



Ballast Product Guide

Welcome to our Ballast Products Catalog. We have updated our ballast offerings to better meet the needs of our customers. Our Electronic Ballast section has been completely revised to include more multi-volt, small case, and micro-can options. And, because Howard Lighting is committed to promoting environmentally friendly products, we've added the high-efficiency multi-volt line of ballasts to our product offerings.

Legislation has impacted some of our current ballast offerings. Because we support the transition to environmentally friendly ballasts, our HID Pulse Start family is in full compliance with the Energy Independence and Security Act of 2007 (EISA2007) efficiency standards. Howard Lighting will continue to sell magnetic fluorescent ballasts impacted by EPCACT2005 through the scheduled cutoff date of 2010, along with magnetic ballasts that are unaffected by this legislation.

While our product offerings have expanded considerably within the last few years, our commitment to provide product literature that is user-friendly remains the same. We sort our ballast information by lamp type to help you quickly find the ballast product that best suits your individual needs.

Our ballast product lines include electronic fluorescent, magnetic fluorescent, electronic compact fluorescent, high intensity discharge, and sign ballasts. Each ballast section provides you with a product image in its overview section, as well as specifications, ordering/specification data, wiring diagrams, and case dimensions. You will also find specific product information within each section. For example, you will find lead length information in the electronic and magnetic fluorescent sections, and capacitor, starter, and bracket information in the HID ballast section. Our goal was to create an informational piece of literature to enhance product knowledge, and assist our customers in selecting the very best lighting solutions for their projects. We hope you feel that we have succeeded.

In addition to our ballast product line, Howard Lighting features a full line of lamp and fixture offerings. Contact a Howard sales representative or a member of our support staff with questions or comments.



Howard Corporate Headquarters

Howard Industries' corporate headquarters and computer and medical cart manufacturing facilities are nestled within the 504-acre Howard Technology Park.

Building highlights:

- 60,000 sq ft of office space
- 72,000 sq ft of manufacturing space
- 3,200 sq ft bridge way connecting offices to manufacturing facility

Power Solutions



Howard Power Solutions, originally known as Howard Industries, was founded in 1968 by Billy W. Howard, Sr. Over the past four decades, this company has grown to be the nation's leading manufacturer of distribution transformers, with over 7 million transformers in service throughout the United States and abroad. Located in Laurel, MS, this facility has 2 million square feet, making it the largest transformer plant in the world. Our newest transformer division, Howard Substation Transformers, located near corporate headquarters, began manufacturing operations in April 2005 producing power transformers with higher KVA and voltage ratings.

Technology Solutions



Our new Corporate Headquarters is also home to our technology division, Howard Technology Solutions, and its medical division, Howard Medical. These 2 divisions bring to market cutting-edge, high-quality technology and medical equipment. Whether selling Howard-manufactured products such as desktops, notebooks, servers, and medical carts or partnering with other industry-leading companies to provide over 190,000 products, one can be sure when you buy from Howard, the needed equipment is available at affordable prices.

Lighting Products



Howard Lighting Products markets a vast portfolio including electronic and magnetic fluorescent ballasts, magnetic HID ballasts, as well as fluorescent lamps, T5/T8 fluorescent lamps, and halogen lamps. This division continually updates their product lines to meet the ever-changing demands of the market. They currently have products in use at Johnson Space Center, Kennedy Space Center, Camp Pendleton, CIA Headquarters, Fort Bragg, and numerous other U.S. government installations, as well as many, many private facilities.

Transportation



Howard Transportation, a wholly-owned subsidiary of Howard Industries, Inc., operates a full-load, long-haul, flat-bed common carrier truck line and brokerage firm that transports commodities and industrial goods throughout the continental United States. Initially started to transport Howard Power Solutions' raw materials and finished products, this division today consists of over 200 trucks with regional terminal facilities also located in West Virginia and North Carolina.

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Fluorescent Electronic Ballast

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Electronic
Ballast

Electromagnetic
Ballast

Compact
Fluorescent Ballasts

HID

Sign
Ballast



Instant Start



Instant Start CFL/Long Tube



Product Overview

Rapid Start



Program Rapid Start



Identifying the fluorescent model number • • • • •

To simplify the identification of Howard ballasts for specifying, ordering or stocking, every item has been assigned an easy-to-use, easy-to-understand model number. Each individual digit represents a specific characteristic of the ballast. Each alpha/numeric model number provides a complete description of each ballast.



EP2/32IS/MV/MC/HE	ELECTRONIC BALLAST
EP L 2/32IS/MV/MC/HE	LOW POWER
EP H 3/32IS/MV/MC/HE	HIGH POWER
EP2/32IS/MV/MC/HE	PRECISION POWER < 10% THD
EP 3 /32IS/MV/MC/HE	NUMBER OF LAMPS SUPPORTED BY THE BALLAST
EP3/ 3 2IS/MV/MC/HE	PRIMARY LAMP DESIGN
EP3/32 I S/MV/MC/HE	INSTANT START, PARALLEL CIRCUIT
EP2/32 PR S/MV/MC/HE	PROGRAM RAPID START
E2/40 RS -120MC	RAPID START
EP2/32IS/ MV /MC/HE	INPUT LINE VOLTAGE (MULTI-VOLT STANDARD 120-277V)
EP2/32IS/MV/ MC	MICRO-CASE
EP2/75IS/MV/ SC	SMALL-CASE
EP2/32IS/MV/MC/ HE	HIGH EFFICIENCY BALLAST

Fluorescent Electronic Ballast

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Lead Lengths

Fluorescent Ballast Lead Lengths

	Red	Yellow	Blue	White	Black
E2/32IS-120MC	46	-	31	25	25
EP2/32IS/MV/MC*	37	-	31	25	25
EP2/32IS/MV/MC/HE*	46	-	31	25	25
E2/32PRS/MV/MC/HE*	31	46	31	24	24
EP3/32IS/MV/MC/HE	46	-	31	25	25
EP4/32IS/MV/MC/HE	46	-	31	25	25
EPL2/32IS/MV/MC*	37	-	31	25	25
EPL2/32IS/MV/MC/HE	46	-	31	25	25
EPL3/32IS/MV/MC**	37	-	31	25	25
EPL3/32IS/MV/SC/HE**	41	-	30	24	24
EPL3/32IS/MV/MC/HE	46	-	31	25	25
EPL4/32IS/MV/MC/HE	46	-	31	25	25
EPH2/32IS/MV/MC/HE	46	-	31	25	25
EPH3/32IS/MV/MC/HE	46	-	31	25	25
EP2/59IS/MV/MC	79	-	45-1/2	24	24
EP2/40IS-TT/MV/SC	43	-	32	26	26
EP3/40IS-TT/MV/SC	43	-	32	26	26
EP2/54HO/PRS/MV/90CW	32	48	32	24	24
E2/40RS-120MC	31	46	31	25	25
E2/40RS-277	27	44	27	24	24
E2/110RS-120	44	71	44	27	27
E2/110RS-277	44	69	44	27	27
EP2/110RS/MV	44	71	44	27	27
E2/75IS-120MC	79	-	46	22	22
EP2/75IS/MV/SC	79	-	46	25	25
E2/72RS-120R	44	46	31	24	24

* CEE Listed

** Will be deleted from catalog when inventory is depleted

Electronic
Ballast

Electromagnetic
Ballast

Compact
Fluorescent Ballasts

HID

Sign
Ballast

Specifications

Instant Start

- Ballast shall have a five-year warranty
- Ballast shall be UL certified
- Ballast shall be sound rated Class A
- Ballast shall be Class P Type 1 Outdoor
- Ballast shall have a Lamp Current Crest Factor of <1.7
- Ballast shall withstand line transients as specified in ANSI C62.41-1991
- Ballast shall comply with the limits of FCC Part 18C Class A
- Ballast shall have a lamp operating frequency greater than 40KHz
- Ballast shall have a 0 F minimum lamp starting temperature for primary lamp
- Ballast shall be Instant Start
- Ballast shall be Parallel Lamp Operation
- Ballast shall have a minimum Power Factor of 98% for primary lamp operation
- Ballast shall operate within a +/- 10% of the ballast specified line voltage at an input frequency of 50Hz or 60Hz
- Ballast shall have a maximum case hot spot temperature of 90°C

Rapid Start

- Ballast shall have a five year warranty
- Ballast shall be UL certified
- Ballast shall be sound rated Class A
- Ballast shall be Class P Type 1 Outdoor
- Ballast shall have a Lamp Current Crest Factor of <1.7
- Ballast shall withstand line transients as specified in ANSI C62.41-1991
- Ballast shall comply with the limits of FCC Part 18C Class A
- Ballast shall have a lamp operating frequency greater than 20kHz
- Ballast shall have a 32° F/ 0° C minimum lamp starting temperature for primary lamp
- Ballast shall be potted
- Ballast shall be Rapid Start
- Ballast shall be Series Lamp Operation
- Ballast shall have minimum Power Factor of 98% for primary lamp operation
- Ballast shall operate within +/- 10% of the ballast specified line voltage at 60Hz
- Ballast shall have a maximum case hot spot temperature of 90°C

T5 Program Rapid Start

- Ballast with a maximum case temperature of 90°C shall have a three-year warranty
- Ballast with a maximum case temperature of 70°C shall have a five-year warranty
- Ballast shall be UL listed
- Ballast shall be sound rated Class A
- Ballast shall be Class P Type 1 Outdoor
- Ballast shall have a Lamp Current Crest Factor of <1.7
- Ballast shall withstand line transients as specified in ANSI C62.41-1991
- Ballast shall comply with the limits of FCC Part 18C Class A
- Ballast shall have a lamp operating frequency of 40kHz
- Ballast shall have a 0° F minimum lamp starting temperature for primary lamp
- Ballast shall be Program Rapid Start
- Ballast shall be Series Lamp Operation
- Ballast shall have end-of-life protection
- Ballast shall have a 0°F minimum starting temperature
- Ballast shall have minimum Power Factor of 98% for primary lamp operation
- Ballast shall operate within +/- 10% of the ballast specified line voltage at 60Hz
- Ballast shall operate at a maximum case hot spot temperature of 90°C

Rapid Start – Residential Rated

- Ballast shall have a five year warranty
- Ballast shall be UL certified
- Ballast shall be sound rated Class A
- Ballast shall be Class P Type 1 Outdoor
- Ballast shall have a Lamp Current Crest Factor of <1.7
- Ballast shall withstand line transients as specified in ANSI C62.41-1991
- Ballast shall comply with the limits of FCC Part 18C Class B (residential)
- Ballast shall have a lamp operating frequency greater than 40KHz
- Ballast shall have a 0 F minimum lamp starting temperature for primary lamp
- Ballast shall be Instant Start
- Ballast shall be Parallel Lamp Operation
- Ballast shall have a minimum Power Factor of 98% for primary lamp operation
- Ballast shall operate within a +/- 10% of the ballast specified line voltage at an input frequency of 60Hz
- Ballast shall have a maximum case hot spot temperature of 90 C

Instant Start CFL/ Long Twin Tube

- Ballast shall have a five-year warranty
- Ballast shall be UL listed
- Ballast shall be sound rated Class A
- Ballast shall be Class P Type 1 Outdoor
- Ballast shall have a Lamp Current Crest Factor of <1.7
- Ballast shall withstand line transients as specified in ANSI C62.41-1991
- Ballast shall comply with the limits of FCC Part 18C Class A
- Ballast shall have a lamp operating frequency greater than 20kHz
- Ballast shall have a 0° F minimum lamp starting temperature for primary lamp
- Ballast shall be potted
- Ballast shall be Rapid Start
- Ballast shall be Series Lamp Operation
- Ballast shall have minimum Power Factor of 99% for primary lamp operation
- Ballast shall operate within +/- 10% of the ballast specified line voltage at 60Hz
- Ballast shall have a maximum case hot spot temperature of 90° C

T8 Program Rapid Start

- Ballast shall have a five year warranty
- Ballast shall be UL listed
- Ballast shall be sound rated Class A
- Ballast shall be Class P Type 1 Outdoor
- Ballast shall have a Lamp Current Crest Factor of <1.7
- Ballast shall withstand line transients as specified in ANSI C62.41-2002
- Ballast shall comply with the limits of FCC Part 18C Class A
- Ballast shall have a lamp operating frequency of 40kHz
- Ballast shall have a 0° F minimum lamp starting temperature for primary lamp
- Ballast shall be Program Start
- Ballast shall be Series Lamp Operation
- Ballast shall have minimum Power Factor of 98% for primary lamp operation
- Ballast shall operate within +/- 10% of the ballast specified line voltage at 60Hz
- Ballast shall operate at a maximum case hot spot temperature of 90°C

Electronic
Ballast

Electromagnetic
Ballast

Compact
Fluorescent Ballasts

HID

Sign
Ballast

Fluorescent Electronic Ballast

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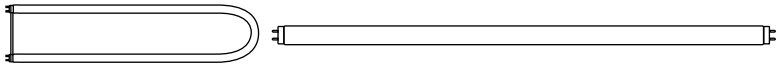
Electronic
Ballast

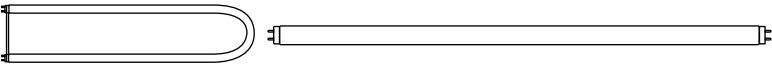
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HID

Sign
Ballast

	Number of Lamps per Ballast	Lamp Watts	Ballast Model Number	Line Voltage	Line Current (amps)	Input Watts (ANSI)	Total Harmonic Distortion Rating	Ballast Factor (ANSI)	Ballast Efficacy Factor	Wir./Dim Diag Pg.
F17T8, FBO17T8 										
One Lamp Out										
Standard Power	1	17	EP2/32IS/MV/MC	120	0.18	22	<10%	1.10	4.95	2/A2
	1	17	EP2/32IS/MV/MC	277	0.08	21	<15%	1.10	5.18	2/A2
	1	17	EP2/32IS/MV/MC/HE	120	0.16	21	<10%	1.10	5.24	2/A3
	1	17	EP2/32IS/MV/MC/HE	277	0.09	21	<15%	1.10	5.24	2/A3
Low Power	1	17	EPL2/32IS/MV/SC/HE	120	0.16	18	<10%	0.90	5.00	2/A1
	1	17	EPL2/32IS/MV/SC/HE	277	0.07	18	<10%	0.90	5.00	2/A1
	1	17	EPL2/32IS/MV/MC/HE	120	0.14	17	<10%	0.96	5.65	2/A3
	1	17	EPL2/32IS/MV/MC/HE	277	0.08	16	<20%	0.96	6.00	2/A3
High Power	1	17	EPH2/32IS/MV/MC/HE	120	0.22	25	<10%	1.42	5.68	2/A2
	1	17	EPH2/32IS/MV/MC/HE	277	0.11	25	<15%	1.42	5.68	2/A2
Standard Power	2	17	E2/32IS-120MC	120	0.30	34	<30%	0.92	2.71	2/A2
	2	17	EP2/32IS/MV/MC	120	0.28	34	<10%	0.89	2.62	2/A2
	2	17	EP2/32IS/MV/MC	277	0.13	34	<12%	0.89	2.62	2/A2
	2	17	EP2/32IS/MV/MC/HE	120	0.25	28	<10%	0.91	3.25	2/A3
	2	17	EP2/32IS/MV/MC/HE	277	0.11	28	<15%	0.91	3.25	2/A3
Low Power	2	17	EPL2/32IS/MV/MC	120	0.21	25	<10%	0.84	3.36	2/A2
	2	17	EPL2/32IS/MV/MC	277	0.10	25	<15%	0.84	3.36	2/A2
	2	17	EPL2/32IS/MV/SC/HE	120	0.23	27	<10%	0.80	2.96	2/A1
	2	17	EPL2/32IS/MV/SC/HE	277	0.10	27	<10%	0.80	2.96	2/A1
	2	17	EPL2/32IS/MV/MC/HE	120	0.21	25	<10%	0.80	3.20	2/A3
	2	17	EPL2/32IS/MV/MC/HE	277	0.09	23	<20%	0.80	3.48	2/A3
High Power	2	17	EPH2/32IS/MV/MC/HE	120	0.33	39	<10%	1.23	3.15	2/A2
	2	17	EPH2/32IS/MV/MC/HE	277	0.15	39	<15%	1.23	3.15	2/A2
One Lamp Out										
Low Power	2	17	EPL3/32IS/MV/SC/HE	120	0.27	31	<12%	0.87	2.81	3/A1
	2	17	EPL3/32IS/MV/SC/HE	277	0.12	31	<15%	0.87	2.81	3/A1
Standard Power	3	17	EP3/32IS/MV/MC/HE	120	0.38	45	<10%	0.92	2.04	3/A2
	3	17	EP3/32IS/MV/MC/HE	277	0.17	45	<15%	0.92	2.04	3/A2
Low Power	3	17	EPL3/32IS/MV/MC	120	0.37	43	<10%	0.86	1.95	3/A2
	3	17	EPL3/32IS/MV/MC	277	0.16	43	<15%	0.86	2.00	3/A2
	3	17	EPL3/32IS/MV/SC/HE	120	0.34	41	<10%	0.80	1.95	3/A1
	3	17	EPL3/32IS/MV/SC/HE	277	0.15	40	<12%	0.80	2.00	3/A1
High Power	3	17	EPH3/32IS/MV/MC/HE	120	0.49	58	<10%	1.23	2.12	3/A2
	3	17	EPH3/32IS/MV/MC/HE	277	0.22	57	<10%	1.23	2.16	3/A2
Standard Power	4	17	EP4/32IS/MV/MC/HE	120	0.49	59	<10%	0.93	1.58	4/A2
	4	17	EP4/32IS/MV/MC/HE	277	0.22	58	<10%	0.93	1.60	4/A2
F17T8, FBO17T8 continued on next page										

	Number of Lamps per Ballast	Lamp Watts	Ballast Model Number	Line Voltage	Line Current (amps)	Input Watts (ANSI)	Total Harmonic Distortion Rating	Ballast Factor (ANSI)	Ballast Efficacy Factor	Wir./Dim Diag Pg.
F17T8, FBO17T8 continued 										
Standard Power	4	17	EP4/32IS/MV/MC/HE	120	0.49	59	<10%	0.93	1.58	4/A2
	4	17	EP4/32IS/MV/MC/HE	277	0.22	58	<10%	0.93	1.60	4/A2
Low Power	4	17	EPL4/32IS/MV/MC/HE	120	0.46	54	<10%	0.79	1.46	4/A2
	4	17	EPL4/32IS/MV/MC/HE	277	0.19	52	<10%	0.79	1.52	4/A2
	4	17	EPL4/32IS/MV/SC/HE	120	0.45	53	<10%	0.79	1.49	4/A1
	4	17	EPL4/32IS/MV/SC/HE	277	0.20	53	<12%	0.79	1.49	4/A1
F25T8, FBO25T8, F24T8										
One Lamp Out										
Standard Power	1	25	EP2/32IS/MV/MC	120	0.26	32	<10%	1.01	3.16	2/A2
	1	25	EP2/32IS/MV/MC	277	0.12	32	<10%	1.01	3.16	2/A2
	1	25	EP2/32IS/MV/MC/HE	120	0.23	26	<10%	1.08	4.15	2/A3
	1	25	EP2/32IS/MV/MC/HE	277	0.10	26	<15%	1.08	4.15	2/A3
Low Power	1	25	EPL2/32IS/MV/MC	120	0.21	25	<10%	0.80	3.20	2/A2
	1	25	EPL2/32IS/MV/MC	277	0.10	25	<15%	0.80	3.20	2/A2
	1	25	EPL2/32IS/MV/SC/HE	120	0.20	24	<10%	0.89	3.71	2/A1
	1	25	EPL2/32IS/MV/SC/HE	277	0.09	24	<15%	0.89	3.71	2/A1
	1	25	EPL2/32IS/MV/MC/HE	120	0.20	24	<10%	0.95	3.96	2/A3
	1	25	EPL2/32IS/MV/MC/HE	277	0.09	22	<20%	0.95	4.32	2/A3
High Power	1	25	EPH2/32IS/MV/MC/HE	120	0.28	33	<10%	1.23	3.73	2/A2
	1	25	EPH2/32IS/MV/MC/HE	277	0.13	33	<15%	1.23	3.73	2/A2
Standard Power	2	25	E2/32IS-120MC	120	0.38	49	<25%	0.90	1.84	2/A2
	2	25	EP2/32IS/MV/MC	120	0.40	47	<10%	0.88	1.87	2/A2
	2	25	EP2/32IS/MV/MC	277	0.17	47	<10%	0.89	1.87	2/A2
	2	25	EP2/32IS/MV/MC/HE	120	0.36	42	<10%	0.89	2.12	2/A3
	2	25	EP2/32IS/MV/MC/HE	277	0.16	41	<15%	0.89	2.17	2/A3
Low Power	2	25	EPL2/32IS/MV/MC	120	0.34	40	<10%	0.81	2.03	2/A2
	2	25	EPL2/32IS/MV/MC	277	0.15	39	<15%	0.81	2.07	2/A2
	2	25	EPL2/32IS/MV/SC/HE	120	0.32	38	<10%	0.78	2.05	2/A1
	2	25	EPL2/32IS/MV/SC/HE	277	0.14	38	<10%	0.78	2.05	2/A1
	2	25	EPL2/32IS/MV/MC/HE	120	0.31	37	<10%	0.79	2.14	2/A3
	2	25	EPL2/32IS/MV/MC/HE	277	0.13	35	<15%	0.79	2.26	2/A3
High Power	2	25	EPH2/32IS/MV/MC/HE	120	0.45	54	<10%	1.20	2.22	2/A2
	2	25	EPH2/32IS/MV/MC/HE	277	0.20	54	<15%	1.20	2.22	2/A2
One Lamp Out										
Standard Power	2	25	EP3/32IS/MV/MC/HE	120	0.42	50	<10%	1.00	2.00	3/A2
	2	25	EP3/32IS/MV/MC/HE	277	0.18	50	<15%	1.00	2.00	3/A2
F25T8, FBO25T8, F24T8 continued on next page										

Electronic
Ballast

Electromagnetic
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Compact
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Fluorescent Electronic Ballast

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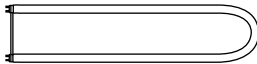
Electronic
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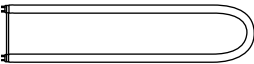
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Compact
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Sign
Ballast

	Number of Lamps per Ballast	Lamp Watts	Ballast Model Number	Line Voltage	Line Current (amps)	Input Watts (ANSI)	Total Harmonic Distortion Rating	Ballast Factor (ANSI)	Ballast Efficacy Factor	Wir./Dim Diag Pg.
F25T8, FBO25T8, F24T8 continued 										
Low Power	2	25	EPL3/32IS/MV/SC/HE	120	0.37	44	<10%	0.86	1.95	3/A1
	2	25	EPL3/32IS/MV/SC/HE	277	0.16	44	<15%	0.86	1.95	3/A1
High Power	2	25	EPH3/32IS/MV/MC/HE	120	0.55	65	<10%	1.28	1.97	3/A2
	2	25	EPH3/32IS/MV/MC/HE	277	0.25	65	<15%	1.28	1.97	3/A2
Standard Power	3	25	EP3/32IS/MV/MC/HE	120	0.56	68	<10%	0.90	1.32	3/A2
	3	25	EP3/32IS/MV/MC/HE	277	0.24	66	<15%	0.90	1.36	3/A2
Low Power	3	25	EPL3/32IS/MV/MC	120	0.51	60	<10%	0.82	1.37	3/A2
	3	25	EPL3/32IS/MV/MC	277	0.22	58	<15%	0.82	1.41	3/A2
	3	25	EPL3/32IS/MV/SC/HE	120	0.49	58	<10%	0.78	1.34	3/A1
	3	25	EPL3/32IS/MV/SC/HE	277	0.21	57	<10%	0.78	1.37	3/A1
Hight Power	3	25	EPH3/32IS/MV/MC/HE	120	0.69	81	<10%	1.20	1.48	3/A2
	3	25	EPH3/32IS/MV/MC/HE	277	0.30	81	<10%	1.20	1.48	3/A2
One Lamp Out										
	3	25	EPL4/32IS/MV/MC/HE	120	0.53	62	<10%	0.84	1.35	4/A2
	3	25	EPL4/32IS/MV/MC/HE	277	0.22	61	<15%	0.84	1.38	4/A2
Standard Power	4	25	EP4/32IS/MV/MC/HE	120	0.72	87	<10%	0.89	1.02	4/A2
	4	25	EP4/32IS/MV/MC/HE	277	0.32	85	<10%	0.89	1.05	4/A2
Low Power	4	25	EPL4/32IS/MV/MC/HE	120	0.64	76	<10%	0.78	1.03	4/A2
	4	25	EPL4/32IS/MV/MC/HE	277	0.27	74	<10%	0.78	1.05	4/A2
	4	25	EPL4/32IS/MV/SC/HE	120	0.65	77	<10%	0.78	1.01	4/A1
	4	25	EPL4/32IS/MV/SC/HE	277	0.28	76	<10%	0.78	1.03	4/A1
F32T8/ES (25W)										
One Lamp Out										
Standard Power	1	25	EP2/32IS/MV/MC	120	0.24	29	<10%	1.07	3.68	2/A2
	1	25	EP2/32IS/MV/MC	277	0.105	28	<15%	1.07	3.69	2/A2
	1	25	EP2/32IS/MV/MC/HE	120	0.24	29	<10%	1.08	3.72	2/A3
	1	25	EP2/32IS/MV/MC/HE	277	0.11	29	<15%	1.08	3.72	2/A3
Low Power	1	25	EPL2/32IS/MV/SC/HE	120	0.20	24	<10%	0.88	3.67	2/A1
	1	25	EPL2/32IS/MV/SC/HE	277	0.09	24	<14%	0.88	3.67	2/A1
	1	25	EPL2/32IS/MV/MC/HE	120	0.21	25	<10%	0.93	3.72	2/A3
	1	25	EPL2/32IS/MV/MC/HE	277	0.10	23	<20%	0.93	4.04	2/A3
High Power	1	25	EPH2/32IS/MV/MC/HE	120	0.32	38	<10%	1.38	3.63	2/A2
	1	25	EPH2/32IS/MV/MC/HE	277	0.15	38	<15%	1.38	3.63	2/A2
Standard Power	2	25	EP2/32IS/MV/MC	120	0.39	47	<10%	0.89	1.88	2/A2
	2	25	EP2/32IS/MV/MC	277	0.17	46	<10%	0.89	1.89	2/A2
	2	25	EP2/32IS/MV/MC/HE	120	0.39	46	<10%	0.89	1.93	2/A3
F32T8/ES (25W) continued on next page										

	Number of Lamps per Ballast	Lamp Watts	Ballast Model Number	Line Voltage	Line Current (amps)	Input Watts (ANSI)	Total Harmonic Distortion Rating	Ballast Factor (ANSI)	Ballast Efficacy Factor	Wir./Dim Diag Pg.
F32T8/ES (25W) continued 										
Standard Power	2	25	EP2/32IS/MV/MC/HE	277	0.17	45	<15%	0.89	1.98	2/A3
	2	25	EP2/32PRS/MV/MC/HE	120	0.42	50	<10%	1.00	2.00	7/A3
	2	25	EP2/32PRS/MV/MC/HE	277	0.18	49	<10%	1.00	2.04	7/A3
Low Power	2	25	EPL2/32IS/MV/SC/HE	120	0.32	38	<10%	0.75	1.97	2/A1
	2	25	EPL2/32IS/MV/SC/HE	277	0.14	38	<12%	0.75	1.97	2/A1
	2	25	EPL2/32IS/MV/MC/HE	120	0.33	39	<10%	0.78	2.00	2/A3
	2	25	EPL2/32IS/MV/MC/HE	277	0.14	38	<15%	0.78	2.05	2/A3
High Power	2	25	EPH2/32IS/MV/MC/HE	120	0.53	63	<10%	1.18	1.87	2/A2
	2	25	EPH2/32IS/MV/MC/HE	277	0.23	62	<15%	1.18	1.90	2/A2
One Lamp Out										
Standard Power	2	25	EP3/32IS/MV/MC/HE	120	0.43	51	<10%	1.00	1.96	3/A2
	2	25	EP3/32IS/MV/MC/HE	277	0.19	51	<15%	1.00	1.96	3/A2
Low Power	2	25	EPL3/32IS/MV/MC	120	0.41	48	<10%	0.95	1.98	3/A2
	2	25	EPL3/32IS/MV/MC	277	0.18	47	<15%	0.92	1.96	3/A2
	2	25	EPL3/32IS/MV/SC/HE	120	0.36	43	<10%	0.84	1.95	3/A1
	2	25	EPL3/32IS/MV/SC/HE	277	0.16	43	<11%	0.84	1.95	3/A1
High Power	2	25	EPH3/32IS/MV/MC/HE	120	0.56	67	<10%	1.28	1.91	3/A2
	2	25	EPH3/32IS/MV/MC/HE	277	0.25	66	<15%	1.28	1.94	3/A2
Standard Power	3	25	EP3/32IS/MV/MC/HE	120	0.56	68	<10%	0.90	1.32	3/A2
	3	25	EP3/32IS/MV/MC/HE	277	0.25	68	<15%	0.90	1.32	3/A2
Low Power	3	25	EPL3/32IS/MV/MC	120	0.53	63	<10%	0.85	1.35	3/A2
	3	25	EPL3/32IS/MV/MC	277	0.23	61	<15%	0.85	1.39	3/A2
	3	25	EPL3/32IS/MV/SC/HE	120	0.49	58	<10%	0.75	1.29	3/A1
	3	25	EPL3/32IS/MV/SC/HE	277	0.21	57	<10%	0.75	1.32	3/A1
High Power	3	25	EPH3/32IS/MV/MC/HE	120	0.72	86	<10%	1.20	1.40	3/A2
	3	25	EPH3/32IS/MV/MC/HE	277	0.32	85	<10%	1.20	1.41	3/A2
One Lamp Out										
Standard Power	3	25	EP4/32IS/MV/MC/HE	120	0.62	74	<10%	0.96	1.30	4/A2
	3	25	EP4/32IS/MV/MC/HE	277	0.27	73	<10%	0.96	1.32	4/A2
Low Power	3	25	EPL4/32IS/MV/MC/HE	120	0.57	68	<10%	0.84	1.24	4/A2
	3	25	EPL4/32IS/MV/MC/HE	277	0.25	66	<15%	0.84	1.27	4/A2
Standard Power	4	25	EP4/32IS/MV/MC/HE	120	0.74	88	<10%	0.88	1.00	4/A2
	4	25	EP4/32IS/MV/MC/HE	277	0.33	88	<10%	0.88	1.00	4/A2
Low Power	4	25	EPL4/32IS/MV/MC/HE	120	0.69	82	<10%	0.78	0.95	4/A2
	4	25	EPL4/32IS/MV/MC/HE	277	0.30	81	<10%	0.78	0.96	4/A2

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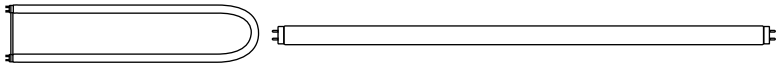
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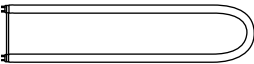
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	Number of Lamps per Ballast	Lamp Watts	Ballast Model Number	Line Voltage	Line Current (amps)	Input Watts (ANSI)	Total Harmonic Distortion Rating	Ballast Factor (ANSI)	Ballast Efficacy Factor	Wir./Dim Diag Pg.
F32T8/ES (28W) 										
One Lamp Out										
Standard Power	1	28	EP2/32IS/MV/MC	120	0.26	31	<10%	1.07	3.45	2/A2
	1	28	EP2/32IS/MV/MC	277	0.12	31	<15%	1.07	3.46	2/A2
	1	28	EP2/32IS/MV/MC/HE	120	0.25	30	<10%	1.08	3.60	2/A3
	1	28	EP2/32IS/MV/MC/HE	277	0.11	29	<15%	1.08	3.72	2/A3
Low Power	1	28	EPL2/32IS/MV/SC/HE	120	0.21	26	<10%	0.88	3.38	2/A1
	1	28	EPL2/32IS/MV/SC/HE	277	0.09	26	<14%	0.88	3.38	2/A1
	1	28	EPL2/32IS/MV/MC/HE	120	0.22	26	<10%	0.93	3.58	2/A3
	1	28	EPL2/32IS/MV/MC/HE	277	0.10	24	<20%	0.93	3.88	2/A3
High Power	1	28	EPH2/32IS/MV/MC/HE	120	0.33	39	<10%	1.38	3.54	2/A2
	1	28	EPH2/32IS/MV/MC/HE	277	0.15	39	<15%	1.38	3.54	2/A2
Standard Power	2	28	EP2/32IS/MV/MC	120	0.41	49	<10%	0.89	1.81	2/A2
	2	28	EP2/32IS/MV/MC	277	0.18	48	<10%	0.89	1.85	2/A2
	2	28	EP2/32IS/MV/MC/HE	120	0.41	49	<10%	0.89	1.82	2/A3
	2	28	EP2/32IS/MV/MC/HE	277	0.18	47	<15%	0.89	1.89	2/A3
	2	28	EP2/32PRS/MV/MC/HE	120	0.44	52	<10%	0.90	1.73	7/A3
	2	28	EP2/32PRS/MV/MC/HE	277	0.19	51	<10%	0.90	1.76	7/A3
Low Power	2	28	EPL2/32IS/MV/SC/HE	120	0.35	41	<10%	0.75	1.83	2/A1
	2	28	EPL2/32IS/MV/SC/HE	277	0.15	41	<12%	0.75	1.83	2/A1
	2	28	EPL2/32IS/MV/MC/HE	120	0.35	41	<10%	0.78	1.90	2/A3
	2	28	EPL2/32IS/MV/MC/HE	277	0.15	41	<15%	0.78	1.90	2/A3
High Power	2	28	EPH2/32IS/MV/MC/HE	120	0.54	64	<10%	1.18	1.84	2/A2
	2	28	EPH2/32IS/MV/MC/HE	277	0.24	63	<15%	1.18	1.87	2/A2
One Lamp Out										
Standard Power	2	28	EP3/32IS/MV/MC/HE	120	0.45	54	<10%	0.99	1.83	3/A2
	2	28	EP3/32IS/MV/MC/HE	277	0.20	53	<15%	0.99	1.87	3/A2
Low Power	2	28	EPL3/32IS/MV/MC	120	0.42	49	<10%	0.92	1.88	3/A2
	2	28	EPL3/32IS/MV/MC	277	0.19	48	<15%	0.92	1.92	3/A2
	2	28	EPL3/32IS/MV/SC/HE	120	0.40	48	<10%	0.84	1.75	3/A1
	2	28	EPL3/32IS/MV/SC/HE	277	0.17	47	<11%	0.84	1.79	3/A1
High Power	2	28	EPH3/32IS/MV/MC/HE	120	0.59	70	<10%	1.27	1.81	3/A2
	2	28	EPH3/32IS/MV/MC/HE	277	0.26	69	<15%	1.27	1.84	3/A2
Standard Power	3	28	EP3/32IS/MV/MC/HE	120	0.60	72	<10%	0.88	1.22	3/A2
	3	28	EP3/32IS/MV/MC/HE	277	0.26	70	<15%	0.88	1.26	3/A2
	3	28	EP3/32IS/MV/MC/HE	120	0.60	72	<10%	0.88	1.22	3/A2
	3	28	EP3/32IS/MV/MC/HE	277	0.26	70	<15%	0.88	1.26	3/A2
Low Power	3	28	EPL3/32IS/MV/MC	120	0.55	64	<10%	0.81	1.27	3/A2
	3	28	EPL3/32IS/MV/MC	277	0.24	63	<15%	0.81	1.29	3/A2
F32T8/ES (28W) continued on next page										

