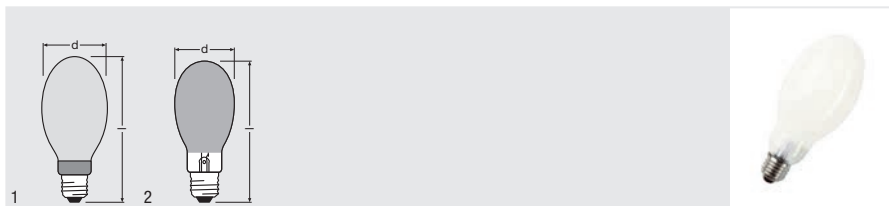


# POWERSTAR HQI®-E coated

## Metal halide lamps with quartz technology for enclosed luminaires



Product name	GTIN (EAN)	W	lm		d [mm]	l [mm]				No.
HQI-E 250 W/N/SI CO <sup>1)</sup>	4050300444628	250	20500	E40	90	216	A	6	1	
HQI-E 250 W/D PRO	4008321677907	250	18000	E40	90	226	A	12	1	
HQI-E 250W/N PLUS <sup>3)</sup>	4052899197527	250	22500	E40	89	220	A	12	1	
HQI-E 400 W/N/SI CO <sup>1)</sup>	4008321302342	400	36500	E40	118	297	A+	6	1	
HQI-E 400 W/N CO <sup>2)</sup>	4008321526724	400	40000	E40	120	290	A+	12	1	
HQI-E 400 W/D PRO <sup>2)</sup>	4008321677884	400	34000	E40	120	290	A	12	1	
HQI-E 400W/N PLUS <sup>2) 3)</sup>	4008321792389	400	40000	E40	120	290	A+	12	1	
HQI-E 1000 W/N	4008321528261	1000	100000	E40	165	380	A+	6	2	

<sup>1)</sup> Lamp ignites at an ignition voltage of 0.9...1.3 kV/s; lamps must not be operated with 4...5 kV igniters

<sup>2)</sup> With NAV<sup>®</sup> control gear

<sup>3)</sup> In preparation

### Product features

- POWERSTAR<sup>®</sup> quartz technology
- Light colors: neutral white (NDL), daylight (D)

### Product benefits


- Long lifetime
- Good to excellent color rendering
- E40 screw base for simple lamp handling
- UV values significantly below the maximum permitted thresholds according to IEC 61167 thanks to UV filter

### Areas of application

- Factories and workshops
- Exhibition halls and trade fairs
- Sports halls and multi-purpose halls
- Approved only for use in enclosed luminaires
- Outdoor applications only in suitable luminaires



## POWERSTAR HQI®-E coated

Product name	A	W <sub>K</sub>	$\frac{W}{K}$	Circuit diagram <sup>2)</sup>	Im	Im/W	R <sub>a</sub>	K	
HQI-E 70 W/WDL CO	0.90	70.00	12 <sup>1)</sup>	2	4700	67	75	2900	Any
HQI-E 70 W/NDL CO	0.90	70.00	12 <sup>1)</sup>	2	5100	73	82	4000	Any
HQI-E 100 W/WDL CO	1.10	100.00	16 <sup>1)</sup>	2	7900	79	75	3000	Any
HQI-E 100 W/NDL CO	1.10	100.00	16 <sup>1)</sup>	2	7700	77	82	4000	Any
HQI-E 150 W/WDL CO	1.80	150.00	20 <sup>1)</sup>	2	11000	73	75	2900	Any
HQI-E 150 W/NDL CO	1.80	150.00	20 <sup>1)</sup>	2	11000	73	88	4000	Any

1) At rated voltage and cos  $\varphi \geq 0.9$   
2) Circuit diagrams, see page 10.53

3) See operating instructions: "Photometric and electrical data"

## POWERSTAR HQI®-E clear


Product name	A	W <sub>K</sub>	$\frac{W}{K}$	Circuit diagram <sup>3)</sup>	Im	Im/W	R <sub>a</sub>	K	
HQI-E 400 W/N CL <sup>1)</sup>	3.80	442.00	45 <sup>2)</sup>	2	42000	93	62	4000	h45

