High Mast Lighting

Volume 3

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AGENT:

CU Phosco Lighting has designed and manufactured High Mast Lighting for clients throughout the World for over 40 years. During this time we have gained a wealth of experience in the structural, mechanical and electrical aspects of high mast design, production and maintenance.

Our high masts offer ease of maintenance with a simple and effective winching system which allows the lighting ring to be lowered to ground level for lantern maintenance.

We can also offer a full lighting design package to suit our clients' requirements, whether the application is for Highways, Sports, Airport or Port Authority.

CU Phosco Lighting Contracts Diviision are an experienced team who are able to supply, install and maintain high masts using their own ASLEC and NICEIC certified personnel.

High Mast Lighting

High Mast

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HIGH MAST LIGHTING

High mast lighting is the most efficient method of lighting large areas with the minimum number of obstructions.
CU Phosco, the world leaders in high mast lighting, have achieved that distinction by continuous development, investment and innovation. Our experience is unequalled in the number of high masts we have made and the many different situations in which we have installed them over the past 40 years.

WHY CU PHOSCO HIGH MASTS?

- To illuminate large areas with minimum obstructions
- For a complete design, manufacture and installation package
- High masts can be used in confined spaces and do not require a large area to be cleared as base hinged columns do
- Unique patented double drum winch with individual adjustment possible on each drum
- Any height mast shaft from 10m to 60m manufactured by us to whatever specification is required
- Mast and fittings can be maintained at ground level for greater safety
- Minimum maintenance required with sealed for life bearings on mast pulleys
- Quick raising and lowering system
- Light and portable power tool which can be carried to inaccessible sites with ease
- Remote operation

TAILOR MADE

CU Phosco High Masts are manufactured at our Cleckheaton factory which only produces High Masts. This dedicated production facility enables us to manufacture High Masts tailor made to our customers' requirements.

Some suppliers of High Masts buy masts and/or raising and lowering equipment from outside suppliers, and try to fit the customers' needs to their limited range of products. This is not the CU Phosco way. We have a wide variety of designs outside our standard production range and are able to offer High Masts to suit any specification in the world.

DETAILS

As the manufacturer of the largest number of High Masts, CU Phosco have learnt from experience with their own products and from the observation of other designs, details that cannot easily be seen but which are important for long term reliability. One example is the flange joint detail. The CU Phosco detail may seem excessively conservative using two welds where other manufacturers use one and with a substantial number of gussets. We know, however, that cutting costs in this area produces an element of risk the consequences of which cannot be accepted for such substantial structures as High Masts.

On all our High Masts, CU Phosco provide the facility to fit support brackets to hold the luminaire carriage during maintenance. It is not necessary but we think it worthwhile and so do the men who maintain the equipment.

TOTAL CAPABILITY

CU Phosco offer customers who require it a turnkey package. We will design the lighting scheme, check that all equipment to be supplied conforms to the specifications, design and arrange the installation of the foundations, design and install the electricity supply, manufacture the High Masts and luminaires, deliver the equipment, install the equipment and commission the equipment to confirm that the specification has been achieved.

CU Phosco are NICEIC and ASLEC Approved Contractors. We are pleased to take on the whole job or part of it. In many cases worldwide where our customers needed help, we have supplied personnel to supervise the local operatives undertaking the installation and commissioning of High Mast schemes.

REFURBISHMENT

Hiigh Masts, whether made by CU Phosco or other manufacturers, are substantial pieces of equipment and with proper maintenance they will last much longer than their design life. CU Phosco can check the structural soundness of High Masts to confirm that they will be safe for extended use. At the end of the design life of a High Mast the lanterns or floodlights, if original, will seem well out of date to a modern engineer. CU Phosco offer a refit service to bring old masts upto date by fitting new more energy efficient luminaires, checking and refurbishing or replacing the lantern ring, headframe, ropes, electrical cables and winches.

SIMPLICITY - RELIABILITY - SAFETY

CU Phosco's design philosophy for High Masts is to eliminate all items requiring servicing from the mast head. It is for this reason we recommend the in-tension system. Using double or triple drum winches, CU Phosco's patented system.

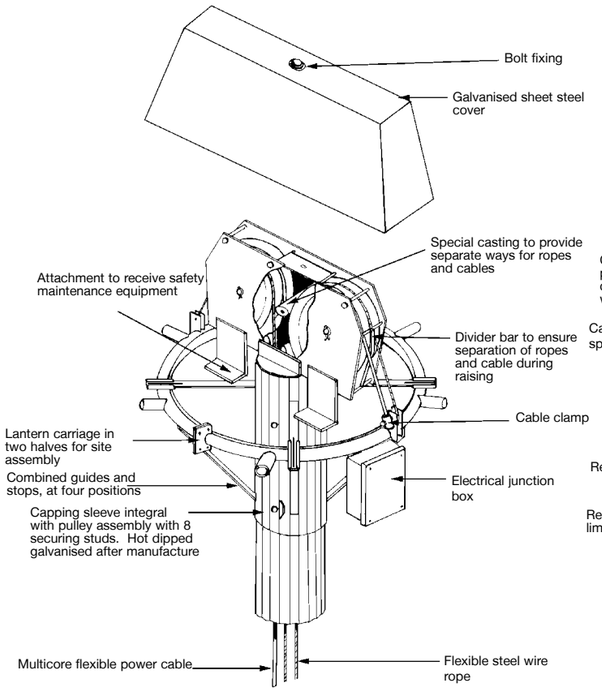
- Supplied factory made and terminated - so no site cutting or termination of ropes is required
- Has no troublesome divider or compensating device - as CU Phosco's system allows individual operation of each winch drum for adjustment
- Has pulley bearings at the top of the mast which are sealed for life - so no maintenance is required
- Does not require latches - no latches mean no moving parts at the top of the mast. High masts are lowered and raised very infrequently and latching systems often do not unlatch whether due to corrosion, airborne debris or birds. Once the lantern ring is stuck on the latches at the top it is expensive to rectify either by sky tower or by taking down the mast. Latch designs do not hold the lantern ring tight against the docking point and wind induced vibration can severely shorten lamp and lantern life. With some latch systems one latch can be engaged before the others are operational and an inexperienced operator can leave the lantern ring oscillating on the latches.

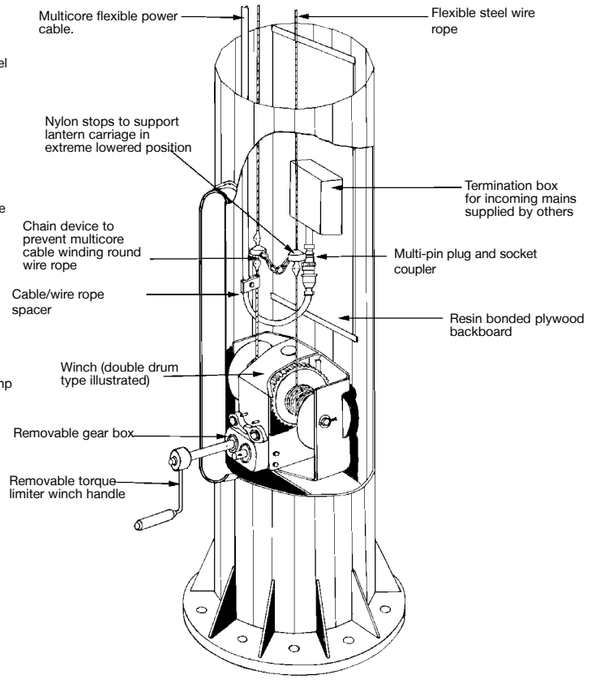
CU Phosco are confident that even after long periods without use, their raising and lowering system will function properly. A confidence founded on four decades of experience and tens of thousands of high masts.

You can see that to design a product that really functions reliably and safely, simplicity is necessary.

SIMPLE - RELIABLE - SAFE

MAST HEAD ASSEMBLY





BASE COMPARTMENT

HIGH MAST SPECIFICATION

For 40 years CU have been engaged in a continuous process of research and development of High Masts. Over those years CU have built up a wealth of experience unique throughout the world in the structural, mechanical and electrical aspects of high mast design, production and maintenance. The basis of this experience forms the specification on which our masts are manufactured. CU are able to supply masts for use in Zone 2 hazardous areas with special power cables, plugs and sockets, junction boxes, cable glands, contactors and power tool. A separate specification is available for this type of mast.

MAST STRUCTURE

The mast shall be continuously tapered of polygonal cross section, presenting good visual appearance.

CU masts are duo-decagonal (20 sided). Bespoke masts can be made to suit clients' requirements.

DYNAMIC LOADING

The masts shall be designed to I.L.E. Technical Report No. 7 on the maximum wind speed likely to be exceeded only once in 50 years, measured at a height of 10 metres above level ground. Wind excited oscillation shall be damped by the method of construction and adequate allowance made for the related stress. Full design calculations for the mast will be provided by the manufacturer.

CU masts have been subject to full scale destructive testing by the CEGB at the structural test centre at Cheddar. The test proved our design calculations and exceeded the predicted failure load, and final test to destruction confirmed the manner and location of failure expected by our engineers. CU masts have also been wind tunnel tested at the De Haviland wind tunnel to derive the correct shap coefficient for use in our calculations. CU's design department is certified to BS EN ISO 9001 for the design of high masts and other lighting columns.

MAST CONSTRUCTION

The masts shall be constructed from mild steel plates cut and folded to form a polyganol section, telescopic jointed and fillet welded, with the exception of site joints.

Each mast selection delivered over 6m in length shall include a telescopic and welded joint to provide diaphragm stiffness and to maintain the structural section during delivery.

A door shall be provided in the base of the mast to permit clear access to equipment. The door shall be weather and vandal resistant with a heavy duty lock. The base flange welded connection to the mast shall fully develop the strength of the section. In addition, supplementary gussets shall be provided between bolt holes. The mast shall be delivered to site in sections and joined with stressing equipment thus forming a sleeve joint - no site welding or bolted joints will be permitted.

CU's weld geometry and procedures have been developed in conjunction with an internationally established welding consultant.

METAL PROTECTION

The entire mast shall be hot dip galvanised after fabrication, internally and externally, in accordance with BS EN ISO 1461.

Mast can be 'T' washed, etch primed at the factory for painting on site

MECHANICAL ARRANGEMENTS

For installation and maintenance purposes it shall be possible to raise or lower the lantern carriage using a winch in the base of the mast. The steel wire rope supporting the lantern carriage shall be in tension at all times to prolong rope life and will not depend on latches for security.

Stadium masts have a fixed head with lift system or ladders. Through many years of experience of many thousands of masts CU's policy is the pursuit of simplicity. The minimum number of moving parts and absence of complication ensure the longest possible trouble free life. However, if the client insists on latching devices, CU are able to supply such a system.

MAST HEAD ASSEMBLY

The pulleys shall be of large diameter, appropriate to the multicore flexible cable being used. They shall be of non-corrodible material and run on self-lubricating bearings with stainless steel spindles. Arrangements shall be provided to ensure that the electric cables and steel wire ropes are separated before passing over their respective pulleys to prevent ropes and cables leaving the pulleys' grooves.

The pulleys shall be housed in a chassis integral with a sleeve which slips over the top of the mast and is secured axially and in azimuth. Guides and stops shall be provided for docking the lantern carriage. The complete chassis assembly shall be hot dip galvanised after fabrication.

LANTERN CARRIAGES

The lantern carriage shall be of durable steel tube designed to act as electric conduit with cable holes fully protected by grommets. It shall be fitted with junction box mounting plate(s) and be in two halves joined by bolted flanges to permit removal from the erected mast. Lantern fixing arms and plates shall be welded to the carriage. The carriage shall incorporate buffer arrangements to prevent damage to the mast finish and luminaires and not require rollers or other moving parts.