	Number of Lamps per Ballast	Lamp Watts	Ballast Model Number	Line Voltage	Line Current (amps)	Input Watts (ANSI)	Total Harmonic Distortion Rating	Ballast Factor (ANSI)	Ballast Efficacy Factor	Wir./Dim Diag Pg.
F32T8/ES (28W) continued 										
Low Power	3	28	EPL3/32IS/MV/SC/HE	120	0.52	62	<10%	0.75	1.21	3/A1
	3	28	EPL3/32IS/MV/SC/HE	277	0.22	62	<10%	0.75	1.21	3/A1
High Power	3	28	EPH3/32IS/MV/MC/HE	120	0.78	93	<10%	1.18	1.27	3/A2
	3	28	EPH3/32IS/MV/MC/HE	277	0.34	92	<10%	1.18	1.28	3/A2
One Lamp Out										
Standard Power	3	28	EP4/32IS/MV/MC/HE	120	0.65	77	<10%	0.96	1.25	4/A2
	3	28	EP4/32IS/MV/MC/HE	277	0.29	77	<10%	0.96	1.25	4/A2
Low Power	3	28	EPL4/32IS/MV/MC/HE	120	0.59	70	<10%	0.82	1.17	4/A2
	3	28	EPL4/32IS/MV/MC/HE	277	0.26	70	<10%	0.82	1.17	4/A2
Standard Power	4	28	EP4/32IS/MV/MC/HE	120	0.79	94	<10%	0.88	0.94	4/A2
	4	28	EP4/32IS/MV/MC/HE	277	0.35	94	<10%	0.88	0.94	4/A2
Low Power	4	28	EPL4/32IS/MV/MC	120	0.71	84	<10%	0.77	0.91	4/A2
	4	28	EPL4/32IS/MV/MC	277	0.31	84	<10%	0.77	0.91	4/A2
	4	28	EPL4/32IS/MV/MC/HE	120	0.71	84	<10%	0.77	0.92	4/A2
	4	28	EPL4/32IS/MV/MC/HE	277	0.31	84	<10%	0.77	0.92	4/A2
F32T8/ES (30W)										
One Lamp Out										
Standard Power	1	30	EP2/32IS/MV/MC	120	0.31	37	<10%	1.00	2.70	2/A2
	1	30	EP2/32IS/MV/MC	277	0.13	37	<11%	1.00	2.70	2/A2
	1	30	EP2/32IS/MV/MC/HE	120	0.27	31	<10%	1.08	3.48	2/A3
	1	30	EP2/32IS/MV/MC/HE	277	0.12	30	<15%	1.08	3.60	2/A3
Low Power	1	30	EPL2/32IS/MV/SC/HE	120	0.24	28	<10%	0.87	3.11	2/A1
	1	30	EPL2/32IS/MV/SC/HE	277	0.10	28	<13%	0.87	3.11	2/A1
	1	30	EPL2/32IS/MV/MC/HE	120	0.24	28	<10%	0.93	3.32	2/A3
	1	30	EPL2/32IS/MV/MC/HE	277	0.11	28	<15%	0.93	3.32	2/A3
High Power	1	30	EPH2/32IS/MV/MC/HE	120	0.36	44	<10%	1.38	3.14	2/A2
	1	30	EPH2/32IS/MV/MC/HE	277	0.16	44	<15%	1.38	3.14	2/A2
Standard Power	2	30	E2/32IS-120MC	120	0.45	54	<20%	0.87	1.61	2/A2
	2	30	EP2/32IS/MV/MC	277	0.20	55	<10%	0.87	1.58	2/A2
	2	30	EP2/32IS/MV/MC	120	0.47	56	<10%	0.87	1.55	2/A2
	2	30	EP2/32IS/MV/MC/HE	120	0.44	51	<10%	0.89	1.75	2/A3
	2	30	EP2/32IS/MV/MC/HE	277	0.19	51	<15%	0.89	1.75	2/A3
	2	30	EP2/32PRS/MV/MC/HE	120	0.45	54	<10%	0.90	1.67	7/A3
	2	30	EP2/32PRS/MV/MC/HE	277	0.20	53	<10%	0.90	1.70	7/A3
Low Power	2	30	EPL2/32IS/MV/SC/HE	120	0.38	46	<10%	0.75	1.63	2/A1
	2	30	EPL2/32IS/MV/SC/HE	277	0.16	45	<11%	0.75	1.67	2/A1
F32T8/ES (30W) continued on next page										

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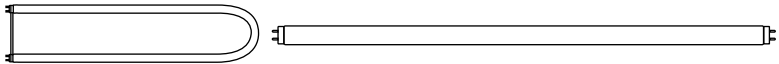
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	Number of Lamps per Ballast	Lamp Watts	Ballast Model Number	Line Voltage	Line Current (amps)	Input Watts (ANSI)	Total Harmonic Distortion Rating	Ballast Factor (ANSI)	Ballast Efficacy Factor	Wir./Dim DiagPg.
F32T8/ES (30W) continued 										
Low Power	2	30	EPL2/32IS/MV/MC/HE	120	0.38	45	<10%	0.78	1.73	2/A3
	2	30	EPL2/32IS/MV/MC/HE	277	0.17	46	<15%	0.78	1.70	2/A3
High Power	2	30	EPH2/32IS/MV/MC/HE	120	0.58	69	<10%	1.18	1.71	2/A2
	2	30	EPH2/32IS/MV/MC/HE	277	0.25	69	<15%	1.18	1.71	2/A2
Standard Power	2	30	EP3/32IS/MV/MC/HE	120	0.48	59	<10%	0.99	1.68	3/A2
	2	30	EP3/32IS/MV/MC/HE	277	0.21	58	<15%	0.99	1.71	3/A2
One Lamp Out										
Low Power	2	30	EPL3/32IS/MV/MC	120	0.45	54	<10%	0.92	1.70	3/A2
	2	30	EPL3/32IS/MV/MC	277	0.20	53	<15%	0.92	1.74	3/A2
	2	30	EPL3/32IS/MV/SC/HE	120	0.44	52	<10%	0.84	1.62	3/A1
	2	30	EPL3/32IS/MV/SC/HE	277	0.19	52	<11%	0.84	1.62	3/A1
High Power	2	30	EPH3/32IS/MV/MC/HE	120	0.64	76	<10%	1.27	1.67	3/A2
	2	30	EPH3/32IS/MV/MC/HE	277	0.28	75	<15%	1.27	1.69	3/A2
Standard Power	3	30	EP3/32IS/MV/MC/HE	120	0.65	79	<10%	0.88	1.11	3/A2
	3	30	EP3/32IS/MV/MC/HE	277	0.28	77	<15%	0.88	1.14	3/A2
Low Power	3	30	EPL3/32IS/MV/MC	120	0.60	71	<10%	0.81	1.14	3/A2
	3	30	EPL3/32IS/MV/MC	277	0.26	70	<15%	0.81	1.16	3/A2
	3	30	EPL3/32IS/MV/SC/HE	120	0.57	69	<10%	0.75	1.09	3/A1
	3	30	EPL3/32IS/MV/SC/HE	277	0.24	68	<10%	0.75	1.10	3/A1
High Power	3	30	EPH3/32IS/MV/MC/HE	120	0.84	99	<10%	1.18	1.19	3/A2
	3	30	EPH3/32IS/MV/MC/HE	277	0.37	99	<10%	1.18	1.19	3/A2
One Lamp Out										
Standard Power	3	30	EP4/32IS/MV/MC/HE	120	0.71	84	<10%	0.96	1.14	4/A2
	3	30	EP4/32IS/MV/MC/HE	277	0.31	84	<10%	0.96	1.14	4/A2
Low Power	3	30	EPL4/32IS/MV/MC/HE	120	0.63	75	<10%	0.82	1.09	4/A2
	3	30	EPL4/32IS/MV/MC/HE	277	0.28	74	<10%	0.82	1.11	4/A2
Standard Power	4	30	EP4/32IS/MV/MC/HE	120	0.85	101	<10%	0.88	0.87	4/A2
	4	30	EP4/32IS/MV/MC/HE	277	0.37	100	<10%	0.88	0.88	4/A2
Low Power	4	30	EPL4/32IS/MV/MC/HE	120	0.76	90	<10%	0.77	0.86	4/A2
	4	30	EPL4/32IS/MV/MC/HE	277	0.33	89	<10%	0.77	0.87	4/A2
F32T8, FB31T8, F32T8/U6 (Primary Lamp Design)										
One Lamp Out										
Standard Power	1	32	E2/32IS-120MC	120	0.31	38	<30%	1.11	2.92	2/A2
	1	32	EP2/32IS/MV/MC	120	0.33	39	<10%	1.00	2.56	2/A2
	1	32	EP2/32IS/MV/MC	277	0.14	39	<10%	1.00	2.56	2/A2
	1	32	EP2/32IS/MV/MC/HE	120	0.29	35	<10%	1.08	3.09	2/A3
F32T8, FB31T8, F32T8/U6 continued on next page										

	Number of Lamps per Ballast	Lamp Watts	Ballast Model Number	Line Voltage	Line Current (amps)	Input Watts (ANSI)	Total Harmonic Distortion Rating	Ballast Factor (ANSI)	Ballast Efficacy Factor	Wir./Dim Diag Pg.
F32T8, FB31T8, F32T8/U6 continued										
Standard Power	1	32	EP2/32IS/MV/MC/HE	277	0.13	34	<15%	1.08	3.18	2/A3
Low Power	1	32	EPL2/32IS/MV/MC	120	0.24	29	<10%	0.83	2.86	2/A2
	1	32	EPL2/32IS/MV/MC	277	0.11	28	<15%	0.83	2.96	2/A2
	1	32	EPL2/32IS/MV/SC/HE	120	0.26	31	<10%	0.87	2.81	2/A1
	1	32	EPL2/32IS/MV/SC/HE	277	0.11	31	<10%	0.87	2.81	2/A1
	1	32	EPL2/32IS/MV/MC/HE	120	0.26	31	<10%	0.93	3.00	2/A3
	1	32	EPL2/32IS/MV/MC/HE	277	0.12	30	<15%	0.93	3.10	2/A3
High Power	1	32	EPH2/32IS/MV/MC/HE	120	0.37	45	<10%	1.37	3.04	2/A2
	1	32	EPH2/32IS/MV/MC/HE	277	0.17	45	<15%	1.37	3.04	2/A2
Standard Power	2	32	E2/32IS-120MC	120	0.49	57	<20%	0.85	1.49	2/A2
	2	32	EP2/32IS/MV/MC	120	0.50	60	<10%	0.87	1.45	2/A2
	2	32	EP2/32IS/MV/MC	277	0.21	59	<10%	0.87	1.47	2/A2
	2	32	EP2/32IS/MV/MC/HE	120	0.46	55	<10%	0.89	1.62	2/A3
	2	32	EP2/32IS/MV/MC/HE	277	0.20	54	<10%	0.89	1.65	2/A3
	2	32	EP2/32PRS/MV/MC/HE	120	0.48	57	<10%	0.88	1.54	7/A3
	2	32	EP2/32PRS/MV/MC/HE	277	0.21	56	<10%	0.88	1.57	7/A3
Low Power	2	32	EPL2/32IS/MV/MC	120	0.44	52	<10%	0.80	1.54	2/A2
	2	32	EPL2/32IS/MV/MC	277	0.19	51	<10%	0.80	1.57	2/A2
	2	32	EPL2/32IS/MV/SC/HE	120	0.40	48	<10%	0.75	1.56	2/A1
	2	32	EPL2/32IS/MV/SC/HE	277	0.17	48	<10%	0.75	1.56	2/A1
	2	32	EPL2/32IS/MV/MC/HE	120	0.40	49	<10%	0.78	1.59	2/A3
	2	32	EPL2/32IS/MV/MC/HE	277	0.18	48	<15%	0.78	1.63	2/A3
High Power	2	32	EPH2/32IS/MV/MC/HE	120	0.62	74	<10%	1.18	1.59	2/A2
	2	32	EPH2/32IS/MV/MC/HE	277	0.27	73	<10%	1.18	1.62	2/A2
One Lamp Out										
Standard Power	2	32	EP3/32IS/MV/MC/HE	120	0.53	63	<10%	0.99	1.57	3/A2
	2	32	EP3/32IS/MV/MC/HE	277	0.24	63	<15%	0.99	1.57	3/A2
Low Power	2	32	EPL3/32IS/MV/MC	120	0.49	58	<10%	0.92	1.59	3/A2
	2	32	EPL3/32IS/MV/MC	277	0.21	57	<15%	0.92	1.61	3/A2
	2	32	EPL3/32IS/MV/SC/HE	120	0.46	55	<10%	0.85	1.55	3/A1
	2	32	EPL3/32IS/MV/SC/HE	277	0.20	54	<10%	0.85	1.57	3/A1
High Power	2	32	EPH3/32IS/MV/MC/HE	120	0.69	81	<10%	1.27	1.57	3/A2
	2	32	EPH3/32IS/MV/MC/HE	277	0.30	80	<10%	1.27	1.59	3/A2
Standard Power	3	32	EP3/32IS/MV/MC/HE	120	0.71	85	<10%	0.88	1.04	3/A2
	3	32	EP3/32IS/MV/MC/HE	277	0.31	83	<10%	0.88	1.06	3/A2
Low Power	3	32	EPL3/32IS/MV/MC	120	0.64	76	<10%	0.78	1.03	3/A2
	3	32	EPL3/32IS/MV/MC	277	0.27	74	<10%	0.78	1.05	3/A2
F32T8, FB31T8, F32T8/U6 continued on next page										

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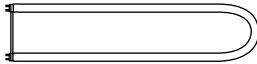
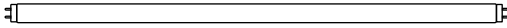
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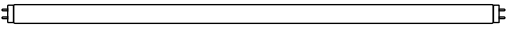
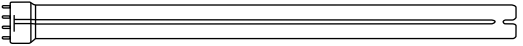
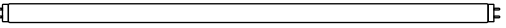
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	Number of Lamps per Ballast	Lamp Watts	Ballast Model Number	Line Voltage	Line Current (amps)	Input Watts (ANSI)	Total Harmonic Distortion Rating	Ballast Factor (ANSI)	Ballast Efficacy Factor	Wir./Dim DiagPg.
F32T8, FB31T8, F32T8/U6 continued 										
Low Power	3	32	EPL3/32IS/MV/SC/HE	120	0.63	72	<10%	0.75	1.04	3/A1
	3	32	EPL3/32IS/MV/SC/HE	277	0.26	72	<10%	0.75	1.04	3/A1
High Power	3	32	EPH3/32IS/MV/MC/HE	120	0.91	109	<10%	1.18	1.08	3/A2
	3	32	EPH3/32IS/MV/MC/HE	277	0.39	107	<10%	1.18	1.10	3/A2
One Lamp Out										
Standard Power	3	32	EP4/32IS/MV/MC/HE	120	0.77	92	<10%	0.96	1.04	4/A2
	3	32	EP4/32IS/MV/MC/HE	277	0.34	89	<10%	0.96	1.08	4/A2
Low Power	3	32	EPL4/32IS/MV/MC/HE	120	0.68	81	<10%	0.82	1.01	4/A2
	3	32	EPL4/32IS/MV/MC/HE	277	0.29	80	<10%	0.82	1.03	4/A2
Standard Power	4	32	EP4/32IS/MV/MC/HE	120	0.93	110	<10%	0.88	0.80	4/A2
	4	32	EP4/32IS/MV/MC/HE	277	0.40	108	<10%	0.88	0.81	4/A2
Low Power	4	32	EPL4/32IS/MV/MC/HE	120	0.82	98	<10%	0.77	0.79	4/A2
	4	32	EPL4/32IS/MV/MC/HE	277	0.35	96	<10%	0.77	0.80	4/A2
F40T8 										
Standard Power	1	40	E2/32IS-120MC	120	0.48	45	<30%	1.00	2.22	2/A2
	1	40	EP2/32IS/MV/MC	120	0.39	47	<10%	0.99	2.11	2/A2
	1	40	EP2/32IS/MV/MC	277	0.17	46	<10%	0.99	2.15	2/A2
	1	40	EP2/32IS/MV/MC/HE	120	0.35	44	<10%	1.00	2.27	2/A3
	1	40	EP2/32IS/MV/MC/HE	277	0.16	43	<15%	1.00	2.33	2/A3
Low Power	1	40	EPL2/32IS/MV/MC	120	0.35	41	<10%	0.89	2.17	2/A2
	1	40	EPL2/32IS/MV/MC	277	0.15	40	<15%	0.89	2.23	2/A2
	1	40	EPL2/32IS/MV/SC/HE	120	0.30	36	<10%	0.87	2.42	2/A1
	1	40	EPL2/32IS/MV/SC/HE	277	0.13	36	<10%	0.87	2.42	2/A1
	1	40	EPL2/32IS/MV/MC/HE	120	0.30	35	<10%	0.90	2.57	2/A3
	1	40	EPL2/32IS/MV/MC/HE	277	0.13	35	<15%	0.90	2.57	2/A3
High Power	1	40	EPH2/32IS/MV/MC/HE	120	0.45	54	<10%	1.26	2.33	2/A2
	1	40	EPH2/32IS/MV/MC/HE	277	0.20	54	<15%	1.26	2.33	2/A2
One Lamp Out										
Standard Power	2	40	EP3/32IS/MV/MC/HE	120	0.65	78	<10%	0.95	1.22	3/A2
	2	40	EP3/32IS/MV/MC/HE	277	0.29	77	<15%	0.95	1.23	3/A2
	2	40	EP3/32IS/MV/MC/HE	120	0.65	78	<10%	0.95	1.22	3/A2
	2	40	EP3/32IS/MV/MC/HE	277	0.29	77	<15%	0.95	1.23	3/A2
Low Power	2	40	EPL3/32IS/MV/MC	120	0.60	71	<10%	0.87	1.23	3/A2
	2	40	EPL3/32IS/MV/MC	277	0.26	70	<15%	0.87	1.24	3/A2
	2	40	EPL3/32IS/MV/SC/HE	120	0.58	68	<10%	0.84	1.24	3/A1
F40T8 continued on next page										

	Number of Lamps per Ballast	Lamp Watts	Ballast Model Number	Line Voltage	Line Current (amps)	Input Watts (ANSI)	Total Harmonic Distortion Rating	Ballast Factor (ANSI)	Ballast Efficacy Factor	Wir./Dim DiagPg.
F40T8 continued 										
Low Power	2	40	EPL3/32IS/MV/SC/HE	277	0.25	67	<10%	0.84	1.25	3/A1
High Power	2	40	EPH3/32IS/MV/MC/HE	120	0.84	100	<10%	1.26	1.26	3/A2
	2	40	EPH3/32IS/MV/MC/HE	277	0.36	98	<10%	1.26	1.29	3/A2
One Lamp Out										
Standard Power	3	40	EP4/32IS/MV/MC/HE	120	0.77	92	<10%	0.96	1.04	4/A2
	3	40	EP4/32IS/MV/MC/HE	277	0.41	109	<10%	0.96	0.88	4/A2
Low Power	3	40	EPL4/32IS/MV/MC/HE	120	0.82	98	<10%	0.82	0.85	4/A2
	3	40	EPL4/32IS/MV/MC/HE	277	0.35	96	<10%	0.82	0.85	4/A2
F96T8										
One Lamp Out										
Standard Power	1	59	EP2/59IS/MV/MC	120	0.58	70	<10%	0.95	1.36	2/A3
	1	59	EP2/59IS/MV/MC	120	0.58	70	<10%	0.95	1.36	2/A3
	1	59	EP2/59IS/MV/MC	277	0.25	69	<10%	0.95	1.38	2/A3
Standard Power	2	59	EP2/59IS/MV/MC	120	0.94	113	<10%	0.87	0.77	2/A3
	2	59	EP2/59IS/MV/MC	277	0.40	110	<10%	0.87	0.79	2/A3
FT40W/2G11 										
Standard Power	2	40	EP2/40IS-TT/MV/SC	120	0.56	67	<10%	0.84	1.25	5/A1
	2	40	EP2/40IS-TT/MV/SC	277	0.24	65	<10%	0.84	1.29	5/A1
Standard Power	3	40	EP3/40IS-TT/MV/SC	120	0.81	97	<10%	0.84	0.87	6/A1
	3	40	EP3/40IS-TT/MV/SC	277	0.34	95	<10%	0.84	0.88	6/A1
FC12T5HO 										
Standard Power	1	55	EP2/54HO/PRS/MV/90CW	120	0.45	55	<20%	0.88	1.60	8/A7
	1	55	EP2/54HO/PRS/MV/90CW	230	0.24	55	<20%	0.88	1.60	8/A7
	1	55	EP2/54HO/PRS/MV/90CW	277	0.20	55	<20%	0.88	1.60	8/A7
Standard Power	2	55	EP2/54HO/PRS/MV/90CW	120	0.87	106	<15%	0.86	0.81	7/A7
	2	55	EP2/54HO/PRS/MV/90CW	230	0.42	103	<15%	0.86	0.83	7/A7
	2	55	EP2/54HO/PRS/MV/90CW	277	0.37	103	<15%	0.86	0.83	7/A7
FT36W/2G11										
One Lamp Out										
Standard Power	1	36/39	EP2/54HO/PRS/MV/90CW	120	0.38	46	<20%	1.18	2.57	10/A7
FT36W/2G11 continued on next page										

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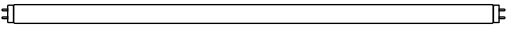
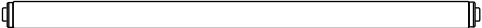
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	Number of Lamps per Ballast	Lamp Watts	Ballast Model Number	Line Voltage	Line Current (amps)	Input Watts (ANSI)	Total Harmonic Distortion Rating	Ballast Factor (ANSI)	Ballast Efficacy Factor	Wir./Dim Diag Pg.
FT36W/2G11 continued										
Standard Power	1	36/39	EP2/54HO/PRS/MV/90CW	230	0.21	46	<20%	1.18	2.57	8/A7
	1	36/39	EP2/54HO/PRS/MV/90CW	277	0.18	46	<20%	1.18	2.57	8/A7
Standard Power	2	36/39	EP2/54HO/PRS/MV/90CW	120	0.71	89	<15%	1.16	1.30	7/A7
	2	36/39	EP2/54HO/PRS/MV/90CW	230	0.35	86	<15%	1.16	1.35	7/A7
	2	36/39	EP2/54HO/PRS/MV/90CW	277	0.31	86	<15%	1.16	1.35	7/A7
FT50W/2G11										
One Lamp Out										
Standard Power	1	50	EP2/54HO/PRS/MV/90CW	120	0.52	61	<20%	1.15	1.89	8/A7
	1	50	EP2/54HO/PRS/MV/90CW	230	0.28	61	<20%	1.15	1.89	8/A7
	1	50	EP2/54HO/PRS/MV/90CW	277	0.23	61	<20%	1.15	1.89	8/A7
Standard Power	2	50	EP2/54HO/PRS/MV/90CW	120	1.01	118	<10%	1.12	0.95	7/A7
	2	50	EP2/54HO/PRS/MV/90CW	230	0.51	115	<10%	1.12	0.97	7/A7
	2	50	EP2/54HO/PRS/MV/90CW	277	0.43	115	<10%	1.12	0.97	7/A7
FT55W/2G11										
One Lamp Out										
Standard Power	1	55	EP2/54HO/PRS/MV/90CW	120	0.51	58	<20%	0.96	1.66	8/A7
	1	55	EP2/54HO/PRS/MV/90CW	230	0.27	58	<20%	0.96	1.66	8/A7
	1	55	EP2/54HO/PRS/MV/90CW	277	0.22	58	<20%	0.96	1.66	8/A7
Standard Power	2	55	EP2/54HO/PRS/MV/90CW	120	0.94	112	<10%	0.92	0.82	7/A7
	2	55	EP2/54HO/PRS/MV/90CW	230	0.48	109	<10%	0.92	0.84	7/A7
	2	55	EP2/54HO/PRS/MV/90CW	277	0.40	109	<10%	0.92	0.84	7/A7
F54T5HO (Primary Lamp Design)										
One Lamp Out										
Standard Power	1	54	EP2/54HO/PRS/MV/90CW	120	0.54	62	<20%	1.10	1.77	8/A7
	1	54	EP2/54HO/PRS/MV/90CW	230	0.29	62	<20%	1.10	1.77	8/A7
	1	54	EP2/54HO/PRS/MV/90CW	277	0.23	62	<20%	1.10	1.77	8/A7
Standard Power	2	54	EP2/54HO/PRS/MV/90CW	120	1.00	120	<10%	1.00	0.83	7/A7
	2	54	EP2/54HO/PRS/MV/90CW	230	0.52	117	<10%	1.00	0.85	7/A7
	2	54	EP2/54HO/PRS/MV/90CW	277	0.43	117	<10%	1.00	0.85	7/A7
F40T12 (Primary Lamp Design)										
	2	40	E2/40RS-120MC	120	0.63	74	<20%	0.85	1.15	1/A3
	2	40	E2/40RS-277	277	0.253	70	<20%	0.85	1.21	1/A4

	Number of Lamps per Ballast	Lamp Watts	Ballast Model Number	Line Voltage	Line Current (amps)	Input Watts (ANSI)	Total Harmonic Distortion Rating	Ballast Factor (ANSI)	Ballast Efficacy Factor	Wir./Dim Diag Pg.
F40T12/ES 										
	2	34	E2/40RS-120MC	120	0.54	62	<25%	0.85	1.37	1/A3
FB40T12										
	2	40	E2/40RS-277	277	0.253	70	<20%	0.85	1.21	1/A4
FB40T10										
	2	40	E2/40RS-277	277	0.253	70	<20%	0.86	1.23	1/A4
F34T12, FB34T12										
	2	34	E2/40RS-277	277	0.22	61	<20%	0.81	1.33	1/A4
F48T12HO 										
One Lamp Out										
	1	60	E2/110RS-120	120	0.71	67	<15%	1.12	1.672	1/A5
	1	60	E2/110RS-277	277	0.31	67	<15%	1.12	1.672	1/A5
	2	60	E2/110RS-120	120	1.13	119	<10%	0.99	0.83	1/A5
	2	60	E2/110RS-277	277	0.48	119	<10%	0.99	0.83	1/A5
	2	60	EP2/110RS-MV	120	0.88	104	<15%	0.90	0.87	1/A5
	2	60	EP2/110RS-MV	277	0.38	104	<15%	0.90	0.87	1/A5
F60T12HO										
One Lamp Out										
	1	75	E2/110RS-120	120	0.82	81	<15%	1.08	1.33	1/A5
	1	75	E2/110RS-277	277	0.35	81	<15%	1.08	1.33	1/A5
	2	75	E2/110RS-120	120	1.29	144	<10%	0.96	0.67	1/A5
	2	75	E2/110RS-277	277	0.53	144	<10%	0.96	0.67	1/A5
	2	75	EP2/110RS-MV	120	1.10	132	<12%	0.90	0.68	1/A9
	2	75	EP2/110RS-MV	277	0.47	132	<12%	0.90	0.68	1/A9
F72T12HO										
One Lamp Out										
	1	85	E2/110RS-120	120	0.89	85	<15%	1.05	1.235	1/A5
	1	85	E2/110RS-277	277	0.39	85	<15%	1.05	1.235	1/A5
	2	85	E2/110RS-120	120	1.4	153	<10%	0.9	0.588	1/A5
	2	85	E2/110RS-277	277	0.6	153	<10%	0.90	0.588	1/A5
F72T12HO continued on next page										

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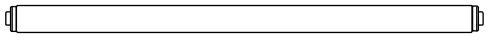
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	Number of Lamps per Ballast	Lamp Watts	Ballast Model Number	Line Voltage	Line Current (amps)	Input Watts (ANSI)	Total Harmonic Distortion Rating	Ballast Factor (ANSI)	Ballast Efficacy Factor	Wir./Dim DiagPg.
F72T12HO continued 										
	2	85	EP2/110RS-MV	120	1.3	154	<10%	0.90	0.58	1/A9
	2	85	EP2/110RS-MV	277	0.56	154	<12%	0.90	0.58	1/A9
F96T12HO* (Primary Lamp Design), F96T12HOES										
One Lamp Out										
	1	110/95	E2/110RS-120	120	1.1/0.91	113/108	<10%	1.03/1.03	0.912/0.953	1/A5
	1	110/95	E2/110RS-277	277	0.45/0.37	113/108	<10%	1.03/1.03	0.912/0.953	1/A5
	1	110	EP2/110RS-MV	120	0.88	104	<10%	0.92	0.88	1/A9
	1	110	EP2/110RS-MV	277	0.38	104	<10%	0.92	0.88	1/A9
	2	110/95	E2/110RS-120	120	1.74/1.44	200/169	<10%	.90/.89	.45/.526	1/A5
	2	110/95	E2/110RS-277	277	0.69/0.57	200/169	<10%	0.90/0.89	0.45/0.526	1/A5
	2	110/95	EP2/110RS-MV	120	1.65/1.38	196/164	<15%	0.85/0.90	0.43/0.55	1/A9
	2	110/95	EP2/110RS-MV	277	0.71/0.60	196/164	<15%	0.85/0.90	0.43/0.55	1/A9
F60T12										
One Lamp Out										
	1	50	E2/75IS-277	277	0.24	55	<10%	1.10	2.00	2/A6
	2	50	E2/75IS-277	277	0.36	100	<10%	1.00	1.00	2/A6
F64T12										
One Lamp Out										
	1	52	E2/75IS-277	277	0.24	57	<10%	1.09	1.91	2/A6
F64T12										
	2	52	E2/75IS-277	277	0.37	103	<10%	0.99	0.96	2/A6
F72T12										
One Lamp Out										
	1	57	E2/75IS-120MC	120	0.54	64	<10%	1.02	1.63	2/A8
	1	57	E2/75IS-277	277	0.27	61	<10%	1.07	1.75	2/A6
	2	57	E2/75IS-120MC	120	0.85	106	<10%	0.9	0.85	2/A8
	2	57	E2/75IS-277	277	0.41	113	<10%	0.98	0.87	2/A6
	2	55	EP2/75IS/MV/SC	120	0.91	108	<10%	0.92	0.85	2/A1
	2	55	EP2/75IS/MV/SC	277	0.38	107	<10%	0.92	0.86	2/A1

	Number of Lamps per Ballast	Lamp Watts	Ballast Model Number	Line Voltage	Line Current (amps)	Input Watts (ANSI)	Total Harmonic Distortion Rating	Ballast Factor (ANSI)	Ballast Efficacy Factor	Wir./Dim Diag Pg.
F84T12 										
One Lamp Out										
	1	70	E2/75IS-277	277	0.31	74	<10%	1.05	1.41	2/A6
	2	70	E2/75IS-277	277	0.48	134	<10%	0.96	0.72	2/A6
F96T12 (Primary Lamp Design)										
One Lamp Out										
	1	75	E2/75IS-120MC	120	0.68	82	<10%	1.02	1.24	2/A8
	1	75	E2/75IS-277	277	0.32	144	<10%	1.05	1.32	2/A6
	2	75	E2/75IS-120MC	120	1.13	135	<10%	0.88	0.65	2/A8
	2	75	E2/75IS-277	277	0.50	79	<10%	0.95	0.66	2/A6
	2	75	EP2/75IS/MV/SC	120	1.17	137	<10%	0.9	0.66	2/A8
	2	75	EP2/75IS/MV/SC	277	0.50	135	<10%	0.9	0.67	2/A6
F96T12ES										
One Lamp Out										
	1	60	E2/75IS-120MC	120	0.54	64	<10%	1.00	1.56	2/A8
	1	60	E2/75IS-277	277	0.27	64	<10%	1.07	1.67	2/A6
	2	60	E2/75IS-120MC	120	0.88	105	<10%	0.88	0.84	2/A8
	2	60	E2/75IS-277	277	0.41	113	<10%	0.94	0.83	2/A6
	2	60	EP2/75IS/MV/SC	120	0.88	105	<10%	0.89	0.85	2/A1
	2	60	EP2/75IS/MV/SC	277	0.38	107	<10%	0.89	0.86	2/A1
F96T12HOES										
One Lamp Out										
	1	57	E2/75IS-277	277	0.27	61	<10%	1.07	1.75	2/A6
	2	60	EP2/75IS/MV/SC	120	1.05	124	<10%	0.58	0.47	2/A5
	2	60	EP2/75IS/MV/SC	277	0.44	122	<10%	0.58	0.48	2/A4
F48T12HO										
	2	60	E2/72RS/120R	120	0.85	102	<10%	1.1	1.08	1/A5
F60T12HO										
	2	75	E2/72RS/120R	120	0.96	116	<10%	0.96	0.82	1/A5

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Ballast

Electromagnetic
Ballast

Compact
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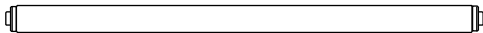
Electronic Ballast

Electromagnetic Ballast

Compact Fluorescent Ballasts

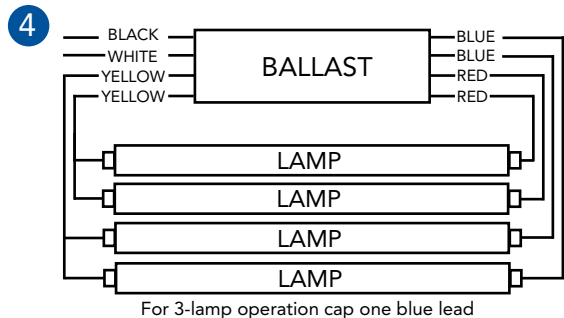
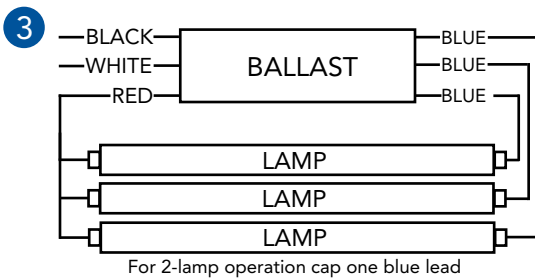
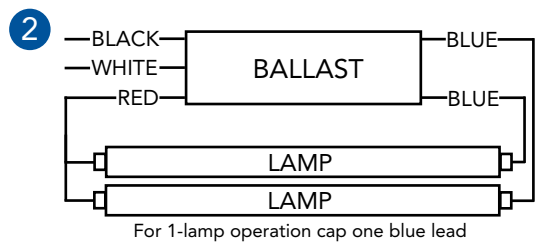
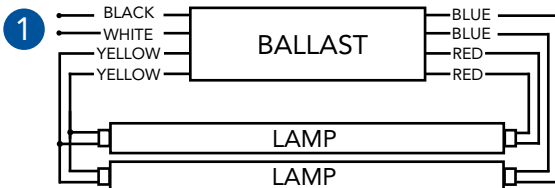
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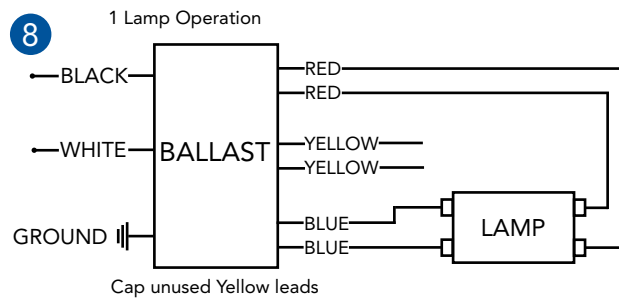
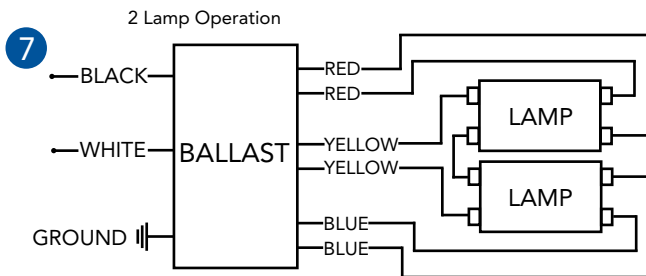
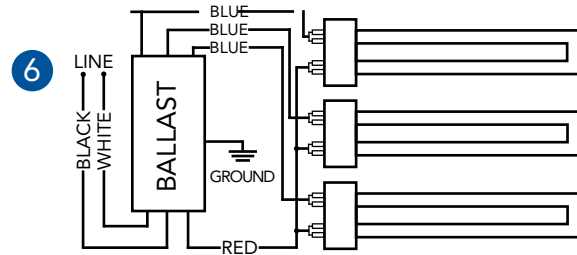
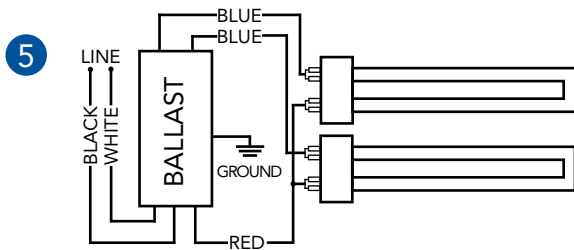
Sign Ballast

	Number of Lamps per Ballast	Lamp Watts	Ballast Model Number	Line Voltage	Line Current (amps)	Input Watts (ANSI)	Total Harmonic Distortion Rating	Ballast Factor (ANSI)	Ballast Efficacy Factor	Wir./Dim Diag Pg.
F72T12HO (Primary Lamp Design) 										
	2	85	E2/72RS/120R	120	1.12	136	<10%	0.89	0.65	1/A5
F96T12HO, F96T12HOES										
One Lamp Out										
	1	110/95	E2/72RS/120R	120	.78/.67	95/81	<10%	.80/.80	.84/.99	1/A5

Wiring Diagrams

Install in accordance with National and Local Electrical Codes. Disconnect power when installing or servicing. Ballast case must be grounded. Install lamps within 3/4" of grounded metal plane.

