Discharge Lamps and Ballasts

Luminaires may utilize fluorescent or high intensity discharge sources that contain small amounts of mercury. New disposal labeling for these lamps includes the mercury identifier shown below to indicate that the lamp contains mercury and should be disposed of in accordance with local requirements.

Information sources regarding lamp recycling and disposal are included on the packaging of most mercury-containing lamps and also can be located at www.lamprecycle.org.

TECHNICAL SUPPORT FOR LAMP AND BALLAST SUPPLIERS

Lamp Supplier	*Phone*
GE	800-GE LAMPS
Philips	800-555-0050
SYLVANIA	800-255-5042
Venture	800-451-2606

Ballast Supplier	*Phone*
Advance Transformer Co.	800-372-3331, ext. 2
Aromat Corporation	888-427-6628
Denki Corporation of North America	800-908-8882
Future Wave Technologies, Inc.	508-460-3300
Howard Industries, Inc.	800-956-3456, ext. 1654
Lutron Electronics Co., Inc.	800-523-9466
OSRAM SYLVANIA	800-654-0089
OSRAM SYLVANIA, Canada	905-673-6171
Radionic Industries, Inc.	773-804-0100
Robertson Worldwide	800-323-5633, ext. 5
Universal Lighting Technologies	800-225-5278, ext. 538
Venture Lighting International	800-451-2606

CONTENTS

All electric discharge lamps are characterized as negative resistance light sources. Therefore, they require support devices that limit the current when voltage is applied, to prevent the lamp from being destroyed. The ballast is the device limiting the current capability.

Additionally, the ballast provides the lamp with proper voltage to reliably start and operate the lamp throughout its rated service life. A transformer integral to the ballast circuit matches voltage required for the lamp to the available supply voltage.

Fluorescent and H.I.D. lamps exhibit several electrical characteristics that have important effects on ballasts. The following definitions will help explain those characteristics.

Starting Voltage

Fluorescent rapid start lamps contain cathodes which are preheated by the ballast. A variety of fluorescent rapid start ballasts are available to produce reliable starting for specific ambient temperatures. Mercury vapor and most metal halide lamps incorporate integral starting electrodes which allow the lamps to start at relatively low voltages in ambient temperatures ranging above -20°F (-30°C).

High pressure sodium and low wattage (≤ 150 watts) metal halide lamps require separate electronic starting devices (called "ignitors") which deliver a high voltage pulse to establish the arc. HPS will start reliably above -40°F (-40°C) ambient temperatures. The pulse repeats each cycle with a maximum pulse width of 15 microseconds. Once the lamp arc is established, the ignitor drops out of the circuit.

Starting Current

This is the initial current available to the lamp during warm-up. If the current is incorrect, the lamp may not start or reach its rated operating performance. Rated lamp life may be affected.

Operating Current

Operating current is the rated current flow under nominal operating conditions once the lamp arc has been established and is performing at rated levels. The starting current may differ from the operating current. Care should be taken to load circuits to the highest load conditions (amperes). Normal power factor ballasts have higher starting currents than operating. Low wattage (100 watts or less) metal halide and HPS lamps have the highest current demand during restrike (hot start).

Fluorescent lamp operating voltage remains relatively constant throughout rated life. Lamp life, ballast life, and light output may be affected if the operating voltage varies significantly from the voltage specified for the ballast. In general, fluorescent ballasts should be operated within ±7½% of their rated voltage.

Mercury vapor and metal halide lamp operating voltage remains relatively constant throughout rated life, although lamp manufacturing tolerances can allow for as much as ±10% variance from nominal. As a result, depending on the type of ballast being used, H.I.D. lamp wattage may vary considerably. High pressure sodium lamp operating voltage rises continually from initial installation until end of life.

HPS ballasts are designed to provide increased voltage requirement to the lamp through rated life. For example, a 400W HPS lamp normally starts at 100 volts and increases to 140 volts at end of life.

Operating Wattage

Fluorescent lamps operate at rated wattage if the supply voltage is nominal and the lamp is operating at an ambient temperature of 77°F (25°C). H.I.D. lamps operate at rated wattage only if the lamp voltage and supply voltage is nominal. Lamp wattage, light output, and lamp life may be affected if any conditions vary from nominal.

Crest Factor

Crest factor is the ratio of peak to RMS (root mean square) current. For example, the crest factor of a true sine wave form is 1.41. Lamp manufacturers' published data is based on lamps operated on a standard reactor ballast with a 1.41 crest factor. Input voltage to a commercial ballast is a sine wave, but the secondary voltage wave shape in the inductive and capacitive type ballast is distorted, and their crest factors are higher than 1.41.

Tests indicate that ballasts with higher crest factors may result in depreciation of lumen output or reduced lamp life. In general, a maximum lamp current crest factor of 1.7 for fluorescent ballasts is recommended. H.I.D. constant wattage and constant wattage autotransformer ballasts have a crest factor of about 1.8. Metal halide and HPS ballasts approach 1.65. H.I.D. lamp recommendations suggest a maximum crest factor of 2.0 for mercury vapor and 1.8 for metal halide and HPS.

Power Factor

Power factor (the phase between voltage and current) is the ratio of line watts to line volts x line amps, expressed in a percentage. A high power factor (HPF) ballast must have a power factor of at least 90% at nominal line voltage and lamp voltage. In most cases as the lamp and capacitors age, the power factor will drop below 90%. A normal power factor (NPF) ballast has a power factor below 90%, usually around 50%. NPF compact fluorescent ballasts can be as low as 28%.

A normal power factor ballast has almost twice the line current as a high power factor ballast, thereby requiring larger wire sizes, breakers, switches, etc. for the equivalent connected load. Some power utilities may assess a penalty charge for inefficient use of power due to low power factor equipment.

Radio Frequency Interference (RFI) and Electromagnetic Interference (EMI)

Electronic fluorescent ballasts generally operate at a frequency in excess of 20,000 Hz to optimize lamp efficacy. Electronic ballasts may feed back interference into the power system resulting in interference with sensitive electronic equipment such as communications or data processing equipment. High-quality electronic ballasts use filters and enclosures to reduce conducted and radiated EMI to acceptable limits as specified by the Federal Communications Commission (FCC).

Ballast Sound Ratings

Core and coil ballasts may produce a slight hum due to the magnetic action within the ballast. Fluorescent ballasts are sound rated by a letter code, A through D. An A sound rating is the quietest ballast and is typically recommended for commercial applications. Because solid state electronic ballasts do not contain a core and coil, they will generally operate quieter than magnetic ballasts.

Ballast Case Temperature

The ballast case temperature is affected by changes in ambient temperature and voltage increase. Fluorescent ballasts contain a Class P thermal switch which will disconnect the ballast if it exceeds 105°C. Excessive ambient temperature or voltage supply may significantly reduce the life of the ballast.

Harmonic Distortion

All ballasts generate harmonic currents of some magnitude in the electrical distribution system. The ratio of RMS (root mean square) harmonic current to the RMS fundamental current is the Total Harmonic Distortion or THD. THD is often used to assess the ability of a fluorescent electronic ballast to control harmonic currents. The ANSI standard for electronic ballasts specifies a maximum THD of 32%. Conventional magnetic ballasts are generally in the range of 10% to 20%. Most hybrid electronic ballasts (containing both electronic and electromagnetic components) fall into the area of 20% to 30% THD. Solid state electronic ballasts (containing virtually all electronic components) are usually less than 10%.

Ballast Regulation

This is the ability of a ballast to control lamp wattage when subjected to line voltage variation. Consideration should be given to line voltage variations expected on a given electrical system where H.I.D. lamps are used. Most new power distribution systems are designed to provide ±3% of nominal voltage. However, some systems, especially older ones, may have variances up to ±10% from nominal. Regulation characteristics for various ballast types are listed in the ballast data tables. Typically the cost of a ballast rises with the degree of regulation available. The better the regulation, the higher the cost.

Primary Dropout Voltage

All power distribution systems experience dips and peaks in line voltage as well as other transient conditions. Well-regulated systems seldom see voltage fluctuations of 20% or more. Be sure to check the primary dropout voltage rating on H.I.D. ballasts if voltage variations are of concern. Voltage dips in excess of this rating may cause the lamps to extinguish and recycle.

Lamp Ordering and Availability

Ordering Information

Example: **F32T8 LPPM730 J25**

	Wattage Length/Bulb Designation	Manufacturer LPG = GE LPS = SYLVANIA LPP = Philips	Color/Job Pack Designation											
			CW	CWX	WW	WWX	2700	3000	3500	4100	5000	6500	7500	DAY
Linear Fluorescent	F13T5	LPP	CW											
	F13T5	LPS	CW J24		WW J24									
	F17T8	LPG						730 J24 830 J24	735 J24 835 J24 SP35 J24	741 J24 841 J24	850 J24			
	F17T8	LPS					827 J30		735 J30 835 J30 M735 J30 M835EX J30	741 J30 841 J30				
	F17T8	LPP						TL830 J25		TL741 J25 TL841 J25				
	F25T8	LPG						730 J24 830 J24	735 J24 SP35 J24 SX35 J24	741 J24 SX41 J24				
	F25T8	LPS					827 J30		M735 J30 M835EX J30	M741 J30 M841EX J30				
	F25T8	LPP						TL730 J25 TL830 J25	TL735 J25 TL835 J25	TL741 J25 TL841 J25				
	F30T12	LPG							SX35 J24					
	F32T8	LPG						ME730EX J36	M835 J36	M741EX J36 ME741EX J36		SP65 J36		
	F32T8	LPS					827 J30	730 J30 830 J30 M730 J30	735 J30 835 J30 835EX J30 M735 J30 M835 J30 M835EXS J30	741 J30 841 J30 M741 J30 M841 J30 M81EX J30 M841EXS J30	850 J30			
	F32T8	LPP						M730 J25 M830 J25 TL930 J25	M735 J25 M835 J25	M741 J25 M741EX J25 M841 J25 M841EX J25 M841EXL J25	TL950 J25			
	F39T5HO	LPS							835 J40					
	F40T12	LPG	ESCW J30						SP35 J30					
	F40T12	LPP						ME730S J30	M835 J25					
	F40T12	LPS	ESCW J30											
	F48T12HO	LPG	J24						SP35 J24					
	F48T12HO	LPS								D41 J30				
	F48T8HO	LPP							TL735 J24 TL835 J24					
	F54T5HO	LPG								841 J40				
	F54T5HO	LPS						830 J40	835 J40	841 J40				
	F54T5HO	LPP							835 J40					
	F96T12	LPS							ESD35 J15					
	F96T12HO	LPG	CT J15						SP35 J15					
	F96T12HO	LPS	ESCW J15											
	F96T8	LPG							SP35 J24					
	F96T8	LPS							835 J24	841 J24				
	F96T8HO	LPG							SP35 J24 SX35 J24					
	F96T8HO	LPP							735 J24 835 J24	841 J24				
	F96T8HO	LPS							735 J24 835 J24	841 J24				
U Lamps	FB31T8	LPS						830 J15	835 J15 835EX J15	841 J15				
	FB32T8	LPG							SP35 J12 SX35 J12					
	FB32T8	LPP						M830 J20	TL835 J20					
	FB32T8	LPS						730 J16	735 J16 835 J16	741 J16				
	FB40T12	LPS	ESCW J12											
Compact Fluor.	FCF18	LPG						SX30 J40						
	FCF39	LPG							SX35 J40					
	FCF40	LPG							SX35 J36	SX41 J36				
	FCF40	LPP							TL835 J25	TL841 J25				
	FCF40	LPS						830 J10	835 J10	841 J10				
	FCF55	LPS						830 J10	835 J10	841 J10				

NOTES:

1 The table above shows those lamps commonly available through Lithonia Lighting. Please contact your Lithonia representative or your lamp manufacturer for other lamps available from these manufacturers.

2 Performance for these lamps will vary, contact your lamp supplier for specific performance information.

3 Many lamps meet the Federal EPA TCLP test and are available from several lamp manufacturers. Consult your lamp manufacturer for availability.

4 Jxx (example: J24) refers to the number of lamps in a single job pack.

Generic Electronic Ballast Option

Lithonia Lighting maintains in its distribution centers and selected field warehouses the industry's largest and broadest inventory of luminaires with popular electronic ballasts. If ballast quality, performance and availability are a concern, but you have no vendor preference, specify Lithonia's generic electronic ballast option. This ensures you an electronic ballast that meets or exceeds ANSI standards for high-frequency electronic ballasts. Ballasts are from nationally-recognized manufacturers with established warranty and service programs.

Specify **GEB** for ballasts with less than 20%THD. Specify **GEB10IS, GEB10RS** and **GEB10PS** for ballasts with less than 10%THD. Multi-volt option (**MVOLT**) currently is available in *less than 10% THD ballasts* only. GEB10IS is standard MVOLT.

