AUDIO/VISUAL, ENTERTAINMENT, AND PHOTOGRAPHIC LAMPS

Halogen • Incandescent • Specialty Fluorescent • Metal Halide • Xenon Short Arc

USHIO

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250	1000707	J120V-250W/79MM SHORT	12
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150	1000722	J130V-150W/119MM LONG	13
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360	1000442	EYB, JCD82V-360W	19
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35	1000823	JC12V-35W	20
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50	1000829	JC12V-50WF	20
50	1000830	JC12V-50WG1.0	20
50	1000848	JC24V-50W	20
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50	1000827	JC12V-50W	22
50	1000828	JC12V-50W	22
50	1003487	JC12V-50WF	22
JC, JCD – GY6.35 Base			
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100	1000807	JC12V-100WG	22
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500	1001814	JCV220V-500WBM	23
500	1000997	JCV240V-500WBM	23
575	1000543	FLK, HX-600, JCV115V-575WCM	23
575	1003584	SPH115V-575W, JCD115V-575WCM	23
575	1003585	SPH115V-575WLL, JCD115V-575WBM	23
575	1002196	HX-601, JCV115V-575WBM	23
600	1000665	GLC/HP-600, JCS115V-600WCM	23
700	1000998	JCV240V-700WCH	23
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1000	1000098	BWN, JCS120V-1000WC1	23
1000	1000494	FCV, JCV120V-1000WCF	23
1000	1000509	FEL, JCV120V-1000WCH	23
1000	1000510	FEP, JCV240V-1000WCH	23
1200	1000972	JCV120V-1200WCH	23
JC, JCD, JCS, JCV – GY9.5 Base			
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100	1000504	FDT, JC12V-100W	24
150	1000309	EKL, JCD21V-150W	24
150	1000503	FDS/DZE, JC24V-150W	24
250	1000245	DYG, JCD30V-250WS	24
300	1000886	JCD100V-300WC	24
300	1000540	FKW, JCS120V-300WC/UA	24
420	1000304	EKB, JCD120V-420WC	24
500	1000285	EHA, JCS120V-500W	24
500	1000629	FTK, JCD120V-500WCT	24
500	1000914	JCD240V-500WC	24
500	1000603	FRG, JCS120V-500WC1	24
575	1003326	JCS120V-575WC	24
575	1003327	JCS120V-575WX	24
600	1000251	DYS/DYV/BHC, JCD120V-600WC	24
600	1000252	DYS-5, JCD125V-600WC	24
600	1000547	FMR, JCV120V-600WGY	24
625	1000089	BVE, JCS120V-625W	24
650	1000305	EKD, JCD120V-650WS	24
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650	1000604	FRK, JCS120V-650WC/UA	24
650	1000249	DYR/220V, JCD220V-650WC1	24
650	1000250	DYR/240V, JCD240V-650WC2	24
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900	1000088	BVA, JCS120V-900W	24
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JCR – MR16, GX5.3 Base			
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35	1000344	EPN, JCR12V-35W	40
50	1000335	ENL, JCR12V-50W	40
50	1000350	EPZ, JCR13.8V-50W	40
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100	1000326	EMC, JCR12V-100W	40
100	1000420	EXV, JCR12V-100W	40
120	1000311	EKN, JCR17.7V-120W	40
150	1000173	DDL, JCR20V-150W	40
JCR – MR16, GX5.3 Base			
150	1001628	EKE/HO, JCR21V-150W	40
150	1000297	EJA, JCR21V-150W	40
150	1000301	EJM, JCR21V-150W	40
150	1000302	EJV, JCR21V-150W	40
150	1000306	EKE, JCR21V-150W	40
150	1003370	EKE/L, JCR21V-150W 10H/5	40
150	1000319	ELD/EJN, JCR21V-150W	40
200	1000300	EJL, JCR24V-200W	40
200	1000314	EKX, JCR24V-200W	40
250	1000318	ELC, JCR24V-250W	40
250	1003106	ELC-3, JCR24V-250W	40
250	1003264	ELC-5, JCR24V-250W	40
JCR – MR16, GY5.3 Base			
85	1000357	ESH, JCR82V-85W	41
85	1000358	ESJ, JER82V-85W	41
150	1000356	ESD, JCR120V-150W	41
150	1000940	JCR120V-150W/B	41
200	1000441	EYA, JCR82V-200W	41

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JCR – MR16, GY5.3 Base			
250	1000386	EVW, JCR82V-250W	41
250	1000333	ENH, JCR120V-250W	41
250	1000379	ETJ, JCR120V-250W	41
300	1000321	ELH, JCR120V-300W	41
300	1000332	ENG, JCR120V-300W	41
360	1000337	ENX, JCR82V-360W	41
360	1000338	ENX-5, JCR86V-360W	41
410	1000636	FXL, JCR82V-410W	41
JCR – MR16, GZ6.35 Base			
50	1000268	EFM, JCR8V-50W	41
75	1000270	EFN, JCR12V-75W	41
100	1000271	EFP, JCR12V-100W	41
100	1003003	JCR12V-100W/H10	41
150	1000272	EFR, JCR15V-150W	41
JCS – G17T-7 Base			
1200	1000072	BRN, JCS120V-1200W	26
1200	1000082	BTG, JCS120V-1200W	26
JCS – P28s Base (C-13D Filament)			
500	1000083	BTL, JCS120V-500WBP28	27
500	1000084	BTM, JCS120V-500WCP28	27
500	1000208	FMC/DNS, JCS120V-500WB2P28	27
750	1000085	BTN, JCS120V-750WBP28	27
750	1000086	BTP, JCS120V-750WCP28	27
750	1000209	FMD/DNT, JCS120V-750WB2P28	27
1000	1000087	BTR, JCS120V-1000WCP28	27
JCV – P28s Base (CC-8 Filament)			
500	1000274	EGE, JCV120V-500WB	27
750	1000275	EGF, JCV120V-750WC	27
750	1000276	EGG, JCV120V-750WB	27
1000	1000278	EGJ, JCV120V-1000WC	27
1000	1000280	EGM, JCV120V-1000WB	27
JCS – P40s Base			
1000	1000091	BVT, JCS120V-1000WBP40	27
1000	1000092	BVV, JCS120V-1000WCP40	27
1000	1000214	DPW, JCS120V-1000W	27
1500	1000145	CWZ, JCS120V-1500W	27
1500	1000220	DTA, JCS120V-1500WCP40	27
2000	1000093	BVW, JCS120V-2000WCP40	27
JCV – E10 Base			
150	1000479	FBT, JCV30V-150W	28
JCV – E11 Base			
75	1000988	JCV120V-75WGSN	28
75	1000989	JCV120V-75WGSNF	28
100	1000970	JCV120V-100WGSN	28
100	1000971	JCV120V-100WGSNF	28
100	1000361	ESN, JCV120V-100WGSN2	28
150	1000377	ETG, JCV120V-150WGSN	28

Wattage	USHIO Code	ANSI Code / Product Code	Page #
JCV – E11 Base			
150	1000378	ETH, JCV120V-150WGSNF	28
150	1000359	ESL, JCV120V-150WGSN2	28
250	1000294	EHT, JCV120V-250WGSN	28
250	1000360	ESM, JCV120V-250WGSNF	28
250	1000991	JCV130V-250WGSN	28
250	1001809	JCV130V-250WGSNF	28
325	1000295	EHV, JCV120V-325WBS	28
400	1000976	JCV120V-400WGSN	28
400	1000977	JCV120V-400WGSNF	28
500	1000384	EVR, JCV120V-500WGS	28
500	1000466	EYX, JCV120V-500WGSF	28
500	1000465	EYW, JCV130V-500WGS	28
500	1000464	EYV, JCV130V-500WGSF	28
500	1000995	JCV230V-500WGS	28
750	1000463	EYT, JCV120V-750WB1	28
1000	1000967	JCV120V-1000WC3	28
JCV – E39 Base			
2000	1000095	BWF, JCV120V-2000W	28
2000	1000096	BWG, JCV120V-2000W	28
JCV – G9.5 Base			
1000	1000510	FEP, JCV240V-1000WCH	23
1200	1000972	JCV120V-1200WCH	23
JCV – GY9.5 Base			
600	1000547	FMR, JCV120V-600WGY	24
JCV – GZ9.5 Base			
300	1000578	FNA, JCV120V-300WGY	25
JDR – MR11, BA15d Base			
20	1000609	FST, JDR/M12V-20W/BA/SP17	38
20	1000610	FST/FG, JDR/M12V-20W/BA/SP17/FG	38
35	1000659	GDZ, JDR/M12V-35W/BA/FL30	38
JDR – MR11, GZ4 Base			
12	1000615	FTA, JDR/M12V-12W/G/NSP9.5	37
12	1000616	FTA/FG, JDR/M12V-12W/G/VNSP9.5/FG	37
20	1000617	FTB, JDR/M12V-20W/G/SP10	37
20	1000618	FTB/FG, JDR/M12V-20W/G/SP10/FG	37
20	1000619	FTC, JDR/M12V-20W/G/SP17	37
20	1000620	FTC/FG, JDR/M12V-20W/G/SP17/FG	37
20	1000621	FTD, JDR/M12V-20W/G/FL30	37
20	1000622	FTD/FG, JDR/M12V-20W/G/FL30/FG	37
35	1000625	FTF, JDR/M12V-35W/G/SP20	37
35	1000627	FTH, JDR/M12V-35W/G/FL30	37
35	1000628	FTH/FG, JDR/M12V-35W/G/FL30/FG	37
20	1001000	JDR/M24V-20W/SP19/FG	37
20	1001004	JDR/M24V-20W/FL30/FG	37
35	1001007	JDR/M24V-35W/SP13	37
35	1001010	JDR/M24V-35W/FL30/FG	37

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JDR – MR16, E17 Base			
75	1001032	JDR120V-75WL/SP12	42
75	1001030	JDR120V-75WL/NFL24	42
75	1001033	JDR120V-75WL/FL38	42
100	1001013	JDR120V-100WL/SP14	42
100	1001011	JDR120V-100WL/NFL24	42
100	1001016	JDR120V-100WL/FL38	42
JDR – MR16, E26 Base			
75	1001834	JDR120V-75WL/SP14	42
75	1001031	JDR120V-75WL/NFL24	42
75	1001029	JDR120V-75W/FL30/FG	42
100	1001014	JDR120V-100WL/NSP10	42
100	1001012	JDR120V-100WL/NFL20	42
100	1001017	JDR120V-100WL/FL30	42
JP – R7s Base (OAL≈ 119.6mm)			
500	1000502	FDN, JP120V-500WCF6	14
500	1000500	FDF, JP120V-500WC6	14
500	1001084	JP220V-500WC	14
750	1000327	EMD, JP120V-750WCF	14
750	1000299	EJG, JP120V-750WC	14
800	1000329	EMF, JP240V-800WCF	14
800	1000328	EME, JP240V-800WC1UA	14
1000	1000489	FCM, JP120V-1000WC1	14
1000	1000533	FHM, JP120V-1000WCF1	14
1000	1000298	EJD, JP185V-1000WS	14
500	1000652	GDA, JP120V-500WC2	14
500	1000654	GDA/240V, JP245V-500WC	14
1000	1000523	FFT, JP120V-1000WC2	14
1500	1000529	FGT, JP120V-15000WCF	14
1500	1000499	FDB, JP120V-1500WC	14
2000	1000524	FFW, JP120V-2000WC	14
1000	1000310	EKM, JP225V-1000WCL	14
1250	1001086	JP225V-1250WC1	14
JPD – R7s-18, RX7s Base			
150	1001106	JPD25V-150WG1	15
300	1000292	EHP, JPD120V-300WG	15
375	1000230	DWZ, JPD30V-375W	15
400	1000293	EHR, JPD120V-400WG	15
400	1000498	FDA, JPD120V-400W	15
420	1000472	FAL, JPD120V-420WC	15
420	1000518	FFM, JPD120V-420WC1	15
600	1000486	FCB, JPD120V-600WD	15
600	1000508	FEA, JPD240V-600WC	15
650	1000471	FAD, JPD120V-650WC	15
650	1000482	FBX, JPD120V-650WCF	15
650	1000229	DWY/FAB, JPD120V-650WS	15
650	1000485	FCA, JPD120V-650WSF	15

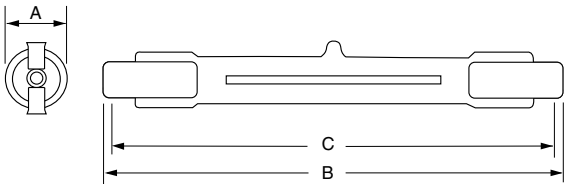
Wattage	USHIO Code	ANSI Code / Product Code	Page #
JPD – R7s-18, RX7s Base			
650	1001103	JPD220V-650WC	15
800	1000238	DXX/220V, JPD220V-800WC1	15
800	1000240	DXX/240V, JPD240V-800WC	15
1000	1000236	DXW, JPD120V-1000WC5	15
1000	1000234	DXN, JPD120V-1000WS1	15
1000	1000511	FER, JPD120V-1000WC6	15
1000	1000228	DWT, JPD120V-1000WB1	15
1000	1000241	DYA, JPD120V-1000WC2	15
1000	1000483	FBY, JPD120V-1000WC5F	15
1000	1001102	JPD220V-1000WC	15
2000	1000516	FEY, JPD120V-2000WC	15
2000	1000515	FEX/240V, JPD240V-2000WC1	15
JS – GY22 Base			
500	1000281	EGN, JS120V-500WC	30
750	1000282	EGR, JS120V-750WC (CP39)	30
1000	1000283	EGT, JS120V-1000WC (CP40)	30
1000	1003248	VL1K-115V, JS115V-1000WC/V	30
1000	1003273	VL1K240V, JS240V-1000WC/V	30
JS – G38 Base			
1000	1000154	CYV, JS120V-1000WC2	31
1500	1000150	CXZ, JS120V-1500W	31
2000	1000094	BWA, JS120V-2000W/G38	31
2000	1000155	CYX, JS120V-2000WC	31
5000	1000215	DPY, JS120V-5000WC	31
10000	1000223	DTY/220V, JS220V-10000WG38	31
JT – E26 Base			
150	1001883	JT120V-150WG	35
250	1001142	JT120V-250WGF	35
JT – E39 Base			
500	1001143	JT120V-500WB	35
1000	1001134	JT120V-1000WB	35
1000	1001889	JT240V-1000WB	35
JT – E40 Base			
500	1003516	JT220V-550WC1/E40	35
1000	1003361	JT120V-1000WC/E40	35
1000	1003517	JT220V-1000WC1/E40	35
MHL – G12 Base			
70	5001468	MHL-70	54
150	5001381	MHL-150	54
MHL – R7s Base			
250	5000089	MHL-250	54
450	5000114	MHL-450	54
MHR - Fiber Optic Metal Halide			
100	5000789	MHR-100D/L	58
150	5000834	MHR-150N	58
250	5001377	MHR-250N	58

J

- Only for Use in Approved Enclosed Halogen Fixtures
- Recessed Single Contact
- Compact CC-8 & Linear C-8 Filaments
- Even, Linear Illumination
- T2.5 & T4

Watts (W)	Ordering Code	Lamp Description	Dimensions (mm) Dia (A)	MOL (B)	C-to-C (C)	Filament Type	Lumens (lm)	Avg Life (h)	Bulb Finish
		R7s-12 Base – MOL ≈ 3 1/8" (80.3mm) – T2.5, T4*							
100	1000698	J120V-100W/79MM SHORT	8.0	80.3	74.9	CC-8	1450	1500	Clear
100	1000721	J130V-100W/79MM SHORT	8.0	80.3	74.9	CC-8	1450	1500	Clear
100	1000762	J240V-100W/79MM SHORT	8.0	80.3	74.9	CC-8	1250	1500	Clear
150	1001734	J12V-150WA/80*	12.0	85.5	80.0	C-8	2700	2000	Clear
150	1000701	J120V-150W/79MM SHORT	8.0	80.3	74.9	CC-8	2400	1500	Clear
150	1000723	J130V-150W/79MM SHORT	8.0	80.3	74.9	CC-8	2400	2000	Clear
150	1000751	J230V-150W/79MM SHORT	8.0	80.3	74.9	CC-8	1950	1500	Clear
200	1000703	J120V-200W/79MM SHORT	8.0	80.3	74.9	CC-8	3460	2000	Clear
250	1000707	J120V-250W/79MM SHORT	8.0	80.3	74.9	CC-8	4500	2000	Clear
300	1000709	J120V-300W/79MM SHORT	8.0	80.3	74.9	CC-8	5900	2000	Clear

With greater economy through long life and high output, J series of lamps are ideal for flood lighting wide areas for both indoor and outdoor lighting installations.

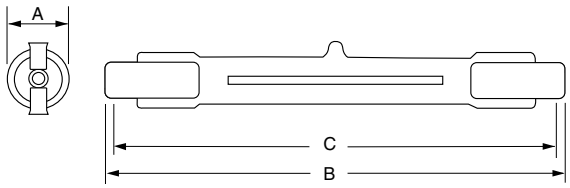


R7s-12

J

- Only for Use in Approved Enclosed Halogen Fixtures
- Recessed Single Contact Base - R7s-12
- Compact CC-8 & Linear C-8 Filaments
- T2.5 & T4

Watts (W)	Ordering Code	Lamp Description	Dimensions (mm) Dia (A)	MOL (B)	C-to-C (C)	Filament Type	Lumens (lm)	Color Temp (K)	Avg Life (h)	Bulb Finish	Case Qty
		R7s-12 Base – MOL≈ 4-11/16" (119.6mm) – T 2.5									
100	1000697	J120V-100W/119MM LONG	8.0	119.6	114.2	C-8	1450	2750	1500	Clear	50
100	1000720	J130V-100W/119MM LONG	8.0	119.6	114.2	C-8	1450	2750	1500	Clear	50
150	1000719	J12V-150WG/119MM LONG	8.0	119.6	114.2	C-8	2400	2900	1500	Clear	50
150	1000700	J120V-150W/119MM LONG	8.0	119.6	114.2	C-8	2400	2800	1500	Clear	50
150	1000722	J130V-150W/119MM LONG	8.0	119.6	114.2	C-8	2400	2850	1500	Clear	50
200	1000702	J120V-200W/119MM LONG	8.0	119.6	114.2	C-8	2850	2900	2000	Clear	50
300	1000291	EHM, J120V-300W	8.0	119.6	114.2	C-8	5900	3000	2000	Clear	50
300	1000296	EHZ, J120V-300WF	8.0	119.6	114.2	C-8	5770	3000	2000	Frosted	50
300	1000726	J130V-300W/119MM LONG	8.0	119.6	114.2	C-8	5900	——	2000	Clear	50
500	1000488	FCL, J120V-500W	8.0	119.6	114.2	C-8	10000	3000	2000	Clear	50
500	1000497	FCZ, J120V-500WF	8.0	119.6	114.2	C-8	10700	3000	2000	Frosted	50
500	1000224	DVS, J130V-500WB	8.0	119.6	114.2	C-8	10500	3000	2000	Clear	50
500	1000736	J220V-500WE/119MM LONG	12.0	119.6	114.2	C-8	9500	3000	2000	Clear	50
500	1000077	BSH, J240V-500WN	10.0	119.6	114.2	C-8	9500	2950	2000	Clear	50
750	1000738	J220V-750WB1	12.0	119.6	114.2	C-8	16100	3050	1500	Clear	50
		R7s-12 Base – MOL ≈ 7-1/2" (191.1mm) – T 2.5, T4*									
1000	1000695	J120V-1000WB*	12.0	191.1	185.7	C-8	22000	3000	2000	Clear	100
		R7s-12 Base – MOL ≈ 10-5/64" (256.1mm) – T 2.5									
1500	1000243	DYD, J240V-1500WB	8.0	256.1	250.7	C-8	33000	3050	2000	Clear	100

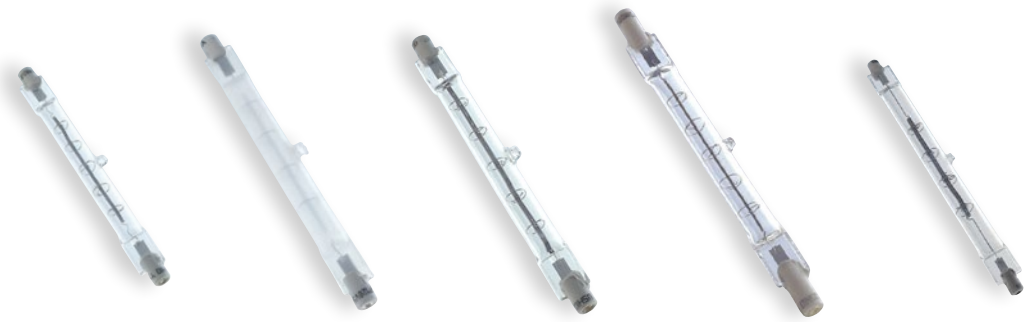


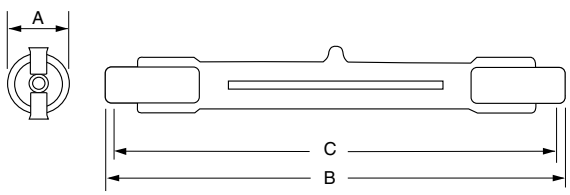
R7s-12

JP

- Only for Use in Approved Enclosed Halogen Fixtures
- Recessed Single Contact Base - R7s*, R7s-12
- Operate Horizontal ±4°
- T2.5, T3 & T4

Watts (W)	Ordering Code	Lamp Description	Dimensions (mm) Dia (A)	MOL (B)	C-to-C (C)	Filament Type	Lumens (lm)	Color Temp (K)	Avg Life (h)	Bulb Finish	Case Qty
		MOL ≈ 4-11/16" (119.6mm) – R7s-12, R7s* Base									
500	1000502	FDN, JP120V-500WCF6	12.0	119.6	114.2	C-8	12500	3200	400	Frosted	50
500	1000500	FDF, JP120V-500WC6	12.0	119.6	114.2	C-8	13250	3200	400	Clear	50
500	1001084	JP220V-500WC*	12.0	119.6	114.2	C-8	12500	3200	200	Clear	10
750	1000327	EMD, JP120V-750WCF	12.0	119.6	114.2	C-8	19500	3200	400	Frosted	50
750	1000299	EJG, JP120V-750WC	12.0	119.6	114.2	C-8	20600	3200	400	Clear	50
800	1000329	EMF, JP240V-800WCF	12.0	119.6	114.2	C-8	21400	3200	250	Frosted	50
800	1000328	EME, JP240V-800WC1UA	12.0	119.6	114.2	C-8	22000	3200	250	Clear	50
1000	1000489	FCM, JP120V-1000WC1	12.0	119.6	114.2	C-8	27000	3200	300	Clear	50
1000	1000533	FHM, JP120V-1000WCF1	12.0	119.6	114.2	C-8	26000	3200	300	Frosted	50
1000	1000298	EJD, JP185V-1000WS*	12.0	119.6	114.2	C-8	33600	3350	100	Clear	50
		MOL ≈ 5-5/16" (135.2mm) – R7s-12 Base									
500	1000652	GDA, JP120V-500WC2	12.0	135.2	129.8	C-8	11000	3100	100	Clear	50
500	1000654	GDA/240V, JP245V-500WC	12.0	135.2	129.8	C-8	11000	3150	100	Clear	50
		MOL ≈ 6-19/32" (167.4mm) – R7s-12 Base									
1000	1000523	FFT, JP120V-1000WC2	12.0	167.4	163.3	C-8	27000	3200	300	Clear	100
1500	1000529	FGT, JP120V-1500WCF	13.0	167.4	162.0	C-8	40200	3200	400	Frosted	100
1500	1000499	FDB, JP120V-1500WC	13.0	167.4	162.0	C-8	41200	3200	400	Clear	100
		MOL ≈ 6-21/32" (169.3mm) – R7s-12 Base									
2000	1000524	FFW, JP120V-2000WC	14.0	169.3	163.9	C-8	57000	3200	125	Clear	100
		MOL ≈ 7-9/16" (191.1mm) – R7s* Base									
1000	1000310	EKM, JP225V-1000WCL*	12.0	191.1	140.0	C-8	25000	3200	200	Clear	100
1250	1001086	JP225V-1250WC1*	12.0	191.1	185.7	C-8	33500	3200	200	Clear	100



