



**Case No.: 10-1604-EL-EEC**

Rule 4901:1-39-05(F), Ohio Administrative Code (O.A.C.), permits a mercantile customer to file, either individually or jointly with an electric utility, an application to commit the customer's existing demand reduction, demand response, and energy efficiency programs for integration with the electric utility's programs. The following application form is to be used by mercantile customers, either individually or jointly with their electric utility, to apply for commitment of such programs implemented during the prior three calendar years.

Completed applications requesting the cash rebate reasonable arrangement option (Option 1) in lieu of an exemption from the rider will be automatically approved on the sixty-first calendar day after filing, unless the Commission, or an attorney examiner, suspends or denies the application prior to that time. Completed applications requesting the exemption from the electric utilities' energy efficiency rider option (Option 2) will not qualify for the 60-day automatic approval.

Complete a separate application for each customer program. Projects undertaken by a customer as a single program at a single location or at various locations within the same service territory should be submitted together as a single program filing, when possible. Check all boxes that are applicable to your program. For each box checked, be sure to complete all subparts of the question, and provide all requested additional information. Submittal of incomplete applications may result in a suspension of the automatic approval process or denial of the application.

If you consider some of the items requested in the application to be confidential or trade secret information, please file a copy of the application under seal, along with a motion for protective order pertaining to the material you believe to be confidential. Please also file a copy of the application in the public docket, with the information you believe to be confidential redacted.

## Section 1: Company Information

Name: FINDLAY-HANCOCK CO LIBRARY

Principal address: 206 Broadway, Findlay, Oh 45840

Address of facility for which this energy efficiency program applies: 206 Broadway St, Findlay, Oh 45840-3329

Name and telephone number for responses to questions:

Jeff Winkle, Findlay-Hancock Co Library, (419) 424-7051 Ext. 260\_

Electricity use by our company (at least one must apply to your company – check the box or boxes that apply):

- ☒ We use more than seven hundred thousand kilowatt hours per year at our facility. (Please attach documentation.)

See Confidential and Proprietary Attachment 4 – Calculation of Rider Exemption and UCT which provides the facility consumption for the last three years, benchmark kWh, and the last 12 months usage.

- ☐ We are part of a national account involving multiple facilities in one or more states. (Please attach documentation.) When checked, see Attachment 6 – Supporting Documentation for a listing of the customer's name and service addresses of other accounts in the AEP Ohio service territory.

## Section 2: Application Information

A) We are filing this application (choose which applies):

- ☐ Individually, on our own.
- ☒ Jointly with our electric utility.

B) Our electric utility is: Ohio Power Company

The application to participate in the electric utility energy efficiency program is  
"Confidential and Proprietary Attachment 3 – Self Direct Program Project  
Completed Application."

C) We are offering to commit (choose which applies):

- ☐ Energy savings from our energy efficiency program. (Complete Sections 3, 5, 6, and 7.)
- ☐ Demand reduction from our demand response/demand reduction program. (Complete Sections 4, 5, 6, and 7.)
- ☒ Both the energy savings and the demand reduction from our energy efficiency program. (Complete all sections of the Application.)

### Section 3: Energy Efficiency Programs

A) Our energy efficiency program involves (choose whichever applies):

- ☒ Early replacement of fully functioning equipment with new equipment. (Provide the date on which you replaced your fully functioning equipment, 12/15/2008 and the date on which you would have replaced your equipment if you had not replaced it early. Please include a brief explanation for how you determined this future replacement date (or, if not known, please explain why this is not known)).

The remaining life of the equipment varies and is not known with certainty. The future replacement date is unknown and has historically been at the end of equipment life. Replacement was completed early to achieve energy savings and to reduce future maintenance costs.

- ☐ Installation of new equipment to replace equipment that needed to be replaced. We installed our new equipment on the following date(s):
- ☐ Installation of new equipment for new construction or facility expansion. We installed our new equipment on the following date(s):

B) Energy savings achieved/to be achieved by your energy efficiency program:

- a) If you checked the box indicating that your project involves the early replacement of fully functioning equipment replaced with new equipment, then calculate the annual savings [(kWh used by the original equipment) - (kWh used by new equipment) = (kWh per year saved)]. Please attach your calculations and record the results below:

Unit Quantity (watts) = Existing (watts x units) - Installed (watts x units)

kWh Reduction (Annual Savings) = Unit Quantity x (Deemed kWh/Unit)

Annual savings: 51,102 kWh

See Confidential and Proprietary Attachment 5 - Self Direct Program Project Calculation for annual energy savings calculations and Attachment 8 - Prescriptive Protocols for the work papers that provide all methodologies, protocols, and practices used in this application for prescriptive measures, as needed.

- b) If you checked the box indicating that you installed new equipment to replace equipment that needed to be replaced, then calculate the annual savings [(kWh used by less efficient new equipment) - (kWh used by the higher efficiency new equipment) = (kWh per year saved)]. Please attach your calculations and record the results below:

Annual savings: kWh

Please describe the less efficient new equipment that you rejected in favor of the more efficient new equipment.

- c) If you checked the box indicating that your project involves equipment for new construction or facility expansion, then calculate the annual savings [(kWh used by less efficient new equipment) - (kWh used by higher efficiency new equipment) = (kWh per year saved)]. Please attach your calculations and record the results below:

Annual savings: kWh

Please describe the less efficient new equipment that you rejected in favor of the more efficient new equipment.

## Section 4: Demand Reduction/Demand Response Programs

A) Our program involves (choose which applies):

- ☒ Coincident peak-demand savings from our energy efficiency program.
- ☐ Actual peak-demand reduction. (Attach a description and documentation of the peak-demand reduction.)
- ☐ Potential peak-demand reduction (choose which applies):

➤ Choose one or more of the following that applies:

- ☐ Our peak-demand reduction program meets the requirements to be counted as a capacity resource under a tariff of a regional transmission organization (RTO) approved by the Federal Energy Regulatory Commission.
- ☐ Our peak-demand reduction program meets the requirements to be counted as a capacity resource under a program that is equivalent to an RTO program, which has been approved by the Public Utilities Commission of Ohio.

B) What is the date your peak demand reduction program was initiated?

The coincident peak-demand savings are permanent installations that reduce demand through energy efficiency and were installed on the date specified in Section 3 A above.

C) What is the peak demand reduction achieved or capable of being achieved (show calculations through which this was determined):

Unit Quantity (watts) = Existing (watts x units) – Installed (watts x units)

KW Demand Reduction = Unit Quantity (watts) x (Deemed KW/Unit (watts))

9.4 kW

See Confidential and Proprietary Attachment 5 – Self Direct Program Project Calculation for peak demand reduction calculation, and Attachment 8 – Prescriptive Protocols for the work papers that provide all methodologies, protocols, and practices used in this application for prescriptive measures, as needed.

## **Section 5: Request for Cash Rebate Reasonable Arrangement (Option 1) or Exemption from Rider (Option 2)**

Under this section, check the box that applies and fill in all blanks relating to that choice.

Note: If Option 2 is selected, the application will not qualify for the 60-day automatic approval. All applications, however, will be considered on a timely basis by the Commission.

A) We are applying for:

☒ Option 1: A cash rebate reasonable arrangement.

OR

☐ Option 2: An exemption from the cost recovery mechanism implemented by the electric utility.

B) The value of the option that we are seeking is:

Option 1: A cash rebate reasonable arrangement, which is the lesser of (show both amounts):

☐ A cash rebate, based on avoided generation cost, of \$\_\_\_\_\_. (Attach documentation showing the methodology used to determine the cash rebate value and calculations showing how this payment amount was determined.)

OR

☒ A cash rebate valued at no more than 50% of the total project cost, which is equal to \$ 2,891.66. (Attach documentation and calculations showing how this payment amount was determined.)

See Confidential and Proprietary Attachment 5 – Self Direct Program Project Calculation for incentive calculations for this mercantile program.

Option 2: An exemption from payment of the electric utility's energy efficiency/peak demand reduction rider.

☐ An exemption from payment of the electric utility's energy efficiency/peak demand reduction rider for \_\_\_\_ months (not to exceed 24 months). (Attach

calculations showing how this time period was determined.)

OR

- ☐ Ongoing exemption from payment of the electric utility's energy efficiency/peak demand reduction rider for an initial period of 24 months because this program is part of an ongoing efficiency program that is practiced by our organization. (Attach documentation that establishes your organization's ongoing efficiency program. In order to continue the exemption beyond the initial 24 month period your organization will need to provide a future application establishing additional energy savings and the continuance of the organization's energy efficiency program.)



## Section 6: Cost Effectiveness

The program is cost effective because it has a benefit/cost ratio greater than 1 using the (choose which applies):

- ☐ Total Resource Cost (TRC) Test. The calculated TRC value is: \_\_\_\_\_  
(Continue to Subsection 1, then skip Subsection 2)
- ☒ Utility Cost Test (UCT) . The calculated UCT value is: 7.0 (Skip to Subsection 2.)

### Subsection 1: TRC Test Used (please fill in all blanks).

The TRC value of the program is calculated by dividing the value of our avoided supply costs (capacity and energy) by the sum of our program costs and our electric utility's administrative costs to implement the program.

Our avoided supply costs were \_\_\_\_\_.

Our program costs were \_\_\_\_\_.

The utility's administrative costs were \_\_\_\_\_.

### Subsection 2: UCT Used (please fill in all blanks).

We calculated the UCT value of our program by dividing the value of our avoided supply costs (capacity and energy) by the costs to our electric utility (including administrative costs and incentives paid or rider exemption costs) to obtain our commitment.

Our avoided supply costs were \$ 22,405.06

The utility's administrative costs were \$ 306.61

The utility's incentive costs/rebate costs were \$ 2,891.66.

## Section 7: Additional Information

Please attach the following supporting documentation to this application:

- Narrative description of your program including, but not limited to, make, model, and year of any installed and replaced equipment.

See Attachment 1 - Self Direct Project Overview and Commitment for a description of the project. See Attachment 6 - Supporting Documentation, for the specifications of the replacement equipment Attachment 8 - Prescriptive Protocols for the work papers that provide all methodologies, protocols, and practices used in this application for prescriptive measures, as needed. Due to the length of time since the equipment replacement, the make, model and year of the replaced equipment is not available.

- A copy of the formal declaration or agreement that commits your program to the electric utility, including:

- 1) any confidentiality requirements associated with the agreement;

See Attachment 2 - Self Direct Program Project Blank Application including Rules and Requirements. All confidentiality requirements are pursuant to the Retrospective Projects/Rules and Requirements that are part of the signed application which is provided as Confidential and Proprietary Attachment 3 - Self Direct Program Project Completed Application.)

- 2) a description of any consequences of noncompliance with the terms of the commitment;

See Attachment 2 - Self Direct Program Project Blank Application including Rules and Requirements. All consequences of noncompliance are pursuant to the Retrospective Projects/Rules and Requirements that are part of the signed application which is provided as Confidential and Proprietary Attachment 3 - Self Direct Program Project Completed Application.

- 3) a description of coordination requirements between you and the electric utility with regard to peak demand reduction;

None required because the resources committed are permanent installations that reduce demand through increased efficiency during the Company's peak summer demand period generally defined as May through September and do not require specific coordination and communication to provide demand reduction capabilities to the Company.

- 4) permission by you to the electric utility and Commission staff and consultants to measure and verify energy savings and/or peak-demand reductions resulting from your program; and,

See Attachment 2 - Self Direct Program Blank Application including Rules and Requirements granting such permission pursuant to the Retrospective Projects/Rules and Requirements that are part of the signed application which is provided as Confidential and Proprietary Attachment 3 - Self Direct Program Project Completed Application.

- 5) a commitment by you to provide an annual report on your energy savings and electric utility peak-demand reductions achieved.

See Attachment 1 - Self Direct Project Overview and Commitment for the commitment to comply with any information and compliance reporting requirements imposed by rule or as part of the approval of this arrangement by the Public Utilities Commission of Ohio.

- A description of all methodologies, protocols, and practices used or proposed to be used in measuring and verifying program results. Additionally, identify and explain all deviations from any program measurement and verification guidelines that may be published by the Commission.

The Company applies the same methodologies, protocols, and practices to Self Direct Program retrospective projects that are screened and submitted for approval as it does to prospective projects submitted through its Prescriptive and Custom Programs. The Commission has not published a technical reference manual for use by the Company so deviations can not be identified. The project submitted is a prescriptive project and energy savings are determined as described in Confidential and Proprietary Attachment 5 - Self Direct Program Project Calculation, and Attachment 8 - Prescriptive Protocols for the work papers that provide all methodologies, protocols, and practices used in this application for prescriptive measures, as needed.



# Public Utilities Commission

Application to Commit  
Energy Efficiency/Peak Demand  
Reduction Programs  
(Mercantile Customers Only)

Case No.: 10-1604-EL-EEC

State of OHIO :

JEFFREY A ROEM Affiant, being duly sworn according to law, deposes and says that:

1. I am the duly authorized representative of:  
  
KEMA Services, Inc agent of Ohio Power
2. I have personally examined all the information contained in the foregoing application, including any exhibits and attachments. Based upon my examination and inquiry of those persons immediately responsible for obtaining the information contained in the application, I believe that the information is true, accurate and complete.
3. I am aware of fines and penalties which may be imposed under Ohio Revised Code Sections 2921.11, 2921.31, 4903.02, 4903.03, and 4903.99 for submitting false information.

[Signature] ENERGY EFFICIENCY ENGINEER  
Signature of Affiant & Title

Sworn and subscribed before me this 24<sup>th</sup> day of NOVEMBER, 2010 Month/Year

[Signature]  
Signature of official administering oath

Angie Doan, Outreach Manager  
Print Name and Title

My commission expires on 01-03-11



ANGIE DOAN  
Notary Public, State of Ohio  
My Commission Expires 01-03-11



### Self Direct Project Overview & Commitment

The Public Utility Commission of Ohio (PUCO) will soon review your application for participation in AEP Ohio's Energy Efficiency/Peak Demand Response program. Based on your submitted project, please select by initialing one of the two options below, sign and fax to 877-607-0740.

<b>Customer Name</b>	<b>FINDLAY-HANCOCK CO LIBRARY</b>	
<b>Project Number</b>	<b>AEP-10-01376</b>	
<b>Customer Premise Address</b>	<b>206 BROADWAY ST, FINDLAY, OH 45840-3329</b>	
<b>Customer Mailing Address</b>	<b>206 Broadway, Findlay, OH 45840</b>	
<b>Date Received</b>	<b>2/25/2010</b>	
<b>Project Installation Date</b>	<b>12/15/2008</b>	
<b>Annual kWh Reduction</b>	<b>51,102</b>	
<b>Total Project Cost</b>	<b>\$31,100.00</b>	
<b>Unadjusted Energy Efficiency Credit (EEC) Calculation</b>	<b>\$3,855.55</b>	
<b>Simple Payback (yrs)</b>	<b>7.2</b>	
<b>Utility Cost Test (UCT)</b>	<b>7.0</b>	
<b>Please Choose One Option Below and Initial</b>		
<b>Option 1 - Self Direct EEC: 75%</b>	<b>\$2,891.66</b>	<input type="checkbox"/> <b>Initial:</b> _____
<b>Option 2 - EE/PDR Rider Exemption</b>	<b>19 Months (After PUCO Approval)</b>	<input type="checkbox"/> <b>Initial:</b> _____

**Note:** This is a one time selection. By selecting Option 1, the customer will receive payment in the amount stated above. Selection of Option 2: EE/PDR rider exemption, will result in the customer not being eligible to participate in any other energy efficiency programs offered by AEP Ohio during the period of exemption. In addition, the term of Option 2: EE/PDR rider exemption is subject to ongoing review for compliance and could be changed by the PUCO.

If Option 1 has been selected, will the Energy Efficiency Funds selected help you move forward with other energy efficiency projects?

\_\_\_\_ YES      \_\_\_\_ NO

#### Project Overview:

The Self Direct (Prescriptive) project that the above has completed and applied is as follows.

Replaced (30) 4' 3L T12 fixtures with (27) 4' 2L T8 fixtures  
Replaced (80) 4' 2L T12 with (63) 4' 3L T8 fixtures  
Replaced (67) 4' 2L T12 fixtures with (35) 4' 2L T8 fixtures  
Installed (10) new hardwired CFL fixtures greater than 30W  
Replaced (6) incandescent exit signs with LED exit signs

The documentation that was included with the application proved that the energy measures applied for were purchased and installed.

*By signing this document, the Mercantile customer affirms its intention to commit and integrate the above listed energy efficiency resources into the utility's peak demand reduction, demand response, and energy efficiency programs. By signing, the Mercantile customer also agrees to serve as a joint applicant in any filings necessary to secure approval of this arrangement by the Public Utilities Commission of Ohio, and comply with any information and compliance reporting requirements imposed by rule or as part of that approval.*

**Ohio Power Company**

**FINDLAY-HANCOCK CO LIBRARY**

By: \_\_\_\_\_

By: \_\_\_\_\_

Title: \_\_\_\_\_

Title: \_\_\_\_\_

Date: \_\_\_\_\_

Date: \_\_\_\_\_



Co./Dept.	Co.
Phone #	Phone # 419-420-3018
Fax #	Fax #

Project # AEP-10-01376  
Docket # OP-10-1604

Attachment 1  
Project Overview & Commitment

Page 2 of 2

### Self Direct Project Overview & Commitment

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Total Project Cost	\$31,100.00
Unadjusted Energy Efficiency Credit (EEC) Calculation	\$3,855.55
Simple Payback (yrs)	7.2
Utility Cost Test (UCT)	7.0
Please Choose One Option Below and Initial	
Option 1 - Self Direct EEC: 75%	\$2,891.66 <input checked="" type="checkbox"/> Initial: <i>SW</i>
Option 2 - EE/PDR Rider Exemption	19 Months (After PUCO Approval) <input type="checkbox"/> Initial:

**Note:** This is a one time selection. By selecting Option 1, the customer will receive payment in the amount stated above. Selection of Option 2: EE/PDR rider exemption, will result in the customer not being eligible to participate in any other energy efficiency programs offered by AEP Ohio during the period of exemption. In addition, the term of Option 2: EE/PDR rider exemption is subject to ongoing review for compliance and could be changed by the PUCO.

If Option 1 has been selected, will the Energy Efficiency Funds selected help you move forward with other energy efficiency projects?

☒ YES ☐ NO

### Project Overview:

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The documentation that was included with the application proved that the energy measures applied for were purchased and installed.

By signing this document, the Mercantile customer affirms its intention to commit and integrate the above listed energy efficiency resources into the utility's peak demand reduction, demand response, and energy efficiency programs. By signing, the Mercantile customer also agrees to serve as a joint applicant in any filings necessary to secure approval of this arrangement by the Public Utilities Commission of Ohio, and comply with any information and compliance reporting requirements imposed by rule or as part of that approval.

Ohio Power Company

By: *John J. Williams*

Title: Manager

Date: 10/05/10

FINDLAY-HANCOCK CO LIBRARY

By: *Jeffrey L. Winkler*

Title: Director

Date: 10-01-10



## Self-Direct Program Project Application

### Application Instructions

- Read the Rules and Requirements for Retrospective Projects before completing an application.
- Complete a separate application form for each installation account number.
- Complete the appropriate Self-Direct Program Excel spreadsheet for each application:
  - The Self-Direct Prescriptive Spreadsheet for specific lighting conversions and installations covered in the Prescriptive Program.
  - The Self-Direct Custom Spreadsheet for lighting improvements not covered in the Prescriptive Program and for any other energy efficiency installation.
- Information necessary for complete applications includes:
  - The Self-Direct Program project description.
  - Full descriptions of each measure replaced and installed along with project costs, existing and new equipment inventories/operation descriptions, baseline and new usage measurements or detailed calculations, total energy and peak demand savings, and other specified information.
  - Detailed customer-approved invoices, proof of purchase, receipts.
  - Technical specifications, studies/proposals, up to five digital photos of the new equipment and, if available, the removed equipment.
  - All other documentation and verification to justify the project for energy efficiency credits (EEC).
  - NOTE: Sending inadequate invoice documentation, incomplete/incorrect forms or incomplete backup information, including detailed energy and peak demand calculations, will delay review of the application. Contact AEP Ohio if you require additional assistance in completing the application.
- Submit all information to AEP Ohio. All completed submissions become the property of AEP Ohio. Make a copy of all documents for your records.

### **FORM SUBMITTAL:** Please note all Rules and Requirements.

Emailed submissions with attachments are preferred.

Return the signed, completed form and all required detailed documentation to:

**Email:** gridSMARTohio@kema.com  
**Mail:** AEP Ohio  
6031 East Main Street, Suite 190  
Columbus, OH 43213  
**Fax:** 877-607-0740  
**Questions:** 877-607-0739

Visit **gridSMARTohio.com** for more information on the Self-Direct Program and other incentive programs offered by AEP Ohio.





## Self-Direct Program Project Application

THIS APPLICATION FORM IS VALID THROUGH DECEMBER 31, 2010.

Will be assigned by AEP Ohio

PROJECT ID: \_\_\_\_\_

Account Qualification (Check one or both if applicable)

☐ 700,000 kWh per year      ☐ National Account or Multiple Facilities (under the same name in Ohio)

### SECTION 1: CUSTOMER INFORMATION

Company Name		Date (mm/dd/yyyy)	
Mailing Address		Contact E-mail*	
City	State	Zip Code	
Contact Name (print)	Phone ( ) -	Fax ( ) -	
Taxpayer ID #/SSN/FEIN (99-9999999)	Tax Status: <input type="checkbox"/> Corporation (Incl. INC, PC, etc.) <input type="checkbox"/> LLC <input type="checkbox"/> Tax Exempt (may receive 1099) <input type="checkbox"/> Individual <input type="checkbox"/> Other		

### SECTION 2: PAYMENT RELEASE AUTHORIZATION (who will receive payment)

Payable to (if different from Customer)		Mailing Address	
City	State	Zip	
Taxpayer ID # of Recipient (if different from Customer) (99-9999999)	Tax Status: <input type="checkbox"/> Corporation (Incl. INC, PC, etc.) <input type="checkbox"/> LLC <input type="checkbox"/> Tax Exempt (may receive 1099) <input type="checkbox"/> Individual <input type="checkbox"/> Other		

### SECTION 3: JOB SITE INFORMATION (where equipment was installed)

Job Site: Customer Name (as it appears on the electric service account)		Project Contact Name	
Job Site Address (physical location)		Project Contact Telephone ( ) -	
City	State	Zip Code	Project Contact Email
Job Site Account Number		Primary Account Number (if different than Job Site)	

Construction Type: ☐ New Construction ☐ Existing Building ☐ Major Renovation

Building Type: ☐ Office ☐ School (K-12) ☐ College ☐ Retail/Service ☐ Restaurant ☐ Hotel/Motel ☐ Medical  
☐ Grocery ☐ Warehouse ☐ Light industry ☐ Heavy Industry ☐ Government/Municipal ☐ Other \_\_\_\_\_

Project In-Service Date	Total Project Cost \$	Incremental Cost** \$
Total Annual kWh Claimed (applicable only to Custom measures)		Peak kW Demand Reduction Claimed (applicable only to Custom measures)

### SECTION 4: CONTRACTOR INFORMATION (equipment or service provider/ installer other than Customer). Attach additional sheets if needed.

Note: internal labor costs are not eligible project costs.

Contractor Name			
Contractor Street Address		City	State      Zip Code
Contractor Contact Name	Contact Telephone ( ) -	Contact Email	

### SECTION 5: CUSTOMER ELECTION (your election in this section does not affect your qualification for EEC payment or EE/PDR rider exemption)

If I choose the energy efficiency credit payment:

- ☐ Yes, I plan to use it for future energy efficiency projects. *Please briefly describe your project here. A pre-approval application will be required to reserve your funds.*
- ☐ No, I have completed all cost-effective energy efficiency projects and intend to use my energy efficiency credit payment for other operational needs.

### SECTION 6: CUSTOMER SIGNATURE

By signing here, I acknowledge the information on this application is accurate and complete. I confirm I have read, agree with and understand the Rules and Requirements of this application and I have the authority to execute on behalf of my company / corporation.

Customer Signature \_\_\_\_\_ Date \_\_\_\_\_

\* By providing your e-mail address, you are granting AEP Ohio permission to send further e-mails regarding our programs and services.

\*\* Cost of higher efficiency equipment option compared to standard efficiency equipment option.



## Self-Direct Program

### Rules and Requirements for Retrospective Projects

Columbus Southern Power Company and Ohio Power Company are collectively known as AEP Ohio ("AEP Ohio"). AEP Ohio provides energy efficiency credits (EEC) for the purchase and installation of qualifying cost-effective equipment in the Customer's facility (the Customer's "Commitment of Resources") under the Rules and Requirements provided in this application and subject to regulatory approvals.

#### Customer Qualifications

The Self-Direct Program (the "Program") applies to customers served at AEP Ohio's retail electric rates who meet the minimum energy usage requirements of 700,000 kWh per year or who are part of a national application involving multiple facilities in one or more states.

#### Terms and Conditions

- THIS APPLICATION FORM IS VALID FOR SUBMITTAL BY CUSTOMERS UNDER THE SELF DIRECT PROGRAM UNTIL DECEMBER 31, 2010. AEP Ohio programs may be changed or cancelled at any time without notice. The Customer and its contractor are solely responsible for contacting AEP Ohio to ask whether or not the program is still in effect and to verify program parameters.
- This application defines the Date of Acceptance.
- For applications submitted in 2010, projects must have a completion date and begun operation between January 1, 2007 and the Date of Acceptance into the Self-Direct Program. Energy efficiency credit levels, as shown in the table below, are based on the calendar year of installation / operation. Customer shall provide proof of equipment installation / operation start-up.
- Customer agrees to commit all energy and demand resources identified in this application to AEP Ohio's energy and demand targets / benchmarks as identified in Senate Bill 221.
- All documentation and verification is subject to strict confidentiality.
- The peak demand hours are defined as weekdays, 7:00 AM to 9:00 PM, May through September.
- All applications are subject to AEP Ohio, its contractor(s) / agent(s), and the Public Utility Commission of Ohio (PUCO) review and approval prior to any EEC payments or exemptions from the Energy Efficiency / Peak Demand Reduction (EE/PDR) Rider under this program.
- Energy efficient equipment must be installed on the AEP Ohio electric account listed on the application.
- EEC payments are limited and subject to availability while program funding lasts.
- While funding is available, the payment will be:
  - 75% of the calculated incentive under the Prescriptive Program, or
  - \$0.06 per annual kWh saved under the Custom Program, whichever is applicable to this project.
  - To ensure maximum program participation, AEP Ohio reserves the right to limit funding per project, per program and per business entity. A sliding scale incentive reduction will be incorporated when the calculated incentive exceeds \$120,000 per project.
- EEC payments will be capped at 37.5% of the project cost.
- In lieu of a one-time EEC payment, the Customer may elect to seek an exemption from the EE/PDR rider for the associated electric account. The exemption is defined in the table below.
- If an exemption is elected, the Customer is not eligible for other Prescriptive and Custom energy efficiency/peak demand reduction programs offered by AEP Ohio during the period of exemption. Unless additional approved resources are committed, the Customer will, after the specified number of months on this Application, be subject to the EE/PDR rider.
- If a one-time EEC payment is elected, the Customer will remain in the EE/PDR rider and may also participate in other AEP Ohio energy efficiency and/or demand reduction programs.
- Eligible measures must produce verifiable and persistent energy and/or demand reduction, for a period of no less than five (5) years from the date of installation, through an increase in efficiency or through the use of load-shifting technologies and/or demand reduction. Measurement and verification may be required.
- Ineligible measures:
  - Rely solely on changes in customer behavior and require no capital investment, or merely terminate existing processes, facilities and/or operations.
  - Are required by state or federal law, building or other codes, or are standard industry practices.
  - Involve fuel switching, plug loads, or generate electricity.
  - Are easily reverted / removed or are installed entirely for reasons other than improving energy efficiency.
  - Include other conditions to be determined by AEP Ohio.

