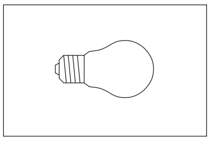
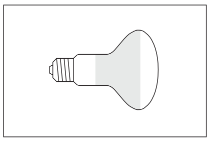
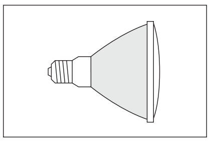


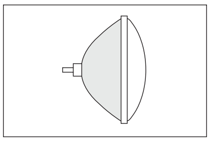
General service lamp				
Des.	P (W)	(lm)	l (mm)	d (mm)
A60	60	730	107	60
A60	100	1380	107	60
A65	150	2220	128	65
A80	200	3150	156	80
Cap: E27/E40		Lamp life 1000 h		



Reflector lamp				
Des.	P (W)	(lm)	l (mm)	d (mm)
R63	60	650	103	63
R80	100	1080	110	80
R95	100	1030	135	95
Cap: E27		Lamp life 1000 h		

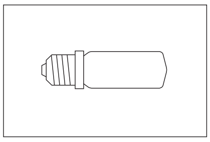


Parabolic reflector lamp				
Des.	P (W)	(lm)	l (mm)	d (mm)
PAR38	60	600	136	122
	80	800		
	120	1200		
Cap: E27		Lamp life 2000 h		

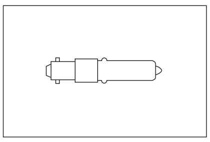


Parabolic reflector lamp				
Des.	P (W)	(lm)	l (mm)	d (mm)
PAR56	300	3000	127	179
Cap: GX16d		Lamp life 2000 h		

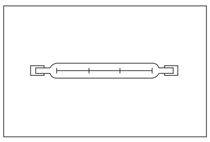
General service lamps, reflector lamps and two standard PAR lamps for mains voltage with data regarding lamp classification, power P, luminous flux Φ, lamp length l and lamp diameter d.



Halogen lamp				
Des.	P (W)	(lm)	l (mm)	d (mm)
QT32	75	1050	85	32
	100	1400	85	
	150	2500	105	
	250	4200	105	
Cap: E27	Lamp life 2000 h			

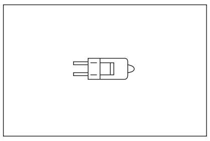


Halogen lamp				
Des.	P (W)	(lm)	l (mm)	d (mm)
QT18	75	1050	86	18
	100	1400	86	
	150	2500	98	
	250	4200	98	
Cap: B15d	Lamp life 2000 h			

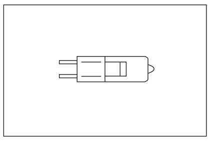


Halogen lamp				
Des.	P (W)	(lm)	l (mm)	d (mm)
QT-DE12	100	1650	75	12
	150	2500	75	
	200	3200	115	
	300	5000	115	
	500	9500	115	
Cap: R7s-15		Lamp life 2000 h		

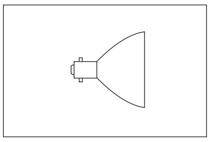
Single and double-ended halogen lamps for mains voltage.



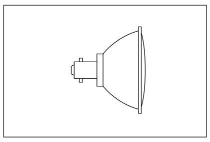
LV halogen lamp				
Des.	P (W)	(lm)	l (mm)	d (mm)
QT9	10	140	31	9
	20	350		
Cap: G4		Lamp life 2000 h		



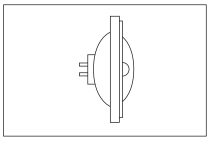
LV halogen lamp				
Des.	P (W)	(lm)	l (mm)	d (mm)
QT12	50	950	44	12
	75	1600		
	100	2500		
Cap: GY6.35		Lamp life 2000 h		



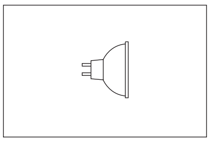
LV halogen reflector lamp				
Des.	P (W)	(lm)	l (mm)	d (mm)
QR38	20	7000	38	38
QR58	50	18000	59	58
Cap: B15d		Lamp life 2000 h		



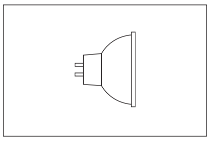
LV halogen reflector lamp				
Des.	P (W)	(lm)	l (mm)	d (mm)
QR70	20	5000	50	70
	75	15000		
	75	19000		
Cap: B15d		Lamp life 2000 h		



LV halogen reflector lamp				
Des.	P (W)	(lm)	l (mm)	d (mm)
QR111	50	20000	45	111
	75	25000		
	100	45000		
Cap: G53		Lamp life 2000 h		



LV halogen cool-beam reflector lamp				
Des.	P (W)	(lm)	l (mm)	d (mm)
QR-CB35	20	5000	37/44	35
QR-CB35	35	8000		
Cap: GZ4		Lamp life 2000 h		



LV halogen cool-beam reflector lamp				
Des.	P (W)	(lm)	l (mm)	d (mm)
QR-CB51	20	8000	45	51
QR-CB51	35	13000		
	50	15000		
	65/70	20000		
Cap: GX5.3		Lamp life 3000 h		

Low-voltage halogen lamps, clear, with metal reflector or with cool-beam reflector.

