



Visualux

The Designers' Guide

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Visualux Designers Guide

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Introduction

Thank you for requesting the latest version of the Visualux Designers Guide, we hope that you find it both helpful and informative.

The staff of Visualux has been involved with the design and manufacture of products for the opto electronics and associated industries since the early 1980's and during this time have been responsible for designing and supplying products to many of the major electronics companies throughout the world. We operate a policy of continuous development and we are constantly evaluating new materials, so that our products can continue to stay at the forefront of our industry.

Our major product lines, LED backlights and Contrast Filters, are detailed in this catalogue. Currently we are developing a range of CCFL (Cold Cathode Fluorescent Lighting) devices which include the lamps, drive inverters and acrylic light guides - these are also shown in the Visualux Designers Guide. We were also involved for many years with the Clare/Pendar range of high quality switch and indicator assemblies, which were renowned for their quality and reliability, and have maintained a source of supply for these products directly from Europe.

If you are unable to find the information that you require in this catalogue then please contact us and we will try our best to supply the data that you require. We would be very pleased to hear from you if you feel that the information in this catalogue is not extensive enough or could be presented in a more 'user friendly' way.

Thank you again for the interest that you have shown in our products.

RACHEL GOLDSWORTHY
Sales & Marketing Director

Catalogue Issue No: 22- 11/99 (Web)

Styles of LCD (Liquid Crystal Display)



A standard transfective LCD



A transfective LCD with a Visualux LED backlight



A negative transmissive LCD with a Visualux LED backlight

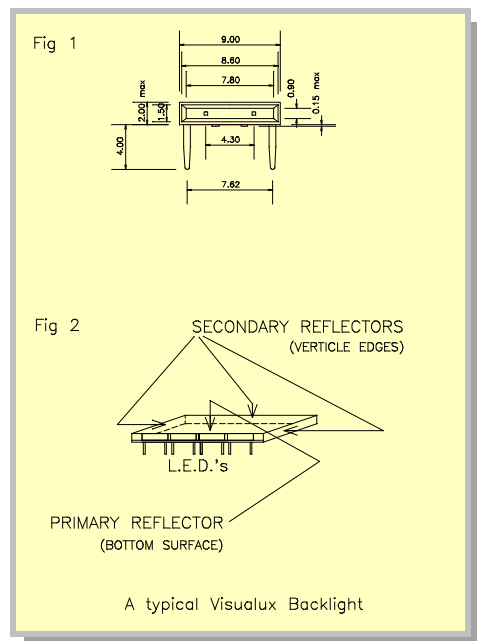
There are three main types of LCD display:

- ❖ Reflective - This type of display relies completely on reflected light (daylight or artificial light) to be viewable - you cannot see it in the dark and it cannot be backlit.
- ❖ Transfective - This type of display can use reflected light or be backlit.
- ❖ Transmissive - This type of display can usually be viewed using reflected light or be backlit.

Visualux (*edge lit*) Backlights

Visualux Backlights were primarily designed for use with transfective and transmissive LCDs but are being used in a number of other areas that include status warning indicators and low power, long life, lighting systems. All Visualux Backlights are supplied, unless otherwise requested, as an S-Series style backlight. Below are descriptions of the standard options that are available.

S-Series



The ultimate Backlight, designed for applications where maximum light output efficiency is the primary concern. Visualux Backlights use custom designed LED emitters (fig.1) to 'fire' light into a cast acrylic light guide. The S-Series uses ultra white secondary reflectors, located on the vertical edges, to reflect light down to the primary reflector that is located below the viewing area (fig.2). **We use ultra white spray coatings for our primary and secondary reflectors, unlike our competitors who use a white adhesive tape which can easily delaminate.** The S-Series has been designed to utilise all available emitted light and this results in a very low light loss factor.

E-Series

The E-Series Visualux Backlight is manufactured to the same high standards as the S-Series but has been designed for applications where cost effectiveness is of more importance than light output efficiency. Instead of ultra white secondary reflectors, the E-Series uses the reflective properties of a precision machined edge.

