

Ballasts For High Intensity Discharge Lamps

Universal Means Higher Expectations In High Intensity Discharge

Universal Lighting Technologies ("Universal") offers a wide array of ballasts for High Intensity Discharge (HID) lamps. Applications include Metal Halide (MH), Pulse Start Metal Halide (PSMH), and High Pressure Sodium (HPS) lamps ranging from 35 to 1500 watts.

We're the technology leader in every category of HID ballasts. Our Universal Precise™ line is the latest innovation in magnetic core & coil technology in years.



Universal offers a complete line of HID ballasts for applications ranging from 35 - 1500 watts.

Product Overview

Core & Coil

Core & coil ballasts are used in over 90% of all HID fixtures. Universal's core & coil models are available for all HID lamp types, including single-, dual-, tri-, quad- and multi-volt designs. For added versatility and reduced inventory costs, Universal has also introduced the industry's first Multi-5™ ballast (120, 208, 240, 277, or 480 volt), featuring a 480-volt tap on a conventional quad-tap ballast.

Our core & coil models are ideal for a wide variety of lighting applications, including factories, warehouses, gymnasiums and retail stores. All these ballasts feature precision-wound coils, ensuring even heat dissipation and the highest electrical integrity.

Universal's Universal Precise™ is the next generation in core & coil technology, featuring a smaller, light-weight design and improved temperature performance. Universal Precise™ fits virtually all applications, and has no exposed live metal parts. There are no plastic extrusions, which prevents breakage during shipping. Color-coded leads make installation easy.

50 Hertz

Universal offers 50 Hz core & coil ballasts to meet the rapid growth in demand in international markets. Our ballasts are available for 220, 230, and 240 volt electrical systems.

F-Can

These ballasts are used primarily for indoor downlighting applications where quiet operation is essential. All the components of these ballasts are enclosed in a fluorescent-style ballast can and are thermally protected.



F-Can Ballasts



Core and Coil Ballasts



HID Ballast Kits

Product Overview

For maximum safety and reliability, all Universal capacitors come with built-in bleed resistors (patented by Universal) and approved by CSA (CSA file #LR51331, metal cases only). Environmental safety is assured by use of biodegradable, nontoxic (no PCBs) dielectric fluid (soybean oil), patented by Universal for use in capacitors. Dry-film capacitors do not include protective devices. Since they can fail in a hazardous manner, it is the responsibility of the purchaser to take appropriate precautions.

Capacitors

Universal has a comprehensive line of capacitors in metal cases (up to 525V ratings) and plastic cases (up to 400V ratings). All Universal capacitors are designed for 60,000 hours of continuous life. They're exceptionally reliable because we put them through accelerated life testing at 125% rated voltage and rated temperature +10°C.

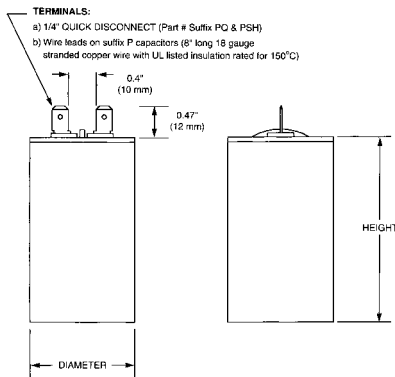
Universal capacitors are normally packaged with ballasts. They may also be ordered separately, bulk packaged, or individually boxed with the suffix "BH" (metal cases only). Capacitor weights vary from 1/4 lb. to 1 lb. each.

Dry Capacitors

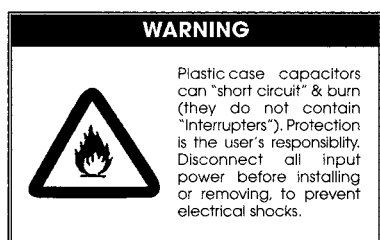
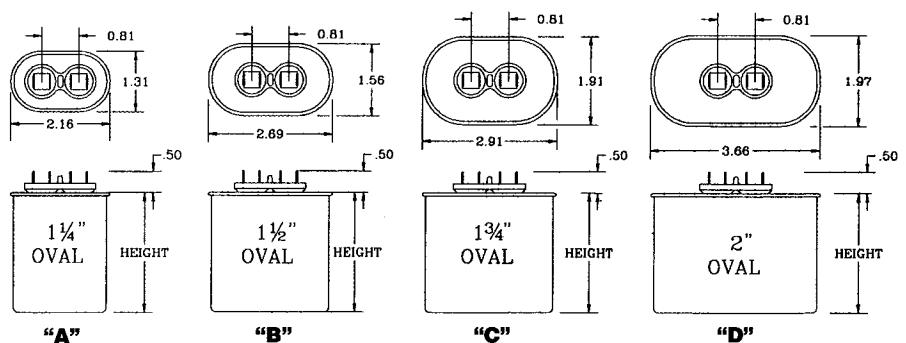
Type "P" plastic case capacitors described in this section are dry and do NOT contain safety interrupters (or oil). Plastic cases are UL rated "94V-0" (for use up to 100°C maximum). Type "P" capacitors are supplied with stranded copper wire leads 8 inches long (18 awg, with 150°C rated insulation). Capacitor rolls are sealed inside plastic cases using epoxy. Design and testing of Universal capacitors follow specifications in Electronic Industries Association (EIA) Standard 456-A, titled "Metalized Film Dielectric Capacitors for Alternating Current Application."

"P" capacitors are designed and rated for continuous duty AC voltages below 400VAC @ 50 or 60 Hz. Capacitors used with HID ballasts at voltages above 400VAC should contain interrupters (available from Universal in oval "MF" and round "RMF" oil-filled metal cases).

Plastic Dry Type Capacitors

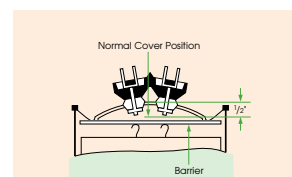
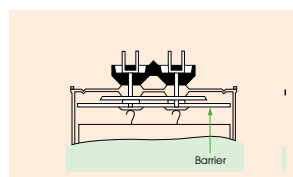


Metal and Oil Filled Capacitors



Protective Device (Only in metal cases)

Protective device to prevent case rupture



Oil-Filled Capacitors

μF	VACr	Part #	Case	Ht (")	μF	VACr	Part #	Case	Ht (")
5.0	300	005-1466-BH	1.25 oval	2.2	22.5	300	005-1419-BH	1.50 oval	3.5
6.0	300	005-1561-BH	1.25 oval	2.2	24.0	360	005-3160-BH	1.75 oval	3.1
7.0	300	005-1410-BH	1.25 oval	2.2	24.0	400	005-2664-BH	1.75 oval	3.1
8.0	330	005-1411-BH	1.25 oval	2.2	24.0	480	005-2779-BH	1.75 oval	3.9
10.0	330	005-1413-BH	1.25 oval	2.7	24.5	300	005-3278-BH	1.75 oval	2.7
10.0	400	005-2666-BH	1.25 oval	3.9	26.0	330	005-2669-BH	1.75 oval	3.1
10.0	400	005-1184-BH	1.50 oval	2.7	26.0	525	0052776-BH	1.75 oval	4.3
10.0	400	005-2167-BH	1.75 dia	2.9	28.0	240	005-1886-BH	1.75 dia	2.3
12.0	300	005-1467-BH	1.25 oval	3.1	28.0	300	005-1468-BH	1.75 oval	3.1
12.0	400	005-2799-BH	1.50 oval	2.7	28.0	425	005-1799-BH	1.75 oval	3.9
12.0	440	005-1464-BH	1.50 oval	3.1	30.0	440	005-1475-BH	1.75 oval	3.9
13.0	300	005-1414-BH	1.25 oval	3.1	32.0	300	005-2351-BH	1.75 oval	3.1
14.0	240	005-1884-BH	1.75 dia	2.3	32.0	525	005-1474-BH	2.00 oval	3.9
14.0	300	005-1415-BH	1.50 oval	2.7	33.0	300	005-1470-BH	1.75 oval	3.1
15.0	400	005-1185-BH	1.75 oval	2.7	35.0	330	005-1421-BH	1.75 oval	3.1
16.0	300	005-1498-BH	1.50 oval	2.7	36.0	525	005-2793-BH	2.00 oval	4.3
17.5	300	005-1417-BH	1.50 oval	3.1	40.0	240	005-1887-BH	1.75 dia	2.7
18.0	440	005-1401-BH	1.75 oval	3.1	40.0	300	005-1768-BH	1.75 oval	3.9
18.5	330	005-1796-BH	1.50 oval	3.1	48.0	330	005-1422-BH	1.75 oval	3.9
20.0	240	005-1885-BH	1.75 dia	2.3	52.0	240	005-1888-BH	2.00 dia	2.9
20.0	330	005-1418-BH	1.50 oval	3.1	55.0	240	005-1594-BH	1.75 oval	3.5
20.5	400	005-3262-BH	1.75 oval	3.1	55.0	300	005-2117-BH	1.75 oval	3.9
21.0	525	005-1495-BH	1.75 oval	3.9					

Dry Capacitors

--		90°C Rated			100°C Rated			105°C Rated		
µF	V	Part #	DIA (")L (")		Part #	DIA (")L (")		Part #	DIA (")L (")	
5.0	280	005-4400-BH	1.18	2.20	R17058511-BH	1.26	2.36			
5.0	280	005-4051-BH	1.18	2.76	R17058512-BH	1.26	2.83			
5.0	330				R17058539-BH	1.26	2.24			
6.0	280				R17058513-BH	1.26	2.36			
6.0	280	005-4052-BH	1.18	2.76	R17058514-BH	1.26	2.83			
7.0	280	005-4053-BH	1.58	2.76	R17058515-BH	1.65	2.83			
8.0	300	005-4054-BH	1.58	2.76	R17058535-BH	1.65	2.83			
8.0	330				R17058541-BH	1.65	2.83			
10.0	280	005-4407-BH	1.18	2.76	R17058517-BH	1.26	2.83			
10.0	280	005-4056-BH	1.58	2.76	R17058519-BH	1.65	2.83	R17058226-BH	1.65	2.83
10.0	330	005-4408-BH	1.58	2.76	R17058578-BH	1.65	2.83	R17058227-BH	1.65	2.83
10.0	400	005-4409-BH	1.58	2.76	R17058555-BH	1.65	2.83			
10.0	400	005-4025-BH	1.58	3.74	R17058557-BH	1.65	3.82	R17058310-BH	1.65	3.82
11.0	400	005-4485-BH	1.58	2.76	R17058558-BH	1.65	2.83			
12.0	300	005-4099-BH	1.58	2.76	R17058536-BH	1.65	2.83			
12.0	330	005-4411-BH	1.58	2.76	R17058543-BH	1.65	2.83			
12.0	400	005-4412-BH	1.58	3.74	R17058580-BH	1.65	3.82			
13.0	330	005-4044-BH	1.58	3.74						
14.0	170				R17058500-BH	1.26	2.83			
14.0	280	005-4060-BH	1.58	2.76	R17058520-BH	1.65	2.83			
14.0	280	005-4416-BH	1.58	2.76	R17058520-BH	1.65	2.83	R17058232-BH	1.65	2.83
14.0	400	005-4164-BH	1.58	3.74	R17058560-BH	1.65	3.82			
15.0	400				R17058562-BH	1.65	3.82			
15.0	400	005-4026-BH	1.77	3.74	R17058563-BH	1.85	3.82	R17058320-BH	1.85	3.82
16.0	280	005-4062-BH	1.58	2.76	R17058522-BH	1.65	2.83			
16.0	280	005-4420-BH	1.58	2.76	R17058522-BH	1.65	2.83			
16.0	330				R17058547-BH	1.65	2.83			
17.0	400				R17058588-BH	1.65	3.82			
17.5	280				R17058523-BH	1.65	3.82			
20.0	170	005-4065-BH	1.58	2.76	R17058501-BH	1.65	2.83			
20.0	280	005-4066-BH	1.58	3.74	R17058526-BH	1.65	3.82			
20.0	330									
20.0	400				R17058564-BH	1.85	3.82			
20.5	400	005-4432-BH	1.77	3.74	R17058565-BH	1.85	3.82			
21.0	400	005-4128-BH	1.77	3.74	R17058567-BH	1.85	3.82			
22.0	400	005-4483-BH	1.77	3.74	R17058569-BH	1.85	3.82			
22.5	280				R17058527-BH	1.65	3.15			
22.5	280				R17058528-BH	1.65	3.82			
24.0	280				R17058529-BH	1.65	3.82			
24.0	400	005-4438-BH	1.85	3.74	R17058571-BH	1.85	3.82	R17058342-BH	1.85	5.31
24.0	400	005-4027-BH	1.77	4.61						
24.5	330	005-4047-BH	1.58	4.61	R17058552-BH	1.65	4.76			
26.0	300	005-4048-BH	1.58	4.61	R17058537-BH	1.65	4.76			
26.5	400	005-4484-BH	1.77	4.61	R17058574-BH	1.85	4.76			
28.0	170	005-4071-BH	1.58	2.76	R17058502-BH	1.65	2.83			
28.0	280	005-4072-BH	1.58	4.61	R17058530-BH	1.65	4.76			
28.0	330	005-4447-BH	1.77	3.74	8R17058553-BH	1.85	3.82			

Dry Capacitors (Cont.)

μF	V	90°C Rated		100°C Rated		105°C Rated	
		Part #	DIA (")L (")	Part #	DIA (")L (")	Part #	DIA (")L (")
35.0	280			R17058531-BH	1.65 3.82		
35.0	280	005-4075-P	1.77 4.61	R17058532-BH	1.85 4.76		
40.0	240	005-4456-P	1.58 3.74	R17058505-BH	1.65 3.82		
40.0	240	005-4077-P	1.58 4.61	R17058506-BH	1.65 4.76		
48.0	280			R17058533-BH	1.85 4.76		
48.0	330			R17058554-BH	2.05 4.76		
52.0	170	005-4087-P	1.77 3.74	R17058503-BH	1.85 3.82		
52.0	280	005-4127-P	1.77 4.61	R17058534-BH	1.85 4.76		
55.0	240	005-4465-P	1.77 3.74	R17058507-BH	1.85 3.82	R17058212-BH	1.85 5.31
55.0	240	005-4084-P	1.77 4.61	R17058509-BH	1.85 4.76		
55.0	300			R17058538-BH	1.85 4.76		

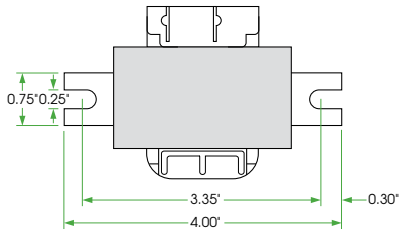
HID

Bracket Reference Chart

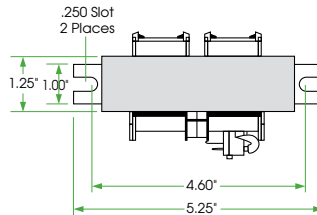
CORE & COIL WELDED BRACKETS

All welded brackets are .093" thick.

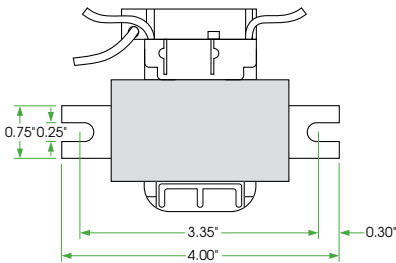
Ref. Drawing B1



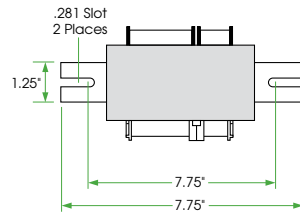
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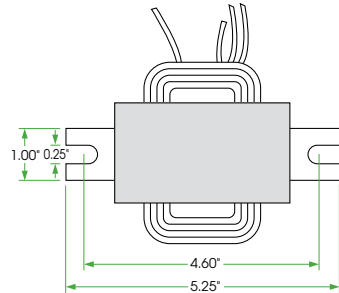
Ref. Drawing B1-A



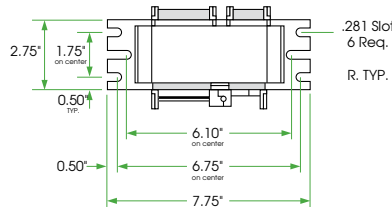
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Ref. Drawing B1-B



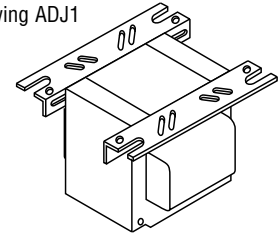
Ref. Drawing B4



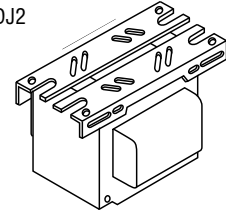
CORE & COIL ADJUSTABLE MOUNTING BRACKETS

Routinely supplied with replacement kits.

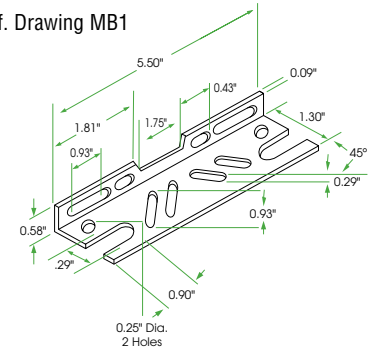
Ref. Drawing ADJ1



Ref. Drawing ADJ2



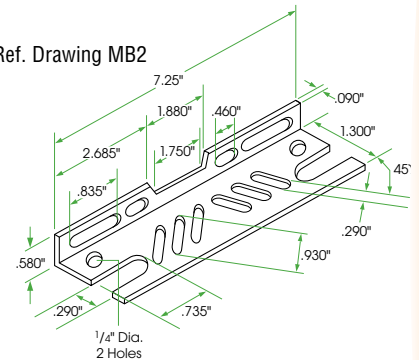
Ref. Drawing MB1



For use with:

- 50 to 175 watt Mercury, High Pressure Sodium and Metal Halide and some 250 watt Metal Halide

Ref. Drawing MB2



For use with:

- 250 to 1500 watt Metal Halide
- 250 to 1000 watt High Pressure Sodium and Mercury Vapor

Application And Operating Information

Underwriters' Laboratories, Inc. Acceptance

All F-Can and Weatherproof ballasts listed in this catalog are Underwriters' Laboratories, Inc. white card listed, except those for 347 volt operation. All Core & Coil and Potted Core & Coil ballasts listed in this catalog are Underwriters' Laboratories, Inc. yellow card listed (component recognized).

Ballast Replacement

Ballast replacement presents the possibility of exposure to potentially hazardous voltages and should be performed only by qualified personnel. All installation, inspection and maintenance should be performed only with the entire circuit power to fixture or equipment turned off. Installation shall be in accordance with National Electric Code.

Heat

A ballast, like any other electrical device, generates heat during normal operation. Planning for maximum heat dissipation with proper fixture design, installation planning and ballast selection will minimize the possibility of a heat-related problem arising. Excessive temperature will have an adverse effect on ballast life.

Normal temperature limits:

F-Can Ballasts

Maximum case temperature: 90°C

Potted Core & Coil Ballasts and
Core & Coil Ballasts

Insulation: Class 180°C

Maximum coil temperature: 165°C

(measured by change of resistance method)

All F-Can ballasts listed in this catalog are equipped with built-in automatic resetting internal thermal protection as a standard feature.

Whenever a ballast with thermal protection is used, it is imperative that the fixture/ballast/lamp combination be heat tested under actual or simulated installation conditions to assure that the ballast will not cycle. The resetting thermal protector functions as a thermostat which will open and temporarily deactivate the ballast when it exceeds the permissible

temperature. The ballast will continue to cycle until the cause of overheating is eliminated. If the ballast is defective, it must be replaced. If the cause is external, the ballast will resume normal operation after abnormal conditions are eliminated.

To attain normal ballast life, the maximum coil temperature of the ballast should not exceed the rating of the insulation system. A temperature increase of 10° C results in a 50% reduction of ballast life.

Low Ambient Temperature (cold)

As temperatures drop, less and less vaporized gas is available within the arc tube of a high intensity discharge lamp, thereby causing an increase in the open circuit voltage required to initiate an arc in the lamp, until a point is reached where the lamp cannot be started. The minimum temperature at which any ballast listed in this catalog will provide reliable starting is listed with the electrical characteristics.

Ballasts should be protected from weather, moisture, or other abnormal atmospheric conditions, unless specifically designed for use under adverse conditions.

Fusing

The purpose of fusing an HID ballast is to remove the ballast from the power line in the event of a ballast system failure. A fuse does not protect the ballast from failing.

Because the temperature in the ballast compartment is high, typically 90°C, fuse ratings are specified at 25°C, and that this rating declines as the temperature increases, HID fuse recommendations are made between 2 and 3 times the maximum current the ballast will draw during all normal conditions.

Fast-blow fuses should not be used due to the possibility of high inrush currents. These currents are due to the fact that the power can be applied at any point in the AC voltage waveform. Standard and slow-blow are acceptable.

When using the 120V tap for auxiliary lighting, a slow-blow fuse should be used to protect the ballast from damage from a fault in the auxiliary lighting circuit.

REMOTE MOUNTING DISTANCE

Maximum Length in Feet for Remote Mounting of HID Ballasts to Lamp

ANSI	Lamp Type	Watts	12 GA	14 GA	16 GA	18 GA
M57	Metal Halide	175	272	171	107	67
M58	Metal Halide	250	194	122	77	48
M59	Metal Halide	400	132	83	52	33
M47	Metal Halide	1000	196	123	77	48
M48	Metal Halide	1500	146	92	58	36

For proper installation, insure that remote ballasts are properly vented and mounted to a heat-dissipating surface.

Application And Operating Information

Sound

High intensity discharge lamp ballasts, like all electromagnetic devices, produce noise, or “hum.” It is the degree of noise which determines the existence of a problem. Ballast noise will only be noticeable when it exceeds the ambient sound level of the installation. It is obvious that a ballast designed primarily for outdoor or factory use would not be suitable in an office environment.

The vast improvements in all high intensity discharge lamps and ballasts, and their excellent energy efficiency, have made them viable options for many indoor applications. The ballasts being considered should be carefully analyzed to insure that there will not be an objectionable level of ballast noise.

All F-Can ballasts listed in this catalog are “Sound Rated” to aid in the selection of a ballast which is proper for the environment in which it will operate.

Potted Core & Coil ballasts are also designed to operate at reduced sound levels, generally several decibels lower than a standard Core & Coil ballast. Core & Coil ballasts are not sound rated.

In situations where light output necessitates using a ballast with a sound rating or noise level not normally acceptable, the ballast should be remotely mounted. Note, however, that not all ballasts listed in this catalog are designed or recommended for remote mounting.

Polarity

Polarity refers to the proper connection of ballast lead wires to line wires. To aid you in making a correct installation, Universal ballast leads are color-coded for easy identification. The white or yellow ballast lead is to be connected to the neutral or common. Choose the appropriate ballast voltage lead to connect to the line.

Grounding

Ballasts and capacitors or starters in metallic casings must always be grounded. Ballasts and components may be grounded to the fixture or otherwise connected to ground. It would be hazardous to make contact with an ungrounded fixture, ballast or other

electrical component while in operation.

Operating Line Voltage Limits

To receive the full benefits of rated lamp output and to prolong ballast life, it is essential that the voltage supplied to an installation be maintained within the prescribed limits.

In general, the line voltage supplied to a lag type ballast (reactor or high reactance autotransformer) should be maintained within 5% of the voltage for which the ballast is rated. The line voltage to lead type ballasts (constant wattage autotransformer or constant wattage isolated) should be maintained within 10%.

Subjecting a ballast to excessive voltage for an extended period of time results in the deterioration of the coil insulation. This insulation breakdown will cause early ballast failure.

Low voltage has no damaging effect on the ballast. It could, however, have an adverse effect on lamp performance and starting dependability.

Maintenance

Selecting and installing an adequate and efficient lighting system means nothing if it is not properly maintained. Maintenance must always be considered as part of the life cycle cost of any high intensity discharge lighting installation in order to assure the continued performance of the system as originally specified.

First and foremost in importance is proper lamp maintenance. High intensity discharge lamps do not “burn out” like an incandescent bulb, but rather, undergo changes within the arc tube which prevent the lamp from starting properly, warming up and producing full light output. The beginning of difficulties such as these generally indicates the end of a lamp’s useful life. Also, a dead lamp left in a fixture can be very damaging to the ignitor in systems which utilize them. To overcome this problem, Universal offers automatic shutoff ignitors, which are described in the ignitor section of this catalog.

Application And Operating Information

In difficult locations, group replacement of all the lamps, working or not, is often more economical and convenient than spot replacement. The same, of course, applies to ballasts which might be approaching the end of their life. Only you can decide what is right for your lighting system, but what is important is that you have a maintenance program.

Periodic cleaning of the fixtures' lenses and reflectors is also important in maintaining proper light output. For indoor systems, maintenance of reflective surfaces, such as walls and ceilings, will also help assure proper levels of illumination.

STANDBY LIGHTING AND PACKAGING

Standby Lighting

To provide light during a high intensity discharge lamp's warmup period, or the cool-down period following a power interruption which has extinguished it, incandescent standby lighting can be incorporated. This is accomplished by use of a standby lighting device, or remote, that switches off an incandescent lamp incorporated into the fixture once an arc has been established, or reestablished, in the HID lamp. Generally, standby lighting devices operate on 120 volts, so a tap must be provided on ballasts designed to operate at higher line voltages.

The 120 volt terminal or lead on all Universal dual-, tri-, quad- and multi-volt ballasts can be used as a tap for standby lighting when the ballast is utilized for any of the higher voltages. Many single voltage ballasts are available with a 120 volt tap and are listed throughout the Core & Coil data section. Other single voltage ballasts may be available in this version. Consult our Customer Service Department for availability and price information.

Any connection to the 120 volt tap must be accomplished by means of a slow-blow fuse. This fuse will protect the ballast from abnormal conditions in the standby lamp circuit or its control device. The fuse should be located in the coolest place in the fixture (below 80°C). The recommended fuse amperage and maximum auxiliary lamp wattage are listed in this catalog for each ballast suitable for standby lighting applications.

Be sure to follow the wiring instructions of the standby lighting device manufacturer. All applicable requirements of the National Electrical Code must be met.

Packaging

Standard Pack

Universal's high intensity discharge lamp ballasts are routinely packed in easy-to-handle cartons containing from 1 to 20 units per carton, depending on the size and weight of the ballasts. Consult Customer Service for the number of "units per carton" for shipment with attached mounting brackets, capacitors (for high power factor units), and ignitors (if required). Other ordering criteria may cause packaging to vary.

Tray Pack

For the convenience of large quantity users who request it, Universal ballasts may be packed in trays. The number of units depends upon the size and weight of each ballast. These trays are large corrugated cartons with lids and sides that come off easily. This type of packaging affords Universal customers a savings of time and money on their own production costs. There are fewer cartons to open, break up and dispose of on the assembly line; warehouse handling is reduced and inventory control is easier. There is no additional charge for tray packing.

