Fluorescent Ballasts - Electronic - Centium

Electronics Ballasts for T5, T8, T12 and Long Twin Tube Fluorescent Lamps

Reliable and robust, this broad line of Centium high frequency electronic ballasts for T5, T5HO, T8 and T12 fluorescent lamps offers all of the necessary commercial grade specifications plus the added benefits of lamp striation reduction technology making these ballasts compatible with energy saving T8 lamps. This provides your customers with a better energy saving solution than when using standard T8 ballast.

Our Centium ballasts are an optimal choice for a broad range of new construction and retrofit applications within the commercial sector including general office lighting, conference, meeting, and board room applications, indirect and decorative lighting, and new fixture designs requiring smaller ballasts.

NEMA Premium

The following ballasts are NEMA Premium®:
ICN1P32N
ICN2P32N
ICN3P32N
ICN4P32N

As a licensee in the NEMA Premium Ballast Program, Philips Lighting Electronics N.A. has determined that these products meet the NEMA Premium specification for premium energy efficiency.

Ballasts for T5 Fluorescent Lamps Are Now Available in a Smaller Can

Philips Advance Centium ballasts for T5 lamps are now available with our industry leading N-can at 9.5"L x 1.3"W x 1.0"H or T-can at 14.17"L x 1.18"W x 1.06"H, which provides fixture manufacturers increased versatility in their newer generation fixture designs.

Setting Industry Standards for Ballast Efficiency

The National Electrical Manufacturers Association (NEMA) has created this program to help lighting professionals and end users recognize the market's highest-performing ballast products. A selection of Centium ballasts meet these requirements.

Electronic Ballast Fundamentals

The job of a ballast

In all fluorescent lighting systems, the ballast's basic tasks include:

- Providing the proper voltage to establish an arc between the two electrodes.
- Regulating the electric current flowing through the lamp to stabilize light output.

In some fluorescent lighting systems, the ballast also provides a controlled amount of electrical energy to preheat or maintain the temperature of the lamp electrodes at levels specified by the manufacturer. This is required to prevent electrode filaments deteriorating prematurely and shortening the lamp life.

Starting Methods

For many years there were only three types of lighting systems: preheat, rapid start and slimline instant start. With the introduction of electronic ballasts, two additional types of lighting system circuits have been added: instant start and programmed start for T8 lamps. Each requires a special ballast design to operate the lamps in the circuit properly.

Instant start electronic ballasts start lamps without delay (<0.1 second) or flicker by providing a starting voltage that is sufficiently high to start a discharge through the lamps without the need for heating lamp electrodes. For F32T8 systems, the starting voltage is about 600V. The elimination of electrode heating helps maximize energy savings — typically saving 2W per lamp compared to rapid start ballasts[1]. Instant start ballasts are best suited for applications with limited switches each day. Lamps operated by instant start ballasts typically operate 10,000 to 15,000 switch cycles before failure.

Rapid start electronic ballasts start lamps quickly (0.5 — 1.0 second) without flicker by heating the lamp electrodes and simultaneously applying a starting voltage. The starting voltage of about 500V for F32T8 systems is sufficient to start a discharge through the lamps when the electrodes have reached an adequate temperature. Electrode heating continues during operation and typically consumes 2W per lamp. Lamps operated by rapid start ballasts typically operate 15,000 to 20,000 switch cycles before failure.

Programmed start electronic ballasts also start lamps quickly (1.0 -1.5 seconds) without flicker. Programmed start ballasts are designed to maximize lamp life in frequent lamp starting applications such as in areas where occupancy sensor controls are used. Programmed start electronic ballasts precisely heat the lamp electrodes, tightly controlling the preheat duration before applying the starting voltage. This enhancement over rapid start ballasts helps minimize electrode stress and depletion of emitter material, thereby maximizing lamp life. Lamps operated by programmed start ballasts typically operate up to 100,000 switch cycles before failure.

Circuits

Series vs. Parallel. Lighting systems are typically wired in a series or parallel circuit. When a ballast is operating multiple lamps in a series circuit, if one lamp fails, the circuit is opened and all the lamps will extinguish. When a ballast operates multiple lamps in a parallel circuit, the lamps operate independently of each other so, if one lamp fails, the others can keep operating as the circuit between them and the ballast remains unbroken.

.The Language of Ballasts

Input Voltage (dedicated vs. multi). Most ballasts are designed to operate at specific voltages. Newer electronic ballasts, including Philips Advance models that use IntelliVolt technology, offer much greater flexibility and other advantages such as inventory reduction. Today's increasing demands on electrical utilities can cause wide voltage variations during load demand changes which in turn cause light output from lamps operated on dedicated electronic and electromagnetic ballasts to vary with the input voltage changes. With IntelliVolt technology, many Philips Advance ballasts maintain constant light output through nominal input voltage ranges of 120 to 277 volts, thereby compensating for any change in input voltage. Some ballasts operate from 277 to 480 volts or 347 to 480 volts.

Input Watts/ANSI Watts. Input watts published by ballast manufacturers are the total watts consumed by both the ballast and the lamps it operates. ANSI watts are the rating given for a ballast measured under the strict testing procedures specified by ANSI standards and are a dependable measure of this lamp/ballast performance. Energy savings can be determined by comparing the input watts of different lighting systems.

Input watts may be affected by tolerance build-up from the ballast, lamp, input voltage and ambient temperature. The input watts published in this catalog are for nominal conditions only.

