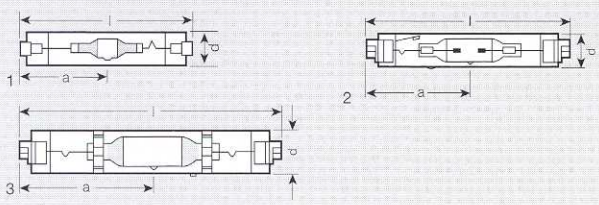
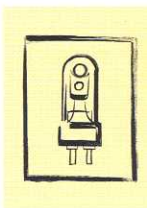
Metal Halide Lamps
TS tubular, double-ended
Quartz technology



Product reference	Product number	W	lm		d [mm]	l max. [mm]	LCL a [mm]	No.	
POWERSTAR® HQI®-TS, UV-reduced									
HQI-TS 70/D UVS	4050300**437521**	75	5000	RX7s	20	114.2*	57	1	12
HQI-TS 70/NDL UVS	4050300**421931**	73	5500	RX7s	20	114.2*	57	1	12
HQI-TS 70/WDL UVS	4050300**412955**	75	5000	RX7s	20	114.2*	57	1	12
HQI-TS 150/D UVS	4050300**437545**	150	11000	RX7s-24	23	132*	66	1	12
HQI-TS 150/NDL UVS	4050300**362380**	150	11250	RX7s-24	23	132*	66	1	12
HQI-TS 150/WDL UVS	4050300**412979**	150	11000	RX7s-24	23	132*	66	1	12
HQI-TS 250/D UVS	4050300**436050**	250	20000	Fc2	25	163	81.5	2	12
HQI-TS 250/NDL UVS	4050300**436036**	250	20000	Fc2	25	163	81.5	2	12
HQI-TS 250/WDL UVS	4050300**436012**	250	22000	Fc2	25	163	81.5	2	12
POWERSTAR® HQI®-TS[3], not UV-reduced									
HQI-TS 400/NDL[1]	4050300**304090**	400	35000	Fc2	31	206	103	3	12
HQI-TS 400/D[2]	4050300**015385**	400	36000	Fc2	31	206	103	3	12



POWERSTAR® HQI®-TS UVS lamps are compact double-ended UV-reduced lamps. Approved for use in enclosed luminaires.

POWERSTAR® HQI®-TS metal halide lamps are noted for their high luminous efficacy and very good colour rendering properties. They are available in Daylight, Neutral White DE LUXE and Warm White DE LUXE.

The Warm White DE LUXE and Neutral White DE LUXE colours combine well with the light from HALOSTAR® lamps.

Benefits: long life, high luminous flux and low thermal output.

Advantages of UV protection:
- Double the illuminance or exposure time compared with unprotected lamps
- Reduced embrittlement of the plastics in luminaires

A low-cost toughened cover plate made from heat resistant glass can be used instead of a UV filter.

Indoor applications:
Factories, shop interiors, shop windows, foyers, hotels, restaurants, trade fairs, exhibitions, offices, schools, sports halls, etc.

Outdoor applications:
Floodlighting, building facades and monuments.

* Contact-to-contact length
1) Operate only with NAV® control gear
2) Operate with NAV® control gear. If operated with HQI® control gear see "Technical data" on page 5.30
3) Not UV-reduced

Which lamp for which installation?