Individual Cartons

All Distributor Replacement Kits, Weatherproof, Potted Core & Coil and other larger ballasts are packaged in individual cartons.

Individual cartons serve a threefold purpose: as a display carton, a stock package, and a shipping container for the retail market. Individual cartons may be packed in master cartons, depending on weight and size.

Individual carton packaging may be available for other ballasts. Contact our Customer Service Department for availability and cost.

Nomenclature

UNIVERSAL PRECISE™

ABBREVIATIONS

CWA	Constant Wattage Autotransformer
CWI	Constant Wattage Isolated
ISO	Regulated Lag
R-HPF	Reactor—High Power Factor
R-NPF	Reactor—Normal Power Factor
HX-HPF	Lag Type — High Reactance Autotransformer—High Power Factor
HX-NPF	Lag Type — High Reactance Autotransformer—Normal Power Factor

UL Bench Top Rise Temperature Code

To facilitate UL inspection, the UL Bench Top Rise Temperature Code is shown on the Universal Core & Coil Ballast label as 1029X. 1029 is the UL Standard for HID Ballasts, and the X is the temperature code. If a fixture is UL listed for 1029D, then automatically all ballasts with an A, B, C or D temperature classification are acceptable for use within that same fixture.

UL Bench Top Rise Letter Code Temperature Range for Class H (180° C) Ballasts

A <75°C	B 75°C < 80°C	C 80°C < 85°C
D 85°C < 90°C	E 90°C < 95°C	F 95°C < 100°C

		← Field →							
1	2	3	4	5	6	7	8	9	
← Number of Digits →									
1	2 to 4	3	1	1	1	1	3	1	
M	2 0 0 0	M L T	A	C	5	M	0 0 0	C	
Lamp Type (M/P/S/H)	Wattage	Primary Voltage (MLT/ML5/TRI/ 48T/120/277/ 230)	Circuit Type (R/A/I/O/L/M)	Style (C/F/W/E/I/P)	Frame Size (E/3/4/5/X)	Socket Type & Other Oddities (M/D/X/L)	Pack Code (000 TO 999)	Container Type (C/T/I/K)	
Field	Description								
1	(M) Metal Halide, (P) Pulse Start Metal Halide, (S) High Pressure Sodium								
2	35 to 1500 Watts (Varies from two to four digits)								
3	(MLT) Quad, (ML5) Multi-5, (TRI) TriVolt, (48T) 480/120, (120) 120, (277) 277, (230) 230V/50Hz								
4	(R) Reactor, (A) CWA, (I) CWI, (O) IsoReg, (L) High Reactance/Lag, (M) MagLag								
5	(C), C&C, (F) F-Can, (W) Weatherproof, (E) Encased/Potted C&C (I) Indoor Encased								
6	(E) E&I, (3) 3x4, (4) 4-3/4, (5) 5-3/4, (X) Non Core and Coil								
7	(M) Mogul or Medium, (D) Double Ended, (X) Multiple Lamps, (L) Low Loss								
8	Pack Code (000 to 999, per pack code listing)								
9	(C) Carton, (T) Tray, (I) Individual, (K) Kit								

Specifications

TYPICAL SPECIFICATIONS FOR HID BALLASTS

1. Ballasts shall be designed in accordance with all applicable ANSI specifications including ANSI C82.4.
2. The Core & Coil ballast shall be designed with class “H” (180°C) or higher insulation system and vacuum impregnated with a 100% solid based resin.
3. All coils shall be precision wound.
4. Core & Coil ballasts shall be designed to operate at least 180 cycles of 12 hours on and 12 hours off, with the lamp circuit in an open or short-circuited condition and without undue reduction in ballast life.
5. Core & Coil ballast and starter combinations shall be designed to provide a reliable lamp starting down to -40°C for High Pressure Sodium and Pulse Start Metal Halide and -30°C for Metal Halide and Mercury at minimum rated line voltage.
6. Manufacturer shall provide written warranty against defects in workmanship, including replacement, for two years from date of manufacture.

CAPACITORS

1. All capacitors will be provided with a self-contained internal bleeder resistor.
2. All oil-filled capacitors will be housed in corrosion-resistant steel cans and contain .25” quick disconnect terminals.
3. All capacitors will be supplied by ballast manufacturer.

IGNITORS

1. All ignitors will be epoxy-filled with either a plastic or aluminum external housing.
2. The ignitor shall be so designed to provide six months of lamp open circuit operation without failure.

KITS

1. All HID kits shall be precision wound to insure proper insulation.
2. All HID kits shall be pre-wired.
3. All HID kits shall be built with color-coded leads.
4. All HID kits are to be UL and CSA recognized following the guidelines found in UL 1029 and CAN/CSA-22.2 No. 74-92 (part 2 and 3).
5. Universal Model _____ (or approved equal).

Distributor Replacement Kits

Universal's HID distributor replacement kits contain the appropriate core & coil, a properly rated capacitor, and all other components required for ballast replacement. Our kits are the quickest and easiest to install of any on the market, thanks to unique design features like:

- Prewired capacitor and ignitor (if required) to save installation time and reduce wiring errors.
- Color-coded leads to reduce risk of incorrect wiring inside the fixture.
- Features that exceed UL standards, including capacitors that offer trip fault protection.
- Simple installation instructions and troubleshooting tips.
- UPS shippable box.

Our kit offerings include many quad voltage (120, 208, 240, or 277 volt) and 480 volt core & coil ballasts, as well as the new Multi-5 five-voltage ballast. 480 volt ballasts are equipped with a 120 volt tap to accommodate stand by lighting.

Also available for Metal Halide and High Pressure Sodium applications, Universal Lighting's Multi-5™ Ballast-Lamp Replacement Kit. This easy to carry convenient all-in-one kit ensures ballast lamp compatibility.

Distributor replacement kit cartons are packaged in master cartons in quantities from 1 to 6 units. Master carton quantities can be found on Universal's list and distributor price sheets.

Quad, 480 Volt, Multi-5™ and Multi-5™ Uni-Pak™ Distributor Replacement Kits

LampType	Wattage	Voltage	Frame Size	Old Part Number	New Part Number
Metal Halide	175	120/208/240/277	3 x 4	1130-91R-500K	M175MLTAC3M500K
	175	Multi-5	3 x 4	New	M175ML5AC3M500K
	175	Multi-5™ Uni-Pak™	3 x 4	New	M175ML5AC3M555K
	175	480-120	3 x 4	1130-31-500K	M17548TAC3M500K
	250	120/208/240/277	3 x 4	1130-92-500K	M250MLTAC3M500K
	250	Multi-5	3 x 4	New	M250ML5AC3M500K
	250	Multi-5™ Uni-Pak™	3 x 4	New	M250ML5AC3M555K
	250	480-120	3 x 4	1130-32-500K	M25048TAC3M500K
	250	120/208/240/277	4.25 x 4.75	1130-92R-500K	M250MLTAC4M500K
	250	Multi-5	4.25 x 4.75	New	M250ML5AC4M500K
	250	Multi-5™ Uni-Pak™	4.25 x 4.75	New	M250ML5AC4M555K
	250	480-120	4.25 x 4.75	1130-32R-500K	M25048TAC4M500K
	400	120/208/240/277	4.25 x 4.75	1130-93U-500K	M400MLTAC4M500K
	400	120/208/240/277	4.25 x 4.75	1130-93R-500K	M400MLTAC4M500K
	400	Multi-5	4.25 x 4.75	1130-826S-500K	M400ML5AC4M500K
	400	Multi-5™ Uni-Pak™	4.25 x 4.75	New	M400ML5AC4M555K
	400	480-120	4.25 x 4.75	1130-33R-500K	M40048TAC4M500K
	1000	120/208/240/277	4.25 x 5.75	1130-97-500K	M1000MLTAC5M500K
	1000	120/208/240/277	4.25 x 5.75	1130-97R-500K	M1000MLTAC5M500K
	1000	Multi-5	4.25 x 5.75	New	M1000ML5AC5M500K
1000	Multi-5™ Uni-Pak™	4.25 x 5.75	New	M1000ML5AC5M555K	
1000	480-120	4.25 x 5.75	1130-57-500K	M100048TAC5M500K	
1250	120/208/240/277	4.25 x 5.75	New	M1250MLTAC5M500K	
1500	120/208/240/277	4.25 x 5.75	1130-99R-500K	M1500MLTAC5M500K	
1500	480-120	4.25 x 5.75	1130-69R-500K	M150048TAC5M500K	

Distributor Replacement Kits

Quad, 480 Volt, Multi-5™ and Multi-5™ Uni-Pak™ Distributor Replacement Kits

Lamp Type	Wattage	Voltage	Frame Size	Old Part Number	New Part Number
Pulse Start Metal Halide	35	120/208/240/277	3 x 4	New	M35MLTLC3M500K
	50	120/208/240/277	3 x 4	11310-95-500K	M50MLTLC3M500K
	70	120/208/240/277	3 x 4	11310-510-500K	M70MLTLC3M500K
	70	480-120	3 x 4	New	M7048TLC3M500K
	70	120/208/240/277	3 x 4	New	M70MLTLC3D500K
	100	120/208/240/277	3 x 4	11310-90-500K	M100MLTLC3M500K
	100	120/208/240/277	3 x 4	New	M100MLTLC3D500K
	100	480-120	3 x 4	New	M10048TLC3M500K
	150	120/208/240/277	3 x 4	11310-543-500K	M150MLTLC3M500K
	150	120/208/240/277	3 x 4	New	M150MLTAC3M500K
	150	120/208/240/277	3 x 4	New	M150MLTLC3D500K
	150	480-120	3 x 4	New	M15048TLC3M500K
	175	120/208/240/277	3 x 4	New	P175MLTAC3M500K
	175	120/208/240/277	3 x 4	New	P175MLTAC3L500K
	175	Multi-5	3 x 4	New	P175ML5AC3M500K
	175	120/208/240/277	4.25 x 5.75	New	P175MLTAC4L500K
	175	120/208/240/277	4.25 x 5.75	New	P17548TAC4L500K
	200	120/208/240/277	3 x 4	New	P200MLTAC3L500K
	200	Multi-5	3 x 4	New	P200ML5AC3M500K
	200	120/208/240/277	3 x 4	New	P20048TAC3L500K
	250	120/208/240/277	4.25 x 4.75	New	P250MLTAC4L500K
	250	Multi-5	4.25 x 4.75	New	P250ML5AC4M500K
	250	Multi-5	4.25 x 4.75	New	P250ML5AC4L500K
	250	480-120	4.25 x 4.75	New	P25048TAC4L500K
	320	120/208/240/277	4.25 x 4.75	1130-827-500K	P320MLTAC4O500K
	320	Multi-5	4.25 x 4.75	New	P320ML5AC4M500K
	320	Multi-5	4.25 x 4.75	New	P320ML5AC4L500K
	320	480-120	4.25 x 4.75	New	P32048TAC4L500K
	350	120/208/240/277	4.25 x 4.75	1130-622-500K	P350MLTAC4M500K
	350	Multi-5	4.25 x 4.75	New	P350ML5AC4M500K
	350	Multi-5	4.25 x 4.75	New	P350ML5AC4L500K
	350	480-120	4.25 x 4.75	New	P35048TAC4L500K
	400	120/208/240/277	4.25 x 4.75	1130-829-500K	P400MLTAC4L500K
	400	Multi-5	4.25 x 4.75	New	P400ML5AC4L500K
	400	480-120	4.25 x 4.75	New	P40048TAC4L500K
	450	120/208/240/277	4.25 x 4.75	New	P450MLTAC4L500K
	450	Multi-5	4.25 x 4.75	New	P450ML5AC4L500K
	450	480-120	4.25 x 4.75	New	P45048TAC4L500K
	750	120/208/240/277	4.25 x 5.75	New	P750MLTAC5M500K
	750	Multi-5	4.25 x 5.75	New	P750ML5AC5M500K
	750	480-120	4.25 x 5.75	New	P75048TAC5M500K
	875	120/208/240/277	4.25 x 5.75	New	P875MLTAC5M500K
	1000	120/208/240/277	4.25 x 5.75	New	P1000MLTAC5M500K
	1000	Multi-5	4.25 x 5.75	New	P1000ML5AC5M500K

Distributor Replacement Kits

Quad, 480 Volt, Multi-5™ and Multi-5™ Uni-Pak™ Distributor Replacement Kits

Lamp Type	Wattage	Voltage	Frame Size	Old Part Number	New Part Number
H.P.S.	50	120/208/240/277	3 x 4	12310-95-500K	S50MLTLC3M500K
	70	120/208/240/277	3 x 4	12310-153-500K	S70MLTLC3M500K
	70	480-120	3 x 4	12310-148R-500K	S7048TLC3M500K
	100	120/208/240/277	3 x 4	12310-90-500K	S100MLTLC3M500K
	100	480-120	3 x 4	12310-30R-500K	S10048TLC3M500K
	150	120/208/240/277	3 x 4	12310-165-500K	S150MLTLC3M500K
	150	480-120	3 x 4	12310-160S-500K	S15048TLC3M500K
	200	120/208/240/277	4.25 x 4.75	New	S200MLTAC4M500K
	200	480-120	4.25 x 4.75	New	S20048TAC4M500K
	250	Multi-5	4.25 x 4.75	New	S250ML5AC4M500K
	250	120/208/240/277	4.25 x 4.75	1230-92S-500K	S250MLTAC4M500K
	250	480-120	4.25 x 4.75	1230-32S-500K	S25048TAC4M500K
	250	Multi-5™ Uni-Pak™	4.25 x 4.75	New	S250ML5AC4M555K
	400	Multi-5	4.25 x 4.75	New	S400ML5AC4M500K
	400	120/208/240/277	4.25 x 4.75	1230-93U-500K	S400MLTAC4M500K
	400	480-120	4.25 x 4.75	1230-33U-500K	S40048TAC4M500K
	400	Multi-5	4.25 x 5.75	New	S400ML5AC5M500K
	400	120/208/240/277	4.25 x 5.75	1230-93S-500K	S400MLTAC5M500K
	400	480-120	4.25 x 5.75	1230-33S-500K	S40048TAC5M500K
	400	Multi-5™ Uni-Pak™	4.25 x 4.75	New	S400ML5AC4M555K
600	120/208/240/277	4.25 x 5.75	New	S600MLTAC5M500K	
1000	120/208/240/277	4.25 x 5.75	1230-97S-500K	S1000MLTAC5M500K	
1000	Multi-5	4.25 x 5.75	New	S1000ML5AC5M500K	
1000	Multi-5™ Uni-Pak™	4.25 x 5.75	New	S1000ML5AC5M555K	
1000	480-120	4.25 x 5.75	1230-57S-500K	S100048TAC5M500K	

Distributor Replacement Kits



Canadian Tri-Tap Distributor Replacement Kits

LampType	Wattage	Voltage	Frame Size	Old Part Number	New Part Number
Metal Halide	175	120/277/347	3 x 4	1130-605-502K	M175TRIAC30502K
	250	120/277/347	3 x 4	New	M250TRIAC3M502K
	250	120/277/347	4.25 x 4.75	1130-593R-502K	M250TRIAC4M502K
	400	120/277/347	4.25 x 4.75	1130-595R-502K	M400TRIAC4M502K
	1000	120/277/347	4.25 x 5.75	1130-598-502K	M1000TRIAC5M502K
	1500	120/277/347	4.25 x 5.75	1130-599-502K	M1500TRIAC5M502K
Pulse Start Metal Halide	35	120/277/347	3 x 4	New	M35TRILC3M502K
	50	120/277/347	3 x 4	New	M50TRILC3M502K
	70	120/277/347	3 x 4	11310-604-502K	M70TRILC3M502K
	100	120/277/347	3 x 4	11310-584-502K	M100TRILC3M502K
	150	120/277/347	3 x 4	11310-590-502K	M150TRILC3M502K
	175	120/277/347	3 x 4	New	P175TRIAC3M502K
	200	120/277/347	3 x 4	New	P200TRIAC3M502K
	250	120/277/347	4.25 x 4.75	New	P250TRIAC4M502K
	320	120/277/347	4.25 x 4.75	New	P320TRIAC4M502K
	350	120/277/347	4.25 x 4.75	New	P350TRIAC4M502K
	400	120/277/347	4.25 x 4.75	New	P400TRIAC4M502K
	450	120/277/347	4.25 x 4.75	New	P450TRIAC4M502K
H.P.S.	750	120/277/347	4.25 x 5.75	New	P750TRIAC5M502K
	70	120/277/347	3 x 4	12310-579-502K	S70TRILC3M502K
	100	120/277/347	3 x 4	12310-584-502K	S100TRILC3M502K
	150	120/277/347	3 x 4	12310-588-502K	S150TRILC3M502K
	250	120/277/347	4.25 x 4.75	1230-593S-502K	S250TRIAC4M502K
	400	120/277/347	4.25 x 4.75	1230-595U-502K	S400TRIAC4M502K
	400	120/277/347	4.25 x 5.75	1230-595S-502K	S400TRIAC5M502K
	1000	120/277/347	4.25 x 5.75	1230-598S-502K	S1000TRIAC5M502K

HID CORE & COIL BALLASTS

METAL HALIDE

- 60 Hz
- Minimum starting temperature: -30° C
- Normal and High Power Factor models available

MH
175-250
WATT

Input Volts	Catalog* Number	Circuit Type	Watts Input	Max Input Current	Nom Open Circuit Voltage	Fuse Rating	Wir Dia	Ref Dwg	Dimensions		Capacitor				Total Weight (lbs.)	Ignitor		UL Bench Top Rise		
									A	B	µF	Min Volt	Dry Film			Oil Filled			Catalog Number	Max Distance to lamp (ft)
(1) 175 WATT M57, M107 METAL HALIDE LAMP																				
120 or				2.15		5														
277 or	M175TRIAC30	CWA	211	0.95	305	2	17	PC1	2.45	3.8	10	400	1.65	2.83	1.56x2.69	2.69	6.8	n/a	n/a	C
347				0.75		2														
120 or				1.90		5														A
208 or	M175MLTAC3M	CWA	213	1.10	305	3	16	PC1	2.2	3.6	10	400	1.65	2.83	1.56x2.69	2.69	6.1	n/a	n/a	C
240 or				0.95		3														B
277				0.85		2														C
480	M17548TAC3M	CWA	210	0.51	315	2	15	PC1	2.0	3.3	10	400	1.65	2.83	1.56x2.69	2.69	5.6	n/a	n/a	D
(1) 250 WATT M58 METAL HALIDE LAMP - 4" Frame																				
230	M250230AC3M	CWA	282	1.40	285	4	46	PC1	3.0	4.3	18	400	n/a	n/a	1.75	3.1	9.0	n/a	n/a	D
120 or				2.78		8														B
277 or	M250TRIAC3M	CWA	295	1.30	320	3	17	PC1	3.0	4.5	15	400	1.85	3.82	2.01x3.01	2.69	9.0	n/a	n/a	D
347				1.05		3														D
120 or				2.65		8														
208 or	M250MLTAC3M	CWA	297	1.58	315	5	16	PC1	3.0	4.3	15	400	1.85	3.82	2.01x3.01	2.69	9.0	n/a	n/a	D
240 or				1.30		4														
277				1.13		3														
120 or				2.50		8														
208 or				1.50		5														
240 or	M250ML5AC3M	CWA	280	1.25	290	4	25	PC1	3.0	4.3	15	400	1.6	3.82	2.01x3.01	2.69	9.0	n/a	n/a	C
277 or				1.10		3														
480				0.65		2														
347	M250347AC3M	CWA	293	1.05	320	3	42	PC1	3.0	4.5	15	400	1.85	3.82	2.01x3.01	2.69	9.0	n/a	n/a	D
480	M25048TAC3M	CWA	292	0.71	320	2	15	PC1	3.0	4.3	15	400	1.85	3.82	2.01x3.01	2.69	9.0	n/a	n/a	D

³ Capacitors are available as an option for high power factor operation.

See page 5-22 for Reference Drawings and Wiring Diagrams.

- 60 Hz
- Minimum starting temperature: -30° C
- High Power Factor models available
- Feature CWA design

HID CORE & COIL BALLASTS
METAL HALIDE

Input Volts	Catalog* Number	Circuit Type	Watts Input	Max Input Current	Nom Open Circuit Voltage	Fuse Rating	Wir Dia	Dimensions			Capacitor				Total Weight (lbs.)	Ignitor		UL Bench Top Rise		
								Ref Dwg	A	B	µF	Min Volt	Dry Film			Oil Filled			Catalog Number	Max Distance to lamp (ft)
(1) 250 WATT M58 METAL HALIDE LAMP - 4.75" Frame																				
120 or 277 or 347	M250TRIAC4M	CWA	280	3.05 1.25 1.05	305	8 3	17	PC2	1.63	3.63	15	400	1.85	3.82	2.01x3.01	2.69	9.5	n/a	n/a	B
120 or 208 or 240 or 277	M250MLTAC4M	CWA	290	3.05 1.65 1.55 1.25	310	8 5 4 3	16	PC2	1.53	3.53	15	400	1.85	3.82	2.01x3.01	2.69	9.5	n/a	n/a	B
120 or 208 or 240 or 277 or 480	M250ML5AC4M	CWA	282	2.42 1.40 1.20 1.00	300	8 5 3	25	PC2	1.82	3.62	15	360	1.85	3.82	2.01x3.01	2.69	10.8	n/a	n/a	A
480	M25048TAC4M	CWA	284	0.60 0.61	300	2	15	PC2	1.82	3.62	15	360	1.85	3.82	2.01x3.01	2.69	10.8	n/a	n/a	B
(1) 400 WATT M59 METAL HALIDE LAMP																				
120	M400120AC4M	CWA	458	3.94	299	10	28	PC2	2.0	3.86	24	360	1.85	3.82	2.01x3.01	3.12	11.2	n/a	n/a	E
230	M400230AC4M	CWA	448	2.20	300	6	46	PC2	2.13	3.75	28	425	n/a	n/a	2.91	3.88	13.0	n/a	n/a	D
120 or 277 or 347	M400TRIAC4M	CWA	455	4.22 1.67 1.44	297	10 5	17	PC2	2.0	3.9	24	360	1.85	3.82	2.01x3.01	3.12	11.0	n/a	n/a	C
120 or 277 or 347	M400TRIAC40	CWA	455	3.90 1.70 1.35	295	10 5 4	29	PC2	2.15	3.90	24	360	n/a	n/a	1.91x2.91	3.10	10.5	n/a	n/a	D D
120 or 208 or 240 or 277	M400MLTAC4M	CWA	458	3.94 2.20 1.93 1.69	299	10 8 5 5	16	PC2	2.0	3.9	24	360	1.85	3.82	2.01x3.01	3.12	11.2	n/a	n/a	E
120 or 208 or 240 or 277 or 480	M400ML5AC4M	CWA	458	4.00 2.30 1.70 1.00	300	10 8 5	25	PC2	2.0	3.9	24	360	1.85	3.82	2.01x3.01	3.12	11.2	n/a	n/a	E
480	M40048TAC4M	CWA	458	1.00	300	50	15	PC2	2.0	3.9	24	360	1.85	3.82	2.01x3.01	3.12	11.0	n/a	n/a	E

See page 5-22 for Reference Drawings and Wiring Diagrams.

HID CORE & COIL BALLASTS

METAL HALIDE- FEATURING MULTI-5™

- 60 HZ.
- Minimum Starting Temperature: -30° C
- Feature CWA Design

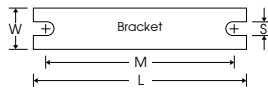
MH
1000-1500
WATT

Input Volts	Catalog* Number	Circuit Type	Watts Input	Max Input Current	Nom Open Circuit Voltage	Fuse Rating	Wir Dia	Dimensions			Capacitor				Total Weight (lbs.)	Ignitor		UL Bench Top Rise		
								Ref Dwg	A	B	µF	Min Volt	Dry Film Dia	Ht		Oil Filled Oval	Ht		Catalog Number	Max Distance to lamp (ft)
(1) 1000 WATT M47 METAL HALIDE LAMP																				
120	M1000120AC5M	CWA	1080	9.00	425	23	28	PC3	2.9	4.75	24	480	n/a	n/a	2.01x3.01	4.0	18.0	n/a	n/a	D
230	M1000230AC5M	CWA	1080	4.70	420	13	46	PC3	3.4	5.30	30	440	n/a	n/a	2.91	3.87	21.0	n/a	n/a	C
120 or				9.00		20														D
277 or	M1000TRIAC5M	CWA	1080	3.90	435	10	17	PC3	3.0	4.95	24	480	n/a	n/a	2.01x3.01	4.0	19.0	n/a	n/a	D
347				3.20		8														E
120 or				8.95		20														
208 or	M1000MLTAC5M	CWA	1080	5.15	425	15	16	PC3	2.9	5.05	24	480	n/a	n/a	2.01x3.01	4.0	22.0	n/a	n/a	D
240 or				4.50		10														
277				3.90		10														
120 or				9.15		20														F
208 or				5.25		15														E
240 or	M1000ML5AC5M	CWA	1080	4.55	420	10	25	PC3	2.9	5.05	24	480	n/a	n/a	2.01x3.01	4.0	22.0	n/a	n/a	E
277 or				3.95		10														E
480				2.30		6														E
480	M100048TAC5M	CWA	1080	2.30	410	6	15	PC3	2.85	4.80	24	480	n/a	n/a	2.01x3.01	4.0	22.0	n/a	n/a	D
(1) 1250 WATT M180 METAL HALIDE LAMP																				
120 or				12.00		30														F
208 or				6.90		20														D
240 or	M1250MLTAC5M	CWA	1360	6.00	420	15	17	PC3	4.4	6.4	32	440	n/a	n/a	1.97x3.66	3.88	25.0	n/a	n/a	D
277				5.20		15														E
(1) 1500 WATT M48 METAL HALIDE LAMP																				
230	M1500230AC5M	CWA	1605	7.00	430	20	46	PC3	4.38	6.18	42(2x21)	480	n/a	n/a	1.96x3.65	3.9	30.0	n/a	n/a	C
120 or				13.70		40														
277 or	M1500TRIAC5M	CWA	1610	6.00	460	20	17	PC3	4.38	6.38	32	525	n/a	n/a	1.96x3.65	3.9	29.5	n/a	n/a	G
347				4.70		15														
120 or				14.30		40														F
208 or	M1500MLTAC5M	CWA	1615	8.30	455	25	48	PC3	4.4	6.4	32	525	n/a	n/a	1.96x3.65	3.9	30.0	n/a	n/a	G
240 or				7.20		20														F
277				6.20		20														E
480	M150048TAC5M	CWA	1620	3.50	445	10	15	PC3	4.4	6.4	32	525	n/a	n/a	1.96x3.65	3.9	30.0	n/a	n/a	E

See page 5-22 for Reference Drawings and Wiring Diagrams.

