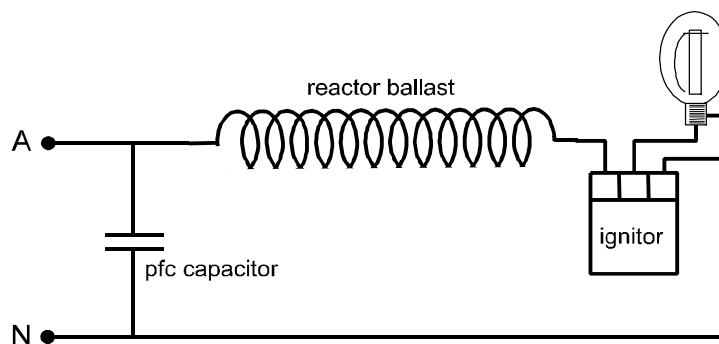


REACTOR- IGNITOR OR CONSTANT WATTAGE?

The information on the following pages has been compiled to provide Macro Power customers with a better understanding of HID lamp ballast characteristics, and to assist with the decision of which ballast (reactor-ignitor or constant wattage) should be used in a given application.

REACTOR-IGNITOR CONFIGURATION



Reactor-Ignitor control gear is an inexpensive, compact and simple method for control of HID lamps. Reactor-ignitor gear consists of;

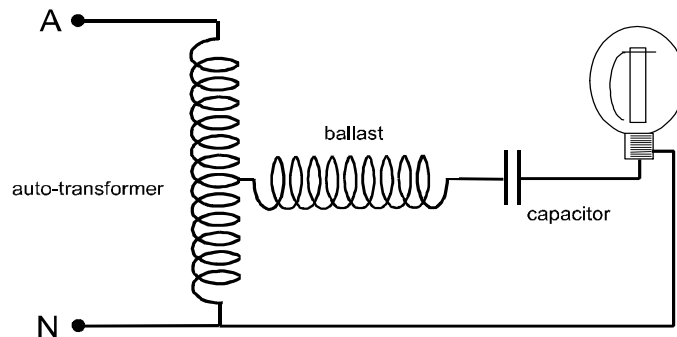
- a coil (choke) to control current to the lamp,
- a capacitor for Power Factor Correction (p.f.c.) and,
- an ignitor which starts the lamp by ionizing the gas in the arc-tube.

Since the coil is connected directly to the mains, the output power from the lamp is directly affected by mains fluctuations, and over-wattage of the lamp is possible thereby potentially shortening lamp life.

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CONSTANT WATTAGE CONFIGURATION



The Constant Wattage (CWA) ballast, although heavier, larger and more costly, provides numerous advantages over reactor-ignitor gear. CWA gear consists of;

- An auto-transformer feeding voltage to a ballast coil,
- A high quality, low tolerance series capacitor,
- An ignitor (HPS gear only. MH CWA gear does not require ignitors)

The lamp output power is maintained at a highly constant state, even over supply fluctuations, due to the regulating action of the auto-transformer. Hence the name Constant Wattage. The capacitor provides the lamp with a higher than line voltage, which ensures reliable starting and a smoother run-up of the lamp to full power.

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SOME USEFUL COMPARASONS OF R-I TO CWA