Applications		POWER-STAR® HCI®	POWER-STAR® HQI®	POWER-STAR® HCI®-TT	HQL®	HQL® DE LUXE	HQL® SUPER DE LUXE	HWL®	VIALOX® NAV® SUPER 4Y®	VIALOX® NAV® NAV® 4Y®	SOX
Office buildings	Open plan offices, foyers	●	●								
	Corridors	●	●								
Trade and industry	Chemical and plastic, industries		●		●	●				●	
	Electrical, precision,		●							●	
	wood and paper industries		●							●	
	Foodstuffs	●	●								
	Textiles, leather goods and		●								
	printing		●								
	Automotive and										
	mechanical industries		●		●	●				●	
	Power stations and										
	district heating plants		●			●				●	
	Laboratories		●			●					
	Steel mills, foundries,										
	gravel plants				●				●	●	●
	Cement works				●				●	●	●
	Warehouses and transport depots		●			●				●	
Schools and colleges	Auditoriums, libraries	●	●								
Retail outlets, shop windows	Groceries, bakeries, delicatessen	●	●								
	Textiles, leather,	●	●								
	photo, watches, jewellery	●	●								
	Cosmetics, hairdressers	●	●								
	Flower shops	●	●								
	Supermarkets	●	●								
	Department stores	●	●								
Public and amenity areas	Foyers	●	●								
	Restaurants	●	●								
	Museums, galleries	●	●								
	Exhibition halls	●	●			●					
	Sports and leisure centres	●	●								
Clinics and surgeries	Diagnosis and treatment	●	●								
Traffic installations	Main streets and	●	●	●							
	pedestrian areas	●	●	●						●	
	Arterial roads and motorways								●		●
	Squares and bridges		●	●					●	●	
	Tunnels and subways								●		●
	Side streets			●		●			●	●	
	Pedestrian crossings		●						●		●
	Junctions		●			●			●		●
	Park and garden paths	●		●		●	●	●		●	
	Canals, locks								●		●
	Railway yards				●				●		
	Airports, aprons		●						●		
Industrial installations	Factory yards, parking lots,		●		●	●			●		
	electrical plant		●		●	●			●		●
	Shipyards, ports, piers				●	●			●		●
	Coal mines, stockpiles,										
	storage yards				●					●	●
	Refineries		●		●			●	●	●	
Building sites	Building sites		●		●				●	●	●
Sports grounds	Sports grounds		●								
	Stadium floodlighting		●								
Flood-lighting	Buildings, monuments,		●	●							
	parks, gardens	●	●	●							
Special applications	Plant lighting,		●								
	aquariums, terrariums		●			●[1)3)]					
	Horticulture		●						●[2)]		
	Colour film and TV productions	●	●								
	Theatre lighting	●	●								
	Surface and material testing	●	●								●
	Colour fastness testing	●	●								

For spectral power distributions see page 5.37.

1) Specifically reflector lamps such as HQL®-R DE LUXE and HWL®-R DE LUXE

2) PLANTASTAR®

3) splash-proofed fittings only

Operating instructions

Supply voltage
Lamps must be connected via appropriate control gear.

With the exception of HQI® 2000 W and 3500 W, which are designed for operation on 400 V/50 Hz, the supply voltage is generally 230/240 V/50 Hz. Note however that HQI®-T 2000/N/230 V is designed for 230 V only.

If a different supply voltage is used, control gear with appropriate taps designed for these voltages should be used.

Permissible mains voltage variation:
Typically ± 3%, but ± 10% in the case of HQL®.

Short term falls in the mains voltage of more than 10% may cause the lamp to go out.

Permanent variations from the rated supply voltage (230/240 V or 400 V) may lead to deviations in chromaticity and luminous flux. They may also reduce the life of the lamps.

Safety
OSRAM high pressure lamps comply with the safety requirements laid down in IEC 62035.
The following lamps are UV-reduced:
HQI®/HCI®-T ≤ 150 W
HQI®/HCI®-TS ≤ 250 W
Because they emit UV radiation and operate at overpressure, the following lamps must only be operated in appropriate fully enclosed luminaires:
- all HCI®-TS and HQI®-TS
- all HCI®-T and HQI®-T
- all HCI®-TC
- all HCI®-E ≥ 250 W and HQI®-E ≥ 250 W
- HQI®-R 150 W/NDL

Since the possibility of a lamp bulb shattering cannot be entirely ruled out, luminaires for the above mentioned lamps must be equipped with heat-resistant shatter-proof shields in sealed luminaires.

Operating a lamp that has a damaged outer bulb is dangerous and not permitted (except HQI®-TS ... lamps without an outer bulb).

At the end of their lives, HID lamps exhibit a "rectification" effect. This is not a manufacturer-specific lamp effect. Because of the excessive DC component the control gear and igniters may overheat so HID lamps should only be operated with control gear fitted with thermal cut-outs. This also applies to dimming control gear.

The chokes and compensating capacitors that are generally needed to operate discharge lamps may, under certain circumstances, form resonant circuits. This in turn will lead to excessive currents and voltages which will damage the lamps, control gear and capacitors. Such resonance must be avoided by suitable circuit design and fuse protection.

Lamp operation
Short-term operation in combination with frequent switching will reduce the life of high pressure lamps. This applies both to cold starting and warm starting. For HQI® lamps of 1000 W and higher in particular, it is important for the lamp to be on for at least three hours and off for at least half an hour.

In low temperature applications down to –50°C only HCI®, HQI® and NAV® lamps are suitable for operation with external igniters. In such applications special (heated) igniters are needed, such as the MZN 400 SU-LT from BAG Turgi for lamps from 100 to 400 W.

The following lamps are suitable for open luminaires:
- all HQI®-E lamps from 70 to 150 W
- all HQI®-E/P and HCI®-E/P, HCI®-PAR

The use of shields should still be considered in each case for absolute safety.