Ballast Factor (BF) is the ratio of light output from a lamp operated on a commercial ballast to the light output of that same lamp operated on a "reference ballast" as specified by ANSI standards. Light output ratings published by lamp manufacturers, are based on this "reference ballast".

$$BF = \frac{\text{light output of lamp operated on commercial ballast}}{\text{light output of lamp operated on reference ballast}}$$

Ballast Efficacy Factor (BEF) is the ratio of ballast factor to input watts. This measurement is generally used to compare the efficiency of various lighting systems — higher numbers being more efficient.

$$\text{Ballast Efficacy Factor} = \frac{\text{Ballast Factor x 100}}{\text{Input Watts}}$$

This comparison is only valid, however, for ballasts operating the same number and type of lamps. In order to compare different types of lighting systems, the lumen output of the lamps must also be used.

Ballast Luminous Efficiency (BLE) is the ratio of total lamp arc power to input watts. This is a new metric based solely on electrical measurements.

$$BLE = \frac{\text{Total Lamp Arc Power}}{\text{Input Watts}}$$

See footnote on page 3-65

ELECTRONIC FLUORESCENT BALLASTS

Power Factor (PF) is the measurement of how effectively a ballast converts the voltage and current supplied by the power source into watts of usable power delivered to the ballast and lamps. Perfect power utilization would result in a power factor of one.

$$PF = \frac{\text{Input Watts}}{\text{Input Current x Input Voltage}}$$

A ballast's power factor may be classified under any one of the following categories:

High Power Factor (HPF)	0.90 or greater
Power Factor Corrected (PFC)	0.80 to 0.89
Normal (Low) Power Factor (NPF)	0.79 or less

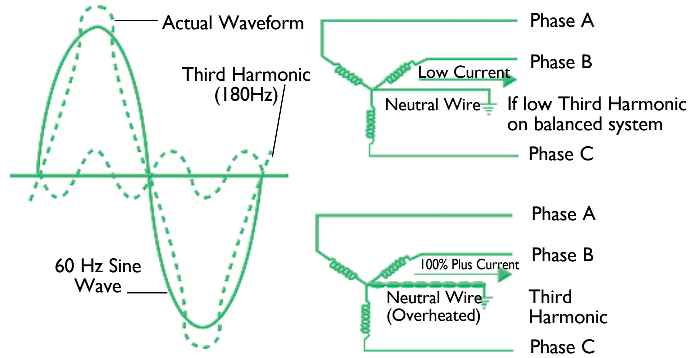
Power factor measurements pertain only to the effective use of power supplied to the ballast. They are not an indication of the ballast's ability to supply light through the lamps. Because low power factor ballasts require about twice the current needed by high power factor ballasts, they allow fewer fixtures per circuit and create added wiring costs. High power factor ballasts are generally specified for all commercial lighting applications.

EMI/RFI. Because they operate at high frequency, electronic ballasts may produce electromagnetic interference (EMI) or radio frequency interference (RFI). RFI frequencies are a subset of EMI frequencies. EMI issues cover all possible operating frequencies while RFI is only concerned with radio and television frequencies. This interference could affect the operation of sensitive electrical equipment, such as radios, televisions or medical equipment. All Philips Advance electronic ballasts incorporate features necessary to afford maximum protection for the operating environment and operate well within regulatory limits.

Ballast Noise. The slight "humming" sound associated with fluorescent lighting systems results from vibration caused by the inherent electromagnetic action in the core-and-coil assembly of the ballasts. All electromagnetic and some electronic ballasts make this sound. Ballasts are assigned a sound rating, "A" through "F", based on the amount of sound produced, with "A" being the quietest. Generally, the larger the lamp and ballast, the higher the sound level and the sound rating will be. Because electronic ballasts have smaller components, they have the lowest sound rating. Some electronic ballasts make almost no sound. There is no ANSI standard for this rating and it is left up to the manufacturer to rate their ballasts.

Inrush Current. All electrical devices including ballasts have an initial current surge that is greater than their steady-state operating current. A standard published by the National Electrical Manufacturers Association (NEMA) — NEMA 410 — Performance Testing for Lighting Controls and Switching Devices with Electronic Fluorescent Ballasts — covers worst-case ballast inrush currents. All circuit breakers and light switches are designed for inrush currents. The electrical system should be designed with this issue in mind.

Total Harmonic Distortion (THD). Harmonic distortion occurs when the wave-shape of current or voltage varies from a pure sine wave. Except for a simple resistor, all electronic devices, including electro-magnetic and electronic ballasts, contribute to power-line distortion. For ballasts, THD is generally considered the percent of harmonic current the ballast adds to the power distribution system. The ANSI standard for electronic ballasts specifies a maximum THD of 32% for commercial applications.. However, most electric utilities now require that the THD of electronic ballasts be 20% or less. Almost all Philips Advance electronic ballasts are rated for either less than 20% THD or less than 10% THD.



Indicates ballast is listed with Underwriters Laboratories, Inc. and complies with UL935 Standard for Fluorescent Lamp Ballasts (File No. E14927).

Visit www.ul.com to find a current listing of Philips Advance ballasts under File No. E14927.

Indicates ballast is certified by Canadian Standards Association and complies with CSA C22.2 No. 74 Standard for Fluorescent Lamp Ballasts (File No. 007310)

Visit www.csa-international.org to find current listing of Philips Advance ballasts under File No. 007310.

