DO HID BALLASTS DRAW MORE CURRENT ON START?
The answer is it depends on the type of ballast.

How do Metal Halide lamps work?

Metal halide (MH) lamps consist of an arc tube (also called a discharge tube or "burner") within an outer envelope, or bulb. The arc tube may be made of either quartz or ceramic and contains a starting gas (usually argon), mercury, and MH salts. Traditional quartz MH arc tubes are similar in shape to mercury vapor (MV) arc tubes, but they operate at higher temperatures and pressures.

MH lamps start when their ballast supplies a high starting voltage higher than those normally supplied to the lamp electrodes through a gas mixture in the arc tube. The gas in the MH arc tube must be ionized before current can flow and start the lamp. In addition to supplying the correct starting voltage, the ballast also regulates the lamp starting current and lamp operating current. (See "What types of ballasts are available to use with metal halide lamps?"

As pressure and temperature increase, the materials within the arc tube vaporize and emit light and ultraviolet (UV) radiation. A bulb (also called "outer jacket" or "outer envelope"), usually made of borosilicate glass, provides a stable thermal environment for the arc tube, contains an inert atmosphere that keeps the components of the arc tube from oxidizing at high temperatures, and reduces the amount of UV radiation that the lamp emits. Some MH lamps have a coated finish on the inside of the bulb that diffuses the light. Often a phosphor coat is used to both diffuse the light and change the lamp's color properties.

Major components housed within HID ballasts include various types of capacitors and igniters.

What are the different types of Capacitors within HID ballasts and how do they work?

All high power factor (HPF) Reactor (R) and High Reactance (HX) ballasts, as well as all Constant Wattage Autotransformer (CWA), Constant Wattage Isolated (CWI), and Regulated Lag ballasts require a capacitor. With core-and-coil units the capacitor is a separate component and must be properly connected electrically. The capacitor for outdoor weatherproof, indoor enclosed, F-can, and postline is already properly connected within the assembly.

Two types of capacitors are currently in use: dry metalized film and oil-filled. Present capacitor technology has allowed all but a few capacitor applications to be dry film. Oil-filled capacitors are used only when dry film technology cannot satisfy high capacitor voltage requirements.

How do HID ballasts work in general?

HID lamps provide light from an electric discharge or arc and have a negative resistance characteristic that would cause them to draw excessive current leading to instant lamp destruction if operated directly from line voltage. The ballast is a power supply for arc discharge lamps. Its purpose in HID lighting is to provide the proper starting voltage to initiate and maintain the lamp arc and to sustain and control lamp current once the arc is established.

A ballast design incorporates basic circuitry to provide specific lamp/ballast operating characteristics. For some types of lighting applications a particular ballast circuit has proven the most cost effective and is, therefore, the only circuit offered. Other applications may require an optimum ballast selection from two or three available alternatives for that particular application. Final selection is based upon cost vs. performance requirements.
HID lamps come in various types and wattage selections. Each lamp type and wattage requires specific starting and operating conditions to develop rated light output and operate the lamp within allowable limits. Ballasts and lamps are designed to meet standards for interchangeability between lamps and ballasts of the same type and wattage. A lamp must be operated by the ballast designed for that lamp, as improper matching of lamp and ballast may cause damage to the lamp or ballast or both. The American National Standards Institute (ANSI) provides specifications to standardize lamp and ballast compatibility.

For many years, all HID ballasts were magnetic ballasts operating at the power line frequency of 50 or 60 Hertz to provide proper lamp operation. In the past few years electronic ballasts have been developed, primarily for metal halide lamps, using integrated circuits that monitor and control lamp operation. Electronic ballast circuits sense lamp operation characteristics and regulate lamp current to operate the lamp at constant wattage, thus providing a more uniform light output and color rendition throughout lamp life. They also sense lamp end-of-life and other circuit conditions and shut down the ballast when the lamp operating characteristics fail to meet operating specifications.

It depends on the type of ballast whether it’s a Reactor type or Constant Wattage Autotransformer type.

Reactor ballasts limit the number of fixtures that can be used on a circuit because they draw substantially more current during lamp starting (warm-up) and/or open-circuit operation (burned-out or missing lamp), than when the lamp is operating normally. It is a single coil ballast and can be used when the input voltage to a fixture meets the starting and operating voltage requirements of an HID lamp. In this situation, the reactor ballast performs only the current-limiting functions since the voltage necessary to initiate the igniter pulses, and start and sustain the lamp comes directly from the input voltage to the fixture. The reactor ballast is electrically in series with the lamp. There is no capacitor involved with the operation of the lamp. This may explain high current readings when the fixtures first come on. Normally these ballasts are LPF.

With the Constant Wattage (CWA) ballast, input current during lamp starting or open circuit conditions does not exceed the input current when the lamp is stabilized. CWA ballasts are engineered to tolerate 25-30% drops in line voltage before the lamp extinguishes (lamp dropout), thus reducing accidental lamp outages. The CWA is a high power factor ballast utilizing a capacitor in series with the lamp rather than across the input. The capacitor works with the core-and-coil to set and regulate the lamp current to the prescribed level.

The CWA ballast provides for greatly improved lamp wattage regulation over reactor and high reactance circuits. A ± 10% line voltage variation will result in a ± 10% change in lamp wattage for metal halide. The metal halide and high pressure sodium ballasts also incorporate wave shaping of the open circuit voltage to provide a higher peak voltage than a normal sine wave. This peak voltage (along with the igniter when used) is used to start the lamp and control the lamp current crest factor (typically 1.60 -1.65).

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