Luminaire design
Luminaires must comply with the EN 60598-1 standard (thermal characteristics and fuse protection).

HQI®-T 1000 to 3500 W lamps should be supported at the crown end of the lamp.

Control gear
HWL®:
No control gear required; connect directly to supply.

HCI®, HQI®, HQL®, NAV®:
- Control gear:
  < 230 V high-reactance transformer,
  ≥ 230 V choke.

For HQI®, HCI® and NAV® lamps ≤ 150 W, chokes (control gear) with thermal cutouts must be used. For HQI® lamps ≥ 250 W and NAV® lamps, chokes (control gear) with thermal cutouts are recommended.
- Igniters: HCI®, HQI® and NAV® lamps require additional igniters (except HQI®-T 2000/N, HQI®-T 2000 D/I, NAV®-E 50/I 4Y®, NAV®-E 70/I 4Y®, NAV®-E 50/I, NAV®-E 70/I, NAV®-E 110, NAV®-E 210 and NAV®-E 350).

NAV® SUPER lamps require igniters with a higher ignition energy.
With suitable igniters or control gear HQI®-TS and NAV®-TS lamps can be instantly restarted while hot.

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

Any distance between the lamp and the control gear is permissible. The distance between the lamp and the igniter must not exceed a certain length depending on the type of igniter (approx. 1.5 m in the case of superimposed igniters, for example). In mains supplies with a neutral conductor, the control gear must be connected to the live conductor. Luminaires without lamps must be switched off to avoid continuous operation of the igniter.

Start-up current
HCI®, HQI®, HQL®, 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". If the MCB is adjusted to the upper limit value of 10 times rated lamp current, it will not cut out at twice the lamp current.

Operating instructions

Holders
The holders used must be capable of withstanding the high voltages that occur during ignition and hot restarts. Suitable high voltage holders can be ordered from lampholder manufacturers.

Power factors
(without correction)
- HWL®: cos φ ~ 1
- HCI®, HQI® and HQL®: cos φ 0.5 . . . 0.7
- NAV®: With chokes: cos φ 0.5
- SOX, SOX-E: cos φ ~ 0.3 (SOX 18: cos φ ~ 0.9)

For PFC capacitor required see pages 5.30 to 5.33.

Wattage reduction
HCI® and HQI® lamps must not be operated at reduced wattage as this would result in colour shifts and shorter lamp life.
HQL® and NAV® lamps may be operated at up to 50% lower wattage, provided ignition takes place at rated wattage.

Lamp start
HWL®: Instant full luminous flux. Starting current approx. 30% higher.

HQL®: Full luminous flux after approx. 5 min. Starting current approx. 40% higher.

HCI®: Full luminous flux after 2 – 4 min. Starting current approx. 40 to 90% higher depending on lamp type and control gear.

HQI®: Full luminous flux after 2 – 4 min. Starting current approx. 40 to 90% higher depending on lamp type and control gear.

NAV®: Full luminous flux after 6 – 10 min. depending on lamp type and control gear. Starting current approx. 25% higher.

SOX,
SOX-E: Full luminous flux after 12 to 15 min. No higher starting current.

Restart
HCI®, HQI®, HQL®, HWL®, NAV®, SOX:
These lamps need a few minutes (2 to 15) to cool down before they can be restarted because the ignition voltage to begin with would be higher than the supply voltage or, in the case of HCI®, HQI® and NAV®, above the ignition voltage of the igniter.

In the case of POWERSTAR® HQI®-TS ≤ 1000 W, HQI-TS 2000/D/S and VIALOX® NAV®-TS lamps, instant restart of the hot lamp is possible if suitable igniters are used. The necessary re-strike voltage is 25 to 60 kV.

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

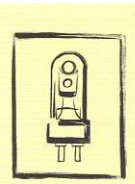
Radio interference
After ignition, radio interference does not normally occur with high pressure and mercury-tungsten blended lamps. Should radio interference occur with HQL® lamps it can be avoided by connecting a low induction capacitor of 0.1 µF parallel to the lamp. Capacitors must not be connected in parallel to POWERSTAR® or VIALOX® lamps.

Luminous flux
All lamp-specific electrical and photometric data is measured after 100 hours of operation under laboratory conditions on reference equipment. Unless otherwise indicated, the specified values for HQI® ≥ 1000 W apply to the horizontal burning position for -T and -TS types and for the base-up burning position for -E types. NAV® lamps are all measured in the in horizontal burning position, and HQL and HWL lamps in the base-up position. In other burning positions there may be considerable differences in the measured values, particularly the luminous flux, colour temperature and life.

