# Electromagnetic Fluorescent Ballasts

## A Wide Product Line To Meet All Your Needs

Our comprehensive line of magnetic ballasts offer outstanding performance and value. These energy-efficient ballasts carry the trusted UNIVERSAL® brand and are available for a wide variety of applications.

Universal Lighting Technologies' ("Universal") full spectrum of solutions includes ballasts for T12/T10/T8 applications, plus Slimline, Circline, trigger-start and preheat ballasts. We also make rugged weatherproof ballasts ... and models specifically engineered for the fast growing export market.

*Our comprehensive line of energy-efficient magnetic ballasts carry the trusted UNIVERSAL® brand name.*



*Universal Lighting Technologies is a subsidiary of Panasonic Electric Works Co., Ltd., a member of the Panasonic Group*

Panasonic

Universal™ Lighting Technologies

# Product Overview

**Rapid Start Ballasts**
These ballasts provide smooth starting to Rapid Start lamps — reaching full brightness in about two seconds without the use of starters. They have built-in filament windings that energize the low-voltage cathodes in Rapid Start lamps. Because electrodes are continuously heated, less voltage is required to strike an arc through a Rapid Start lamp than a Slimline one.

Rapid Start Ballasts

**Ballasts for T12/T10 Applications**
Universal offers a wide variety of T12 and T10 ballasts to operate 1 - 3 Rapid Start lamps. This lamp/ballast system provides smooth, virtually instant starting without the use of starters (30- and 40-watt T12 models and 40-watt T10 models are available). Models for U-lamp applications are also available. UNIVERSAL® PLUS models are available for use where maximum efficiency is required. These "hybrid" type ballasts in corporate an electronic switch which disconnects power to the lamp cathodes after start-up, saving additional energy.

T12/T10 Applications

**Ballasts for T8 Applications**
Universal's T8 product offering includes models for F17, F25, F32 and F40 type T8 lamps. This product line features our OcTek™ electromagnetic ballast models. These models are low initial cost energy efficient options for use with F32T8, 4 foot Rapid Start lamps. These models are available in several variations, including full, medium, low light output and hybrid versions (OcTek™ Plus). These models maximize energy savings and provide effective choices when retrofitting 4-foot T12 fixtures.

T8 Applications

**Slimline Ballasts**
Our Slimline models are designed for use with single-pin Slimline lamps. They do not require the use of starters. These ballasts deliver a high starting voltage to the lamps, enabling an arc to strike through the tube without preheating the lamp cathodes (which are specially constructed to withstand the shock).

Slimline Ballasts

# Product Overview

**Circline Ballasts**
These products are available in 430 mA Rapid Start and preheat types, designed for use with Circline lamps. The operating characteristics are the same for both Circline and conventional lamps. All Circline socket wires are fully sleeved.

**Trigger-Start Ballasts**
These ballasts are designed for use with general fluorescent lamps and do not require the use of starters. They contain preheat windings which allow regular lamp filaments to be heated in one second. However, they require a higher open-circuit voltage than Rapid Start ballasts.

**Preheat Ballasts**
These units are designed for use with general fluorescent lamps and require the use of starters. These ballasts deliver an open-circuit voltage high enough to activate the starter to preheat lamp filaments to a temperature approximately 1750° F. After a few seconds, the starter opens the filament circuit. This provides an additional power surge to enable an electric arc to strike through the lamp and ignite it. Lamp current is then limited by the ballast to an operating level proper for the lamp.

Preheat Ballast

**Export (50/60 Hz) Ballasts**
Our export product offering consists of a variety of one- and two-lamp models for Rapid Start, Preheat, High Output, Slimline, and 1500 mA lamps. Included in this product line are ballasts for 50 and 60 Hz applications, including 120, 127 and 220 volts. Many of these models are available with resetting thermal protection.

Export (50/60 HZ) Ballast

## SAFETY

**NEC & UL Requirements**

Ballast installation presents the possibility of exposure to potentially hazardous voltages and should be performed only by qualified personnel. All installation, inspection and maintenance should be performed only with power to the fixture turned off. Additionally, all fixtures and ballasts must be installed and operated in compliance with the National Electrical Code, Underwriters Laboratories Inc. (UL) requirements and all applicable codes and regulations.

**Polarity**

Polarity refers to the proper connection of ballast lead wires to line wires. To aid you in making a correct installation, Universal ballast leads are color-coded for easy identification. The WHITE ballast lead is to be connected to the neutral (grounded) and the BLACK (or black with white tracer) lead always to the phase ("hot") line wire. Systems where neither of the line wires are at ground potential require specially designed ballasts. A change in polarity may result in the voltage from the lead to the ground exceeding UL-specified limits. In some types of ballasts, a change in polarity may decrease voltage from the lead to the ground, thereby impeding the starting dependability of the ballast.

**Grounding**

Ballast cases and fixtures must always be grounded. The ballast case may be grounded to the fixture or otherwise grounded. It could be hazardous to make contact with an ungrounded fixture or ballast when in operation. Neglecting to properly ground the ballast and fixture combination may also result in failure of certain lamps to start or for unacceptable levels of electromagnetic noise to be conducted onto the power lines.

Operating Line Voltage Limits

To receive the full benefits of rated lamp output and to prolong ballast life, it is essential that voltage supplied to an installation be maintained within limits prescribed for each circuit. These limits are listed below:

Subjecting a ballast to excessive voltage for an extended period of time results in the deterioration of the insulation. This insulation breakdown will cause early ballast failure. Low voltage has no damaging effect on the ballast. However, lamps may not start reliably, and early lamp failure could result.

**Internal Ballast Protection**

Class P Classification - Since January 1, 1984, the National Electrical Code requires that "where Fluorescent fixtures are installed indoors, the ballast shall have thermal protection integral within the ballast except for simple reactance ballasts." This ruling applies to replacement ballasts as well as to those contained within new light fixtures.

In compliance with the National Electrical Code, UL has established a Class P ballast classification for fluorescent light fixtures indoors.

A Class P ballast must employ internal thermal protection limiting its operating temperature.

Universal UL-approved Class P ballasts comply with the National Electrical Code requirement and are equipped with an automatic resetting thermal protector, built-in and adjacent to the transformer coils. The resetting thermal protector functions as a thermostat which will open and temporarily deactivate the ballast when it exceeds the permissible temperature. It will reset when the ballast cools to a safe operating temperature. The ballast will continue to cycle until the cause of overheating is eliminated. If the ballast is defective, it must be replaced. If the cause is external, a Class P ballast will resume normal operation after abnormal conditions are eliminated.

**Fusing**

Class P ballasts do not require fusing. Fusing can be used when a single circuit has a large number of fixtures/ballasts. For a comprehensive list of appropriate fuses, contact our Technical Engineering Services (TES) Department at 1-800-BALLAST or check out our TES home page at www.unvlt.com

| Nominal Voltage | VOLTAGE RANGE | |
|---|---|---|
| | Minimum | Maximum |
| 120 | 110 | 125 |
| 220 | 205 | 232 |
| 240 | 220 | 250 |
| 277 | 255 | 290 |
| 347 | 315 | 364 |
| 480 | 450 | 505 |
| 600 | 570 | 630 |

## PERFORMANCE

**Lamp Connections**
Electromagnetic fluorescent ballasts are designed to generate voltages in excess of 300 volts. It is imperative that proper connection to good quality sockets be assured in accordance with wiring diagrams on each page of the catalog and on product labels. Some applications may not require the use of all of the ballasts output leads. If any leads are not to be connected, each should be individually capped and insulated to at least 600 volts.

**Application Versatility**
Many models are designed to allow for applications with different types or quantities of lamps. Use of products other than noted is not covered by UL Listing and/or CSA certification and cannot be warranted.

**Audible Noise (Sound)**
Electrical equipment, including most fluorescent lamp ballasts, produces some noise. Care must be taken to select a ballast with the proper sound rating for a particular lighting installation. Ballast sound will be noticeable only when it exceeds the ambient sound level.
Although no industry standards currently exist, the generally accepted criteria for sound rating specifications are as follows:

| Location | Average Ambient Noise | Ballast Recommendation |
|---|---|---|
| Typical Office | < 30 decibels | A |
| Noisy Office or Retail | 31-36 decibels | B |
| Factory, Outdoor | > 36 decibels | C |

**Remote Mounting**
Excessive hot or cold temperatures, audible noise requirements or a desire to operate lamps in more than one fixture with the same ballast (master/slave), may make it desirable to mount the ballast remotely. Care must be taken to allow for ballast heat dissipation and proper grounding.
In any application, the wire used to extend leads must be at least as large as the wire supplied on the ballast (18 AWG) with an insulation rating of 1000 VAC at 90°C.
Lead lengths in excess of those noted cause loading effects that can dramatically impact ballast performance and void the warranty.