GEB/GEB10_ Specifications

- UL Listed. CSA Certified. Thermally protected Class P, non-PCB ballast.
- Minimum line transient as shown in IEE587, Category A and ANSI-62.41.
- Ballast circuit type: instant or rapid start, series or parallel wired.
- Ballast operation: 120V nominal (108V-132V) 60Hz, 277V nominal (249V-305V) 60 Hz, MVOLT (108V-305V) 50Hz or 60Hz, or 347V nominal (312V-381V) 60Hz.
- Ballast meets 1988 Federal Efficacy Standard (Law 100-357) where applicable.
- Meets FCC rules/regulations Part 18, 15J for EMI / RFI.
- Minimum lamp starting temperatures: 0°F (-17.8°C) for T5, T5HO, and T8 lamps, 50°F (10°C) for rapid start T8 and T12 standard lamps and 60°F (15.6°C) for T12 energy-saving lamps.
- Power factor equal to or greater than .95.
- Maximum lamp crest factor 1.7.
- Minimum 5-year ballast manufacturer's warranty.
- Ballasts meet all requirements of ANSI C82.11.

Ordering Information

Example: 2SP8 G 3 32 A12 **MVOLT 1/3 GEB10IS**

Voltage	Configuration	Type
120	(blank) Standard	**GEB** ≤20 THD
277	(see box at lower right)	**GEB10IS** ≤10 THD, instant start, multi-volt
347	**1/3** One 3-lamp ballast	**GEB10RS** ≤10 THD, rapid start
MVOLT[1]	**1/4** One 4-lamp ballast	**GEB10PS** ≤10 THD, program start[2]

NOTES:
1 120-277V. Must specify GEB10IS.
2 Available for standard T5 and T5HO lamps in 347V or MVOLT only.
3 IS = instant start, RS = rapid start.
4 S = series, P = parallel. Slimline = series lead or lead lag.
5 Single ballast operating all lamps in 3-lamp or 4-lamp configuration.

GEB/GEB10_ Performance

	Lithonia lamp descr.	Lamp type	Lamp wattage	No. of lamps operated	Max. ANSI watts	Min. ballast factor	Circuit type[3]	Circuit wiring[4]	Sound rating
GEB10IS only	**U31** **U316** **32**	24" T8 U(1⅝") 24" T8 U(6") 48" T8	Std	1 2 3[5] 4[5]	32 59 88 113	0.85	IS	P	A
GEB and GEB10RS	**U31** **U316** **32**	24" T8 U(1⅝") 24" T8 U(6") 48" T8	Std	1 2 3[5] 4[5]	39 62 95 114	0.85	IS or RS	S or P	A
	40 **U40** **U403**	48" T12 24" T12 U(6") 24" T12 U (3")	Std	1 2 3[5]	38 74 110	0.85	RS	S	A
			ES	1 2 3[5]	31 63 93	0.83	RS	S	A
GEB and GEB10IS	**CF 40**	24" TT5	Std	2 3[5]	70 101	0.85	IS	P	A
	96	96" T8	Std	2	110	0.85	IS	P	A
	96T8HO	96" T8	Std	2	160	0.85	RS	S	A
GEB10PS	**54T5HO**	48" T5HO	Std	1 2	62 121	1.10 1.00	PS	S	A
	28T5	48" T5	Std	1 2	33 66	1.04 1.03	PS	S	A
GEB only	**96**	96" T12	Std ES	2	140 116	0.85	IS	Slimline[4]	B
	96HO	96" T12 HO	Std ES	2	209 178	0.85	RS	S	B

Lithonia Standard Ballast Configurations

1-lamp fixtures: One 1-lamp ballast
2-lamp fixtures: One 2-lamp ballast
3-lamp fixtures: One 1-lamp ballast, one 2-lamp ballast
4-lamp fixtures: Two 2-lamp ballasts

Magnetic Ballast Data

Fluorescent Ballasts[1]

Fluorescent ballasts are designed to meet the electrical requirements of a specific type of lamp. Preheat, slimline instant start and rapid start are commonly used ballasts. Preheat and rapid start ballasts provide a starting current to heat the lamp electrodes before the lamp is ignited. Slimline instant start ballasts ignite the lamp by providing a high initial voltage between the lamp electrodes. A larger autotransformer is required for these ballasts to create the high starting voltage. Since fluorescent systems generally are used indoors, fluorescent ballasts incorporate a thermal protective device (Class P switch) to prevent a fire hazard if the ballast should overheat.

Fluorescent Ballast Legislation

The US Department of Energy and Natural Resources Canada has approved legislation that will phase out virtually all T12 fluorescent magnetic ballasts with the exception of dimming ballasts and residential grade ballasts. The intent of the ruling is to convert commercial T12 systems to more efficient electronic T8 systems. The rulemaking will ultimately cover ballasts for 1 and 2 lamp F40T12 lamps; 2 lamp F96T12 and 2 lamp F96T12HO lamps — standard and energy-saving type lamps. Canada legislation also covers T8 magnetic systems. Under the terms of the rulemaking, luminaire manufacturers cannot purchase covered T12 magnetic ballasts on or after July 1, 2005. Magnetic T12 ballasts will be available for replacement into existing commercial and industrial products until June 30, 2010. For more information regarding the legislation or for additional ballast information, review our web information at:

www.lithonia.com/products/groups/fluorescent/mvolt/

Magnetic Ballast Data

Lamp Type	Power Factor	Minimum Starting	Primary Voltage[2]	Operating Current	Input Wattage
Preheat – Trigger Start					
(1) F15WT8, T12	HPF	10°C/50°F -18°C/0°F	120 277	0.27 0.12	32
(2) F15WT8, T12	HPF	-18°C/0°F	120 277	0.47 0.20	53 56
Slimline and Instant Start					
(1) F48T12	HPF	-18°C/0°F	120 277	0.55 0.24	61
(2) F48T12	HPF	10°C/50°F	120 277	0.85 0.37	102
(1) F72, F96T12	HPF	-18°C/0°F	120 277	0.85 0.35	100
(2) F96T12	HPF	10°C/50°F	120 277	1.35 0.60	158
Rapid Start					
(1) F25T8	HPF	10°C/50°F	120 277	0.30 0.12	33
(2) F25T8	HPF	10°C/50°F	120 277	0.55 0.24	65
(1) F30T12	HPF	10°C/50°F	120 277	0.40 0.18	46 48
(2) F30T12	HPF	10°C/50°F	120 277	0.68 0.30	81
(1) F32T8	HPF	10°C/50°F	120 277	0.32 0.14	37
(2) F40T8	HPF	10°C/50°F	120 277	0.61 0.26	71
(1) F40T12 (34 watt)	HPF	16°C/60°F	120 277	0.38 0.16	43
(2) F40T12 (34 watt)	HPF	16°C/60°F	120 277	0.63 0.27	72
(1) F40T10,T12	HPF	10°C/50°F	120 277	0.43 0.19	50
(2) F40T10,T12	HPF	10°C/50°F	120 277	0.73 0.32	86
800mA – High Output					
(1) F48T12HO	HPF	10°C/-20°F	120 277	0.75 0.32	85 80
(2) F48T12HO	HPF	10°C/-20°F	120 277	1.30 0.56	145
(1) F72 or F96T12HO	HPF	-28°C/-20°F	120 277	1.15 0.50	135
(2) F96T12HO	HPF	-28°C/-20°F	120 277	2.05 0.88	237
1500mA – Very High Output/Power Groove					
(1) F96PG/VHO/SHO	HPF	-28°C/-20°F	120 277	3.30 1.35	375
T5 Twin Fluorescent					
(1) FT24W, 27W	HPF	10°C/50°F	120 277	0.28 0.12	32
(2) FT24W, 27W	HPF	10°C/50°F	120 277	0.58 0.25	66
(1) FT36W, 39W	HPF	10°C/50°F	120 277	0.44 0.19	51
(2) FT36W, 39W	HPF	10°C/50°F	120 277	0.76 0.34	88
(1) FT40W	HPF	10°C/50°F	120 277	0.40 0.18	45 46
(2) FT40W	HPF	10°C/50°F	120 277	0.69 0.32	82

NOTES:
1 All data based on magnetic ballasting. For information regarding operation of electronic ballasts, consult ballast manufacturer's technical data.
2 For 347V or other voltages, consult factory.

Fluorescent Magnetic (60Hz) Ballasts

Type of Ballast	Type of Measurement	Equipment Required	Testing Procedure
Preheat	*Starting Current and Operating Current* *Starting Voltage*	Ammeter (0–1 amp scale) Voltmeter (0–300V scale)	Measure amps between lamp and colored high-voltage secondary ballast lead. Remove lamp. 1-lamp: Measure voltage between red lead and white lead. 2-lamp: Measure voltage between a red lead and white lead; between blue lead and white lead.
Rapid Start	*Starting Voltage* *Filament Voltage*	Voltmeter (0-1000V scale) Voltmeter (0-1000V scale)	Measure voltage between a blue lead and highest-reading red lead. 1-lamp: Measure voltage between two red leads; between two blue leads. 2-lamp: Measure voltage between two red leads; between two blue leads; between two yellow leads.
800mA	*Starting Voltage* *Filament Voltage*	Voltmeter (0-1000V scale) Voltmeter (0-1000V scale)	Measure voltage between a blue lead and highest-reading red lead. 1-lamp: Measure voltage between two red leads; between two blue leads. 2-lamp: Measure voltage between two red leads; between two blue leads; between two yellow leads.
1500mA	*Starting Voltage* *Filament Voltage*	Voltmeter (0-1000V scale) Voltmeter	Measure voltage between a blue lead and highest-reading red lead. 1-lamp: Measure voltage between two red leads; between two blue leads. 2-lamp: Measure voltage between two red leads; between two blue leads; between two yellow leads.
Slimline	*Starting Voltage*	Voltmeter (electrostatic or high-voltage type, 0-1000V scale)	Remove lamp. Measure voltage between primary and secondary leads of each lamp as indicated below. For series-sequence ballast, red lead must be in position while measuring starting voltage of remaining lamp. 1-lamp: Measure between red lead and white lead. 2-lamp (series): Measure between red lead and white lead. Insert lamp in red and white position and measure between blue lead and black lead. 2-lamp (lead lag): Measure between red lead and white lead; between blue lead and white lead.
Instant Start	*Starting Voltage*	Voltmeter (electrostatic or high-voltage type, 0-1000V scale)	Remove lamp. Measure voltage between primary and secondary leads of each lamp as indicated below. For series-sequence ballast, red lead must be in position while measuring starting voltage of remaining lamp. 1-lamp: Measure between red lead and white lead. 2-lamp (series): Measure between red lead and white lead. Insert lamp in red and white position and measure between blue lead and black lead. 2-lamp (lead lag): Measure between red lead and white lead; between blue lead and white lead.

Lamp Ordering & Availability

Example: **F18DTT/35 4PIN GE**

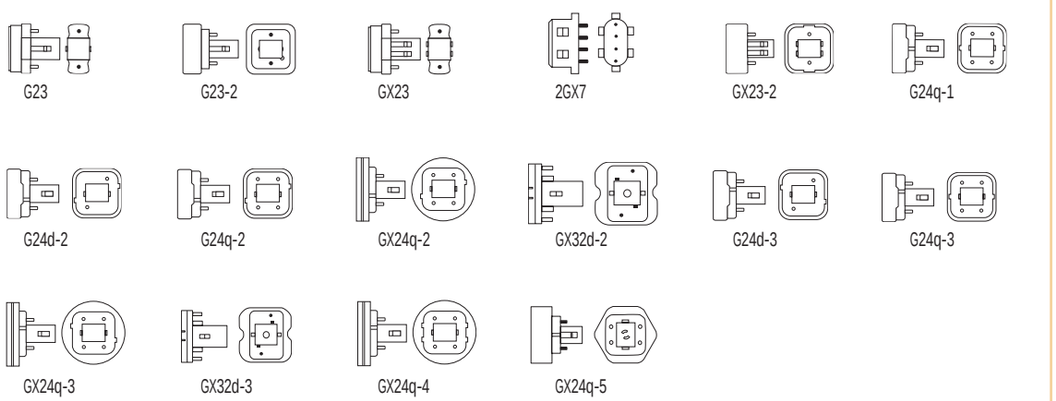
Type	Wattage	Lamp	Color	Pin	Manufacturer
F Fluorescent	**7, 9, 13, 18, 22, 26, 28, 32, 42, 57, 70**	**TT** Twin tube **DTT** Double twin-tube **TRT** Triple tube	**27** **30** **35** **41**	(blank) 2-pin lamp **4PIN** 4-pin lamp	**GE** General Electric **SY** OSRAM SYLVANIA **PH** Philips