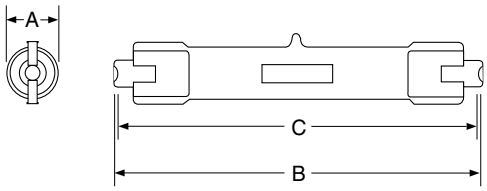


R7s-12

JPD

- Only for Use in Approved Enclosed Halogen Fixtures
- Recessed Single Contact Base - R7s-18 & RX7s
- Universal Burn Position

Watts (W)	Ordering Code	Lamp Description	Dimensions (mm) Dia (A)	MOL (B)	C-to-C (C)	Filament Type	Lumens (lm)	Color Temp (K)	Avg Life (h)	Bulb Finish	Case Qty
		Recessed Single Contact Base – R7s-18, RX7s*									
150	1001106	JPD25V-150WG1 fused	15.0	66.7	64.7	CC-8	2700	2900	3000	Clear	20
300	1000292	EHP, JPD120V-300WG	15.0	80.3	74.9	CC-8	5650	2900	2000	Clear	50
375	1000230	DWZ, JPD30V-375W	15.0	80.3	74.9	CC-8	7500	3000	1000	Clear	50
400	1000293	EHR, JPD120V-400WG	15.0	80.3	74.9	CC-8	7750	2900	2000	Clear	50
400	1000498	FDA, JPD120V-400W	15.0	80.3	74.9	CC-8	10400	3200	200	Clear	50
420	1000472	FAL, JPD120V-420WC	14.0	66.7	62.0	CC-8	11000	3200	75	Clear	50
420	1000518	FFM, JPD120V-420WC1	15.0	80.3	74.9	CC-8	11000	3200	75	Clear	50
600	1000486	FCB, JPD120V-600WD	15.0	95.0	89.6	CC-8	17000	3250	75	Clear	50
600	1000508	FEA, JPD240V-600WC	15.0	95.0	89.6	CC-8	15000	3200	75	Clear	50
650	1000471	FAD, JPD120V-650WC	15.0	80.3	74.9	CC-8	16500	3200	100	Clear	50
650	1000482	FBX, JPD120V-650WCF	15.0	80.3	74.9	CC-8	16000	3200	100	Frosted	50
650	1000485	FCA, JPD120V-650WSF	15.0	80.3	74.9	CC-8	19000	3400	35	Frosted	50
650	1000229	DWY/FAB, JPD120V-650WS	15.0	80.3	74.9	CC-8	20000	3400	25	Clear	50
650	1001103	JPD220V-650WC	15.0	80.3	74.9	CC-8	16300	3200	75	Clear	50
800	1000238	DXX/220V, JPD220V-800WC1	15.0	80.3	74.9	CC-8	20500	3200	75	Clear	50
800	1000240	DXX/240V, JPD240V-800WC	15.0	80.3	74.9	CC-8	20500	3200	75	Clear	50
1000	1000236	DXW, JPD120V-1000WC5	18.0	95.0	89.6	CC-8	28000	3200	150	Clear	50
1000	1000234	DXN, JPD120V-1000WS1	18.0	95.0	89.6	CC-8	31000	3400	50	Clear	50
1000	1000511	FER, JPD120V-1000WC6*	19.0	143.5	138.1	CC-8	27500	3200	500	Clear	50
1000	1000228	DWT, JPD120V-1000WB1*	19.0	143.5	138.1	CC-8	23400	3000	2000	Clear	50
1000	1000241	DYA, JPD120V-1000WC2	18.0	109.5	104.1	CC-8	28000	3200	200	Clear	50
1000	1000483	FBY, JPD120V-1000WC5F	18.0	95.0	89.6	CC-8	26000	3200	150	Frosted	50
1000	1001102	JPD220V-1000WC	18.0	95.0	89.6	CC-8	25000	3200	120	Clear	50
2000	1000516	FEY, JPD120V-2000WC	29.0	143.5	138.1	CC-8	57000	3200	400	Clear	50
2000	1000515	FEX/240V, JCD240V-2000WC1	29.0	143.5	138.1	CC-8	50000	3200	300	Clear	50

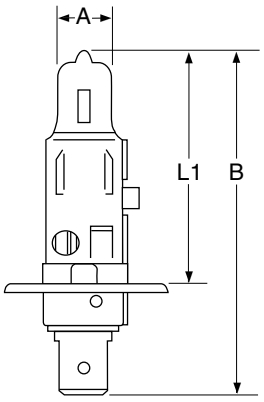


R7s-18

JA

- Only for Use in Approved Enclosed Halogen Fixtures
- P14.5s Base
- 12 Volts

Watts (W)	Ordering Code	Lamp Description	Volts (V)	Dimensions (mm) Dia (A)	MOL (B)	Length (L1)	Filament Type	Lumens (lm)	Color Temp (K)	Avg Life (h)	Case Qty
		P14.5s Base									
55	1000790	JA12V-55W H1-55	12	8.5	67.5	25.25	C-8	1550	3000	150	100

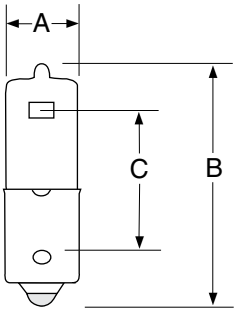


P14.5s

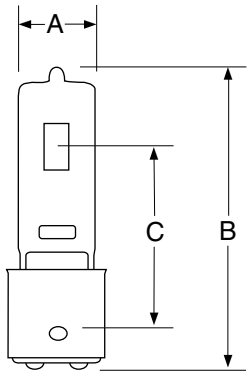
JC, JD, JCV

- Only for Use in Approved Enclosed Halogen Fixtures
- Single Contact Bayonet Base - BA9s
  Double Contact Bayonet Base - BA15d
- Universal Burn Position

Watts (W)	Ordering Code	Lamp Description	Dimensions (mm) Dia (A)	MOL (B)	C-to-C (C)	Filament Type	Lumens (lm)	Color Temp (K)	Avg Life (h)	Bulb Finish	Case Qty
		Single Contact Bayonet Base – BA9s									
20	1000819	JC12V-20W/BA9S	8.0	30.0	13.5	C-6	340	2900	2000	Clear	10
		Double Contact Bayonet Base – BA15d									
60	1000915	JCD24V-60W	12.5	60.5	35.0	CC-6	1260	—	500	Clear	100
75	1000986	JCV120V-75WGB	12.0	59.0	35.0	CC-8	1200	2800	1000	Clear	10
100	1000968	JCV120V-100WGB	13.0	62.0	35.0	CC-8	1600	2800	2000	Clear	10
100	1000969	JCV120V-100WGBF	13.0	62.0	35.0	CC-8	1550	2800	2000	Frosted	10
100	1000364	ESR, JCV120V-100WGB2	13.0	62.0	35.0	CC-2V	1800	2850	750	Clear	10
100	1000374	ETD, JCV120V-100WGB2F	13.0	62.0	35.0	CC-2V	1750	2850	750	Frosted	10
125	1000814	JC12V-125WB/BA15D	15.0	49.0	28.8	C-8	1900	2800	1000	Clear	20
150	1000373	ETC, JCV120V-150WGB	13.0	62.0	35.0	CC-8	2800	2900	2000	Clear	10
150	1000362	ESP, JCV120V-150WGB2	13.0	62.0	35.0	CC-2V	2800	2900	1000	Clear	10
150	1000376	ETF, JCV120V-150WGBF	13.0	62.0	35.0	CC-8	2700	2900	2000	Frosted	10
200	1000512	FEV, JCV120V-200WCB2	13.0	62.0	35.0	CC-2V	5500	3200	50	Clear	10
200	1001803	JCV230V-200WGB	15.0	63.0	35.1	CC-8	5000	2800	2000	Clear	20
250	1000365	ESS, JCV120V-250WGB	13.0	76.0	41.0	CC-8	5000	3000	2000	Clear	10
250	1000372	ETB, JCV120V-250WGBF	13.0	76.0	41.0	CC-8	4800	3000	2000	Frosted	10
500	1000979	JCV120V-500WGB	13.0	87.0	54.0	CC-8	10450	2950	2000	Clear	10



BA9s



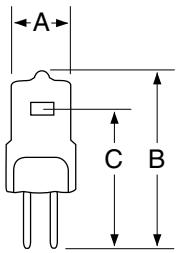
BA15d

JC

- Only for Use in Approved Enclosed Halogen Fixtures
- Miniature 2-Pin Base - G4
- Universal Burn Position

Watts (W)	Ordering Code	Lamp Description	Dimensions (mm) Dia (A)	MOL (B)	C-to-C (C)	Filament Type	Lumens (lm)	Color Temp (K)	Avg Life (h)	Bulb Finish	Case Qty
		Miniature 2-Pin Base – G4									
10	1000857	JC6V-10WH3 (64223)	8.0	31.0	19.5	C-6	150	2900	300	Clear	10
10	1000531	FHD/ESA, JC6V-10W	9.0	30.0	19.5	C-6	200	3200	100	Clear	10
10	1003030	JC12V-10W/G4	9.0	30.0	19.5	C-6	120	2800	2000	Clear	100
10	1000813	JC12V-10WF/G4	9.0	30.0	19.5	C-6	115	2800	2000	Frosted	10
20	1000532	FHE/ESB, JC6V-20W	9.0	30.0	19.5	C-6	450	3200	100	Clear	100
20	1000866	JC6V-20W/G4	9.0	30.0	19.5	C-6	280	2850	2000	Clear	10
20	1000821	JC12V-20W/G4	9.0	30.0	19.5	C-6	350	2850	2000	Clear	10
20	1000804	JC12V-20W/G4	9.0	30.0	19.5	C-8	350	2850	2000	Clear	10
20	1000844	JC24V-20W/G4	9.0	30.0	19.5	C-6	280	2850	2000	Clear	100
30	1000867	JC6V-30W/G4	9.0	30.0	19.3	C-6	800	3300	50	Clear	10
35	1000825	JC12V-35WB/G4	9.0	30.0	19.5	C-6	650	2900	2000	Clear	10

Originally developed as light sources for optical instruments, JC lamps feature an overall compact design with precise LCL placement. The exceptional brightness of this compact lamp make this series an ideal choice for task light applications.



G4

JC, JCD & JCV

- Only for Use in Approved Enclosed Halogen Fixtures
- Miniature 2-Pin Base - G5.3

Watts (W)	Ordering Code	Lamp Description	Dimensions (mm) Dia (A)	MOL (B)	LCL (C)	Filament Type	Lumens (lm)	Color Temp (K)	Avg Life (h)	Burn Position	Bulb Finish	Case Qty	Fig No
		Miniature 2-Pin Base – G5.3											
30	1000254	DZA, JC10.8V-30W	11.5	51.0	27.0	C-6	600	3100	400	BD/Hor	Clear	10	1
50	1000837	JC14.5V-50WC	11.5	55.0	32.0	CBar6	1250	3200	100	BD/Hor	Clear	10	1
100	1000649	GCC, JC12V-100WC5	11.5	57.0	32.0	CBar6	2900	3300	200	BD/Hor	Clear	10	1
125	1000605	FSH, JCV120V-125WB	11.5	57.0	32.0	CC-8	2500	3000	200	BD/Hor	Clear	10	4
200	1000648	GCB, JCD30V-200WC1	11.5	57.0	32.0	CC-6	5300	3200	200	BD/Hor	Clear	20	2
250	1000453	EYH/FKT, JCD120V-250WB	22.0	63.5	36.5	CC-6	6050	3050	150	BD/Hor	Clear	10	3
250	1000647	GCA, JCV120V-250WC	11.5	57.0	32.0	CC-8	5880	3200	200	BD/Hor	Clear	10	4
300	1000899	JCD120V-300WCP	22.0	62.0	37.0	CC-6	7350	3200	100	BD/Hor	Clear	10	3
360	1000442	EYB, JCD82V-360W	11.5	57.0	31.8	CC-8	10000	3300	75	BD/Hor	Clear	10	2
360	1000443	EYB-5, JCD86V-360WS	11.5	57.0	31.8	CC-8	10000	3300	75	BD/Hor	Clear	10	2
600	1000246	DYH, JCD120V-600WCP	22.0	63.0	36.5	CC-6	17000	3200	75	BD/Hor	Clear	10	3
650	1000225	DVY, JCD120V-650WSP	22.0	63.0	36.5	CC-6	20000	3400	25	BD/Hor	Clear	10	3
650	1000247	DYJ, JCD230V-650WSP	24.0	63.5	42.9	2CC-8	20000	3400	20	BD/Hor	Clear	10	5

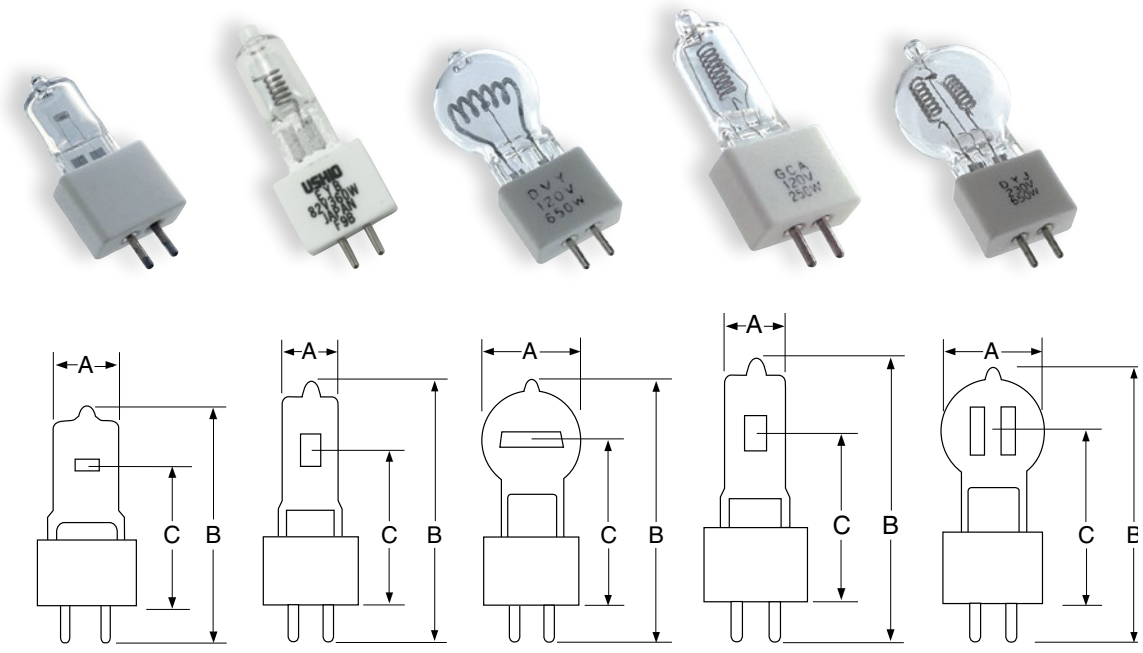


Fig.1 Fig.2 Fig.3 Fig.4 Fig.5

JC, JCD & JCV

- Only for Use in Approved Enclosed Halogen Fixtures
- 2-Pin Base - G6.35

Watts (W)	Ordering Code	Lamp Description	Dimensions (mm) Dia (A)	MOL (B)	LCL (C)	Filament Type	Lumens (lm)	Color Temp (K)	Avg Life (h)	Burn Position	Bulb Finish	Case Qty	Fig No
		2-Pin Base – G6.35											
20	1000822	JC12V-20W	11.0	44.0	30.0	C-6	280	2850	2000	Univ	Clear	10	1
35	1000823	JC12V-35W	11.0	44.0	30.0	C-6	650	2900	2000	Univ	Clear	100	1
50	1000071	BRL, JC12V-50W	11.5	44.0	30.0	CBar6	1600	3400	50	BD/Hor	Clear	100	2
50	1000829	JC12V-50WF	10.5	44.0	30.0	C-6	840	3000	2000	Univ	Frosted	10	1
50	1000830	JC12V-50WG1.0	11.0	44.0	30.0	C-6	900	2900	2000	Univ	Clear	10	1
50	1000848	JC24V-50W	10.5	44.0	30.0	C-6	750	2950	2000	Univ	Clear	10	1
100	1000839	JC24V-100W	11.0	44.0	30.0	CC-6	1800	3000	2000	Univ	Clear	10	1
150	1000492	FCS, JC24V-150WUI	13.5	50.0	32.0	CBar6	5000	3400	50	BD/Hor	Clear	100	2
150	1000505	FDV, JC24V-150W	13.5	50.0	30.0	CBar6	4300	3300	100	BD/Hor	Clear	12	2
150	1000537	FHY, JC24V-150W	13.5	50.0	30.0	CBar6	3700	3100	1000	BD/Hor	Clear	12	2
150	1000371	ESY, JCD100V-150WB	13.5	50.0	33.0	CC-6	3300	3075	200	BD/Hor	Clear	20	1
150	1000893	JCD120V-150WB	14.0	50.0	30.0	CC-6	3200	3075	100	BD/Hor	Clear	10	1
250	1000290	EHJ, JC24V-250W	13.5	55.0	33.0	CBar6	8500	3400	50	BD/Hor	Clear	10	1
250	1000382	EVC/FGX, JC24V-250W	13.0	52.0	35.0	CBar6	8400	3400	300	Univ	Clear	100	1
250	1000343	EPL, JCV30V-250WS1	10.0	50.0	24.5	CC-8	7500	3400	6	Univ	Clear	10	4
275	1000588	FNT, JC24V-275W	13.5	55.0	33.0	CBar6	10000	3400	75	BD/Hor	Clear	10	2
300	1000216	DRA, JCD120V-300W	16.0	50.0	33.0	CC-6	6900	3100	300	BD/Hor	Clear	10	3
400	1000383	EVD, JC36V-400WS1	16.0	60.0	36.0	CBar6	16000	3400	50	BD/Hor	Clear	10	2
400	1002141	EVD/L, JC36V-400H1	18.0	60.0	36.0	CBar6	14500	3400	100	BD/Hor	Clear	10	2

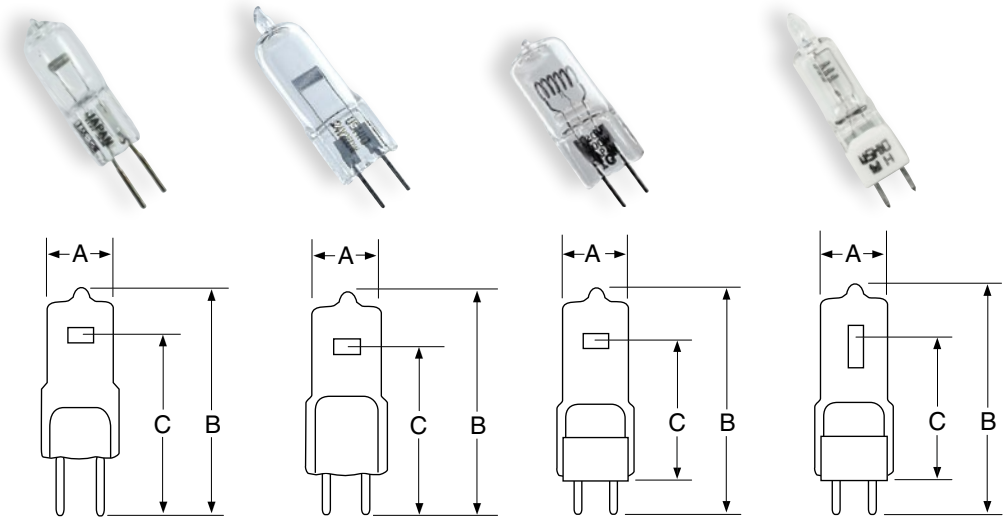


Fig.1 Fig.2 Fig.3 Fig.4

JC, JCD & JCV

- Only for Use in Approved Enclosed Halogen Fixtures
- 2-Pin Base - G6.35/15X19 & GX6.35

Watts (W)	Ordering Code	Lamp Description	Dimensions (mm) Dia (A)	MOL (B)	LCL (C)	Filament Type	Lumens (lm)	Color Temp (K)	Avg Life (h)	Burn Position	Bulb Finish	Case Qty	Fig No
		2-Pin Base – G6.35/15X19											
150	1000843	JC24V-150WL-H	13.5	61.0	37.0	CBar6	5000	3400	50	BD/Hor	Clear	10	1
300	1000897	JCD120V-300WC/LP	22.0	62.0	37.0	CC-6	7500	3200	70	BD/Hor	Clear	10	2
650	1000907	JCD120V-650WL	22.0	62.0	37.0	CC-6	17750	3200	150	BD/Hor	Clear	10	2
		2-Pin Base – GX6.35											
300	1001762	JCD120V-300W	19.5	57.5	37.0	Special	7700	3200	75	BD/Hor	Clear	10	3
300	1000974	(FNS) JCV120V-300WC	16.0	57.5	30.0	CC-8	8100	3200	30	BD/Hor	Clear	10	4
650	1000983	JCV120V-650WC	24.0	57.5	30.0	2CC-8	1700	3200	100	BD/Hor	Clear	50	5
1000	1001822	JCV120V-1000WC4	23.0	67.5	38.0	2CC-8	27000	3200	100	BD/Hor	Clear	10	5

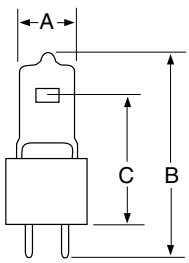


Fig.1

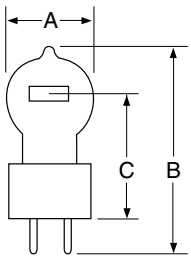


Fig.2

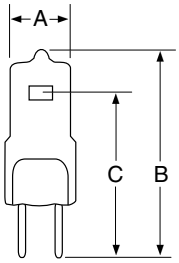


Fig.3

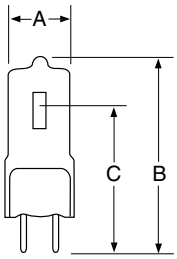


Fig.4

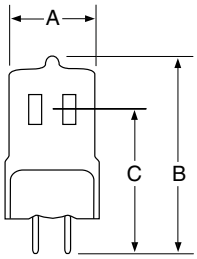


Fig.5

HALOGEN LOW VOLTAGE BI-PIN

JC & JCD

- Only for Use in Approved Enclosed Halogen Fixtures
- 2-Pin Base - GY6.35

Watts (W)	Ordering Code	Lamp Description	Dimensions (mm) Dia (A)	MOL (B)	LCL (C)	Filament Type	Lumens (lm)	Color Temp (K)	Avg Life (h)	Burn Position	Bulb Finish	Case Qty	Fig No
		2-Pin Base – GY6.35											
35	1000824	JC12V-35W	11.0	44.0	30.0	C-8	650	2900	2000	BD/Hor	Clear	10	1
35	1003486	JC12V-35WF	11.0	44.0	30.0	C-8	650	2900	2000	BD/Hor	Frosted	10	1
35	1000902	JCD120V-35W	11.0	55.0	38.0	CC-2V	500	2800	1500	BD/Hor	Clear	10	2
50	1000827	JC12V-50W	11.0	44.0	30.0	C-6	1000	3000	2000	Univ	Clear	10	3
50	1000828	JC12V-50W	11.0	44.0	30.0	C-8	1000	3000	2000	Univ	Clear	100	3
50	1003487	JC12V-50WF	11.0	44.0	30.0	C-8	1000	3000	2000	Univ	Frosted	10	3
50	1000905	JCD120V-50W	11.0	55.0	38.0	CC-2V	700	2800	1500	BD/Hor	Clear	10	2
75	1000835	JC12V-75W	11.0	44.0	30.0	C-6	1600	3000	2000	Univ	Clear	10	3
100	1000806	JC12V-100W	11.0	44.0	30.0	C-6	2300	3000	2000	Univ	Clear	100	3
100	1000807	JC12V-100WG	11.0	44.0	30.0	C-8	2300	3000	2000	Univ	Clear	100	1
100	1000381	EVA, JC12V-100H20	11.5	44.0	30.0	CBar6	2400	3000	2000	BD/Hor	Clear	10	3
100	1000490	FCR, JC12V-100W	11.0	44.0	30.0	CBar6	3400	3300	50	BD/Hor	Clear	100	3
100	1000507	FDX, JC12V-100WCG2	11.5	44.0	30.0	CBar6	3500	3300	50	Univ	Clear	12	5
300	1000545	FLW, JC24V-300WA-H	13.5	55.0	30.0	CBar6	10450	3500	50	BD	Clear	10	5
300	1000846	JC24V-300WB	17.5	55.0	33.0	CBar6	6600	3050	1000	Univ	Clear	10	3

