



Sign Illuminating Products

- † Plastic Sign Fluorescent Ballasts
- † HID Sign Ballasts
- † T5, T8, T12 Electronic Ballasts



The Sign Of A Leader

Signa™ is the newest brand in sign solutions...yet we're part of a company that has nearly 60 years of lighting experience. Signa™ offers the industry's most comprehensive line of plastic sign magnetic and electronic fluorescent ballasts and HID ballasts. Our products offer precision engineering and rugged reliability for both indoor and outdoor lighting applications.

The Signa™ line includes these innovative designs:

† **Signa™ Electronic Sign Ballasts** offer universal input voltage (120V–277V) and instant start technology, simplifying installation and maximizing energy savings.

† **Triad® Electronic Ballasts** are ideal for indoor sign applications. We have a full family of electronic ballasts for T5, T8 and T12 lamps.

† **Universal® HID Ballast Replacement Kits** are ideal for maintenance applications. We offer a wide range of ballasts for metal halide, pulse start metal halide, and high pressure sodium applications.

† **Signa™ HI-N-DRI®** is our premium line of fluorescent sign ballasts specifically designed for high-moisture environments.

† **Signa™ MSB-3** ensures that the installer has the right sign ballast on the truck for every application, from 1 to 6 lamps, 2 to 48 feet—replacing up to 100 conventional ballasts with a maximum of three models.

† **Signa™ HID F-Can and Core & Coil Ballasts** feature compact dimensions and color-coded leads to reduce the chance of miswiring.

The Signa™ name means extraordinary engineering and proven reliability — backed by the best customer support in the business. It's the only name you need to know in sign illuminating products!

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ELECTRONIC SIGN BALLASTS

† Maximum energy efficiency

† Fewer connections – easier to wire

† Universal input voltage (120V to 277V)

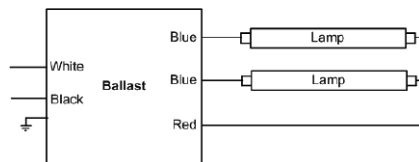
† Parallel instant start operation

† UL and CSA Listed

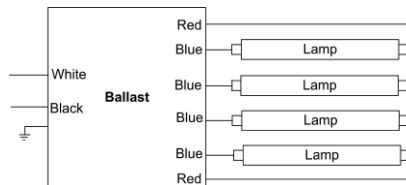
† UL HL listing for Hazardous Locations



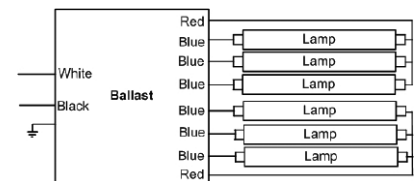
Catalog Number	Total Lamp Footage	Start Temp (°F)	Input Volts	Input Watts (max)	Max Line Current	Wiring Diagram	Case Dimensions (Inches)					Weight (lbs.)
							Case Length	Overall Length	Mounting Length	Height	Width	
T12HO UP TO 8' IN LENGTH OR T8HO UP TO 6' IN LENGTH: 120 - 277 VOLTS - 50/60 HZ												
ESB216-12	2' min. - 16' max. 1 or 2 Lamps	-20	120	134	1.12	1	10.58	11.75	11.14	1.78	3.13	4.2
			277	130	0.47							
ESB432-14	4' min. - 32' max. 1, 2, 3, or 4 Lamps	-20	120	280	2.34	2	13.19	14.31	13.75	2.67	3.19	7.4
			277	274	0.99							
ESB848-46	8' min. - 48' max. 4, 5, or 6 Lamps	-20	120	408	3.41	3	15.56	16.68	16.12	2.67	3.19	9.7
			277	395	1.47							
T12HO UP TO 10' IN LENGTH OR T8HO UP TO 8' IN LENGTH: 120 - 277 VOLTS - 50/60 HZ												
ESB1040-14	10' min. - 40' max. 1, 2, 3, or 4 Lamps	-20	120	341	2.85	2	15.56	16.68	16.12	2.67	3.19	9.7
			277	341	1.25							



For 1 lamp use, cap blue lead
WIRING DIAGRAM 1



For 1, 2, or 3 lamp use, cap unused blue and red leads
WIRING DIAGRAM 2



For 4 or 5 lamp use, cap unused blue leads
WIRING DIAGRAM 3

For More Information, Call
1-800-BALLAST
(225-5278)



HIGH OUTPUT BALLASTS

† Provide ultra-reliable, low temperature starting (as low as -20°F)

† Support 1 to 6 lamps

† Ideal for rugged outdoor sign cabinet applications

† UL Class P thermally protected, Type 2 Outdoor, HL



Catalog Number	Total Lamp Footage	Start Temp (°F)	Max. Line Cur.	Max. Input Watts	Open Circuit Volt.	Wiring Diagram	Case Dimensions (Inches)					Weight (lbs.)
							Case Length	Overall Length	Mounting Length	Height	Width	

PLASTIC SIGN FLUORESCENT BALLASTS - HIGH OUTPUT 800mA RS LAMPS - 120 Volts - 60 Hz

SINGLE LAMP BALLAST

256-148-800*	2' min. - 5'4" max.	-20	0.55	65	400	1	10 ^{37/64}	11 ^{45/64}	11 ^{9/64}	1 ^{3/4}	3 ^{3/16}	8
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TWO LAMP BALLASTS

256-248-800	3' min. - 8' max.	-20	0.90	105	400	1, 2	10 ^{37/64}	11 ^{45/64}	11 ^{9/64}	1 ^{3/4}	3 ^{3/16}	8
256-272-800	4' min. - 12' max.	-20	1.35	160	500	1, 2	10 ^{37/64}	11 ^{45/64}	11 ^{9/64}	1 ^{3/4}	3 ^{3/16}	8
256-296-800	12' min. - 16' max.	-20	1.80	210	500	1, 2	10 ^{37/64}	11 ^{45/64}	11 ^{9/64}	2 ^{43/64}	3 ^{3/16}	11

THREE LAMP BALLASTS

256-348-800	4' min. - 12' max.	-20	1.35	160	500	1, 3, 8	10 ^{37/64}	11 ^{45/64}	11 ^{9/64}	1 ^{3/4}	3 ^{3/16}	8
256-372-800	12' min. - 18' max.	-20	2.00	240	590	3, 8	10 ^{37/64}	11 ^{45/64}	11 ^{9/64}	2 ^{43/64}	3 ^{3/16}	12
256-396-800	10' min. - 24' max.	-20	2.70	325	720	1, 3, 8	13 ^{3/16}	14 ^{5/16}	13 ^{3/4}	2 ^{43/64}	3 ^{3/16}	14
256-3120-800	16' min. - 30' max.	-20	3.50	395	885	3, 8	15 ^{9/16}	16 ^{11/16}	16 ^{1/8}	2 ^{43/64}	3 ^{3/16}	16