Availability of Compact Fluorescent Lamps

■ = Available

Wattage/ Lamp Type	Color				Pin		Base Configuration
	27	30	35	41	2-pin	4-pin	
7TT	■ 1,2,3		■ 1,2,3	■ 1,2,3	■		G23
9TT	■ 1,2,3		■ 1,2,3	■ 1,2,3	■		G23
9DTT	■ 1,2	■ 2	■ 2	■ 1	■		G23-2
13TT	■ 1,2,3	■ 1,2,3	■ 1,2,3	■ 1,2,3	■		GX23
13TT	■ 2	■ 2		■ 2		■	2GX7
13DTT	■ 1,2,3	■ 1,2,3	■ 1,2,3	■ 1,2,3	■		GX23-2
13DTT	■ 1,2,3	■ 1,2,3	■ 1,2,3	■ 1,2,3		■	G24q-1
18DTT	■ 1,2,3	■ 1,2,3	■ 1,2,3	■ 1,2,3	■		G24d-2
18DTT	■ 1,2,3	■ 1,2,3	■ 1,2,3	■ 1,2,3		■	G24q-2
18TRT	■ 1,2,3	■ 1,2,3	■ 1,2,3	■ 1,2,3		■	GX24q-2
22DTT	■ 3				■		GX32d-2
26DTT	■ 1,2,3	■ 1,2,3	■ 1,2,3	■ 1,2,3	■		G24d-3
26DTT	■ 1,2,3	■ 1,2,3	■ 1,2,3	■ 1,2,3		■	G24q-3
26TRT	■ 1,2,3	■ 1,2,3	■ 1,2,3	■ 1,2,3		■	GX24q-3
28DTT	■ 3				■		GX32d-3
32TRT	■ 1,2,3	■ 1,2,3	■ 1,2,3	■ 1,2,3		■	GX24q-3
42TRT	■ 1,2,3	■ 1,2,3	■ 1,2,3	■ 1,2,3		■	GX24q-4
57TRT	■ 2	■ 2	■ 2	■ 2		■	GX24q-5
70TRT	■ 2	■ 2	■ 2	■ 2		■	GX24q-5

NOTES:
1 Available from General Electric.
2 Available from OSRAM SYLVANIA.
3 Available from Philips.



Electronic Ballasts

Power Factor >98%, THD<10%, flicker-free starting, 4-pin lamp

Wattage/ lamp type	No. of lamps	Starting temp.			Electrical information					
					120V		277V		347V	
		120V	277V	347V	Input watts	Max. amps	Input watts	Max. amps	Input watts	Max. amps
13TT	2	0°F (-18°C)	0°F (-18°C)	0°F (-18°C)	30	0.25	29	0.11	N/A	N/A
13DTT	1	0°F (-18°C)	0°F (-18°C)	0°F (-18°C)	18	0.15	18	0.07	18	0.06
	2	0°F (-18°C)	0°F (-18°C)	0°F (-18°C)	32	0.27	32	0.12	33	0.10
18DTT, 18TRT	1	0°F (-18°C)	0°F (-18°C)	0°F (-18°C)	22	0.16	22	0.07	21	0.06
	2	0°F (-18°C)	0°F (-18°C)	0°F (-18°C)	40	0.30	40	0.13	38	0.11
26DTT, 26TRT	1	0°F (-18°C)	0°F (-18°C)	0°F (-18°C)	28	0.25	28	0.11	31	0.09
	2	0°F (-18°C)	0°F (-18°C)	0°F (-18°C)	56	0.49	56	0.21	57	0.17
32TRT	1	0°F (-18°C)	0°F (-18°C)	0°F (-18°C)	36	0.32	36	0.14	36	0.11
	2	0°F (-18°C)	0°F (-18°C)	0°F (-18°C)	69	0.58	69	0.26	62	0.19
42TRT	1	0°F (-18°C)	0°F (-18°C)	0°F (-18°C)	48	0.42	48	0.18	50	0.15
	2	0°F (-18°C)	0°F (-18°C)	0°F (-18°C)	94	0.78	94	0.33	80	0.25
57TRT	1	0°F (-18°C)	0°F (-18°C)	0°F (-18°C)	59	0.50	59	0.21	61	0.18
	2	0°F (-18°C)	0°F (-18°C)	0°F (-18°C)	118	1.00	118	0.42	122	0.36
70TRT	1	0°F (-18°C)	0°F (-18°C)	0°F (-18°C)	75	0.63	75	0.27	74	0.21

Electromagnetic Ballasts

Power Factor – Normal = 50%, High ≥90%, 2-pin lamp

Wattage/ lamp type	No. of lamps	Power factor	Starting temp.			Electrical information					
						120V		277V		347V	
			120V	277V	347V	Input watts	Max. amps	Input watts	Max. amps	Input watts	Max. amps
7TT	1	Normal	0°F (-18°C)	N/A	N/A	9	0.19	N/A	N/A	N/A	N/A
	2	Normal	0°F (-18°C)	N/A	N/A	18	0.38	N/A	N/A	N/A	N/A
9TT	1	Normal	25°F (-4°C)	N/A	N/A	10	0.19	N/A	N/A	N/A	N/A
	2	Normal	25°F (-4°C)	N/A	N/A	20	0.38	N/A	N/A	N/A	N/A
9TT	1	High	25°F (-4°C)	0°F (-18°C)	N/A	11	0.20	13	0.18	N/A	N/A
	2	High	25°F (-4°C)	0°F (-18°C)	N/A	18	0.25	17	0.16	N/A	N/A
13TT, 13DTT	1	Normal	32°F (0°C)	0°F (-18°C)	N/A	17	0.44	16	0.35	N/A	N/A
	2	Normal	32°F (0°C)	0°F (-18°C)	N/A	34	0.88	32	0.70	N/A	N/A
13TT, 13DTT	1	High	32°F (0°C)	0°F (-18°C)	32°F (0°C)	16	0.36	24	0.30	22	0.30
	2	High	32°F (0°C)	0°F (-18°C)	32°F (0°C)	35	0.44	27	0.35	35	0.15
18DTT	1	Normal	50°F (10°C)	50°F (10°C)	N/A	25	0.48	22	0.27	N/A	N/A
	2	Normal	50°F (10°C)	50°F (10°C)	N/A	50	0.96	44	0.54	N/A	N/A
18DTT	1	High	50°F (10°C)	50°F (10°C)	15°F (-9°C)	23	0.35	23	0.27	24	0.25
	2	High	50°F (10°C)	50°F (10°C)	15°F (-9°C)	44	0.73	42	0.28	48	0.50
22DTT	1	High	0°F (-18°C)	N/A	N/A	26	0.62	N/A	N/A	N/A	N/A
	2	High	0°F (-18°C)	N/A	N/A	52	1.24	N/A	N/A	N/A	N/A
26DTT	1	Normal	50°F (10°C)	50°F (10°C)	N/A	33	0.67	31	0.33	N/A	N/A
	2	Normal	50°F (10°C)	50°F (10°C)	N/A	66	1.34	62	0.66	N/A	N/A
26DTT	1	High	50°F (10°C)	50°F (10°C)	25°F (-4°C)	28	0.41	32	0.38	36	0.25
	2	High	50°F (10°C)	50°F (10°C)	25°F (-4°C)	50	0.42	58	0.32	72	0.50
28DTT	1	High	-20°F (-29°C)	N/A	N/A	32	0.84	N/A	N/A	N/A	N/A
	2	High	-20°F (-29°C)	N/A	N/A	64	1.68	N/A	N/A	N/A	N/A

Lamp Data

	Wattage	ANSI	Base – number	Beam bulb type	Burning position	Coated	Manufacturer[1]	Lithonia Cat. No.[2]
Metal Halide[3]	50M	M110	MED-ED17		Universal	Yes	PH, GE, VE	MH50M/C/U
	70M	M98	MED-ED17		Universal	Yes	PH, GE, VE	MH70M/C/U
	100M	M90	MED-ED17		Universal	Yes	PH, GE, VE	MH100M/C/U
	150M	M102	MED - ED17		Universal	No	PH, GE, SY, VE	MH150M/U
	175M	M137 or M152	MOG - ED28		Base up	Yes	PH, GE, VE	MS175BU PSL
	175M	M137 or M152	MOG - ED28		Base up	No	GE, VE	MS175C/BU PSL
	200M	M136	MOG - ED28		Universal	Yes	VE	MS200U PSL
	200M	M136	MOG - ED28		Universal	No	VE	MS200C/U PSL
	250M	M138 or M153	MOG - ED28		BU-HOR	Yes	VE	MS250C/BUH PSL
	250M	M138 or M153	MOG - ED28		BU-HOR	No	VE	MS250BUH PSL
	250M	M138 or M153	MOG - ED28		Base up	Yes	GE, SY	MS250C/BU PSL
	250M	M138 or M153	MOG - ED28		Base up	No	PH, GE, SY	MS250BU PSL
	300M	M151	MOG - ED28		Vertical +/- 15°	Yes	VE	MS300R/C BUD PSL
	300M	M151	MOG - ED28		Vertical +/- 15°	No	VE	MS300R/BUD PSL
	320M	M132 or M154	MOG - ED28		Universal	Yes	PH	MS320R/C/U PSL PH
	320M	M132 or M154	MOG - ED28		Universal	No	PH	MS320R/U PSL PH
	320M	M132 or M154	MOG - ED28		Vertical +/- 15°	Yes	GE, VE	MS320R/BU PSL
	320M	M132 or M154	MOG - ED28		Vertical +/- 15°	No	GE, VE	MS320R/C BU PSL
	320M	M132 or M154	MOG - ED28		BU-HOR	Yes	SY	MS320R/C BU PSL SY
	320M	M132 or M154	MOG - ED28		BU-HOR	No	SY	MS320R/BU PSL SY
	350M	M131	MOG - ED37		Universal	Yes	PH, GE, VE	MS350C/BUD PSL
	350M	M131	MOG - ED37		Universal	No	PH, GE, VE	MS350/BUD PSL
	400M	M135 or M155	MOG - ED37		Base up	Yes	PH, GE, SY, VE	MS400C/BU PSL
	400M	M135 or M155	MOG - ED37		Base up	No	PH, GE, SY, VE	MS400BU PSL
	450M	M144	MOG - ED37		Base up	Yes	VE	MS450C/BU PSL
	450M	M144	MOG - ED37		Base up	No	VE	MS450BU PSL
	750M	M149	MOG - BT37		Base up	Yes	GE	MS750C/BU PSL
	750M	M149	MOG - BT37		Base up	No	GE	MS750BU PSL
	750M	M149	MOG - BT37		BU-HOR	No	SY	MS750BUH PSL
	875M	TBD	MOG - BT37		Base up	No	VE	MS875R/BU PSL
	1000M	M141	MOG - BT37		Universal	No	SY	MS1000R/U PSL
	1000M	M141	MOG - BT37		Base up	No	PH, SY, VE	MS1000R/BU PSL
	1500M	M48	MOG-BT56		BU-HOR	No	PH, GE, SY	MH1500BUH
	1500M	M48	MOG-BT56		BD	No	PH, GE, SY	MH1500BD
Metal Halide[4]	50M	M110	MED-ED17		Universal	Yes	PH, SY, VE	MP50M/C/U
	70M	M98	MED-ED17		Universal	Yes	PH, GE, SY, VE	MP70M/C/U
	100M	M90	MED-ED17		Universal	Yes	PH, GE, SY, VE	MP100M/C/U
	150M	M102	MED-ED17		Universal	Yes	SY	MP150M/C/U
	175M	M57	MOG - ED28		Base up	Yes	SY	MP175C/BU
	175M	M57	MOG - ED28		Base up	No	PH, SY	MP175BU
	200M	M136	MOG - ED28		Vertical +/- 15°	Yes	VE	MP200C/BUD PSL
	200M	M136	MOG - ED28		Vertical +/- 15°	No	VE	MP200BUD PSL
	250M	M58	MOG - ED28		Base up	Yes	SY	MP250C/BU
	250M	M58	MOG - ED28		Base up	No	PH, SY	MP250BU
	250M	M138 or M153	MOG - ED28		Base up	Yes	VE	MP250C/BU PSL
	250M	M138 or M153	MOG - ED28		Base up	No	VE	MP250BU PSL
	300M	M151	MOG - ED28		Vertical +/- 15°	Yes	VE	MP300R/C BU PSL
	300M	M151	MOG - ED28		Vertical +/- 15°	No	VE	MP300R/BU PSL
	320M	M132 or M154	MOG - ED28		Base up	Yes	GE, SY, VE	MP320R/C BU PSL
	320M	M132 or M154	MOG - ED28		Base up	No	GE, SY, VE	MP320R/BU PSL
	350M	M131	MOG - ED37		Vertical +/- 15°	Yes	VE	MP350C/BUD PSL
	350M	M131	MOG - ED37		Vertical +/- 15°	No	VE	MP350BUD PSL
	350M	M131	MOG - ED37		Base up	Yes	GE, SY	MP350C/BU PSL
	350M	M131	MOG - ED37		Base up	No	GE, SY	MP350BU PSL
	400M	M59	MOG - ED37		Universal	Yes	PH, GE, SY, VE	MH400C/U
	400M	M59	MOG - ED37		Universal	No	PH, GE, SY, VE	MH400U
	400M	M59	MOG - ED37		Base up	Yes	PH, GE, SY	MP400C/BU
	400M	M59	MOG - ED37		Base up	No	PH, GE, SY	MP400BU
	400M	M135 or M155	MOG - ED37		Base up	Yes	PH, GE, SY, VE	MP400C/BU PSL
	400M	M135 or M155	MOG - ED37		Base up	No	PH, GE, SY, VE	MP400BU PSL
	450M	M144	MOG - ED37		Base up	Yes	VE	MP450C/BU PSL
	450M	M144	MOG - ED37		Base up	No	VE	MP450BU PSL
	1000M	M47	MOG - BT56		Base up	Yes	SY	MP1000C/BU
	1000M	M47	MOG - BT56		Base up	No	SY	MP1000BU
	1000M	M47	MOG - BT56		Universal	Yes	PH, GE, SY, VE	MH1000C/U
	1000M	M47	MOG - BT56		Universal	No	PH, GE, SY, VE	MH1000U

