# T8

## HIGH FREQUENCY ELECTRONIC BALLASTS

**Instant Start, Normal Light Output**

Parallel

**HIGH POWER FACTOR SOUND RATED A**

*Standard*

ELECTRONIC FLUORESCENT

STANDARD

| Lamp Data Number | Lamp Data Watts | Min. Starting Temp. (°F/°C) | Input Volts | Catalog Number | Certifications UL | Certifications CSA | Line Current (Amps) | Input Power ANSI (Watts) | Ballast Factor | Max. THD % | Power Factor | Dim./ Wiring Diagram |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **F28T8 (48") - Consult www.advancetransformer.com for operating characteristics of these ballasts.** | | | | | | | | | | | | |
| **F32T8/ES (30W)** | | | | | | | | | | | | |
| 1 | 30 | 60/15 | 120 | REL-1P32-SC | ✓ | ✓ | 0.25 | 29 | 0.92 | 20 | 0.98 | Fig. B/63 |
| | | | 277 | VEL-1P32-SC | ✓ | ✓ | 0.11 | | | | | |
| | | | 120 | REL-2P32-SC | ✓ | ✓ | 0.31 | 35 | 1.10 | 25 | 0.93 | Fig. B/*64 |
| | | | 277 | VEL-2P32-SC | ✓ | ✓ | 0.13 | | | | | |
| 2 | 30 | 60/15 | 120 | REL-2P32-SC | ✓ | ✓ | 0.46 | 54 | 0.87 | 20 | 0.98 | Fig. B/64 |
| | | | 277 | VEL-2P32-SC | ✓ | ✓ | 0.20 | | | | | |
| | | | 120 | REL-3P32-SC | ✓ | ✓ | 0.51 | 61 | 1.03 | 20 | 0.99 | Fig. B/*65 |
| | | | 277 | VEL-3P32-SC | ✓ | ✓ | 0.22 | | | | | |
| 3 | 30 | 60/15 | 120 | REL-3P32-SC | ✓ | ✓ | 0.66 | 79 | 0.88 | 20 | 0.99 | Fig. B/65 |
| | | | 277 | VEL-3P32-SC | ✓ | ✓ | 0.29 | | | | | |
| | | | 120 | REL-4P32-SC | ✓ | ✓ | 0.73 | 87 | 1.00 | 20 | 0.99 | Fig. B/*66 |
| | | | 277 | VEL-4P32-SC | ✓ | ✓ | 0.32 | | | | | |
| 4 | 30 | 60/15 | 120 | REL-4P32-SC | ✓ | ✓ | 0.87 | 104 | 0.88 | 20 | 0.99 | Fig. B/66 |
| | | | 277 | VEL-4P32-SC | ✓ | ✓ | 0.38 | | | | | |
| **F32T8, FBO31T8, F32T8/U6** | | | | | | | | | | | | |
| 1 | 32 | 0/-18 | 120 | REL-1P32-SC | ✓ | ✓ | 0.27 | 32 | 0.92 | 20 | 0.98 | Fig. B/63 |
| | | | 277 | VEL-1P32-SC | ✓ | ✓ | 0.12 | | | | | |
| | | | 120 | REL-2P32-SC | ✓ | ✓ | 0.34 | 38 | 1.10 | 25 | | Fig. B/*64 |
| | | | 277 | VEL-2P32-SC | ✓ | ✓ | 0.15 | | | | | |
| | | | 347 | GEL-2P32-SC | ✓ | ✓ | 0.12 | | | | | |
| 2 | 32 | 0/-18 | 120 | REL-2P32-SC | ✓ | ✓ | 0.49 | 58 | 0.87 | 20 | 0.98 | Fig. B/64 |
| | | | 277 | VEL-2P32-SC | ✓ | ✓ | 0.21 | | | | | |
| | | | 347 | GEL-2P32-SC | ✓ | ✓ | 0.17 | 59 | 0.87 | 20 | 0.98 | Fig.B/64 |
| | | | 120 | REL-3P32-SC | ✓ | ✓ | 0.54 | 65 | 1.03 | 20 | 0.99 | Fig. B/*65 |
| | | | 277 | VEL-3P32-SC | ✓ | ✓ | 0.24 | | | | | |
| 3 | 32 | 0/-18 | 120 | REL-3P32-SC | ✓ | ✓ | 0.71 | 85 | 0.88 | 20 | 0.99 | Fig. B/65 |
| | | | 277 | VEL-3P32-SC | ✓ | ✓ | 0.31 | | | | | |
| | | | 120 | REL-4P32-SC | ✓ | ✓ | 0.79 | 94 | 1.00 | 20 | 0.99 | Fig. B/*66 |
| | | | 277 | VEL-4P32-SC | ✓ | ✓ | 0.34 | | | | | |
| | | | 347 | GEL-3P32-RH-TP | | ✓ | 0.26 | 90 | 0.97 | 20 | 0.98 | Fig. A/65 |
| 4 | 32 | 0/-18 | 120 | REL-4P32-SC | ✓ | ✓ | 0.94 | 112 | 0.88 | 20 | 0.99 | Fig. B/66 |
| | | | 277 | VEL-4P32-SC | ✓ | ✓ | 0.41 | | | | | |
| | | | 347 | GEL-4P32-RH-TP | | ✓ | 0.31 | 112 | 0.85 | 20 | 0.98 | Fig. A/66 |
| **F40T8** | | | | | | | | | | | | |
| 2 | 40 | 32/0 | 120 | REL-3P32-SC | ✓ | ✓ | 0.66 | 79 | 1.01 | 20 | 0.99 | Fig. B/*65 |
| | | | 277 | VEL-3P32-SC | ✓ | ✓ | 0.31 | | | | | |
| 3 | 40 | 32/0 | 120 | REL-4P32-SC | ✓ | ✓ | 0.94 | 112 | 0.88 | 20 | 0.99 | Fig. B/*66 |
| | | | 277 | VEL-4P32-SC | ✓ | ✓ | 0.41 | | | | | |
| | | 50/10 | 347 | GEL-3P32-RH-TP | | ✓ | 0.31 | 107 | 0.89 | 15 | 0.98 | Fig. A/65 |
| | | | | GEL-4P32-RH-TP | | ✓ | 0.32 | 108 | 0.89 | 16 | 0.98 | Fig. A/66 |