FOUR LAMP BALLASTS

256-448-800	8' min. - 16' max.	-20	1.90	220	590	1, 4, 6, 9	10 ^{37/64}	11 ^{45/64}	11 ^{9/64}	2 ^{43/64}	3 ^{3/16}	12
256-464-800	10' min. - 22' max.	-20	2.40	285	680	1, 4, 6, 9	13 ^{3/16}	14 ^{5/16}	13 ^{3/4}	2 ^{43/64}	3 ^{3/16}	14
256-472-800	10' min. - 24' max.	-20	2.70	325	720	1, 4, 6, 9	13 ^{3/16}	14 ^{5/16}	13 ^{3/4}	2 ^{43/64}	3 ^{3/16}	14
256-484-800	16' min. - 28' max.	-20	3.50	420	950	4, 6, 9	15 ^{9/16}	16 ^{11/16}	16 ^{1/8}	2 ^{43/64}	3 ^{3/16}	16
256-496-800	16' min. - 32' max.	-20	3.50	420	950	4, 6, 9	15 ^{9/16}	16 ^{11/16}	16 ^{1/8}	2 ^{43/64}	3 ^{3/16}	16
256-4120-800	20' min. - 40' max.	-20	4.40	520	720	4, 6, 9	15 ^{9/16}	16 ^{11/16}	16 ^{1/8}	2 ^{43/64}	3 ^{3/16}	18

SIX LAMP BALLASTS

256-648-800	10' min. - 26' max.	-20	3.00	340	825	5, 7, 10	15 ^{9/16}	16 ^{11/16}	16 ^{1/8}	2 ^{43/64}	3 ^{3/16}	16
256-672-800	20' min. - 36' max.	-20	4.00	480	720	5, 7, 10	15 ^{9/16}	16 ^{11/16}	16 ^{1/8}	2 ^{43/64}	3 ^{3/16}	18
256-696-800	20' min. - 48' max.	-20	5.00	600	720	5, 7, 10	15 ^{9/16}	16 ^{11/16}	16 ^{1/8}	2 ^{43/64}	3 ^{3/16}	18

PLASTIC SIGN FLUORESCENT BALLASTS - HIGH OUTPUT 800mA RS LAMPS - 277 Volts - 60 Hz

FOUR LAMP BALLASTS

256-1588-800	20' min. - 32' max.	-20	1.70	440	900	4, 6, 9	15 ^{9/16}	16 ^{11/16}	16 ^{1/8}	2 ^{43/64}	3 ^{3/16}	16
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PLASTIC SIGN FLUORESCENT BALLASTS - HIGH OUTPUT 800mA RS LAMPS - 347 Volts - 60 Hz

FOUR LAMP BALLASTS

256-4472-600	10' min. - 24' max.	-20	0.85	316	800	6, 9, 16	15 ^{1/2}	16 ^{3/4}	16 ^{1/4}	2 ^{3/4}	3 ^{3/16}	16
256-4496-600	16' min. - 32' max.	-20	1.00	356	980	6, 9, 16	15 ^{1/2}	16 ^{3/4}	16 ^{1/4}	2 ^{3/4}	3 ^{3/16}	16

*0°F min. start temperature for 5' and 5'4" lamps.

MSB-3 BALLASTS

† 3 ballasts replace existing sign ballast inventory

† Cover most applications (1 to 6 lamps, 2 to 48 feet)

† Ideal for sign maintenance



Catalog Number	Total Lamp Footage	Start Temp (°F)	Max. Line Cur.	Max. Input Watts	Open Circuit Volt.	Wiring Diagram	Case Dimensions (Inches)					Weight (lbs.)
							Case Length	Overall Length	Mounting Length	Height	Width	
MSB - PLASTIC SIGN FLUORESCENT BALLASTS - HIGH OUTPUT 800mA RS LAMPS - 120 Volts - 60 Hz												
MSB-218-816	2' min. - 18' max.	-20	2.00	240	625	7,10,26,27,28,29	13 ³ / ₁₆	14 ⁵ / ₁₆	13 ³ / ₄	2 ⁴³ / ₆₄	3 ³ / ₁₆	15
MSB-1232-816	12' min. - 32' max.	-20	3.50	410	970	7,10,26,27,28,29	15 ⁹ / ₁₆	16 ¹¹ / ₁₆	16 ¹ / ₈	2 ⁴³ / ₆₄	3 ³ / ₁₆	16
MSB-1048-816	10' min. - 48' max.	-20	4.80	570	800	7,10,24,25,26,29	15 ⁹ / ₁₆	16 ¹¹ / ₁₆	16 ¹ / ₈	2 ⁴³ / ₆₄	3 ³ / ₁₆	18
MSB - PLASTIC SIGN FLUORESCENT BALLASTS - HIGH OUTPUT 800mA RS LAMPS - 277 Volts - 60 Hz												
277-1048-816	10' min. - 48' max.	-20	2.00	550	800	7,10,24,25,26,29	15 ⁹ / ₁₆	16 ¹¹ / ₁₆	16 ¹ / ₈	2 ⁴³ / ₆₄	3 ³ / ₁₆	19
MSB - PLASTIC SIGN FLUORESCENT BALLASTS - HIGH OUTPUT 800mA RS LAMPS - 347 Volts - 60 Hz												
347-1048-616	10' min. - 48' max.	-20	1.60	569	800	7,10,26,28,29	15 ⁹ / ₁₆	16 ¹¹ / ₁₆	16 ¹ / ₈	2 ⁴³ / ₆₄	3 ³ / ₁₆	19