**Electromagnetic and hybrid ballasts** may be remote mounted according to the table below:

| Wire Size | 30-40 Watt Rapid Start | | 800 mA - HO 1500 mA - VHO | | Instant Start (Slimline) |
|---|---|---|---|---|---|
| | Red/Blue Leads | Yellow Leads | Red/Blue Leads | Yellow Leads | All Leads |
| #6 | 544’ | 384’ | 272’ | 192’ | 544’ |
| #8 | 340’ | 240’ | 170’ | 120’ | 340’ |
| #10 | 214’ | 150’ | 107’ | 75’ | 214’ |
| #12 | 134’ | 94’ | 67’ | 47’ | 134’ |
| #14 | 84’ | 60’ | 42’ | 30’ | 84’ |
| #16 | 52’ | 36’ | 26’ | 18’ | 52’ |
| #18 | 30’ | 20’ | 21’ | 15’ | 30’ |

## PERFORMANCE

**Operating Temperature**
Most fluorescent ballasts and lamps are designed to provide optimum performance at ambient temperature of 77˚F. Three key performance attributes can be impacted by the ambient (room) temperature of the installation:

- **Lamp Starting Dependability**
  Fluorescent lamps are inherently more difficult to start at low temperatures. All ballasts have limitations as to their ability to start lamps at low ambient temperatures. In this catalog, the low starting point for each lamp/ballast combination appears in the column marked “Minimum Starting Temperature.”

- **Light Output**
  Optimum light output from fluorescent lamps is achieved when the lamp wall is at 100-110°F. Any substantial excursion (either colder or warmer) will result in a reduction in light output.

- **Ballast Life**
  A fluorescent lamp ballast, like any other electrical device, generates heat during its normal operation. Ballast temperatures should be kept as low as possible. Maximum dissipation of heat through fixture design and proper ballast installation will help. Although excessive temperature may not cause the ballast to fail immediately, it can dramatically shorten ballast life. To assure maximum life, the ballast case temperature should not exceed 90˚C.

  **CAUSES OF BALLAST OVERHEATING:**
  - Incorrect primary voltage or frequency
  - Incorrect size, type or number of lamps
  - Failed lamp starter
  - Incorrect wiring
  - Poor heat dissipation due to surrounding insulation
  - Sealed (Vapor Tight) Fixtures - Unusual heat build-up due to lack of ventilation in fixtures may cause thermal (on/off) cycling of certain ballasts. Consult Universal for specific recommendations.

**RECOMMENDATIONS...**
- Selection of a proper ballast to match the requirements of the lamp, fixture, voltage and installation.
- Mounting of ballast within the fixture with as much surface contact as possible between the ballast and metal portions of the fixture.
- The use of heat-conducting dissipators (radiators), if necessary, which increase surface contact between the ballast and fixture.
- If necessary, locate the ballast in a remote, cooler area outside the fixture.
- Planned lamp maintenance – the organized replacement of failed and failing lamps, particularly with Preheat or Slimline Systems.
- Use of special LOW HEAT (-LH) rise, VERY LOW HEAT (-VLH) rise and SUPER LOW HEAT (-SLH) rise ballasts where available and necessary.

## LOW-LEAKAGE CURRENT TO GROUND BALLASTS

Many one- and two-lamp, 30- and 40-watt high power Rapid Start ballasts – and two- and three-lamp 20-watt Trigger Start ballasts – meet requirements for "low-leakage-current-to-ground." Those most frequently used in low-leakage applications are listed below.

| Lamps | Line Voltage @ 60Hz | Maximum Leakage To Ground | Catalog Number |
|---|---|---|---|
| (1)F40T12/RS | 120 | 30uA | 412-L-SLH-TC-P |
| (2)F40T12/RS | 120 | 30uA | 446-L-SLH-TC-P |
| (1)F40T12/RS | 277 | 50uA | 458-L-SLH-TC-P |
| (2)F40T12/RS | 277 | 50uA | 443-L-SLH-TC-P |
| (2)F20T12 | 120 | 15uA | 447-LR-VLH-TC-P |

Other ballasts can also be manufactured to meet low-leakage requirements. Consult Universal's Technical Engineering Services Department at 1-800-BALLAST for complete information regarding low-leakage ballasts.

## TYPE 1 BALLASTS

All Universal outdoor non-weatherproof magnetic ballasts (except those for sign applications) are designed to meet UL requirements for Type 1 use (metal enclosure required for wet or damp locations).

## BALLASTS FOR GERMICIDAL LAMPS

Universal manufactures ballasts to operate germicidal lamps. When ordering, make sure the ANSI designation of the germicidal lamp matches exactly with the ballast's recommended application.
Several typically encountered germicidal lamps are listed below along with the proper Universal ballast for their operation.

Contact Universal's Technical Engineering Services at

**1-800-BALLAST**

for additional information or applications not listed

| Germicidal Lamp | Universal Ballast | See Page Number |
|---|---|---|
| (1)G15T8 | 200-H2 | 1-46 – 1-48 |
| | | |
| | | |

**All high power factor ballasts are equipped with capacitors. Oil-filled capacitors contain non-resetting internal protection and are manufactured without PCBs.**

## TYPICAL SPECIFICATIONS FOR ELECTROMAGNETIC BALLASTS

1. Ballasts shall be certified energy saving magnetic type and operate lamps at a frequency of 60 Hz.

2. Ballasts shall be specifically designed to operate (Quantity & Type) lamps.

3. Ballasts shall operate from 60 Hz input source of _____ volts, and tolerate sustained variations of +5%-10% with no damage to the ballasts.

4. Ballasts shall provide transient immunity as specified by ANSI C62.41-1991, Location Category A1.

5. Ballasts shall provide starting sequence consistent with ANSI standard C82.1.

6. Ballasts shall tolerate sustained open circuit and short circuit output conditions with no damage to the ballasts.

7. Ballasts shall be:

– UL LISTED as Class P, and for use in indoor or Type 1 outdoor applications.

– CSA CERTIFIED where applicable (120 and 347 volt models).

8. Ballasts shall tolerate operation, in most fixtures, at ambient temperatures up to 105°F (40°C). Ballast enclosure is limited to 90°C maximum temperature.

9. Ballasts shall have Power Factor greater than .90.

10. Lamp Current Crest Factor (ratio of peak to RMS lamp current) shall be 1.7 or less in accordance with lamp manufacturers recommendation and ANSI C82.1.

– 1.85 or less for instant start slimline (also per ANSI C82.1).

11. Ballasts shall have a Ballast Factor greater than .925 per ANSI C82.1.

– .95 or greater for HO and VHO applications.

12. Input current Total Harmonic Distortion shall not exceed .32 per ANSI C82.1.

13. Ballasts shall be fully encapsulated (potted) to ensure maximum thermal and structural integrity.

14. Manufacturer shall provide written warranty against defects in material or workmanship.

15. Manufacturer shall have been manufacturing electromagnetic ballasts for at least twenty years.

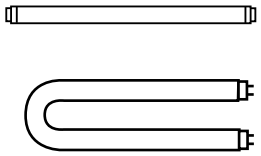
16. Ballasts shall be manufactured in North America.

17. Universal model _____ (or approved equal).

# Lead Lengths

Lead Quantities (per color), Exits (L=Left, R=Right, B=Bottom) and Lengths (in inches, +/- 1")

