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Technical Data

INSTALLATION NOTES FOR FLUORESCENT DIMMING

TUBES

All fluorescent tubes can be dimmed, some more successfully than others. The standard, 38mm-diameter, argon-filled tubes up to 1,800mm long all dim well, especially the 1,200mm type. With a suitable dimmer and ballast, the latter will dim smoothly to virtual extinction, although in practice the minimum usable level is limited, by variations between tubes, to a few per cent of full output. This length tube should always be used if low level performance is critical.

The 1,500mm tube also dims well but, at the minimum level, striations and flickering can limit the performance. 1,800mm tubes do not compare, having a usable lower limit of 10 to 12 per cent, but are quite acceptable for general-purpose use. It is not practical to dim 2,400mm tubes using standard equipment, and this length should therefore be avoided.

Due to the different operating voltages of different length tubes, all tubes on any one dimmer must be of the same length. If a mixture must be used, then a separate dimmer should be installed for each length, which are connected to operate together. The dimmers can be adjusted to balance the light output at low level and full, but this is at best a compromise.

Argon-filled tubes of 26mm diameter will dim satisfactorily, but not to such a low level as their 38mm counterparts. This applies similarly to the U-tube. The lastest 26mm tri-phosphor-coated, krypton-filled tubes are not suitable for dimming with conventional ballasts as they become unstable when dimmed below 50 per cent. Lamps which have a pigmented coat (coloured) or filter coating (reflector lamps) must not be used for dimming

Certain ratings of fluorescent lamps are available with alternative types of cathode, either high resistance or low resistance. It is most important to use the correct lamp with the specific ballast being used. They are not inter-changeable.

Only lamps of the same age, rating and colour, preferably from the same manufacturer, should be used because of the different rates at which light output changes and colour varies in the dimming function.

It is important to ensure that the lamp tube wall temperature remains within recommended tolerances, ie between 30°C and 50°C, at a midpoint along the tube length otherwise dimming performance will vary, and that the lamps are mounted as close as possible to earthed metalwork along the full lamp length.

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FITTINGS

All fittings to be used in a dimmed system must be equipped with a special dimmable ballast. The essential features of this ballast are a separate transformer to provide a continous tube heater current, and a small RC circuit (sometimes refered to as a 'stabilizing network' or a 'tickler circuit') connected from a tap on the choke to neutral. The latter is required to ensure stable operation at low lighting levels and also to promote smooth starting when switched on at a low level.

An earth-plane is required to enhance low level stability and starting. This takes the form of an earthed metal plate running the length of the tube, at least 50mm wide and spaced from it by no more than 12.5mm. The plate is usually an integral part of the fitting (part of the reflector or gear cover). However, as the size and spacing of the plate has a large influence on the light output at low levels, it is important that these parameters are consistent between fittings to ensure balanced illumination.

All ballasts emit noise, and this is made worse by dimming. Therefore the siting of the ballast should be chosen with care, and fittings designs that act as 'sounding boards' must be avoided. Since self contained ballasts are designed for dimming, they generally provide superior noise performance. In situations where the lowest noise levels are required, it may be worth considering the use of remote gear, but keeeping it within 10m of the fitting.

It should be noted that due to earth-plane and noise considerations, not all standard fittings are suitable for conversion to dimming.

The terminals should be clearly marked for the fixed (heater) and variable lines and it is preferable for these to be fused to provide adequate protection for the ballast components and to isolate any faults from the rest of the system.

DIMMER RATINGS

The dimmer size should be calculated in amps, based on the specified uncorrected current of the ballast used. Due to ballast manufacturing tolerances and mains voltage fluctuations, the actual dimmer rating should exceed the calculated figure by about 10 per cent. In practice, it is sufficient to use the tube manufacturer's design current for rating purposes since most ballasts operate close to this figure.

Beware, however, of systems running at low voltages (such as 127V) as auto transformers are sometimes used. In this case, the ballast input current would be increased, possibly to twice the tube current. In all systems using low voltages check the ballast current with the manufacturer so that the correct rating of dimmer can be specified.

Remember that power factor correction (p.f.c.) makes no difference to the dimmer size required. Power factor correction capacitors are connected across the fixed live (f.l.) output from the dimmer and therefore have no effect on the current flowing through the thyristors, which determines the dimmer rating.

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As a guide, the table below lists typical loadings for various sizes of dimmer for use on 220/240V systems.

Number of tubes per dimmer

Tube type	Dimmer rating 5A	10A	20A	30A
1200mm, 40W	11	22	44	66
1500mm, 65W	7	14	28	42
1800mm, 85W	6	12	24	36

INSTALLATION

Install the dimmers according to the drawings supplied and check that all connections are correct. It is helpful to use different wire colours for the fixed and variable lines.

Check that all equipment ratings are correct (including the fittings) especially the voltage and frequencey for projects outside the U.K.

It is essential to disconnect the dimmer from any wiring which is to be subject to insulation tests to avoid damage to electronic components by the high voltages used.

COMMISSIONING

Simply switching on the system is just asking for trouble as not only will faults be difficult to locate but some may cause damage to the equipment. If, for instance, just one ballast is wrongly connected, very high voltages can be generated and all tubes on the same circuit will flicker.

The following simple proceedure will help identify any problems.

1. Disconnect the v.l connection at the dimmer and switch on. Every tube heater (check both ends) should now be on. If they are not, and mains voltage is present at the f.l. terminal, suspect tube end-cap contacts or crossed v.l and f.l connections. Do not proceed until every heater is operating without any sign of discharge (white light).

2. Switch off and temporarily connect the v.l. wire onto the f.l. terminal. Switch on and check that every tube is now at full brightness. At this stage any faults will lie within the v.l. wiring only, or in the ballast.

3. Switch off and re-connect the v.l. wire to the v.l. terminal. Switch on and check that the system dims. If it does not, first check the control wiring, then the dimmer.

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4. Set the dimmer control to minimum (just before the heater relay drops out) and adjust the low-level trim for the minimum light level consistent with flicker-free operation and reasonable light balance between fittings.

   If any fittings appear drastically different to the remainder, check for problems with the earth-plane or excessive cooling of the tube, then try a different tube. Fluorescent tubes are subject to many manufacturing variations which, whilst not normally noticeable, have a marked effect when dimmed to a low level. Therefore it must be expected that out of a batch of tubes some may have to be rejected.

5. Now set the dimmer to maximum and run the system for 100 hours. After this time, set the dimmer to minimum again and re-adjust the low level trim if necessary. This 'burn in' settles the tubes down and will show up any rouges. It may be necessary to repeat the process.