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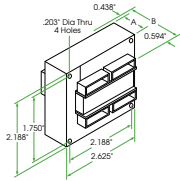
DESCRIPTION	SUFFIX *
For Ballast Only	000
For Bracket Only (see pg. 5-7)	200
For Capacitor Only (see pg. 5-5, 5-6)	500
For Distributor Replacement Kit (see pg. 5-13 thru 5-15)	500K
For Canadian Distributor Replacement Kit (see pg. 5-16)	502K
For Dry-Capacitor & Ballast (see pg. 5-6)	518
For Bracket & Capacitor (see pg. 5-5, 5-7)	700
For Bracket & Dry-Capacitor (see pg. 5-6, 5-7)	718



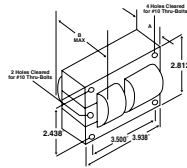
Ref. Dwg.	L	W	M	S
1	4.00"	0.75"	3.35"	0.25"
PC1	5.25"	1.25"	4.60"	0.25"
PC2	7.75"	2.75"	6.10"	0.25"
PC3	7.75"	2.75"	6.10"	0.25"

See p. 5-7 for adjustable mounting brackets and detailed bracket drawings.

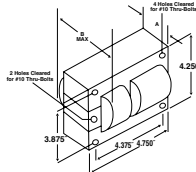
REFERENCE DRAWING 1



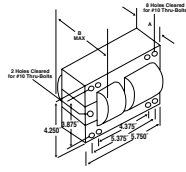
REFERENCE DRAWING PC1



REFERENCE DRAWING PC2

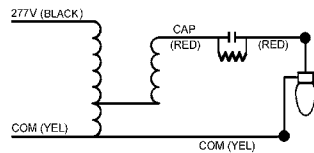


REFERENCE DRAWING PC3

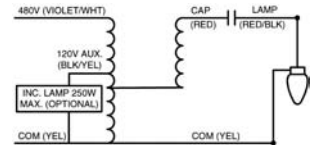


WIRING DIAGRAMS

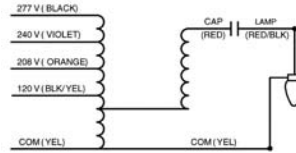
Wiring Diagram 14



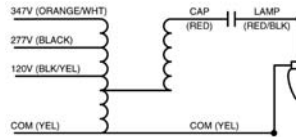
Wiring Diagram 15



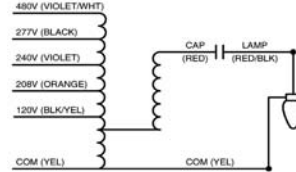
Wiring Diagram 16



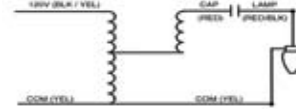
Wiring Diagram 17



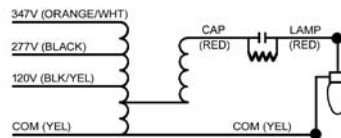
Wiring Diagram 25



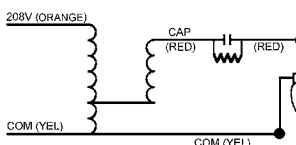
Wiring Diagram 28



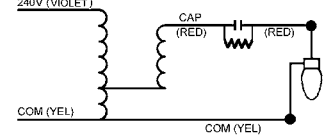
Wiring Diagram 29



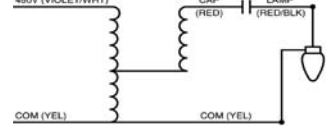
Wiring Diagram 30



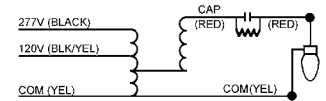
Wiring Diagram 31



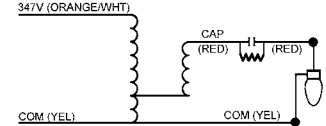
Wiring Diagram 32



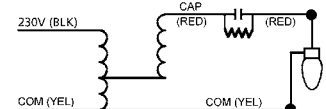
Wiring Diagram 33



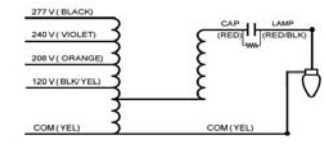
Wiring Diagram 42



Wiring Diagram 46



Wiring Diagram 48



Note: Nominal dimensions provided above
Contact Universal for drawings and/or tolerances

HID CORE & COIL BALLASTS

PULSE START METAL HALIDE

- 60 Hz
- Minimum starting temperature: -30° C
- Normal and High Power Factor models available

**PULSE START
MH
35/39-100 WATT**

Input Volts	Catalog* Number	Circuit Type	Watts Input	Max Input Current	Nom Open Circuit Voltage	Fuse Rating	Wir Dia	Ref Dwg	Dimensions		Capacitor				Total Weight (lbs.)	Ignitor				
									A	B	µF	Min Volt	Dry Film			Oil Filled		Catalog Number	Max Distance to lamp (ft)	UL Bench Top Rise
(1) 35/39 WATT M130 METAL HALIDE LAMP																				
120 or 277 or 347	M35TRILC3M	HX-HPF	54	.84 .40 .30	235	2 1 1	4	PC1	0.85	2.15	5	300	1.26	2.36	1.31x2.16	2.2	1.7	MH100-3A	5	A
120 or 208 or 240 or 277	M35MLTLC3M	HX-HPF 50		.82 .48 .42 .36	230	2 1 1 1	3	PC1	0.85	2.0	5	277	1.26	2.83	1.31x2.16	2.2	1.7	MH100-3A	5	A
(1) 50 WATT M110 METAL HALIDE LAMP — Medium Base																				
120 or 277 or 347	M50TRILC3M	HX-HPF	67	1.30 .61 .48	250	3 2 2	5	PC1	1.05	2.55	6	300	1.26	2.83	1.31x2.16	2.2	4.25	MH100-3A	10	A
120 or 208 or 240 or 277	M50MLTLC3M	HX-HPF 67		1.16 0.67 0.57 0.50	252	3 3 2 2	3	PC1	1.05	2.55	6	300	1.26	2.36	1.31x2.16	2.2	4.25	MH100-3A	10	A
(1) 70 WATT M98 METAL HALIDE LAMP - Medium Base																				
120 or 277 or 347	M70TRILC3M	HX-HPF	91	1.85 0.80 0.65	260	4 2 2	4	PC1	1.5	2.65	8	280	1.65	2.83	1.31x2.16	2.2	5.0	MH100-3A	10	A
120 or 208 or 240 or 277	M70MLTLC3M	HX-HPF 95		1.70 1.04 0.87 0.78	250	4 3 3 2	3	PC1	1.33	2.88	8	300	1.65	2.83	1.31x2.16	2.2	4.25	MH100-3A	10	B
480	M7048TLC3M	HX-HPF	100	0.50	250	1	6	PC1	1.38	2.88	8	300	1.65	2.83	1.31x2.16	2.2	4.25	MH100-3A	10	E
(1) 70 WATT M85 METAL HALIDE LAMP - Double Ended																				
120 or 208 or 240 or 277	M70MLTLC3D	HX-HPF	95	1.70 1.04 0.87 0.78	250	4 3 3 2	3	PC1	1.38	2.88	8	300	1.65	2.83	1.31x2.16	2.2	4.25	MH70-3B	10	B
(1) 100 WATT M90 OR M92 METAL HALIDE LAMP - Medium Base																				
120 or 277 or 347	M100TRILC3M	HX-HPF	125	2.50 1.10 0.90	265	7 3 3	4	PC1	1.6	2.95	12	280	1.65	2.83	1.31x2.16	3.13	5.5	MH100-3A	10	A
120 or 208 or 240 or 277	M100MLTLC3M	HX-HPF 130		2.40 1.45 1.20 1.00	260	5 4 3 3	13	PC1	1.5	2.8	12	300	1.65	2.83	1.31x2.16	3.12	5.0	MH100-3A	10	A
120 or 208 or 240 or 277	M100MLTLC30	HX-HPF	127	2.60 1.55 1.30	260	8 5 4	3	PC1	1.5	2.8	12	280	1.65	2.83	n/a	n/a	5.0	MH100-3A	10	C C B
480	M10048TLC3M	HX-HPF	132	1.15 0.62	285	4 2	6	PC1	1.7	3.0	10	300	1.65	2.83	1.31x2.16	2.7	5.5	MH100-3A	10	B C
(1) 100 WATT M91 METAL HALIDE LAMP - Double Ended																				
120 or 208 or 240 or 277	M100MLTLC3D	HX-HPF	130	2.40 1.45 1.20 1.00	260	5 4 3 3	13	PC1	1.5	2.6	12	300	1.65	2.83	1.31x2.16	3.12	5.0	MH70-3B	10	A

³ Capacitors are available as an option for high power factor operation.

See page 5-29 for Reference Drawings and Wiring Diagrams.

- 60 Hz
- Minimum Starting Temperature: -40° C
- Feature CWA Design

**HID CORE & COIL BALLASTS
PULSE START METAL HALIDE**

Input Volts	Catalog* Number	Circuit Type	Watts Input	Max Input Current	Nom Open Circuit Voltage	Fuse Rating	Wir Dia	Dimensions			Capacitor				Total Weight (lbs.)	Ignitor		UL Bench Top Rise		
								Ref Dwg	A	B	µF	Min Volt	Dry Film			Oil Filled			Catalog Number	Max Distance to lamp (ft)
(1) 150 WATT M102/M142 METAL HALIDE LAMP - Medium Base																				
277	M150277ACEM	RX-NPF RX-HPF	171	0.65	277	4	1	RX1	2.52	3.80	14	280	1.65	2.83	n/a	n/a	4.0	MH100-1A	3	B
120 or 277 or 347	M150TRILC3M	HX-HPF	185	1.48 0.65	245	4 2	5	PC1	2.38	3.65	16	280	1.65	2.83	1.56x2.69	2.69	7.3	MH100-3A	10	D
120 or 208 or 240 or 277	M150MLTLC3M	HX-HPF	185	1.93 1.66 1.48	245	5 5 4	3	PC1	2.38	3.88	16	300	1.65	2.83	1.56x2.69	2.69	7.3	MH100-3A	10	A
120 or 208 or 240 or 277	M150MLTAC3M	CWA	188	1.50 0.90 0.75 0.65	210	4 3 3 2	9	PC1	2.5	3.75	16	330	1.65	3.82	n/a	n/a	7.1	MH150-1A	10	C D C C
480	M15048TLC3M	HX-HPF	185	1.00	260	3	6	PC1	2.3	3.6	16	280	1.65	2.83	1.56x2.69	2.69	7.0	MH100-3A	10	F
(1) 150 WATT M81 METAL HALIDE LAMP - Double Ended																				
120 or 208 or 240 or 277	M150MLTLC3D	HX-HPF	185	1.93 1.66 1.48	245	5 5 4	3	PC1	2.38	3.88	16	277	1.65	2.83	1.56x2.69	2.69	7.3	MH70-3B	10	D
(1) 175 WATT M152 METAL HALIDE PULSE START LAMP																				
277	P175277RCEM	RX-NPF RX-HPF	199	1.50 1.25	277	3	1	RX1	2.3	3.4	12	300	n/a 1.6	n/a 2.8	n/a 1.31x2.16	n/a 3.9	3.9	MH350-1A	10	C
120 or 277 or 347	P175TRIAC3M	CWA	208	1.84 0.79 0.63	308	5 2 2	12	PC1	2.5	3.6	10	400	1.6	2.8	1.31x2.16	3.9	6.8	MH350-1	10	B
120 or 208 or 240 or 277	P175MLTAC3M	CWA	208	2.09 1.26 1.02 0.96	306	5 3 3 2	9	PC1	2.5	3.6	10	400	1.6	2.8	1.31x2.16	3.9	6.8	MH350-1A	10	A
120 or 208 or 240 or 277	P175MLTAC3L	CWA	198	1.95 1.10 1.00 0.80	285	5 3 3 2	9	PC1	3.10	4.20	11	370	1.65	2.83	n/a	n/a	8.5	MH350-1A	2	A
120 or 208 or 240 or 277	P175MLTAC4L	CWA	198	1.70 0.95 0.85 0.75	270	5 3 3 2	9	PC2	1.77	3.3	12.5	330	1.55	2.83	n/a	n/a	8.45	MH350-1A	10	A
120 or 208 or 240 or 277 or 480	P175ML5AC3M	CWA	210	1.80 1.05 0.90 0.80 0.45	295	5 3 3 2 2	26	PC1	2.6	4.0	10	400	1.6	2.8	2.7	2.7	8.0	MH350-1A	10	B
480	P17548TAC3L	CWA	198	0.50	285	2	11	PC1	3.10	4.20	11	360	1.65	2.83	n/a	n/a	8.5	MH350-1A	2	A
480	P17548TAC4L	CWA	198	0.40	275	2	11	PC2	1.80	3.5	12.5	330	1.6	2.8	n/a	n/a	9.6	MH350-1A	10	A
(1) 200 WATT M136 METAL HALIDE PULSE START LAMP																				
277	P200277RCEM	RX-HPF	218	0.92	277	4	1	RX1	1.0	2.8	13	280	1.6	3.6	n/a	n/a	4.7	MH350-1A	10	A
120 or 277 or 347	P200TRIAC3M	CWA	240	2.70 1.04 0.87	310	6 3 3	12	PC1	2.8	4.0	11	400	1.6	2.8	2.7	3.6	8.0	MH350-1A	10	C
120 or 208 or 240 or 277	P200MLTAC3L	CWA	225	2.10 1.85 1.05 0.95	245	7 4 4 3	9	PC1	2.9	4.1	15	330	1.85	3.82	n/a	n/a	9.0	MH100-5A	10	A

HID CORE & COIL BALLASTS

PULSE START METAL HALIDE

- 60 Hz
- Minimum Starting Temperature: -40° C
- CWA and High Power Factor Models Available

**PULSE START
MH
250-320 WATT**

Input Volts	Catalog* Number	Circuit Type	Watts Input	Max Input Current	Nom Open Circuit Voltage	Fuse Rating	Wir Dia	Dimensions			Capacitor				Total Weight (lbs.)	Ignitor		UL Bench Top Rise		
								Ref Dwg	A	B	µF	Min Volt	Dry Film			Oil Filled			Catalog Number	Max Distance to lamp (ft)
(1) 200 WATT M136 METAL HALIDE PULSE START LAMP																				
120 or				2.66		6														
208 or				1.52		4														
240 or	P200ML5AC3M	CWA	233	1.31	303	3	26	PC1	2.7	4.0	11	400	1.6	2.7	n/a	n/a	8.0	MH350-1A	10	C
277 or				1.12		3														
480				0.68		2														
480	P20048TAC3L	CWA	227	0.50	245	2	11	PC1	2.9	4.10	13	330	1.85	3.82	n/a	n/a	9.0	MH100-5A	10	A
(1) 250 WATT M153 METAL HALIDE PULSE START LAMP																				
277	P250277RCEM	RX-NPF RX-HPF	278	2.00 1.25	277	5	1	RX1	1.0	2.8	17.5	300	n/a 1.6	n/a 3.7	n/a n/a	n/a n/a	4.8	MH350-1A	10	A
120 or				2.61		8														
277 or	P250TRIAC4M	CWA	300	1.28	292	3	12	PC2	1.4	3.4	14	400	1.6	3.7	2.3	4.0	9.0	MH350-1A	10	A
347				1.09		3														
120 or				2.40		8														
208 or	P250MLTAC4L	CWA	283	1.40	270	5	9	PC2	2.0	3.9	17	330	1.65	3.82	n/a	n/a	11.0	MH350-1A	10	A
240 or				1.20		5														
277				1.05		3														
120 or				2.45		8														
208 or				1.42		5														
240 or	P250ML5AC4M	CWA	285	1.22	290	5	26	PC2	2.0	3.9	14	400	1.6	3.7	1.56x2.69	3.1	11.3	MH350-1A	10	A
277 or				1.05		3														
480				0.62		2														
120 or				2.5		8														
208 or				1.4		5														
240 or	P250ML5AC4L	CWA	283	1.25	290	5	26	PC2	1.85	3.75	17	330	1.65	3.82	n/a	n/a	10.5	MH350-1A	10	A
277 or				1.05		3														
480				0.60		2														
480	P25048TAC4L	CWA	283	0.60	275	2	11	PC2	1.9	3.6	17	360	1.65	3.82	n/a	n/a	10.0	MH350-1A	10	A
(1) 320 WATT M154 METAL HALIDE PULSE START LAMP																				
277	P320277RCEM	RX-NPF RX-HPF	348	3.05 1.51	277	10 6	1	RX1	1.5	3.3	22.5	280	n/a 1.8	n/a 3.6	n/a n/a	n/a n/a	6.8	MH350-1A	10	A
120 or				4.50		8														
277 or	P320TRIAC4M	CWA	370	2.00	281	4	12	PC2	2.0	3.7	20.5	400	1.6	3.7	2.9	3.6	11.0	MH350-1A	10	C
347				1.50		3														
120 or				3.10		9														
208 or	P320MLTAC40	CWA	364	1.80	275	5	9	PC2	2.0	3.9	21.0	360	1.85	3.82	2.9	3.6	11.0	MH350-1A	10	A
240 or				1.55		5														
277				1.35		4														
120 or				4.00		10														
208 or				2.40		7														
240 or	P320ML5AC4M	CWA	370	2.10	280	5	26	PC2	2.0	3.9	20.5	360	1.8	3.7	1.91x2.91	3.6	11.3	MH350-1A	10	D
277 or				1.85		5														

See page 5-29 for Reference Drawings and Wiring Diagrams.

HID
CORE & COIL

- 60 Hz
- Minimum Starting Temperature: -40° C
- Feature CWA Design

**HID CORE & COIL BALLASTS
PULSE START METAL HALIDE**

Input Volts	Catalog* Number	Circuit Type	Watts Input	Max Input Current	Nom Open Circuit Voltage	Fuse Rating	Wir Dia	Dimensions			Capacitor				Total Weight (lbs.)	Ignitor		UL Bench Top Rise																		
								Ref Dwg	A	B	µF	Min Volt	Dry Film Dia	Ht		Oil Filled Oval	Ht		Catalog Number	Max Distance to lamp (ft)																
(1) 320 WATT M154 METAL HALIDE PULSE START LAMP																																				
120 or 208 or 240 or 277 or 480	P320ML5AC4L	CWA	363	3.10	275	8	26	PC2	1.88	3.8	21	360	n/a	n/a	2.91	3.13	12.0	MH350-1A	10	A																
480				1.80																	7															
480				1.55																	5															
480				1.35																	3															
480				0.80																	3															
480	P32048TAC4L	CWA	364	0.80	280	3	11	PC2	2.0	3.9	21	360	1.85	3.82	n/a	n/a	11.0	MH350-1A	10	A																
120 or 277 or 347				4.00																	10															
277 or 347				2.00																	280															
120 or 208 or 240 or 277				1.50																	3															
120 or 208 or 240 or 277				3.40																	9															
277	P350277RCEM	RX-NPF	377	3.80	277	8	1	RX1	1.5	3.3	22.5	300	—	—	—	—	6.8	MH350-1	10	A																
120 or 277 or 347		RX-HPF	377	2.34									n/a	n/a	1.56x2.69	3.9																				
120 or 277 or 347		CWA	405	2.00									280	5	12	PC2					2.0	4.0	21	400	n/a	n/a	2.9	3.1	11.5	MH350-1A	10	C				
120 or 208 or 240 or 277		P350MLTAC4M	CWA	400									2.00	275	6	9					PC2	2.0	3.9	22	360	n/a	n/a	2.7	3.9	11.0	MH350-1A	10	C			
208 or 240 or 277													1.70																					5		
120 or 208 or 240 or 277	1.45				4																															
120 or 208 or 240 or 277	3.25				9																															
120 or 208 or 240 or 277	1.80				270																															
120 or 208 or 240 or 277	P350MLTAC4O	CWA	397	1.60	270	6	9	PC2	1.92	3.95	22.5	345	1.85	3.82	n/a	n/a	10.0	MH350-1A	10	B																
277				1.40																4	B															
120 or 208 or 240 or 277				4.22																10	C															
120 or 208 or 240 or 277				2.49																7	C															
240 or 277 or 480				2.16																282	5	26	PC2	2.0	3.9	21	400	n/a	n/a	1.91x2.91	3.1	11.3	MH350-1A	10	D	
120 or 208 or 240 or 277 or 480	P350ML5AC4M	CWA	405	1.87	282	5	26	PC2	2.0	3.9	21	400	n/a	n/a	1.91x2.91	3.1	11.3	MH350-1A	10	D																
120 or 208 or 240 or 277 or 480				1.09																	3															
120 or 208 or 240 or 277 or 480				3.35																	9															
120 or 208 or 240 or 277 or 480				1.85																	6															
120 or 208 or 240 or 277 or 480				1.65																	280	5	26	PC2	2.2	4.25	22.5	345	1.85	3.82	n/a	n/a	12	MH350-1A	10	B
120 or 208 or 240 or 277 or 480	P350ML5AC4O	CWA	397	1.40	280	5	26	PC2	2.2	4.25	22.5	345	1.85	3.82	n/a	n/a	12	MH350-1A	10	B																
120 or 208 or 240 or 277 or 480				0.80																	3															
120 or 208 or 240 or 277 or 480				3.35																	10															
120 or 208 or 240 or 277 or 480				1.90																	7															
120 or 208 or 240 or 277 or 480				1.65																	275	9	26	PC2	1.88	3.8	22	360	1.85	3.82	2.69	3.9	12.0	MH350-1A	10	B
120 or 208 or 240 or 277 or 480	P350ML5AC4L	CWA	397	1.45	275	9	26	PC2	1.88	3.8	22	360	1.85	3.82	2.69	3.9	12.0	MH350-1A	10	B																
120 or 208 or 240 or 277 or 480				0.85																	3															
480				0.85																	280	3	11	PC2	2.00	3.95	22.5	345	1.85	3.82	n/a	n/a	11.0	MH350-1A	10	D
480				0.85																	280	3	11	PC2	2.00	3.9	22	360	1.85	3.82	2.69	3.9	11.0	MH350-1A	10	C
480				0.85																	280	3	11	PC2	2.00	3.9	22	360	1.85	3.82	2.69	3.9	11.0	MH350-1A	10	C

**See page 5-29 for Reference
Drawings and Wiring Diagrams.**

HID CORE & COIL BALLASTS

PULSE START METAL HALIDE

- 60 Hz
- Minimum Starting Temperature: -40° C
- CWA and High Power Factor Models Available

**PULSE START
MH
400 WATT**

Input Volts	Catalog* Number	Circuit Type	Watts Input	Max Input Current	Nom Open Circuit Voltage	Fuse Rating	Wir Dia	Dimensions			Capacitor				Total Weight (lbs.)	Ignitor		UL Bench Top Rise				
								Ref Dwg	A	B	µF	Min Volt	Dry Film			Oil Filled			Catalog Number	Max Distance to lamp (ft)		
(1) 400 WATT M135 METAL HALIDE PULSE START LAMP																						
120 or 277 or 347	P400TRIAC4M	CWA	457	4.40	2.01	287	5	12	PC2	2.0	3.8	24	400	1.8	3.6	2.9	3.1	11.0	MH350-1A	10	D	
				1.52																		4
				3.90																		10
120 or 208 or 240 or 277	P400MLTAC4L	CWA	454	2.25	280	7	9	PC2	2.30	4.20	26	330	1.85	3.82	n/a	n/a	11	MH350-1A	10	B	B	
				1.95																		5
				1.70																		5
				4.00																		10
120 or 208 or 240 or 277 or 480	P400ML5AC4M	CWA	457	2.10	286	5	26	PC2	2.0	3.9	24	400	1.8	3.7	1.91x2.91	3.1	11.3	MH350-1A	10	D	D	
				1.85																		5
				1.06																		3
				3.90																		10
				2.25																		7
120 or 208 or 240 or 277 or 480	P400ML5AC4L	CWA	454	1.90	280	5	26	PC2	2.35	4.25	26	330	1.85	3.82	1.91x2.91	3.1	11.3	MH350-1A	10	C	C	
				1.65																		5
				0.95																		3
				3.90																		10
				2.25																		7
480	P40048TAC4L	CWA	454	1.00	285	3	11	PC2	2.35	4.25	26	330	1.85	3.82	n/a	n/a	12.5	MH350-1A	10	D	D	
480	P40048TAC4M	CWA	457	1.00	285	3	11	PC2	2.0	3.9	24	400	1.8	3.6	3.7	3.1	11.3	MH350-1A	10	D	D	

See page 5-29 for Reference Drawings and Wiring Diagrams.

HID
CORE & COIL

**PULSE START
MH
450-1000 WATT**

- 60 Hz
- Minimum Starting Temperature: -40° C
- CWA and High Power Factor Models Available

**HID CORE & COIL BALLASTS
PULSE START METAL HALIDE**

Input Volts	Catalog* Number	Circuit Type	Watts Input	Max Input Current	Nom Open Circuit Voltage	Fuse Rating	Wir Dia	Dimensions			Capacitor				Total Weight (lbs.)	Ignitor		UL Bench Top Rise		
								Ref Dwg	A	B	µF	Min Volt	Dry Film Dia	Ht		Oil Filled Oval	Ht		Catalog Number	Max Distance to lamp (ft)
(1) 450 WATT M144 METAL HALIDE PULSE START LAMP																				
120 or	P450MLTAC4L	CWA	508	4.35	280	10	9	PC2	2.25	4.0	26.5	400	1.85	4.76	2.9	3.5	13.0	MH350-1A	10	B
208 or				2.55		8														C
240 or				2.15		7														C
277				1.90		5														C
120 or	P450ML5AC4L	CWA	508	4.10	280	10	26	PC2	2.65	4.55	26.5	360	1.85	4.76	1.91x2.91	3.9	15.5	MH350-1	10	C
208 or				2.35		8														B
240 or				2.05		7														C
277 or				1.85		5														C
480	P45048TAC4L	CWA	511	1.05	277	4	11	PC2	2.40	4.25	26.5	360	1.85	4.76	2.9	3.5	14.5	MH350-1A	10	B
480				1.40		3														D
(1) 750 WATT M149 METAL HALIDE PULSE START LAMP																				
120 or	P750TRIAC5M	CWA	820	7.05	340	15	12	PC3	2.8	4.6	28	425	n/a	n/a	2.91	3.9	18.0	P750-1B	10	B
277 or				3.05		8														C
347				2.45		8														C
120 or	P750MLTAC5M	CWA	825	7.10	340	18	9	PC3	2.8	4.8	28	400	n/a	n/a	2.91	3.9	18.0	P750-1B	10	D
208 or				4.10		10														A
240 or				3.55		10														B
277				3.10		8														B
120 or	P750ML5AC5M	CWA	820	6.95	340	18	26	PC3	2.8	4.9	28	400	n/a	n/a	2.9	3.9	19.0	P750-1B	16	C
208 or				4.00		10														C
240 or				3.50		10														D
277 or				3.00		8														D
480	P75048TAC5M	CWA	822	1.75	335	5	11	PC3	2.8	4.8	28	400	n/a	n/a	2.91	3.9	18.0	P750-1B	10	C
480				1.80		5														D
(1) 875 WATT M166 METAL HALIDE PULSE START LAMP																				
120 or	P875MLTAC5M	CWA	945	8.50	395	20	9	PC3	2.8	4.5	24	440	n/a	n/a	2.9	3.9	17.5	HPS1000-48	10	D
208 or				5.30		15														C
240 or				4.30		10														A
277				3.80		10														C
(1) 1000 WATT M141 METAL HALIDE PULSE START LAMP																				
120 or	P1000MLTAC5M	CWA	1080	9.00	420	20	9	PC3	2.9	5.1	24	480	n/a	n/a	2.9	3.9	22.0	HPS1000-4B	20	D
208 or				5.20		15														
240 or				4.50		10														
277				3.90		10														
120 or	P1000ML5AC5M	CWA	1080	8.95	420	20	26	PC3	2.9	5.1	24	480	n/a	n/a	2.9	3.9	22.0	HPS1000-4B	20	G
208 or				5.15		15														B
240 or				4.45		10														C
277 or				3.85		10														C
480	P100048TAC5M	CWA	1080	2.25	410	10	11	PC3	2.8	4.8	24	480	n/a	n/a	2.9	3.9	22.0	HPS1000-4B	15	C
480				2.55		10														D

See page 5-29 for Reference Drawings and Wiring Diagrams.