HI-N-DRI® BALLASTS

† Support 1 to 6 lamps

† Lead exits at top of can

† Ideal for high-moisture environments

† UL Class P thermally protected, Type 2 Outdoor, HL



Catalog Number	Total Lamp Footage	Start Temp (°F)	Max. Line Cur.	Max. Input Watts	Open Circuit Volt.	Wiring Diagram	Case Dimensions (Inches)					Weight (lbs.)
							Case Length	Overall Length	Mounting Length	Height	Width	
HI-N-DRI® PLASTIC SIGN FLUORESCENT BALLASTS - HIGH OUTPUT 800mA RS LAMPS - 120 Volts - 60 Hz												
TWO LAMP BALLASTS												
258-272-800	4' min. - 12' max.	-20	1.35	—	500	1, 2	13 1⁄8	14 45⁄64	13 3⁄8	2 5⁄8	3 11⁄32	12
258-296-800	12' min. - 16' max.	-20	2.05	—	560	1, 2	13 1⁄8	14 45⁄64	13 3⁄8	2 5⁄8	3 11⁄32	12
THREE LAMP BALLASTS												
258-348-800	4' min. - 12' max.	-20	1.35	—	450	1, 3, 8	13 1⁄8	14 45⁄64	13 3⁄8	2 5⁄8	3 11⁄32	12
258-372-800	12' min. - 18' max.	-20	2.00	—	590	3, 8	13 1⁄8	14 45⁄64	13 3⁄8	2 5⁄8	3 11⁄32	13
258-396-800	10' min. - 24' max.	-20	2.70	—	720*	1, 3, 8	15 1⁄2	17 5⁄64	16 1⁄8	2 27⁄32	3 3⁄8	15
FOUR LAMP BALLASTS												
258-448-800	8' min. - 16' max.	-20	1.90	—	590	1, 4, 6, 9	13 1⁄8	14 45⁄64	13 3⁄8	2 5⁄8	3 11⁄32	13
258-464-800	10' min. - 22' max.	-20	2.50	300	650	16, 17, 23	13 1⁄8	17 1⁄16	16 3⁄16	2 27⁄32	3 3⁄8	16
258-472-800	10' min. - 24' max.	-20	2.70	—	720*	1, 4, 6, 9	15 1⁄2	17 5⁄16	16 1⁄8	2 5⁄8	3 11⁄32	15
258-484-800	16' min. - 28' max.	-20	3.10	370	750	16, 17, 23	15 1⁄2	17 5⁄64	16 1⁄8	2 27⁄32	3 3⁄8	16
258-496-800	16' min. - 32' max.	-20	3.50	—	920*	4, 6, 9	15 1⁄2	17 5⁄16	16 1⁄8	2 5⁄8	3 11⁄32	18
SIX LAMP BALLASTS												
258-648-800	10' min. - 25' max.	-20	3.00	340	825	17, 21, 22	15 1⁄2	17 5⁄64	16 1⁄8	2 27⁄32	3 3⁄8	16
258-672-800	24' min. - 36' max.	-20	4.30	480	1000	18, 19, 20	15 1⁄2	17 5⁄64	16 1⁄8	2 27⁄32	3 3⁄8	16
258-696-800	20' min. - 48' max.	-20	5.00	600	720	5, 7, 10	15 1⁄2	17 5⁄64	16 1⁄8	2 27⁄32	3 3⁄8	16

* Maximum volts above ground, any lead 590 volts.

For More Information, Call
1-800-BALLAST
(225-5278)



WIRING DIAGRAMS

Diagram Notes:

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

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

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

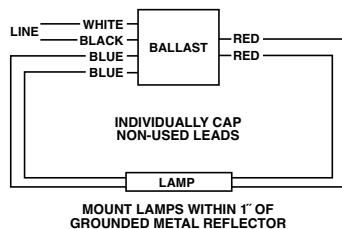


Diagram 1

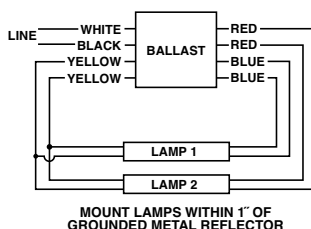


Diagram 2

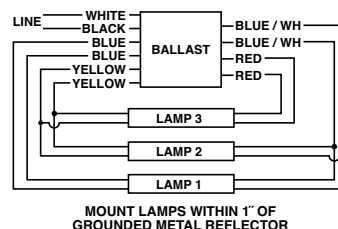


Diagram 3

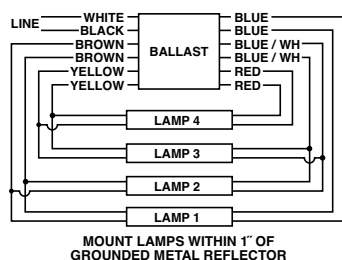


Diagram 4

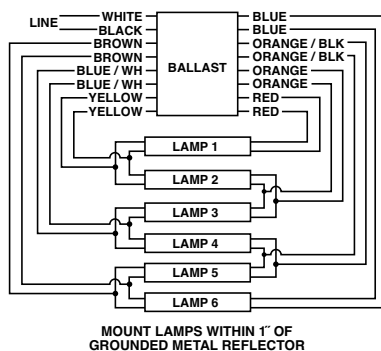


Diagram 5

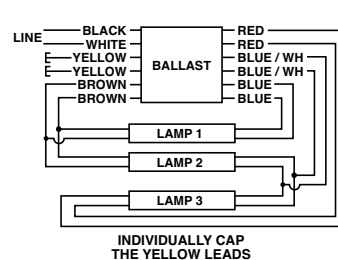


Diagram 6

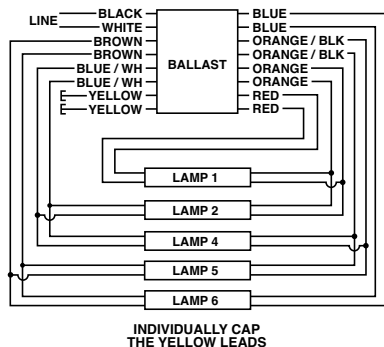


Diagram 7

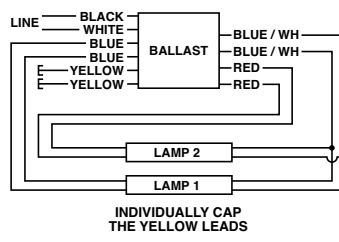


Diagram 8

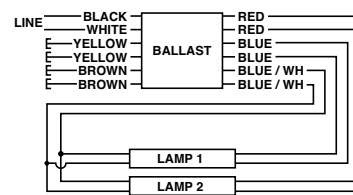


Diagram 9

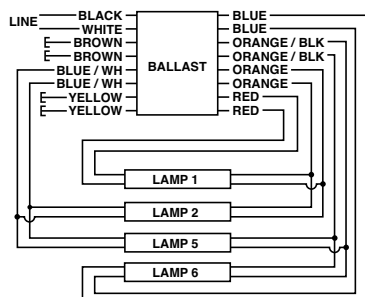


Diagram 10

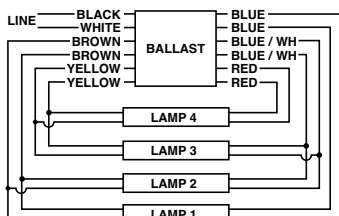


Diagram 16

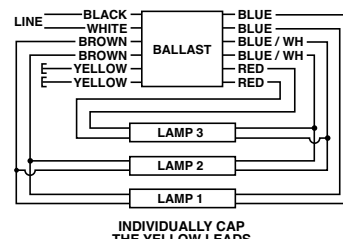


Diagram 17

WIRING DIAGRAMS

Diagram Notes:

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

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

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

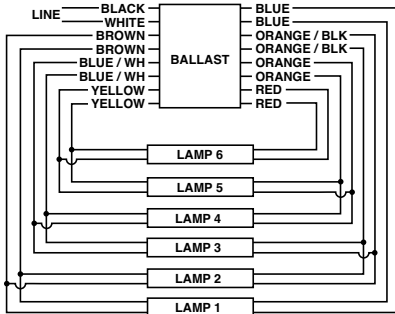


Diagram 18

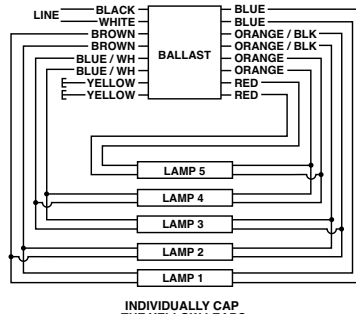
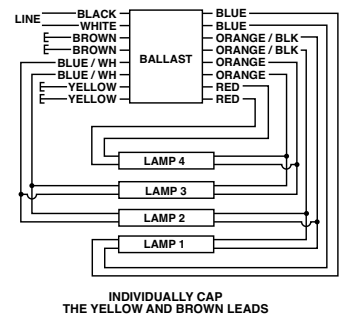
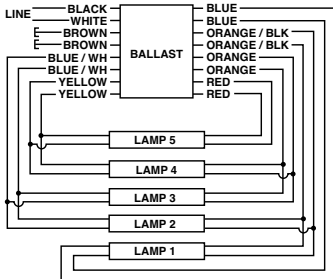


Diagram 19



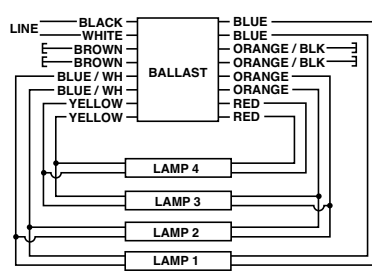
INDIVIDUALLY CAP
THE YELLOW AND BROWN LEADS

Diagram 20



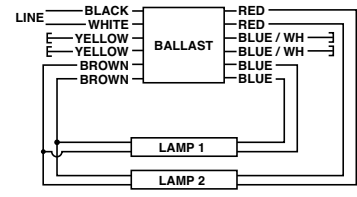
INDIVIDUALLY CAP
THE BROWN LEADS

Diagram 21



INDIVIDUALLY CAP
THE BROWN AND ORANGE/BLK LEADS

Diagram 22



MOUNT LAMPS WITHIN 1" OF
GROUNDED METAL REFLECTOR

Diagram 23

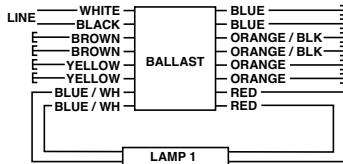


Diagram 24

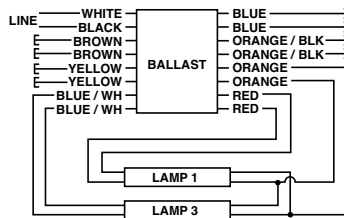


Diagram 25

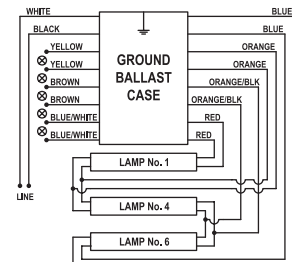


Diagram 26

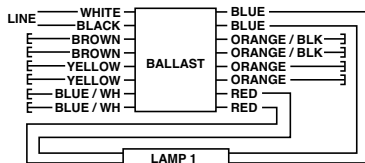


Diagram 27

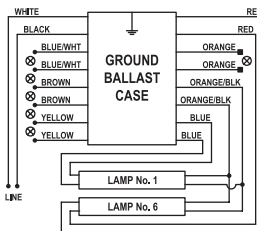


Diagram 28

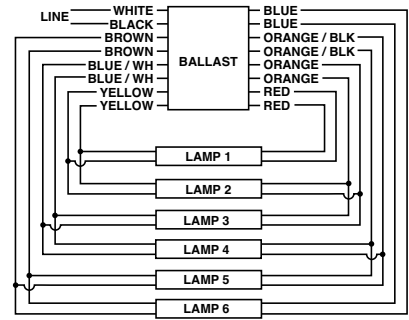


Diagram 29

For More Information, Call
1-800-BALLAST
(225-5278)



BALLAST SELECTION TABLE

PLASTIC SIGN FLUORESCENT BALLASTS																													
No. of Lamps Per Ballasts	TOTAL LAMP FOOTAGE REQUIRED																												
	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48					
1	256-148 *5 foot 4 inch maximum																												
2		256-248 *3 foot minimum																											
		256-272																											
						256-296																							
3		256-348																											
						256-372																							
					256-396																								
								256-3120																					
4				256-448																									
					256-464																								
					256-472																								
								256-484																					
								256-496																					
										256-4120																			
6					256-648																								
										256-672																			
										256-696																			

MSB-3 SIGN BALLASTS																								
No. of Lamps Per Ballasts	TOTAL LAMP FOOTAGE REQUIRED																							
	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48
1-6	MSB-218-816																							
						MSB-1232-816																		
					MSB-1048-816																			

ELECTRONIC SIGN BALLASTS																								
No. of Lamps Per Ballasts	TOTAL LAMP FOOTAGE REQUIRED																							
	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48
1-2	ESB216-12																							
1-4		ESB432-14																						
4-6				ESB848-46																				
1-4					ESB1040-14																			