Normal Input Voltage	Catalog Number Prefix Code	Label Color Coding
120V	R	Yellow
277V	V	Red
347V	G	Grey
120V to 277V	I	Blue
347V to 480V	H	Purple

RoHS COMPLIANT

Indicates ballast complies with directive 2002/95/EC Restriction of Hazardous Substances

ELECTRONIC FLUORESCENT BALLASTS

Total Harmonic Current

Non-Dimming Applications

When selecting a ballast for a lighting application, the Total Harmonic Current (THC) rating of the ballast is more significant than Total Harmonic Distortion (THD). This is because the absolute value of harmonic current, not the percentage, affects the electrical power distribution system. As can been seen in the table below, the THC rating of our Standard 2-lamp electronic T8 lamp ballast (REL-2P32-SC) is well below that of both the conventional (RQM-2S40-TP) and energy-saving magnetic T12 lamp ballasts (R-2S40-TP) it replaces. Moreover, the THC rating of our Centium electronic ballast is even lower.

Dimming Applications

Mark 7 *0-10V* and ROVR

Traditional low voltage controlled ballasts and ROVR typically produce less than 10% THD at full light output and less than 20% THD throughout the entire dimming range, but require extra wires for the control circuit. THC is lower than that of the conventional or energy-saving magnetic system.

Mark 10 *Powerline*

Mark 10 *Powerline* electronic dimming ballasts are controlled by 2-wire modified powerline phase-cut style line voltage dimmers. Whenever the ballast is dimmed, the input voltage is cut or "chopped", causing the THD to increase and the Power Factor to decrease.

Mark 10 *Powerline* electronic dimming systems (ballast and controller) have similar THD and Power Factor levels as the conventional lighting systems they replace. Since a much smaller load is required by the Mark 10 *Powerline* electronic dimming system to achieve the same illumination level as a magnetic ballast system (20-30% less), the total input current will be considerably less. As a result, the magnitude of the total harmonic current will be less.

For example, a typical Mark 10 *Powerline* electronic ballast and dimmer control might draw a line current of 0.58A at 15% THD at full light output. If the light level is reduced to 5% of the maximum, the input power is decreased to 0.19A at 95% THD. While the THD level may seem high at the 5% maximum light output setting, the total harmonic current is still lower (0.13A) than the conventional T12 magnetic system (0.20A). Moreover, the overall heating effect on the wires and the distribution transformer is not higher than the existing conventional or energy saving T12 magnetic systems.[1]

Conclusions

A simple ballast retrofit to electronic ballasts should not cause harmonic problems if none existed before the retrofit. Also, in new fixture applications, total harmonic distortion should not be a concern when specifying electronic ballasts. Finally, it is important to remember that electronic ballasts are not the greatest source of THD in an electrical distribution system. Other electronic devices such as computers, laser printers, and other electronic equipment can draw current with more than 100% THD in some cases.

Table 1: Comparison of THD and THC Levels

Philips Advance Part No.	Ballast Type	Light Output Setting	Lamp Type	Input Current	% THD	THC[2]
RQM-2S40-TP	Conventional Magnetic	100% (Ballast Factor is 0.98)	(2) F40T12	0.84A	<25%	0.20A
R2S40-TP	Energy Saving Magnetic	100% (Ballast Factor is 0.95)	(2) F34T12	0.63A	<20%	0.12A
REL-2P32-SC	*Standard* Electronic	100% (Ballast Factor is 0.88)	(2) F32T8	0.49A	<20%	0.10A
ICN-2P32-N	*Centium* Electronic	100% (Ballast Factor is 0.88)	(2) F32T8	0.49A	<10%	0.05A
IZT-2S32-SC + Dimming Control	*Mark 7 0-10V* Electronic	100% (Ballast Factor is 1.0)	(2) F32T8	0.57A	<10%	0.05A
IZT-2S32-SC + Dimming Control	*Mark 7 0-10V* Electronic	5% (Ballast Factor is 0.05)	(2) F32T8	0.12A	<20%	0.02A
REZ-2S32-SC (Ballast Only)	*Mark 10 Powerline* Electronic	100% (Ballast Factor is 1.0)	(2) F32T8	0.58A	<10%	0.06A
REZ-2S32-SC + Dimming Control	*Mark 10 Powerline* Ballast + Dimmer	100% (Ballast Factor is 1.0)	(2) F32T8	0.58A	<15%	0.09A
REZ-2S32-SC + Dimming Control	*Mark 10 Powerline* Ballast + Dimmer	5% (Ballast Factor is 0.05)	(2) F32T8	0.19A	<95%	0.13A

[1] For a more technical study comparing the a Mark 10 *Powerline* electronic dimming system to an energy saving magnetic system that it replaces, see the article Total Harmonic Distortion in Philips Advance Mark 10 *Powerline* Electronic Dimming Systems by O.C. Morse.

[2] The Total Harmonic Current (THC) of a ballast is calculated by the following equation: An approximation of THC may be obtained by simply multiplying the ballast input current by %THD.

$$\frac{\text{Ballast Input Current}}{\text{Square Root of } (1 + 1/\text{THD}^2)}$$

ELECTRONIC FLUORESCENT BALLASTS

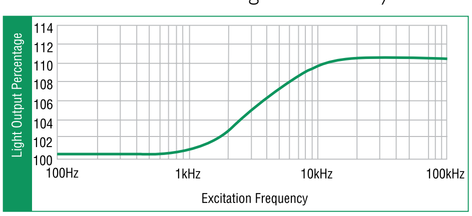
Ballast Life

Philips Advance fluorescent electronic and magnetic ballasts are designed and manufactured to engineering standards correlating to an average life expectancy of 50,000 hours of operation at maximum rated case temperature[2]. Since Philips Advance ballasts operate below their maximum case temperature in the majority of applications, increased ballast life can be expected. As a rule of thumb, ballast life may be doubled for every 10°C reduction in ballast case operating temperature. However, there are many variables, such as input voltage, ambient temperature, etc. which affect ballast operating temperatures, and therefore ballast life.