NOTES:

1 GE = General Electric; SY = OSRAM SYLVANIA; PH = Philips; VE = Venture

2 To specify a manufacturer, add manufacturer to item number. Example: MC100M/CUGE.

3 For use in enclosed rated fixtures only.

4 For use in open or enclosed rated fixtures.

	Wattage	ANSI	Base – number	Beam bulb type	Burning position	Coated	Manufacturer[1]	Lithonia catalog number[2]
Metal Halide PAR Lamps	70M	M98	MED-PAR38	Spot	Universal	No	PH, GE, SY, VE	MP70P38S
	70M	M98	MED-PAR38	Flood	Universal	No	PH, GE, SY,VE	MP70P38F
	70M	M98	MED-PAR38	Wide Flood	Universal	No	GE, SY, VE	MP70P38W
	100M	M90	MED-PAR38	Spot	Universal	No	PH, GE, SY, VE	MP100P38S
	100M	M90	MED-PAR38	Flood	Universal	No	PH, GE, SY, VE	MP100P38F
	100M	M90	MED-PAR38	Wide Flood	Universal	No	GE, SY, VE	MP100P38W
	150M	M102	MED-PAR38	Spot	Universal	No	GE, SY	MP150P38S
	150M	M102	MED-PAR38	Flood	Universal	No	GE, SY	MP150P38F
	150M	M102	MED-PAR38	Wide Flood	Universal	No	GE, SY	MP150P38W
Color-Corrected Ceramic Metal Halide[3]	70M	M98	MED-ED17		Universal	Yes	PH, GE	MC70M/CU
	100M	M90	MED-ED17		Universal	Yes	PH, GE	MC100M/CU
	150M	M102	MED-ED17		Universal	Yes	PH	MC150M/CU
Color-Corrected Ceramic Metal Halide[4]	70M	M98	MED-ED17		Universal	Yes	PH	MPC70M/CU
	100M	M90	MED-ED17		Universal	Yes	PH	MPC100M/CU
	150M	M102	MED-ED17		Universal	Yes	PH	MPC150M/CU
	400M	M135 or M155	MOG-ED37		Base up	Yes	GE	MPC400C/BU LP940
	400M	M135 or M155	MOG-ED37		Base up	No	GE	MPC400/BU LP940
Color-Corrected Ceramic Metal Halide PAR Lamps	35M	M130	MED-PAR20	Spot	Universal	No	PH	MPC35P20S
	35M	M130	MED-PAR20	Flood	Universal	No	PH	MPC35P20F
	35M	M130	MED-PAR30	Spot	Universal	No	PH	MPC35P30S
	35M	M130	MED-PAR30	Flood	Universal	No	PH	MPC35P30F
	70M	M98	MED-PAR30	Spot	Universal	No	PH, GE	MPC70P30S
	70M	M98	MED-PAR30	Flood	Universal	No	PH, GE	MPC70P30F
	70M	M98	MED-PAR38	Spot	Universal	No	PH, GE	MPC70P38S
	70M	M98	MED-PAR38	Flood	Universal	No	PH, GE	MPC70P38F
	70M	M98	MED-PAR38	Wide Flood	Universal	No	PH	MPC70P38W
	100M	M90	MED-PAR38	Spot	Universal	No	PH, GE	MPC100P38S
	100M	M90	MED-PAR38	Flood	Universal	No	PH, GE	MPC200P38F
	100M	M90	MED-PAR38	Wide Flood	Universal	No	PH	MPC100P38W
High Pressure Sodium	35S	S76	MED-ED17		Universal	Yes	PH, GE, SY	LU35M/C
	35S	S76	MED-ED17		Universal	No	PH, GE, SY	LU35M
	50S	S68	MED-ED17		Universal	Yes	PH, GE, SY	LU50M/C
	50S	S68	MED-ED17		Universal	No	PH, GE, SY	LU50M
	50S	S68	MOG-ED23.5		Universal	Yes	PH, GE, SY	LU50C
	50S	S68	MOG-ED23.5		Universal	No	PH, GE, SY	LU50
	70S	S62	MED-ED17		Universal	Yes	PH, GE, SY	LU70M/C
	70S	S62	MED-ED17		Universal	No	PH, GE, SY	LU70M
	70S	S62	MOG-ED23.5		Universal	Yes	PH, GE, SY	LU70C
	70S	S62	MOG-ED23.5		Universal	No	PH, GE, SY	LU70
	100S	S54	MED-ED17		Universal	Yes	PH, GE, SY	LU100M/C
	100S	S54	MED-ED17		Universal	No	PH, GE, SY	LU100M
	100S	S54	MOG-ED23.5		Universal	Yes	PH, GE, SY	LU100C
	100S	S54	MOG-ED23.5		Universal	No	PH, GE, SY	LU100
	150S	S55	MED-ED17		Universal	Yes	PH, GE, SY	LU150M/C
	150S	S55	MED-ED17		Universal	No	PH, GE, SY	LU150M
	150S	S55	MOG-ED23.5		Universal	Yes	PH, GE, SY	LU150C
	150S	S55	MOG-ED23.5		Universal	No	PH, GE, SY	LU150
	200S	S66	MOG-BT18		Universal	Yes	PH, GE, SY	LU200C
	200S	S66	MOG-BT18		Universal	No	PH, GE, SY	LU200
	250S	S50	MOG-BT28		Universal	Yes	PH, SY	LU250C
	250S	S50	MOG-BT28		Universal	No	PH, GE, SY	LU250
	310S	S67	MOG-BT18		Universal	No	PH, GE, SY	LU310
	400S	S51	MOG-BT37		Universal	Yes	PH, GE, SY	LU400C
	400S	S51	MOG-BT37		Universal	No	PH, GE, SY	LU400
	600S	S106	MOG-T15		Universal	No	PH, GE, SY	LU600
	750S	S111	MOG-ED37		Universal	No	PH, GE, SY	LU750
	1000S	S52	MOG-E25		Universal	No	PH, GE, SY	LU1000
White SON High Pressure Sodium	35SDW	S99	PG12-T10		Universal	No	PH	WS35P
	50SDW	S104	MED-ED17		Universal	Yes	PH	WS50M/C
	50SDW	S104	PG12-T10		Universal	No	PH	WS50P
	100SDW	S105	MED-ED17		Universal	Yes	PH	WS100M/C
	100SDW	S105	PG12-T10		Universal	No	PH	WS100P

NOTES:

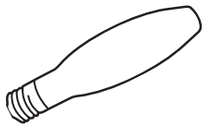
1 GE = General Electric; SY = OSRAM SYLVANIA; PH = Philips; VE = Venture

2 To specify a manufacturer, add manufacturer to item number.
Example: MC100M/CUGE.

3 For use in enclosed rated fixtures only.

4 For use in open or enclosed rated fixtures.

Ballast Data – High Pressure Sodium



High pressure sodium ballasts require a magnetic circuit to produce the open-circuit voltage and control the lamp operating current, and a special electronic starting circuit. The electronic starting circuit applies a high voltage pulse across the lamp to initiate the arc. The pulse continues to fire at each half cycle until the arc is established, at which time it shuts off.