The luminous flux is virtually unaffected by changes in ambient temperature outside the lamp. At low ambient temperatures (down to around –50°C), special igniters are required. The luminous fluxes given relate to the vertical burning position (except for lamps which are designed for the horizontal burning position only).

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

Detailed information on thermal protection tubes for determining lamp data for HQI®-TS and HCI®-TS lamps can be found in DIN 5032 Part 2, Section 3.3.3.3.
NAV®-TS ... lamps should be treated similarly.



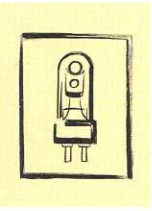
Colour shift
As with all metal halide lamps, POWERSTAR® HQI® lamps may show colour shifts from lamp to lamp. These shifts may be due to external influences such as mains voltage, control gear or luminaire design.

End of service life
High pressure discharge lamps (HCI®, HQI®, NAV® and HQL®) can be considered to have reached the end of their service life if:
- there is a marked change in their colour 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 avoid unnecessary radio interference, HCI®, HQI®, NAV® and HQL® lamps must be replaced as soon as they reach the end of their service life.

Warranty
High pressure discharge lamps are only guaranteed if all operating conditions are observed; in other words, if the maximum permissible lamp temperatures are not exceeded and the lamps are operated only with control gear that has been approved or declared as suitable.

Technical data

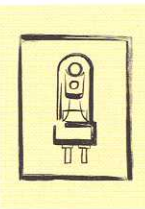


Reference	Lamp current A	Approx. system power with control gear W	PFC capacitor at 50 Hz µF[1]	Circuit diagram No. [2]	Luminous flux lm	Luminous efficacy of lamp lm/W	Colour rendering group	Colour temperature K	Approx. average luminance cd/cm²	Burning position[3]
HCI-T 35/WDL	0.5	48	6	2/9	3300	87	1 B	3000	[6]	universal
HCI-T 70/NDL	1.0	88	12	2/9	5800	81	1 A	4200	[6]	universal
HCI-T 70/WDL	1.0	88	12	2/9	6600	92	1 B	3000	[6]	universal
HCI-T 150/NDL	1.8	167	20	2/9	12700	86	1 A	4200	[6]	universal
HCI-T 150/WDL	1.8	167	20	2/9	14000	95	1 B	3000	[6]	universal
HCI-T 250/WDL	2.9	275	32	2/9	26000	104	1 B	3000	–	universal
HCI-TC 35/WDL	0.5	48	6	2/9	3300	87	1 B	3000	[6]	universal
HCI-TC 70/WDL	1.0	88	12	2/9	6600	92	1 B	3000	[6]	universal
