



Understanding Electronic UltraMax® HID Ballasts



GE offers a complete line of electronic ballasts for HID lighting systems. Electronic HID, like **electronic fluorescent systems that preceded it**, significantly improve the performance of HID lighting. Electronic UltraMax® eHID Ballasts use solid-state components to start and operate HID lamps. Electronic eHID ballasts use IC chips to control and give feedback for optimal performance of the lighting system. GE eHID ballasts improve the efficiency, maintain higher lumens, enhance lamp life and color control, and operate more quietly than the magnetic core and coil ballast that they replace.

GE's line of UltraCool™ UltraMax® eHID ballasts can provide up to 70% energy savings and four times the life of standard halogen. End users can meet strict watts per square foot requirements while achieving significant wattage savings and color control with ceramic metal halide lamps and GE eHID ballasts.

GE's UltraMax® eHID ballasts operate **only pulse start and ceramic metal halide lamps**. **GE UltraMax® eHID ballasts operate lamps at a low frequency square wave** to maximize lamp performance. Extensive analysis of all brands of lamps suggests that the most compatible driving waveform for an electronic HID electronic ballast is a low-frequency squared wave (L.F.S.W.) with higher order harmonic content. L.F.S.W. has been established as a dependable method of ballasting low-wattage HID lamps with significant industry support. Analysis of lamp data has shown that there are limited operating bands between 1 kHz to 200 kHz in which electronic ballast could operate a lamp wattage family without causing unacceptable arc instability due to acoustic resonance. GE's UltraMax® eHID constantly measures and adjusts the wattage, optimizing the ceramic metal halide lamp performance.

GE high-wattage eHID ballasts will operate 250, 300, 320,350 or 400 watt pulse start or ceramic metal halide lamps with one ballast. The eHID Ballast with a PulseArc lamp will produce 70% more lumens per watt than the obsolete probe start magnetic core and coil system. Variable dimming to 50% power reduction is an option with GE eHID high wattage ballast.

GE Ballast HID Electronic nomenclature

G E M H 1 0 0 M S F - 1 2 0			
GE Ballast GEMH = Electronic MH Lamp Watts	Housing MA=Metal Housing ML=Mini Slim MS=Mini Square SL=Slim Line E=PCB board	Connector F = Side leads w/ feet N = Side leads no feet J = Bottom leads w/ studs JN = Bottom leads no studs	Voltage 120 = 120 volt 277 = 277 volt 347 = 347 volt 480 = 480 volt MV = 120-277 volts
			Pack Type No extension = Standard Distributor Pack B=Bulk pack



Understanding Electromagnetic HID Ballasts



GE offers High Intensity Discharge (HID) ballasts for mercury, probe start metal halide, pulse start metal halide and high pressure sodium lamps. Standard metal halide lamps or probe start metal halide over 150 watts, like fluorescent, are electric discharge lamps and require an open circuit voltage of nearly two times the operating voltage to initiate the arc between the two electrodes in the arc tube. High pressure sodium, pulse start metal halide and probe start metal halide lamps 150 watts or less require an igniter to initiate the high voltage to start the lamps. The ballasts provide the starting voltage with the igniter, where required, and provides stability for the lamp. HID lamps have negative impedance characteristics and would draw current until destruction unless a ballast was in place to regulate the current.

HID lamps take several minutes to warm-up and reach full light output. If power is interrupted between the lamp and the ballast, the arc will extinguish and lamp will go out. The lamp must cool down and reduce the vapor pressure before it will re-start. Typical warm-up and restrike times are as follows:

Light Source	Warm-Up Time	Restrike Time
Metal Halide (Probe Start)	3-4 minutes	10-20 minutes
Metal Halide (Pulse Start)	2 minutes	3-4 minutes
High Pressure Sodium	7-10 minutes	1/2-1 minute

GE HID Ballast Types

CORE AND COIL

The most common HID ballasts are the core and coil and is used in 90% of the fixture applications. Core and coil ballasts consist of one, two or three copper (or aluminum) coils on a core of electrical-grade steel laminations. HID ballasts are classified by the kind of circuit they use: Reactor (R), High Reactance autotransformer (HX), Constant Wattage Autotransformer (CWA), Regulated lag (Reg Lag) or Electronic. HID ballast are also classified as high power factor (HPF) or normal power factor (NPF).

GE HID ballast 150 watts or less have High Reactance Autotransformer circuits and high power factor (HX-HPF). GE HID ballast greater that 150 watts have Constant Wattage Autotransformer circuits and are high power factor (HPF).

CWA ballast is the most common circuit for core and coil ballast. CWA circuits provide for stable light regulation. The CWA circuit consists of a high reactance autotransformer with a capacitor in series with the lamp resulting with high power factor ballast. In most CWA ballast circuits a 10% drop in line voltage will only reduce the light output and wattage by 5%. The CWA circuit ballast requires an igniter for QMH pulse start, ceramic metal halide and HPS lamps. Igniters are also required for QMH lamps 150 watts or less.