| Catalog # | Black | | | Black/White | | | White | | | Red | | | Blue | | | Yellow | | | Blue/White | | | Brown | | | Red/White | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Quantity | Exit | Length | Quantity | Exit | Length | Quantity | Exit | Length | Quantity | Exit | Length | Quantity | Exit | Length | Quantity | Exit | Length | Quantity | Exit | Length | Quantity | Exit | Length | Quantity | Exit | Length |
| 200-H2 | 2 | | 8-15 | | | | | | | | | | | | | | | | | | | | | | | | |
| 202-B-TC-P | 1 | L | 12 | | | | 1 | L | 12 | | | | 1 | R | 12 | | | | | | | | | | | | |
| 412-L-TC-P | | | | 1 | L | 12 | 1 | L | 25 | 2 | L | 37 | | | | | | | 2 | R | 27 | | | | | | |
| 413-C-TC-P | 1 | L | 9 | | | | 1 | L | 29 | 2 | R | 30 | 1 | L | 29 | | | | | | | | | | | | |
| 446-LR-TC-P | 1 | L | 22 | | | | 1 | L | 22 | 2 | R | 26 | 2 | R | 26 | 2 | L | 36 | | | | | | | | | |
| 447-LR-TC-P | 1 | L | 10 | | | | 1 | L/R | 10 | 2 | R | 13 | 2 | R | 13 | 2 | L | 18 | | | | | | | | | |
| 480-SLH-TC-P | 1 | L | 18 | | | | 1 | L | 18 | 2 | R | 46 | 2 | R | 46 | 2 | L | 65 | | | | | | | | | |
| 481-LH-TC-P | 1 | L | 10 | | | | 1 | L | 10 | 2 | R | 44 | 2 | L | 60 | | | | | | | | | | | | |
| 487-SLH-TC-P | 1 | L | 18 | | | | 1 | L | 18 | 2 | R | 46 | 2 | R | 46 | 2 | L | 65 | | | | | | | | | |
| 490-XLH-TC-P | 1 | L | 18 | | | | 1 | L | 18 | 2 | R | 33 | 2 | R | 33 | 2 | L | 51 | | | | | | | | | |
| 502-A-TC-P | 1 | L | 12 | | | | 1 | L | 12 | 2 | R | 12 | 1 | L | 12 | 2 | R | 12 | 1 | L | 12 | 1 | R | 12 | | | |
| 532-BR-TC-P | 1 | L | 12 | | | | 1 | L | 12 | 1 | R | 12 | 1 | R | 12 | | | | | | | 2 | L | 12 | | | |
| 540-L-TC-P | 1 | L | 20 | | | | 1 | L | 20 | 2 | R | 25 | 2 | R | 25 | 2 | L | 37 | | | | | | | | | |
| 546-B-TC-P | 1 | L | 12 | | | | 1 | L | 12 | 2 | R | 12 | 1 | L | 12 | | | | | | | | | | | | |
| 547-RS-WS-TC-P | 1 | L | 12 | | | | 2 | L/R | 12 | 2 | R | 12 | 1 | R | 12 | | | | | | | | | | | | |
| 554-L-TC-P | 1 | L | 12 | | | | 1 | L | 12 | 2 | R | 12 | 2 | R | 12 | 2 | L | 12 | | | | | | | | | |
| 564-L-TC-P | 1 | L | 10 | | | | 1 | L | 10 | 2 | R | 13 | 2 | R | 13 | 2 | L | 16 | | | | | | | | | |
| 567-L-TC | 1 | L | 10 | | | | 1 | L | 10 | 2 | R | 13 | 2 | R | 13 | 2 | L | 16 | | | | | | | | | |
| 595-L-TC-P | 1 | L | 20 | | | | 1 | L | 20 | 2 | R | 24 | 2 | R | 24 | 2 | L | 36 | | | | | | | | | |
| 631-LH-TC-P | 1 | L | 18 | | | | 1 | L | 18 | 2 | R | 20 | 2 | R | 20 | 2 | L | 32 | | | | | | | | | |
| 757-XLH-TC | 1 | L | 18 | | | | 1 | L | 18 | 2 | R | 46 | 2 | R | 46 | 2 | L | 65 | | | | | | | | | |
| 806-BR-TC-P | 1 | L | 68 | | | | 1 | L | 68 | 1 | R | 44 | 1 | R | 44 | | | | | | | | | | | | |
| 931-LH-TC-P | 1 | L | 12 | | | | 1 | L | 12 | 2 | R | 12 | 2 | R | 12 | 2 | L | 12 | | | | 2 | L | 12 | | | |
| 937-K-TC-P | 1 | L | 12 | | | | 1 | L | 12 | 2 | R | 12 | 2 | R | 12 | 2 | L | 12 | | | | | | | | | |
| CF1320H2P | 1,1 | L,R | 9,18 | | | | | | | | | | | | | | | | | | | | | | | | |
| M232SR120C | 1 | L | 20 | | | | 1 | L | 20 | 2 | R | 24 | 2 | R | 24 | 2 | L | 36 | | | | | | | | | |
| M232SR277C | 1 | L | 20 | | | | 1 | L | 20 | 2 | R | 24 | 2 | R | 24 | 2 | L | 36 | | | | | | | | | |



- 265 mA
- 4´ Lamp Applications
- OcTek™ Series Featured

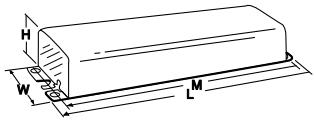
# UNIVERSAL® ELECTROMAGNETIC BALLASTS

## FOR F32T8 and F32T8/U LAMPS



| Lamp Qty. | Lamp Descr. | Line Volts | Catalog Number | Certification E | Certification UL | Certification CSA | Certification | Certification NOM | Line Current (Amps) | Input Power (Watts) | Ballast Factor | Ballast Efficacy Factor | Crest Factor | THD % | Min. F/C Start Temp | Sound Rating | Wiring Diag. | Dim. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| F32T8 - High Power Factor OcTek® | | | | | | | | | | | | | | | | | | |
| 2 | Rapid | 120 | M232SR120C | • | • | • | • | | .65 | 74 | .95 | 1.28 | < 1.7 | < 20 | 50/10 | A | 1 | D2 |
| 2 | Rapid | 277 | M232SR277C | • | • | • | | | .28 | 74 | .95 | 1.28 | < 1.7 | < 20 | 50/10 | A | 1 | D2 |
| F32T8/U - High Power Factor OcTek™ | | | | | | | | | | | | | | | | | | |
| 2 | Rapid | 120 | M232SR120C | • | • | • | • | | .65 | 74 | .95 | 1.28 | < 1.7 | < 20 | 50/10 | A | 1 | D2 |
| 2 | Rapid | 277 | M232SR277C | • | • | • | | | .28 | 74 | .95 | 1.28 | < 1.7 | < 20 | 50/10 | A | 1 | D2 |

| Overall Dimensions | | | Mounting Dimensions | | |
|---|---|---|---|---|---|
| Draw # | L | W | H | M | X |
| D2 | 9 1/2 | 2 3/8 | 1 1/2 | 8 57/64 | 1 11/16 |

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## WIRING DIAGRAMS

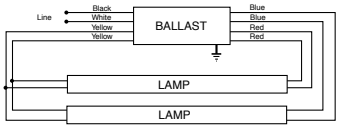
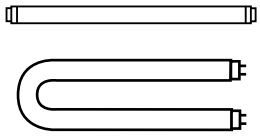



DIAGRAM 1

# UNIVERSAL® ELECTROMAGNETIC BALLASTS

## FOR F30T12, F40T12, F40T12ES, F48" 25W/UTLS AND WORKLITE 25 LAMPS

- 430 and 460 mA
- 3′ and 4′ Lamp Applications
- Standard and Energy Savings Lamps

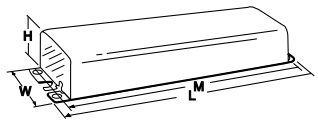




| Lamp Qty. | Lamp Descr. | Line Volts | Catalog Number | Certification | Line CurrentPower (Amps)(Watts) | Input Ballast Factor | Efficacy Factor | Ballast Crest Factor | THD % | Start Temp | Min. F/C | Sound Rating | Wiring Diag. | Dim. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **F30T12 - Normal Power Factor** | | | | | | | | | | | | | | |
| 1 | Rapid | 120 | 413-C-TC-P❊ | • • • | .63 | 37 | .72 | 1.95 | < 1.7 | < 10 | 50/10 | A | 8 | D1 |
| **F40T12 - Normal Power Factor** | | | | | | | | | | | | | | |
| 1 | Rapid | 120 | 413-C-TC-P❊ | • • • | .61 | 33 | .68 | 2.06 | < 1.9 | < 20 | 60/15 | A | 8 | D1 |
| **F40T12ES - Normal Power Factor** | | | | | | | | | | | | | | |
| 1 | Rapid | 120 | 413-C-TC-P❊ | • • • | .61 | 33 | .68 | 2.06 | < 1.9 | < 20 | 60/15 | A | 8 | D1 |
| **F48"25W/UTLS & WORKLITE - Normal Power Factor** | | | | | | | | | | | | | | |
| 1 | Rapid | 120 | 413-C-TC-P❊ | • • • | .53 | 32 | .90 | 2.79 | < 1.7 | < 20 | 50/10 | A | 8 | D1 |

❊ For Residential Use Only

| Overall Dimensions | | | Mounting Dimensions | | |
|---|---|---|---|---|---|
| Draw # | L | W | H | M | X |
| D1 | 6 7/16 | 1 7/8 | 1 1/2 | 6 | - |

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## WIRING DIAGRAMS

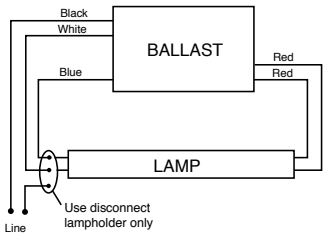
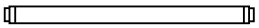



**DIAGRAM 8**



- 800 mA - 840 mA
- 2´ - 8' Lamp Applications
- Standard & Weatherproof and Tanning Models

# UNIVERSAL® ELECTROMAGNETIC BALLASTS

## FOR F24T12HO - F96T12HOLAMPS



See page 1-3 for additional information on weatherproof applications.