HCI-TC 70/NDL	1.0	88	12	2/9	6000	84	1 A	4200	–	universal
HCI-TT 70/WDL	1.0	88	12	2/9	6500	90	1 B	3000	–	universal
HCI-TT 150/WDL	1.8	167	20	2/9	14000	95	1 B	3000	–	universal
HCI-TS 70/NDL	1.0	86	12	2/3/9	5700	81	1 A	4200	[6]	p 45
HCI-TS 70/WDL	1.0	86	12	2/3/9	6500	90	1 B	3000	[6]	p 45
HCI-TS 150/NDL	1.8	167	20	2/3/9	13400	90	1 A	4200	[6]	p 45
HCI-TS 150/WDL	1.8	167	20	2/3/9	13500	92	1 B	3000	[6]	p 45
HCI-TS 250/WDL	2.9	275	32	2/9	24200	100	1 B	3000	–	universal
HCI-E/P 70/NDL clear [6]	0.98	88	12	2/9	5800	82	1 A	4200		universal
HCI-E/P 70/NDL[6]	0.98	88	12	2/9	5600	80	1 A	4200		universal
HCI-E/P 70/WDL clear [6]	0.98	88	12	2/9	6000	86	1 B	3000		universal
HCI-E/P 70/WDL[6]	0.98	88	12	2/9	5700	81	1 B	3000		universal
HCI-E/P 100/WDL clear [6]	1.1	115	16	2	9000	90	1 B	3000		universal
HCI-E/P 100/WDL[6]	1.1	115	16	2	8600	86	1 B	3000		universal
HCI-E/P 150 NDL clear [6]	1.8	167	20	2/9	12500	83	1 A	4200		universal
HCI-E/P 150 NDL[6]	1.8	167	20	2/9	12000	80	1 A	4200		universal
HCI-E/P 150 WDL clear [6]	1.8	167	20	2/9	13000	87	1 B	3000		universal
HCI-E/P 150 WDL[6]	1.8	167	20	2/9	12500	83	1 B	3000		universal
HCI-E 250/WDL	2.9	275	32	2	24500	100	1 B	3000	–	universal
HCI-PAR 20 35/WDL SP [6]	0.5	48	6	2/9	22000[7]	–	1 B	3000		universal
HCI-PAR 20 35/WDL FL[6]	0.5	48	6	2/9	5000[7]	–	1 B	3000		universal
HCI-PAR 30 35/WDL SP [6]	0.5	48	6	2/9	37000[7]	–	1 B	3000		universal
HCI-PAR 30 35/WDL FL[6]	0.5	48	6	2/9	7000[7]	–	1 B	3000		universal
HCI-PAR 30 70/WDL SP [6]	0.97	88	12	2/9	55000[7]	–	1 B	3000		universal
HCI-PAR 30 70/WDL FL[6]	0.97	88	12	2/9	10000[7]	–	1 B	3000		universal
HQI-E 70/NDL clear[4] [5]	1.0	89	12	2/9	5200	71	1 B	4000	1600	universal
HQI-E 70/NDL[4] [5]	1.0	89	12	2/9	4900	67	1 B	3800	25	universal
HQI-E 70/WDL clear[4] [5]	0.95	96	12	2/9	4700	64	1 B	3200	1500	universal
HQI-E 70/WDL[4] [5]	0.95	96	12	2/9	4900	67	1 B	3100	21	universal
HQI-E 100/NDL clear[4]	1.1	115	16	2	7800	78	1 B	4000	1800	universal
HQI-E 100/NDL[4]	1.1	115	16	2	7300	73	1 B	3800	30	universal
HQI-E 100/WDL clear[4]	1.1	115	16	2	8500	85	1 B	3000	1700	universal
HQI-E 100/WDL[4]	1.1	115	16	2	8000	80	1 B	2900	28	universal
HQI-E 150/WDL[4] [5]	1.8	170	20	2/9	12000	80	1B	2900	–	universal
HQI-E 150/NDL clear[4] [5]	1.8	170	20	2/9	11400	76	1 B	4000	–	universal