| REACTOR-IGNITOR | CONSTANT WATTAGE |
|--|---|
| STARTING CHARACTERISTICS | |
| <ul style="list-style-type: none"> - High starting currents (both line and lamp) which require larger feed cables and, in large installations, can necessitate a sequenced power up so as to prevent overload on fuses/breakers etc. - Inrush current to the power factor correction (pfc) capacitor is a contributor to this. - Ignitors are required with almost all MH and HPS reactor gear. | <ul style="list-style-type: none"> - Significantly lower line starting current overcomes many of the problems of reactor gear in this respect. - Ignitors are required only for HPS gear. MH gear does not require ignitors. |
| REGULATION OF LAMP POWER | |
| <ul style="list-style-type: none"> - As little as 4% variation in mains supply voltage will push the lamp wattage to the limit of acceptable tolerances. This undesirable variation of the colour temperature and lumen output is not only annoying but can, in the case of unusually high supply voltages, significantly reduce lamp life over time. | <ul style="list-style-type: none"> - A 10% variation in supply voltage is needed to put the lamp at the same limits of operation. The auto-transformer regulates the voltage to the ballast coil which maintains the lamp power and therefore the lumen output and colour temp. in a relatively constant manner over supply fluctuations. |
| EXTINCTION AND RESTART | |
| <ul style="list-style-type: none"> - A sudden dip in supply voltage (even if only for a few cycles) can cause the lamp to be extinguished. This will be followed by the long re-start period typical of HID lamps, (particularly MH lamps). This aspect may be of significant concern in industrial applications where heavy switching of the mains is common. | <ul style="list-style-type: none"> - Short supply voltage dips of about 40-50% can be tolerated without extinction of the lamp in most cases. - Re-start of MH lamps typically takes several times longer than HPS. Since MH CWA ballasts do not require ignitors, there is no repetitive high voltage pulse which could be damaging if the lamp becomes faulty and will not re-start. |
| GENERAL CHARACTERISTICS | |
| <ul style="list-style-type: none"> - Noticeable lamp flicker. - pfc capacitor is required, - pf \approx 0.85-0.9 (typically) - Low impedance to high frequency mains signals. - Small physical volume and weight compared with CWA, - Lower losses and higher efficiency, - Significantly lower cost. | <ul style="list-style-type: none"> - Greatly reduced lamp flicker - pfc is inherent to the CWA ballast and no additional pfc cap. is required. - pf \approx 0.90 or better. - High impedance to high frequency mains signals. - CWA ballasts are large, heavy and expensive by comparison with reactor-ignitor gear. - Due to lower efficiency and higher losses, CWA gear can generate a significant level of heat. |

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IGNITORS

Ignitors are required with HID lamps because the starting voltage of these lamps is significantly higher than the applied mains voltage.

The Macro Power range of ignitors has been developed to provide consistent and reliable starting of Metal Halide and High Pressure Sodium lamps.

IGNITOR TYPES

SUPERIMPOSED-PULSE IGNITORS:

This type of ignitor produces one or more pulses per half cycle and does not rely on the ballast coil for its operation.

The Macro Power IGH 302, 303 are superimposed ignitors.

The inherent advantage of superimposed ignitors is that the pulse is applied only to the lamp and the ballast is effectively isolated from the pulse. This prevents any possible damage to the insulation of the ballast when the ignitor repeatedly tries to re-strike the lamp.

IMPULSER IGNITORS:

These types of ignitor, such as the Macro Power 201 and 202, use the ballast coil inductance in the generation of the high voltage starting pulse. For this reason the ballast and ignitor have been carefully matched for correct operation.

These ignitors may be mounted close to the ballast or close to the lamp since they are typically capable of starting the lamp over significantly long distances.

MULTI-PULSE IGNITORS:

These ignitors also use the ballast coil to generate the high voltage pulse.

For correct operation the ignitor must be used only with the specified Macro Power ballast as the tapping position on the ballast is carefully matched to each of the different ignitors in the Macro Power range.

The Macro Power 104, 102 and 301 are multi-pulse ignitors.

AS WITH ALL MACRO POWER IGNITORS, ONCE THE LAMP HAS FIRED THE IGNITOR IS AUTOMATICALLY SWITCHED OFF.

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TIMED CUT-OUT IGNITORS:

Potential damage to the lamp and ballast and the annoying flicker of an ageing lamp trying to start can be overcome through the use of an ignitor with a timed cut-out module built in.

This module will switch the ignitor off if the lamp fails to start after a pre-determined period of time.

The inclusion of this relatively inexpensive module is highly recommended by authorities as it will limit the emission of RFI/EMI by the lighting circuits and will prevent the possibility of damage to fittings and ballasts.

The timed cut-out module is available with any ignitor in the Macro Power ignitor range.

The standard timed cut-out period is 120 seconds, however shorter or longer time periods can be accommodated on request.

LONG DISTANCE IGNITORS:

Starting a lamp over significantly long distances can be a problem due to the capacitance of the lamp feed cable to earth. This capacitance acts to absorb the pulse and prevent it from reaching the lamp. For this reason maximum load capacitances for each ignitor are specified.

All Macro Power ignitors have a minimum starting range of 2m, and most can fire a lamp over significantly longer distances. The standard IGH201 ignitor, for example, has a firing range of 60m and this is enough for most applications.

Where the standard firing range is not enough, special Long Distance ignitors have been developed to meet the various 'real world' needs of Macro Power customers.