HID
CORE & COIL

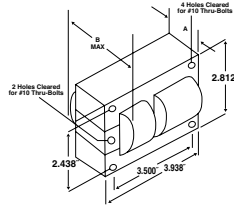
HID CORE & COIL BALLASTS

PULSE START METAL HALIDE

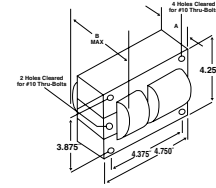
PULSE START
MH

DESCRIPTION	SUFFIX *
For Ballast Only	000
For Bracket Only (see pg. 5-7)	200
For Capacitor Only (see pg. 5-5, 5-6)	500
For Distributor Replacement Kit (see pg. 5-13 thru 5-15)	500K
For Canadian Distributor Replacement Kit (see pg. 5-16)	502K
For Dry-Capacitor & Ballast (see pg. 5-6)	518
For Bracket & Capacitor (see pg. 5-5, 5-7)	700
For Bracket & Dry-Capacitor (see pg. 5-6, 5-7)	718

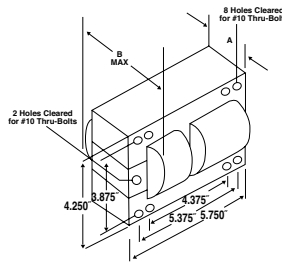
REFERENCE DRAWING PC1



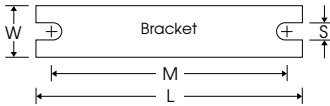
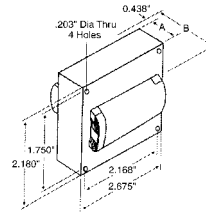
REFERENCE DRAWING PC2



REFERENCE DRAWING PC3



REFERENCE DRAWING RX1

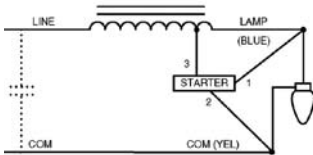


Ref. Dwg.	L	W	M	S
PC1	5.25"	1.25"	4.60"	0.25"
PC2	7.75"	1.25"	5.75"	0.25"
PC3	7.75"	2.75"	6.10"	0.25"
RX1	4.00"	0.75"	3.35"	0.25"

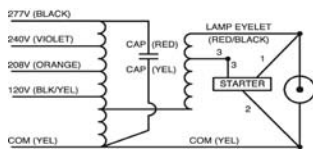
See p. 5-7 for adjustable mounting brackets and detailed bracket drawings.

WIRING DIAGRAMS

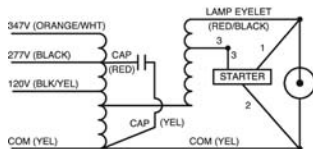
Wiring Diagram 1



Wiring Diagram 3

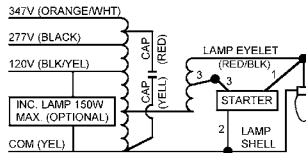


Wiring Diagram 4

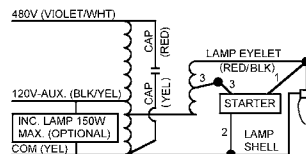


Note: Nominal dimensions provided above
Contact Universal for drawings and/or tolerances

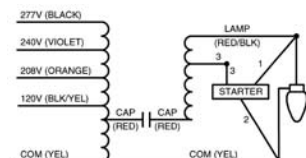
Wiring Diagram 5



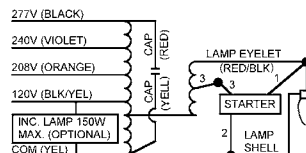
Wiring Diagram 6



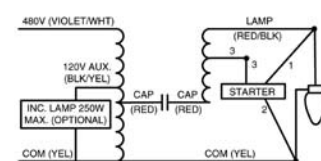
Wiring Diagram 9



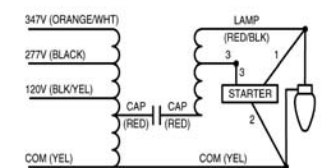
Wiring Diagram 13



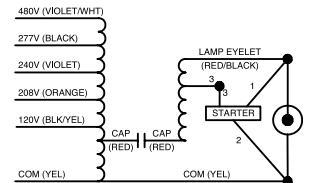
Wiring Diagram 11



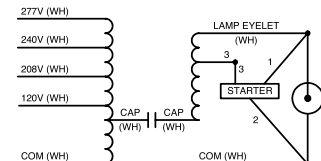
Wiring Diagram 12



Wiring Diagram 26



Wiring Diagram 47



HID
CORE & COIL

- 60 Hz
- Minimum Starting Temperature: -40° C
- Normal and High Power Factor Models

HID CORE & COIL BALLASTS
HIGH PRESSURE SODIUM

Input Volts	Catalog* Number	Circuit Type	Watts Input	Max Input Current	Nom Open Circuit Voltage	Fuse Rating	Wir Dia	Dimensions			Capacitor				Total Weight (lbs.)	Ignitor		UL Bench Top Rise		
								Ref Dwg	A	B	Min Volt	Dry Film		Oil Filled		Catalog Number	Max Distance to lamp (ft)			
											µF	Di	Ht	Oval	Ht					
(1) 35 WATT S76 HIGH PRESSURE SODIUM LAMP																				
120 ¹	1233-251W*	R-HPF ³	43	0.65	120	2	2	1a	0.6	1.7	14	120	n/a	n/a	1.56x2.69	2.7	1.5	HPS150-3A	3	A
																		Permanently Attached		
120	S35120RCEM	RX-NPF RX-HPF	44	0.85 0.63	120	2 3	1	5	0.6	1.7	14	240	—	—	1.9	2.3	1.0	HPS150-3A	10	A
(1) 50 WATT S68 HIGH PRESSURE SODIUM LAMP																				
120 ¹	1233-35W*	R-HPF ³	60	0.90	120	5	2	1a	0.9	2.4	20	240	n/a	n/a	1.56x2.69	3.1	2.0	HPS150-3A	3	A
																		Permanently Attached		
120	S50120RCEM	RX-NPF RX-HPF	60	1.12 0.90	120	8 5	1	5	0.8	2.0	20	240	—	—	1.9	2.3	2.0	HPS150-3A	3	A
120 or 208 or 240 or 277	S50MLTLC3M	HX-HPF	66	1.24 0.60 0.52 0.45	130	5 3 3 2	3	PC1	1.3	2.7	5	300	1.2	2.2	2.2	2.2	4.1	HPS150-3A	5	A
(1) 70 WATT S62 HIGH PRESSURE SODIUM LAMP																				
120	1233-142W*	R-HPF	83	1.30	120	5	2	1a	1.3	2.8	2.8	120	1.6	2.7	n/a	n/a	2.5	HPS150-3A	3	A
																		Permanently Attached		
120	S70120RCEM	RX-NPF RX-HPF	80	1.60 1.30	120	8 4	1	RX1	1.1	2.8	28	240	n/a	n/a	1.3	2.7	2.0	HPS150-3A	3	A
230	S70230LC3M	HX-HPF	88	1.00	120	2	35	PC1	1.9	3.2	10	280	1.6	2.7	1.3	2.7	5.7	HPS150-3A	3	A
120 or 277	S7027TLC3M	HX-HPF	98	1.50 0.65	120	5 2	36	PC1	1.3	2.8	7	300	n/a	n/a	1.3	2.2	4.1	HPS150-3A	10	B
120 or 277 or 347	S70TRILC3M	HX-HPF	94	1.50 0.65 0.50	120	5 2 2	4	PC1	2.0	3.5	7	300	1.2	2.7	1.31x2.16	2.2	4.2	HPS150-3A	10	B
120 or 208 or 240 or 277	S70MLTLC3M	HX-HPF	98	1.50 0.88 0.75 0.65	120	5 3 3 2	3	PC1	1.3	2.8	7	300	1.2	2.8	1.31x2.16	2.2	4.2	HPS150-3A	10	B
480	S7048TLC3M	HX-HPF	94	0.34	120	2	6	PC1	1.8	2.9	7	300	1.2	2.8	1.3	2.2	5.6	HPS150-3A	10	A
(1) 100 WATT S54 HIGH PRESSURE SODIUM LAMP																				
120 ¹	1233-10W*	R-HPF ³	117	1.80	120	8	2	1a	1.5	2.9	40	240	1.6	3.6	1.87	2.9	2.8	HPS150-3A	3	A
																		Permanently Attached		
120	S100120RCEM	RX-NPF RX-HPF	115 112	2.24 1.81	120	10 8	1	5	1.50	2.8	40	240	—	—	1.8	2.7	2.0	HPS150-3A	10	A
120 or 277	S10027TLC3M	HX-HPF	122	2.20 0.95	120	3 2	36	PC1	2.0	3.4	10	330	1.6	2.7	1.3	2.7	5.9	HPS150-3A	10	B
120 or 277 or 347	S100TRILC3M	HX-HPF	130	2.20 0.95 0.69	120	8 3 2	5	PC1	2.0	3.5	10	330	1.2	2.7	1.31x2.16	2.7	5.9	HPS150-3A	10	B
120 or 208 or 240 or 277	S100MLTLC3M	HX-HPF	122	2.20 1.30 1.10 0.95	120	8 5 5 3	3	PC1	2.0	3.4	10	330	1.2	2.7	2.2	2.7	6.0	HPS150-3A	10	B
480	S10048TLC3M	HX-HPF	135	0.57	120	2	6	PC1	2.0	3.3	10	277	1.6	2.8	1.3	2.2	6.2	HPS150-3A	5	E

¹ Also can be used on a 277 volt line in conjunction with the step down transformers

³ Capacitors are available as an option for High Power Factor operation

* Ballast has built-in starter.

See pages 5-34 and 5-35 for Reference Drawings and Wiring Diagrams.

HID CORE & COIL BALLASTS

HIGH PRESSURE SODIUM

- 60 Hz
- Minimum Starting Temperature: -40° C
- CWA, Normal and High Power Factor Models

HPS
150-250
WATT

Input Volts	Catalog* Number	Circuit Type	Watts Input	Max Input Current	Nom Open Circuit Voltage	Fuse Rating	Wir Dia	Dimensions			Capacitor				Total Weight (lbs.)	Ignitor		UL Bench Top Rise		
								Ref Dwg	A	B	µF	Min Volt	Dry Film			Oil Filled			Catalog Number	Max Distance to lamp (ft)
(1) 150 WATT S55 HIGH PRESSURE SODIUM LAMP																				
120 ¹	I233-154W*	R-HPF ³	171	2.40	120	8	2	1a	2.0	3.4	52	240	1.8	3.0	2.12	2.9	3.5	HPS150-3A	3	A
Permanently Attached																				
120	S150120RCEM	RX-NPF RX-HPF	168	4.40 2.35	120	5	1	5	2.0	3.1	15	240	n/a	n/a	2.0	2.9	3.3	HPS150-3A	3	A
120 or 277	S15027TLC3M	HX-HPF	295	1.90 0.80	185	10 5	36	PC1	2.5	3.9	14	280	n/a	n/a	2.7	2.7	7.0	HPS150-3A	10	B A
120 or 277 or 347	S150TRILC3M	HX-HPF	188	3.00 1.35 1.00	120	10 5 4	5	PC1	2.3	3.7	14	300	1.6	2.8	1.56x2.69	2.7	7.0	HPS150-3A	10	B C B
120 or 208 or 240 or 277	S150MLTLC3M	HX-HPF	188	1.90 1.00 0.95 0.80	120	10 5 5 5	3	PC1	2.5	3.9	14	280	1.6	2.8	2.7	2.7	7.0	HPS150-3A	10	B A B A
480	S15048TLC3M	HX-HPF	189	0.72	120	3	6	PC1	3.0	4.5	14	277	1.6	2.7	1.56x2.69	2.7	8.7	HPS150-3A	10	D
(1) 200 WATT S66 HIGH PRESSURE SODIUM LAMP																				
120	S200TRIAC4M	CWA	233	2.00	184	7	12	PC2	1.4	3.3	28	280	n/a	n/a	1.91x2.91	3.1	8.7	HPS400-3A	10	C
277				0.86		3														
347				0.68		3														
120 or 208 or 240 or 277	S200MLTAC4M	CWA	230	2.10	175	7	9	PC2	1.2	3.0	28	300	1.8	3.7	1.91X2.91	3.1	8.5	HPS400-3A	10	B
120 or				1.20		4														
240 or				1.00		4														
277	0.88	3																		
480	S20048TAC4M	CWA	240	0.56	172	2	34	PC2	2.0	3.8	28	280	1.6	4.6	1.7	3.1	11.0	HPS400-3A	10	C
(1) 250 WATT S50 HIGH PRESSURE SODIUM LAMP																				
120	S250120AC4M	CWA	295	2.50	185	8	38	PC2	1.8	3.7	35	330	n/a	n/a	1.8	3.1	10.3	HPS400-3A	10	A
230	S250230AC4M	CWA	280	1.24	188	5	39	PC2	1.7	3.6	40	300	n/a	n/a	1.8	3.9	10.3	HPS400-3A	3	B
240	S250240AC4M	CWA	295	1.20	185	4	40	PC2	1.8	3.7	35	330	n/a	n/a	1.8	3.1	10.3	HPS400-3A	10	A
120 or 277 or 347	S250TRIAC4M	CWA	300	2.50	190	8	12	PC2	1.7	3.8	35	330	1.6	3.7	1.91x2.91	3.1	10.3	HPS400-3A	10	C
277 or				1.20		4														
347				1.00		3														
120 or 208 or 240 or 277	S250MLTAC4M	CWA	295	2.50	190	8	9	PC2	1.8	3.7	35	330	1.6	3.7	1.91x2.91	3.1	10.3	HPS400-3A	10	A
120 or				1.40		5														
240 or				1.20		4														
277	1.10	4																		
120 or 208 or 240 or 277 or 480	S250ML5AC4M	CWA	300	2.50	200	8	26	PC2	2.0	3.8	35	330	1.6	3.7	1.91x2.91	3.1	14.0	HPS400-3A	10	A
120 or				1.40		5														
208 or				1.20		4														
240 or				1.10		4														
277 or				0.60		2														
480	S25048TAC4M	CWA	285	0.62	200	2	11	PC2	1.8	3.7	35	280	1.6	3.7	1.91x2.91	3.1	10.4	HPS400-3A	5	A

* Ballast has built-in starter.

* Also can be used on a 277 volt line in conjunction with the step-down transformers described on page 5-53.

³ Capacitors are available as an option for high power factor operation.

See pages 5-34 and 5-35 for Reference Drawings and Wiring Diagrams.

HID
CORE & COIL

- 60 Hz
- Minimum Starting Temperature: -40° C
- CWA, Normal and High Power Factors Models Available

HID CORE & COIL BALLASTS
HIGH PRESSURE SODIUM-
FEATURING MULTI-5™

Input Volts	Catalog* Number	Circuit Type	Watts Input	Max Input Current	Nom Open Circuit Voltage	Fuse Rating	Wir Dia	Dimensions			Capacitor				Total Weight (lbs.)	Ignitor		UL Bench Top Rise		
								Ref Dwg	A	B	µF	Min Volt	Dry Film			Oil Filled			Catalog Number	Max Distance to lamp (ft)
(1) 400 WATT S51 HIGH PRESSURE SODIUM LAMP - 4 3/8" Frame																				
230	S400230AC4M	CWA	465	2.05	190	8	39	PC2	2.5	4.3	64	300	n/a	n/a	1.8	3.2	15.5	HPS400-3A	10	D
120 or				3.95		10														
277 or	S400TRIAC4M	CWA	465	1.70	192	5	12	PC2	2.32	4.1	55	240	1.8	3.7	1.91x2.91	3.5	14.0	HPS400-3A	10	D
347				1.35		4														
120 or				3.80		10														
208 or	S400MLTAC4M	CWA	463	2.20	190	6	9	PC2	2.32	4.1	55	240	1.8	3.7	1.91x2.91	3.5	14.0	HPS400-3A	10	D
240 or				1.80		5														
277				1.70		5														
120 or				3.95		10														
208 or				2.30		6														
240 or	S400ML5AC4M	CWA	465	2.00	190	5	26	PC2	2.44	4.3	55	240	1.8	3.7	1.91x2.91	3.5	14.0	HPS400-3A	10	D
277 or				1.70		5														
480				1.00		3														
480	S40048TAC4M	CWA	464	1.00	190	3	11	PC2	2.32	4.1	55	240	1.8	3.7	1.91x2.91	3.5	14.0	HPS400-3A	10	D
(1) 400 WATT S51 HIGH PRESSURE SODIUM LAMP - 5 3/8" Frame																				
120 or				3.90		10														
277 or	S400TRIAC5M	CWA	467	1.70	200	5	12	PC2	2.2	4.1	48	280	2.0	4.7	1.91x2.91	3.9	16.0	HPS400-3A	10	E
347				1.35		4														
120 or				3.95		10														
208 or	S400MLTAC5M	CWA	470	2.30	200	6	9	PC3	2.25	4.1	48	280	2.0	4.7	1.91x2.91	3.9	16.0	HPS400-3A	10	D
240 or				2.00		5														
277				1.70		5														
120 or				4.00		10														
208 or				2.30		6														
240 or	S400ML5AC5M	CWA	468	2.00	200	5	26	PC3	2.5	4.5	48	300	2.0	4.7	1.91x2.91	3.9	17.5	HPS400-3A	10	D
277 or				1.75		5														
480				1.00		3														
480	S40048TAC5M	CWA	467	1.00	200	3	11	PC3	2.25	4.1	48	280	2.0	4.7	1.91x2.91	3.9	16.0	HPS400-3A	10	D
(1) 430 WATT SON AGRO HIGH PRESSURE SODIUM LAMP																				
120 or				4.50		10														
208 or	S430MLTAC4M	CWA	490	2.50	205	8	9	PC2	2.2	4.3	48	330	2.0	4.7	1.91x2.91	3.9	11.0	HPS400-3A	10	D
240 or				2.10		7														
277				1.80		5														

³ Capacitors are available as an option for high power factor operation.

See pages 5-34 and 5-35 for Reference Drawings and Wiring Diagrams.

HID CORE & COIL BALLASTS

HIGH PRESSURE SODIUM

- 60 Hz
- Minimum starting temperature: -40° C
- CWA models available

HPS
600-1000
WATT

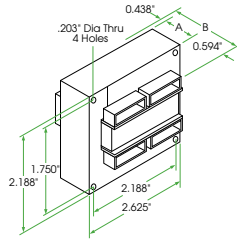
Input Volts	Catalog* Number	Circuit Type	Watts Input	Max Input Current	Nom Open Circuit Voltage	Fuse Rating	Wir Dia	Dimensions			Capacitor				Total Weight (lbs.)	Ignitor		UL Bench Top Rise			
								Ref Dwg	A	B	µF	Min Volt	Dry Film			Oil Filled			Catalog Number	Max Distance to lamp (ft)	
(1) 600 WATT S106 HIGH PRESSURE SODIUM LAMP																					
120 or	S600MLTAC5M	CWA	640	5.10	240	20	9	PC3	3.0	5.0	55	300	1.8	4.7	1.91x2.91	3.9	21.0	HPS600-1B	10	A	
208 or				3.10																	15
240 or				2.70																	10
277				2.35																	10
(1) 1000 WATT S52 HIGH PRESSURE SODIUM LAMP																					
220 or	S1000230AC5M	CWA	1100	5.15	405	15	39	PC3	4.0	5.8	36	540	n/a	n/a	3.66	4.25	25.5	HPS1000-4B	10	D	
230 or				5.00																	15
240				4.80		15															
120 or	S100024TAC5M	CWA	1100	9.50	440	20	40	PC3	3.7	5.7	26	525	n/a	n/a	1.8	4.3	26.0	HPS1000-4B	10	C	
240				4.80																	10
120 or	S1000TRIAC5M	CWA	1100	9.60	440	20	12	PC3	3.8	5.8	26	525	n/a	n/a	1.9	2.9	27.0	HPS1000-4B	15	D	
277 or				4.30																	10
347				3.40																	10
120 or	S1000MLTAC5M	CWA	1100	9.50	440	20	9	PC3	3.7	5.7	26	525	n/a	n/a	1.91x2.91	4.3	26.0	HPS1000-4B	15	C	
208 or				5.50																	15
240 or				4.80																	10
277				4.20																	10
120 or	S1000ML5AC5M	CWA	1048	9.10	440	20	26	PC3	3.7	5.6	26	480	n/a	n/a	1.91x2.91	4.3	26.0	HPS1000-4B	15	D	
208 or				5.40																	15
240 or				4.60																	10
277 or				4.10																	10
480				2.45																	8
480	S1000480AC5M	CWA	1100	2.45	440	8	11	PC3	3.7	6.0	26	500	n/a	n/a	1.8	4.3	25.0	HPS1000-4B	15	D	
480	S100048TAC5M	CWA	1100	2.45	440	8	11	PC3	3.7	6.0	26	525	n/a	n/a	1.91x2.91	4.3	25.0	HPS1000-4B	15	D	

See pages 5-34 and 5-35 for Reference Drawings and Wiring Diagrams.

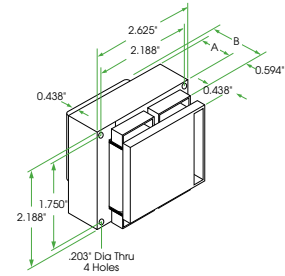
HID
CORE & COIL

DESCRIPTION	SUFFIX *
For Ballast Only	000
For Bracket Only (see pg. 5-7)	200
For Capacitor Only (see pg. 5-5, 5-6)	500
For Distributor Replacement Kit (see pg. 5-13 thru 5-15)	500K
For Canadian Distributor Replacement Kit (see pg. 5-16)	502K
For Dry-Capacitor & Ballast (see pg. 5-6)	518
For Bracket & Capacitor (see pg. 5-5, 5-7)	700
For Bracket & Dry-Capacitor (see pg. 5-6, 5-7)	718

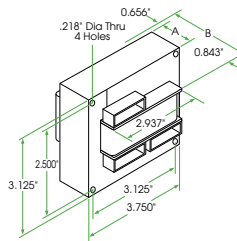
REFERENCE DRAWING 1



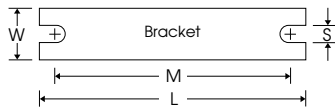
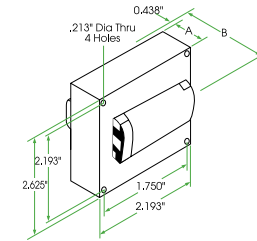
REFERENCE DRAWING 1a



REFERENCE DRAWING 4



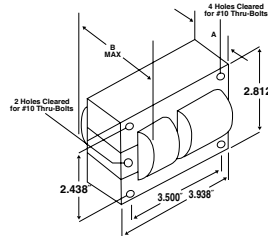
REFERENCE DRAWING 5



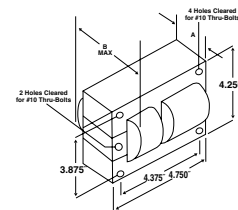
Ref. Dwg.	L	W	M	S
1, 1a, 5	4.00"	0.75"	3.35"	0.25"
PC1, 4	5.25"	1.25"	4.60"	0.25"
PC2, PC3	7.75"	1.25"	5.75"	0.25"

See p. 5-7 for adjustable mounting brackets and detailed bracket drawings.