SA-Series

This series of Visualux Backlights has been designed for applications that require all the benefits of the Visualux technology but at the lowest possible price. SA-Series Backlights are supplied as two separate unassembled components, e.g. LED emitter and light guide. The LED emitter is the same type as used in the S and E Series Visualux Backlights and the cast acrylic light guide is of the same design as the E-Series which utilised the reflective properties of the light guides precision machined edge but without the machined ledge for the LED emitters.

PCB Modules

The PCB modules are either S,E or SA Series Backlights mounted on to a single sided or PTH circuit board. Apart from the Backlight we are able to mount resistors and other devices that may be required. The major advantage of this system is that only two leads are needed to be terminated.

Visualux (*edge lit*) Backlights

When the Visualux Backlights are used with transfective LCDs a brilliant white reflector is usually sufficient. However, a transmissive (transparent) LCD will benefit from using a Backlight that has a brightly coloured primary reflector, because the LCD characters or graphics will have a contrasting background even if the Backlight is not illuminated.

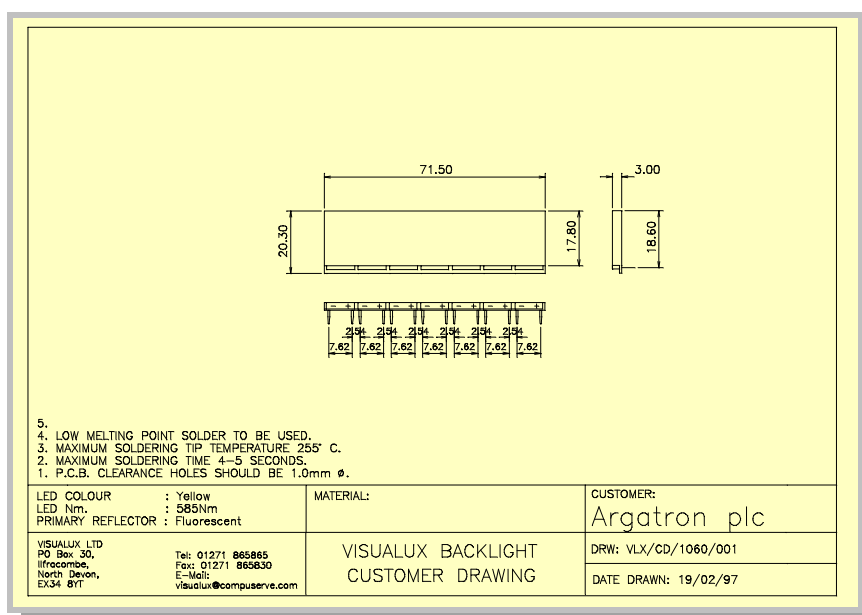
One of the major benefits of using a Visualux Backlight is the exceptionally long life span of the device, which can be up to 100,000 hours - this is equivalent, in most cases, to the life of a typical LCD.

Visualux Backlights are available in a large range of standard sizes with a brilliant white or brightly coloured primary reflector. The secondary reflectors of the S-Series are always brilliant white.

Customised sizes are available and the cost for the origination of S and E-Series Backlights is usually less than £200. For this sum you will receive an engineering drawing, which is allocated its own unique data reference number and a quantity of Backlights dependent on the complexity of the part. Delivery is usually 3 - 4 weeks from receipt of order. For large volume usage we can also supply LED emitters made to your custom design.

Visualux operate a policy of constant development, so if you do not find the type or style of Backlight that you require in this Designers Catalogue, please contact your local Visualux sales office to discuss your requirements.

