

Operating instructions

Power supply

Suitable control gear is required to operate the lamps. This may be electromagnetic ballasts (also called conventional control gear (CCG) or chokes) or electronic control gear (ECG). For chokes, the tap provided for the available supply voltage (usually 230 V AC at 50 Hz) must be used. If a different supply voltage is used, control gear with appropriate taps designed for these voltages must be used.

Photometric and electrical data

All stated electrical and photometric data are specific values after aging the lamps for 100 hours and are valid for operation on reference equipment (IEC 60923) under laboratory conditions. For lamps that are only released for operation on ECG, the values are valid for operation on square wave electronic control gear (IEC 61167) under laboratory conditions.

For HCI® lamps the specified values relate to the horizontal burning position for TS-, TT-, and ET- types, and to the base-up burning position for all other types, unless otherwise indicated. For HQI® lamps the specified values apply to the horizontal burning position for T-types > 150 W and TS-types and for the base-up burning position for T-types ≤ 150 W, E and TM-types, unless indicated otherwise. NAV® lamps are all measured in the horizontal burning position, and HQ and HW lamps in the base-up position. In other burning positions there may be considerable differences in the measured values, particularly the luminous flux, color temperature and lamp life. With the exception of SOX, the luminous flux is virtually unaffected by the ambient temperature outside the fixture. At low ambient temperatures down to around -50 °C special igniters are needed.

All POWERBALL® HCI®-TS ..., POWERSTAR® HQI®-TS ... and VIALOX® NAV®-TS ... lamps achieve their rated data at relatively high ambient temperatures, such as those in typical fixtures or fixture simulators. Detailed information on fixture simulators for determining lamp data for HQI®-TS and HCI®-TS can be found in IEC 61167, Annex B.6. NAV®-TS ... lamps should be treated similarly.

Lamp survival factor (LSF) states the percentage of lamps that still function after a given period of time.

Lamp lumen maintenance factor (LLMF) states the percentage of luminous flux compared to the value at 100 h still left at a given time.

Permitted line voltage deviation

The permitted line voltage deviation for operation on electromagnetic ballast for HQL® is ± 10% and for HCI®, HQI® and NAV® is ± 3%.

Sudden fluctuations in the line voltage of more than ± 10% may cause the lamps to go out. If the deviation from rated supply voltage (230 V or 400 V) is permanent without an adjusted choke tap, high intensity discharge lamps may exhibit changes in chromaticity and luminous flux. Lamp life may also be reduced. Electronic control gear like the POWERTRONIC® PTi, PT-FIT or PTo is immune to alterations in supply voltage to a large extent and provides a constant lamp wattage over a wide range of input voltage.

Safety

OSRAM high intensity discharge lamps meet the safety requirements defined in IEC 62035 and IEC 61167.

Because of their high operating pressure the following lamps may only be used in fully enclosed fixtures designed to take them. In the rare case that a discharge vessel shatters, the fixture must be able to retain all the hot pieces of ceramic or glass throughout its life.

This relates to the following lamps:

- All HCI®-T and HQI®-T lamps
- All HCI®-TM and HQI®-TM lamps
- All HCI®-TC lamps
- All HCI®-TF lamps
- All HCI®-TS and HQI®-TS lamps
- All HCI®-TT and HCI®-ET lamps
- All HQI®-E lamps
- HQI®-R 150 W/NDL lamps

The following lamps are suitable for open fixtures:

- All HCI®-E/P and HCI®-PAR lamps
- All HQI®-E/P lamps

Operating lamps with a damaged outer bulb is dangerous and therefore not permitted. At the end of their lives, sodium high-pressure lamps and metal halide lamps can exhibit a "rectification" effect. This is not a manufacturer-specific effect. Because of the excessive DC components, when operated on electromagnetic ballasts the lamp control gear (choke, transformers and/or starters) may be overloaded. To meet the requirements of IEC 62035 therefore, suitable protective measures must be taken to ensure that safety is maintained under these conditions. This applies also to control gear with the option of power reduction. NAV® PLUG-IN lamps have been developed specially as substitutes for mercury vapor lamps in existing fixtures and are therefore not affected. The chokes and pf correction capacitors generally needed for operating discharge lamps may, under certain conditions, create oscillating circuits. These circuits may then produce excessive currents and voltages, which in turn can destroy the control gear, capacitors and lamps. Such resonance phenomena must be avoided by appropriate circuits and fuses.