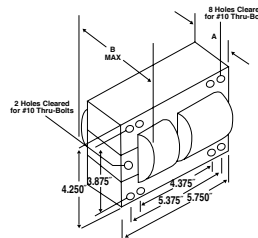
REFERENCE DRAWING PC1



REFERENCE DRAWING PC2



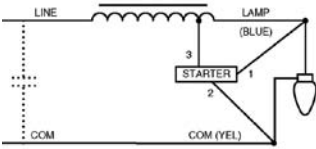
REFERENCE DRAWING PC3



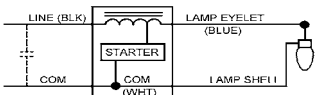
Note: Nominal dimensions provided above
Contact Universal for drawings and/or tolerances

WIRING DIAGRAMS

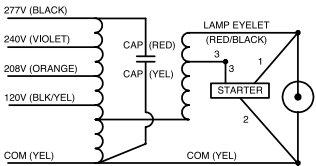
Wiring Diagram 1



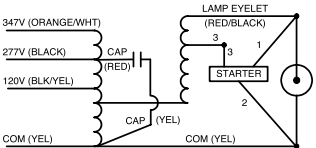
Wiring Diagram 2



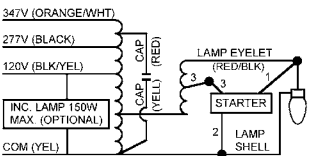
Wiring Diagram 3



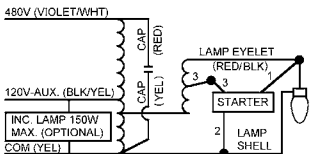
Wiring Diagram 4



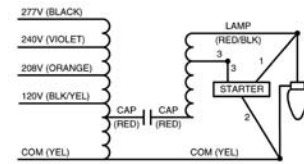
Wiring Diagram 5



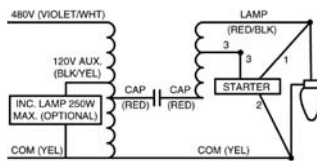
Wiring Diagram 6



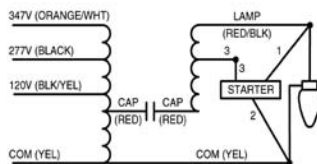
Wiring Diagram 9



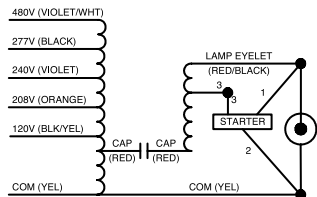
Wiring Diagram 11



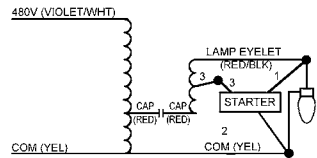
Wiring Diagram 12



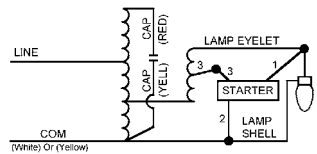
Wiring Diagram 26



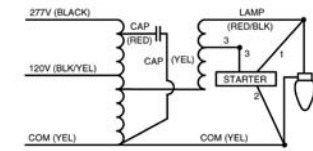
Wiring Diagram 34



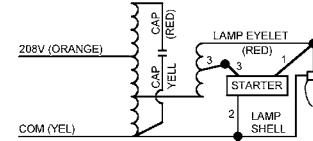
Wiring Diagram 35



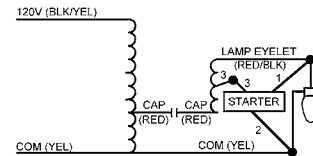
Wiring Diagram 36



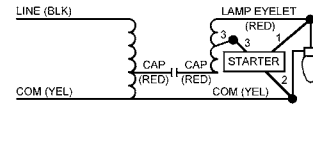
Wiring Diagram 37



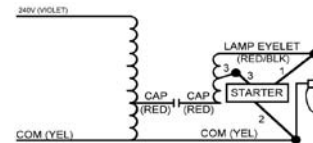
Wiring Diagram 38



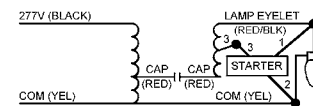
Wiring Diagram 39



Wiring Diagram 40



Wiring Diagram 41



- 50 Hz
- Minimum Starting Temperature: -40° C
- CWA, Normal and High Power factor models available

HID CORE & COIL BALLASTS 50 HERTZ

Input Volts	Catalog* Number	Circuit Type	Input Watts	Max Input Curr.	Nom Open Circuit Volt.	Fuse Rating	Wir Dia	Dimensions			Capacitor				Total Wt. (lbs.)	Ignitor		UL Bench Top Rise		
								Ref Dwg	A	B	µF	Min Volt	Dry Film			Oil Filled			Catalog Number	Max Dist. lamp
													Dia	Ht	Oval	Ht				
(1) 175 WATT M57 METAL HALIDE LAMP																				
230	M175230AC3M	CWA	205	1.17	312	2	14	PC1	2.25	3.55	12	400	1.56	3.74	1.5	3.13	6.7	n/a	n/a	C
(1) 250 WATT M58 METAL HALIDE LAMP																				
230	M250230AC3M	CWA	282	1.55	285	3	14	PC1	3.0	4.3	18	400	n/a	n/a	2.01x3.01	3.1	9.0	n/a	n/a	D
(1) 400 WATT M59 METAL HALIDE LAMP																				
230	M400230AC4M	CWA	435	2.44	300	5	14	PC2	2.13	3.73	28	425	n/a	n/a	1.91x2.91	3.9	13.0	n/a	n/a	D
(1) 1000 WATT M47 METAL HALIDE LAMP																				
230	M1000230AC5M	CWA	1080	5.33	405	15	14	PC3	3.44	5.24	30	440	n/a	n/a	2.01x3.01	3.9	24.0	n/a	n/a	C
(1) 1500 WATT M48 METAL HALIDE LAMP																				
230	M1500230AC5M	CWA	1605	7.29	430	20	14	PC3	4.38	6.18	42(2x21)	480	n/a	n/a	1.97x3.66	3.9	30	n/a	n/a	C
(1) 200 WATT S66 HIGH PRESSURE SODIUM LAMP																				
240	1238-183S	R-NPF R-HPF	225	2.90 2.06	240	8 3	1	4	1.5	3.0	—	—	—	—	—	—	5.4	HPS460-1B	10	D
(1) 250 WATT S50 HIGH PRESSURE SODIUM LAMP																				
230	1238-133S	R-NPF R-HPF	278	3.60 2.50	230	10 5	1	4	2.0	3.5	—	—	—	—	—	—	7.1	HPS460-1B	10	A
230	S250230AC4M	CWA	280	1.38	188	5	8	PC2	1.78	3.58	40	300	n/a	n/a	2.01x3.01	3.9	10.3	HPS400-3A	3	B
(1) 400 WATT S51 HIGH PRESSURE SODIUM LAMP (continued)																				
230	S400230AC4M	CWA	465	2.26	190	8	10	PC2	2.5	4.3	64	300	n/a	n/a	1.91x2.91	3.1	15.5	HPS400-3A	3	D
(1) 1000 WATT S52 HIGH PRESSURE SODIUM LAMP																				
230	S1000230AC5M	CWA	1100	5.44	405	15	39	PC3	4.0	5.8	36	540	n/a	n/a	1.96x3.65	4.25	25.5	HPS1000-4B	10	D

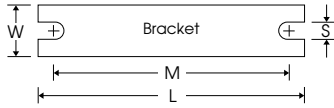
See page 5-37 for Reference Drawings and Wiring Diagrams.

HID CORE & COIL BALLASTS

50 HERTZ

50 HZ

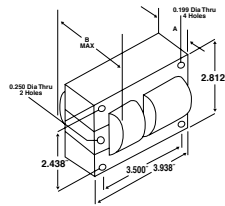
DESCRIPTION	SUFFIX *
For Ballast Only	000
For Capacitor Only (see pg. 5-5, 5-6)	500



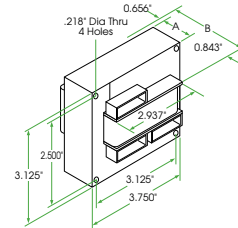
Ref. Dwg.	L	W	M	S
1	4.00"	0.75"	3.60"	0.25"
2, 3, 4	5.25"	1.75"	4.60"	0.25"
PC1	5.25"	1.25"	4.60"	0.25"
PC2	7.75"	1.25"	5.75"	0.25"
PC3	7.75"	2.75"	6.10"	0.25"

See p. 5-8 for adjustable mounting brackets and detailed bracket drawings.

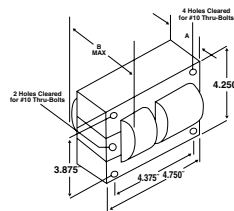
REFERENCE DRAWING PC1



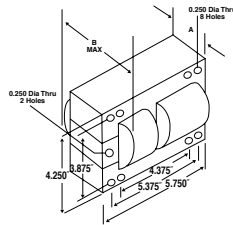
REFERENCE DRAWING 4



REFERENCE DRAWING PC2

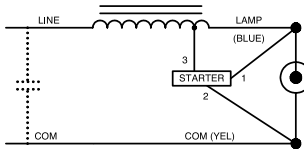


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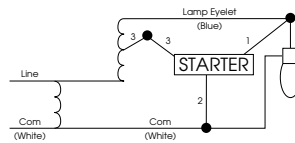


WIRING DIAGRAMS

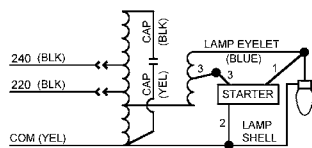
Wiring Diagram 1



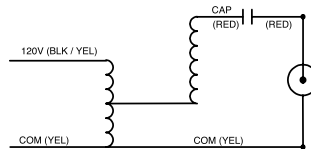
Wiring Diagram 10



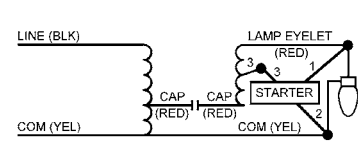
Wiring Diagram 8



Wiring Diagram 14



Wiring Diagram 39



Note: Nominal dimensions provided above
Contact Universal for drawings and/or tolerances

- 60 Hz
- Minimum Starting Temperature: -30° C
- CWA and High Power Factor Designs

F-CAN BALLASTS
METAL HALIDE

Input Volts	Catalog Number	Circuit Type	Input Watts	Max Input Current	Nom Open Circuit Voltage	Fuse Rating	Wir Dia	Dimensions			Total Weight	Max Dist To Lamp (ft)	Sound Rating	Certifications	
								Overall Length	Case Length	Mtg Dim				UL	CSA
(1) 35/39 WATT M130 METAL HALIDE (with built-in ignitor)															
120	1120-251A-TC	CWA	55	0.50	225	2	21	9.50	8.35	8.85	3.0	20	B	Yes	Yes
(1) 50 WATT M110 METAL HALIDE (with built-in ignitor)															
120 or 277	11210-236C-TC	HX-HPF	70	0.64 0.65	240	3 2	20	11.75	10.56	11.14	11.0	20	B	Yes	Yes
(1) 70 WATT M85 METAL HALIDE (with built-in ignitor)															
120 or 277	11210-277C-TC ⁷	HX-HPF	98	2.00 0.90	250	6 3	20	11.75	10.56	11.14	11.0	20	B	Yes	Yes
(1) 70 WATT M98 METAL HALIDE (with built-in ignitor)															
120 or 277	11210-506C-TC ²²	HX-HPF	90	2.00 0.90	250	6 3	20	11.75	10.56	11.14	11.0	20	B	Yes	Yes
120 or 347	11210-554C-TC	HX-HPF	90	2.00 0.80	250	6 3	20	11.75	10.56	11.14	11.0	20	B	No	Yes
(1) 100 WATT M90 METAL HALIDE (with built-in ignitor)															
120 or 277	11210-239C-TC	HX-HPF	125	2.20 1.00	250	8 4	20	11.75	10.56	11.14	11.0	20	B	Yes	Yes
120 or 347	11210-606C-TC	HX-HPF	125	2.20 0.70	250	8 2	20	11.75	10.56	11.14	11.0	20	B	No	Yes
(1) 150 WATT M81 METAL HALIDE (with built-in ignitor)															
120 or 277	11210-242C-TC	HX-HPF	185	3.70 1.60	260	10 5	20	14.31	13.19	13.75	14.0	20	B	Yes	Yes
(1) 150 WATT M102 METAL HALIDE (with built-in ignitor)															
120 or 277	11210-539C-TC	HX-HPF	185	3.70 1.60	260	10 4	20	14.31	13.19	13.75	14.0	20	B	Yes	Yes
(1) 175 WATT M57 METAL HALIDE LAMP															
120 or 277	1110-245SC-TC	CWA	205	1.75 0.75	300	5 3	20	14.32	13.19	13.75	14.0	*	B	Yes	Yes
120 or 347	1110-564C-TC	CWA	205	1.75 0.62	300	5 2	20	11.75	10.55	11.10	14.0	*	B	Yes	Yes
(1) 250 WATT M58 METAL HALIDE LAMP															
120 or 277	1110-246C-TC ^{8*}	CWA	295	2.50 1.10	280	8 4	20	16.75	15.57	16.13	17.5	*	C	Yes	Yes
120 or 277	1111-246C-TC ²³	CWA	300	2.50 1.10	300	8 4	22	11.75	10.55	11.10	11.0	*	B	Yes	Yes
120 or 347	1110-566C-TC	CWA	295	2.50 0.95	285	8 3	20	16.65	15.55	16.10	17.5	*	C	Yes	Yes
(1) 400 WATT M59 METAL HALIDE LAMP															
120 or 277	1110-247SC-TC	CWA	455	3.90 1.70	300	10 5	20	19.25	18.06	18.63	23.0	*	C	Yes	Yes
120 or 277	1111-247SC-TC ²³	CWA	460	3.90 1.70	300	10 5	22	14.31	13.19	13.75	14.0	*	B	Yes	Yes
120 or 347	1110-568C-TC	CWA	460	3.90 1.30	300	10 5	20	19.25	18.05	18.60	23.0	*	C	Yes	Yes

⁷ This ballast may also be used with (1) 70 watt S88 High Pressure Sodium lamp.

²² M98 Designates Venture Lighting catalog numbers MH70/4/MED, C/4/MED or MS70/C/84/MED/W

^{8*} This ballast can be used with a MH200 ignitor to operate (1) 250 watt M103 lamp. Consult Universal for instructions.

²³ Two of these ballasts are required to operate the lamp. Electrical data is for two ballasts, except for "Sound Rating," which is for each ballast

* Refer to Page 5-5.

See page 5-40 for Reference Drawings and Wiring Diagrams.

F-CAN BALLASTS

HIGH PRESSURE SODIUM

- 60 Hz
- Minimum Starting Temperature: -40° C
- CWA and High Power Factor Designs

HPS
35-250
WATT

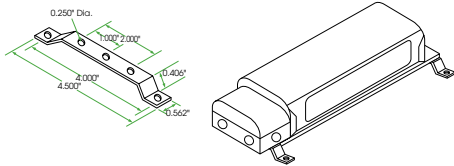
Input Volts	Catalog Number	Circuit Type	Input Watts	Max Input Current	Nom Open Circuit Voltage	Fuse Rating	Wir Dia	Dimensions			Total Weight	Max Dist To Lamp (ft)	Sound Rating	Certifications	
								Overall Length	Case Length	Mtg Dim				UL	CSA
(1) 35 WATT S76 HIGH PRESSURE SODIUM (with built-in starter)															
120 or 277	12210-261C-TC	HX-HPF	55	0.80 0.35	120	5 2	20	11.75	10.55	11.10	9.0	10	B	Yes	Yes
(1) 50 WATT S68 HIGH PRESSURE SODIUM (with built-in starter)															
120 or 277	12210-236C-TC	HX-HPF	75	1.40 0.60	120	5 2	20	11.75	10.55	11.10	9.0	10	B	Yes	Yes
(1) 70 WATT S62 HIGH PRESSURE SODIUM (with built-in starter)															
120 or 277	12210-237C-TC	HX-HPF	97	1.60 0.70	140	5 2	20	11.75	10.56	11.14	9.15	10	B	Yes	Yes
120 or 347	12210-552C-TC	HX-HPF	109	1.69 0.63	145	5 2	20	11.75	10.55	11.10	9.2	10	B	Yes	Yes
(1) 100 WATT S54 HIGH PRESSURE SODIUM (with built-in starter)															
120 or 277	12210-239C-TC	HX-HPF	125	2.10 1.00	130	6 3	20	11.75	10.55	11.10	10.4	10	B	Yes	Yes
120 or 347	12210-606C-TC	HX-HPF	126	2.10 0.90	165	6 3	20	11.75	10.55	11.10	10.4	10	B	Yes	Yes
(1) 150 WATT S55 HIGH PRESSURE SODIUM (with built-in starter)															
120 or 277	12210-241C-TC	HX-HPF	185	2.80 1.20	120	8 4	20	14.30	13.15	13.75	14.1	10	B	Yes	Yes
120 or 347	12210-602C-TC	HX-HPF	185	2.80 1.03	120	8 3	20	14.30	13.15	13.75	14.1	10	B	Yes	Yes

See page 5-40 for Reference Drawings and Wiring Diagrams.

HID
F-CAN

F-CAN BALLASTS OPTIONAL ACCESSORIES

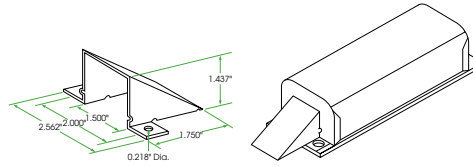
Mounting Bracket Assemblies



Catalog Number 2-BMB-1.

Available for the remote installation of ballasts. Each assembly consists of two (2) mounting brackets, four (4) screws, four (4) washers and four (4) nuts.

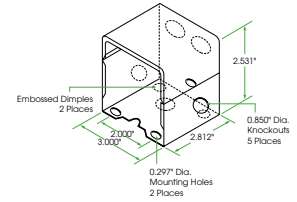
Tee-Pee Lead Wire Covers



Catalog Number TP5. Ref. part #001-2013.

For use where ballast is attached to the surface of an enclosure or raceway.

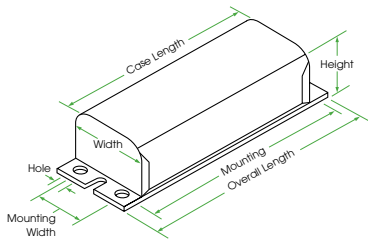
Splice Box



Catalog Number SB-4. Ref. part #001-2009

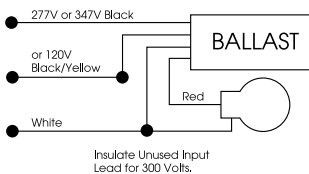
For use with all F-Can Ballasts. It is easily installed on the anchor bracket provided on each F-Can ballast. It contains five (5) 7/8\"/>

REFERENCE DRAWING FOR F-CAN

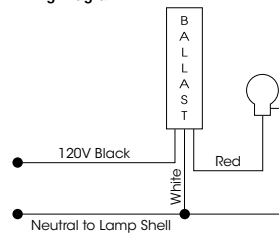


WIRING DIAGRAMS

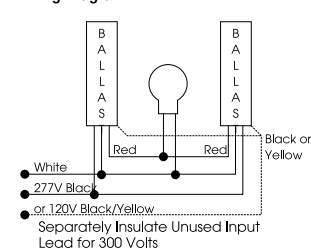
Wiring Diagram 20



Wiring Diagram 21



Wiring Diagram 22



Note: Nominal dimensions provided above
Contact Universal for drawings and/or tolerances

STANDARD IGNITORS • INSTANT RESTRIKE IGNITORS • LONG DISTANCE IGNITORS • AUTOMATIC SHUTOFF IGNITORS • SHUTOFF DEVICES

IGNITORS

Catalog Number	Description	Reference Drawing Number
--STANDARD IGNITORS		(See pg. 5-43)
PULSE START METAL HALIDE		
MH 70-3B ¹³	For double-ended MH lamps with HX-HPF ballasts: 70 watt (M85), 100 watt (M91), and 150 watt (M81)	27
MH 100-3A	For MH lamps with HX-HPF ballasts: 35/39w(M130), 50w(M110), 70w(M98), 100w(M90/M140), and 150w(M102/M142)	25
MH 150-1A	For 150 watt (M102/M142) lamp with CWA ballast	28
MH 200-1B ¹³	For double-ended MH 250 watt (M80) lamp	28
MH 350-1A	For MH lamps with CWA ballasts: 175 watt (M152/M137), 200 watt (M136), 250 watt (M153/M138), 320 watt (M154/M132), 350 watt (M131), 400 watt (M155/M135), and 450 watt (M144)	24
P 750-1B ¹³	For 750 watt (M149) MH lamp	28
HPS 1000-4B ¹³	For MH lamps: 875 watt (M166) and 1000 watt (M141). It is also used for 1000W HPS lamps	28
HIGH PRESSURE SODIUM		
HPS 150-3A	For HPS lamps of 150 watt or less with HX-HPF ballast, except 150 watt S56 lamp	24
HPS 400-3A	For HPS lamps from 200 to 400 watts and 150 watt S56 lamp with CWA ballasts	25
HPS 450-1B ¹³	For 150 watt S56, 200, 250 or 400 watt lamps with 240 volt/60 Hz reactor ballasts. With attached mounting bracket.	28
HPS 460-1B ¹³	For 200, 250 and 400 watt lamps with HX-HPF ballasts and 50 Hz reactor ballasts. With attached mounting bracket.	28
HPS 600-1B	For 600 watt lamps.	28
HPS 610-1B	For 600 watt lamps.	27
HPS 1000-4B ¹³	For 1000 watt HPS and Pulse Start Metal Halide lamps. With attached mounting bracket.	27
HPS 1000-6B ¹³	Obsolete	27
PLUG REPLACEABLE IGNITORS		
PULSE START METAL HALIDE		
MH 150-G15	For MH lamps with HX-HPF ballasts: 35/39 watt (M130), 50 watt (M110), 70 watt (M98), 100 watt (M90/M140), and 150 watt (M102/M142)	32
MH 350-G05	For MH lamps with CWA ballasts: 175 watt (M152/M137), 200 watt (M136), 250 watt (M153/M138), 320 watt (M154/M132), 350 watt (M131), 400 watt (M155/M135), and 450 watt (M144)	32
HIGH PRESSURE SODIUM		
HPS 150-G01	For HPS lamps of 150 watt or less with HX-HPF ballast, except 150 watt S56 lamp	32
HPS 400-G05	For HPS lamps from 200 to 400 watts and 150 watt S56 lamp with CWA ballasts	32
INSTANT RESTRIKE IGNITORS		
HIGH PRESSURE SODIUM		
HPS 150-5B ¹³	Instant Restrike Ignitor — for lamps of 150 watts or less except 150 watt S56. Ignitor has attached mounting bracket.	30
LONG DISTANCE IGNITORS		
PULSE START METAL HALIDE		
MH 100-5A	For MH lamps from 35 to 50 watts. Max Ballast to Lamp Distance ($\approx 20'$)	25
MH 100-5A	For MH lamps from 70 to 150 watts. Max Ballast to Lamp Distance ($\approx 30'$)	25
MH UNV-5B	For MH lamps from 35 to 450 watts. Ignitor incorporates automatic resetting thermal protection. Max Ballast to Lamp Distance ($\approx 50'$)	25
HIGH PRESSURE SODIUM		
HPS 150-4A	For HPS lamps of 150 watt or less, except 150 watt S56 lamp. Max Ballast to Lamp Distance ($\approx 20'$)	24
HPS 400-4A	For HPS lamps from 200 to 400 watts and 150 watt S56 lamp. Max Ballast to Lamp Distance ($\approx 25'$)	25
HPS 1000-5B	For 1000 watt HPS lamps. Ignitor incorporates automatic resetting thermal protection. Max Ballast to Lamp Distance ($\approx 50'$)	25
AUTOMATIC SHUTOFF IGNITORS		
PULSE START METAL HALIDE		
MH 100-35B ¹³	For MH lamps: 35/39 watt (M130), 50 watt (M110), 70 watt (M98), 100 watt (M90/M140), and 150 watt (M102/M142). With attached mounting bracket	28
MH 150-35B ¹³	For 150 watt M81 lamp with CWA ballasts. With attached mounting bracket.	31
MH 350-15B ¹³	For MH lamps: 175 watt (M152/M137), 200 watt (M136), 250 watt (M153/M138), 320 watt (M154/M132), 350 watt (M131), 400 watt (M155/M135), and 450 watt (M144)	31
P 750-15B ¹³	For 750 watt (M149) MH lamp	31
HPS 1000-55B ¹³	For MH lamps: 875 watt (M166) and 1000 watt (M141). It is also used for 1000W HPS lamps	31
HIGH PRESSURE SODIUM		
HPS 150-45B ¹³	For lamps of 150 watts or less except 150 watt S56. With attached mounting bracket.	28
HPS 400-45B ¹³	For lamps from 200 to 400 watts and 150 watt S56 with constant wattage autotransformer ballasts. With attached mounting bracket.	28
HPS 1000-55B ¹³	For 1000 watt HPS and Pulse Start Metal Halide lamps. With attached mounting bracket.	31
AUTOMATIC SHUTOFF DEVICES		
In addition to one-piece shutoff ignitors, automatic shutoff devices are available as separate components for use with the ignitors below.		
SA-55	HPS 150-3A, HPS 150-5B	25
SA-100	MH70-3B, MH100-3A, MH150-1A, MH350-1A, HPS150-4A, HPS400-3A, HPS600-1B	25
SA-250	HPS1000-4B ignitor, only with 1000 watt HPS ballasts	33

¹³ May also be available without attached mounting bracket. Substitute "A" suffix for "B" suffix when ordering. Minimum quantities may apply.

Lamp Watts	ANSI Code	Circuit Type	Standard Igniters	Auto Shutoff	Instant Restrike	Long Distance Igniters
HIGH PRESSURE SODIUM IGNITORS						
35	S76	Reactor	HPS 150-3A	HPS 150-45B	HPS 150-5B	HPS 150-4A
50	S68	Reactor, HX	HPS 150-3A	HPS 150-45B	HPS 150-5B	HPS 150-4A
70	S62	Reactor, HX	HPS 150-3A	HPS 150-45B	HPS 150-5B	HPS 150-4A
100	S54	Reactor, HX	HPS 150-3A	HPS 150-45B	HPS 150-5B	HPS 150-4A
150	S55	Reactor, HX	HPS 150-3A	HPS 150-45B	HPS 150-5B	HPS 150-4A
150	S56	CWA	HPS 400-3A	HPS 400-45B	—	HPS 400-4A
250	S50	Reactor	HPS 450-1B	HPS 400-45B	—	HPS 400-4A
250	S50	CWA	HPS 400-3A	HPS 400-45B	—	HPS 400-4A
250	S50	HX	HPS 460-1B	HPS 400-45B	—	HPS 400-4A
400	S51	Reactor	HPS 450-1B	HPS 400-45B	—	HPS 400-4A
400	S51	CWA	HPS 400-3A	HPS 400-45B	—	HPS 400-4A
400	S51	HX	HPS 460-1B	HPS 400-45B	—	HPS 400-4A
600	S106	CWA	HPS 600-1B	—	—	—
600	S106	Reactor	HPS 610-1B	—	—	—
1000	S52	CWA	HPS 1000-4B	HPS 1000-55B	—	—

Lamp Watts	ANSI Code	Circuit Type	Standard Igniters	Auto Shutoff	Long Distance Igniters
METAL HALIDE IGNITORS					
35	M130	Reactor	MH 100-3A	—	MH 100-5A
50	M110	HX	MH 100-3A	—	MH 100-5A
70	M85	HX	MH 70-3B	MH 70-35B	MH 100-5A
70	M98	HX	MH 100-3A	MH 100-35B	MH 100-5A
100	M90	Reactor	MH 100-3A	MH 100-35B	MH 100-5A
100	M90	CWA	MH 100-3A	MH 100-35B	MH 100-5A
100	M91	HX	MH 70-3B	—	—
150	M81	HX	MH 70-3B	—	—
150	M81	CWA	MH 150-35B	MH 150-35B	—
150	M102	HX	MH 100-3A	MH 100-35B	MH 100-5A
350	M131	Reactor	MH 70-3B	—	—
350	M131	HX	MH 70-3B	—	—

STANDARD IGNITORS

Standard Igniters are supplied with all Universal High Pressure Sodium and Metal Halide ballasts requiring igniters. These ballasts are supplied with an appropriate external ignitor unless the ignitor is permanently attached to or built into the ballast.

INSTANT RESTRIKE IGNITORS

An Instant Restrike Ignitor generates multiple pulses to restrike a lamp arc after a brief power interruption has extinguished it, without the typical 3-minute cool-down time. A Standard Ignitor cannot restrike an arc until the lamp has had time to sufficiently cool. Even though an Instant Restrike Ignitor can reinitiate the lamp arc immediately upon restoration of power, the lamp is still subject to warmup. The following chart is based on an S55 lamp.

