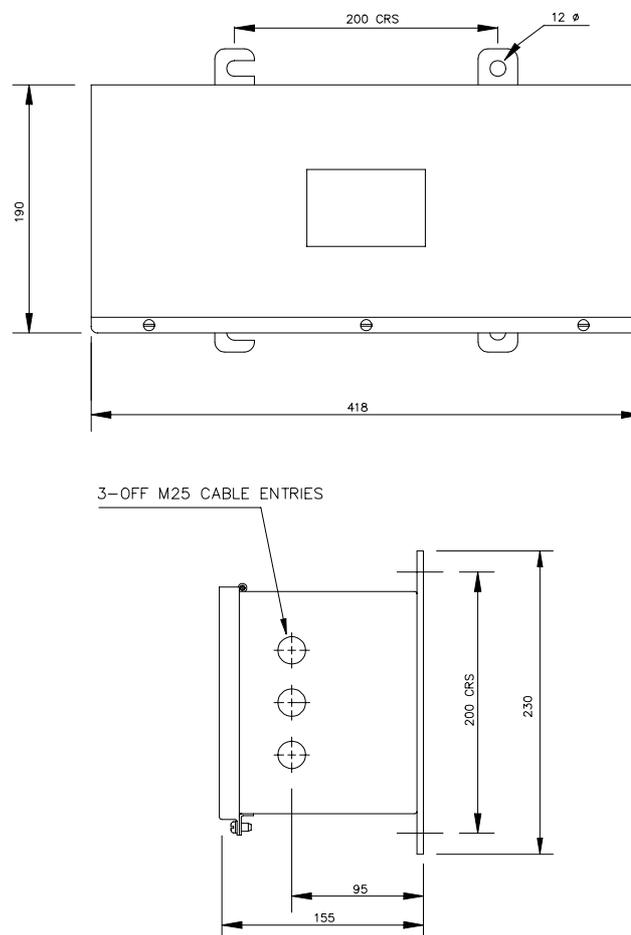


# INSTALLATION, OPERATION AND MAINTENANCE

## Universal Gearbox

**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.



## 0.0 Specification

Type of Protection	Ex dem (flameproof, increased safety and encapsulated)
Protection standards	EN 50014: 1998 EN 50018: 2000 EN 50019: 2000 EN 50028: 1987 EN 50281-1-1
ATEX Equipment Classification	Group II Category 2 G Group II Category 2 D
Area Classification	Zone 1 and 21 areas to EN 60079-10 and EN 50281-3. Installation to EN 60079-14 and EN 50281-2. Gas groups IIA, IIB and IIC to EN 60079-14
Certificate	EC Type Examination Certificate BAS01ATEX2270
Equipment coding	 II 2 G EEx dem IIC (refer to table for T rating and ambient) II 2 D (refer to table for temperatures)
Ingress Protection	IP66 and IP67 to BS EN 60529

CE Mark 	The CE marking of this product applies to "The Electrical Equipment (Safety) Regulations 1994" and "The Electromagnetic Compatibility Regulations 1992", it does not apply to the "Equipment and Protective Systems intended for use in Explosive Atmospheres Regulations 1996". [This legislation is the equivalent in UK law of EC directives 73/23EEC, 89/336/EEC and 94/9/EC, respectively].
ATEX Declaration	The Equipment as described and identified in these instructions is declared to meet the provisions of the ATEX directive by reason of the EC Type Examination denoted based on the harmonised standards listed above. J A Lilley Technical manager Reference: D02/00-00 dated 5-7-2

## 1.0 Introduction - Universal Gearbox

The Universal series of control gear boxes replaces the 700 and 500 series gear boxes and is designed to run a variety of different HID lamps and provide a transformer step up unit that will allow 240V luminaires to be run from 120v power supplies.

As this can be used as a remote gearbox, the ignitor is not included in the box. An external ignitor will be required in the luminaire being controlled and this arrangement eliminates the need for high voltage cable between the gearbox and luminaire.

As well as providing current limiting through an appropriately sized ballast, the gearbox has power factor correction capacitors fitted which improve power factor to 0.85 or better. These capacitors are fitted into a flameproof aluminium case.

The gearbox is also available fitted with an encapsulated fuse as an option.

See table 2 for product weights.

**Notes:** *The ratings for the various types are as indicated in TABLE 0.*

## 2.0 Storage

Luminaires and control gear boxes are to be stored in cool dry conditions preventing ingress of moisture and condensation. Any specific instructions concerning emergency luminaires must be complied with.