- All equipment must be new; used or rebuilt equipment is not eligible.
- Costs associated with internal labor are not eligible.
- Customer is allowed and encouraged to consider using all or a portion of the EEC payment, as received from AEP Ohio under this program, to help fund other customer-initiated energy efficiency and peak demand reduction projects in the future. Future projects can also qualify for participation in the Prescriptive or Custom Program.
- A signed application with documentation verifying installation of the project including, but not limited to, equipment, equipment specifications, invoices, purchase orders, approvals, photographs and other related information must be submitted to AEP Ohio.
- Customer projects that warrant special treatment (i.e., non-typical projects) will be considered on a case-by-case basis by AEP Ohio.
- AEP Ohio reserves the right to randomly inspect Customer facility(ies) for installation of materials listed on this application and will need access to survey the installed project. Customer understands and agrees that their installations submitted under this Program may also be subject to inspections by the PUCO or their designee, and photographs of installation may be required.
- If the inspection finds that Customer did not comply with program rules and requirements, any payment received under this Program must be returned to AEP Ohio including interest. Any rider exemptions will also be voided. In addition, AEP Ohio reserves the right to withhold payment or exemption for projects that do not meet reasonable industry standards as determined by AEP Ohio.
- AEP Ohio reserves the right to refuse payment and participation if the Customer or contractor violates program rules and requirements. AEP Ohio is not liable for EEC or rider exemptions promised to Customer as a result of program misrepresentation.
- Customer understands and agrees that all other terms and conditions, as specified in the application, including all attachments and exhibits attached to this application, which will serve as a contract for the Customer's commitment of energy and demand resources to AEP Ohio, shall apply.
- AEP Ohio reserves the right to request additional backup information, supporting details, calculations, manufacturer specification sheets, photographs or any other information prior to any payment or exemption.
- Equipment could have been installed in retrofit, replacement, or new construction applications and must meet reasonable industry standards. All equipment / measures must meet minimum cost effectiveness requirements as defined or determined by AEP Ohio. Customer must also provide evidence of measure life.
- AEP Ohio will issue approved EEC payments in the form of checks.
- Customer can not apply for EEC for future projects and elect after the fact to apply for exemption under this program.
- Customer shall be responsible to comply with any applicable codes or ordinances.
- Customer shall be responsible for the proper disposal of all waste and equipment.
- All submissions become the property of AEP Ohio. Keep a copy for your records.

#### Disclaimers

##### AEP Ohio:

- Does not endorse any particular manufacturer, product or system design by offering these EEC.
- Will not be responsible for any tax liability imposed on the Customer as a result of any payment for EEC. AEP Ohio will report EEC payments greater than \$600 as income on IRS form 1099. Such payments shall be taxable unless Customer meets acceptable tax exemption criteria. Customers are encouraged to consult with their tax advisors about the tax liability of any payments.
- Does not expressly or implicitly warrant the performance of installed equipment (contact your contractor or supplier for detailed equipment warranties).
- Is not responsible for the proper disposal/recycling of any waste generated as a result of this project.
- Is not liable for any damage caused by the operation or malfunction of the installed equipment.
- Does not guarantee that a specific level of energy or cost savings will result from the implementation of energy conservation measures or the use of products funded under this program.

OPTION #1 - ONE-TIME PAYMENT	
Energy Efficiency Credit Levels	75% of the calculated Prescriptive incentive payment or \$0.06/annual kWh saved under the Custom Program. Further funding limits may apply.
Min / Max Payback before Energy Efficiency Credit Applied	1 year Min / 7 Year Max Or pass cost effectiveness test(s) (determined by AEP Ohio)

OPTION #2 - EXEMPTION FROM EE / PDR RIDER
Exemption from the EE/PDR rider is determined by comparing the value of the one-time EEC payment with the estimated net present value (NPV) of the EE/PDR rider as calculated by AEP Ohio for the Customer's associated electric account. This NPV is defined as the Customer's financial contribution to AEP Ohio's efforts to reach EE/PDR targets.

## Self-Direct Program

### Retrospective Project Description: Project \_\_\_\_\_ of \_\_\_\_\_

Project Descriptive Name	Project In-service Date
Affected Electric Account Number	

Claimed Project Baseline (AEP Ohio will make the final determination of applicable baseline):

- ☐ Retrofit (the project was an elective retrofit and the equipment was still operable)
- ☐ Replacement (the project was a replacement of equipment at or near the end of its useful life)
- ☐ New (the project was an addition of new equipment in an existing facility or new construction)

Describe the project including detail of energy savings equipment. Attach additional sheets if needed.

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Describe the removed equipment and operating strategy. Please provide up to five digital photos of the equipment, if available. Attach additional sheets if needed.

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Describe the installed equipment and operating strategy. Please provide up to five digital photos of the equipment. Attach additional sheets if needed.

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Describe your calculation method for energy efficiency and attach all documentation of energy savings. Use additional sheets if needed.

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Identify other benefits of proposed project in addition to electrical energy and/or demand reduction:

- |   |  |
|---|--|
| <input type="checkbox"/> Conserves other utilities (gas, water, etc.) | <input type="checkbox"/> Meets environmental regulations |
| <input type="checkbox"/> Improves process flow                        | <input type="checkbox"/> Reduces labor                   |
| <input type="checkbox"/> Improves product quality                     | <input type="checkbox"/> Saves energy                    |
| <input type="checkbox"/> Increases production capacity                | <input type="checkbox"/> Uses fewer raw materials        |
| <input type="checkbox"/> Other _____                                  |  |

## Project Technical Specifications

(This sheet provides an example of the required data for input to the Self-Direct spreadsheet. The Self-Direct spreadsheet provides additional guidance and streamlines the process for collecting, documenting and reporting this information to AEP Ohio, and it follows the format of this sheet. Please provide as much detail as possible on the Self-Direct spreadsheet to expedite review and processing of the application).

Please complete the Self-Direct spreadsheet for each measure installed and provide supporting documentation including engineering or equipment supplier studies, customer-approved invoices, purchase orders, detailed calculations of baseline and energy and peak demand savings. A detailed proposal and complete package will expedite review of application. This information is required by AEP Ohio and/or its consultants for project analysis.

	EQUIPMENT REMOVED OR LOWER EFFICIENCY OPTION	INSTALLED EQUIPMENT OR HIGHER EFFICIENCY OPTION
Equipment type		
Manufacturer of equipment (attach manufacturer specification sheets)		
Model number(s)		
Date of removal / In-service date		
Age of equipment at removal		
Estimated remaining useful life at time of removal or installation		
Efficiency rating		
Nameplate data: kW, tons, HP, watts, etc.		
Quantity		
Annual operating hours		
Annual energy savings (kWh)		
Peak reduction (kW)*		
Annual electric bill savings (\$)		
<b>COST BREAKOUT</b>		
Equipment		
Engineering		
Installation		
Other (explain)		
<b>TOTAL PROJECT COST</b>		
Incremental Cost = Cost of higher efficiency equipment option compared to standard efficiency equipment option.		
<p>* Determination of peak demand reduction (kW) from non-HVAC equipment: For non-HVAC measures, calculate the average kW reduction over the period from 7 a.m. to 9 p.m., weekdays, from May 1 through September 30. The preferred calculation method will estimate hourly kW demands over the peak demand period, and average the results. However, if measures do not vary significantly during those hours, a less rigorous estimation process may be applied if approved in advance by the program.</p> <p>* Determination of peak demand reduction (kW) within HVAC systems: Calculate the maximum HVAC peak demand reduction that occurs between 7 a.m. to 9 p.m. on a weekday from May 1 through September 30.</p>		



## FEATURES & SPECIFICATIONS

### CONSTRUCTION

10% maximum total harmonic distortion (THD).

Series circuit wiring.

Programmed rapid start.

High power factor.

Compatible with Lithonia Lighting fluorescent unit inverters and occupancy sensor switches.

Compatible with LST lengths up to 12' in 2GT8 and 2SP8 fixtures. For LST compatibility in other product families, consult factory.

One-, two-, three- and four-lamp fixtures.

**BALLAST** — Thermally protected, resetting, Class P, non-PCB, UL listed ballast is standard. Minimum line transient as shown in IEE587, Category A, ANSI-62.41. Ballast operates at 120V nominal (108-132V) 60/50 Hz, 277V nominal (249-305V) 60/50 Hz or 347V nominal (312-381V) 60/50 Hz. MVOLT (120-277) 50 Hz or 60 Hz.

Ballast meets 1988 Federal Efficacy Standard (Law 100-357) where applicable. Ballast meets all requirements of ANSI C82.11. Meets FCC rules/regulations Part 18, 15J for EMI/RFI.

Minimum starting temperatures: 0°F for T8 lamps; 50°F for T12 standard lamps; 60°F for T12 energy-saving lamps.

1.7 maximum lamp crest factor.

Power factor  $\geq$  .95.

### LISTING

UL listed and labeled. Listed and labeled to comply with Canadian standards.

### LISTING

Minimum five-year ballast manufacturer's warranty.

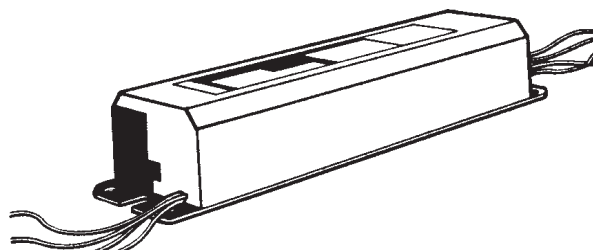
*Specifications subject to change without notice.*

Catalog Number	
Notes	Type

Electronic Ballast Option

# GEB10RS

PROGRAMMED RAPID START



## BALLAST SELECTION

Actual ballast selection based on specified lamp type (see Performance Table, on reverse side). The following are the standard number lamp/number ballast(s) supplied per fixture unless otherwise specified:

<i>Lamps/Fixture</i>	<i>Ballast/Fixture</i>
For:	Use:

1-lamp fixture	One 1-lamp ballast
----------------	--------------------

2-lamp fixture	One 2-lamp ballast
----------------	--------------------

3-lamp fixture	One 1-lamp and one 2-lamp ballast
----------------	-----------------------------------

4-lamp fixture	Two 2-lamp ballasts
----------------	---------------------

To specify one ballast for 3-lamp or 4-lamp operation indicate **1/3** (1 ballast/3 lamps) or **1/4** (1 ballast/4 lamps).

# GEB10RS Electronic Ballast Option, Programmed Rapid Start

## GEB10RS PERFORMANCE MATRIX

	Lamp Nomenclature	Lamp Type	Lamp Wattage	Number of Lamps	Maximum Wattage	Minimum Ballast Factor	Circuit Type <sup>2</sup>	Circuit Wiring	Sound Rating
<b>GEB10RS</b>	U31	T8, 1-5/8" U	Standard	1	39	.88	RS	Series	A
	U316	T8, 6" U		2	62				
				3 <sup>1</sup>	95				
	32	T8, 48"		4 <sup>1</sup>	114				

NOTES:

1 Single ballast operating all lamps in 3- or 4-lamp configuration.

2 RS= Programmed rapid start

## ORDERING INFORMATION

Choose the boldface catalog nomenclature that best suits your needs and write it on the appropriate line.

Example: **2SP8 G 3 32 A12 120 GEB10RS**

<b>Voltage</b>	<b>Ballast quantity</b>	<b>Ballast type</b>
120	(blank) Standard	GEB10RS THD≤10 programmed rapid
277	1/3 One 3-lamp ballast	start
347	1/4 One 4-lamp ballast	
MVOLT		



AN



TYPE: FO1  
JOB NAME: FINDLAY LIBRARY  
CAT#: 2GT8 2 32 A12 MVOLT GEB10IS PAF

## FEATURES & SPECIFICATIONS

### INTENDED USE

Low-profile static luminaire provides general illumination for recessed applications, ideal for restricted plenum spaces.

### ATTRIBUTES

Designed exclusively for use with T8 lamps, electronic ballasts and sockets.

### CONSTRUCTION

Smooth hemmed sides and smooth, inward formed end flanges for safe handling. Lighter weight fixture allows for safe, easy installation.

Standard steel door frame has superior structural integrity with premium extruded appearance and precision flush mitered corners. Steel door allows easy lens replacement without frame disassembly (for lenses up to .156" thick). Powder painted, steel latches provide easy, secure door closure.

Superior mechanical light seal requires no foam gasketing. Integral T-bar clips secure fixture to T-bar system. Housing formed from cold-rolled steel. Acrylic shielding material 100% UV stabilized. No asbestos is used in this product.

### FINISH

Five-stage iron-phosphate pretreatment ensures superior paint adhesion and rust resistance. Painted parts finished with high-gloss, baked white enamel.

### ELECTRICAL SYSTEM

Standard ballast is electronic, thermally protected, resetting, Class P, HPF, non-PCB, UL Listed, CSA certified ballast, universal voltage and sound rated A.

Luminaire is suitable for damp locations. AWM, TFN or THHN wire used throughout, rated for required temperatures.

### LISTING

Standard: UL Optional: Canada — CSA or cUL Mexico — NOM

### WARRANTY

Guaranteed for one year against mechanical defects in manufacture.

US patents: 6,210,025; 6,231,213; 2,288,471

Specifications subject to change without notice.

General Purpose T8 Troffer

GT8 2'x4'

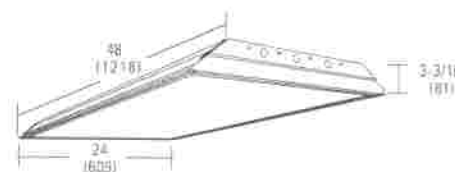


2, 3 or 4 Lamps



### Specifications

Length: 48 (1218)  
Width: 24 (609)  
Depth: 3-3/16 (81)  
Weight: 22 lbs (9.9 kg)



All dimensions are inches (millimeters).

## ORDERING INFORMATION

For shortest lead times, configure product using **standard options** (shown in bold).

Example: 2GT8 4 32 A12 MVOLT 1/4 GEB10IS

2GT8							
Series	Number of lamps	Door, frame	Voltage	Options <sup>2</sup>			
2GT8 2' wide	2 3 4 Not included.	(blank) <b>Flush steel, white</b> FN Flush aluminum, natural FM Flush aluminum, matte black <b>FW Flush aluminum, white</b> RN Regressed aluminum, natural RM Regressed aluminum, matte black <b>RW Regressed aluminum, white</b>	120 277 347 <b>MVOLT</b> Others available.	1/4 One 4-lamp ballast 1/3 One 3-lamp ballast <b>GEB10IS Electronic ballast, ≤10% THD, instant start</b> <b>GEB10RS Electronic ballast, ≤10% THD, rapid start</b> <b>EL Emergency battery pack (nominal 300 lumens)</b> <b>EL14 Emergency battery pack (nominal 1400 lumens)</b> GLR Internal fast-blow fuse GMF Internal slow-blow fuse LST Tandem-wired fixture pairs (shared ballasts) <b>PWS1836 6' prewire, 3/8" dia., 18-gauge, 1 circuit</b> PAF Painted after fabrication LP735 Lamped; 700-series, 3500K LP741 Lamped; 700-series, 4100K JP Palletized and stretch-wrapped without individual cartons; grid trim <b>CSA CSA Certified</b> <b>NOM NOM Certified</b>			
Trim type	Lamp type	Diffuser type					
(blank) <b>Grid</b> F Overlapping flanged	32 32W T8 (48")						

NOTES

1 Available with flush door frames only

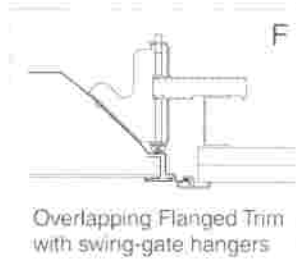
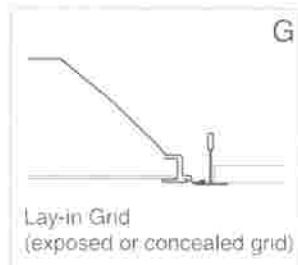
2 MVOLT standard for 120-277V applications, 50-60 Hz operation. Some options require voltage specified.

### NOTES

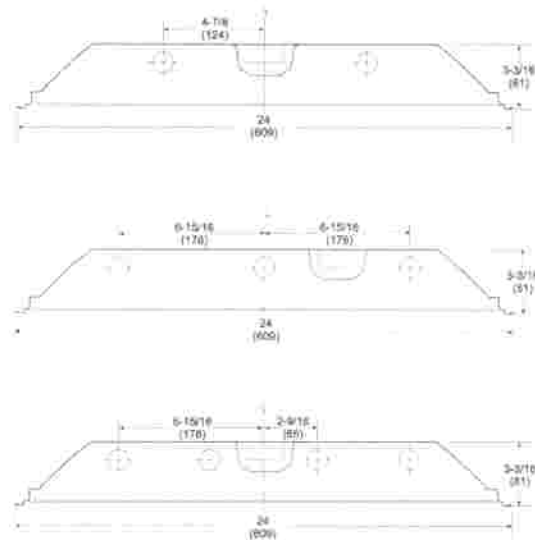
- Available with flush door frames only.
- MVOLT standard for 120-277V applications. 50-60 Hz operation. Some options require voltage specified.

**GT8 2'x4' Static T8 Troffer****MOUNTING DATA**

Continuous row mounting of flanged units requires CRE and CRM trim options (see Options).

**NOTE:**

1. Recommended rough-in dimensions for F-trim fixtures 24"x48" (Tolerance is  $\pm 1/4"$ ).  
Swing-gate range 1-3/16" to 3-15/16". Swing-gate span 23-3/8" to 26-11/16". Fixture  
swing-gate points require additional 1-1/16" over nominal fixture height.

**DIMENSIONS****PHOTOMETRICS**

Calculated using the zonal cavity method in accordance with IESNA LM-41 procedure. Floor reflectances are 20%.  
Lamp configurations shown are typical. Full photometric data on these and other configurations available upon request.

**2GT8 2 3/2 A12****Report LTL 7424**

Lumens per lamp - 2850 - Lum. eff. - 81.7%

S/MH (along) 1.2 (across) 1.4

**Coefficient of Utilization**

Ceiling	80%			70%			50%		
Wall	70%	50%	30%	70%	50%	30%	50%	30%	10%
0	97	97	97	95	95	95	91	91	91
1	89	86	82	87	84	81	80	78	76
2	82	75	70	80	74	69	71	67	63
3	75	67	60	73	65	59	63	58	54
4	69	59	52	67	58	52	56	51	46
5	63	53	46	62	52	46	51	45	40
6	59	48	41	47	47	40	46	40	35
7	54	44	37	53	43	36	42	36	31
8	51	40	33	49	39	33	38	32	28
9	47	37	30	46	36	30	35	29	25
10	44	34	27	43	33	27	32	27	23

**2GT8 3 3/2 A12 1/3****Report LTL 7421**

Lumens per lamp - 2850 - Lum. eff. - 80.1%

S/MH (along) 1.2 (across) 1.4

**Coefficient of Utilization**

Ceiling	80%			70%			50%		
Wall	70%	50%	30%	70%	50%	30%	50%	30%	10%
0	95	95	95	93	93	93	89	89	89
1	88	84	81	85	82	79	79	76	74
2	80	74	69	78	72	68	70	66	62
3	74	66	59	72	64	58	62	57	53
4	68	58	52	66	57	51	55	50	46
5	62	52	45	61	52	45	50	44	40
6	58	47	40	56	47	40	45	39	35
7	54	43	36	52	42	36	41	35	31
8	50	39	33	49	39	32	38	32	28
9	47	36	30	45	36	29	35	29	25
10	44	33	27	43	33	27	32	27	23

**2GT8 4 3/2 A12 1/4****Report LTL 7425**

Lumens per lamp - 2850 - Lum. eff. - 78.6%

S/MH (along) 1.2 (across) 1.4

**Coefficient of Utilization**

Ceiling	80%			70%			50%		
Wall	70%	50%	30%	70%	50%	30%	50%	30%	10%
0	94	94	94	91	91	91	87	87	87
1	86	82	79	84	81	78	77	75	73
2	79	73	68	77	71	67	68	64	61
3	72	64	58	70	63	57	61	56	52
4	66	57	51	65	56	50	54	49	45
5	61	51	45	60	51	44	49	43	39
6	57	47	40	55	46	39	44	39	34
7	53	42	36	51	42	35	40	35	31
8	49	39	32	48	38	32	37	31	27
9	46	35	29	45	35	29	34	29	25
10	43	33	27	42	32	27	32	26	22

**Zonal Lumens Summary**

Zone	Lumens	% Lamp	% Fixture
0-30	1372	24.1	29.4
0-40	2277	39.9	48.9
0-60	3907	68.5	83.9
0-90	4658	81.7	100.0
90-180	0	0	0
0-180	4658	81.7	100.0

**Zonal Lumens Summary**

Zone	Lumens	% Lamp	% Fixture
0-30	2066	24.2	30.2
0-40	3412	39.9	49.8
0-60	5768	67.5	84.2
0-90	6851	80.1	100.0
90-180	0	0	0
0-180	6851	80.1	100.0

**Zonal Lumens Summary**

Zone	Lumens	% Lamp	% Fixture
0-30	2718	23.8	30.3
0-40	4481	39.3	50.0
0-60	7553	66.3	84.2
0-90	8965	78.6	100.0
90-180	0	0	0
0-180	8965	78.6	100.0

**Energy** (Calculated in accordance with NEMA standard LE-5)

LER FL	Annual Energy Cost*	Lamp Description	Lamp Lumens	Balast Factor	Watts
73	\$3.29	(2) 32W T8	2850	.90	58
70	\$3.43	(3) 32W T8	2850	.87	85
73	\$3.29	(4) 32W T8	2850	.88	109

\* Cumulative yearly lighting energy cost per 1000 lumens



## FEATURES & SPECIFICATIONS

### INTENDED USE

Static T8 fixtures provide general illumination for recessed applications; ideal for restricted plenum spaces.

### ATTRIBUTES

Designed exclusively for use with T8 lamps, electronic ballasts and sockets.

### CONSTRUCTION

Smooth hemmed sides and smooth, inward formed end flanges for safe handling. Lighter weight fixture allows safe, easy installation.

Standard steel door frame has superior structural integrity with premium extruded appearance and precision flush mitered corners. Powder-painted, steel latches provide easy, secure door closure.

Superior mechanical light seal requires no foam gasketing. Integral T-bar clips secure fixture to T-bar system. Housing formed from cold-rolled steel. Acrylic shielding material 100% UV stabilized. No asbestos is used in this product.

### FINISH

Five-stage iron-phosphate pretreatment ensures superior paint adhesion and rust resistance. Painted parts finished with high-gloss, baked white enamel.

### OPTICAL

Broad range of lens options available.

### ELECTRICAL SYSTEM

Standard ballast is electronic, thermally protected, resetting, Class P, HPF, non-PCB, UL Listed, CSA certified ballast, universal voltage and sound rated A.

Luminaire is suitable for damp locations, AWM, TFN or THHN wire used throughout, rated for required temperatures.

### LISTING

Standard, UL Optional; Canada — CSA or cUL; Mexico — NOM.

### WARRANTY

Guaranteed for one year against mechanical defects in manufacture.

Specifications subject to change without notice.

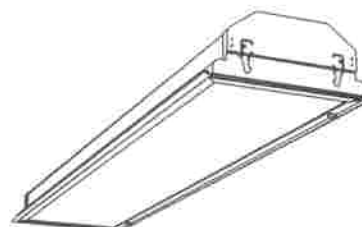
TYPE: FO1A

JOB NAME: FINDLAY LIBRARY

CAT#: GT8 2 32 A12 MVOLT GEB10IS PAF

Static Troffer

GT8 1'x4'



1, 2 or 3 Lamps

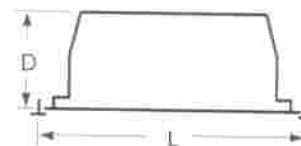
### Specifications

Length: 48 (1218)

Width: 12 (305)

Depth: 4-1/2 (114)

Weight: 17 lbs (7.7 kg)



All dimensions are inches (millimetry)

## ORDERING INFORMATION

For shortest lead times, configure product using **standard options** (shown in bold).

Example: GT8 2 32 A12 MVOLT GEB10IS

GT8		32			
Series	Number of lamps	Door frame		Volts	Options <sup>1</sup>
GT8 1'wide	1 2 3 Not included	(blank) <b>Flush steel</b>		120	1/3 One three-lamp ballast
		FN Flush aluminum, natural		277	<b>GEB10IS</b> Electronic ballast, <10% THD, instant start
		FM Flush aluminum, matte black		347	<b>GEB10RS</b> Electronic ballast, <10% THD, rapid start
		FW Flush aluminum, white		<b>MVOLT</b>	<b>EL</b> Emergency battery pack (nominal 300 lumens)
		RN Regressed aluminum, natural		Others available	<b>EL14</b> Emergency battery pack (nominal 1400 lumens)
		RM Regressed aluminum, matte black			GLR Internal fast-blow fuse
		RW Regressed aluminum, white			GMF Internal slow-blow fuse
Trim type	Lamp type	Diffuser type			<b>PWS1836</b> 6' prewire, 3/8" dia., 18-gauge, 1 circuit
(blank) <b>Grid</b>	32 32W T8 (48")	A12 <b>#12 pattern acrylic</b>			LP Lamped, specify lamp type and color
<b>F</b> Overlapping flanged		A12125 <b>#12 pattern acrylic, 0.125" thick</b>			<b>LP735</b> Lamped, 700-series, 3500K
		A19 #19 pattern acrylic, 0.156" thick			PAF Painted after fabrication (white enamel)
		A15 #15 pattern acrylic, 0.2" thick			SSR Specular silver interior finish 95% reflective
		PC1S 1/2" x 1/2" x 1/2" plastic cube louver, silver			CRE Flanged trim for continuous row mounting (end)
		PC2S 1-1/2" x 1-1/2" x 1" plastic cube louver, silver			CRM Flanged trim for continuous row mounting (middle)
		PC3S 3/4" x 3/4" x 1/2" plastic cube louver, silver			JP Pallentized and stretch-wrapped without individual cartons; grid trim only
				<b>CSA</b>	<b>CSA Certified</b>
				<b>NOM</b>	<b>NOM Certified</b>

NOTE

<sup>1</sup> MVOLT standard for 120-277V applications, 50-60 Hz operation. Some options require voltage specified.