If required, lantern carriages can be fitted with screens or canopies.

WINCHES

Winches shall be completely self-sustaining without the need for brakes, springs or clutches which require adjustment, or which can be affected by moisture or lubricant. The gear ratio shall be 53:1. The winches shall be self-lubricating by means of an oil bath, and lubricant recommended by the supplier shall be used.

Termination of the winch ropes shall not involve distortion or twisting of the rope structure. At least four turns of rope shall remain on the drum when the lantern carriage is fully lowered. In the case of multi-drum winches each rope shall be direct from lantern carriage to winch and not include any intermediate connection. The winch shall be designed to be installed or removed through the door opening. Winch drums shall be groooved to ensure a tidy rope lay and be fitted with a device to ensure smooth return of the rope for each layer. A test certificate shall be supplied with each winch. The capacity, operating speed and recommended lubricant shall be clearly marked on each winch with an indelible label. The driving spindle shall be positively locked when not in use by automatic means. Each winch shall be supplied with a fitted waterproof cover.

The patented CU double drum winch is to be preferred where price is not the only consideration. The twin independent drums are both capable of lowering the luminaires alone. The drums are attached directly to the lantern carriage without any intermediate connectors. The drums can each be adjusted individually so any difference in the elasticity of the ropes does not affect the lantern carriage.

STANDARD MAST DIMENSIONS

Mast Type	Mast Height (m)	Windspeed (m/sec)	S2 Factor (1A / 2A)	Weight (Kg)	Head Area (sq.m)	Foundation Loadings (Unfactored) Vertical Load kN	Horizontal Shear kN	Bending Moment kNm
HMA9180	18	45	1A	350	3.3	10	7	97
		45	1A	750	3.1	13	7	95
		45	2A	350	3.8	10	7	101
		45	2A	750	3.5	13	6	96
		50	1A	350	2.4	10	7	96
		50	1A	750	2.2	13	7	93
		50	2A	350	2.7	10	7	97
		50	2A	750	2.5	13	7	94
HMA9200	20	45	1A	350	2.6	10	6	95
		45	1A	750	2.3	13	6	88
		45	2A	350	2.9	10	6	95
		45	2A	750	2.7	13	6	94
		50	1A	350	1.8	10	7	92
		50	1A	750	1.6	13	6	88
		50	2A	350	2.1	10	6	95
		50	2A	750	1.9	13	6	91
HMA9250	25	45	1A	350	1.4	11	6	96
		45	1A	750	1.1	14	5	91
		45	2A	350	1.5	11	5	93
		45	2A	750	1.2	14	5	88
		50	1A	350	0.9	11	6	99
		50	2A	350	1.0	11	6	96
HMA9251	25	45	1A	350	3.3	13	8	156
		45	1A	750	2.9	16	8	148
		45	2A	350	3.7	13	8	157
		45	2A	750	3.4	16	8	154
		50	1A	350	2.2	13	9	150
		50	1A	750	2.0	16	9	147
		50	2A	350	2.6	13	8	155
		50	2A	750	2.3	16	8	149
HMA9300	30	45	1A	350	1.0	14	6	115
		45	2A	350	1.2	14	6	116
		45	2A	750	0.9	17	5	112

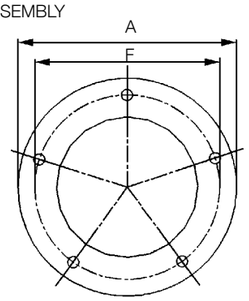
Mast Type	Mast Height (m)	Windspeed (m/sec)	S2 Factor (1A / 2A)	Weight (Kg)	Head Area (sq.m)	Foundation Loadings (Unfactored) Vertical Load kN	Horizontal Shear kN	Bending Moment kNm
HMA9301	30	45	1A	350	3.2	17	9	198
		45	1A	750	2.8	20	9	191
		45	2A	350	3.5	17	9	200
		45	2A	750	3.0	20	8	188
		50	1A	350	2.1	17	10	194
		50	1A	750	1.8	20	9	187
		50	2A	350	2.4	17	9	198
		50	2A	750	2.1	20	9	191
HMA9302	30	45	1A	350	4.1	19	11	232
		45	1A	750	3.7	22	10	224
		45	2A	350	4.6	19	11	238
		45	2A	750	4.2	22	10	230
		50	1A	350	2.7	19	11	225
		50	1A	750	2.5	22	11	222
		50	2A	350	3.1	19	11	231
		50	2A	750	2.8	22	11	223
HMA9350	35	45	1A	350	3.2	21	11	259
		45	1A	750	2.8	24	11	249
		45	2A	350	3.6	21	11	262
		45	2A	750	3.3	24	11	257
		50	1A	350	1.9	21	12	253
		50	1A	750	1.6	24	12	243
		50	2A	350	2.3	21	12	259
		50	2A	750	2.0	24	11	250
HMA9400	40	45	1A	350	3.1	26	13	322
		45	1A	750	2.7	29	13	310
		45	2A	350	3.4	26	12	321
		45	2A	750	3.0	29	12	311
		50	1A	350	2.2	26	15	344
		50	1A	750	1.9	29	14	334
		50	2A	350	2.4	26	14	339
		50	2A	750	2.1	29	14	330

STANDARD FOUNDATION DIMENSIONS

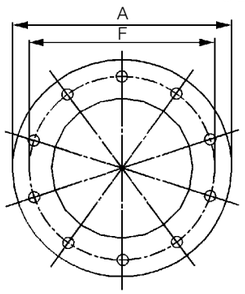
Mast Reference	Mast Height m	Flange Diameter A mm	Flange Thickness B mm	Stud Projection C mm	Stud Length D mm	Stud Diameter E mm	Hole Diameter mm	Hole Centres/ PCD F mm	Stud Quantity
15MT14	15	450 sq	25	170	850	27	35	350	4
18MT14	18	450 sq	25	170	850	27	35	350	4
HMA9180	18	690	25	170	850	27	35	584	5 *
20MT14	20	500 sq	25	170	850	27	35	400	4
HMA9200	20	690	25	170	850	27	35	584	5 *
HMA9250	25	690	25	170	850	27	35	584	10
HMA9251	25	750	25	170	850	27	35	650	10
HMA9300	30	690	25	170	850	27	35	584	10
HMA9301	30	750	30	170	850	27	35	650	10
HMA9302	30	840	30	170	850	27	35	737	10
HMA9350	35	940	30	170	850	27	35	838	10
HMA9400	40	1000	40	200	1240	39	45	890	10

* HMA9180 and HMA9200 have flangeplates drilled with 10 holes and can be used with 10 stud base.

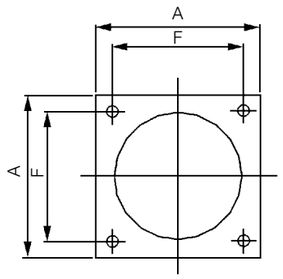
5 BOLT ASSEMBLY

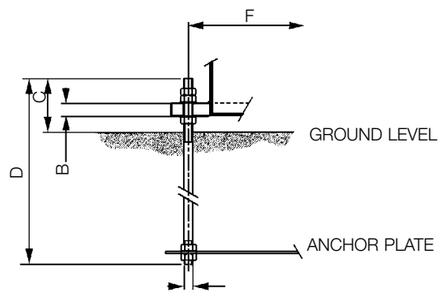


10 BOLT ASSEMBLY



TYPE 14 DUO



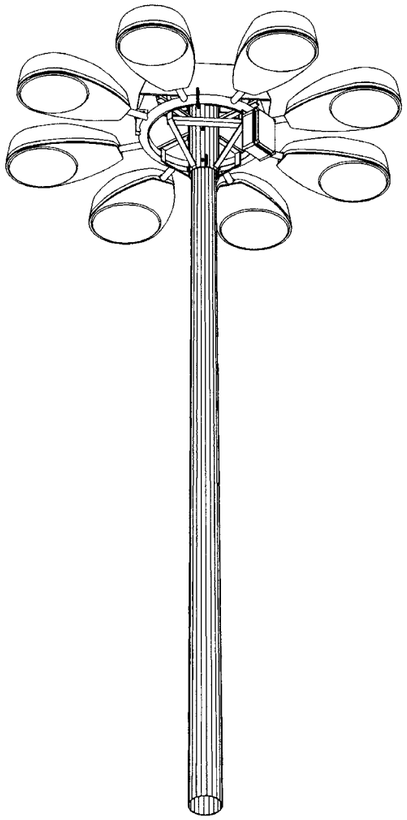


SPECIAL MASTS AVAILABLE:

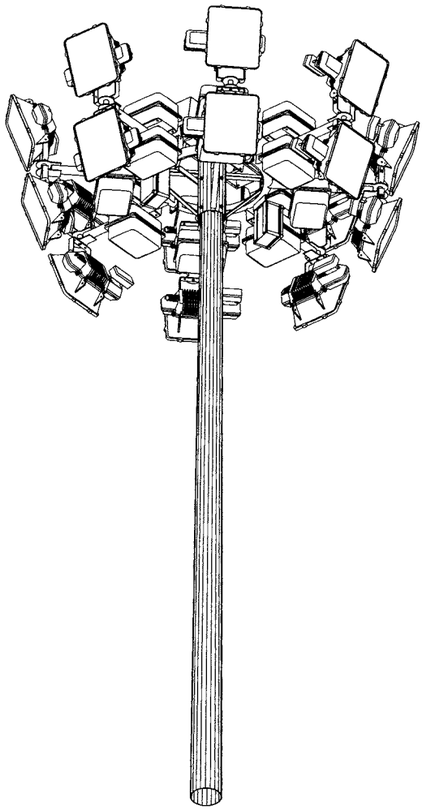
- For higher, lower or intermediate wind speeds.
- To provide strictly limited deflections for CCTV or telecommunications use.
- To carry heavier loads.
- To carry a greater projected area of luminaires at greater, shorter or intermediate mounting heights.
- To fit existing foundation bolts.

The maximum carrying capacity will be limited by the type of winch used (see page 12). 15m, 18m and 20m T14 masts will only accept Type 14 single drum winch. The projected area shown is related to luminaire shape, aspect ratio, or array and shielding factor. We can advise of the actual projected area if given the type and number of luminaires and their aiming angles. Maximum projected areas. as shown in the tables on pages 6-7, are based on BS CP3 Chapter V Part 2 for ground roughness Category 2, Class A. The masts are designed based on the requirements of the The Institution of Lighting Engineers Technical Report No 7. Data for other standards or wind speeds are available on request.