## 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

and EN50281-2 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 products are Class 1 and should be effectively earthed.

The boxes are quite 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 box 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.

The European standard EN 50281-1-2 also gives details of selection, installation and maintenance.

### 3.1.2 Hybrid Mixtures – Gas and Dust

Where Hybrid mixtures exist as defined in EN 1127 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.

## 3.2 Tools

Screwdrivers: 12mm blade, 6mm blade and 3mm blade.

Suitable spanners for installing 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 gearboxes 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 tappings 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.

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, tappings 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 tappings should be re-set. If not, advice on the effect of these temporary supplies should be sought from the Technical Department.

## 3.4 Luminaires

The Universal box can be used to supply a wide range of luminaires. Care must be taken to ensure that the lamp used in the associated luminaire corresponds to the control gear used. This gearbox is designed to run both HPS and MBI lamps, but MBI lamps must be 'SON gear compatible'.

**Note :** *HPS and MBI control gear boxes should not be energised with an unlampped luminaire connected. HPS lamps with internal ignitors must not be used.*

### 3.5 Mounting

The box should be firmly attached to the structure in a position where access can be gained to install cables and carry out routine maintenance. If the box is to be mounted with the long axis vertical, the cable entries must be at the lower end.

The fixing centre is 200mm x 200mm and the bolt size is 10mm nominal.

### 3.6 Cable Connection

#### 3.6.1 Cables

The temperature rise of the entry when the box is used at its maximum ambient is such that ordinary PVC cable can be used. The box will loop conductors up to 6mm<sup>2</sup> section as standard. 300/500V ratings are adequate to supply the luminaire and no special internal construction is necessary. Internal and external earth points are provided. The cable size from the control box to the luminaire will depend on the supply circuit fuse rating.

#### 3.6.2 Cabling and Cable Glands

The installer and user take responsibility for the selection of cables, cable glands and seals.

The temperature conditions at the supply cable entry point are such that 70°C (ordinary PVC) cable can be used.

The product is certified for ATEX and to comply with the certification for installation and use within the EU, cable glands and sealing plugs must have ATEX component approval or be certified to EN 50014 ("E generation").

For installation and use outside of the EU, suitable cable glands in accordance with EN 50014 or IEC 60079-0 will meet the technical requirements.

The cable and gland assembly when installed must maintain a minimum IP54 rating for Ex e terminals and IP 65 for dust applications.

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. Cable glands may be rated for high or low risk of mechanical danger and the installer or user should select as required.

Three tapped cable entries are provided. One with a plug and seal suitable for permanent use, and the others have travelling plugs. M20 x 1.5 entries are standard, other sizes are available on request. Where brass cable glands are used in a corrosive environment, cadmium or nickel plating should be used.]

### 3.7 Electrical Connections

- 1 Undo the screws securing the hinged lid. If the lid is removed to facilitate cabling, take care not to mix it up with lids from other boxes which may have a different rating.
- 2 Reselect the voltage tapping if necessary.
- 3 Install the cable glands and cables. If the rubber sealing washer supplied is used, the large stainless steel washer must also be fitted.
- 4 Install the conductors in the appropriate terminals. Take care not to cut back the insulation excessively, 1mm bare conductor outside the terminal is a maximum.
- 5 Any unused terminal should be fully tightened.
- 6 Check for correct connections and replace the lid, torque 2Nm.

### 3.8 Inspection and Maintenance

Individual organisations will have their own procedures for inspection and maintenance. What follows are guidelines based on *BS EN 60079-17* and on our experience. Maintenance work and fault finding must be performed by competent personnel under an appropriate permit to work and with the apparatus isolated.

Frequency of maintenance will depend on experience and the operating conditions.

Before opening the box must be electrically isolated.

