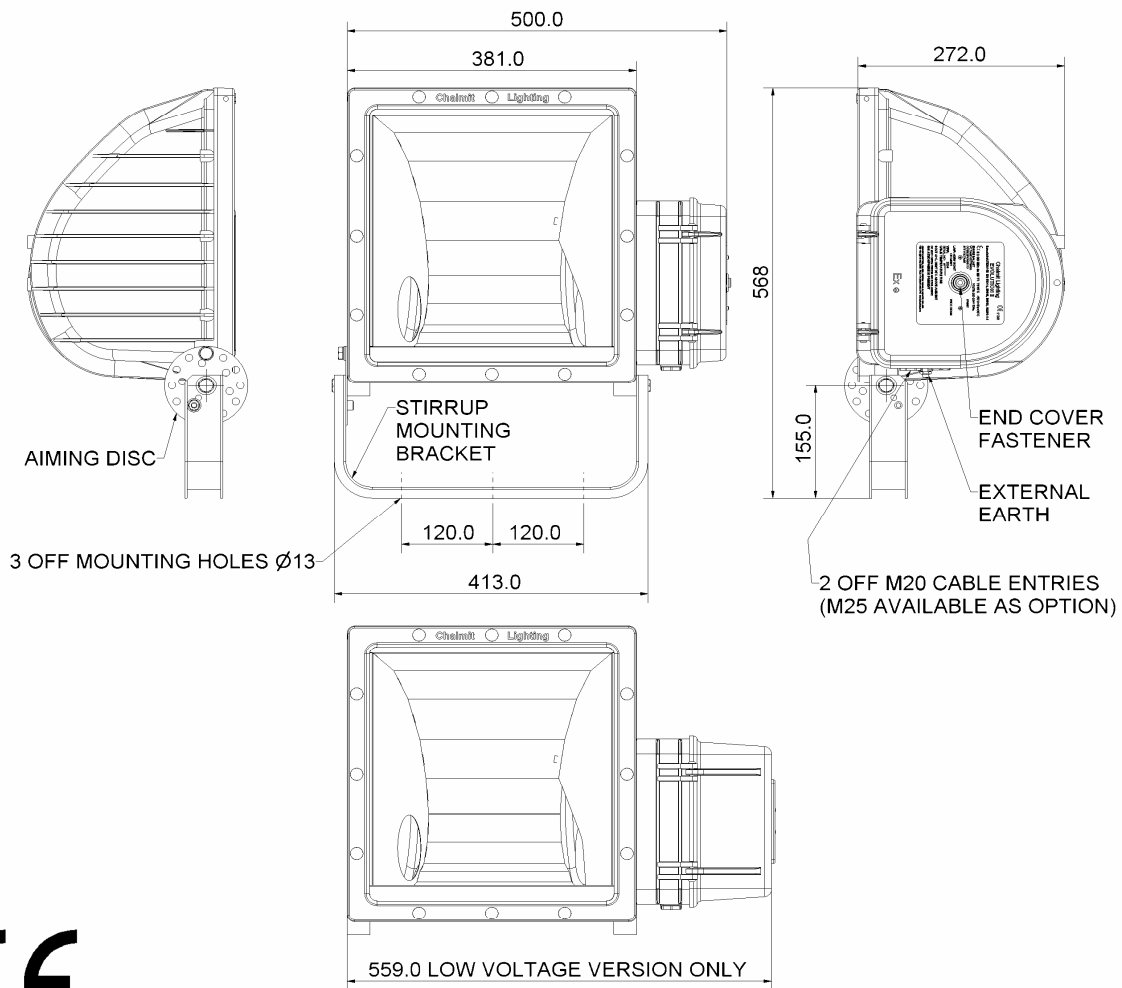


INSTALLATION, OPERATION AND MAINTENANCE INSTRUCTIONS

# EVOLUTION II

**Important :** Please read these instructions carefully before installing or maintaining this equipment. Good electrical practices should be followed at all times and this data should be used as a guide only.





## 1.0 Special provisions for safe use

The 120V version of this product must only be mounted with the lamp horizontal or within 10 degrees of the horizontal position. Please refer to the product certificate for further information.

## 2.0 Storage

Luminaires and control gearboxes are to be stored in cool dry conditions preventing ingress of moisture and condensation.

## 3.0 Installation and Safety

### 3.1 General

There are no health hazards associated with this product whilst in normal use. However, care should be exercised during the following operations. Installation should be carried out in accordance with *BS EN 60079-14* or the local hazardous area code of practice, whichever is appropriate, and fitting of specified insulating material to be adhered to where a specific fire resistance rating is required.