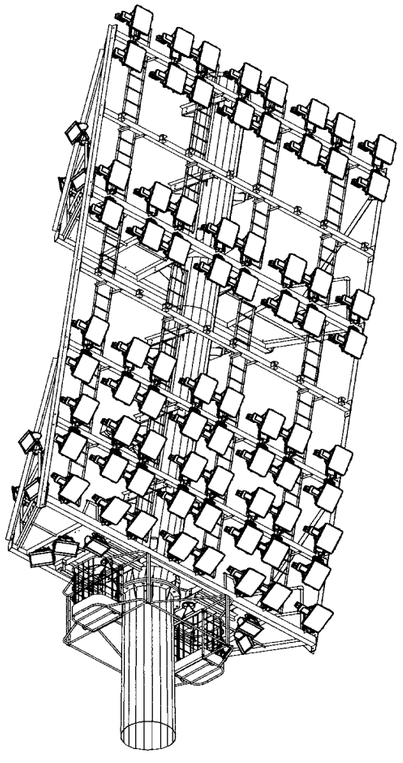
TYPICAL MAST HEAD DETAILS



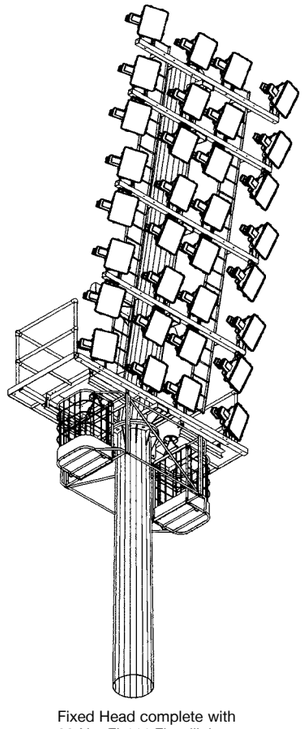
Lantern carriage with 8 No. symmetrically arranged P655 lanterns



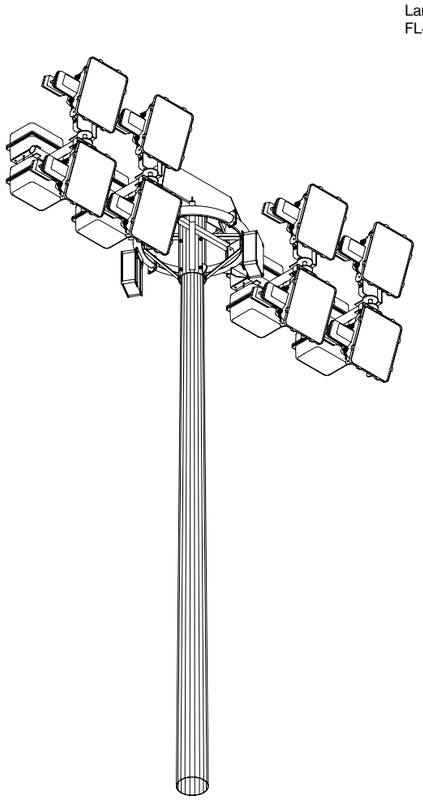
Lantern carriage with 16 No. symmetrically arranged FL444 floodlights complete with gearboxes



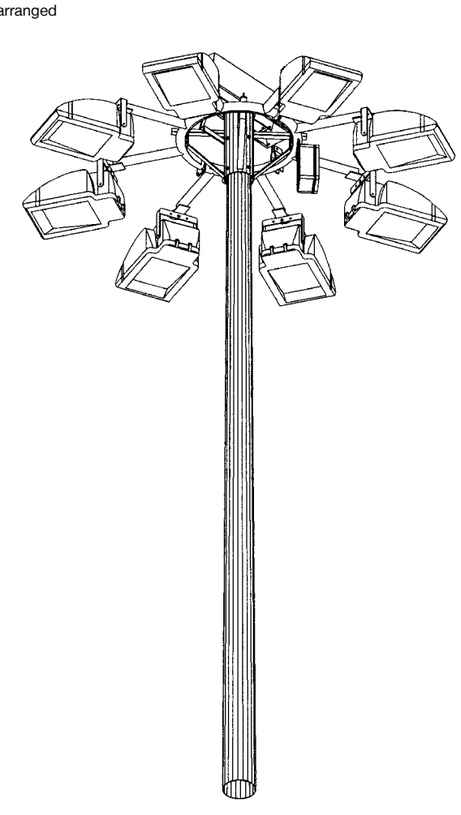
Fixed Head for up to 104 No. FL444 Floodlights



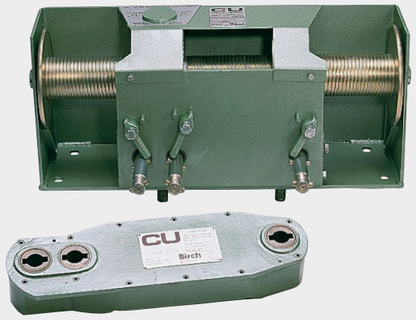
Fixed Head complete with 32 No. FL444 Floodlights

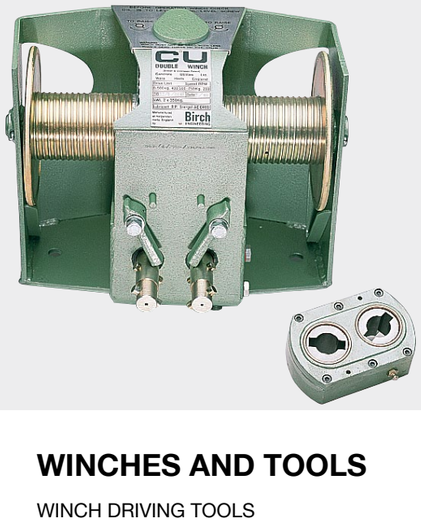


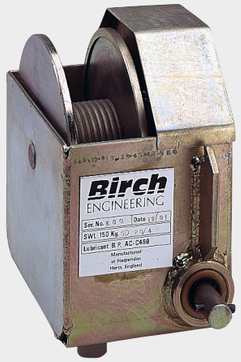
Lantern carriage with 8 No. asymmetrically arranged FL444 floodlights

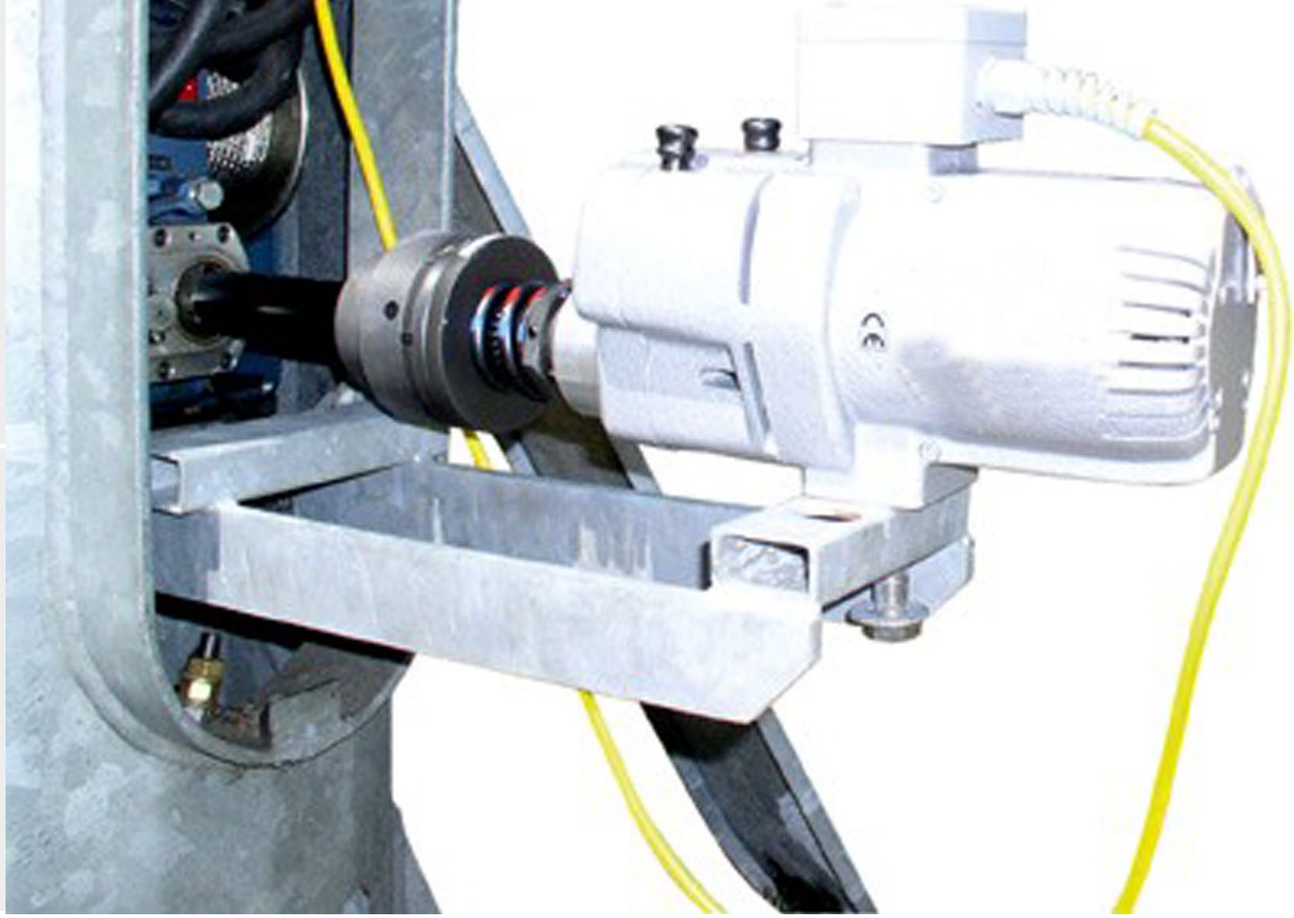


Lantern carriage with 8 No. symmetrically arranged FL500 floodlights









WINCHES AND TOOLS

WINCH DRIVING TOOLS

The power tool shall be a multi-speed reversible tool incorporating a torque limiting device which can be readily adjusted and locked. A remote control switch shall be incorporated to allow the equipment to be operated from a distance of 5 metres. Arrangements shall be provided to support the power tool accurately and securely during operation.

Handles shall be provided for manual operation of the winches and they will also incorporate a torque limiting device which can be adjusted and locked.

STEEL WIRE ROPES

Steel wire ropes shall be flexible 'marine grade' stainless steel of 7/19 construction. Thimbles and terminals shall be of compatible material. Steel wire ropes shall be factory cut terminated and pre-rigged for ease of installation. Ropes with hemp or nylon cores shall not be used.

CABLE & CABLE CONNECTIONS

Multi core flexible round sheath power cables shall be provided, terminating in the base compartment of the mast, fitted with plugs and sockets and a guard ring. At the mast head, cables shall be connected to a weatherproof junction box on the lantern ring equipped with suitable nylon glands. The equipment shall be suitably rated for the required duty. Power cables shall be factory cut and pre-rigged for ease of installation.

CU's standard equipment uses single or twin 7 core cable or alternative core can be supplied up to a maximum of 6 cables per mast.

FOUNDATIONS

Guaranteed performance, medium tensile, high yield, galvanised holding down bolts shall be supplied complete with anchor plate for casting into the foundation. A precision made steel template with tubed holes to ensure correct vertical and horizontal bolt alignment shall also be provided.

EARTHING TERMINAL

A 12mm diameter stainless steel bolt shall be attached to the mast structure at a convenient point within the base compartment to provide a lightning and cable earthing point.

EXTENSION LEAD

An extension lead or leads of multicore cable equal to that within the mast and fitted with a plug and socket, shall be provided to enable the lanterns and permanent supply cable to be tested when in the lowered position, using the base compartment socket supply.

SINGLE DRUM WINCH

SD40/6

Fully self-sustaining. Gear ratio 53:1. Grooved drum to suit 6mm stainless steel wire ropes. Tested and certified. Accessible rope drum fixing. Power or hand operated. Maximum load 350kg. Self-lubricating.

DOUBLE DRUM WINCH

DD35/45/60/6

Fully self-sustaining. Gear ratio 53:1. Grooved drums to suit 6mm stainless steel wire ropes. Two separate independently achored ropes. Tested and certified. Accessible rope drum fixing. Power or hand operated. Maximum load 750kg. drive through removable linking gearbox and individual drum adjustment is possible with gearbox removed. Self-lubricating. Patented.

DD30/40/50/8

Fully self-sustaining. Gear ratio 53:1. Grooved drums to suit 8mm stainless steel wire ropes. Two separate independently anchored ropes. Tested and certified. Accessible rope drum fixing. Power or hand operated. Maximum load 1000kg. Drive through removable linking gearbox and individual drum adjustment is possible with gearbox removed. Self-lubricating. Patented.