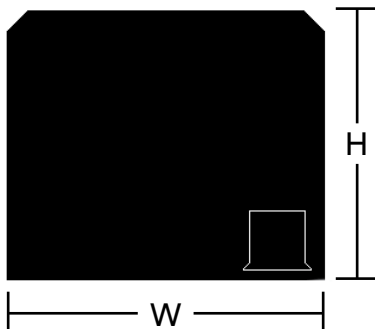




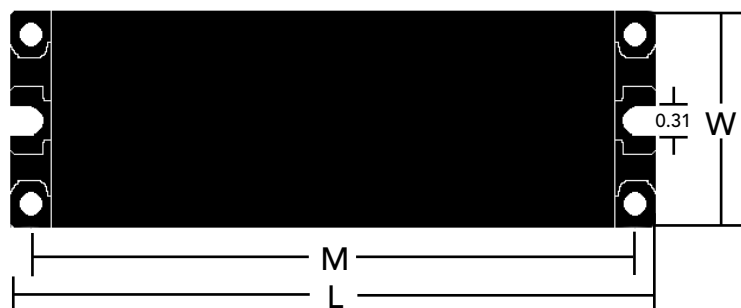
Linear Case Ballast Dimensions

Diagram	Measurement in inches.			
	Dim. L	Dim. W	Dim. H	Dim. M
A1	9.50	1.80	1.20	9.00
A2	9.50	1.30	1.05	9.00
A3	9.50	1.30	1.00	9.00
A4	9.50	1.70	1.30	9.00
A5	11.75	2.375	1.63	11.13
A6	9.50	2.375	1.60	9.00
A7	16.75	1.18	1.00	16.25
A8	9.50	1.70	1.20	9.00
A9	11.80	2.15	1.61	11.00

Side Ballast View



Bottom Ballast View



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Electronic Fluorescent Ballasts		
U.P.C. Item #	Catalog #	Suggested Replacement
11102	E1/32IS-120	E2/32IS/MV/MC/HE
11202	E1/32IS-277	E2/32IS/MV/MC/HE
12102	E2/32IS-120	E2/32IS/MV/MC/HE
12202	E2/32IS-277	E2/32IS/MV/MC/HE
13102	E3/32IS-120	E3/32IS/MV/MC/HE
13202	E3/32IS-277	E3/32IS/MV/MC/HE
14102	E4/32IS-120	E4/32IS/MV/MC/HE
14202	E4/32IS-277	E4/32IS/MV/MC/HE
11105	E1/32IS-120HEX	EP2/32IS/MV/SC/HE
11205	E1/32IS-277HEX	EP2/32IS/MV/SC/HE
12105	E2/32IS-120HEX	EP2/32IS/MV/SC/HE
12205	E2/32IS-277HEX	EP2/32IS/MV/SC/HE
12105	E3/32IS-120HEX	EP3/32IS/MV/SC/HE
13205	E3/32IS-277HEX	EP3/32IS/MV/SC/HE
14105	E4/32IS-120HEX	EP4/32IS/MV/SC/HE
14205	E4/32IS-277HEX	EP4/32IS/MV/SC/HE
11103	E1/32IS-120SC	EP2/32IS/MV/MC/HE
11203	E1/32IS-277SC	EP2/32IS/MV/MC/HE
12103	E2/32IS-120SC	EP2/32IS/MV/MC/HE
12203	E2/32IS-277SC	EP2/32IS/MV/MC/HE
13103	E3/32IS-120SC	EP3/32IS/MV/MC/HE
13203	E3/32IS-277SC	EP3/32IS/MV/MC/HE
14103	E4/32IS-120SC	EP4/32IS/MV/MC/HE
14203	E4/32IS-277SC	EP4/32IS/MV/MC/HE
12104	E2/40IS-TT-120	EP2/40IS-TT/MV/SC
12204	E2/40IS-TT-277	EP2/40IS-TT/MV/SC
13104	E3/40IS-TT-120	EP3/40IS-TT/MV/SC
13204	E3/40IS-TT-277	EP3/40IS-TT/MV/SC
01915	E2/40RS-120	E2/40RS-120MC
31102	E1/59IS-120	EP2/59IS/MV/MC
31202	E1/59IS-277	EP2/59IS/MV/MC
32102	E2/59IS-120	EP2/59IS/MV/MC
32202	E2/59IS-277	EP2/59IS/MV/MC
01942	EP2/59IS/MV/SC	EP2/59IS/MV/MC
11122	EH1/32IS-120	EPH2/32IS/MV/MC
11222	EH1/32IS-277	EPH2/32IS/MV/MC

U.P.C. Item #	Catalog #	Suggested Replacement
12122	EH2/32IS-120	EPH2/32IS/MV/MC
12222	EH2/32IS-277	EPH2/32IS/MV/MC
13222	EH3/32IS-120	EPH3/32IS/MV/MC
13222	EH3/32IS-277	EPH3/32IS/MV/MC
14122	EH4/32IS-120	n/a
14222	EH4/32IS-277	n/a
11112	EL1/32IS-120	EPL2/32IS/MV/MC/HE
11212	EL1/32IS-277	EPL2/32IS/MV/MC/HE
12112	EL2/32IS-120	EPL2/32IS/MV/MC/HE
12212	EL2/32IS-277	EPL2/32IS/MV/MC/HE
13112	EL3/32IS-120	EPL3/32IS/MV/MC/HE
13212	EL3/32IS-277	EPL3/32IS/MV/MC/HE
14112	EL4/32IS-120	EPL4/32IS/MV/MC/HE
14212	EL4/32IS-277	EPL4/32IS/MV/MC/HE
11115	EL1/32IS-120HEX	EPL2/32IS/MV/SC/HE
11215	EL1/32IS-277HEX	EPL2/32IS/MV/SC/HE
12115	EL2/32IS-120HEX	EPL2/32IS/MV/SC/HE
12215	EL2/32IS-277HEX	EPL2/32IS/MV/SC/HE
13115	EL3/32IS-120HEX	EPL3/32IS/MV/SC/HE
13215	EL3/32IS-277HEX	EPL3/32IS/MV/SC/HE
14115	EL4/32IS-120HEX	EPL4/32IS/MV/SC/HE
14215	EL4/32IS-277HEX	EPL4/32IS/MV/SC/HE
21152	EP1/32IS/120-277	EP2/32IS/MV/MC/HE
22152	EP2/32IS/120-277	EP2/32IS/MV/MC/HE
23152	EP3/32IS/120-277	EP3/32IS/MV/MC/HE
24152	EP4/32IS/120-277	EP4/32IS/MV/MC/HE
21132	EP1/32IS-120	EP2/32IS/MV/MC/HE
21232	EP1/32IS-277	EP2/32IS/MV/MC/HE
22132	EP2/32IS-120	EP2/32IS/MV/MC/HE
22232	EP2/32IS-277	EP2/32IS/MV/MC/HE
23132	EP3/32IS-277	EP3/32IS/MV/MC/HE
23232	EP3/32IS-277	EP3/32IS/MV/MC/HE
24132	EP4/32IS-120	EP4/32IS/MV/MC/HE
24232	EP4/32IS-277	EP4/32IS/MV/MC/HE
22153	EP2/32IS/120-277SC	EP2/32IS/MV/MC/HE
23153	EP3/32IS/120-277SC	EP3/32IS/MV/MC/HE

Products Discontinued

U.P.C. Item #	Catalog #	Suggested Replacement
24153	EP4/32IS/120-277SC	EP4/32IS/MV/MC/HE
22154	EP2/40IS-TT/120-277	EP2/40IS-TT/MV/SC
21252	EPL1/32IS/120-277	EPL2/32IS/MV/MC/HE
22252	EPL2/32IS/120-277	EPL2/32IS/MV/MC/HE
23252	EPL3/32IS/120-277	EPL3/32IS/MV/MC/HE
24252	EPL4/32IS/120-277	EPL4/32IS/MV/MC/HE
21342	EPL1/32IS-120	EPL2/32IS/MV/MC/HE
21442	EPL1/32IS-277	EPL2/32IS/MV/MC/HE
22342	EPL2/32IS-120	EPL2/32IS/MV/MC/HE
22442	EPL2/32IS-277	EPL2/32IS/MV/MC/HE
23342	EPL3/32IS-120	EPL3/32IS/MV/MC/HE
23442	EPL3/32IS-277	EPL3/32IS/MV/MC/HE
24342	EPL4/32IS-120	EPL4/32IS/MV/MC/HE
24242	EPL4/32IS-277	EPL4/32IS/MV/MC/HE

U.P.C. Item #	Catalog #	Suggested Replacement
11302	E1/32IS-347	n/a
13302	E3/32IS-347	n/a
14302	E4/32IS-347	n/a
11104	E1/40IS-TT-120	n/a
11204	E1/40IS-TT-277	n/a
11214	EL1/40IS-TT-277	n/a
12114	EL2/40IS-TT-120	n/a
12214	EL2/40IS-TT-277	n/a
13114	EL3/40IS-TT-120	n/a
13214	EL3/40IS-TT-277	n/a
21254	EPL1/40IS-TT/120-277	n/a
22254	EPL2/40IS-TT/120-277	n/a
23254	EPL3/40IS-TT/120-277	n/a

Refrigeration/Freezer Ballasts		
U.P.C. Item #	Catalog #	Suggested Replacement
12404	E2/36RS-120R	n/a
12405	E1/72RS-120R	n/a
12401	E2/72RS-120	E2/72RS-120R

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Instant Start



Rapid Start

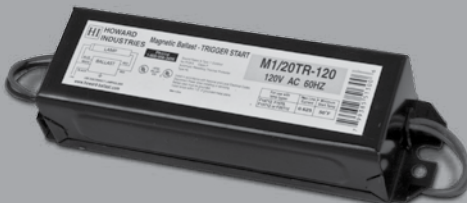


Product Overview

Compact Fluorescent



Preheat Trigger Start



Identifying the Ballast Model Number

To simplify the identification of Howard ballasts for specifying, ordering or stocking, every item has been assigned easy-to-use, easy-to-understand model number. Each individual digit represents a specific characteristic of the ballast. Each alpha/numeric model number provides a complete description of each ballast.

M2/40RS-120	MAGNETIC BALLAST
M2/40RS-120	NUMBER OF LAMPS SUPPORTED BY THE BALLAST
M2/40RS-120	PRIMARY LAMP DESIGN
M2/40RS-120	RAPID START
M2/75IS-120	INSTANT START
M1/13CFN-120	COMPACT FLUORESCENT NORMAL POWER
M2/40RS-120	INPUT LINE VOLTAGE

Specifications

- Ballast shall have a three-year limited warranty
- Ballast shall be UL certified
- Ballast shall be Class P Type 1 Outdoor
- Ballast shall have a Lamp Current Crest Factor of <1.7
- Ballast shall withstand line transients as specified in ANSI C62.41-1991
- Ballast shall have a minimum Power Factor of 90% for primary lamp operation
- Ballast shall operate within a +/- 10% of the ballast specified line voltage at an input frequency of 60Hz
- Ballast shall have a maximum case hot spot temperature of 90°C

Fluorescent Electromagnetic Ballasts

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Energy Policy Act Update:

Fluorescent Ballast Efficiency Baseline Increases • • • • •

The Department of Energy finalized a rule regarding the manufacture and sale of fluorescent lamp ballasts that will result in significant energy savings and emissions reductions. The commercial and industrial lighting sector will be subject to new energy-efficient lighting regulations beginning April 1, 2005. Under these new regulations ballast manufacturers can no longer produce ballasts for installation into new lighting fixtures unless they meet the new minimum Ballast Efficacy requirements (BEF's).

These regulations affect ballast that operates T12 fluorescent lamps. The new regulation has a different effective date for new fixtures versus replacing existing ballast in the field or replacement ballasts. With existing technology today, only electronic ballasts comply with these not DOE guidelines. The following is a summary of this new regulation and the products and markets affected.

Ballast Regulations

T12 magnetic ballast for replacement purposes in existing installations can be manufactured until June 30, 2010, but must meet the following requirements:

- Be labeled "for Replacement Use Only"
- Have leads shorter than the length of lamps intended to be operated
- Be shipped in packages not exceeding 10 ballasts
- Meet existing T12 magnetic BEF criteria

Exemptions include:

- T12 dimming ballasts that dim to 50% or less
- Two lamp F96T12HO ballast designed for -20F operation and used in an outdoor sign
- Magnetic ballasts with power factors less than 0.90 designed and labeled for residential building applications

The lamps covered and BEF numbers are as follows:

Application	Ballast Input Voltage	Ballast Efficacy Factor
One F40T12 lamp	120 or 277	2.29
Two F40T12 lamps	120 or 277	1.17
Two F96T12 lamps	120 or 277	0.63
Two F96T12HO lamps	120 or 277	0.39

Minimum requirements have not been set for T8 lamps, since there are a few applications where electronic ballast would not be used and the low frequency magnetic ballasts would be necessary.

Important Effective Dates

July 1, 2005 ballast manufacturers can no longer sell ballasts for use in new fixtures that do not meet the BEF requirements. Replacement ballasts marked "For Replacement Use Only" are to be provided until the final implementation date.

April 1, 2006 lighting fixtures manufacturers can no longer incorporate ballast that do not meet the new BEF requirements in new fixtures

July 1, 2010 ballasts, including replacements, can no longer be manufactured unless they meet the new BEF Guidelines.

If you have questions about what Howard Lighting Products is doing to ensure our products meet or exceed these government regulations, contact our customer support department at 800.956.3456 between 8:00am – 5:00pm CST or by e-mail at lighting@howard-ind.com.

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Ballast

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Magnetic ballasts affected by EPACT2005

Ballast Model Number	Suggested Replacement
M1/40RS-120	N/A
M1/40RS-277	N/A
M2/40RS-120	E2/40RS-120MC
M2/40RS-220	N/A
M2/40RS-240	N/A
M2/40RS-277	E2/40RS-277
M1/75IS-120	N/A
M1/75IS-277	N/A
M2/75IS-120	E2/75IS-120MC or EP2/75IS/MV/SC
M2/75IS-277	E2/75IS-277 or EP2/75IS/MV/SC
M1/110RS-120	N/A
M1/110RS-277	N/A
M2/110RS-120	E2/110RS-120 or EP2/110RS-MV
M2/110RS-277	E2/110RS-277 or EP2/110RS-MV

Fluorescent Ballast Lead Lengths

	RED	YELLOW	BLUE	WHITE	BLACK
M2/30RS-120	12	12	12	12	12
M2/32RS-120	12	12	12	12	12
M2/32RS-277	12	12	12	12	12
M1/40RS-120	12	-	12	12	12
M1/40RS-277	12	-	12	12	12
M2/40RS-120	12	12	12	12	12
M2/40RS-220	12	12	12	12	12
M2/40RS-240	12	12	12	12	12
M2/40RS-277	12	12	12	12	12
M1/20TR-120	12	-	12	12	12
M2/20TR-120	12	12	12	12	12
M1/75IS-120	12	-	-	12	12
M1/75IS-277	12	-	-	12	12
M2/75IS-120	12	12	12	12	12
M2/75IS-277	12	12	12	12	12
M1/110RS-120	12	-	12	12	12
M1/110RS-277	12	-	12	12	12
M2/110RS-120	12	12	12	12	12
M2/110RS-277	12	12	12	12	12
M1/22RSC-120	9	-	9	12	12
M1/26CFH-120	-	-	15	15	15
M1/26CFN-277	-	-	-	-	9 x 18
M2/40RSCH-120	9	9	9	12	12
M1/9CFN-120	-	-	-	-	9 x 18
M1/13CFH-120	-	-	12	12	12
M1/13CFN-120	-	-	-	-	9 x 18
M1/18CFH-120	-	-	15	15	15
M1/28CFH-120	-	-	15	15	15
M2/13CFH-120	-	-	15	15	15

Electronic
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Ballast

Compact
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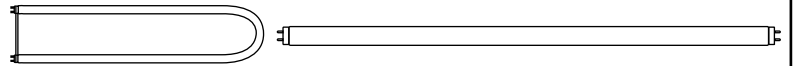
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Electronic Ballast

Number of Lamps per Ballast	Lamp Watts	Ballast Model Number	Line Voltage	Line Current (amps)		Input Watts (ANSI)		Ballast Factor (ANSI)		Minimum Starting Temp. F/C		Total Harmonic Distortion	Power Factor	Sound Rating	Wir./Dim Diag Pg.
				STD.	ES	STD.	ES	STD.	ES	STD.	ES				

RAPID START/RAPID START LAMPS

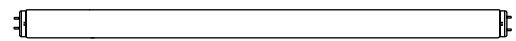
F32T8, F32T8/U (265MA)
FB31T8, F32T8/ES (230 MA)



2	32/30	M2/32RS-120	120	0.64	0.6	69	65	90%	88%	50/10	60/15	10%	0.90	A	2/T2
2	32/20	M2/32RS-277	277	0.27	0.25	69	65	90%	88%	50/10	60/15	10%	0.90	A	2/T2

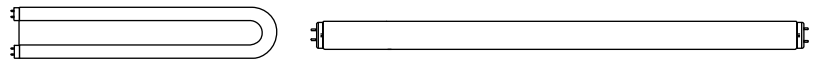
Electromagnetic Ballast

F30T12 (455MA) F30T12/ES (430MA)



2	30/25	M2/30RS-120	120	0.63	0.55	75	65	96%	91%	50/10	60/15	14%	0.95	A	2/T2
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F40T12, F40T12/U (460MA)
F40T12/U/ES, F40T12/U/ES (430 MA)

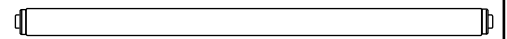


1	40/34	M1/40RS-120	120	0.43	0.37	51	44	95%	88%	50/10	60/15	12%	0.98	A	1/T2
1	40/34	M1/40RS-277	277	0.19	0.17	52	46	95%	88%	50/10	60/15	12%	0.99	A	1/T2
2	40/34	M2/40RS-120	120	0.74	0.63	87	74	92%	88%	50/10	60/15	15%	0.98	A	2/T2
2	40/34	M2/40RS-220	220	0.41	0.35	88	74	90%	88%	50/10	60/15	20%	0.98	A	2/T2
2	40/34	M2/40RS-240	240	0.37	0.31	86	74	90%	88%	50/10	60/15	20%	0.99	A	2/T2
2	40/34	M2/40RS-277	277	0.32	0.28	87	77	93%	88%	50/10	60/15	20%	0.98	A	2/T2

Compact Fluorescent Ballasts

RAPID START/HIGH OUTPUT

F72T12/HO (800MA)



1	85	M1/110RS-120	120	1.11	NA	123	NA	101%	NA	-20/-29	NA	30%	0.94	C	1/R7
1	85	M1/110RS-277	277	0.46	NA	117	NA	98%	NA	-20/-29	NA	30%	0.93	C	1/R7
2	85	M2/110RS-120	120	1.84	NA	206	NA	95%	NA	-20/-29	NA	20%	0.94	C	2/R7
2	85	M2/110RS-277	277	0.76	NA	202	NA	95%	NA	-20/-29	NA	20%	0.96	C	2/R7

F96T12/HO (800MA) F96T12/HO/ES (840 MA)

1	110/95	M1/110RS-120	120	1.38	1.2	153	128	102%	95%	-20/-29	60/15	30%	0.91	C	1/R7
1	110/95	M1/110RS-277	277	0.57	0.5	147	123	99%	92%	-20/-29	60/15	33%	0.91	C	1/R7
2	110/95	M2/110RS-120	120	2.19	1.92	244	218	95%	94%	-20/-29	60/15	20%	0.95	C	2/R7
2	110/95	M2/110RS-277	277	0.94	0.78	244	209	95%	90%	-20/-29	60/15	10%	0.97	C	2/R7

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Number of Lamps per Ballast	Lamp Watts	Ballast Model Number	Line Voltage	Line Current (amps)	Input Watts (ANSI)	Ballast Factor (ANSI)	Minimum Starting Temp. F/C		Total Harmonic Distortion	Power Factor	Sound Rating	Wir./Dim Diag Pg.
							STD.	ES				
INSTANT START/SLIMLINE LAMPS												
F60T12 (425MA) 												
2	50	M2/75IS-120	120	0.93	109	80%	50/10	N/A	20%	0.97	C	4/R6
2	50	M2/75IS-277	277	0.47	120	83%	50/10	N/A	30%	0.93	C	5/R6
F72T12 (425MA)												
1	55	M1/75IS-120	120	0.72	78	80%	50/10	N/A	25%	0.91	C	3/R6
1	55	M1/75IS-277	277	0.3	78	80%	50/10	N/A	30%	0.92	C	3/R6
2	55	M2/75IS-120	120	1.11	130	80%	50/10	N/A	20%	0.98	C	4/R6
2	55	M2/75IS-277	277	0.51	132	83%	50/10	N/A	30%	0.94	C	5/R6
F96T12 (425MA)												
1	75	M1/75IS-120	120	0.83	93	76%	50/10	N/A	23%	0.93	C	3/R6
1	75	M1/75IS-277	277	0.36	92	76%	50/10	N/A	30%	0.94	C	3/R6
2	75	M2/75IS-120	120	1.35	156	76%	50/10	N/A	20%	0.97	C	4/R6
2	75	M2/75IS-277	277	0.63	156	80%	50/10	N/A	30%	0.95	C	5/R6
F96T12/ES (425MA)												
1	60	M1/75IS-120	120	0.72	77	72%	60/15	30%	0.90	C	3/R6	2/R6
1	60	M1/75IS-277	277	0.29	75	73%	60/15	30%	0.92	C	3/R6	2/R6
2	60	M2/75IS-120	120	1.08	126	73%	N/A	60/15	25%	0.97	C	4/R6
2	60	M2/75IS-277	277	0.53	128	75%	N/A	60/15	30%	0.91	C	5/R6

Number of Lamps per Ballast	Lamp Watts	Ballast Model Number	Line Voltage	Line Current (amps)	Input Watts (ANSI)	Ballast Factor (ANSI)	Minimum Starting Temp. F/C	Total Harmonic Distortion	Power Factor	Sound Rating	Wir./Dim Diag Pg.
PREHEAT BALLASTS/STARTER REQUIRED											
F14T8 											
1	14	M1/13CFN-120	120	0.29	16	75%	50/10	10%	0.46	A	9/C4
F15T8											
1	15	M1/13CFN-120	120	0.27	16	75%	50/10	10%	0.50	A	9/C4
F18T8											
1	18	M1/13CFN-120	120	0.23	16	72%	50/10	10%	0.58	A	9/C4

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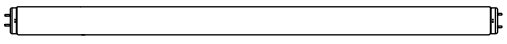
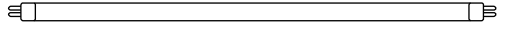
Electronic
Ballast

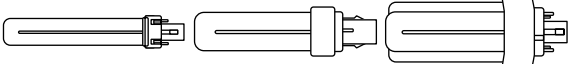
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Number of Lamps per Ballast	Lamp Watts	Ballast Model Number	Line Voltage	Line Current (amps)	Input Watts (ANSI)	Ballast Factor (ANSI)	Minimum Starting Temp. F/C	Total Harmonic Distortion	Power Factor	Sound Rating	Wir./Dim Diag Pg.
PREHEAT BALLASTS/STARTER REQUIRED											
F14T12											
1	14	M1/13CFN-120	120	0.3	16	82%	50/10	10%	0.45	A	9/C4
F15T12											
1	15	M1/13CFN-120	120	0.28	17	87%	50/10	10%	0.50	A	9/C4
F20T12											
1	20	M1/13CFN-120	120	0.22	17	70%	50/10	10%	0.60	A	9/C4
PREHEAT-TRIGGER START BALLASTS/NO STARTER REQUIRED											
F8T5											
1	8	M1/9CFN-120	120	0.15	10	60%	50/10	10%	0.55	A	9/C1
F15T8											
1	15	M1/20TR-120	120	0.6	30	103%	50/10	10%	0.42	A	6/R3
2	15	M2/20TR-120	120	0.64	35	70%	50/10	15%	0.45	A	12/T1
F14T12											
1	14	M1/20TR-120	120	0.64	29	93%	50/10	10%	0.40	A	6/R3
F15T12											
1	15	M1/20TR-120	120	0.62	31	100%	50/10	10%	0.42	A	6/R3
2	15	M2/20TR-120	120	0.64	36	80%	50/10	20%	0.47	A	12/T1
F20T12											
1	20	M1/20TR-120	120	0.57	30	85%	50/10	10%	0.45	A	6/R3
2	20	M2/20TR-120	120	0.58	35	55%	50/10	18%	0.50	A	12/T1

Number of Lamps per Ballast	Lamp Watts	Ballast Model Number	Line Voltage	Line Current (amps)	Input Watts (ANSI)	Ballast Factor (ANSI)	Minimum Starting Temp. F/C	Total Harmonic Distortion	Power Factor	Sound Rating	Wir./Dim Diag Pg.
RAPID START/CIRCLINE LAMPS/NORMAL POWER FACTOR											
F8T9											
1	22	M1/22RSC-120	120	0.49	24	73%	50/10	10%	0.41	A	7/R3
RAPID START/CIRCLINE LAMPS/HIGH POWER FACTOR											
(1) FC8T9 & (1) FC12T9											
2	22 & 32	M2/40RSC-120	120	0.56	65	75%	50/10	20%	0.98	A	8/T1
(1) FC12T9 & (1) FC16T9											
2	32 & 40	M2/40RSC-120	120	0.44	51	75%	50/10	20%	0.98	A	8/T1
PREHEAT BALLASTS/2-PIN COMPACT FLUORESCENT LAMPS/NORMAL POWER FACTOR											
CFT7W/G23, PL-S7W, F7BX, CF7DS											
1	7	M1/9CFN-120	120	0.16	10	95%	50/10	10%	0.5	A	10/C1
CFT9W/G23, PL-S9W, F9BX, CF9DS											
1	9	M1/9CFN-120	120	0.13	10	95%	50/10	13%	0.6	A	10/C1
CFT13W/1GX23, PL-S13W, F13BX, CF13DS, CFQ13W/1GX23, PL-C13W/USA, F13BX23T4, CF13DD											
1	13	M1/13CFN-120	120	0.25	15	95%	32/0	13%	0.5	A	10/C4
CFQ18W/GX24D, PL-C18W, F18DBXT4, CRF18DD											
1	18	M1/18CFN-277	277	0.23	20	95%	50/10	13%	0.5	A	10/C4
CFQ26W/G24D, PL-C26W, F26DBXT4, CF26DD											
1	26	M1/26CFN-277	277	0.27	31	92%	50/10	10%	0.4	A	10/X4
PREHEAT BALLASTS/2-PIN COMPACT FLUORESCENT LAMPS/HIGH POWER FACTOR											
CFT13W/G23, PL-S13W, F13BX, CF13DS, CFQ13W/1GX23, PL-C13W/USA, F13BX23T4, CF13DD											
1	13	M1/13CFH-120	120	0.13	14	90%	32/0	7%	0.95	A	11/R5
2	13	M2/13CFH-120	120	0.25	29	90%	32/0	25%	0.97	A	14/R4
CFQ18W/GX24D, PL-C18W, F18DBXT4, CRF18DD, CFM18W/GX24D, F18TBX, CF1818DT											
1	18	M1/18CFH-120	120	0.18	21	90%	50/10	20%	0.97	A	11/R3
CFQ26W/G24D, PL-C26W, F26DBXT4, CF26DD, CFM26W/GX24D, F26TBX, CF26DT											
1	26	M1/26CFH-120	120	0.27	32	90%	50/10	22%	0.97	A	11/R3
1	28	M1/28CFH-120	120	0.24	28	90%	50/10	22%	0.97	A	11/R4

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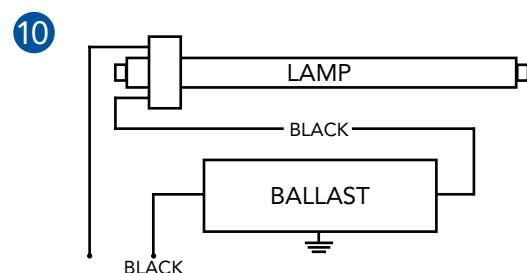
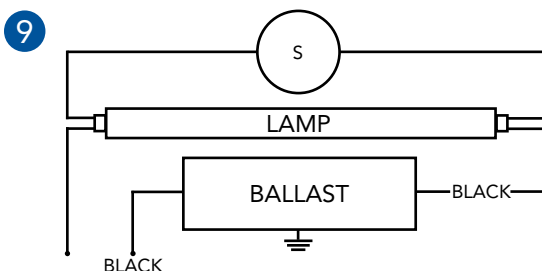
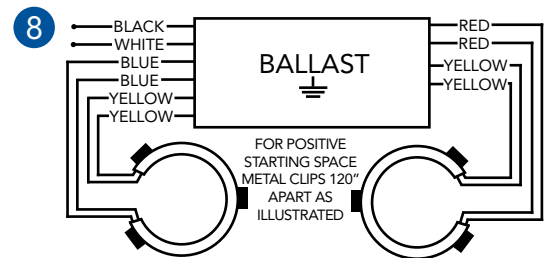
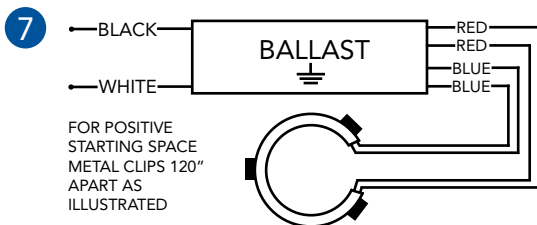
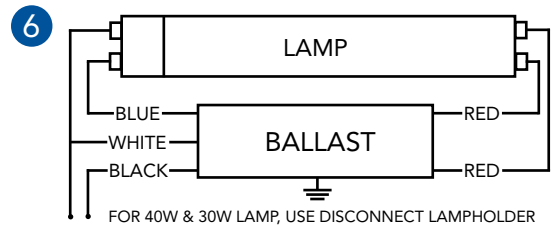
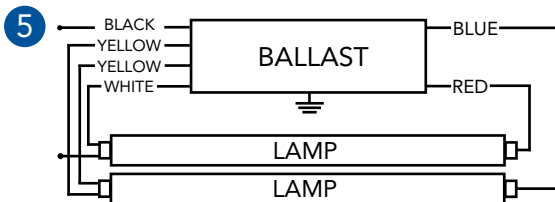
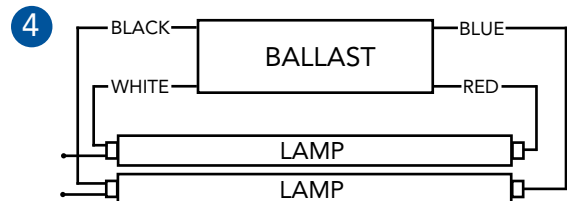
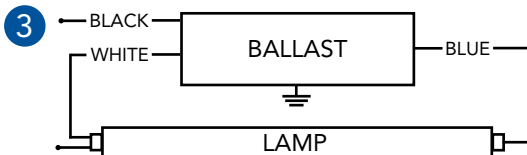
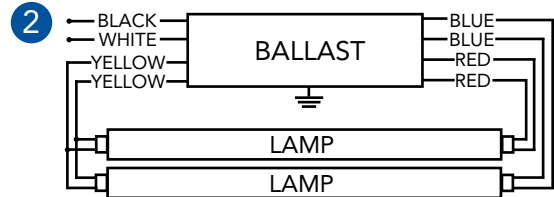
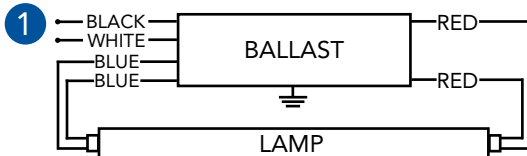
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Wiring Diagrams

Install in accordance with National and Local Electrical Codes. Disconnect power when installing or servicing. Ballast case must be grounded. Install lamps within 3/4" of grounded metal plane.