| Lamp Qty. | Lamp Descr. | Line Volts | Catalog Number | Certification (E) | (UL) | (CSA) | (NOM) | Line Current (Amps) | Input Power (Watts) | Ballast Factor | Ballast Efficacy Factor | Crest Factor | THD % | Min. F/C Start Temp | Sound Rating | Wiring Diag. | Dim. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **F24T12HO - High Power Factor** | | | | | | | | | | | | | | | | | |
| 2 | Rapid | 120 | 490-XLH-TC-P | • | • | | | .95 | 103 | .81 | 0.79 | < 2.0 | > 32 | -20/-29 | B | 1 | D7 |
| 2 | Rapid | 120 | 631-LH-TC-P❁ | • | • | | | 1.13 | 100 | .83 | 0.83 | < 2.0 | < 32 | -20/-29 | B | 1 | D6 |
| **F36T12HO - High Power Factor** | | | | | | | | | | | | | | | | | |
| 2 | Rapid | 120 | 490-XLH-TC-P | • | • | | | 1.06 | 121 | .84 | 0.69 | < 2.0 | < 32 | 50/10 | B | 1 | D7 |
| 2 | Rapid | 120 | 631-LH-TC-P✪ | • | • | | | 1.20 | 122 | .85 | 0.69 | < 1.9 | < 20 | -20/-29 | B | 1 | D6 |
| **F42T12HO - High Power Factor** | | | | | | | | | | | | | | | | | |
| 2 | Rapid | 120 | 490-XLH-TC-P | • | • | | | 1.12 | 130 | .86 | 0.66 | < 2.0 | < 32 | 50/10 | B | 1 | D7 |
| **F48T12HO - High Power Factor** | | | | | | | | | | | | | | | | | |
| 1 | Rapid | 120 | 481-LH-TC-P▼ | • | • | | | .79 | 82 | .84 | 1.02 | < 1.9 | > 32 | -20/-29 | B | 12 | D7 |
| 1 | Rapid | 120 | 490-XLH-TC-P▼ | • | • | | | .82 | 82 | .81 | 0.99 | < 2.0 | > 32 | -20/-29 | B | 15 | D7 |
| 1 | Rapid | 120 | 631-LH-TC-P▼ | • | • | | | 1.05 | 82 | .83 | 1.02 | < 1.9 | < 32 | -20/-29 | B | 15 | D6 |
| 2 | Rapid | 120 | 490-XLH-TC-P | • | • | | | 1.18 | 139 | .87 | 0.63 | < 2.0 | < 20 | -20/-29 | B | 1 | D7 |
| 2 | Rapid | 120 | 631-LH-TC-P | • | • | | | 1.25 | 137 | .85 | 0.62 | < 1.7 | < 20 | -20/-29 | B | 1 | D6 |
| **F48T12HOES - High Power Factor** | | | | | | | | | | | | | | | | | |
| 1 | Rapid | 120 | 481-LH-TC-P▼ | • | • | | | .77 | 75 | .79 | 1.05 | < 1.9 | > 32 | 60/15 | B | 12 | D7 |
| 1 | Rapid | 120 | 490-XLH-TC-P▼ | • | • | | | .80 | 76 | .78 | 1.03 | < 2.0 | > 32 | 60/15 | B | 15 | D7 |
| 1 | Rapid | 120 | 631-LH-TC-P▼ | • | • | | | 1.03 | 75 | .77 | 1.03 | < 1.9 | < 32 | 60/15 | B | 15 | D6 |
| 2 | Rapid | 120 | 490-XLH-TC-P | • | • | | | 1.07 | 124 | .83 | 0.67 | < 2.0 | < 32 | 60/15 | B | 1 | D7 |
| 2 | Rapid | 120 | 631-LH-TC-P | • | • | | | 1.15 | 124 | .80 | 0.64 | < 1.9 | < 20 | 60/15 | B | 1 | D6 |
| **F60T12HO - High Power Factor** | | | | | | | | | | | | | | | | | |
| 1 | Rapid | 120 | 481-LH-TC-P | • | • | | | .86 | 100 | .87 | 0.87 | < 1.9 | < 32 | -20/-29 | B | 12 | D7 |
| 1 | Rapid | 120 | 490-XLH-TC-P | • | • | | | .92 | 99 | .83 | 0.84 | < 2.0 | > 32 | -20/-29 | B | 15 | D7 |
| 1 | Rapid | 120 | 631-LH-TC-P▼ | • | • | | | 1.08 | 94 | .85 | 0.90 | < 1.7 | < 32 | -20/-29 | B | 15 | D6 |
| 2 | Rapid | 120 | 490-XLH-TC-P | • | • | | | 1.42 | 169 | .89 | 0.53 | < 2.0 | < 20 | -20/-29 | B | 1 | D7 |
| **F64T12HO - High Power Factor** | | | | | | | | | | | | | | | | | |
| 1 | Rapid | 120 | 481-LH-TC-P | • | • | | | .90 | 102 | .87 | 0.85 | < 1.9 | < 32 | -20/-29 | B | 12 | D7 |
| 1 | Rapid | 120 | 490-XLH-TC-P | • | • | | | .93 | 101 | .84 | 0.83 | < 1.9 | > 32 | -20/-29 | B | 15 | D7 |
| 2 | Rapid | 120 | 490-XLH-TC-P | • | • | | | 1.50 | 178 | .89 | 0.50 | < 1.9 | < 20 | -20/-29 | B | 1 | D7 |
| **F72T12HO - High Power Factor** | | | | | | | | | | | | | | | | | |
| 1 | Rapid | 120 | 481-LH-TC-P | • | • | | | .92 | 106 | .89 | 0.84 | < 1.9 | < 32 | -20/-29 | B | 12 | D7 |
| 1 | Rapid | 120 | 490-XLH-TC-P | • | • | | | .95 | 107 | .86 | 0.80 | < 2.0 | > 32 | -20/-29 | B | 15 | D7 |
| 2 | Rapid | 120 | 480-SLH-TC-P | • | • | • | • | 1.69 | 196 | .97 | 0.49 | < 1.9 | < 20 | -20/-29 | B | 1 | D7 |
| 2 | Rapid | 120 | 490-XLH-TC-P | • | • | | | 1.50 | 177 | .92 | 0.52 | < 1.7 | < 10 | -20/-29 | B | 1 | D7 |
| 2 | Rapid | 277 | 487-SLH-TC-P | • | • | • | • | .74 | 197 | .96 | 0.48 | < 1.7 | < 20 | -20/-29 | B | 1 | D7 |
| **F84T12HO - High Power Factor** | | | | | | | | | | | | | | | | | |
| 1 | Rapid | 120 | 481-LH-TC-P | • | • | | | 1.02 | 119 | .88 | 0.74 | < 1.9 | < 32 | -20/-29 | B | 12 | D7 |
| 2 | Rapid | 120 | 480-SLH-TC-P | • | • | • | • | 1.87 | 220 | .93 | 0.42 | < 1.9 | < 20 | -20/-29 | B | 1 | D7 |
| 2 | Rapid | 277 | 487-SLH-TC-P | • | • | • | • | .87 | 235 | .97 | 0.41 | < 1.9 | < 20 | -20/-29 | B | 1 | D7 |
| **F96T12HO - High Power Factor** | | | | | | | | | | | | | | | | | |
| 1 | Rapid | 120 | 481-LH-TC-P | • | • | | | 1.16 | 136 | .91 | 0.67 | < 1.9 | < 20 | -20/-29 | B | 12 | D7 |
| 1 | Rapid | 120 | 490-XLH-TC-P | • | • | | | 1.10 | 124 | .85 | 0.65 | < 2.0 | < 20 | -20/-29 | B | 15 | D7 |
| 2 | Rapid | 120 | 480-SLH-TC-P | • | • | • | • | 1.99 | 237 | .96 | 0.41 | < 1.7 | < 10 | -20/-29 | B | 1 | D7 |
| 2 | Rapid | 277 | 487-SLH-TC-P | • | • | • | • | .87 | 237 | .95 | 0.40 | < 1.7 | < 10 | -20/-29 | B | 1 | D7 |
| **F96T12HOES - High Power Factor** | | | | | | | | | | | | | | | | | |
| 1 | Rapid | 120 | 481-LH-TC-P | • | • | | | .96 | 110 | .84 | 0.77 | < 1.9 | < 32 | 60/15 | B | 12 | D7 |
| 1 | Rapid | 120 | 490-XLH-TC-P | • | • | | | .94 | 106 | .81 | 0.76 | < 2.0 | < 32 | 60/15 | B | 15 | D7 |
| 2 | Rapid | 120 | 480-SLH-TC-P | • | • | • | • | 1.72 | 202 | .89 | 0.44 | < 1.9 | < 20 | 60/15 | B | 1 | D7 |
| 2 | Rapid | 277 | 487-SLH-TC-P | • | • | • | • | .75 | 205 | .91 | 0.44 | < 1.9 | < 20 | 60/15 | B | 1 | D7 |