LEAD LENGTHS

Catalog Number	Inches								
	White	Black	Blues	Reds	Yellows	Browns	Oranges	Orange Blacks	Blue Whites
ELECTRONIC SIGN BALLASTS - T12HO AND T8HO LAMPS - UNIVERSAL INPUT VOLTAGE									
ESB216-12	24	24	120	120					
ESB432-14	24	24	120	120					
ESB848-46	24	24	120	120					
ESB1040-14	24	24	120	120					
PLASTIC SIGN FLUORESCENT BALLASTS - HIGH OUTPUT 800mA RS LAMPS - 120 Volts - 60 Hz									
Single Lamp Ballast									
256-148-800	24	24	36	36					
Two Lamp Ballasts									
256-248-800	24	24	38	38	47				
256-272-800	24	24	38	38	48				
256-296-800	27	27	48	48	68				
Three Lamp Ballasts									
256-348-800	24	24	28	38	28				43
256-372-800	31	47	51	67	67				51
256-396-800	24	24	75	63	63				78
256-3120-800	24	24	96	80	84				96
Four Lamp Ballasts									
256-448-800	36	24	65	40	39	56			48
256-464-800	24	24	48	48	48	48			48
256-472-800	24	24	79	48	75	83			57
256-484-800	24	24	80	54	60	80			72
256-496-800	24	24	80	54	60	80			72
256-4120-800	24	24	80	80	72	72			54
Six Lamp Ballasts									
256-648-800	24	24	31	58	55	28	50	35	40
256-672-800	24	24	50	80	70	38	50	50	38
256-696-800	24	24	80	80	70	50	50	50	50
PLASTIC SIGN FLUORESCENT BALLASTS - HIGH OUTPUT 800mA RS LAMPS - 277 Volts - 60 Hz									
Four Lamp Ballasts									
256-1588-800	24	24	80	54	60	80			72
PLASTIC SIGN FLUORESCENT BALLASTS - HIGH OUTPUT 800mA RS LAMPS - 347 Volts - 60 Hz									
Four Lamp Ballasts									
256-4472-600	24	24	79	48	75	83			57
256-4496-600	24	24	80	54	60	80			72
MSB - PLASTIC SIGN FLUORESCENT BALLASTS - HIGH OUTPUT 800mA RS LAMPS - 120 Volts - 60 Hz									
MSB-218-816	24	24	60	60	60	60	60	60	60
MSB-1232-816	24	24	80	60	60	80	60	60	72
MSB-1048-816	24	24	80	80	70	50	60	60	50
MSB - PLASTIC SIGN FLUORESCENT BALLASTS - HIGH OUTPUT 800mA RS LAMPS - 277 Volts - 60 Hz									
277-1048-816	24	24	80	80	70	50	60	60	50
MSB - PLASTIC SIGN FLUORESCENT BALLASTS - HIGH OUTPUT 800mA RS LAMPS - 347 Volts - 60 Hz									
347-1048-616	24	24	80	80	70	50	60	60	50
HI-N-DRI® PLASTIC SIGN FLUORESCENT BALLASTS - HIGH OUTPUT 800mA RS LAMPS - 120 Volts - 60 Hz									
Two Lamp Ballasts									
258-272-800	24	24	38	38	48				
258-296-800	24	24	48	48	68				
Three Lamp Ballasts									
258-348-800	24	24	28	38	28				43
258-372-800	24	24	51	67	67				51
258-396-800	24	24	72	60	60				72
Four Lamp Ballasts									
258-448-800	24	24	65	40	40	56			48
258-464-800	24	24	58	58	60	60			58
258-472-800	24	24	72	60	60	72			70
258-484-800	24	24	81	55	59	79			73
258-496-800	24	24	80	54	60	80			72
Six Lamp Ballasts									
258-648-800	24	24	30	57	56	29			41
258-672-800	24	24	49	79	74	42			42
258-696-800	24	24	80	80	70	50			50

PLASTIC SIGN FLUORESCENT TROUBLESHOOTING

PROBLEM: LAMP FLICKER, LAMP OUTAGE

THE ELECTRIC SIGN AS A SYSTEM OF COMPONENTS

SYSTEM COMPONENT	POSSIBLE CAUSE	TEST	POSSIBLE SOLUTION
Supply Voltage	Poor electrical ground.	Insure that the fixture/sign is well grounded.	Improve ground bonding connections/circuit.
	Low supply voltage.	Measure input voltage and insure that it is within recommended range. Verify supply wiring is of proper gauge. Guard against excessively long runs of supply wiring.	• Adjust supply transformer loading or • Install buck-boost transformer.
Supply Wiring & Connections	Poor connections.	Visual inspection for broken, loose wiring.	Secure & insulate connections.
Lamp Wiring & Connections	Poor lamp connection.	Inspect lamps & sockets for proper fit & positioning.	Mechanical adjustments as required.
		Loose, broken, dirty, corroded sockets or lamp contacts.	Replace/correct sockets & contacts.
	Improper lamp wiring.	Compare lamp hook-up to ballast label.	Correct as necessary.
Lamps	Improper lamp filament heating.	Visual inspection for end blackening of lamps.	Perform electrical test.
	Defective lamp/ improper lamp type.	Replace lamp.	Replace lamp.
	Excessive lamp footage.	Compare to ballast rating.	Correct as necessary.
Installation & Environment	Cold ambient temperature.	Check ballast rating, lamp type.	• Correct ballast/lamp if necessary or • Reduce any drafts.
	Water.	Visual inspection.	Improve the physical installation as required to eliminate water intrusion.
	Overheating.	Visual inspection.	Insure ballast has the opportunity for heat transfer to minimize heat build-up.

CAUTION: Servicing of electric signs should only be performed by qualified personnel. Disconnect power before servicing. Observe OSHA guidelines for safe electrical practices.

ELECTRICAL TEST PROCEDURE:

- I. Remove all lamps and turn sign/fixture on.
- II. Test cathode heating at each lamp socket with a filament tester.
 - A. If filament tester illuminates, cathode heating is good. Try known good lamps.
 - B. If filament tester doesn't illuminate, cathode heating is incorrect at that socket.
 1. Note each failed socket.
 2. Open wiring channel, disconnect ballast leads from fixture circuit, and apply filament tester to ballast leads for each failed socket.
 - a. If filament tester illuminates, ballast is OK, problem is in leads/socket. Double check lamp wiring with that shown on ballast label.
 - b. If filament tester illuminates poorly (or not at all), ballast is defective, a lead is shorted, or a poor connection is present.
- III. After correcting (a) and/or (b), close the wiring channel and repeat test II.
 - A. If no problem is indicated in the filament retest, relamp with known good lamps.
 - B. If known good lamps still do not operate, replace ballast.

TECHNICAL AND APPLICATION DATA

Heat

Ballasts generate heat during normal operation. By design, fluorescent ballasts should operate so that their maximum hot-spot case temperature does not exceed 90°C (194°F). Operating at higher temperatures will shorten ballast life. The temperature the ballast reaches depends on the temperature of the area surrounding it—plus the heat-conducting surface touching the ballast. Ballasts should be installed in a manner that avoids future overheating. To maintain normal ballast temperature, you should:

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

Moisture Protection

1. Vent the sign as well as possible without allowing water to enter.
2. Ballasts should be mounted horizontally (except for weatherproof types). If the ballast must be mounted vertically, allow room for sufficient air circulation. Certain codes and standards may require lead wire protection on the leads as they exit the sign ballast. For these applications, a tee-pee cover can be used to protect the wires from mechanical damage. These tee-pee covers are available through electrical suppliers.

Grounding

The white lead of a 120-volt ballast must be connected to the neutral or ground side of the power supply. All metal parts of the sign, as well as the ballast case, must be grounded either through the conduit which holds the power supply or by direct connection with a grounding wire. An ungrounded sign is a

potential hazard—and it can give misleading symptoms when looking for sign faults.