Wattage	ANSI Code	Ballast Type	Power Factor	Wiring Diagram	Regulation LineV=LampW	Minimum Starting Ambient	Primary Voltage	Dropout Voltage	Starting Current	Operating Current	Open-Circuit Current	Input Wattage
35	S76	R	NPF	H1	+/-5%=+/-12%	-40C/-40F	120	95	1.35	0.84	NIL	46
	S76	R	HPF	H2	+/-5%=+/-12%	-40C/-40F	120	95	0.78	0.38	0.68	46
50	S68	R	NPF	H1	+/-5%=+/-12%	-40C/-40F	120	95	1.80	1.18	NIL	62
	S68	R	HPF	H2	+/-5%=+/-12%	-40C/-40F	120	95	0.95	0.55	1.00	62
	S68	HX	HPF	H5	+/-5%=+/-12%	-40C/-40F	120/277	95/225	0.65/0.30	0.61/0.26	1.24/0.44	66
70	S62	R	NPF	H1	+/-5%=+/-12%	-40C/-40F	120	95	2.10	1.60	NIL	83
	S62	R	HPF	H2	+/-5%=+/-12%	-40C/-40F	120	95	0.90	0.75	1.30	83
	S62	HX	HPF	H5	+/-5%=+/-12%	-40C/-40F	120/277	95/225	0.90/0.35	0.82/0.36	1.40/0.70	94
	S62	HX	HPF	H4	+/-5%=+/-12%	-40C/-40F	208	155	0.50	0.48	0.90	94
	S62	HX	HPF	H4	+/-5%=+/-12%	-40C/-40F	240	180	0.44	0.41	0.80	94
	S62	HX	HPF	H4	+/-5%=+/-12%	-40C/-40F	347	275	0.25	0.29	0.60	94
	S62	HX	HPF	H4	+/-5%=+/-12%	-40C/-40F	480	385	0.21	0.20	0.40	94
	S62	CWA	HPF	H3	+/-10%=+/-10%	-40C/-40F	120/277	90/208	0.90/0.40	0.90/0.40	0.20/0.09	95
	S62	CWI	HPF	H6	+/-10%=+/-10%	-40C/-40F	120/240	90/180	0.50/0.25	0.86/0.43	0.50/0.25	95
	S62	CWI	HPF	H6	+/-10%=+/-10%	-40C/-40F	208	156	0.30	0.50	0.30	95
	S62	MRB	HPF	H9	+/-10%=+/-3%	-40C/-40F	120/240	85/165	0.45/0.20	0.90/0.50	0.60/0.30	103
100	S54	R	NPF	H1	+/-5%=+/-12%	-40C/-40F	120	95	3.10	2.10	NIL	117
	S54	R	HPF	H2	+/-5%=+/-12%	-40C/-40F	120	95	1.50	1.05	1.80	117
	S54	HX	HPF	H5	+/-5%=+/-12%	-40C/-40F	120/277	96/222	1.30/0.60	1.14/0.49	2.20/0.95	130
	S54	HX	HPF	H4	+/-5%=+/-12%	-40C/-40F	208	166	0.75	0.66	1.30	130
	S54	HX	HPF	H4	+/-5%=+/-12%	-40C/-40F	240	192	0.65	0.57	1.10	130
	S54	HX	HPF	H4	+/-5%=+/-12%	-40C/-40F	347	275	0.45	0.39	0.70	130
	S54	HX	HPF	H4	+/-5%=+/-12%	-40C/-40F	480	385	0.35	0.28	0.60	130
	S54	CWA	HPF	H3	+/-10%=+/-10%	-40C/-40F	120/277	90/208	0.80/0.35	1.20/0.50	0.65/0.25	138
	S54	CWA	HPF	H3	+/-10%=+/-10%	-40C/-40F	480	360	0.20	0.30	0.15	138
	S54	CWI	HPF	H6	+/-10%=+/-10%	-40C/-40F	120/240	90/180	0.70/0.35	1.22/0.61	0.70/0.35	130
	S54	CWI	HPF	H6	+/-10%=+/-10%	-40C/-40F	208	156	0.40	0.70	0.40	130
	S54	MRB	HPF	H9	+/-10%=+/-3%	-40C/-40F	120/240	75/150	1.00/0.50	1.20/0.60	0.44/0.22	138
	S54	MRB	HPF	H9	+/-10%=+/-3%	-40C/-40F	277	185	0.21	0.60	0.45	138
	S54	MRB	HPF	H9	+/-10%=+/-3%	-40C/-40F	480	330	0.12	0.30	0.25	138
150	S55	R	NPF	H1	+/-5%=+/-12%	-40C/-40F	120	95	4.50	3.20	NIL	171
	S55	R	HPF	H2	+/-5%=+/-12%	-40C/-40F	120	95	2.25	1.50	2.40	171
	S55	HX	HPF	H5	+/-5%=+/-12%	-40C/-40F	120/277	96/222	2.00/0.88	1.66/0.72	3.00/1.30	189
	S55	HX	HPF	H4	+/-5%=+/-12%	-40C/-40F	208	166	1.15	0.96	1.65	189
	S55	HX	HPF	H4	+/-5%=+/-12%	-40C/-40F	240	192	1.00	0.83	1.45	189
	S55	HX	HPF	H4	+/-5%=+/-12%	-40C/-40F	347	280	0.53	0.57	1.00	189
	S55	HX	HPF	H4	+/-5%=+/-12%	-40C/-40F	480	385	0.50	0.44	0.72	189
	S55	CWA	HPF	H3	+/-10%=+/-10%	-40C/-40F	120/277	90/208	0.96/0.42	1.70/0.70	0.96/0.42	190
	S55	CWA	HPF	H3	+/-10%=+/-10%	-40C/-40F	480	360	0.24	0.50	0.24	190
	S55	CWI	HPF	H6	+/-10%=+/-10%	-40C/-40F	120/240	90/180	0.90/0.45	1.76/0.88	1.00/0.50	190
	S55	CWI	HPF	H6	+/-10%=+/-10%	-40C/-40F	208	156	0.50	1.01	0.60	190
	S55	MRB	HPF	H9	+/-10%=+/-3%	-40C/-40F	120/240	75/150	1.40/0.70	1.70/0.90	1.60/0.80	196
	S55	MRB	HPF	H9	+/-10%=+/-3%	-40C/-40F	277	160	0.60	0.75	0.70	196
	S55	MRB	HPF	H9	+/-10%=+/-3%	-40C/-40F	480	300	0.35	0.40	0.40	196
200	S66	CWA	HPF	H3	+/-10%=+/-10%	-40C/-40F	120	80	1.50	2.20	1.25	245
	S66	CWA	HPF	H3	+/-10%=+/-10%	-40C/-40F	208	130	0.92	1.25	0.75	245
	S66	CWA	HPF	H3	+/-10%=+/-10%	-40C/-40F	240	160	0.75	1.10	0.75	245
	S66	CWA	HPF	H3	+/-10%=+/-10%	-40C/-40F	277	180	0.66	0.95	0.60	245
	S66	CWA	HPF	H3	+/-10%=+/-10%	-40C/-40F	347	230	0.55	0.75	0.38	245
	S66	CWA	HPF	H3	+/-10%=+/-10%	-40C/-40F	480	300	0.41	0.56	0.35	245
	S66	MRB	HPF	H9	+/-10%=+/-3%	-40C/-40F	120/240	55/110	0.80/0.40	2.20/1.10	1.50/0.75	255
	S66	MRB	HPF	H9	+/-10%=+/-3%	-40C/-40F	480	220	0.20	0.55	0.38	255
250	S50	CWA	HPF	H3	+/-10%=+/-10%	-40C/-40F	120	90	1.75	2.50	1.70	300
	S50	CWA	HPF	H3	+/-10%=+/-10%	-40C/-40F	208	156	1.00	1.50	1.00	300
	S50	CWA	HPF	H3	+/-10%=+/-10%	-40C/-40F	240	180	0.85	1.30	0.80	300
	S50	CWA	HPF	H3	+/-10%=+/-10%	-40C/-40F	277	208	0.75	1.10	0.75	300
	S50	CWA	HPF	H3	+/-10%=+/-10%	-40C/-40F	347	260	0.75	0.90	0.70	300
	S50	CWA	HPF	H3	+/-10%=+/-10%	-40C/-40F	480	360	0.44	0.65	0.46	310
	S50	CWI	HPF	H6	+/-10%=+/-10%	-40C/-40F	120/240	90/180	1.20/0.60	2.75/1.38	1.50/0.75	300
	S50	CWI	HPF	H6	+/-10%=+/-10%	-40C/-40F	208	156	0.70	1.60	0.87	300
	S50	MRB	HPF	H9	+/-10%=+/-3%	-40C/-40F	120/240	55/110	1.00/0.50	2.70/1.45	1.80/0.90	310
	S50	MRB	HPF	H9	+/-10%=+/-3%	-40C/-40F	277	120	0.45	1.20	0.75	310
	S50	MRB	HPF	H9	+/-10%=+/-3%	-40C/-40F	480	240	0.25	0.70	0.45	310
310	S67	CWA	HPF	H3	+/-10%=+/-10%	-40C/-40F	120	90	1.70	3.40	1.80	365
	S67	CWA	HPF	H3	+/-10%=+/-10%	-40C/-40F	208	156	0.89	1.95	1.00	365
	S67	CWA	HPF	H3	+/-10%=+/-10%	-40C/-40F	240	180	0.85	1.70	0.90	365
	S67	CWA	HPF	H3	+/-10%=+/-10%	-40C/-40F	277	208	0.75	1.45	0.80	365
	S67	CWA	HPF	H3	+/-10%=+/-10%	-40C/-40F	480	360	0.41	0.90	0.45	365
	S67	MRB	HPF	H9	+/-10%=+/-3%	-40C/-40F	120/240	40/80	1.30/0.75	3.30/1.70	1.20/0.60	380
	S67	MRB	HPF	H9	+/-10%=+/-3%	-40C/-40F	480	175	0.37	0.90	0.30	380
400	S51	CWA	HPF	H3	+/-10%=+/-10%	-40C/-40F	120	90	3.30	3.90	2.00	465
	S51	CWA	HPF	H3	+/-10%=+/-10%	-40C/-40F	208	156	1.80	2.25	1.20	465
	S51	CWA	HPF	H3	+/-10%=+/-10%	-40C/-40F	240	180	1.60	1.95	0.95	465
	S51	CWA	HPF	H3	+/-10%=+/-10%	-40C/-40F	277	208	1.40	1.70	0.85	465
	S51	CWA	HPF	H3	+/-10%=+/-10%	-40C/-40F	347	260	1.10	1.36	0.70	465
	S51	CWA	HPF	H3	+/-10%=+/-10%	-40C/-40F	480	360	0.75	1.00	0.60	467
	S51	CWI	HPF	H6	+/-10%=+/-10%	-40C/-40F	120/240	90/180	2.00/1.00	4.20/2.10	2.00/1.00	465
	S51	CWI	HPF	H6	+/-10%=+/-10%	-40C/-40F	208	156	1.15	2.40	1.15	465
	S51	CWI	HPF	H6	+/-10%=+/-10%	-40C/-40F	480	330	0.68	0.93	0.46	446
	S51	MRB	HPF	H9	+/-10%=+/-3%	-40C/-40F	120/240	45/90	2.00/1.00	4.20/2.10	2.20/1.10	490
	S51	MRB	HPF	H9	+/-10%=+/-3%	-40C/-40F	277	105	0.85	1.80	0.95	490
	S51	MRB	HPF	H9	+/-10%=+/-3%	-40C/-40F	480	180	0.50	1.10	0.55	490
600	S106	CWA	HPF	H3	+/-10%=+/-10%	-40C/-40F	120	65	5.20	5.50	3.00	670
	S106	CWA	HPF	H3	+/-10%=+/-10%	-40C/-40F	208	110	3.00	3.30	1.75	670
	S106	CWA	HPF	H3	+/-10%=+/-10%	-40C/-40F	240	130	2.60	2.90	2.60	670
	S106	CWA	HPF	H3	+/-10%=+/-10%	-40C/-40F	277	140	2.15	2.50	1.40	665
	S106	CWA	HPF	H3	+/-10%=+/-10%	-40C/-40F	347	160	1.70	2.00	1.10	665
	S106	CWA	HPF	H3	+/-10%=+/-10%	-40C/-40F	480	250	1.20	1.43	0.75	665
750	S111	CWA	HPF	H3	+/-10%=+/-10%	-40C/-40F	120	90	6.70	7.12	3.00	840
	S111	CWA	HPF	H3	+/-10%=+/-10%	-40C/-40F	208	156	3.85	4.10	1.75	840
	S111	CWA	HPF	H3	+/-10%=+/-10%	-40C/-40F	240	180	3.35	3.56	1.60	840
	S111	CWA	HPF	H3	+/-10%=+/-10%	-40C/-40F	277	208	3.00	3.10	1.50	840
	S111	CWA	HPF	H3	+/-10%=+/-10%	-40C/-40F	347	260	2.30	2.50	1.20	840
	S111	CWA	HPF	H3	+/-10%=+/-10%	-40C/-40F	480	360	1.65	1.80	0.90	840
1000	S52	CWA	HPF	H3	+/-10%=+/-10%	-40C/-40F	120	90	6.40	9.20	3.70	1100
	S52	CWA	HPF	H3	+/-10%=+/-10%	-40C/-40F	208	156	3.80	5.50	2.7	1100
	S52	CWA	HPF	H3	+/-10%=+/-10%	-40C/-40F	240	120	3.20	4.75	2.4	1100
	S52	CWA	HPF	H3	+/-10%=+/-10%	-40C/-40F	277	208	2.80	4.00	1.40	1100
	S52	CWA	HPF	H3	+/-10%=+/-10%	-40C/-40F	347	260	2.20	3.30	1.10	1100
	S52	CWA	HPF	H3	+/-10%=+/-10%	-40C/-40F	480	360	1.60	2.30	0.90	1100

Metal halide lamps are available in two varieties: PROBE START lamps, which rely on a high lamp current crest factor, a high ballast open-circuit voltage and a starting electrode to initiate the arc; and PULSE START lamps, which contain no starting electrode and rely on an ignitor in the ballast to initiate the arc.

HAZARD WARNING – USE OF METAL HALIDE LAMPS

These lamps can cause serious skin burn and eye inflamation from ultraviolet radiation if the outer envelope of the lamp is broken or punctured and the arc-tube continues to operate. Do not use where people will remain for more than a few minutes unless adequate shielding or other safety precautions are used. Certain types of lamps that will automatically extinguish when the outer envelope is broken are commercially available.

California will not allow the use of probe-start metal halide ballasts in 150-500W luminaires with a vertical base-up lamp beginning January 1, 2006. Other states have implemented similar requirements, typically beginning in 2008.