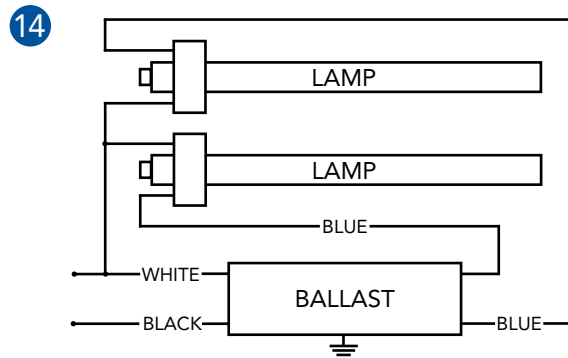
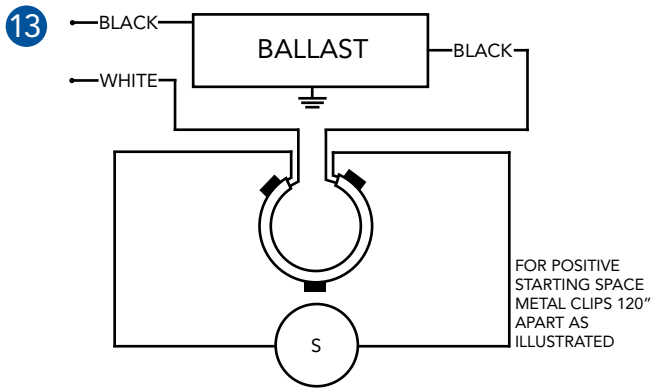
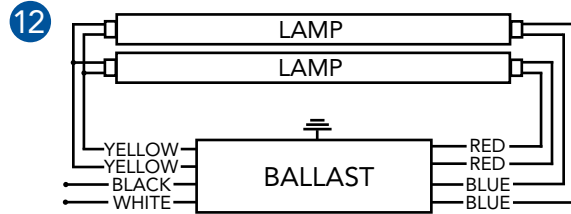
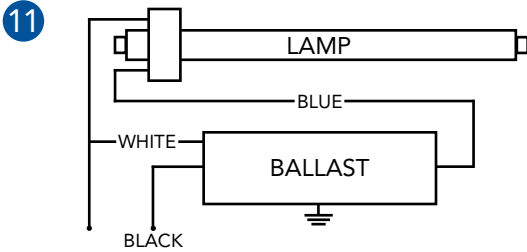
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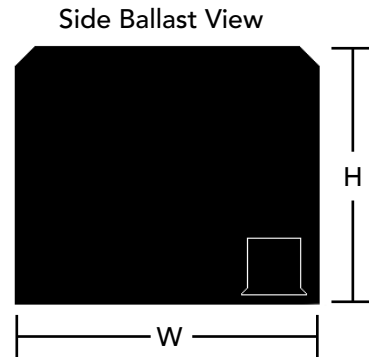
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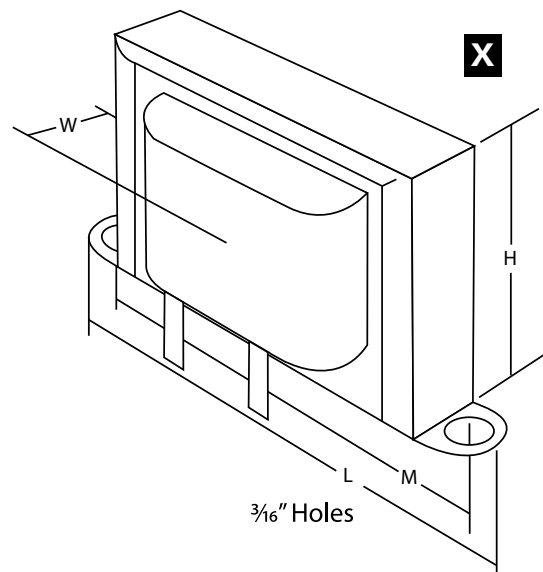
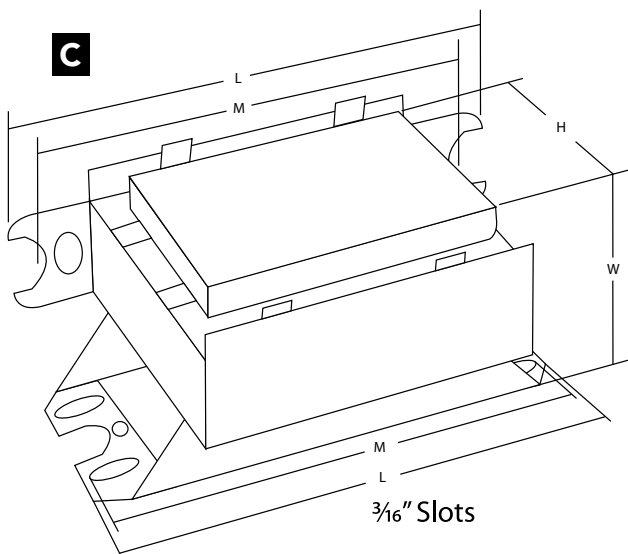
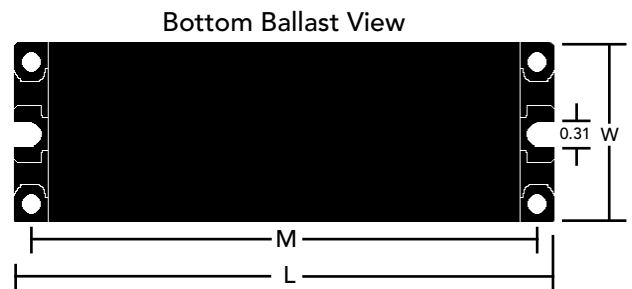
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Case Ballast Dimensions

LINEAR CASE BALLAST DIMENSIONS				
Diagram	MEASUREMENT IN INCHES			
	Dim. L	Dim. W	Dim. H	Dim. M
R3	6.39	1.88	1.42	5.94
R4	4.68	2.1	1.59	4.31
R5	3.19	1.87	1.4	2.73
R6	9.32	3.08	1.78	8.77
R7	11.58	3.13	2.54	10.95
T1	6.51	2.32	1.54	5.94
T2	9.36	2.34	1.54	8.77



LINEAR CASE BALLAST DIMENSIONS				
Diagram	MEASUREMENT IN INCHES			
	Dim. L	Dim. W	Dim. H	Dim. M
R3	6.39	1.88	1.42	5.94
R4	4.68	2.1	1.59	4.31
R5	3.19	1.87	1.4	2.73



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26W Compact
Fluorescent



Product Overview

42W Compact
Fluorescent



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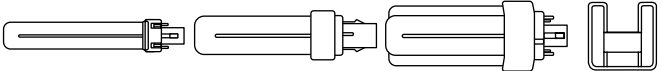
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Specifications

- Ballast shall have a five-year warranty with maximum case temperature of 70°C or three-year warranty with maximum case temperature of 90°C.
- Ballast shall be UL certified.
- Ballast shall be sound rated Class A.
- Ballast shall be Class P Type 1 Outdoor.
- Ballast shall have a Lamp Current Crest Factor of <1.7.
- Ballast shall withstand line transients as specified in ANSI C62.41.
- Ballast shall comply with the limits of FCC Part 18C Class B (Consumer).
- Ballast shall have a lamp operating frequency greater than 40KHz.
- Ballast shall have color-coded, dual entry poke-in connectors.
- Ballast shall ignite lamps within 900ms.
- Ballast shall have a 0°F minimum lamp starting temperature for primary lamp(s).
- Ballast shall be Program Start.
- Ballast shall be Series Lamp Operation.
- Ballast shall have a minimum Power Factor of 97% for primary lamp operation.
- Ballast shall operate within a +/- 10% of the ballast specified line voltage at an input frequency of 50Hz or 60Hz.
- Ballast shall have a maximum case hot spot temperature of 90°C.
- Ballast shall have end of lamp life protection.
- Ballast shall have auto restart.

	Number of Lamps per Ballast	Lamp Watts	Ballast Model Number	Line Voltage	Line Current (amps)	Input Watts (ANSI)	Total Harmonic Distortion Rating	Ballast Factor (ANSI)	Ballast Efficacy Factor
*Primary Lamp Design									
CF7SE	1	7	EP2/13CF/MV/K	120	0.08	9	<10%	0.88	9.53
CF7SE	1	7	EP2/13CF/MV/K	277	0.04	10	<20%	0.93	9.42
CF7SE	2	7	EP2/13CF/MV/K	120	0.14	16	<10%	0.91	5.59
CF7SE	2	7	EP2/13CF/MV/K	277	0.06	17	<20%	0.91	5.48
CF9SE	1	9	EP2/13CF/MV/K	120	0.09	11	<10%	0.92	8.37
CF9SE	1	9	EP2/13CF/MV/K	277	0.05	12	<20%	1.00	8.42
CF9SE	2	9	EP2/13CF/MV/K	120	0.16	19	<10%	0.92	4.7
CF9SE	2	9	EP2/13CF/MV/K	277	0.08	21	<15%	0.98	4.77
2D10W	1	10	EP2/13CF/MV/K	120	0.11	13	<10%	0.92	7.09
2D10W	1	10	EP2/13CF/MV/K	277	0.05	13	<20%	0.93	6.93
2D10W	2	10	EP2/13CF/MV/K	120	0.2	24	<10%	0.94	3.9
2D10W	2	10	EP2/13CF/MV/K	277	0.09	24	<15%	0.97	4.01

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	Number of Lamps per Ballast	Lamp Watts	Ballast Model Number	Line Voltage	Line Current (amps)	Input Watts (ANSI)	Total Harmonic Distortion Rating	Ballast Factor (ANSI)	Ballast Efficacy Factor
CF13DE	1	13	EP2/13CF/MV/K	120	0.15	17	<10%	1.04	6.02
CF13DE	1	13	EP2/13CF/MV/K	277	0.07	18	<20%	1.05	5.93
CF13DE*	2	13	EP2/13CF/MV/K	120	0.27	33	<10%	1.03	3.17
CF13DE*	2	13	EP2/13CF/MV/K	277	0.12	32	<10%	1.04	3.23
CF13TE	1	13	EP2/13CF/MV/K	120	0.14	16	<10%	0.97	6.04
CF13TE	1	13	EP2/13CF/MV/K	277	0.06	16	<20%	0.96	5.9
CF13TE*	2	13	EP2/13CF/MV/K	120	0.25	30	<10%	0.92	3.1
CF13TE*	2	13	EP2/13CF/MV/K	277	0.11	29	<10%	0.93	3.17
2D10W	1	10	EP2/13CF/MV/K	120	0.11	13	<10%	0.92	7.09
2D10W	1	10	EP2/13CF/MV/K	277	0.05	13	<20%	0.93	6.93
2D10W	2	10	EP2/13CF/MV/K	120	0.2	24	<10%	0.94	3.9
2D10W	2	10	EP2/13CF/MV/K	277	0.09	24	<15%	0.97	4.01
2D16W	1	16	EP2/13CF/MV/K	120	0.15	18	<10%	0.9	5.08
2D16W	1	16	EP2/13CF/MV/K	277	0.07	18	<20%	0.9	5.04
2D16W	2	16	EP2/18CF/MV/K	120	0.32	38	<10%	1.02	2.7
2D16W	2	16	EP2/18CF/MV/K	277	0.14	38	<10%	1.08	2.81
CF18DE	1	18	EP2/18CF/MV/K	120	0.19	23	<10%	1.12	4.8
CF18DE	1	18	EP2/18CF/MV/K	277	0.09	23	<15%	1.13	4.83
CF18DE*	2	18	EP2/18CF/MV/K	120	0.36	44	<10%	1.08	2.48
CF18DE*	2	18	EP2/18CF/MV/K	277	0.16	42	<10%	1.08	2.54
CF18TE	1	18	EP2/18CF/MV/K	120	0.18	21	<10%	1.03	4.91
CF18TE	1	18	EP2/18CF/MV/K	277	0.08	21	<15%	1.04	4.88
CF18TE*	2	18	EP2/18CF/MV/K	120	0.33	39	<10%	0.98	2.52
CF18TE*	2	18	EP2/18CF/MV/K	277	0.14	39	<10%	1.11	2.88
2D21W	1	21	EP2/18CF/MV/K	120	0.17	20	<10%	0.84	4.11
2D21W	1	21	EP2/18CF/MV/K	277	0.08	21	<15%	0.84	4.07

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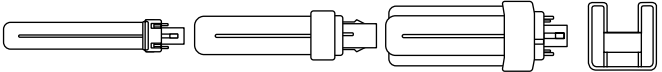
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	Number of Lamps per Ballast	Lamp Watts	Ballast Model Number	Line Voltage	Line Current (amps)	Input Watts (ANSI)	Total Harmonic Distortion Rating	Ballast Factor (ANSI)	Ballast Efficacy Factor
*Primary Lamp Design 									
2D21W	2	21	EP2/18CF/MV/K	120	0.31	38	<10%	0.80	2.13
2D21W	2	21	EP2/18CF/MV/K	277	0.14	37	<10%	0.80	2.15
CFQ26W/G24q*	2	26	EP2/26CF/MV/K2	120	0.43	51	<10%	1.00	1.96
CFQ26W/G24q*	2	26	EP2/26CF/MV/K2	277	0.19	51	<10%	1.00	1.96
CFQ26W/G24q	1	26	EP2/26CF/MV/K2	120	0.23	27	<10%	1.00	3.70
CFQ26W/G24q	1	26	EP2/26CF/MV/K2	277	0.10	27	<10%	1.00	3.70
CFTR26W/GX24q	2	26	EP2/26CF/MV/K2	120	0.45	54	<10%	1.00	1.85
CFTR26W/GX24q	2	26	EP2/26CF/MV/K2	277	0.20	54	<10%	1.00	1.85
CFTR26W/GX24q	1	26	EP2/26CF/MV/K2	120	0.24	29	<10%	1.10	3.79
CFTR26W/GX24q	1	26	EP2/26CF/MV/K2	277	0.11	29	<10%	1.10	3.79
CFTR42W/GX24q	1	42	EP2/26CF/MV/K2	120	0.38	46	<10%	0.98	2.13
CFTR42W/GX24q	1	42	EP2/26CF/MV/K2	277	0.17	46	<10%	0.98	2.13
CFTR32W/GX24q	1	32	EP2/26CF/MV/K2	120	0.31	36	<10%	0.98	2.72
CFTR32W/GX24q	1	32	EP2/26CF/MV/K2	277	0.13	36	<10%	0.98	2.72
CFTR57W/GX24q	1	57	EP2/26CF/MV/K2	120	0.43	52	<10%	0.81	1.56
CFTR57W/GX24q	1	57	EP2/26CF/MV/K2	277	0.19	51	<10%	0.82	1.61
CFQ57W/G24q	1	57	EP2/26CF/MV/K2	120	0.43	52	<10%	0.81	1.56
CFQ57W/G24q	1	57	EP2/26CF/MV/K2	277	0.19	51	<10%	0.82	1.61
CFS21W/GR10q	2	21	EP2/26CF/MV/K2	120	0.42	51	<10%	1.12	2.2
CFS21W/GR10q	2	21	EP2/26CF/MV/K2	277	0.18	51	<10%	1.12	2.2
FT24W/2G11	1	24	EP2/26CF/MV/K2	120	0.41	48	<10%	0.93	1.94
FT24W/2G11	1	24	EP2/26CF/MV/K2	277	0.18	48	<10%	0.93	1.94
FT24W/2G11	2	24	EP2/26CF/MV/K2	120	0.21	26	<10%	0.90	3.52

	Number of Lamps per Ballast	Lamp Watts	Ballast Model Number	Line Voltage	Line Current (amps)	Input Watts (ANSI)	Total Harmonic Distortion Rating	Ballast Factor (ANSI)	Ballast Efficacy Factor
FT24W/2G11	2	24	EP2/26CF/MV/K2	277	0.10	26	<10%	0.89	3.46
FT18W/2G11	2	18	EP2/26CF/MV/K2	120	0.27	33	<10%	0.73	2.24
FT18W/2G11	2	18	EP2/26CF/MV/K2	277	0.12	33	<10%	0.74	2.26
F24T5 HO	2	24	EP2/26CF/MV/K2	120	0.44	51	<10%	1.00	1.96
F24T5 HO	2	24	EP2/26CF/MV/K2	277	0.19	51	<10%	1.00	1.96
FC16T9 40W	1	40	EP2/26CF/MV/K2	120	0.36	43	<10%	1.00	2.33
FC16T9 40W	1	40	EP2/26CF/MV/K2	277	0.16	43	<10%	1.00	2.33
FC12T5 40W	1	40	EP2/26CF/MV/K2	120	0.28	34	<10%	0.74	2.17
FC12T5 40W	1	40	EP2/26CF/MV/K2	277	0.13	34	<10%	0.75	2.18
FC9T5 22W	1	22	EP2/26CF/MV/K2	120	0.22	27	<10%	1.02	3.84
FC9T5 22W	1	22	EP2/26CF/MV/K2	277	0.08	27	<12%	1.03	3.82
CFM36W/2G10	1	36	EP2/42CF/MV/K2	120	0.27	33	<10%	0.80	2.45
CFM36W/2G10	1	36	EP2/42CF/MV/K2	277	0.13	33	<15%	0.80	2.44
CFM36W/2G10	2	36	EP2/42CF/MV/K2	120	0.52	63	<10%	0.78	1.25
CFM36W/2G10	2	36	EP2/42CF/MV/K2	277	0.23	62	<10%	0.79	1.27
CFQ26W/G24q	1	26	EP2/42CF/MV/K2	120	0.27	32	<10%	1.00	3.12
CFQ26W/G24q	1	26	EP2/42CF/MV/K2	277	0.13	32	<12%	1.00	3.12
CFQ26W/G24q	2	26	EP2/42CF/MV/K2	120	0.45	54	<10%	0.90	1.67
CFQ26W/G24q	2	26	EP2/42CF/MV/K2	277	0.21	54	<12%	0.90	1.67
CFS28W/GR10q	1	28	EP2/42CF/MV/K2	120	0.29	34	<10%	1.00	2.94
CFS28W/GR10q	1	28	EP2/42CF/MV/K2	277	0.14	34	<10%	1.00	2.94
CFTR26W/GX24q	1	26	EP2/42CF/MV/K2	120	0.27	32	<10%	1.00	3.12
CFTR26W/GX24q	1	26	EP2/42CF/MV/K2	277	0.13	32	<12%	1.00	3.12
CFTR26W/GX24q	2	26	EP2/42CF/MV/K2	120	0.45	54	<10%	0.90	1.67
CFTR26W/GX24q	2	26	EP2/42CF/MV/K2	277	0.21	54	<12%	0.90	1.67

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Electronic Ballast

	Number of Lamps per Ballast	Lamp Watts	Ballast Model Number	Line Voltage	Line Current (amps)	Input Watts (ANSI)	Total Harmonic Distortion Rating	Ballast Factor (ANSI)	Ballast Efficacy Factor
CFTR32W/GX24q	1	32	EP2/42CF/MV/K2	120	0.35	42	<10%	0.96	2.29
CFTR32W/GX24q	1	32	EP2/42CF/MV/K2	277	0.13	42	<12%	0.96	2.29
CFTR32W/GX24q	2	32	EP2/42CF/MV/K2	120	0.53	63	<10%	0.95	1.51
CFTR32W/GX24q	2	32	EP2/42CF/MV/K2	277	0.23	63	<12%	0.95	1.51

Electromagnetic Ballast

CFTR42W/GX24q	1	42	EP2/42CF/MV/K2	120	0.4	47	<10%	1.00	2.13
CFTR42W/GX24q	1	42	EP2/42CF/MV/K2	277	0.18	47	<10%	1.00	2.13
CFTR42W/GX24q*	2	42	EP2/42CF/MV/K2	120	0.77	94	<10%	1.00	1.14
CFTR42W/GX24q*	2	42	EP2/42CF/MV/K2	277	0.38	93	<10%	1.00	1.08
CFTR57W/GX24q	1	57	EP2/42CF/MV/K2	120	0.49	58	<10%	1.00	1.72
CFTR57W/GX24q	1	57	EP2/42CF/MV/K2	277	0.22	58	<12%	1.00	1.72

Compact Fluorescent Ballasts

CFTR70W/GX24q	1	70	EP2/42CF/MV/K2	120	0.61	73	<10%	1.00	1.37
CFTR70W/GX24q	1	70	EP2/42CF/MV/K2	277	0.27	73	<12%	1.00	1.37
FC12T5 40W	1	40	EP2/42CF/MV/K2	120	0.31	37	<10%	0.84	2.24
FC12T5 40W	1	40	EP2/42CF/MV/K2	277	0.14	37	<15%	0.84	2.24
FC12T5 40W	2	40	EP2/42CF/MV/K2	120	0.59	70	<10%	0.80	1.13
FC12T5 40W	2	40	EP2/42CF/MV/K2	277	0.26	70	<10%	0.81	1.15
FC9T5 22W	2	22	EP2/42CF/MV/K2	120	0.44	52	<10%	1.10	2.11
FC9T5 22W	2	22	EP2/42CF/MV/K2	277	0.19	52	<12%	1.10	2.11

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FC9T5+FC12T5	1+1	22 40	EP2/42CF/MV/K2	120	0.55	67	<10%	0.90	1.34
FC9T5+FC12T5	1+1	22 40	EP2/42CF/MV/K2	277	0.25	67	<10%	0.90	1.34

Sign Ballast

FT24W/2G11	1	24	EP2/42CF/MV/K2	120	0.22	26	<10%	0.92	3.56
FT24W/2G11	1	24	EP2/42CF/MV/K2	277	0.1	27	<15%	0.92	3.48
FT24W/2G11	2	24	EP2/42CF/MV/K2	120	0.45	54	<10%	1.00	1.85
FT24W/2G11	2	24	EP2/42CF/MV/K2	277	0.2	54	<10%	1.00	1.85
FT36W/2G11	1	36	EP2/42CF/MV/K2	120	0.31	37	<10%	0.88	2.38

	Number of Lamps per Ballast	Lamp Watts	Ballast Model Number	Line Voltage	Line Current (amps)	Input Watts (ANSI)	Total Harmonic Distortion Rating	Ballast Factor (ANSI)	Ballast Efficacy Factor
FT36W/2G11	1	36	EP2/42CF/MV/K2	277	0.14	37	<12%	0.88	2.38
FT36W/2G11	2	36	EP2/42CF/MV/K2	120	0.55	66	<10%	0.8	1.21
FT36W/2G11	2	36	EP2/42CF/MV/K2	277	0.24	65	<10%	0.8	1.21
FT39W/2G11	1	39	EP2/42CF/MV/K2	120	0.37	45	<10%	1.00	2.22
FT39W/2G11	1	39	EP2/42CF/MV/K2	277	0.17	45	<12%	1.00	2.22
FT39W/2G11	2	39	EP2/42CF/MV/K2	120	0.69	82	<10%	0.95	1.16
FT39W/2G11	2	39	EP2/42CF/MV/K2	277	0.3	82	<10%	0.95	1.16
FT40W/2G11	1	40	EP2/42CF/MV/K2	120	0.37	45	<10%	1.00	2.22
FT40W/2G11	1	40	EP2/42CF/MV/K2	277	0.17	45	<12%	1.00	2.22
FT40W/2G11	2	40	EP2/42CF/MV/K2	120	0.69	82	<10%	0.95	1.16
FT40W/2G11	2	40	EP2/42CF/MV/K2	277	0.3	82	<10%	0.95	1.16
FT55W/2G11	1	55	EP2/42CF/MV/K2	120	0.36	43	<10%	0.71	1.65
FT55W/2G11	1	55	EP2/42CF/MV/K2	277	0.16	44	<12%	0.72	1.66

Electronic Ballast

Electromagnetic Ballast

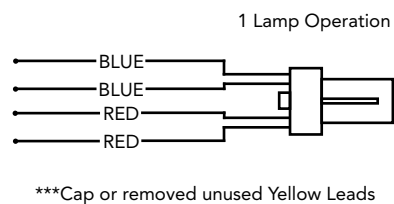
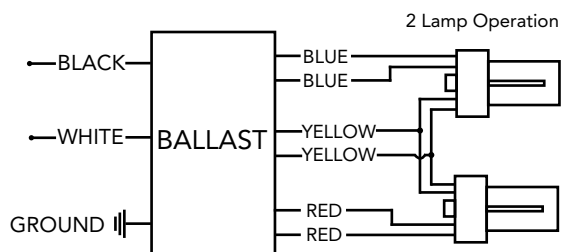
Compact Fluorescent Ballasts

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Sign Ballast

Wiring Diagrams, Case Dimensions & Lamp Guide • • • • •

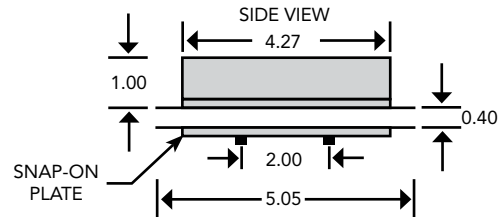
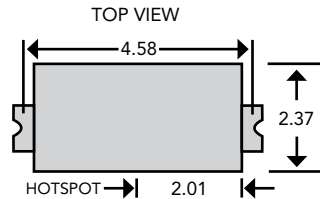
EP2/13CF/MV/K Wiring Diagram



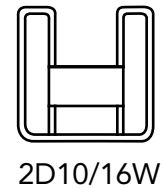
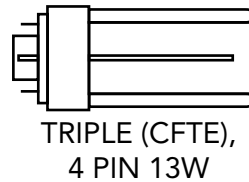
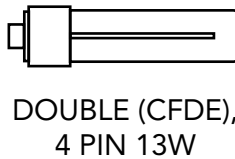
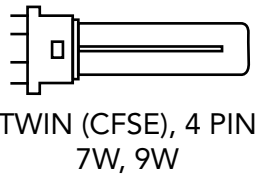
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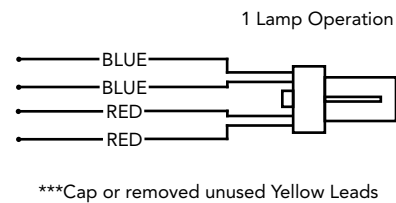
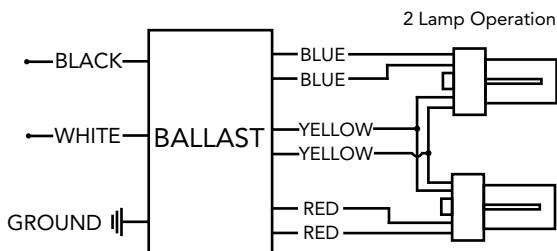
Ballast Dimensions



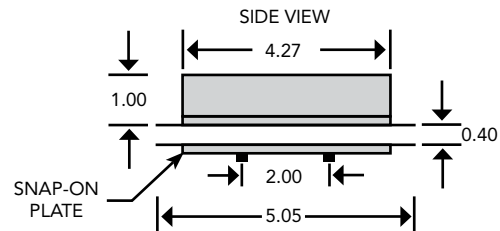
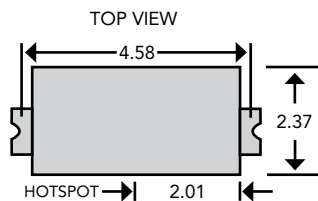
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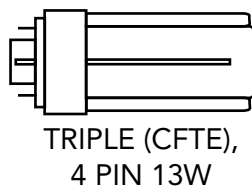
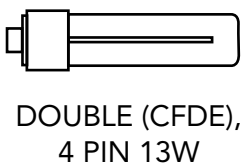
EP2/18CF/MV/K Wiring Diagram



Ballast Dimensions



This ballast will operate the following lamps:



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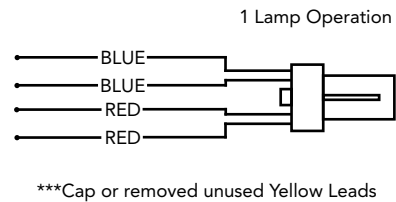
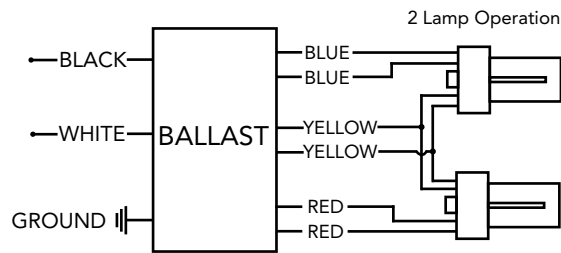
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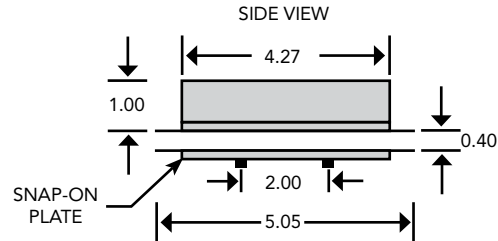
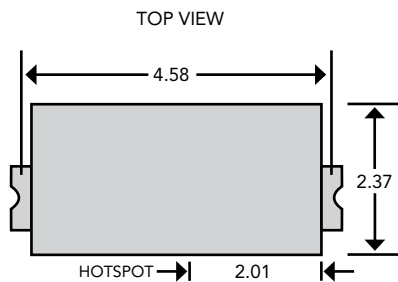
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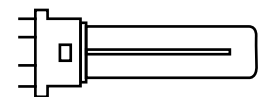
EP2/26CF/MV/K2 Wiring Diagram



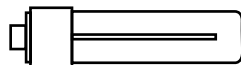
Ballast Dimensions



This ballast will operate the following lamps:



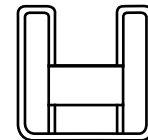
TWIN (CFSE), 4 PIN
13W, 24W



DOUBLE (CFDE),
4 PIN 26W



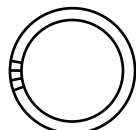
TRIPLE (CFTE),
4 PIN 26/32/42W



2D21/28/38W



TRIPLE (CFTE),
4 PIN 57W



CIRCLINE (CFTE),
22W 40W

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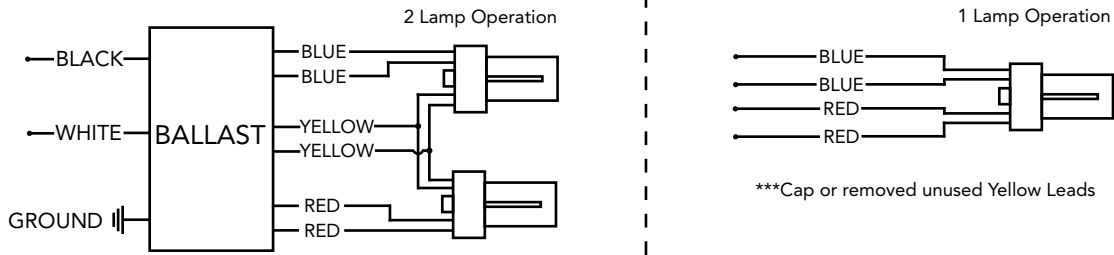
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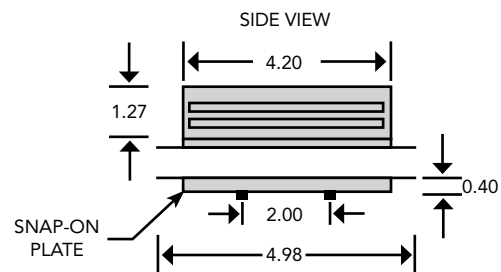
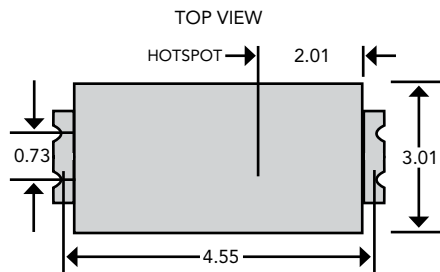
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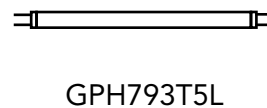
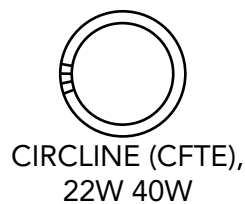
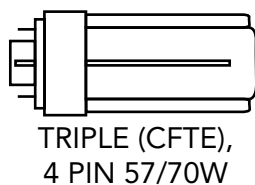
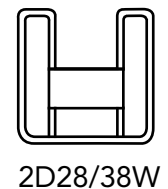
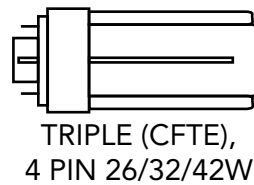
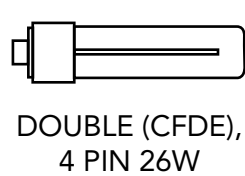
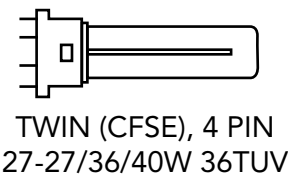
EP2/42CF/MV/K2 Wiring Diagram



Ballast Dimensions



This ballast will operate the following lamps:



Electronic
Ballast

Electromagnetic
Ballast

Compact
Fluorescent Ballasts

HID

Sign
Ballast



Product Overview



Electronic
Ballast

Electromagnetic
Ballast

Compact
Fluorescent Ballasts

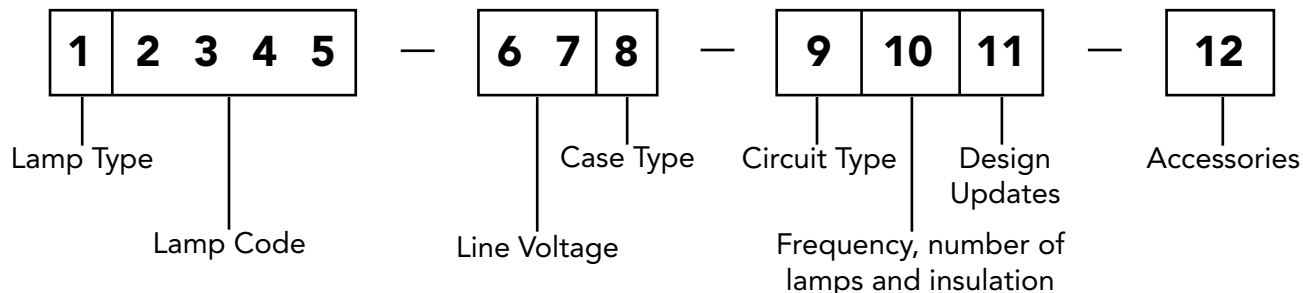
HID

Sign
Ballast

High Intensity Discharge (HID) Ballasts

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Identifying the Ballast Model Number



HID Ballast Model Number example: Metal Halide (M), 400 watt (0400), 120/208/240/277 line voltage (71), *core and coil (C), CWA circuit (2), 60 line frequency/1lamp (1), standard design (1), replacement kit (K).