TRIPLE DRUM WINCH

TD45/60/6

Fully self-sustaining. Gear ratio 53:1. Grooved drums to suit 6mm stainless steel wire ropes. Three separate independently anchored ropes. Tested and certified. Accessible rope drum fixing. Power or hand operated. Maximum load 1050kg. Drive through removable linking gearbox and individual drum adjustment is possible with gearbox removed. Self-lubricating. Patented.

TD30/40/50/60/8

Fully self-sustaining. Gear ratio 53:1. Grooved drums to suit 8mm stainless steel wire ropes. Three separate independently anchored ropes. Tested and certified. Accessible rope drum fixing. Power or hand operated. Maximum load 1500kg. Drive through removable linking gearbox and individual drum adjustment is possible with gearbox removed. Self-lubricating. Patented.

TYPE 14 WINCH

SD20/4

Fully self-sustaining. Gear ratio 50:1. Grooved drum to suit 4mm staiinless steel wire ropes. Tested and certified. Maximum load 150kg. Self luibricating. Power or hand operated. Solely for use with T14 Power Tool. Single speed. Integral Torque Limiter. Single phase up to 50Hz.

POWER TOOLS

Heavy Duty Model D32-11RL

4 speed reversible. 240V (110v model available). Single phase AC/DC up to 60Hz. Radio suppressed. Specification in accordance with CEE 20 Regulations.

Remote Control Switch

For operating power tool. Very robust, moulded rubber case. Requires constant switch pressure for operation.

Torque Limiter

Propietary, precision made, finely adjustable unit working on a system of balls and springs.

CONTRACT SERVICES

CU Phosco Lighting Contract Services are the market leaders in the design, supply, installation and maintenance of high mast lighting for large areas and sports facilities. Operating out of two depots in Yorkshire and Hertfordshire, CU Phosco Lighting undertake contracts througthout the UK, Europe and the rest of the world, working closely with a number of large organisations including airports, port authorities, highway authorities, rail networks and sports clubs. All CU Phosco Lighting High Mast equipment is designed and manufactured in the UK within a Quality Management System that complies with BS EN ISO 9001:2008.

Sectors covered:

- Airports
- Ports
- Highways
- Retail facilities
- Rail networks
- Sports facilities
- Gas & Oil

PROJECT MANAGEMENT

CU Phosco Lighting provides a professional and reliable service, offering a complete project management package to all our clients. We have the capability and rescources to undertake all elements involved in the installation of high mast lighting equipment from initial design through to final commissioning.

CU Phosco Lighting values its relationship with its customers and will provide clear information and advice throughout all stages of the project.

HIGH MAST MAINTENANCE

CU Phosco Lighting operates throughout the UK and Europe providing quality high mast maintenance solutions to our clients.

By implementing a structured maintenance programme CU Phosco Lighting can ensure compliance with all current legislation and enhance the life of the equipment.

CU Phosco Lighting also has the ability to carry out maintenance on other manufacturers' high mast equipment.

SPECIALIST CONTRACTS

As well as high mast lighting, CU Phosco Lighting has the capability to undertake other specialist design and installation projects.

- CCTV Masts
- Lightning protection systems
- Catenary lighting systems
- Wind turbine masts

ACCREDITATIONS AND TRAINING

CU Phosco Lighting aims to achieve the highest degree of professionalism and integrity in all projects it undertakes. This is achieved by ensuring that our highly qualified and trained engineers are subject to a continual programme of training and development.

- ASLEC
- NICEIC
- ILP
- Lumicom
- HIghways Electrical Registration Scheme Approved
- Constructionline

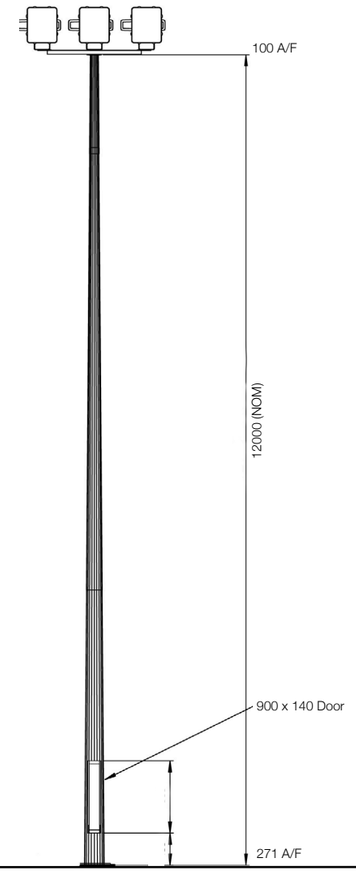
LUMICOM MEMBER

SILVER GROUP MEMBER

constructionline

ASLEC

APPROVED CONTRACTOR



SPORTS LIGHTING

For over 40 years CU Phosco Lighting has been providing sports lighting solutions for recreational and prestigious sports facilities throughout the world. We have a specialist service available for all levels of sports lighting from our in-house Sports Lighting Division.

Our Sports lighting package comprises:

- A dedicated project manager providing a single point of contact
- A 'free of charge' lighting design service
- Product supply from our vast portfolio
- Product installation by our experienced team
- A very competitive package price ensuring quality as well as value for money
- Support and advice for planning and funding applications
- Optional maintenance programmes

SITE SURVEY AND LIGHTING DESIGN

Where necessary we will undertake an initial site survey ensuring a complete understanding from the very beginning. Listening to your ideas, concerns, possible budgetary and site specific restrictions to ensure a suitable solution is provided. From here our specialist technical design team can prepare a comprehensive lighting proposal for any sporting application to any standard of play. An environmentally friendly lighting calculation that addresses the issues of obtrusive light is at the forefront of any lighting design that we produce.

We will work with you and the relevant planning authority to ensure the highest level of compliance. We can also undertake site surveys and inspections of existing installations providing recommendations and quotations for possible upgrades. Once the lighting design has been approved we will then provide a full quotation outlining the details of the agreed package.

SUPPLY AND INSTALL

We offer a specialist in-house turnkey package that provides complete project management by CU Phosco throughout. From initial product manufacturing to on-site contracting we keep close control of the project delivery. We can undertake all civil and electrical engineering for both new and existing installations. All phases of planning / scheduling are handled by our Sports Lighting Division, ensuring that your project is delivered on time within budget and to the origininal design specification. As standard we will undertake a light test reading upon completion to confirm the installation performs as designed. We also provide a full operations and maintenance manual outlining the technical details of your installation.

MAINTENANCE PROGRAMMES

Almost all installations require maintenance to ensure the products' longevity and integrity. Our service engineers can offer annual or periodic maintenance checks on your sports lighting system. This includes NICEIC electrical testing, product integrity checks and lighting level surveys. We carry an extensive range of spare components, including lamps and control gear, which enables us to deliver a fast and efficient service. Our maintenance package is available for all types of installation and for any manufacturer's products.

Details of our products suitable for sports lighting systems can be found in various other sections of this catalogue.

SAPCA
The Sports and Play Construction Association

STADIUM MASTS

GENERAL SPECIFICATION

The stadium mast shall comprise of a duo-decagon (20 sided) monopole structure of continuous taper sections. The structure shall be designed to withstand a windspeed in accordance with CP3 Chapter V. The structure shall also comply with the international high mast code as published by the Institution of Lighting Engineers Technical Report No. 7. Mast sections shall be in 5.5m lengths so that each 11m section for assembly has at least one peripheral transverse welded joint. This joint has a double thickness of material over the joint length, which acts as a stiffening diaphragm and provides additional support to the section during delivery. After assembly, each site joint allso acts as a diaphragm of substantial length as every site joint is greater than one and a half times the diameter. The completed mast, therefore, has diaphragms at approximately 5.5m spacing which provides additional support against distortion of the cross section, and thereby, also provides greater resistance to buckling. Although difficult to quantify, the closer the spacing of such diaphragm, the greater the resistance to section collapse and the formation of a plastic hinge.

The mast shall be fabricated from steel manufactured to BS EN 10025, graded as required and hot dip galvanised to BS EN ISO 1461. The fixed headframe shall incline at an angle of 10º and shall comprise of one or more working platforms. The platforms shall be fully protected by guard rails. Provision shall be made to mount the floodlights in rows of 4, 6 or 8 depending on the total number on each mast. Care shall be taken to enable full axial azimuth adjustment to be carried out. Care shall also be taken to ensure rear access to the luminaires for relamping.

The working platforms shall be linked with 2 or 4 no. service ladders, each ladder shall be fitted with a ‘Railok’ safety system (if required), 2 no. ‘Railok’ units shall be supplied with the contract together with 2 no. safety belts. Access to the working platform shall be by a mobile 2-man cage permanently attached to each mast and docked under the lower platform when not in use. The cage shall be certified under the Lifting Regulations 1971.

The cage shall be operated by a double drum winch housed in the mast base compartment and the cage lifting ropes shall be stainless steel with a solid core at least 8mm diameter. The winch shall be driven by a portable electric multispeed power tool fitted with a torque limiter, remote lead and switch. The mast shall be mounted on a flangeplate welded to the shaft and drilled to accept the medium high tensile foundation bolts. Provision shall be made inside the mast for mounting the installing contractor’s power cables by catenary suspension wires.

PARTICULAR SPECIFICATION

The mast shall provide a mounting height to the underside of the platform to suit the lighting design requirements. It shall be of welded steel construction, unstayed and of continuously tapered form. Dimensions shall comply with ILE Technical Report No. 7. It shall be designed for a 3 second gust wind speed with a return period of 25 years, of 45m/sec or required wind speed for location measured at a height of 10 metres above ground level, giving a dynamic wind pressure of 1240N/m sq. and have a design life of at least 25 years.

Allowance for seismic effects shall be made, if required, by means of the equation:-

V = CW

V = Nominal Seismic Force
C = Seismic Co-efficient assumed to be 0.05, and
W = Total Vertical Load

For a limit state design, the nomimal seismic force shall be multiplied by partial load factors of 1.00 for the serviceability limit state and 1.40 for the ultimate limit state to obtain the design seismic forces. The design seismic force shall be applied successively longitudinally and transversely at the baseplate level. Each mast shall have a uniform steel flangeplate for bolting to the foundations together with a set of high tensile foundation bolts, a lower steel anchorplate and a removable steel template. The contractor shall be responsible for levelling the flangeplate on the prepared foundations and correctly aligning the mast. Exposed bolts and nuts shall be protected with ‘Denso’ tape or equal and approved, after lubrication with graphite filled silicon grease.

Welding shall comply with the appropriate British Standards as listed in BS499. Details of the welding procedure shall be submitted in accordance with BS EN 1011.

A copy of the calculations for the design of the masts showing clearly the grade of steel to be used shall be submitted for the approval of the engineer. Calculations shall take into account the weakening effect of the doorways.

A base compartment shall be provided of adequate size to contain the winch mechanism equipment. The compartment shall have a vandal resistant, weatherproof access door with heavy-duty vandal resistant locks, suitable for identical pattern keys. A number of keys can be provided if required.A 16mm diameter corrosion resistant earth stud shall be fitted within the compartment. Adequate working space shall be available for operating the hoisting equipment at the foot of the mast.

PROTECTION OF STEELWORK AGAINST CORROSION

Protection of surfaces shall be hot dipped galvanised to BS EN ISO 1461 for both internal and external faces. Painting of the mast is not required.

WINCHING MECHANISM

The maintenance cage shall be raised and lowered by a self-sustaining worm geared winch suitable for both manual and power driven operation and located at the foot of the mast. The winch shall be of double drum type which provides two completely separate suspension systems. The power tool shall be a four speed reversible tool incorporating a pre-set torque limiting device. Remote control switch shall be incorporated to allow the equipment to be operated from a distance of 5m. Arrangements shall be provided to support the power tool accurately and securely during operation.

The winch and all hoisting equipment shall be adequate to allow for attaching hoist ropes to a maintenance cage or cradle which shall sustain a working load of 250 kgs. The hoisting mechanism shall comply with all appropriate safety regulations.