Fluorescent

Sheet #: GT8-1x4

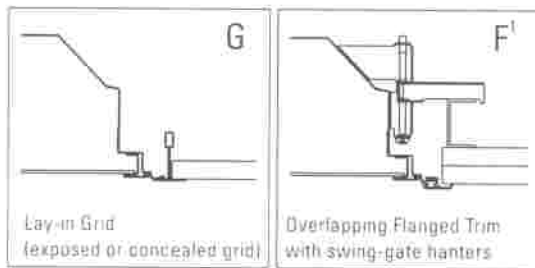
STAT-95



## GT8 1'x4' Static Troffer

### MOUNTING DATA

Continuous row mounting of flanged lights requires CRE and CRM trim options (see Optional)

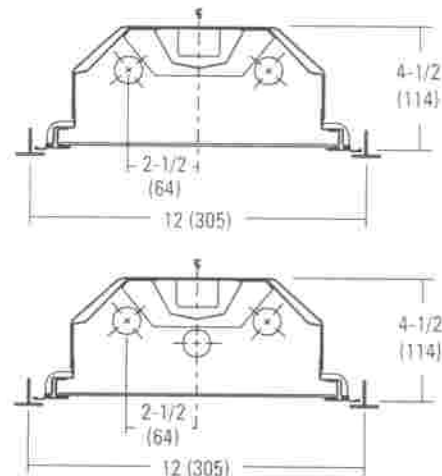


#### NOTE

1. Recommended rough-in dimensions for F trim (fixtures 12"x48") (Tolerance is +1/8", -0"). Swing-gate range 1-9/16" to 3-3/4", depth 10-3/4" to 14-3/4".

### DIMENSIONS

Inches (millimeters). Subject to change without notice.



### PHOTOMETRICS

Calculated using the zonal cavity method in accordance with IESNA (LM) procedure. Floor reflectances are 20%. Lamp configurations shown are typical. Full photometric data for these and other configurations available upon request.

GT8 2 3/2 A12

Report: LTL12536

LUMENS PER LAMP 2850

Luminaire Efficiency: 77.7%

#### Coefficients of Utilization

pc	20%								
	80%			50%			30%		
	70%	50%	30%	50%	30%	10%	50%	30%	10%
0	92	92	92	86	86	86	83	83	83
1	85	82	79	77	74	72	74	72	70
2	78	72	67	68	64	61	66	63	60
3	72	64	58	61	56	52	59	55	51
4	66	58	51	55	50	45	53	48	45
5	61	52	45	49	44	40	48	43	39
6	57	47	40	45	39	35	44	39	35
7	53	43	36	41	36	32	40	35	31
8	49	39	33	38	32	28	37	32	28
9	46	36	30	35	30	26	34	29	26
10	43	33	28	32	27	24	32	27	23

#### Zonal Lumen Summary

Zone	Lumens	% Lamp	% Fixture
0° - 30°	1471	25.6	33.2
0° - 40°	2347	41.2	53.0
0° - 60°	3777	66.3	85.3
0° - 90°	4426	77.7	100.0
90° - 180°	0	0.0	0.0
0° - 180°	4426	77.7	100.0



Sheet #: GT8-1x4

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Lithonia Lighting

Fluorescent

One Lithonia Way, Conyers, GA 30012

Phone: 800-558-7763 Fax: 770-929-8789

www.lithonia.com

AN



TYPE: FO2

JOB NAME: FINDLAY LIBRARY

CAT#: 2PM3N G B 3 32 18LD MVOLT 1/3 GEB10IS PAF

RS

## FEATURES & SPECIFICATIONS

**INTENDED USE** — High performance parabolic luminaires for use in open area applications and electronic offices where optical control, visual comfort and light cut-off are important.

**ATTRIBUTES** — Design optimized for use with T8 lamps and low-profile electronic ballasts.

Choice of diffuse or specular louvers utilizing the latest developments in louver finishing for minimized louver iridescence.

**CONSTRUCTION** — Black reveal provides floating louver appearance, conceals optional air-supply slots.

Square corner end plates improve strength and durability.

Integral T-bar safety clips hold fixture to T-bar securely; no fasteners required.

Heavy-gauge hinges die-formed for maximum strength; spring action latches concealed in black reveal.

Housing formed from cold-rolled steel. Louver formed from anodized aluminum. No asbestos used in this product.

Overlapping flange and modular ceiling trims available factory installed with swing gate hangers or field convertible with optional trim and hangers.

**FINISH** — Five-stage iron phosphate pretreatment ensures superior paint adhesion. Painted parts finished with high-gloss, baked white enamel.

**ELECTRICAL SYSTEM** — Thermally-protected, resetting, Class P, HPF, non-PCB, UL Listed, CSA certified ballast is standard.

Electronic ballasts are sound rated A.

Fixture conforms to UL1570 and is suitable for damp locations. AWM, TFM or THHN wire used throughout, rated for required temperatures.

**LISTING** — UL Listed (Standard), CSA Certified or NDM Certified (see Options).

**WARRANTY** — Guaranteed for one year against mechanical defects in manufacture.

PARAMAX® Parabolic Troffer

# 2PM3N 2'x4'

3" Louver Family



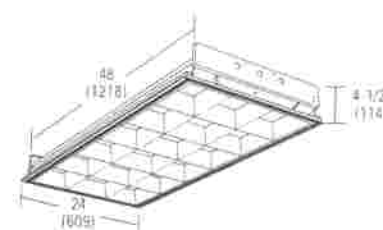
### Specifications

Length: 24 (609)

Width: 48 (1218)

Depth: 4 1/2 (114)

Weight: 32 lbs (14.5 kg)



All dimensions are inches (millimeters). Specifications subject to change without notice.

## ORDERING INFORMATION

For shortest lead times, configure product using **standard options (shown in bold)**.

Example: 2PM3N G B 3 32 18LD MVOLT 1/3 GEB10IS

2PM3N		32		Voltage		Options <sup>2</sup>	
Series	Air function	Lamp type	Number of lamps	MVOLT <sup>2</sup>		(blank)	Two ballasts
2PM3N Paramax 3" louver family	<b>B No air function</b>	<b>32 32W T8 (48")</b>		120		<b>1/3 One 3-lamp ballast</b>	
	A Air supply/return (slots in side trim)			277		<b>1/4 One 4-lamp ballast</b>	
	H Heat removal (through lamp cavity, dampers available)			347		1/41/2 Use with LST. One 4-lamp and one 2-lamp ballast.	
	D Dual function supply/return/removal			Others available.		<b>GEB10IS Electronic ballast, ≤10% THD, instant start</b>	
						<b>GEB10RS Electronic ballast, ≤10% THD, rapid start</b>	
						<b>EL Emergency battery pack (nominal 300 lumens; see Fluorescent battery packs tab)<sup>3</sup></b>	
						<b>EL14 Emergency battery pack<sup>3</sup></b>	
						<b>PWS1836 6' prewire, 3/8" dia., 18-gauge, 3 wires</b>	
						<b>PWS1846 6' prewire, 3/8" dia., 18-gauge, 4 wires</b>	
						<b>QFC313 Reloc Quick-Flex 12/3G, 13" <sup>2,4</sup></b>	
						LST Tandem fixture pairs (shared ballasts)	
						LP Lamped; specify lamp type and color	
						<b>LP735 Lamped</b>	
						GLR Internal fast-blow fuse <sup>5</sup>	
						GMF Internal slow-blow fuse <sup>5</sup>	
						ACS Air closure strips (A and D models only)	
						APB Air-pattern control blades (A and D models only)	
						<b>PAF Painted after fabrication (white enamel)</b>	
						2R Two reflector channel covers <sup>4</sup>	
						<b>JP Palletized and stretch-wrapped (G and MT trim only)</b>	
						CSA CSA Certified	
						NDM NOM Certified	

### NOTES:

- Standard louver configuration:  
2 lamps = 12 cells; diffuse silver  
3 lamps = 18 cells; diffuse silver  
4 lamps = 24 cells; diffuse silver
- MVOLT standard for 120V and 277V applications. Some options require voltage specified.
- Some options increase fixture depth. Consult factory if plenum space is a concern.
- Must specify circuit wiring. Refer to [www.lithonia.com/Reloc](http://www.lithonia.com/Reloc) for additional information.
- Must specify voltage.
- Available with 3-lamp 18 or 24 cell only.

Fluorescent

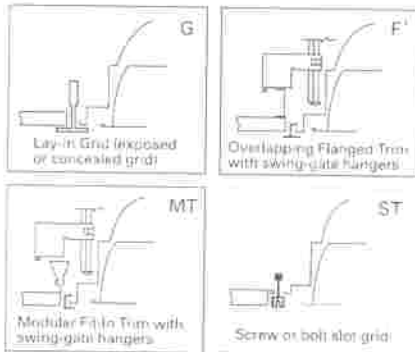
Sheet #: 2PM3N-2x4

PAR-130

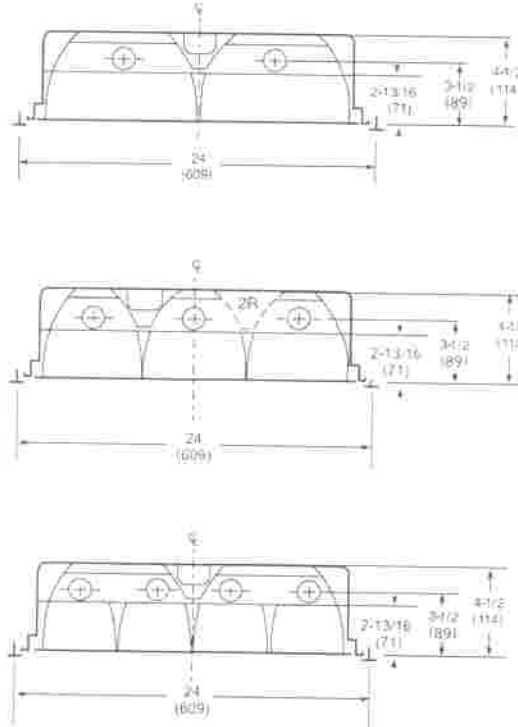
**2PM3N 2'x4' 3" Louver Family****MOUNTING DATA**

Continuous row mounting of flanged units requires CRE and CRM trim options (see trims)

Ceiling Type	Appropriate Trim Type
Exposed grid tee	G
Concealed grid tee	G, ST
Concealed Z-spline	F, MT
Metal pan (consult factory)	MT
Screw slot (consult factory)	ST
Acoustical tile, plaster or plasterboard on rigid support parallel to lamps	F

**NOTE**

1. Recommended rough-in dimensions for F trim fixtures 24"x48" (Tolerance is  $\pm 1/4"$ , 0") Swing-gate range 1-7/16" to 3-7/16", span 23-1/2" to 26-7/16"

**DIMENSIONS****PHOTOMETRICS**

Calculated using the zonal cavity method in accordance with IESNA LM-79 procedures. Floor reflectances are 20%. Lamp configurations shown are typical. Full photometric data on these and other configurations available upon request.

Energy (Calculated in accordance with NEMA standard LE-5)

LERFP	ANNUAL ENERGY COST*	LAMP DESCRIPTION	LAMP LUMENS	EFFECT FACTOR	WATTS
65 (LD louver)	\$3.69	(2) 32WT8	2850	88	59
66 (LD louver)	\$3.64	(3) 32WT8	2850	88	85
59 (LD louver)	\$4.07	(4) 32WT8	2850	88	112

\* Comparative yearly lighting energy cost over 1000 hours.

TEST NO: LTL14495

2PM3N 2'x2' 12LD

LUMENS PER LAMP: 2850

LAMPS PER LUMINAIRE: 2

HCR	pc	Coefficients of Utilization											
		20%				70%				50%			
		50%	30%	10%	10%	50%	30%	10%	10%	50%	30%	10%	10%
0	0	91	91	91	89	89	89	85	85	85	85	85	85
1	1	82	79	76	80	77	75	77	75	73	73	73	73
2	2	72	67	63	71	66	63	68	64	61	61	61	61
3	3	64	58	53	62	57	53	60	56	52	52	52	52
4	4	56	50	45	55	49	45	53	48	44	44	44	44
5	5	50	44	39	49	43	38	48	42	38	38	38	38
6	6	45	38	34	44	38	33	43	37	33	33	33	33
7	7	41	34	29	40	34	29	39	33	29	29	29	29
8	8	37	31	26	36	30	26	35	30	26	26	26	26
9	9	34	28	23	33	27	23	32	27	23	23	23	23
10	10	31	25	21	31	25	21	30	25	21	21	21	21

Zonal Lumen Summary			
Zone	Lumens	% Lamp	% Fixture
0° - 30°	1177.0	20.7	26.9
0° - 40°	2015.8	35.4	46.1
0° - 60°	3919.0	68.8	89.6
0° - 90°	4372.0	76.7	100.0
90° - 180°	0.0	0.0	0.0
0° - 180°	4372.0	76.7	100.0

TEST NO: LTL14671

2PM3N 3'x2' 18LD

LUMENS PER LAMP: 2850

LAMPS PER LUMINAIRE: 3

HCR	pc	Coefficients of Utilization											
		20%				70%				50%			
		50%	30%	10%	10%	50%	30%	10%	10%	50%	30%	10%	10%
0	0	89	89	89	87	87	87	83	83	83	83	83	83
1	1	80	78	75	79	76	74	76	74	72	72	72	72
2	2	71	67	63	70	66	63	67	64	61	61	61	61
3	3	64	58	54	62	57	53	60	56	53	53	53	53
4	4	57	51	46	56	50	46	54	49	45	45	45	45
5	5	51	45	40	50	44	40	49	44	40	40	40	40
6	6	46	40	35	45	39	35	44	39	35	35	35	35
7	7	42	36	31	41	35	31	40	35	31	31	31	31
8	8	38	32	28	36	32	28	37	31	28	28	28	28
9	9	35	29	25	34	29	25	34	29	25	25	25	25
10	10	32	26	23	32	26	23	31	26	22	22	22	22

Zonal Lumen Summary			
Zone	Lumens	% Lamp	% Fixture
0° - 30°	1982.1	23.2	30.9
0° - 40°	3413.2	39.9	53.1
0° - 60°	5866.8	68.6	91.4
0° - 90°	6422.1	75.1	100.0
90° - 180°	0.0	0.0	0.0
0° - 180°	6422.1	75.1	100.0

TEST NO: LTL14541

2PM3N 4'x2' 32LD

LUMENS PER LAMP: 2850

LAMPS PER LUMINAIRE: 4

HCR	pc	Coefficients of Utilization											
		20%				70%				50%			
		50%	30%	10%	10%	50%	30%	10%	10%	50%	30%	10%	10%
0	0	79	79	79	77	77	77	74	74	74	74	74	74
1	1	71	69	67	70	68	66	67	65	64	64	64	64
2	2	64	60	57	63	59	56	60	57	55	55	55	55
3	3	57	53	49	56	52	48	54	51	48	48	48	48
4	4	51	46	42	50	46	42	49	45	42	42	42	42
5	5	46	41	37	46	41	37	44	40	37	37	37	37
6	6	42	37	33	41	36	33	40	36	32	32	32	32
7	7	38	33	29	36	33	29	37	32	29	29	29	29
8	8	35	30	26	33	30	26	34	29	26	26	26	26
9	9	32	27	24	32	27	24	31	27	23	23	23	23
10	10	30	25	22	30	25	22	29	24	21	21	21	21

Zonal Lumen Summary			
Zone	Lumens	% Lamp	% Fixture
0° - 30°	2850.0	23.2	35.1
0° - 40°	4346.4	38.1	57.6
0° - 60°	7076.5	62.1	93.7
0° - 90°	7551.8	66.2	100.0
90° - 180°	0.0	0.0	0.0
0° - 180°	7551.8	66.2	100.0



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## FEATURES & SPECIFICATIONS

### INTENDED USE

For applications that require the clean appearance of a flat-bottom diffuser. Provides high light levels for storage rooms, offices or retail applications.

### ATTRIBUTES

Linear side prisms control brightness, pyramidal bottom prisms minimize lamp image. Diffuser hinges open from either side for easy maintenance. Full depth, white enamel end plates.

### CONSTRUCTION

Die-formed from code gauge cold-rolled steel. Channel cover snaps into place without the use of tools. Full end cap factory installed to reduce job site labor. Diffuser is extruded clear acrylic.

### FINISH

Five-stage iron-phosphate pretreatment ensures superior paint adhesion and rust resistance. Finished with high-gloss, baked white enamel.

### ELECTRICAL SYSTEM

Thermally protected, resetting, Class P, HPF, UL listed, CSA Certified ballast is standard. Energy saving and electronic ballasts are sound rated A. Luminaire is suitable for damp locations. AWM, TFN or THHN wire used throughout, rated for required temperatures.

### INSTALLATION

For surface or stem mounting, individual or row installation.

### LISTING

UL Listed (standard). Optional: Canada CSA or cUL Mexico NOM.

### WARRANTY

Guaranteed for one year against mechanical defects in manufacture.

TYPE: FO3

JOB NAME: FINDLAY LIBRARY

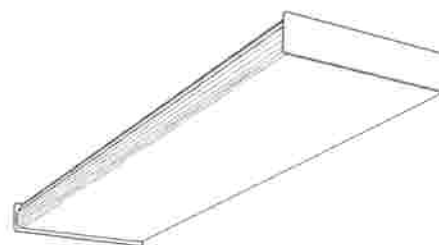
CAT#: SB 2 32 MVOLT GEB10IS

Square-Basket Wraparound

**SB**

**NARROW BODY**

2', 4' or 8' lengths  
2 lamps

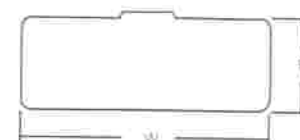


### Specifications

Length: 24" (610), 48" (1219) or 96" (2348)

Width: 8-5/16" (212)

Height: 2-7/8" (73)



All dimensions are inches (millimeters). Specifications subject to change without notice.

## ORDERING INFORMATION

For shortest lead times, configure product using **standard options (shown in bold)**.

Example: SB 2 32 MVOLT GEB10IS

SB 2					
Series/No. lamps		Lamp type	Voltage	Options	
<b>SB 2 2 lamps, 8-1/3" wide</b>		17 17W T8 (24")	120	<b>Shipped installed in fixture</b>	
For tandem double-length unit, add prefix T		<b>32 32W T8 (48")</b>	277	<b>GEB10IS T8 electronic ballast, ≤10 THD, instant start</b>	
Example TSB			347	GEB10PS T8 electronic ballast, ≤10% THD, program start	
			<b>MVOLT<sup>1</sup></b>	EL Emergency battery pack (nominal 300 lumens, see Life Safety section)	
				ELT4 Emergency battery pack (nominal 1200 lumens, see Life Safety section)	
				GLR Internal fast-blow fusing <sup>2</sup>	
				GMF Internal slow-blow fusing <sup>2</sup>	
				RIF1 Radio interference filter (1 per fixture)	
				LSC Lens safety clips (2 per fixture)	
				CSA Listed and labeled to comply with Canadian standards	
				NOM NOM Certified	
				SSR Specular silver interior finish (95% reflective)	
				BDP Ballast disconnect plug (meets codes that require in-fixture disconnect)	
				<b>Accessories (Order as separate catalog number)</b>	
				SQ Swivel stem hanger (specify length in 2' increments)	
				1B Ceiling spacer (1-1/2" to 2-1/2" from ceiling)	
				DSH24 Double stem hanger for 4' fixtures, 24" stems <sup>3</sup>	

### NOTES:

1. Electronic ballast 120V through 277V only.
2. Only available on 2-lamp 4' SB fixtures.
3. Must specify voltage, 120V or 277V.

Fluorescent

Sheet #: SB-N

WRAP-200



# SB Square Basket Wraparound, Narrow Body

## MOUNTING DATA

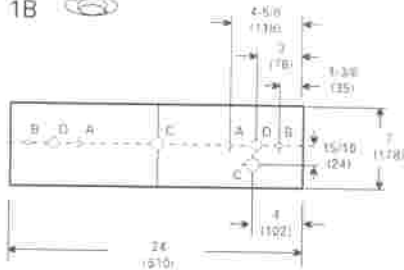
Unit or row installation: Surface or stem mounting.

UNIT INSTALLATION — Minimum of two hangers required.

ROW INSTALLATION — One hanger per fixture plus one per row required.

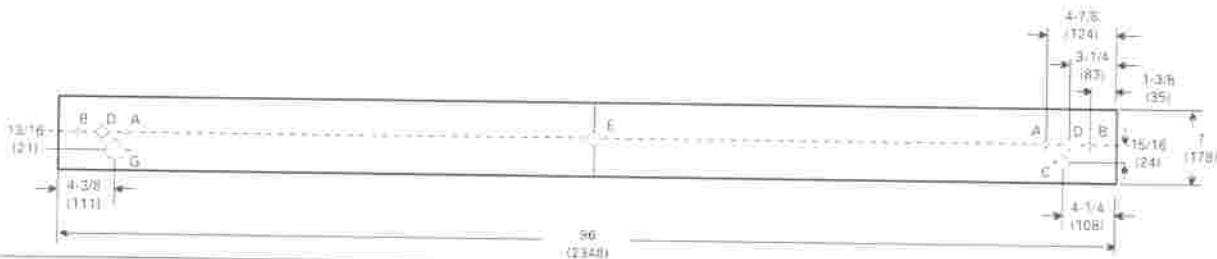
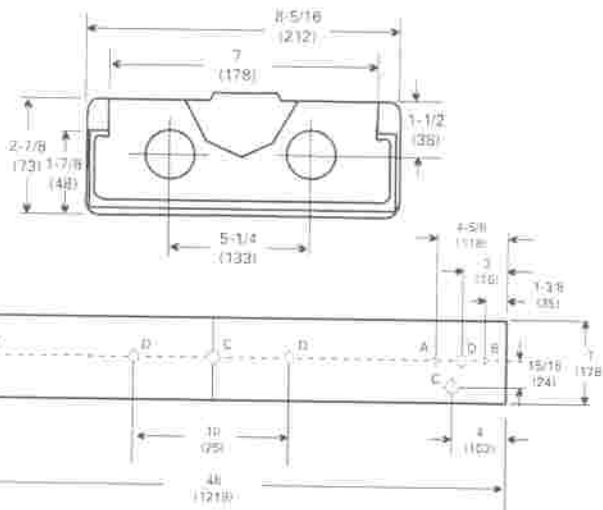


A = 1/4 x 1/2 (64 x 13) Oval Hole  
B = 1/4 x 1/2 (64 x 13) K.O.  
C = 7/8 (22) Dia. K.O.  
D = 11/16 (17) Dia. K.O.  
E = 2 (51) Dia. K.O.



## DIMENSIONS

All dimensions are inches (millimeters). Specifications subject to change without notice.



## PHOTOMETRICS

Calculated using the zonal cavity method in accordance with IESNA LM41 procedure. Floor reflectances are 20%. Lamp configurations shown are typical. All data based on 25°C T<sub>amb</sub> photometric data on these and other configurations available upon request.

### SB 232

Report LTL 5048 – Lumens per lamp = 3050

S/MH (along) 1.2 (across) 1.3

### Coefficient of Utilization

Cavity	80%	70%	60%	50%	40%	30%	20%	10%	0%
0	87	87	87	84	84	84	78	78	65
1	80	76	73	77	74	71	69	67	56
2	73	67	63	70	66	61	61	57	47
3	67	60	54	65	58	53	55	50	41
4	62	54	47	59	52	46	49	44	35
5	57	48	41	55	46	40	44	39	30
6	52	43	37	50	42	36	39	34	27
7	48	39	32	47	38	32	36	30	23
8	45	35	29	43	34	28	32	27	20
9	41	31	25	40	30	25	29	24	18
10	38	28	23	37	28	22	26	21	15

### Zonal Lumens Summary

Zone	Lumens	%Lumens	%Fixture
0-30	1179	19.3	25.7
0-40	1927	31.6	42.0
0-60	3195	52.4	69.7
0-90	3984	65.3	86.9
90-180	601	9.9	13.1
0-180	4586	75.2	100.0



Sheet #: SB-N

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Lithonia Lighting

Fluorescent

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www.lithonia.com



## FEATURES & SPECIFICATIONS

### INTENDED USE

Recessed frame in rated Non-IC. Approved for all ceiling and wiring types.  
New Construction or Remodel applications.

### CONSTRUCTION

Galvanized steel frame. Cutout section on frame for remodel applications.  
Galvanized bar hangers span up to 24" o.c. and feature built in nailer and T-bar clips.  
Galvanized steel junction box with removable access door, four built in romex clamps; six 1/2" knockouts with slots for pryout.  
Maximum 8 (4in 4out), No 12 AWG conductors. Rated for 90° C  
Ground wire provided.

### ELECTRICAL SYSTEM

Class P thermally protected ballast protects against improper contact with insulation. Approved for through branch circuit wiring.  
Multi-volt, 120V through 277V, electronic ballast with end of life protection is standard when ordering an electronic ballast.

### INSTALLATION

2 x 8 wood joist or T-bar installation.  
Expandable bar hangers allow for off-center mounting in wood joist or T-bar ceilings.  
Length of 25-1/4" maximum 13-1/4" minimum or cut to fit 10-1/2" on center joist construction.  
Trim clips hold finishing trim secure and snug to ceiling.  
Maximum ceiling thickness determined by finishing trim. See specific trim page.

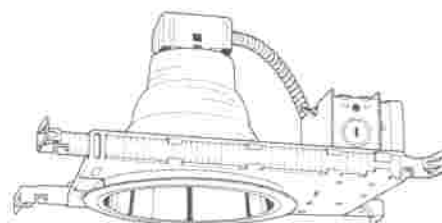
### LISTING

UL Listed for US and Canadian safety standards.  
Damp location listed. (See trim selection for wet location listing.)

TYPE: FO4

JOB NAME: FINDLAY LIBRARY

CAT#: LP6F 42TRT MVOLT 607A TRW



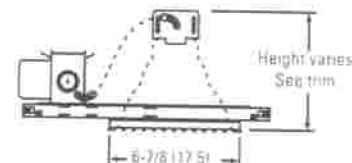
6" Frame-in

**LP6F**

FLUORESCENT

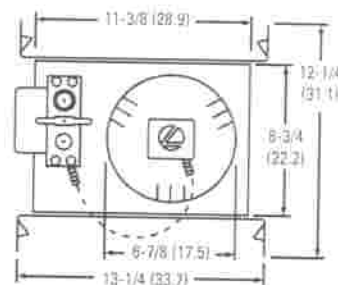
Non-IC

New or Remodel Construction



### Specifications

Height: 3-1/2 (8.9)  
(Trim height varies)  
Length: 13-1/4 (33.7)  
Width: 12-1/4 (31.1)  
Ceiling Opening: 7 (17.8)



All dimensions are inches (centimeters).

## ORDERING INFORMATION

For shortest lead times, configure product using **standard options (shown in bold)**.