M	0	4	0	0	—	7	1	C	—	2	1	1	—	K
----------	----------	----------	----------	----------	---	----------	----------	----------	---	----------	----------	----------	---	----------

LAMP CODE

Column 1:
Selects the proper lamp type.
M = Metal Halide/Pulse Start MH
S = High Pressure Sodium
MS = Metal Halide/High Pressure Sodium

LAMP WATTAGE

Column 2 3 4 5:
Selects the proper lamp wattages.
0035 = 35 Watt
0050 = 50 Watt
0070 = 70 Watt
0100 = 100 Watt
0150 = 150 Watt
0175 = 175 Watt
0200 = 200 Watt
0250 = 250 Watt
0320 = 320 Watt
0350 = 350 Watt
0400 = 400 Watt
0750 = 750 Watt
0875 = 875 Watt
1000 = 1000 Watt
1500 = 1500 Watt

LINE VOLTAGE

Column 6 7:
Selects the proper input operating voltages.

120	0 2
277	0 8
480	1 1
120/277	2 3
120T/480	2 9
120/277/347	5 9
120/208/240/277	7 1
120/208/240/277/480	8 1

CASE TYPE

Column 8:
Indicates the type of case used.
Case Construction Type.

Core and Coil	C
Utility - Tabbed	U

CIRCUIT TYPE

Column 9:
Indicates the type of circuit used.
Design Type

R-HPF - Reactor	1
CWA - Constant Wattage Auto Transformer	2
HX-HPF - High Reactance-High Power Factor	5
PS-CWA - Pulse Start Constant Wattage	
Autotransformer	6
Multiple Lamp Reactor	8
Multiple Lamp CWA	9

LINE FREQUENCY AND NUMBER OF LAMPS

Column 10:
Ballast operating frequency and total number of lamps that the ballast can operate at any one time.

Frequency	No. of Lamps	Insulation Class
60	1	H (180) 1
60	1	N (200) 2
60	1	H (180) E
* E = EISA 2007 Compliant (Circle E)		

DESIGN UPDATES

Column 11:
Indicates design revisions that are deemed significant enough for a model number change.

ACCESSORIES

Column 12:
Accessory codes are used to specify components included in the ballast order. This code is not part of the model number included on the label, but will be used as an extension to identify accessories.

CORE AND COIL ONLY	NO SUFFIX
Ballast with welded bracket	B
Ballast with oil cap	C
Ballast with dry cap	D
Ballast with standard starter	E
Ballast replacement kit	K
Ballast with lamp replacement kit	L
Pre-wired ballast replacement kit	P

*Disclaimer: All possible ballast product numbers might not be available. Please consult factory before ordering.

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Ballast

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Compact
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Specifications

Performance:

- Ballast shall be designed in accordance with all applicable ANSI specifications including ANSI C82.4.
- Ballast shall be designed with Class "H" (180°C) or higher insulation system.
- Ballasts shall be designed to operate for 60,000 hours of continuous operation at their maximum rated temperature.
- Ballast and starter combinations shall operate reliably at starting temperatures of -40°C for High Pressure Sodium ballasts and -30°C for Metal Halide ballasts at nominal line voltage of plus or minus 10%.
- All HID ballast shall have a nominal ballast factor of 1.0.

Regulatory:

- Manufacturer shall provide written warranty against defects in material or workmanship for 2-Years from date of manufacture.
- Manufacturer shall have been manufacturing HID ballasts for at least ten years.
- All HID ballasts shall be UL component recognized.
- Ballast must be Howard Lighting Products (or approved equal).

Capacitors & Starters for HID

Capacitors:

- All capacitors provided shall have a self-contained internal bleeder resistor where required according to UL1029.
- All oil-filled capacitors shall be housed in aluminum or corrosion-resistant steel cans and contain .25" quick disconnect terminals.

- Oil filled capacitors shall have a 90°C max. case temperature rating.
- Dry film capacitors shall have a 100°C max. case temperature rating cap.

Starters:

- All starters will be epoxy-filled with a plastic external housing or aluminum external housing.
- All starters shall be designed to provide six months of open circuit operation without failure.
- All starters shall have a case rating temperature of 105°C.
- All starters shall be designed to withstand 10,000 hours of continuous pulsing.
- All starters shall have no exposed live parts.

HID Kits:

- All HID kits shall be precision wound to insure proper insulation.
- HID core and coil shall be interchangeable with prior ballast or include mounting bracket to adapt ballast to intended fixture.
- All HID kits shall be supplied with pre-insulated input voltage leads.
- There are to be no exposed live parts on the core & coil, starter, or dry capacitor.
- Must meet all ANSI Specifications for the specified lamp.
- Kit must include installation instructions and 1-800# for field assistance.
- Ballast must be Howard Lighting Product (or approved equal).

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Products Discontinued

U.P.C. Item #	Catalog #	Suggested Replacement
00029	M0100-23C-511	M0100-71C-512
91405	M0100-71C-511	M0100-71C-512
99402	M0150-71C-511	M0150-71C-512
90105	M0175-09C-212	n/a
90104	M0175-24C-212	n/a
90106	M0175-29C-211	M0175-81C-213
92402	M0175-71C-211	M0175-71C-214
01013	M0250-08C-212	M0250-71C-215
93277	M0250-08C-213	M0250-71C-215
93448	M0250-09C-211	n/a
93347	M0250-09C-212	n/a
93247	M0250-11C-211	M0250-81C-215
93102	M0250-11C-212	M0250-81C-215
93105	M0250-23C-212	M0250-71C-215
93101	M0250-23C-213	M0250-71C-215
93468	M0250-24C-211	n/a
93107	M0250-24C-212	n/a
93224	M0250-24C-212	n/a

U.P.C. Item #	Catalog #	Suggested Replacement
93114	M0250-29C-211	M0250-81C-215
93116	M0250-29C-212	M0250-81C-215
93103	M0250-59C-211	n/a
93106	M0250-59C-212	n/a
93402	M0250-71C-211	M0250-71C-215
93422	M0250-71C-212	M0250-71C-215
93478	M0250-71C-213	M0250-71C-215
93478	M0250-71U-213	n/a
93405	M0250-81C-211	M0250-81C-215
93400	M0250-81C-212	M0250-81C-215
99624	M0250-81C-213	M0250-81C-215
03953	M0250-81C-214	M0250-81C-215
94202	M0400-08C-211	M0400-71C-213
94301	M0400-08C-212	M0400-71C-213
94102	M0400-11C-211	M0400-81C-212
94802	M0400-29C-211	n/a
94104	M0400-59C-211	n/a
94402	M0400-71C-211	M0400-71C-213

High Intensity Discharge (HID) Ballasts

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Products Discontinued

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U.P.C. Item #	Catalog #	Suggested Replacement
94422	M0400-71C-212	M0400-71C-213
94405	M0400-81C-211	M0400-81C-212
00002	M1000-08C-212	M1000-71C-214
95102	M1000-11C-212	M1000-81C-213
99602	M1000-11C-213	M1000-81C-213
95222	M1000-11C-222	n/a
99603	M1000-11C-223	n/a
95000	M1000-29C-212	n/a
99600	M1000-29C-213	n/a
99601	M1000-29C-223	n/a
95402	M1000-71C-212	M1000-71C-214
99593	M1000-71C-213	M1000-71C-214
95400	M1000-71C-222	n/a
99594	M1000-71C-223	n/a
00184	M1000-81C-211	M1000-81C-213
99617	M1000-81C-212	M1000-81C-213
99619	M1000-81C-611	n/a
96202	M1500-08C-212	M1500-71C-214
96102	M1500-11C-212	n/a
96222	M1500-11C-222	n/a
96402	M1500-71C-212	M1500-71C-214
97408	M1500-71C-222	M1500-71C-214
97415	S0070-71C-511	S0070-71C-512
91415	S0100-71C-511	S0100-71C-512
93315	S0150-59C-511	n/a
93415	S0150-71C-511	S0150-71C-512
96112	S0250-11C-211	S0250-81C-212
96114	S0250-29C-211	n/a
96412	S0250-71C-211	S0250-71C-214
96412	S0250-71U-211	n/a
94112	S0400-11C-211	S0400-81C-212
93121	S0400-11C-221	n/a
00003	S0400-29C-211	n/a
94312	S0400-59C-211	n/a
94412	S0400-71U-211	n/a
94400	S0400-81C-211	S0400-81C-212
90112	S1000-11C-211	S1000-81C-212
90212	S1000-29C-211	n/a
90412	S1000-71C-211	S1000-71C-212
92103	M0175-02C-411	n/a
92203	M0175-27C-411	n/a
92303	M0175-29C-411	n/a
93304	M0250-02C-411	n/a
93204	M0250-27C-411	n/a
93104	M0250-29C-411	n/a
93510	M0350-02C-411	n/a
93100	M0350-27C-411	n/a
93527	M0350-28C-411	n/a
93520	M0350-29C-411	n/a
00239	M0350-30C-411	n/a
94304	M0400-02C-411	n/a
94804	M0400-27C-411	n/a

U.P.C. Item #	Catalog #	Suggested Replacement
94904	M0400-28C-411	n/a
94004	M0400-29C-411	n/a
94114	M0400-62C-411	n/a
97207	M0320-08C-711	n/a
99770	M0320-08C-7E1	n/a
99823	M0320-08C-7E2	n/a
98207	M0350-08C-711	n/a
99772	M0350-08C-7E1	n/a
99824	M0350-08C-7E2	n/a
94207	M0400-08C-711	n/a
99773	M0400-08C-7E1	n/a
99825	M0400-08C-7E2	n/a
93407	M0200-08C-611	n/a
93280	M0200-11C-611	n/a
93120	M0200-23C-611	n/a
93172	M0200-29C-611	n/a
93447	M0200-71C-611	n/a
93306	M0250-11C-611	n/a
99765	M0250-11C-6E1	n/a
93406	M0250-71C-611	n/a
99762	M0250-71C-6E1	n/a
99622	M0250-81C-611	n/a
97106	M0320-11C-611	n/a
97406	M0320-71C-611	M0320-71C-6E4
02278	M0320-71C-612	M0320-71C-6E4
99760	M0320-71C-6E1	M0320-71C-6E4
98406	M0350-71C-611	M0350-71C-6E4
02100	M0350-71C-612	M0350-71C-6E4
99761	M0350-71C-6E1	M0350-71C-6E4
94408	M0400-11C-611	n/a
99767	M0400-11C-6E1	n/a
94401	M0400-29C-611	n/a
99774	M0400-29C-6E1	n/a
94406	M0400-71C-611	M0400-71C-6E3
99768	M0400-71C-6E1	M0400-71C-6E3
99690	M0750-11C-611	M0750-81C-612
99689	M0750-71C-611	M0750-71C-612
99677	M0750-81C-611	M0750-81C-612
99610	M0875-11C-611	n/a
99611	M0875-11C-621	n/a
99608	M0875-29C-611	n/a
99609	M0875-29C-621	n/a
99612	M0875-71C-611	n/a
99745	M0875-81C-611	n/a
00355	M1000-11C-611	n/a
99606	M1000-11C-612	n/a
99607	M1000-11C-622	n/a
99604	M1000-29C-612	n/a
99605	M1000-29C-622	n/a
00004	M1000-71C-611	n/a
99595	M1000-71C-612	n/a
99596	M1000-71C-622	n/a

NEW ENERGY POLICY



Metal Halide Legislation

(EISA) Energy Independence & Security Act of 2007

Implementation Date: January 1, 2009

Products Affected: All metal halide fixtures (indoor or outdoor) from 150 to 500 watts. Products not compliant can no longer be manufactured after December 31, 2008.

Inventory: Replacement lamps and ballast for probe start (standard metal halide) will remain available and are not affected by the legislation. Remaining probe start fixture inventory may be sold after January 1, 2009, provided it was manufactured prior to January 1, 2009.

Purpose/Intent: Shift the US to energy independence and utilization of higher efficiency lighting products.

Luminaire Exemptions:

Standards do not apply to fixtures that:

- Use electronic ballast rated for 480 volts
 - Use regulated lag ballast
 - Fixtures that meet all of the following criteria (within a single fixture):
1. Contain a ballast rated to operate at an ambient air temperature above 50° C as specified by UL 1029-2001
 2. Rated for wet location use as defined by National Electrical Code 2002 Section 410.4(A)
 3. Are only rated for 150W lamps

Federal Trade Commission (FTC)

Label Identification:

- Circle E logo is required on ballast contained in the fixture, product packaging, all advertising and marketing materials (merchandising, catalogs, website content, point of purchase, etc.)*.
- Affected products (150W - 500W) manufactured on or after January 1, 2009, require the identification mark.

Probe Start (watts)	ANSI	Lamp Size	Mean Lumens	Pulse Start Watts	ANSI	Lamp Size	Mean Lumens
150	M107/E	Medium	8500	150	M102/E	Medium	10000
175	M57/E	Medium Mogul	9300	175	M152/E M137/E	Mogul	12800
				200	M136/E	Mogul	13500
250	M58/E	Mogul	17000	250	M153/E M138/E	Mogul	19000
				320	M154/E M132/E	Mogul	21000
				350	M131/E	Mogul	27000
400	M59/E	Mogul	23500	400	M155/E M135/E	Mogul	31000

EISA Minimum Ballast Efficiency:

Ballast Type	Minimum Ballast Efficiency Rating	Fixture Wattage
Magnetic Probe Start	94%	150W - 250W
Magnetic or Electronic Pulse Start	88%	
Electronic (non-Pulse Start)	90% 92%	251W - 500W

Ⓔ Compliant Efficiency Calculation (examples):

Fixture Wattage	Minimum Efficiency	Input Watt Calculation (maximum fixture input watts)
250 Watt Probe Start	94%	$250 / .94 = 266$
250 Watt Pulse Start	88%	$250 / .88 = 284$
250 Watt Electronic Pulse Start	90%	$250 / .90 = 278$

Benefits of Pulse Start Metal Halide vs Probe Start :

- Faster restrike time (3-4 minutes)
- Half the warm up time (2 minutes)
- 25% to 50% improved lumen output (efficacy)
- Improved illumination levels over life (better lumen maintenance)
- Colder starting temperatures

Contact your local Howard Lighting District Manager or Agent to receive:

- Howard Lighting product information
- Product specification details
- Other energy saving lighting products from Howard Lighting
- Energy audit information

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Input Voltage	Model Number	Circuit Type	Input Power (Watts)	Lamp Power Nom. Lamp Watts	Maximum Input Current	Norm. Open Cir. Volt.	Wir. Dia. pgs. 69-73	Fig pg. 74	A (in.)	B (in.)	Capacitor Cat. # Number Specifications pg. 65	Total Wt. (lbs.)	Ignitor Part Number	Pri/Sec Conductor C-Copper A-Alum	U.L. Bench Top Rise Code
175 WATT, ANSI Code M-57; 150 WATT, ANSI Code M-107 Metal Halide Lamp															
120V	M0175-02C-212	CWA	210	175	1.80	300	C	1	2.42	3.94	10.0/400	6.80	-	C/C	C
480V	M0175-11C-211	CWA	209	175	0.50	295	C	1	2.75	4.00	10.0/400	8.30	-	C/C	B
120V 277V 347V	M0175-59C-212	CWA	212 212 212	175	1.90 0.50 0.60	300	C	1	2.42	3.94	10.0/400	7.20	-	C/C	D C C
120V 208V 240V 277V	M0175-71C-214	CWA	210 210 210 210	175	2.20 1.30 1.10 1.00	305	C	1	2.42	4.00	10.0/400	7.00	-		D D D D
120V 208V 240V 277V 480V	M0175-81C-213	CWA	202 202 202 202 202	175	2.20 1.30 1.10 0.90 0.50	295	C	1	2.50	4.10	10.0/400	8.00	-		D D D D D D
250 WATT, ANSI Code M-58, Metal Halide Lamp															
120V 277V 347V	M0250-59C-211	CWA	285 289 289	250	2.60 1.20 0.90	310	C	2	1.70	3.63	15.0/400	10.00	-	C/C	A A A
120V 208V 240V 277V	M0250-71C-211	CWA	288 288 288 288	250	2.70 1.50 1.30 1.20	310	C	2	1.70	3.63	15.0/400	10.00	-	C/C	A A A B
120V 208V 240V 277V	M0250-71C-213	CWA	290 292 293 293	250	2.70 2.00 1.40 1.20	310	C	2	1.70	3.63	15.0/400	8.80	-	C/A	A A A B
120V 208V 240V 277V	M0250-71C-215	CWA	272 272 272 272	250	2.70 1.60 1.30 1.20	310	C	2	1.70	3.63	15.0/400	9.00	-	C/A	E E E E
120V 208V 240V 277V	M0250-71U-213	CWA	290 292 293 293	250	2.70 2.00 1.40 1.20	310	C	2	1.70	3.63	15.0/400	8.80	-	C/A	A A A B
120V 208V 240V 277V 480V	M0250-81C-211	CWA	285 291 290 290 292	250	2.60 1.50 1.30 1.10 0.70	305	C	2	1.70	3.63	15.0/400	10.00	-	C/C	A A A A B
120V 208V 240V 277V 480V	M0250-81C-212*	CWA	288 290 291 293 293	250	2.50 1.40 1.30 1.10 0.60	290	C	1	3.00	4.18	15.0/400	10.00	-	C/C	B C C D D
120V 208V 240V 277V 480V	M0250-81C-215	CWA	295 295 295 295 295	250	3.90 2.40 2.00 1.80 1.00	310	C	2	1.90	3.80	15.0/400	10.00	-	C/A	A A A A A
*3X4 Core															

Input Voltage	Model Number	Circuit Type	Input Power (Watts)	Lamp Power Nom. Lamp Watts	Maximum Input Current	Norm. Open Cir. Volt.	Wir. Dia. pgs. 69-73	Fig pg. 74	A (in.)	B (in.)	Capacitor Cat. # Number Specifications pg. 65	Total Wt. (lbs.)	Ignitor Part Number	Pri/Sec Conductor C-Copper A-Alum	U.L. Bench Top Rise Code
400 WATT, ANSI Code M-59, Metal Halide Lamp															
120T 480V	M0400-29C-211	CWA	462	400	1.00	305	C	2	2.30	4.23	24.0/400	12.00	-	C/A	D
120V 277V 347V	M0400-59C-211	CWA	453 456 457	400	4.00 1.70 1.40	300	C	2	2.00	3.93	24.0/400	12.00	-	C/A	D D B
120V 208V 240V 277V	M0400-71C-213	CWA	453 453 453 453	400	4.00 2.30 2.00 1.80	300	C	2	2.20	4.20	24.0/400	11.00	-	A/A	D D D D
120V 208V 240V 277V 480V	M0400-81C-211	CWA	456 458 460 458 462	400	4.10 2.30 2.00 1.70 1.00	305	C	2	2.30	4.23	24.0/400	12.00	-	C/A	B B C C E
120V 208V 240V 277V 480V	M0400-81C-212	CWA	459 459 459 459 459	400	4.00 2.30 2.00 1.80 1.00	305	C	2	2.30	4.23	24.0/400	12.00	-	C/A	B B C C C
1000 WATT, ANSI Code M-47, Metal Halide Lamp															
277V	M1000-08C-212	CWA	1074	1000	3.80	425	C	5	2.80	4.93	24.0/480	20.60	-	C/C	A
480V	M1000-11C-212	CWA	1078	1000	2.30	425	C	5	2.80	4.93	24.0/480	20.40	-	C/C	C
120V 208V 240V 277V	M1000-71C-213	CWA	1075 1028 1079 1075	1000	9.00 5.00 4.60 4.00	420	C	5	3.00	5.50	24.0/480	19.50	-	C/A	C C B B
120V 208V 240V 277V	M1000-71C-214	CWA	1085 1085 1085 1085	1000	9.30 5.30 4.60 4.00	445	C	5	3.50	5.70	24.0/480	21.00	-	A/A	C C C C
120V 208V 240V 277V	M1000-71C-215	CWA	1106 1106 1052 1082	1000	9.00 5.20 4.50 3.90	430	C	5	2.80	4.80	24.0/480	21.00	-	A/A	D D D D
120V 208V 240V 277V 480V	M1000-81C-213	CWA	1100 1100 1100 1100 1100	1000	9.20 5.30 4.60 4.00 2.30	420	C	5	3.20	5.20	24.0/480	21.00	-	C/A	D D D D D
1500 WATT, ANSI Code M-48, Metal Halide Lamp															
277V	M1500-08C-212	CWA	1603	1500	6.10	462	C	3	4.00	6.13	32.0/525	29.20	-	C/C	D
480V	M1500-11C-212	CWA	1603	1500	3.50	462	C	3	4.00	6.13	32.0/525	29.60	-	C/C	E
480V	M1500-11C-222	CWA	1603	1500	3.50	462	C	3	4.00	6.13	32.0/525	29.60	-	C/C	A
120V 208V 240V 277V	M1500-71C-212	CWA	1603 1603 1603 1603	1500	14.00 8.00 7.10 6.10	462	C	3	4.00	6.13	32.0/525	29.40	-	C/C	D C C B
120V 208V 240V 277V	M1500-71C-214														
120V 208V 240V 277V	M1500-71C-222	CWA	1603 1603 1603 1603	1500	14.00 8.00 7.00 6.10	462	C	3	4.00	6.13	32.0/525	29.40	-	C/C	A A A A

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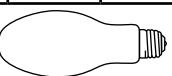
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Input Voltage	Model Number	Circuit Type	Input Power (Watts)	Lamp Power Nom. Lamp Watts	Maximum Input Current	E	Norm. Open Cir. Volt.	Wir. Dia. pgs. 69-73	Fig pg. 74	A (in.)	B (in.)	Capacitor Cat. # Number Specifications pg. 65	Total Wt. (lbs.)	Ignitor Part Number	Pri/Sec Conductor C-Copper A-Alum	U.L. Bench Top Rise Code
50 WATT, ANSI Code M-110, Metal Halide Lamp 																
277V	M0050-08C-111	R-NPF	60	50	0.80		277	A	7	1.16	2.25		2.00	ST1001	C	A
277V	M0050-08C-111	R-HPF	60	50	0.60		277	A	7	1.16	2.25	5.0/280	2.00	ST1001	C	A
120V 277V	M0050-23C-511	HX-HPF	72 72	50	1.35 0.60		250	B	1	1.05	2.1	6.0/280	4.00	ST1001	C/C	A B
70 WATT, ANSI Code M-98, Metal Halide Lamp																
277V	M0070-08C-111	R-NPF	84	70	1.10		277	A	7	1.55	2.6		2.50	ST1001	C	A
277V	M0070-08C-111	R-HPF	84	70	0.80		277	A	7	1.55	2.6	8.0/280	2.50	ST1001	C	A
120V 208V 240V 277V	M0070-71C-511	HX-HPF	85 85 86 85	70	1.60 1.00 0.80 0.70		250	B	1	1.44	2.75	8.0/280	4.60	ST1001	C/C	A A A A
100 WATT, ANSI Code M-90, Metal Halide Lamp																
120V 277V	M0100-23C-511	HX-HPF	126 126	100	2.80 1.20		290	B	1	1.75	3.27	12.0/280	5.50	ST1001	C/C	A A
120V 208V 240V 277V	M0100-71C-512	HX-HPF	129 129 129 129	100	1.20 0.70 0.60 0.50		270	B	1	1.5	2.9	12.0/280	5.50	ST1001	C/C	B B B B
150 WATT, ANSI Code M-102, Metal Halide Lamp																
120V 208V 240V 277V	M0150-71C-511	HX-HPF	183 184 184 184	150	4.00 2.05 1.80 1.60		280	B	1	2.3	3.75	16.0/280	7.00	ST1001	C/C	B B B B
120V 208V 240V 277V	M0150-71C-512	HX-HPF	186 186 186 186	150	3.50 2.00 1.70 1.50		265	B	1	2.3	3.8	16.0/280	7.00	ST1001	C/C	B B B B
200 WATT, ANSI Code M-136, Pulse Start Metal Halide Lamp 																
480V	M0200-11C-611	PS-CWA	235	200	0.50		240	D	2	2.42	3.80	15.0/300	7.40	ST1001	C/C	B
120T 277V	M0200-23C-611	PS-CWA	234 231	200	2.00 0.90		240	D	2	2.42	3.80	15.0/300	7.40	ST1001	C/C	B A
120/ 208/ 240/ 480V	M0200-71C-611	PS-CWA	234 233 231 231	200	2.00 1.30 1.00 0.90		240	D	2	2.42	3.80	15.0/300	7.40	ST1001	C/C	B B A A
250 WATT, ANSI Code M-138, M-153, Pulse Start Metal Halide Lamp																
480V	M0250-11C-611	PS-CWA	288	250	0.60		272	D	2	1.60	3.53	15.0/400	10.00	ST1001	C/C	A
480V	M0250-11C-6E1	PS-CWA	288	250	0.60	+	272	D	2	1.60	3.53	15.0/400	10.00	ST1001	C/C	A
120V 208V 240V 277V	M0250-71C-611	PS-CWA	288 288 288 288	250	2.50 1.40 1.20 1.10		240	D	2	1.60	3.53	15.0/400	10.00	ST1001	C/C	A A A A

Input Voltage	Model Number	Circuit Type	Input Power (Watts)	Lamp Power Nom. Lamp Watts	Maximum Input Current	E	Norm. Open Cir. Volt.	Wir. Dia. pgs. 69-73	Fig pg. 74	A (in.)	B (in.)	Capacitor Cat. # Number Specifications pg. 65	Total Wt. (lbs.)	Ignitor Part Number	Pri/Sec Conductor C-Copper A-Alum	U.L. Bench Top Rise Code
250 WATT, ANSI Code M-138, M-153, Pulse Start Metal Halide Lamp																
120V 208V 240V 277V	M0250-71C-6E1	PS-CWA	288 288 288 288	250	2.50 1.40 1.20 1.10	+	240	D	2	1.60	3.53	15.0/400	10.00	ST1001	C/C	A A A A
320 WATT, ANSI Code M-132, M-154, Pulse Start Metal Halide Lamp																
277V	M0320-08C-711	R-HPF	340	320	1.80		277	D	4	1.73	3.90	17.5/280	8.90	ST1000	C	A
277V	M0320-08C-7E1	R-HPF	340	320	1.80	+	277	D	4	1.73	3.90	17.5/280	8.90	ST1000	C	A
120V 208V 240V 277V	M0320-71C-6E4	PS-CWA	363 363 363 363	320	3.10 1.80 1.60 1.40	+	280	D	2	1.90	3.80	21.0/360	11.00	ST1001	A/A	A A A A
350 WATT, ANSI Code M-131, Pulse Start Metal Halide Lamp																
277V	M0350-08C-7E1	R-HPF	372	350	2.10	+	277	A	4	1.83	4.00	20.0/280	8.40	ST1000	C	A
277V	M0350-08C-7E2	R-HPF	372	350	2.10	+	277	A	4	1.83	4.00	20.0/280	8.40	ST1000	C	A
120V 208V 240V 277V	M0350-71C-6E4	PS-CWA	397 397 397 397	350	3.50 2.00 1.80 1.60	+	275	D	2	2.30	4.20	24/400	12.00	ST1001	C/A	A A A A
400 WATT, ANSI Code M-135, M-155, Pulse Start Metal Halide Lamp																
480V	M0400-11C-6E1	PS-CWA	455	400	0.90	+	270	D	2	1.94	3.93	26.0/330	11.50	ST1001	C/C	D
120T 480V	M0400-29C-611	PS-CWA	455	400	0.90		270	D	2	1.94	3.93	26.0/330	11.50	ST1001	C/C	D
120T 480V	M0400-29C-6E1	PS-CWA	455	400	0.90	+	270	D	2	1.94	3.93	26.0/330	11.50	ST1001	C/C	D
120V 208V 240V 277V	M0400-71C-6E3	PS-CWA	449 449 449 449	400	4.00 2.30 2.00 1.80	+	270	D	2	2.30	4.40	26.0/360	11.00	ST1000 ST1001	A/A	D D D D
750 WATT, ANSI Code M-149, Pulse Start Metal Halide Lamp																
120V 208V 240V 277V	M0750-71C-611	PS-CWA	827 814 819 820	750	7.20 3.90 3.60 3.10		385	D	5	2.50	4.50	24.0/480	16.13	ST1003	C/A	C B C C
120V 208V 240V 277V	M0750-71C-612	PS-CWA	845 845 845 845	750	7.30 4.10 3.70 3.20		370	D	5	2.63	4.90	24.0/480	17.00	ST1003	C/A	C C C C
875 WATT, ANSI Code M-166, Pulse Start Metal Halide Lamp																
120V 208V 240V 277V	M0875-71C-611	PS-CWA	970 930 973 972	875	7.80 4.40 4.00 3.40		420	D	5	3.00	5.00	22.0/460	19.50	ST2002	C/A	B A A A
1000 WATT, ANSI Code M-141, Pulse Start Metal Halide Lamp																
480V	M1000-11C-611	PS-CWA	1080	1000	2.30		425	D	5	2.80	4.93	24.0/480	20.40	ST2002	C/C	C
120T 480V	M1000-29C-612	PS-CWA	1065	1000	2.20		420	D	5	3.00	5.00	24.0/480	19.50	ST2002	C/A	C

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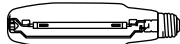
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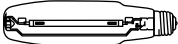
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Input Voltage	Model Number	Circuit Type	Input Power (Watts)	Lamp Power Nom. Lamp Watts	Maximum Input Current	E	Norm. Open Cir. Volt.	Wir. Dia. pgs. 69-73	Fig Pg. 74	A (in.)	B (in.)	Capacitor Cat. # Number Specifications pg. 65	Total Wt. (lbs.)	Ignitor Part Number	Pri/Sec Conductor C-Copper A-Alum	U.L. Bench Top Rise Code
1000 WATT, ANSI Code M-141, Pulse Start Metal Halide Lamp																
120V 208V 240V 277V	M1000-71C-612	PS- CWA	1075/ 1028/ 1079/ 1075	1000	9.00 5.00 4.50 4.00		420	D	5	3.00	5.50	24.0/480	19.50	ST2002	C/A	C C B B
120V 208V 240V 277V 480V	M1000-81C-611	PS- CWA	1065/ 1053/ 1052/ 1053/ 1056	1000	9.10 5.20 4.50 4.00 2.20		425	D	5	3.75	5.75	24.0/480	21.50	ST2002	C/A	C B B B B
175 WATT, ANSI Code M-137, M-152, M-57, Pulse Start or Standard Metal Halide Lamp																
120V	M0175-02C-411	E-Reg	204	175	1.70		272	A	3	1.56	3.52	17.0/380	12.00	ST1002	C/C	A
120T 480V	M0175-29C-411	E-Reg	204	175	0.40		272	A	3	1.56	3.52	17.0/380	12.00	ST1002	C/C	A
250 WATT, ANSI Code M-138, M-153, M-58, Pulse Start or Standard Metal Halide Lamp																
120V	M0250-02C-411	E-Reg	287	250	2.50		275	A	3	2.25	4.25	15.0/480	16.00	ST1002	C/C	A
120T 277V	M0250-27C-411	E-Reg	287	250	1.10		275	A	3	2.25	4.25	15.0/480	16.00	ST1002	C/C	A
120T/ 480V	M0250-29C-411	E-Reg	287	250	0.60		275	A	3	2.25	4.25	15.0/480	16.00	ST1002	C/C	A
350 WATT, ANSI Code M-131, Pulse Start or Standard Metal Halide Lamp																
120V	M0350-02C-411	E-Reg	400	350	3.40		280	A	3	3.00	5.00	19.0/480	20.60	ST1002	C/C	A
120T 480V	M0350-29C-411	E-Reg	400	350	0.90		275	A	3	3.00	5.00	19.0/480	20.60	ST1002	C/C	A
120T 208V	M0350-30C-411	E-Reg	400	350	1.90		280	A	3	3.00	5.00	19.0/480	20.60	ST1002	C/C	A
400 WATT, ANSI Code M-135, M-155, M-59, Pulse Start or Standard Metal Halide Lamp																
120V	M0400-02C-411	E-Reg	450	400	3.80		275	E	3	3.50	5.50	21.0/480	23.20	ST1002	C/C	A
120T 277V	M0400-27C-411	E-Reg	450	400	1.60		275	E	3	3.50	5.50	21.0/480	23.20	ST1002	C/C	A
347V	M0400-28C-411	E-Reg	450	400	1.30		275	E	3	3.50	5.50	21.0/480	23.20	ST1002	C/C	A

Input Voltage	Model Number	Circuit Type	Input Power (Watts)	Lamp Power Nom. Lamp Watts	Maximum Input Current	Norm. Open Cir. Volt.	Wir. Dia	Fig pg. 40	A (in.)	B (in.)	Capacitor Cat. # Number Specifications pg. 39	Total Wt. (lbs.)	Ignitor Part Number	Pri/Sec Conductor C-Copper A-Alum	U.L. Bench Top Rise Code
35 WATT, ANSI Code S-76, High Pressure Sodium Lamp 															
120V	S0035-02C-111	R-NPF	42	35	1.20	120	A	7	0.63	1.70		2.0	ST2001	C	A
120V	S0035-02C-111	R-HPF	42	35	0.90	120	A	7	0.63	1.70	20.0/120	2.0	ST2001	C	A