A typical Visualux Backlight custom drawing



Visualux (*edge lit*) Backlights

Specification for the Visualux Backlight body (Light Guide)

Mechanical Properties:	Test	Unit	Values
Tensile Strength	DIN 53455	N/mm ²	65-68
Compressive Strength	DIN 53454	N/mm ²	125
Flexural Strength	DIN 53452	N/mm ²	120
Impact Strength	DIN 53453	kJ/m ²	12
Modules of elasticity	DIN 53457	N/mm ²	3,000
Elongation at break	DIN 53455	%	4
Indentation hardness	DIN 53456	N/mm ²	175

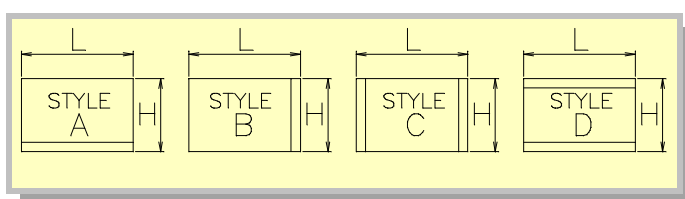
Thermal Properties:			
Heat Stability - Vicat B	DIN 53460	°C	105
Forming temperature		°C	150-170
Coefficient of linear thermal expansion	VDE 0304/1	mm/m°C.	0.08
Specific heat		kJ/kg°C.	1.46
Thermal conductivity		W/m°C.	0.19

Electrical Properties:			
Dielectric strength	DIN 53481	kV/mm.	40
Volume resistivity	DIN 53482	ohm x cm.	10 ¹⁵
Dielectric constant, 10 ³ Hz.	DIN 53483		3.4
Dissipation factor, 50 Hz.	DIN 53483		0.06

Other Properties:			
Specific gravity	DIN 53472	g/cm ²	1.2
Water absorption	at 20°C.in 24 hrs.	%	0.17
Light transmission	4500 Å	%	92

Visualux (*edge lit*) Backlights

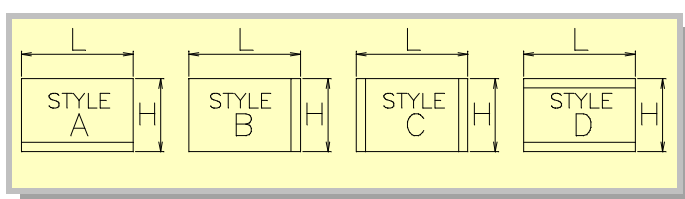
A range of Visualux Backlight designs



Reference	Style	L	H	No. of LEDs	Illuminated Area (mm)
VLX100	A	66.50	29.50	6	66.50 x 27.00
VLX102	A	47.00	29.50	4	47.00 x 27.00
VLX104	A	47.00	20.50	4	47.00 x 18.00
VLX106	A	47.00	23.00	4	47.00 x 20.50
VLX108	A	66.00	18.00	6	66.00 x 19.50
VLX110	A	66.00	22.00	6	66.00 x 19.50
VLX112	B	26.00	10.50	1	23.50 x 10.50
VLX114	B	26.00	9.50	1	23.50 x 9.50
VLX116	B	31.00	10.50	1	28.50 x 10.50
VLX118	B	38.50	14.50	1	36.00 x 14.50
VLX120	B	43.50	10.50	1	41.00 x 10.50
VLX122	B	26.00	18.00	1	23.50 x 18.00
VLX124	B	30.00	15.50	1	27.50 x 15.50
VLX126	B	50.50	15.50	1	48.00 x 15.50
VLX128	B	52.50	17.00	1	50.00 x 17.00
VLX130	B	51.50	12.50	1	49.00 x 12.50
VLX132	B	42.00	20.00	1	39.50 x 20.00
VLX134	B	50.50	20.00	1	48.00 x 20.00
VLX136	B	57.00	20.00	1	54.50 x 20.00
VLX138	B	49.50	13.00	1	47.00 x 13.00
VLX140	A	76.50	28.00	7	76.50 x 25.50
VLX142	A	90.00	28.00	8	90.00 x 25.50
VLX144	A	90.00	22.00	8	90.00 x 19.50
VLX146	A	98.00	24.50	9	98.00 x 22.00
VLX148	A	88.00	35.00	8	88.00 x 32.50
VLX150	A	108.00	35.00	10	108.00 x 32.50
VLX152	A	134.00	35.00	13	134.00 x 32.50
VLX154	A	67.00	28.50	6	67.00 x 26.00
VLX156	A	47.50	17.00	4	47.50 x 14.50
VLX158	A	48.70	23.30	4	48.70 x 20.80