Lamp operation

Operating high intensity discharge lamps for short periods in combination with frequent on/off switching will shorten their life. The lamps should be operated for at least 3 hours and should remain off for at least 30 minutes. This applies in particular to HQI® ≥ 1000 W. NAV® lamps are not suitable for short on/off cycles but should burn for at least 5 minutes. In low-temperature applications down to -50 °C only HCI®, HQI® and NAV® lamps are suitable for operation with an external igniter. Such applications call for special (heatable) igniters such as MZN 400 SU-LT from BAG Turgi (for lamps from 100 to 400 W) and similar igniters from other manufacturers.



Operating instructions

Fixture design

Fixtures must comply with design according to the standard EN 60598 (thermal characteristics and fuse protection).
HQI® 1000 W to 2000 W lamps should be held without pressure or by means of a lamp support close to the crown end. The same applies to NAV®-T 1000 W lamps in the horizontal burning position. In particular, no radiation must be reflected onto the sensitive parts of the lamp. This may cause thermal overloads, which in turn will generally lead to premature failure. For a detailed description and instructions on how to avoid problems see the brochure entitled "Metal halide lamps. Instructions for use and application" on the internet at www.osram.com/osram_com/news-and-knowledge/high-pressure-discharge-lamps/index.jsp.

Control gear

HWL®:

No control gear required; connect directly to power supply. HCl®, HQI®, HQL®, NAV®:

- Control gear:
 - < 220 V high-reactance transformer
 - ≥ 220 V choke (according to IEC 61347)
- Electronic control gear (ECG)

For HCl®, HQI® and NAV® lamps, control gear with suitable overload protection should be used (see Safety).

- Igniters: HCl®, HQI® and NAV® lamps also need an appropriate igniter. Exceptions:
 - HQI®-T 2000/N
 - HQI®-T 2000/D/I
 - NAV®-E 50/I
 - NAV®-E 70/I
 - NAV®-E 68
 - NAV®-E 110
 - NAV®-E 210
 - NAV®-E 350

NAV® SUPER lamps require igniters with a higher ignition energy.

With suitable igniters or operating equipment HCl®, HQI® and NAV® lamps can be instantly restarted while hot. For more information see Restarting.

SOX, SOX-E:

Operation with high-reactance transformers (except SOX 18 tapped choke and 5 µF ignition capacitor) or hybrid control gear.

For the permissible distances between the lamp and the control gear, check the information provided by the equipment manufacturer.

Start-up current

HCl®, HQI®, NAV®, HQL®:

Depending on the control gear used, the start-up current may be up to twice as high as the operating current.

Circuit protection

Fuses for HCl®, HQI® and NAV® lamps must be slow-acting. If fuse-wire is used it should be rated for twice the rated lamp current. If MCBs are provided they should comply with characteristic "C".

Holders

The holders used must be capable of withstanding the high voltages that occur during ignition and hot restrikes. Suitable high-voltage holders can be ordered from lampholder manufacturers. A retainer is recommended for outdoor applications to prevent them coming loose (IEC 60238).

Power factors

(without correction)

- HWL®: $\cos \varphi \sim 1$
- HCl®, HQI® and HQL®: $\cos \varphi$ 0.5 to 0.7
- NAV®: With chokes $\cos \varphi$ 0.5
- SOX, SOX-E: $\cos \varphi \sim 0.3$ (SOX 18: $\cos \varphi \sim 0.9$)

For PFC capacitors according to requirements and application check the manufacturer's specifications. Recommended compensation capacitor values for single compensation see pages 6.41 to 6.50.

Power reduction

HQI® lamps must not be operated at reduced wattage as this may result in color shifts, poorer maintenance and shorter lamp life.