Input Voltage	Model Number	Circuit Type	Input Power (Watts)	Lamp Power Nom. Lamp Watts	Maximum Input Current	Norm. Open Cir. Volt.	Wir. Dia. pgs. 69-73	Fig. pg. 74	A (in.)	B (in.)	Capacitor Cat. # Number Specifications pg. 65	Total Wt. (lbs.)	Ignitor Part Number	Pri/Sec Conductor C-Copper A-Alum	U.L. Bench Top Rise Code
50 WATT, ANSI Code S-68, High Pressure Sodium Lamp															
120V	S0050-02C-111	R-NPF	61	50	1.70	120	A	7	0.90	1.80		1.5	ST2001	C	A
120V	S0050-02C-111	R-HPF	61	50	0.90	120	A	7	0.90	1.80	20.0/120	1.5	ST2001	C	A
70 WATT, ANSI Code S-62, High Pressure Sodium Lamp															
120V	S0070-02C-111	R-NPF	80	70	2.30	120	A	7	1.30	2.50		2.0	ST2001	C	A
120V	S0070-02C-111	R-HPF	80	70	1.00	120	A	7	1.30	2.50	28.0/120	2.0	ST2001	C	A
120V 208V 240V 277V	S0070-71C-512	HX-HPF	91 91 91 91	70	1.70 1.00 0.90 0.70	120	B	1	1.5	3.10	7.0/280	5.0	ST2001	C/C	A A A A
100 WATT, ANSI Code S-54, High Pressure Sodium Lamp															
120V	S0100-02C-111	R-NPF	115	100	3.00	120	A	7	1.54	2.60		3.0	ST2001	C	A
120V	S0100-02C-111	R-HPF	115	100	1.70	120	A	7	1.54	2.60	46.0/120	3.0	ST2001	C	A
120V 208V 240V 277V	S0100-71C-512	HX-HPF	128 129 130 128	100	2.20 1.30 1.10 1.00	125	B	1	2.00	3.40	10.0/280	7.2	ST2001A	C/C	B B B B
150 WATT, ANSI Code S-55, High Pressure Sodium Lamp															
120V	S0150-02C-111	R-NPF	167	150	4.10	120	A	7	2.20	3.50		3.5	ST2001	C/C	A
120V	S0150-02C-111	R-HPF	167	150	3.00	120	A	7	2.20	3.50	55.0/120	3.5	ST2001	C/C	A
120V 208V 240V 277V	S0150-71C-512	HX-HPF	188 188 188 188	150	3.50 1.95 1.70 1.50	120	B	1	2.5	3.80	14.0/280	8.0	ST2001	C/C	C C C C
200 WATT, ANSI Code S-66, High Pressure Sodium Lamp															
120V 208V 240V 277V	S0200-71U-211	CWA	240 240 240 240	200	2.10 1.20 1.05 0.92	185	D	2	1.25	3.00	28.0/240	7.4	ST2000	C/C	D D D D
250 WATT, ANSI Code S-50, High Pressure Sodium Lamp															
120T/ 480V	S0250-29C-211	CWA	301	250	0.70	194	D	2	2.00	3.85	35.0/240	11.7	ST2000	C/C	A
120V 208V 240V 277V	S0250-71C-211	CWA	295 295 295 295	250	2.50 1.40 1.20 1.10	183	D	2	1.80	3.73	35.0/240	10.6	ST2000	C/C	A A A A
120V 208V 240V 277V	S0250-71U-211	CWA	295 295 295 295	250	2.50 1.40 1.20 1.10	183	D	2	1.80	3.73	35.0/240	10.6	ST2000	C/C	A A A A
120V 208V 240V 277V 480V	S0250-81C-211	CWA	300 300 301 301 301	250	2.60 1.60 1.30 1.10 0.70	194	D	2	2.00	3.85	35.0/240	11.7	ST2000	C/C	A B A A A
120V 208V 240V 277V 480V	S0250-81C-212	CWA	292 292 292 292 292	250	2.50 1.50 1.30 1.10 0.60	186	D	2	2.00	3.60	35.0/240	11.7	ST2000	C/C	A A A A A

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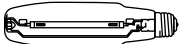
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Input Voltage	Model Number	Circuit Type	Input Power (Watts)	Lamp Power Nom. Lamp Watts	Maximum Input Current	Norm. Open Cir. Volt.	Wir. Dia. pgs. 69-73	Fig pg. 74	A (in.)	B (in.)	Capacitor Cat. # Number Specifications pg. 65	Total Wt. (lbs.)	Ignitor Part Number	Pri/Sec Conductor C-Copper A-Alum	U.L. Bench Top Rise Code
310 WATT, ANSI Code S-67, High Pressure Sodium Lamp															
															
120V 208V 240V 277V	S0310-71U-211	CWA	360 360 360 360	310	3.20 1.85 1.60 1.40	185	D	2	2.15	3.75	45.0/280	12.3	ST2000	C/C	C C C C
400 WATT, ANSI Code S-51, High Pressure Sodium Lamp															
120V 208V 240V 277V	S0400-71C-211	CWA	463 463 463 463	400	3.70 2.20 1.90 1.60	190	D	2	2.28	4.23	55.0/240	13.2	ST2000	C/C	D A B B
120V 208V 240V 277V	S0400-71C-212	CWA	464 464 464 464	400	4.00 2.40 2.10 1.70	190	D	2	2.28	4.23	55.0/240	13.5	ST2000	C/C	C D C B
120V 208V 240V 277V	S0400-71U-211	CWA	463 463 463 463	400	3.70 2.20 1.90 1.60	190	D	2	2.28	4.23	55.0/240	13.2	ST2000	C/C	D A B B
120V 208V 240V 277V 480V	S0400-81C-212	CWA	475 475 475 475 475	400	2.50 1.40 1.25 1.10 0.65	200	D	2	2.62	4.25	55.0/240	15.0	ST2000	C/C	D D D D D
1000 WATT, ANSI Code S-52, High Pressure Sodium Lamp															
120T 480V	S1000-29C-211	CWA	1096	1000	2.40	438	D	3	3.75	5.88	26.0/525	27.0	ST2002	C/C	C
120V 208V 240V 277V	S1000-71C-212	CWA		1000			D	3			26.0/525		ST2000	C/C	
120V 208V 240V 277V 480V	S1000-81C-212	CWA	24 1072 1126 1133 1127	1000	9.30 5.20 4.60 3.90 2.30	435	D	3	4	6.10	26.0/525	28.2	ST2000	C/C	D D D D D

Capacitors

Identifying the capacitor model number

1 2 3

MICROFARAD
(M fd.) VALUE

4 5 6

RATED
VOLTAGE

7

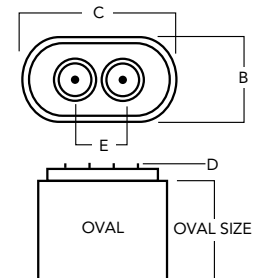
CAPACITOR
TYPE
(1) OIL-FILLED
(2) DRY FILM
(3) ROUND OIL-FILLED

8

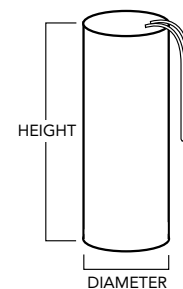
CASE
DIMENSIONS
(SEE TABLES)

Capacitor Dimensions (inches)

OVAL OIL-FILLED CAPACITOR DIMENSIONS (inches)					
MODEL TYPE	MAXIMUM				
	OVAL SIZE	DIM. B	DIM. C	DIM. D	DIM. E
A	1.25	1.31	2.16	0.50	0.81
B	1.50	1.56	2.69	0.50	0.81
C	1.75	1.91	2.91	0.50	0.81
D	2.00	1.97	2.66	0.50	0.81



ROUND OIL-FILLED CAPACITOR DIMENSIONS (inches)		
MODEL TYPE	MAXIMUM DIAMETER	MAXIMUM HEIGHT
A	1.51	3.27
B	1.77	3.27
C	2	4.06
D	2.5	5.63



ROUND DRY FILM CAPACITOR DIMENSIONS (inches)		
MODEL TYPE	MAXIMUM DIAMETER	MAXIMUM HEIGHT
A	1.25	3.23
B	1.58	3.62
C	1.77	4.21
D	2	1.97

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Capacitor Specifications

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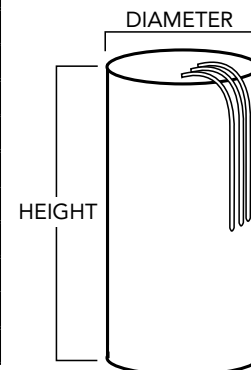
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MODEL NUMBER	MICROFARAD VALUE	VOLTS	MAX HEIGHT (inches)	HOWARD INDUSTRIES BALLAST FAMILY WHERE USED
OVAL OIL-FILLED 90°C				
12.0/280-1A	12.0	280	3.13	M0100-XXC-511 MH 100 HX-HPF M-90
10.0/400-1B	10.0	400	2.87	M0175-XXC-212 MH 175 CWA M-57
17.0/380-1B	17.0	380	3.40	M0175-XXC-411 MH 175 REG-LAG, M-137, M-152, M-57
15.0/300-1C	15.0	300	2.69	M0200-XXC-611 MH 200 PS CWA, M136
15.0/400-1C	15.0	400	2.90	M0250-XXC-X1X MH 250 CWA & PA CWA M-58, M138
15.0/480-1C	15.0	480	4.87	M0250-XXC-411 MH 250 REG-LAG, M-138, M-153, M-58
24.0/400-1C	24.0	400	3.87	M0400-XXC-21X MH 400 CWA M-59
24.0/480-1C	24.0	480	3.88	M1000-XXC-212 MH 1000 CWA M-47
5.0/280-1A	5.0	280	2.50	S0050-XXC-511 HPS 50 HX-HPF S-68
7.0/280-1A	7.0	280	2.50	S0070-XXC-511 HPS 70 HX-HPF S-62
10.0/280-1A	10.0	280	2.50	S0100-XXC-511 HPS 100 HX-HPF S-54
14.0/280-1B	14.0	280	2.87	S0150-XXC-X11 HPS 150 HX-HPF S-55
28.0/280-1C	28.0	280	3.87	S0200-XXC-X11 HPS 200 HX-HPF S-66
35.0/240-1C	35.0	240	3.87	S0250-XXC-211 HPS 250 CWA S-50
55.0/240-1C	55.0	240	3.87	S0400-XXC-211 HPS 400 CWA S-51
26.0/525-1C	26.0	525	4.87	S1000-XXC-211 HPS 1000 CWA S-52
19.5/400-1C	19.5	400	3.40	M0320-XXC-611 MH 320 PS CWA M-132
17.5/280-1B	17.5	280	3.23	M0320-08C-711 MH 320 PS REACTOR M-132
20.5/400-1C	20.5	400	3.40	M0350-XXC-611 MH 350 PS CWA M-131
20.0/280-1B	20.0	280	3.23	M0350-08C-711 MH 350 PS REACTOR M-131
19.0/480-1C	19.0	480	4.73	M0350-XXC-411 MH 350 REG-LAG, M-138, M-153, M-58
15.0/300-1C	15.0	300	3.23	M0400-08C-711 MH 400 PS REACTOR M-135, M-155
26.0/330-1C	26.0	330	3.23	M0400-XXC-611 MH 400 PS CWA M-135, M-155
21.0/480-1C	21.0	480	3.23	M0400-XXC-411 MH 400 REG-LAG M-128, M-135, M-59
32.0/525-1D	32.0	525	5.30	M1500-XXC-212 MH 1500 CWA M-48
ROUND OIL-FILLED 90°C				
12.0/280-3A	12.0	280	3.27	M0100-XXC-511 MH 100 HX-HPF M-90
10.0/400-3A	10.0	400	3.27	M0175-XXC-212 MH 175 CWA M-57
15.0/400-3B	15.0	400	3.27	M0250-XXC-X1X MH 250 CWA & PA CWA M-58, M138
24.0/400-3C	24.0	400	4.06	M0400-XXC-21X MH 400 CWA M-59
24.0/480-3C	24.0	480	4.06	M1000-XXC-212 MH 1000 CWA M-47
5.0/280-3A	5.0	280	3.27	S0050-XXC-511 HPS 50 HX-HPF S-68
7.0/280-3A	7.0	280	3.27	S0070-XXC-511 HPS 70 HX-HPF S-62
10.0/280-3A	10.0	280	3.27	S0100-XXC-511 HPS 100 HX-HPF S-54
14.0/280-3A	14.0	280	3.27	S0150-XXC-X11 HPS 150 HX-HPF S-55
28.0/280-3B	28.0	280	3.27	S0200-XXC-X11 HPS 200 HX-HPF S-66
26.0/525-3D	26.0	525	5.63	S1000-XXC-211 HPS 1000 CWA S-52
19.5/400-3B	19.5	400	4.06	M0320-XXC-611 MH 320 PS CWA M-132
17.5/280-3A	17.5	280	3.27	M0320-08C-711 MH 320 PS REACTOR M-132
20.0/280-3B	20.0	280	3.27	M0350-08C-711 MH 350 PS REACTOR M-131
32.0/525-3D	32.0	525	5.63	M1500-XXC-212 MH 1500 CWA M-48
45.0/280-3C	45.0	280	4.06	S0310-XXU-211 HPS 310 CWA S-67

MODEL NUMBER	MICROFARAD VALUE	VOLTS	MAX HEIGHT (inches)	HOWARD INDUSTRIES BALLAST FAMILY WHERE USED
ROUND DRY FILM 100°C				
10.0/400-2B	10.0	400	3.72	M0175-XXC-212 MH 175 CWA M-57
15.0/300-2C	15.0	300	3.75	M0200-XXC-611 MH 200 PS CWA, M136
15.0/400-2C	15.0	400	4.20	M0250-XXC-X1X MH 250 CWA & PS CWA M-58, M-138
24.0/400-2C	24.0	400	5.20	M0400-XXC-21X MH 400 CWA M-59
5.0/280-2A	5.0	280	3.23	S0050-XXC-511 HPS 50 HX-HPF S-68
7.0/280-2A	7.1	280	3.23	S0070-XXC-511 HPS 70 HX-HPF S-62
10.0/280-2B	10.0	280	3.23	S0100-XXC-511 HPS 100 HX-HPF S-54
12.0/280-2B	12.0	280	3.23	M0100-XXC-511 MH 100 HX-HPF M-90
14.0/280-2B	14.0	280	3.72	S0150-XXC-X11 HPS 150 HX-HPF S-55
28.0/280-2C	28.0	280	4.70	S0200-XXC-X11 HPS 200 CWA S-66
35.0/240-2C	35.0	240	4.70	S0250-XXC-211 HPS 250 CWA S-50
55.0/240-2C	55.0	240	4.21	S0400-XXC-211 HPS 400 CWA S-51
19.5/400-2C	19.5	400	4.70	M0320-XXC-611 MH 320 PS CWA M-132
17.5/280-2C	17.5	280	4.70	M0320-08C-711 MH 320 PS REACTOR M-132
20.5/400-2C	20.5	400	4.70	M0350-XXC-611 MH 350 PS CWA M-131
20.0/280-2C	20.0	280	3.80	M0350-08C-711 MH 350 PS REACTOR M-131
20.0/280-2C	20.0	280	4.70	M0400-08C-711 MH 400 PS REACTOR M-135, M-155
26.0/330-2C	26.0	330	4.20	M0400-XXC-611 MH 400 PS CWA M-135, M-155

Starters

STARTERS				
MODEL TYPE	BALLAST FAMILY WHERE USED	UPC CODE	MAXIMUM DIMENSIONS	
			DIAMETER	HEIGHT
ST1000	Pulse Start MH Reactor Ballasts (320, 350, 400 Watt)	61000	1.25	2.5
ST1001	Pulse Start CWA and HX Circuits 100 - 400 Watts	61001	1.25	2.5
ST1002	Pulse Start Regulated Lag	61002	1.25	2.5
ST1003	Pulse Start 750 Watt	99679	1.25	2.5
ST2000	HPS CWA Circuits 250 & 400 watts	62000	1.25	2.5
ST2001A	HPS Hx Circuits 35 - 150 Watts	62004	1.25	2.5
ST2002	HPS CWA 1000 Watt	62002	1.25	2.5
ST2002LR	Long Range HPS CWA 1000 Watt	62003	1.25	2.5



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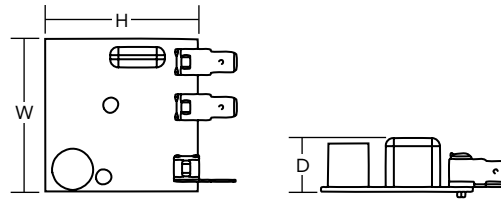
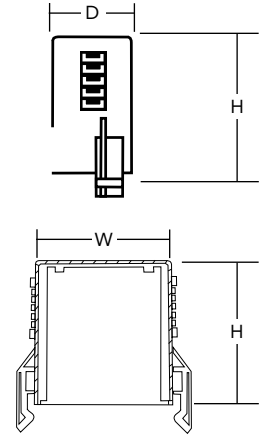
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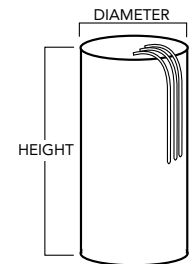
Starters - Utility Grade Plug-in Style

Starters					
MODEL TYPE	BALLAST FAMILY WHERE USED	UPC CODE	MAXIMUM DIMENSIONS		
			HEIGHT	WIDTH	DEPTH
ST1001UF	Unpotted Plug-in PSMH 50 - 400W	04371	1.9	1.9	0.7
ST1001UFP	Encapsulated Plug-in PSMH 50 - 400 W	04372	2	2	1.2
ST2001UF	Unpotted Plug-in HPS 35 - 150W	03730	1.9	1.9	0.7
ST2001UFP	Encapsulated Plug-in HPS 35 - 150W	03731	2	2	1.2
ST2000UF	Unpotted Plug-in HPS 250 - 400W	03853	1.9	1.9	0.7
ST2000UFP	Encapsulated Plug-in HPS 250 - 400W	03854	2	2	1.2
ST2002UF	Unpotted Plug-in HPS 1000W	04370	1.9	1.9	0.7



Starter Stopper

Starter Stopper				
MODEL TYPE	DESCRIPTION	UPC CODE	MAXIMUM DIMENSIONS	
			DIAMETER	HEIGHT
SS-1000NO	Starter Stopper Normally Open	62005	1.61	2.38



Brackets

Brackets									
BRACKET CATALOG NUMBER	WELDED BRACKET DIMENSIONS					ACCESSORY CODE	COMMONLY USED FOR	BALLAST DIM FIG.	BRACKET FIG.
	L	W	M	S					
1092-077303-100	----	----	----	----	Loose	B00	3X4 Core size kits	1	B
1092-077303-102	----	----	----	----	Loose	B02	4.25 x 4.75 4.25 x 6.00 Core size kits	2	A
1092-077303-103	----	----	----	----	Welded	B03	Reactor Ballasts	6	6
1092-077303-106	6.5	1.25	5.75	0.28	Welded	B06	4.25 x 4.75 Core size	2,3	C
1092-077303-107	5.1	1	4.5	0.25	Welded	B07	3 x 4 Core size	1	C
1092-077303-108	7.8	2.75	6.13	0.25	Welded	B08	4.25 x 6.00 Core size	5	C
1092-077303-109	7.8	4.5	6.75	0.31	Welded	B09	4.25 x 6.00 Core size	5	C
1092-077304-100	----	----	----	----	Loose	B12	Starters	----	----
1092-077304-101	----	----	----	----	Loose	B11	Capacitors	----	----

Electronic Ballast

Electromagnetic Ballast

Compact Fluorescent Ballasts

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Sign Ballast

Mounting Brackets

FIGURE A

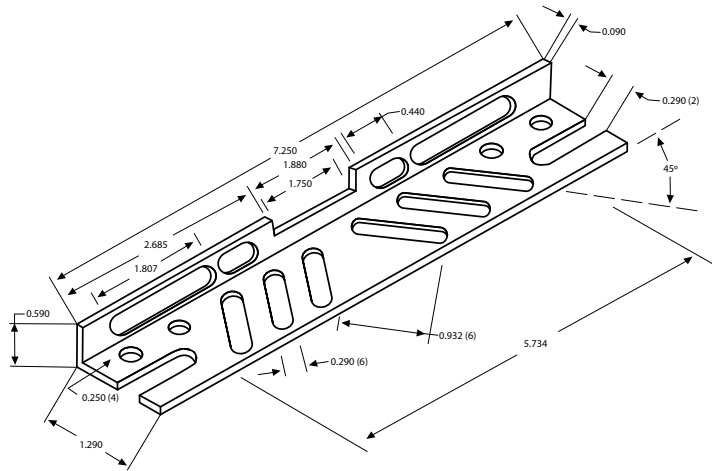


FIGURE B

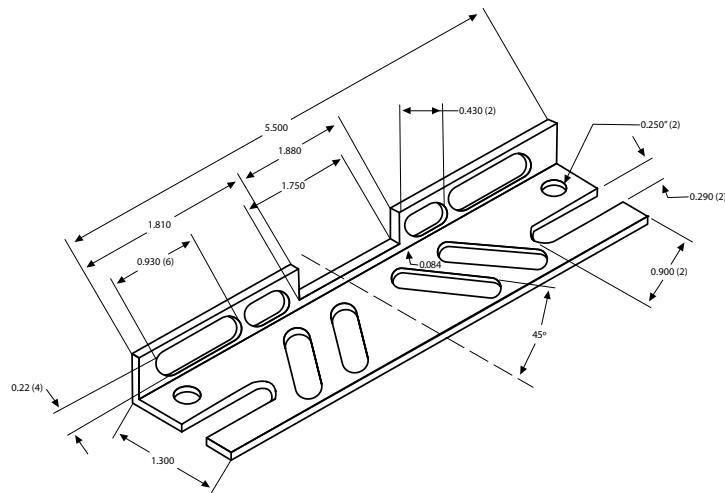
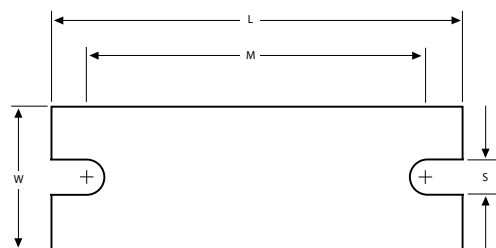


FIGURE C



Electronic
Ballast

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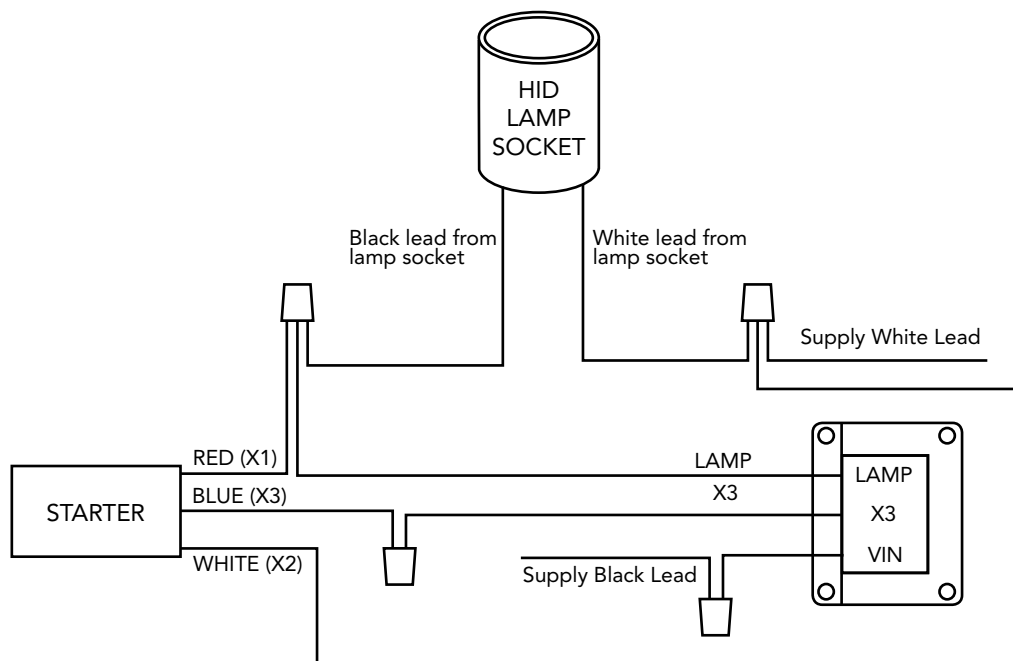
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HID Ballast Wiring Connections

A



TYPICAL REACTOR WIRING CONNECTIONS

(for HI reactor ballasts with model number -1xx or -7xx suffix, such as S0150-02C-111 or M0400-08C-711)

1. Field wiring connections should only be made by qualified personnel.
2. Turn off supply voltage at breaker before accessing fixture Wiring Compartment.
3. Refer to wiring diagram on ballast label for proper component connections (typical connections illustrated above).
4. For safe operation:
 - a) Ground all system components (metallic case capacitor, ballast core, fixture housing, etc)
 - b) Insure all unused leads are individually insulated from ground
 - c) Wire product in accordance with local and national electric codes
 - d) Never perform maintenance while fixture is energized
5. Reassemble fixture Wiring Compartment after completing wiring connections.
6. Turn on supply voltage at breaker.

Electronic
Ballast

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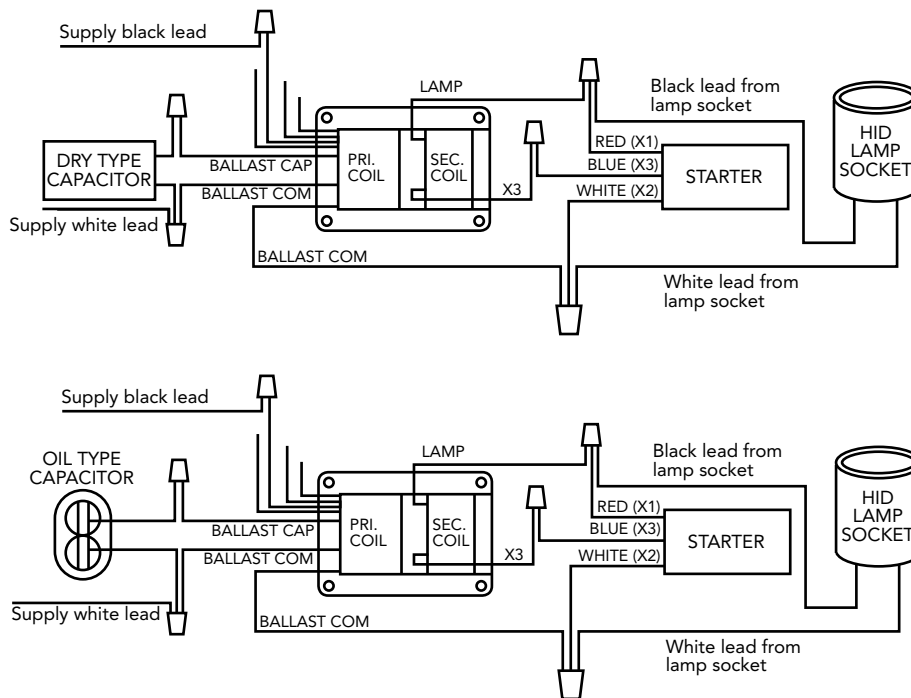
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Ballast

HID Ballast Wiring Connections

B



TYPICAL HX (High Reactance) BALLAST CONNECTIONS
(for HI HX-ballasts with model number -5xx suffix, such as M0100-71C-511)

1. Field wiring connections should only be made by qualified personnel.
2. Turn off supply voltage at breaker before accessing fixture Wiring Compartment.
3. Refer to wiring diagram on ballast label for proper component connections (typical connections illustrated above).
4. For safe operation:
 - a) Ground all system components (metallic case capacitor, ballast core, fixture housing, etc)
 - b) Insure all unused leads are individually insulated from ground
 - c) Wire product in accordance with local and national electric codes
 - d) Never perform maintenance while fixture is energized
5. Reassemble fixture Wiring Compartment after completing wiring connections.
6. Turn on supply voltage at breaker.

Electronic
Ballast

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Ballast

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HID

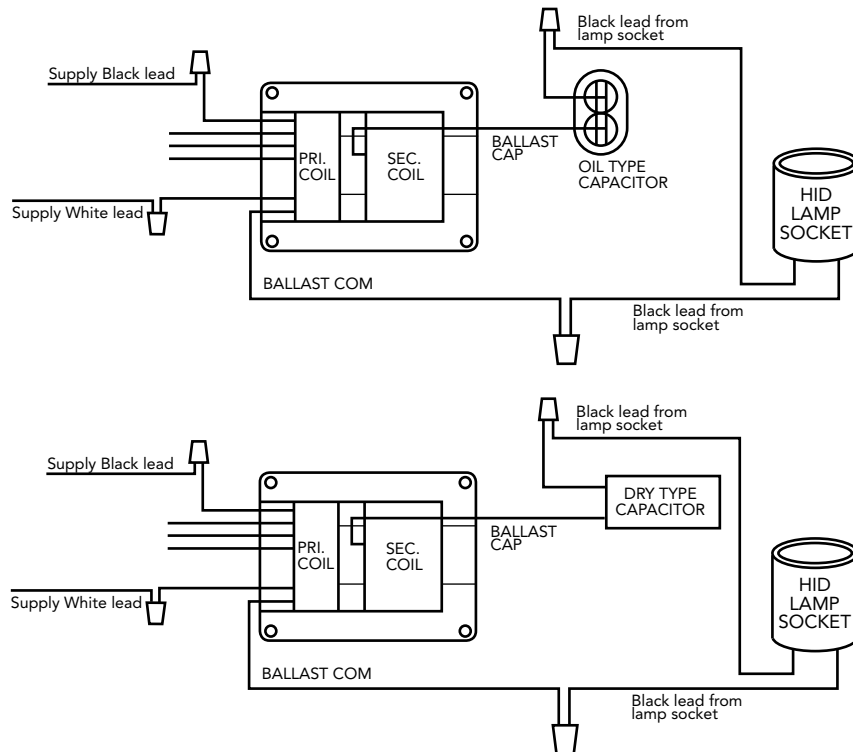
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HID Ballast Wiring Connections

C



TYPICAL CWA BALLAST WIRING CONNECTIONS

(for HI Metal Halide CWA type ballasts with model number -2xx suffix, such as M0400-71C-211)

1. Field wiring connections should only be made by qualified personnel.
2. Turn off supply voltage at breaker before accessing fixture Wiring Compartment.
3. Refer to wiring diagram on ballast label for proper component connections (typical connections illustrated above).
4. For safe operation:
 - a) Ground all system components (metallic case capacitor, ballast core, fixture housing, etc)
 - b) Insure all unused leads are individually insulated from ground
 - c) Wire product in accordance with local and national electric codes
 - d) Never perform maintenance while fixture is energized
5. Reassemble fixture Wiring Compartment after completing wiring connections.
6. Turn on supply voltage at breaker.

Electronic
Ballast

Electromagnetic
Ballast

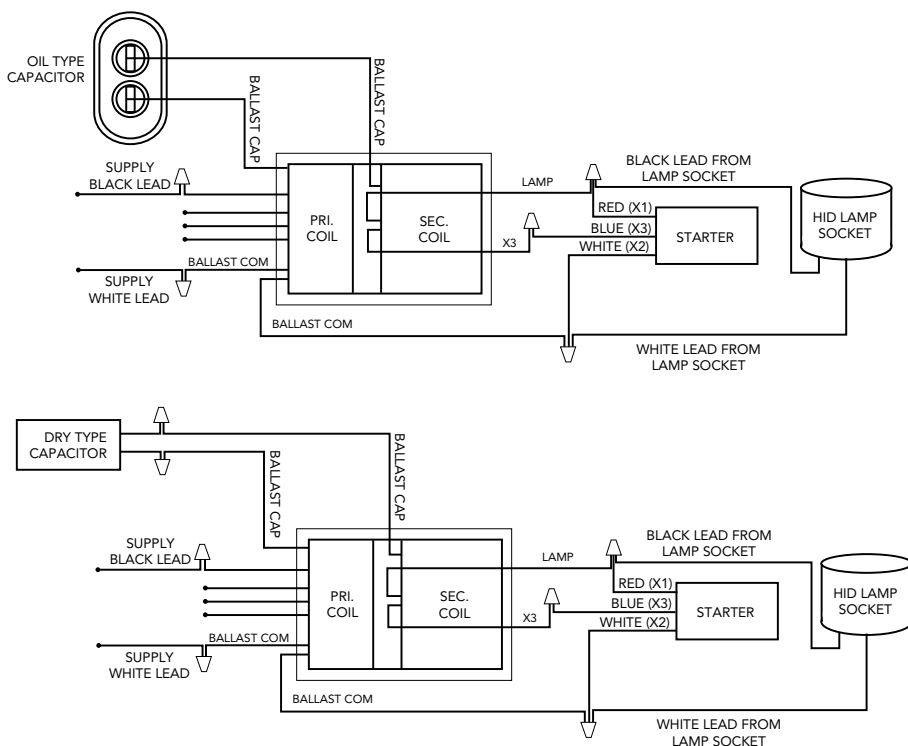
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Fluorescent Ballasts

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HID Ballast Wiring Connections

D



TYPICAL CWA BALLAST w/STARTER WIRING CONNECTIONS

(for HI Pulse Start CWA type ballasts with model number -6xx suffix, such as M0400-71C-611)(also, for HI High Pressure Sodium CWA type ballasts with model number -2xx suffix, such as S0400-71C-211)

1. Field wiring connections should only be made by qualified personnel.
2. Turn off supply voltage at breaker before accessing fixture Wiring Compartment.
3. Refer to wiring diagram on ballast label for proper component connections (typical connections illustrated above).
4. For safe operation:
 - a) Ground all system components (metallic case capacitor, ballast core, fixture housing, etc)
 - b) Insure all unused leads are individually insulated from ground
 - c) Wire product in accordance with local and national electric codes
 - d) Never perform maintenance while fixture is energized
5. Reassemble fixture Wiring Compartment after completing wiring connections.
6. Turn on supply voltage at breaker.