Time Lamp Is Extinguished	Restrike Time	Light Output On Reignition	Lamp Warmup Time
1 second	2 seconds	87%	35 seconds
5 seconds	Instant	83%	70 seconds
15 seconds	Instant	76%	130 seconds
30 seconds	Instant	62%	190 seconds
1 minute	Instant	46%	255 seconds
Cold Start	Instant	36%	360 seconds

PLUG REPLACEABLE IGNITORS

Incorporates terminals and a separate mounting base to simplify construction and replacement.

LONG DISTANCE IGNITORS

Long Distance Igniters are used in situations where a ignitor must be mounted further from the lamp than is recommended for a standard ignitor. The maximum lamp to ignitor distance for these igniters is 50 feet, which may vary depending on the type of lamp, ballast, fixture, and wiring.

AUTOMATIC SHUTOFF IGNITORS

In the event of a lamp failure, a Standard Ignitor will continue to pulse, trying to start the lamp. This may reduce the life of the ignitor. An Automatic Shutoff Ignitor will apply pulses for 10 to 12 minutes and then deactivate if a lamp arc cannot be initiated. Resetting the ignitor is accomplished by momentarily interrupting the power to the ballast. For this reason, these igniters are not recommended for use on unswitched circuits.

SHUTOFF DEVICES

Ignitor Accessory (IA) devices can be used to convert a Standard Ignitor into an Automatic Shutoff Ignitor. Simply match the Shutoff Device catalog number on page 5-62 with the Standard Ignitor that is supplied with the ballast. Using the IA device with the Standard Ignitor eliminates the need to buy a separate Automatic Shutoff Ignitor.

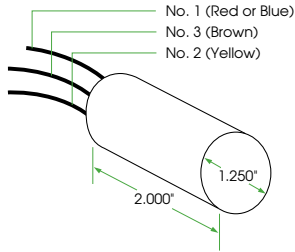
TEMPERATURE RATING

Most igniters are rated for a 105°C maximum case temperature. Consult ballast specification sheets at www.unvlt.com for specific details.

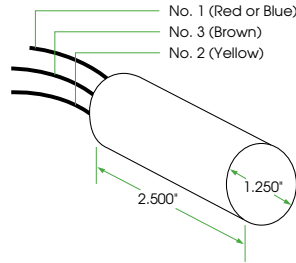
REFERENCE DRAWINGS

All dimensions in decimals.
All lead lengths: 13 inches ±1

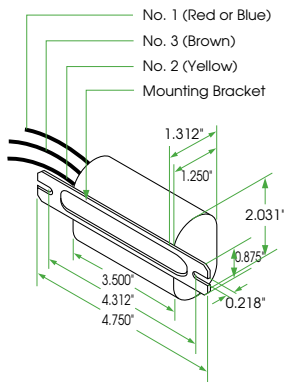
Ref. Drawing 24



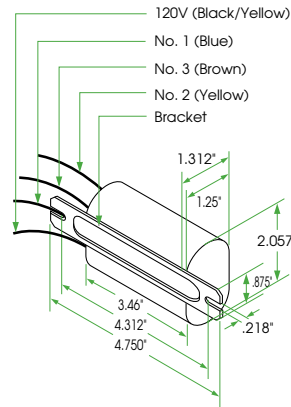
Ref. Drawing 25



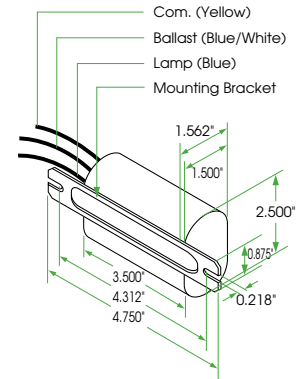
Ref. Drawing 27



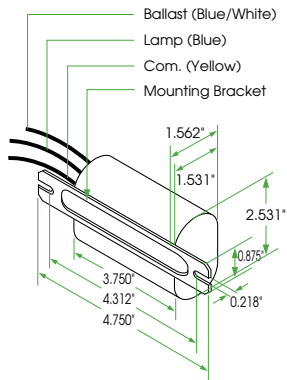
Ref. Drawing 28



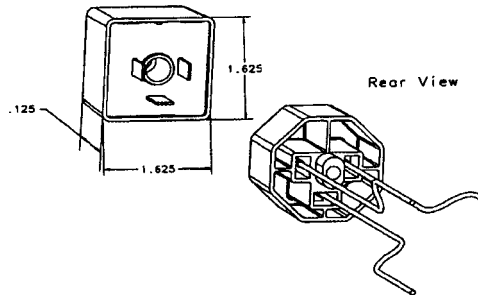
Ref. Drawing 30



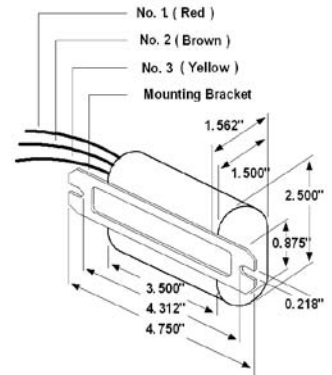
Ref. Drawing 31



Ref. Drawing 32



Ref. Drawing 33



Note: Nominal dimensions provided above
Contact Universal for drawings and/or tolerances

Notes

HID

eHID

Less energy. Enhanced performances.

Experience significant energy savings and increased lumen output vs. halogen lamps with Electronic High Intensity Discharge (HID) ballasts from Universal Lighting Technologies. Vossloh-Schwabe (VS), also a Panasonic Lighting Company, recently merged its US operation into Universal. This merger combines Vossloh's market leading high quality electronic HID product line with Universal's extensive offering.

There are numerous advantages of using VS electronic HID ballasts. Operating HID lamps used in HID lighting systems with electronic ballasts greatly increases system efficiency in comparison with magnetic ballasts. These ballasts are designed to provide optimal lamp performance and maximum energy savings. With enhanced capabilities to downsize the form factor of luminaire housings and reduce wiring costs, VS electronic HID ballasts lead the way to electronic solutions for HID lighting. Micro-processor controlled intelligence offers superior lamp performance and the flexibility for proprietary value-added functions. VS electronic HID ballasts cover your HID needs with products for Metal Halide Lamps ranging from 20 Watts to 210 Watts.



VS electronic HID ballasts continuously monitors lamp characteristics during operation and adjusts the lamp current to optimize performance. This guarantees controlled operation in all modes of operation. The lamp color temperature is also stabilized by using VS electronic HID ballasts due to its relatively constant output power characteristics in addition to producing flicker free lighting that usually occurs at the end of the discharge lamp's service life. The technology enhancements of VS electronic HID ballasts, allowing very small form factors and light weight designs, has enabled new, innovative luminaire designs.

Product Overview

Micro Series: The introduction of the smallest eHID ballasts in the market was coordinated with the launch of the new miniaturized capsule MH lamps enabling the ultimate luminaire design flexibility. Extremely compact and aesthetically pleasing, luminaire designs are approaching the form factor and size of low voltage halogen systems.



Mini Ballast Series: Two ideal form factors that are used in millions of HID track light luminaires characterize the mini series of eHID ballasts. The mini-slim and mini-square units revolutionized track lighting by allowing significantly smaller and greater variety of luminaire designs while providing energy savings of 60-70% versus halogen systems.



Standard Case “Valued-added Series”: Millions of recessed, track-head and specialty luminaires have used the de facto industry standard enclosure since introduction. The significant energy savings and enhanced reliability of our ballasts promoted the rapid escalation of electronically ballasted MH luminaires for almost 15 years. Technological advancements have now allowed the integration of multiple, value-added functions such as: a powersource for the self-heating thermal protectors, an electronic 277V step-down transformer, and an intelligent auxiliary lighting control for back-up lighting during lamp hot restrike modes. Ideal for new, retrofit and replacement applications in recessed luminaires.

Features and Benefits:

- Optimum lamp performance
- Rugged, compact and lightweight design
- High power factor
- Enhanced color and CRI uniformity
- Shut-down protection
- Reduced wiring costs
- Eliminates nuisance lamp cycling at end-of-lamp life (intelligent lamp sensing capabilities)
- Constant lamp power
- Reduced lamp dropouts due to improved line voltage dip withstand
- Quiet operation
- Durable performance for various applications
- Fewer SKUs required in inventory
- Broadens design flexibility for new applications and luminaires

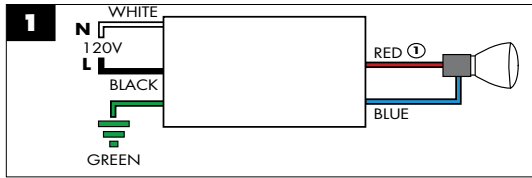


eHID Product Family

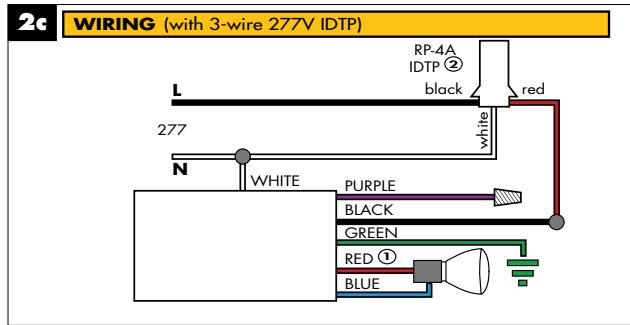
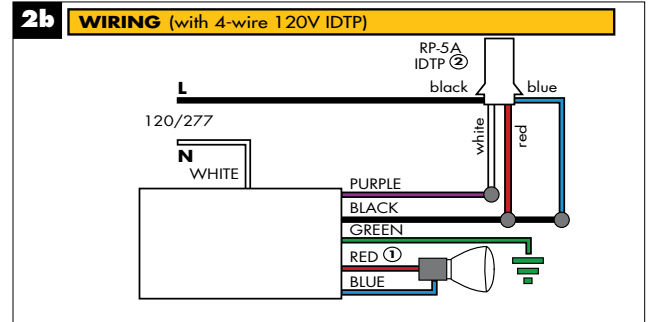
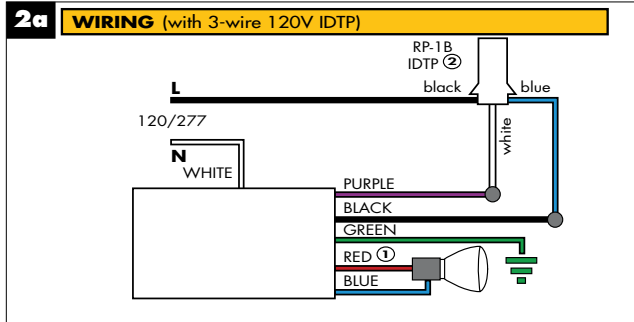
Part #	Description	Lamp Wattage	Lamp Type	Input Voltage	Input Power	Mounting	Lead Exit	Dimensions	Wiring
Micro Series									
188514	M2012CK-7EUN	20	M/C156	120	24.5	No Feet	Side	1	1
188882	M2012CK-7EUN-F	20	M/C156	120	24.5	Feet	Side	2	1
188883	M2012CK-7EUN-J	20	M/C156	120	24.5	Studs	Top	3	1
188574	M2212CK-7EUN	22	M/C175	120	26.5	No Feet	Side	1	1
188884	M2212CK-7EUN-F	22	M/C175	120	26.5	Feet	Side	2	1
188885	M2212CK-7EUN-J	22	M/C175	120	26.5	Studs	Top	3	1
188635	M3912CK-7EUN	39	M/C130	120	45	No Feet	Side	4	1
188776	M3912CK-7EUN-F	39	M/C130	120	45	Feet	Side	2	1
188756	M3912CK-7EUN-J	39	M/C130	120	45	Studs	Top	3	1
188757	MTm3912CK-7EUN	39Tm	M/C179	120	45	No Feet	Side	4	1
188777	MTm3912CK-7EUN-F	39Tm	M/C179	120	45	Feet	Side	2	1
188758	MTm3912CK-7EUN-J	39Tm	M/C179	120	45	Studs	Top	3	1
Mini-Slim Series									
188246	M3912CK-6EUN-F	39	M/C130	120	45	Feet	Side	5	1
188702	M3927CK-6EUN-F	39	M/C130	277	44	Feet	Side	6	1
188774	M3927CK-6EUN-J	39	M/C130	277	44	Studs	Top	7	1
188164	M7012CK-6EUN-F	70	M/C98, M/C139, M/C143	120	77	Feet	Side	5	1
188703	M7027CK-6EUN-F	70	M/C98, M/C139, M/C143	277	77	Feet	Side	6	1
188775	M7027CK-6EUN-J	70	M/C98, M/C139, M/C143	277	77	Studs	Top	7	1
Mini-Square Series									
188151	M2012CK-6EU-F	20	M/C156	120	23	Feet	Side	8	1
188627	M2012CK-6EU-J	20	M/C156	120	23	Studs	Top	9	1
188701	M2212CK-6EU-J	22	M/C175	120	26.5	Studs	Top	9	1
188293	M3912CK-6EU-F	39	M/C130	120	45	Feet	Side	8	1
188512	M3912CK-6EU-J	39	M/C130	120	45	Studs	Top	9	1
188402	M3927CK-6EU-F	39	M/C130	277	44	Feet	Side	10	1
188551	M3927CK-6EU-J	39	M/C130	277	44	Studs	Top	9	1
188377	JM7012CK-6EU-F	70	M/C98, M/C139, M/C143	120	77	Feet	Side	11	1
188628	M7012CK-6EU-J	70	M/C98, M/C139, M/C143	120	77	Studs	Top	9	1
188895	M3912-27CK-6EU-F	39	M/C130	120-277	44	Feet	Side	10	1
188896	M3912-27CK-6EU-J	39	M/C130	120-277	44	Studs	Top	9	1
188897	M3912/27CK-6EU-JT3	39	M/C130	120/277	44/46	Studs	Top	9	2a,2b,2c
188901	M2012-27CK-6EU-F	20	M/C156	120-277	24	Feet	Side	10	1
188902	M2012-27CK-6EU-J	20	M/C156	120-277	24	Studs	Top	9	1
188903	M2012/27CK-6EU-JT3	20	M/C156	120/277	24/26	Studs	Top	9	2a,2b,2c
188939	M7012-27CK-6EU-F	70	M/C98, M/C139, M/C143	120-277	77	Feet	Side	10	1
188940	M7012-27CK-6EU-J	70	M/C98, M/C139, M/C143	120-277	77	Studs	Top	9	1
188941	M7012/27CK-6EU-JT3	70	M/C98, M/C139, M/C143	120/277	77/79	Studs	Top	9	2a,2b,2c
Standard Series									
188610	M2012-27CK-5EU-F	20	M/C156	120-277	24	Feet	Side	12	1
188611	M2012/27CK-5EU-JT3	20	M/C156	120/277	24/26	Studs	Top	13	2a, 2b, 2c
188156	M3912-27CK-5EU	39	M/C130	120-277	44	No Feet	Side	14	1
188157	M3912-27CK-5EU-F	39	M/C130	120-277	44	Feet	Side	12	1
188301	M3912-27CK-5EU-J	39	M/C130	120-277	44	Studs	Top	13	1
188629	M3912/27CK-5EU-JT3	39	M/C130	120/277	44/46	Studs	Top	13	2a, 2b, 2c
188630	M3912/27CK-5EU-JA3	39	M/C130	120/277	46/187	Studs	Top	13	3a, 3b, 3c
188612	M5012-27CK-5EU-F	50	M148 or M110	120-277	56	Feet	Side	12	1
188613	M5012/27CK-5EU-JT3	50	M148 or M110	120/277	56/58	Studs	Top	13	2a, 2b, 2c
188165	M7012-27CK-5EU	70	M/C98, M/C139, M/C143	120-277	78	No Feet	Side	14	1
188166	M7012-27CK-5EU-F	70	M/C98, M/C139, M/C143	120-277	78	Feet	Side	12	1
188167	M7012-27CK-5EU-J	70	M/C98, M/C139, M/C143	120-277	78	Studs	Top	13	1
188631	M7012/27CK-5EU-JT3	70	M/C98, M/C139, M/C143	120/277	79/81	Studs	Top	13	2a, 2b, 2c
188632	M7012/27CK-5EU-JA3	70	M/C98, M/C139, M/C143	120/277	81/212	Studs	Top	13	3a, 3b, 3c
188633	M10012/27CK-5EU-JT3	100	M/C90, M/C140 and M/C164	120/277	110/212	Studs	Top	13	2a, 2b, 2c
188168	M10012-27CK-5EU	100	M/C90, M/C140 and M/C164	120-277	110	No Feet	Side	14	1
188169	M10012-27CK-5EU-F	100	M/C90, M/C140 and M/C164	120-277	110	Feet	Side	12	1
188302	M10012-27CK-5EU-J	100	M/C90, M/C140 and M/C164	120-277	110	Studs	Top	13	1
188634	M10012/27CK-5EU-JA3	100	M/C90, M/C140 and M/C164	120/277	112/235	Studs	Top	13	3a, 3b, 3c
188638*	M15012-27CK-5EU-F	150	M/C102/E and M/C142/E	120-277	163	Feet	Side	12	1
188639*	M15012-27CK-5EU-J	150	M/C102/E and M/C142/E	120-277	163	Studs	Top	13	1
188989*	M15012/27CK-5EU-JT3	150	M/C102 and M/C142	120/277	163/165	Studs	Top	13	2a, 2b, 2c
Mid Wattage									
188909*	M21020-27CK-2EUN-F	210	C183	208-277	227	Feet	Side	17	4a, 4b

*Exceeds EISA 2007 requirements with 90% efficiency.

Wiring Diagrams

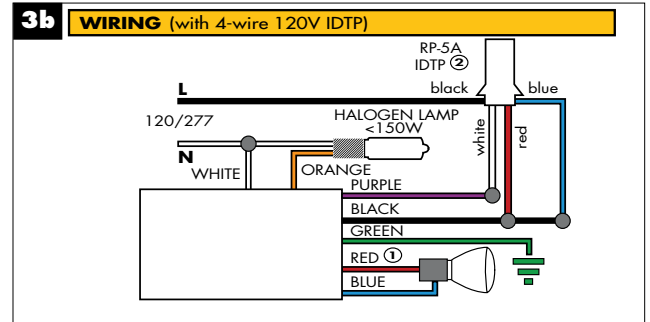
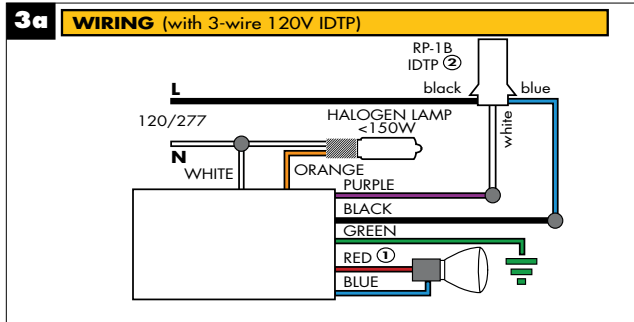


120/277V with IDTP Tap



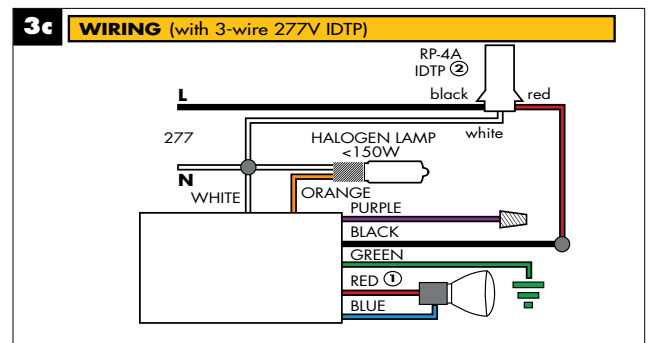
120/277V with Auxiliary Control + IDTP Tap

Wiring & Dimensions Diagrams (shown in millimeters and inches)

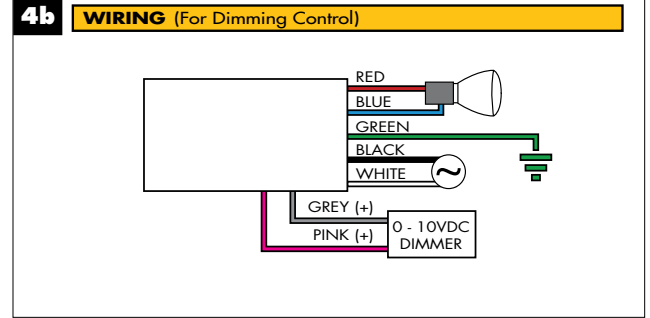
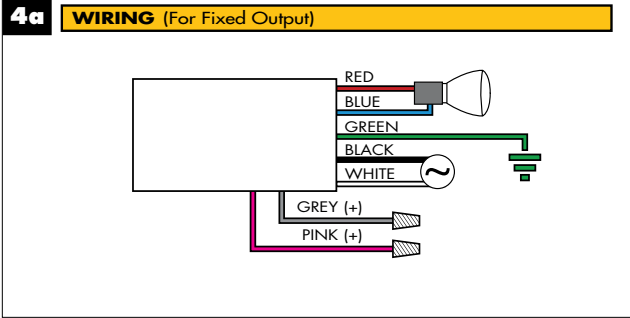


Notes for Wiring Diagram

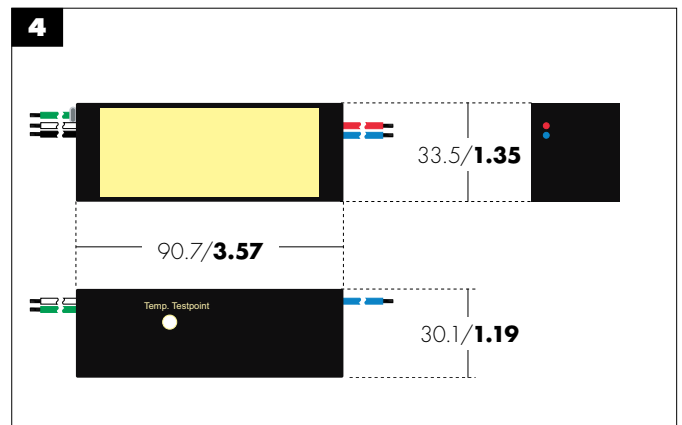
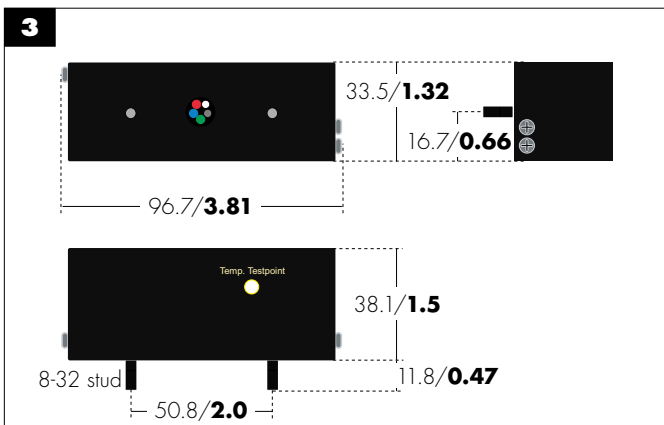
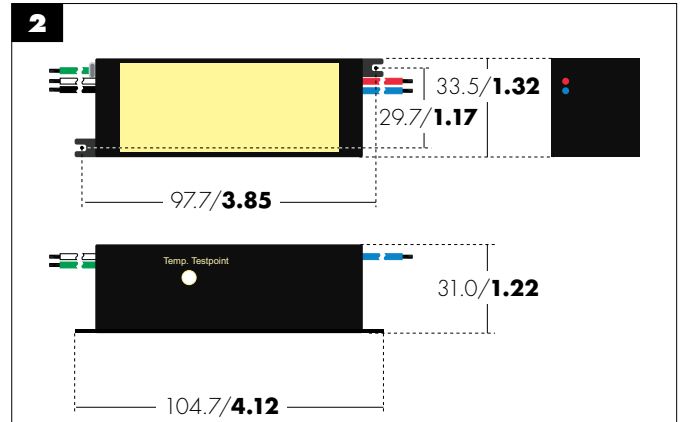
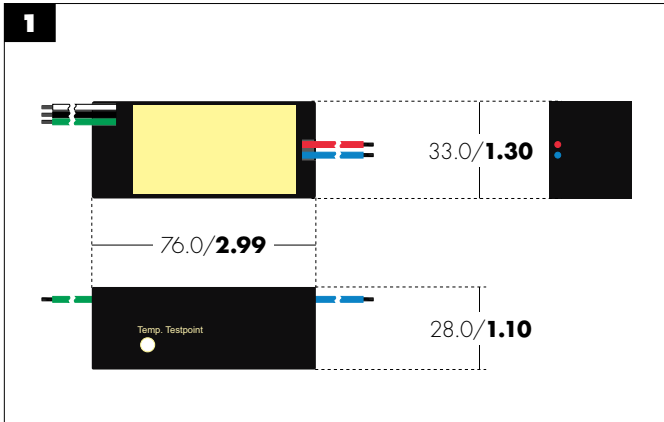
- ① Connect red lead to center contact on Edison base lampholders
- ② IDTP - Insulation Detector Thermal Protector



