</b>	
T5	2 x 24W
<b>4000 Lumen Output</b>	
T5	4 x 14W

### Performance Guide

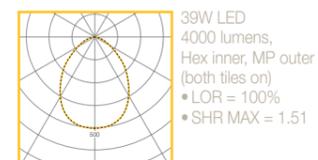
Lamps	39W LED	Illuminance	503 lux	Spacing	3.0m x 2.4m
Lamps	32W LED	Illuminance	330 lux	Spacing	3.0m x 3.0m



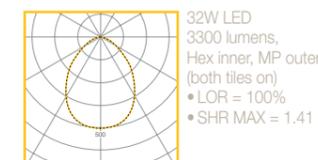
### LED Performance

Colour Temp	Ra (CRI)	Life Expectancy	Colour Consistency
4000K	≥ 80	L <sub>90</sub> (50,000hrs)	MacAdam 3 SDCM

### Photometric Performance

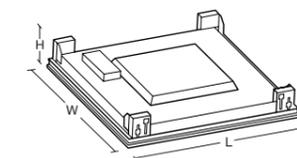


Utilisation Factors UF(F)	
Room Reflectance	Room Index
C W F	1.00 3.00 5.00
0.70 0.50 0.20	0.75 0.99 1.06



Utilisation Factors UF(F)	
Room Reflectance	Room Index
C W F	1.00 3.00 5.00
0.70 0.50 0.20	0.75 0.99 1.06

### Dimensions



Version	L	W	H	Prepared Aperture	KG	KG
Spring T	599	599	80	–	5.2	6.2
Exposed T	584	584	80	–	4.9	5.9
Plasterboard Frame	660	660	85	625 x 625	6.9	7.9

### To Specify

Recessed LED 600 x 600mm luminaire with dual optic configuration, optional air return facility and visual symmetry from all angles of view. Extruded aluminium frame and steel body finished white. Incorporating intermediate brightness zone to diffuse light and graduate brightness across the ceiling from all angles of view. Dual optic to consist of Hexaprism/Louvre inner and micro polymer optic outer tile with optional integral detectors – as Whitecroft Lighting DUO<sup>3</sup> OFFICE



Inner blanking tile



Louvre inner and sky graphic outer



Mirage LED inner and micro polymer optic outer



Hexaprism inner, blue/night light outer

### Optics

- Lumen outputs and wattages differ from product to product depending on the configuration. There are two output options;
  - Medium output; denoted by '2' in the part code
  - High output; denoted by '3' in the part code
- For specific lumen output and wattage, please refer to individual photometric files
- Range of inner and outer feature tile options to mix and match
- Choice of inner tile;
  - Blank: Steel blanking plate finished white
  - Downlight: Pre-cut 165 Ø aperture for Mirage LED (purchased separately)
  - Spotlight: Pre-cut 80 Ø apertures for 4 x Concert SE products (purchased separately)
  - Hexaprism optic
  - Hexaprism optic with louvre
- Choice of outer tile;
  - Blank: Steel blanking plate finished white
  - Micro polymer optic
  - Picture: Acrylic sky graphic
  - Blue/Night Light: Additional blue LEDs behind a micro polymer optic
- Separate switching of tiles is standard within the Blue/Night Light, Downlight and Spotlight variants

### Body

- Steel body finished in highly reflective white
- Robust extruded aluminium frame finished white
- IP rating differs from IP20 to IP44 depending on configuration. Refer to Whitecroft Technical Desk
- For 600 x 600mm grid ceilings. See ceiling compatibility matrix on Whitecroft website
- Available with or without air handling. Air handling of 30 litres per second (refer to Whitecroft Technical Desk)
- Choice of integral emergency options; 3hr and COMECS (can be wired as Easytest if required)
- Complete visual symmetry from all angles
- DALI as standard
- For Downlight and Spotlight variants, Mirage LED and Concert SEs must be purchased and fitted within Duo<sup>3</sup> separately. See Whitecroft website
- Optional integral Command Plus DALI COMPL4 detector mounted in the outer tile for standalone functionality or connection to a Command Plus system
- Optional integral Command Elite DALI COMD1 detector mounted in the outer tile for a complete DALI addressable controls system

### Order Codes

Order codes are generated using the table below, select each feature required to achieve the final custom luminaire.