For example, the IGH301/30 was developed for use with HPS1000 CWA ballasts to fire the American LU1000 lamp over a cable run of up to 30m. This is a typical example since lighting poles with control gear mounted at the bottom, lamp at the top and a long run of cable in between are in common use.

For details on specific ignitors and their firing ranges, see the specification sheets for each.

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STANDBY CHANGEOVER RELAY SCR-8

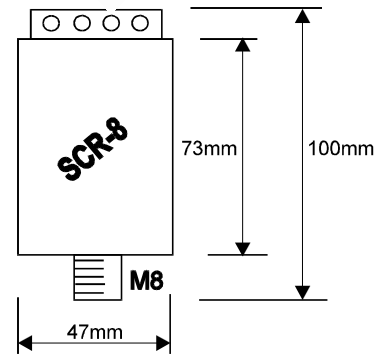
Due to its inherent starting characteristics, HID lighting needs time for the lamp to rise to its full power state. This is especially true if the lamp has been running and is then re-started, as it needs to cool itself down before it can re-ignite. This can take anywhere up to 15 minutes depending on the lamp type.

During these periods when the lamp is doing little or no useful work, it is often necessary that there be some auxiliary source of light available to prevent accident or injury to personnel or damage to equipment and products.

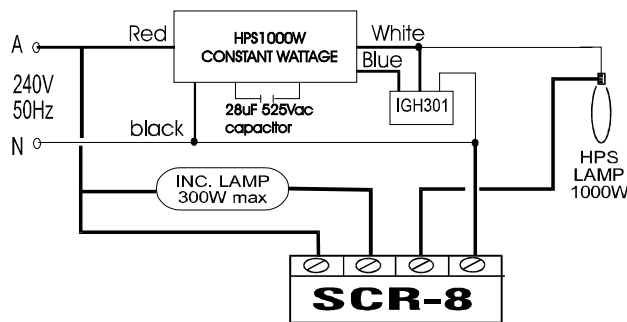
The SCR-8 is an electronic changeover relay developed to control an auxiliary light source (such as an incandescent lamp).

The SCR-8 electronically monitors the state of the HID lamp output power. When this is low, the SCR-8 will switch the incandescent lamp on and keep it on until the HID lamp reaches about 75% of its full output power. At this point the auxiliary lamp is automatically switched off and the HID lamp continues its ramp up to full power. If at any time the HID lamp turns off for any reason, the SCR-8 will sense the loss of output, immediately switch the auxiliary lamp (300W Max.) on and repeat the cycle described above.(provided power is available to the aux. lamp and SCR-8).

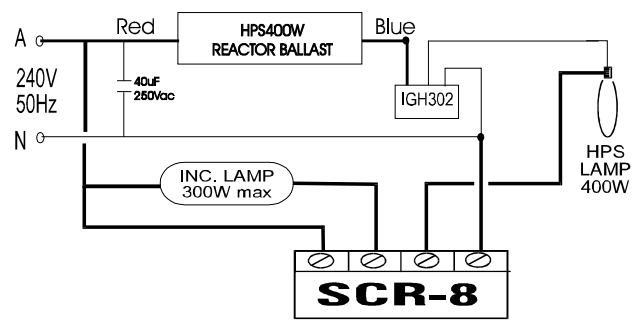
The SCR-8 is suitable for use with MH/HPS Reactor-Ignitor ballasts 150-400W, or Constant Wattage ballasts 175-1000W. (Control gear outside these ranges can be accommodated on request).



Superimposed, multi-pulse or impulse ignitors as well as Reactor or Constant Wattage, may be safely used in conjunction with the SCR-8. These features make it a very versatile and useful device.



EXAMPLE-1 Using Constant Wattage Ballast Configuration



EXAMPLE-2 Using Reactor Ballast Configuration

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POWER REDUCTION SWITCHES

While the maximum performance of a lighting system is only required during busy active hours a significant energy savings are gained if the illumination level can be reduced during less demanding times. Therefore power reduction is possible in HPS and MH's lighting level by switching the inductance in the luminaries without compromising the uniformity of the lighting design which is easily achieved with Macro Power's Hi/Low power reduction relays. The power input of mercury vapour and high pressure sodium vapour can be reduced to as low as 50% of the rated wattage without impairing lamp life.