Wattage	ANSI Code	Ballast Type	Power Factor	Wiring Diagram	Regulation LineV=LampW	Minimum Starting Ambient	Primary Voltage	Dropout Voltage	Starting Current	Operating Current	Open-Circuit Current	Input Wattage
50	M110	R	NPF		+/-5%=+/-12%	-30C/-20F	277	190	.068	0.62	NIL	62
	M110	R	HPF	M5	+/-5%=+/-12%	-30C/-20F	277	190	0.35	0.22	0.55	62
	M110	HX	HPF	M1	+/-5%=+/-12%	-30C/-20F	120/277	90/208	0.60/0.25	0.66/0.28	1.00/0.45	72
	M110	HX	HPF	M1	+/-5%=+/-12%	-30C/-20F	208	150	0.51	0.35	0.67	67
	M110	HX	HPF	M1	+/-5%=+/-12%	-30C/-20F	240	175	0.47	0.30	0.57	67
	M110	HX	HPF	M1	+/-5%=+/-12%	-30C/-20F	347	220	0.17	0.20	0.55	67
70	M98	R	NPF		+/-5%=+/-12%	-30C/-20F	277	190	1.15	.90	NIL	85
	M98	R	HPF	M5	+/-5%=+/-12%	-30C/-20F	277	190	0.50	0.32	0.80	85
	M98	HX	HPF	M1	+/-5%=+/-12%	-30C/-20F	120/277	90/208	0.55/0.25	0.85/0.37	1.90/0.80	88
	M98	HX	HPF	M1	+/-5%=+/-12%	-30C/-20F	208	156	0.30	0.49	1.00	88
	M98	HX	HPF	M1	+/-5%=+/-12%	-30C/-20F	240	180	0.25	0.42	0.90	88
	M98	HX	HPF	M1	+/-5%=+/-12%	-30C/-20F	347	260	0.20	0.30	0.65	88
100	M90	R	HPF	M5	+/-5%=+/-12%	-30C/-20F	277	190	0.70	0.45	1.05	118
	M90	HX	HPF	M1	+/-5%=+/-12%	-30C/-20F	120/277	90/208	1.15/0.50	1.15/0.50	2.60/1.15	130
	M90	HX	HPF	M1	+/-5%=+/-12%	-30C/-20F	208	156	0.66	0.66	1.50	130
	M90	HX	HPF	M1	+/-5%=+/-12%	-30C/-20F	240	180	0.58	0.58	1.30	130
	M90	HX	HPF	M1	+/-5%=+/-12%	-30C/-20F	347	260	0.40	0.40	1.00	130
	M90	HX	HPF	M1	+/-5%=+/-12%	-30C/-20F	480	340	0.30	0.30	0.55	132
	M90	CWA	HPF	M4	+/-10%=+/-10%	-30C/-20F	120/277	60/140	0.80/0.35	1.20/0.50	1.05/0.45	128
150	M102	LLRPSL	HPF	M5	+/-5%=+/-12%	-30C/-20F	277	170	0.70	0.63	1.50	173
	M102	HX	HPF	M1	+/-5%=+/-12%	-30C/-20F	120/277	90/208	0.95/0.42	1.60/0.70	3.65/1.58	185
	M102	HX	HPF	M1	+/-5%=+/-12%	-30C/-20F	208	156	0.55	0.90	2.10	185
	M102	HX	HPF	M1	+/-5%=+/-12%	-30C/-20F	240	180	.50	.80	1.80	185
	M102	HX	HPF	M1	+/-5%=+/-12%	-30C/-20F	347	260	0.65	0.55	1.25	185
	M102	SCWA	HPF	M4	+/-10%=+/-10%	-30C/-20F	120/277	90/210	1.15/0.50	1.75/0.80	1.40/0.60	189
	M102	SCWA	HPF	M4	+/-10%=+/-10%	-30C/-20F	347	260	0.40	0.70	0.50	189
175	M57orH39	CWA	HPF	M2	+/-10%=+/-10%	-30C/-20F	120	60	1.30	1.80	1.80	213
	M57orH39	CWA	HPF	M2	+/-10%=+/-10%	-30C/-20F	208	105	0.74	1.10	1.10	213
	M57orH39	CWA	HPF	M2	+/-10%=+/-10%	-30C/-20F	240	120	0.64	0.90	0.85	213
	M57orH39	CWA	HPF	M2	+/-10%=+/-10%	-30C/-20F	277	140	0.53	0.80	0.80	213
	M57orH39	CWA	HPF	M2	+/-10%=+/-10%	-30C/-20F	347	180	0.36	0.62	0.62	213
	M57orH39	CWA	HPF	M2	+/-10%=+/-10%	-30C/-20F	480	220	0.27	0.45	0.51	213
	M137	SCWA	HPF	M7	+/-10%=+/-10%	-40C/-40F	120	60	1.10	1.80	1.70	208
	M137	SCWA	HPF	M7	+/-10%=+/-10%	-40C/-40F	208	105	0.58	1.10	1.10	208
	M137	SCWA	HPF	M7	+/-10%=+/-10%	-40C/-40F	240	120	0.51	0.90	0.85	208
	M137	SCWA	HPF	M7	+/-10%=+/-10%	-40C/-40F	277	140	0.45	0.80	0.80	208
	M137	SCWA	HPF	M7	+/-10%=+/-10%	-40C/-40F	347	185	0.40	0.70	0.60	220
	M137	SCWA	HPF	M7	+/-10%=+/-10%	-40C/-40F	480	220	0.25	0.50	0.45	210
	M137	RLB	HPF	M6	+/-10%=+/-3%	-40C/-40F	120	84	1.0	2.00	1.25	220
	M137	RLB	HPF	M6	+/-10%=+/-3%	-40C/-40F	277	195	0.43	0.87	0.54	220
	M137	RLB	HPF	M6	+/-10%=+/-3%	-40C/-40F	347	243	0.35	0.70	0.43	220
	M137	RLB	HPF	M6	+/-10%=+/-3%	-40C/-40F	480	336	0.25	0.50	0.31	220
200	M136	LLRPSL	HPF	M5	+/-5%=+/-12%	-40C/-40F	277	180	1.00	0.80	1.30	218
	M136	SCWA	HPF	M7	+/-10%=+/-10%	-40C/-40F	120	80	1.15	2.20	1.80	232
	M136	SCWA	HPF	M7	+/-10%=+/-10%	-40C/-40F	208	140	0.65	1.25	1.25	232
	M136	SCWA	HPF	M7	+/-10%=+/-10%	-40C/-40F	240	160	0.55	1.10	1.10	232
	M136	SCWA	HPF	M7	+/-10%=+/-10%	-40C/-40F	277	180	0.49	0.95	0.90	232
	M136	SCWA	HPF	M7	+/-10%=+/-10%	-40C/-40F	347	215	0.55	0.77	0.75	232
	M136	SCWA	HPF	M7	+/-10%=+/-10%	-40C/-40F	480	240	0.19	0.50	0.43	232
	M136	RLB	HPF	M6	+/-10%=+/-3%	-40C/-40F	277	138	0.60	0.90	0.50	244
250	M58orH37	CWA	HPF	M2	+/-10%=+/-10%	-30C/-20F	120	65	1.35	2.60	2.04	294
	M58orH37	CWA	HPF	M2	+/-10%=+/-10%	-30C/-20F	208	105	0.72	1.50	1.48	294
	M58orH37	CWA	HPF	M2	+/-10%=+/-10%	-30C/-20F	240	125	0.65	1.30	1.22	294
	M58orH37	CWA	HPF	M2	+/-10%=+/-10%	-30C/-20F	277	150	0.44	1.12	1.12	294
	M58orH37	CWA	HPF	M2	+/-10%=+/-10%	-30C/-20F	347	190	0.35	0.85	1.05	294
	M58orH37	CWA	HPF	M2	+/-10%=+/-10%	-30C/-20F	480	260	0.25	0.65	0.65	294
	M58orH37	CWI	HPF	M3	+/-10%=+/-10%	-30C/-20F	120/240	60/120	0.90/0.45	2.66/1.33	2.00/1.00	295
	M58orH37	CWI	HPF	M3	+/-10%=+/-10%	-30C/-20F	208	105	0.50	1.54	1.20	295
	M138	SCWA	HPF	M7	+/-10%=+/-10%	-40C/-40F	120	60	1.96	2.50	1.85	288
	M138	SCWA	HPF	M7	+/-10%=+/-10%	-40C/-40F	208	115	1.13	1.45	1.07	288
	M138	SCWA	HPF	M7	+/-10%=+/-10%	-40C/-40F	240	133	0.98	1.25	0.92	288
	M138	SCWA	HPF	M7	+/-10%=+/-10%	-40C/-40F	277	153	0.85	1.10	0.80	288
	M138	SCWA	HPF	M7	+/-10%=+/-10%	-40C/-40F	347	180	0.45	0.95	0.75	298
	M138	SCWA	HPF	M7	+/-10%=+/-10%	-40C/-40F	480	220	0.21	0.57	0.48	298
	M138	RLB	HPF	M6	+/-10%=+/-3%	-40C/-40F	120	85	1.00	2.80	2.31	298
	M138	RLB	HPF	M6	+/-10%=+/-3%	-40C/-40F	240	165	0.50	1.38	1.15	298
	M138	RLB	HPF	M6	+/-10%=+/-3%	-40C/-40F	277	195	0.43	1.20	1.00	298
	M138	RLB	HPF	M6	+/-10%=+/-3%	-40C/-40F	347	243	0.35	0.95	0.80	298
	M138	RLB	HPF	M6	+/-10%=+/-10%	-40C/-40F	480	336	0.25	0.70	0.58	298
320	M132	LLRPSL	HPF	M5	+/-5%=+/-12%	-40C/-40F	277	180	1.45	1.30	1.90	342
	M154/M132	LLSCWA	HPF	M7	(+/-)10%=(+/-)10%	-40C/-40F	120	67	2.04	2.96	1.95	350
	M154/M132	LLSCWA	HPF	M7	(+/-)10%=(+/-)10%	-40C/-40F	208	114	1.16	1.69	1.09	350
	M154/M132	LLSCWA	HPF	M7	(+/-)10%=(+/-)10%	-40C/-40F	240	135	1.01	1.48	0.97	350
	M154/M132	LLSCWA	HPF	M7	(+/-)10%=(+/-)10%	-40C/-40F	277	156	0.88	1.27	0.84	350
	M132	SCWA	HPF	M7	+/-10%=+/-10%	-40C/-40F	120	90	3.30	3.30	1.60	368
	M132	SCWA	HPF	M7	+/-10%=+/-10%	-40C/-40F	208	155	1.90	1.90	1.00	368
	M132	SCWA	HPF	M7	+/-10%=+/-10%	-40C/-40F	240	180	1.60	1.70	0.80	368
	M132	SCWA	HPF	M7	+/-10%=+/-10%	-40C/-40F	277	208	1.40	1.40	0.70	368
	M132	SCWA	HPF	M7	+/-10%=+/-10%	-40C/-40F	347	175	0.95	1.15	1.10	368
	M132	SCWA	HPF	M7	+/-10%=+/-10%	-40C/-40F	480	240	0.63	0.80	0.65	368

Ballast Data – Metal Halide (350W-1500W)