Lamp Operating Frequency

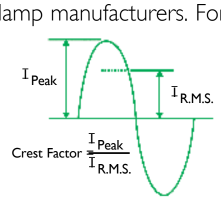
Electromagnetic ballasts and the lamps connected to them operate at an input voltage frequency of 60 Hertz (Hz), 60 cycles per second — which is the standard alternating voltage/current frequency provided in North America. Electronic ballasts, on the other hand, convert this 60 Hz input to operate lamps at much higher frequencies above 20 Kilohertz (kHz), 20,000 cycles per second. Philips Advance ballasts operate above 20 kHz, but avoid certain ranges such as 30-40 kHz (infrared) and 54-62 kHz (theft deterrent systems) due to interference issues.

Because electronic ballasts function at high frequency, the fluorescent lighting systems that they operate can convert power to light more efficiently than systems operated by electromagnetic ballasts (See chart below). For example, lamps operated on electronic ballasts can produce over 10 percent more light then if operated on electromagnetic ballasts at the same power levels. In effect, today's electronic ballasts provide additional energy savings by matching the light output from electromagnetic ballasts while operating the lamps at lower power. This is the main reason why electronic ballast systems are more efficient than magnetic ballast system.



Crest Factor

Lamp manufacturers use crest factor to determine ballast performance as it relates to lamp life. Lamp Current Crest Factor is a measurement of current supplied by a ballast to start and operate the lamp. It is basically the ratio of peak current to RMS (average) current. High crest factor currents may cause the lamp electrodes to wear out faster, reducing lamp life. Crest factor requirements are regulated by ANSI (American National Standards Institute) standards and specified by lamp manufacturers. For rapid start and instant start T8 lamps the ratio is 1.7 maximum, and for instant start slimline lamps, it is 1 .85 maximum.



Weight and Size Advantages

Since electronic components in electronic ballasts are smaller and lighter than the core-and-coil assembly in electromagnetic ballasts, electronic ballasts can weigh less than half as much as comparable electromagnetic models. Almost all Philips Advance electronic ballasts have a smaller cross-section than electromagnetic ballasts but maintain the same mounting dimensions. This means that they can fit into all new fixture designs and can be easily retrofitted into existing fluorescent lighting systems.

Controllability

The ability of a building's occupants to control how they light their space is becoming an increasingly important factor for organizations in determining what real estate they will lease, buy or invest in. The ability to dim the lights or easily shut them off completely is a trend fueled not just by a desire to help the environment, but also by significant economic benefits. These benefits include greater energy efficiency — in terms of reduced HVAC costs as well as energy savings for lighting — more comfortable and productive working environments, and compliance with ever tighter energy efficiency regulations. Philips Advance offers four families of electronic controllable ballasts — ROVR, Mark 7 *0-10V*, Mark 10 *Powerline*, PowerSpec HDF.

Compatibility With Powerline Carrier Systems

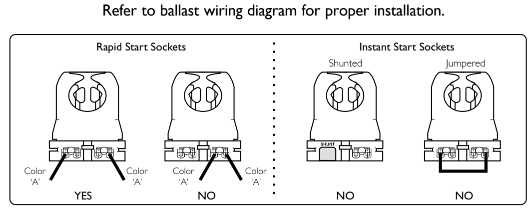
A powerline carrier system (PLC) uses electronic wiring devices to send information via a high frequency signal over the 120V or 277V electrical power distribution system of a building. For example, PLC systems are used in automatic clock systems (master time systems) to synchronize all of the clocks in a building or reset the time after a power outage. They eliminate the need for maintenance personnel to reset hundreds of clocks throughout a facility.

In a PLC system, a generator is used to impose a 1 to 4V high frequency signal on top of the existing voltage sine wave (60 Hz). This signal is generally in the 2500 to 9500Hz range, with some older systems operating at 19,500Hz or higher. Some electronic ballasts which are capacitive can absorb the signal from a PLC system. As a result, the signal becomes too weak to be "heard" by the receiver (like a timeclock) connected to the powerline.

Instant Start vs. Rapid Start Sockets for Dimming

When using dimming ballasts in fixtures, sockets must be of the Rapid Start type. Many fixtures with T-8 Instant Start electronic ballasts use jumpered or "shunted" Instant Start sockets. Controllable ballasts require two distinctly separate wires for each lamp socket. If you encounter shunted or jumpered sockets in a retrofit application, they must be removed and replaced with Rapid Start sockets.

Improper socket application will damage the ballast and void the ballast warranty. Refer to ballast wiring diagram for proper installation.



Fluorescent Lamp Burn-In

Today, most lamp manufacturers do not require the burn-in of linear fluorescent lamps prior to dimming in order to attain rated lamp life and stable electrical measurements. However, some manufacturers of compact fluorescent lamp sources do require a 100 hour burn-in prior to dimming. Consult your lamp manufacturer for their latest requirements.