Example: LP6F 13D TT/TRT MVOLT 607A

LP6F					
Series	Lamps	Volt	Options		Reflector
<b>LP6F</b>	13D TT <sup>1</sup>	<b>MVOLT<sup>2</sup></b>	ADEZ Advance Mark 10™ electronic dimming ballast; must specify 120V or 277V; requires 4-pin lamp; minimum dimming level 5%	<b>607A</b>	<b>Clear diffuse open</b>
	18D TT <sup>1</sup>	120		<b>607A2</b>	<b>Clear specular open</b>
	26D TT	277		<b>6M1A2</b>	<b>Clear specular multiplier</b>
	<b>13D TT/TRT<sup>1,2</sup></b>	<b>347</b>	DMHL Lutron Compact SE™ electronic dimming ballast, 120V or 277V; requires 4-pin lamp; minimum dimming level 5%	6M1B2	Black specular multiplier
	18D TT/TRT <sup>2</sup>			6M1G2	Gold specular multiplier
	<b>26-42TRT<sup>2</sup></b>		EL Emergency battery pack with integral test switch	<b>6B3</b>	<b>Black baffle with diffuse upper reflector</b>
	26TRT		ELR Emergency battery pack with remote test switch	<b>6B3W</b>	<b>White baffle with diffuse upper reflector</b>
	32TRT		BDP Ballast disconnect plug (meets codes that require in-fixture disconnect)	<b>6B4</b>	<b>Black baffle with white upper reflector</b>
	42TRT		GMF Single slow-blow fuse	<b>6B4W</b>	<b>White baffle with white upper reflector</b>
			WLP 35K lamp (shipped separately)	6W7A	Clear diffuse wallwash
			<b>TRW White flange</b>	<b>6W7A2</b>	<b>Clear specular wallwash</b>
				<b>6LD3</b>	<b>White splay, drop opal glass lens</b>
				6LD83	Black baffle, drop opal glass lens
				<b>6LF3</b>	<b>White splay, flat white glass lens</b>
				6LFB3	Black splay, flat white glass lens
				<b>6L4</b>	<b>White splay, flat fresnel glass lens</b>
				6LB4	Black baffle, flat fresnel glass lens

### NOTES:

- Not available with ADEZ or DMHL.
  - Not available with WLP or DMHL.
  - MVOLT - Electronic multi-volt ballast capable of operating any line voltage from 120-277V, 50 or 60Hz.
- See reflector specification sheets for maximum wattages.

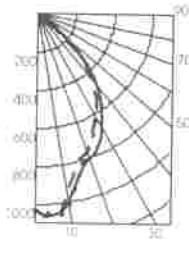
### Accessories:

- Order as separate catalog number.
- CTE Ceiling trim extender
  - LBH 22" extended bar hangers, set of two
  - LCMB Channel bar mounting brackets, set of two
  - LSMC T-bar mounting clips, set of four

## 6" Fluorescent LP6F Photometrics

Distribution curve    Distribution data    Output data    Coefficient of utilization    Single luminaire data 30" above floor

**J7AZ, 32W TRT lamp, 1.0 s/mh, 2400 rated lumens, test no. LTL1604**

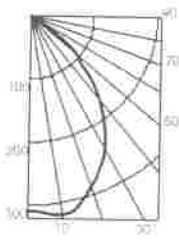


	cp	Lumens	Zone	Lumens	% Lamp	pf	pc	80%				70%				50%			
								50%	30%	50%	30%	50%	30%	50%	30%	50%	30%		
0	1032		0' - 30'	673.9	28.1	0	64	64	62	62	59	59							
5	1060	99	0' - 40'	1022.7	42.6	1	59	57	58	56	55	54							
15	857	243	0' - 60'	1281.7	53.4	2	54	52	53	51	51	50							
25	727	332	0' - 90'	1285.0	53.5	3	50	47	49	46	48	45							
35	560	349	0' - 180'	0.0	0.0	4	46	42	45	42	44	41							
45	333	237	90' - 180'	0.0	0.0	5	42	39	42	38	41	38							
55	9	22				6	39	36	39	35	38	35							
65	2	2	0' - 180'	1285.0	53.5	7	36	33	36	32	35	32							
75	1	1	*Total Efficiency.			8	34	30	33	30	33	30							
85	0	0				9	31	28	31	28	31	28							
90	0	0				10	29	26	29	26	29	26							

Task Height: 2.5h

Initial FC					
Mounting	Center	50% beam	52.0	10% beam	61.4
Height	Beam	Diameter	FC	Diameter	FC
8.0	34.1	5.4	17.1	11.3	3.4
10.0	18.3	7.3	9.2	15.4	1.8
12.0	11.4	9.3	5.7	19.5	1.1
14.0	7.8	11.2	3.9	23.6	0.8
16.0	5.7	13.2	2.6	27.7	0.5

**6B3, 18W TRT lamp, 1.2 s/mh, 1200 rated lumens, test no. 9919**

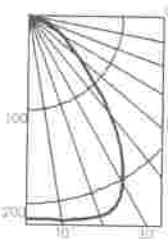


cp		Lumens				pf	20%					
			Zone	Lumens	% Lamp	pc	80%	70%	50%			
pw						pw	50%	30%	50%	30%	50%	30%
5	314	30	0° - 30°	238.9	19.9	0	50	50	49	49	47	47
15	309	86	0° - 40°	366.8	30.6	1	46	45	45	44	44	43
25	267	122	0° - 60°	505.6	42.1	2	42	40	41	40	40	38
35	205	128	0° - 90°	507.8	42.3	3	38	36	38	36	37	35
45	130	99	90° - 180°	0.0	0.0	4	35	32	35	32	34	31
55	44	39				5	32	29	32	29	31	29
65	2	2				6	30	27	29	26	29	26
75	0	0				7	27	24	27	24	26	24
85	0	0				8	25	22	25	22	24	22
90	0					9	23	20	23	20	23	20
						10	22	19	22	19	21	19
*Total Efficiency												

Task Height: 2.5h

Initial FC					
Mounting	Center	50% beam	56.4	10% beam	96.4
Height	Beam	Diameter	FC	Diameter	FC
8.0	10.2	6.4	5.1	12.3	1.0
10.0	5.5	8.7	2.7	16.8	0.5
12.0	3.4	11.0	1.7	21.2	0.3
14.0	2.3	13.3	1.2	25.7	0.2
16.0	1.7	15.6	0.8	30.2	0.2

**6L4, 18W TRT lamp, 1.24 s/mh, 1200 rated lumens, test no. LTL9685**



cp Lumens			Zone	Lumens	% Lamp	pf	20%					
							pc	80%	70%	50%		
pw	50%	30%	50%	30%	50%	30%						
5	218	21	0° - 30°	185.8	15.5	0	46	46	45	45	43	
15	224	64	0° - 40°	292.8	24.4	1	41	40	40	39	38	
25	223	101	0° - 60°	416.6	34.7	2	37	35	36	34	33	
35	173	107	0° - 90°	461.9	38.5	3	33	31	33	30	29	
45	98	77	90° - 180°	0.0	0.0	4	30	27	30	27	26	
55	52	47				5	27	24	27	24	24	
65	29	29	0° - 180°	461.9	38.5	6	25	22	25	22	21	
75	13	14				7	23	20	23	20	22	
85	1	2				8	21	18	21	18	20	
90	0					9	19	17	19	16	19	
						10	18	15	18	15	17	

Task Height: 2.5h

Initial FC					
Mounting	Center	50% beam	66.4	10% beam	97.4
Height	Beam	Diameter	FC	Diameter	FC
8.0	7.2	7.2	3.6	12.5	0.7
10.0	3.9	9.8	1.9	17.1	0.4
12.0	2.4	12.4	1.2	21.6	0.2
14.0	1.6	15.0	0.8	26.2	0.2
16.0	1.2	17.7	0.6	30.7	0.1

## FEATURES

- Trim, low-profile design, only 1-3/16" deep.
- Flattened knockouts for cleaner appearance.
- Snap-fit channel cover attachment. No tools required for wire-way access.
- Hinged, removable channel cover allows hands-free wiring and quick installation.
- Factory-installed starters on all preheat models.
- Romex/BXR conduit connector provided with each fixture.
- Optional instant-on electronic start magnetic ballast for flicker-free lamp start.
- Low-brightness, linear prismatic diffuser provides improved visual comfort.
- 15% DR acrylic and snap-fit diffuser design for improved shatter-resistant and positive attachment.
- Optional task diffuser with clear linear prismatic bottom and opaque front for maximum illumination without direct edge glare.
- Five fixture lengths available.
- Available with factory-installed lamp, switch, cordset and convenience outlet options.

## SPECIFICATIONS

**BALLAST** — Normal power factor reactor type ballast standard. Others available (See ordering information).

**WIRING & ELECTRICAL** — Fixture conforms to UL 1570 and is suitable for damp locations. AWM, TFN or THHN wire used throughout, rated for required temperatures.

**MATERIALS** — Metal parts precision roll-formed from 20 gauge cold rolled steel.

**FINISH** — Five-stage iron-phosphate pre-treatment ensures superior paint adhesion and rust resistance. Painted parts finished with polyester powder paint.

**LISTING** — UL listed and labeled. Listed and labeled to comply with Canadian and Mexican Standards.

Specifications subject to change without notice.

TYPE: FO5

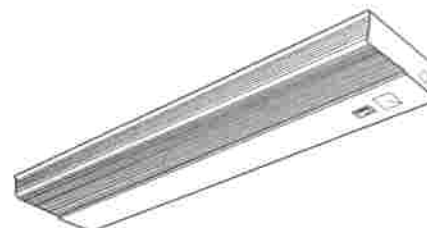
JOB NAME: FINDLAY LIBRARY

CAT#: UC 24 120 SWR

Undercabinet Light

UC

1" Wrap-Front Lens



## PHOTOMETRICS

Photometry derived in accordance with IESNA LM41 procedure. Vertical and horizontal illuminance is calculated with fixture mounted 15" from work surface. Full photometric data available upon request.

**Initial Point Illumination on horizontal work surface. (fc)**

Coordinates are on 6" centers.

UC 24

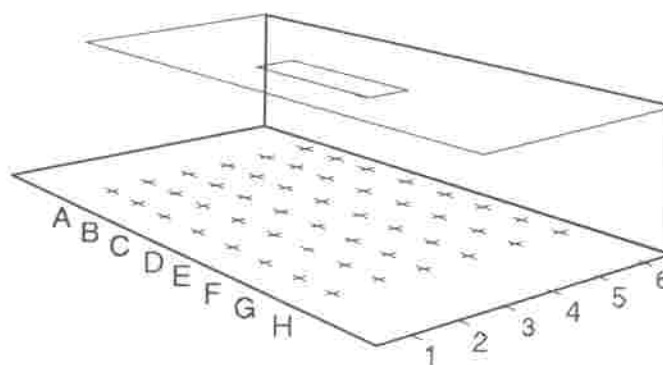
Report LTL 6349

	1	2	3	4	5	6
A	7	9	9	7	5	3
B	13	19	18	13	8	4
C	21	30	29	19	10	6
D	26	38	36	23	12	7
E	26	38	36	23	12	7
F	21	30	29	19	10	6
G	13	18	18	13	8	4
H	7	9	9	7	5	3

UC 42

Report LTL 6447

	1	2	3	4	5	6
A	22	31	31	21	13	7
B	32	46	44	30	17	9
C	37	54	52	35	19	11
D	40	58	56	37	21	11
E	40	58	56	37	21	11
F	37	54	52	35	19	11
G	32	46	44	30	17	9
H	22	31	31	21	13	7









TYPE: FO6  
JOB NAME: FINDLAY LIBRARY  
CAT#: AF10 2 32 MVOLT GEB10RS SSR

## FEATURES & SPECIFICATIONS

### INTENDED USE

For applications that require medium to high light levels such as manufacturing, warehousing, storage, retail or task lighting. Ideal for mounting heights up to 25'.

### ATTRIBUTES

Heavy-duty design for demanding industrial environments. Pressure-lock lampholders enclosed in snap-in turret housing. Available in 4' or 8' lengths. 6' lamp spacing on 2-lamp models, 3' lamp spacing on 3-lamp models. Solid top, 10% or 20% uplight reflectors available, painted after fabrication.

### CONSTRUCTION

Die-embossed reflector constructed of heavy gauge cold-rolled steel. White enamel reflector finish standard, porcelain finish optional.

### FINISH

Five-stage iron-phosphate pretreatment ensures superior paint adhesion and rust resistance. Finish is high-gloss baked white enamel.

### ELECTRICAL SYSTEM

Thermally protected, resetting, Class P, HPF, UL listed, CSA Certified ballast is standard. Energy saving and electronic ballasts are sound rated A. Fixture is suitable for damp locations, AWM, TFN or THHN wire used throughout, rated for required temperatures.

### INSTALLATION

For surface or suspended mounting, unit or row installation.

### LISTING

120V, 277V and MVOLT are UL Listed and CSA Certified (standard). 347V is CSA Certified (see Options). NDM Certified (see Options).

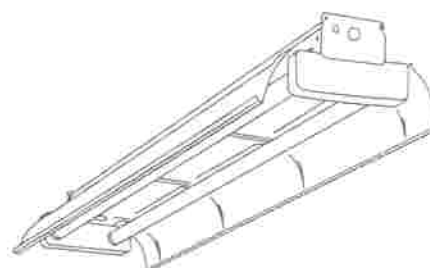
### WARRANTY

Guaranteed for one year against mechanical defects in manufacture.

Heavy-Duty Turret Industrial

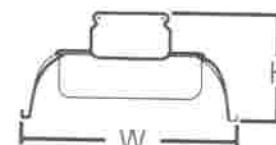
AF

Rapid Start  
4' or 8' lengths  
1, 2, 3 or 4 lamps



### Specifications

Length: 49-13/16 (1265) or 99-5/8 (2530)  
Width: 13-3/8 (340)  
Height: 5-5/8 (158)



All dimensions are inches (millimeters).

Specifications subject to change without notice.

## ORDERING INFORMATION

For shortest lead times, configure product using **standard options (shown in bold)**.

Example: AF 3 32 277 1/3 GEB10IS

Series	Lamps	Lamp type	Voltage	Options
AFST Solid reflector	1	32 32W T8 (48")	120	<b>Shipped installed in fixture</b>
AF10 10% uplight apertured reflector	2		277	1/3 One 3-lamp ballast (32 watt electronic ballast only)
	3		347	1/4 One 4-lamp ballast (32 watt electronic ballast only)
AF 20% uplight apertured reflector	4		<b>MVOLT<sup>2</sup></b>	GEB T8 electronic ballast, $\leq 20\%$ THD
	Not included			<b>GEB10IS T8 electronic ballast, <math>\leq 10\%</math> THD, instant start<sup>1</sup></b>
				<b>GEB10RS T8 electronic ballasts, 10% THD, rapid start</b>
				EL Emergency battery pack (nominal 300 lumens), see Life Safety Section
				GLR Internal fast-blow fusing (add X for external)
				GMF Internal slow-blow fusing (add X for external)
				PLF Plug-in wiring. Specify 1, 2 or 3 branch circuits & hot wires (A = black, B = red, C = blue, AB or AC)
				TILW Tandem in-line wiring
				PO White porcelain reflector finish
				<b>SSR 95% reflective silver coating</b>
				NDM NDM Certified
				BDP Ballast disconnect <sup>2</sup>

For tandem double-length unit, add prefix T.  
Example: IAF10

**Accessories**  
Order as separate catalog number

ACEP	Full-depth endplates (1 pair)
HRUN	Hooker® T-bar hanger for 5' channel (flush to ceiling)
HRUN1	Hooker® T-bar hanger for 5' channel (1-1/2' from ceiling)
SO	Swivel stem hanger (specify length in 2' increments)
IB	Ceiling spacer (1-1/2" to 2-1/2" from ceiling)
HC36	Chain hangers (1 pair, 36" long)
THDN	Tong hanger for 5' channel
WGAPV	Wireguard, 4" white (order 2 for 8' fixtures) <sup>3</sup>
DLAF ME	4" 30" x 30" metal eggcrate (louvers)
DLAF A12	4" framed acrylic prismatic lens <sup>4</sup>

**NOTES:**  
1 Available only with 32 lamp type.  
2 Electronic ballast 120 through 277 volt only. Available with 32 watt T8 only MVOLT must specify GEB10IS.  
3 Meets codes that require in fixture disconnect.  
4 Order 2 for 8' fixtures.

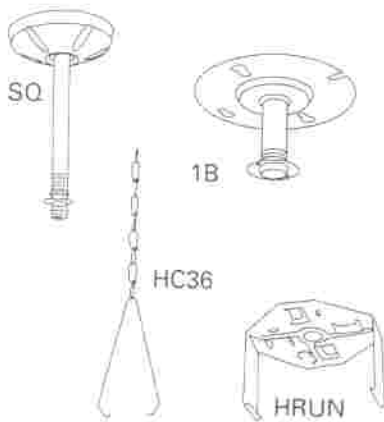
## AF Rapid Start

### MOUNTING DATA

For unit or row installation, surface or stem mounting.

UNIT INSTALLATION — Minimum of two hangers required.

ROW INSTALLATION — One hanger per fixture plus one per row required.



### DIMENSIONS

A = 1/4 x 1/2 (64 x 13) Oval Hole

C = 7/8 (22) Dia. K.O.

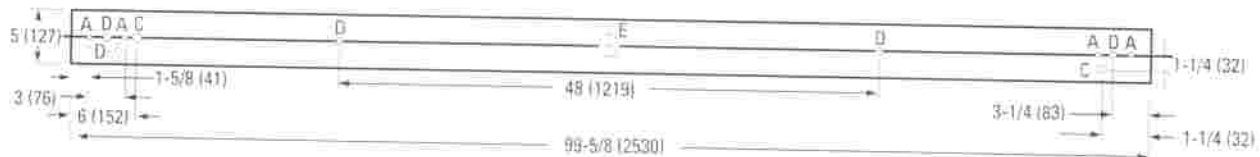
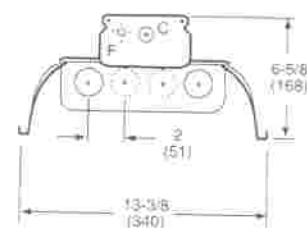
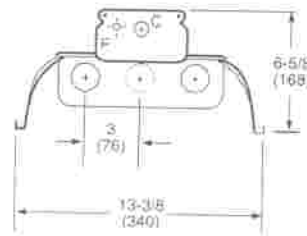
D = 11/16 (17) Dia. K.O.

E = 2 (51) Dia. K.O.

F = 7/16 (11) Dia. K.O.

All dimensions are inches (millimeters).

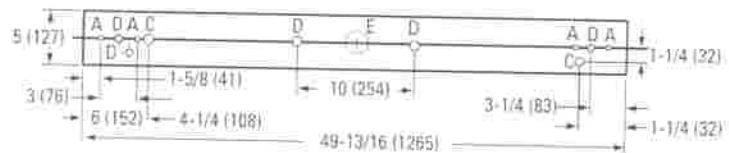
Specifications subject to change without notice.



Energy (Calculated in accordance with NEMA standard LE-5)

LER FW	ANNUAL ENERGY COST*	LAMP DESCRIPTION	LAMP LUMENS	GLASS TAYLOR	WATTAGE
74	\$3.24	(2) F32T8	2800	.88	60

\*Calculated in accordance with NEMA Standards LE-5



### PHOTOMETRICS

Calculated using the zonal cavity method in accordance with IESNA LM41 procedure. Floor reflectances are 20%. Lamp configurations shown are typical. All data based on 25°C. Full photometric data on these and other configurations available upon request.

AF 2 32

Report ITL 5711

S/MH 1.4

Coefficient of Utilization

Ceiling	70%	50%	35%	20%	10%	70%	50%	35%	20%	10%	50%	30%	10%
1	94	90	86	80	86	83	79	76	74				
2	86	79	73	62	75	70	69	65	61				
3	78	69	62	74	66	60	61	56	52				
4	72	61	54	68	59	52	54	48	44				
5	65	54	46	62	52	44	48	41	37				
10	43	31	24	41	30	23	28	22	18				

Zonal Lumens Summary

Zone	Lumens	% Lamp	% Fixture
0-30	996	17.2	19.0
0-40	1677	28.9	31.9
0-60	3126	53.9	59.6
0-90	4074	70.2	77.6
90-180	1175	20.3	22.4
0-180	5249	90.5	100.0



Sheet #: AF-RS

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Lithonia Lighting

Industrial

One Lithonia Way, Conyers, GA 30013

Phone: 770-922-9000 Fax: 770-861-8141

www.lithonia.com



TYPE: F07  
JOB NAME: FINDLAY LIBRARY  
CAT#: WSQ 2/32TRT MD 120 PE

## FEATURES & SPECIFICATIONS

**INTENDED USE** — For building and wall-mounted applications.

**CONSTRUCTION** — Rugged, die-cast, single-piece aluminum housing. Die-cast doorframe has a 1/8" thick tempered glass lens. Doorframe is fully gasketed with one-piece solid silicone.

**FINISH** — Standard finish is textured dark bronze (DDBT) corrosion-resistant polyester powder finish. Additional architectural colors are available; see [www.lithonia.com/archcolors](http://www.lithonia.com/archcolors). Striping is also available.

**OPTICAL SYSTEM** — Segmented reflectors for superior uniformity and control. Medium throw (MD) full cutoff distribution available.

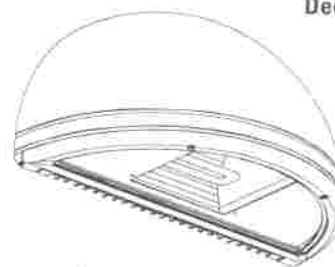
**ELECTRICAL SYSTEM** — Ballast: Class P, multi-volt electronic, high power factor multi-volt, <10%THD, with starting temperature of 0°F (-18°C).

Socket: High temperature thermoplastic with an integral lamp retention clip.

**INSTALLATION** — Universal mounting mechanism with integral mounting support allows fixture to hinge down. Bubble level provides correct alignment with each installation.

**LISTING** — UL Listed to US and Canadian safety standards (see Options). Suitable for wet locations (damp location listed in lens-up orientation). WLU option offers wet location listing in up orientation (see Options). IP65 Rated, 25°C ambient.

NOTE: Specifications subject to change without notice.



### Specifications

Length: 18.0 (45.7)  
Depth: 7.25 (18.4)  
Overall Height: 9.0 (22.8)  
\*Weight: 30 (13.6 kg)  
\*Weight as configured in example below.

All dimensions are inches (centimeters) unless otherwise specified.

Decorative Wall-Mounted Lighting

# WSQ

## COMPACT FLUORESCENT

26DTT  
2/26DTT  
26TRT  
2/26TRT  
32TRT  
2/32TRT  
42TRT  
2/42TRT

## ORDERING INFORMATION

For shortest lead times, configure product using **standard options (shown in bold)**.  
Example: WSQ 42TRT MD MVOLT LPI

Example: WSQ 42RT MD LPI LPI

WSQ					
Series	Wattage/Source	Distribution	Voltage	Options	Lamp <sup>1,2</sup>
WSQ	26DTT	MD Medium throw	120	<u>Shipped installed in fixture</u>	LPI Lamp included L/LP Less lamp
	2/26DTT				
	26TRT				
	2/26TRT				
	32TRT				
	2/32TRT				
	42TRT				
	2/42TRT				
			MVOLT <sup>1</sup>		
				DC12 Emergency circuit 12 volt (35W lamp included std.) <sup>3</sup>	
				2DC12 Emergency circuit 12 volt (2, 35W lamps included) <sup>2</sup>	
				DC2012 Emergency circuit 12 volt (20W lamp included) <sup>1,2</sup>	
				2DC2012 Emergency circuit 12 volt (2, 20W lamps included) <sup>1,2</sup>	
				DFL Diffusing lens	
				EC Emergency circuit <sup>2</sup>	
				ELDW Emergency battery pack (32°F min. operating temp.) <sup>4,5,6</sup>	
				ELDWR Fixture wired for Bodine® B30 remote battery pack (32°F min. operating temp.) <sup>4</sup>	
				ELDW RPS Fixture wired for PS1400 or PSOL3 remote battery pack (32°F min. operating temp.) <sup>4,7</sup>	
				GMF Internal slow-blow fusing <sup>8,9</sup>	
				PE Photoelectric cell-button type <sup>8,9</sup>	
				WLU Wet location door for up orientation	
				CSA CSA Certified	
				NOM NOM Certified	
				<u>Shipped separately</u>	
				BBW Surface-mounted back box <sup>10</sup>	
				UT5 Uptilt 5 degrees <sup>10</sup>	
				WG Wire guard <sup>9</sup>	
				VG Vandal guard <sup>9</sup>	
					Finish <sup>11</sup>
					(blank) Dark bronze, textured
					DSST Sandstone, textured
					DNAT Natural aluminum, textured
					DWHG White, textured
					DBLB Black, textured
					CR Enhanced corrosion resistant
					CRT Non-stick protective coating <sup>12</sup>

NOTES:

1 Multi-volt electronic ballast capable of operating on any line voltage from 120-277V.

2 Not available with GMF, EC, ELDWs.

3 Maximum allowable wattage lamp included.

4 Not available with MVOLT, must specify voltage.

5 Not available with 2/32TRT or 2/42TRT.

### NOTES:

- 1 Multi-volt electronic ballast capable of operating on any line voltage from 120-277V.
- 2 Not available with GMF, EC, ELDWs.
- 3 Maximum allowable wattage lamp included.
- 4 Not available with MVOLT, must specify voltage.
- 5 Not available with 2/32TRT or 2/42TRT.
- 6 Not available with DCs or EC.
- 7 Not available with 2/42TRT.
- 8 Not available with 343V.
- 9 Must be ordered with fixture; cannot be field installed.
- 10 May be ordered as an accessory.
- 11 See [www.lithonia.com/archcolors](http://www.lithonia.com/archcolors) for additional color options.
- 12 Black finish only.
- 13 Must be specified 135K lamp with LPI.
- 14 Must specify finish.

### Accessories<sup>14</sup>

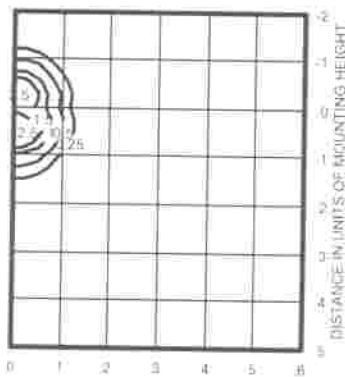
Order as separate catalog number  
WSBBW Surface mounted back box  
WSUTS Uptilt 5 degrees



## WSQ Fluorescent Building Mounted

### WSQ 2/26DTT MD TEST NO: LTL11984

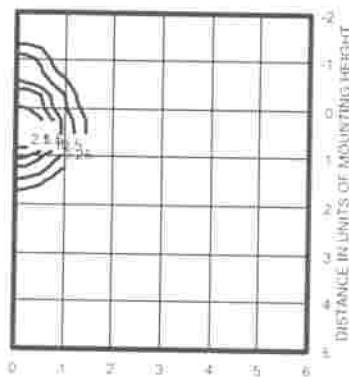
ISOILLUMINANCE PLOT (Footcandle)



W lamp, horizontal lamp orientation  
Footcandle values based on 12"  
mounting height, 1800 rated lumens  
Luminaire Efficiency: 25.3%

### WSQ 32TRT MD TEST NO: LTL11981

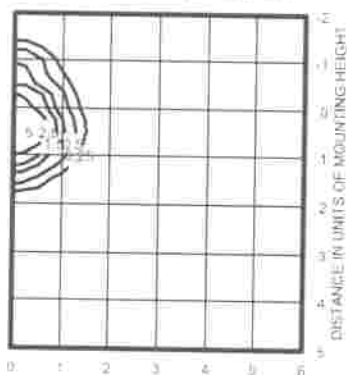
ISOILLUMINANCE PLOT (Footcandle)



W lamp, horizontal lamp orientation  
Footcandle values based on 12"  
mounting height, 2400 rated lumens  
Luminaire Efficiency: 50.4%

### WSQ 42TRT MD TEST NO: LTL11979

ISOILLUMINANCE PLOT (Footcandle)



W lamp, horizontal lamp orientation  
Footcandle values based on 12"  
mounting height, 3200 rated lumens  
Luminaire Efficiency: 48.5%

Emergency Battery Pack Lamp Compatibility

Emergency Battery Pack	ELDW	ELDWR	ELDWRPS
2/26DTT long lamp	■	■	■
2/26DTT	■	■	■
2/26TRT long lamp	■	■	■
2/26TRT	■	■	■
32TRT long lamp	■	■	■
2/32TRT			■
42TRT long lamp	■	■	■
2/42TRT			





TYPE: F08  
JOB NAME: FINDLAY LIBRARY  
CAT#: LF8 2/42TRT F803A MVOLT TRW

## FEATURES & SPECIFICATIONS

### INTENDED USE

Recessed Frame-in rated Non-IC for New Construction only. Approved for all ceiling types and wiring types.