1) At rated voltage and cos $\varphi \geq 0.9$
2) For circuit diagrams see page 5.34
3) For examples see page 5.36
4) For reduction in luminous flux see page 5.14, footnote 1)
5) For the advantages of operation with POWERTRONIC®, see chapter 9
6) In preparation
7) Axial luminous intensity cd

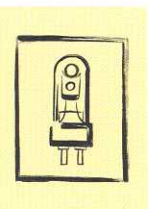
Technical data

Reference	Lamp current A	Approx. system power with control gear W	PFC capacitor at 50 Hz µF[1]	Circuit diagram No. [2]	Luminous flux lm	Luminous efficacy of lamp lm/W	Colour rendering group	Colour temperature K	Approx. average luminance cd/cm²	Burning position[3]
HQI-E 150/NDL[7] [8]	1.8	170	20	2/9	10500	70	1 B	3800	–	universal
HQI-E/P 250/D	3.0	275	32	2	17000	71	1 A	6000	–	universal
HQI-E 250/D	3.0	275	32	2	19000	76	1 A	5200	20	universal[4]
HQI-E/P 400/D[6]	3.8	420	45	2	27000	68	1 A	4500	–	universal
HQI-E/P 400/D[5]	3.5	400	35	2	23000	67	1 A	5000	–	universal
HQI-E 400/D[6]	3.8	460	45	2	30000	76	1 A	5900	17	universal
HQI-E 400/D[5]	3.6	400	35	2	26000	72	1 A	5800	10	universal
HQI-E 400/N clear[5][7]	3.5	405	35	2	36000	97	2 B	3600	–	universal
HQI-E 400/N clear[6][7]	4.2	460	45	2	45000	112	2 A	4000	–	universal
HQI-E 400/N[5][7]	3.5	405	35	2	34000	92	2 B	3600	–	universal
HQI-E 400/N[6][7]	4.2	460	45	2	43000	107	2 A	4000	–	universal
HQI-E 1000/N	9.5	1065	85	2	95000	80	2 B	3900	23	h 45
HQI-R 150/NDL/FO[8]	1.8	170	20	2/9	11000	73	1 B	4200	–	p 15
HQI-T 70/NDL[8]	1.0	91	12	2/9	5500	73	1 B	4200	5300	universal
HQI-T 70/WDL[8]	1.0	91	12	2/9	5200	69	1 B	3000	5000	universal
HQI-T 150/NDL[8]	1.8	170	20	2/9	13000	87	1 B	4200	8300	universal
HQI-T 150/WDL[8]	1.8	170	20	2/9	13000	87	1 B	3000	8000	universal
HQI-T 250/D	3.0	275	32	2	20000	80	1 A	5300	1100	universal[4]
HQI-BT 400/D[6][15]	4.0	460	45	2	32000	76	1 A	5200	1400	universal
HQI-BT 400/D[5][15]	3.5	400	35	2	25000	69	1 A	6100	650	universal
HQI-T 400/N[5][7]	3.6	420	35	2	34000	89	2 B	3800	–	p 45
HQI-T 400/N[6][7]	4.1	460	45	2	42000	100	2 B	3700	–	p 45
HQI-T 400 BLUE	3.6	400	45	2	–	–	–	–	–	universal
HQI-T 400 GREEN	3.6	400	45	2	–	–	–	–	–	universal
HQI-T 1000/D	9.5	1065	85	2	80000	80	1 A	6000	810	p 60
HQI-T 2000/D	10.3	2080	60	2	180000	90	1 A	6000	920	p 60
HQI-T 2000/D/I	10.3	2080	60	1	180000	90	1 A	6000	920	p 60
HQI-T 2000/N[10]	8.8	2070	37	1	200000[9]	100	2 B	4500	530	universal[11]
HQI-T 2000/N/230 V[14]	16.5	2070	125	2	190000	95	2 B	4500	530	p 30
HQI-T 2000 N/E SUPER	8.8	2080	37	2	220000[9]	120	2 B	4000	800	p 30
HQI-T 2000/N/SN SUPER[12]	8.8	2080	37	2	220000[13]	120	2 B	4000	800	p 30
HQI-TS 70/D [8]	1.0	95	12	2/3/9	5000	67	1 B	5200	1500	p 45
HQI-TS 70/NDL[8]	1.0	89	12	2/3/9	5500	75	1 B	4000	1650	p 45
HQI-TS 70/WDL[8]	1.0	94	12	2/3/9	5000	64	1 B	3000	1500	p 45
HQI-TS 150/D [8]	1.8	170	20	2/3/10	11000	73	1 B	5200	1500	p 45
HQI-TS 150/NDL[8]	1.8	170	20	2/3/10	11250	75	1 B	4200	1500	p 45
HQI-TS 150/WDL[8]	1.8	170	20	2/3/10	11000	73	1 B	3000	2400	p 45
HQI-TS 250/D [8]	3.0	275	32	2/3	20000	80	1 A	5100	1500	p 45
HQI-TS 250/NDL[8]	3.0	275	32	2/3	20000	80	1 B	4200	1350	p 45
HQI-TS 250/WDL[8]	2.8	275	32	2/3	22000	88	1 B	3200	1600	p 45
HQI-TS 400/D [6]	4.1	440	45	2/3	36000	90	1 A	5200	1400	p 45
HQI-TS 400/D [5]	3.6	385	35	2/3	28000	80	1 A	5600	1100	p 45



1) At rated voltage and cos φ ≥ 0.9
2) For circuit diagrams see page 5.34
3) For examples see page 5.36
4) Colour shifts are possible in the base-down burning position
5) With HQI® control gear
6) With NAV® control gear
7) For reduction in luminous flux see page 5.14, footnote 1)
8) For the advantages of operation with POWERTRONIC® see Chapter 9
9) 170,000 lm in the vertical burning position
10) No igniter required
11) p 30 recommended
12) Lamps ignite at an ignition voltage of 0.9 to 1.3 kVs
13) With 10.3 A control gear
14) Specially developed for 230 V control gear. Excellent luminous flux behaviour: 190,000 lumen after 4000 hours of operation
15) Data applies also to discontinued type HQI®-T 400 W/D