See footnote on page 3-65

ELECTRONIC FLUORESCENT BALLASTS

Ordering Information

How to Order

Philips Lighting 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

LD – CFL Mounting/Connector Options

BL = Bottom leads
BLS = Bottom leads with mounting studs
BS = Bottom mounting studs with single entry color coded connectors
EL = End leads
LD = Length mounting feet with SmartMate® dual entry color coded connectors
QS = QuikStart

Linear Fluorescent Mounting/Connector Options
2LS = 2 Level Switching
SD = Step Dimming

H1 – CFL Can Description

H1 = Hybrid metal / plastic case, size 1
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
M6 = Metal case, size 6

Linear Fluorescent Can Description
90C = 90°C maximum case temperature rating
A = 'A' can
D = 'D' can
G = 'G' can
HL = High light output
L = 'L' can
LW = Low watt
MC = Micro can
N = 'N' can
SC = Small can
T = 'T' Can

26 – Lamp Watts (Primary lamp)

S – Wiring Configuration

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

2 – Maximum Number of Lamps

CF – Family Name

CF = Compact Fluorescent	CN = Centium
DA = ROVR	DL = ROVR
EB = AmbiStar	ELB = AmbiStar
EZ = Mark 10® *Powerline*	MB = AmbiStar
OP = Optanium	UV = PureVolt
ZT = Mark 7® *0-10V*	

I – Input Voltage

G = 347V
H = IntelliVolt 347V to 480V 50/60 Hz
I = IntelliVolt 120V to 277V 50/60 Hz
R = 120V
V = 277V

Corporate Offices
(800) 322-2086

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

Visit our web site at www.philips.com/advance

- 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 Philips Advance electronic ballast which best matches the requirements of your application. The technical specifications in this catalog (located on pages 9-7 to 9-14) will be useful in obtaining bids from electrical contractors.
- Contact your local Philips Lighting 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.

Remote, Tandem or Through Wiring Distances

Remote Mounting of Electronic Ballasts

Unlike magnetic ballasts, electronic ballasts are limited in remote mounting distance from the lamps they operate. The factors limiting the distance from the electronic ballasts to the lamps are: open circuit voltage as opposed to operating voltage, operating frequency and the lamp operating current.

As the distance from the high frequency electronic ballasts to the lamp increases, so does the capacitance across the lead wire to the lamp. This increase in capacitance is important for two reasons. First, if the capacitance is too high, there will not be sufficient open circuit voltage across the lamp for proper lamp ignition.

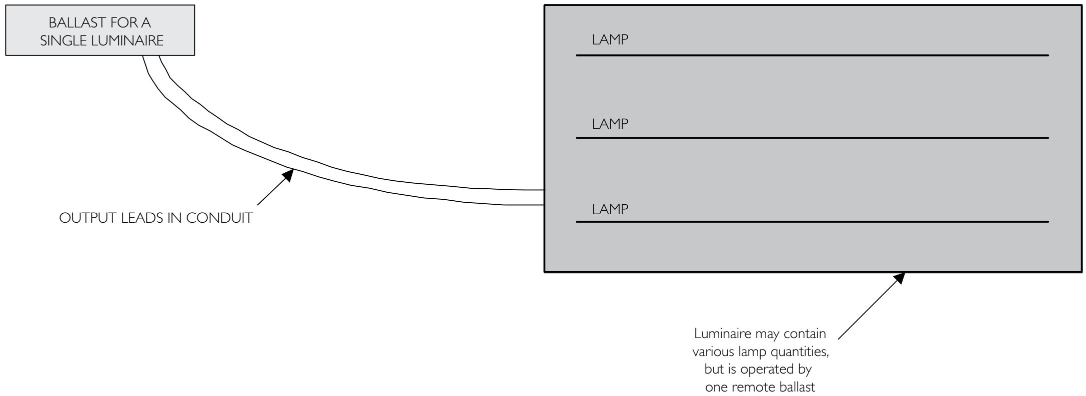
Second, if the lamp is capable of ignition, the increased capacitance will cause a loss in the current to the lamp. The added capacitance creates what is known as a "shunt" around the lamp; in other words the current will leak from the red wire (or blue) to the yellow, completely bypassing the lamp. The current through the lamp will be reduced, resulting in lower lumens, with the possibility that the lamp will not be capable of sustained operation.

The Mark 7 *0-10V*, Mark 10 *Powerline,* PowerSpec HDF, and ROVR dimming ballasts are particularly sensitive to high capacitance associated with long lead wires. The dimming ballast is capable of very low dim levels because constant filament heat is provided to the lamp. If there is any loss of current, the filament current will be reduced and the lamp will begin to flicker, or it will be completely extinguished. It is also important that the red and blue leads not be twisted together. Twisting the red and blue leads will add capacitance, causing the lamp to flicker at the lower dimming levels.

Open circuit voltage is a function of input voltage in some ballast designs, particularly for dedicated voltage ballasts. Cold temperature starting is a function of open circuit voltage. The lead length recommendations in the following table are for normal rated input voltages (120V, 277V, 347V) at 25°C ambient temperature.

In summary, there is a wide range and varying types of electronic ballast architectures that are capable of being remote mounted for an equally wide range of distances. If you are uncertain of the remote mounting restrictions for a particular electronic ballast please consult Philips Lighting Customer Care (Warranty/Technical Service)

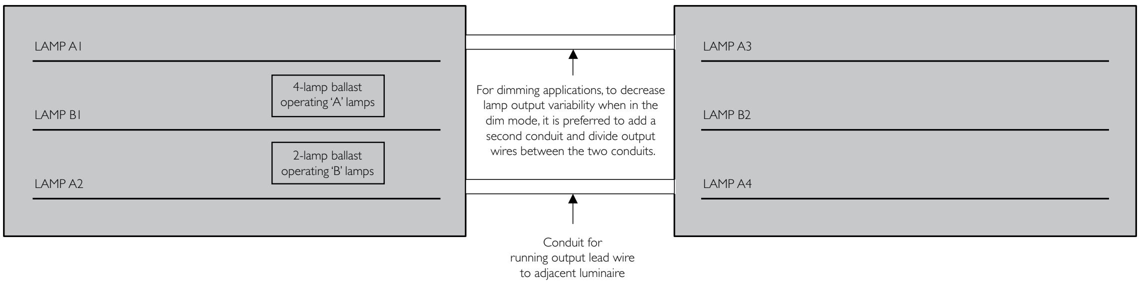
Remote Wiring



Note: Recommended output lead lengths and remote mounting distances should not be exceeded.