1) With NAV® control gear  
2) At rated voltage and cos  $\varphi \geq 0.9$

3) Circuit diagrams, see page 10.53

4) See operating instructions: "Photometric and electrical data"


## POWERSTAR HQI®-E coated

Product name	A	W <sub>K</sub>	$\frac{W}{K}$	Circuit diagram <sup>6)</sup>	Im	Im/W	R <sub>a</sub>	K	
HQI-E 250 W/N/SI CO <sup>1)</sup>	2.10	250.00	32 <sup>3)</sup>	2	20500	82	70	3800	Any
HQI-E 250 W/D PRO	3.00	250.00	32 <sup>3)</sup>	2	18000	72	92	5200	Any <sup>4)</sup>
HQI-E 250 W/N PLUS <sup>5)</sup>	2.60	270.00	32	2	22500	83	65	3800	h45
HQI-E 400 W/N/SI CO <sup>1)</sup>	3.40	400.00	45 <sup>3)</sup>	2	36500	91	70	3900	Any
HQI-E 400 W/N CO <sup>2)</sup>	3.80	444.00	45 <sup>3)</sup>	2	40000	91	62	3800	h45
HQI-E 400 W/D PRO <sup>2)</sup>	4.00	420.00	45 <sup>3)</sup>	2	34000	82	92	5200	Any
HQI-E 400 W/N PLUS <sup>2),5)</sup>	4.00	420.00	45	2	40000	95	65	3800	h45
HQI-E 1000 W/N	9.50	1060.00	85 <sup>3)</sup>	2	100000	94	62	3700	h45

1) Lamp ignites at an ignition voltage of 0.9... 1.3 kV; lamps must not be operated with 4... 5 kV igniters  
2) With NAV® control gear  
3) At rated voltage and cos  $\varphi \geq 0.9$

4) Color shifts possible in base-down burning position  
5) In preparation  
6) Circuit diagrams, see page 10.53  
7) See operating instructions: "Photometric and electrical data"

## VIALOX® NAV®-E SUPER 6Y


Product name	A	W <sub>K</sub>	$\frac{W}{K}$	Circuit diagram <sup>3)</sup>	Im	Im/W	R <sub>a</sub>	K	
NAV-E 50 W SUPER 6Y <sup>1)</sup>	0.75	52.00	10 <sup>2)</sup>	2/3	4000	77	$\leq 25$	2000	Any
NAV-E 70 W SUPER 6Y <sup>1)</sup>	0.98	70.00	12 <sup>2)</sup>	2/3	6300	90	$\leq 25$	2000	Any
NAV-E 100 W SUPER 6Y <sup>1)</sup>	1.20	100.00	12 <sup>2)</sup>	2/3	10400	104	$\leq 25$	2000	Any
NAV-E 150 W SUPER 6Y <sup>1)</sup>	1.80	152.00	20 <sup>2)</sup>	2/3	17000	112	$\leq 25$	2000	Any
NAV-E 250 W SUPER 6Y <sup>1)</sup>	2.95	255.00	32 <sup>2)</sup>	2/3	31600	124	$\leq 25$	2000	Any
NAV-E 400 W SUPER 6Y <sup>1)</sup>	4.42	410.00	45 <sup>2)</sup>	2	56500	138	$\leq 25$	2000	Any

1) Important: Before replacing NAV® standard lamps in existing installations, check that the igniters are suitable  
2) At rated voltage and cos  $\varphi \geq 0.9$

3) Circuit diagrams, see page 10.53

4) See operating instructions: "Photometric and electrical data"

