

Mazda LAMP DATA SHEET

Sodium Discharge

Type SO/H

Low Pressure

General Description

The Sodium lamp consists of the following essential features.

- (1) A discharge tube of special glass, containing metallic Sodium and inert gas at low pressure.
- (2) An electrode sealed into each end of the discharge tube.
- (3) A double-walled vacuum jacket serving as an outer bulb.
- (4) Means of connection to the supply.

Owing to the comparatively long length of the discharge tube, it is, for convenience of design, bent into the form of a U.

The special glass employed is chemically resistant to attack by hot ionized Sodium vapour.

Thermal insulation is effected by operating the discharge tube in a vacuum jacket by means of which the optimum required temperature and pressure of Sodium vapour is attained during lamp operation.

The discharge tube contains Neon and Argon at a low pressure for the purpose of initiating the discharge prior to the vapourization of the Sodium.

As the lamp operates at a low vapour pressure, there is no delay in striking the arc if the lamp is switched on while still warm from previous operation.

The brightness of the lamp, however, when starting under this condition will depend upon the amount the lamp has cooled since being switched off.

The luminous radiation is concentrated at 5890\AA and 5896\AA and its colour may be described as monochromatic yellow.

Method of connection to the supply is by means of a ceramic BC cap which is made to engage with the ceramic collar of the vacuum jacket.

The vacuum jacket mentioned above incorporates the following special features -

- (a) A metallic getter, located within the walls of the jacket provides a harder vacuum and gives a prolonged service life.
- (b) The film of getter is visible at the top of the jacket, and has a dark silvery appearance so long as the vacuum conditions are preserved. In the event of a leak developing, this material will rapidly turn white, or disappear altogether. This provides a ready visual method of checking the condition of the vacuum jacket in service.
- (c) The seal-off pip is covered by a metal cap, which effectively protects the jacket at this point against rough handling in service.
- (d) The vacuum jacket is used for a number of lamps and it is estimated that the life of the jacket approximates to the total life of 4 to 5 lamps.

General Applications

The Sodium lamp is almost exclusively used for Streetlighting.

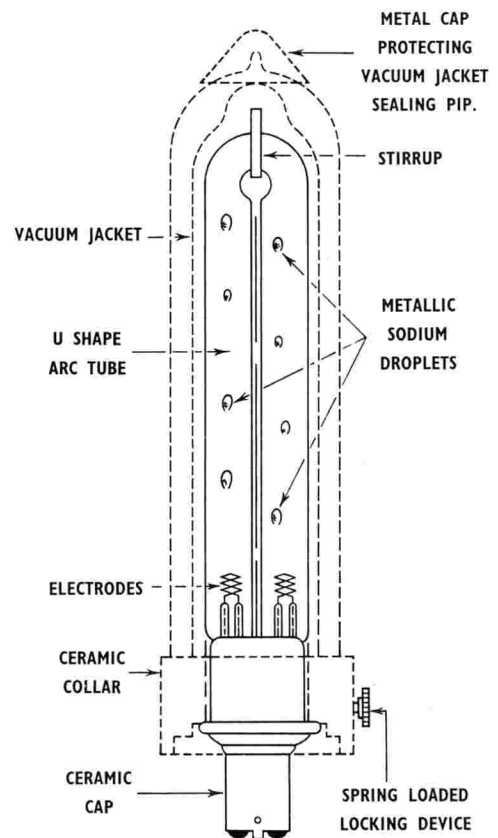
Standard Ratings

Rating		Type
Watts	Volts	
45	200/250	SO/H
60	Dependent on	SO/H
85	Transformer	SO/H
140	Tap	SO/H

Dimensions

Lamp only

Watts	Width Across Arc Tube (mm)	Overall Length To Cap Seating (mm)	Arc Length (mm) Maximum
45	32	180 ± 2	132
60	32	241 ± 2	191
85	32	357 ± 2	306
140	40	456 ± 2	403



TYPICAL CONSTRUCTION OF MAZDA SODIUM LAMP

The vacuum jacket is shown in broken lines

Lamp Assembled in Vacuum Jacket

Watts	Diameter (mm) of Vacuum Jacket	Overall Length (mm)	Light Centre Length (mm)
45	50 ± 2	238 ± 10	140 ± 10
60	50 ± 2	300 ± 10	170 ± 10
85	50 ± 2	415 ± 10	230 ± 10
140	65 ± 2	518 ± 10	280 ± 10