### CONSTRUCTION

Rugged, galvanized steel frame.

Galvanized steel junction box with (4) romex knock outs, (2) 3/4" and (4) 1/2" nominal conduit knock outs with pryout slots. Rated for through branch wiring. Removable door for easy access.

Ground wire provided. Rated for 90°C supply wire.

Galvanized bar hangers span up to 24" o.c. and feature built-in T-bar clips and nailers.

### ELECTRICAL SYSTEM

Socket attaches to reflector with pre-mounted screw to ensure proper and consistent lamp position.

Multi-volt (MVOLT), 120V through 277V, electronic ballast with end of life protection is standard.

Thermally protected against improper contact with insulation and approved for through-branch circuit wiring.

### INSTALLATION

T-bar or wood joist installation.

Expandable bar hangers allow for off-center mounting in T-bar ceiling or wood joists.

Bar hangers expand to a length of 25 1/4" maximum 13 1/4" minimum.

Reflector is secured to frame-in by mechanical trim ring.

Vertically adjustable yoke allows for flush mounting of trims to ceiling face.

Reflectors accommodate ceilings up to 1-1/2" thick.

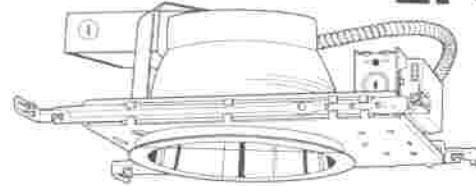
### LISTING

UL listed to US and Canadian safety standards.

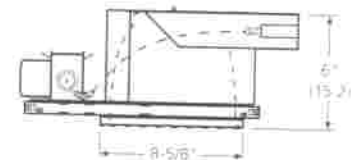
Damp location listed. (See trim selection for wet location.)

8" Frame In

# LF8 TRT

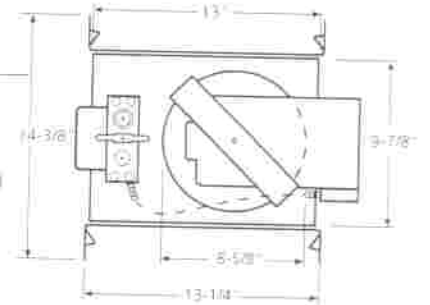


**FLUORESCENT**  
Horizontal  
Non-IC  
New Construction



### Specifications

Height: 6 (15.2)  
Length: 13-1/2 (34.3)  
Width: 14-3/8 (36.5)  
Ceiling Opening: 8-7/8 (22.5)



All dimensions are inches (centimeters)

## ORDERING INFORMATION

For shortest lead times, configure product using **standard options (shown in bold)**.  
Example: LF8 2/26-42TRT MVOLT F803AZ

LF8					
Series	Lamps	Volts	Options	Reflector	
LF8	2/26-42TRT <sup>1</sup> 2/26TRT 2/32TRT 2/42TRT	MVOLT <sup>2</sup> 347	ADEZ Advance Mark 10™ electronic dimming ballast. Must specify 120V or 277V. Requires 4-pin lamp. Minimum dimming level 5%.	F803A Clear diffuse open	
			BMHL Lutron Compact SE™ solid-state dimming ballast, 120V or 277V. Requires 4-pin lamp. Minimum dimming level 5%.	F803AZ Clear specular open	
			EL Emergency battery pack with integral test switch. <sup>3</sup>	F8B4 Black baffle	
			ELR Emergency battery pack with remote test switch. <sup>3</sup>	F8B4W White baffle	
			GMF Single slow-blow fuse.	F8W3A Clear diffuse wallwash	
			WLP 35K Lamp (shipped separately).	F8W3AZ Clear specular wallwash	
			TRW White flange.	F8LT1 White splay flat clear lens <sup>4</sup>	
				F8LTB1 Black baffle flat clear lens <sup>4</sup>	
				F8LT4 White splay fresnel lens <sup>4</sup>	
				F8LTB4 Black baffle fresnel lens <sup>4</sup>	
				F8LT73 White splay T73 tempered prismatic lens <sup>4</sup>	
				F8LTB73 Black baffle T73 tempered prismatic lens <sup>4</sup>	

### NOTES:

<sup>1</sup> Not available with BMHL or WLP.

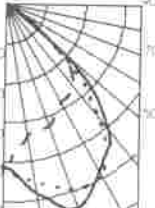
<sup>2</sup> MVOLT: Electronic multi-volt ballast capable of operating any line voltage from 120-277 50 or 60Hz.

<sup>3</sup> For dimensional changes, refer to accessories tab. For two-lamp configuration, consult factory.

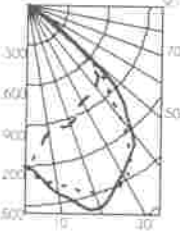
<sup>4</sup> Lens removal required before EL testing.

See trim specification sheets for maximum wattages.

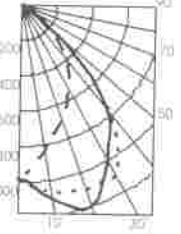
## LF8 TRT 8" Horizontal Fluorescent Frame-in

Distribution curve	Distribution data		Output data		Coefficient of utilization						Single luminaire data 30" above floor		
803A, (2) 32W TRT lamps, 1.6 s/mh, 4800 rated lumens, test no. LTL12058													
	cp	Lumens	Zone	Lumens	% Lamp	pc	80%		70%		50%		
							pw	50%	30%	50%	30%	50%	30%
	0	1230		0° - 30°	1185.8	24.7	0	71	71	70	70	66	66
	5	1267	123				1	65	63	64	62	61	60
	15	1421	404	0° - 40°	1957.6	40.8	2	59	56	58	55	56	54
	25	1437	659	0° - 60°	2842.3	59.2	3	54	50	53	49	51	48
	35	1240	772				4	49	45	48	44	47	43
	45	883	661	0° - 90°	2871.7	59.8	5	44	40	44	40	43	39
	55	221	223	90° - 180°	0.0	0.0	6	41	38	40	36	39	35
	65	19	22				7	37	33	37	32	36	32
	75	5	6	0° - 180°	2871.7	59.8	8	34	30	34	30	33	29
	85	1	1				9	32	27	31	27	31	27
90	0					10	29	25	29	25	28	25	
*Total Efficiency													
Task Height: 2.5ft													
Initial FC											50% beam -		
Mounting: Center											73.5		
											10% beam -		
Height	Beam	Diameter	FC	Diameter	FC								
8.0	40.7	8.2	20.3	13.5	4.1								
10.0	21.9	11.2	10.8	18.5	2.2								
12.0	13.6	14.2	6.8	23.4	1.4								
14.0	9.3	17.2	4.6	28.3	0.9								
16.0	6.7	20.2	3.4	33.3	0.7								

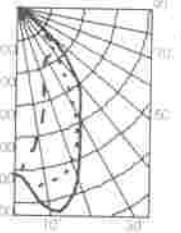
F803AZ, (2) 32W TRT lamps, 1.6 s/mh, 4800 rated lumens, test no. LTL12057

	cp	Lumens	Zone	Lumens % Lamp	
	0	1215	0° - 30°	1172.6 24.4	
	5	1245	0° - 40°	1940.8 40.4	
	15	1405	0° - 60°	2801.3 58.4	
	25	1418	0° - 90°	2818.0 58.7	
	35	1232	90° - 180°	0.0 0.0	
	45	905	0° - 180°	2818.0 58.7	
	55	169			
	65	10			
	75	3			
	85	1			
	90	0			
*Total Efficiency					
Task Height: 2.5ft					
Initial FC					
50% beam - 73.5					
10% beam - 101.7					
Mounting	Center	Beam	Diameter	FC	
Height	Beam	Diameter	FC	Diameter	
8.0	40.2	8.3	20.1	13.5	4.0
10.0	21.6	11.3	10.8	18.4	2.2
12.0	13.5	14.3	6.7	23.3	1.3
14.0	9.2	17.3	4.6	28.3	0.9
16.0	6.7	20.3	3.3	33.2	0.7

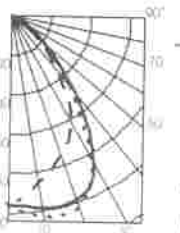
F8B4, (2) 32W TRT lamps, 1.39 s/mh, 4800 rated lumens, test no. LTL12045

	cp	Lumens	Zone	Lumens % Lamp	pt	20%						Task Height: 2.5ft		
	pc	80%	70%	50%	pc	50%	30%	50%	30%	50%	30%			
	pw	50%	30%	50%	30%	50%	30%	50%	30%	50%	30%			
	0	983				0	47	47	46	46	44	44	Initial FC Mounting: 'Center' 50% beam - 57.2' 10% beam - 97.4' Height: Beam Diameter FC Diameter FC 8.0 32.5 7.3 16.2 12.5 3.3 10.0 17.5 10.0 8.7 17.1 1.7 12.0 10.9 12.6 5.4 21.6 1.1 14.0 7.4 15.3 3.7 26.2 0.7 16.0 5.4 18.0 2.7 30.7 0.5	
	5	999	0° - 30°	872.0	18.2	1	43	42	42	41	40	39		
	15	1074	0° - 40°	1379.0	28.7	2	39	37	38	37	37	36		
	25	1031	0° - 60°	1863.2	38.8	3	36	33	35	33	34	32		
	35	816	507	0° - 90°	1880.2	39.2	4	33	30	32	30	31		29
	45	497	376			5	30	27	29	27	29	26		
	55	107	109	90° - 180°	0.0	0.0	6	27	25	27	24	26		24
	65	9	10			7	25	22	25	22	24	22		
	75	5	5	0° - 180°	1880.2	39.2	8	23	20	23	20	23		20
85	2	2	*Total Efficiency			9	22	19	21	19	21	19		
90	0				10	20	17	20	17	19	17			

F8LTB4, (2) 32W TRT lamps, 1.15 s/mh, 4800 rated lumens, test no. LTL12046

	cp	Lumens	Zone	Lumens % Lamp	pl	20%						Tank Height 2.5ft				
					pd	80%	70%	50%								
					pw	50%	30%	50%	30%	50%	30%					
	0	1026			0	41	41	40	40	38	38					
	5	1063	104	0 - 30°	790.5	16.5	1	37	36	36	36		35	34		
	15	1091	303	0 - 40°	1155.6	24.1	2	34	32	33	32		32	31		
	25	837	384	0 - 60°	1554.0	32.4	3	31	29	30	28		29	28		
	35	586	365				4	28	26	28	25		27	25		
	45	339	283	0° - 90°	1649.4	34.4	5	26	23	25	23		25	23		
	55	148	136	90° - 180°	0.0	0.0	6	24	21	23	21		23	21		
	65	63	64	0° - 180°	1649.4	34.4	7	22	19	22	19		21	19		
	75	28	29				8	20	18	20	18		20	17		
*Total Efficiency					9	19	16	19	16	18	16					
85	0	2				10	18	15	17	15	17	15				
90	0															
					Initial FC							50% beam -	10% beam -			
					Mounting Center							58.1	92.4			
					Height Beam							Diameter	FC	Diameter	FC	
					8.0							33.9	5.9	17.0	11.5	3.4
					10.0							18.2	8.0	9.1	18.7	1.8
					12.0							11.4	10.1	5.7	19.8	1.1
					14.0							7.8	12.3	3.9	24.0	0.8
					16.0							5.6	14.4	2.8	28.2	0.5

F8LTB73, (2) 32W TRT lamps, 1.26 s/mh, 4800 rated lumens, test no. LTL12047

	cp	Lumens	Zone	Lumens % Lamp	pt	20%						Task Height: 2.5ft
					pc	80%	70%	50%				
					pw	50%	30%	50%	30%	50%	30%	
	0	958	0° - 30°	764.6 15.9	0	40	40	39	39	37	37	
	5	963	0° - 40°	1151.0 24.0	1	36	35	36	36	34	34	
	15	958	0° - 60°	1525.6 31.8	2	33	31	32	31	31	30	
	25	884	0° - 90°	1608.8 33.5	3	30	28	30	28	29	27	
	35	625	90° - 180°	0.0 0.0	4	27	25	27	25	26	24	
	45	313	0° - 180°	1608.8 33.5	5	25	23	25	22	24	22	
	55	141			6	23	21	23	20	22	20	
	65	59			7	21	19	21	19	21	18	
	75	21			8	20	17	19	17	19	17	
85	0			9	18	16	18	16	18	16		
90	0			10	17	15	17	15	17	15		
*Total Efficiency												

## FEATURES

- One-piece, extruded aluminum housing with brushed finish and chrome trim.
- Woodgrain vinyl laminated to injection-molded ends — brushed aluminum end appliques optional.
- Up/down light distribution options.
- Lens housing secured to channel assembly by spring-loaded latches.
- Gasketed back plate and silicone-sealed housing eliminate light leaks.
- Convenience outlet available on 120V units.

## SPECIFICATIONS

**BALLAST** — Thermally-protected, Class P, HPF, non-PCB, UL listed, CSA certified ballast is standard. Sound rated A.

**WIRING & ELECTRICAL** — Fixture conforms to UL 1570 and is suitable for damp locations. AWM, TFN or THHN wire used throughout, rated for required temperatures.

**MATERIALS** — Parts are die-formed from code-gauge steel.

**FINISH** — Five-stage iron-phosphate pretreatment ensures superior paint adhesion and rust resistance. Standard finish is high-gloss, baked white enamel. Architectural black 40% gloss finish is optional. All parts PAF.

**LISTING** — UL listed and labeled. Listed and labeled to comply with Canadian and Mexican Standards (see Options).

Specifications subject to change without notice.

## ENERGY

- Luminaire Efficacy Rating (LER) and Annual Energy Cost: Two-lamp LER/FW = 58, Annual Energy Cost = \$4.14. Based on 32W T8 lamp (2850 lumens) and energy-saving electronic ballast. Ballast factor = .88, input watts = 54.

Calculated in accordance with NEMA standard LE-5

**TYPE: F09**

**JOB NAME: FINDLAY LIBRARY**

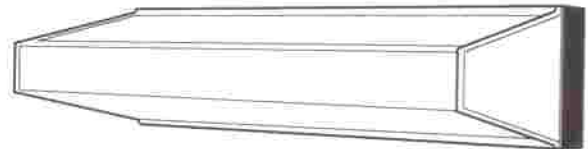
**CAT#: W 2 32 120 GEB10RS PAF**

Surface Commercial

**W**

Contemporary Wall Bracket

1', 2', 3' or 4' Lengths  
1 or 2 Lamps



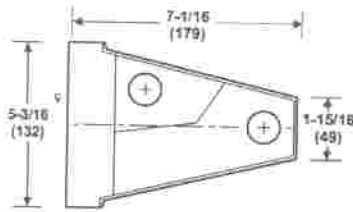
## PHOTOMETRICS

Full photometric reports available upon request.



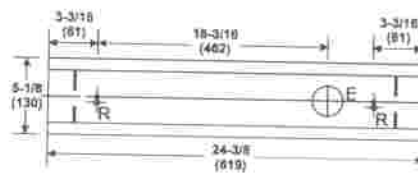
# W Wall Bracket, Contemporary

## MOUNTING DATA

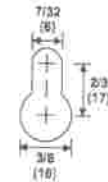
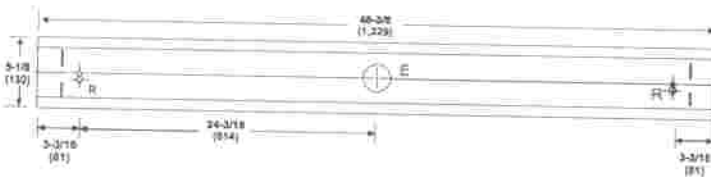
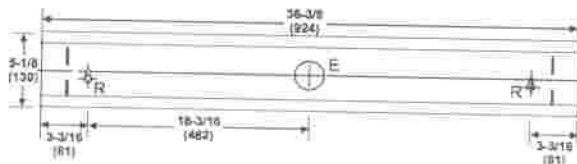


## DIMENSIONS

Inches (millimeters). Subject to change without notice.



E = 2(51) Dia. K.O.  
R = Keyhole Slot



## ORDERING INFORMATION

Example: W 2 32 120 GEB CO

Series	Lamp type	Diffuser type/ light distribution	Voltage	Options
W Wall Bracket	U16 18W T8 U (12") 17 17W T8 (24") CF18 18W TT5 RS (12") 20 20W T12 (24") 25 25W T8 (36") 30 30W T12 (36") 32 32W T8 (48") 40 40W T12 (48")	(blank) #12 pattern .125" thick lower lens, matte white; #12 pattern .187" thick upper lens A12U #12 pattern .125" lower and upper lens DO Downlight only	120, 277, 347, MVOLT <sup>1</sup> Others available.	CO Grounded convenience outlet, 120V only (lower right) <sup>1</sup> AE Brushed aluminum end cap appliques S1 Pull-chain switch; installed bottom left; on/off operation of all lamps only (120V only) <sup>1</sup> S2 Pull-chain switch; on/off operation of forward (down) lamp; rear (up) lamp remote-switched (120V only) <sup>1,4,5</sup> S4 Pull-chain switch; four position — front only, rear only, all on, all off; installed bottom left (120V only) <sup>1,4,5</sup> 2/1 Two 1-lamp ballasts <sup>1,6</sup> BF Internal baffle for up and down light separation GEB Electronic ballasts, ≤ 20% THD GEB10IS Electronic ballasts, ≤ 10% THD, Instant Start GEB10RS Electronic ballasts, ≤ 10% THD, Rapid Start ES Energy saving ballasts N Unswitched night light for 7W C7 lamp; top left NS Night light with push-switch for 7W C7 lamp; top left MB Matte black finish PAF Painted after fabrication CSA Listed and labeled to comply with Canadian Standards NOM Listed and labeled to comply with Mexican Standards

### NOTES:

1. One lamp only.
2. MVOLT available with GEB10IS only.
3. For optional locations, consult factory.
4. BF option must be specified if separation of up and down light is desired.
5. Requires 2/1 option (2-lamp only).
6. Required with S2 or S4 options.

W

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w.p65

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www.lithonia.com • IN CANADA: 1100 50TH AVE., LACHINE, QUEBEC H8T 2V3



## FEATURES & SPECIFICATIONS

### INTENDED USE

For parking garages, convenience stores, hotels and walkways.

### CONSTRUCTION

Rugged, die-cast, soft corner aluminum housing with 0.12" nominal wall thickness. Die-cast, hinged door frame is fully gasketed with one piece tubular silicone.

**FINISH** — Standard finish is dark bronze (DOB), polyester powder with other architectural colors available.

**OPTICAL SYSTEM** — Reflector is optical quality aluminum that works in tandem with a light-diffusing prismatic lens. Prismatic, impact-resistant, tempered glass, drop-dish acrylic lens or drop-dish polycarbonate lens.

**ELECTRICAL SYSTEM** — Constant-wattage autotransformer ballast is copper-wound and 100% factory-tested. Horizontally-oriented, mogul-base, porcelain socket with copper alloy, nickel-plated screw shell and center contact. UL listed 1500W, 600V, 4KV pulse rated.

**INSTALLATION** — Utilizes four 0.5" mounting holes and one 0.88" electrical connection hole located on top (mounting hardware not included).

**LISTING** — UL 1572 listed for wet locations. Covered ceiling mount on concrete, steel or aluminum. Not for use in dwellings. Listed and labeled to comply with Canadian Standards (outdoor use only).

TYPE: H01

JOB NAME: FINDLAY LIBRARY

CAT#: KACM 100M DPA 120 L/LP

### Surface-Mounted Soft Square HID Lighting

**CONTOUR**  
SERIES

**KACM**

METAL HALIDE

150W, 175W, 200W, 250W, 320W, 350W, 400W

15' to 30' Mounting



### Standard Dimensions

Square: 17-1/2 (44.5)

Depth: FP Option: 7-1/8 (18.1)

DP Option: 11-1/8 (28.3)

Weight: 40 lbs. (18.1 kg)

All dimensions are inches (centimeters) unless otherwise specified.

## ORDERING INFORMATION

Choose the boldface catalog nomenclature that best suits your needs and write it on the appropriate line. Order accessories as separate catalog number.

Example: **KACM 400M FP 120 LPI**

Series	Lens	Voltage	Options	
<b>KACM 100M</b>	<b>FP</b> Flat prismatic, C73T lens	<b>120</b>	<b>Shipped Installed</b>	<b>Architectural Colors<sup>4</sup></b>
<b>KACM 175M</b>	<b>DPA</b> Drop prismatic acrylic lens	<b>208<sup>2</sup></b>	<b>SF</b> Single fuse (120, 277, 347V) n/a TB	<b>Standard Colors</b>
<b>KACM 200M<sup>4</sup></b>		<b>240<sup>2</sup></b>	<b>DF</b> Double fuse (208, 240, 480V) n/a TB	<b>DOB</b> Dark bronze (standard)
<b>KACM 250M<sup>4</sup></b>	<b>DPP</b> Drop prismatic polycarbonate lens	<b>277</b>	<b>LPI</b> Lamp included as standard	<b>DWH</b> White
<b>KACM 320M<sup>4</sup></b>		<b>347</b>	<b>L/LP</b> Less lamp	<b>DBL</b> Black
<b>KACM 350M<sup>4</sup></b>		<b>480<sup>2</sup></b>	<b>QRS</b> Quartz restrike system (250W max, 120V lamp not included)	<b>Classic Colors</b>
<b>KACM 400M<sup>5</sup></b>		<b>TB<sup>1</sup></b>	<b>CSA</b> Listed and labeled to comply with Canadian Standards	<b>DMB</b> Medium bronze
			<b>EC</b> Emergency circuit	<b>DNA</b> Natural aluminum
			<b>YK</b> Yoke mount	<b>DSS</b> Sandstone
			<b>TC</b> Thru-wire conduit tee capability	<b>DGC</b> Charcoal gray
				<b>DTG</b> Tennis green
				<b>DBR</b> Bright red
				<b>DSB</b> Steel blue

### Pulse Start

**SCWA** Super CWA pulse start ballast (TB only)

NOTE: SCWA ballast must be selected to comply with California Title 20 metal halide regulations. SCWA also may be required to meet other states' regulations. Consult local authorities.

### Shipped Separately<sup>7</sup>

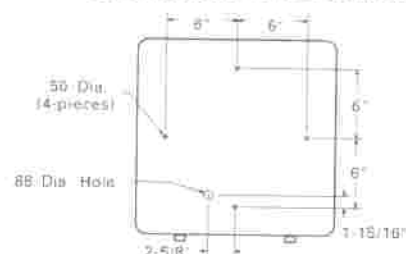
**KACVG** Vandal guard<sup>3</sup>

**KACWG** Wire guard

### NOTES:

- Multi-tap ballast (120, 208, 240, 277V)
- May be ordered as accessory.
- FP lens only.
- Other architectural colors available; see Architectural Colors brochure, form 794.3
- May be ordered with SCWA.
- Must be ordered with SCWA.
- Consult factory for availability in Canada.

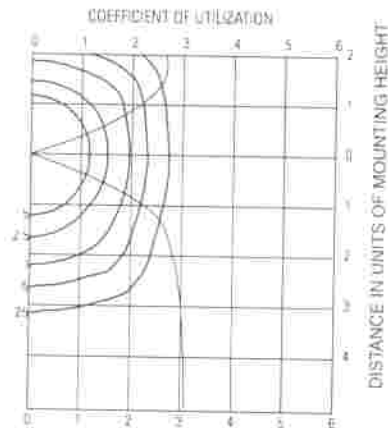
### KACM MOUNTING DETAIL



# KACM Surface-Mounted Soft Square HID Lighting

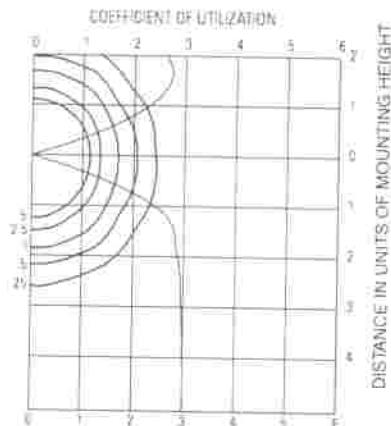
Coefficient of Utilization \_\_\_\_\_  
Initial Footcandles \_\_\_\_\_

## KACM 400M DP Test No. 1192121701



400W Metal Halide lamp, 36000 rated lumens. Footcandle values based on 15' mounting height, Distribution DP cutoff.

## KACM 400M FP Test No. 1192121702



400W Metal Halide lamp, 36000 rated lumens. Footcandle values based on 15' mounting height, Distribution FP cutoff.

### Mounting Height Correction Factor

(Multiply the fc level by the correction factor)

10 ft. = 2.25

12 ft. = 1.56

20 ft. = 0.56

25 ft. = 0.36

$$\left( \frac{\text{Existing Mounting Height}}{\text{New Mounting Height}} \right)^2 = \text{Correction factor}$$



An Acuity Brands Company

Sheet #: KACM-M

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Lithonia Lighting

Outdoor

One Lithonia Way, Conners, GA 30012-3957

Phone 770-922-9000 Fax 770-918-1209

www.lithonia.com



TYPE: EX1  
JOB NAME: FINDLAY LIBRARY  
CAT#: LQM S W 3 R 120/277 EL N

## FEATURES & SPECIFICATIONS

### INTENDED USE

Ideal for applications requiring attractive, quick-installation exit signs and low energy consumption.

### CONSTRUCTION

Engineering-grade thermoplastic housing is impact-resistant, scratch-resistant, and corrosion-proof. UL94V-0 flame rating. UV-stable resin resists discoloration from natural and man-made light sources.

Rugged unibody housing snaps together with no additional mechanical fasteners. Faceplate and back cover are interchangeable on housing. Positive snap-fit tabs hold faceplate securely, yet pry out easily for lamp compartment access.

Universal directional chevron inserts are easily removed and reinserted. Uniform graphics illumination without shadows or hot spots. Reinforced, impact-resistant color panels. Letters 6" high with 3/4" stroke.

U.S. Patent No. 5,526,251, 5,611,163, 5,739,639, 5,954,423, D495,751 and 6,502,044. Canada Patent No. 2,204,218. Other patents pending.

### LAMPS

LEDs mounted on printed circuit boards. Expected LED life over 25 years. Low energy consumption - less than one watt. LED lamp operates in normal (AC input) and emergency (DC input) modes.

### BATTERY

Sealed, maintenance-free nickel-cadmium battery delivers 90-minute capacity to emergency lamps. Automatic recharge after battery discharge.