Electronic
Ballast

Electromagnetic
Ballast

Compact
Fluorescent Ballasts

HID

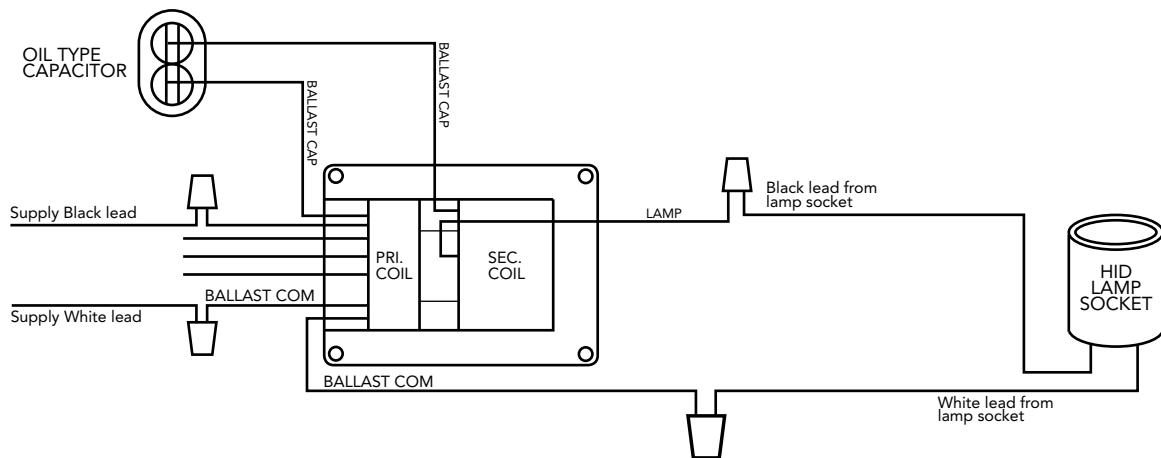
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HID Ballast Wiring Connections

E



M1000-81C-2xx CWA BALLAST WIRING CONNECTIONS

1. Field wiring connections should only be made by qualified personnel.
2. Turn off supply voltage at breaker before accessing fixture Wiring Compartment.
3. Refer to wiring diagram on ballast label for proper component connections (typical connections illustrated above).
4. For safe operation:
 - a) Ground all system components (metallic case capacitor, ballast core, fixture housing, etc)
 - b) Insure all unused leads are individually insulated from ground
 - c) Wire product in accordance with local and national electric codes
 - d) Never perform maintenance while fixture is energized
5. Reassemble fixture Wiring Compartment after completing wiring connections.
6. Turn on supply voltage at breaker.

Electronic
Ballast

Electromagnetic
Ballast

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Fluorescent Ballasts

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Sign
Ballast

FIGURE #1

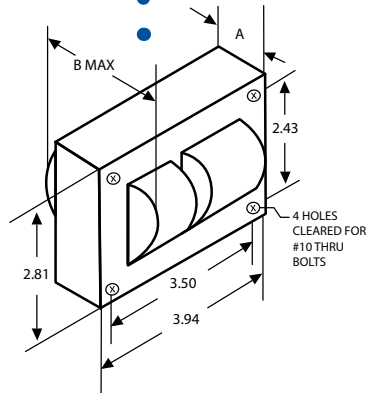


FIGURE #2

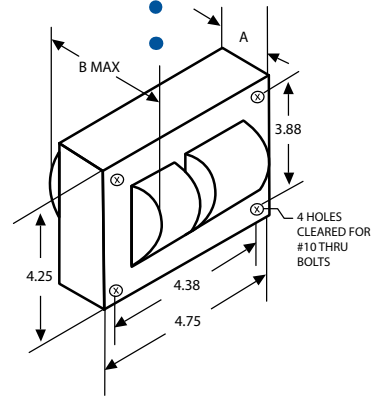


FIGURE #3

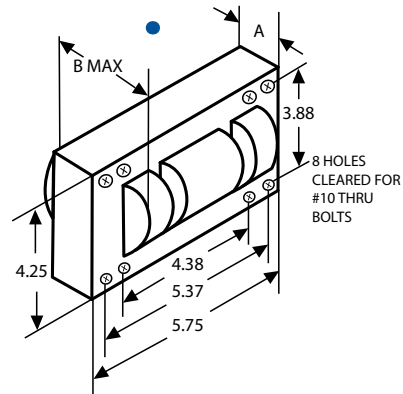


FIGURE #4

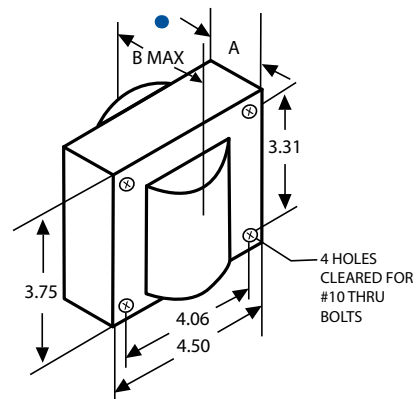


FIGURE #5

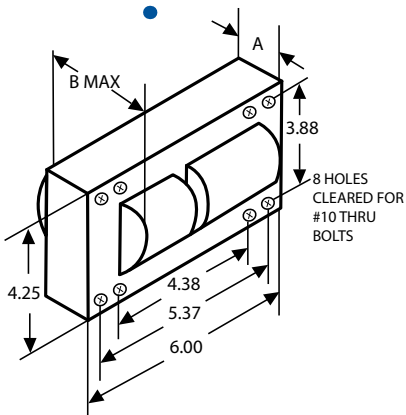
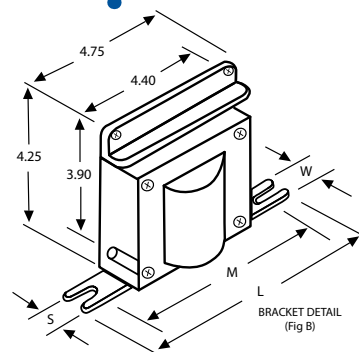


FIGURE #6



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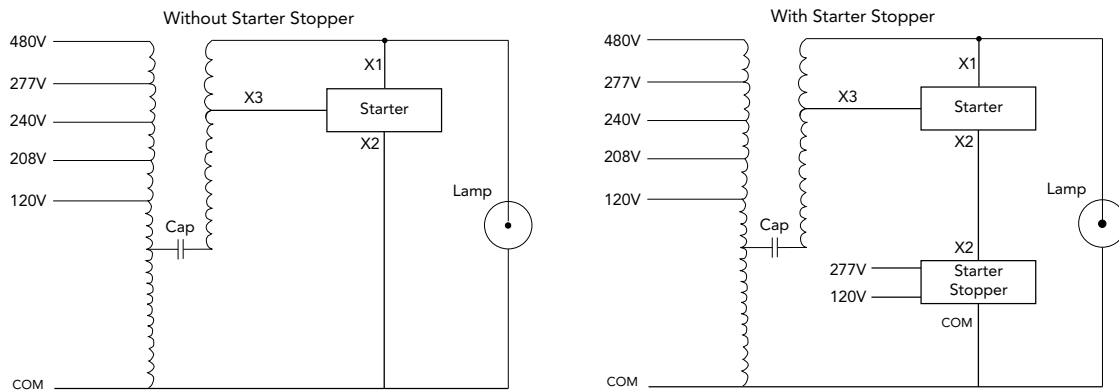
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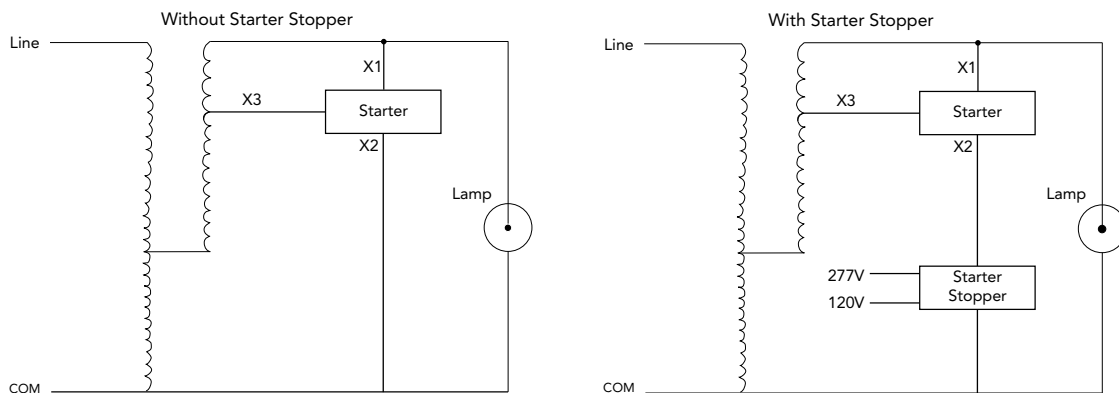
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Starter Stopper Wiring Connections

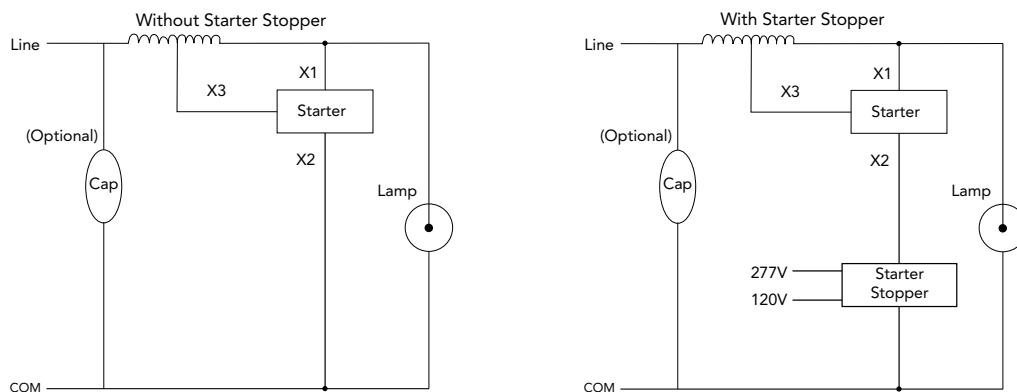
A Constant Wattage Autotransformer (CWA)



B High Reactance Autotransformer (HX)



C Reactor (R)



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Electronic
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Product Overview

Magnetic
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Ballast

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Lead Lengths

MODEL NUMBER	WHITE	BLACK	BLUE	RED	YELLOW	BROWN	ORANGE	ORANGE/ BLACK	BLUE/ WHITE
MS2/24HO-120*	24	24	44	38	44	-	-	-	-
MBS/0412/12/120	18	18	33	33	51	-	-	-	-
MS2/96HO-120*	24	24	52	52	52	-	-	-	-
MS3/48HO-120*	24	24	38	26	26	-	-	-	32
MSB/0620/24/120	24	24	75	46	75	46	-	-	46
MS4/48HO-277*	24	24	44	26	26	38	-	-	32
MSB/1224/24/120	24	24	74	32	70	78	-	-	52
MS4/72HO-277*	24	24	56	38	38	50	-	-	44
MSB/2040/24/120	24	24	80	80	72	72	-	-	54
MS4/96HO-277*	24	24	66	48	48	60	-	-	54
MS4/120HO-120*	24	24	78	60	60	72	-	-	66
MS6/48HO-120*	24	24	46	60	60	60	54	66	48
MSB/1240/46/120	24	24	50	80	70	50	50	50	50
MSB/2448/46/120	24	24	50	50	70	50	50	50	50
ES3/96HO-120*	30	30	132	132	-	-	-	-	-
ES4/96HO-120*	30	30	132	132	-	-	-	-	-
ES4/120HO-120*	30	30	132	132	-	-	-	-	-
ES6/96HO-120*	30	30	132	132	-	-	-	-	-

* Will be deleted from catalog when inventory is depleted

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Magnetic Sign Ballast

MODEL	NUMBER LAMPS	MIN/MAX LAMP RANGE (feet)	MAX LAMP LENGTH (in.)	LINE CURRENT (amps)	INPUT WATTS	OCV	BALLAST DIMENSIONS (inches)					WEIGHT (lbs)	WIRING DIAGRAM
							BASE LENGTH 'BL'	MOUNTING LENGTH 'ML'	CAN LENGTH 'CL'	CAN HEIGHT 'H'	CAN WIDTH 'W'		
MS2/24HO-120*	1 or 2	2-4	24	0.70	85	330	11.75	11.12	10.45	2.62	3.18	10.75	1,2
MSB/0412/12/120	1 or 2	4-12	96	1.03	120	480	11.75	11	10.45	2.6	3.19	11.75	1,2
MS2/96HO-120*	2	12-16	96	2.00	222	530	11.75	11.12	10.45	2.62	3.18	11.75	2
MS3/48HO-120*	1-3	6-12	48	1.50	162	530	11.75	11.12	10.45	2.62	3.18	11.75	3,4,5
MSB/0412/12/120	1 or 2	4-12	96	1.03	120	480	11.75	11	10.45	2.6	3.19	11.75	1,2
MS4/48HO-277*	2-4	8-16	48	0.86	235	575	11.75	11.12	10.45	2.62	3.18	11.75	6,7,8
MSB/1224/24/120	2-4	12-24	72	2.70	285	785	14.31	13.75	10.45	2.63	3.19	12.5	6,7,8
MS4/72HO-277*	2-4	16-24	72	1.18	312	720	11.75	11.12	10.45	2.62	3.18	12.5	6,7,8
MSB/2040/24/120	2-4	20-40	120	4.00	412	720	19.2	18.63	15.2	2.69	3.19	17.25	6,7,8
MS4/96HO-277*	2-4	24-32	96	1.43	375	1000	16.5	15.87	15.2	2.62	3.18	17.25	6,7,8
MS4/120HO-120*	2-4	20-40	120	3.80	455	800	16.5	15.87	15.2	2.62	3.18	18.75	6,7,8
MS6/48HO-120*	4-6	8-24	48	2.80	320	850	16.5	15.87	15.2	2.62	3.18	17.5	9,10,11
MSB/1240/46/120	4-6	12-40	72	3.20	350	720	19.19	18.63	15.2	2.69	3.19	17.75	9,10,11
MSB/2448/46/120	4-6	30-48	96	4.50	540	720	19.19	18.63	15.2	2.69	3.19	18.5	9,10,11

Electronic Sign Ballast

MODEL	NUMBER LAMPS	MIN/MAX LAMP RANGE (feet)	MAX LAMP LENGTH (in.)	LINE CURRENT (amps)	INPUT WATTS	OCV	BALLAST DIMENSIONS (inches)					WEIGHT (lbs)	WIRING DIAGRAM
							BASE LENGTH 'BL'	MOUNTING LENGTH 'ML'	CAN LENGTH 'CL'	CAN HEIGHT 'H'	CAN WIDTH 'W'		
ES3/96HO-120*	1-3	4-24	96	1.50	134	750	12.38	11.75	10.5	1.75	3	5	12
ES4/96HO-120*	1-6	8-32	96	2.50	198	750	15.00	14.38	13	2.5	3	8	14
ES4/120HO-120*	1-4	10-40	120	2.75	305	750	15.00	14.38	13	2.5	3	8	13
ES6/96HO-120*	2-6	10-48	96	2.85	292	700	15.00	14.38	13	2.5	3	8	14

*Will be deleted from catalog when inventory is depleted

Electronic Ballast

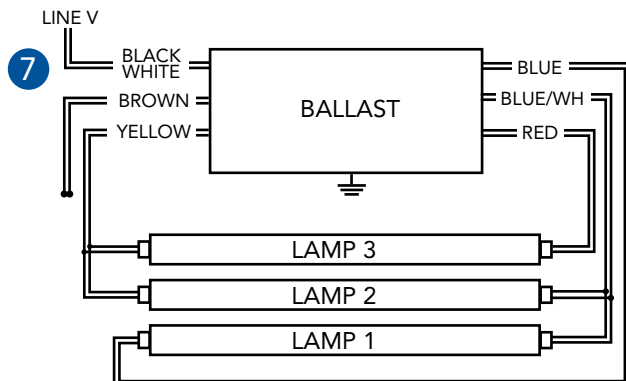
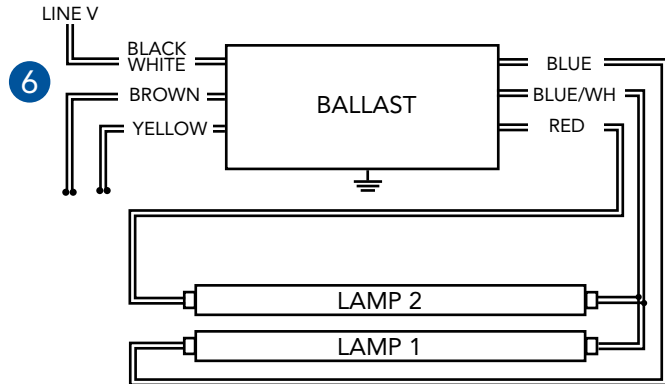
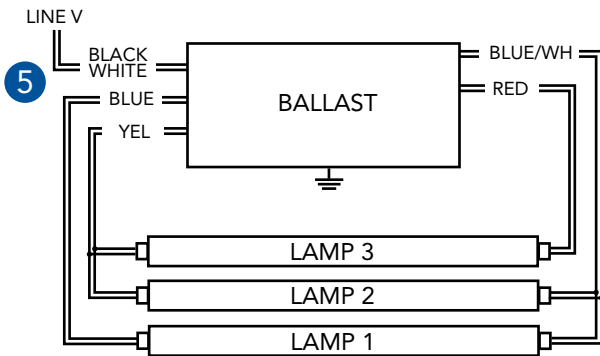
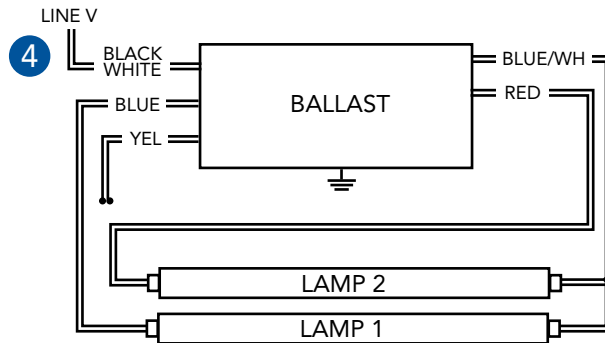
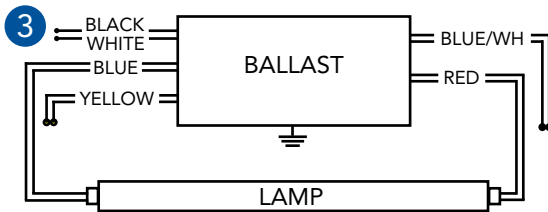
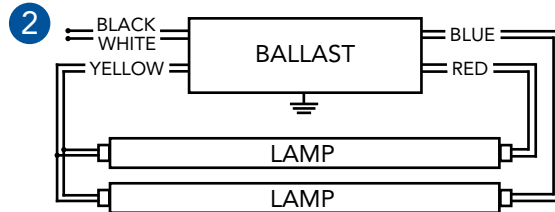
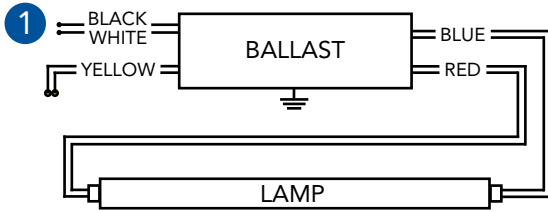
Electromagnetic Ballast

Compact Fluorescent Ballasts

HID

Sign Ballast

Wiring Diagrams



Electronic
Ballast

Electromagnetic
Ballast

Compact
Fluorescent Ballasts

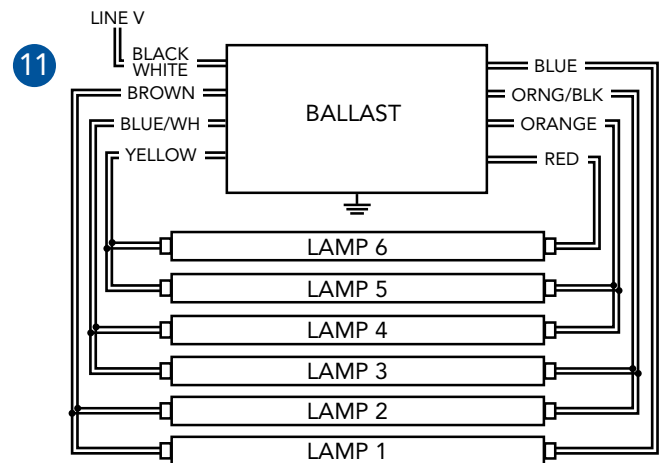
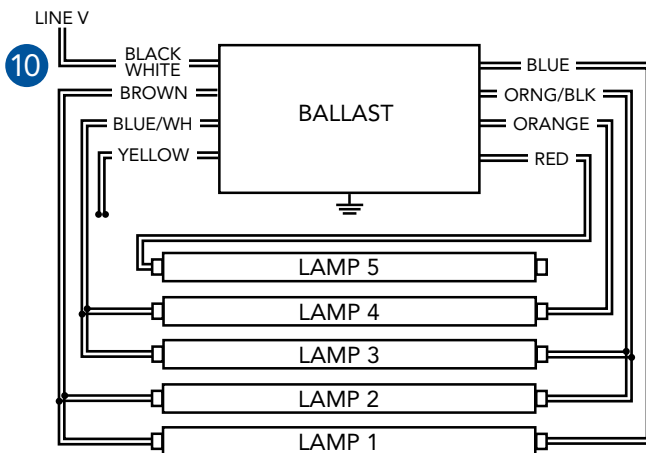
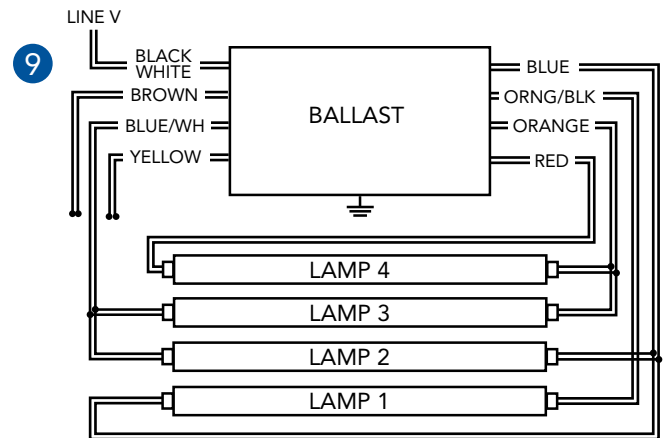
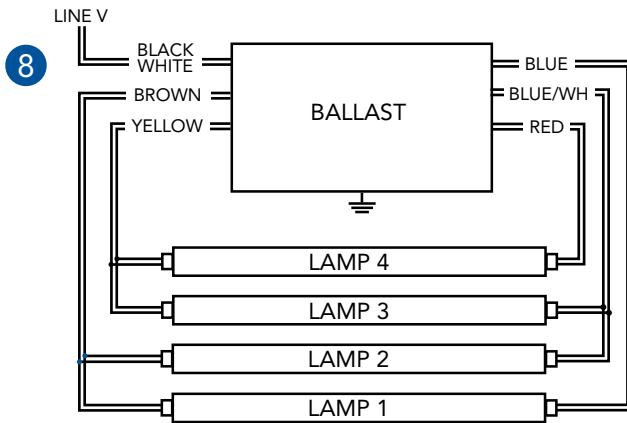
HID

Sign
Ballast

Sign Ballasts

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Wiring Diagrams



Electronic
Ballast

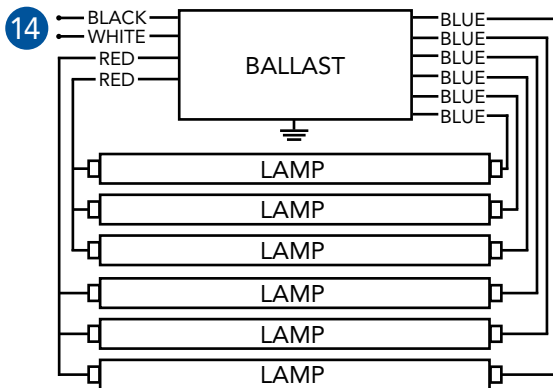
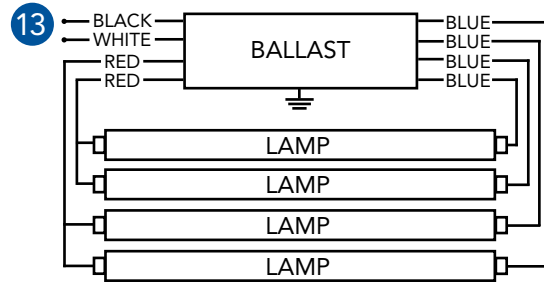
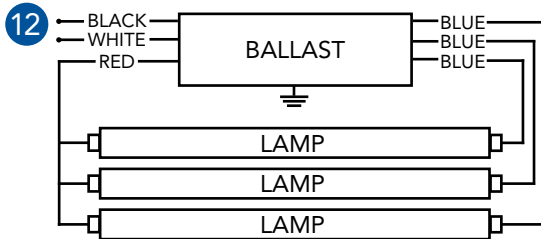
Electromagnetic
Ballast

Compact
Fluorescent Ballasts

HID

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Wiring Diagrams



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Glossary

AC (Alternating Current)

Current which flows in one direction and then the other, alternately.

Amperes

("Amps.") A measure of electrical current. In incandescent lamps, the current is related to voltage and power as follows: Watts (power) = Volts x Amps (current).

ANSI (American National Standards Institute)

A consensus-based organization which coordinates voluntary standards for the physical, electrical and performance characteristics of lamps, ballasts, luminaires and other lighting and electrical equipment.

ANSI Ballast Type

Ballast type used to operate lamp in accordance with ANSI standard.

Ballast

An auxiliary piece of equipment required to start and to properly control the flow of current to gas discharge light sources such as fluorescent and high intensity discharge (HID) lamps. Typically, magnetic ballasts (also called electromagnetic ballasts) contain copper windings on an iron core while electronic ballasts are smaller and more efficient and contain electronic components.

Ballast Efficacy Factor (BEF)

Defined as ballast factor divided by input watts. The value is 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)

This is the percentage of a lamp's rated lumen output that can be expected when operated on a specific, commercially available ballast. Note that the "rated output" is sometimes measured on a reference ballast unlike ones that actually operate the lamp in the field.

For example, a ballast with a ballast factor of 0.93 will result in the lamp's emitting 93% of its rated lumen output. Ballast with a lower BF results in less light output and also generally consumes less power.

Ballast Hum

Sound generated by the vibration of laminations in the iron core of the transformer or inductor present in the ballast.

Ballast Losses

Power or energy dissipated in the ballast as heat and not converted to lamp energy.

Canadian Standards Association (CSA)

An organization that writes standards and tests lighting equipment for performance as well as electrical and fire safety. Canadian provincial laws generally require that all products sold for consumer use in Canada must have CSA or equivalent approval.

Capacitor

Device in ballast that stores electrical energy. Often used for power factor correction and lamp regulation.

Glossary • • • • •

Circle E

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

Coil

Windings of copper or aluminum wire surrounding the steel core in ballast. Also refers to the entire assembly comprising the inductor or transformer.

Core

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

Core & Coil Ballast

A ballast that uses a "Core & Coil" assembly to operate fluorescent or HID lamps. Refers to copper windings on a steel core.

Current Type (AC/DC)

Whether the operational voltage is based on Alternating Current or Direct Current.

Efficacy

A measurement of how effective the light source is in converting electrical energy to lumens of visible light. Expressed in lumens-per-watt (LPW) this measure gives more weight to the yellow region of the spectrum and less weight to the blue and red region where the eye is not as sensitive.

Energy Policy Act (EPACT)

Comprehensive energy legislation passed by the U. S. Congress in 1992. The lighting portion includes lamp labeling and minimum energy efficacy (lumens/watt) requirements for many commonly used incandescent and fluorescent lamp types. Federal Canadian legislation sets similar minimum energy efficacy requirements for incandescent reflector lamps and common linear fluorescent lamps.

Energy Independence and Security Act of 2007 (EISA 2007)

In an effort to move the US toward energy independence, Congress passed the Energy Independence and Security Act of 2007. This new legislation requires certain standards for ballast efficiencies. It went into effect beginning January 1, 2009. The legislation mandates all metal halide fixtures between 150 and 500 Watts must contain 1) a pulse start ballast rated at 88% efficiency or better, 2) a metal halide ballast rated at 94% or better, or 3) an electronic nonpulse start ballast rated at 90-92% or better depending on wattage.

Federal Communications Commission (FCC)

The U. S. Federal agency that regulates emissions in the radio frequency portion of the electromagnetic spectrum. Part 18 of the FCC rules specifies electromagnetic interference (EMI) from lighting devices operating at frequencies greater than 9 kilohertz (kHz). Typical electronically-ballasted compact fluorescent lamps operate in the 24 - 100 kHz frequency range.

Flicker

The periodic variation in light level caused by AC operation that can lead to strobe effects.

Ballast Product Guide

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Glossary

Frequency

Rate of alternation 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.

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 fourwire Wye three-phase system.

Hertz (Hz)

Unit used to measure frequency of alternating current or voltage.

High Power Factor

A ballast whose power factor is corrected to 90% or greater.

Ignitor

An electronic device providing a high voltage pulse to initiate an electrical discharge. Typically, the ignitor is paired with or is a part of the ballast (See STARTER).

Input Voltage

Power supply voltage required for proper operation of fluorescent or HID ballast.

Input 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 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. (See RAPID START).

Kelvin

A unit of temperature starting from absolute zero, parallel to the Celsius (or Centigrade) scale. 0C is 273K.

Kilowatt (kW)

The measure of electrical power equal to 1000 watts.

Kilowatt Hour (kWh)

The standard measure of electrical energy and the typical billing unit used by electrical utilities for electricity use. A 100-watt lamp operated for 10 hours consumes 1000 watt-hours (100 x 10) or one kilowatt-hour. If the utility charges \$.10/kWh, then the electricity cost for the 10 hours of operation would be 10 cents (1 x \$.10)

Laminations

Layers of steel, making up the "core" that is surrounded by the coils in a core & coil ballast.

Glossary • • • • •

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.

Normal Power Factor

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

Open Circuit Voltage (OCV)

Open Circuit Voltage measured across the socket the lamp screws into, with the ballast powered on. It is dangerous to stick a voltmeter into such a socket without precise knowledge of the ballast because exceedingly high voltages could be present.

Operating Voltage

For electrical discharge lamps, this is the voltage measured across the discharge when the lamp is operating. It is a function of the lamp arc tube characteristics and is largely independent of the ballast.

Power Factor

Measurement of the relationship between the AC source voltage and current. High power factor ballasts require less AC operating current 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).

Preheat Circuit

A type of fluorescent lamp-ballast circuit used with the first commercial fluorescent lamp products. A push button or automatic switch is used to preheat the lamp cathodes to a glow state. Starting the lamp can then be accomplished using simple "choke" or reactor 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.

Pulse Start

An HID ballast with a high voltage ignitor to start the lamp.

Rapid Start Circuit

A fluorescent lamp-ballast circuit that utilizes continuous cathode heating, while the system is energized, to start and maintain lamp light output at efficient levels. Rapid start ballasts may be either electromagnetic, electronic or of hybrid designs. Full-range fluorescent lamp dimming is only possible with rapid start systems (See INSTANT START).

Rapid Start

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

Ballast Product Guide

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Glossary

Starter

An electronic module or device used to assist in starting a discharge lamp, typically by providing a high-voltage surge (See IGNITOR).

System

A term referring to the lamp and ballast combination, and sometimes to the entire lighting delivery system including the fixture, the optics, the particular layout and the lighting controls.

TCLP Test

The Toxicity Characteristic Leaching Procedure (TCLP) test, specified in the Resource Conservation and Recovery Act (RCRA) of 1990, is used to characterize fluorescent lamp waste as hazardous or nonhazardous waste. The TCLP test measures the ability of the mercury and/or lead in a lamp to leach from a landfill into groundwater.

Total Harmonic Distortion (THD)

A measure of the distortion of the input current on alternating current (AC) power systems caused by higher order harmonics of the fundamental frequency (60Hz in North America). THD is expressed in percent and may refer to individual electrical loads (such as ballast) or a total electrical circuit or system in a building. ANSI C82.77 recommends THD not exceed 32% for individual commercial electronic ballasts, although some electrical utilities may require lower THDs on some systems. Excessive THDs on electrical systems can cause efficiency losses as well as overheating and deterioration of system components.

Underwriters' Laboratories (UL)

A private organization which tests and lists electrical (and other) equipment for electrical and fire safety according to recognized UL and other standards. A UL listing is not an indication of overall performance. Lamps are not UL listed except for compact fluorescent lamp assemblies - those with screw bases and built-in ballasts.

Uniform Product Code (UPC)

The 12 digit code on the saleable unit that is used for scanning at the register.

Volt

A measure of "electrical pressure" between two points. The higher the voltage, the more current will be pushed through a resistor connected across the points. The volt specification of an incandescent lamp is the electrical "pressure" required to drive it at its designed point. The "voltage" of a ballast (e.g. 277 V) refers to the line voltage it must be connected to.

Voltage

A measurement of the electromotive force in an electrical circuit or device expressed in volts. Voltage can be thought of as being analogous to the pressure in a waterline.

Watts

A unit of electrical power. Lamps are rated in watts to indicate the rate at which they consume energy. (See KILOWATT HOUR).