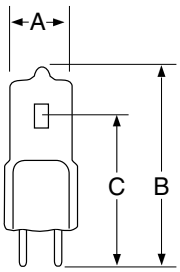


Fig.1

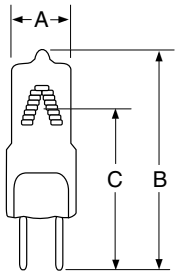


Fig.2

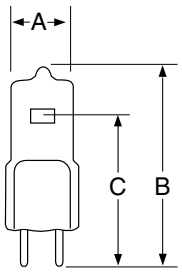


Fig.3

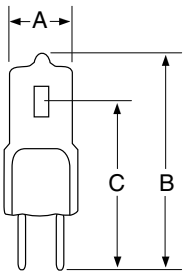


Fig.4

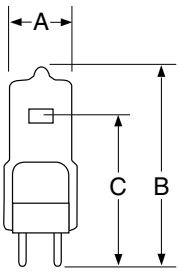


Fig.5

JCD, JCS & JCV

- Only for Use in Approved Enclosed Halogen Fixtures
- Medium 2-Pin Base - G9.5

Watts (W)	Ordering Code	Lamp Description	Dimensions (mm) Dia (A)	MOL (B)	LCL (C)	Filament Type	Lumens (lm)	Color Temp (K)	Avg Life (h)	Burn Position	Case Qty	Fig No
		Medium 2-Pin Prefocus Base – G9.5										
400	1003023	HX-401, JCV115V-400WBM	19.0	104.0	60.3	CC-8	8500	3050	1500	Univ	10	1
400	1003022	HX-400, JCV115V-400WCM	19.0	104.0	60.3	CC-8	10000	3200	300	Univ	10	1
500	1000286	EHC/EHB, JCV120V-500WCM	13.5	101.0	60.3	CC-8	12700	3200	300	Univ	50	2
500	1000287	EHD, JCV120V-500WBH	13.5	101.0	60.3	CC-8	10000	3000	2000	Univ	50	2
500	1001814	JCV220V-500WBM	15.0	102.0	60.3	CC-8	10500	3000	400	Univ	10	2
500	1000997	JCV240V-500WBM	15.0	102.0	60.3	CC-8	10500	3000	400	Univ	50	2
575	1000543	FLK, HX-600, JCV115V-575WCM	18.0	104.0	60.5	CC-8	16500	3200	300	Univ	10	1
575	1003584	SPH115V-575W, JCD115V-575WCM	19.0	104.0	60.3	CC-6	16500	3250	300	Univ	10	4
575	1003585	SPH115V-575WLL, JCD115V-575WBM	19.0	104.0	60.3	CC-6	14000	3050	800	Univ	10	4
575	1002196	HX-601, JCV115V-575WBM	19.0	104.0	60.3	CC-8	12800	3050	1500	Univ	10	1
600	1000665	GLC/HP-600, JCS115V-600WCM	20.0	101.6	60.0	C-13D	15600	3200	300	Univ	10	3
700	1000998	JCV240V-700WCH	19.5	102.0	60.3	CC-8	18000	3200	350	Univ	50	2
750	1000288	EHF, JCV120V-750WCH	15.0	104.0	60.3	CC-8	20400	3200	300	Univ	50	2
750	1000289	EHG, JCV120V-750WBH	19.0	104.0	60.3	CC-8	15400	3000	2000	Univ	50	2
1000	1000098	BWN, JCS120V-1000WC1	22.0	114.3	60.3	C-13D	28500	3200	200	Univ	10	3
1000	1000494	FCV, JCV120V-1000WCF	19.0	104.0	60.3	CC-8	26500	3200	300	Univ	50	2
1000	1000509	FEL, JCV120V-1000WCH	19.0	104.0	60.3	CC-8	27500	3200	375	Univ	50	2
1000	1000510	FEP, JCV240V-1000WCH	19.0	101.0	60.3	CC-8	25500	3200	300	Univ	50	2
1200	1000972	JCV120V-1200WCH	22.0	104.0	60.3	CC-8	33000	3250	200	Univ	10	2

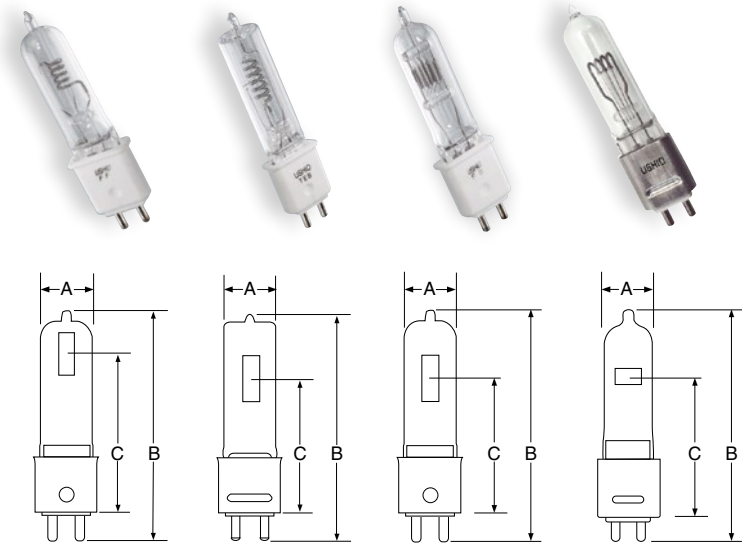


Fig.1 Fig.2 Fig.3 Fig.4

JC, JCD, JCS & JCV

- Only for Use in Approved Enclosed Halogen Fixtures
- 2-Pin Prefocus Base - GY9.5
- Bulb Finish - Clear

Watts (W)	Ordering Code	Lamp Description	Dimensions (mm) Dia (A)	MOL (B)	LCL (C)	Filament Type	Lumens (lm)	Color Temp (K)	Avg Life (h)	Burn Position	Case Qty	Fig No
		2-Pin Prefocus Base – GY9.5										
100	1000459	EYL, JC12V-100WC4	11.5	62.0	36.5	CBar6	2900	3300	50	BD/Hor	10	1
100	1000504	FDT, JC12V-100W	11.5	57.0	27.0	CBar6	2900	3300	50	BD/Hor	10	1
150	1000309	EKL, JCD21V-150W	11.5	51.0	27.0	CC-6	4650	3350	40	BD/Hor	10	1
150	1000503	FDS/DZE, JC24V-150W	14.0	57.2	33.4	CBar6	5000	3400	50	BD/Hor	10	1
250	1000245	DYG, JCD30V-250WS	19.9	63.5	36.5	CC-6	8000	3400	15	BD/Hor	10	1
300	1000886	JCD100V-300WC	22.0	63.0	36.5	CC-6	7500	3200	150	BD/Hor	10	2
300	1000540	FKW, JCS120V-300WC/UA	23.0	90.4	46.5	C-13	7800	3200	200	Univ	50	3
420	1000304	EKB, JCD120V-420WC	22.0	63.0	36.5	CC-6	11000	3200	75	BD/Hor	10	2
500	1000629	FTK, JCD120V-500WCT	22.0	65.3	36.5	CC-6	13500	3100	200	BD/Hor	10	1
500	1000914	JCD240V-500WC	24.0	62.0	36.5	2CC-8	12500	3200	50	BD/Hor	10	4
500	1000285	EHA, JCS120V-500W	19.5	76.0	36.5	C-13D	——	3200	75	BD/Hor	10	5
500	1000603	FRG, JCS120V-500WC1	23.0	90.4	46.5	C-13D	13000	3200	150	Univ	50	3
575	1003326	JCS120V-575WC	25.0	90.0	46.5	8-C-13D	15500	3200	300	BD	10	3
575	1003327	JCS120V-575WX	25.0	90.0	46.5	8-C-13D	12000	3200	1500	BD	10	3
600	1000251	DYS/DYV/BHC, JCD120V-600WC	22.0	63.0	36.5	CC-6	17000	3200	75	BD/Hor	10	2
600	1000252	DYS-5, JCD125V-600WC	22.0	63.0	36.5	CC-6	13750	3200	75	BD/Hor	10	2
600	1000547	FMR, JCV120V-600WGY	17.0	88.9	50.8	CC-8	12500	3000	2000	BD/Hor	50	6
625	1000089	BVE, JCS120V-625W	19.5	89.0	44.5	C-13D	——	3350	75	BD/Hor	10	5
650	1000305	EKD, JCD120V-650WS	19.9	66.0	36.5	CC-6	20000	3400	25	BD/Hor	10	2
650	1000604	FRK, JCS120V-650WC/UA	22.5	90.4	46.5	C-13D	17500	3200	200	Univ	50	3
650	1000249	DYR/220V, JCD220V-650WC1	24.0	63.0	36.5	2CC-8	16500	3200	50	BD/Hor	10	4
650	1000250	DYR/240V, JCD240V-650WC2	24.0	63.0	36.5	2CC-8	16500	3200	50	BD/Hor	10	4
800	1000909	JCD120V-800WC	24.0	62.0	36.5	CC-6	19500	3200	75	BD/Hor	10	2
900	1000088	BVA, JCS120V-900W	23.0	95.0	44.5	C-13D	——	3300	75	BD/Hor	10	3
1000	1003862	GAC, JCS120V-1000WC	22.0	95.0	46.5	C-13D	28500	3200	250	BD/Hor	10	3

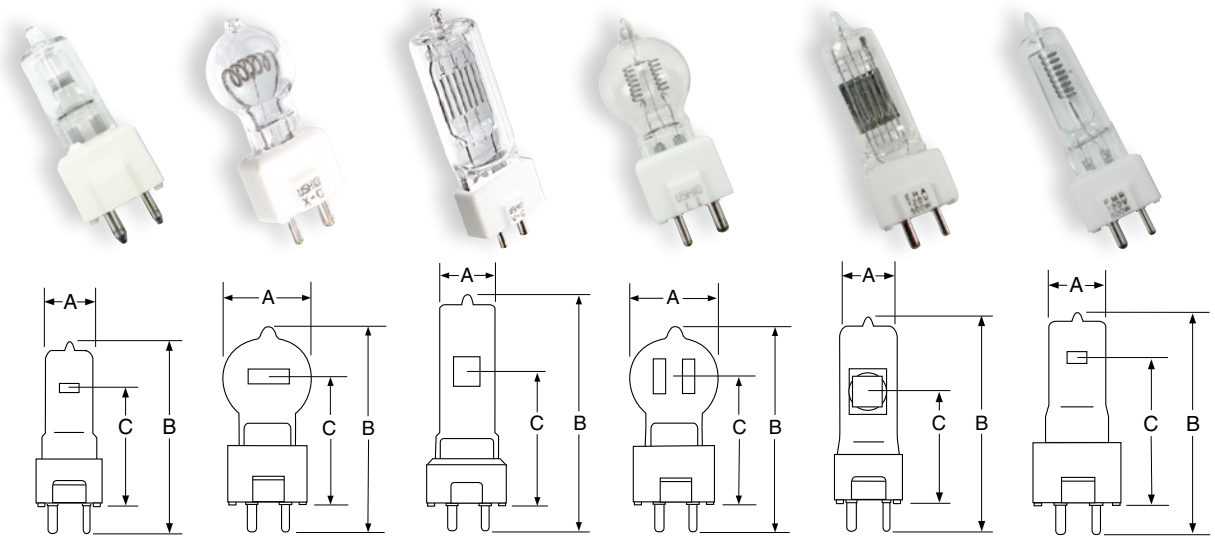
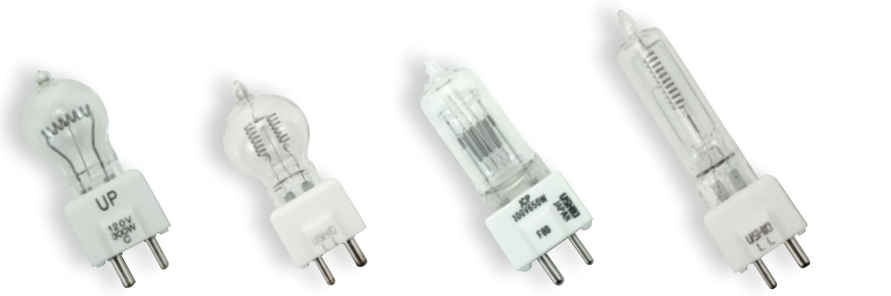


Fig.1 Fig.2 Fig.3 Fig.4 Fig.5 Fig.6

JCD, JCP & JCV

- Only for Use in Approved Enclosed Halogen Fixtures
- Medium 2-Pin Prefocus Base - GY9.5/15x19
  GY9.5/16X21, GY9.5/16X24 & GZ9.5

Watts (W)	Ordering Code	Lamp Description	Dimensions (mm) Dia (A)	MOL (B)	LCL (C)	Filament Type	Lumens (lm)	Color Temp (K)	Avg Life (h)	Burn Position	Case Qty	Fig No
		Medium 2-Pin Prefocus Base – GY9.5/15x21										
300	1000896	JCD120V-300WC	22.0	63.5	36.5	CC-6	7500	3200	100	BD/Hor	10	1
		Medium 2-Pin Prefocus Base – GY9.5/16x21										
300	1000912	JCD230V-300WC	24.0	63.5	36.5	2CC-8	7050	3150	75	BD/Hor	10	2
500	1000903	JCD120V-500WC	22.0	62.0	36.5	CC-6	13000	3200	100	BD/Hor	10	1
		Medium 2-Pin Prefocus Base – GZ9.5										
300	1000578	FNA, JCV120V-300WGY	16.0	88.9	50.8	CC-8	5800	3000	2000	BD/Hor	50	4



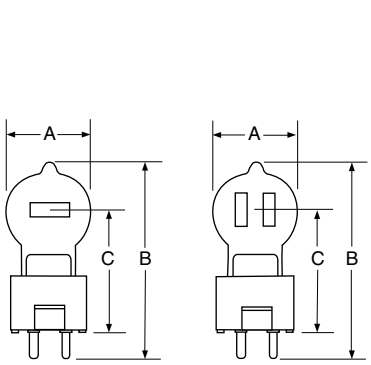


Fig.1

Fig.2

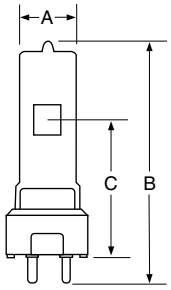


Fig.3

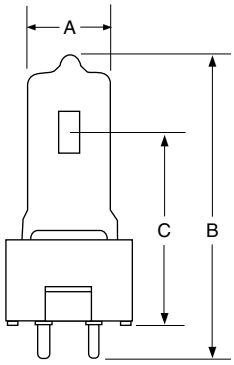


Fig.4

JCS

- Only for Use in Approved Enclosed Halogen Fixtures
- 4-Pin Base - G17t-7
- Standard Voltage (120 volts)
- Monoplane Filament

Watts (W)	Ordering Code	Lamp Description	Dimensions (mm) Dia (A)	MOL (B)	LCL (C)	Filament Type	Lumens (lm)	Color Temp (K)	Avg Life (h)	Burn Position	Fig No
		4-Pin Base – G17t-7									
1200	1000072	BRN, JCS120V-1200W	23.0	95.0	38.7	C-13D ❍	—	3350	20	BD/Hor	1
1200	1000082	BTG, JCS120V-1200W	23.0	95.0	39.7	C-13D ❍	38200	3350	20	BD	1

❍ Proximity Reflector

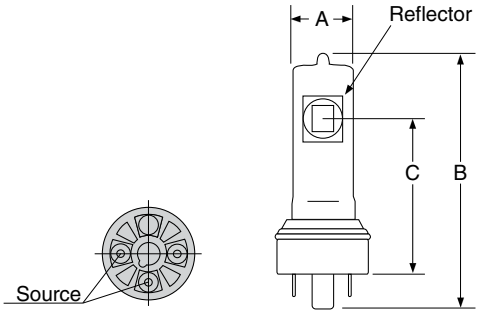


Fig.1

JCS & JCV

- Only for Use in Approved Enclosed Halogen Fixtures
- Medium Prefocus Base - P28s
  Mogul Prefocus Base - P40s
- 120 Volts

Watts (W)	Ordering Code	Lamp Description	Dimensions (mm) Dia (A)	MOL (B)	LCL (C)	Filament Type	Lumens (lm)	Color Temp (K)	Avg Life (h)	Burn Position	Case Qty	Fig No
		Medium Prefocus Base – P28s (C-13D Filament)										
500	1000083	BTL, JCS120V-500WBP28	19.5	127.0	55.5	C-13D	11000	3050	500	BD/Hor	50	1
500	1000084	BTM, JCS120V-500WCP28	19.5	127.0	55.5	C-13D	13000	3200	100	BD/Hor	50	1
500	1000208	FMC/DNS, JCS120V-500WB2P28	19.5	156.0	88.9	C-13D	11000	3050	500	Univ	50	2
750	1000085	BTN, JCS120V-750WBP28	23.0	127.0	55.5	C-13D	17000	3050	500	BD/Hor	50	1
750	1000086	BTP, JCS120V-750WCP28	23.0	127.0	55.5	C-13D	20000	3200	200	BD/Hor	50	1
750	1000209	FMD/DNT, JCS120V-750WB2P28	23.0	156.0	88.9	C-13D	17000	3050	500	Univ	50	2
1000	1000087	BTR, JCS120V-1000WCP28	23.0	127.0	55.5	C-13D	28500	3200	250	BD/Hor	50	1
		Medium Prefocus Base – P28s (CC-8 Filament)										
500	1000274	EGE, JCV120V-500WB	14.0	152.0	88.9	CC-8	10450	3000	2000	Univ	50	3
750	1000275	EGF, JCV120V-750WC	16.0	152.0	88.9	CC-8	20400	3200	500	Univ	20	3
750	1000276	EGG, JCV120V-750WB	16.0	152.0	88.9	CC-8	15750	3000	2000	Univ	50	3
1000	1000278	EGJ, JCV120V-1000WC	19.5	152.0	88.9	CC-8	27500	3200	500	Univ	50	3
1000	1000280	EGM, JCV120V-1000WB*	19.0	152.0	88.9	CC-8	21500	3000	2000	Univ	50	3
		Mogul Prefocus Base – P40s										
1000	1000091	BVT, JCS120V-1000WBP40	23.0	177.8	100.0	C-13D	23000	3050	500	Univ	20	4
1000	1000092	BVV, JCS120V-1000WCP40	23.0	177.8	100.0	C-13D	27500	3200	200	Univ	20	4
1000	1000214	DPW, JCS120V-1000W	64.0	241.3	87.3	C-13	28000	3200	50	BD	25	7
1500	1000145	CWZ, JCS120V-1500W	35.0	190.0	100.0	C-13D	38500	3200	325	Univ	20	5
1500	1000220	DTA, JCS120V-1500WCP40	25.0	203.0	87.3	C-13D	39000	3200	100	BD	20	6
2000	1000093	BVW, JCS120V-2000WCP40	35.0	203.2	100.0	C-13	57500	3200	300	Univ	20	6

* Frosted Envelope

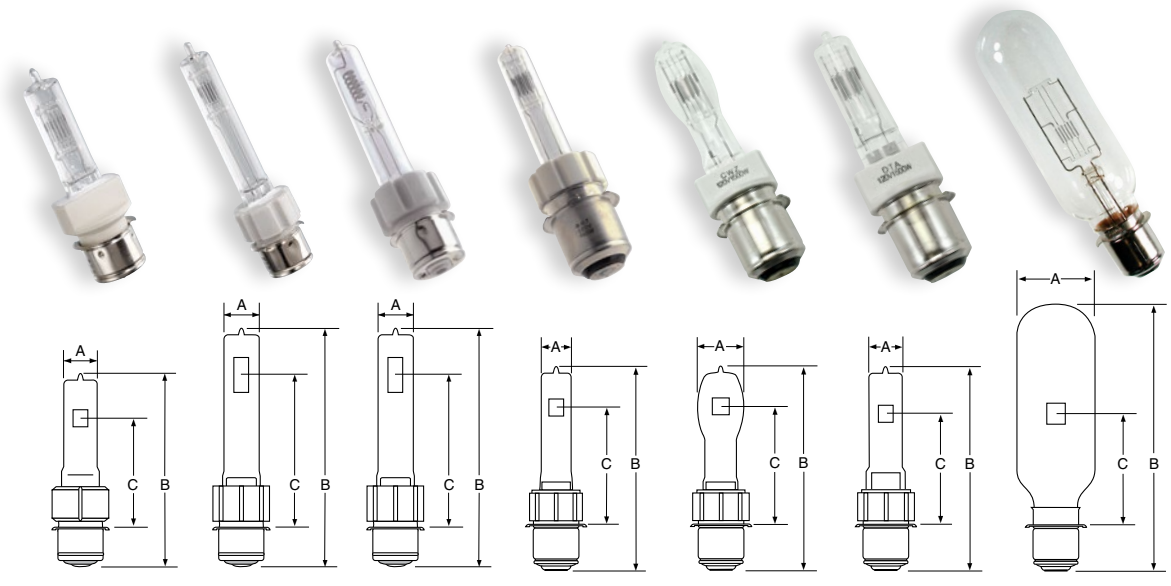
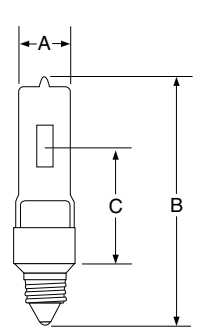


Fig.1 Fig.2 Fig.3 Fig.4 Fig.5 Fig.6 Fig.7

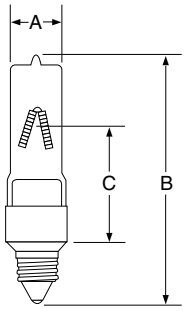
JCV

- Only for Use in Approved Enclosed Halogen Fixtures
- Minican Screw Base - E10/E11
  Mogul Screw Base - E39
- Universal Burn Position