Low-voltage disconnect prevents excessively deep discharge that can permanently damage battery. Conveniently located test switch and LED provide visual and manual means of monitoring system operation.

### ELECTRONICS

Constant-current series charger minimizes energy consumption and provides low operating costs. Printed circuit boards are 100% quality tested during manufacturing. Current-limiting charger circuitry protects printed circuit boards from shorts.

### DIAGNOSTICS (SD option only)

Two-state constant-current charge: maximizes battery life and automatically recharges after battery discharge. Low voltage disconnect prevents excessive deep discharge that can permanently damage the battery. AC/LVD reset (line latch) allows battery connection before AC power is applied and prevents battery damage from deep discharge.

Single-point microcomputer control for all electronic features.

Crystal oscillator timing system with watchdog protection for precision accuracy.

Brownout protection is automatically switched to emergency mode when supply voltage drops below 80% of nominal.



Thermoplastic Exits

# LQM EL N



### LED LAMPS

Emergency Operation  
Nickel-Cadmium Battery



Single multi-chromatic LED indicator to display two-state charging, test activation and three-state diagnostic status.

Test switch provides manual activation of 30-second diagnostic testing for on-demand visual inspection. Self-diagnostic (option) testing for five minutes every 30 days and 30 minutes every six months.

Diagnostic evaluation of LED light source, AC to DC transfer, charging and battery condition. Continuously monitors AC functionality.

### INSTALLATION

Universal (top-, end-, or back-) mounting. Easily removed mounting knockouts. J-box pattern on back panel. Housing snaps to canopy with four positive-locking tabs. Cam-locking pin tightly secures housing to canopy.

### LISTING

UL listed (standard). NEM Certified (see Options). Meets UL924, NFPA 101 (current Life Safety Code), NEC and OSHA illumination standards, and State of Minnesota energy-efficient legislation requiring less than 20W consumption.

### WARRANTY

Five-year total customer satisfaction warranty, including the LED lamps.

## ORDERING INFORMATION

For shortest lead times, configure product using **standard options (shown in bold)**.

Example: LQM S W 3 R 120/277 EL N

LQM			120/277		EL N	
Family	Face type	Housing color	Number of faces	Letter color	Emergency operation	Options <sup>1</sup>
<b>LQM</b>	<b>S</b> Stencil <b>P</b> Panel <sup>1,2</sup>	(blank) Black <b>W</b> White	<b>1</b> Single face <sup>3</sup> <b>3</b> Single face with extra faceplate and color panel	<b>R</b> Red <b>G</b> Green	<b>EL N</b> Nickel-cadmium battery	(blank) <b>None</b> F Flashing emergency operation (one flash/sec) <sup>1,3,4</sup> FI Fire alarm flashing interface <sup>1,5</sup> FA Flashing emergency operation and intermittent audible alarm (one flash/sec) <sup>1,5</sup> NEM NEM Certified for Mexico <sup>1,4,7</sup> SD Self-diagnostics <sup>1</sup>

### NOTES:

<sup>1</sup> See back of spec sheet for special housing dimensions. Consult factory for compatible accessories.

<sup>2</sup> Special wording available in red or green. Consult factory.

<sup>3</sup> Only available with options.

<sup>4</sup> Some special voltages available. Consult factory.

<sup>5</sup> Choice of F, FA or FI. Not available with more than one.

<sup>6</sup> Not available with SD.

<sup>7</sup> Not available with F, FA or FI options.

### Accessories

Order as separate item.

ELAWGEX Back-mount wireguard

ELAWGEXT Top-mount wireguard

ELAWGEXE End-mount wireguard

Emergency

Sheet #: LQM-EL-N

QMEX-110



# LQM EL N Emergency LED, Quantum

## SPECIFICATIONS

### ELECTRICAL

#### Primary Circuit

Type <sup>1</sup>	Rated LED life <sup>2</sup>	Supply voltage	Input watts	Max. amps
		120	71	.05
Red LED	25+ years	277	92	.06
Green LED	25+ years	120	66	.05
		277	70	.06

### BATTERY

#### Nickel-Cadmium

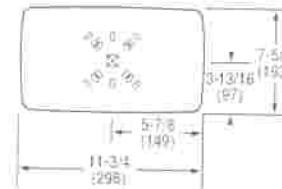
Voltage	Shelf life <sup>3</sup>	Expected life <sup>3</sup>	Maintenance	Optimum temperature <sup>5</sup>
1.2 <sup>6</sup>	3 yrs.	7-9 yrs.	none <sup>4</sup>	32°-100°F (0°-37.8°C)

- 1 LED lamps operate in normal (AC input) and emergency (DC input) modes.
- 2 Based on continuous operation.
- 3 At 77°F (25°C).
- 4 Periodic system status test recommended.
- 5 Optimum ambient temperature range where unit will provide capacity for 90 minutes. Higher and lower temperatures affect life and capacity. Consult factory for detailed information.
- 6 2.4 volts for DL option.

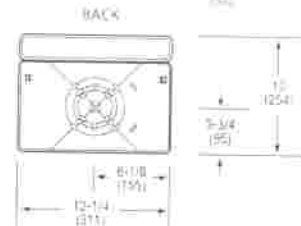
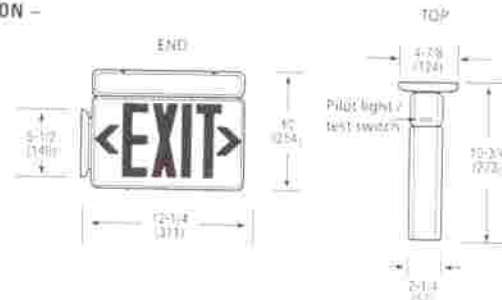
## MOUNTING

All dimensions are inches (millimeters).

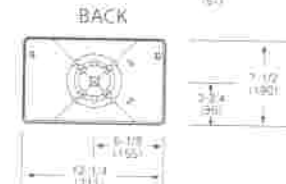
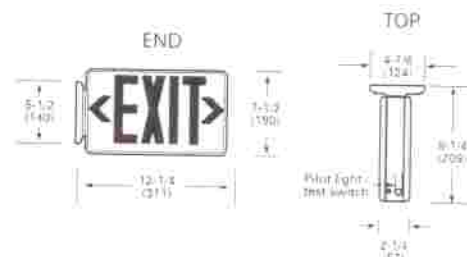
Shipping weight: 2.6 lbs. (1.2 kgs.)



### SD OPTION -



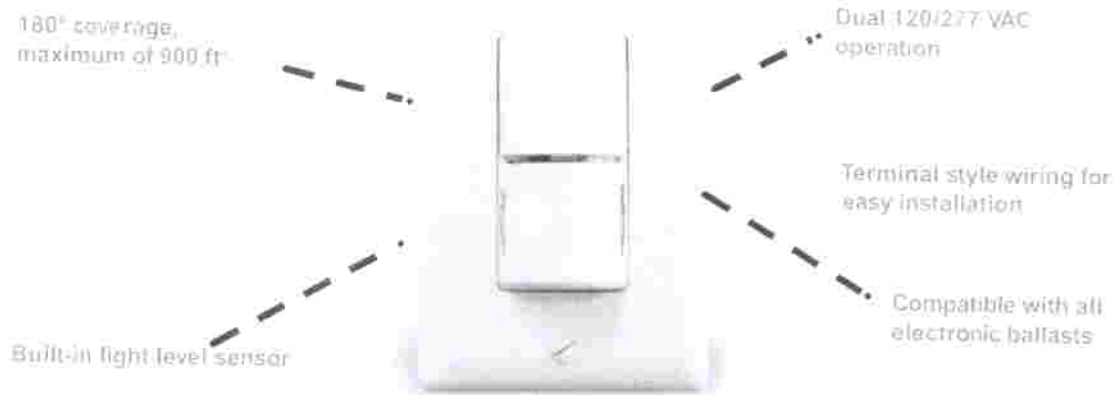
With Options - Including: panel faceplates and black housing



TYPE: OC  
JOB NAME: FINDLAY LIBRARY  
CAT#: WS 200 120/277 IV

A

## WS-200 Passive Infrared Wall Switch Sensor



### Product Overview

#### Description

The WS-200 automatic wall switch sensors replace existing wall switches and fit behind standard decorator wall plates. They turn lighting on and off based on occupancy and ambient light levels.

#### Operation

The WS-200 utilizes advanced passive infrared technology to detect occupancy. Detection occurs when the WS senses the difference between infrared energy from a human body in motion and the background space. Lighting automatically turns on when occupancy is detected. After a user-specified length of time when no occupancy is detected, lighting automatically switches off. The sensors can also be used with multiple switches for multi-level lighting.

#### Light Level Sensor

The WS-200 features a built-in light level sensor. This feature holds lighting systems off when natural light levels are above the pre-set level. Once lights are switched on, the sensor will not switch them off even if daylight levels increase. Using the light level feature is optional and the setting is adjustable by the user.

#### Applications

The WS-200 has the flexibility to work in a variety of applications including offices, conference rooms, break rooms, and utility rooms. Energy savings for these areas can be as high as 60% since lighting will no longer remain on once the room is vacant. With a competitive price, low installation cost, and high energy savings, paybacks are usually well under two years.

### Features

- ASIC technology reduces components and enhances reliability.
- Pulse Count Processing eliminates false offs without reducing sensitivity.
- Detection Signature Analysis eliminates false triggers; provides immunity to RFI and EMI.
- Zero crossing circuitry reduces stress on the relay and results in increased sensor life.
- Digital time delay adjustment from 30 seconds up to 30 minutes.
- Adjustable unit sensitivity from 20% to 100%.
- Integrated light level sensor holds lights off when natural light levels are above the pre-set level.
- Custom, 2-level Fresnel lens enhances detection at the desktop level.
- Screw terminal wiring system eliminates the need for wire nuts, making installation quicker.
- Patented voltage drop protection.
- For safety, there is no leakage to load in the off mode and sensor is safety grounded.
- LED indicates occupancy detection.



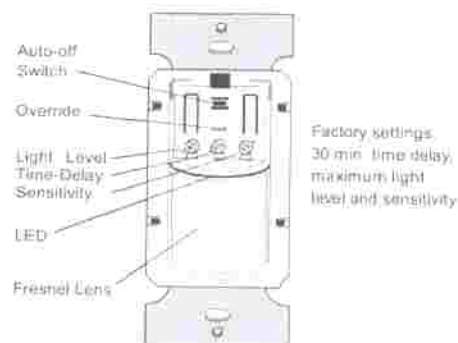
## Specifications

- 120/277 VAC
- Coverage of 180 degrees, maximum 900 ft<sup>2</sup> 300 ft<sup>2</sup> for desktop activity.
- Time delay adjustable from 30 seconds up to 30 minutes
- Adjustable unit sensitivity from 20% to 100%
- Adjustable light level setting of 2 to 200 footcandles (21.5 to 2,153 lux)

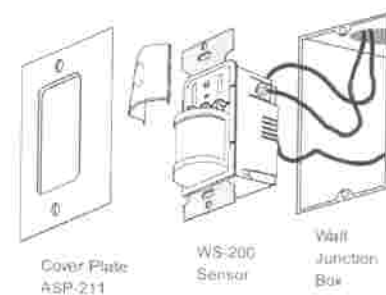
- Compatible with all electronic ballasts and PL lamp ballasts
- Dimensions: 2.6" x 1.7" x 2" (66.0mm x 43.1mm x 50.8mm) L x W x D
- UL and CUL listed. Five year warranty.

## Controls & Installation

### Product Controls

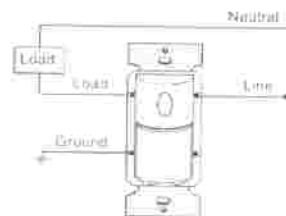


### Installation

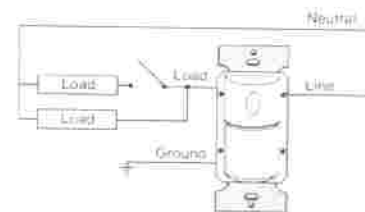


## Wiring

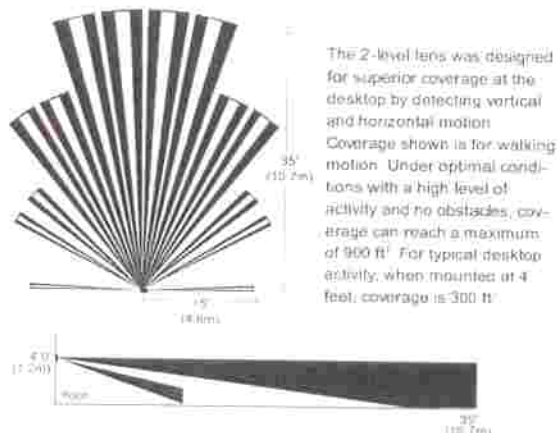
### Single Level Lighting



### Manual Bi-level Lighting



## Coverage & Wire Connection



### Wire Connections



Wiring the sensor is quick and simple with the WS's terminal wiring screws.

## Ordering Information

Catalog No.	Color	Voltage	Load Requirement	Coverage
<input type="checkbox"/> WS-200-W	White	120 VAC, 60 Hz or 277 VAC, 60 Hz	0-600 Watt Ballast or 0-1200 Watt Ballast	180°, up to 900 ft <sup>2</sup> (83.6 m <sup>2</sup> )
<input type="checkbox"/> WS-200-A	Almond			
<input type="checkbox"/> WS-200-I	Ivory			
<input type="checkbox"/> WS-200-G	Grey			
<input type="checkbox"/> WS-200-B	Black			

One ASP-211 single-gang cover plate included. Order ASP-422 for blank 2-gang cover plate. ASP-432 for 2-gang cover plate with switch option (specify color). \*Models for 220/240 VAC (WS-230) and 347 VAC (WS-347) are available.

www.wattstopper.com  
800.879.6585



# AEP GridSMART

KEMA Operations Manual

Supplement – Summary of Deemed Savings for  
Incentives Year 2009





# Summary of Common Deemed Savings Measures

The below table contains prescriptive measures in a convenient format for viewing the default deemed savings.

Measure	Unit	Incentive Per Unit	kW Per Unit	Total kWh Per Unit	Years Life
Screw in CFL 5-15 Watts	Lamp	\$2.00	0.029	155	2
Screw in CFL 16-26 Watts	Lamp	\$2.00	0.054	290	2
Screw in CFL 27 Watts or higher	Lamp	\$3.00	0.069	368	2
Hardwired CFL 29W or Less	Fixture	\$30.00	0.052	276	12
Hardwired 30W or Greater	Fixture	\$60.00	0.103	544	12
T12 to T8 Conversion (with electronic ballast): 2-foot & 3-foot T12 to T8	Lamp	\$6.00	0.012	60.5	11
T12 to T8 Conversion (with electronic ballast): 4-foot T12 U Tube to T8 U Tube	Lamp	\$5.00	0.009	46.7	11
T12 to T8 Conversion (with electronic ballast): 4-foot T12 to HP or RW T8	Lamp	\$7.00	0.012	62	11
T12 to T8 Conversion (with electronic ballast): 8-foot T12 to Reduced Wattage T8	Lamp	\$7.00	0.016	78.7	11
Standard T8 to Reduced Wattage T8 (Lamp Only): 4-foot T8 to RW T8 (lamp only)	Lamp	\$1.00	0.005	28.8	3
Standard T8 to Reduced Wattage T8 (Lamp Only): 8-foot T8 to RW T8 (lamp only)	Lamp	\$1.00	0.005	24.6	3
Delamping (Combined with T8 ballast retrofit): 2-foot & 3-foot delamping	Lamps Removed	\$5.00	0.022	119.3	11
Delamping (Combined with T8 ballast retrofit): 4-foot delamping	Lamps Removed	\$7.50	0.032	172.3	11
Delamping (Combined with T8 ballast retrofit): 8-foot delamping	Lamps Removed	\$12.50	0.062	333.7	11
LED Exit Signs	Fixture	\$25.00	0.042	343.4	16
Cold Cathode Lamps	Lamp	\$5.00	0.020	108	5
Lighting Occupancy Sensors	Controlled kW	\$90.00	0.300	1385	8
New T8/T5 Fixture	kW Reduction	\$350.00	0.916	4914	11
Lighting Density	kW Reduction	\$400.00	0.916	4914	11
LED Traffic Signals	Lamp	\$15.00	0.085	275	6
LED Pedestrian Signals	Lamp	\$15.00	0.044	150	8



# AEP GridSMART

KEMA Operations Manual

Appendix A – AEP Ohio Prescriptive Lighting  
Protocols





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# Lighting





Most lighting measures presented in these work papers use the same methodology. The following provides the assumptions and methods used for calculating energy savings.

Baseline and retrofit equipment assumptions, i.e. wattages, are specific to the measure. Most lighting retrofits assume an early replacement of existing technologies where the baseline represents the equipment removed.

Savings are calculated by applying operating hours and other parameters that define the energy savings. These workpapers base the energy savings methodology on the California 2005 DEER Study<sup>1</sup> assumptions. The DEER database is a tool that was jointly developed by the California Public Utilities Commission (CPUC) and the California Energy Commission with support and input from the Investor-Owned Utilities and other interested stakeholders. DEER provides operating hours, interactive effects and coincidence factors by building type; however, savings for AEP Ohio Program will not be dependent on building type. Savings presented here are calculated using averages of DEER building type values.

Lighting factors used in savings calculations are listed in the table below. This document explains how these values and the resulting savings were derived.

**Table 1: Average Lighting Factors**

<b>CFL Annual Operating Hours</b>	<b>Other Lighting Annual Operating Hours</b>	<b>Demand Interactive Effects</b>	<b>Coincident Diversity Factors</b>	<b>Energy Interactive Effects</b>
4,321	4,389	1.19	0.77	1.12

Annual energy savings and the peak coincident demand savings were calculated using the equations below:

Non-coincident kW reduction = kW of existing equipment - kW of replacement equipment

Energy savings are based on the difference between baseline and efficient equipment connected wattage and annual operating hours, according to the following formula:

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<sup>1</sup> 2005 Database for Energy Efficiency Resources (DEER) Update Study Final Report - Residential and Commercial Non-Weather Sensitive Measures



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$$\text{kWh Reduction} = (\text{kW of existing equipment} - \text{kW of replacement equipment}) * (\text{Annual operating hours}) * (\text{Energy Interactive Effects})$$

Coincident demand savings are calculated by applying the coincidence factor and the demand interactive effect, according to the following formula:

$$\text{Coincident kW savings} = \text{non-coincident kW savings} * \text{Coincidence Factor} * \text{Demand interactive effect}$$

Interactive factors account for savings that the measures achieve through avoided air conditioning load because of reduced internal heat gains from energy-efficient lighting. The interactive effects do not apply to exterior lighting.

The annual operating hours, the coincidence factors, and the interactive effect factors are all derived from DEER figures.

The following table lists building types set by DEER. A straight average across DEER building types would heavily weight sectors that happen to have multiple DEER categories. For instance, DEER has four sectors in education and only two in medical. A straight average of operating hours would have weighted the education sector twice as heavily as the medical sector where in reality the two are similar in electric demand.<sup>2</sup> Instead, our average values are that of sector groupings as stated in the table below.

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<sup>2</sup> AEP Ohio 2009 to 2028 Energy Efficiency, Peak Demand Reduction Potential Study, Volume 2. Page 48. Summit Blue Consulting, Inc. August 13, 2009.



**Table 2: DEER Building Types**

<b>DEER</b>	<b>Average Grouping</b>
Education – Primary School	K-12 School
Education – Secondary School	
Education – Community College	College/University
Education – University	
Grocery	Grocery
Health/Medical – Hospital	Medical
Health/Medical – Nursing Home	
Lodging – Hotel	Hotel/Motel
Lodging – Motel	
Lodging – Guest Room	
Manufacturing – Light Industrial	Light Industry
Office – Large	Office
Office – Small	
Restaurant – Sit-Down	Restaurant
Restaurant – Fast-Food	
Retail – 3-Story Large	Retail/Service
Retail – Single-Story Large	
Retail – Small	
Storage – Conditioned	Warehouse
Storage – Unconditioned	
Warehouse – Refrigerated	

The following tables list DEER values. Compact fluorescent lamps (CFLs), LED lighting (unless otherwise noted), and integrated ballast ceramic metal halides have CFL lighting operating hours. Other lighting categories have different operating hours as shown below.



**Table 3: Interactive Effects by Building Type from DEER**

<b>DEER Market Sector</b>	<b>Demand Interactive Effects</b>	<b>Energy Interactive Effects</b>
Education – Primary School	1.23	1.15
Education – Secondary School	1.23	1.15
Education – Community College	1.22	1.15
Education – University	1.22	1.15
Grocery	1.25	1.13
Medical – Hospital	1.26	1.18
Medical – Clinic	1.26	1.18
Lodging Hotel	1.14	1.14
Lodging Motel	1.14	1.14
Lodging – Guest Rooms	1.14	1.14
Manufacturing – Light Industrial	1.08	1.04
Office – Large	1.25	1.17
Office – Small	1.25	1.17
Restaurant – Sit-Down	1.26	1.15
Restaurant – Fast-Food	1.26	1.15
Retail – 3-Story Large	1.19	1.11
Retail – Single-Story Large	1.19	1.11
Retail – Small	1.19	1.11
Storage Conditioned	1.09	1.06
Storage Unconditioned	1.09	1.06
Warehouse	1.09	1.06



**Table 4: Coincident Diversity Factors from DEER**

<b>DEER Market Sector</b>	<b>Coincident Diversity Factors</b>
Education – Primary School	0.42
Education – Secondary School	0.42
Education – Community College	0.68
Education – University	0.68
Grocery	0.81
Medical – Hospital	0.74
Medical – Clinic	0.74
Lodging Hotel	0.67
Lodging Motel	0.67
Lodging – Guest Rooms	0.67
Manufacturing – Light Industrial	0.99
Office – Large	0.81
Office – Small	0.81
Restaurant – Sit-Down	0.68
Restaurant – Fast-Food	0.68
Retail – 3-Story Large	0.88
Retail – Single-Story Large	0.88
Retail – Small	0.88
Storage Conditioned	0.84
Storage Unconditioned	0.84
Warehouse	0.84



**Table 5: Annual Operating Hours from DEER**

<b>DEER Market Sector</b>	<b>CFL Annual Operating Hours</b>	<b>Other Lighting Annual Operating Hours</b>
Education – Primary School	1,440	1,440
Education – Secondary School	2,305	2,305
Education – Community College	3,792	3,792
Education – University	3,073	3,073
Grocery	5,824	5,824
Medical – Hospital	8,736	8,736
Medical – Clinic*	4,212	4,212
Lodging Hotel	8,736	8,736
Lodging Motel	8,736	8,736
Lodging – Guest Rooms	1,145	NA
Manufacturing – Light Industrial*	4,290	4,290
Office – Large	2,739	2,808
Office – Small	2,492	2,808
Restaurant – Sit-Down	3,444	4,368
Restaurant – Fast-Food	6,188	6,188
Retail – 3-Story Large	4,259	4,259
Retail – Single-Story Large	4,368	4,368
Retail – Small	3,724	4,004
Storage Conditioned*	2,860	4,859
Storage Unconditioned*	2,860	4,859
Warehouse*	2,600	4,859

\* Not from DEER

Industrial-operating hours are assumed based on the following sources:

- DEER estimates hours to be 2,860.
- Efficiency Vermont Technical Reference User Manual's (No. 2004-29) estimates 5,913 hours.
- The 2004-2005 PG&E work papers assumed 6,650 hours for process industrial and 4,400 for assembly industrial.

DEER's estimated hours are far lower than figures other sources have provided and so we have increased the DEER values by 50% or to 4,290 hours. This value is reasonable and on the conservative side of the averages. We will use this conservative value until more data is available for AEP Ohio or other MidWestern utility territory.





Similarly, we believe that the DEER storage and warehouse operating hours are low as well. Using data from other programs in the region, KEMA has seen average operating hours that are significantly higher and is using a higher value of 4,859 as a better estimate of deemed operating hours for this region.

DEER has set Medical-Hospital operating hours at 8,736. We have lowered this value for the purposes of calculating our average by using operating hours that are 50% above that of offices or 4,212 hours (Medical-Clinic operating hours). This reduction accounts for areas in medical facilities that behave more like offices and do not operate around the clock. The value used in our calculations is the average of the DEER Hospital and the revised clinic operating hours.

Hotel/Motel operating hours are the average of guest room hours and either hotel or motel operating hours since a facility can only be one or the other.

Incremental costs are taken from a number of sources. The AEP Ohio 2009-2028 Energy Efficiency/Peak Demand Reduction Potential Study conducted in August of 2009 provides costs for some measures. Since this study was prepared specifically for AEP, the utility's costs are used whenever applicable. Because some measures listed in the study do not match with that of the program, costs are derived from other sources as well including DEER, KEMA, and the Commonwealth Edison Company's 2008-10 Energy Efficiency and Demand Response Plan prepared by ICF International. The ICF document is referenced as the ICF Portfolio Plan.



<b>Compact Fluorescent Lamps, Screw-In</b>	
<b>Measure Description</b>	ENERGY STAR-rated CFLs with lamp/ballast efficacy of $\geq 40$ lumens per Watt. Measure applies only if incandescent or HID lamps are being replaced.
<b>Units</b>	Per lamp
<b>Base Case Description</b>	Incandescent or HID lamps.
<b>Measure Savings</b>	Source: KEMA
<b>Measure Incremental Cost</b>	Source: AEP Ohio Potential Study
<b>Effective Useful Life</b>	Source: DEER 2.5 years

This incentive applies to screw-in lamps and applies only if an incandescent or high-intensity discharge (HID) lamp is being replaced. All screw-in CFLs must be ENERGY STAR® rated. The lamp/ballast combination must have an efficacy  $\geq 40$  lumens per Watt (LPW). For screw-in CFLs, electronic ballasts are required for lamps  $\geq 18$  Watts.

### **Measure Savings**

Baseline and retrofit equipment assumptions are presented in the next table. Most lighting retrofits assume an early replacement of existing technologies where the baseline represents the equipment removed. The table shows the wattages used for the savings calculations.



**Table 6: Baseline and Retrofit Wattages**

Measure	Base Wattage (Watts)	Retrofit Wattage (Watts)	kW Reductions (kW)
15 W or less	75	15	0.060
15 W or less	60	15	0.045
15 W or less	60	14	0.046
15 W or less	50	14	0.036
15 W or less	65	13	0.052
15 W or less	60	13	0.047
15 W or less	40	13	0.027
15 W or less	40	11	0.029
15 W or less	40	10	0.030
15 W or less	35	7	0.028
15 W or less	30	7	0.023
15 W or less	25	7	0.018
15 W or less	30	9	0.021
15 W or less	25	9	0.016
15 W or less	25	5	0.020
15 W or less	20	5	0.015
16W-25W	100	25	0.075
16W-25W	75	25	0.05
16W-25W	100	23	0.077
16W-25W	100	20	0.08
16W-25W	75	20	0.055
16W-25W	75	19	0.056
16W-25W	75	18	0.057
16W-25W	60	18	0.042
16W-25W	60	16	0.044
26W and Greater	150	40	0.11
26W and Greater	150	36	0.114
26W and Greater	100	30	0.07
26W and Greater	100	28	0.072
26W and Greater	100	26	0.074
26W and Greater	75	26	0.049



**Table 7: Wattage Reduction**

Wattage Category	Average Wattage Reduction
≤15	32
16 to 26	60
>26	76

The following tables provide the measure savings using the above wattage reduction assumptions.