Visualux (*edge lit*) Backlights

A range of Visualux Backlight designs

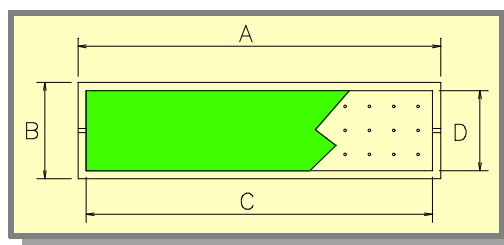


Reference	Style	L	H	No. of LEDs	Illuminated Area (mm)
VLX200	C	68.50	28.50	4	63.50 x 28.50
VLX202	C	53.00	23.00	4	48.00 x 23.00
VLX204	C	68.50	18.80	2	63.50 x 18.80
VLX206	C	71.00	15.50	2	66.00 x 15.50
VLX208	C	28.50	10.50	2	23.50 x 10.50
VLX210	C	28.50	9.50	2	23.50 x 9.50
VLX212	C	33.50	10.50	2	28.50 x 10.50
VLX214	C	41.00	14.50	2	36.00 x 14.50
VLX216	C	46.00	10.50	2	41.00 x 10.50
VLX218	C	28.50	18.00	2	23.50 x 18.00
VLX220	C	32.50	15.50	2	27.50 x 15.50
VLX222	C	53.00	15.50	2	48.00 x 15.50
VLX224	C	55.50	17.00	2	50.50 x 17.00
VLX226	C	54.00	12.50	2	49.00 x 12.50
VLX228	C	44.50	20.00	2	39.50 x 20.00
VLX230	C	53.00	20.00	2	48.00 x 20.00
VLX232	C	59.50	20.00	2	54.50 x 20.00
VLX234	C	65.00	14.50	2	60.00 x 14.50
VLX236	C	73.00	14.50	2	68.00 x 14.50
VLX238	C	67.00	17.00	2	62.00 x 17.00
VLX240	C	52.00	13.00	2	47.00 x 13.00
VLX242	C	61.00	13.00	2	56.00 x 13.00
VLX244	C	71.00	16.50	2	66.00 x 16.50
VLX246	C	82.00	26.00	4	77.00 x 26.00
VLX248	D	166.00	65.00	32	166.00 x 60.00
VLX250	D	93.50	76.00	18	93.50 x 71.00
VLX252	D	67.50	53.00	12	67.50 x 48.00
VLX254	D	72.00	48.00	14	43.00 x 72.00

Visualux (*bottom lit*) Backlights

MEL - LED Lighting Panels

MEL (Maximum Even Luminance) Panels - These lighting panels are manufactured for Visualux and offer a totally even illumination due to the LEDs being placed in a 'lattice' directly beneath the viewing area.



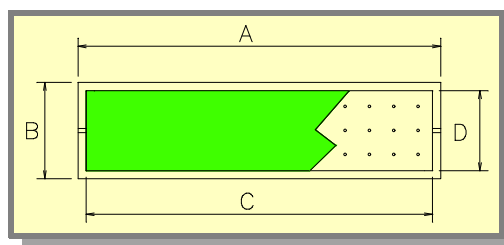
Part No.	A (Length)	B (Width)	C (Lit)	D (Lit Width)	Overall Thicknes	No. of LEDs	Typ. V	mA
VLX-MEL6001	72.00	29.50	68.00	26.50	5.00	44	4.2	220
VLX-MEL6001-1	72.00	29.50	68.00	26.50	5.00	44	8	110
VLX-MEL6002	82.30	29.50	78.30	26.50	5.00	52	4.2	260
VLX-MEL6002-1	82.30	29.50	78.30	26.50	5.00	48	4.2	240
VLX-MEL6003	159.20	21.20	155.60	16.70	5.00	56	4.2	280
VLX-MEL6003-1	159.20	21.20	155.60	16.70	5.00	56	4.2	280
VLX-MEL6003-2	159.20	21.20	155.60	16.70	5.00	56	4.2	280
VLX-MEL6003-3	159.20	21.20	155.60	16.70	5.00	56	4.2	280
VLX-MEL6004	78.00	43.50	74.00	39.50	5.00	78	4.2	390
VLX-MEL6004-1	78.00	43.50	74.00	39.50	5.00	78	4.2	390
VLX-MEL6005	68.00	18.60	65.60	16.60	4.00	26	4.2	130
VLX-MEL6006	60.70	20.80	58.70	18.40	4.00	36	4.2	180
VLX-MEL6006-1	60.70	20.80	58.70	18.40	4.00	30	4.2	150
VLX-MEL6007	89.00	24.00	85.00	20.00	5.00	42	4.2	210
VLX-MEL6007-1	89.00	24.00	85.00	20.00	5.00	26	4.2	130
VLX-MEL6007-2	89.00	24.00	85.00	20.00	5.00	42	4.2	210
VLX-MEL6008	73.30	43.50	71.70	39.80	5.00	72	4.1	360
VLX-MEL6009	65.50	22.00	61.50	19.00	5.00	24	4.2	120
VLX-MEL6010	104.00	28.50	100.00	24.50	5.00	72	4.2	360