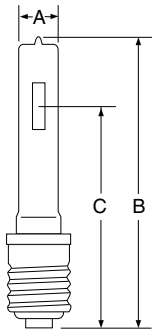
Watts (W)	Ordering Code	Lamp Description	Dimensions (mm) Dia (A)	MOL (B)	LCL (C)	Filament Type	Lumens (lm)	Color Temp (K)	Avg Life (h)	Bulb Finish	Case Qty
		Mini Candelabra Base – E10									
150	1000479	FBT, JCV30V-150WS	11.5	60.0	27.5	CC-8	5000	3400	6	Clear	10
		Mini Candelabra Base - E11									
75	1000988	JCV120V-75WGSN	12.0	69.0	32.0	CC-8	1125	2800	1000	Clear	10
75	1000989	JCV120V-75WGSNF	12.0	65.0	32.0	CC-8	1170	2850	1000	Frosted	10
100	1000970	JCV120V-100WGSN	14.0	69.0	32.0	CC-8	1600	2850	1500	Clear	10
100	1000971	JCV120V-100WGSNF	14.0	69.0	32.0	CC-8	1550	2800	1500	Frosted	10
100	1000361	ESN, JCV120V-100WGSN2	13.0	71.0	35.0	CC-2V	1800	2850	750	Clear	10
150	1000377	ETG, JCV120V-150WGSN	13.0	71.0	35.0	CC-8	2800	2900	2000	Clear	10
150	1000378	ETH, JCV120V-150WGSNF	13.0	71.0	35.0	CC-8	2700	2900	2000	Frosted	10
150	1000359	ESL, JCV120V-150WGSN2	13.0	71.0	35.0	CC-2V	2800	2900	1000	Clear	10
250	1000294	EHT, JCV120V-250WGSN	13.5	80.0	41.3	CC-8	5000	3000	2000	Clear	10
250	1000360	ESM, JCV120V-250WGSNF	13.0	80.0	41.0	CC-8	4800	3000	2000	Frosted	10
250	1000991	JCV130V-250WGSN	13.0	80.0	41.0	CC-8	5000	3000	2000	Clear	10
250	1001809	JCV130V-250WGSNF	13.0	80.0	41.0	CC-8	4850	3000	2000	Frosted	10
325	1000295	EHV, JCV120V-325WBS	13.0	80.0	41.0	CC-8	7800	3100	500	Clear	10
400	1000976	JCV120V-400WGSN	13.0	92.0	51.0	CC-8	8250	2950	2000	Clear	50
400	1000977	JCV120V-400WGSNF	13.0	92.0	51.0	CC-8	7850	2950	2000	Frosted	50
500	1000384	EVR, JCV120V-500WGS	13.0	92.0	51.0	CC-8	10450	2950	2000	Clear	50
500	1000466	EYX, JCV120V-500WGSF	13.0	92.0	51.0	CC-8	9500	3000	2000	Frosted	50
500	1000465	EYW, JCV130V-500WGS	13.0	92.0	51.0	CC-8	10000	3000	2000	Clear	10
500	1000464	EYV, JCV130V-500WGSF	13.0	92.0	51.0	CC-8	9500	3000	2000	Frosted	10
500	1000995	JCV230V-500WGS	13.0	92.0	50.8	CC-8	9000	2950	2000	Clear	50
750	1000463	EYT, JCV120V-750WB1	13.0	95.0	51.0	CC-8	18500	3050	500	Clear	10
1000	1000967	JCV120V-1000WC3	13.5	100.0	51.0	CC-8	26000	3200	300	Clear	10
		Krypton Fill – Mini Candelabra Base – E11 (Incandescent = cooler than halogen)									
20	1000973	JCV120V-20WGSN/E11/INC	0.41	2.56	1.77	CC-8	200	2700	2000	Clear	50
40	1000978	JCV120V-40WGSN/E11/INC	0.41	2.56	1.81	CC-8	560	2800	2000	Clear	10
60	1000982	JCV120V-60WGSN/E11/INC	0.47	2.56	1.81	CC-8	960	2800	2000	Clear	100
		Mogul Screw Base – E39									
2000	1000095	BWF, JCV120V-2000W	25.0	190.5	133.4	CC-8	59000	3200	500	Clear	20
2000	1000096	BWG, JCV120V-2000W	25.0	190.5	133.4	CC-8	57200	3200	500	Frosted	20



E10/E11



E11

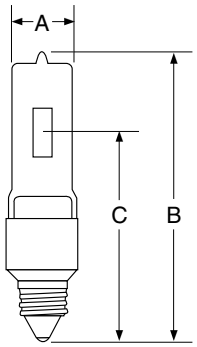


E39

JD

- Only for Use in Approved Halogen Fixture
- Single Ended Halogen
- Universal Burn Position

Watts (W)	Ordering Code	Lamp Description	Dimensions (mm) Dia (A)	MOL (B)	LCL (C)	Filament Type	Lumens (lm)	Color Temp (K)	Avg Life (h)	Bulb Finish	Case Qty
		Mini Candelabra Base – E11									
75	1003089	JD120V-75W/E11	13.5	69.0	32.0	CC-8	1125	2800	1000	Clear	10
75	1003090	JD120V-75WF/E11	13.5	69.0	32.0	CC-8	1090	2800	1000	Frosted	10
100	1003091	JD120V-100W/E11	13.5	71.0	35.0	CC-8	1600	2800	1500	Clear	10
100	1003092	JD120V-100WF/E11	13.5	71.0	35.0	CC-8	1550	2800	1500	Frosted	10
150	1003093	JD120V-150W/E11	13.5	76.2	35.0	CC-8	2800	2900	2000	Clear	10
150	1003094	JD120V-150WF/E11	13.5	76.2	35.0	CC-8	2700	2900	2000	Frosted	10

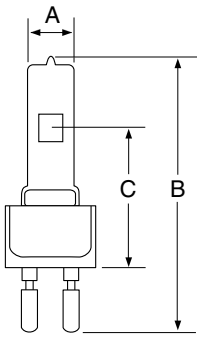


E11

JS

- Only for Use in Approved Enclosed Halogen Fixtures
- Bipost Base - G22

Watts (W)	Ordering Code	Lamp Description	Dimensions (mm) Dia (A)	MOL (B)	LCL (C)	Filament Type	Lumens (lm)	Color Temp (K)	Avg Life (h)	Burn Position	Case Qty
		Medium Bipost Base – G22									
500	1000281	EGN, JS120V-500WC	23.0	117.0	63.5	C-13D	13000	3200	100	BD/Hor	50
750	1000282	EGR, JS120V-750WC (CP39)	23.0	127.0	63.5	C-13D	21000	3200	200	BD/Hor	50
1000	1000283	EGT, JS120V-1000WC (CP40)	23.0	127.0	63.5	C-13D	28500	3200	200	BD/Hor	50
1000	1003248	VL1K-115V, JS115V-1000WC/V	22.0	140.0	72.5	8-C-13D	28500	3200	300	Univ	50
1000	1003273	VL1K-240V, JS240V-1000WC/V	22.0	140.0	72.5	8-C-13D	25500	3200	300	Univ	50



G22

JS

- Only for Use in Approved Enclosed Halogen Fixtures
- Mogul Bipost Base - G38

Watts (W)	Ordering Code	Lamp Description	Dimensions (mm) Dia (A)	MOL (B)	LCL (C)	Filament Type	Lumens (lm)	Color Temp (K)	Avg Life (h)	Burn Position	Case Qty	Fig No
		Mogul Bipost Base – G38										
1000	1000154	CYV, JS120V-1000WC2	23.0	200.0	127.0	C-13	28500	3200	200	BD/Hor	20	1
1500	1000150	CXZ, JS120V-1500W	40.0	210.0	127.0	C-13	44500	3200	400	BD	20	2
2000	1000094	BWA, JS120V-2000W/G38	25.0	203.2	127.0	CC-8	54000	3200	500	Univ	20	3
2000	1000155	CYX, JS120V-2000WC	40.0	210.0	127.0	C-13	59000	3200	300	BD/45°	20	2
5000	1000215	DPY, JS120V-5000WC	60.0	268.0	165.0	C-13	145000	3200	500	BD/45°	20	4
10000	1000223	DTY/220V, JS220V-10000WG38	80.0	400.0	254.0	C-13	290000	3200	400	BD/45°	6	5

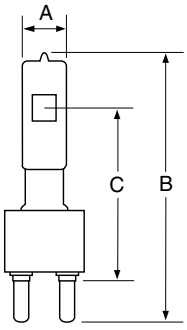


Fig.1

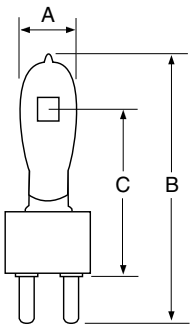


Fig.2

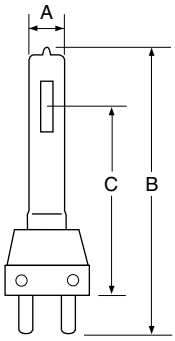


Fig.3

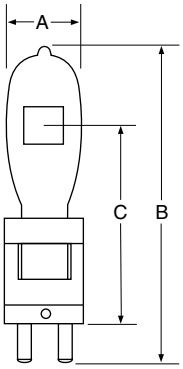


Fig.4

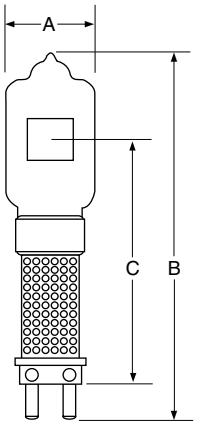


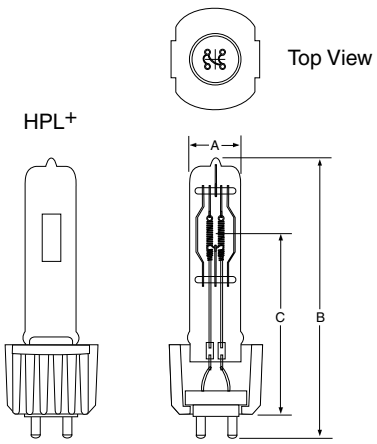
Fig.5

HPL+ SERIES - for ETC Source Four™, Source Four JR™ & Source Four PAR

- Only for Use in Approved Enclosed Halogen Fixtures
- More Fixture Light Output Using Less Electrical Energy
- Integral Heat Sink Base
- Low Seal Temperature

Watts (W)	Ordering Code	Lamp Description		Dimensions (mm) Dia (A)	MOL (B)	LCL (C)	Filament Type	Lumens (lm)	Color Temp (K)	Avg Life (h)	Case Qty
		HPL+ 77 Volt									
550	1000668	HPL-550/77V+	(JS77V-550WC)	18.35	104	60.3	4-C8	16170	3250	300	10
550	1000669	HPL-550/77X+	(JS77V-550WX)	18.35	104	60.3	4-C8	12160	3050	2000	10
750	1000676	HPL-750/77V	(JS77V-750WC)	18.35	104	60.3	4-C8	22950	3250	300	10
		HPL+ 115 Volt									
375	1000666	HPL-375/115V+	(JS115V-375WC)	18.35	104	60.3	4-C8	10540	3250	300	10
375	1000667	HPL-375/115X+	(JS115V-375WX)	18.35	104	60.3	4-C8	8000	3050	1000	10
575	1000670	HPL-575/115V+	(JS115V-575WC)	18.35	104	60.3	4-C8	16520	3250	300	10
575	1000671	HPL-575/115X+	(JS115V-575WX)	18.35	104	60.3	4-C8	12360	3050	2000	10
750	1000675	HPL-750/115V+	(JS115V-750WC)	18.35	104	60.3	4-C8	21900	3250	300	10
750	1003153	HPL-750/115X+	(JS115V-750WX)	18.35	104	60.3	4-C8	16400	3050	1500	10
		HPL+ 120 Volt									
575	1000672	HPL-575/120V+	(JS120V-575WC)	18.35	104	60.3	4-C8	16520	3250	300	10
575	1002283	HPL-575/120X+	(JS120V-575WX)	18.35	104	60.3	4-C8	12360	3050	2000	10
750	1003144	HPL-750/120V+	(JS120V-750WC)	18.35	104	60.3	4-C8	21900	3250	300	10
750	1003178	HPL-750/120X+	(JS120V-750WX)	18.35	104	60.3	4-C8	16400	3050	1500	10
		HPL+ 230 Volt									
375	1003182	HPL-375/230X+	(JS230V-375WXN)	18.35	104	60.3	6-C8	7250	3000	1000	10
575	1000673	HPL-575/230V+	(JS230V-575WCN)	18.35	104	60.3	6-C8	14900	3200	400	10
575	1002233	HPL-575/230X+	(JS230V-575WXN)	18.35	104	60.3	6-C8	11780	3050	1500	10
750	1002289	HPL-750/230V+	(JS230V-750WCN)	18.35	104	60.3	6-C8	19750	3200	300	10
750	1003179	HPL-750/230X+	(JS230V-750WXN)	18.35	104	60.3	6-C8	15600	3050	1500	10
		HPL+ 240 Volt									
375	1003183	HPL-375/240X+	(JS240V-375WXN)	18.35	104	60.3	6-C8	7250	3000	1000	10
575	1000674	HPL-575/240V+	(JS240V-575WCN)	18.35	104	60.3	6-C8	14900	3200	400	10
575	1002234	HPL-575/240X+	(JS240V-575WXN)	18.35	104	60.3	6-C8	11780	3050	1500	10
750	1003184	HPL-750/240V+	(JS240V-750WCN)	18.35	104	60.3	6-C8	19750	3200	300	10
750	1003180	HPL-750/240X+	(JS240V-750WXN)	18.35	104	60.3	6-C8	15600	3050	1500	10

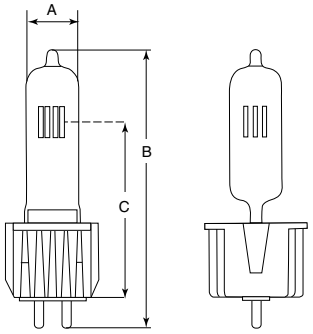
Licensed under U.S. Patent #RE36316 claims 9-12 and 16-17 only; Canadian Patent #2,103,358; European Patent #592589 & #969496. No other licenses expressed or implied."



HPL SUPER LIFE

- 3,000 Hours Life
- Ceramic Heat Sink Base Maintains its Resistance to Electric Conductivity Over the Life of the Lamp
- Six Filament Design for an Even and Smoother Field
- Tapered Pins Ensure Easy Fit Into the Fixture Socket

Watts (W)	Ordering Code	Lamp Description	Dimensions (mm) Dia (A)	MOL (B)	LCL (C)	Filament Type	Lumens (lm)	Color Temp (K)	Avg Life (h)	Case Qty
		Heat Sink Base								
575	1004063	HPL-575/115V/SL, Super Life	19	104	60.3	6-C8	10500	2950	3000	10
575	1004220	HPL-575/120V/SL, Super Life	19	104	60.3	6-C8	10500	2950	3000	10

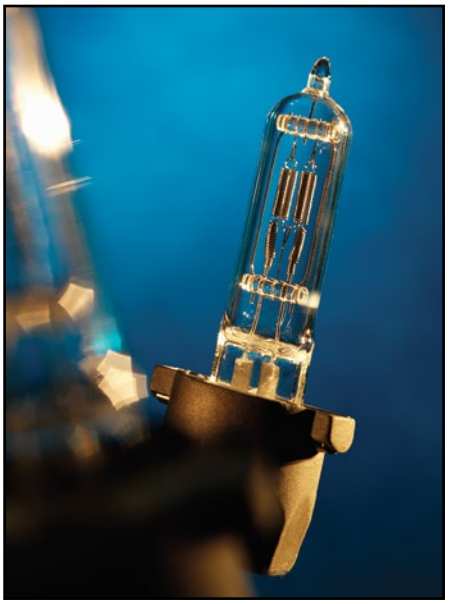


QXL SERIES - for ETC Revolution

- Only for Use in Approved Enclosed Halogen Fixtures
- More Fixture Light Output Using Less Electrical Energy
- Integral Heat Sink Base
- Low Seal Temperature

Watts (W)	Ordering Code	Lamp Description	Dimensions (mm) Dia (A)	MOL (B)	LCL (C)	Filament Type	Lumens (lm)	Color Temp (K)	Avg Life (h)	Case Qty
		QXL 77 Volt								
750	1003336	QXL-77V-750W (JS77V-750WC/QXL)	18.35	104	60.3	4-C8	22950	3250	300	50

Licensed under U.S. Patent #RE36316 claims 9-12 and 16-17 only; Canadian Patent #2,103,358; European Patent #592589 & #969496. No other licenses expressed or implied."

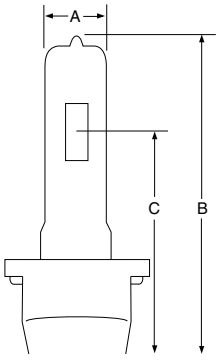


FOR ETC FIXTURE: SOURCE FOUR™ REVOLUTION™

Ushio's QXL™ (Quick eXchange Lamp) Halogen lamp, was designed in conjunction with ETC's new Source Four™ Revolution™ automated spotlight. The QXL™ utilizes the proven performance characteristics of the 750 watt HPL with increased lumen output.

The patented QXL™ base is revolutionary in that it allows the user to quickly change the lamp without opening the fixture. This feature eliminates any issues with lamp alignment and optical settings.

Because overheating is a common adversary with Halogen lamps, Ushio has developed new Heat-Shield™ technology that prevents seal failure due to high thermal radiation vvgenerated from the Halogen capsule. This ensures that 300 rated life hours will be achieved.



QXL

ETC Source Four™ Revolution™

Source Four™, Revolution™ & QXL™ are trademarks of Electronic Theatre Controls, Inc.

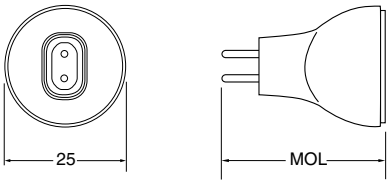
Licensed under U.S. Patent #RE36316 claims 9-12 and 16-17 only; Canadian Patent #2,103,358; European Patent #592589 & #969496. All other patents pending.

MR8

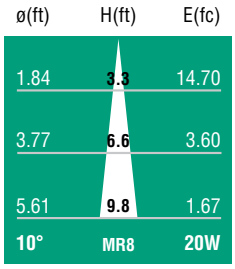
- Only for Use in Approved Halogen Fixtures
- 25mm, Dichroic Coating, Faceted Mirror Reflector
- Miniature 2-Pin Base - GZ4
- Low Voltage - 12 Volts
- Universal Burn Position

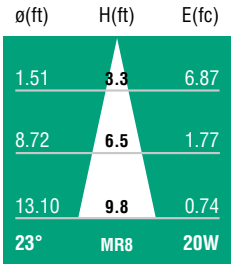
Watts (W)	Ordering Code	Lamp Description	MOL (mm)	Color Temp (K)	Beam Angle	Beam Spread	Beam Max CP (cd)	Ave Life (h)	Case Qty
		Miniature 2-Pin Base – GZ4 with Front Glass Cover							
20	1003116	MR8 12V-20W/NSP10/FG	34.6	3050	10º	Narrow Spot	1700	2000	12
20	1003117	MR8 12V-20W/NFL23/FG	34.6	3050	23º	Narrow Flood	800	2000	12
35	1003118	MR8 12V-35W/SP13/FG	34.6	3050	13º	Spot	2300	2000	12
35	1003119	MR8 12V-35W/NFL26/FG	34.6	3050	26º	Narrow Flood	1400	2000	12

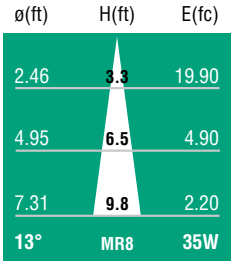
At only one inch in diameter, the USHIO MR8 lamp allows for even smaller fixture designs than MR11 and MR16 lamps. Use with USHIO C-14B socket. Ordering code: 1000109.

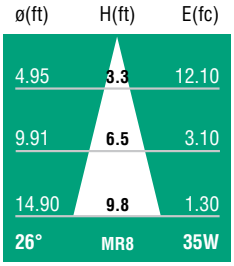


GZ4





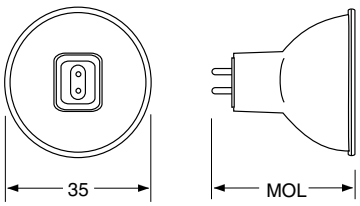




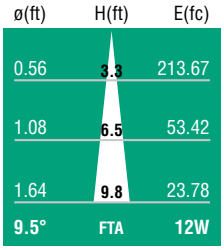
MR11

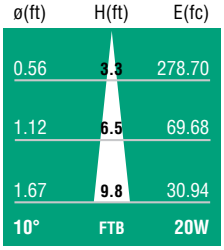
- Only for Use in Approved Halogen Fixtures
- 35mm, Dichroic Coating, Faceted Mirror Reflector
- Miniature 2-Pin Base - GZ4
- 12 & 24 Volts
- Universal Burn Position
- Available with Front Glass Cover (FG)

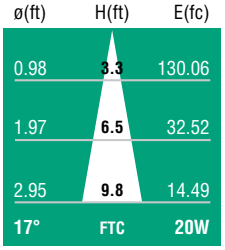
Watts (W)	Ordering Code	Lamp Description	MOL (mm)	Color Temp (K)	Beam Angle	Beam Spread	Beam Max CP (cd)	Ave Life (h)	Case Qty
		Miniature 2-Pin Base – GZ4							
12	1000615	FTA, JDR/M12V-12W/G/NSP9.5	35.0	2925	9.5°	Narrow Spot	2300	2000	10
12	1000616	FTA/FG, JDR/M12V-12W/G/NSP9.5/FG	35.0	2925	9.5°	Narrow Spot	2300	2000	10
20	1000617	FTB, JDR/M12V-20W/G/SP10	35.0	2925	10°	Spot	3000	2000	10
20	1000618	FTB/FG, JDR/M12V-20W/G/SP10/FG	40.9	2925	10°	Spot	3000	2000	10
20	1000619	FTC, JDR/M12V-20W/G/SP17	35.0	2925	17°	Spot	1400	2000	10
20	1000620	FTC/FG, JDR/M12V-20W/G/SP17/FG	35.0	2925	17°	Spot	1400	2000	10
20	1000621	FTD, JDR/M12V-20W/G/FL30	35.0	2925	30°	Flood	600	2000	10
20	1000622	FTD/FG, JDR/M12V-20W/G/FL30/FG	40.9	2925	30°	Flood	600	2000	10
35	1000625	FTF, JDR/M12V-35W/G/SP20	35.0	2950	20°	Spot	2400	2000	10
35	1000627	FTH, JDR/M12V-35W/G/FL30	35.0	2950	30°	Flood	1300	2000	10
35	1000628	FTH/FG, JDR/M12V-35W/G/FL30/FG	40.9	2950	30°	Flood	1300	2000	10
		24 Volt, Miniature 2-Pin Base – GZ4							
20	1001000	JDR/M24V-20W/SP19/FG	40.9	2925	19°	Spot	1150	2000	10
20	1001004	JDR/M24V-20W/FL30/FG	35.0	2925	30°	Flood	500	2000	10
35	1001007	JDR/M24V-35W/SP13	35.0	2925	13°	Spot	2100	2000	10
35	1001010	JDR/M24V-35W/FL30/FG	35.0	2950	30°	Flood	850	2000	10

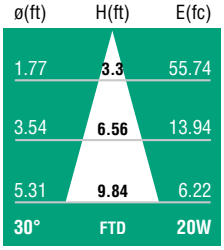


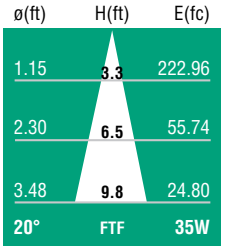
GZ4

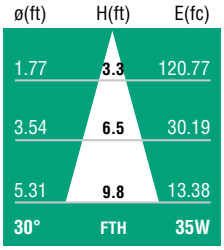


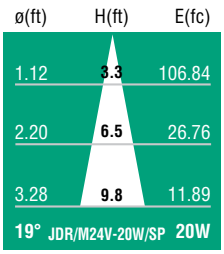


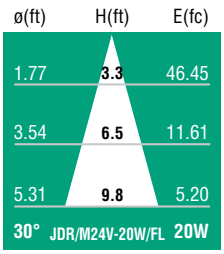


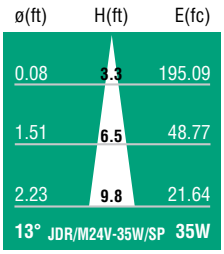


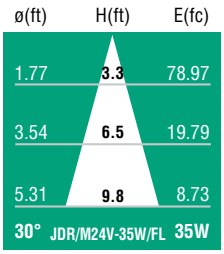








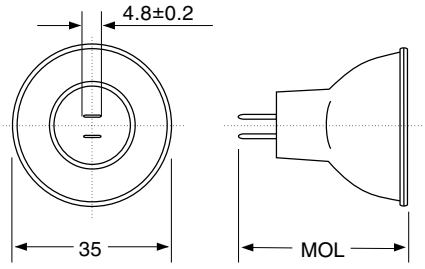




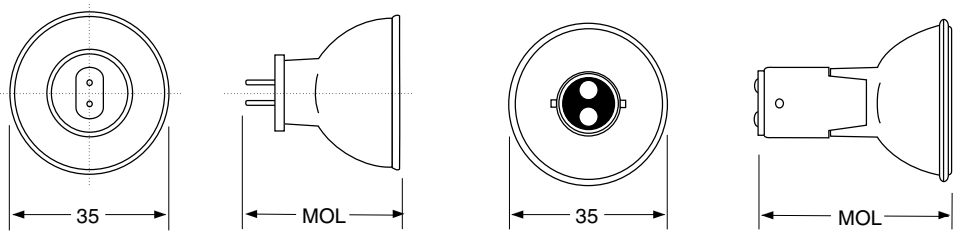
MR11

- Only for Use in Approved Enclosed Halogen Fixtures
- Miniature 2-Pin Base - GZ4, 2-Pin Base - G4.8/5.3 & Double Contact Bayonet Base - BA15d
- Low Voltage
- Universal Burn Position
- Faceted (except as noted)