The twin hoisting ropes shall be of stainless steel stranded wire running from the winch to the cage over pulleys made from non-corrodible metal at the top of the mast. The selection, provision and installatiom of the rope shall be in accordance with BSMA29. The pulley grooves shall be suitably protected against moisture, dirt and rust and fitted with close fitting guards to prevent derailment of the hoist rope. Self-lubricating pulley bearings shall be used. All vital parts of the hoisting mechanism shall be of stainless steel or other non-corrodible material to the approval of the engineer. Thimble type connections shall be used for ropes, wherever possible, alternatively, bulldog grips shall be used. Particular care shall be taken to ensure that the wire rope cannot abrade against any component.

When the cage is in fully lowered position, at least to within 1.3m of the base line, at least 4 turns of the hoisting rope shall be left on the winch drum to ensure that the securing arrangement on the drum does not take the full load when hoisting.

The rope shall be as clearly visible as practicable during the hoisting operation. There shall be a clear indication near the winch to show when the cage has reached the design operating height. Details relating to lubrication shall be given on an engraved label fixed to, or adjacent to, the winch in a visible position.

FLOODLIGHT PLATFORM

The floodlight platform shall be attached to the upper shaft by a bolted connection; no welding shall be permitted during site assembly. The headframe shall be inclined at an angle of 10° to facilitate floodlight aiming.

Floodlights shall be in rows of 4, 6 or 8 to allow relamping from ladders in pairs; access ladders shall, if required, have a ‘Railok’ safety track to comply with BS5062/1973. The headframe shall be complete with guard rails for safe working.

MAINTENANCE CAGE

A maintenance cage shall be provided of sufficient size and strength to raise two men together with maintenance equipment, total weight 250kgs to the top of the mast. The maintenance cage shall be raised and lowered by the mast winch and wire ropes. Suitable arrangements shall be provided to prevent damage to the protective systems of the mast during raising and lowering. The cage shall be hot dipped galvanised after manufacture. The safe working load shall be prominently displayed in a permanent position on the maintenance cage.

Photograph courtesy of Cheshire County Sports Club

Part numbers, lamp choice and weights of all floodlights can be found on pages 32 - 33

Floodlights

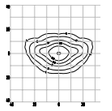
FL500 Pages 22 - 23

FL550 Pages 24 - 25

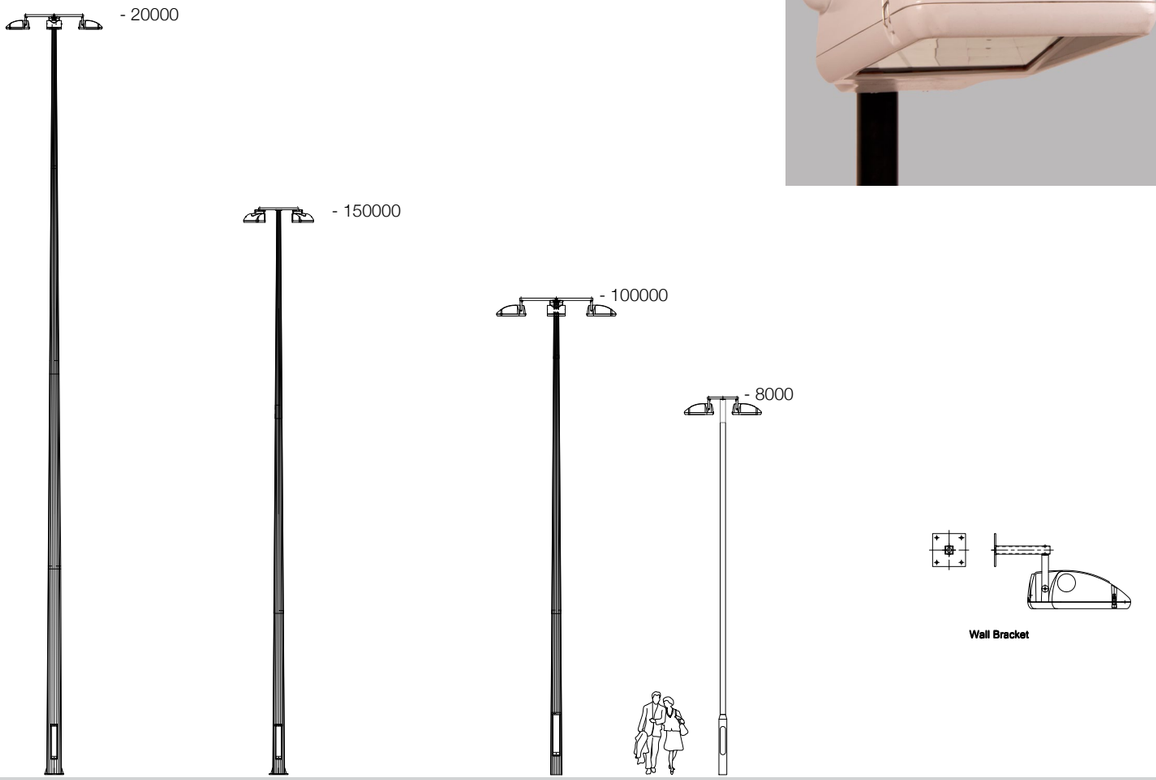
FL444 Pages 26 - 27

FL300 Pages 28 - 29

WB520
WB530 Pages 30 - 31



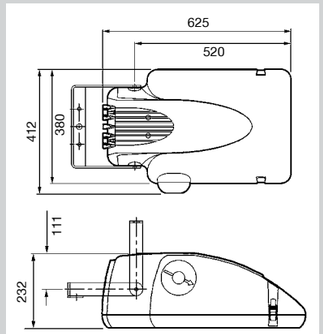
Technical Pages 32 - 33

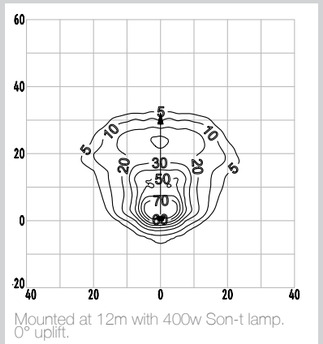


Wall Bracket

Mounted on CU Phosco Floodpoles

Mounted on CU Phosco Forest columns





Mounted at 12m with 400w Son-t lamp.
0° uplift.

Recommended Applications:	High masts, ports, airports, car parks, sports facilities, architecture, railways
Mounting Height:	8-30m, for fixing on a floodlight bracket
Wind area:	0.12m^2
Stirrup fixing	
IP Rating:	IP65

FL500

A unique full cut-off floodlight with an internally angled flat glass and a main beam at 65 degrees, so no external light control is required. This enables it to light a larger area than equivalent low light pollution floodlights, without unsightly cowls. It is suitable for areas where a high degree of light control is required, such as airport aprons.

MATERIALS AND FINISHES

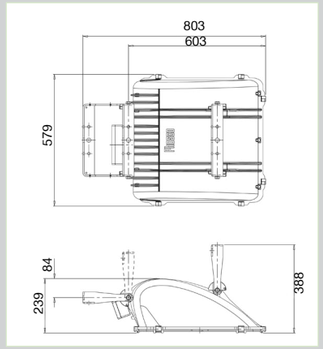
- Recyclable die-cast aluminium body
- Highly efficient reflector design with 65 degree main beam which enables greater spacings to be used
- Heat resistant toughened glass
- Stirrup fixing suitable for suspended or horizontal mounting
- IP65 sealed lamp and gear compartment with an activated charcoal filter.
- Integral gear up to 600w and up to 1000w MHNLA with remote control gear.

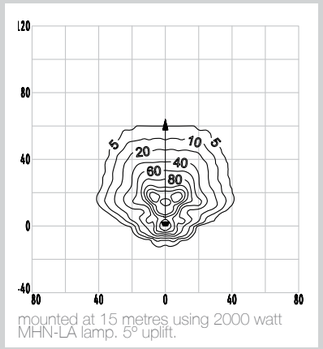
OPTIONS AND EXTRAS

- NEMA socket/photocell or miniature photocell option
- Choice of RAL colours at extra cost

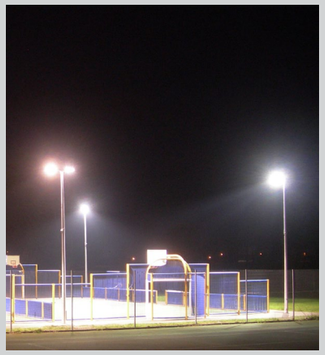
Part numbers, lamp choice and weights of all floodlights can be found on pages 32 - 33

Photograph courtesy of Cheshire Sports Club

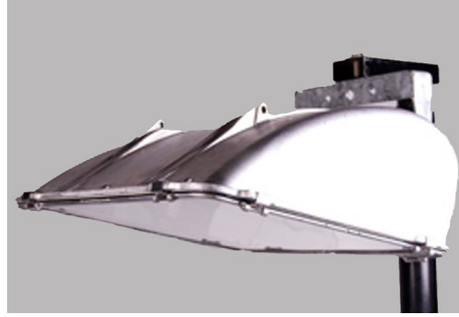


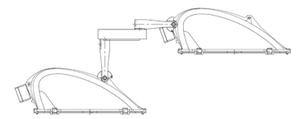


mounted at 15 metres using 2000 watt MHN-LA lamp. 5º uplift.



Recommended Applications:	Sports facilities, high masts, airports, ports, industrial areas, railways
Mounting Height:	15 - 60m, for fixing on a floodlight bracket
Wind area:	0.14m^2
Stirrup fixing:	In 2 positions
IP Rating:	IP65





Mounted on CU Phosco Type 14 Mast

FL550

A lightweight full cut-off floodlight designed to provide highly efficient illumination with no upward light on larger area with multiple lamp configurations as standard. The floodlight is suitable for lighting sports pitches, airports, ports and industrial/ commercial areas. Usually pole or mast mounted the floodlight may also be fixed direct to structures such as spectator stands and buildings. The distribution is asymmetric in the vertical plane.

MATERIALS AND FINISHES

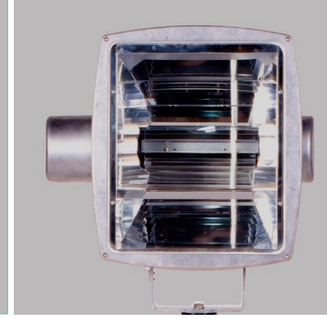
- LM6 marine grade high pressure die cast aluminium body
- IP65 lamp compartment
- Glass diffuser hinged from rear of floodlight for use on high masts but may be rotated for improved access in mid-hinge or base hinge column installations
- Specular aluminium reflectors
- Galvanised stirrup for supported or suspended mounting. This arrangement allows the floodlight to be rotated in azimuth and adjusted in elevation
- Elevation indicator for stirrup with anti-rotation discs to maintain aiming elevation under wind loading. Front and rear stirrup positions enables over and underslung floodlights without interference
- Variety of lamps available suitable for floodlighting
- Standard ignitor box or instant restrike ignitor box can be mounted directly to rear of floodlight

OPTIONS AND EXTRAS

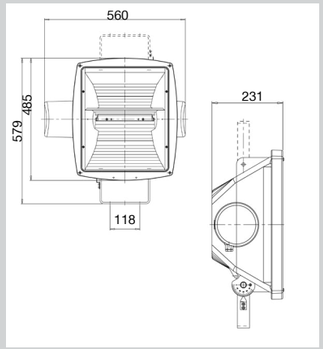
- Instant restrike ignitor
- Range of optics are available
- Choice of RAL colours at extra cost
- Twin 400w lamp configuration

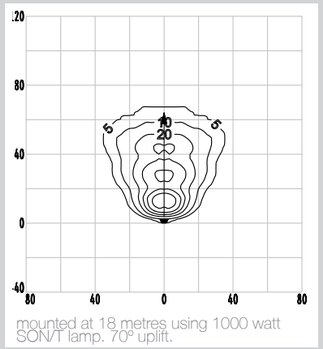
Part numbers, lamp choice and weights of all floodlights can be found on pages 32 - 33

Mounted on CU Phosco Floodpole at 20 metres



Mounted on CU Phosco Floodpole at 15 metres





Recommended Applications:	High masts, airports, ports, sports facilities, industrial areas, architectural lighting
Mounting Height:	12 - 60m for fixing on a floodlight bracket
Wind area:	0.21m^2
Stirrup fixing:	
IP Rating:	IP65

FL444

The FL444 in three alternative reflector versions is designed to provide highly efficient illumination of larger areas with 1kW and 2kW lamps. The floodlight is particularly suitable for lighting sports complexes, airports and industrial/commercial areas. Usually pole or mast mounted the floodlight may also be fixed direct to structures such as spectator stands and buildings. The distribution is asymmetric in the vertical plane. A range of baffles and optics are available for light control.