## VIALOX® NAV®-E SUPER 4Y®

Product name	A	W <sub>K</sub>	$\frac{W}{K}$	Circuit diagram <sup>3)</sup>	Im	Im/W	R <sub>a</sub>	K	
NAV-E 50 W SUPER 4Y <sup>1)</sup>	0.75	52.00	10 <sup>2)</sup>	2/3	4000	77	$\leq 25$	2000	Any
NAV-E 70 W SUPER 4Y <sup>1)</sup>	0.98	71.00	12 <sup>2)</sup>	2/3	6600	90	$\leq 25$	2000	Any
NAV-E 100 W SUPER 4Y <sup>1)</sup>	1.20	100.00	12 <sup>2)</sup>	2/3	10400	104	$\leq 25$	2000	Any
NAV-E 150 W SUPER 4Y <sup>1)</sup>	1.80	152.00	20 <sup>2)</sup>	2/3	17000	112	$\leq 25$	2000	Any
NAV-E 250 W SUPER 4Y <sup>1)</sup>	2.95	255.00	32 <sup>2)</sup>	2/3	31600	124	$\leq 25$	2000	Any
NAV-E 400 W SUPER 4Y <sup>1)</sup>	4.42	410.00	45 <sup>2)</sup>	2	56500	138	$\leq 25$	2000	Any

1) Important: Before replacing NAV® standard lamps in existing installations, check that the igniters are suitable  
2) At rated voltage and cos  $\varphi \geq 0.9$

3) Circuit diagrams, see page 10.53

4) See operating instructions: "Photometric and electrical data"



## Operating instructions

### Power supply

Suitable control gears are required to operate the lamps. These may be electromagnetic ballasts (also called conventional control gears (CCGs) or chokes) or electronic control gears (ECGs). 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 gears 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 ECGs, the values are valid for operation on square-wave electronic control gears (IEC 61167) under laboratory conditions.

For HCl<sup>®</sup> 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 indicated otherwise. For HQI<sup>®</sup> lamps, the specified values apply to the horizontal burning position for T-types > 150 W and TS-types and to the base-up burning position for T-types ≤ 150 W unless indicated otherwise. NAV<sup>®</sup> lamps are all measured in the horizontal burning position. In other burning positions, there may be considerable differences in the measured values, particularly the luminous flux, color temperature and lamp life.

The luminous flux is virtually unaffected by the ambient temperature outside the luminaire. At low ambient temperatures down to around -50 °C, special igniters are needed.

All POWERSTAR<sup>®</sup> HQI<sup>®</sup>-TS ... and VIALOX<sup>®</sup> NAV<sup>®</sup>-TS ... lamps achieve their rated data at relatively high ambient temperatures, such as those in typical luminaires or luminaire simulators.

Detailed information on luminaire simulators for determining lamp data for HQI<sup>®</sup>-TS and HCl<sup>®</sup>-TS can be found in IEC 61167, Annex B.6. NAV<sup>®</sup>-TS ... lamps should be treated similarly.

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

The 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 ballasts for HCl<sup>®</sup>, HQI<sup>®</sup> and NAV<sup>®</sup> is ± 3 %. Sudden fluctuations in the line voltage of more than ± 10 % may cause the lamps to go out. If the deviation from the 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 gears such as POWERTRONIC<sup>®</sup> PTi, PT-FIT or PTo are immune to alterations in supply voltage to a large extent and provide 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 luminaires designed to take them. In the rare case that a discharge vessel shatters, the luminaire must be able to retain all the hot pieces of ceramic or glass throughout its life.

This relates to the following lamps:

- All HCl<sup>®</sup>-T and HQI<sup>®</sup>-T lamps
- All HCl<sup>®</sup>-TC lamps
- All HCl<sup>®</sup>-TF lamps
- All HCl<sup>®</sup>-TS and HQI<sup>®</sup>-TS lamps
- All HCl<sup>®</sup>-TT and HCl<sup>®</sup>-ET lamps
- All HQI<sup>®</sup>-E lamps
- HQI<sup>®</sup>-R 150 W/NDL lamps

The following lamps are suitable for open luminaires:

- All HCl<sup>®</sup>-E/P and HCl<sup>®</sup>-PAR lamps
- All HQI<sup>®</sup>-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 gears (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 gears with the option of power reduction. NAV<sup>®</sup> Plug-in lamps have been developed specially as substitutes for mercury vapor lamps in existing luminaires 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 gears, 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<sup>®</sup> ≥ 1000 W. NAV<sup>®</sup> 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 HCl<sup>®</sup>, HQI<sup>®</sup> and NAV<sup>®</sup> lamps designed for operation with an external ignitor are suitable. 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