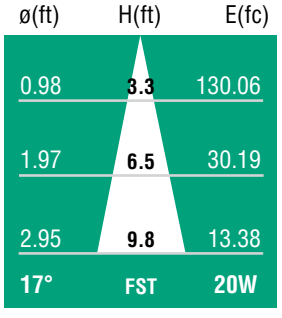
Watts (W)	Ordering Code	Lamp Description	MOL (mm)	Reflector Type	Filament Type	Color Temp (K)	Beam Angle	Beam Spread	Max CP (cd)	Ave Life (h)	Case Qty
		Miniature 2-Pin Base – GZ4									
10	1000931	JCR/M6V-10WN/FG	40.8	Faceted	C-6	3050	8.5°	Narrow Spot	3000	200	100
15	1000932	JCR/M6V-15W/FG/XX MR11	35.0	Faceted	C-6	3050	17°	Spot	3900	500	100
20	1000934	JCR/M6V-20W	33.3	Faceted	C-6	3200	20°	Spot	1800	50	10
35	1000930	JCR/M14V-35W	36.0	Specular	C-8	—	—	—	—	50	10
50	1000926	JCR/M12V-50W	35.0	Specular	C-8	—	—	—	—	50	10
		2-Pin Base – G4.8/5.3									
75	1000929	JCR/M12V-75W/HO	37.0	Specular	C-8	—	—	—	—	50	10
100	1000921	JCR/M12V-100W	37.0	Specular	C-8	3400	—	—	—	25	10
		Double Contact Bayonet Base – BA15d									
20	1000609	FST, JDR/M12V-20W/BA/SP17	44.0	Faceted	C-6	2900	17°	Spot	1400	2000	10
20	1000610	FST/FG, JDR/M12V-20W/BA/SP17/FG	46.5	Faceted	C-6	2900	17°	Spot	1400	2000	10
35	1000659	GDZ, JDR/M12V-35W/BA/FL30	45.0	Faceted	C-6	2950	30°	Flood	1600	2000	10

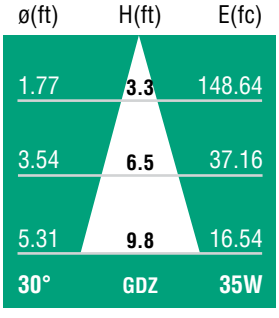


GZ4



G4.8/5.3 BA15d



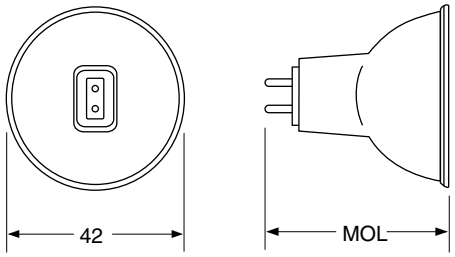


JCR

- Only for Use in Approved Enclosed Halogen Fixtures
- 2-Pin Base - GX5.3
- 42mm Dichroic Coated Reflector
- Operate Base Down to Horizontal
- Focused Beam for Optical Applications

Watts (W)	Ordering Code	Lamp Description	Dimensions MOL (mm)	Reflector Type	Filament Type	Working Distance (mm)	Center Screen Illuminance (lx)	Color Temp (K)	Avg Life (h)	Burn Position
		2-Pin Base – GX5.3 MR13 Reflector								
250	1000423	EXY, JCR82V-250W	44.5	Faceted	CC-8	152.4	610	3250	250	BD/Hor
300	1000414	EXR, JCR82V-300W	44.5	Faceted	CC-8	152.4	1100	3350	35	BD/Hor
300	1000421	EXW, JCR82V-300W	44.5	Faceted	CC-8	152.4	1200	3400	15	BD/Hor
300	1000535	FHS, JCR82V-300W	44.5	Faceted	CC-8	152.4	1000	3300	70	BD/Hor

Center Screen Illuminance - Approximate value for reference only



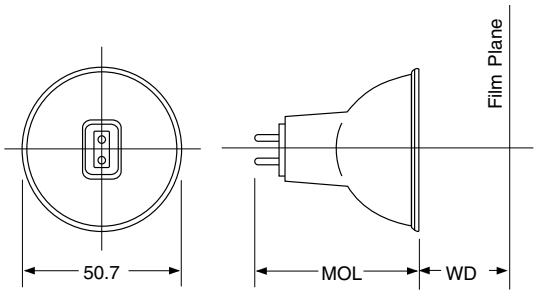
GX5.3

JCR

- Focused Beam for Optical Applications
- Only for Use in Approved Enclosed Halogen Fixtures
- 2-Pin Base - GX5.3
- 50mm Dichroic Coated Reflector

Watts (W)	Ordering Code	Lamp Description	MOL (mm)	Reflector Type	Filament Type	Working Distance (mm)	Luminous Intensity (cd)	Center Screen Illuminance (lx)	Color Temp (K)	Avg Life (h)	Burn Position	Case Qty
		2-Pin Base – GX5.3										
30	1000315	EKZ, JCR10.8V-30W	44.5	Specular	CC-6	38.1	—	400	3100	200	BD/Hor	10
35	1000344	EPN, JCR12V-35W	44.5	Specular	C-6	29.0	—	350	3300	50	BD/Hor	10
50	1000335	ENL, JCR12V-50W	44.5	Faceted	C-6	38.1	2000	—	3000	4000	Univ	10
50	1000350	EPZ, JCR13.8V-50W	44.5	Specular	CC-6	108	—	—	3150	1000	BD/Hor	10
50	1000339	ENZ, JCR30V-50W	44.5	Specular	CC-6	29.0	—	650	3400	25	BD/Hor	12
80	1000174	DDM, JCR19V-80W	44.5	Faceted	CC-6	152.4	—	680	3350	50	BD/Hor	10
80	1000303	EJY, JCR19V-80W	44.5	Specular	CC-6	38.1	—	—	3400	25	BD/Hor	12
80	1000307	EKG, JCR19V-80W	44.5	Specular	CC-6	44.5	—	700	3400	25	BD/Hor	10
80	1000336	ENW/ENC, JCR19V-80W	44.5	Specular	CC-6	44.5	—	600	3200	400	BD/Hor	10
80	1000177	DDS, JCR21V-80W	44.5	Faceted	CC-6	165.0	—	646	3125	500	BD/Hor	10
80	1000312	EKP, JCR30V-80W	44.5	Faceted	CC-6	44.5	—	750	3400	25	BD/Hor	10
80	1000317	ELB, JCR30V-80W	44.5	Specular	CC-6	29.0	—	900	3400	15	BD/Hor	12
85	1000180	DED, JCR13.8V-85W	44.5	Specular	C-8	165.0	—	1000	3150	1000	BD/Hor	10
90	1000347	EPV, JCR14.5V-90W	44.5	Stippled	CC-6	155.2	—	1345	3150	500	BD/Hor	10
90	1000349	EPX, JCR14.5V-90W	44.5	Stippled	CC-6	165.1	—	538	3150	500	BD/Hor	10
100	1000326	EMC, JCR12V-100W	44.5	Faceted	CC-6	26.5	—	—	3200	200	BD/Hor	10
100	1000420	EXV, JCR12V-100W	44.5	Faceted	C-6	—	4500	—	3350	50	BD/Hor	10
120	1000311	EKN, JCR17.7V-120W	44.5	Specular	CC-6	38.1	—	1000	3200	120	BD/Hor	10
150	1000173	DDL, JCR20V-150W	44.5	Faceted	CC-6	194.5	—	400	3150	500	BD/Hor	10
150	1001628	EKE/HO, JCR21V-150W	44.5	Specular	CC-6	43	—	—	3250	200	BD/Hor	10
150	1000297	EJA, JCR21V-150W	44.5	Specular	CC-6	28	—	—	3400	40	BD/Hor	10
150	1000301	EJM, JCR21V-150W	44.5	Specular	CC-6	38.1	—	—	3400	40	BD/Hor	10
150	1000302	EJV, JCR21V-150W	44.5	Specular	CC-6	44.5	—	1500	3400	40	BD/Hor	10
150	1000306	EKE, JCR21V-150W	44.5	Specular	CC-6	44.5	—	900	3250	200	BD/Hor	10
150	1003370	EKE/L, JCR21V-150W 10H/5	44.5	Specular	CC-6	—	—	—	—	1000	BD	10
150	1000319	ELD/EJN, JCR21V-150W	44.5	Stippled	CC-6	50.8	—	320	3400	40	BD/Hor	10
200	1000300	EJL, JCR24V-200W	44.5	Specular	CC-6	31.7	—	1100	3400	50	BD/Hor	10
200	1000314	EKX, JCR24V-200W	44.5	Stippled	CC-6	139.7	—	—	3400	25	BD/Hor	10
250	1000318	ELC, JCR24V-250W	44.5	Specular	CC-6	31.7	—	1500	3400	50	BD/Hor	10
250	1003106	ELC-3, JCR24V-250W	44.5	Specular	CC-6	31.8	—	960	3400	300	BD/Hor	10
250	1003264	ELC-5, JCR24V-250W	44.5	Specular	CC-6	31.8	—	960	3400	500	BD/Hor	10

Center Screen Illuminance - Approximate value for reference only

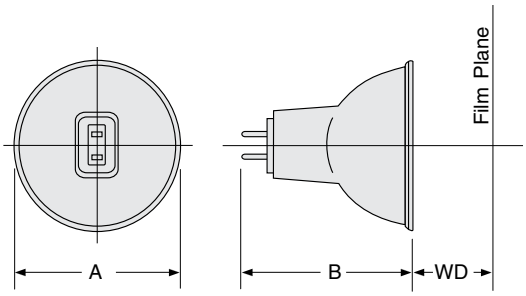


GX5.3

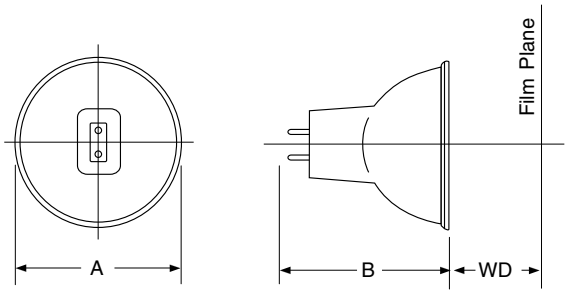
JCR

- Focused Beam for Optical Applications
- Only for Use in Approved Enclosed Halogen Fixtures
- Oval 2-Pin Base - GY5.3, 2-Pin Base - GZ6.35
- 50mm Dichroic Coated Reflector
- Operate Base Down to Horizontal

Watts	Ordering Code	Lamp Description	Dimensions (mm) Dia (A)	Dimensions (mm) MOL (B)	Reflector Type	Filament Type	Working Distance (mm)	Color Temp (K)	Avg Life (h)	Burn Position	Case Qty
		Oval 2-Pin Base – GY5.3									
85	1000357	ESH, JCR82V-85W	50.67	44.5	Stippled	CC-8	152.0	2950	250	BD/Hor	10
85	1000358	ESJ, JER82V-85W	50.67	44.5	Specular	CC-8	32.0	3350	40	BD/Hor	10
150	1000356	ESD, JCR120V-150W	50.67	44.5	Stippled	CC-8	44.5	3350	12	BD/Hor	12
150	1000940	JCR120V-150W/B	50.67	44.5	Stippled	CC-8	—	3050	100	BD/Hor	10
200	1000441	EYA, JCR82V-200W	50.67	44.5	Faceted	CC-8	38.1	3300	50	BD/Hor	12
250	1000386	EVW, JCR82V-250W	50.67	44.5	Faceted	CC-8	298.5	3300	50	BD/Hor	10
250	1000333	ENH, JCR120V-250W	50.67	44.5	Faceted	CC-8	152.4	3250	175	BD/Hor	10
250	1000379	ETJ, JCR120V-250W	50.67	44.5	Specular	CC-8	36.5	3250	175	BD/Hor	10
300	1000321	ELH, JCR120V-300W	50.67	44.5	Stippled	CC-8	154.3	3350	35	BD/Hor	10
300	1000332	ENG, JCR120V-300W	50.67	44.5	Stippled	CC-8	152.4	3450	15	BD/Hor	10
360	1000337	ENX, JCR82V-360W	50.67	44.5	Faceted	CC-8	298.5	3300	75	BD/Hor	10
360	1000338	ENX-5, JCR86V-360W	50.67	44.5	Faceted	CC-8	298.5	3300	75	BD/Hor	10
410	1000636	FXL, JCR82V-410W	50.67	44.5	Faceted	CC-8	298.5	3300	75	BD/Hor	10
		2-Pin Base – GZ6.35									
50	1000268	EFM, JCR8V-50W	49.7	42.0	—	C-6	32.0	3350	50	BD/Hor	10
75	1000270	EFN, JCR12V-75W	50.0	42.0	Specular	C-6	32.0	3400	50	BD/Hor	10
100	1000271	EFP, JCR12V-100W	50.0	42.0	Specular	C-6	32.0	3400	50	BD/Hor	10
100	1003003	JCR12V-100W/H10	50.0	42.0	Specular	C-8	32.0	3100	1000	BD/Hor	10
150	1000272	EFR, JCR15V-150W	50.0	42.0	Specular	C-8	32.0	3400	50	BD/Hor	10



GY5.3

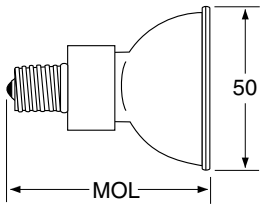


GZ6.35

JDR Line Voltage

- Only for Use in Approved Enclosed Halogen Fixtures
- 50mm Dichroic Coated Reflector
- Line Voltage - 120 Volts
- Operate Base Up
- Intermediate Screw Base - E17

Watts (W)	Ordering Code	Lamp Description	ANSI Code	MOL (mm)	Color Temp (K)	Beam Angle	Beam Spread	Max CP (cd)	Avg Life (h)	Case Qty
		Intermediate Screw Base - E17								
75	1001032	JDR120V-75WL/SP14	FSA	75	3000	14°	Spot	5000	2000	10
75	1001030	JDR120V-75WL/NFL24	FSB	75	3000	24°	Narrow Spot	1800	2000	10
75	1001033	JDR120V-75WL/FL38	FSD	75	3000	38°	Flood	1300	2000	10
100	1001013	JDR120V-100WL/SP14	FSC	75	3000	14°	Spot	7100	2000	12
100	1001011	JDR120V-100WL/NFL24	FSE	75	3000	24°	Narrow Spot	4200	2000	10
100	1001016	JDR120V-100WL/FL38	FSF	75	3000	38°	Flood	2800	2000	10



E17

ECO PLUS PAR (PAR20, 30, 30LN & 38)

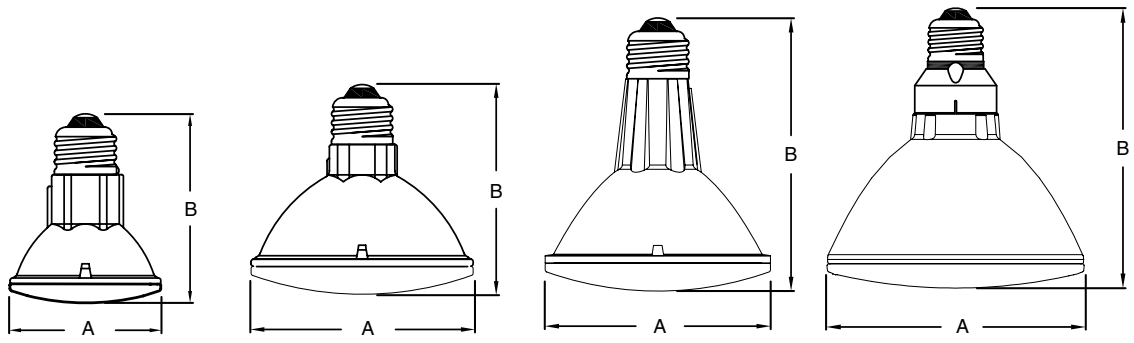
- Energy Savings
- Silver Coated Reflector for Improved Collection Efficiency
- Meets US Federal Minimum Efficiency Standard
- Medium Screw Base - E26
- Dimmable
- Mercury Free
- Universal Burn Positon
- 120 Volts

Watts (W)	Ordering Code	Lamp Description	Dimensions Dia (A)	Dimensions MOL (B)	Color Temp (K)	Beam Angle	Beam Spread	Approx. Lumens (lm)	Avg Life (h)	Case Qty
		ECO PLUS PAR20 Medium Screw Base – E26*								
38	1003839	Ⓔ 38PAR20/FL30/120V	2.50	3.25	2900	30°	Flood	500	2500	15
		ECO PLUS PAR30 Medium Screw Base – E26*								
38	1003842	Ⓔ 38PAR30/FL30/120V	3.75	3.63	2900	30°	Flood	530	2500	15
60	1003841	Ⓔ 60PAR30/FL30/120V	3.75	3.63	2900	30°	Flood	1070	2000	15
		ECO PLUS PAR30 LONG NECK Medium Screw Base – E26*								
38	1003844	Ⓔ 38PAR30LN/FL30/120V	3.75	4.75	2900	30°	Flood	520	2500	15
60	1003843	Ⓔ 60PAR30LN/FL30/120V	3.75	4.75	2900	30°	Flood	1070	2000	15
		ECO PLUS PAR38 Medium Screw Base – E26*								
38	1003847	Ⓔ 38PAR38/FL25/120V	4.75	5.31	2900	25°	Flood	550	2500	15
43	1003848	Ⓔ 43PAR38/FL25/120V	4.75	5.31	2900	25°	Flood	700	2000	15
60	1003845	Ⓔ 60PAR38/FL25/120V	4.75	5.31	2900	25°	Flood	1070	2000	15
70	1003846	Ⓔ 70PAR38/FL25/120V	4.75	5.31	2900	25°	Flood	1310	2000	15

Ⓔ = This bulb meets US Federal Minimum Efficiency Standard.

All dimensions shown in inches unless otherwise noted.

* Only for use in approved Halogen fixtures.



PAR20 PAR30 PAR30LN PAR38

SLIDE, FILM & OPTICAL PROJECTION LAMPS

- Double Contact Bayonet Base - BA15d
  Single Contact Bayonet Base BA15s
- Operate Base Down (except as noted)

Watts (W)	Ordering Code	Lamp Description	Volts (V)	Dimensions (mm) Dia (A)	MOL (B)	LCL (C)	Filament Type	Lumens (lm)	Color Temp (K)	Avg Life (h)	Burn Position	Case Qty	Fig No
		Double Contact Bayonet Base – BA15d											
30	1000060	BLC	120	35	60.3	34.9	CC-2V	400	2775	50	BD/Hor	12	1
50	1000062	BLX	120	35	60.3	34.9	CC-2V	780	2850	50	BD/Hor	12	1
75	1000066	BNF	120	35	60.3	34.9	CC-2V	1300	2900	50	BD/Hor	12	1
75	1000128	CBX/CBS	120	25	79.4	34.9	CC-13	1250	2950	50	BD	25	3
100	1000132	CEA/CEB/CDK	120	25	78.0	35.0	CC-13	1800	2970	50	BD	25	3
200	1000051	BEJ	120	38	66.7	34.9	CC-2V	4600	3100	25	BD	12	2
		Single Contact Bayonet Base – BA15s											
75	1000100	BXE	10	25	75.0	44.5	C-8	1700	—	100	BD	12	3
100	1000065	BMY	120	35	60.3	34.9	CC-13	1860	2950	50	BD/Hor	25	1
150	1000136	CHK	120	25	92.1	34.9	CC-13	2995	2850	500	BD	25	4

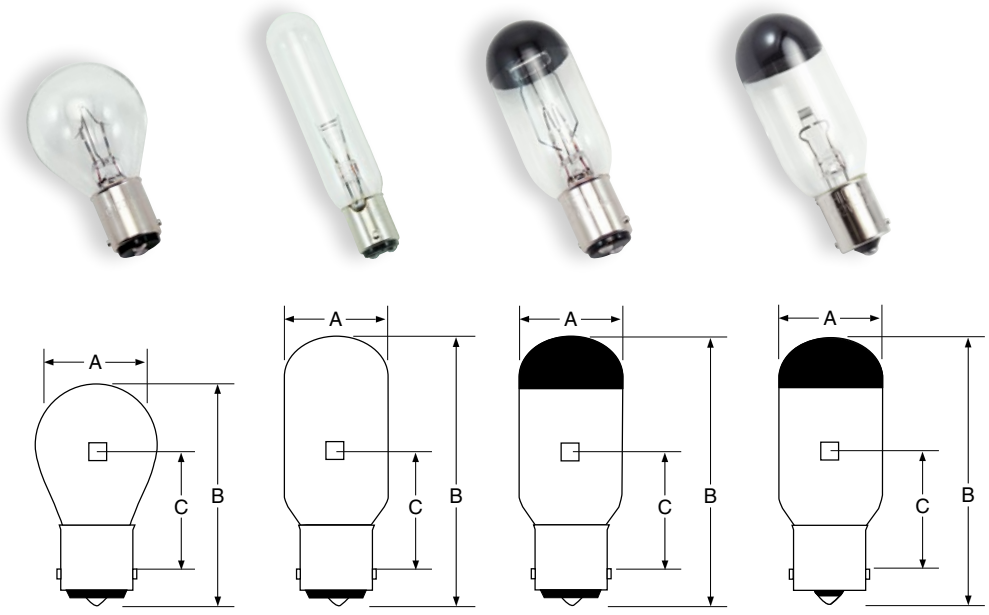


Fig.1 Fig.2 Fig.3 Fig.4

• Mogul Screw Base - E39

Watts (W)	Ordering Code	Lamp Description	Volts (V)	Dimensions (mm) Dia (A)	MOL (B)	LCL (C)	Filament Type	Lumens (lm)	Color Temp (K)	Avg Life (h)	Burn Position	Case Qty	Fig No
		Mogul Screw Base – E39											
1000	1000219	DRW	120	64.0	230	125.0	C-13D	27400	3250	25	BD	25	1

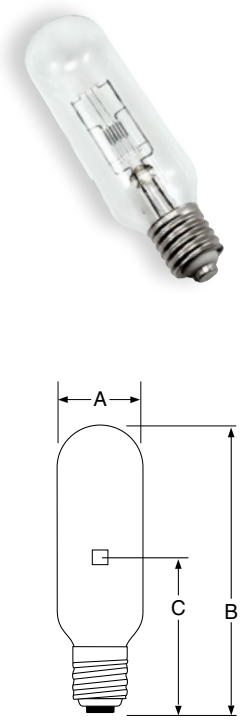


Fig.1

- 4-Pin Base - G17t-7
- 1 9/16" (39.7mm) Light Center Length
- Proximity & Opaque Reflector Lamps

Watts (W)	Ordering Code	Lamp Description	Volts (V)	Dimensions (mm) Dia (A)	MOL (B)	LCL (C)	Filament Type	Color Temp (K)	Avg Life (h)	Burn Position	Case Qty	Fig No
4-Pin Base – G17t-7 - 1 9/16" (39.7mm) LCL												
500	1000047	BCK	120	19.5	88.9	38.7	C-13D	❍3250	50	BD/Hor	12	1

❍ Proximity Reflector

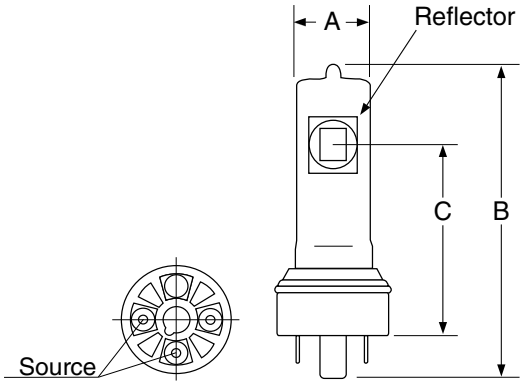


Fig.1

FILM & OVERHEAD PROJECTION LAMPS

- Medium Prefocus Base - P28s
- 2 3/16" (55.5mm) & 3 1/2" (88.9mm) Light Center Length
- Medium Screw Base - E26
- 3" (76mm) Light Center Length