Wattage	ANSI Code	Ballast Type	Power Factor	Wiring Diagram	Open Regulation LineV=LampW	Minimum Starting Ambient	Primary Voltage	Dropout Voltage	Starting Current	Operating Current	Circuit Current	Input Wattage
350	M131	LLRPSL	HPF	M5	+/-5%=+/-12%	-40C/-40F	277	200	2.00	1.50	2.10	375
	M131	SCWA	HPF	M7	+/-10%=+/-10%	-40C/-40F	120	60	3.60	3.70	1.80	400
	M131	SCWA	HPF	M7	+/-10%=+/-10%	-40C/-40F	208	105	2.10	2.10	1.10	400
	M131	SCWA	HPF	M7	+/-10%=+/-10%	-40C/-40F	240	120	1.80	1.80	0.90	400
	M131	SCWA	HPF	M7	+/-10%=+/-10%	-40C/-40F	277	140	1.60	1.60	0.80	400
	M131	SCWA	HPF	M7	+/-10%=+/-10%	-40C/-40F	347	175	1.00	1.25	1.05	400
	M131	SCWA	HPF	M7	+/-10%=+/-10%	-40C/-40F	480	240	0.75	0.90	0.65	400
400	M59orH33	CWA	HPF	M2	+/-10%=+/-10%	-30C/-20F	120	60	2.50	4.00	3.20	452
	M59orH33	CWA	HPF	M2	+/-10%=+/-10%	-30C/-20F	208	105	1.40	2.30	1.80	458
	M59orH33	CWA	HPF	M2	+/-10%=+/-10%	-30C/-20F	240	120	1.20	2.00	1.60	458
	M59orH33	CWA	HPF	M2	+/-10%=+/-10%	-30C/-20F	277	140	1.00	1.75	1.50	458
	M59orH33	CWA	HPF	M2	+/-10%=+/-10%	-30C/-20F	347	175	1.20	1.40	1.05	460
	M59orH33	CWA	HPF	M2	+/-10%=+/-10%	-30C/-20F	480	240	0.60	1.00	0.90	465
	M59orH33	CWI	HPF	M3	+/-10%=+/-10%	-30C/-20F	120	60	1.30	4.20	4.10	465
	M59orH33	CWI	HPF	M3	+/-10%=+/-10%	-30C/-20F	208	104	0.75	2.45	2.40	465
	M59orH33	CWI	HPF	M3	+/-10%=+/-10%	-30C/-20F	240	120	0.65	2.10	2.05	465
	M59orH33	CWI	HPF	M3	+/-10%=+/-10%	-30C/-20F	277	138	0.60	1.70	1.80	462
	M59orH33	CWI	HPF	M3	+/-10%=+/-10%	-30C/-20F	347	174	0.50	1.35	1.45	462
	M59orH33	CWI	HPF	M3	+/-10%=+/-10%	-30C/-20F	480	200	0.60	1.00	0.90	458
	M135	LLRPSL	HPF	M5	+/-5%=+/-12%	-40C/-40F	277	200	2.10	1.70	2.10	425
	M155/M135	LLSCWA	HPF	M7	(+/-)10%=(+/-)10%	-40C/-40F	120	60	3.16	3.80	2.10	434
	M155/M135	LLSCWA	HPF	M7	(+/-)10%=(+/-)10%	-40C/-40F	208	104	1.78	2.10	1.20	434
	M155/M135	LLSCWA	HPF	M7	(+/-)10%=(+/-)10%	-40C/-40F	240	120	1.58	1.90	1.07	434
	M155/M135	LLSCWA	HPF	M7	(+/-)10%=(+/-)10%	-40C/-40F	277	138	1.38	1.65	0.92	434
	M135	SCWA	HPF	M7	+/-10%=+/-10%	-40C/-40F	120	90	3.30	4.00	2.30	456
	M135	SCWA	HPF	M7	+/-10%=+/-10%	-40C/-40F	208	155	2.00	2.30	1.90	456
	M135	SCWA	HPF	M7	+/-10%=+/-10%	-40C/-40F	240	180	1.75	2.10	1.60	456
	M135	SCWA	HPF	M7	+/-10%=+/-10%	-40C/-40F	277	208	1.40	1.80	0.90	456
	M135	SCWA	HPF	M7	+/-10%=+/-10%	-40C/-40F	347	175	1.20	1.40	0.95	456
	M135	SCWA	HPF	M7	+/-10%=+/-10%	-40C/-40F	480	240	0.85	1.00	0.63	456
	M135	SCWI	HPF	M4	+/-10%=+/-10%	-40C/-40F	120	60	1.30	4.20	3.80	455
	M135	SCWI	HPF	M4	+/-10%=+/-10%	-40C/-40F	208	104	0.75	2.40	2.20	455
	M135	SCWI	HPF	M4	+/-10%=+/-10%	-40C/-40F	240	120	0.65	2.10	1.90	455
	M135	RLB	HPF	M6	+/-10%=+/-3%	-40C/-40F	120	65	1.85	4.00	2.40	465
	M135	RLB	HPF	M6	+/-10%=+/-3%	-40C/-40F	208	113	1.10	2.30	1.40	465
	M135	RLB	HPF	M6	+/-10%=+/-3%	-40C/-40F	240	130	0.95	2.00	1.20	465
	M135	RLB	HPF	M6	+/-10%=+/-3%	-40C/-40F	277	150	0.70	1.70	1.25	465
	M135	RLB	HPF	M6	+/-10%=+/-3%	-40C/-40F	347	185	0.55	1.40	0.90	465
	M135	RLB	HPF	M6	+/-10%=+/-3%	-40C/-40F	480	250	0.40	1.00	0.70	465
450	M144	LLRPSL	HPF	M5	+/-5%=+/-12%	-40C/-40F	277	200	2.25	1.90	2.35	480
	M144	SCWA	HPF	M7	+/-10%=+/-10%	-40C/-40F	120	75	2.70	4.44	2.68	508
	M144	SCWA	HPF	M7	+/-10%=+/-10%	-40C/-40F	208	130	1.56	2.56	1.67	508
	M144	SCWA	HPF	M7	+/-10%=+/-10%	-40C/-40F	240	150	1.35	2.22	1.44	508
	M144	SCWA	HPF	M7	+/-10%=+/-10%	-40C/-40F	277	170	1.17	1.92	1.25	508
	M144	SCWA	HPF	M7	+/-10%=+/-10%	-40C/-40F	347	220	1.45	1.60	0.30	505
	M144	SCWA	HPF	M7	+/-10%=+/-10%	-40C/-40F	480	270	1.00	1.10	0.25	514
	M144	RLB	HPF	M6	+/-10%=+/-3%	-40C/-40F	277	110	0.70	2.00	1.25	530
750	M149	SCWA	HPF	M7	+/-10%=+/-10%	-40C/-40F	120	80	5.80	7.00	6.00	825
	M149	SCWA	HPF	M7	+/-10%=+/-10%	-40C/-40F	208	150	3.30	4.00	3.50	825
	M149	SCWA	HPF	M7	+/-10%=+/-10%	-40C/-40F	240	160	2.90	3.50	3.10	825
	M149	SCWA	HPF	M7	+/-10%=+/-10%	-40C/-40F	277	185	2.50	3.00	2.70	825
	M149	SCWA	HPF	M7	+/-10%=+/-10%	-40C/-40F	347	230	2.00	2.45	2.20	825
	M149	SCWA	HPF	M7	+/-10%=+/-10%	-40C/-40F	480	320	1.50	2.00	1.50	825
1000	M47orH36	CWA	HPF	M2	+/-10%=+/-10%	-30C/-20F	120	85	5.70	9.20	6.00	1080
	M47orH36	CWA	HPF	M2	+/-10%=+/-10%	-30C/-20F	208	145	3.40	5.30	3.50	1080
	M47orH36	CWA	HPF	M2	+/-10%=+/-10%	-30C/-20F	240	170	2.90	4.60	3.00	1080
	M47orH36	CWA	HPF	M2	+/-10%=+/-10%	-30C/-20F	277	195	2.50	4.00	2.60	1080
	M47orH36	CWA	HPF	M2	+/-10%=+/-10%	-30C/-20F	347	245	1.30	3.20	2.50	1080
	M47orH36	CWA	HPF	M2	+/-10%=+/-10%	-30C/-20F	480	335	1.50	2.30	1.60	1080
	M47orH36	CWI	HPF	M3	+/-10%=+/-10%	-30C/-20F	208	125	1.65	5.30	3.25	1080
	M47orH36	CWI	HPF	M3	+/-10%=+/-10%	-30C/-20F	240	145	1.30	4.80	3.20	1080
	M141	SCWA	HPF	M7	+/-10%=+/-10%	-30C/-20F	120	84	7.80	9.20	4.50	1080
	M141	SCWA	HPF	M7	+/-10%=+/-10%	-30C/-20F	208	146	4.00	5.30	2.70	1080
	M141	SCWA	HPF	M7	+/-10%=+/-10%	-30C/-20F	240	168	3.70	4.60	2.30	1080
	M141	SCWA	HPF	M7	+/-10%=+/-10%	-30C/-20F	277	194	3.20	4.00	2.20	1080
	M141	SCWA	HPF	M7	+/-10%=+/-10%	-30C/-20F	347	230	2.25	3.20	1.75	1075
	M141	SCWA	HPF	M7	+/-10%=+/-10%	-30C/-20F	480	320	1.65	2.35	1.30	1080
1500	M48	CWA	HPF	M2	+/-10%=+/-10%	-30C/-20F	120	80	9.00	14.00	6.60	1610
	M48	CWA	HPF	M2	+/-10%=+/-10%	-30C/-20F	208	140	5.20	8.00	3.85	1610
	M48	CWA	HPF	M2	+/-10%=+/-10%	-30C/-20F	240	160	4.50	7.00	3.45	1610
	M48	CWA	HPF	M2	+/-10%=+/-10%	-30C/-20F	277	185	3.85	6.00	3.05	1610
	M48	CWA	HPF	M2	+/-10%=+/-10%	-30C/-20F	347	230	4.60	4.80	1.70	1610
	M48	CWA	HPF	M2	+/-10%=+/-10%	-30C/-20F	480	320	2.25	3.50	1.65	1610

Important Changes in the 2005 National Electrical Code for Metal Halide Systems

The 2005 NEC requires that luminaires with a metal halide lamp be provided with either a containment barrier that encloses the lamp or with a means that will only accept an ANSI Type O metal halide lamp.

Metal halide lamps are rated based on their enclosure requirements:

ANSI Type E: enclosed-rated for luminaires that have a glass lens or plastic lens rated for arc tube containment.

ANSI Type S: standard lamps rated for enclosed luminaires or open luminaires if certain lamp operating conditions are followed based on the lamp manufacturer's recommendations.

ANSI Type O: open-rated for use in open or enclosed luminaires. These lamps have a special base with a narrow contact point.

Enclosed luminaires:

Lithonia metal halide enclosed luminaires are provided with a standard socket, which will accept Type E, Type S or Type O lamps.

Open luminaires:

Lithonia metal halide open luminaires are available with a protected socket, which will accept only Type O lamps.

For more information, see page 385 of the HID section, or go to:
http://www.lithonia.com/protectedsocket/

Mercury vapor lamps from 175 watts through 1000 watts will operate satisfactorily on equivalent-wattage probe-start metal halide ballasts.

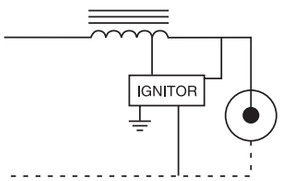
For electrical characteristics of these wattages, see metal halide ballast information.

HAZARD WARNING – USE OF MERCURY VAPOR LAMPS

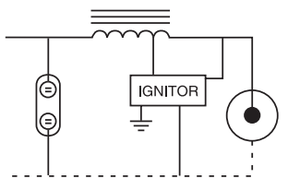
These lamps can cause serious skin burns and eye inflammation from ultraviolet radiation if the outer envelope of the lamp is broken or punctured and the arc-tube continues to operate. Do not use where people will remain for more than a few minutes unless adequate shielding or other safety precautions are used. Certain types of lamps that will automatically extinguish when the outer envelope is broken are commercially available.

The Energy Policy Act of 2005 will ban the use of mercury vapor ballasts in the US, manufactured or imported after January 1, 2008.

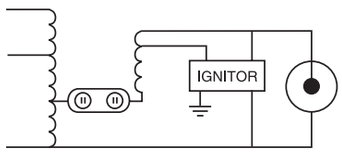
Wattage	ANSI Code	Open Ballast Type	Power Factor	Wiring Diagram	Regulation LineV=LampW	Starting Ambient	Minimum Primary Voltage	Dropout Voltage	Starting Current	Operating Current	Circuit Current	Input Wattage
50	H46	HX	NPF	M1 less cap	+/-5%=+/-12%	-30C/-20F	120	80	2.10	1.50	0.25	74
	H46	CWA	HPF	M2	+/-10%=+/-10%	-30C/-20F	120/277	60/138	0.60/0.25	0.70/0.30	0.25/0.11	74
75	H43	HX	NPF	M1 less cap	+/-5%=+/-12%	-30C/-20F	120	102	2.60	1.60	0.30	96
	H43	CWA	HPF	M2	+/-10%=+/-10%	-30C/-20F	120/277	64/145	0.80/0.35	0.90/0.40	0.50/0.22	93
100	H38 or H44	HX	NPF	M1 less cap	+/-5%=+/-12%	-30C/-20F	120	90	3.60	2.10	0.50	125
	H38 or H44	CWA	HPF	M2	+/-10%=+/-10%	-30C/-20F	120	65	0.68	1.05	0.52	123
	H38 or H44	CWA	HPF	M2	+/-10%=+/-10%	-30C/-20F	208	110	0.44	0.60	0.36	125
	H38 or H44	CWA	HPF	M2	+/-10%=+/-10%	-30C/-20F	240	130	0.39	0.52	0.31	125
	H38 or H44	CWA	HPF	M2	+/-10%=+/-10%	-30C/-20F	277	150	0.34	0.45	0.28	125
	H38 or H44	CWA	HPF	M2	+/-10%=+/-10%	-30C/-20F	347	180	0.38	0.38	0.22	125
	H38 or H44	CWA	HPF	M2	+/-10%=+/-10%	-30C/-20F	480	230	0.26	0.26	0.16	120



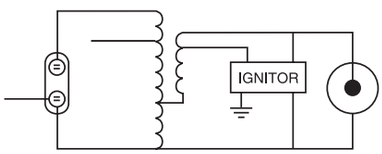
H1



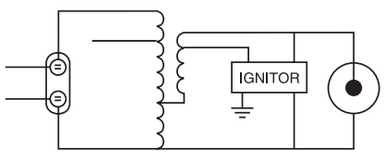
H2



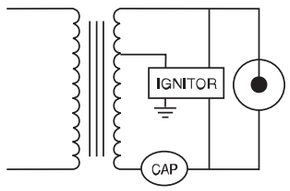
H3



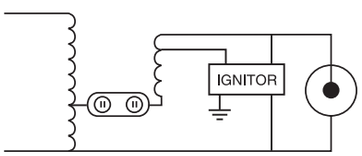
H4



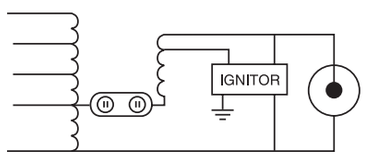
H5



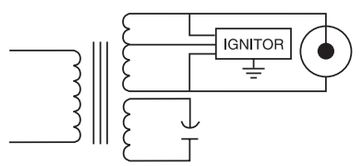
H6



H7

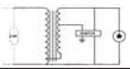
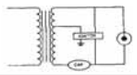
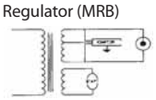


H8

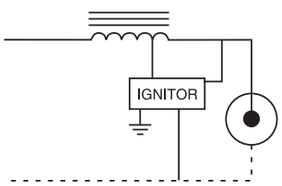


H9

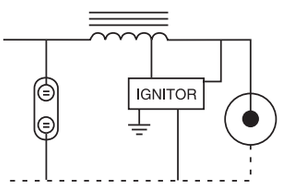
Ballast Circuit Data – High Pressure Sodium