Proper Lamp Life and Starting

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

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

Flashing

Rapid-start lamps may be flashed without reduction in lamp life by using ballasts which are specifically designed for this operation. These ballasts are designed with slightly higher filament voltages than the conventional ballast to ensure satisfactory lamp life. Instant-start lamps cannot be flashed. CAUTION: Use only one flasher contact per ballast.

Light Output vs. Temperature

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

Lamp Starting Problems

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

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

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

Short Lamp Life

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

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

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

HID F-CAN BALLASTS

† Support 35 to 400 watt lamps

† Metal halide and pulse start metal halide units provide bright-white light and excellent color

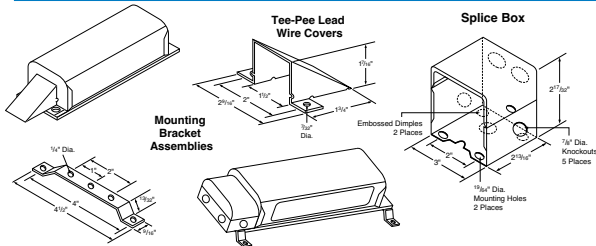
† High-pressure sodium ballasts are efficient and cost-effective

† Color-coded leads reduce miswiring

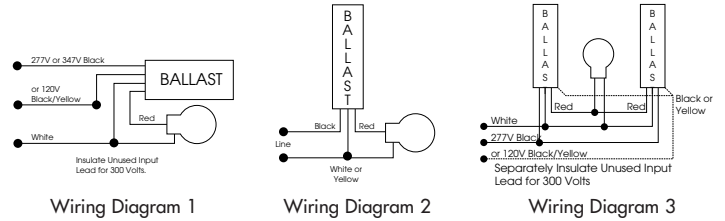
† UL listed and CSA certified



ACCESSORIES



WIRING



Input Volts	Catalog Number	Circuit Type	Input Watts	Max Input Current	NOM Open Circuit Voltage	Fuse Rating	Wiring Diagram	Overall Dimensions			Case Length	Mounting Dimensions			Total Weight (lbs)	Max Distance to Lamp (ft)	Sound Rating
								Length	Width	Height		Length	Width	Hole			
(1) 175 WATT METAL HALIDE																	
120 or 277	1110-245-SC-TC	CWA	205	1.75 0.75	300	5 3	1	14.30	3.15	2.60	13.15	13.75	2.00	0.20	14.0	*	B
120 or 347	1110-564-C-TC	CWA	205	1.75 0.62	300	5 2	1	11.75	3.15	2.60	10.55	11.10	2.00	0.20	14.0	*	B
(1) 250 WATT M58 METAL HALIDE																	
120 or 277	1110-246C-TC¹	CWA	295	2.50 1.10	280	8 4	1	16.65	3.15	2.60	15.55	16.10	2.00	0.20	17.5	*	C
120 or 277	1111-246C-TC²	CWA	300	2.50 1.10	300	8 4	3	11.75	3.15	2.60	10.55	11.10	2.00	0.20	11.0	*	B
120 or 347	1110-566C-TC	CWA	295	2.50 0.95	285	8 3	1	16.65	3.15	2.60	15.55	16.10	2.00	0.20	17.5	*	C
(1) 400 WATT M59 METAL HALIDE																	
120 or 277	1110-247SC-TC	CWA	460	3.90 1.70	300	10 5	1	19.25	3.15	2.60	18.05	18.60	2.00	0.20	23.0	*	C
120 or 277	1111-247SC-TC¹	CWA	460	3.90 1.70	300	10 5	3	14.30	3.15	2.60	13.15	13.75	2.00	0.20	14.0	*	B
120 or 347	1110-568C-TC	CWA	460	3.90 1.30	300	10 5	1	19.25	3.15	2.60	18.05 1.40	18.60	2.00 4	0.20	23.0	*	C
(1) 35 WATT S76 HIGH PRESSURE SODIUM LAMP (WITH BUILT-IN IGNITOR)																	
120 or 277	12210-261C-TC	HX-HPF	55	0.80 0.35	120	5 2	1	11.75	3.15	2.60	10.55	11.10	2.00	0.20	9.0	10	B
(1) 50 WATT S68 HIGH PRESSURE SODIUM LAMP (WITH BUILT-IN IGNITOR)																	
120 or 277	12210-236C-TC	HX-HPF	75	1.40 0.60	120	5 2	1	11.75	3.15	2.60	10.55	11.10	2.00	0.20	9.0	10	B
(1) 70 WATT S62 HIGH PRESSURE SODIUM LAMP (WITH BUILT-IN IGNITOR)																	
120 or 277	12210-237C-TC	HX-HPF	97	1.60 0.70	140	5 2	1	11.75	3.15	2.60	10.55	11.10	2.00	0.20	9.2	10	B
120 or 277	12210-552C-TC	HX-HPF	109	1.69 0.63	145	5 2	1	11.75	3.15	2.60	10.55	11.10	2.00	0.20	9.0	10	B
(1) 100 WATT S54 HIGH PRESSURE SODIUM LAMP (WITH BUILT-IN IGNITOR)																	
120 or 277	12210-239C-TC	HX-HPF	125	2.10 1.00	130	6 3	1	11.75	3.15	2.60	10.55	11.10	2.00	0.20	10.4	10	B
120 or 277	12210-606C-TC	HX-HPF	165	2.10 0.90	165	6 3	1	11.75	3.15	2.60	10.55	11.10	2.00	0.20	10.4	10	B
(1) 150 WATT S55 HIGH PRESSURE SODIUM LAMP (WITH BUILT-IN IGNITOR)																	
120 or 277	12210-241C-TC	HX-HPF	185	2.80 1.20	120	8 4	1	14.30	3.15	2.60	13.15	13.75	2.00	0.20	14.1	10	B
120 or 347	12210-602C-TC	HX-HPF	185	2.80 1.03	120	8 3	1	14.30	3.15	2.60	13.15	13.75	2.00	0.20	14.1	10	B

1—This ballast can be used with a MH200 Ignitor to operate (1) 250 Watt M103 lamp. Contact Universal Lighting for instructions.

2—Two of these ballasts are required to operate the lamp. Electrical Data is shown for two ballasts with the exception of Sound Rating, which is listed for each ballast.