**See Page 1-12 for Diagrams**

Refer to pages 8-32 to 8-41 for lead lengths and shipping data

## Introduction

High efficiency, high frequency electronic ballasts offer enhanced lighting performance and energy savings. The Electric Power Research Institute estimates that lighting consumes 20-25% of all electric power and that lighting energy accounts for 40% of the average commercial electric bill. The retrofit of existing facilities with modern lighting systems increases productivity and can save over one-half the energy of the original system.

This potential for savings has prompted the EPA (Environmental Protection Agency) to create the Green Lights program. U.S. Corporations, in this voluntary program, retrofit their lighting systems with energy efficient lamps and ballasts whenever economically feasible. The economics of lighting retrofits have never been better. Investment payback is often accelerated by "Demand Side Management" programs from electric utilities that offer incentives in the form of rebates for energy efficient measures.

## Ballast Basics

Modern electronic ballasts operate at a frequency above 20,000 Hz. This high frequency operates lamps more efficiently (10-15% more light output) and eliminates the 60 cycle hum and visible flicker normally associated with electromagnetic ballasts. Modern solid-state circuitry makes the electronic ballast practical, reliable and cooler running.

# LAMP/BALLAST COMPATIBILITY

## Standards and Regulations

Typical lamp specifications include starting voltage, operating current, cathode voltage, crest factor, etc. Electronic ballasts from Advance Transformer are designed to meet the lamp manufacturers specifications and the requirements of:

- ANSI/IEEE C62.41 (American National Standards Institute)
- ANSI C82.11 (American National Standards Institute)
- FCC Part 18 (RFI and EMI)
- UL (Underwriter Laboratories)
- Public Law No. 100-357 (minimum efficiency standards)
- NAECA (National Appliance Energy Conservation Amendments)
- CSA (Canadian Standards Association) where applicable
- The National Electrical Code and all Municipal Electrical Codes.

No fluorescent lighting system will meet expectations unless the lamp and ballasts are properly matched. Proper (electronic ballast/fluorescent lamp/fixture) combinations result in applications with the correct light levels for the task at hand, lamps that provide rated lamp life, and a safe and aesthetically pleasing installation. Advance® electronic ballasts are tested by independent laboratories to ensure compatibility with lamps from all major manufacturers.

