dering in the usual sense does not exist. All that is perceived is saturated yellow in various shades, from the pure colour to black. Low-pressure sodium lamps have therefore been replaced by high-pressure sodium lamps to a great extent, especially in their main field of application: street lighting.

A combination of ignitor and ballast is necessary to operate some of the tubular models, but usually a leakage transformer is used as a starting device and ballast. Low-pressure sodium lamps require a run-up time of a few minutes and a short cooling time before re-ignition. Instant re-ignition is possible if special control gear is used. There are restrictions regarding the burning position.

Low-pressure sodium lamps are normally U-shaped, sometimes also tubular, surrounded by an additional glass envelope.

2.3.2.5 High-pressure mercury lamps

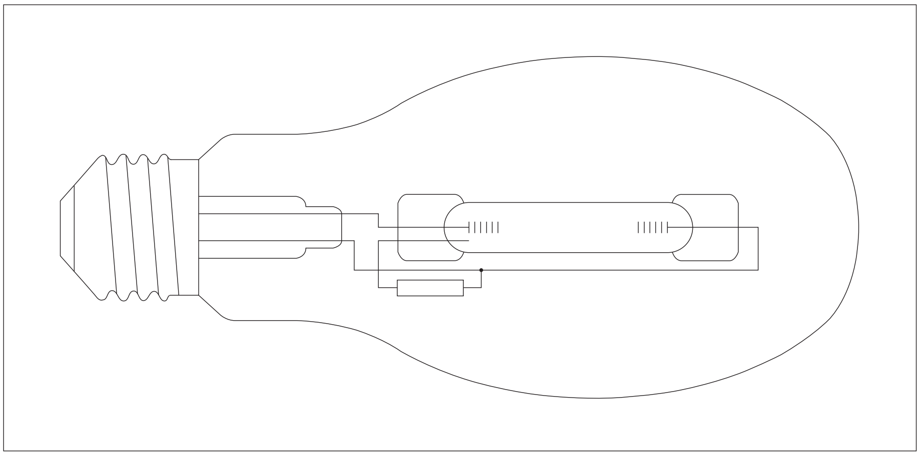
High-pressure mercury lamps have a short quartz glass discharge tube that contains a mixture of inert gas and mercury. Electrodes are positioned at both ends of the discharge tube. In close proximity to one of the electrodes there is an additional auxiliary electrode for the ignition of the lamp. The discharge tube is surrounded by a glass envelope that stabilises the lamp temperature and protects the discharge tube from corrosion.
The outer glass can be provided with a fluorescent coating to control the luminous colour.

When the lamp is ignited, there is an initial luminous discharge from the auxiliary electrode which gradually extends to the second main electrode. When the gas has been ionised in this way, there is an arc discharge between the two main electrodes, which, at this point in time, is the equivalent of a low-pressure discharge. Only when all the mercury has been evaporated via the arc discharge and the resulting heat has produced sufficient excess pressure, does high-pressure discharge take place and the lamp produce full power.

High-pressure mercury lamps have moderate luminous efficacy and a very long lamp life. As a light source they are relatively compact, which allows their light to be controlled via optical equipment.

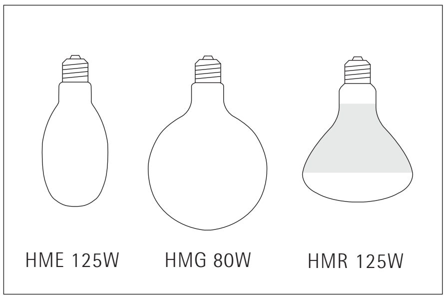
The light produced by high-pressure mercury lamps is bluish-white in colour due to the lack of the red spectral range. Colour rendering is poor, but remains constant throughout the entire lamp life. A neutral white or warm white colour appearance and improved colour rendering properties are achieved by the addition of fluorescent materials.

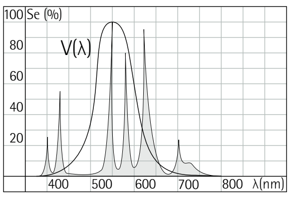
Due to the integrated auxiliary electrode there is no need for high-pressure



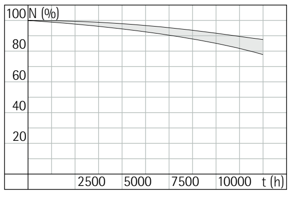
High-pressure mercury lamp with quartz glass discharge tube and elliptical bulb. As a rule the bulb is coated with a layer of fluorescent material which transforms the UV radiation produced by the lamp into visible light, thereby improving luminous efficacy and colour rendering.

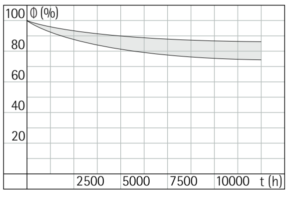
Standard high-pressure mercury lamps with elliptical bulb (HME), spherical bulb (HMG) and integrated reflector (HMR).

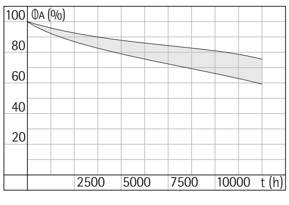




Relative spectral distribution $S_e(\lambda)$ of high-pressure mercury lamps.

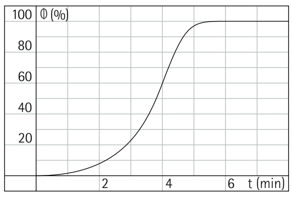






Proportion of operating lamps N, lamp lumens Φ and luminous flux of total installation Φ_A (as the product of both values) as a function of the operating time t.