**Table 8: Measure Savings for 15 W or less**

Annual Operating Hours	Demand Interactive Effects	Coincident Diversity Factors	Energy Interactive Effects	Peak kW Savings	kWh Savings
4,321	1.19	0.77	1.12	0.029	155

**Table 9: Measure Savings for 16 – 26 W**

Annual Operating Hours	Demand Interactive Effects	Coincident Diversity Factors	Energy Interactive Effects	Peak kW Savings	kWh Savings
4,321	1.19	0.77	1.12	0.054	290

**Table 10: Measure Savings for > 26 W**

Annual Operating Hours	Demand Interactive Effects	Coincident Diversity Factors	Energy Interactive Effects	Peak kW Savings	kWh Savings
4,321	1.19	0.77	1.12	0.069	368

### Measure Savings Analysis

Annual energy savings and the peak coincident demand savings were calculated using the equations below.

Noncoincident kW reduction = kW of existing equipment - kW of replacement equipment

Energy savings are based on the difference between baseline and efficient equipment connected wattage and annual operating hours, according to the following formula:



$$\text{kWh Reduction} = (\text{kW of existing equipment} - \text{kW of replacement equipment}) * (\text{Annual operating hours}) * (\text{Energy Interactive Effects})$$

Coincident demand savings are calculated by applying the coincidence factor and the demand interactive effect, according to the following formula:

$$\text{Coincident kW savings} = \text{noncoincident kW savings} * \text{Coincidence Factor} * \text{Demand interactive effect}$$

Interactive factors account for savings that the measures achieve through avoided air conditioning load because of reduced internal heat gains from energy-efficient lighting.

The annual operating hours, the coincidence factors, and the interactive effect factors are all derived from DEER figures.<sup>3</sup>

### Measure Life and Incremental Measure Cost

The following table provides the measure life and incremental measure cost (IMC) documented for this measure as well as the source of the data.

Incremental cost is the cost difference between the energy-efficient equipment and the less efficient option. For lighting measures, the IMC is equal to the full measure cost since the cost of the less efficient option, i.e., not conducting the retrofit, is \$0.

**Table 11: Measure Life and Incremental Measure Cost**

Wattage Category		Value	Source
All	Measure Life	2.5	DEER 2005
≤15W	Incremental Measure Cost	\$4.13	AEP Ohio Potential Study
16W-26W	Incremental Measure Cost	\$4.13	AEP Ohio Potential Study
> 26W	Incremental Measure Cost	\$4.13	AEP Ohio Potential Study

<sup>3</sup> 2005 Database for Energy Efficiency Resources (DEER) Update Study Final Report - Residential and Commercial Non-Weather Sensitive Measures



<b>Compact Fluorescent Fixtures, Hardwired</b>	
<b>Measure Description</b>	New fixtures or modular retrofits with hardwired electronic ballasts qualify. The CFL ballast must be programmed start or programmed rapid start with a PF $\geq 90$ and THD $\leq 20\%$ .
<b>Units</b>	Per fixture
<b>Base Case Description</b>	Incandescent or HID lamps.
<b>Measure Savings</b>	Source: KEMA
<b>Measure Incremental Cost</b>	Source: KEMA
<b>Effective Useful Life</b>	Source: DEER 12 years

Hardwired CFL incentives apply only to complete new fixtures or modular (pin-based) retrofits with hardwired electronic ballasts. The CFL ballast must be programmed 'start' or programmed 'rapid start' with a PF  $\geq 90$  and THD  $\leq 20$  percent.

### **Measure Savings**

Baseline and retrofit equipment assumptions are presented in the table below. Most lighting retrofits assume early replacement of existing technologies where the baseline represents the equipment removed. The following table shows the wattages used for the savings calculations.





**Table 12: Baseline and Retrofit Wattages**

Measure	Base Wattage	Retrofit Wattage	kW Reduction
29W or Less	100	28	0.072
29W or Less	125	27	0.098
29W or Less	110	27	0.083
29W or Less	100	26	0.074
29W or Less	75	26	0.049
29W or Less	100	25	0.075
29W or Less	75	25	0.05
29W or Less	100	23	0.077
29W or Less	75	20	0.055
29W or Less	75	19	0.056
29W or Less	75	18	0.057
29W or Less	60	18	0.042
29W or Less	60	16	0.044
29W or Less	60	15	0.045
29W or Less	60	14	0.046
29W or Less	60	13	0.047
29W or Less	40	13	0.027
29W or Less	40	9	0.031
30W or Greater	120	30	0.09
30W or Greater	120	40	0.08
30W or Greater	200	55	0.145
30W or Greater	200	65	0.135

**Table 13: Wattage Reduction**

Wattage Category	Average Wattage Reduction
≤29	57
≥30W	113

The following tables provide the measure savings using the above wattage reduction assumptions.

**Table 14: Measure Savings for 29W or less**

Annual Operating Hours	Demand Interactive Effects	Coincident Diversity Factors	Energy Interactive Effects	Peak kW Savings	kWh Savings
4,321	1.19	0.77	1.12	0.052	276



**Table 15: Measure Savings for ≥30W**

Annual Operating Hours	Demand Interactive Effects	Coincident Diversity Factors	Energy Interactive Effects	Peak kW Savings	kWh Savings
4,321	1.19	0.77	1.12	0.103	544

### Measure Savings Analysis

Annual energy savings and the peak coincident demand savings were calculated using the equations below. The annual operation hours, the coincidence factors, and the interactive effect factors were all derived from the DEER database.<sup>4</sup> DEER values by building type were averaged for the AEP Ohio Program.

Non-coincident kW reduction = kW of existing equipment - kW of replacement equipment

Energy savings are calculated by applying the annual operating hours and the energy interactive effect, according to the following formula:

kWh Reduction = non-coincident kW savings \* Annual operating hours \* Energy interactive effect

Coincident demand savings are calculated by applying the coincidence factor and the demand interactive effect, according to the following formula:

Coincident kW savings = non-coincident kW savings \* Coincidence Factor \* Demand interactive effect

### Measure Life and Incremental Measure Cost

The table below provides the measure life and IMC documented for this measure as well as the source of the data.

Incremental cost is the cost difference between the energy-efficient equipment and the less efficient option. For lighting measures, the IMC is equal to the full measure cost since the cost of the less efficient option, i.e., not conducting the retrofit, is \$0.

<sup>4</sup> 2005 Database for Energy Efficiency Resources (DEER) Update Study Final Report - Residential and Commercial Non-Weather Sensitive Measures



**Table 16: Measure Life and Incremental Measure Cost**

<b>Wattage Category</b>		<b>Value</b>	<b>Source</b>
All	Measure Life	12	DEER
≤29	Incremental Measure Cost	\$95	KEMA
≥30W	Incremental Measure Cost	\$132	KEMA



<b>Permanent Lamp Removal</b>	
<b>Measure Description</b>	Incentives are paid for the permanent removal of existing 8', 4', 3' and 2' fluorescent lamps. Unused lamps, lamp holders, and ballasts must be permanently removed from the fixture. This measure is applicable when retrofitting from T12 lamps to T8 lamps or simply removing lamps from a T8 fixture. Removing lamps from a T12 fixture that is not being retrofitted with T8 lamps are not eligible for this incentive.
<b>Units</b>	Per lamp
<b>Base Case Description</b>	Various configurations of fluorescent fixtures before removal of lamps.
<b>Measure Savings</b>	Source: KEMA
<b>Measure Incremental Cost</b>	Source: ICF Portfolio Plan
<b>Effective Useful Life</b>	Source: DEER 11 years

Incentives are paid for the permanent removal of existing fluorescent lamps resulting in a net reduction of the number of foot-lamps. Customers are responsible for determining whether or not to use reflectors in combination with lamp removal in order to maintain adequate lighting levels. Unused lamps, lamp holders, and ballasts must be permanently removed from the fixture. This measure is applicable when retrofitting from T12 lamps to T8 lamps or simply removing lamps from a T8 fixture. Removing lamps from a T12 fixture that is not being retrofitted with T8 lamps is not eligible for this incentive. A Pre-approval Application is required for lamp removal projects in order for KEMA to have the option of conducting a pre-retrofit inspection.

### Measure Savings

Non-coincident demand savings are summarized by the following table:

**Table 17: Wattage Reduction**

<b>Wattage Category</b>	<b>Average Wattage Reduction</b>
8 Foot Lamp Removal	68
4 Foot Lamp Removal	35
2 Foot or 3 Foot Lamp Removal	24



**Table 18: Measure Savings for 8-Foot Lamp Removal**

Annual Operating Hours	Demand Interactive Effects	Coincident Diversity Factors	Energy Interactive Effects	8-foot Lamp Peak Savings (kW)	8-foot Savings (kWh)
4,389	1.19	0.77	1.12	0.062	333.7

**Table 19: Measure Savings for 4-Foot Lamp Removal**

Annual Operating Hours	Demand Interactive Effects	Coincident Diversity Factors	Energy Interactive Effects	4-foot Lamp Peak Savings (kW)	4-foot Savings (kWh)
4,389	1.19	0.77	1.12	0.032	172.3

**Table 20: Measure Savings for 2-Foot or 3-Foot Lamp Removal**

Annual Operating Hours	Demand Interactive Effects	Coincident Diversity Factors	Energy Interactive Effects	2-foot or 3-foot Lamp Peak Savings (kW)	2-foot or 3-foot Savings (kWh)
4,389	1.19	0.77	1.12	0.022	119.3

### Measure Savings Analysis

Annual energy savings and the peak coincident demand savings were calculated using the equations below. The annual operating hours, the coincidence factors, and the interactive effect factors were all derived from the DEER database.<sup>5</sup> However, DEER values by building type were averaged for the AEP Ohio Program.

Non-coincident kW reduction = kW of existing equipment - kW of replacement equipment

<sup>5</sup> 2005 Database for Energy Efficiency Resources (DEER) Update Study Final Report - Residential and Commercial Non-Weather Sensitive Measures



Energy savings are calculated by applying the annual operating hours and the energy interactive effect, according to the following formula:

$$\text{kWh Reduction} = \text{non-coincident kW savings} * \text{Annual operating hours} * \text{Energy interactive effect}$$

Coincident demand savings are calculated by applying the coincidence factor and the demand interactive effect, according to the following formula:

$$\text{Coincident kW savings} = \text{non-coincident kW savings} * \text{Coincidence Factor} * \text{Demand interactive effect}$$

Baseline assumptions are presented in the next table. Most lighting retrofits assume an early replacement of existing technologies where the baseline represents the equipment removed. The table shows the wattages used for the savings calculations. Weighted average savings values are used when determining deemed savings for each 8 foot or 4 foot lamp permanently removed.

**Table 21: Wattages for Eight-foot Lamps**

Baseline	Base Wattage	Lamp Removed Wattage	Weight Percentages
Two 8' T12 (60W/75W)	140	70	85%
Two 8' T8 (59W)	111	56	15%
Total Weighted Average		68	

**Table 22: Wattages for Four-foot Lamps**

Baseline	Base Wattage	Lamp Removed Wattage	Weight Percentages
Two 4' T8 (32W)	65	36	3%
Two 4' T12 (34W/40W)	72	36	8%
Three 4' T8 (32W)	92	31	7%
Three 4' T12 (34W/40W)	115	38	22%
Four 4' T8 (32W)	118	30	15%
Four 4' T12 (34W/40W)	144	36	45%
Total Weighted Average		35	





**Table 23: Wattages for Two and Three-foot Lamps**

Baseline	Base Wattage	Lamp Removed Wattage	Weight Percentages
Two 3' T12 (30W)	76	38	15%
Two 3' T8 (34W/40W)	48	24	15%
Two 2' T8 (17W)	31	15	30%
Two 2' T12 (20W)	56	28	30%
Three 2' T8 (17W)	46	16	2.5%
Three 2' T12 (20W)	62	21	2.5%
Four 2' T8 (17W)	60	15	2.5%
Four 2' T12 (20W)	112	28	2.5%
Total Weighted Average		24	

#### **Measure Life and Incremental Measure Cost**

The following table provides the measure life and incremental measure cost (IMC) documented for this measure as well as the source of the data.

Incremental cost is cost difference between the energy efficient equipment and the less efficient option. For lighting measures, the IMC is equal to the full measure cost since the cost of the less efficient option, i.e., not conducting the retrofit, is \$0.

**Table 24: Measure Life and Incremental Measure Cost**

Measure Category		Value	Source
All	Measure Life	11	DEER
8-Foot Lamp Removal	Incremental Measure Cost	\$25.91	ICF Portfolio Plan
4-Foot Lamp Removal	Incremental Measure Cost	\$25.70	ICF Portfolio Plan
2-Foot or 3-Foot Removal	Incremental Measure Cost	\$25.70	KEMA



High Performance and Reduced Wattage 4-foot T8 Lamps and Ballast	
<b>Measure Description</b>	This measure consists of replacing existing T12 4' lamps and magnetic ballasts with high performance 32W T8 lamps or reduced wattage 28W or 25W lamps and electronic ballasts. Both the lamp and ballast must meet the Consortium for Energy Efficiency (CEE) high performance or reduced wattage T8 specification ( <a href="http://www.cee1.org">www.cee1.org</a> ) summarized below.
<b>Units</b>	Per lamp
<b>Base Case Description</b>	T12 lamp and magnetic ballasts
<b>Measure Savings</b>	Source: KEMA
<b>Measure Incremental Cost</b>	Source: AEP Ohio Potential Study
<b>Effective Useful Life</b>	Source: DEER 11 years

This measure consists of replacing existing T12 lamps and magnetic ballasts with high-performance T8 lamps or reduced wattage (28 or 25W) T8 lamps and electronic ballasts. This measure is based on the Consortium for Energy Efficiency (CEE) high-performance T8 or reduced wattage specification ([www.cee1.org](http://www.cee1.org)) and is summarized below. A list of qualified lamps and ballasts can be found at: <http://www.cee1.org>. Both the lamp and ballast must meet the specification to qualify for an incentive. The incentive is calculated based on the number of lamps installed. A manufacturer's specification sheet must accompany the application.

For reduced wattage 4-foot T8 lamps, the nominal wattage must be 28 W ( $\geq 2,585$  Lumens) or 25 W ( $\geq 2,400$  Lumens) to qualify. The mean system efficacy must be  $\geq 90$  MLPW, CRI  $\geq 80$ , and lumen maintenance at 94 percent. Other requirements can be found on the CEE website using the links above.

The table below provides the specification for high performance systems.



**Table 25: High-Performance T8 Specifications**

Performance Characteristics for Systems				
Mean system efficacy	≥ 90 Mean Lumens per Watt (MLPW) for Instant Start Ballasts			
	≥ 88 MLPW for Programmed Rapid Start Ballasts			
Performance Characteristics for Lamps				
Color Rendering Index (CRI)	≥ 80			
Minimum initial lamp lumens	≥ 3100 Lumens <sup>6</sup>			
Lamp life	≥ 24,000 hours			
Lumen maintenance or minimum mean lumens	≥ 90% or ≥ 2,900 Mean Lumens			
Performance Characteristics for Ballasts				
Ballast Efficacy Factor (BEF)  BEF = (BF x 100) / Ballast Input Watts	Instant-Start Ballast (BEF)			
	Lamps	Low BF ≤ 0.85	Norm 0.85 < BF ≤ 1.0	High BF ≥ 1.01
	1	> 3.08	> 3.11	NA
	2	> 1.60	> 1.58	>1.55
	3	≥ 1.04	≥ 1.05	≥ 1.04
	4	≥ 0.79	≥ 0.80	≥ 0.77
	Programmed Rapid Start Ballast (BEF)			
	1	≥ 2.84	≥ 2.84	NA
	2	≥ 1.48	≥ 1.47	≥ 1.51
	3	≥ 0.97	≥ 1.00	≥ 1.00
	4	≥ 0.76	≥ 0.75	≥ 0.75
	Ballast Frequency	20 to 33 kHz or ≥ 40 kHz		
Power Factor	≥ 0.90			
Total Harmonic Distortion	≤ 20%			

### Measure Savings

Savings are summarized by the following table:

**Table 26: Measure Savings for High-Performance or Reduced Wattage 4-foot Lamp and Ballast (per lamp)**

<b>Coincident Demand Savings (kW)</b>	<b>Energy Savings (kWh)</b>
0.012	62.0

<sup>6</sup> For lamps with temperature ≥4500K, 2,950 minimum initial lamp lumens are specified.



### Measure Savings Analysis

Annual energy savings and the peak coincident demand savings were calculated using the equations below. The annual operating hours, the coincidence factors, and the interactive effect factors were all derived from the DEER database and shown in the following table. However, DEER values by building type were averaged for the AEP Ohio Program.

**Table 27: Factors used for Calculating Lighting Savings**

<b>Annual Operating Hours</b>	<b>Demand Interactive Effects</b>	<b>Coincident Diversity Factors</b>	<b>Energy Interactive Effects</b>
4,389	1.19	0.77	1.12

Non-coincident kW reduction = kW of existing equipment - kW of replacement equipment

Energy savings are calculated by applying the annual operating hours and the energy interactive effect, according to the following formula:

$$\text{kWh Reduction} = \text{non-coincident kW savings} * \text{Annual operating hours} * \text{Energy interactive effect}$$

Coincident demand savings are calculated by applying the coincidence factor and the demand interactive effect, according to the following formula:

$$\text{Coincident kW savings} = \text{non-coincident kW savings} * \text{Coincidence Factor} * \text{Demand interactive effect}$$

Baseline and retrofit equipment assumptions are presented in the table below.



**Table 28: Baseline and Retrofit Wattages for High-Performance or Reduced Wattage Fixture Retrofits**

	T8, 4-foot Configuration	Base Fixture Wattage	Retrofit Lamp Wattage	Retrofit Fixture Wattage	Demand Savings per fixture (kW)	Demand Savings per lamp (kW)	Weight Percentages
High	4-lamp	144	32	108	0.036	0.009	9%
	3-lamp	103	32	83	0.02	0.007	4%
	2-lamp	72	32	54	0.018	0.009	8%
	1-lamp	43	32	28	0.015	0.015	4%
Med	4-lamp	144	28	96	0.048	0.012	15%
	3-lamp	103	28	72	0.031	0.010	10%
	2-lamp	72	28	48	0.024	0.012	15%
	1-lamp	43	28	25	0.018	0.018	10%
Low	4-lamp	144	25	85	0.059	0.015	9%
	3-lamp	103	25	66	0.037	0.012	4%
	2-lamp	72	25	44	0.028	0.014	8%
	1-lamp	43	25	22	0.021	0.021	4%
	Weighted Average					0.0126	

#### Measure Life and Incremental Measure Cost

The table below provides the measure life and IMC documented for this measure as well as the source of the data. Incremental cost is the cost difference between the energy-efficient equipment and the less efficient option. In this case, the IMC is equal to the full measure cost since cost of the less efficient option is 0.

**Table 29: Measure Life and Incremental Measure Cost**

	Measure Category	Value	Source
Measure Life	Lamp and Ballast	11	DEER
Incremental Measure Cost	4 Foot Lamp and Ballast	\$13.14	AEP Ohio Potential Study



Reduced Wattage 4-foot Lamp Only	
<b>Measure Description</b>	This measure consists of replacing existing standard T8 4' lamps and electronic ballasts with reduced wattage T8 lamps. The lamp must meet the Consortium for Energy Efficiency (CEE) reduced wattage T8 specification ( <a href="http://www.cee1.org">www.cee1.org</a> ). The nominal wattage for 4 foot lamps must be 28W ( $\geq 2585$ Lumens) or 25W ( $\geq 2400$ Lumens) to qualify. The mean system efficacy must be $\geq 90$ MLPW, CRI $\geq 80$ , and lumen maintenance at 94%. A manufacturer's specification sheet must accompany the application.
<b>Units</b>	Per lamp
<b>Base Case Description</b>	Standard T8 fixtures.
<b>Measure Savings</b>	Source: KEMA
<b>Measure Incremental Cost</b>	Source: ICF Portfolio Plan
<b>Effective Useful Life</b>	Source: KEMA 3 years

Incentives are available when replacing standard 32-Watt T8 lamps with reduced-wattage T8 lamps when an electronic ballast is already present. The lamps must be reduced wattage in accordance with the Consortium for Energy Efficiency (CEE) specification ([www.cee1.org](http://www.cee1.org)). Qualified products can be found at <http://www.cee1.org>. The nominal wattage must be 28 W ( $\geq 2,585$  Lumens) or 25 W ( $\geq 2,400$  Lumens) to qualify. The mean system efficacy must be  $\geq 90$  MLPW, CRI  $\geq 80$ , and lumen maintenance at 94 percent. A manufacturer's specification sheet must accompany the application.

### Measure Savings

Savings are summarized by the following table:

**Table 30: Measure Savings for Reduced-Wattage 4-foot Lamp Only**

Coincident Demand Savings (kW)	Energy Savings (kWh)
0.005	28.8

### Measure Savings Analysis

Annual energy savings and the peak coincident demand savings were calculated using the equations below. The annual operating hours, the coincidence factors, and the interactive effect factors were all derived from the DEER database and shown in the next table. However, DEER values by building type were averaged for the AEP Ohio Program.





**Table 31: Factors used for Calculating Lighting Savings**

Annual Operating Hours	Demand Interactive Effects	Coincident Diversity Factors	Energy Interactive Effects
4,389	1.19	0.77	1.12

Non-coincident kW reduction = kW of existing equipment - kW of replacement equipment

Energy savings are calculated by applying the annual operating hours and the energy interactive effect, according to the following formula:

$$\text{kWh Reduction} = \text{non-coincident kW savings} * \text{Annual operating hours} * \text{Energy interactive effect}$$

Coincident demand savings are calculated by applying the coincidence factor and the demand interactive effect, according to the following formula:

$$\text{Coincident kW savings} = \text{non-coincident kW savings} * \text{Coincidence Factor} * \text{Demand interactive effect}$$

Baseline and retrofit equipment assumptions are presented in the next table.

**Table 32: Baseline and Retrofit Wattages for 4-foot T8 Lamp Only**

T8 Configuration	Base Lamp Wattage	Base Fixture Wattage	Retrofit Lamp Wattage	Retrofit Fixture Wattage	Demand Savings per fixture (kW)	Demand Savings per lamp (kW)	Weight Percentages
4 ft, 4-lamp	32	112	28	96	0.016	0.004	18%
4 ft, 3-lamp	32	85	28	72	0.013	0.004	13%
4 ft, 2-lamp	32	58	28	48	0.01	0.005	15%
4 ft, 1-lamp	32	32	28	25	0.007	0.007	5%
4 ft, 4-lamp	32	112	25	85	0.027	0.007	18%
4 ft, 3-lamp	32	85	25	66	0.019	0.006	13%
4 ft, 2-lamp	32	58	25	44	0.014	0.007	15%
4 ft, 1-lamp	32	32	25	22	0.01	0.010	5%
Weighted Average						0.006	

### Measure Life and Incremental Measure Cost

The following table provides the measure life and IMC documented for this measure as well as the source of the data. Incremental cost is the cost difference between the energy-efficient equipment and the less efficient option. In this case, the IMC is equal to the full measure cost for



lamp and ballast retrofit and incremental for lamp only. The lamp and ballast retrofit is a change in technology.

**Table 33: Measure Life and Incremental Measure Cost**

	<b>Measure Category</b>	<b>Value</b>	<b>Source</b>
Measure Life	Lamp Only	3	KEMA
Incremental Measure Cost	4 Foot Lamp Only	\$2.10	ICF Portfolio Plan



Reduced Wattage 8-foot	
<b>Measure Description</b>	<p>This measure consists of replacing existing T12 8' lamps and magnetic ballasts with reduced wattage T8 lamps and electronic ballasts. Both the lamp and ballast must meet the Consortium for Energy Efficiency (CEE) high performance or reduced wattage T8 specification (<a href="http://www.cee1.org">www.cee1.org</a>). Eight foot lamps must have a minimum MLPW of 90 and must have a nominal wattage of less than 57W. A manufacturer's specification sheet must accompany the application.</p> <p>High wattage T8 (59W) can be replaced with reduced wattage lamps without replacing the ballast. The lamps must also meet CEE standards for reduced wattage.</p>
<b>Units</b>	Per lamp
<b>Base Case Description</b>	T12 lamp and magnetic ballasts or high watt T8 fixtures (for reduced wattage lamp only replacements).
<b>Measure Savings</b>	Source: KEMA
<b>Measure Incremental Cost</b>	Source: DEER and ICF Portfolio Plan
<b>Effective Useful Life</b>	Source: KEMA and DEER

This measure consists of replacing existing T12 lamps and magnetic ballasts with reduced wattage lamp and electronic ballast systems. The lamps and ballasts must meet the Consortium for Energy Efficiency (CEE) specification ([www.cee1.org](http://www.cee1.org)). Qualified lamps and ballast products can be found at <http://www.cee1.org>. Incentives are also available when replacing 59-Watt T8 lamps with reduced-wattage T8 lamps when an electronic ballast is already present. Eight-foot lamps must have a minimum MLPW of 90 and must have a nominal wattage of less than 57 W. A manufacturer's specification sheet must accompany the application.

### Measure Savings

Savings are summarized by the following table:

**Table 34: Measure Savings for Reduced-Wattage 8-foot Lamp and Ballast**

Coincident Demand Savings (kW)	Energy Savings (kWh)
0.016	78.7



**Table 35: Measure Savings for Reduced-Wattage 8-foot Lamp Only**

Coincident Demand Savings (kW)	Energy Savings (kWh)
0.005	24.6

### Measure Savings Analysis

Annual energy savings and the peak coincident demand savings were calculated using the equations below. The annual operating hours, the coincidence factors, and the interactive effect factors were all derived from the DEER database and shown in the table below. DEER values by building type were averaged for the AEP Ohio Program.

**Table 36: Factors used for Calculating Lighting Savings**

Annual Operating Hours	Demand Interactive Effects	Coincident Diversity Factors	Energy Interactive Effects
4,389	1.19	0.77	1.12

Non-coincident kW reduction = kW of existing equipment - kW of replacement equipment

Energy savings are calculated by applying the annual operating hours and the energy interactive effect, according to the following formula:

$$\text{kWh Reduction} = \text{non-coincident kW savings} * \text{Annual operating hours} * \text{Energy interactive effect}$$

Coincident demand savings are calculated by applying the coincidence factor and the demand interactive effect, according to the following formula:

$$\text{Coincident kW savings} = \text{non-coincident kW savings} * \text{Coincidence Factor} * \text{Demand interactive effect}$$

Baseline and retrofit equipment assumptions are presented in the next table.



**Table 37: Baseline and Retrofit Wattages for 8-foot**

	Configuration	Base Lamp Wattage	Base Fixture Wattage	Retrofit Lamp Wattage	Retrofit Fixture Wattage	Demand Savings per fixture (kW)	Demand Savings per lamp (kW)	Weight Percentages
Lamp and Ballast	8ft, 2 lamp	60	132	57	102	0.030	0.015	50%
	8ft, 1-lamp	60	77	57	60	0.017	0.017	50%
	Weighted Average						0.016	
Lamp Only	8ft, 2 lamp	59	106	57	102	0.004	0.002	50%
	8ft, 1-lamp	59	68	57	60	0.008	0.008	50%
	Weighted Average						0.005	

#### Measure Life and Incremental Measure Cost

The following table provides the measure life and IMC documented for this measure as well as the source of the data. Incremental cost is the cost difference between the energy-efficient equipment and the less efficient option. In this case, the IMC is equal to the full measure cost for lamp and ballast retrofit and incremental for lamp only. The lamp and ballast retrofit is a change in technology.