ELECTRONIC FLUORESCENT BALLASTS

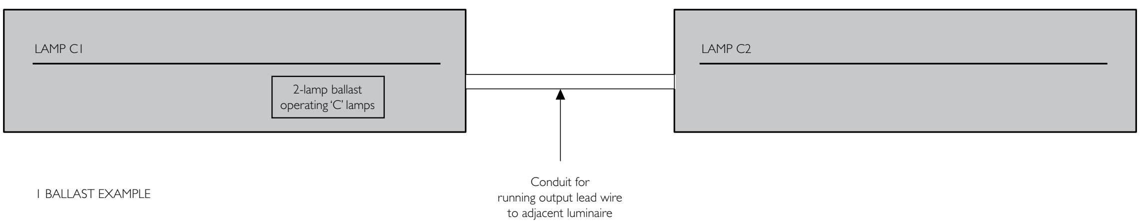
Tandem Wiring



2 BALLAST EXAMPLE

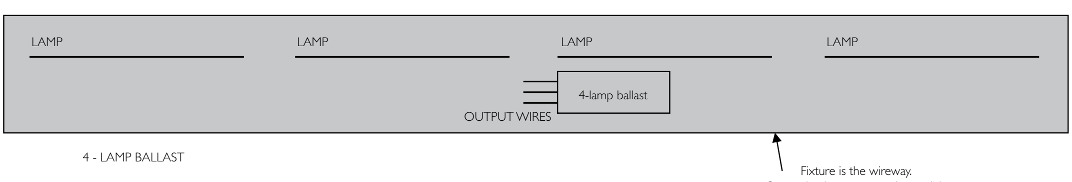
BALLAST 'A' OPERATES OUTBOARD LAMPS
BALLAST 'B' OPERATES INBOARD LAMPS

(2) 3-lamp luminaires shown as an example, but this would also be applicable for any luminaire containing 2-lamps or more

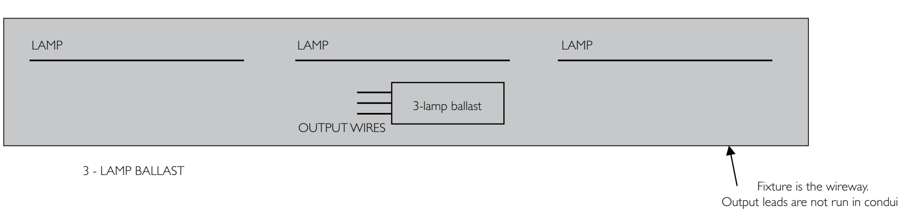


1 BALLAST EXAMPLE

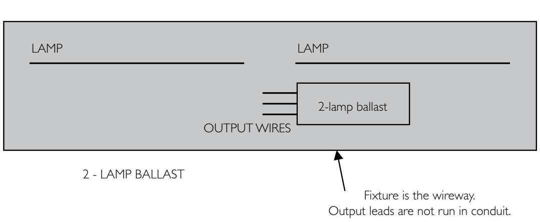
Through Wiring



4 - LAMP BALLAST



3 - LAMP BALLAST



2 - LAMP BALLAST

Note: Ballast should be mounted at center of fixture to minimize lead lengths. Recommended output lead lengths and remote mounting distances (pages 3-14 to 3-18) should not be exceeded.

Diagrams are also aplicable for multiple lamp cross-section luminaires. For example, an 8-foot luminaire with two lamps in cross section and a single 4-lamp ballast.

Philips Fluorescent Dimming Ballast Application Usage

- While installing a Philips fluorescent dimming ballast in a fixture, care should be taken that the output lead lengths do not exceed the specified maximum permissible limits. These limits are specified in the Remote, Tandem or Through Wiring Distance table on the next page.
- If excessive output lead lengths (outside the specification) are maintained for a Philips fluorescent dimming ballast then the ballast may behave undesirably or abnormally at low dim levels.
- If output lead wire lengths are not specified for linear Philips fluorescent dimming ballasts, then it implies that the output lead length should not be extended any more than what was provided with the dimming ballast.
- For Philips CFL dimming ballasts, the output lead length between the ballast and the lamp socket should be maintained as short as possible. It is recommended that this lead length should not exceed 24''.
- Before using a Philips fluorescent dimming ballast in remote mounting applications or for applications with emergency power supplies, please refer to the Remote, Tandem or Through Wiring Distance table on the next page and verify whether the ballast supports remote mounting application.
- If the Philips fluorescent dimming ballast supports remote mounting, then
    - o For non emergency application, the remote mounting distance should not exceed the specified limit.
    - o For applications with emergency power supplies, the total output lead wire length measured from the fluorescent dimming ballast to the lamps sockets (including the emergency ballast wiring) should not exceed the specified limit of the Remote, Tandem or Through Wiring Distance table on the next page.
- If the Philips fluorescent dimming ballast does not support remote mounting, then
    - o For non emergency application, the output lead length should not be extended any further than what was provided with the dimming ballast.
    - o For applications with emergency power supplies, the total output lead wire length measured from the dimming ballast to the lamp sockets (including the emergency ballast wiring) should not exceed the lead length that was provided with the fluorescent dimming ballast. If maintaining the lead lengths within the specification is not possible then it is recommended to use a Philips fluorescent dimming ballast that supports remote mounting. The example below can be used as a reference for an appropriate application usage of a Philips fluorescent dimming ballast.