In the UK the requirements of the *'Health and Safety at Work Act'* must be met.

Handling and electrical work associated with this product to be in accordance with *the 'Manual Handling Operations Regulations'* and *'Electricity at Work Regulations, 1989'*. Your attention is drawn to the paragraphs (i) 'Electrical Supplies', (ii) 'Electrical Fault Finding and Replacement' and (iii) 'Inspection and Maintenance'. The luminaires are Class 1 and should be effectively earthed.

The luminaires are heavy and suitable means of handling on installation must be provided.

Certification details on the rating plate must be verified against the application requirements before installation.

The information in this leaflet is correct at the time of publication. The company reserves the right to make specification changes as required.

#### 3.1.1 Use in Combustible Dust Atmospheres

Where the equipment is used in ignitable dust atmospheres reference must be made to the selection and installation standards in order that the equipment is used correctly. In particular this applies to the de-rating of surface temperature for use where dust clouds may be present. Dust layers should not be allowed to accumulate on the fitting surface and good housekeeping is required for safe operation. Dust in layers has the potential to form ignitable clouds and to burn at lower temperatures.

Refer to EN50281-1-2 for additional details of selection, installation and maintenance

#### 3.1.2 Hybrid Mixtures – Gas and Dust

Where Hybrid mixtures exist as defined in EN1127 as a potentially explosive atmosphere, consideration should be given to verifying that the maximum surface temperature of the luminaire is below the ignition temperature of the hybrid mixture.

#### 3.1.3 Floodlight Orientation in the Presence of Combustible Dust.

The luminaire was tested in accordance with EN 50281-1-1 and IEC 61241-1-1 practice A.

As the build up of the dust layer can never be guaranteed not to occur, the luminaire must not be mounted in an orientation where the dust could lie on the glass. The temperature on the glass is the hottest point on the luminaire and any obstruction of the radiation from the luminaire will cause the surface temperature to increase.

## 3.2 Tools

4, 5, 6mm A/F socket keys.

3mm and 5mm flat blade screwdriver.

19mm and 13mm A/F spanner.

Suitable spanners for installing cable glands.

Pliers, knife, wire strippers/cutters.

### 3.3 Electrical Supplies

The supply voltage and frequency should be specified when ordering. A maximum voltage variation of +6%/-6% on the nominal is expected. (The safety limit for T rating is +10%). Luminaires should not be operated continuously at more than +6%/-10% of the rated supply voltage of the control gear or tapping. **Care is needed connecting to the nominal UK mains supply.** The user must determine the **actual** underlying site supply and purchase or adjust accordingly. In this case, the luminaires have multi-tapped control gear that can be set to a range of 50 and 60 Hz voltages. Different ballasts are used for 50 and 60 Hz. The tapplings are shown on the control gear and the limits are shown on the rating plate. They are selected by changing the position of the wire feeding the ballast. The low voltage version feeds the ballast via the transformer and for simplicity the ballast selection tapplings are shown as 110/115/120V which represents the incoming mains supply voltage not the volts into the ballast.

If the equipment is located in sections of the system where the voltage is higher or lower than nominal, an appropriate voltage tap should be selected, but care must be taken to log or mark the equipment so that the tapping is re-set if the equipment is re-located. If in doubt, tapplings should be set on the high side. 10V maximum drop below nominal is desirable for HPS and advised for MBI. The light output will be reduced. The figures given are at the luminaire. Where MBI/Metal Halide lamps are used, the tapping must be set accurately for best performance.

Where shore or construction site supplies are used, which are different to the service supplies, the tapplings should be re-set. If not, advice on the effect of these temporary supplies should be sought from the Technical Department.

### 3.4 Lamps

All the HPS lamps used in this range are of a standardised type and there is no preference between makes, or in the case of HPS, colours. The cap is E40. The luminaire uses tubular lamps. If mixed installations are used, care must be taken to ensure that the correct lamp is fitted on installation and replacement. The 250W MBI lamp is the 3.A type that runs on a SON ballast. The control gear supplied for the 400W MBI lamp is designed to run the standard "SON compatible" OSRAM lamp which has a current rating of 4.2A. Other SON compatible lamps may be used. **The obsolete 3.5A 400W Metal halide lamp must not be used in this luminaire.** HPS lamps substantially maintain their light output to the end of their electrical half life, which can be up to 24,000 hours. However, lamp replacement at around 16,000 hours is desirable to avoid piecemeal replacement on a large scale. MBI lamps have a shorter life and higher lumen depreciation, **HPS and MBI lamps should be replaced shortly after they do not light.** One indication of the end of life for HPS lamps is 'cycling' where the lamp extinguishes then re-ignites after a minute or so interval. If discharge luminaires are burned continuously, they should be switched off occasionally to allow old lamps to fail to re-ignite, rather than possibly become diodes with detrimental effects on control gear. Also see section 4.0.