## Instant Start

Instant start electronic ballasts are the most popular type of electronic ballast today because they provide maximum energy savings and they start lamps without delay or flashing. Since they do not provide lamp electrode heating, instant start ballasts consume less energy than comparable rapid start, program rapid start or programmed start ballasts. As a result, they provide the most energy efficient solution to fluorescent lamp ballasting. The instant start ballast uses 1.5 to 2 watts less energy per lamp than the rapid start alternative.

## Instant Start (cont'd)

Instant start electronic ballasts provide a high initial voltage (typically 600V for F32T8 lamps) to start the lamp. This high voltage is required to initiate discharge between the unheated electrodes of the lamp. However, the cold electrodes of lamps operated by an instant start ballast may deteriorate more quickly than the warmed electrodes of lamps operated by a rapid start, program rapid start or programmed start ballast. Lamps operated by instant start ballasts will typically withstand 10-15K switch cycles. Instant start ballasts are typically wired in *parallel*. This means that if one lamp fails, the other lamps in the circuit will remain lit.

## Rapid Start

Rapid start ballasts have a separate set of windings which provide a low voltage (approx. 3.5 volts) to the electrodes for one second prior to lamp ignition. A starting voltage somewhat lower than that of instant start ballast (typically 450-550V for F32T8 lamps) is applied, striking an electrical arc inside the lamp. Most rapid start electronic ballasts continue to heat the electrode even after the lamp has started, which results in a power loss of 1.5 to 2 watts per lamp. Lamps operated by a rapid start electronic ballast will typically withstand15-20K switch cycles. Rapid start ballasts are typically wired in *series*. This means that is one lamp fails, all other lamps in the circuit will extinguish.

## Program Rapid Start

The Advance *Centium®* Program Rapid Start (PRS) electronic ballasts have been designed for use with occupancy switches by providing up to 30,000 lamp starts. PRS electronic ballasts precisely heat the lamp cathodes to 650°C with virtually no glow current before applying arc voltage to the lamp. Program rapid start ballasts are typically wired in *series*. However, The Advance *Centium®* PRS ballasts also feature series-parallel lamp operation for the 3 and 4 lamp units. This means that 1 or 2 lamps will continue to operate normally in the event of a single lamp failure.

## Programmed Start

Programmed start (PS) electronic ballasts provide maximum lamp life in frequent starting conditions (up to 50,000 starts). PS ballasts like the Advance Smartmate, Mark 5™, Mark 7® *0-10V*, Mark 10® *Powerline,* and ROVR use a custom integrated circuit (IC) which monitors lamp and ballast conditions to ensure optimal system lighting performance. Like Program rapid start ballasts, PS ballasts also precisely heat the lamp cathodes. However, PS ballasts heat the lamp cathodes to 700°C prior to lamp ignition. This puts the least amount of stress on the lamp electrodes, resulting in maximum lamp life regardless of the number of lamp starts. Programmed start ballasts are typically wired in *series*.

## Ballast Factor

Light output ratings published by lamp manufacturers are based on powering the lamp with a "reference ballast" as specified by ANSI standards. The ballast factor of a particular ballast provides a measure of expected light output.

Advance Transformer offers electronic ballasts with several different ballast factors. This enables the lighting system designer to adjust the lighting level to meet the requirements of a particular application. The lighting system designer can trade watts for lumens by selecting the appropriate ballast.

$$\text{Ballast Factor} = \frac{\text{Lumen output of lamp operated by rated ballast}}{\text{Lumen output of lamp operated by ``reference ballast''}}$$

# ORDERING INFORMATION

## How to Order

Advance Transformer has developed the industry's broadest distribution system for electronic ballasts. More than 3000 stocking distributors nationwide. For information on the distributor best able to serve your needs, please call 800-372-3331.