### Luminaire design

Luminaires must comply with design according to the EN 60598 standard (thermal characteristics and fuse protection). HQI® 1000 W to 2000 W lamps should be held without applying 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. When designing the luminaire (specifically the reflector), care has to be taken that, 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" at [www.ledvance.com/hid-knowledge](http://www.ledvance.com/hid-knowledge).

### Control gears

HCI®, HQI®, NAV®:

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

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

- Igniters: HCI®, 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® SUPER lamps in particular require igniters with a higher ignition energy. With suitable igniters or operating equipment, some specific HCI®, HQI® and NAV® lamps can be instantly restarted while hot. For more information, see: Restarting.

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

### Start-up current

HCI®, HQI®, NAV®:

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 HCI®, 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. Lamp holders with retention device are recommended for outdoor applications to prevent them coming loose (IEC 60238).

### Power factors

(without compensation)

- HCI® and HQI®:  $\cos \phi$  0.5 to 0.7
- NAV®: With chokes  $\cos \phi$  0.5

For PFC capacitors according to requirements and application, check the manufacturer's specifications. For recommended compensation capacitor values for single compensation, see pages 10.42 to 10.49.

### Power reduction

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

The dimming of HCI® POWERBALL® lamps on the POWERTRONIC® PTo 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 HCI®-TT and HCI®-ET can be operated at the next lower choke impedance with reduced power. Where dimming is permitted, the lifetime of the lamps remains unchanged. Further details regarding dimming can be found at [www.ledvance.com](http://www.ledvance.com) under Products.



## Operating instructions

### Switch-on

HCI®:	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

### Restarting

HCI®, HQI®, NAV®:

Depending on the type, 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 ignitors do not permanently provide ignition pulses during the cooldown of the lamp and thus prevent overheating. The devices pause after every short ignition attempt and shut down entirely after longer unsuccessful ignition (earliest shutdown after 15 min).

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

HQI®-TS Excellence

HQI®-TS

NAV®-TS

Depending on the lamp type, the necessary restrike voltage is 25 to 60 kVs.

### Radio interference

Except during ignition, radio interference does not normally occur with high pressure lamps. Capacitors must not be connected in parallel to the high-pressure lamp. The requirements of DIN EN 50160 must be met.

### Color shifts

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 luminaire design.

### End of life

High intensity discharge lamps (HCI®, HQI® and NAV®) 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 gears and to avoid unnecessary radio interference, HCI®, HQI® and NAV® lamps must be replaced as soon as they reach the end of their life.

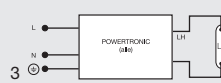
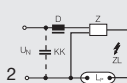
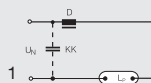
### Guarantee

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 gears. In addition, the specified lifetimes apply only to operation in luminaires that do not reflect radiation back onto the lamp (see paragraph "Luminaire design" on page 10.51).



## Circuit diagrams

These **circuit diagrams** refer to the lamps listed on pages 10.42 to 10.49



D = Choke  
 KK = Compensation capacitor  
 L<sub>p</sub> = Lamp  
 L = Line conductor (phase)  
 LH = High-voltage terminal  
 N = Neutral line

U<sub>N</sub> = Line voltage  
 Z = Igniter (install close to the lamp)  
 ZL = Ignition line (for screw bases link to base contact in the holder)

For single-phase supplies, the choke must be connected to the live lead.

The right igniter for the particular lamp type must be used to ensure reliable and safe ignition. For POWERTRONIC® electronic control gear for HCl®, HQI® and NAV® high intensity discharge lamps, see Section 16.

Chokes, lampholders, capacitors, high-reactance transformers and igniters are available from electrical suppliers.



Burning positions – Bases

Burning positions



□ Permitted    ■ Not permitted

Bases