❁Power Factor Corrected to 75% for (2) F24T12HO
✪Power Factor Corrected to 85% for (2) F36T12HO
▼Power Factor Corrected to >70%
✠For Distribution Only

# UNIVERSAL® ELECTROMAGNETIC BALLASTS

- 1500 - 1580 mA
- 4´ and 6´ VHO, SHO & PG Lamp Applications

## FOR F72PG17, F72T12VHO, F96PG17, F96PG17ES, F96T12VHO AND F96T12VHOES LAMPS

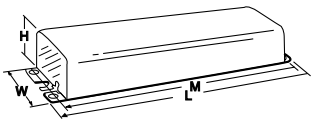


| Lamp Qty. | Lamp Descr. | Line Volts | Catalog Number | Certification (E) | (UL) | (CSA) | | NOM | Line Current (Amps) | Input Power (Watts) | Ballast Factor | Ballast Efficacy Factor | Crest Factor | THD % | Min. F/C Start Temp | Sound Rating | Wiring Diag. | Dim. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| F72PG17 - High Power Factor | | | | | | | | | | | | | | | | | | |
| 2 | Rapid | 120 | 931-LH-TC-P①✠ | • | • | | | | 2.77 | 303 | .82 | 0.27 | < 1.7 | < 20 | -20/-29 | D | 1 | D8 |
| 2 | Rapid | 277 | 937-K-TC-P❷✠ | • | • | | | | 1.26 | 341 | .92 | 0.27 | < 1.7 | < 20 | -20/-29 | D | 1 | D8 |
| F72T12VHO - High Power Factor | | | | | | | | | | | | | | | | | | |
| 2 | Rapid | 120 | 931-LH-TC-P①✠ | • | • | | | | 2.77 | 303 | .80 | 0.26 | < 1.7 | < 20 | -20/-29 | D | 1 | D8 |
| 2 | Rapid | 277 | 937-K-TC-P❷✠ | • | • | | | | 1.26 | 341 | .91 | 0.27 | < 1.7 | < 20 | -20/-29 | D | 1 | D8 |
| F96PG17 - High Power Factor | | | | | | | | | | | | | | | | | | |
| 2 | Rapid | 120 | 931-LH-TC-P①✠ | • | • | | | | 3.25 | 380 | .83 | 0.22 | < 1.7 | < 20 | -20/-29 | D | 1 | D8 |
| 2 | Rapid | 277 | 937-K-TC-P❷✠ | • | • | | | | 1.61 | 429 | .95 | 0.22 | < 1.7 | < 20 | -20/-29 | D | 1 | D8 |
| F96PG17ES - High Power Factor | | | | | | | | | | | | | | | | | | |
| 2 | Rapid | 120 | 931-LH-TC-P✠ | • | • | | | | 2.88 | 333 | .75 | 0.22 | < 1.7 | < 32 | 60/15 | D | 1 | D8 |
| F96T12VHO - High Power Factor | | | | | | | | | | | | | | | | | | |
| 2 | Rapid | 120 | 931-LH-TC-P①✠ | • | • | | | | 3.83 | 431 | .93 | 0.22 | < 1.7 | < 20 | -20/-29 | D | 1 | D8 |
| 2 | Rapid | 277 | 937-LH-TC-P❷✠ | • | • | | | | 1.64 | 450 | .95 | 0.21 | < 1.7 | < 20 | -20/-29 | D | 1 | D8 |
| F96T12VHOES - High Power Factor | | | | | | | | | | | | | | | | | | |
| 2 | Rapid | 120 | 931-LH-TC-P✠ | • | • | | | | 3.09 | 361 | .83 | 0.23 | < 1.7 | < 20 | 60/15 | D | 1 | D8 |

❷Cannot be used with T10 or T10J lamps
①May be used with equivalent T10 or T10J Lamps
✠ For Distribution Only

See page 1-18 for Dimensions and Wiring Diagrams

| Overall Dimensions | | | Mounting Dimensions | | |
|---|---|---|---|---|---|
| Draw # | L | W | H | M | X |
| D6 | 11 3/4 | 3 1/8 | 1 25/32 | 11 9/64 | 2 |
| D7 | 11 3/4 | 3 3/16 | 1 5/8 | 11 9/64 | 2 |
| D8 | 14 5/16 | 3 3/16 | 2 5/8 | 13 3/4 | 2 |




D

## WIRING DIAGRAMS

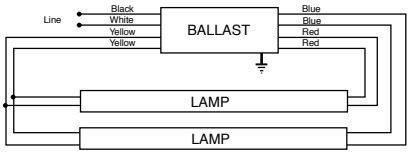



DIAGRAM 1

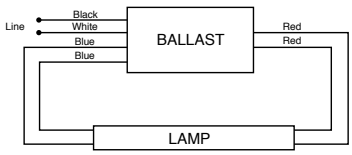



DIAGRAM 12

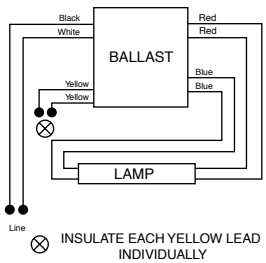
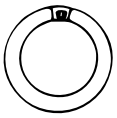



DIAGRAM 15

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



- 430 mA
- 20-40 Watt Lamp Applications

# UNIVERSAL® ELECTROMAGNETIC BALLASTS

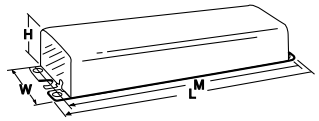
## FOR FC6T9, FC8T9 and FC12T9 LAMPS



| Lamp Qty. | Lamp Descr. | Line Volts | Catalog Number | Certification | | | | NOM | Line Current (Amps) | Input Power (Watts) | Ballast Factor | Ballast Efficacy Factor | Crest Factor | THD % | Min. F/C Start Temp | Sound Rating | Wiring Diag. | Dim. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FC6T9 (20 Watt) - Normal Power Factor | | | | | | | | | | | | | | | | | | |
| 1 | Rapid | 120 | 547-RS-WS-TC-P✠ | • | • | | | | .64 | 27 | .90 | 3.30 | < 1.7 | < 10 | 50/10 | A | 29 | D1 |
| FC8T9 (22 Watt) - Normal Power Factor | | | | | | | | | | | | | | | | | | |
| 1 | Rapid | 120 | 547-RS-WS-TC-P☆✠ | • | • | | | | .60 | 30 | .85 | 2.83 | < 1.7 | < 10 | 50/10 | A | 29 | D1 |
| FC12T9 (32 Watt) - Normal Power Factor | | | | | | | | | | | | | | | | | | |
| 1 | Preheat | 120 | 202-B-TC-P❶✠ | • | • | | | | .67 | 37 | .91 | 2.44 | < 1.7 | <10 | 50/10 | A | 22 | D11 |

☆Also available in White Cans
♥Only available in White Cans
♣Starter is built in as an integral component
❶Requires Starter
❸May be used with any combination of F30T12/RS, F40T12/RS, FC12T9/RS and FC16T9/RS
■For Replacement Only
✠For Distribution Only

| Overall Dimensions | | | Mounting Dimensions | | |
|---|---|---|---|---|---|
| Draw # | L | W | H | M | X |
| D1 | 6 7/16 | 1 7/8 | 1 1/2 | 6 | - |
| D11 | 6 7/16 | 1 7/8 | 1 5/16 | 6 | - |