Watts (W)	Ordering Code	Lamp Description	Volts (V)	Dimensions (mm) Dia (A)	MOL (B)	LCL (C)	Filament Type	Lumens (lm)	Color Temp (K)	Avg Life (h)	Burn Position	Case Qty	Fig No
		Medium Prefocus Base – P28s - 2 3/16" (55.5mm) LCL											
500	1000179	DEB	120	38.0	144	88.9	C-13D	9000	2850	800	BU	25	1
500	1000205	DMX	120	64.0	144	55.5	C-13	13200	3200	50	BD	25	2
500	1000211	DNW	120	64.0	145	55.5	C-13	10000	3050	500	BD/Hor	25	2
		Medium Screw Base – E26 - 3" (76mm) LCL											
750	1000169	DCX	120	38.0	139.7	76.2	C-13D	19500	3200	25	BD	25	3

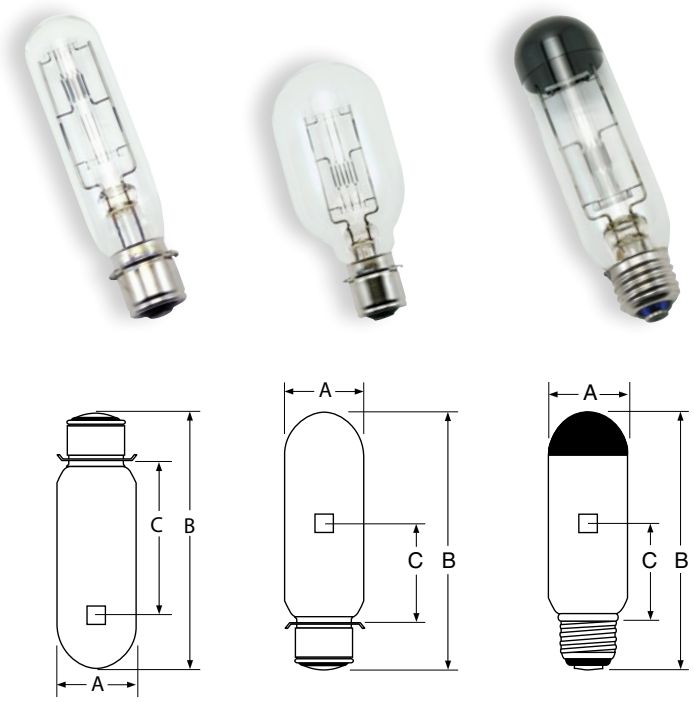
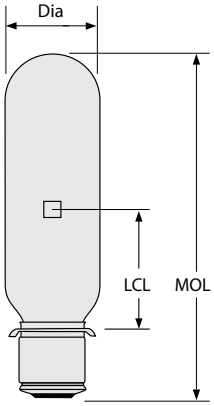


Fig.1 Fig.2 Fig.3

INCANDESCENT PROJECTION LAMPS

- Projection Sound Lamps
- Single Contact Prefocus Base - P30s
  Mogul Prefocus Base - P40s

Watts (W)	Ordering Code	Lamp Description	Volts (V)	Amps (A)	Dimensions Dia (mm)	Dimensions MOL (mm)	Dimensions LCL (mm)	Filament Type	Lumens (lm)	Color Temp (K)	Avg Life (h)	Burn Position	Case Qty
		Mogul Prefocus Base – P40s											
1500	1000221	DTJ	120	——	64	242	87.3	C-13D	42500	3200	25	BD	25



• Medium Screw Base - E26

Watts (W)	Ordering Code	Lamp Description	Volts (V)	Dimensions (mm) Dia (A)	Dimensions (mm) MOL (B)	Lumens (lm)	Color Temp (K)	Avg Life (h)	Burn Position	Case Qty	Fig No
		Medium Screw Base – E26									
75	1001266	PH140, S-14	120	44.0	86.0	1150	2900	50	Univ	30	1
75	1001267	PH211, A-21	115-125	67.0	126.0	1000	3000	100	Univ	30	2
150	1001268	PH212, A-21	115-125	67.0	126.0	2300	3050	100	Univ	30	2
250	1001269	PH213, A-21 NO.1	115-125	67.0	126.0	7000	3400	3	Univ	30	2

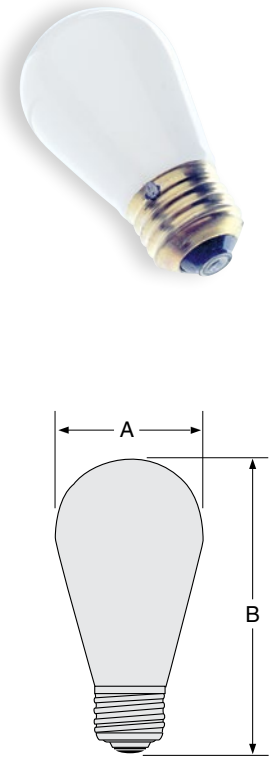


Fig.1

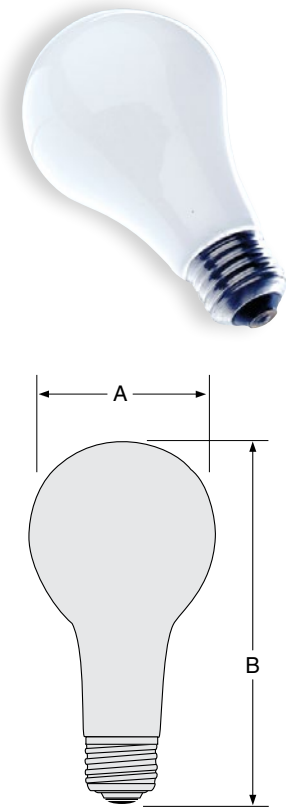


Fig.2

INCANDESCENT PHOTOFLOOD LAMPS

- Medium Screw Base - E26
- Inside Frosted & Blue Bulbs
- 115-120 Volts

Watts (W)	Ordering Code	Lamp Description	Volts (V)	Dimensions (mm) Dia (A)	Dimensions (mm) MOL (B)	Approx Lumens (lm)	Color Temp (K)	Avg Life (h)	Burn Position	Application	Case Qty	Fig No
		Medium Screw Base – E26										
250	1000026	BBA, A-21 NO.1	120	67.0	126.0	8500	3400	3	Univ	Photoflood	30	1
250	1000046	BCA, A-21 NO. B1 BLUE	120	67.0	126.0	2970	5760	3	Univ	Photoflood	30	1
250	1000265	ECA, A-23	120	75.0	140.0	6500	3200	20	Univ	Photoflood	30	1
300	1000024	BAH, INC115V-300W	115	66.7	125.4	9300	3200	20	Univ	Photocopy	30	1
500	1000263	EBV, PS-25 NO.2	120	80.0	152.0	17000	3400	6	Univ	Photoflood	30	2
500	1000264	EBW, PS-25 NO. B2/BLUE	120	80.0	152.0	6680	4840	6	Univ	Photoflood	30	2
500	1000266	ECT, PS-25 3200K	120	79.4	152.0	13650	3200	60	Univ	Photoflood	30	2

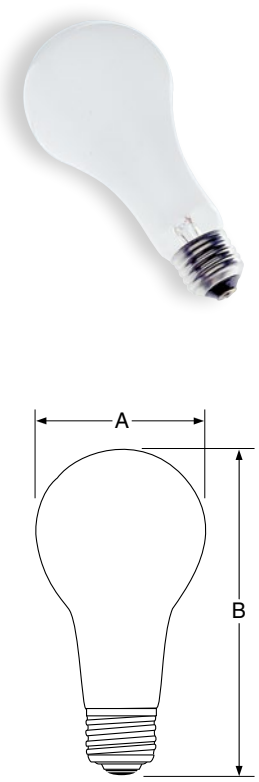


Fig.1

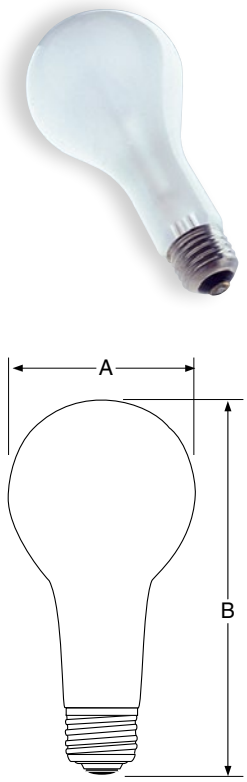


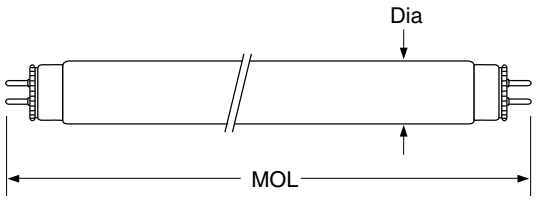
Fig.2

Watts (W)	Ordering Code	Lamp Description	Volts (V)	System Cross Reference	Case Qty
		Entertainment Flash			
1000	5000916	UA-AF1, 1000W, 400V	400	Dataflash HO1	6
1000	5000177	UA-DF1, 1000W, 400V	400	Dataflash SO1	6

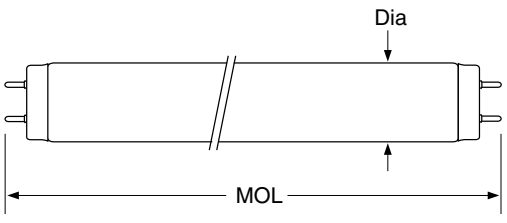
BLACKLIGHT BLUE FLUORESCENT LAMPS

- Fluorescent Lamps
- High CRI

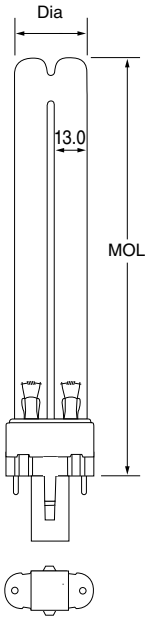
Watts (W)	Ordering Code	Lamp Description	Volts (V)	Amperage (A)	Dimensions (mm) Dia (mm)	Dimensions (mm) MOL (mm)	Spectral Peak (nm)	UV Output (W)	Avg Life (h)	Base Type
		BLACKLIGHT BLUE T-5 DIAMETER								
4.0	3000106	F4T5BLB	29	0.170	15.5	134.5	368	0.5	3000	G5
6.0	3000111	F6T5BLB	42	0.160	15.5	210.5	368	1.0	3000	G5
8.0	3000116	F8T5BLB	57	0.145	15.5	287.0	368	1.2	3000	G5
		BLACKLIGHT BLUE T-8 DIAMETER								
10.0	3000305	F10T8BLB	46	0.230	25.5	330.0	368	1.5	4000	G13
15.0	3000078	F15T8BLB	55	0.305	25.5	436.0	368	2.6	4000	G13
30.5	3000148	F30T8BLB	99	0.355	25.5	893.0	368	6.3	4000	G13
		BLACKLIGHT BLUE T-10 DIAMETER								
20.0	3000306	F20T10/BLB (PREHEAT)	58	0.360	32.5	588.5	368	3.7	4000	G13
		BLACKLIGHT BLUE, COMPACT								
9.0	3000325	FPX9BLB	59	0.180	28.0	145.0	368	1.4	4000	G23
18.0	3000327	FPX18KBLB	58	0.375	40.0	225.0	368	3.3	4000	2G11



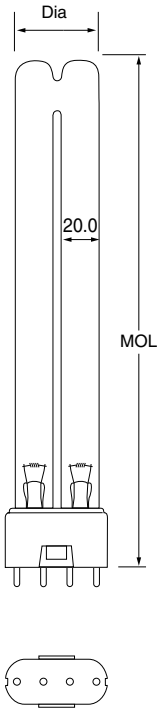
T5 Miniature Bi-Pin G5 Base



T8 & T10 Medium Bi-Pin G13 Base



G23



2G11

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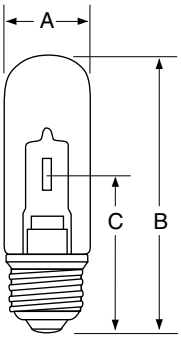
See Safety & Handling Instructions on Page 62

JT

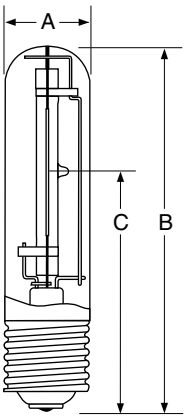
- Only for Use in Approved Enclosed Halogen Fixtures
- Medium Screw Base - E26
- Mogul Screw Base - E39/E40
- Double Envelope
- 120 Volt (except as noted)
- Universal Burn Position

Watts (W)	Ordering Code	Lamp Description	Dimensions (mm) Dia (A)	MOL (B)	LCL (C)	Filament Type	Lumens (lm)	Color Temp (K)	Avg Life (h)	Bulb Finish	Case Qty
		Medium Screw Base – E26 Compact Version									
150	1001883	JT120V-150WG	31.0	85.0	54.0	CC-8	2800	2800	2000	Clear	10
250	1001142	JT120V-250WGF	31.0	105.0	58.0	CC-8	4850	2950	2000	Frosted	50
		Mogul Screw Base – E39/E40									
500	1001143	JT120V-500WB	42.0	193.0	123.0	C-8	11000	3200	2000	Clear	10
1000	1001134	JT120V-1000WB	42.0	260.0	157.0	C-8	22000	3050	2000	Clear	50
1000	1001889	JT240V-1000WB	42.0	260.0	175.0	C-8	21500	3400	2000	Clear	50
		Mogul Screw Base – E39/E40									
500	1003516	JT220V-500WC1/E40	42.0	195.0	123.0	C-8	12500	3200	200	Clear	50
1000	1003361	JT120V-1000WC/E40	42.0	195.0	123.0	C-8	25000	3200	150	Clear	50
1000	1003517	JT220V-1000WC1/E40	42.0	195.0	123.0	C-8	25000	3200	200	Clear	50

JT type Halogen lamps are double-enveloped lamps in which a Halogen lamp serves as an inner tube.



E26 - Clear or Frosted
Compact Version



E39 and E40

COLORLITE™ SERIES

- Consistent Color
- High Color Saturation
- No Color Filter or Gels Required for Fixture
- 6,000 Hours Useful Life

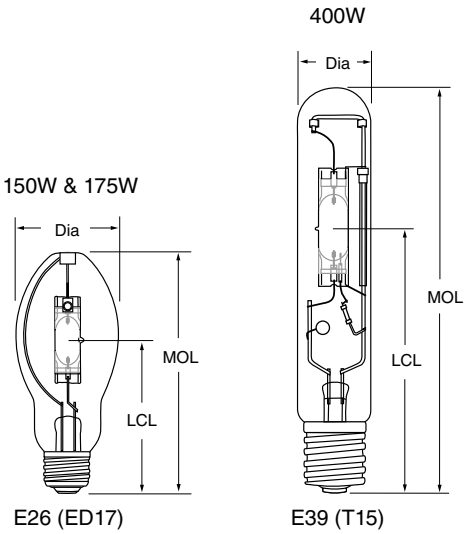
Watts (W)	Ordering Code	Lamp Description	Amperage (A)	Dimensions Dia (mm)	MOL (mm)	LCL (mm)	Luminous Flux (lm)	Wavelength (nm)	Saturation (%)	ANSI Ballast/ Fixture	Burn Position	Case Qty
		Single-Ended Medium Screw Base – E26										
150	5001498	UHI-S150/MAGENTA	1.80	54	138	86	7500	-530	43	M102/E	Univ	12
175	5001455	UHI-S175/E26/BLUE	1.50	54	138	86	3900	470	70	M57/E	Univ	6
		Single-Ended Mogul Screw Base – E39										
400	5000948	UHI-S400MG, MAGENTA	3.25	46	275	175	21000	-540	25	M59/E	Univ	12

Recommended Ignition Voltage: 4kV
* Need ignitor with 4kV
Lamp should be switched off for at least 15 minutes/week

Use only in fixtures installed with safety glass.

/E = Enclosed Fixture Required.
Use only in fixtures installed with tempered safety glass.

Average Life:
ED17 – 150W, 175W = 6000 hours
T15 – 400W = 8000 hours



R
See Safety & Handling Instructions on Page 63

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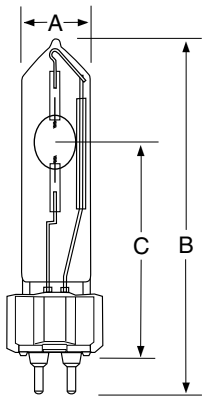
MHL

- For Blacklight Special Effects
- Only Use in UV Protective Housing!

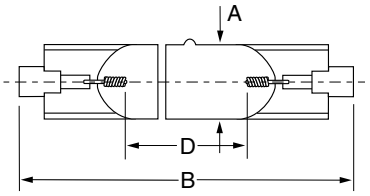
Watts (W)	Ordering Code	Lamp Description	Volts (V)	Spectral Range (nm)	Dimensions (mm) Dia (A)	MOL (B)	LCL (C)	Arc Gap (D)	Avg Life (h)	Base Type	Contact Type
		Single Ended Metal Halide - G12 Base									
70	5001468	MHL-70	95	300-450	23.0	102	56	—	500	G12	—
150	5001381	MHL-150	100	300-450	23.0	99	56	—	500	G12	—
		Double Ended Metal Halide - R7s Base									
250	5000089	MHL-250	125	300-450	15.5	68	—	18	500	RSC	R7s
400	5000803	MHL-400/XX	130	300-450	13.5	106	—	32	500	RSC	R7s
450	5000114	MHL-450	140	300-450	16.3	106	—	31	500	RSC	R7s

70W & 150W



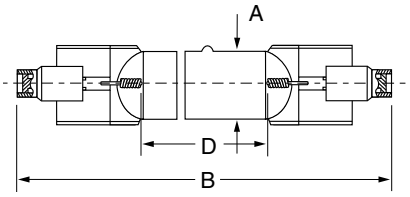
G12

250W



R7s

450W



R7s

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R

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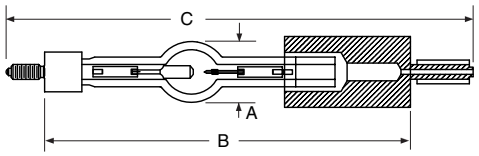
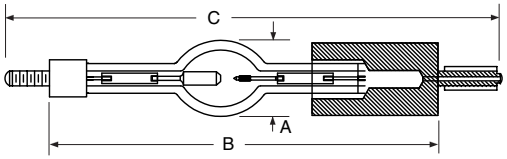
SMH

- High Brightness
- 5700K-6000K Daylight Color Temperature

Watts (W)	Ordering Code	Lamp Description	Volts (V)	Amperage (A)	Dimensions (mm) Dia (A)	LCL (B)	MOL (C)	Arc Gap (mm)	Color Temp (K)	Luminous Flux (lm)	Avg Life (h)	Burn Position
SMH EmArc® Enhanced Metal Arc – Double Ended Metal Halide												
600	5001335	SMH-600/SC1	68	8.8	16.5	100.0	131	3.0	5700	45000	1000	Hor
850	5001477	SMH-850/D2	90	9.4	21	104.5	138	3.5	6000	70000	1000	Hor
850	5001634	SMH-850/SB1	90	9.4	21	104.5	138	3.5	6000	70000	1000	Hor
850	5001470	SMH-850/SC1	90	9.4	21	104.5	138	3.5	6000	70000	1000	Hor



600/SC



SMH-850/D2
SMH-850/SB1
SMH-850/SC1

R
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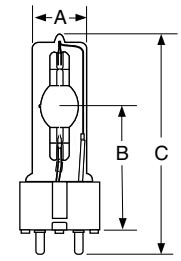
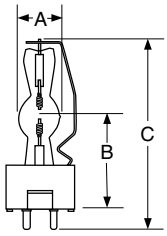
USD & USR

- Compact Design
- High Brightness
- Daylight Color Temperature
- Universal Burn Position

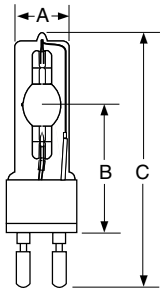
Watts (W)	Ordering Code	Lamp Description	Volts (V)	Nominal Dimensions (mm) Dia (A)	LCL (B)	MOL (C)	Arc Gap (mm)	Color Temp (K)	Luminous Flux (lm)	Avg Life (h)	Base Type
		USD – Single Ended Metal Halide									
250	5002003	USD-250/2	95	23	55	108	5.0	8500	18000	2000	GY9.5
		USR – Single Ended Metal Halide									
575	5002008	USR-575/2	95	30	65	125	7.0	7800	44000	1000	GX9.5
700	5002010	USR-700SA	70	30	39	85	4.0	5600	56000	750	GY9.5
1200	5002392	USR-1200/2	87	40	85	175	10	1200	100000	1000	G22



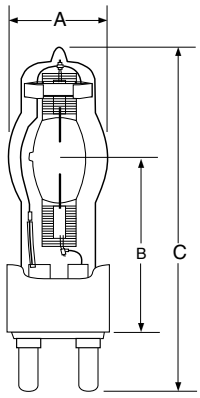
USD-250/2S



USR-700/SA



USR-575/2



USR-1200/2

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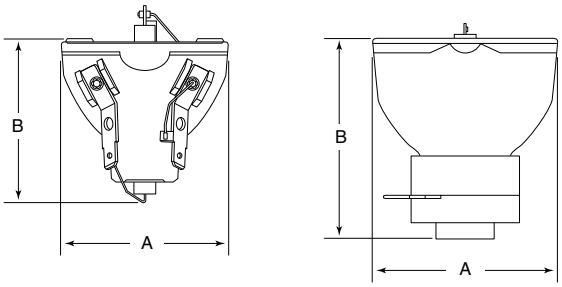
R
See Safety & Handling Instructions on Page 63

U-STAGE - NSL

- High Pressure Short Arc Lamps
- High Lumen Output
- Long Life
- High Color Temperature - 8000K
- Available in 132W, 189W, 300W, 330W

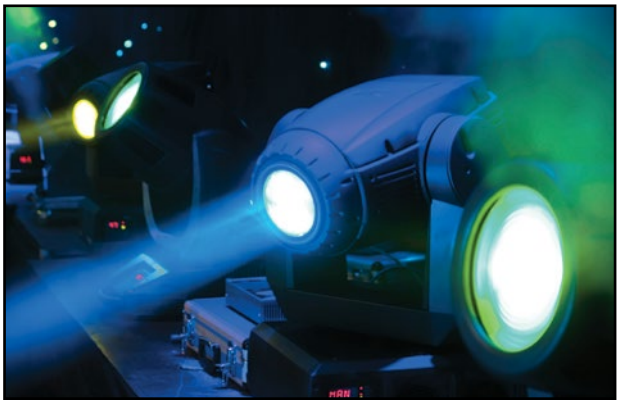
Watts (W)	Ordering Code	Lamp Description	Volts (V)	Dimensions (mm) Dia (A)	Dimensions (mm) MOL (B)	Arc Gap (mm)	Color Temp (K)	Lumen Output (lm)	Working Distance (mm)	Avg Life (h)	Burn Position
U-STAGE NSL for Moving Stage Lights											
132	5002463	NSL-132 (2R)	69	46	45	0.8	8000	5150	37.7	6000	ANY
189	5002464	NSL-189 (5R)	75	51	56	0.9	8000	8000	34.5	2000	ANY



SUPER HIGH-PRESSURE DISCHARGE LAMPS FOR MOVING STAGE LIGHTS

U-stage lamps from Ushio are a series of super high-pressure discharge lamps pre-aligned into a reflector to deliver a high luminosity and a highly reliable light source. This optimized compact design makes the U-stage lamps the ideal light source for high-performance moving stage lights.