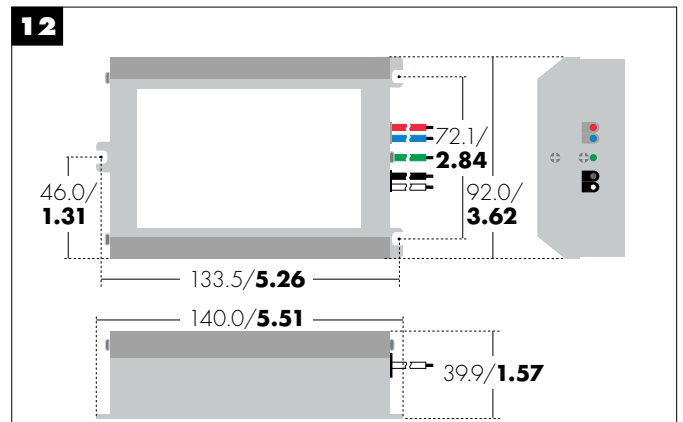
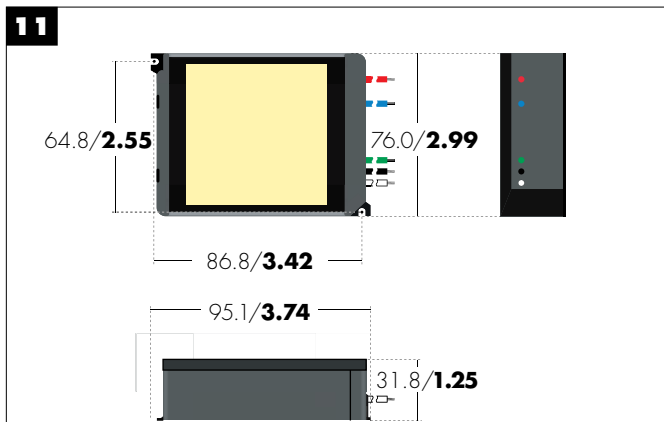
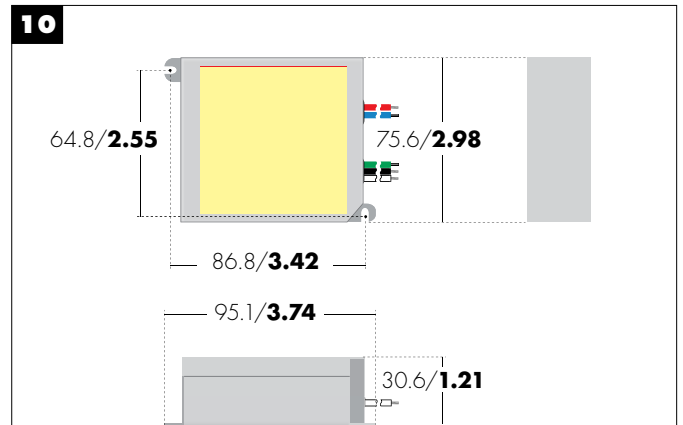
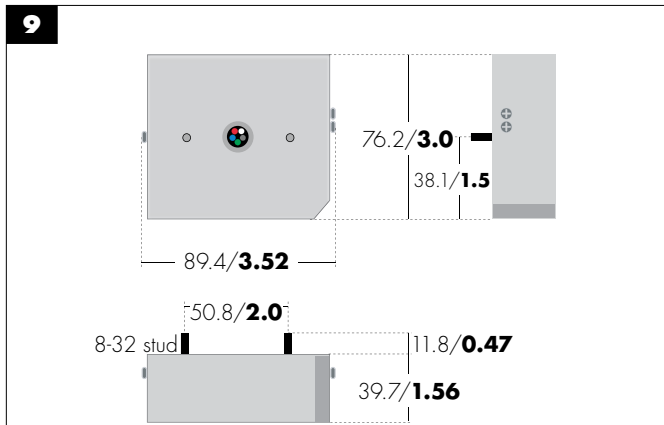
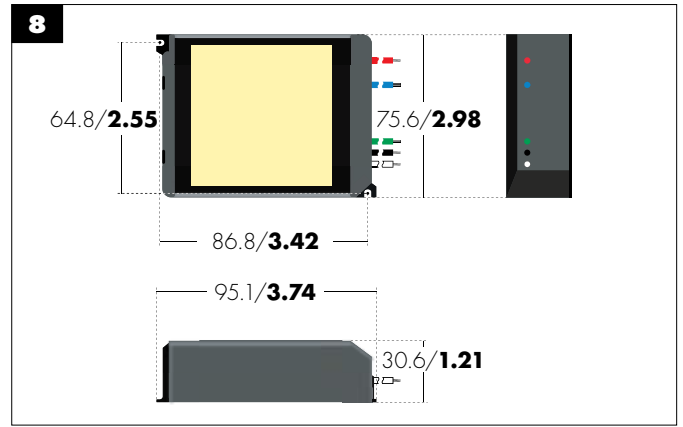
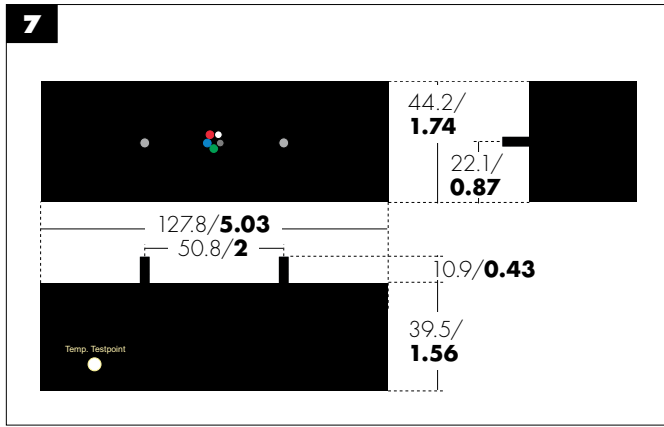
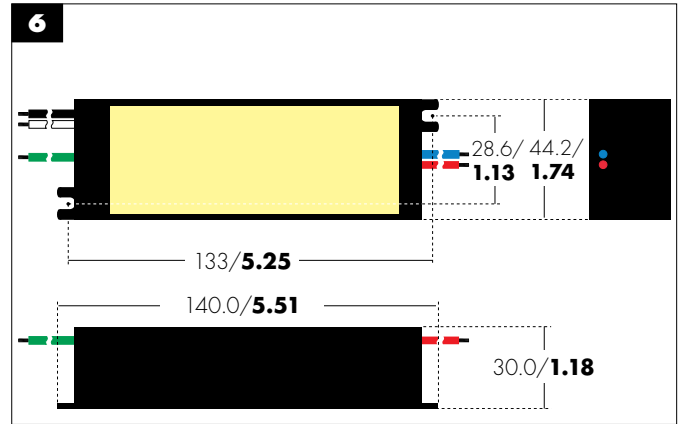
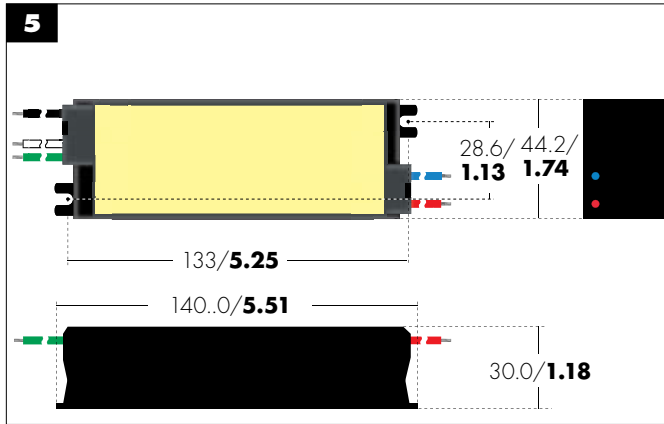
Dimming Ballasts



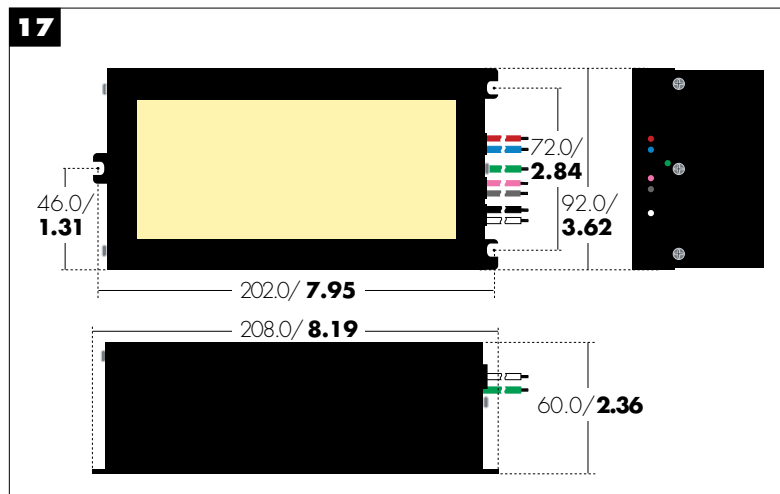
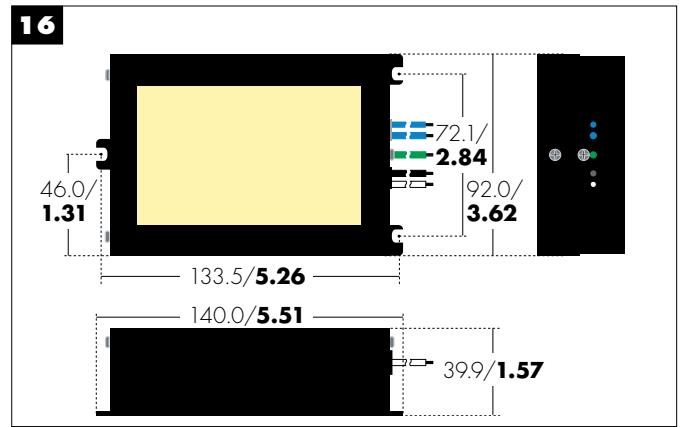
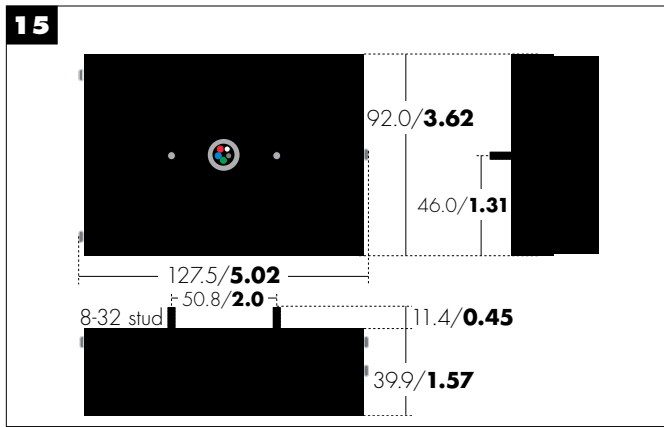
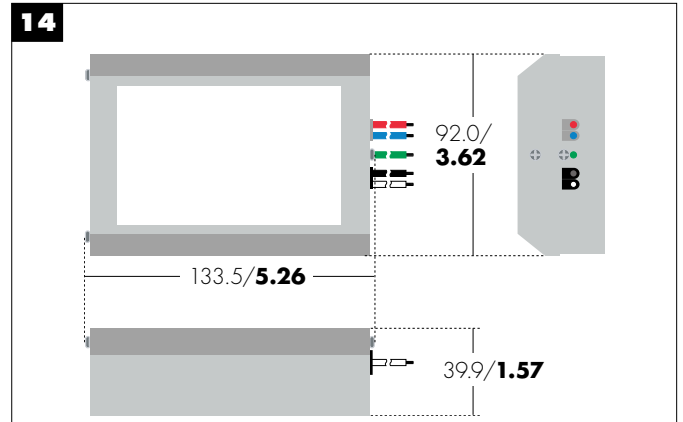
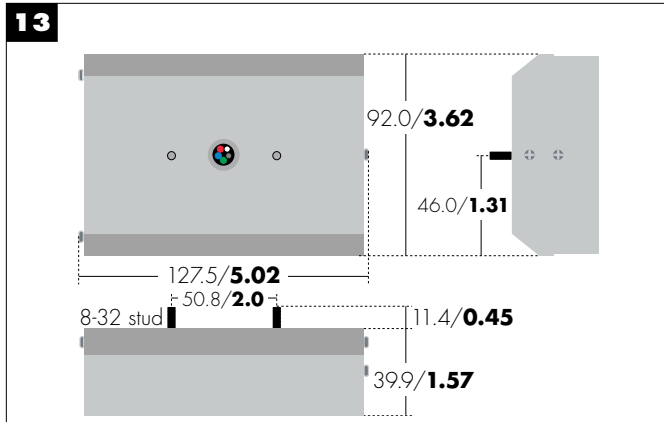
Dimensions



Dimensions



Dimensions



Application And Operating Information

General:

If the electrical current through an HID lamp is properly stabilized, an HID plasma arc with very high luminous efficiency is created in the arc tube chamber resulting in a very efficient light source. The internal pressure of the arc tube chamber rises as the arc tube temperature increases and will attain between 1 and 10 bar; thereby, defining these lamps as high-pressure HID lamps, high intensity discharge lamps or simply HID lamps. The light output and color rendition of HID lamps vary considerably depending on the lamp family (mercury, metal halide or sodium lamps).

HID lamps can only be started and operated with ballasts. Ignitors or ignition voltage characteristics are additionally required for sodium and metal halide lamps. As well as stabilizing the lamp's operating point, ballasts also influence the lamp's output and luminous flux, the system light output, the service life of the lamps as well as the color temperature of the light source.

Electromagnetic or electronic ballasts can be used for HID lamps, but unlike fluorescent lamps, lamp efficiency is not significantly improved by the use of electronic ballasts. However, electronic ballasts can lead to a reduction of the inherent losses and thus to an increase in system efficiency. In addition, electronic ballasts can ensure gentle lamp operation, which may increase lamp's service life.

Electronic Ballasts for Metal Halide Lamps

Electronic ballasts are designed with all the components required to operate metal halide lamps, including ignition, power factor correction, and stable normal operation. Furthermore, they safely shutdown lamps at the end of their service life to prevent high temperatures from being generated in the luminaires that could influence the service life of the luminaire or its components. Vossloh-Schwabe also provides special electronic ballasts for additional luminaire functions such as heater power for insulation detection thermal protectors and for switching on of an auxiliary incandescent lamp for the dark phase of an HID lamp during initial warm-up or during hot-restrike cool-down mode.

Standards/Regulations

ANSI C82.14 Low-Frequency Square Wave Electronic Ballasts for Metal Halide Lamps

UL 1598 Standard for Safety-Luminaires

ANSI C82.77 Harmonic Emission Limits-Related Power Quality Requirements or Lighting Equipment

ANSI/UL 1029 Standard for Safety-High Intensity HID Lamp Ballasts

ANSI/IEEE C62.41 Surge Voltages in Low Voltage AC Power Circuits

US Code of Federal Regulations Title 47 –Telecommunications Part 18– Industrial, Scientific and Medical Devices

Application And Operating Information

Technical Specifications:

Operating voltage range

120VAC rated: 120V 277V $\pm 10\%$

277VAC rated: 277V $\pm 10\%$

120–277V rated: 108V–305V

120/277V rated: 108V–132V and 249V–305V

Leakage current $\leq 0.5\text{mA}$

Hot restrike auxiliary lamp operation

In order to ensure continuous illumination even during the ignition period or in the event of a lamp drop-out due to short term power outage, an additional incandescent lamp (maximum 150W) can be used on models designated with a JA suffix.

Short circuit issues

The ballast output metal halide lamp leads are basically short-circuit-proof. However, any shorts or connections between those lamp leads to the ballast case or to safetyneutral (earth ground) will destroy the ballasts. Likewise the metal halide lamp leads shall not be connected to input power connections nor shall the auxiliary lamp leads be shorted together otherwise the ballast's circuitry could be damaged or fail.

Provisions in the luminaire design should be implemented to prevent all lead wires but especially lamp leads from being pinched, damaged, or cut during luminaire assembly, field installation or normal service.

Mechanical Mounting:

Surface

Firm, flat, preferably metal surface required to ensure good heat transfer for long ballast service life and reliability. Avoid mounting on uneven or protruding surfaces.

Mounting Location

Electronic ballasts must be protected against moisture and heat. Outdoor applications must utilize luminaires with the appropriate weatherproof ratings depending on location. Most Vossloh-Schwabe electronic ballasts are rated "Outdoor Type 1".

Fastening

Use mechanical means to ensure ballasts are fixed tightly to flat surfaces. Use appropriately sized screws depending on the ballast mounting slot size or spring clips to provide interference fit.

Heat transfer

If ballast is destined for installation in a luminaire, sufficient heat transfer must be ensured between the electronic ballast and the luminaire housing. Electronic ballasts should be mounted with the greatest possible clearance from heat sources or lamps. During operation, the temperature measured at the ballast's tc point must not exceed the specified maximum value.

Application And Operating Information

Technical Specifications:

- **Dimensional tolerances:**

- Case: $\pm 1\text{mm}$ ($\pm 0.039''$)
- Standard lead length tolerances: $+50\text{mm}$ ($+2''$) or -30mm ($-1''$) Micro lead length tolerances: $\pm 15\text{mm}$ ($\pm 0.6''$)
- Slot width on "F" mounting tabs: 5mm ($0.20''$); for Mini-Square Size: 4mm ($0.157''$)

- **Remote wiring guidelines:**

- Each lamp's lead wires must be run in a separate conduit from the input power leads to achieve good EMI performance and maximum remote capabilities. Lamp leads shall not be bundled together, but each set of lamp leads shall be run in its own conduit.
- Individual lamp lead wires must be used for external fixture wire extensions using wire types SF-2 (equivalent to SEW-2 or 3071) or SFF-2 (equivalent to SEWF-2 or 3070) or alternately, if approved by VS, high voltage luminaire wire with a 18AWG conductor and a 1000VAC minimum voltage rating. Temperature rating is especially critical if the lamp lead extension wires are directly connected to lampholder terminals.
- Maximum remote distances:
See individual model specification sheets.
The specified maximum remote distances are based on lamp leads run in a minimum $\frac{1}{2}''$ internal diameter conduit, pipe or flexible conduit. For longer remote distances contact the TES group at Universal Lighting.
- Using service power cords (types SJ, SO, ST, SV etc.) or metal clad cable assemblies for lamp lead extension wire are **not** recommended as they are not compatible with the above characteristics, can cause starting problems and shall not be used unless VS gives written approval.

Insulation clearance

Remote mounted ballasts shall be installed per National Electrical Code and local codes while also complying with wiring methods per Vossloh-Schwabe recommendations. Per UL requirements, thermal insulation shall be a minimum of 3" from any ballast surface.

Application And Operating Information

Safety Functions:

Regulatory approvals

Vossloh-Schwabe electronic HID ballasts are UL listed or UL recognized component and cUL listed for use in Canada.

Shutdown of defective lamps

In the event of a lamp failing to ignite or of a lamp with low or high operating voltages (end of lamp's service life), the electronic ballast will switch off after a defined period of time (typically 30 minutes). The ballast will also shut-down if the lamp fails to achieve symmetrical current operation (rectification) or if lamp leads are shorted to each other. After lamp replacement, the ballast output can be reset by disconnecting (count to 10) and then reconnecting input power.

Transient input voltage

Electronic ballasts incorporate transient protection that complies with ANSI C62.41 and ANSI C82.14 test procedure and values.

Temperature Protection

To prevent excess temperatures, ballasts contain thermal protection devices or thermal sensing circuitry. A ballast will restart after it has cooled down, however, it might be necessary to briefly reset the input power after the over-temperature condition is resolved.

General guidelines

Always disconnect power to the luminaire before installation or service of the ballasts. Install to all provisions of local or National Electric Codes. The ballast case/green lead must be grounded. Dispose of any replaced ballasts or lamps properly per local environmental regulations.

Reliability and Service Life:

The electronic ballast service life is inversely proportional to the temperature of its critical internal components. Normal ballast operation shall have the temperature of the tc point less than the warranted values in the individual specification sheets

Electrical Installation:

3-Phase connection of luminaires with electronic ballasts

Prior to operating newly installed lighting systems, please check the ballast's rated voltage range to ensure it is appropriate for the job site input power supply voltage. The neutral power supply wire must be connected securely to all luminaires and to all ballasts. Power supply conductors must only be connected or disconnected when the circuit is not energized. The neutral conductor must never be disconnected as the first disconnected wire nor individually at the circuit panel, at a distribution wiring junction box or at the luminaire during energized power supply operation as out-of balance voltage operation can lead to serious over-voltages and subsequent ballast failures.

Power factor compensation

Luminaires with electronic ballasts do not need power factor compensation, as the typical power factor range of electronic ballasts is 95 to 99%.

Application And Operating Information

Wiring

Wiring between the power supply, electronic ballasts and lamp must comply with the respective circuit diagram.

Note: the ballast (metal) case (using toothed washer) or provided green lead must be connected to safety-neutral (earth ground). In addition, all metal luminaire parts and metal lamp reflector/housings shall also be connected to earth ground for safety and for proper lamp starting. Metal halide luminaires must only be fitted with electrical components that are rated to withstand ignition voltages of 4kV. To ensure compliance with RFI suppression limits, input and output conductors should not be run in the same conduit as lamp conductors. Conduit size recommendations are stated in the individual ballast specification sheets or construction notes.

Lamp maintenance notice

To replace end-of-service lamps, turn-off luminaire power, remove and replace lamps then turn-on luminaire power. If power was not turned off during lamp replacement, the luminaire/ballast-input power must be reset to restart the new lamp. If the lamp or wiring is defective, the ballast will “shut-down” in 1.5 to 30 minutes depending upon the fault condition.

Supplemental IDTP wiring

The IDTP (insulation detector thermal protector) is required by UL for most recessed luminaires. This fast acting thermal protector is typically mounted on the same junction box as the electronic ballast. Special “JT” electronic ballasts provide a separate 120V power supply for the IDTP heater to allow the luminaire to be rated for both 120V and 277V operation. See the individual ballast specifications for the proper wiring procedures for JT & JA ballasts with this IDTP heater function.

Note: When using JT or JA ballasts on multiple lamp luminaires, only one ballast yellow or purple lead should be connected to the IDTP heater. All other ballasts’ yellow or purple leads should be capped-off. Operation of JT and JA ballasts on 208V and 240V is not recommended, as the IDTP may not function properly.

Lamp compatibility

Not all HID lamps are compatible with all electronic ballasts. Therefore, consult with Vossloh-Schwabe Technical Support or a specific lamp company regarding a certain lamp’s compatibility.

Sign Illuminating Ballasts

A Complete Range Of Solutions... From The Name You Trust

Universal Lighting Technologies ("Universal") is known throughout the sign business as a company that can set and meet today's toughest industry standards. Our high-output ballasts are great for rugged outdoor sign cabinet applications because they provide ultra-reliable, low-temperature starting as low as -20° F. All Universal sign ballasts offer Class P thermal protection. We have three product lines spanning the sign business:

- The UNIVERSAL® USB is a line that offers complete coverage with 6 units.
- The UNIVERSAL® MAX-3 ensures that the installer has the right sign ballast on the truck for every application, from 1-6 lamps, 2-48 feet — replacing up to 100 conventional ballasts with a maximum of three models.
- Signa® Electronic Sign ballasts are ideal for new sign installations with minimum wire connections, universal input voltage, parallel lamp operation, and maximum energy savings.

Universal offers the convenience of one-stop shopping for not just sign ballasts, but compact fluorescent, linear fluorescent, HID, and all your other ballast needs.

For the unmistakable sign of quality and reliability, turn to Universal.



Universal® sign ballasts provide ultra-reliable low-temperature starting — plus Class P thermal protection.

Application And Operating Information

Heat

Ballasts generate heat during normal operation. By design, fluorescent ballasts should operate so that their maximum hot-spot case temperature does not exceed 90°C (194°F). Operating at higher temperatures will shorten ballast life or may cause the thermal protection circuit to trip.

The temperature the ballast reaches depends on the temperature of the area surrounding it — plus the heat-conducting surface touching the ballast. Ballasts should be installed in a manner that avoids future overheating. To maintain normal ballast temperature, you should:

1. Mount the ballast against a flat surface of heavy gauge metal such as the structural part of the sign.
2. Keep the ballast as far away as possible from other ballasts, lamps or reflective surfaces. (Lamps generate approximately three-fourths of the heat in a plastic sign.) The ends of the lamps are the hottest part, so you should mount the ballast as far away from the ends as possible.
3. Paint the inside of the sign with flat white paint.

Moisture Protection

1. Vent the sign as well as possible without allowing water to enter.
2. Ballasts should be mounted horizontally (except for weatherproof types). If the ballast must be mounted vertically, allow room for sufficient air circulation. Wherever possible, mount the ballast in an enclosure outside the sign by using Universal pup tents. You can get pup tents at no charge when you order the plastic sign ballast. Your wholesaler will also have a supply for your convenience.

Grounding

The white lead of a 120-volt ballast must be connected to the neutral or ground side of the power supply. All metal parts of the sign, as well as the ballast case, must be grounded either through the conduit which holds the power supply or by direct connection with a grounding wire. An ungrounded sign is a potential hazard—and it can give misleading symptoms when looking for sign faults.

Proper Lamp Life and Starting

In rapid-start installations, proper filament heating is necessary for reliable starting and normal lamp life. To ensure that proper heating is taking place, the following steps are recommended:

1. Lamp leads should be kept as short as possible and with a minimum of splices.
2. All connections should be soldered.
3. Maintain proper alignment and spacing of lamp holders to ensure good contact in the sockets.
4. Mount lamps within one inch of grounded metal. This is one lamp manufacturer's published requirement for reliable starting.

Light Output vs. Temperature

The light output of a fluorescent lamp varies according to the mercury vapor pressure inside the lamp. This pressure is controlled by the coldest spot on the bulb wall. The ballast may start the lamp, but the light output can be very low if the bulb wall temperature is low. Several factors influence this, including ambient temperatures, wind, type of enclosure, etc. If maximum light output is critical, consult a lamp manufacturer for advice.

Lamp Starting Problems

Occasionally a field problem will arise involving improper lamp starting. The usual complaint is that the lamps start slowly (or not at all). Here are some of the causes:

1. Low line voltage
2. Improper sign grounding
3. Insufficient or no filament voltage
4. Insufficient or no open circuit voltage
5. Dirty lamps during high-humidity operating conditions
6. Lamps improperly inserted in the sockets

If lamp starting is a problem in your installation, check the sign grounding, filament voltage (3.4 - 3.9 volts), and open circuit voltage. If all are normal, the probable cause is dirty lamps. The lamps should be washed in clean water, drip-dried, and reinstalled. If this doesn't solve the problem, contact your nearest Universal representative for further assistance.

Short Lamp Life

If the lamp has not given proper length of service as specified by the lamp manufacturer, the following reasons for early failure should be considered:

1. Improper starting due to insufficient filament voltage
2. Frequent starting and short operating periods
3. Improper ballast
4. Improper voltage supply
5. Faulty wiring
6. Defective lamps
7. Lamps improperly inserted in sockets

Early lamp failure will be preceded by a dense blackening on either or both ends of the lamps. This blackening will extend three or four inches from the lamp base and should not be confused with a small dense spot, which is a mercury deposit that can occur any time during lamp life. Dense blackening due to early lamp failure should not be confused with the gray bands that sometimes appear toward the end of normal lamp life (about two inches from either end of the lamp).

Sign Ballast Footage Chart

UNIVERSAL® USB Fluorescent Sign Ballast Matrix																															
No. of Lamps Per Ballast	TOTAL LAMP FOOTAGE REQUIRED																														
	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48							
1-2	USB-0412-12																														
1-4	USB-0816-14																														
	USB-1024-14																														
2-4	USB-1632-24																														
4-6	USB-2036-46																														
	USB-2048-46																														

UNIVERSAL® USB Fluorescent Sign Ballast Matrix																																	
No. of Lamps Per Ballast	TOTAL LAMP FOOTAGE REQUIRED																																
	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48									
1-6	USB-0218-16																																
	USB-1232-16																																
	USB-1048-16																																

SIGNA® Electronic Sign Ballast Matrix																																
No. of Lamps Per Ballast	TOTAL LAMP FOOTAGE REQUIRED																															
	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48								
1-2	ESB216-12																															
2-4	ESB432-14																															
4-6	ESB848-46																															
1-4	ESB1040-14																															

Plastic Sign Ballasts LEAD LENGTHS (Inches)

Catalog Number	White	Black	Blues	Reds	Yellows	Browns	Oranges	Orange Blacks	Blue Whites	Red Whites
PLASTIC SIGN BALLASTS - HIGH OUTPUT 800mA RS LAMPS - 120 Volts - 60 Hz										
TWO LAMP BALLASTS										
USB-0412-12	24	24	38	38	48					
FOUR LAMP BALLASTS										
USB-0816-14	36	24	65	40	39	56			48	
USB-1024-14	24	24	79	48	75	83			57	
USB-1632-24	24	24	80	54	60	80			72	
SIX LAMP BALLASTS										
USB-2036-46	24	24	50	80	70	38	50	50	38	
USB-2048-46	24	24	80	80	70	50	50	50	50	
MAX-3 HIGH OUTPUT SIGN BALLASTS 800mA RS LAMPS - 120 Volts - 60 Hz										
ONE TO SIX LAMP BALLASTS										
USB-0218-16	24	24	60	60	60	60	60	60	60	
USB-1232-16	24	24	80	60	60	80	60	60	72	
USB-1048-16	24	24	80	80	70	50	60	60	50	
SIGNA ELECTRONIC SIGN BALLASTS- T12 RAPID START HIGH OUTPUT LAMPS - 108 to 305 VOLTS - 50/60 Hz										
ONE TO SIX LAMP BALLASTS										
ESB216-12			68	68						
ESB432-14			80	80					80	80
ESB848-46			80	80			80	80	80	80

Note: Maximum volts above ground, any lead 590 volts.