Distributor Ballast Kits

GE stocks a comprehensive inventory of **quad and 5-tap HID voltage ballast kits**. The kits contain the appropriate core and coil, capacitor, ignitor (where required), mounting bracket, mounting hardware and instructions to allow the stocking distributor to meet the needs of their customer while minimizing their investment in component parts. The quad ballast kit has color-coded leads to identify voltages and operates at 120/208/240/277. **The 5-tap HID ballast kits also include 480-volt applications** and are listed as ML5, though GE also offers single-voltage kits for 480-volt with 120-volt taps for stand-by lighting.

Also available for metal halide and high pressure sodium applications is the **5-tap ballast-lamp replacement kit listed as -55**. This easy-to-carry, convenient, all-in-one kit, ensures ballast-lamp compatibility by including the lamp as well.

Ignitors and capacitors, where required, are included with the quad and 5-tap ballast kits.

Capacitors

Most GE capacitors and ignitors are sold in ballast kits that come pre-wired and reduce labor cost. Capacitors and ignitors are also sold separately.

Power factor capacitors are used to reduce the negative effects that inductive devices (HID ballast) have on power factor ratings. GE sells a complete line of capacitors that must be properly matched to the lamp and HID ballast. GE capacitors have bleed-in resistors and use biodegradable, nontoxic (no PCBs) dielectric fluid.

GE Oil-filled Capacitors are packaged in metal cases (up to 520V ratings). All GE capacitors are designed for 60,000 hours of continuous life.

Dry Capacitors do not contain oil and are manufactured with plastic casing. Dry casings are rated up 100°C maximum.

Dry capacitors are designed and rated for AC voltages below 400V at 50 or 60Hz.

Ignitors

Ignitors are also sold in individual cartons for replacement needs. Ignitors supply a high voltage pulse to ionize the gas creating the glow discharge. Once the lamp is started the ignitor stops providing the pulse. Ignitors are designed to last thousand of hours; however, if the lamp fails or the socket is empty, the ignitor will continue to pulse. The lamps should be replaced or the fixture turned off to prevent premature failure of the ignitor.

Standard ignitors are supplied with metal halide ballast 150 watts or less, pulse start metal halide and high-pressure sodium ballast. There are several different ignitors that meet the needs of many GE lamp and ballast combinations. The appropriate ignitor is listed in the catalog under the ballast specifications.

Potted Core and Coil Ballast

GE potted core and coil ballasts are designed for applications requiring quieter or cooler operation than provided by standard coil and coil ballast. The potting material is sand-filled polyester which provides excellent sound-deadening and heat-transfer qualities.

F-Can Ballast

GE F-Can ballast is recommended for indoor applications and where ballast noise must be minimized. F-Can ballast are encased in fluorescent ballast-type cans and potted with asphalt insulating materials to minimize noise.

Ballast Date and Temperature Codes

Date Codes

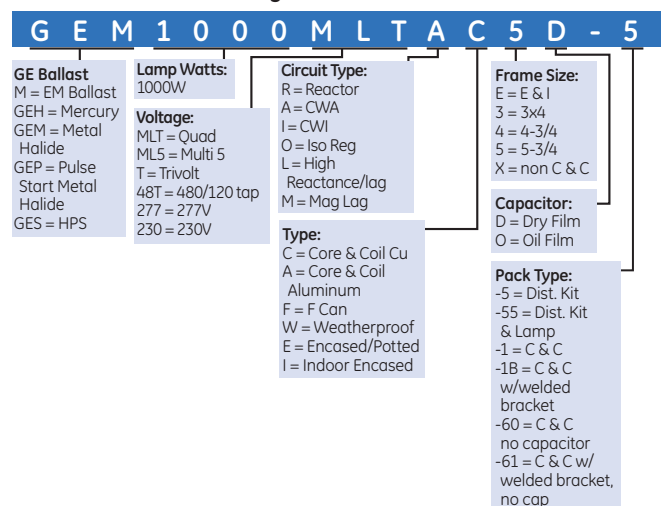
GE HID core and coil ballast manufacturing date codes are located on the top end of the core. They are printed in white and indicate year, month manufactured, and order the ballast was manufactured in the month. A code of 070100001 would indicate manufacture date of 07 (year 2007), 01 (month of January), and 00001 would be the manufacturing sequence.

UL Bench Top Temperature Code

To help with UL inspection, the UL Bench top code is listed on the GE label on the core and coil ballast as 1029X. X is the temperature code and represented by the following temperature classifications: A, B, C, D, E and F.