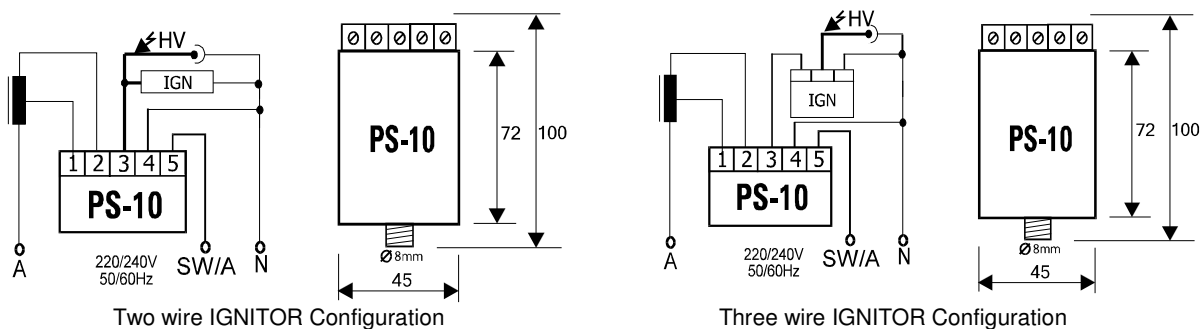
PS-10 – This power switch relay can be simply and easily wired into the control equipment circuit and operated by a separate switch. When this separate control supply is energized the lamp runs at reduced power.

Lamp Power Reduction applications can be as following and much more.

- In factories, warehouses, industrial storage, railway yards etc., a reduction in the lighting level outside working hours to provide amenity security.
- Car parking areas, floodlighting of buildings, security lighting, advertising signs, and public amenity areas can all benefit from reduced yet uniform lighting in the quite hours, late in the evening and in the early hours of the morning.
- Low level but uniform security lighting on railway station platforms.
- Airport gate lounges and check-in counters, baggage areas and customs halls.
- In road lighting applications, reduced lighting levels can be set to periods of very low traffic volumes, e.g.: 12:00am – 4:00am.



This excellent device not just only offers you a reduction in power bill but also extends you lamp life and therefore having less lamp replacement costs.



Note: Due to continual product improvement data and specification are subject to change without notice.

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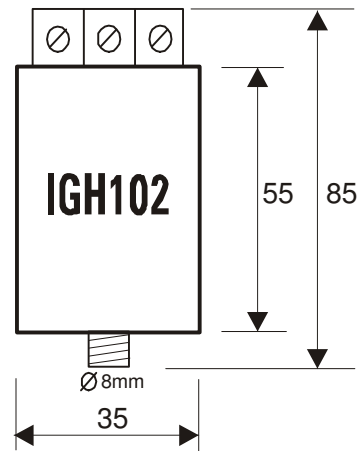
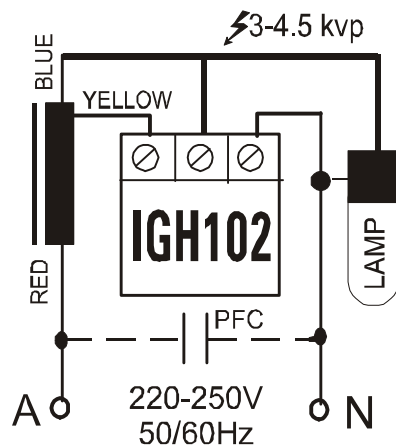
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IGH102

The IGH102 ignitor is a superimposed pulse type ignitor for single or double ended metal halide lamps up to 150W with Macro Power tapped ballast. The maximum firing distance may vary due to the variation of the cable capacitance but is usually possible at distances of 2M. When the lamp starts the ignitor is automatically deactivated.

IGH102/T has an inbuilt, timed cut-out module of 120 sec. (standard).

| | |
|---------------------------------------|-----------------------|
| Supply voltage at ballast input: | 220-250 V, 50/60 Hz |
| Pulse voltage: | 3000-4500 Vp |
| Pulse repetition rate: | 2 – 4 per cycle (min) |
| Cut off voltage: | 190 V |
| Maximum load capacitance: | 250 pF |
| Losses during lamp operation: | negligible |
| Temperature rise: | negligible |
| Case temperature (maximum allowable): | 90°C |
| Termination: | 3 way terminal block |
| Mass: | 160 g |