* Refer to Page 24

HID CORE AND COIL REPLACEMENT KITS

† High Pressure Sodium, Metal Halide, and Pulse Start Metal Halide Ballasts

† Include, adjustable brackets, capacitor and starter if required

† Wide Range of Lamp Wattages

† Color coded leads reduce miswiring

† Multi-5 Options Available (120/208/240/277/480V) from one ballast



Lamp Type	Lamp Watts	ANSI Code	Input Volts	Catalog Number	Circuit Type	Input Power (Watts)	Max. Input Current
High Pressure Sodium	150 W	S55	120/208/240/277	S150MLTLC3M500K	HX-HPF	190	3.00/1.70/1.50/1.30
	200 W	S66	120/208/240/277	S200MLTAC4M500K	CWA	230	2.10/1.20/1.00/0.88
	250 W	S50	120/208/240/277/480	S250ML5AC4M500K	CWA	300	2.55/1.45/1.30/1.10/0.65
	400 W	S51	120/208/240/277/480	S400ML5AC4M500K	CWA	465	4.00/2.30/2.00/1.70/1.10
	400 W	S51	120/208/240/277/480	S400ML5AC5M500K	CWA	468	4.40/2.62/2.21/1.90/1.05
	1000 W	S52	120/208/240/277/480	S1000ML5AC5M500K	CWA	1048	9.10/5.40/4.60/4.10/2.45
Metal Halide	175 W	M57, H39, or M107	120/208/240/277/480	M175ML5AC3M500K	CWA	208/210	1.90/1.10/0.95/0.85/0.50
	250 W	M58	120/208/277/480	M250ML5AC3M500K	CWA	280	2.50/1.50/1.25/1.10/0.65
	250 W	M58	120/208/240/277/480	M250ML5AC4M500K	CWA	282	2.42/1.40/1.20/1.00/0.60
	400 W	M59	120/208/240/277/480	M400ML5AC4M500K	CWA	458	4.00/2.30/2.00/1.70/1.00
	1000 W	M47	120/208/240/277/480	M1000ML5AC5M500K	CWA	1060	8.80/5.20/4.40/3.90/2.30
	1500 W	M48	120/208/240/277	M1500MLTAC5M500K	CWA	1610	14.00/8.00/7.00/6.00
Pulse Start Metal Halide	175 W	M137 or M152	120/208/240/277/480	P175ML5AC3M500K	CWA	285	1.80/1.10/0.90/0.78/0.45
	200 W	M136	120/208/240/277/480	P200ML5AC3M500K	CWA	233	2.66/1.52/1.31/1.12/0.68
	250 W	M138 or M153	120/208/240/277/480	P250ML5AC4M500K	CWA	285	2.45/1.42/1.22/1.05/0.62
	320 W	M132 or M154	120/208/240/277/480	P320ML5AC4M500K	CWA	405	4.00/2.40/2.10/1.85/1.06
	350 W	M131	120/208/240/277/480	P350ML5AC4M500K	CWA	405	4.22/2.49/2.16/1.87/1.09
	400 W	M135 or M155	120/208/240/277/480	P400ML5AC4M500K	CWA	458	4.00/2.40/2.10/1.85/1.06
	450 W	M144	120/208/240/277/480	P450ML5AC4M500K	CWA	510	4.44/2.56/2.38/1.92/1.22
	750 W	M149	120/208/240/277/480	P750ML5AC5M500K	CWA	820	6.95/4.00/3.50/3.00/1.75
	1000 W	M141	120/208/240/277	P1000MLTAC5M500K	CWA	1070	8.80/5.10/4.50/4.10

Universal offers a wide variety of ballasts for all lighting applications. See our website for complete details.

HID TROUBLESHOOTING

PROBLEM: LAMP DOES NOT LIGHT

SYSTEM COMPONENT	POSSIBLE CAUSE	TEST	POSSIBLE SOLUTION
Supply voltage	No line voltage. Low line voltage.	Measure input voltage at ballast with multimeter.	No voltage: Inspect wiring. Check any in-line fuses or other devices such as photocells, auto-shutoff starters or sensors. Low voltage: Reduce the load on the line voltage supply transformer. Install buck-boost transformer.
Secondary wiring and connections	Incorrect ballast, lamp, capacitor and/or starter combination. Loose connections.	Verify correct components using information on ballast label.	Replace incorrect components.
Lamp	Failed lamp.	Test with known good lamp.	Replace lamp.
Capacitor	Failed capacitor.	Test capacitor with multimeter.	Replace capacitor.
Starter	Failed starter.	Test starter with multimeter.	Replace starter.
Ballast	Ballast and starter mounted too far from lamp. Defective ballast.	Visual inspection. Test with multimeter.	• Correct to proper distance or install a long distance starter or • Replace ballast.

PROBLEM: SHORT LAMP LIFE

Lamp	Lamp not compatible with system. Lamp operating position incorrect. Failed lamp.	Verify lamp wattage and type. Check lamp for suitability. Test with known good lamp.	Replace lamp with properly rated lamp.
Capacitor	Failed capacitor.	Test capacitor with multimeter.	Replace capacitor.
Starter	Failed starter.	Test starter with multimeter.	Replace starter.
Ballast	Failed ballast.	Test ballast with multimeter.	Replace ballast.

PROBLEM: LOW LIGHT OUTPUT

Lamp	Normal light output depreciation.	Test with known good lamp.	Replace lamp.
Component compatibility	Incorrect ballast, lamp, capacitor and/or starter combination.	Verify correct components using information on ballast label.	Replace incorrect components.
Supply voltage	Low line voltage.	Measure input voltage at ballast with multimeter.	• Reduce the load on the line voltage supply transformer or • Install buck-boost transformer.
Capacitor	Failed capacitor.	Test capacitor with multimeter.	Replace capacitor.
Ballast	Failed ballast.	Test starter with multimeter.	Replace ballast.

PROBLEM: LAMP CYCLING ON AND OFF

Lamp	Lamps reaching normal end of life.	Test with known good lamp.	Replace lamp.
Socket	Damaged socket.	Visual inspection for cracks etc.	Replace socket.

CAUTION: Servicing of electric signs should only be performed by qualified personnel. Disconnect power before servicing. Observe OSHA guidelines for safe electrical practices.