For termination and colour details please contact Visualux
(All dimesions in mm)

Visualux *(bottom lit)* Backlights

MEL - LED Lighting Panels

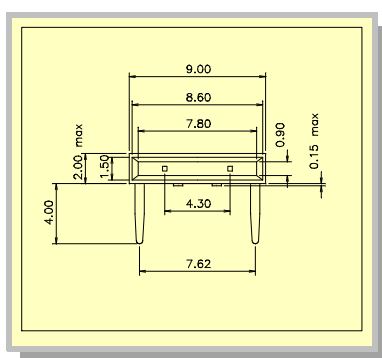
MEL (Maximum Even Luminance) Panels - These lighting panels are manufactured for Visualux and offer a totally even illumination due to the LEDs being placed in a 'lattice' directly beneath the viewing area.

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For termination and colour details please contact Visualux
(All dimesions in mm)

Visualux (*edge lit*) Backlights

Specification for Visualux Backlight LEDs



CHARACTERISTICS	RATINGS
Peak Forward Current 10 seconds pulse 0.3 duty cycle	1.0 Amp
Operating Temperature	-30°C +85°C
Storage Temperature	-55°C +100°C
Average Forward Current	25mA

COLOUR:	RED	GREEN	AMBER	YELLOW	HIGH EFFICIENCY RED
REFERENCE NO:	LL-1-2-R	LL-1-2-G	LL-1-2-A	LL-1-2-Y	LL-1-2-HER
Forward Voltage (VF) IF=20mA	4.2v Typ. 4.6v Max.	4.2v Typ. 4.6v Max.	3.6vTyp. 4.0v Max.	4.2v Typ. 4.6v Max.	3.6v Typ. 4.0v Max.
Reverse Current (IR) VR=10v	0.1mA Max.	0.1mA Max.	0.1mA Max.	0.1mA Max.	0.1mA Max.
Luminous Intensity (IV) IF=10mA	Typ. 15mcd	Typ. 40mcd	Typ. 30mcd	Typ. 35mcd	Typ. 80mcd
Peak Wavelength (P)	630Nm	570Nm	610Nm	585Nm	660Nm

SPECIAL NOTE

- ❖ Low melting point solder should be used.
- ❖ Maximum soldering tip temperature should not exceed 255°C.
- ❖ Maximum soldering time should not exceed 3-4 seconds from the reflector edge.

Visualite Contrast Filters

Application guide for Visualite Contrast Filters

The Visualite Contrast Filters that are available from Visualux Ltd are manufactured from the highest quality polymers currently available world-wide. The standard thickness for these filters is 1.5mm but custom thicknesses are available, to special order, and are available in increments of 0.1mm starting from 0.5mm.