Example:

A luminaire contains (1) IZT3S32SC Philips Mark 7 *0-10V* fluorescent dimming ballast and (1) emergency ballast in a three lamp, single lamp cross-section, 12' fixture. This application will have issues because of the excessive wire lengths that result in capacitive losses which may cause short lamp life, uneven lamp performance, or even inability to ignite the lamp(s). In such an application it is preferred to use one of the following approaches:

* One IZT2S32SC ballast to control two lamps (can be remote mounted up to 6') and one IZT132SC ballast in conjunction with the emergency ballast to control one lamp. The total output lead length measured from the dimming ballast to the lamps sockets (including the emergency ballast wiring) should be less than 6'.
* One IZT132SC ballast to control one lamp (can be remote mounted up to 6') and one IZT2S32SC ballast in conjunction with emergency ballast to control two lamps. The total output lead length measured from the dimming ballast to the lamps sockets (including the emergency ballast wiring) should be less than 6' (This approach will provide 2 lamps to be turned ON during emergency).

- For additional application support, contact technical support at Philips Lighting.

ELECTRONIC FLUORESCENT BALLASTS

		Allowed Wiring Configuration			Maximum Lead Length (Feet) for Tandem or Through Wiring (Total length of all wires between ballast and lamp sockets)						Application Note
		Remote (max length)	Tandem	Through	Blue	Red	Yellow	Blue/White	Brown	Orange	
GCN-2S28-L		20'	Yes	Yes	10'	10'	10'				2 (f)
GOP-2PSP32-LW-SC		20'	Yes	Yes	20'	20'	18'				1 (e)
GOP-2PSP32-SC		20'	Yes	Yes	20'	20'	18'				1 (e)
GOP-3PSP32-SC		20'	Yes	Yes	20'	20'	18'	18'			1 (e)
GOP-4PSP32-LW-SC		20'	Yes	Yes	20'	20'	18'	18'	18'		1 (e)
GOP-4PSP32-SC		20'	Yes	Yes	20'	20'	18'	18'	18'		1 (e)
GOPA-1P32-LW-SC		8'	Yes	Yes	8'	8'					1 (c)
GOPA-1P32-SC		8'	Yes	Yes	8'	8'					1 (c)
GOPA-2P32-LW-SC		8'	Yes	Yes	8'	8'					1 (c)
GOPA-2P32-SC		8'	Yes	Yes	8'	8'					1 (c)
GOPA-3P32-LW-SC		8'	Yes	Yes	8'	8'					1 (c)
GOPA-3P32-SC		8'	Yes	Yes	8'	8'					1 (c)
GOPA-4P32-LW-SC		8'	Yes	Yes	8'	8'	8'				1 (c)
GOPA-4P32-SC		8'	Yes	Yes	8'	8'	8'				1 (c)
HCN-2S54-90C-WL		20'	Yes	Yes	20'	4'	20'				3
HCN-4S54-90C-2LS-G		20'	Yes	Yes	20'	4'	4'	20'	20'	20'	7
HDF128T5		6'	NA	NA							4
HDF132T8		6'	NA	NA							4
HDF140T5		6'	NA	NA							4
HDF154T5		No	NA	NA							5
HDF224T5		6'	Yes	Yes	6'	6'	6'				1
HDF226T4		No	No	No							5
HDF228T5		6'	Yes	Yes	6'	6'	6'				1
HDF232T8		6'	Yes	Yes	6'	6'	6'				1
HDF239T5		6'	Yes	Yes	6'	6'	6'				1
HDF240T5		6'	No	No							4
HDF242T5		No	No	No							5
HDF254T5		No	No	Yes	5'	4'	4'				3
HDF332T8		No	No	No							5
HDF432T8		No	No	Yes	1'	1.25'	5.2'	1.25'	4.2'		3
HOP-2PSP54-L		20'	Yes	Yes	20'	20'	15'				1
HOP-2PSP32-HL-L		20'	Yes	Yes	20'	20'	18'	18'			1 (e)
HOP-4PSP54-2LS-G		20'	Yes	Yes	20'	20'	15'	15'	15'		1
HOP-4PSP32-HL-G		20'	Yes	Yes	20'	20'	18'	18'	18'		1 (e)
ICF-1D38-H1-LD		15'	NA	NA							4
ICF-2S13-H1-LD	1-Lamp	15'	NA	NA							4
ICF-2S13-M1-BS	2-Lamp	6'	Yes	Yes	2'	6'	6'				2
ICF-2S18-H1-LD	1-Lamp	15'	NA	NA							4
ICF-2S18-M1-BS	2-Lamp	6'	Yes	Yes	2'	6'	6'				2
ICF-2S26-H1-LD	1-Lamp	15'	NA	NA							4
ICF-2S26-M1-BS	2-Lamp	6'	Yes	Yes	2'	6'	6'				2
ICF-2S42-M2-BS	1-Lamp	15'	NA	NA							4
ICF-2S42-M2-LD	2-Lamp	6'	Yes	Yes	2'	6'	6'				2
ICF-2S42-90C-M2-BS	1-Lamp	15'	NA	NA							4
ICF-2S42-90C-M2-LD	2-Lamp	6'	Yes	Yes	2'	6'	6'				2
ICF-2S70-M4-LD		6'	Yes	Yes	2'	6'	6'				2
ICN-132-MC		20'	NA	NA							4
ICN-1P32-N		20'	NA	NA							4
ICN-1S80-T		20'	NA	NA							4
ICN-1TTP40-SC		20'	NA	NA							4
ICN-2M32-MC		20'	Yes	Yes	20'	20'					1

For nominal input voltage and 25°C ambient temperature. See all notes on page 3-18.