Run-up characteristic: lamp lumens Φ in relation to time t.



mercury lamps to have an ignitor, but they do have to be run on a ballast. High-pressure mercury lamps require a run up time of some minutes and a longer cooling time before restriking. There are no restrictions as to the burning position.

High-pressure mercury lamps are available in various shapes and sizes; the outer bulbs can be spherical, elliptical or mushroom-shaped, the latter versions being designed as reflector lamps.

2.3.2.6 Self-ballasted mercury lamps

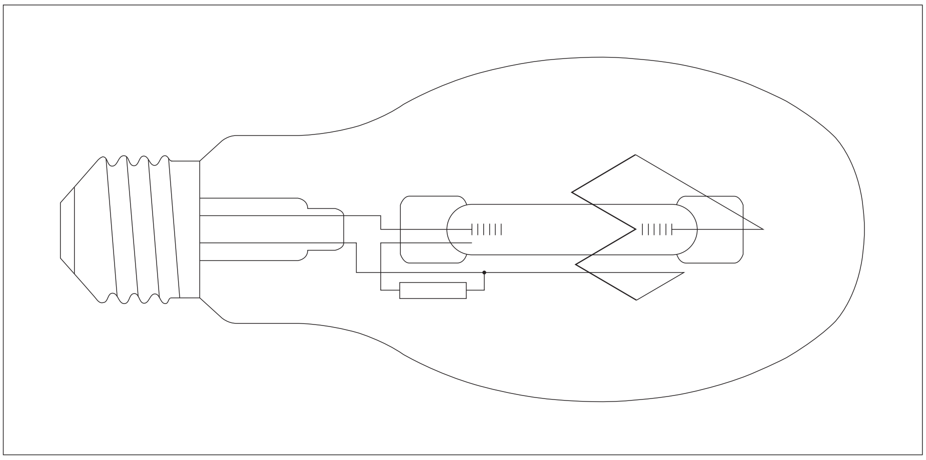
Self-ballasted mercury lamps are basically constructed in the same way as high-pressure mercury lamps. They have an additional filament in the outer glass bulb, however, which is connected in series with the discharge tube. The filament takes on the role of a current limiter, making an external ballast unnecessary. The warm white light produced by the filament complements the missing red content in the mercury spectrum, which improves the colour rendering. Self-ballasted mercury lamps usually contain additional fluorescent material to enhance the luminous colour and improve the luminous efficacy.

Self-ballasted mercury lamps have similar qualities to high-pressure mercury lamps. Luminous efficacy and lamp life rates are not so good, however, with the consequence that they are seldom used for architectural lighting. Since they require no ignitor or control gear and are produced with an E 27 cap, self-ballasted mercury lamps can be used as incandescent lamps.

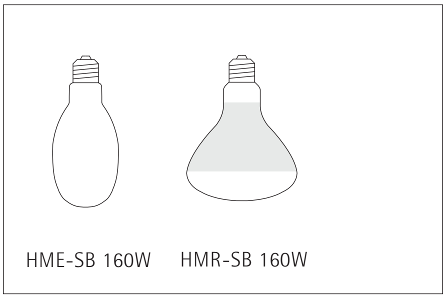
The filament in self-ballasted mercury lamps radiates light immediately on ignition. After a few minutes the incandescent component diminishes and the mercury vapour discharge reaches full power. Following an interruption to the mains supply self-ballasted mercury lamps require a cooling-off period. Self-ballasted mercury lamps cannot be dimmed. There are restrictions as to the burning position for certain lamp types.

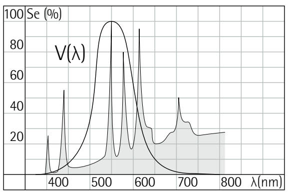
Self-ballasted mercury lamps are available with an elliptical bulb or as mushroom-shaped reflector lamps.

Self-ballasted mercury lamp with a quartz glass discharge tube for high-pressure mercury discharge and an additional filament that takes on the function of preresistance and supplements the spectrum in the red range. The elliptical bulb is frequently provided with a coating of light-diffusing material.

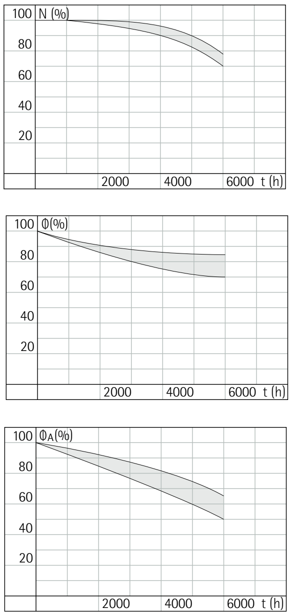


Standard self-ballasted mercury lamp with elliptical bulb (HME-SB), or integral reflector (HMR-SB).

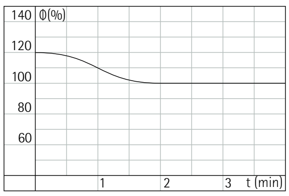




Relative spectral distribution Se (λ) of a self-ballasted mercury lamp with the combination of the spectra produced by the high-pressure mercury dis-charge and the filament.



Proportion of functional lamps N, lamp lumens Φ and luminous flux of overall installation ΦA (as the product of both values) in relation to the operating time t.



Run-up characteristic: lamp lumens Φ in relation to time t.