## Electronic Ballast Part Number Breakdown

| I | CF | - | 2 | S | 26 | - | H1 | - | LD |
|---|---|---|---|---|---|---|---|---|---|

**CFL Mounting/Connector Options**

BS = Bottom mounting studs with single entry color coded connectors
LD = Length mounting feet with SmartMate™ dual entry color coded connectors
LS = Length mounting feet with single entry color coded connectors
QS = QuikStart

**Linear Fluorescent Mounting/Connector Options**

TP* = Thermal Protected
2LS = 2 Level Switching

**CFL Can Desription**

H1 = Hybrid metal / plastic case, size 1
L2 = Linear
M1 = Metal case, size 1
M2 = Metal case, size 2
M3 = Metal case, size 3
M4 = Metal case, size 4
M5 = Metal case, size 5
S1 = Square, style 1
S2 = Square, style 2
SC = Small can

**Linear Fluorescent Can Desription**

90C = 90˚C maximum case temperature rating
HL = High light output
LW = Low watt
MC = Micro can
RH* = Reduced harmonics
S = Slimline
SC = Small can

**Lamp Watts (Primary lamp)**

**Wiring Configuration**

D = 2D, series
M = Modified parallel**
P = Parallel
Q = Quad CFL, series
S = Series
T = Triple CFL, series
TTS = Long twin tube, series
TTP = Long twin tube, parallel

**Maximum Number of Lamps**

**Family Name**

CF = Compact Fluorescent
CN = Centium
DA = ROVR
DA & DL = ROVR
EL = Standard
EZ = Mark 10® *Powerline*
IC = Mark 5®
MB = Matchbox
OP = Optanium
ZT = Mark 7® *0-10V*

**Input Voltage**

G = 347V
H = IntelliVolt-Hi (347V through 480V, 50/60 Hz)
I = IntelliVolt™ (120V through 277V, 50/60 Hz)
R = 120V
V = 277V
X = 220V

Corporate Offices
(800) 322-2086

Press 1
To reach Customer Service
Press 2
If you know the last name and you will reach the spell by name directory
Press 0
Or stay on the line to be connected to the operator

You may dial the four digit extension of the person you want to reach at any time

Visit our web site at
www.advancetransformer.com

Customer Support/
Technical Service
(800) 372-3331
+1 (847) 390-5000 (International)

Dial the four digit extension of the person you want to reach

Press 1
For customer support
Press 2
For technical applications, or warranty information
Press 4
To dial by name

- Plan your lighting installation carefully; consider using the services of a qualified lighting designer
- Consult your local electric utility regarding demand side management rebate programs.
- Select the Advance electronic ballast which best matches the requirements of your application. The technical specifications in this catalog (located on pages 8-14 to 8-30) will be useful in obtaining bids from electrical contractors.
- Contact your local Advance distributor. You will find them to be a helpful supplier of both products and information.

* Many current and all future electronic ballast part numbers will not use the "RH-TP" suffixes even though these ballasts will be thermally protected.
** Parallel Wiring Configuration. However, if one lamp fails, all other lamps in the circuit will extinguish.

# HIGH FREQUENCY ELECTRONIC BALLASTS

T8

## Instant Start, Normal Light Output

Parallel

**HIGH POWER FACTOR** **SOUND RATED A**

*Standard*

ELECTRONIC FLUORESCENT

STANDARD

| Lamp Data Number | Lamp Data Watts | Min. Starting Temp. (°F/°C) | Input Volts | Catalog Number | Certifications UL | Certifications CSA | Line Current (Amps) | Input Power ANSI (Watts) | Ballast Factor | Max. THD % | Power Factor | Dim./ Wiring Diagram |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **F17T8, FBO16T8** | | | | | | | | | | | | |
| 1 | 17 | 0/-18 | 120 | REL-2P17-RH-TP | ✓ | ✓ | 0.19 | 22 | 1.15 | 25 | 0.95 | Fig. A/*64 |
| | | | 277 | VEL-2P17-RH-TP | ✓ | ✓ | 0.09 | | | | | |
| 2 | 17 | 0/-18 | 120 | REL-2P17-RH-TP | ✓ | ✓ | 0.29 | 34 | 0.98 | 20 | 0.98 | Fig. A/64 |
| | | | 277 | VEL-2P17-RH-TP | ✓ | ✓ | 0.13 | | | | | |