Ballast Type	Available Input Voltage	Maximum Input Current	Power Factor	Regulation (+/- Input Voltage = +/- Lamp Wattage)	Input Watts Loss	Crest Factor
High Pressure Sodium						
Reactor 	50W, 70W, 100W, and 150W; 120V only	Higher than operating	50% NPF Standard 90% + HPF Optional	+/- 5% = +/- 12%	LOW	1.4 to 1.5
High-Reactance Autotransformer 	50W; 120V or 277V 70W, 100W, and 150W; 120V, 277V, or 347V	Higher than operating	90% + HPF	+/- 5% = +/- 12%	MEDIUM	1.5
Constant Wattage Autotransformer (CWA) 	70W, 100W and 150W; 120V or 277V 200W, 250W, 310W, 400W 600W, 750W, and 1000W; 120V, 277V, or 347V	Operating	90% + HPF	+/- 10% = +/- 10%	MEDIUM to HIGH	1.7 to 1.8
Constant Wattage Isolated (CWI) 	70W, 100W, 150W, 250W, and 400W; 120V, 208V, or 240V	Operating	90% + HPF	+/- 10% = +/- 10%	MEDIUM to HIGH	1.7 to 1.8
Magnetic Regulator (MRB) 	70W ; 120V or 240V 100W, 150W, 250W, and 400W; 120V, 240V, 277V or 480V 200W and 310W; 120V, 240V, or 480V	Operating	90% + HPF	+/- 10% = +/- 3%	HIGH	1.7 to 1.8

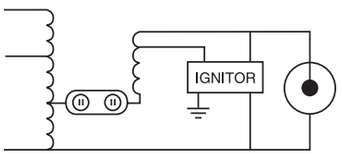
High Pressure Sodium



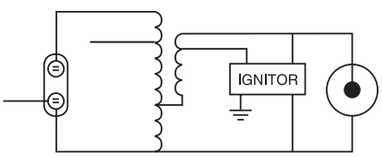
H1



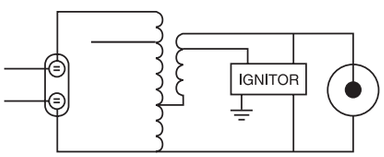
H2



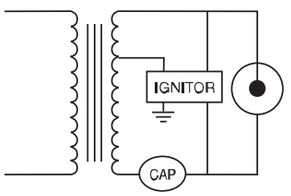
H3



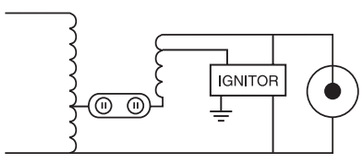
H4



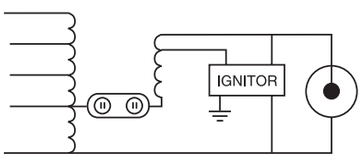
H5



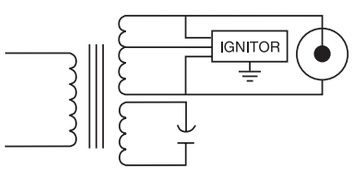
H6



H7

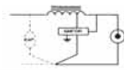
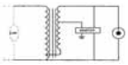
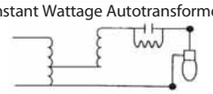
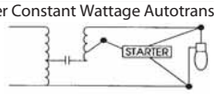
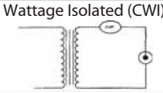
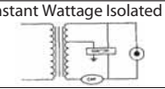
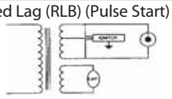
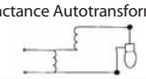


H8



H9

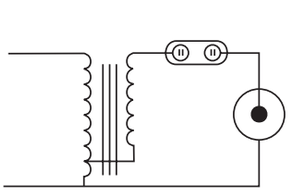
Ballast Circuit Data – Metal Halide & Mercuy Vapor

Ballast Type	Available Input Voltage	Maximum Input Current	Power Factor	Regulation (+/- Input Voltage = +/- Lamp Wattage)	Input Watts Loss	Crest Factor
Metal Halide						
Linear Reactor (Pulse Start) 	50W, 70W, 100W, 150W, 200W, 320W, 350W, 400W, and 450W; 277V only	Higher than operating	90% + HPF	+/- 5% = +/- 12%	LOW	1.4 to 1.5
High-Reactance Autotransformer (Pulse Start) 	50W; 120V or 277V 70W, 100W, and 150W; 120V, 277V, or 347V	Higher than operating	90% + HPF	+/- 5% = +/- 12%	MEDIUM	1.5
Constant Wattage Autotransformer (CWA) 	175W, 250W, 400W, and 1000W; 120V, 277V, or 347V	Operating	90% + HPF	+/- 10% = +/- 10%	MEDIUM to HIGH	1.7 to 1.8
Super Constant Wattage Autotransformer (SCWA) (Pulse Start) 	100W; 120V or 277V 150W; 120V, 277V or 347V 175W; 120V, or 347V 200W, 250W, 320W, 350W, 400W and 450W; 120V, 277V, or 347V	Operating	90% + HPF	+/- 10% = +/- 10%	MEDIUM to HIGH	1.6
Constant Wattage Isolated (CWI) 	250W; 120V, 208V, or 240V 400W; 120V, 208V, 240V, 277V or 347V 1000W; 208V or 240V	Operating	90% + HPF	+/- 10% = +/- 10%	MEDIUM to HIGH	1.7 to 1.8
Super Constant Wattage Isolated (SCWI) (Pulse Start) 	400W; 120V, 208V, or 240V	Operating	90% + HPF	+/- 10% = +/- 10%	MEDIUM to HIGH	1.6
Regulated Lag (RLB) (Pulse Start) 	175W; 120V, 277V, 347V, or 480V 200W and 450W; 277V only 250W and 400W; 120V, 240V, 277V, 347V, or 480V	Operating	90% + HPF	+/- 10% = +/- 3%	HIGH	1.6
Mercury Vapor						
High-Reactance Autotransformer 	50W, 75W, 100W, 175W, 250W; 120V only	Higher than operating	50% NPF Standard	+/- 5% = +/- 12%	MEDIUM	1.5
Constant Wattage Autotransformer (CWA) 	50W, 75W and 1000W; 120V, or 277V 100W, 175W, 250W, and 400W; 120V, 277V, or 347V	Operating	90% + HPF	+/- 10% = +/- 5%	MEDIUM to HIGH	1.7 to 1.8

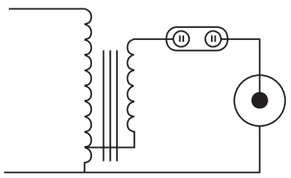
NOTE : Ungrounded power distribution systems may carry transient line voltages under fault conditions. Because high transients can cause premature ballst and lamp failures, it is not recommended that luminaires be operated on any 480V or other ungrounded systems.

The ballast serves four basic functions: 1) Transforms the line voltage to the required lamp operating voltage; 2) Limits the lamp operating current; 3) Provides the open-circuit starting voltage characteristics required to start the lamp; and 4) Regulates the lamp wattage for a variation in power supply input voltage.

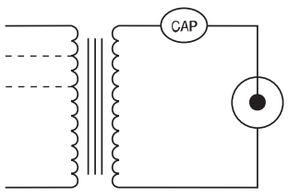
Metal Halide/Mercury Vapor



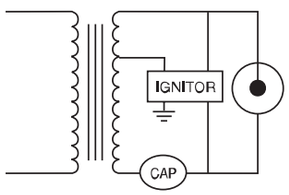
M1



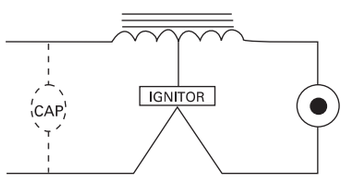
M2



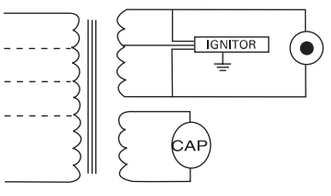
M3



M4



M5



M6

NOTE:
For M7 Super CWA Pulse Start Circuit Diagram, see H7 HPS Circuit Diagram.

Ballast Testing

1. H.I.D. Open-Circuit and Short-Circuit Test Limits

	Lamp			Secondary short circuit current Amps
	Wattage	ANSI Number	RMS Voltage	
Mercury ballasts	50	H46	225–255	0.85–1.15
	75	H43	225–255	0.95–1.70
	100	H38	225–255	1.10–2.00
	175	H39	225–255	2.00–3.60
	250	H37	225–255	3.00–3.80
	400	H33	225–255	4.40–7.90
	2–400 (ILO)	2–H33	225–255	4.40–7.90
	2–400 (Series)	2–H33	475–525	4.20–5.40
	700	H35	405–455	3.90–5.85
	1000	H36	405–455	5.70–9.00
Metal halide ballasts	70	M85	210–250	0.85–1.30
	100	M90	250–300	1.15–1.76
	150	M81	220–260	1.75–2.60
	175	M57	285–320	1.50–1.90
	250	M80	230–270	2.90–4.30
	250	M58	285–320	2.20–2.85
	400	M59	285–320	3.50–4.50
	2–400 (ILO)	2–M59	285–320	3.50–4.50
	2–400 (Series)	2–M59	600–665	3.30–4.30
	1000	M47	400–445	4.80–6.15
	1500	M48	400–445	7.40–9.60
High pressure sodium ballasts*	35	S76	110–130	0.85–1.45
	50	S68	110–130	1.50–2.30
	70	S62	110–130	1.60–2.90
	100	S54	110–130	2.45–3.80
	150	S55	110–130	3.50–5.40
	150	S56	200–250	2.00–3.00
	200	S66	200–230	2.50–3.70
	250	S50	175–225	3.00–5.30
	310	S67	155–190	3.80–5.70
	400	S51	175–225	5.00–7.60
	1000	S52	420–480	5.50–8.10
Low pressure sodium ballasts	18	L69	300–325	0.30–0.40
	35	L70	455–505	0.52–0.78
	55	L71	455–505	0.52–0.78
	90	L72	455–525	0.80–1.20
	135	L73	645–715	0.80–1.20
	180	L74	645–715	0.80–1.20

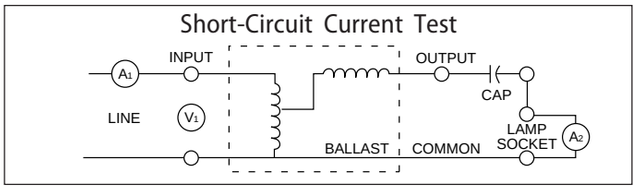
*CAUTION: Always disconnect the ignitor before measuring the output voltage of high pressure sodium ballasts. High voltage starting pulses can damage commonly used multi-meters.

2. H.I.D. Short-Circuit Lamp Current

To ensure the ballast is delivering the proper current under lamp starting conditions, a measurement may be taken by connecting an ammeter between the lamp socket center pin and the socket shell with rated input voltage applied to the ballast. If available, a socket adapter may be used.

1. Energize ballast with proper rated input voltage.
2. Measure current with ammeter at A_1 and A_2 as shown below.
3. Readings must be within test limits shown above.

When using a clamp-on ammeter for this measurement, be certain the meter is not near the magnetic field of the ballast or any steel member which might distort the magnetic field.



When short-circuit lamp current test results in high, low or no reading:

Further checks should be made to determine whether cause is attributable to improper supply voltage, shorted or open capacitor or inoperative ballast. Checks may be made as follows:

- *Supply Voltage Check*

  Measure line voltage. If ballast is multi-voltage unit make certain input voltage connection is made to proper input voltage terminal or lead.

- *Capacitor Check*

  Verify capacitor rating is as required and shown on ballast label.

- *Ballast Check*

  Perform open-circuit voltage test to ensure operation within the RMS range shown in the table to the left.

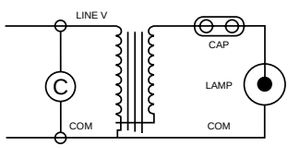
3. H.I.D. Ballast Continuity Testing

Continuity of Primary Coil

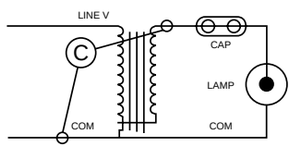
1. Disconnect ballast from power supply and discharge the capacitor.
2. Check for continuity of ballast primary coil between input leads.

Continuity of Secondary Coil

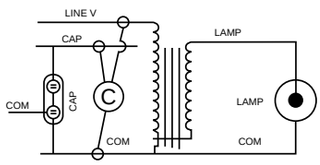
1. Disconnect ballast from power supply and discharge the capacitor.
2. Check for continuity of ballast secondary coil between lamp and common leads.



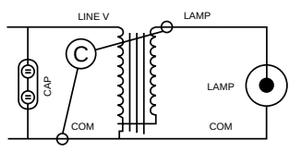
Between Common and Line Leads.



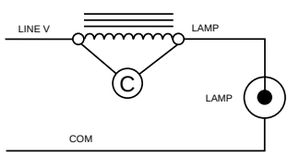
Between Common and Capacitor Leads.



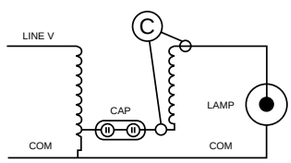
Between Line and Lamp Leads.



Between Common and Lamp Leads.



Between Common and Capacitor Leads.



Between Common and Lamp Leads.

NOTE: Information compiled by Advance Transformer Co. and reprinted with permission.