U.P.C. ITEM #	CATALOG #	UNIVERSAL	ADVANCE	OSI	GE
ELECTRONIC FLUORESCENT BALLASTS					
01945	E2/32IS-120MC	B232I120RES-A	REB-2P32-SC		GE-323-120-RES
02078	E2/40RS-120MC	B240R120HP	REL-2S40-SC	QTP2x40T12/120RSN-SC	GE240RS120
01916	E2/40RS-277	B240R277HP	VEL-2S40-SC	QTP2x40T12/277RSN-SC	
01917	E2/75IS-120	B260I120HP	REL-2P60-S-A	QT2x96/120IS	
01943	E2/75IS-277	B260I277HP	VEL-2PIS-S	N/A	N/A
01918	E2/110RS-120	B295SR120HP	REL-2S110	QT2x96/120HO	
01944	E2/110RS-277	B295SR277HP	VEL-2S110	QT2x96/277HO	B295SR277HP
02826	EP2/32IS/MV/MC	B232IUNVHP-B	ICN-2M32-MC	QTP2x32T8/UNVISN-SC	GE-232-MV-N
04033	EP3/32IS/MV/MC/HE	B332IUNVHP-A	ICN-3P32-SC	QTP3x32T8/UNVISN-SC	GE-332-MV-N
04034	EP4/32IS/MV/MC/HE	B432IUNVHP-A	ICN-4P32-SC	QTP4x32T8/UNVISN-SC	GE-432-MV-N
00222	EP2/32IS/MV/SC/HE	B232IUNVHE-A	IOP-2P32-SC	QHE2x32T8/UNVISN-SC	GE232MAX-N/ULTRA
01261	EP3/32IS/MV/SC/HE	B332IUNVHE-A	IOP-3P32-SC	QHE3x32T8/UNVISN-SC	GE332MAX-N/ULTRA
01262	EP4/32IS/MV/SC/HE	B432IUNVHE-A	IOP-4P32-SC	QHE4x32T8/UNVISN-SC	GE432MAX-N/ULTRA
01940	EP2/40IS-TT/MV/SC	C240PUNVHP-B	REL-2TT540	QTP2X40TT5/120/277PSN-F	C240PUNVHP-B-IP
01941	EP3/40IS-TT/MV/SC				
01942	EP2/59IS/MV/SC	B259IUNVHP-A	IOP-2P59-SC	QHE2x59T8ISN-SC	GE-259-MV-N
02238	EPH2/32IS/MV/SC/HE	B232IUNVHEH-A	IOP-2P32-HL-SC	QHE2x32T8/UNVISH-SC	GE232MAX-H/ULTRA
02239	EPH3/32IS/MV/SC/HE	B332IUNVHEH-A	IOP-3P32-HL-SC	QHE3x32T8/UNVISH-SC	GE332MAX-H/ULTRA
22143	EPL2/32IS/MV/MC/HE	B232IUNVEL-A	IOP-2P32-LW-SC	QHE2x32T8/UNVISL-SC	GE232MAX-L/ULTRA
02960	EPL3/32IS/MV/MC	B332IUNEL-A	IOP-3P32-LW-SC	QHE3x32T8/UNVISL-SC	GE332MAX-L/ULTRA
02962	EPL4/32IS/MV/MC	B432IUNVEL-A	IOP-4P32-LW-SC	QHE4x32T8/UNVISL-SC	GE432MAX-L/ULTRA
01432	EPL2/32IS/MV/SC/HE	B232IUNVEL-A	IOP-2P32-LW-SC	QHE2x32T8/UNVISL-SC	GE232MAX-L/ULTRA
01469	EPL3/32IS/MV/SC/HE	B332IUNEL-A	IOP-3P32-LW-SC	QHE3x32T8/UNVISL-SC	GE332MAX-L/ULTRA
01470	EPL4/32IS/MV/SC/HE	B432IUNVEL-A	IOP-4P32-LW-SC	QHE4x32T8/UNVISL-SC	GE432MAX-L/ULTRA
12405	E2/72RS-120	N/A	N/A	N/A	N/A
11107	EP2/54HO/PRS/MV/90CW	B254PUNV-D	ICN-S254-90C	QTP2x54T5HO/UNVPSN-HT	GE254MVPS90-F
COMPACT FLUORESCENT BALLASTS					
02136	EP2/13CF/MV/K	C213UNVME/BE/SE/BES	ICF-2S13-H1-LD-K	QTP1/2x13CF/UNVBS	GEC213-MVPS-SE
02134	EP2/18CF/MV/K	C218UNVME/BE/SE/BES	ICF-2S18-H1-LD-K	QTP1/2x18CF/UNVBS	GEC218-MVPS-SE
02133	EP2/26CF/MV/K	C2642UNVME/BE/SE/BES	ICF-2S26-H1-LD-K	QTP1/2x26CF/UNVBS	GEC226-MVPS-SE
14303	EP2/42CF/MV/K	C2642UNVME/BE/SE/BES	ICF-2S42-M2-LD-K	QTP1/2x26/32/42CF/UNVBM	C242UNVSE-IP
03934	EP2/26CF/MV/K2	C2642UNVME/BE/SE/BES	ICF-2S26-H1-LD-K	QTP1/2x26CF/UNVBS	GEC226-MVPS-SE
03935	EP2/42CF/MV/K2	C2642UNVME/BE/SE/BES	ICF-2S42-M2-LD-K	QTP1/2x26/32/42CF/UNVBM	C242UNVSE-IP
MAGNETIC FLUORESCENT BALLASTS					
52104	M2/30RS-120	573-L-TC-P	R-2SP30-TP	MB2x30/120RS-SRNB	GEM230RS120
52103	M2/32RS-120	M232SR120	R-2S32-TP		M232SR120C
52203	M2/32RS-277	M232SR277	VK-2S32-TP		M232SR277C
51100	M1/40RS-120	412-L-SLH-TC-P	R-140-TP	MB1x40/120RS-SRNB	GEM140HRS120DIY

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MAGNETIC FLUORESCENT BALLASTS					
51200	M1/40RS-277	458-L-SLH-TC-P	V-140-TP	MB1x40/277RS-SRKNK	
52100	M2/40RS-120	446-L-SLH-TC-P	R-2S40-TP	MB2x40/120RS-SRKNK	GEM240RS120IP
52105	M2/40RS-220	540-L-TC-P	XQM-2S40-TP		
52106	M2/40RS-240	437-L-TC-P	YQM-2S40-TP		
52200	M2/40RS-277	443-L-SLH-TC-P	V-2S40-TP	MB2x40/277RS-SRKNK	GEM240RS277IP
51300	M1/20TR-120	546-B-TC-P	RLQ-120-TP	MB1x15/120PH/TP	GEM120TC120DIY
51301	M2/20TR-120	447-LR-TC-P	L-220F	MB2x20/120PH/TP	GEM220TS120DIY
51101	M1/75IS-120	822-BR-TC-P	RSM-175-S-TP	MB1x96/120IS-SRKNK	GEM196IS120IP
51201	M1/75IS-277	828-BR-TC-P	VSM-175-S-TP	MB1x96/277IS-SRKNK	GEM196IS277IP
52101	M2/75IS-120	806-SLH-TC-P	R-2E75-S-TP	MB2x96/120IS-SRKNK	GEM296IS120IP
52201	M2/75IS-277	827-SLH-TC-P	V-2E75-S-TP	MB2x96/277IS-SRKNK	GEM296IS277IP
51102	M1/110RS-120	481-LH-TC-P	RS-110-TP	MB1x96/HO/120RS-SRKNK	
51202	M1/110RS-277	479-LH-TC-P	VS-110-TP	MB1x96/HO/277RS-SRKNK	
52102	M2/110RS-120	480-SLH-TC-P	RS-2S110-TP	MB2x96/HO/120RS-SRKNK	GEM296HORS120IP
52202	M2/110RS-277	487-SLH-TC-P	VS-2S110-TP	MB2x96/HO/277RS-SRKNK	GEM296HORS277IP
51400	M1/22PHC-120	200-H2P	LC-14-20-C-TP	MB1x20/120PH/TP	GEM120PH120DIY
51402	M1/22RSC-120	547-RS-WS-TC-P	RLQS-122-TP-W	MB1x22/120CIRC	GEM1FC8T9RS120IP
51401	M2/40RSCH-120	726-L-VLH-WS-TC-P	RMS-32-40-TP-W		GEM1FC16T9RS120
51509	M1/9CFN-120	4105H2P	LC-4-9-C-TP		
51513	M1/13CFH-120	4112P	H-1B13-TP-W		
51514	M1/13CFN-120	4111P	LO-13-22-TP		
51518	M1/18CFH-120	4120P	H-1Q18-TP-W		
51526	M1/26CFH-120	4124P	H-1Q26-TP-W		
51527	M1/26CFH-277	4223P	VL-1Q26-TP-W		
51528	M1/28CFH-120	4138P	H-1Q28-TP-W		
52513	M2/13CFH-120	4114P	H-2B13-TP-W		
HID BALLASTS					
93113	M0050-08C-111-K				
91001	M0050-23C-511-K		71A5181-001D	M50/120/277-KIT	
93117	M0070-08C-111-K				
90405	M0070-71C-511-K	M70MLTLC3M500K	71A5292-001D	M70/MULTI-KIT	GEM70MLTLC3D-5
00029	M0100-23C-511-K				
99986	M0100-71C-513-K	M100MLTLC3M500K	71A590-001D	M100/MULTI-KIT	N/A
99945	M0150-71C-512-K	M150MLTLC3M500K	71A5492-001D	M150/MULTI-KIT	GEM150MLTLC3D-5
90101	M0175-02C-212-K				
92102	M0175-11C-211-K			M175/480-KIT	
90102	M0175-59C-212-K		71A55A0-001D	M175/480/120T-KIT	

U.P.C. ITEM #	CATALOG #	UNIVERSAL	ADVANCE	OSI	GE
HID BALLASTS					
03958	M0175-71C-214-K	M175MLTAC3M500K	71A5570-001D	M175/MULTI-KIT	GEM175MLTAC3-5
03976	M0175-81C-213-K	M175ML5AC3M500K	N/A	M175/SUPER5-KIT	GEM175ML5AC3-5
93103	M0250-59C-211-K		71A57A0-001D		
03954	M0250-71C-215-K	M250MLTAC4M500K	71A5770-001D	M250/MULTI-KIT	GEM250MLTAC-5
03977	M0250-81C-215-K	M250ML5AC4M500K	71A5750-001D	M250/SUPER5-KIT	GEM250ML5AC4-5
94802	M0400-29C-211-K			M400/480/120T-KIT	
94104	M0400-59C-211-K				
94422	M0400-71C-213-K	M400MLTAC4M500K	71A6071-001D	M400/MULTI-KIT	GEM400MLTAA4-5
99919	M0400-81C-212-K	M400ML5AC4M500K	71A6051-001D	M400/SUPER5-KIT	GEM400ML5AA4-5
00002	M1000-08C-212-K				
95102	M1000-11C-212-K	M100048TAC5M500K	71A6542-001D	M1000/480-KIT	GEM100048TAC5-5
04091	M1000-71C-214-K	M1000MLTAC5M500K	71A6572-001D	M1000/MULTI-KIT	GEM1000MLTAA5-5
99948	M1000-81C-213-K	M1000ML5AC5M500K	71A6552-001	M1000/SUPER5-KIT	GEM1000ML5AA5-5
96202	M1500-08C-212-K				
96102	M1500-11C-212-K	M150048TAC5M500K	71A6742-001	M1500-480-KIT	GEM150048TAC5M5-5
96402	M1500-71C-212-K	M1500MLTAC5M500K	71A6772-001	M1500/MULTI-KIT	GEM1500MLTAC5-5
92103	M0175-02C-411-K				
92303	M0175-29C-411-K		71A5544-500DT		
93304	M0250-02C-411-K		71A5704-500		
93204	M0250-27C-411-K		71A5734-500T		
93104	M0250-29C-411-K		71A5744-500T		
93510	M0350-02C-411-K		71A5984-500T		
93520	M0350-29C-411-K				
00239	M0350-30C-411-K				
94304	M0400-02C-411-K		71A6004-500		
94804	M0400-27C-411-K		71A6034-500T		
94904	M0400-28C-411-K		71A60B4-500T		
93280	M0200-11C-611-K	P20048TAC3M500K		M200/480-PS-KIT	
93120	M0200-23C-611-K				
93447	M0200-71C-611-K	P200MLTAC4M500K	71A5692-001D	M200/MULTI-PS-KIT	
93306	M0250-11C-611-K	P25048TAC4M500K		M250/480-PS-KIT	GEP25048TAC4-5
99765	M0250-11C-6E1-K	P25048TAC4M500K	71A5642-500DT	M250/480-PS-KIT	GEP25048TAC4-5
93406	M0250-71C-611-K	P250MLTAC4M500K	71A5792-001D	M250/MULTI-PS-KIT	GEP250MLTAC4-5
99770	M0320-08C-7E1-K	P320277RCEM500K	71A5837-001D		
99760	M0320-08C-7E1-K	P320MLTAC4M500K	71A5892-001D	M320/MULTI-PS-KIT	GEP320MLTAC4M-5
02278	M0320-71C-6E4-K	P320MLTAC4M500K	71A5892-001D	M320/MULTI-PS-KIT	GEP320MLTAC4M-5

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U.P.C. ITEM #	CATALOG #	UNIVERSAL	ADVANCE	OSI	GE
HID BALLASTS					
99772	M0350-08C-7E1-K	P350277RCEM500K	71A5937-001D		
99824	M0350-08C-7E2-K	P350277RCEM500K	71A5937-001D		
99916	M0350-71C-6E4-K	P350MLTAC4M500K	71A5993-001D	M350/MULTI-PS-KIT	GEP350MLTAC4-5
94207	M0400-08C-711-K	P400277RCEM500K	71A6137-001D		
09767	M0400-11C-6E1-K	P40048TAC4M500K	71A6042-500DT	M400/480-PS-KIT	GEP40048TAC4-5
94401	M0400-29C-611-K	P40048TAC4M500K	71A6042-500DT	M400/480/120T-PS-KIT	
99774	M0400-29C-6E1-K	P40048TAC4M500K	71A6042-500DT	M400/480/120T-PS-KIT	N/A
94406	M0400-71C-611-K	P400MLTAC4M500K	71A6092-001D	M400/MULTI-PS-KIT	GEP400MLTAC4-5
99917	M0400-71C-6E3-K	P400MLTAC4M500K	71A6092-001D	M400/MULTI-PS-KIT	GEP400MLTAC4-5
99689	M0750-71C-611-K	P750MLTAC5M500K		M750/MULTI-PS-KIT	GEP750MLTAC5-5
99940	M0750-71C-612-K	P750MLTAC5M500K		M750/MULTI-PS-KIT	GEP750MLTAC5-5
99612	M0875-71C-611-K	P875MLTAC5M500K			
99622	M0875-81C-611-K				
00355	M1000-11C-611-K	P100048TAC5M500K		M1000/480-PS-KIT	
99604	M1000-29C-612-K				
99595	M1000-71C-612-K	P1000MLTAC5M500K	71A6593-001	M1000/MULTI-PS-KIT	GEP1000MLTAC5-5
99619	M1000-81C-611-K	P1000ML5AC5M500K			GEP1000MLT5AC5-5
90307	S0035-02C-111-K	S35120RCEM000K	71A7701-001DB	LU35/120R	
93108	S0050-02C-111-K	S50120RCEM000K	71A7807-001DB	LU50/120R	
93109	S0070-02C-111-K	S70120RCEM000K	71A7907-001DB	LU70/120R	
97415	S0070-71C-511-K	S70MLTLC3M500K	71A7971-001D	LU70/MULTI-KIT	GES70MLTLC3D-5
99934	S0070-71C-512-K	S70MLTLC3M500K	71A7971-001D	LU70/MULTI-KIT	GES70MLTLC3D-5
93111	S0100-02C-111-K	S100120RCEM000K	71A8007-001DB	LU100/120R	
91415	S0100-71C-511-K	S100MLTLC3M000K	71A8071-001D	LU100/MULTI-KIT	GES100MLTLC3D-5
01464	S0100-71C-512-K	S100MLTLC3M000K	71A8071-001D	LU100/MULTI-KIT	GES100MLTLC3D-5
93110	S0150-02C-111-K	S150120RCEM000K	71A8107-001D	LU150/120R	
93415	S0150-71C-511-K	S150MLTAC4M500K	71A8172-001D	LU150/MULTI-KIT	GES150MLTLC3D-5
99921	S0150-71C-512-K	S150MLTAC4M500K	71A8172-001D	LU150/MULTI-KIT	GES150MLTLC3D-5
96112	S0250-11C-211-K	S25048TAC4M500K	71A8241-001D	LU250/480-KIT	
96114	S0250-29C-211-K			LU250/480/120T-KIT	
96412	M0250-71C-212-K	S250MLTAC4M500K	71A8271-001D	LU250/MULTI-KIT	GES250MLTAC4-5
96580	S0250-81C-211-K	S250ML5AC4M500K	71A8251-001D	LU250/SUPER5-KIT	GES250ML5AC4-5
94112	S0400-11C-211-K	S40048TAC4M500K	71A8443-001D	LU400/480-KIT	GES40048TAC4-5
00003	S0400-29C-211-K			LU400/480/120T-KIT	
94312	S0400-59C-211-K		71A84A3-001D		
94412	S0250-71C-212-K	S400MLTAC4M500K	71A8473-001D	LU400/MULTI-KIT	GES400MLTAC4-5

U.P.C. ITEM #	CATALOG #	UNIVERSAL	ADVANCE	OSI	GE
HID BALLASTS					
94400	S0400-81C-212-K	S400ML5AC4M500K	71A8453-001D	LU400/SUPER5-KIT	GES400ML5AC4-5
90112	S1000-11C-211-K	S100048TAC5M500K	71A8743-001D	LU1000/480-KIT	GES100048TAC5-5
90212	S1000-29C-211-K				
90412	S1000-71C-211-K	S1000MLTAC5M500K	71A8773-001D	LU1000/MULTI-KIT	GES1000MLTAC505
MAGNETIC SIGN BALLASTS					
00106	MS1/48HO-120				
00165	MS1/48HO-277				
00107	MS2/24HO-120				
00166	MS2/24HO-277				
03796	MSB/0412/12/120	USB-0412-12		MSB-12-0412-TP	GESB-0412-12
00108	MS2/72HO-120	USB-0412-12		MSB-12-0412-TP	GESB-0412-12
00167	MS2/72HO-277				
00109	MS2/96HO-120				
00168	MS2/96HO-277				
00110	MS3/48HO-120				
00169	MS3/48HO-277				
00111	MS3/72HO-120				
00170	MS3/72HO-277				
00112	MS3/96HO-120				
00171	MS3/96HO-277				
03797	MSB/0620/24/120	USB-0816-24	ASB0620-24	MSB-24-0620-TP	GESB-0620-24
00172	MS4/48HO-277		VSB0620-24		
03798	MSB/1224/24/120	USB-1024-24	ASB1224-24	MSB-24-1224-TP	GESB-1224-24
00173	MS4/72HO-277		VSB1224-24		
03799	MSB/2040/24/120	USB-1632-24			GESB-1632-24
00115	MS4/96HO-120	USB-1632-24			GESB-1632-24
00174	MS4/96HO-277				
00116	MS4/120HO-120		ASB2040-24	MSB-24-2040-TP	GESB-2040-24
00175	MS4/120HO-277		VSB2040-24		
00117	MS5/72HO-120				
00176	MS5/72HO-277				
00118	MS6/48HO-120				

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U.P.C. ITEM #	CATALOG #	UNIVERSAL	ADVANCE	OSI	GE
MAGNETIC SIGN BALLASTS					
00177	MS6/48HO-277				
03800	MSB/1240/46/120	USB-2036-46	ASB1240-46	MSB-46-1240-TP	GESB-1240-46
00178	MS6/72HO-277		VSB1240-46		
03801	MSB/2448/46/120	USB-2048-46	ASB2448-46	MSB-46-2448-TP	GESB-2448-46
00179	MS6/96HO-277		VSB2448-46		
ELECTRONIC SIGN BALLASTS					
00102	ES3/96HO-120				
00180	ES3/96HO-208-277				
00103	ES4/96HO-120		ASB-1232-24-E		
00181	ES4/96HO-208-277				
00104	ES4/120HO-120				
00182	ES4/120HO-208-277				
00105	ES6/96HO-120		ASB-2040-46-E		
00183	ES6/96HO-208-277				
F-CAN SIGN BALLASTS					
00099	M0175-23F-211	1110-245SC-TC	72C5581NP	M175/120/277/F-CAN	1110245SCTC0001
00100	M0250-23F-211	1110-246SC-TC	72C5782NP	M250/120/277/F-CAN	1110246SCTC000C
00101	M0400-23F-211	1110-247SC-TC	72C6082NP	M400/120/277/F-CAN	1110247SCTC0001

ELECTRONIC FLUORESCENT BALLAST 5 YEAR LIMITED WARRANTY

Howard Industries, Inc. warrants to the purchaser that its electronic fluorescent ballasts will be free from defects in material and workmanship as conditioned herein for a period of five (5) years from date of manufacture. The date of manufacture by Howard Industries, Inc., Ballast Products Division is stamped on the ballast.

During said warranty period, Howard Industries, Inc. agrees and shall be obligated to a limit of refund of the purchase price of the ballast or, at the option of Howard Industries, Inc., replacement of defective ballasts including a \$10.00 provision for installation costs.

This warranty is not applicable and is voided to any product manufactured by Howard Industries, Inc. which is not stored, installed, operated and maintained in accordance with:

- The National Electric Code (NEC)
- The Standards for Safety of Underwriters Laboratories, Inc. (UL)
- The Standards for the American National Standards Institute (ANSI)
- The Specific Instructions Provided by Howard Industries, Inc. for the Installation of the Product(s)
- Accepted industry practices

The warranties set forth herein are in lieu of any and all other warranties expressed or implied including the warranties of merchantability and fitness for a particular purpose. In no case shall Howard Industries, Inc. be obligated or liable for any indirect, consequential, or incidental damages for breach of this or any other warranty, expressed or implied, whatsoever.

Should at any time within the stated five year period from date of manufacture any appearance of defect in material or workmanship appear, purchaser must notify Howard Industries, Inc. by calling 1-800-956-3456 or (601) 422-0033. Written notice may be mailed to Howard Industries, Inc., Ballast Products Division, PO Box 1590, Laurel, MS 39441 or by fax at (601) 422-1652.

As a condition to qualify for refund of original ballast purchase price or replacement under the provisions of this limited warranty, defective ballasts must be available for return to Howard Industries, Inc. at its request for inspection and test analysis. Prior written approval for return must be obtained from the factory.

MAGNETIC FLUORESCENT BALLAST 3 YEAR LIMITED WARRANTY

Howard Industries, Inc. warrants to the purchaser that its magnetic fluorescent ballasts will be free from defects in material and workmanship as conditioned herein for a period of three (3) years from date of manufacture. The date of manufacture by Howard Industries, Inc., Ballast Products Division is stamped on the ballast.

During said warranty period, Howard Industries, Inc. agrees and shall be obligated to a limit of refund of the purchase price of the ballast or, at the option of Howard Industries, Inc., replacement of defective ballasts.

This warranty is not applicable and is voided to any product manufactured by Howard Industries, Inc. which is not stored, installed, operated and maintained in accordance with:

- The National Electric Code (NEC)
- The Standards for Safety of Underwriters Laboratories, Inc. (UL)
- The Standards for the American National Standards Institute (ANSI)
- The Specific Instructions Provided by Howard Industries, Inc. for the Installation of the Product(s)
- Accepted industry practices

The warranties set forth herein are in lieu of any and all other warranties expressed or implied including the warranties of merchantability and fitness for a particular purpose. In no case shall Howard Industries, Inc. be obligated or liable for any indirect, consequential, or incidental damages for breach of this or any other warranty, expressed or implied, whatsoever.

Should at any time within the stated three year period from date of manufacture any appearance of defect in material or workmanship appear, purchaser must notify Howard Industries, Inc. by calling 1-800-956-3456 or (601) 422-0033. Written notice may be mailed to Howard Industries, Inc., Ballast Products Division, PO Box 1590, Laurel, MS 39441 or by fax at (601) 422-1652.

As a condition to qualify for refund of original ballast purchase price or replacement under the provisions of this limited warranty, defective ballasts must be available for return to Howard Industries, Inc. at its request for inspection and test analysis. Prior written approval for return must be obtained from the factory.

MAGNETIC HID BALLAST 2 YEAR LIMITED WARRANTY

Howard Industries, Inc. warrants to the purchaser that its magnetic HID ballasts will be free from defects in material and workmanship as conditioned herein for a period of two (2) years from date of manufacture. The date of manufacture by Howard Industries, Inc., Ballast Products Division is stamped on the ballast.

During said warranty period, Howard Industries, Inc. agrees and shall be obligated to a limit of refund of the purchase price of the ballast or, at the option of Howard Industries, Inc., replacement of defective ballasts.

This warranty is not applicable and is voided to any product manufactured by Howard Industries, Inc. which is not stored, installed, operated and maintained in accordance with:

- The National Electric Code (NEC)
- The Standards for Safety of Underwriters Laboratories, Inc. (UL)
- The Standards for the American National Standards Institute (ANSI)
- The Specific Instructions Provided by Howard Industries, Inc. for the Installation of the Product(s)
- Accepted industry practices

The warranties set forth herein are in lieu of any and all other warranties expressed or implied including the warranties of merchantability and fitness for a particular purpose. In no case shall Howard Industries, Inc. be obligated or liable for any indirect, consequential, or incidental damages for breach of this or any other warranty, expressed or implied, whatsoever.

Should at any time within the stated two year period from date of manufacture any appearance of defect in material or workmanship appear, purchaser must notify Howard Industries, Inc. by calling 1-800-956-3456 or (601) 422-0033. Written notice may be mailed to Howard Industries, Inc., Ballast Products Division, PO Box 1590, Laurel, MS 39441 or by fax at (601) 422-1652.

As a condition to qualify for refund of original ballast purchase price or replacement under the provisions of this limited warranty, defective ballasts must be available for return to Howard Industries, Inc. at its request for inspection and test analysis. Prior written approval for return must be obtained from the factory.

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Combination T8 Lamp/Ballast System Warranty "Security Plus"

Howard Industries, Inc. – Lighting Products Division warrants lamps installed on Howard electronic ballast to be free from defects in material and workmanship and to operate from the date of installation (or date of manufacture if installation date is not known or available) for the time periods and subject to the terms and conditions specified in the table below. If lamps fail to

operate for the warranty period, Howard Lighting Products will provide a free replacement lamp (no labor allowance). If a Howard electronic ballast fails to operate within the warranty period, Howard Lighting Products will provide a free replacement ballast and labor allowance in accordance with our ballast warranty guide.

Electronic Ballast	Lamp	Ballast Warranty	Lamp Warranty
Standard Power	F17T8/xxx/ECO, F25T8/xxx/ECO, F30T8/8xx/ES/ECO, F32T8/xxx/ECO, F32T8/8xx/HL/ECO, FB32T8/xxx/6/ECO	60 months	30 months
Low Power	F17T8/xxx/ECO, F25T8/xxx/ECO, F30T8/8xx/ES/ECO, F32T8/xxx/ECO, F32T8/8xx/HL/ECO, FB32T8/xxx/6/ECO	60 months	30 months
High Power	F17T8/xxx/ECO, F25T8/xxx/ECO, F30T8/8xx/ES/ECO, F32T8/xxx/ECO, F32T8/8xx/HL/ECO, FB32T8/xxx/6/ECO	60 months	30 months
HE Standard Power	F17T8/xxx/ECO, F25T8/xxx/ECO, F28T8/8xx/ES/ECO, F30T8/8xx/ES/ECO, F32T8/xxx/ECO, F32T8/8xx/HL/ECO, FB28T8/8xx/ES/ECO, FB32T8/xxx/6/ECO	60 months	30 months
HE Low Power	F17T8/xxx/ECO, F25T8/xxx/ECO, F28T8/8xx/ES/ECO, F30T8/8xx/ES/ECO, F32T8/xxx/ECO, F32T8/8xx/HL/ECO, FB28T8/8xx/ES/ECO, FB32T8/xxx/6/ECO	60 months	30 months

Note: Fluorescent lamp warranty periods are based on a 3 hour minimum cycle, unless otherwise noted, with a maximum of 4,000 hours per year. Other operating cycles may affect the warranty period. The Howard lamp warranty can renew when the installation is group relamped. For more details contact Howard Lighting Products.

Terms and Conditions

1. HOWARD Industries warrants the lamps to be free from defects in material and workmanship, and warrants its ballasts as provided in HOWARD's current published ballast warranty, hereby made part of this warranty.
2. Howard lamps and electronic ballast must be installed together as a system. Lamps must be operated on ballasts indicated, within the electrical values noted on HOWARD ballast labels, and with all lamp and lighting equipment instructions and be operated within the normal specified operating range of environmental conditions for the systems. Ballasts and lamps must be installed and operated in accordance with the latest National Electric Code, UL, and ANSI specifications. Ballasts and lamps operated in any system, which has been subjected to abnormal stresses, but not limited to, excess temperatures or under or over voltage conditions are excluded from coverage under this Warranty.
3. The installation must be registered with HOWARD Industries within thirty (30) days from date of completion. HOWARD's combination T8 Lamp/Ballast System Warranty (Security Plus) Registration Form must be completed per instructions and installation acknowledged by HOWARD Industries.
4. Replacement of Howard lamps with lamps from other manufacturers will void the lamp portion of this warranty.
5. Replacement of Howard electronic ballast with any other ballast manufacturer will void the entire warranty.
6. For ballast refer to HOWARD Industries current published ballast warranty. HOWARD Industries will replace in-warranty failures by furnishing lamps in kind.
7. Howard Industries reserves the right to examine all failed ballasts and/or lamps and reserves the right to be the sole judge as to whether any ballasts and/or lamps are defective and covered under this warranty.
8. This Warranty shall be the sole remedy of the Customer and the sole liability of HOWARD Industries to Customer. NO IMPLIED WARRANTY OR MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE IS MADE OR IS TO BE IMPLIED. HOWARD Industries will not under any circumstances whether as a result of breach of contract, breach of warranty, tort, strict liability or otherwise be liable for consequential, incidental, special or exemplary damages including, but not limited to, loss of profits or revenues, loss of use of ballasts or any other goods or associated equipment or damages to any associated equipment, cost of capital, cost of substitute products, facilities or services, down time costs, or claims of claimant's customers.
9. After contacting Howard Lighting Products and receiving a return authorization number, the user/customer shall promptly return the product at the user/customer's expense to Howard Lighting Products after receiving instructions as to when and where to ship product. Failure to follow this procedure shall void this warranty.
10. Refer to HOWARD Industries Ballast Limited Warranty for other terms and conditions and limitations not otherwise superseded in the foregoing HOWARD Lighting Products Combination T8 Lamp/Ballast System Warranty (Security Plus).
11. Subject to change without notice.

Terms and Conditions of Sales • • • • •

1. General

- a. All orders are subject to acceptance by Howard Industries, Inc. – Lighting Products Division (hereinafter “Howard Lighting”).
- b. Specifications are subject to change without notice. Contact Howard Lighting for verification.
- c. Howard Lighting assumes no responsibility for the improper selection, installation, use, and/or maintenance of its products.
- d. The terms and conditions set forth herein are in lieu of any and all other terms and conditions expressed or implied including the warranties of merchantability and fitness for a particular purpose. In no case shall Howard Lighting or Howard Industries, Inc. be obligated or liable for any indirect, consequential, or incidental damages for breach of these or any other terms and conditions expressed or implied whatsoever.

2. Terms

- a. Purchaser understands net is due thirty (30) calendar days from the Howard Lighting invoice date.
- b. Purchaser understands an interest charge of 1.5% per month will be added on any past due balances.

3. Pricing

Unless noted otherwise in writing by Howard Lighting:

- a. All pricing and quotes are based on US dollars.
- b. Pricing is subject to change without notice.
- c. The applicable taxes will be added to invoices.
- d. Written quotes will be honored for thirty (30) calendar days given all fixtures are released for shipment within sixty (60) calendar days from the quote date.
- e. Shipments requested after a quote expires may be subject to a price increase.
 - i. Exceptions may be made when specific ship dates are noted on the original quote.
 - ii. Pricing is subject to change if any accessory, option, or other condition is changed from the original quote.

4. Minimum Billing

Howard Lighting's minimum billing amount is \$100 (US).

5. Freight Allowance

- a. Howard Lighting provides a freight allowance for orders totaling \$1,000 (US) net given the full order is being shipped via normal freight to the same address in any of the contiguous 48 states in the US. Additional freight charges will be added as applicable to shipments to Alaska, Hawaii, and outside the US.
- b. Partial shipments and shipments made to more than one location must each total \$1,000 (US) net to earn a freight allowance. Howard Lighting may make partial shipments at its own discretion, billing each shipment as it is made, but with freight terms applicable to the complete order.
- c. Orders of less than \$1,000 (US) net will be shipped as directed by the purchaser either freight collect or prepaid with the freight charges being added to the invoice.
- d. For air or premium freight requests on orders over \$1,000 (US) net, Howard Lighting will add the air or premium freight charges less the normally-incurred freight charges to the invoice.
- e. Unless noted otherwise in writing by Howard Lighting, all published prices and quotes are F.O.B. factory, Mendenhall, MS or from one of our authorized representatives' facilities.
- f. To qualify for this freight allowance, Howard Lighting reserves

the right to select the shipment's point of origin, method of transportation, and routing.

6. Freight Claims

Purchaser understands and agrees to report claims for damage, shortage, or errors in material as follows:

- a. Claims for damage and/or shortage caused by shipping must be made by the consignee to the shipper within ten (10) calendar days of delivery.
 - i. All items in question must be kept in their original cartons and at the original delivery point for inspection by carrier (upon request).
 - ii. If notified, Howard Lighting will assist purchaser as possible with claim.
- b. Claims involving shortages or errors in material believed to be caused by Howard Lighting will not be considered unless noted on the delivery receipt and reported to Howard Lighting within ten (10) calendar days of delivery.

7. Returned Goods Policy

- a. Howard Lighting will not accept any returned products without prior written authorization from Howard Lighting.
- b. Return request must be made to Howard Lighting within 90 days of original shipment.
- c. Purchaser agrees to prepay all transportation charges on all returned products.
- d. Credit will be issued at the prices in effect at the time of shipment or at the time of the return – whichever is lower – provided the products are in a saleable condition, are current models, and are listed in the published price sheet in effect at the time of the return.
- e. Purchaser understands that all non-stock, special, custom, or modified versions of normal factory-stock items are not returnable.
- f. If Howard Lighting accepts the returned merchandise and credits the purchaser's account, the purchaser agrees to pay a restocking fee of 25% plus the original freight cost. These amounts will be deducted from the credit to cover the cost of handling and inspection.
- g. Howard Lighting will not issue account credits when the value of the items to be returned is less than \$50 (US).
- h. Returns from any one-job order will be limited to no more than 10% of the original job order's value.
- i. Orders for stocked products may be cancelled without any cancellation charges provided Howard Lighting receives a written cancellation request prior to shipment.
- j. Order cancellations for custom products are subject to cancellation charges based on the costs incurred and commitments made by Howard Lighting up to and including the date the written cancellation notification was received.

8. Hold For Release Orders

Orders received as “hold for release” or “will advise” are not processed for manufacture until a written release is received and the order has been priced.

9. Claims

Refunds, repairs, or replacement will be at the sole discretion of Howard Lighting. Reimbursement for any field labor and/or service charges must be pre-approved in writing by Howard Lighting. Refer to our product warranty for more information.

Surround yourself with Howard Lighting. We did.



Nestled within the 504 acre Howard Technology Park, our new corporate headquarters are surrounded and filled with our superior lighting products. From the round back floods and compact fluorescents throughout the approximately 62,000 square feet of office space to the high bays illuminating the roughly 77,000 square foot Howard Technology Solutions and Howard Medical manufacturing facilities, we are your total lighting resource.

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