Technical data

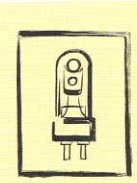


Reference	Lamp current A	Approx. system power with control gear W	PFC capacitor at 50 Hz µF[1]	Circuit diagram No.[2]	Luminous flux lm	Luminous efficacy of lamp lm/W	Colour rendering group	Colour temperature K	Approx. average luminance cd/cm²	Burning position[3]
HQI-TS 400/NDL	4.0	440	45	2/3	35000	88	1 B	4200	1200	p 45
HQI-TS 1000/D/S	9.6	1065	85	2/3	90000	90	1 A	5900	2600	p 30
HQI-TS 1000/NDL/S	9.6	1065	85	2/3	90000	90	1 B	4400	–	p 30
HQI-TS 2000/D/S[8]	11.3[9]	2030	60	2/4	200000	100	1 A	5800	7000	p 30
HQI-TS 1000/D, HQI TS 2000/D and HQI TS 3500/D have been discontinued										
HQI-TS 2000/N/L[10]	10.3	2180	60	2/4	225000	107	2B	4100	–	p 15
HQI-TS 2000/N/L[11]	9.8	2020	37	2/4	200000	102	2B	4700	–	p 15
HQL 50 SUPER DE LUXE	0.6	59	7	1	1600	32	2 B	3000	3	universal
HQL 80 SUPER DE LUXE	0.8	89	8	1	3400	43	2 B	3000	4	universal
HQL 125 SUPER DE LUXE	1.15	137	10	1	5700	46	2 B	3000	6	universal
HQL 50 DE LUXE	0.6	59	7	1	2000	40	3	3300	4	universal
HQL 80 DE LUXE	0.8	89	8	1	4000	50	3	3200	5	universal
HQL 125 DE LUXE	1.15	137	10	1	6500	52	3	3200	7	universal
HQL 250 DE LUXE	2.15	266	18	1	14000	56	3	3100	10	universal
HQL 400 DE LUXE	3.25	425	25	1	24000	60	3	3000	10.5	universal
HQL 50	0.6	59	7	1	1800	36	3	4200	4	universal
HQL 80	0.8	89	8	1	3800	48	3	4100	5	universal
HQL 125	1.15	137	10	1	6300	50	3	4000	7	universal
HQL 250	2.15	266	18	1	13000	52	3	3900	10	universal
HQL 400	3.25	425	25	1	22000	55	3	3800	10.5	universal
HQL 700	5.4	735	40	1	38500	55	3	3550	13	universal
HQL 1000	7.5	1045	60	1	57000	58	3	3550	16	universal
HQL-B 50 SUPER DE LUXE	0.6	59	7	1	1600	32	2B	2900	< 1.1	universal
HQL-B 80 SUPER DE LUXE	0.8	89	8	1	3000	38	2 B	2900	< 2.2	universal
HQL-R 80 DE LUXE	0.8	89	8	1	3000[4]	38	3	3500	6	universal
HWL 160 225 V	0.8	160[6]	–	–	3100	19	2 B	3600	3	hs 30
HWL 160 235 V	0.8	160[6]	–	–	3100	19	2 B	3600	3	hs 30
HWL 250 225 V	1.2	250[6]	–	–	5600	22	2 B	3800	5	universal[7]
HWL 250 235 V	1.2	250[6]	–	–	5600	22	2 B	3800	5	universal[7]
HWL 500 225 V	2.4	500[6]	–	–	14000	28	2 B	4100	6	universal[7]
HWL 500 235 V	2.3	500[6]	–	–	14000	28	2 B	4100	6	universal[7]
HWL-R 160 DE LUXE	0.75	160[6]	–	–	2500[4]	16	2 A	3200	5	hs 15
NAV-E 50 4Y	0.77	62	10	2	3500	70	4	2000	4	universal
NAV-E 50/E	0.77	62	10	2	3500	70	4	2000	4	universal
NAV-E 50/I 4Y[5]	0.77	62	10	1	3500	70	4	2000	4	universal
NAV-E 50/I[5]	0.77	62	10	1	3500	70	4	2000	4	universal
NAV-E 70 4Y	0.98	83	12	2	5600	80	4	2000	7	universal
NAV-E 70/E	0.98	83	12	2	5600	80	4	2000	7	universal
NAV-E 70/I 4Y[5]	0.98	83	12	1	5600	80	4	2000	7	universal
NAV-E 70/I[5]	0.98	83	12	1	5600	80	4	2000	7	universal
NAV-T 250	3.0	275	32	2	27000	108	4	2100	400	universal
NAV-T 250 SUPER	3.0	285	32	2	33000	127	4	2000	500	universal

1) At rated voltage and cos φ ≥ 0.9
2) For circuit diagrams see page 5.34
3) For examples see page 5.36
4) See luminous intensity distribution curve on page 5.35
5) No igniter required
6) No control gear required
7) hs 45 recommended
8) Lamps may be operated only on 10.3 A chokes
9) Lamp current measured at a 10.3 A choke
10) With 10.3 A control gear
11) With 8.8 A control gear