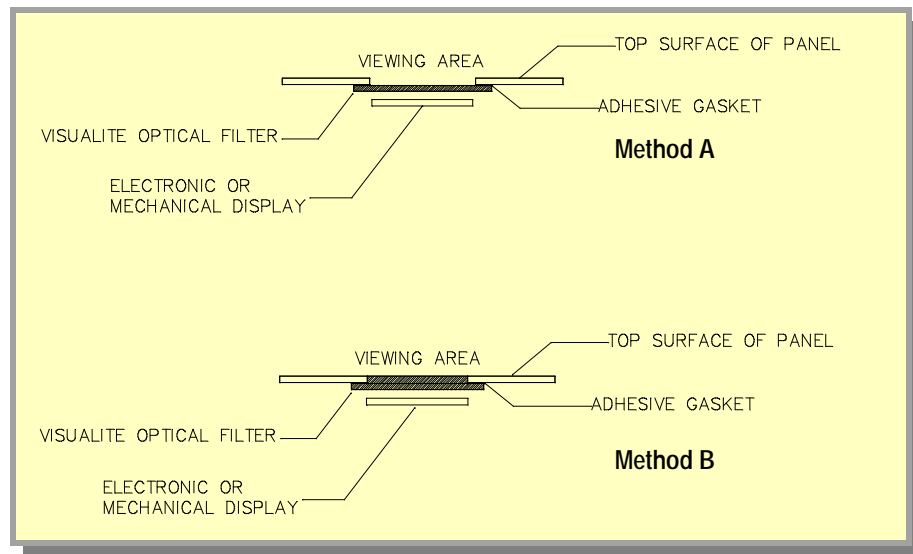
COLOUR	SUGGESTED USE (Display type)
* Red 2424	L.E.D.
*Red 6400	L.E.D. or Plasma
Red 6531	High brightness or matched L.E.Ds
Green 4720	Vacuum Fluorescent
* Green 4748	L.E.D. (Green)
Grey 2711	Any single or multi coloured display
* Grey 2064-2	Any single or multi coloured display
* Grey 7210	Any single or multi coloured display
* Yellow 5425	Electroluminescent
* Amber 5423	Plasma
Blue 3214	Blue LED or Vacuum Fluorescent
Clear 0000	L.C.D. or any display

* Denotes non standard colours - minimum purchase quantities apply

- ☐ Manufactured from High Grade Optical Acrylic
- ☐ Standard thickness 1.5mm - Other thicknesses available to order
- ☐ Standard thickness tolerance an unrivalled +/- 10%
- ☐ Available with our VT600 anti glare treatment

Your Visualite Contrast Filter is available as a custom cut to size part or can be purchased as a complete sheet for your own fabrication. Machining options are also available for customising your parts - a full design and development team is available to help with any design problems that might be encountered.

Visualite Contrast Filters



Above are shown two preferred methods of fixing a Visualite Contrast Filter

Method A

This is the most cost effective way of fixing. The Visualite Contrast Filter is supplied as a square or rectangle and is bonded to the underside of the front panel by using a suitable sealant or double sided gasket.

Method B

This method, although more expensive than Method A, gives a more professional and aesthetically pleasing look to the front panel. The Visualite Contrast Filter is supplied with a machined ledge around the perimeter of the filter. The ledge is usually between 5-10 mm wide, depending on the size of the filter, and the depth of the ledge is usually the same as the thickness of the front panel into which it will be fitted. As with Method A, a suitable sealant or double sided gasket should be used for fixing. A major advantage of using this method of fixing is that the Visualite Contrast Filter will be fixed level with the top surface of the front panel thus minimising the build up of dirt and dust in the viewing area.

VT600 Anti-reflective

VT600 Anti-reflective surface treatment process



..... how would you prefer your display to look ?

VT600 anti-reflective surface treatment process is a coating developed by Visualux engineers. This surface treatment process enables unwanted light reflections to be dissipated from the viewing surfaces of acrylic, polycarbonate, PVC and other types of plastic display filters and panels. Unlike other 'anti-glare' style coatings, VT600 has been specifically formulated to allow the forming of the display panels or filters after VT600 has been applied and this will not result in any cracking or peeling of the coating. This is particularly useful if the customer needs to purchase the material in sheets and then form the parts after other manufacturing processes have been undertaken. VT600 is applied to the Visualite Contrast Filters as standard and can be applied to 'free issue' mouldings and bezels. VT600 has also been applied to the front polarisers of LCDs, in situations where a low level of light reflection is required.