D

## WIRING DIAGRAMS

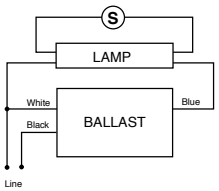



DIAGRAM 22

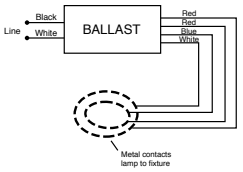


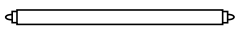

DIAGRAM 29

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

# UNIVERSAL® ELECTROMAGNETIC BALLASTS

## FOR F24T12 - F48T12 LAMPS

- 425-440 mA
- 2′-4′ Lamp Applications
- Slimline



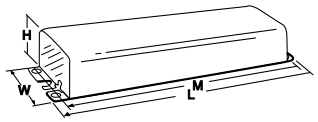
**T12 SLIMLINE**



| Lamp Qty. | Lamp Descr. | Line Volts | Catalog Number | Certification (E) | (UL) | (CSA) | (NOM) | Line Current (Amps) | Input Power (Watts) | Ballast Factor | Ballast Efficacy Factor | Crest Factor | THD % | Min. F/C Start Temp | Sound Rating | Wiring Diag. | Dim. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| F24T12 - High Power Factor | | | | | | | | | | | | | | | | | |
| 2 | Instant | 277 | 532-BR-TC-P◗✠ | • | • | | | .29 | 60 | .96 | 1.60 | < 1.85 | < 32 | 32 / 0 | B | 40 | D6 |
| F36T12 - High Power Factor | | | | | | | | | | | | | | | | | |
| 2 | Instant | 277 | 532-BR-TC-P◗✠ | • | • | | | .34 | 75 | .93 | 1.24 | < 1.85 | < 32 | 32 / 0 | B | 40 | D12 |
| F40T12 /IS - Bi Pin - High Power Factor | | | | | | | | | | | | | | | | | |
| 2 | Instant | 277 | 532-BR-TC-P✠ | • | • | | | .37 | 94 | .92 | 0.98 | < 1.85 | < 32 | 32 / 0 | B | 40 | D12 |
| F42T12 - High Power Factor | | | | | | | | | | | | | | | | | |
| 2 | Instant | 277 | 532-BR-TC-P✠ | • | • | | | .34 | 84 | .94 | 1.11 | < 1.85 | < 32 | 32 / 0 | B | 40 | D12 |
| F48T12 - High Power Factor | | | | | | | | | | | | | | | | | |
| 2 | Instant | 277 | 532-BR-TC-P✠ | • | • | | | .35 | 95 | .96 | 1.01 | < 1.85 | < 32 | 32 / 0 | B | 40 | D12 |
| F48T12ES - High Power Factor | | | | | | | | | | | | | | | | | |
| 2 | Instant | 277 | 532-BR-TC-P✠ | • | • | | | .32 | 82 | .94 | 1.15 | < 2.0 | < 32 | 60/15 | B | 40 | D12 |

◗Power Factor Corrected to >75%
✠For Distribution Only

| Overall Dimensions | | | Mounting Dimensions | | |
|---|---|---|---|---|---|
| Draw # | L | W | H | M | X |
| D6 | 11 3/4 | 3 1/8 | 1 25/32 | 11 9/64 | 2 |
| D12 | 11 3/4 | 3 3/16 | 1 25/32 | 11 9/64 | 2 |




D

## WIRING DIAGRAMS

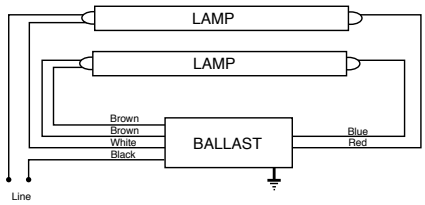
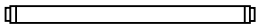



**DIAGRAM 40**

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



- 14, 15, 18, & 19 Watt T8 Applications
- 14 & 15 Watt T12 Applications

# UNIVERSAL® ELECTROMAGNETIC BALLASTS

## FOR F14T8, F14T12, F15T8, F18T8, F19T8 AND F15T12 LAMPS



| Lamp Qty. | Lamp Descr. | Line Volts | Catalog Number | Certification (E) | Certification (UL) | Certification (CSA) | Certification | Certification NOM | Line Current (Amps) | Input Power (Watts) | Ballast Factor | Ballast Efficacy Factor | Crest Factor | THD % | Min. F/C Start Temp | Sound Rating | Wiring Diag. | Dim. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| F14T8 - Normal Power Factor | | | | | | | | | | | | | | | | | | |
| 1 | Preheat | 120 | 200-H2❶ | • | • | | • | | .36 | 19 | .99 | 5.15 | < 1.7 | <10 | 50/10 | A | 21 | E1 |
| F14T12 - High Power Factor | | | | | | | | | | | | | | | | | | |
| 2 | Preheat | 120 | 564-L-TC-P | • | • | | • | | .39 | 45 | .79 | 1.75 | < 1.7 | <20 | 50/10 | A | 1 | D2 |
| 2 | Preheat | 277 | 554-L-TC-P✠ | • | • | | | | .17 | 45 | .79 | 1.76 | < 1.9 | <20 | 50/10 | A | 1 | D2 |
| F14T12 - Normal Power Factor | | | | | | | | | | | | | | | | | | |
| 1 | Preheat | 120 | 200-H2❶ | • | • | | • | | .37 | 20 | .98 | 4.85 | < 1.7 | <10 | 50/10 | A | 21 | E1 |
| 1 | Preheat | 120 | 546-B-TC-P♠✠ | • | • | | • | | .66 | 30 | .86 | 2.87 | < 1.7 | <10 | 50/10 | A | 8 | D1 |
| F15T8 - High Power Factor | | | | | | | | | | | | | | | | | | |
| 2 | Preheat | 120 | 564-L-TC-P | • | • | | • | | .47 | 51 | .91 | 1.78 | < 1.7 | <32 | 50/10 | A | 1 | D2 |
| 2 | Preheat | 277 | 554-L-TC-P✠ | • | • | | | | .20 | 51 | .89 | 1.76 | < 1.9 | <20 | 50/10 | A | 1 | D2 |
| F15T8 - Normal Power Factor | | | | | | | | | | | | | | | | | | |
| 1 | Preheat | 120 | 200-H2❶ | • | • | | • | | .32 | 20 | 1.05 | 5.13 | < 1.7 | <10 | 50/10 | A | 21 | E1 |
| 1 | Preheat | 120 | 546-B-TC-P♠✠ | • | • | | • | | .55 | 25 | .89 | 3.50 | < 1.7 | <10 | 50/10 | A | 8 | D1 |
| 1 | Preheat | 120 | CF1320H2P❶ | • | • | | | | .26 | 17 | .75 | 4.55 | < 1.7 | <15 | 50/10 | A | 21 | E2 |
| 2 | Preheat | 120 | 447-LR-TC-P | • | • | | | | .50 | 39 | .75 | 1.92 | < 1.7 | <20 | 50/10 | A | 1 | D3 |
| F18T8 - Normal Power | | | | | | | | | | | | | | | | | | |
| 1 | Preheat | 120 | 200-H2❶ | • | • | | • | | .28 | 19 | .80 | 4.29 | < 1.7 | <10 | 50/10 | A | 21 | E1 |
| F19T8 - Normal Power | | | | | | | | | | | | | | | | | | |
| 1 | Preheat | 120 | 200-H2❶ | • | • | | • | | .26 | 18 | .80 | 4.33 | < 1.7 | <10 | 50/10 | A | 21 | E1 |
| F15T12 - High Power | | | | | | | | | | | | | | | | | | |
| 2 | Preheat | 120 | 564-L-TC-P | • | • | | • | | .43 | 44 | .85 | 1.91 | < 1.7 | <20 | 50/10 | A | 1 | D2 |
| 2 | Preheat | 277 | 554-L-TC-P✠ | • | • | | | | .20 | 49 | .87 | 1.78 | < 1.9 | <20 | 50/10 | A | 1 | D2 |
| F15T12 - Normal Power | | | | | | | | | | | | | | | | | | |
| 1 | Preheat | 120 | 200-H2❶ | • | • | | • | | .44 | 21 | 1.08 | 5.19 | < 1.7 | <10 | 50/10 | A | 21 | E1 |
| 1 | Preheat | 120 | 546-B-TC-P♠✠ | • | • | | • | | .61 | 30 | .96 | 3.23 | < 1.7 | <10 | 50/10 | A | 8 | D1 |
| 2 | Preheat | 120 | 447-LR-TC-P | • | • | | | | .56 | 42 | .80 | 1.90 | < 1.7 | <20 | 50/10 | A | 1 | D3 |

❶Requires Starter
♣Starter is built in as an integral component
♠Requires one circuit interrupting lamp holder
❺Recommended for enclosed Fixtures Requiring "very low heat" ballasts
✠For Distribution Only