- 1 Ensure that the control box is operating the associated luminaire correctly. If the luminaire does not operate correctly with a serviceable lamp, check the control box first for signs of bad connections or overheating. If the box is in good condition and the choke has continuity, complete the fault finding procedure for the luminaire (see below).
- 2 Open the box. Check for any signs of water ingress and if there is any, determine the entry point if possible. Replace the cable gland sealing washers and box lid gasket as appropriate (see below). Clean up and dry out the box before re-energising.
- 3 Check terminals for tightness and any signs of overheating. Replace terminals where necessary. If the choke has overheated it will be badly discoloured. A d.c. resistance check compared with a spare unit will give confirmation of any internal shorting.
- 4 The capacitor should be checked visually and if intact and not corroded should be satisfactory. The only failure with shunt capacitance is that the capacitance reduces in the self-heating type or that the fuse blows. Capacitors can be disconnected and given a capacitance check. If capacitance has been lost and is critical factor in the circuit design, consideration will need to be given to further investigation and the replacement of the units.
- 5 Check the lid gasket and if there are signs that the gasket is not making a good joint, replace it (see below).
- 6 Check that the cable glands are tight and nip if necessary.
- 7 Refit the lid and re-tighten the screws. A spot of grease on the screw is recommended.
- 8 Check that the rating label is readable and secure. Refit using silicone sealant or other suitable adhesive if necessary.
- 9 Re-energise and check for correct luminaire operation. Any spare parts needed must be obtained from the manufacturer and unauthorised modifications must not be made.
- 10 Avoid the build up of dust layers by regular cleaning.

### 3.9 Replacement of Lid Gasket

If a lid gasket needs to be replaced, obtain a spare from Chalmit. Remove the old gasket and scrape off any adhesive. Apply a bead of silicone sealant to the lid in the centre of the gasket position. Put the gasket in place squarely and squeeze out the sealant. Use a piece of metal sheet or chipboard which will fit inside the lid to keep the gasket in place while the adhesive initially cures. (*A sheet of polythene will prevent any surplus adhesive sticking to the plate*). After 60 minutes, or when convenient, remove the sheet and allow to cure in free air before refitting.

### 4.0 Electrical Fault Finding and Replacement

Any fault finding must be done by a competent electrician and if carried out with the box in place, under a permit to work. The supply must be isolated. The ballasts and transformers are fitted with a non-self resetting thermal cut-out, which will disconnect the power if the windings are too hot. To reset this, disconnect the power and reconnect it after a short delay

With MBF the faults are simple, loose or broken connections, unserviceable lamps or open circuit control gear. 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.

### 5.0 Fuse Ratings

The fuse ratings for HID lamp circuits need to take account of three components of circuit current. Current inrush to PFC capacitors which can be up to 25 x the rated capacitor current and last 1-2 milliseconds; 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; 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. 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.

Where transformers are fused, they are done so on the basis that they will be running HID lamps at powers up to rated. Therefore the fuse values chosen reflect this with higher ratings.

**Note:** Starting and running currents for 240V, 50Hz using internal control gear or the Universal gearbox are indicated in TABLE 1.

**6.0 Disposal of Control Box**

The unit is chiefly made from inert 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 electrical components may give off noxious fumes if incinerated and this should only be done by licensed operators. Care must be taken to render these fumes harmless or avoid inhalation.

All disposal should be in accordance with local authority regulations and the *Environmental Protection Act 1990 - "Waste Management - The Duty of Care"*.

In accordance with the provisions of Section 6 of the *"Health and Safety at Work Act 1974"* and as amended by the *"Consumer Protection Act 1987"*. You should ensure that this information is made available to all concerned.

Table 0	Ratings	Refer to Section: 0,1		
		Dust rating (°C)	Gas rating	At ambient (°C)
UNIE/150/HS	150W HPS/Metal Halide	110	T4	45
		120	T3	55
UNIE/250/MS	250W HPS/Metal Halide	110	T4	45
		120	T3	55
UNIE/400/MS	400W HPS/Metal Halide	120	T4	55
UNIE/600	600W HPS	115	T4	45
		125	T3	55
UNIE/TF/500	120-240V 500VA Transformer	105	T4	35
		115	T3	55
UNIE/TF/1000	120-240V 1000VA Transformer	105	T4	35
		115	T3	55

Table 1 Starting and Running Current				
Lamp	Start A	Run A	Capacitance µF	Circuit Power (W)
150W HPS	1.45	0.8	20	175
250W HPS	2.35	1.3	30	285
400W HPS	4.0	2.2	40	445
600W HPS	5.6	3.1	60	645
250W MBI	2.7	1.35	30	285
400W MBI	4.4	2.1	30	440
500 VA	N/A	5.0	N/A	500
1000 VA	N/A	9.0	N/A	1000

**Note :** Minimum power factor correction : 0.85

Table 2 Approximate weights					
150w	250w	400w	600w	500VA	1000VA
10.5Kg	11.5Kg	12.0Kg	14.0Kg	11.0Kg	13.0Kg

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