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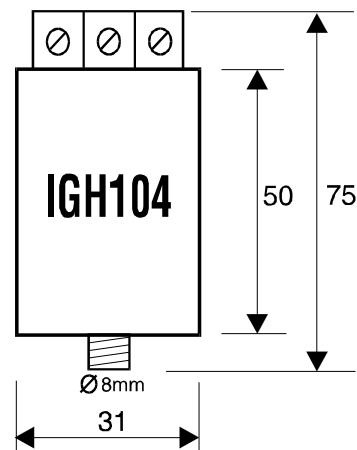
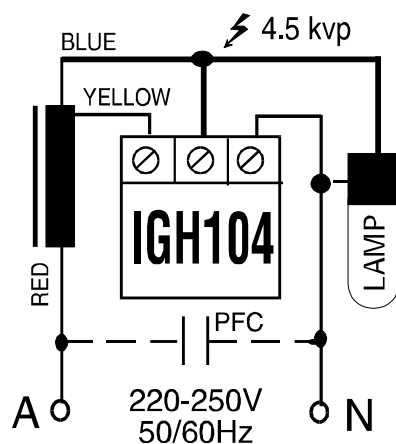
IGH104

The IGH104 ignitor is a pulse type ignitor for single or double-ended metal halide/high pressure sodium lamps up to 1000W. The ignitor is to be used with suitable Macro Power tapped ballasts. The maximum firing distance may vary due to a variation in cable capacitance but it is usually possible to fire the lamp at distances up to and greater than 6M. When the lamp starts the ignitor is automatically deactivated.

IGH104/30 is the long distance version of this ignitor. Max. firing distance 30m.

IGH104/T has an inbuilt timed cut-out module of 120sec (standard).

| | |
|---------------------------------------|----------------------|
| Supply voltage at ballast input | 220-250 V, 50/60 Hz |
| Pulse voltage: | 2500 - 4500 Vp |
| Pulse repetition rate: | 3-4 per cycle (min) |
| Cut off voltage: | 190 V |
| Maximum load capacitance: | 400 pF |
| Losses during lamp operation: | negligible |
| Temperature rise: | negligible |
| Case temperature (maximum allowable): | 90°C |
| Termination: | 3 way terminal block |
| Mass: | 75 g |



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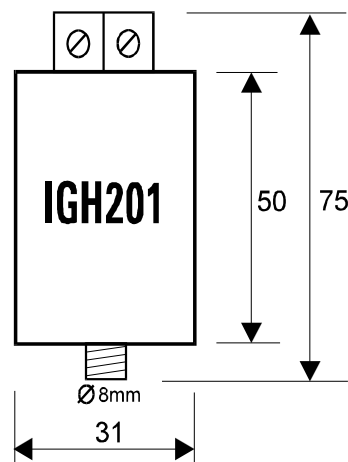
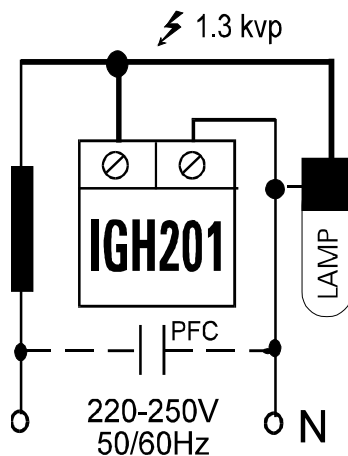
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IGH201

The IGH201 ignitor is a pulse type ignitor for single ended metal halide lamps 250W to 2000W. The ignitor and reactor type control gear combination can be mounted remote from the lamp, the distance may vary due to the variation of the cable capacitance but it is greater than 60M usually. When the lamp starts the ignitor is automatically deactivated.

IGH201/T has an inbuilt timed cut-out module of 11 minutes (standard).

| | |
|---------------------------------------|----------------------|
| Supply voltage at ballast input: | 220-250 V, 50/60 Hz |
| Pulse voltage: | 800 - 1300 V |
| Pulse repetition rate: | 1 per cycle |
| Cut off voltage: | 190 V |
| Maximum load capacitance: | 10,000 pF |
| Losses during lamp operation: | negligible |
| Temperature rise: | negligible |
| Case temperature (maximum allowable): | 90°C |
| Termination: | 2 way terminal block |
| Mass: | 52g |