# UNIVERSAL® ELECTROMAGNETIC BALLASTS

## FOR F20T12 - F40T12, AND F30T8 LAMPS

- 20-40 Watt T12 Lamp Applications
- 30 Watt T8 Lamp Applications

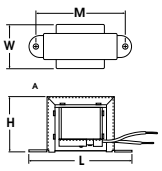
**PREHEAT/ TRIGGER 60Hz**

| Lamp Qty. | Lamp Descr. | Line Volts | Catalog Number | Certification E | Certification UL | Certification CSA | Certification NOM | Line Current (Amps) | Input Power (Watts) | Ballast Factor | Ballast Efficacy Factor | Crest Factor | THD % | Min. F/C Start Temp | Sound Rating | Wiring Diag. | Dim. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| F20T12 - High Power Factor | | | | | | | | | | | | | | | | | |
| 2 | Preheat | 120 | 564-L-TC-P | • | • | | • | .51 | 55 | .85 | 1.55 | < 1.7 | <20 | 50/10 | A | 1 | D2 |
| 2 | Preheat | 277 | 554-L-TC-P✠ | • | • | | | .22 | 55 | .86 | 1.55 | < 1.7 | <20 | 50/10 | A | 1 | D2 |
| F20T12 - Normal Power Factor | | | | | | | | | | | | | | | | | |
| 1 | Preheat | 120 | 200-H2❶ | • | • | | • | .30 | 20 | .83 | 4.15 | < 1.7 | <10 | 50/10 | A | 21 | E1 |
| 1 | Preheat | 120 | 546-B-TC-P♠✠ | • | • | | • | .58 | 29 | .82 | 2.83 | < 1.7 | <10 | 50/10 | A | 8 | D1 |
| 1 | Preheat | 120 | CF1320H2P❶ | • | • | | | .26 | 17 | .75 | 4.55 | < 1.7 | <15 | 50/10 | A | 21 | E2 |
| 2 | Preheat | 120 | 447-LR-TC-P | • | • | | | .43 | 37 | .56 | 1.51 | < 1.7 | <20 | 50/10 | A | 1 | D3 |
| F30T8 - Normal Power Factor | | | | | | | | | | | | | | | | | |
| 1 | Preheat | 120 | 202-B-TC-P❶✠ | • | • | | | .62 | 37 | .97 | 2.62 | < 1.7 | <10 | 50/10 | A | 22 | D11 |
| F30T12 - Normal Power Factor | | | | | | | | | | | | | | | | | |
| 1 | Preheat/RS | 120 | 202-B-TC-P❶✠ | • | • | | | .68 | 37 | .85 | 2.28 | < 1.7 | <10 | 50/10 | A | 22 | D11 |
| F40T12 - Normal Power Factor | | | | | | | | | | | | | | | | | |
| 1 | Preheat/RS | 120 | 202-B-TC-P❶✠ | • | • | | | .60 | 39 | .77 | 1.99 | < 1.7 | <10 | 50/10 | A | 22 | D11 |
| F40T12ES - Normal Power Factor | | | | | | | | | | | | | | | | | |
| 1 | Preheat/RS | 120 | 202-B-TC-P❶✠ | • | • | | | .68 | 37 | .82 | 2.22 | < 1.9 | <10 | 60/15 | A | 22 | D11 |

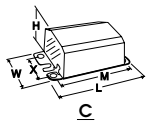
♣ Starter is built in as an integral component
❶ Requires Starter
♠ Requires one circuit interrupting lamp holder
❺ Recommended for enclosed Fixtures Requiring "very low heat" ballasts
✠ For Distribution Only

See page 1-24 for Dimensions and Wiring Diagrams

| Overall Dimensions | | | Mounting Dimensions | | |
|---|---|---|---|---|---|
| Draw # | L | W | H | M | X |
| D1 | 6 7/16 | 1 7/8 | 1 1/2 | 6 | - |
| D2 | 9 1/2 | 2 3/8 | 1 1/2 | 8 57/64 | 1 11/16 |
| D3 | 6 19/32 | 2 3/8 | 1 1/2 | 6 | - |
| D11 | 6 7/16 | 1 7/8 | 1 5/16 | 6 | - |
| E1 | 3 1/16 | 1 25/32 | 1 5/16 | 2 3/4 | - |
| E2 | 3 5/64 | 1 31/64 | 1 3/16 | 1 11/16 | - |

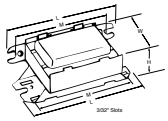


B



C

D


E

## WIRING DIAGRAMS

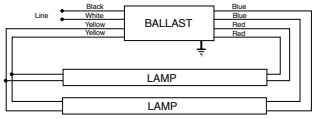


DIAGRAM 1

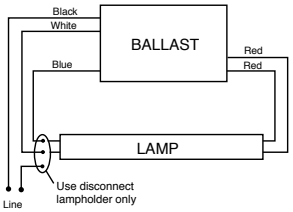


DIAGRAM 8

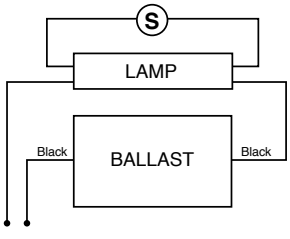


DIAGRAM 21

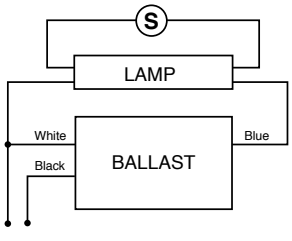
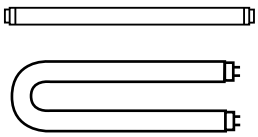


DIAGRAM 22

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



- 14-40 Watt
- Preheat/Trigger
- T12/T8
- 430-460 mA
- Rapid Start T12

# UNIVERSAL® ELECTROMAGNETIC BALLASTS

## FOR 14 - 40 WATT, T8 AND T12 LAMPS

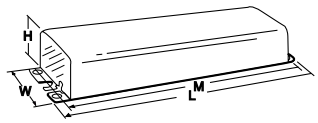


| Lamp Qty. | Lamp Descr. | Line Volts | Catalog Number | Certification (E) | (UL) | (CSA) | (NOM) | Line Current (Amps) | Input Power (Watts) | Ballast Factor | Ballast Efficacy Factor | Crest Factor | THD % | Min. F/C Start Temp | Sound Rating | Wiring Diag. | Dim. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **F14T12 - High Power Factor** | | | | | | | | | | | | | | | | | |
| 2 | Trigger | 220/60Hz | 567-L-TC | | | | • | .22 | 44 | .76 | 1.74 | < 1.9 | < 20 | 50/10 | A | 1 | D2 |
| **F15T12 - High Power Factor** | | | | | | | | | | | | | | | | | |
| 2 | Trigger | 220/60Hz | 567-L-TC | | | | • | .24 | 47 | .85 | 1.81 | < 1.9 | < 20 | 50/10 | A | 1 | D2 |
| **F15T8 - High Power Factor** | | | | | | | | | | | | | | | | | |
| 2 | Trigger | 220/60Hz | 567-L-TC | | | | • | .25 | 49 | .86 | 1.77 | < 1.9 | < 32 | 50/10 | A | 1 | D2 |
| **F20T12 - High Power Factor** | | | | | | | | | | | | | | | | | |
| 2 | Trigger | 127/60Hz | 597-L-TC-P❾ | | • | | • | .45 | 55 | .88 | 1.60 | < 1.7 | < 15 | 50/10 | A | 1 | D2 |
| 2 | Trigger | 220/60Hz | 567-L-TC | | | | • | .26 | 53 | .83 | 1.55 | < 1.7 | < 20 | 50/10 | A | 1 | D2 |
| **F40T12 - High Power Factor** | | | | | | | | | | | | | | | | | |
| 2 | Rapid | 120/60Hz | 446-LR-TC-P❼ | • | • | | • | .77 | 91 | .93 | 1.02 | <1.7 | <20 | 50/10 | A | 1 | D2 |
| 2 | Rapid | 127/60Hz | 595-L-TC-P⓾ | | • | | • | .70 | 87 | .88 | 1.01 | < 1.7 | < 20 | 50/10 | A | 1 | D2 |
| 2 | Rapid | 220/60Hz | 540-L-TC-P | | • | | | .42 | 90 | .91 | 1.01 | <1.7 | <20 | 50/10 | A | 1 | D2 |
| **F40T12/U - High Power Factor** | | | | | | | | | | | | | | | | | |
| 1 | Rapid | 120/60Hz | 412-L-TC-P❼ | | • | • | | .48 | 57 | .95 | 1.67 | < 1.7 | < 20 | 60/15 | A | 42 | D2 |
| 2 | Rapid | 120/60Hz | 446-LR-TC-P❼ | | • | • | • | .77 | 91 | .91 | 1.00 | < 1.7 | < 20 | 50/10 | A | 1 | D2 |
| **F40T12ES - High Power Factor** | | | | | | | | | | | | | | | | | |
| 1 | Rapid | 120/60Hz | 412-L-TC-P❼ | | • | • | | .44 | 51 | .90 | 1.76 | < 1.7 | < 20 | 50/10 | A | 42 | D2 |
| 2 | Rapid | 120/60Hz | 446-LR-TC-P❼ | | • | • | • | .66 | 75 | .86 | 1.15 | < 1.9 | < 20 | 60/15 | A | 1 | D2 |
| 2 | Rapid | 220/60Hz | 540-L-TC-P | | • | | | .36 | 75 | .86 | 1.15 | <1.9 | <20 | 60/15 | A | 1 | D2 |
| 2 | Rapid | 277/60Hz | 443-L-TC-P❼ | | • | • | • | .32 | 82 | .88 | 1.08 | < 1.9 | < 20 | 60/15 | A | 1 | D2 |
| **F40T12ES/U - High Power Factor** | | | | | | | | | | | | | | | | | |
| 2 | Rapid | 120/60Hz | 446-LR-TC-P❼ | | • | • | • | .66 | 75 | .86 | 1.15 | < 1.9 | < 20 | 60/15 | A | 1 | D2 |