Visualux CCFL Products

Cold Cathode Fluorescent Lighting

Visualux are able to supply a range of CCFL tubes, inverters and light guides to suit most applications. Due to the very large range of CCFL tubes and inverters currently available, Visualux will advise on the best combination of parts to suit your application. We are able to supply just the tube or inverter or in house, we manufacture complete CCFL modules to your specification. These modules comprise CCFL tube(s) fitted to an acrylic light guide which can then connected to an inverter.

CCFL Sizes (Normally available from stock)

(All dimensions in mm)

Part No.	Diameter	Length	Termination	Notes
VLXF-220-RGD/2.4	2.4	220	Wire Ends	
VLXF-240-RGD/2.4	2.4	240	Wire Ends	
VLXF-258-RGD/2.4	2.4	258	Wire Ends	
VLXF-216-RGD/2.6	2.6	216	Wire Ends	
VLXF-300-RGD/2.6	2.6	300	Wire Ends	
VLXF-50-RGD/3.0	3.0	50	Wire Ends	
VLXF-216-RGD/3.0	3.0	216	Wire Ends	
VLXF-240-RGD/3.0	3.0	240	Wire Ends	
VLXF-250-RGD/3.0	3.0	250	Wire Ends	
VLXF-300-RGD/3.0	3.0	300	Wire Ends	
VLXF-360-SYN/3.0	3.0	360	Leads & Connector *	
VLXF-100-SYN/4.0	4.0	100	Leads & Connector *	
VLXF-216-SYN/4.0	4.0	216	Leads & Connector *	
VLXF-266-SYN/4.0	4.0	266	Leads & Connector *	
VLXF-300-SYN/4.0	4.0	300	Leads & Connector *	
VLXF-220-RGD/4.1	4.1	220	Wire Ends	
VLXF-252-RGD/4.1	4.1	252	Wire Ends	
microLux2x50 kit	2.0	50	Wire Ends	Complete with inverter
VLXLEAD-300/600		300/600	Connectort/Wire End	H.V. lead & connector to fit our VLXINV inverters (except VLXINV-8002)

* The connectors fit the VLXINV series of inverters except VLXINV-8002

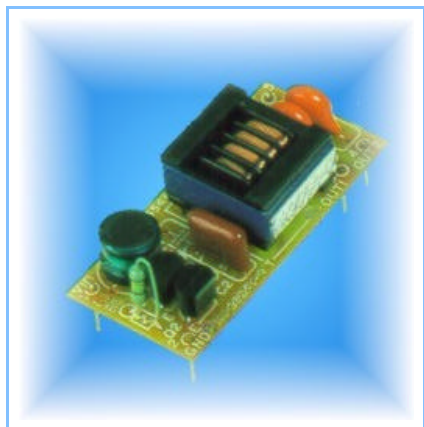
The above list shows a range of the stock size CCFLs currently available. Visualux offer a full customising service on CCFLs with lamps available in lengths and diameters to your specification. Shaped lamps are also available to special order.

We are constantly increasing our range of CCFL tubes and inverters - please contact Visualux regularly for the latest product information.

Visualux CCFL Products

Cold Cathode Fluorescent Lighting - Drive Inverters

Visualux supply a large range of standard CCFL drive inverters to suit the most demanding applications. Whether it is as a 'one off' replacement for an existing unit or a large production batch requirement, your orders will be treated with the same high degree of professionalism.



A Visualux inverter can be supplied with solder pad connections, flying leads, or connectors - depending on the inverter type. If your product requires a custom inverter, Visualux can usually have custom designs and pricing available within a week. Inverter configurations already supplied by Visualux include variable range input devices and multiple output systems.

To be sure of obtaining the maximum life from your CCFLs it is essential to use an inverter that is matched as accurately as possible to the characteristics of the lamp. Overdriving can result in a brighter lamp but this will inevitably result in a much reduced lamp life.