**Table 38: Measure Life and Incremental Measure Cost**

	Measure Category	Value	Source
Measure Life	Lamp and Ballast	11	DEER
Measure Life	Lamp Only	3	KEMA
Incremental Measure Cost	8 Foot Lamp and Ballast	\$36.91	DEER
Incremental Measure Cost	8 Foot Lamp Only	\$5.50	ICF Portfolio Plan



2-foot & 3-foot T8 Lamps and Ballast	
<b>Measure Description</b>	This measure consists of replacing existing T12 2-foot and 3-foot lamps and magnetic ballasts with 17W, 2-foot, and 25W, 3-foot, T8 lamps and electronic ballasts.
<b>Units</b>	Per lamp
<b>Base Case Description</b>	T12 lamps and magnetic ballast
<b>Measure Savings</b>	Source: KEMA
<b>Measure Incremental Cost</b>	Source: PG&E 2006 Work papers
<b>Effective Useful Life</b>	Source: DEER 11 years

This measure consists of replacing existing T12 lamps and magnetic ballasts with T8 lamps and electronic ballasts. The lamp must have a color rendering index (CRI)  $\geq 80$  and the ballast must have a total harmonic distortion (THD)  $\leq 32\%$  at full light output and power factor (PF)  $\geq 0.90$ . Ballasts must also be warranted against defects for 5 years. The incentive is calculated based on the number of lamps installed. A manufacturer's specification sheet must accompany the application.

### Measure Savings

The coincident kW and kWh savings are provided in the following table:

**Table 39: Measure Savings for 2-foot and 3-foot Lamp and Ballast (per lamp)**

2-foot Lamp fixtures		3-foot Lamp fixtures	
Coincident Demand Savings (kW)	Energy Savings (kWh)	Coincident Demand Savings (kW)	Energy Savings (kWh)
0.010	51.6	0.013	69.5





### Measure Savings Analysis

Annual energy savings and the peak coincident demand savings were calculated using the equations below. The annual operating hours, the coincidence factors, and the interactive effect factors were all derived from the DEER database and shown in the following table.

**Table 40: Factors used for Calculating Lighting Savings**

Annual Operating Hours	Demand Interactive Effects	Coincident Diversity Factors	Energy Interactive Effects
4,389	1.19	0.77	1.12

Non-coincident kW reduction = kW of existing equipment - kW of replacement equipment

Energy savings are calculated by applying the annual operating hours and the energy interactive effect, according to the following formula:

$$\text{kWh Reduction} = \text{non-coincident kW savings} * \text{Annual operating hours} * \text{Energy interactive effect}$$

Coincident demand savings are calculated by applying the coincidence factor and the demand interactive effect, according to the following formula:

$$\text{Coincident kW savings} = \text{non-coincident kW savings} * \text{Coincidence Factor} * \text{Demand interactive effect}$$

Baseline and retrofit equipment assumptions are presented in the tables below. The fixture wattages were collected from PG&E's Non-residential Retrofit Program standard fixture wattage table.



**Table 41: Baseline and Retrofit Wattages for 2-foot lamps**

T8 Configuration	Base Lamp Wattage	Base Fixture Wattage	Retrofit Lamp Wattage	Retrofit Fixture Wattage	Demand Savings per fixture (kW)	Demand Savings per lamp (kW)	Weight Percentages
2 ft, 4-lamp	20	112	17	61	0.051	0.013	2.5%
2 ft, 3-lamp	20	84	17	47	0.037	0.012	2.5%
2 ft, 2-lamp	20	56	17	33	0.023	0.012	65%
2 ft, 1-lamp	20	28	17	20	0.008	0.008	30%
Weighted Average						0.011	

**Table 42: Baseline and Retrofit Wattages for 3-foot lamps**

T8 Configuration	Base Lamp Wattage	Base Fixture Wattage	Retrofit Lamp Wattage	Retrofit Fixture Wattage	Demand Savings per fixture (kW)	Demand Savings per lamp (kW)	Weight Percentages
3 ft, 4-lamp	30	152	25	87	0.065	0.0163	2.5%
3 ft, 3-lamp	30	114	25	67	0.047	0.0157	2.5%
3 ft, 2-lamp	30	76	25	46	0.030	0.0150	65%
3 ft, 1-lamp	30	38	25	26	0.012	0.0120	30%
Weighted Average						0.014	

#### Measure Life and Incremental Measure Cost

The table below provides the measure life and IMC documented for this measure as well as the source of the data. Incremental cost is cost difference between the energy-efficient equipment and the less efficient option. In this case, the IMC is equal to the full measure cost since cost of the less efficient option is \$0.

**Table 43: Measure Life and Incremental Measure Cost**

	Measure Category	Value	Source
Measure Life	Lamp and Ballast	11	DEER
Measure Life	Lamp Only	3	KEMA
Incremental Measure Cost	2 Foot Lamp and Ballast	\$10.50	PG&E 2006 Work Paper
Incremental Measure Cost	3 Foot Lamp and Ballast	\$21	PG&E 2006 Work Paper



U-Tube T8 Lamps and Ballast	
<b>Measure Description</b>	This measure consists of replacing existing T12 U-tube lamps and magnetic ballasts with T8 U-tube lamps and electronic ballasts.
<b>Units</b>	Per lamp
<b>Base Case Description</b>	U-tube T12 lamps and magnetic ballast
<b>Measure Savings</b>	Source: KEMA
<b>Measure Incremental Cost</b>	Source: AEP Ohio Potential Study
<b>Effective Useful Life</b>	Source: DEER 11 years

This measure consists of replacing existing U-tube T12 lamps and magnetic ballasts with U-tube T8 lamps and electronic ballasts. The lamp must have a color rendering index (CRI)  $\geq 80$  and the ballast must have a total harmonic distortion (THD)  $\leq 20\%$  at full light output and power factor (PF)  $\geq 90$ . Ballasts must also be warranted against defect for 5 years. The incentive is calculated based on the number of lamps installed. A manufacturer's specification sheet must accompany the application.

### Measure Savings

The coincident kW and kWh savings are in the following table.

**Table 44: Measure Savings for U-tube Lamp and Ballast (per lamp)**

Coincident Demand Savings (kW)	Energy Savings (kWh)
0.009	46.7

### Measure Savings Analysis

Annual energy savings and the peak coincident demand savings were calculated using the equations below. The annual operating hours, the coincidence factors, and the interactive effect factors were all derived from the DEER database and shown in the following table.<sup>7</sup>

<sup>7</sup> 2005 Database for Energy Efficiency Resources (DEER) Update Study Final Report - Residential and Commercial Non-Weather Sensitive Measures



**Table 45: Factors used for Calculating Lighting Savings**

Annual Operating Hours	Demand Interactive Effects	Coincident Diversity Factors	Energy Interactive Effects
4,389	1.19	0.77	1.12

Non-coincident kW reduction = kW of existing equipment - kW of replacement equipment

Energy savings are calculated by applying the annual operating hours and the energy interactive effect, according to the following formula:

$$\text{kWh Reduction} = \text{non-coincident kW savings} * \text{Annual operating hours} * \text{Energy interactive effect}$$

Coincident demand savings are calculated by applying the coincidence factor and the demand interactive effect, according to the following formula:

$$\text{Coincident kW savings} = \text{non-coincident kW savings} * \text{Coincidence Factor} * \text{Demand interactive effect}$$

Baseline and retrofit equipment assumptions are presented in the following table. The wattages were collected from PG&E's Non-residential retrofit standard wattages table.

**Table 46: Baseline and Retrofit Wattages for U-tube lamps**

T8 Configuration	Base Lamp Wattage	Base Fixture Wattage	Retrofit Lamp Wattage	Retrofit Fixture Wattage	Demand Savings per fixture (kW)	Demand Savings per lamp (kW)	Weight Percentages
U-tube, 2 lamp	35	72	32	59	0.013	0.007	50%
U-tube, 1 lamp	35	43	32	31	0.012	0.012	50%
Weighted Average						0.010	

### Measure Life and Incremental Measure Cost

The table below provides the measure life and IMC documented for this measure as well as the source of the data. Incremental cost is cost difference between the energy-efficient equipment and the less efficient option. In this case, the IMC is equal to the full measure cost since cost of the less efficient option is \$0. For U-tubes, it is assumed that the cost is the same as a high performance 4-foot T8 lamp (DEER measure ID D03-852).



**Table 47: Measure Life and Incremental Measure Cost**

	<b>Measure Category</b>	<b>Value</b>	<b>Source</b>
Measure Life	Lamp and Ballast	11	DEER
Measure Life	Lamp Only	3	KEMA
Incremental Measure Cost	U-Tube Lamp and Ballast	\$13.14	AEP Potential Study



Cold Cathode	
<b>Measure Description</b>	All cold cathode fluorescent lamps (CCFLs) must replace incandescent lamps of at least 10 W and not greater than 40 W. Cold cathode lamps may be medium (Edison) or candelabra base. Product must be rated for at least 18,000 average life hours.
<b>Units</b>	Per lamp
<b>Base Case Description</b>	Incandescent
<b>Measure Savings</b>	Source: KEMA, SCE
<b>Measure Incremental Cost</b>	Source: PG&E
<b>Effective Useful Life</b>	Source: SCE 5 years

All cold cathode fluorescent lamps (CCFLs) must replace incandescent lamps of at least 10 W and not greater than 40 W. Cold cathode lamps may be medium (Edison) or candelabra base. The product must be rated for at least 18,000 average life hours.

### Measure Savings

Baseline and retrofit equipment assumptions are presented in table below. Most lighting retrofits assume an early replacement of existing technologies where the baseline represents the equipment removed. The table shows the wattages used for the savings calculations from SCE and KEMA research of cold cathode manufacturers.

**Table 48: Baseline and Retrofit Wattages**

Measures <sup>8</sup>	Base Wattage (Watts)	Retrofit Wattage (Watts)	Wattage Reduction (Watt)
Incandescent (15W) -> Cold Cathode FL (5W)	15	5	10
Incandescent (30W) -> Cold Cathode FL (5W)	30	5	25
Incandescent (40W) -> Cold Cathode FL (8W)	40	8	32
Average			22

The following table provides the measure savings using the above non-coincident savings.

<sup>8</sup> Southern California Edison Company, Cold Cathode Fluorescent Lamp Workpaper WPSCNRLG0063. 2007.





**Table 49: Measure Savings**

Annual Operating Hours	Demand Interactive Effects	Coincident Diversity Factors	Energy Interactive Effects	Peak kW Savings	kWh Savings
4,321	1.19	0.77	1.12	0.020	108

### Measure Savings Analysis

Annual energy savings and the peak coincident demand savings were calculated using the equations below. The annual operating hours, the coincidence factors, and the interactive effect factors were all derived from the DEER database.

Non-coincident kW reduction = kW of existing equipment - kW of replacement equipment

Energy savings are calculated by applying the annual operating hours and the energy interactive effect, according to the following formula:

kWh Reduction = non-coincident kW savings \* Annual operating hours \* Energy interactive effect

Coincident demand savings are calculated by applying the coincidence factor and the demand interactive effect, according to the following formula:

Coincident kW savings = non-coincident kW savings \* Coincidence Factor \* Demand interactive effect

### Measure Life and Incremental Measure Cost

The following table provides the measure life and IMC documented for this measure as well as the source of the data.

Incremental cost is cost difference between the energy-efficient equipment and the less efficient option. In this case, the IMC is equal to the full measure cost since cost of the less efficient option is \$0..



**Table 50: Measure Life and Incremental Measure Cost<sup>9</sup>**

	<b>Value</b>	<b>Source</b>
Measure Life	5	SCE WP
Incremental Measure Cost	\$9.68	PG&E WP

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<sup>9</sup> Southern California Edison Company, Cold Cathode Fluorescent Lamp Workpaper WPSCNRLG0063. 2007, Pacific Gas & Electric, Lighting WP.doc, 2006.



Exit Signs	
<b>Measure Description</b>	High-efficiency exit signs must replace or retrofit an existing incandescent exit sign. Electroluminescent, photoluminescent, T1 and light-emitting diode (LED) exit signs are eligible under this category. Non-electrified and remote exit signs are not eligible. All new exit signs or retrofit exit signs must be UL or ETL listed, have a minimum lifetime of 10 years, and have an input wattage $\leq 5$ Watts or be ENERGY STAR qualified.
<b>Units</b>	Per Sign
<b>Base Case Description</b>	Incandescent Exit Signs
<b>Measure Savings</b>	Source: ENERGY STAR
<b>Measure Incremental Cost</b>	Source: AEP Ohio Potential Study
<b>Effective Useful Life</b>	Source: DEER 16 years

High-efficiency exit signs must replace or retrofit an existing incandescent exit sign. Electroluminescent, photoluminescent, T1 and light-emitting diode (LED) exit signs are eligible under this category. Non-electrified and remote exit signs are not eligible. All new exit signs or retrofit exit signs must be UL or ETL listed, have a minimum lifetime of 10 years, and have an input wattage  $\leq 5$  Watts or be ENERGY STAR qualified.

### Measure Savings

Baseline and retrofit equipment assumptions are presented in the next table. Most lighting retrofits assume an early replacement of existing technologies where the baseline represents the equipment removed. The table shows the wattages used for the savings calculations.

**Table 51: Baseline and Retrofit Wattages**

Measure	Base Wattage	Retrofit Wattage	Wattage Reduction
Two Incandescent Bulbs (20W each) -> LED EXIT Sign (5W)	40	5	35

The measure savings use the above non-coincident savings.

**Table 52: Exit Sign Savings**

Peak kW Savings	kWh Savings
0.042	343.4



### Measure Savings Analysis

Annual energy savings and the peak coincident demand savings were calculated using the equations below. The coincident diversity factor is 1.0 since the sign is on all the time. The operating hours are 8,760 hours per year.<sup>10</sup>

**Table 53: Factors used for Calculating Savings**

Annual Operating Hours	Demand Interactive Effects	Coincident Diversity Factors	Energy Interactive Effects
8,760	1.19	1.00	1.12

Non-coincident kW reduction = kW of existing equipment - kW of replacement equipment

Energy savings are calculated by applying the annual operating hours and the energy interactive effect, according to the following formula:

$$\text{kWh Reduction} = \text{non-coincident kW savings} * \text{Annual operating hours} * \text{Energy interactive effect}$$

Coincident demand savings are calculated by applying the coincidence factor and the demand interactive effect, according to the following formula:

$$\text{Coincident kW savings} = \text{non-coincident kW savings} * \text{Coincidence Factor} * \text{Demand interactive effect.}$$

### Measure Life and Incremental Measure Cost

The following table provides the measure life and incremental measure cost (IMC) documented for this measure as well as the source of the data.

Incremental cost is cost difference between the energy efficient equipment and the less efficient option. In this case, the IMC is equal to the full measure cost since the cost of the less efficient option, i.e., not conducting the retrofit, is \$0.

<sup>10</sup> 2005 Database for Energy Efficiency Resources (DEER) Update Study Final Report - Residential and Commercial Non-Weather Sensitive Measures



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**Table 54: Measure Life and Incremental Measure Cost**

	Value	Source
Measure Life	16	DEER
Incremental Measure Cost	\$82.54	AEP Ohio Potential Study



Occupancy Sensors	
<b>Measure Description</b>	Passive infrared, ultrasonic detectors and fixture-integrated sensors or sensors with a combination thereof are eligible. All sensors must be hard-wired and control interior lighting fixtures. The incentive is per Watt controlled.
<b>Units</b>	Per Connected Watt
<b>Base Case Description</b>	No Sensor
<b>Measure Savings</b>	Source: DEER
<b>Measure Incremental Cost</b>	Source: DEER
<b>Effective Useful Life</b>	Source: DEER 8 years

Passive infrared, ultrasonic detectors and fixture-integrated sensors or sensors with a combination thereof are eligible. All sensors must be hard-wired and control interior lighting fixtures. The incentive is per Watt controlled.

### Measure Savings

The annual operation hours, the coincidence factors, and the interactive effect factors were all derived from the DEER database.

**Table 55: Measure Savings for Occupancy Sensor per Connected Watt**

Annual Operating Hours	Demand Interactive Effects	Coincident Diversity Factors	Energy Interactive Effects	Peak Watt Savings	kWh Savings
4,389	1.19	0.77	1.12	0.0003	1.385

### Measure Savings Analysis

Annual energy savings and the peak coincident demand savings were calculated using the equations below.

Energy savings are calculated by applying the annual operating hours and the energy interactive effect, according to the following formula:

$$\text{kWh Reduction} = \text{Connected wattage}/1000 * \text{Annual operating hours} * \text{Energy interactive effect} * \text{Occupancy Off Rate}$$

Coincident demand savings are calculated by applying the coincidence factor and the demand interactive effect, according to the following formula:



$$\text{Coincident kW savings} = \text{Connected wattage}/1000 * \text{Occupancy Off Rate} * \text{Coincidence Factor} * \text{Demand interactive effect}$$

The baseline for this measure is fixtures that do not include any automatic controls, i.e., manual switches. Since the unit is defined as per connected Watt, the baseline demand is one watt. Demand savings depend on whether areas are high or low occupancy. DEER states that occupancy time off rates are at 20 percent for high-occupancy building types and 50 percent for low-occupancy building types.<sup>11</sup> The table below shows the assumed range of occupancy off rates. Calculations here are performed with the 28% average sensor off rate.

**Table 56: Occupancy Off Rate**

Average Grouping	Occupancy Sensor Off Rate
Office	20%
School (K-12)	20%
College/University	20%
Retail/Service	20%
Restaurant	20%
Hotel/Motel	20%
Medical	20%
Grocery	20%
Warehouse	50%
Light Industry	50%
Heavy Industry	50%
Average	28%

#### **Measure Life and Incremental Measure Cost**

The following table provides the measure life and IMC documented for this measure as well as the source of the data.

Incremental cost is cost difference between the energy efficient equipment and the less efficient option. For lighting measures, the IMC is equal to the full measure cost since the cost of the less efficient option, i.e., not conducting the retrofit, is \$0.

<sup>11</sup> 2005 Database for Energy Efficiency Resources (DEER) Update Study Final Report - Residential and Commercial Non-Weather Sensitive Measures





**Table 57: Measure Life and Incremental Measure Cost**

	<b>Value</b>	<b>Source</b>
Measure Life	8	DEER
Incremental Measure Cost	\$0.32	DEER



<b>New T5/T8 Fluorescent Fixtures</b>	
<b>Measure Description</b>	This measure consists of replacing one or more existing fixtures with new fixtures containing T8 or T5 lamps and electronic ballasts. The T8 or T5 lamps must have a color rendering index (CRI) $\geq 80$ . The electronic ballast must be high frequency ( $\geq 20$ kHz), UL listed, and warranted against defects for 5 years. Ballasts must have a power factor (PF) $\geq 0.90$ . Ballasts for 4-foot lamps must have total harmonic distortion (THD) $\leq 20$ percent at full light output. For 2- and 3-foot lamps, ballasts must have THD $\leq 32\%$ at full light output.
<b>Units</b>	Per Watt reduced
<b>Base Case Description</b>	Typically high wattage HID fixtures
<b>Measure Savings</b>	Source: KEMA
<b>Measure Incremental Cost</b>	Source: KEMA
<b>Effective Useful Life</b>	Source: DEER 11 years

This measure consists of replacing one or more existing fixtures with new fixtures containing T8 or T5 lamps and electronic ballasts. The T8 or T5 lamps must have a color rendering index (CRI)  $\geq 80$ . The electronic ballast must be high frequency ( $\geq 20$  kHz), UL listed, and warranted against defects for 5 years. Ballasts must have a power factor (PF)  $\geq 0.90$ . Ballasts for 4-foot lamps must have total harmonic distortion (THD)  $\leq 20$  percent at full light output. For 2- and 3-foot lamps, ballasts must have THD  $\leq 32$  percent at full light output.

### Measure Savings

The annual operating hours, the coincidence factors, and the interactive effect factors were all derived from the DEER database.<sup>12</sup>

**Table 58: Measure Savings for New T8/T5 Fluorescent Fixtures per Watt Reduced**

Annual Operating Hours	Demand Interactive Effects	Coincident Diversity Factors	Energy Interactive Effects	Peak Watt Savings	kWh Savings
4,389	1.19	0.77	1.12	0.0009	4.9141

<sup>12</sup> 2005 Database for Energy Efficiency Resources (DEER) Update Study Final Report - Residential and Commercial Non-Weather Sensitive Measures



### Measure Savings Analysis

Annual energy savings and the peak coincident demand savings were calculated using the equations below.

$$\text{Non-coincident kW reduction} = \text{kW of existing equipment} - \text{kW of replacement equipment}$$

Energy savings are calculated by applying the annual operating hours and the energy interactive effect, according to the following formula:

$\text{kWh Reduction} = \text{no-coincident kW savings} * \text{Annual operating hours} * \text{Energy interactive effect}$   
Coincident demand savings are calculated by applying the coincidence factor and the demand interactive effect, according to the following formula:

$$\text{Coincident kW savings} = \text{non-coincident kW savings} * \text{Coincidence Factor} * \text{Demand interactive effect}$$

Baseline and retrofit equipment assumptions are variable. Because we define this measure with the number of watts reduced, the non-coincident demand savings will be one watt by definition.

### Measure Life and Incremental Measure Cost

The following table provides the measure life and IMC documented for this measure as well as the source of the data.

Incremental cost is cost difference between the energy efficient equipment and the less efficient option. For lighting measures, the IMC is equal to the full measure cost since the cost of the less efficient option, i.e., not conducting the retrofit, is \$0.

**Table 59: Measure Life and Incremental Measure Cost**

	Value	Source
Measure Life	11	DEER
Incremental Measure Cost <sup>13</sup>	\$0.75	KEMA



LED Traffic Signals	
<b>Measure Description</b>	LED traffic signals meeting ENERGY STAR criteria, including arrow signals, that will replace existing incandescent traffic signals. Signals shall have a maximum wattage of 25. Signals must be installed and active. Lights must be hardwired, with the exception of pedestrian hand signals. Yellow lights are not eligible for rebates.
<b>Units</b>	Per Signal
<b>Base Case Description</b>	Incandescent fixtures
<b>Measure Savings</b>	Source: Michigan Statewide Energy Savings Database
<b>Measure Incremental Cost</b>	Source: Michigan Statewide Energy Savings Database
<b>Effective Useful Life</b>	Source: Michigan Statewide Energy Savings Database Traffic Signal: 6 Years Pedestrian Signal: 8 Years

LED traffic signals that meet ENERGY STAR criteria save 80-90 percent of the energy typically consumed by incandescent traffic signals and LED signals generally last 5-10 times longer. Since traffic signals operate 24 hours a day, 365 days a year, the opportunity for energy savings is significant, particularly in the peak demand. LED Traffic signals perform better than incandescent models and are a better value. They also have lower maintenance costs because they need to be replaced less frequently.

### Measure Savings

The energy savings vary for red, green and yellow signals. Savings also vary for round lamps, arrows and pedestrian signals. Reviewing details on California, Wisconsin and Texan programs, the savings below are typical.

In general, savings are greater on car traffic signals and cost generally less than for pedestrian signals. These savings include diversity for each lamp type, and represent an average.

**Table 60: Measure Savings Traffic and Pedestrian Signals**

Signal Type	kW	kWh
Traffic	0.085	275
Pedestrian	0.044	150



### Measure Life and Incremental Measure Cost

The following table provides the measure life and IMC documented for this measure as well as the source of the data.

Incremental cost is cost difference between the energy efficient equipment and the less efficient option. For lighting measures, the IMC is equal to the full measure cost since the cost of the less efficient option, i.e., not conducting the retrofit, is \$0.

**Table 61: Measure Life and Incremental Measure Cost**

	Signal Type	Value	Source
Measure Life	Traffic	6	KEMA
Incremental Measure Cost	Traffic	\$90	KEMA
Measure Life	Pedestrian	8	KEMA
Incremental Measure Cost <sup>14</sup>	Pedestrian	\$140	KEMA



Lighting Density	
<b>Measure Description</b>	Savings for new construction lighting projects will be calculated with lighting density.
<b>Units</b>	Per kW Reduced
<b>Base Case Description</b>	ASHRAE 90.1-2004 Lighting density.
<b>Measure Savings</b>	Source: KEMA
<b>Measure Incremental Cost</b>	Source: NA
<b>Effective Useful Life</b>	Source: DEER 11 Years

This measure applies only to new construction lighting projects and savings are calculated using the ASHRAE 90.1-2004 new construction lighting density as a baseline. The wattages are given on a per square foot basis and vary with business type.

The following table shows the ASHRAE criteria.

**Table 62: ASHRAE Building Density Criteria**

Building Type	Lighting Power Density (W/ft <sup>2</sup> )	Building Type	Lighting Power Density (W/ft <sup>2</sup> )
Automotive	0.9	Motion Picture Theatre	1.2
Convention Center	1.2	Multi-Family	0.7
Court House	1.2	Museum	1.1
Dining: Bar Lounge/Leisure	1.3	Office	1.0
Dining: Cafeteria/Fast Food	1.4	Parking Garage	0.3
Dining: Family	1.6	Penitentiary	1.0
Dormitory	1.0	Performing Arts Theatre	1.6
Exercise Center	1.0	Police/Fire Station	1.0
Gymnasium	1.1	Retail	1.5
Health Care	1.0	School/University	1.2
Hospital	1.2	Sports Arena	1.1



Hotel	1.0	Town Hall	1.1
Library	1.3	Transportation	1.0
Manufacturing Facility	1.3	Warehouse	0.8
Motel	1.0	Workshop.	1.4

Applications must calculate the kW reduction using the above numbers, taking into account the business type as well as the actual building square footage. On a per kW reduced basis, the following table shows the energy and coincident savings.

**Table 63: Lighting Density Savings**

Annual Operating Hours	Demand Interactive Effects	Coincident Diversity Factors	Energy Interactive Effects	Peak Watt Savings	kWh Savings
4,389	1.19	0.77	1.12	0.916	4,914

### Measure Savings Analysis

Annual energy savings and the peak coincident demand savings were calculated using the equations below.

$$\text{Non-coincident kW reduction} = \text{kW of existing equipment} - \text{kW of replacement equipment}$$

Energy savings are calculated by applying the annual operating hours and the energy interactive effect, according to the following formula:

$\text{kWh Reduction} = \text{non-coincident kW savings} * \text{Annual operating hours} * \text{Energy interactive effect}$   
Coincident demand savings are calculated by applying the coincidence factor and the demand interactive effect, according to the following formula:

$$\text{Coincident kW savings} = \text{non-coincident kW savings} * \text{Coincidence Factor} * \text{Demand interactive effect}$$

Baseline and retrofit equipment assumptions are variable. Because we define this measure as in the number of watts reduced, the non-coincident demand savings will be one kW by definition.

### Measure Life

The following table provides the measure life documented for this measure as well as the source of the data.





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**Table 64: Measure Life**

	Value	Source
Measure Life	11	DEER

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