The dimming of HCl® POWERBALL® lamps is permitted. Dimming, however, leads to a change in the photometric parameters, lamp efficiency drops and the color rendering decreases. Especially due to the shift in color dimming seems to be less suitable for indoor lighting.

Dimming of NAV®-lamps (with exception of lamps with internal ignition unit) is permissible on POWERTRONIC® PTO, NAV®-lamps (with exception of lamps with internal ignition unit), as well as HCl®-TT and HCl®-ET can be operated at the next lower choke impedance with reduced power. HWL® and HQL® must not be dimmed. Where dimming is permitted, the lifetime of the lamps remains unchanged. Further details regarding dimming can be found at www.osram.com under News & Knowledge.

Switch-on

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|-------------|---|
| HWL®: | Instant full luminous flux. Starting current approx. 30% higher |
| HQL®: | Full luminous flux after approx. 5 minutes. Starting current approx. 40% higher |
| HCl®: | Full luminous flux after approx. 1 to 3 minutes. Starting current approx. 40% to 90% higher – depending on lamp type and control gear |
| HQI®: | Full luminous flux after approx. 2 to 4 minutes. Starting current approx. 40% to 90% higher – depending on lamp type and control gear |
| NAV®: | Full luminous flux after approx. 6 to 10 minutes depending on lamp type and control gear. Starting current approx. 25% higher |
| SOX, SOX-E: | Full luminous flux after approx. 12 to 15 minutes. Or longer at low ambient temperatures. No higher starting current. |



Operating instructions

Restarting

HCI®, HQI®, NAV®, HQL®, HWL®:

These lamps need a little time (0.25 to 15 minutes) to cool down before they can be restarted because the necessary ignition voltage would initially be higher than the supply voltage or, in the case of HCI®, HQI® and NAV®, above the ignition voltage of the igniter. The use of a timer igniter is recommended because these igniters do not provide permanently ignition pulses during cooldown of the lamp and thus prevent overheating. The devices pause after every short ignition attempt and shut down entirely after longer unsuccessful ignition (shut-down earliest after 15 min).

Instant restarting is possible with suitable igniters for the following lamps:

HQI®-TS EXCELLENCE

HQI®-TS

NAV®-TS

The necessary restrike voltage is depending on lamp type 25 to 60 kVs.

SOX, SOX-E:

SOX 18 lamps can be instantly restarted. All other SOX lamps need a cooling time of a few minutes before they can be restarted.

Radio interference

Except during ignition, radio interference does not normally occur with high pressure lamps. Should radio interference occur with HQL® lamps it can be avoided by connecting a low induction capacitor of 0.1 µF parallel to the lamp. Capacitors must not be connected parallel to any other high-pressure lamp. The requirements of DIN EN 50160 must be met.

Color shift

HCI® and HQI® lamps may show color shifts from lamp to lamp. These shifts may be due to external influences such as the line voltage, control gear, burning position or fixture design.

End of life

High intensity discharge lamps (HCI®, HQI®, NAV® and HQL®) can be considered to have reached the end of their life if:

- there is a marked change in their color or
- there is a significant loss of brightness or
- the lamp no longer ignites or
- the lamp periodically goes out and comes on again.

To protect the control gear and to avoid unnecessary radio interference, HCI®, HQI®, NAV® and HQL® lamps must be replaced as soon as they reach the end of their life.

Guarantee

A warranty for high intensity discharge lamps can only be given if the prescribed operating conditions are observed; that is in particular if the maximum permissible lamp temperatures are not exceeded and the lamps are operated only on appropriate control gear. In addition, the lifetimes specified by OSRAM apply only to operation in fixtures that do not reflect radiation back onto the lamp (see Fixture design, page "Fixture design" on page 6.52).

OSRAM System+ Guarantee for HCI®/HQI®/NAV® lamps and POWERTRONIC® ECG



With POWERTRONIC® electronic control gear from OSRAM high intensity discharge lamps can be operated perfectly and intelligently.

For system operation an extended guarantee can be granted on the POWERTRONIC® ECG and on the relevant HCI®/HQI®/NAV® lamp.

Detailed information on usage and guarantee conditions as well as a registration form can be found at www.osram.com/system-guarantee.