UL Bench Top Letter Code	Temperature Range for Class H (180C) Ballast
A	Less than 75C
B	75C < 80C
C	80C < 85C
D	85C < 90C
E	90C < 95C
F	95C < 100C

GE Ballast HID Electromagnetic nomenclature



Metal Halide

HID Electronic and Electromagnetic Ballasts For 250 – 1500W Metal Halide HID Lamps

78522 – GEM250TRIAC4-5

Metal Halide

1 – 250W M58 Tri Tap (120/277/347V)

General characteristics	
Ballast Type	Magnetic – Core and Coil
ANSI Lamp Codes	M58
Voltage	120/277/347
Line Voltage Regulation (+/-)	10%
Circuit Type	CWA
Insulation Class	Class N, 200C
Type of Capacitor	Oil filled
Capacitance	15 Mfd GECAP-15/400V-O
Voltage (MIN)	450
Capacitor Temperature Rating	105°C (221°F)
GE Igniter	
Sound Rating	
Additional Info	

Electrical characteristics	
Supply Current Frequency	50 Hz/60 Hz

Order information		
Type	No. Items Per Sales Unit	No. Items Per Standard Package
Distributor Kit	1	6

Specifications by lamp and line voltage				
Lamp	Specifications by line voltage			
M58 250W MH	120	277	347	
	System Wattage (W)	290	290	290
	Nominal Current	2.5A	1.08A	0.86A
	Ballast Factor	1	1	1
	Ballast Efficiency Factor	0.85	0.85	0.85
	Max Input Current	2.75 A	1.19 A	0.95 A
	Starting Current	2.30 A	2.30 A	2.30 A
	Open Circuit Voltage	305V	305V	305V
	Drop Out Voltage	72V	166V	208V
	Power Factor (>=)%	90	90	90
	Min. Starting Temp (°F/°C)	-20 / -29	-20 / -29	-20 / -29
	Fuse Rating	8	3	3
	UL Bench Top Rise	A	A	A

Safety and performance  UL Listed

- Magnetic ballast construction ideal for a wide variety of lighting applications
- Precision-wound coils, ensuring even heat dissipation and the highest electrical integrity
- Distributor replacement kit contains the appropriate core and coil with color coded leads, a properly rated capacitor and ignitor (if required) and all other components required for ballast replacement
- Tri Tap ballast (120/277/347)

Dimensions	
Wiring diagram HID W-(M) – see example on page 18-69	
Case dimensions – Ref Drawing PC1 – see page 18-71	
Length (L)	5.25 in (133 mm)
Width (W)	1.25 in (32 mm)
Mounting dimensions	
Mount Length (M)	
Mount Width (X or F)	
Mount Slots (MS)	
A	2.17 in (55 mm)
B	3.62 in (92 mm)
Weight	10.02 lbs
Exit Type	Side
Nominal Length	4.37 in (111 mm)
Frame Size (H x L)	4.25 in (108 mm) x 4.75 in (121 mm)

87212 – GEM250ML5AC4-5

Metal Halide

1 – 250W MH M58 or 5-Tap (120/208/240/277/480V)

General characteristics	
Ballast Type	Magnetic – Core and Coil
ANSI Lamp Codes	M58
Voltage	120/208/240/277/480
Line Voltage Regulation (+/-)	10%
Circuit Type	CWA
Insulation Class	180C
Type of Capacitor	Oil filled
Capacitance	15 Mfd GECAP-15/400V-O
Voltage (MIN)	400
Capacitor Temperature Rating	100°C (212°F)
GE Igniter	
Sound Rating	
Additional Info	

Electrical characteristics	
Supply Current Frequency	60 Hz

Order information		
Type	No. Items Per Sales Unit	No. Items Per Standard Package
Distributor Kit	1	3

Specifications by lamp and line voltage						
Lamp	Specifications by line voltage					
M58	120	208	240	277	480	
	System Wattage (W)	293	293	293	293	293
	Nominal Current	4.00 A	2.30 A	2.00 A	1.70 A	1.00 A
	Ballast Factor	1	1	1	1	1
	Ballast Efficiency Factor	0.85	0.85	0.85	0.85	0.85
	Max Input Current	2.50 A	1.40 A	1.30 A	1.10 A	0.65 A
	Starting Current	2.50 A	1.40 A	1.20 A	1.00 A	0.60 A
	Open Circuit Voltage	300V	300V	300V	300V	300V
	Drop Out Voltage	96V	166V	192V	222V	384V
	Power Factor (>=)%	90	90	90	90	90
	Min. Starting Temp (°F/°C)	-22 / -30	-22 / -30	-22 / -30	-22 / -30	-22 / -30
	Fuse Rating	8	5	4	3	2
	UL Bench Top Rise	A	A	A	A	A

Safety and performance  UL Listed

- Magnetic ballast construction ideal for a wide variety of lighting applications
- Precision-wound coils, ensuring even heat dissipation and the highest electrical integrity
- Distributor replacement kit contains the appropriate core and coil with color coded leads, a properly rated capacitor and ignitor (if required) and all other components required for ballast replacement
- 5-tap ballast (120, 208, 240, 277, or 480 volt) featuring a 480-volt tap

Dimensions	
Wiring diagram HID W-(K) – see example on page 18-69	
Case dimensions – Ref Drawing PC2 – see page 18-71	
Length (L)	5.25 in (133 mm)
Width (W)	1.25 in (32 mm)
Mounting dimensions	
Mount Length (M)	4.6 in (117 mm)
Mount Width (X or F)	
Mount Slots (MS)	0.25 in (6 mm)
A	1.8
B	3.6
Weight	10.80 lbs
Exit Type	Side
Nominal Length	3.2 in (83 mm)
Frame Size (H x L)	4.25 in x 4.75 in
Lead lengths	
Orange	
Violet and Black	
Violet/White	
Black/Yellow	