Duo3	Inner	Outer	Driver/Control	Output	Ceiling
D3	M Hexaprism	A Micropolymer	Y DALI	2 Medium	XT Exposed T
	L Louvre	P Sky picture	Q1Y COMD1	3 High	ST Spring T
	B Blank	C Colour: Blue	Q4PY COMPL4		
	S Spotlight	B* Blank			
	D Downlight				

Note: combination of blank inner and blank outer is not available

### Options

AIR HANDLING	Add A after T	D3MPY2XTA
3HR EMERGENCY	Add suffix EM	D3MPY2XTEM
COMECS**	Add suffix /EP	D3MPY2XT/EP
PLASTERBOARD FRAME***		SFTPBF

\* Blank outer is not available with integral emergency or controls

\*\* Can be wired as Easytest if required

\*\*\* Must be used with XT product

### Equivalent Lamp Types

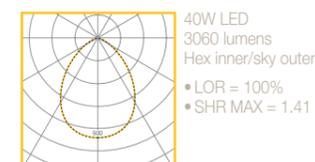
#### Medium Output

T5 2 x 24W

#### High Output

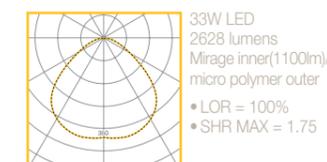
T5 4 x 14W

### Photometric Performance



Utilisation Factors UF(F)

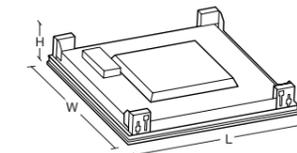
Room Reflectance	Room Index	C	W	F	1.00	3.00	5.00
		0.70	0.50	0.20	0.78	1.01	1.07



Utilisation Factors UF(F)

Room Reflectance	Room Index	C	W	F	1.00	3.00	5.00
		0.70	0.50	0.20	0.75	0.99	1.06

### Dimensions



Version	L	W	H	Prepared Aperture	KG	KG
Spring T	599	599	80	-	5.2	6.2
Exposed T	584	584	80	-	4.9	5.9
Plasterboard Frame	660	660	85	625 x 625 $\frac{3}{32}$	6.9	7.9

Note: Weights will differ depending on custom configuration of product. Refer to Whitecroft Technical Desk

### Ceiling Integration

Refer to common ceiling compatibility matrix on website

#### Exposed T Grids

T25 Lay in  
T15 Lay in  
T15 Tegular (Bracket kit required)

#### Alugrids

SAS AL – 15/16  
SAS AL – 15/08

#### Spring T Grids

SAS – 150/120  
Armstrong – Orcal 1800/3000  
Burgess Clip in/A bar

#### Plasterboard

Prepared aperture (requires installation frame)

### LED Performance

Colour Temp	Ra (CRI)	Life Expectancy	Colour Consistency
4000K	≥ 80	L <sub>50</sub> (50,000hrs)	MacAdam 3 SDCM

### To Specify

Recessed LED 600 x 600mm feature luminaire with dual optic configuration and optional air return facility. Inner tile to consist of integrated downlight / spotlight / Hexaprism / Hexaprism with louvre / blanking plate and outer tile to consist of micro polymer optic / sky graphic outer / blue night light / blanking plate – as Whitecroft Lighting DUO<sup>3</sup> FEATURE

*Lighting, design, controls:*  
Total Project Solutions

**Rep. Ireland Office**

Fagerhult Ltd  
F1 Calmount Park  
Ballymount, Dublin 12  
Ireland

T +353 (0)1 426 0200  
F +353 (0)1 429 9606  
info@fagerhult.ie  
www.fagerhult.ie

**Middle East Office**

Fagerhult Middle East  
P.O. Box 126287  
Dubai  
United Arab Emirates

T +971 (0)4 3297120  
F +971 (0)4 3297130  
info@fagerhult.ae  
www.fagerhult.ae

**UK Head Office**

Whitecroft Lighting Ltd  
Burlington Street  
Ashton-Under-Lyne  
Lancashire OL7 0AX

T +44 (0)161 330 6811  
F +44 (0)161 331 5855  
email@whitecroflight.com

**London Customer Centre**

Whitecroft Lighting Ltd  
102-108 Clerkenwell Road  
London  
EC1M 5SA

T +44 (0)161 330 6811  
F +44 (0)161 331 5855

**Online**

[whitecroflighting.com](http://whitecroflighting.com)