STANDARD ELECTRONIC BALLASTS

† Products for T8 & T12 Lamps

† Universal input voltage available

† Light weight, low profile cases

† UL and CSA Listed

† T8 parallel lamp operation

† UL Type 1 outdoor



T8 & T12 ELECTRONIC BALLAST

Lamps	Catalog Number	Total Lamp Footage	Start Temp (°F)	Input Volts	Max Input Watts	Max Line Current	Wiring Diagram	Dimens. Chart Ref.	Weight
T12 - 120V									
(1) F40T12	B134R120M-A	4' only	60/50	120	36	0.36	2	-A	1.7
(2) F40T12	B234SR120M-A	8' only	60/50	120	71	0.63	30	-A	1.7
T8 - 120V									
(1) F32T8	B132I120RH-A	2' min. - 4' max.	0	120	31	0.26	1	-A	1.7
(2) F32T8	B232I120RH-A	4' min. - 8' max.	0	120	58	0.49	3	-A	1.7
(3) F32T8	B332I120RH-A	6' min. - 12' max.	0	120	86	0.75	6	-A	1.7
(4) F32T8	B432I120RH-A	8' min. - 32' max.	0	120	112	0.93	7a	-A	1.7
T8 - UNIVERSAL INPUT									
(1) F32T8	B132IUNVHP-B	2' min. - 4' max.	0	120	31	0.26	1	-B	1.7
				277	31	0.12	1	-B	1.7
(2) F32T8	B232IUNVHP-B	4' min. - 8' max.	0	120	59	0.5	3	-B	1.7
				277	58	0.21	3	-B	1.7
(3) F32T8	B332IUNVHP-A	6' min. - 12' max.	0	120	86	0.7	6	-A	1.7
				277	84	0.31	6	-A	1.7
(4) F32T8	B432IUNVHP-A	8' min. - 32' max.	0	120	112	0.93	7a	-A	1.7
				277	109	0.4	7a	-A	1.7

Overall Dimensions			Mounting Dimensions		
Draw #	L	W	H	M	X
-A	9.50"	1.70"	1.18"	8.89"	1.69"
-B	9.50"	1.50"	1.00"	8.89"	0.88"

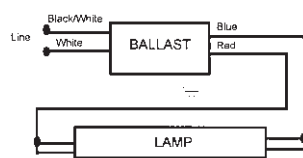
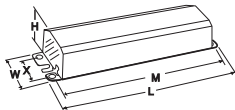


Diagram 1

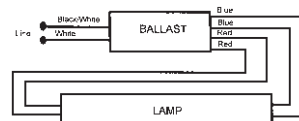


Diagram 2

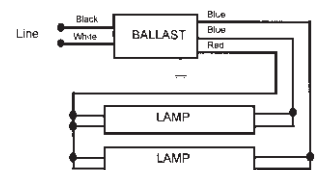


Diagram 3

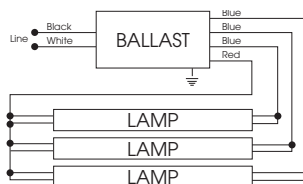


Diagram 6

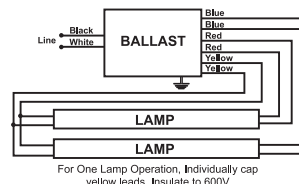


Diagram 30

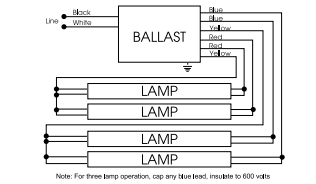


Diagram 7a

STANDARD ELECTRONIC BALLASTS

† Products for T5HO, T8HO & T12HO

† UL and CSA Listed

† Universal input voltage available

† UL Type 1 Outdoor

† Light weight, low profile cases

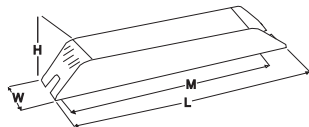


T12HO, T8HO, T5HO ELECTRONIC BALLASTS

Lamps	Catalog Number	Total Lamp Footage	Start Temp (°F)	Input Volts	Max Input Watts	Max Line Current	Wiring Diagram	Dimens. Chart Ref.	Weight
T12HO - 120V & UNIVERSAL INPUT									
(2) F96T12HO	B295SR120HP	12' min. - 16' max	-20°	120	185	1.6	4	SL	4
(2) F96T12HO	B295SRUNVHP	12' min. - 16' max	-20°	120	208	1.77	4	SL	4
				277	206	0.76			
T8HO - 120V									
(1 OR 2) F96T8HO	B286I120RH	4' min. - 16' max.	-20°	120	151	1.3	3	SL	4
T8HO - 277V									
(1 OR 2) F96T8HO	B286I277RH	4' min. - 16' max.	-20°	277	144	0.53	3	SL	4
T5HO - UNIVERSAL INPUT									
(1 OR 2) F24T5HO	B224PUNV-C	1.83' min. - 3.67' max.	0°	120	53	0.45	37	-C	1
				277	52	0.19			
(1 OR 2) F39T5HO	B239PUNV-D	2.78' min. - 5.57' max.	0°	120	89	0.75	37	-D	1.25
				277	88	0.32			
(1 OR 2) F54T5HO	B254PUNV-D	3.76' min. - 7.53' max.	0°	120	120	1.03	37	-D	1.25
				277	117	0.43			
(3 OR 4) F54T5HO	B454PUNV-E	3.76' min. - 15.04' max.	0°	120	240	2.01	44	-D	2.5
				277	234	0.86			

Universal offers a wide variety of ballasts for all lighting applications. See our website for complete details.

Overall Dimensions				Mounting Dimensions	
Draw #	L	W	H	M	X
-C	14.25"	1.18"	1.0"	13.75"	-
-D	16.88"	1.18"	1.0"	16.20"	-
-E	16.88"	1.74"	1.18"	16.20"	-



Overall Dimensions				Mounting Dimensions	
Draw #	L	W	H	M	X
SL	11.75"	3.13"	1.78"	11.14"	2.0"

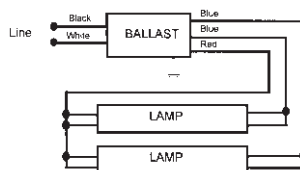
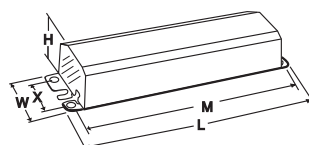


Diagram 3

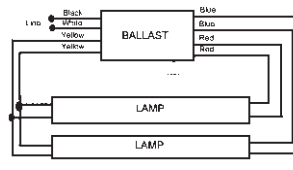


Diagram 4

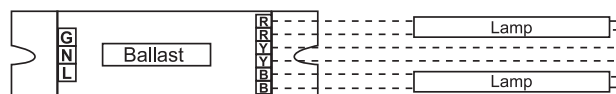
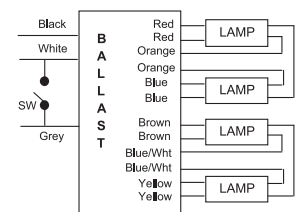


Diagram 37

FOR ONE LAMP OPERATION, CAP YELLOW LEADS INDIVIDUALLY



SW	
Closed	4 Lamps
Open	2 Lamps

Diagram 44

For More Information, Call
1-800-BALLAST
(225-5278)





It's Easy To Reach Us...



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



General information: 1-615-316-5100
Technical Engineering Services: 1-800-BALLAST



Web site: www.unvlt.com
E-mail: webmaster@unvlt.com

Lit #SIP0609

All specification information is subject to change without notification.