The above information is current at the time of publication. The development of lamps and control gear is ongoing and detailed advice on lamp performance can be obtained from the Technical Department or the lamp supplier.

Incandescent lamps and tungsten halogen must be selected for the supply voltage. Running at over the rated supply voltage will reduce life and at greater than +10% will compromise the T rating.

**Important:** *HPS and MBI circuits should not be energised without a lamp fitted. HPS & MBI lamps with internal ignitors must not be used.*

### 3.5 Mounting

Luminaires should be installed where access for maintenance is practical and in accordance with any lighting design information provided for the installation. This will usually consist of aiming points and aiming angles. The mounting arrangements should be secured with lock washers or self locking nuts and bolts.

When the luminaire is mounted vertically it is recommended that the gear compartment should be facing downwards.

The luminaire is provided with a mechanism to adjust and lock the floodlight to 5-degree intervals. The outer ring of holes in the adjustment disc gives increments of 30 degrees, this is the coarse adjustment, and is used second. The inner ring has 6 holes giving offsets of plus 0,5,10,15,20 or 25 degree on the 30-degree increments, this setting is used first. The numbers indicate the degrees but the holes are not in order. They can be viewed

through the hole in the mounting bracket. The unit is set up with the terminal cover end tightened enough to allow the unit to be moved smoothly. Fine adjustment is made by selecting the correct hole and loosely fixing in the mounting bracket. The pivot bolt is then tightened still, allowing controlled movement. The bolt securing disc to case is unscrewed from the case and reinserted when the coarse adjustment gives the required correct angle. When everything is correct all bolts are fully tightened. Main pivot 30Nm, case bolt 16Nm, bracket bolt 20Nm. Example 1: Inner ring set at '0', then by moving the outer ring, 0°, 30°, 60° angles are achieved. Example 2: Inner ring set at '5', then by moving the outer ring, 5°, 35°, 65° angles are achieved. When the luminaire is mounted using the pendant mount bracket arrangement, the brackets must be mounted on a horizontal surface with the luminaire aimed glass downwards. The minimum distance between the luminaire and illuminated surface, directly in front of the luminaire, is 1 metre.

### 3.6 Cabling and Cable Glands

#### 3.6.1 Cables

The cable entry temperatures are given as the rise over the maximum rated ambient ( $T_{amb}$ ). This allows the user to adjust the cable specification for actual maximum site ambient.

The maximum conductor size is 6mm<sup>2</sup>. Internal and external earth points are provided. 300/500V cable ratings are adequate and no special internal construction is necessary as the terminations are Ex e. The standard looping cable size is 6mm<sup>2</sup>. The selection of cable size must be suitable for the fuse rating. Some guidance on this is given below. The fuse ratings apply to the circuit on the supply side of the control gear.

#### 3.6.2 Cable Glands

This apparatus is certified to *EN 50014: 1997, EN 50018: 2000, EN 50019: 2000 and EN 50281-1-1:1998*.

Cable glands for entry into Ex e enclosures when fitted with any gland to body sealing method and the supply cable, must reliably maintain the IP rating of the enclosure with a minimum value of IP54. The cable gland must withstand an impact value of 7Nm or 4Nm where the risk of mechanical damage is low.

Sealing plugs must be similarly rated and a tool must be required for their removal. Where the cable is not reliably clamped externally to the apparatus, the cable gland must clamp the cable against a pull in Newtons of 20 x the cable OD in mm for non-armoured cable and 80 x the cable OD for armoured cable. Cable glands must be ATEX certified. Two tapped cable entries are provided, one with a plug and seal suitable for permanent use, the other has a travelling plug. M20 x 1.5 entries are standard, with M25 available on request. Where brass cable glands are used in corrosive environments cadmium or nickel plating should be used.

#### 3.7 Cable Connection

The cable connections are made by slackening the end cover bolt and swinging the cover to one side, it can be latched in place by sliding the hinge point. The conductors should be bared back so that they make full contact in the terminals, but the bare conductor should not be more than 1mm beyond the terminal. Unused terminal screws should be tightened. The core must be identified by polarity and connected in accordance with the terminal markings. Before re-fitting the cover, a final check on the correctness of connections should be made. Cover bolt torque 10Nm.