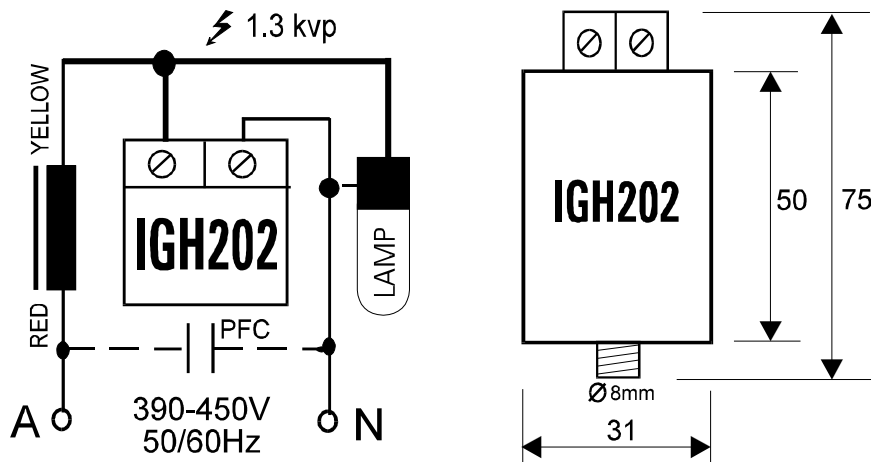
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IGH202

The IGH202 ignitor is a pulse type ignitor for single ended metal halide lamps 250W to 2000W, operated from a 415V supply. The ignitor and reactor type control gear combination can be mounted remote from the lamp, the distance may vary due to the variation of the cable capacitance but it is greater than 60M usually. When the lamp starts the ignitor is automatically deactivated.

| | |
|---------------------------------------|----------------------|
| Supply voltage at ballast input: | 390-450V, 50/60 Hz |
| Pulse voltage: | 800 - 1300 V |
| Pulse repetition rate: | 1 per cycle |
| Cut off voltage: | 380V |
| Maximum load capacitance: | 10,000 pF |
| Losses during lamp operation: | negligible |
| Temperature rise: | negligible |
| Case temperature (maximum allowable): | 90°C |
| Termination: | 2 way terminal block |
| Mass: | 52 g |



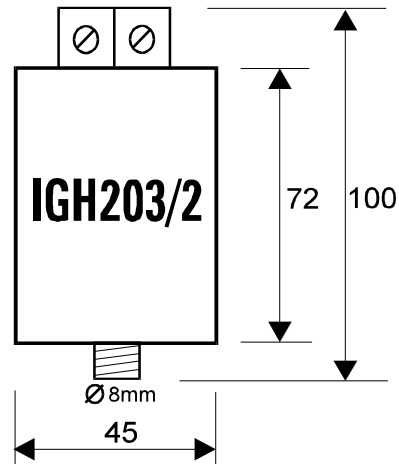
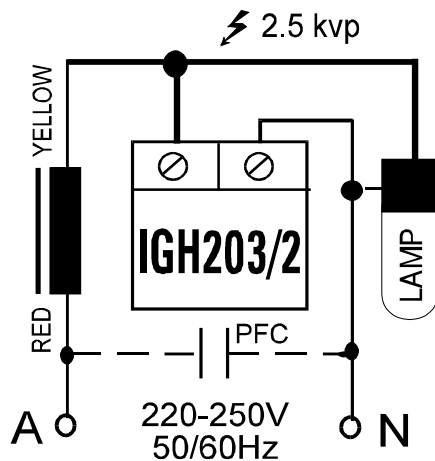
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IGH203/2

The **IGH203/2** ignitor is a universal superimposed pulse type ignitor for single or double ended Metal Halide and HPS lamps with a 240V supply. The maximum firing distance may vary due to the variation of the cable capacitance but is usually possible at distances of 30M or greater. When the lamp starts the ignitor is automatically deactivated.

| | |
|---------------------------------------|----------------------|
| Supply voltage at ballast input: | 220-250 V, 50/60 Hz |
| Pulse voltage: | 4500 Vp |
| Pulse repetition rate: | 2 per cycle (min) |
| Cut off voltage: | 190 V |
| Maximum load capacitance: | 250 pF |
| Losses during lamp operation: | negligible |
| Temperature rise: | negligible |
| Case temperature (maximum allowable): | 90°C |
| Termination: | 2 way terminal block |
| Mass: | 250 g |



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