HIGH OUTPUT BALLASTS



- Provide ultra-reliable low-temperature starting (as low as -20°F)
- Support 1 to 6 lamps
- Ideal for rugged outdoor sign cabinet applications
- Class P thermally protected

STANDARD HIGH OUTPUT SIGN BALLASTS

Catalog Number	Total Lamp Footage	Start Temp (°F)	Max. Line Cur.	Max. Input Watts	Open Circuit Volt.	Wiring Diagram	Dimen. Chart Ref.	Weight (lbs.)
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PLASTIC SIGN BALLASTS - HIGH OUTPUT 800mA RS LAMPS - 120 Volts - 60 Hz

TWO LAMP BALLASTS

USB-0412-12	4' min. - 12' max.	-20	1.35	160	500	1a, 2a	1	8
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FOUR LAMP BALLASTS

USB-0816-14	8' min. - 16' max.	-20	1.90	220	590	4a, 6a, 9, 1b	2	12
USB-1024-14	10' min. - 24' max.	-20	2.70	325	720	4a, 6a, 9, 1b	3	14
USB-1632-24	16' min. - 32' max.	-20	3.50	420	950	4a, 6a, 9	4	16

SIX LAMP BALLASTS

USB-2036-46	20' min. - 36' max.	-20	4.00	480	600	5a, 7, 7a	4	18
USB-2048-46	20' min. - 48' max.	-20	5.00	600	720	5a, 7, 7a	4	18

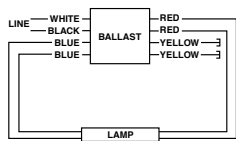


Diagram 1a

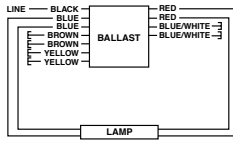
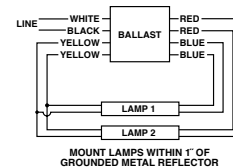
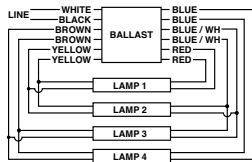


Diagram 1b



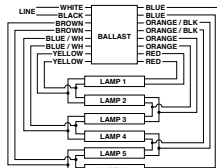
MOUNT LAMPS WITHIN 1' OF GROUNDED METAL REFLECTOR

Diagram 2a



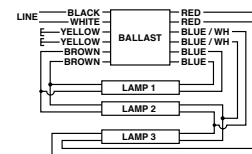
MOUNT LAMPS WITHIN 1' OF GROUNDED METAL REFLECTOR

Diagram 4a



MOUNT LAMPS WITHIN 1' OF GROUNDED METAL REFLECTOR

Diagram 5a



INDIVIDUALLY CAP THE YELLOW LEADS

Diagram 6a

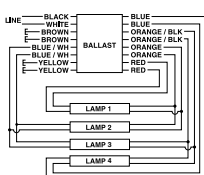
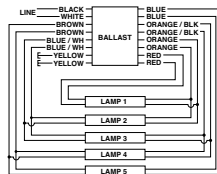


Diagram 7



INDIVIDUALLY CAP THE YELLOW LEADS

Diagram 7a

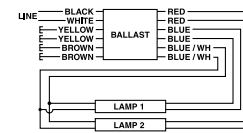


Diagram 9

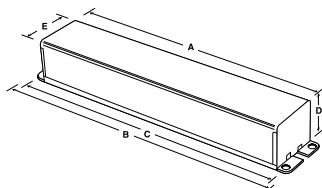
PLASTIC SIGN FLUORESCENT BALLASTS DIMENSION CHART - STANDARD CASE (INCHES)

Ref. #	A	B	C	D	E
1	10 37/64"	11 45/64"	11 9/64"	1 3/4"	3 3/16"
2	10 37/64"	11 45/64"	11 9/64"	2 43/64"	3 3/16"
3	13 3/16"	14 5/16"	13 3/4"	2 43/64"	3 3/16"
4	15 3/16"	16 11/16"	16 1/8"	2 43/64"	3 3/16"

Diagrams Notes:

Note 1: When operating a two-lamp ballast on one lamp insulate each yellow lead.

Note 3: When operating a four-lamp ballast on three lamps insulate each yellow blue/white, and brown lead.



UNIVERSAL® MAX-3 HIGH OUTPUT SIGN BALLASTS

- Superior fill material coats all components and fills all voids to dissipate heat for cooler operation, longer life.
- Supports 1 to 6 lamps, 2 to 48 feet total length
- Low watt-loss steel lamination and all-copper coils assure cooler, more efficient operation and performance.
- Class P thermally protected



MAX-3 BALLASTS

Catalog Number	Total Lamp Footage	Start Temp (°F)	Max. Line Cur.	Max. Input Watts	Open Circuit Volt.	Wiring Diagram	Dimen. Chart Ref.	Weight (lbs.)
MAX-3 HIGH OUTPUT SIGN BALLASTS 800mA RS LAMPS - 120 Volts - 60 Hz								
ONE TO SIX LAMP BALLASTS								
USB-0218-16	2' min. - 18' max.	-20°	2.00	240	625	3, 4, 5, 6, 7, 8	1	15
USB-1232-16	12' min. - 32' max.	-20°	3.50	410	970	3, 4, 5, 6, 7, 8	1	16
USB-1048-16	10' min. - 48' max.	-20°	4.80	570	800	1, 2, 3, 4, 7, 8	2	18

See page 6-3 for Lead Lengths

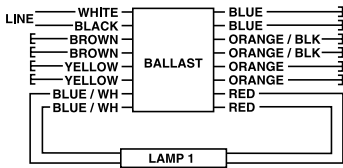


Diagram 1

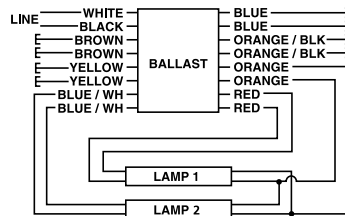


Diagram 2

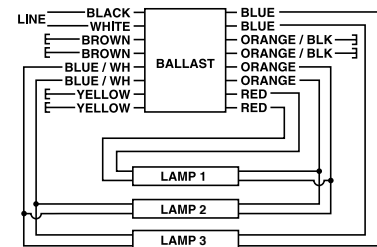
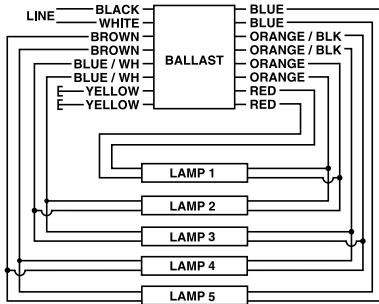


Diagram 3



INDIVIDUALLY CAP THE YELLOW LEADS

Diagram 4

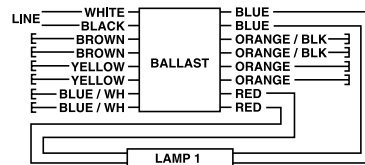


Diagram 5

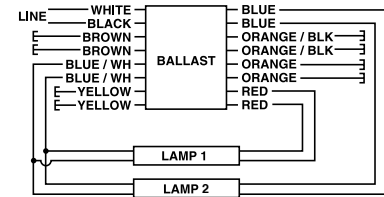


Diagram 6

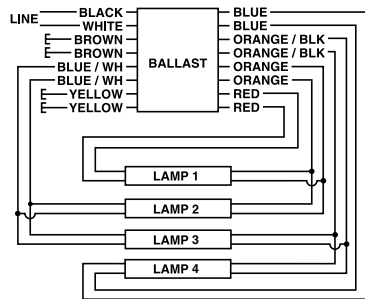


Diagram 7

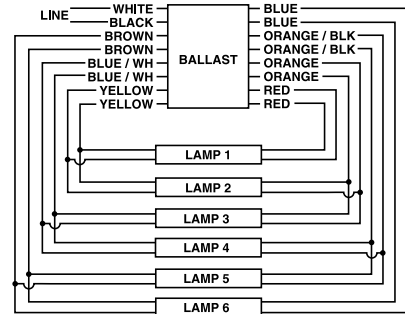
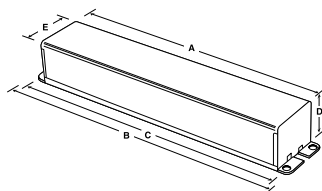


Diagram 8



MAX-3 SERIES HIGH OUTPUT SIGN BALLASTS DIMENSION CHART

Ref. #	A	B	C	D	E
1	13 ^{3/16} "	14 ^{5/16} "	13 ^{3/4} "	2 ^{43/64} "	3 ^{3/16} "
2	15 ^{9/16} "	16 ^{11/16} "	16 ^{1/8} "	2 ^{43/64} "	3 ^{3/16} "

Diagrams Notes:

Note 1: When operating a two-lamp ballast on one lamp insulate each yellow lead.

Note 2: When operating a three-lamp ballast on two lamps insulate each yellow and blue/white lead.

Note 3: When operating a four-lamp ballast on three lamps insulate each yellow blue/white, and brown lead.

- Instant start for maximum energy savings
- Simplified wiring for fewer connections
- Universal input voltage
- Parallel Lamp Operation

Catalog Number	Total Lamp Footage	Start Temp (°F)	Input Voltage	Max. Input Watts	Max. Line Current (A)	Wiring Diagram	Dimen. Chart Ref.	Weight (lbs.)
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T12HO UP TO 8' IN LENGTH OR T8HO UP TO 6' IN LENGTH - 120 to 277 Volts - 50/60 Hz

ONE TO TWO LAMP BALLASTS

ESB216-12	2' min. - 16' max.	-20	120	134	1.12	10	1	4.2
			277	130	0.47			

ONE, TWO, THREE OR FOUR LAMP BALLASTS

ESB432-14	4' min. - 32' max.	-20	120	280	2.34	11	2	7.4
			277	274	0.99			

FOUR, FIVE OR SIX LAMP BALLASTS

ESB848-46	8' min. - 48' max.	-20	120	408	3.41	12	3	9.7
			277	395	1.47			

T12HO UP TO 8' IN LENGTH OR T8HO UP TO 8' IN LENGTH - 120 to 277 Volts - 50/60 Hz

ONE, TWO, THREE OR FOUR LAMP BALLASTS

ESB1040-14	10' min. - 40' max.	-20	120	341	2.85	11	3	10
			277	331	1.25			

Consult www.signasign.com for complete specification information

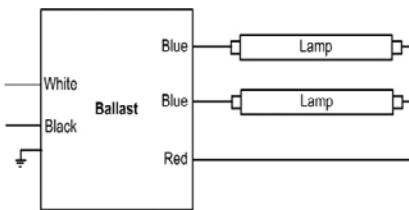


Diagram 10

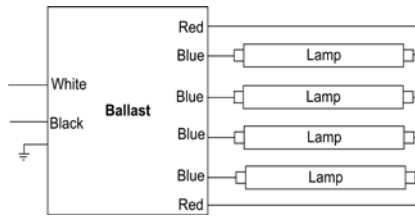


Diagram 11

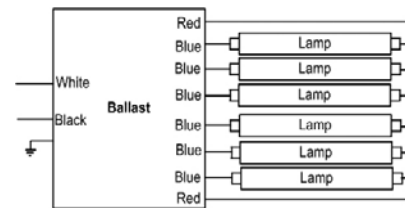
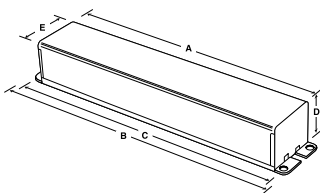


Diagram 12



**ELECTRONIC SIGN BALLASTS
DIMENSION CHART - STANDARD CASE (INCHES)**

Ref. #	A	B	C	D	E
1	10 ^{37/64} "	11 ^{45/64} "	11 ^{9/64} "	1 ^{3/4} "	3 ^{3/16} "
2	13 ^{3/16} "	14 ^{5/16} "	13 ^{3/4} "	2 ^{43/64} "	3 ^{3/16} "
3	15 ^{9/16} "	16 ^{11/16} "	16 ^{1/8} "	2 ^{43/64} "	3 ^{3/16} "

Diagrams Notes:

When Operating less than the maximum number of lamps, insulate unused blue leads.

Glossary

AC (Alternating Current)—Current which passes from the generator in one direction and then the other, alternately

ANSI (American National Standards Institute)—Non-profit organization that generates voluntary product performance standards for many U.S. industries. ANSI Standard C82.1 applies to electromagnetic ballasts.

Arc—Intense luminous discharge formed by the passage of electric current across a space between electrodes.

Auto Reset Shutdown Circuit—Circuit senses lamp end of life and will automatically shut off power to the lamp(s). When a new lamp is inserted in the socket, the ballast resets, and turns on the lamp automatically. Some shutdown circuits require the power to be interrupted before a new lamp will re-light.

Ballast—Device for starting and regulating fluorescent and high intensity discharge lamps.

Ballast Efficacy Factor (BEF)—Value used to evaluate various lighting systems based on light output and power input. The BEF can only be used to compare systems operating the same type and quantity of lamps.

Ballast Factor (BF)—Measure of light output from lamp operated by commercial ballast as compared to a laboratory standard reference ballast. Ballast factor .94 means ballast produces 94% of light produced by ANSI C82.2 reference ballast operating same lamps.

Ballast Hum—Sound generated by the vibration of laminations in the electromagnetic field that transforms the current for discharge lamp use.

Ballast Losses—Power which is supplied to a ballast that is not converted into lamp energy. Ballast loss is dissipated as heat.

Bottom Exit (BE)—A configuration with leads or a wire-trap on the bottom or base of the ballast. This type of configuration is usually used when the ballast is mounted onto a junction box plate.

Bottom Exit Studs (BES)—A configuration with screw studs mounted on the base plate or bottom of the ballast. The screws are 3/8" inches long with a #8-32 thread size (#8-32 nut). They are mounted on a two-inch center. The studs are usually used to mount the ballast directly onto a junction box plate.

 **Canadian Energy Standards**—Indicates ballast complies with Canadian Energy Standards and meets the requirements of CAN/CSA-C654-M91.

 **Canadian Standards Association (CSA)**—Association that generates product performance and safety standards for many Canadian industries.

Capacitor—Device in ballast that stores electrical energy. Often used for power factor correction and lamp regulation (see "Power Factor").

Cathode—See "Electrode"

Centigrade (C)—Celsius temperature scale where 0°C = 32°F.

Circle E—Designates a ballast meets or exceeds the requirements of Public Law 100-357 establishing standards of efficiency.

Class P Thermal Protector—A switching device sensitive to current and heat that automatically disconnects ballast if the ballast temperature exceeds UL temperature limitations.

Coil—Windings of copper or aluminum wire surrounding the steel core in ballast.

Core—Component of electromagnetic ballast that is surrounded by the coil. Core is comprised of steel laminations or solid ferrite material.

Core & Coil Ballast—Another term for an electromagnetic ballast.

Crest Factor (Lamp Current Crest Factor)—Ratio of peak lamp current to RMS or average lamp operating current.

Efficacy—Lumen output per unit of power supplied to ballast (lumens per watt).

Electrical Testing Laboratory (ETL)—Independent testing laboratory that performs ballast tests and certifies accuracy of performance data.

Electrode—Metal filaments that emit electrons in a fluorescent lamp. Negatively charged free electrons emitted by one electrode are attracted to the positive electrode (anode), creating an electric current and arc between electrodes.

Electromagnetic Ballast (Magnetic Ballast)—A ballast that uses a "Core & Coil" assembly to transform electrical current to start and operate fluorescent lamps.

EMI (Electromagnetic Interference)—Electrical interference (noise) generated by electrical and electronic devices. Levels generated by high frequency electronic devices are subject to regulation by Federal Communications Commission (FCC).

Filament—Metal Tungsten wire coated with Barium Oxide that emits electrons when voltage is applied.

Filament Voltage—Voltage applied to the lamp cathode.

Fluorescent Lamp—Gas filled lamp in which light is produced by the interaction of electrons with phosphors lining the lamp's glass tube.

Foot Candles—Measure of light level on a surface being illuminated. Defined as one lumen of light per one square foot of surface area.

Four-Pin Compact Fluorescent Lamps—Type of lamps that do not have any starter built into the base of the lamp. Therefore, the ballast has the starting circuit. Traditionally 4-pin lamps are designed to work with electronic ballasts; however, Universal does offer magnetic ballasts to operate some 4-pin lamps.

Frequency—Rate of alteration in an AC current. Expressed in cycles per second or Hertz (Hz).

Harmonic—An integral multiple of the fundamental frequency (60 Hz) that becomes a component of the current (see "Harmonic Distortion").

Harmonic Distortion—Distortion of an AC waveform caused by multiples of the fundamental frequency (harmonics). Odd triplet harmonics (thirds, ninths, etc.) may result in large currents on the neutral line in a four-wire Wye three-phase system.

Hertz (Hz)—Unit used to measure frequency of alteration of current or voltage; cycles per second.

Glossary

High Efficiency (Energy Saving) Electromagnetic Ballast—Ballast with Core & Coils, designed to minimize ballast losses compared to the “standard” ballast.

High Intensity Discharge (HID) Lamp—A lamp containing a filled arc tube in which the active element becomes vaporized (a gaseous state) and is discharged into the arc stream to produce light.

High Power Factor—A ballast whose power factor is corrected to 90% or greater by use of a capacitor.

Incandescent Lamp—Lamp in which light is produced by a filament heated by an electric current.

Input Voltage—Power supply voltage required for proper operation of an arc discharge lighting ballast.

Inputs Watts—The total power input to the ballast which includes lamp watts and ballast losses. The total power input to the fixture is the input watts to the ballast or ballasts and is the value to be used when calculating cost of energy and air conditioning loads.

Instant Start Lamp—a fluorescent lamp with a single pin at each end. The lamp is ignited by a high voltage without any filament heating.

Instant Start—Lamp starting method in which lamps are started by high voltage input with no preheating of lamp filaments. Some rapid start lamps are designed so that they may be instant started.

Laminations—Layers of steel, making up the “core” that is surrounded by the coils in a core & coil ballasts.

Lamp Current Crest Factor—See “Crest Factor.”

Lamp Filament—See “Electrode.”

Lamp Watts—Input power used to operate lamps.

Lumens/Watt—A measurement of white light produced by each output watt.

Metal Cases—Case design used in both magnetic and electronic ballasts. These ballasts are grounded once they are mounted to the fixture. They meet all safety codes, some of which do not allow plastic in open plenum areas.

National Electric Code (NEC)—A nationally accepted electrical installation code to reduce the risk of fire, developed by the National Fire Protection Association.

National Energy Standards for Fluorescent Ballasts—A federal law enacted in 1988 that sets energy standards for ballasts consistent throughout the United States.

NOM—Laboratory that sets safety standards for building materials, electrical appliances and other products for Mexico.

Non-PCB Capacitor—Capacitor used in ballasts to help provide power factor correction. Contains no polychlorinated biphenyls and meets EPA requirements.

Normal Power Factor—Ballasts with power factor less than .90 and do not incorporate any means of Power Factor Correction.

Parallel Lamp Operation—Refers to ballasts that employ multiple-output current paths from a single ballast to allow lamps to operate independent of one another, allowing other lamps operated by the ballast to remain lit should companion lamp(s) fail.

PCB (Polychlorinated Biphenyls)—Chemical pollutant formerly used in ballast capacitors.

Potting—Material used to completely surround and cover components of some magnetic and electronic ballasts. Potting compound fulfills functions of protecting components, dampening sound, and dissipating heat.

Power Factor—Measurement of the relationship between the AC source voltage and current. High power factor ballasts require less AC operating current operating at the same wattage than an equivalent low power factor ballast. Formula: Power Factor equals Input Watts divided by the product of Line Volts times Line Amps (Volt Amps or VA).

Power Factor Corrected—Ballasts that incorporate a means of Power Factor Correction but whose power factor is <90% and >50%.

Preheat Lamp—A fluorescent lamp in which the filament must be heated by use of a starter before the arc is created. These lamps are typically operated with electromagnetic ballasts.

Programmed Rapid Start—lamp starting method which preheats the lamp filaments while not allowing the lamp to ignite and then applies the open circuit voltage (OCV) to start the lamp. The user may experience a half to one-second delay after turning on the lamps while the pre-heating takes place. This type of starting circuit keeps lamp end blackening to a minimum and improves lamp life performance, especially in applications where the lamps are frequently switched on and off.

Rapid Start Lamp—A fluorescent lamp with two pins at each end connected to the filament. The filaments are heated by the ballast to aid in starting. Some rapid start lamps may be instant started without filament heat, for example, the F32T8 lamp.

Rapid Start—Lamp starting method in which lamp filaments are heated while open circuit voltage (OCV) is applied to facilitate lamp ignition.


Series Lamp Operation—Refers to ballasts that employ a single current path passing through all lamps operated by the ballast. If one lamp should fail, companion lamps operated by the same ballasts will also extinguish or dim.

Standard Alternating Current Frequency in the United States—60 Hertz (Hz) or 60 cycles per second.

Total Harmonic Distortion (THD)—The combined effect of Harmonic Distortion on the AC waveform produced by a ballast or other device. Expressed as a percentage. Excessive levels of THD can create large currents on the neutral line of a four-wire Wye three phase system. (See “Harmonic Distortion”)

Transients—High voltage surges through an electrical system caused by lightning strikes to nearby transformers, overhead lines or the ground. May also be caused by switching of motors and compressors, as well as by short circuits or utility system switching. Can lead to premature ballast failure.

Two-Pin Compact Fluorescent Lamps—Type of lamps that have the glow bottle starter built into the base of the lamp. Traditionally 2-pin lamps are designed to work with electromagnetic ballasts.

 UL (Underwriters' Laboratories, Inc.)—Laboratory that sets safety standards for building materials, electrical appliances and other products.

Watts—Measurement of electrical ability to do work.

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Limited Warranty



Universal Lighting Technologies, 26 Century Blvd., Suite 500, Nashville, TN 37214-3683, 1-800-BALLAST, (hereinafter called "Universal") warrants to the purchaser that its lamp ballasts (hereinafter called "Lighting Products") will be free from defects in material and workmanship for the specified warranty periods beginning from the date of manufacture.

TRIAD Electronic Fluorescent Ballasts	up to 60 Months*
Universal, Energy Saving Electromagnetic Fluorescent Ballasts	36 Months
AddressPro, SuperDim, and DaliPro Ballasts	36 Months
Standard Universal Electromagnetic, Fluorescent & HID Ballasts	24 Months
Universal Sign Ballasts	24 Months
MAX-3 Series Sign Ballasts	36 Months
Basic-12 and Homestar Electronic Ballasts	36 Months
VS Lampholders	36 Months
VS Brand Magnetic IEC, Electronic IEC, Ignitors, Switches and Capacitors	36 Months
Electronic HID	up to 60 Months*
LED Drivers	60 Months
LED Modules	36 Months

Defect defined as 1 or more individual LEDs dark at initial start or > 10% of individual LEDs dark during the warranty period. The above warranty periods are based on 4000hrs/yr operation of the LED Lighting Products in normal operating conditions in compliance with the written specifications of Universal. Replacement and/or repair of individual LED Lighting Products does not extend the warranty beyond the original warranty period.

**Consult individual product information sheets at www.unvlt.com for specific warranty information.*

If it appears within the specified warranty period that any Universal Lighting Product does not meet the warranty specified above, Universal will provide a replacement lighting product. Universal extends this limited warranty to the first end-user purchaser only. This warranty is conditional based upon proper storage, installation, use and maintenance.

This warranty is not applicable to, and Universal makes no warranty whatsoever with respect to, any Lighting Product not installed and operated in accordance with the National Electric Code (NEC), the Standards for Safety of Underwriters Laboratories, Inc. (UL), Standards for the American National Standards Institute (ANSI), in Canada, the Canadian Standards Association (CSA), or the International Electrotechnical Commission (IEC). Nor is this warranty applicable to any Lighting Product which has not been installed and operated in accordance with Universal's specifications and connection diagrams or Lighting Products which have been submitted to abnormal operating conditions. This includes, but is not limited to, excessive temperatures as specified in Universal's published literature. The conditions for any tests (to be) performed on Lighting Products which are claimed to have not performed in accordance with the terms of the warranty shall be mutually agreed upon in writing and Universal may be represented at any such tests.

NO IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE SHALL APPLY BEYOND THE AFOREMENTIONED WARRANTY PERIOD. The foregoing warranty is exclusive of all other statutory, written or oral warranties and no other warranties of any kind, statutory or otherwise, are given or herein expressed. Warranty claims are to be made in accordance with Universal's published Warranty Service Program, which is available upon request. This warranty sets forth Universal's obligations and responsibilities regarding its Lighting Products and is the exclusive remedy available to the claimant.

LIMITATIONS OF LIABILITY. Under no circumstances, whether as a result of breach of contract, breach of warranty, tort, strict liability or otherwise, will Universal be liable for consequential, incidental, special or exemplary damages, including, but not limited to, loss of profits, loss of use or damage to any property or equipment, cost of capital, cost of substitute product, facilities or services, down time costs or claims of claimant's customers. Universal's liability for all claims of any kind or for any loss or damages arising out of, resulting from or concerning any aspect of this warranty or from the Lighting Products or services furnished hereunder, shall not exceed the price of the specific Lighting Product which gives right to the claim, except in accordance with Universal's Technical Engineering Service Program.

STATE LAW RIGHT. Some states do not allow the exclusion or limitation of consequential or incidental damages or the duration of time for an implied warranty. Therefore, the limitations or exclusions of consequential or incidental damage and implied warranties may not apply to certain claimants. This warranty provides the claimant with specific legal rights and claimants may have other rights that vary from state to state.



UniversalTM Lighting Technologies

IT'S EASY TO REACH US...



Universal Lighting Technologies, Inc.
26 Century Blvd., Suite 500
Nashville, TN 37214-3683



General Info: (615) 316-5100

For Technical Engineering Services (TES), application support and warranty information, call 1-800-BALLAST



Website: www.unvlt.com

Email: webmaster@unvlt.com