#### 3.7.1 Selecting the Tapping

The tapping is set on the supply side of the ballast terminal block, the supply wire going to the appropriate tap and the voltages are shown on the ballast label. The ignitor connection goes into the two terminals next to the ignitor housing, the blue connection is always to the end neutral terminal, the live brown connection goes into the second terminal. The luminaire is factory set at the highest tapping, or that given with the order. The tapping suitable for the supply is selected or confirmed on installation. The unused connection terminals are to be fully tightened to prevent incorrect selection during initial lamp installation or relamping.

#### 3.8 Fitting lamps

Isolate the supply before opening the end cover. Make sure the correct lamp is selected as detailed above. Access for fitting lamps is gained through the end hinged cover. The ignitor cable connections are unscrewed and the ignitor housing turned anti-clockwise to release. The ignitor housing fixing screws are thread locked into place and are not to be removed in service. The lamp should be firmly screwed into place and the housing

replaced. Reconnect the cables, make a final check on the tapping and mains terminals then close the hinged cover and tighten fastening bolt. (The front cover is permanently fixed. The bolts have been covered with a hard setting resin to prevent removal, which would invalidate the certificate). Note that the end cover will not close unless the ignitor/lamp housing is in its correct position.

### 3.9 Inspection and Maintenance

Visual inspection should be carried out at a minimum of 12 monthly intervals and more frequently if conditions are severe, refer to *BS EN 60079-17*. The time between lamp changes could be very infrequent and this is too long a period without inspection.

#### 3.9.1 Routine Examination

The equipment must be de-energised before opening and note taken of the rated opening delay period, 15 minutes if there is a hazardous atmosphere present. Individual organisations will have their own procedures. What follows are guidelines based on *BS EN 60079-17* and on our experience:

- 1 Ensure the lamp is lit when energised and that the lampglass is not damaged.
- 2 When de-energised and left to cool, there should be no significant sign of internal moisture. If there are signs of water ingress, the luminaire should be opened up, dried out, and any likely ingress points eliminated by re-gasketing, re-greasing or other replacement.
- 3 Check the terminal chamber gasket for any damage or permanent set and replace as required, the gasket is held in place by a few spots of silicone RTV.
- 4 Check the cable gland for tightness and nip up if necessary.
- 5 Check any external earthing.
- 6 Examine the front glass for any signs of damage. If thought necessary, the fillet of silicone sealant can be re-sealed with a proprietary brand of clear RTV silicone. ***If the glass is damaged the luminaire must be returned for servicing.***
- 7 The terminal chamber should be opened periodically and checked for moisture and dirt ingress. The cable connections should be checked for tightness. The gasket should be checked for cracks or lack of elasticity, and if necessary, replaced. Cover bolt torque: 10Nm.
- 8 The ignitor housing flameproof path is cylindrical and can not be readily checked, it will not go out of shape. The ignitor housing securing bolts are designed to be fixed in place and must not be removed. When relamping, make sure the flameproof spigot path is free of dirt and slides into place smoothly. A little molybdenum spray (*Dow Corning MOLYKOTE*) can be used.
- 9 Check that mountings are secure and the adjusting disc bolts are tight.
- 10 Clean the lampglass.
- 11 If it has been suspected that the luminaire has mechanical damage, a stringent workshop overhaul will be required. Where spares are needed, these must be replaced with factory specified parts. No modifications should be made without the knowledge and approval of the manufacturer.

### 4.0 Electrical Fault Finding and Replacement

Any fault finding must be done by a competent electrician with the luminaire isolated and, if carried out with the luminaire in place, under a permit to work.

With HPS and MBI lamps the ignitor can become faulty. If the lamp is fitted, the choke has continuity and the connections are good and correct, they should produce an 'attempt to start' effect and a buzzing sound from the ignitor. It will be unusual to have no other parts available to perform a substitution fault finding routine and this is the normal procedure. Control gear will not normally go open circuit unless it has overheated first and the signs of this are obvious, being severe discoloration of the paint on the gear and cracks in any exposed insulation. Similarly, a bad contact at the lamp cap will usually result in signs of overheating.

The ballast is fitted with a non self-resetting thermal cut-out that will open the circuit if the temperature of the ballast exceeds a safe value. This cut-out will then reset when the mains is switched off and on again.