As a leader in projector lamp technology, Ushio has a long history of developing short-arc discharge lamp targeting longer life, higher brightness and higher efficiency.



Applications:

- Moving Lights
- Stage
- Concert
- Night Clubs

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METAL HALIDE LAMPS WITH REFLECTOR

MHR

- Cold Mirror Reflector
- Compact Design
- Standard AMP Connector
- Aligned to a Fiber During Manufacturing

Watts (W)	Ordering Code	Lamp Description	Volts (V)	Ignition Voltage (kV)	Lamp Current (A)	Luminous Flux through Aperature ø13mm distance 42mm (lm)*	ø10mm distance 44mm (lm)*	ø25mm distance 33mm (lm)**	Color Temp (K)	CRI	Avg Life (h)	ANSI Ballast/ Fixture	Case Qty
		AMP Connector											
100	5000789	MHR-100D	95	4	1.2	1600	1800	4600	5200	72	6000	M90/E	1
150	5000834	MHR-150N	95	4	1.8	2000	2200	5300	4200	75	6000	M81/E	1
250	5001377	MHR-250N	100	4	3.0	3500 ▲	—	—	4200	72	4000	M80/E	1

* Measurement taken with optical sphere
** Measurement taken through fiber bundle
▲ (ø13mm; distance 53mm)

/E = Enclosed Fixture Required.

Optimal distance from reflector to fiber (with ø13mm fiber bundle):
100W & 150W: 42mm
250W: 53mm

Length of Base Lead Wire: Approx. 75mm

Base Type: AMP Universal Mate-N-Lok
MHR-100D: 3 channel plug
MHR-100D/HR: 5 channel plug
MHR-150N: 5 channel plug
MHR-250N: 5 channel plug

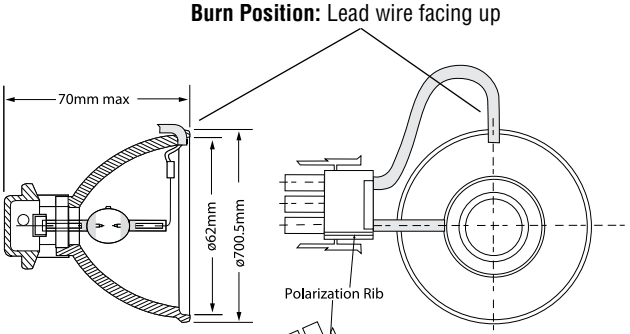
Application Hints
The optimal focal distance between the lamp and the fibre depends on the diameter of the fibre. A rough calculation of the optimal distance between lamp and fixture can be done by the following formula:

100/150W Fd = 52mm - D * 0.77
250W Fd = 64mm - D * 0.77

Fd(mm): Optimal distance betweeen fiber and lamp
D(mm): Diameter of the fiber bundle

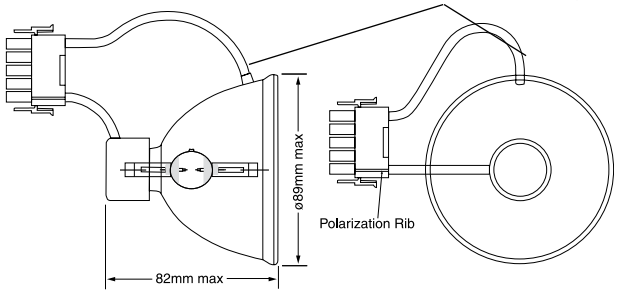
UV and IR radiation from the lamp may cause damage to synthetic fibers. Therefore, reflective or absorbing filters are recommended for use with synthetic fibers.

Burn Position: Lead wire facing up

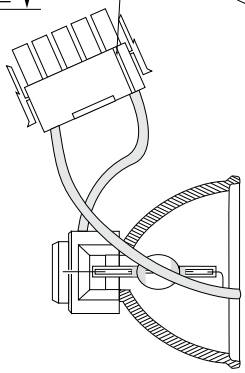


MHR-100D/L
MHR-150N
MHR 100D/HR

Burn Position: Lead wire facing up



MHR-250N



WARNING!
The lamp emits UV radiation which can cause serious eye and skin damage. Therefore, the lamp must be used only in closed lamp houses.

Ballast & Ignitor Information
At the end of their lifetime, metal halide lamps may show rectifier effects causing a rise in current of up to 3 times of the rated value thereby posssibly damaging the ballast. Therefore we recommend to use only ballasts with integrated thermoswitch. For line compensation, a capacitor should be used. It is recommended to use ignitors with a timer switch. The use of electronic ballasts is possible if the operating frequency is below 250Hz. All lamps must be used with 4kV ignitor.

MHR-100D
Warm-up Time to 95% luminous flux: 2.5 minutes with standard ballast
Reignition Time: Approximately 1 minute

MHR-150N
Warm-up Time: 3 minutes
Reignition Time: Approximately 2 minutes

MHR-250N
Warm-up Time: 10 minutes
Reignition Time: Approximately 7 minutes

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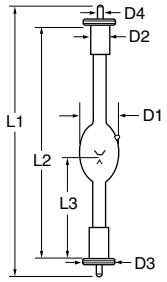
See Safety & Handling Instructions on Page 63

UXL

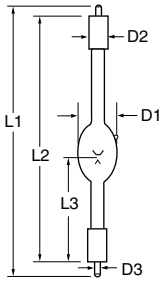
- 300 - 1000 Watts
- Searchlight
- Followspot
- Projection

Watts (W)	Ordering Code	Lamp Description	Rated Amps (A)	Current Control Range (A)	Volts (V)	Forced Air Cooling (m/sec)	Arc Gap (mm)	Diameter (mm) (D1) max	(D2)	(D3)	(D4)	Length (mm) (L1)	(L2)	(L3)	Avg Life (h)
		Xenon Short Arc													
300	5000343	UXL-300D-0	15	14-16	20	—	2.6	25	13	19	M5P0.9	175	150	65	1000
300	5000346	UXL-302-0	15	8-15	20		2.6	25	13	NO 10-32 UNF	—	174	150	85	900
350	5000350	UXL-351E-0	16	15-17	22	3-6	2.9	22	13	—	M8	133	120	66.5	1000
500	5000360	UXL-500D-0	25	17-25	20	4-6	4.0	29	20	M8P1.25	M8P1.25	234	204	95	1500(V) / 1200(H)
550	5000368	UXL-553	25	17-25	22	7-8	3.1	30	15	M6P1.0	—	161	135	65	1500
1000	5002060	UXL-10S	50	30-55	20	4-6	4.2	40	25	11	5/16-18 UNC	245	214	98.5	—
1000	5001075	UXL-10SB	50	30-55	20	4-6	4.2	40	25	11	5/16-18 UNC	245	214	98.5	1500



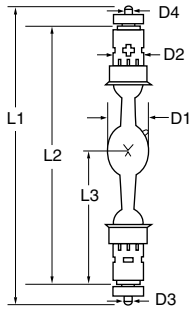
UXL-300D-0

Burn Position: Vertical ±15°



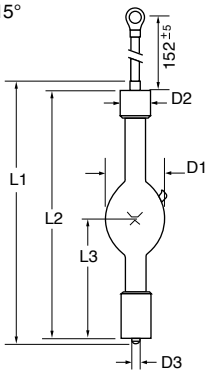
UXL-302-0

Burn Position: Vertical ±30°



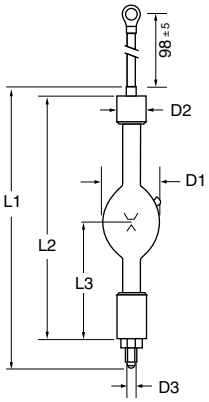
UXL-500D-0 / UXL-1000D-0

Burn Position:
Horizontal ±15° Vertical ±15°



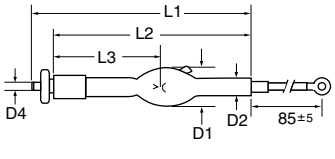
UXL-502HS-0

Burn Position: Vertical ±15°



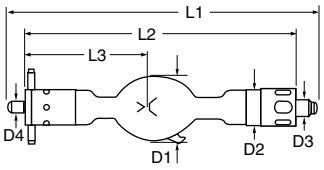
UXL-553

Burn Position:
Horizontal ±15° Vertical ±15°



UXL-351E-0

Burn Position: Horizontal ±15°



UXL-10S / UXL-16S

Burn Position: Horizontal ±15°

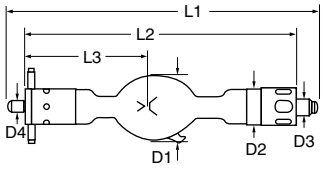
See Safety & Handling Instructions on Page 64

XENON SHORT ARC LAMPS

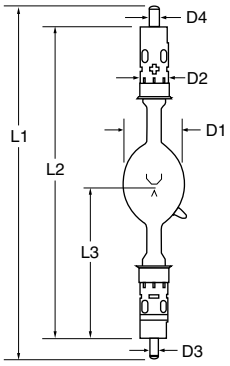
UXL

- 1600 - 3000 Watts
- Searchlight
- Followspot
- Projection

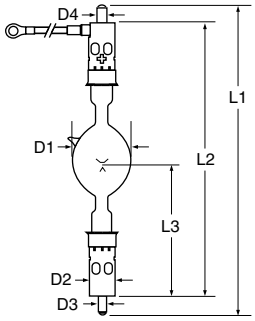
Watts (W)	Ordering Code	Lamp Description	Rated Amps (A)	Current Control Range (A)	Volts (V)	Forced Air Cooling (m/sec)	Arc Gap (mm)	Diameter (mm) (D1) max	(D2)	(D3)	(D4)	Length (mm) (L1)	(L2)	(L3)	Avg Life (h)
		Xenon Short Arc													
1600	5001076	UXL-16SB	65	45-70	22	4-6	4.0	46.5	25	11	5/16-18 UNC	245	214	98.5	1500
2000	5001062	UXL-20FS	80	50-85	25	10-13	6.0	60	27	7.8	9.4	342	302	147	2000
2000	5001434	UXL-20SC	80	50-85	29	5-10	5.5	60	27	7.9	9.5	342	302	147	2400
2000	5001063	UXL-2000FS	70	50-85	29	10-13	6.0	55	27	12	10	370	320	145	2000
2000	5000336	UXL-2000HA	80	60-85	25	7-10	6.0	52	27	M14 P1.5	14	370	320	145	2000
2500	5001077	UXL-25SC	90	70-100	28	10-13	6.0	60	25	7.9	9.5	342	300	147	1500(V) / 1200(H)
3000	5001079	UXL-30SC	100	60-110	30	5-10	6.0	60	27	7.9	9.5	342	302	147	1500(V) / 1200(H)



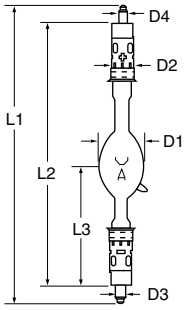
UXL-16SB
Burn Position: Horizontal ±15° Vertical ±15°



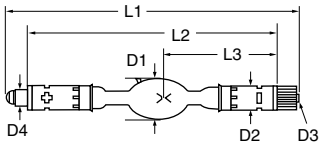
UXL-20FS
Burn Position:
Horizontal ±15° Vertical ±15°



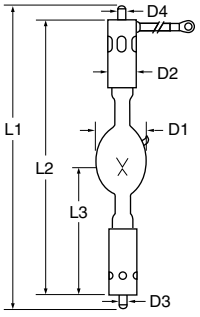
UXL-20SC
Burn Position:
Horizontal ±30° Vertical ±30°



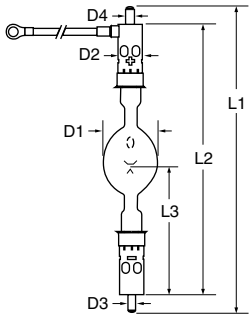
UXL-2000FS
Burn Position:
Horizontal ±15° Vertical ±15°



UXL-2000HA
Burn Position: Horizontal ±15°



UXL-25SC / UXL-40SC
Burn Position:
Horizontal ±15° Vertical ±15°



UXL-30SC
Burn Position:
Horizontal ±30° Vertical ±30°

See Safety & Handling Instructions on Page 64

LAMP SPECIFICATION ABBREVIATIONS

RATINGS

W	Watts
V	Volts
kV	Kilovolts
A	Amps
h	Hours
K	Kelvin
lm	Lumens
lm/W	Lumens per Watt
lx	Center Screen Illuminance
cd	Candela
cp	Candle Power
CRI	Color Rendering Index
m/sec	Meters per Second

DIMENSIONS

LL	Light Length (filament length)
LCL	Light Center Length
C-to-C	Contact to Contact
MOL	Maximum Overall Length
Dia	Diameter
Max	Maximum

All dimensions are approximate measurements in millimeters (mm)

BURN POSITION (BURN POS)

BD	Base Down
BD/45	Within 45º of vertical base down
BD/Hor	Base Down to Horizontal
BU	Base Up
Horiz	Horizontal
H±10	Within ±10º of horizontal position
H±15	Within ±15º of horizontal position
H±10/-45	+10º;-45º of horizontal position
H+15/-45	+15º;-45º of horizontal position
H+60	Within +60º of horizontal position
V∓15	Within ∓15º of vertical position
V±30	Within ±30º of vertical position
Univ	Universal Burn Position

SAFETY AND HANDLING

TUNGSTEN HALOGEN AND INCANDESCENT LAMPS

- Always wear eye protection when installing Halogen lamps. Some Halogen lamps have internal pressures of several atmospheres.
- Halogen lamps operate at extremely high temperatures that can cause serious physical injuries and property damage.
- Only use Halogen lamps in Halogen-approved fixtures. Fixtures should fully contain any parts of the halogen lamp upon the event of a lamp burst.
- Do not use Halogen lamps in close proximity of paper, cloth or other combustible materials that can cause a fire hazard.
- Lamps are very fragile, do not drop, crush, bend or shake them.
- Do not touch the Halogen bulb surface or inside reflectors with your bare hands. Oils from skin can lead to breakage or shorten the life of the lamp. Use clean gloves or lint free cloth for installation and removal.
- Clean any dirt, oil, or lint away from the lamp with alcohol and a lint free cloth or tissue. Any foreign particles or materials on the bulb surface can cause hot spots on the bulb and result in lamp failure.
- Never touch the lamp when it is on, or soon after it has been turned off, as it is hot and will cause serious burns.
- Do not look directly at the operating lamp for any period of time; this may cause serious eye injury.
- Always turn off the electrical power before inserting, removing, or cleaning the lamp.
- Affix the lamp securely in the socket. Improper installations will cause electrical arcing, overheating and short life to lamp and socket. Replace lampholders and sockets when necessary.
- Keep the temperature of the Halogen lamp seal below 350º C.
- Keep the temperature of the Halogen bulb wall above 250º C.
- Keep the temperature of the Halogen lamp bulb wall below 800º C.
- Make sure lamps of specified wattage and voltage are only used in appropriately rated fixtures. Unspecified use will lead to short lamp life, breakage and overheating of fixture.
- Lamps should not be operated beyond the total rated voltage. Avoid the use of dimmers that may drive your lamp over its rated voltage.
- Operate the lamp only in the indicated burn position. Failure to do so will lead to overheating and short life of the lamp.
- Use an external fuse when required.
- Do not allow one lamp to directly expose another. This may lead to overheating and shortened lamp life.

FLUORESCENT LAMPS

- Fluorescent lamps operate at high surface temperatures that can cause serious physical injuries. Turn power off and allow adequate time (approximately 10 minutes) for the lamp to cool before attempting replacement.
- In order to avoid the risk of electrical shock, make sure the power to the fixture is turned off when replacing a lamp. Hold compact fluorescent lamps by the lamp base.
- Lamps are very fragile. Do not drop, crush, bend or shake them. Fluorescent tubes may shatter with considerable force when broken.

FLUORESCENT LAMPS (Continue)

- To ensure that the lamps remain in the sockets for the duration of the operation, make sure that the fixture's sockets are not worn prior to installation of the lamps. If the lamps are installed in worn sockets, the lamps could fall out of the fixture during operation.
- Never operate a lamp above or below its rated current voltage.
- Electrical connections should be clean and in good condition. Replace lamp holders and sockets when needed. Affix the lamp securely in the socket. Improper installations will cause electrical arcing, overheating and short life to the lamp and socket.
- Do not look directly at the operating lamp for any period of time; this may cause serious eye injury.
- Fluorescent lamp use is not recommended in extreme weather conditions. Excessive cold/warm temperatures dramatically affect starting, lamp life and lumen maintenance.
- There is a NEMA recognized industry issue where T2, T4 and T5 fluorescent and compact fluorescent lamps when operated on high frequency electronic ballasts may experience abnormal end-of-life phenomenon. This end-of-life failure can result in the bulb wall cracking near the base of the lamp, or the lamp overheating in the base location and possibly melting the base and/or the socket. NEMA recommends that if high frequency electronic ballasts are used that the ballast has an internal end-of-life protection circuit that will safely and reliably shut down the system in the rare event of a end-of-life failure as described above. For additional information please refer to NEMA papers on their website www.nema.org.

METAL HALIDE DISCHARGE LAMPS

- Always wear eye protection when installing Metal Halide discharge lamps. Some Metal Halide discharge lamps have high internal pressure even while cold.
- Metal Halide discharge lamps emit ultraviolet radiation which is harmful to eyes and skin!
- Metal Halide discharge lamps should only be used in enclosed fixtures with ultraviolet absorbing filter glass. Failure to do so may cause serious skin burn and eye damage. Do not use these lamps in fixtures where any unfiltered light is emitted from the fixture. Do not operate these lamps if the ultraviolet absorbing filter glass is broken or not installed.
- Metal Halide discharge lamps should only be operated in an enclosed fixture that safely contains all lamp parts in the event of a lamp burst or rupture. These lamps operate at a high internal pressure and at high temperatures. A lamp burst can occur causing physical injury and property damage.
- Lamps should never be operated beyond their rated useful life. The risk of a lamp burst increases with lamp age, temperature, improper operation and improper handling.
- Never bump, drop, apply excessive stress, or scratch the lamp. This could cause the lamp to burst! Do not operate any lamps with any traces of scratches, cracks, or physical damage.
- Never operate a lamp above or below its rated current or voltage. This may cause the lamp to leak or burst.
- Always turn off the electrical power before inserting, removing, or cleaning the lamp.
- Clean any dirt, oil, or lint away from the lamp with alcohol and a lint free cloth or tissue.
- Electrical connections should be clean and in good condition. Replace lamp holders and sockets when needed. Affix the lamp securely in the socket. Improper installations will cause electrical arcing, overheating and short life to lamp and socket.
- Never touch the lamp when it is on, or soon after it has been turned off, as it is hot and will cause serious burns. Lamps should be allowed to cool for a minimum of ten (10) minutes after the lamp is turned off.
- Do not use lamp in close proximity of paper, cloth or other combustible material that can cause a fire hazard.
- Do not look directly at the operating lamp for any period of time; this may cause serious eye injury.
- Metal Halide discharge lamps contain mercury. USHIO strives to preserve the environment and make efficient use of resources. Please refer to your local environmental laws regarding disposal and recycling of mercury containing lamps. For more information, please go to www.lamprecycle.org.

(Hg) contains mercury
contient du mercure
Manage in Accord with Disposal Laws
www.lamprecycle.org 1-800-895-8842

Metal Halide, Fluorescent and High Pressure Sodium discharge lamps contain Mercury. USHIO realizes the importance of lamp recycling and we encourage all lamps to be properly disposed of in order to help preserve the environment and our Earth's precious natural resources. Please refer to your local environmental laws regarding disposal and recycling of Mercury containing lamps. To learn more about lamp recycling requirements in your area, you can contact your state environmental authorities or visit www.lamprecycle.org.

R - NON SELF-EXTINGUISHING LAMP

WARNING: This lamp can cause serious skin burn and eye inflammation from shortwave ultraviolet radiation if outer envelope of the lamp is broken or punctured. Do not use where people will remain for more than a few minutes unless adequate shielding or other safety precautions are used. Lamps that will automatically extinguish when the outer envelope is broken or punctured are commercially available. Complies with the USA Federal Standard 21 CFR 1040.30 and Canada Standard SOR/80-381.

HIGH PRESSURE XENON ARC LAMPS

WARNING!

- Xenon arc lamps could burst when not in operation causing serious injuries! It is critical to follow safety instructions when handling Xenon arc lamps!
- Xenon arc lamps have a high internal pressure. Depending upon the lamp, the internal pressure can exceed 10 ATM or 147 PSI, even when not in operation.
- Always wear eye/face and body protection when handling Xenon arc lamps!
- Never bump, drop, apply excessive stress, or scratch the lamp. This could cause the lamp to burst!
- Always transport the lamp in the provided protective case or cover until installation!
- Save the protective case or cover and packaging materials (box) for lamps that have been used to their rated service life. Use the protective case when disposing of the lamps.
- Never touch the lamp when it is on, or soon after it has been turned off, as it is hot and will cause serious burns. Lamps should be allowed to cool for a minimum of ten (10) minutes after the lamp is turned off.
- Always operate the lamp in closed, protective housings.
- Do not look directly at the operating lamp for any length of time; this may cause serious eye injury.
- Do not use lamp in close proximity of paper, cloth or other combustible material that can cause a fire hazard.
- Some Xenon arc lamps produce Ozone that is considered toxic at relatively high concentration levels. Use ozone-producing lamps in lamp housings equipped with exhaust systems.
- Never operate a lamp above or below its rated current or voltage. This may cause the lamp to leak or burst.
- Affix the lamp in the correct polarity according to the lamp and fixture design.
- Affix lamps by hand tightening only. Do not use any tools to tighten nuts or the lamp itself. Any excessive stress to the lamp will cause a burst.
- Electrical connections should be clean and in good condition. Replace lamp holders and sockets when needed. Fix the lamp and its lead wire firmly to the terminals.
- Clean any dirt, oil, or lint away from the lamp with alcohol and a lint free cloth or tissue.
- Xenon arc lamps should not be used beyond their rated service life. Operation beyond the rated service life will cause the lamp to burst.
- The lamp must be operated under the specified conditions such as lamp amperage, voltage, and cooling conditions.
- Do not overcool the lamp. Air should never be directly forced on the bulb because uneven cooling will result.
- Recommended cooling methods are: air flow, N2 gas flow, heat sink and an exhaust duct.
- The lamp base temperature must be kept below 200° C.

XENON ARC LAMP DISPOSAL

- Xenon arc lamps must be disposed of in a careful and proper manner in order to prevent injury.
    1. Wear a protective mask, leather gloves and protective clothing when handling a spent lamp.
    2. Place the used lamp in its original protective case and original cardboard packaging (box) that was provided when the lamp was new.
    3. Firmly attach tape around the original cardboard box to seal the lamp securely.
    4. From approximately three (3) feet in height, drop the cardboard box, with the lamp and protective case inside, onto a hard floor to break the lamp.
    5. Shake the cardboard box to determine if the lamp is broken.

XENON SHORT ARC LAMPS

PART 1
SAFETY AND HANDLING OF XENON SHORT ARC LAMPS

INTRODUCTION
Short arc lamps have many applications in today's world of technology and applied sciences. As with many other devices used in production fabs or field applications, potential hazards exist. Caution along with a general understanding of any device or chemical significantly reduces the possibility of injury.

In order to better understand the precautions associated with the various short arc lamps, we must first examine the products within the lamp and the products produced by the lamp.

All discharge lamps contain metals, gas, or a combination of the two (some non-standard arc lamps, e.g. HMI, sodium vapor, etc., contain inorganic compounds).

SAFETY PRECAUTIONS
Xenon arc lamps typically have a high internal pressure. Depending upon the lamp, the internal pressure can exceed 10 ATM or 147 PSI, even when it is not in operation. For this reason, it is wise to handle the xenon lamp with great care. Use the following precautions when handling xenon lamps:

1. Never bump or drop the lamp.
2. Always wear eye protection.
3. When transporting the lamp, make sure it is in a protective case or cover.
4. Always operate the lamp in protective housings.