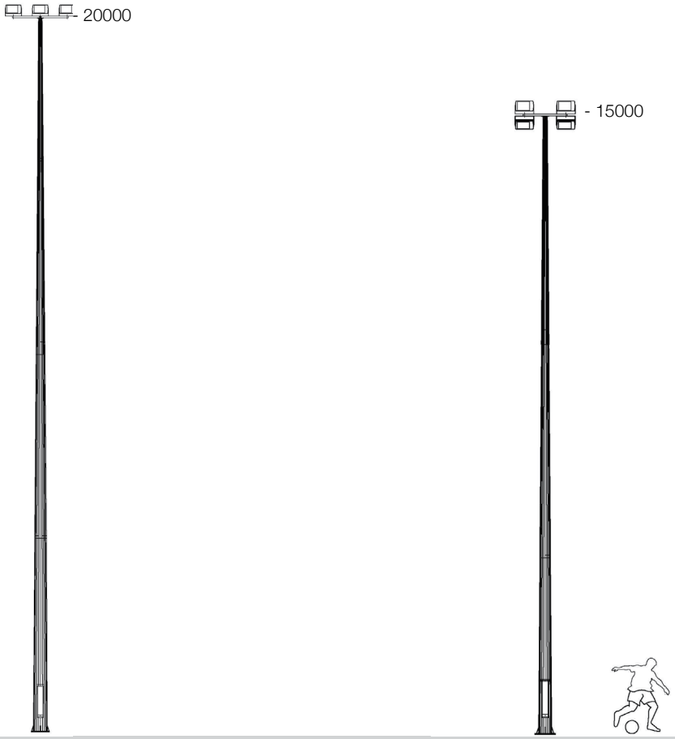
MATERIALS AND FINISHES

- High pressure die cast aluminium body
- Heat resistant toughened front glass
- For use with lamps of 1000w to 2000w, all with remote control gear
- The 2 asymmetric beam options have an integral baffle to control upward spread of light
- Power cut-off safety switch fitted to 2kW lamp version
- Projector version uses short arc lamps (HQI-TS2 and MHN-SA)
- Rear access for easy maintenance
- Galvanised dual stirrup for supported or suspended mounting. This arrangement allows the floodlight to be rotated in azimuth and adjusted in elevation

OPTIONS AND EXTRAS

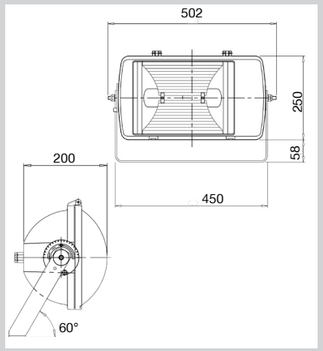
- Narrow asymmetric beam options (for side lighting of sports stadiums etc) or narrow projector beam options (for lighting over long distances such as corner towers of stadiums)
- Louvre option to reduce sideways distribution.
- Low glare baffle option to reduce upward light.
- Airport baffle option for use in and around airport sites where a high degree of light control above the horizontal is needed.
- Choice of RAL colours at extra cost
- Instant restrike ignitor

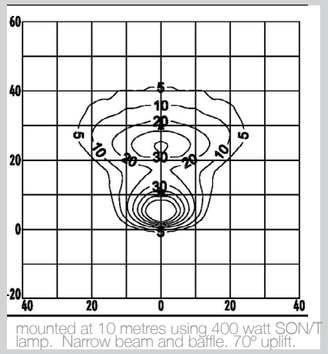
Part numbers, lamp choice and weights of all floodlights can be found on pages 32- 33



Mounted at 20 metres

Mounted at 15 metres





mounted at 10 metres using 400 watt SON/T lamp. Narrow beam and baffle. 70° uplift.

Recommended Applications:	High masts, airports, sports facilities, architecture, industrial areas
Mounting Height:	8 - 30m for fixing on a floodlight bracket
Wind Area:	0.11m²
Stirrup fixing:	
IP Rating:	IP54

FL300

A Design Council award winning compact floodlight. Its compact size enables it to be used in floodlighting buildings where a powerful unit of the smallest possible dimensions is required. Excellent for roundabout lighting on centrally mounted high mast.

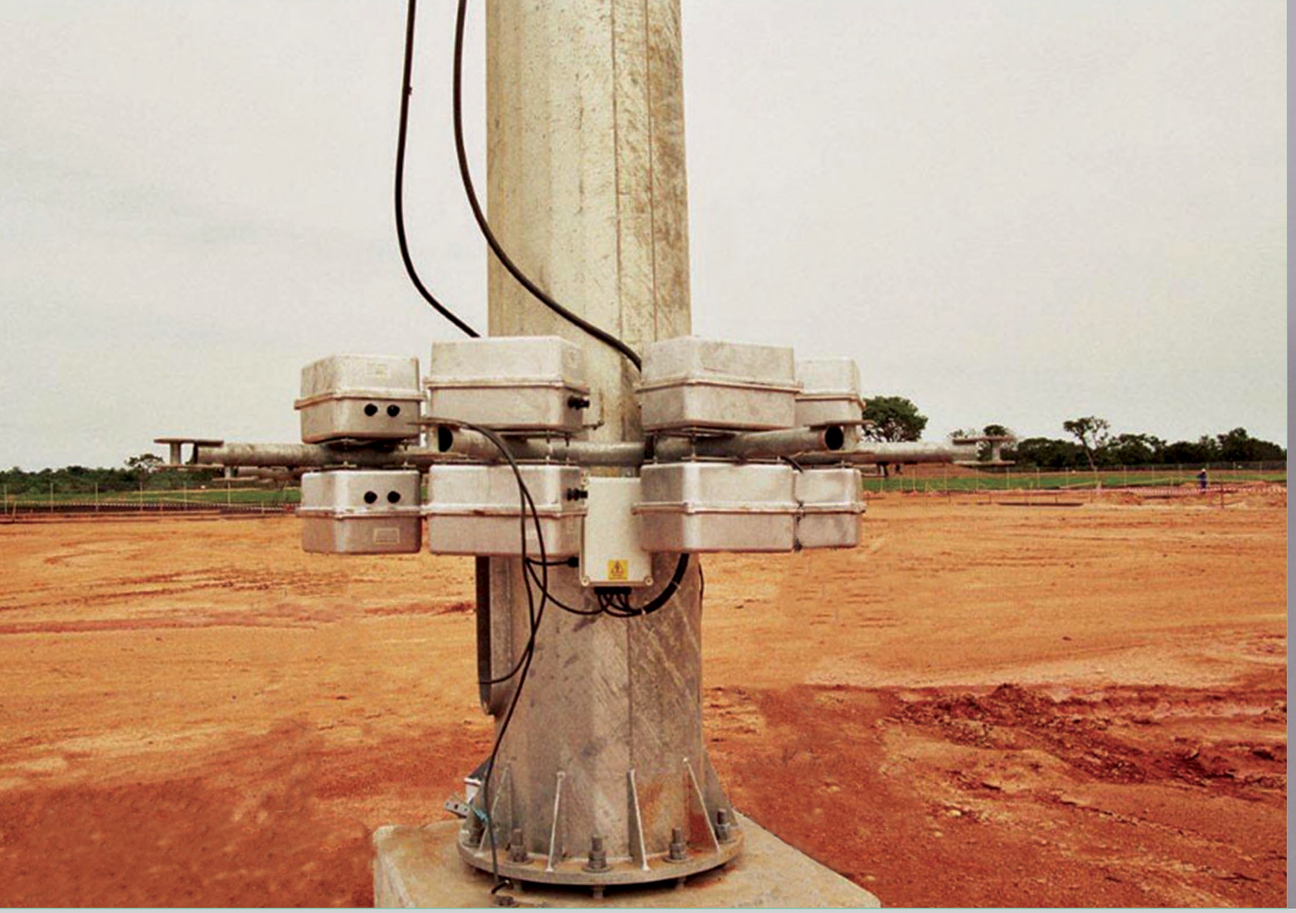
MATERIALS AND FINISHES

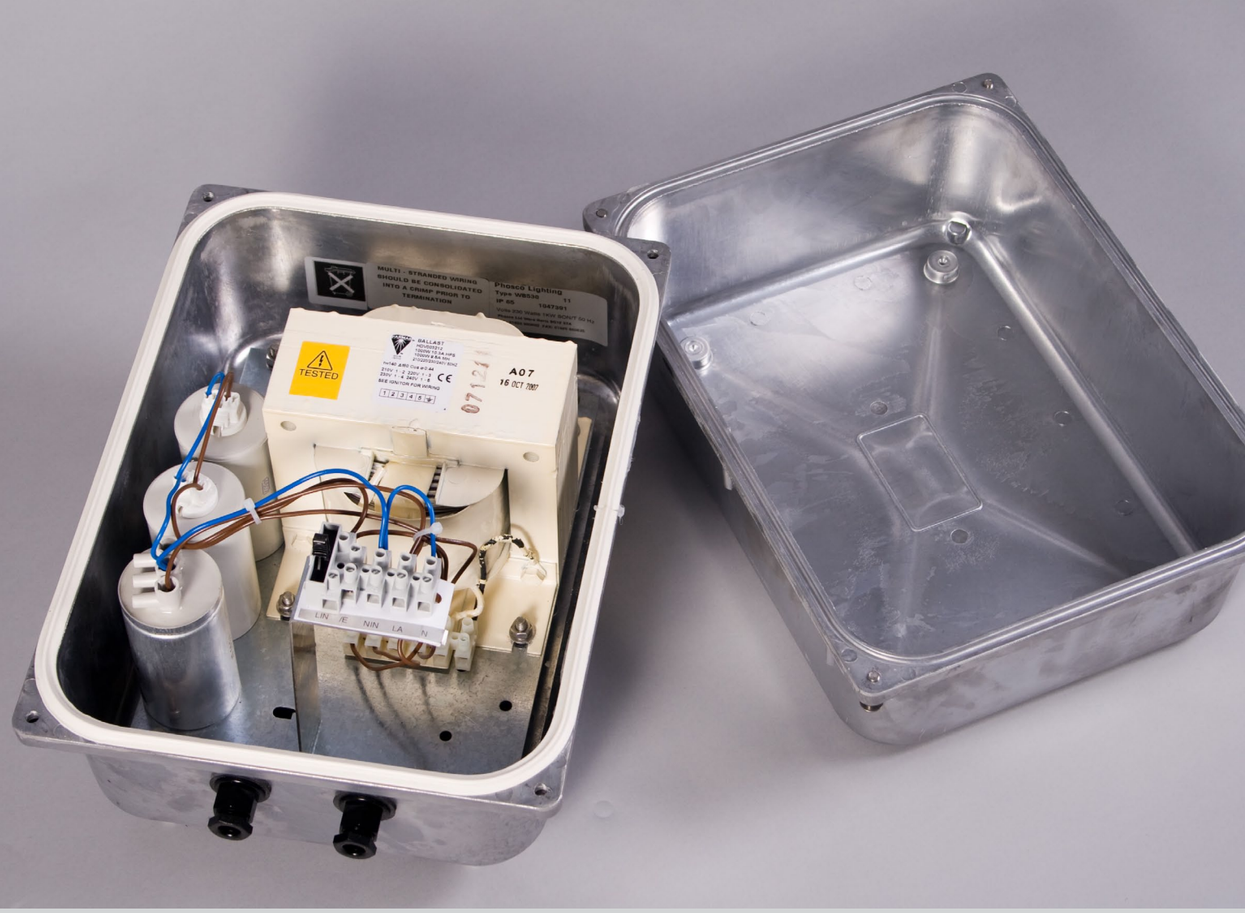
- LM6 marine grade die cast aluminium body
- For use with remote control gear
- IP65 lamp compartment
- Curved heat resistant toughened glass diffuser
- Specular aluminium reflectors
- Galvanised stirrup for supported or suspended mounting.
- This arrangement allows the floodlight to be rotated in azimuth and adjusted in elevation
- Elevation indicator for stirrup with anti-rotation discs to maintain aiming elevation under wind loading. Front and rear stirrup positions enables over and underslung floodlioghts without interference
- Variety of lamps available suitable for floodlighting