2.3.2 Discharge lamps

In contrast to incandescent lamps, light from discharge lamps is not produced by heating a filament, but by exciting gases or metal vapours. This is effected by applying voltage between two electrodes located in a discharge tube filled with inert gases or metal vapours. Through the voltage current is produced between the two electrodes. On their way through the discharge tube the electrons collide with gas atoms, which are in turn excited to radiate light, when the electrons are travelling at a sufficiently high speed. For every type of gas there is a certain wavelength combination; radiation, i.e. light, is produced from one or several narrow frequency ranges.

If the speed of the electrons increases, the gas atoms are no longer excited on collision, but ionised; the gas atom is decomposed to create a free electron and a positively charged ion. The number of electrically charged, effective particles in the discharge tube is accordingly increased, giving rise to a corresponding increase in radiation.

It soon becomes evident that discharge lamps have different properties to incandescent lamps. This applies in the first place to the means by which the light of the respective lamp is produced. Whereas incandescent lamps have a continuous spectrum dependent on the temperature of the filament, discharge lamps produce a spectrum with narrow bands that are typical for the respective gases or metal vapours. The spectral lines can occur in all regions of the spectrum, from infrared through the visible region to ultraviolet. The number and distribution of the spectral lines results in light of different luminous colours. These can be determined by the choice of gas or metal vapour in the discharge tube, and as a result white light of various colour temperatures can be produced. Moreover, it is possible to exceed the given limit for thermal radiators of 3650 K and produce daylight-quality light of higher colour temperatures. Another method for the effective production of luminous colours is through the application of fluorescent coatings on the interior surfaces of the discharge tube. Ultraviolet radiation in particular, which occurs during certain gas discharge processes, is transformed into visible light by means of these fluorescent substances, through which specific luminous colours can be produced by the appropriate selection and mixing of the fluorescent material.

The quality of the discharge lamp can also be influenced by changing the pressure inside the discharge tube. The spectral lines spread out as the pressure increases, approaching continuous spectral distribution. This results in enhanced colour rendering and luminous efficacy.

Apart from the differences in the kind of light they produce, there are also differences between incandescent and discharge lamps when it comes to operating conditions. Incandescent lamps can be run on the mains without any additional control gear. They produce light as soon as they are switched on. In the case of discharge lamps, however, there are various special ignition and operating conditions.

To ignite a discharge lamp there must be sufficient electron current in the discharge tube. As the gas that is to be excited is not ionised before ignition, these electrons must be made available via a special starting device. Once the discharge lamp has been ignited there is an avalanche-like ionisation of the excited gases, which in turn leads to a continuously increasing operating current, which would increase and destroy the lamp in a relatively short time. To prevent this from happening the operating current must be controlled by means of a ballast.

Additional equipment is necessary for both the ignition and operation of discharge lamps. In some cases, this equipment is integrated into the lamp; but it is normally installed separate from the lamp, in the luminaire.

The ignition behaviour and performance of discharge lamps depend on the operating temperature; in some cases this leads to lamp forms with additional glass bulbs. If the current is interrupted it is usually necessary to allow the lamp to cool down for a while before restarting it. Instant reignition is only possible if the starting voltage is very high. There are special requirements for some of the lamps regarding the burning position.

Discharge lamps can be divided into two main groups depending on the operating pressure. Each of these groups has different properties. One group comprises low-pressure discharge lamps. These lamps contain inert gases or a mixture of inert gas and metal vapour at a pressure well below 1 bar. Due to the low pressure inside the discharge tube there is hardly any interaction between the gas molecules. The result is a pure line spectrum.

The luminous efficacy of low-pressure discharge lamps is mainly dependent on lamp volume. To attain adequate luminous power the lamps must have large discharge tubes.

High-pressure discharge lamps, on the other hand, are operated at a pressure well above 1 bar. Due to the high pressure and the resulting high temperatures there is a great deal of interaction in the discharge gas. Light is no longer radiated in narrow spectral lines but in broader frequency ranges. In general, radiation shifts with increasing pressure into the long-wave region of the spectrum.

The luminous power per unit of volume is far greater than that of a low-pressure