Mercury and mercury/xenon lamps are generally at high pressures during operation only. Lamps of this nature should always be operated in closed housings that provide some form of chamber exhaust. In the event of a catastrophic failure (explosion), the closed chamber will prevent injury from flying debris and exhaust stack will provide an escape for mercury or mercury vapor. Some systems may be equipped with condensers, which are designed to protect the equipment and the immediate environment. Since the operating temperature of these lamps will critically affect their performance, exhaust flow rates will vary between the size of the lamp and the size of the chamber. It is best to set exhaust flow rates based upon the desired performance of the lamp. Experimentation of individual systems and system location is highly recommended.

WHAT TO DO IN CASE OF A CATASTROPHIC FAILURE
With most mercury type short arc lamps, the mercury will condense and assume its natural phase very rapidly after explosion. Therefore, small beads of mercury will be present in the lamp housing. Since continued exposure to mercury through the skin, eyes, or respiratory system can be hazardous, it is important to take the following steps when cleaning up mercury:

1. Wear surgical gloves, proper face masks, and goggles.
2. The best way to remove mercury from the system is by aspiration. The suction of a syringe or vacuum device is very effective (do not use lungs). After the noticeable amounts of mercury are removed, gently wipe the optics with lint free paper that is slightly dampened by a residue free liquid.
3. It is important to note that small particles of glass may be present, therefore operators or technicians should take caution to avoid cuts or scratches. The aftermath of a xenon lamp explosion will leave glass particles. No potentially hazardous chemicals will be present, but again, be cautious! Glass particles can cause injury.
4. Any used or spent lamps should be discarded by proper disposal organizations.

Mercury snoop devices are available to measure the presence of mercury in a chamber. These devices may be used where concern about damage to the optics by free mercury is present.

BY-PRODUCTS OF SHORT ARC LAMPS
Ultra-Violet
The primary function of the gas discharge lamp is to produce light for illumination and/or to utilize the various wavelengths for specific photochemical reactions. All discharge lamps will produce ultraviolet light.

All lamps should be operated in a closed chamber. Any time UV leakage is present (through cracks or optics), protective UV glasses should be worn. These glasses are available at any lab supply outlets. Never look at a short arc lamp with the naked eye while it is operating. In fact, it is not advisable to examine a free standing short arc lamp unless you have good reason to do so. In this case, protection for the skin and dark welding type glasses should be worn.

Infrared
Short arc lamps will also produce infrared light. As a result, chambers, direct optics and the lamp will reach relatively high temperatures. Take caution not to touch or expose these areas to temperature sensitive materials.

Ozone
Ozone is the combination of diatomic oxygen (oxygen and monatomic oxygen). Ozone is a strong oxidizer and it will decompose organic compounds. Ozone has a bittersweet smell that is unique to itself. It is considered toxic and relatively high concentrations can be hazardous.

It takes energy to create ozone. Energy will also break it down (UV, 253.7nm). Any lamp which produces wavelengths below 225nm is capable of producing ozone. The amount of ozone produced by a lamp will vary according to the type of lamp and the amount of oxygen in the immediate atmosphere around the lamp.

Most short arc lamps are very inefficient below 225nm. Because the percentage of oxygen in the atmosphere is approximately 20% (this will vary with humidity), ozone production is rarely a problem. However, depending upon the sensitivity of the process and the equipment being used, ozone control may be necessary.

Exhaust systems from the chamber or doping the quartz are two ways to control ozone. Exhausting the lamp chamber will effectively remove ozone. The exhaust flow will depend upon the lamp type and the size of the chamber. The lamp performance will be affected if the exhaust flow is too high. Ozone detectors may be placed within the chamber and the levels can be monitored to establish comfortable levels. Since ozone is a gas and not a vapor, it is not necessary to exhaust at high flow rates.

XENON SHORT ARC LAMPS

Ozone levels can also be controlled by the absorption of the lines emitted by the lamp below 225nm. Titanium or cerium doping is possible however, users should make careful evaluations and be certain that ozone is in fact a problem. Since the lamp is absorbing UV and this phenomena occurs at reduced values of average power densities, the lamp life will suffer. Lamps made of doped quartz tend to be expensive and where relatively short wavelengths are necessary or process, doping is not recommended.

Summary

1. Short arc lamps are invaluable sources for many of today's technical needs.
2. Products within the lamp and produced by the lamp are only harmful when misunderstood or mishandled.
3. Be careful in choosing a vendor for the short arc lamp. Quality products are a key element in avoiding unpleasant surprises.
4. Handle lamps with care. Do not take any unnecessary risks.
5. Make careful evaluations before assuming a problem exist. In this way, future issues may be avoided.

PART 2
SHORT ARC LAMPS AND OZONE PRODUCTION

SHORT ARC LAMPS AND OZONE PRODUCTION
A considerable amount of interest has been generated lately concerning the harmful affects of items produced by short arc lamps. With the newly enacted U.S. Clean Air Act, more and more questions have been raised in particular.

1. How much ozone is produced by a short arc lamp?
2. How can this ozone production be stopped or controlled?

First of all, all non-filtered xenon, xenon/mercury and mercury lamps will produce ozone. How much is difficult, if not impossible to say. To understand why, you have to look at some basic facts.

Ozone is a natural compound of oxygen, occurring in the outer atmosphere. It is a tri-atomic (O-three) phase of oxygen at molecular weight 47.9982 g/g-mol as opposed to 31.9988 g/g-mol for the stable O-two (bi-atomic) oxygen.

In order to produce ozone it takes energy, in this case light. Without light, in specific wavelengths below 225nm, ozone will not be produced. In the outer atmosphere, ozone is produced by sunlight. The excitation of an otherwise very stable O-two molecule, causes it to either split or be joined to a free oxygen radical, creating this tri-atomic phase. This layer acts as the filter protecting the Earth's surface from UV C and B, and to a certain extent, UV A radiation.

Let's consider what it might take to produce ozone here on Earth. Basic components needed:

1. Lamp
2. Chamber
3. Oxygen

Lamp
As stated above, any non-filtered short arc discharge lamp will produce ozone. However, these lamps also produce a wavelength at 257.3nm, and this wavelength will break ozone back down.

When the gas in the lamp is not purely xenon, most of the ozone is produced when the lamp has just been started, before the thermionic arc is fully achieved (mature steady state operation). This is usually during the first 5 minutes or so, of operation when the lamp is operating at a pressure consistent with the production of ozone. During the steady state operation of most discharge lamps, the area under the points on the wavelengths under 225nm is less than 0.5% of the total spectrum of the lamp; in special cases, perhaps as high as 5 or 6%. In other cases there is no line production at all.

Chamber
Most lamps operate in a lamp house. The amount of potential ozone created will depend on how large that lamp house is, how much air is moving through that lamp house (rate and volume), and what the relative humidity is in the lamp house.

Oxygen
Certainly, no one cools the lamp with pure oxygen! This is not safe nor advisable. Therefore, the oxygen must come from free air. The basic percentage of oxygen in the atmosphere is twenty percent, and this with forced flow is dynamic at best.

In order to determine exactly how much ozone is produced by a lamp, a device for ozone measurement must be placed directly onto a specific chamber. The flow rate must be consistent and so should the humidity. It is not possible to ascertain precise data any other way.

Filtering
How do you control the production of ozone? Short of operating the lamp in a vacuum, the only way to avoid ozone production from a lamp is to filter it. Titanium and cerium doped quartz does this very nicely, often cutting off the spectrum at 380-410nm. However, for applications needing energy densities below the cutoff point, doping the lamp is not possible.

Why is ozone considered a problem?
Ozone is a strong oxidizer. In heavy molecular concentrations it will break down organic tissue. There are applications using specific lamps for decomposing bacteria. In some equipment where ozone would be a problem, rubber parts are not used in the exposed environment and nitrogen will be used for cooling.

In the course of technology the well being of the people involved is always a concern. The question is not if we should be concerned. We should be. But what are the limits of reasonable concern? At what point does the reductions of potential harm in one area, increase the real harm to people in another, such as cost? These are issues the user needs to investigate. As a lamp manufacturer, we are asked to produce products for highly specific applications. Danger revolving around the use of lighting products need never be an issue if the risk is managed and clearly understood. It is strongly recommended that users contact their system suppliers for specifics.

THORIUM USE IN DISCHARGE LAMPS

HISTORY
Thorium, first discovered by the Swedish Chemist Jons Berzelius in 1828, was named after the Scandinavian god of war, Thor. The atomic weight of thorium is 232.0381, atomic number 90. The melting point is 1750°C, with a boiling point of 3800°C (approximate).

Thorium is relatively abundant mineral with large deposits found in New England. It occurs in thorite and in thorianite. Thorium is commercially extracted from the mineral monazite.

The method of extraction involves reducing thorium oxide with calcium by the electrolysis of anhydrous thorium chloride in a fused mixture of sodium and potassium chlorides. Other, more complex methods are also used.

Thorium is the second member of the actinide series of elements. A silvery-white metal, it is air stable and retains luster for many months. Only a few elements or compounds, such as tungsten and tantalum carbide, have higher melting temperatures.

The principle use for thorium has been in the Welsbach mantle used in gas camping lanterns. It is also used to impart high strength and creep resistance in magnesium products.

Since thorium has a low work function and a high electron emission (and the oxide is excellent for controlling grain size) it is used to coat or impregnate lamp filaments and arc discharge electrodes.

Thorium oxide is also used in glass where a high refractive index and low dispersion is desired.

ATW 232 thorium occurs naturally and has a half life of 1.41×10^{10} years. As an alpha emitter, it goes through six alpha and four beta decay steps before becoming the stable isotope ATW 208 Pb (lead).

THORIUM USE IN LAMPS
Since Edison's day, thorium oxide has played a major role in lamp production. As previously stated, thorium's value in lamp manufacturing is well established and no known material can replaced it with the same practical integrity.

Lamp stability, lamp life, and consistent production replication is extremely important in lamp manufacturing, especially where micron and submicron lithography work is desired.

In short, without complex electrode materials and production systems, lamp based photolithography would not be possible.

Electrode/thorium mixtures are 2% to 4% thorium by weight. It is also important to note that in a DC short arc lamp only cathode (emitter) is thorium impregnated. The anode (the larger electrode) is the target, and as such requires no thorium. AC long arc xenon lamps are typically manufactured with both electrodes impregnated with thorium, typically 2% each.

THORIUM AND SAFEFY
Since the application of thorium in a lamp product in the hands of an end user is not known, nor regarded as hazardous, this paper does not deal with it as hazardous compound. Obviously, effort should be extended in order to justify this position.

Many individuals simply hear the term "radioactive" and they cringe. Historical events come to mind: Three Mile Island, Chernobyl, and of course, Diane Silkwood, not to mention those very unfortunate individuals exposed to massive amounts of radiation during bouts with cancer.

Radiation is subject to many physical phenomenons. Since radiation is simply a term designated for any source that emits some form of wave or particle from a center hub out to an outer wave from rim; such as radio waves, light waves and atomic decay. Most of these resources are not harmful, and may be controlled to the point of being in a nonhazardous condition.

The key to safety regarding all aspects of radiation is education and a nonemotional evaluation of the source. Sensationalism is fine for playwrights and paperback novels, but contributes little to science.

WHAT OF THORIUM?
Thorium is a radioactive compound. The important distinction is that thorium is a primary alpha emitter. What is an alpha? Very importantly, alpha is a non-penetrating particle.

The British physicist, Ernest Rutherford, was the first to identify the different kinds of radiation. Alpha, beta and gamma rays were distinguished by the way they responded in magnetic fields, and he discovered, by their differences in penetrability.

Basically, it was found that gamma rays displayed x-ray like penetrability, beta rays were much less penetrable, and alpha rays (thorium primary) were scarcely penetrating at all.

Rutherford further examined the alpha ray and in measuring the e/m ratio found it equivalent to that of a helium atom. It is important to note that unlike the relatively hazardous uranium atom, thorium is not fissionable.

However, since thorium is radioactive, and as such is experiencing decay, what is the danger from the daughter products, in this case the four beta decay steps before becoming lead?

Bear in mind the time consideration. One half life is over millions of years. By the nature of ATW 232 thorium, actual production of beta particles (still far less penetrating than gamma rays) is very ray. In fact, statistically, it does not exist relative to the background radiation that we are all exposed to day to day.

So far we have examined the properties of thorium through the documented work and particle history of the product.

No aspect is complete within the scientific method without including actual quantitative data. As such, a series of simple test were conducted on five items, all containing thorium oxide.

THORIUM USE IN DISCHARGE LAMPS

LAMP – THORIUM VALUE TESTING
Items utilized

1. Lamp cathode from a 5000 watt xenon/mercury lamp. Total weight of cathode was 1.7 grams at 2% thorium oxide or 0.03401 gram.
2. Coleman camping mantle silk-lite 21A.
3. 1000 watt short arc discharge lamp for semiconductor lithography.
4. 5000 watt lamp short arc lamp for PC lithography.
5. 6.5KW xenon long arc AC lamp.
6. Two 0.050 inch thick metal sheets.
7. G-M counter Ludlum model #18 analyzer.
8. Thin window G-M sensor model #44-9.
9. Sodium iodide crystal gamma probe #44-3.

THORIUM VALUE TESTING

Note: Background was 50 CPM with Detector A 500 CPM, with Detector B translating to about .02 millirem.

Please note the radiation source and shield diagram and the assessment chart.

	Detector A			Detector B		
	Source	S-1	S-2	Source	S-1	S-2
1000 Watt Lamp	60 CPM	50	50	- -	-	-
5000 Watt Lamp	75 CPM	50	50	- -	-	-
6.5KW	110 CPM	50	50	- -	-	-
Cathode	75 CPM	50	50	500	-	-
Mantle	10,000 CPM	50	-	- -	-	-

The concept here was to measure the emission from the standpoint of an individual placing a lamp into a system, and from the standpoint of an individual operating a machine using the lamp.

Please note the diagram S-1 and S-2 represent two metal shields. S-1 would be an inner housing and S-2 would represent the outer housing or door of the machine.

If you use water to cool the lamp within a quartz jacket this too would act as a shield. Distances were kept minimal and far smaller than most large systems.

By observing the chart it is plain to see that the statistical value of radiation from each product with the exception of the camping mantle was not above background radiation.

In fact, the camping mantle at 10,000 CPM was 90 times more active than the 6.5KW lamp 110 CPM. Remember we must subtract 50 CPM from these figures to account for background noise leaving the 6.5KW lamp at 60 CPM and the mantle at 9,950 CPM (camping mantles of older vintage are relatively high in alpha production, newer ones are far less active, if at all).

Again, in this case the background was 50 counts per minute or approximately 0.2 millirem. In fact, one of our customers in an independent test with a 2.4KW lamp observed the same readings.

Given the overall statistical value, the arc discharge lamp at the stated level of thorium content is not any higher than background radiation. As such, its presence does not put anyone at any more risk than one could expect by simply sitting in a room and reading this paper.

Furthermore, according to the Radiology Health Handbook 1970 page #104, one gram of ATW 232 is equal to 1.9 X 10-7 Curie.

Given the fact that the largest cathode we make for short arc photolithography lamps has only 0.03401 of a gram of thorium, there is little concern. Even the AC 6.5KW lamp at 0.04701(approximate) of a gram of thorium, the total with both electrodes impregnated is of no concern, falling very well below the roentgen equivalent physical (REP) for soft tissue absorption and extremely well below the soft tissue extent of 93 ergs/g.

On a comparative risk assessment value the common smoke detector or vintage camping mantle produces thousands of times more potential saturation than any of today's thorium impregnated arc discharged lamps.

With all that has been noted on thorium and alpha radiation by various health organizations at worst in small or large amounts, inhalation is the "do-not-do" condition. Certainly a lamp or bare electrode should never fall into this realm of concern.

For further information it may be noted that according to the state of California Radiation Control regulations, California Administrative Code Title 17 Health, page 15, article 3 (exemptions), item B, number nine: "Any finished product or part fabricated of, or containing tungsten-thoriated or magnesium-thorium alloys; providing that the thorium content is not over 4% by weight is exempt from any radiation health regulations."

Given the test performed for this paper it is obvious why the 2-4% thoriated tungsten electrode is not a health risk. Found in high performance automobile rims, bicycle frames, camping mantles, optics, and lamps, thorium has established itself as a critical, as well as safe, useful products. Understanding its properties and metallurgy contributions will no doubt keep it with us for some time.

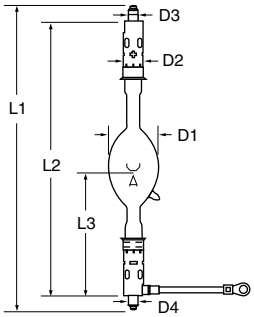
References:
California Radiation Control Regulations Handbook, State of California Department of Health Services; Handbook of Chemistry and Physics, 69th edition; History of Physics, Isaac Asimov, 1966; Radiology Health Handbook, 1970.

Acknowledgments and thanks to:
The NRC, NTIS, NEMA, California State University Long Beach Radiation Safety Laboratory, and special thanks to Mr. Jeffrey S. Mellon and Ms. Kristin Boucquey at UCLB, Keith Cordero and Mike So of Ushio America, and Diagnostic Laboratory, for their assistance.

UXL

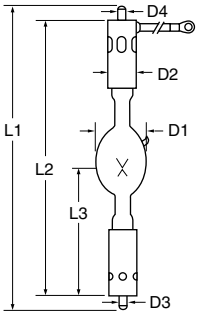
- 3000 - 7000 Watts
- Searchlight
- Followspot
- Projection

Watts (W)	Ordering Code	Lamp Description	Rated Amps (A)	Current Control Range (A)	Volts (V)	Forced Air Cooling (m/sec)	Arc Gap (mm)	Diameter (mm) (D1) max	(D2)	(D3)	(D4)	Length (mm) (L1)	(L2)	(L3)	Avg Life (h)
		Xenon Short Arc													
3000	5001064	UXL-3000FS	100	60-100	30	10-13	7.0	70	27	13	14	428	—	171.0	1200
4000	5000631	UXL-40SC	135	80-150	29	10-13	7.0	70	30	7.9	9.5	410	370	174.5	1200
4000	5002082	UXL-40SCH	135	80-150	29	10-13	—	70	30	7.9	9.4	410	370	174.5	—
6000	5000943	UXL-60SC	160	120-170	37	10-13	9.0	80	30	9.4	7.85	433	392	176.0	500
7000	5000634	UXL-70SC	160	120-170	42	10-13	10.0	80	30	7.9	9.4	433	392	171.0	500



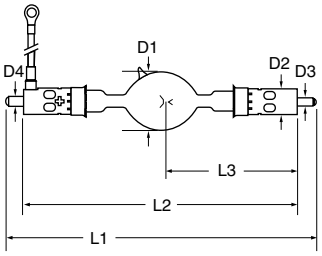
UXL-3000FS

Burn Position:
Horizontal ±15°
Vertical



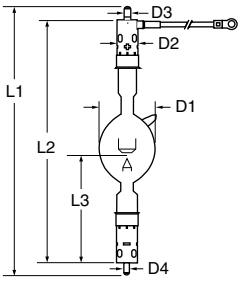
UXL-40SC / UXL-40SCH

Burn Position:
Horizontal ±15°
Vertical ±15°



UXL-70SC

Burn Position:
Horizontal $^{+}15°/^{-}45$



UXL-60SC / UXL-50SC

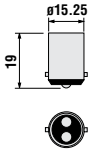
Burn Position:
Horizontal ±15° Vertical

See Safety & Handling Instructions on Page 64

LAMP BASE TYPES

BA9s

BA15d



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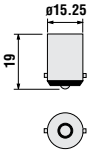

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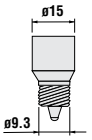

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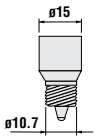

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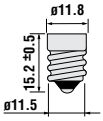

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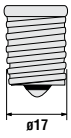

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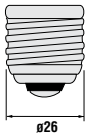

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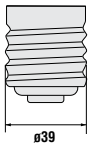

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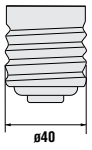

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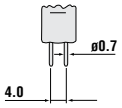

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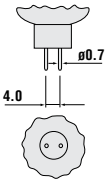

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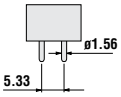

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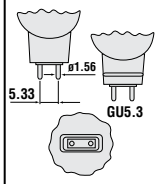

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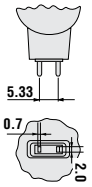

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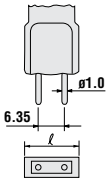

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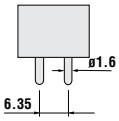

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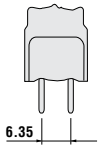

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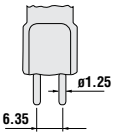

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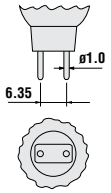

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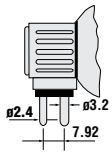

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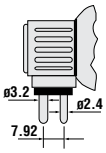

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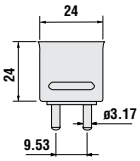

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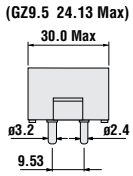

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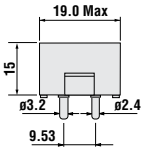

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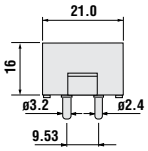

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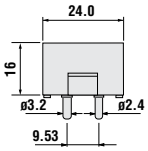

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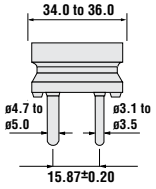

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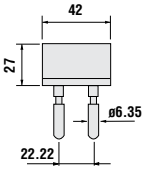

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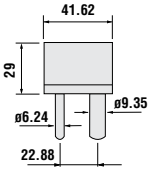

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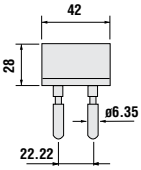

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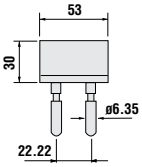

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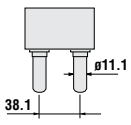
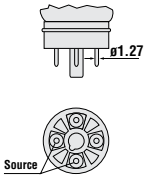


G17q-7



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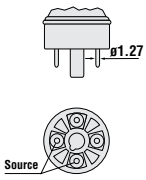

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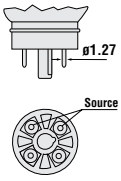

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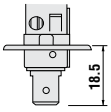

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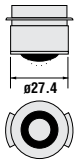

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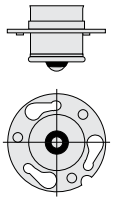

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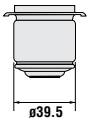


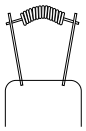
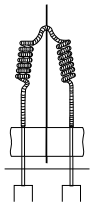
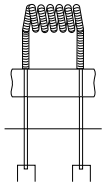
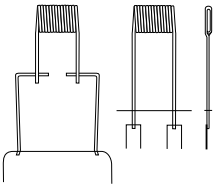
Fc2

R7s-12/R7s-18

Rx7s

LAMP FILAMENT TYPES

LAMP FILAMENT TYPES

C-2R	CC-2V	C-6	CC-6	CBar6 (CF-6)
				
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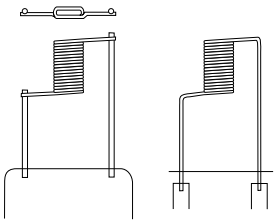
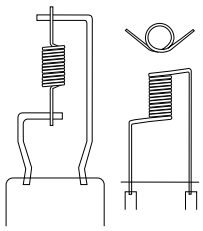
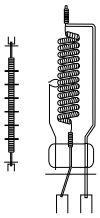
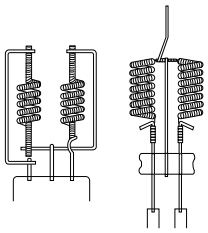
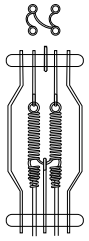
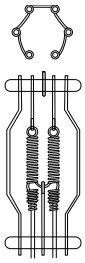
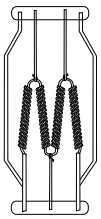
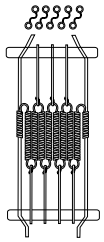
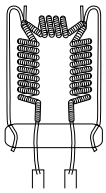
				
6-C8	**C-13**	**CC-13**	**C-13D**	**SPECIAL**
				

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