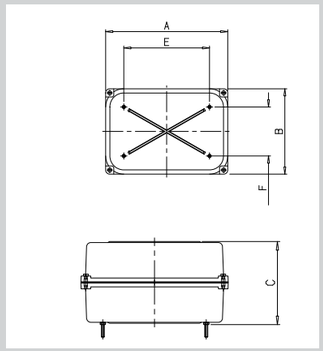
OPTIONS AND EXTRAS

- Regular baffle and dedicated airport baffle options
- Louvres to control the sideways spread of light
- Instant re-strike option
- Three asymmetrical beam widths enable illumination to be tailored to suit situation
- Wire guard over glass front
- Choice of RAL colours at extra cost

Part numbers, lamp choice and weights of all floodlights can be found on pages 32 - 33







WB520 for discharge sources up to 400 watt
WB530 for discharge sources up to 2000 watt (includes twin up to 600 watt)
Supplied pre-wired with control gear

Body:	LM6-M high pressure die cast alloy
Lid:	Fully gasketed and fixed with 4 captive stainless steel screws
Option:	Nylon flexible conduit tube (IP65) for connecting control gear boxes to floodlights/luminaires providing additional protection to the cable
IP Classification:	IP65

Control gear is normally supplied for 240V quotation.
Control gear for other voltages available on request.
Boxes can be supplied empty, or with gear tray only,
with or without glands

WB520 AND WB530 CONTROL GEAR BOXES

DIMENSIONS AND WEIGHTS	WB520	WB530
Length A	299mm	359mm
Width B	209mm	269mm
Height C	168mm	226mm
Fixing Centres E & F	210mm x 120mm	256mm x 165mm
Fixing Studs	6mm dia.	8mm dia.
Weight: Without Control Gear	3.5kg	5.8 kg
Weight: Fitted with 150 watt Son Control Gear	6.3 kg	(Twin: 9.1kg)
Weight: Fitted with 250 watt Son Control Gear	7.3 kg	(Twin: 11.1 kg)
Weight: Fitted with 400 watt Son Control Gear	7.9 kg	(Twin: 12.3 kg)
Weight: Fitted with 400 watt MBI Control Gear	7.7 kg	(Twin: 14.2 kg)
Weight: Fitted with 600 watt Son Control Gear	9.3 kg	(Twin: 17.4 kg)
Weight: Fitted with 1000 watt Son Control Gear	-	22.4 kg
Weight: Fitted with 1000 watt MBI Control Gear	-	17.6 kg
Weight: Fitted with 2000 watt MBI Control Gear	-	22.5 kg

Floodlights

There are two types of floodlighting. The floodlighting of buildings and other features for decorative reasons and the floodlighting of external areas for night time use. Building floodlighting is a specialist area where we are pleased to offer advice but one where formulae and illuminance calculations are secondary to talent, experience and on-site trial.
For area and sports floodlighting there are recommended illuminance levels that provide a basis for lighting design.These are maintained illuminance levels, i.e. taking account of dirt build up on luminaires, lamp lumen depreciation, lamp survival and internal deterioration of reflectors (if relevant).

AREA FLOODLIGHTING

	Maintained Average Illuminance Lux	Maintained Minimum Illuminance Lux
Car Park	10 - 20	5 - 10
Loading Area	50	15
Shopping Area	50	10
Security	5 - 10	2.5 - 5
Dockyard	20	5
Marshalling Yard	10 - 20	5 - 10
General Working Area	30	15

SPORTS FLOODLIGHTING

	Top Level Lux Level	Club Level Lux Level
Football	800	120
Rugby	500	120
Hockey	500	250
Tennis	500	260
Athletics	500	300
Bowls	300	200
Basketball	300	200
Netball	300	200
Volleyball	300	200

The illuminance levels recommended above are guide levels. Specified levels for individual sports can be found from the sports association responsible or the Sports Council. The CIBSE provides guidance on general area lighting and the user, i.e. rail, port, may also have their own particular specification.

FL500 Floodlight

Wind area 0.12m²

Description	Product	Weight	Description	Product	Weight
Luminaire reference	**FL500**	**13.8 kg**			
100W SON/T control gear	100SONT	2.1 kg	100W SON/T electronic control gear	100SONELE	0.8 kg
150W SON/T control gear	150SONT	2.8 kg	150W SON/T electronic control gear	150SONELE	0.8 kg
250W SON/T control gear	250SONT	3.9 kg	100W CDO electronic control gear	100CDOTT	0.8 kg
400W SON/T control gear	400SONT	5.3 kg	150W CDO electronic control gear	150CDOTT	0.8 kg
600W SON/T control gear	600SONT	7.3 kg	90W Cosmopolis control gear	90COSMO	0.9 kg
100W CDO/TT control gear	100CDOTT	2.1 kg	140W Cosmopolis control gear	140COSMO	0.9 kg
150W CDO/TT control gear	150CDOTT	2.8 kg			
250W MBI/T control gear	250MBIT	3.9 kg			
400W MBI/T control gear	400 MBIT	5.3 kg			
1000W MHN lamp	1000MHNLA	1.0 kg			

Options	
NEMA photocell socket	NEMA
Instant restrike system (25-/400w only)	IR
Special colour RAL number	RAL

FL550 Floodlight

Wind area 0.14m²

Description	Product	Weight	Description	Product	Weight
Luminaire reference	**FL550**	**17.7 kg**			
Twin 400W SON-T lamp	400SONTW	1.2 kg	Twin 400W MBI lamp	400MBITW	1.2 kg
1000W SON-T lamp	1000SONT	0.4 kg	1000W MBI lamp	1000MBI	0.4 kg
			1000W MHNLA lamp	1000MHNLA	1.0 kg
			2000w MHNLA lamp	2000MHNLA	1.1 kg

Options	
Special colour RAL number	RAL

FL444 Floodlight

Wind area 0.19m²

Description	Product	Weight	Description	Product	Weight
Luminaire Reference	**FL444**	**13.0 kg**			
1000W SONT lamp	1000SON	0.4 kg	1000W MBI-T lamp	1000MBI	0.4 kg
			1000W MHNLA lamp	1000MHNLA	1.0 kg
			2000W MHNLA lamp	2000MHNLA	1.1 kg

Options (first three are mutually exclusive)	
Louvres	L
Airport baffle (1000w Son-T only)	S80
Low glare baffle	B
Narrow asymmetric beam	Narrow
Projector beam	PROJ
Instant restrike system (Double ended lamps only)	IR

FL300 Floodlight

Wind area 0.11m²

Description	Product	Weight	Description	Product	Weight
Luminaire Reference	**FL300**	**6.4 kg**			
100w SON-T lamp	100SONT	0.2 kg	150w SON-T	150SONELE	0.2 kg
150w SON-T lamp	150SONT	0.2 kg	150w CDO-TT	150CDOTTELE	0.2 kg
250w SON-T lamp	250SONT	0.3 kg	90w Cosmopolis lamp	90COSMO	0.1 kg
400w SON-T lamp	400SONT	0.3 kg	140w Cosmopolis lamp	140COSMO	0.1 kg
600w SON lamp	600SONT	7.3 kg			
250w MBI-T lamp	250MBIT	0.3 kg			
400w MBI-T lamp	400MBIT	0.3 kg			
35w SOX lamp	35SOX	1.2 kg			
100w CDO-TT lamp	100CDOTT	0.2 kg			
150w CDO-TT lamp	150CDOTT	0.2 kg			
250w CDO-TT lamp	250CDOTT	0.2 kg			

Options (first three are mutually exclusive)	
Louvres	L
Airport baffle	S80
Wire guard	WG
Instant restrike lamp	IR
Narrow assymetric beam	1
Medium assymetric beam	2
Wide assymetric beam	3

** Please note that the FL550,FL444 and FL300 floodlights can only be supplied with remote control gear fitted into a WB520 or WB530 gearbox.*

** Please also note that floodlights fitted with 2kW control gear will require a 3 phase electrical supply*

Photograph by kind permission of Proven Engineering, Scotland.

CU Phosco manufacture a range of specialist columns and masts which is too wide to be shown in this catalogue.

In addition to the Wind Turbine, Antenna and CCTV masts shown here, we also manufacture products for lightning protection, sailing masts, masts for advertising panels, anemometer masts, sundial masts, solar panel masts and many others.

Please call our sales office for your special requirements.

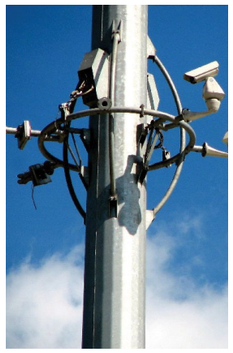
Other Masts

Wind Turbine Masts

Pages 36 - 37

Antenna & StreetPole Masts

Pages 38 - 39



CCTV Masts

Page 40

Photograph by kind permission of Proven Engineering, Scotland.

Photograph by kind permission of Proven Engineering, Scotland.

Clevely's Promenade, Lancashire (by kind permission of Quiet Revolution Ltd)

WIND TURBINE MASTS

The CU Phosco Lighting design team have a wealth of experience in the renewable wind turbine energy market. The product portfolio outlined below gives a basis from which we can further develop our design offerings to suit individual requirements or manufacture current product designs dependant on the operating criteria of the turbine.

Design calculations and checks must be undertaken to ensure the integrity of the mast structure and the interaction between the mast and turbine. These are calculated in-house by our team based on the key turbine information provided to us. Results from these calculations will define which product options are available to purchase. Whatever your requirements our team of designers will advise you and support you through the product choices.

The vast majority of our wind turbine structures are manufactured from folded sheet steel and finished with hot dip galvanising. They are of a tapered design supplied in two or more sections with site laps for tirfing the sections together. This makes the mast easy to transport and erect at many different locations.

STATIC MASTS
Height Range: 6m – 50m

ROOF MOUNTED STATIC MASTS
Height Range: 3 – 10m

Static mast systems offer a competitive solution for wind turbine mounting. Access to the turbine can be made via crane or the mast can be manufactured with exterior climbing rungs. Static masts are popular for turbines that have a heavy head loading and therefore cannot be approved for raise and lower mast systems. Site suitability for crane access must be considered. For roof mounted masts the building's structural integrity should also be measured.