Physical Characteristics

Caps for 45, 60 and 85 watt lamps B22S/4000
for 140 watts B22M/4010

Electrical Characteristics

Rating		Lamp operating volts	Lamp operating current (amps.)	Lamp starting current (amps.)
Watts	Volts			
45	200/250	65/90	0.6	0.54
60		95/125	0.6	0.54
85		150/180	0.6	0.54
140		155/190	0.9	0.81

Light Source Characteristics and Performance

Efficiency, luminous output and average life

Rating Watts	Volts	Lumens per watt			Lumens			Average Life (hours)
		at 100 hr.	Average through life	at 4000 hr.	at 100 hr.	Average through life	at 4000 hr.	
45	200/250	58	50	45	2610	2250	2025	4000
60		67	57	51	4020	3420	3060	4000
85		73	65	60	6205	5525	5100	4000
140		73	65	60	10,220	9100	8400	4000

The time required for the lamps to reach full brilliance is of the order of 20 minutes.

Operating Position

45 and 60 watt lamps - from 5° above horizontal with cap down, to vertical with cap up.

85 and 140 watt lamps - from 5° above horizontal with cap down, to 20° below horizontal with cap up.

Circuit and Control Gear

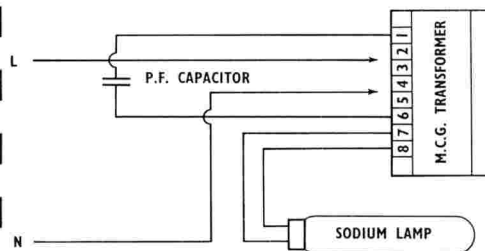
The control gear consists of a step up high reactance transformer with an open circuit secondary voltage of about 480 volts which provides sufficient voltage for starting, with progressively lower voltage as the neon discharge vapourises the metallic sodium and the lamp current increases.

For normal operation on a.c. supply the transformers and capacitors for power factor correction are as opposite:

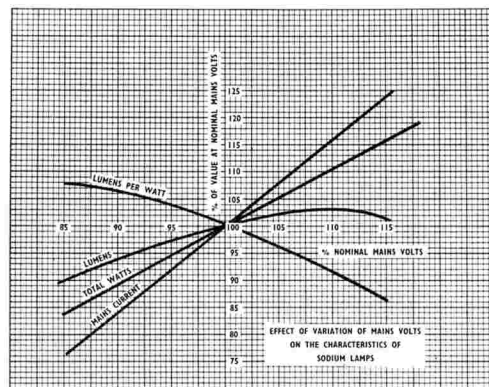
The lamp is connected to the mains as shown in the circuit diagram. The tappings corresponding with the supply voltage are given in the table below:

Supply Voltage	Transformer No.		Lamp Terminals	Transformer No.		Lamp Terminals
	MCG 113 for 45, 60 & 85 watts	MCG 112 for 140 watts		MCG 109 for 45, 60 & 85 watts	MCG 107 for 140 watts	
	Lamps Term'ls	Lamp Term'ls		Lamps Term'ls	Lamp Term'ls	
190	2-4	2-4	7-8	-	-	5-6
200	1-4	1-4		-	-	
210	3-5	3-5		-	-	
220	2-5	2-5		2-3	2-3	
230	1-5	1-5		1-3	1-3	
240	3-6	3-6		2-4	2-4	
250	2-6	2-6		1-4	1-4	
260	1-6	1-6		-	-	

Unless it is required to operate on supply voltages lower than 220 volts, the use of Transformer Nos. 107 and 109 is recommended.



CIRCUIT DIAGRAM



Lamp Wattage	For 190/260V Supply			For 220/250V Supply		
	Trans-former No.	Capaci-tor No.	Capaci-tance Mfd.	Trans-former No.	Capaci-tor No.	Capaci-tance Mfd.
45	MCG 113	PL 27	15	MCG 109	PL 27	15
60-85	MCG 113	PL 26	13	MCG 109	PL 27	15
140	MCG 112	PL 31	18	MCG 107	PL 28	20