| Lamp Data Number | Lamp Data Watts | Min. Starting Temp. (°F/°C) | Input Volts | Catalog Number | Certifications UL | Certifications CSA | Line Current (Amps) | Input Power ANSI (Watts) | Ballast Factor | Max. THD % | Power Factor | Dim./ Wiring Diagram |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **F17T8, FBO16T8** | | | | | | | | | | | | |
| 1 | 17 | 0/-18 | 120 | REL-1P32-SC | ✓ | ✓ | 0.19 | 20 | 0.95 | 30 | 0.90 | Fig. B/63 |
| | | | 277 | VEL-1P32-SC | ✓ | ✓ | 0.08 | | | | | |
| 2 | 17 | 0/-18 | 120 | REL-2P32-SC | ✓ | ✓ | 0.29 | 34 | 0.98 | 30 | 0.98 | Fig. B/64 |
| | | | 277 | VEL-2P32-SC | ✓ | ✓ | 0.13 | | | | | |
| | | | 347 | GEL-2P32-SC | ✓ | ✓ | 0.31 | | 0.92 | 30 | 0.91 | |
| 3 | 17 | 0/-18 | 120 | REL-3P32-SC | ✓ | ✓ | 0.39 | 47 | 0.99 | 20 | 0.99 | Fig. B/65 |
| | | | 277 | VEL-3P32-SC | ✓ | ✓ | 0.17 | | | | | |
| 4 | 17 | 0/-18 | 120 | REL-4P32-SC | ✓ | ✓ | 0.51 | 61 | 0.96 | 20 | 0.99 | Fig. B/66 |
| | | | 277 | VEL-4P32-SC | ✓ | ✓ | 0.22 | | | | | |
| | | | 347 | GEL-4P32-RH-TP | ✓ | ✓ | 0.18 | 56 | 0.88 | 28 | 0.92 | Fig. B/66 |
| **F25T8, FBO24T8** | | | | | | | | | | | | |
| 1 | 25 | 0/-18 | 120 | REL-1P32-SC | ✓ | ✓ | 0.23 | 27 | 0.92 | 25 | 0.96 | Fig. B/63 |
| | | | 277 | VEL-1P32-SC | ✓ | ✓ | 0.10 | | | | | |
| | | | 120 | REL-2P32-SC | ✓ | ✓ | 0.29 | 30 | 1.10 | 30 | 0.90 | Fig. B/*64 |
| | | | 277 | VEL-2P32-SC | ✓ | ✓ | 0.13 | | | | | |
| 2 | 25 | 0/-18 | 120 | REL-2P32-SC | ✓ | ✓ | 0.40 | 47 | 0.90 | 25 | 0.98 | Fig. B/64 |
| | | | 277 | VEL-2P32-SC | ✓ | ✓ | 0.17 | | | | | |
| | | | 347 | GEL-2P32-SC | ✓ | ✓ | 0.14 | 48 | 0.98 | 25 | 0.98 | Fig. B/64 |
| | | | 120 | REL-3P32-SC | ✓ | ✓ | 0.42 | 54 | 1.06 | 20 | 0.99 | Fig. B/*65 |
| | | | 277 | VEL-3P32-SC | ✓ | ✓ | 0.19 | | | | | |
| 3 | 25 | 0/-18 | 120 | REL-3P32-SC | ✓ | ✓ | 0.55 | 66 | 0.93 | 20 | 0.99 | Fig. B/65 |
| | | | 277 | VEL-3P32-SC | ✓ | ✓ | 0.24 | | | | | |
| | | | 347 | GEL-3P32-RH-TP | | ✓ | 0.21 | 70 | 0.95 | 25 | 0.96 | Fig. A/65 |
| | | | 120 | REL-4P32-SC | ✓ | ✓ | 0.62 | 74 | 1.04 | 20 | 0.99 | Fig. B/*66 |
| | | | 277 | VEL-4P32-SC | ✓ | ✓ | 0.27 | | | | | |
| 4 | 25 | 0/-18 | 120 | REL-4P32-SC | ✓ | ✓ | 0.74 | 89 | 0.94 | 20 | 0.99 | Fig. B/66 |
| | | | 277 | VEL-4P32-SC | ✓ | ✓ | 0.32 | | | | | |
| | | | 347 | GEL-4P32-RH-TP | | ✓ | 0.25 | 85 | 0.88 | 25 | 0.96 | Fig. A/66 |

Refer to pages 8-32 to 8-41 for lead lengths and shipping data

**See Page 1-12 for Diagrams**