HYDRAULIC BASE HINGED MASTS
Height Range: 6m – 18m

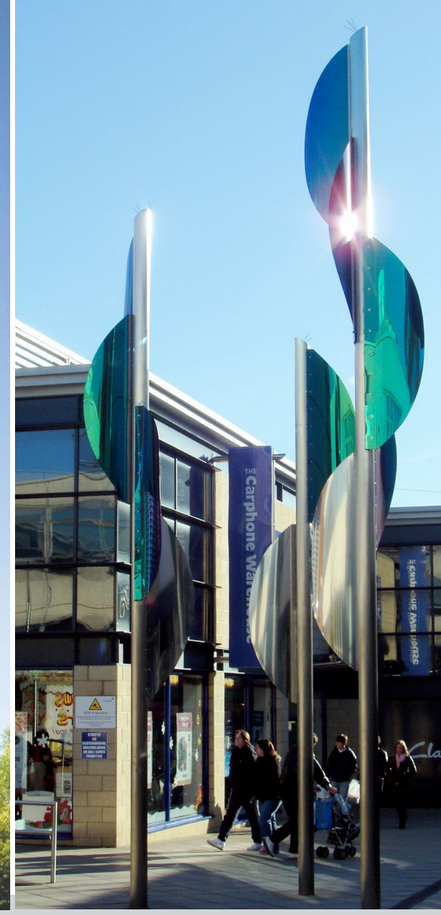
This system allows the raise and lower of the mast through use of a hydraulic ram. The hydraulic ram fits between the base pedestal and the lower section of the mast structure providing a controlled lift and lower option. An on site power supply or generator must be available for the ram operation. This system offers a quick, safe solution for turbine access and maintenance. Hydraulic masts should not be left in a lowered position for prolonged periods of time as this can affect the alignment of the mast and pedestal.

GIN POLE MASTS
Height Range: 6m – 20m

Gin pole masts offer a manual operation to raise and lower the turbine. The mast structure is static in design with the inclusion of lifting lugs at the base. Two tubular steel poles fix to an anchor plate on the foundation and the mast is raised and lowered by the use of wire lifting ropes which sit between the turbine mast and the tubular poles. Gin poles masts are ideal for use on sites where power is unavailable.

MAST FOUNDATIONS

Foundation sizes and design vary with each mast design. Depending on mast height and head loading these foundations can consist of M27, M30 or M39 studs, nuts and washers. Setting templates for stud assembly and alignment are included. Each design is calculated and manufactured in-house to be supplied with the mast structure. Ground conditions and site suitability are the responsibility of the purchaser; advice should be sourced from a certified Civil Engineer.



ANTENNA MASTS AND STREETPOLES

CU Phosco has been working with mobile phone operators since the birth of the mobile telecommunication industry and in that time have built up a wealth of experience and knowledge in the design, manufacture and on time delivery of antenna masts and antenna mast packages.

Design calculations and checks must be undertaken to ensure the integrity of the mast structure and that the antennas are operational within the specified limits of their manufacturers and the mobile phone operators.

The design team can advise on the most efficient method of upgrade of existing sites based on their knowledge and the company's flexible manufacturing capability.

Our flexible manufacturing capability means that we can design and manufacture one off monopoles or streetpoles to suit our customers' individual site requirements if necessary.

The majority of our antenna products are manufactured from steel and are hot dip galvanised which we are able to provide painted where specified. The products portfolio outlined gives a brief description of some of the types of masts and poles we have developed for our customers over the years.

MONOPOLES

A monopole is a multi sided column used as an alternative to lattice towers in heights normally ranging from 12m to 30m. A monople usually has the ability to support 6, 9 or 12 off antennas as well as a number of microwave dishes. They are normally fitted with steps of some type and an anti-climb facility together with a certified fall arrest system. Monopoles are usually mounted in rural or industrial areas where their size is not significant and a large number of antennas can be fitted.

STREETPOLES

This type of structure is a slimline design usually situated in a street-side location, either pavement or grass verge, in heights ranging from 8 to 20m. Designs can incorporate Dual-Stack and Single-Stack methods, to maintain an optimum shroud size while providing service for more than one operator. Dual-Stack is where there are two arrays of antenna stacked at different heights. Single Stack means that all antennas are located at the same height.

ROAD LIGHTING POLES

Road lighting poles are, as the name implies, road lighting columns with antennas fitted. CU Phosco can manufacture these to our customers' requirements.

A special type of road lighting column is the high mast, up to 30 metres high, which can be fitted with multiple antennas at greater heights than normal road lighting columns.

ROOF AND WALL MOUNTED POLES

Structures of various heights can be fixed to buildings.

BESPOKE SOLUTIONS

Our wide range of production capabilities enables us to produce bespoke one-off products designed by architects and sculptors which in some instances can incorporate antennas.

CCTV MASTS

The folded sheet steel mast shown has been developed by CU Phosco for Closed Circuit Television sites with restricted access for servicing after installation has been completed.

The mast has been designed for heights up to and including 47m with a maximum 3 second gust wind speed of 54 m/sec., and to 20m height for speeds up to 72 m/sec. The mast is a duo decagon (20 sided) section to give improved aerodynamic performance.

The CCTV on its camera ring mounting can be lowered for maintenance by means of a self-sustaining double drum winch using a portable power tool. The camera is mounted above the mast head to give as large as possible field of view. Mulltiple cameras can be mounted on the camera ring to meet specific project requirements.

This raising and lowering system has been developed by the company over a 40 year period. The pulley system at the head is suitable for cables up to 20mm diameter and the cables have to be capable of supporting their own weight for the height of the mast.

The mast meets the requirements of ILE Technical Report No. 7:2000 where applicable.

Standard finish as supplied is Hot Dipped Galvanised to BS EN ISO 1461.

It is normal practice to use a flanged column but an integral root can be supplied. Holding down studs are supplied complete with an anchor plate for casting-in by others. A jig drilled template is supplied to locate and orientate the studs. Ground level loads will be supplied to enable a foundation design to be carried out to suit local site conditions.

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CU PHOSCO CLIENTS WORLDWIDE

UK CLIENTS
Central Government
Local Authorities
BAA
BP
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Balfour Beatty
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IBM
ICI
Jaguar
London Underground
MGM
National Power
Nissan
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Sainsbury
Shell
Tesco
Transco
Toyota
Vodaphone
Unilever

AIRPORTS
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London - Gatwick
London - Stansted
London - Luton
London - City
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Birmingham
Edinburgh
Glasgow
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Bournemouth
Cardiff
Coventry
Kirkwall - Orkney Isles
Farnborough
Liverpool
Southampton
Stornaway

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Killingholme
Tilbury
Tyne
Felixstowe
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Isle of Man
Yarmouth
Mailaig

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Chelsea FC
Liverpool FC
Bolton Wanderers FC
Charlton Athletic FC
Birmingham City FC
QPR FC
Wycombe Wanderers FC
Blackpool FC
Wigan Athletic FC
Leyton Orient FC
Barry Town FC
East Stirling FC
Stevenage Borough FC
Kidderminster Farriers FC
Hednesford FC
Reading Town FC
Hitchin Town FC
Eastbourne FC
Ware FC
Bradford Bulls RLFC
Wigan RLFC
Leeds RLFC
Sheffield Steelers RLFC
Wasps RLFC
IRFU Ravenshill
Cambridge University
Saracen RUFC
Roslyn Park RUFC
West Hartlepool RUFC
Preston Grasshoppers RUFC
Hertford RUFC
Don Valley Stadium
Gateshead AC
Bromley Sports Centre
Julie Rose Stadium - Kent
Crystal Palace Track
Bank of England SC

INTERNATIONAL

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Isfahan - Iran
Basrah - Iraq
Kingston - Jamaica
Kansai - Japan
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Llongwe - Malawi
Subang - Malaysia
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Kuantan
Sepang - Kuala Lumpur
Luqa - Malta
Gan - Maldives
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Warri - Nigeria
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Funchal - Madeira
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Columbo - Sri Lanka
Sikhuphe - Swaziland
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Abu Dhabi - UAE
Dubai - UAE
Jebel Ali - UAE
Sharjah - UAE
Ho Chi Min City
San'a - Yemen

PORTS
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Sydney - Australia
Gladstone - Australia
Muara - Brunei
Rangoon - Burma
Vancouver - Canada
Port Arica - Chile
Port Lirquen - Chile
Port Artesanaide - China
Taccahuano - Chile
Coronel Port - Chile
Tiangin - China
Shekou - China
Dublin
Cork
Rossliare
Tema -Ghana
Takaradi - Ghana
Gibraltar
Europort Rotterdam
ECT Rotterdam
Kwai Chung - Hong Kong
Mumbai -India
Jakarta - Indonesia
Belawan - Indonesia
Surabaya - Indonesia
Tanjon Priok - Indonesia
Bandar Abbas - Iran
Kingston - Jamaica
Aquaba - Jordan
Misurata - Libya
Derna - Libya
Port Kelang - Malaysia
Port Butterworth - Malaysia
Kota Kinabalu - Malaysia
Jahore - Malaysia
Port Louis - Mauritius
Beira - Mozambique
Lagos - Nigeria
Callao Port - Peru
Port Qaboos - Oman
Port Raysut - Oman
Qasim Port - Pakistan
Lisbon - Portugal
Oporto - Portugal
Madeira - Portugal
Azores - Portugal
Manila - Philippines
Doha - Qatar
Jeddah - Saudi Arabia
Jubail - Saudi Arabia
Dammam - Saudi Arabia
Mahe - Seychelles
Port of Singapore
Durban - South Africa
East London - South Africa
Richards Bay - South Africa
Colombo - Sri Lanka
Port Sudan
Taichung - Taiwan
Port Rashid - UAE
Port Jebal Ali - UAE
Dubai Dry Dock - UAE
Fujairah - UAE
Khor Fakkan - UAE
Ras Al Khaimah - UAE
Sharjah - UAE
Port Zayed - UAE
Puerto Cabello - Venezuela
Hodiedah - Yemen

SPORTS STADIUMS
Sir Vivian Richards Stadium - Antigua
Bermuda Stadium
Berakas Stadium - Brunei
Police Stadium - Brunei
Montreal Olympic Stadium
Ningbo Stadium - China
Dalian Stadium - China
Chaoyang Stadium - China
IRFU Lansdowne Road
IRFU Musgrove Park
IRFU Limerick
Corinthians Stadium
Victoria Stadium - Gibraltar
Ajax FC - Holland
Happy Valley Race Course - HK
Shatin Race Course - HK
Ma On Shan - HK
Hussein Sports City - Jordan
Amman National Stadium
Tun Razak Hockey Stadium
Ipoh Stadium -Malaysia
Petronas Stadium - Malaysia
Larkin Stadium - Malaysia
Muar Stadium - Malaysia
United Malayan Banking Stadium
Kenningau Stadium - Malaysia
Lankawi Stadium - Malaysia
Katmandu Stadium - Nepal
Lagos Stadium - Nigeria
Makurdi Stadium - Nigeria
Benin Stadium - Nigeria
Sohar Stadium - Oman
Castelo de Maia - Portugal
Estadio de Nelas - Portugal
Estadio N.S. de Remedica
Pedroucos Stadium
Matosinhos Stadium
Gondim Stadium - Portugal
Sintra City Stadium
Casa de Cambra
Leca Stadium
Gaia Stadium
Jamor Stadium
Lordelo Stadium
Belenses/Restelo Stadium
Sergio Conceicacao
Coimbra
Vagos Stadium
Rapide Bucharest - Romania
Yakutsk Stadium - Russia
Mecca Stadium - Saudi Arabia
Delta Hockey Stadium - Singapore
Singapore Sports Council
Taichung Stadium - Taiwan
Tainan Stadium - Taiwan
Genka Stadium - Turkey
Nasra Stadium - UAE
Al Hamyra Stadium - UAE
Arab League Clubs - UAE
Gems World Academy - UAE