Standard Inverters available are:

- 5vDC Input - Single Output
- 5vDC Input - Dual Output
- 9vDC Input - Single Output
- 9vDC Input - Dual Output
- 12vDC Input - Single Output
- 12vDC Input - Dual Output
- 24vDC Input - Single Output
- 24vDC Input - Dual Output
- 12vDC Input - Single Output (Dimming)
- 12vDC Input - Up to 8 lamp output with TTL On/Off and Brightness control
- 230vAC, 50Hz Input - Dual Output

We are constantly increasing our range of CCFL tubes and inverters -
please contact Visualux regularly for the latest product information.

Visualux CCFL Products

Cold Cathode Fluorescent Lighting - Drive Inverters (vDC)

Inverter	Lamps	Input (VDC)	Size L x W x H (mm)	CCFL Length 3-4mm dia. *	Minimum Order	Notes
VLXINV-4153	1	12	58 x 21 x 11.5	50-150	1	Stock Item
VLXINV-4253	1	12	58 x 21 x 11.5	151-250	1	Stock Item
VLXINV-4353	1	12	58 x 21 x 11.5	251-350	1	Stock Item
VLXINV-42032	2	12	70 x 21 x 12.5	151-250	1	Stock Item
VLXINV-43032	2	12	70 x 21 x 12.5	251-350	1	Stock Item
VLXINV-8002	1	8 - 20	80 x 20 x 9.0		1	Stock Item - Dimming
VLXINV-4151	1	5	58.5 x 21 x 11.5	50-150	25	To Order
VLXINV-4251	1	5	58.5 x 21 x 11.5	151-250	25	To Order
VLXINV-4351	1	5	58.5 x 21 x 11.5	251-350	25	To Order
VLXINV-4451	1	5	70 x 21 12.5	351-420	25	To Order
VLXINV-4321	1	6	58.5 x 21 x 11.5	251-350	25	To Order
VLXINV-4321A	1	7.2	58.5 x 21 x 11.5	251-350	25	To Order
VLXINV-4152	1	9	58.5 x 21 x 11.5	50-150	25	To Order
VLXINV-4252	1	9	58.5 x 21 x 11.5	151-250	25	To Order
VLXINV-4352	1	9	58.5 x 21 x 11.5	251-350	25	To Order
VLXINV-4452	1	9	70 x 21 12.5	351-420	25	To Order
VLXINV-4453	1	12	70 x 21 12.5	351-420	1	Stock Item
VLXINV-4154	1	24	58.5 x 21 x 11.5	50-150	25	To Order
VLXINV-4254	1	24	58.5 x 21 x 11.5	151-250	25	To Order
VLXINV-4354	1	24	58.5 x 21 x 11.5	251-350	25	To Order
VLXINV-4454	1	24	70 x 21 x 12.5	351-420	25	To Order
VLXINV-41012	2	5	70 x 21 x 12.5	50-150	25	To Order
VLXINV-42012	2	5	70 x 21 x 12.5	151-250	25	To Order
VLXINV-41022	2	9	70 x 21 x 12.5	50-150	25	To Order
VLXINV-42022	2	9	70 x 21 x 12.5	151-250	25	To Order
VLXINV-43022	2	9	70 x 21 x 12.5	251-350	25	To Order
VLXINV-41032	2	12	70 x 21 x 12.5	50-150	1	Stock Item
VLXINV-44032	2	12	70 x 21 x 12.5	351-420	1	Stock Item
VLXINV-41042	2	24	70 x 21 x 12.5	50-150	25	To Order
VLXINV-42042	2	24	70 x 21 x 12.5	151-250	25	To Order
VLXINV-43042	2	24	70 x 21 x 12.5	251-350	25	To Order
VLXINV-44042	2	24	70 x 21 x 12.5	351-420	25	To Order

* 3-4 mm dia. is an example of usage - we have used these inverters on CCFLs from 2.6 to 6.0 mm diameter

Visualux CCFL Products

Cold Cathode Fluorescent Lighting - Drive Inverters (vAC)

[illegible]

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