ELECTRONIC FLUORESCENT BALLASTS

For 49-80W T5HO Lamps

HIGH POWER FACTOR SOUND RATED A

RoHS COMPLIANT

	Input Volts	Lamp Starting Method	Ballast Family	Catalog Number	Input Power ANSI (Watts)	Ballast Factor	Max. THD %	Line Current (Amps)	Min. Starting Temp. (°F/°C)	Dim.	Wiring Dia.
F54T5/HO (49W)											
1	120-277	PS	Centium	ICN-2S54-N	60	1.10	15	0.50-0.22	-20/-29	N	73
				ICN-2S54-T	57	1.04	10	0.48-0.21		T	
				ICN-2S54-90C-N	60	1.10	15	0.50-0.22		N	
				ICN-2S54-90C-T	57	1.04	10	0.48-0.21		T	
			Optanium	IOP-2PSP54-SC	57	1.00	10	0.47-0.21		B	77
	347-480		Centium	HCN-2S54-90C-WL	58	1.02	10	0.18-0.13		L	73
			Optanium	HOP-2PSP54-L	54-51	1.00	10	0.16-0.10			77
2	120-277	PS	Centium	ICN-2S54-N	110	1.04	10	0.93-0.40	-20/-29	N	74
				ICN-2S54-T	107-104	1.00	10	0.90-0.38		T	
				ICN-2S54-90C-N	110	1.04	10	0.93-0.40		N	
				ICN-2S54-90C-T	107-104	1.00	10	0.90-0.38		T	
			Optanium	IOP-2PSP54-SC	109-105	1.00	10	0.91-0.38		B	78
	347-480		Centium	HCN-2S54-90C-WL	112-109	1.00	10	0.35-0.25		L	74
			Optanium	HOP-2PSP54-L	106-100	1.00	10	0.32-0.20			78
3	120-277	PS	Centium	ICN-4S54-90C-2LS-G	168-165	1.00	10	1.52-0.66	-20/-29	G	75A
			Optanium	IOP-4PSP54-2LS-G	162-159	1.00	10	1.35-0.58			80
	347-480		Centium	HCN-4S54-90C-2LS-G	175-172	1.00	10	0.54-0.39			75A
			Optanium	HOP-4PSP54-2LS-G	160-154	1.00	10	0.47-0.32			80
4	120-277	PS	Centium	ICN-4S54-90C-2LS-G	222-216	1.00	10	2.00-0.86	-20/-29	G	75
			Optanium	IOP-4PSP54-2LS-G	224-208	1.00	10	1.79-0.76			79
	347-480		Centium	HCN-4S54-90C-2LS-G	223-221	1.00	10	0.69-0.50			75
			Optanium	HOP-4PSP54-2LS-G	214-206	1.00	10	0.62-0.43			79
F54T5/HO (54W)											
1	120-277	PS	Centium	ICN-2S54-N	62	1.02	10	0.52-0.23	-20/-29	N	73
				ICN-2S54-T	62	1.04	10	0.53-0.23		T	
				ICN-2S54-90C-N	62	1.02	10	0.52-0.23		N	
				ICN-2S54-90C-T	62	1.04	10	0.53-0.23		T	
			Optanium	IOP-2PSP54-SC	60	1.00	10	0.50 - 0.22		B	77
	347-480		Centium	HCN-2S54-90C-WL	62	1.02	10	0.18-0.13		L	73
			Optanium	HOP-2PSP54-L	62-57	1.00	10	0.18-0.12			77
2	120-277	PS	Centium	ICN-2S54-N	120-116	1.00	10	1.00-0.43	-20/-29	N	74
				ICN-2S54-T	118-115	1.00	10	0.98-0.42		T	
				ICN-2S54-90C-N	120-116	1.00	10	1.00-0.43		N	
				ICN-2S54-90C-T	118-115	1.00	10	0.98-0.42		T	
			Optanium	IOP-2PSP54-SC	117-114	1.00	10	0.98 - 0.41		B	78
	347-480		Centium	HCN-2S54-90C-WL	120-119	1.00	10	0.35-0.25		L	74
			Optanium	HOP-2PSP54-L	116-113	1.00	10	0.35-0.23			78
3	120-277	PS	Centium	ICN-4S54-90C-2LS-G	182-179	1.00	10	1.52-0.66	-20/-29	G	75A
			Optanium	IOP-4PSP54-2LS-G	176-174	1.00	10	1.47-0.83			80
	347-480		Centium	HCN-4S54-90C-2LS-G	188-186	1.04	10	0.54-0.39			75A
			Optanium	HOP-4PSP54-2LS-G	180-174	1.00	10	0.53-0.36			80
4	120-277	PS	Centium	ICN-4S54-90C-2LS-G	240-234	1.00	10	2.00-0.86	-20/-29	G	75
			Optanium	IOP-4PSP54-2LS-G	235-229	1.00	10	1.96-0.83			79
	347-480		Centium	HCN-4S54-90C-2LS-G	239-237	1.00	10	0.69-0.50			75
			Optanium	HOP-4PSP54-2LS-G	240-234	1.00	10	0.70-0.48			79
F80T5/HO (80W)											
1	120-277	PS	Centium	ICN-1S80-T	90-88	1.00	10	0.74-0.32	0/-18	T	73

Refer to page 3-35 to 3-37 for dimensions and wiring diagrams. Refer to pages 9-23 to 9-27 for lead lengths and shipping data