The transformer (if fitted) is also fitted with a non-self resetting thermal cut-out.

Before re-assembling, all connections should be checked and any damaged cable replaced.

## 5.0 Fuse Ratings

The fuse ratings for HID lamp circuits need to take account of three components of circuit current.

- 1) Current inrush to PFC capacitors which can be up to 25 x the rated capacitor current and last 1-2 milliseconds
- 2) Lamp starting current including steady capacitor current which together may decline from up to 200% of normal at 10 seconds after switch-on to normal after 4 minutes.
- 3) Rectification effects caused by asymmetrical cathode heating for a few seconds after starting, this effect is random and very variable.

With the availability of MCB's with a wide range of characteristics, the individual engineer can make a better judgement of what is required. Use MCB's suitable for inrush currents to reduce ratings. The normal capacitor current will probably be the determining factor, 0.076A per  $\mu\text{F}$  at 240V, 50Hz (adjust for other voltages by multiplication, x 6/5 for 60Hz). For HBC fuses use 1.5 x normal capacitor current. All calculations must satisfy wiring regulations. For Tungsten Halogen inrush use 8 x rated current.

For the low voltage version the use of slow blow type fuses or MCB's are recommended to allow for the inrush of the transformer.

**Note :** For starting and running currents for 240V/120v, 50Hz using internal control gear see TABLE 1. Conventional matrix for HBC fuses is outlined in TABLE 2.

## 6.0 Disposal of Material

The unit is mostly made from incombustible materials. The capacitor is of the dry film type and does not contain PCB's. The control gear contains plastic parts and polyester resin. The ignitor contains electronic components and synthetic resins. All electrical components may give off noxious fumes if incinerated. Take care to render these fumes harmless or avoid inhalation. Any local regulations concerning disposal must be complied with.

### 6.1 Lamps

Incandescent lamps and discharge lamps in modest quantities are not "special waste". The outer envelope should be broken in the container to avoid injury.

This applies to the UK, there may be other regulations on disposal operating in other countries.

Re-cycling facilities are also becoming available.

**Important:** Do not incinerate lamps.

## 0.0 Tables 0/1/2

Table 0 Maximum Ambient and Temperature Ratings Refer to Section: 1.0

Lamp	Wattage	Tamb °C	T Class	Dust Rating °C	Cable Rating °C	Cable Rise °C
T/HAL (E40)	500W	40	T3	195	90	50
T/HAL (R7s)	500W	55	T3	195	80	40
SON/T	150	40	T4	130	80	40
SON/T	150	55	T3	175	90	35
SON/T	250	40	T4	130	80	40
SON/T	250	55	T3	175	90	35
SON/T	400	40	T3	175	80	40
SON/T	400	55	T3	175	95 (100)	40 (45)
SON/T	600	35	T3	195	90	55
MBI-T	150	40	T4	130	80	40
MBI-T	150	55	T3	175	90	35

MBI-T	250	40	T4	130	80	40
MBI-T	250	55	T3	175	90	35
MBI-T	400	40	T3	175	80	40
MBI-T	400	55	T3	175	90 (100)	35(45)

Figures in brackets indicate the values for the low voltage version where they are different to the 240v version

**Table 1 Starting and Running Currents**

Refer to Section : 5.0

Lamp	Lamp A	Start A	Run A	Capacitance $\mu$ F	Circuit Power (W)
150W HPS	1.8	1.45 (3.1)	0.8 (1.7)	20	175
250W HPS	3.0	2.35 (4.9)	1.3 (2.7)	30	285
400W HPS	4.6	4.0 (7.8)	2.2 (4.3)	45	445
600W HPS	6.8	5.6	3.1	60	645
150W MBI	1.8	1.6 (3.1)	0.8 (1.7)	20	175
250W MBI	3.0	2.7 (4.9)	1.35 (2.7)	30	285
400W MBI	4.2	4.0 (7.8)	2.2 (4.3)	45	445

Figures in brackets indicate currents for the low voltage version at 120V 50Hz.

**Notes :** *Minimum power factor correction: 0.85.  
The start and run currents are corrected.*

**Table 2 Fuse Ratings**

Refer to Section : 5.0

Lamp Wattage	Number of Lamps					
	1	2	3	4	5	6
150W	4A	6A	10A	10A	16A	16A
250W	10A	16A	16A	20A	20A	20A
400W	16A	20A	20A	25A	25A	32A
600W	16A	20A	25A	32A	32A	40A

For low voltage version increase fuse sizes by a factor of two.

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