Technical data

Reference	Lamp current A	Approx. system power with control gear W	PFC capacitor at 50 Hz µF[1]	Circuit diagram No.[2]	Luminous flux lm	Luminous efficacy of lamp lm/W	Colour rendering group	Colour temperature K	Approx. average luminance cd/cm²	Burning position[3]
NAV-T 400 4Y	4.4	440	45	2	48000	120	4	2000	500	universal
NAV-T 400	4.4	440	45	2	48000	120	4	2000	500	universal
NAV-T 400 SUPER	4.4	450	45	2	55500	135	4	2000	600	universal
NAV-T 600 SUPER	6.2	645	65	2	90000	150	4	2000	700	universal
NAV-T 1000	10.3	1075	100	2	130000	130	4	2000	600	universal
NAV-TS 70 SUPER	1.0	83	12	2/3	6800	97	4	2000	400	p 45
NAV-TS 150 SUPER	1.8	170	20	2/3	15000	100	4	2000	300	p 45
NAV-TS 250	3.0	275	36	2/3	25500	102	4	2000	400	p 45
NAV-TS 400	4.4	440	45	2/3	48000	120	4	2000	550	p 45
SOX 18	0.35	25[8]/25[9]	5	5/6/7	1800[10]	100[10]	–	–	10	h 150
SOX 35	0.6	66[8]/50[9]	20	5/6/7	4600[10]	124[10]	–	–	10	h 110
SOX 55	0.59	82[8]/69[9]	20	5/6/7	8100[10]	145[10]	–	–	10	h 110
SOX 90	0.94	125[8]/105[9]	26	5/6/7	13500[10]	148[10]	–	–	10	p 20
SOX 135	0.95	175[8]/159[9]	45	5/6/7	22500[10]	167[10]	–	–	10	p 20
SOX 180	0.9	225[8][9]	40	5/6/7	32000[10]	173[10]	–	–	10	p 20
SOX-E 26	0.45	61[8]	6	5/6/7	3500[10]	130[10]	–	–	4	h 110
SOX-E 36	0.35	68[8]	4.4	5/6/7	5750[10]	164[10]	–	–	4	h 110
SOX-E 66	0.62	109[8]	7.6	5/6/7	10700[10]	165[10]	–	–	4	p 20
SOX-E 91	0.62	134[8]	5.2	5/6/7	17000[10]	189[10]	–	–	4	p 20
SOX-E 131	0.62	172[8]	3.4	5/6/7	25000[10]	97[10]	–	–	4	p 20
NAV-E 100 SUPER	1.2	115	12	2	9500	95	4	2000	15	universal
NAV-E 110[5]	1.3	125	10	1	8000	73	4	2000	11	universal
NAV-E 150 4Y	1.8	170	20	2	14000	93	4	2000	10	universal
NAV-E 150	1.8	170	20	2	14000	93	4	2000	10	universal
NAV-E 150 SUPER	1.8	176	20	2	17000	109	4	2000	11	universal
NAV-E 210[5]	2.25	232	18	1	18000	86	4	2000	13	universal
NAV-E 250 4Y	3.0	275	32	2	25000	100	4	2000	19	universal
NAV-E 250	3.0	275	32	2	25000	100	4	2000	19	universal
NAV-E 250 SUPER	3.0	285	32	2	32000	123	4	2000	23	universal
NAV-E 350[5]	3.6	385	25	1	34000	97	4	2000	16	universal
NAV-E 400 4Y	4.45	440	45	2	47000	118	4	2000	22	universal
NAV-E 400	4.45	440	45	2	47000	118	4	2000	22	universal
NAV-E 400 SUPER	4.4	450	45	2	54000	132	4	2000	24	universal
NAV-E 1000	10.3	1075	100	2	128000	128	4	2000	30	universal
NAV-T 50 SUPER	0.8	66	10	2	4400	81	4	2000	250	universal
NAV-T 70 4Y	1.0	83	12	2	5900	84	4	2000	210	universal
NAV-T 70	1.0	83	12	2	5900	84	4	2000	210	universal
NAV-T 70 SUPER	1.0	83	12	2	6500	93	4	2000	400	universal
NAV-T 100 SUPER	1.2	115	12	2	10000	100	4	2000	300	universal
NAV-T 150 4Y	1.8	170	20	2	14500	97	4	2000	300	universal
NAV-T 150	1.8	170	20	2	14500	97	4	2000	300	universal
NAV-T 150 SUPER	1.8	176	20	2	17500	112	4	2000	350	universal
NAV-T 250 4Y	3.0	275	32	2	27000	108	4	2100	400	universal



1) At rated voltage and cos φ ≥ 0.9
2) For circuit diagrams see page 5.34
3) For examples see page 5.36
4) See luminous intensity distribution curve on page 5.35
5) No igniter required
6) No control gear required
7) Reduced-load via a reduced-load circuit integrated in POWERTRONIC® PT-DS 80 (switch input on POWERTRONIC®)
8) System wattage: lamp + high reactance transformer
9) System wattage: lamp + hybrid control gear
10) Values resulting from operating the lamp with a high reactance transformer