❾May also be used with F14T12, F15T8 and F15T12 Lamps
❍Power Factor Corrected to >80%
✜Power Factor Corrected to >85%
❼For Export Only-may not be purchased for use in the USA
✓For Distribution Only

⓾May also be used with F40T12ES Lamps
■For Replacement Only
✠For Distribution Only

| Overall Dimensions | | | Mounting Dimensions | | |
|---|---|---|---|---|---|
| Draw # | L | W | H | M | X |
| D2 | 9 1/2 | 2 3/8 | 1 1/2 | 8 57/64 | 1 11/16 |




D

## WIRING DIAGRAMS

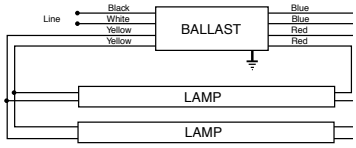



DIAGRAM 1

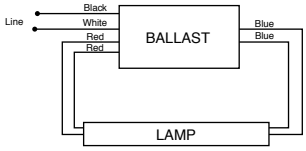


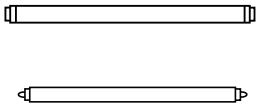

DIAGRAM 42

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

# UNIVERSAL® ELECTROMAGNETIC BALLASTS

## FOR F64 - F96 LAMPS

- 425-440 mA
- 6´-8´ Lamp Applications
- T12 Slimline
- Instant Start



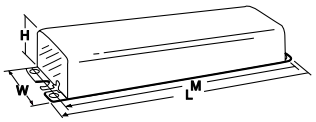
**EXPORT**



| Lamp Qty. | Lamp Descr. | Line Volts | Catalog Number | Certification (E) | (UL) | (CSA) | (NOM) | Line Current (Amps) | Input Power (Watts) | Ballast Factor | Ballast Efficacy Factor | Crest Factor | THD % | Min. F/C Start Temp | Sound Rating | Wiring Diag. | Dim. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| F64T12 - High Power Factor | | | | | | | | | | | | | | | | | |
| 2 | Instant | 120/60Hz | 806-BR-TC-P | | • | • | | 1.05 | 124 | 1.05 | 0.84 | <1.85 | <20 | 50/10 | C | 39 | D12 |
| F72T12 - High Power Factor | | | | | | | | | | | | | | | | | |
| 2 | Instant | 120/60Hz | 806-BR-TC-P❼ | | • | • | | 1.15 | 131 | .90 | 0.69 | < 1.85 | < 32 | 50/10 | C | 39 | D12 |
| F84T12 - High Power Factor | | | | | | | | | | | | | | | | | |
| 2 | Instant | 120/60Hz | 806-BR-TC-P❼ | | • | • | | 1.29 | 149 | .92 | 0.62 | < 1.85 | < 32 | 50/10 | C | 39 | D12 |
| F96T12 - High Power Factor | | | | | | | | | | | | | | | | | |
| 2 | Instant | 120/60Hz | 806-BR-TC-P❼ | | • | • | | 1.40 | 162 | .89 | 0.55 | < 1.85 | < 32 | 50/10 | C | 39 | D12 |
| F96T12ES - High Power Factor | | | | | | | | | | | | | | | | | |
| 2 | Instant | 120/60Hz | 806-BR-TC-P❼ | | • | • | | 1.16 | 129 | .86 | 0.67 | < 2.0 | < 32 | 60/15 | C | 39 | D12 |

◗ Power Factor Corrected to >75%
❍Power Factor Corrected to >80%
✜Power Factor Corrected to >85%
❼For Export Only-may not be purchased for use in the USA
✠For Distribution Only

| Overall Dimensions | | | Mounting Dimensions | | |
|---|---|---|---|---|---|
| Draw # | L | W | H | M | X |
| D10 | 9 29/64 | 3 3/32 | 1 25/32 | 8 57/64 | 1 11/16 |
| D12 | 11 3/4 | 3 3/16 | 1 25/32 | 11 9/64 | 2 |




D

### WIRING DIAGRAMS

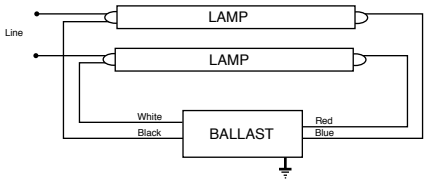
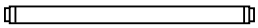



DIAGRAM 39

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



- 430 mA
- Rapid Start
- Continuous Dimming

# UNIVERSAL® ELECTROMAGNETIC BALLASTS

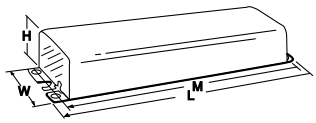
## FOR F30T12 AND F40T12 LAMPS



| Lamp Qty. | Lamp Descr. | Line Volts | Catalog Number | Certification (E) | (UL) | (CSA) | (NOM) | Line Current (Amps) | Input Power (Watts) | Ballast Factor | Ballast Efficacy Factor | Crest Factor | THD % | Min. F/C Start Temp | Sound Rating | Wiring Diag. | Dim. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| F40T12 - High Power Factor | | | | | | | | | | | | | | | | | |
| 2 | @ 100% | 120 | 502-A-TC-P†❽Ⱶ | • | • | | | .85 | 94 | .88 | 0.94 | < 1.7 | < 20 | 50/10 | A | 18 | D5 |
| 2 | @ 20% | 120 | 502-A-TC-P†❽Ⱶ | • | • | | | .68 | 35 | .20 | .57 | < 1.7 | < 32 | 50/10 | A | 18 | D5 |
| 2 | @ 100% | 277 | 678-A-TC-P†❽Ⱶ | • | • | | | .39 | 100 | .88 | 0.94 | < 1.7 | < 32 | 50/10 | A | 16 | D5 |
| 2 | @ 20% | 277 | 678-A-TC-P†❽Ⱶ | • | • | | | .34 | 30 | .20 | .67 | < 1.7 | < 32 | 50/10 | A | 16 | D5 |
| F30T12 - Corrected Power Factor | | | | | | | | | | | | | | | | | |
| 2 | @ 100% | 120 | 502-A-TC-P❽③Ⱶ | • | • | | | .87 | 83 | .89 | 1.07 | < 1.7 | < 20 | 50/10 | A | 18 | D5 |
| 2 | @ 20% | 120 | 502-A-TC-P❽②Ⱶ | • | • | | | .58 | 27 | .21 | .77 | < 1.9 | < 32 | 50/10 | A | 18 | D5 |
| 2 | @ 100% | 277 | 678-A-TC-P❽③Ⱶ | • | • | | | .85 | 96 | .90 | 0.93 | < 1.7 | < 32 | 50/10 | A | 16 | D5 |
| 2 | @ 20% | 277 | 678-A-TC-P†❽②Ⱶ | • | • | | | .68 | 33 | .23 | .70 | < 1.7 | < 32 | 50/10 | A | 16 | D5 |

♠Requires one circuit interrupting lamp holder
†Requires two circuit interrupting lamp holder
❽UL component recognized for use with specific Dimming Controls
②Power Factor Corrected to <60%
③Power Factor Corrected to >60%
ⱹFor Distribution Only

| Overall Dimensions | | | Mounting Dimensions | | |
|---|---|---|---|---|---|
| Draw # | L | W | H | M | X |
| D5 | 16 3/8 | 2 3/8 | 1 1/2 | 15 25/32 | 1 11/16 |




D

## WIRING DIAGRAMS

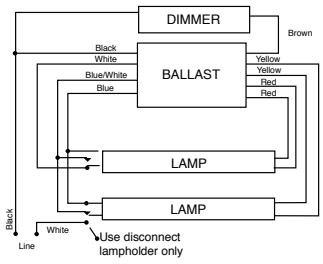



DIAGRAM 18

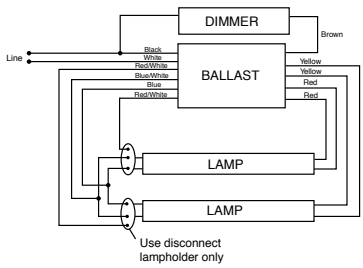



DIAGRAM 16

***WARNING***

*External fuses should not be used with 277-volt dimming ballasts.*

***CAUTION***

*The control circuit line will carry approximately 0.375 amps per 40-watt lamps (and approximately 0.41 amps per 30-watt lamp). This means that the control circuit attached to the ballast brown wire must be sized appropriately. Please note that the ampacity of the control line is approximately double the ampacity requirement of the line when 277-volt dimming ballasts are used. When 120-volt ballasts are used, the ampacity requirement of the control lead is slightly lower than the line current.*

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