AMERICAN ELECTRIC POWER

Legal Department

American Electric Power
1 Riverside Plaza
Columbus, OH 43215-2373
AEP.com

January 16, 2013

Chairman Todd Snitchler
Ohio Power Siting Board
Public Utilities Commission of Ohio
180 East Broad Street
Columbus, OH 43215-3793

Yazen Alami
Regulatory Services
(614) 716-2920 (P)
(614) 716-2950 (F)
yalami@aep.com

Re: **In the Matter of Liberty Union Local Schools and Ohio Power Company for Approval of a Special Arrangement Agreement with a Mercantile Customer**) **Case No. 13-0186-EL-EEC**

Dear Chairman Snitchler,

Attached please find the Joint Application of Ohio Power Company (OPCo) and mercantile customer Liberty Union Local Schools for approval of a Special Arrangement of the commitment of energy efficiency/peak demand reduction (EE/PDR) resources toward compliance with the statutory benchmarks for 2013.

Amended Substitute Senate Bill 221 sets forth in R.C. 4928.66 EE/PDR benchmarks that electric distribution utilities shall be required to meet or exceed. The statute allows utilities to include EE/PDR resources committed by mercantile customers for integration into the utilities programs to be counted toward compliance with a utility's EE/PDR benchmarks. The statute also enables the Commission to approve special arrangements for mercantile customers that commit EE/PDR resources to be counted toward compliance with EE/PDR benchmarks.

The Commission's Order in Case No. 10-834-EL-EEC, established a streamlined process to expedite review of these special arrangements by developing a sample application process for parties to follow for consideration of such programs implemented during the prior three calendar years. Attached is OPCo's version of that application and accompanying affidavit. Any confidential information referenced in the Joint Application has been provided to the Commission Staff for filing in Commission Docket 10-1799-EL-EEC, under a request for protective treatment. OPCo respectfully requests that the Commission treat the two cases as associated dockets.

Cordially,

/s/ Yazen Alami
Yazen Alami

Attachments

Ohio | Public Utilities Commission

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

Case No.: 13-0186-**EL-EEC**

Mercantile Customer: LIBERTY UNION LOCAL SCHOOLS

Electric Utility: Ohio Power

Program Title or Description: AEP Ohio Business Incentives for Energy Efficiency: Self Direct Program

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 in accordance with the Commission's pilot program established in Case No. 10-834-EL-POR

Completed applications requesting the cash rebate reasonable arrangement option (Option 1) in lieu of an exemption from the electric utility's energy efficiency and demand reduction (EEDR) 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 EEDR rider (Option 2) will also qualify for the 60-day automatic approval so long as the exemption period does not exceed 24 months. Rider exemptions for periods of more than 24 months will be reviewed by the Commission Staff and are only approved up the issuance of a Commission order.

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.

Any confidential or trade secret information may be submitted to Staff on disc or via email at ee-pdr@puc.state.oh.us.

Section 1: Company Information

Name: LIBERTY UNION LOCAL SCHOOLS

Principal address: 1108 S. Main St., Baltimore, Oh 43105

Address of facility for which this energy efficiency program applies: 500 W Washington St, Baltimore, Oh 43105-1180

Name and telephone number for responses to questions:

Paul E. Mathews, Liberty Union Local Schools, (740) 862-4171

Electricity use by the customer (check the box(es) that apply):

☒ The customer uses 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.

☐ The customer is 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) The customer is 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) The customer is offering to commit (choose which applies):

☐ Energy savings from our energy efficiency program. (Complete Sections 3, 5, 6, and 7.)

☐ Capacity savings from the customer's demand response/demand reduction program. (Complete Sections 4, 5, 6, and 7.)

☒ Both the energy savings and the demand reduction from the customer's energy efficiency program. (Complete all sections of the Application.)

Section 3: Energy Efficiency Programs

A) The customer's energy efficiency program involves (choose whichever applies):

☐ Early replacement of fully functioning equipment with new equipment. (Provide the date on which the customer replaced fully functioning equipment, and the date on which the customer would have replaced such equipment if it had not been replaced early. Please include a brief explanation for how the customer determined this future replacement date (or, if not known, please explain why this is not known)).

☐ Installation of new equipment to replace equipment that needed to be replaced. The customer installed new equipment on the following date(s):

☒ Installation of new equipment for new construction or facility expansion. The customer installed new equipment on the following date(s): 1/1/2011

☐ Behavioral or operational improvement.

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

1) 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:

Annual savings: kWh

2) 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.

3) 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:

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

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

Annual savings: 125,814 kWh

See Confidential and Proprietary Attachment 5 – Self Direct Program Project Calculation for annual energy savings calculations and 10-1599-EL-EEC for the work papers that provide all methodologies, protocols, and practices used in this application for prescriptive measures, as needed.

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

The less efficient new equipment is the minimum required by Ohio State code or Federal Standard whichever is more stringent. For those measures where no code applies the baseline equipment is assumed to be the least efficient equipment available in the marketplace or standard practice, whichever results in the most conservative annual savings. Any information available describing the less efficient new equipment option is provided in 10-1599-EL-EEC for the work papers that provide all methodologies, protocols, and practices used in this application for prescriptive measures.

4) If you checked the box indicating that the project involves behavioral or operational improvements, provide a description of how the annual savings were determined.

Section 4: Demand Reduction/Demand Response Programs

A) The customer's program involves (check the one that applies)::

☒ Coincident peak-demand savings from the customer's 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:

  ☐ The customer's 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.

  ☐ The customer's 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) On what date did the customer initiate its demand reduction program?

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))

29.2 kW

See Confidential and Proprietary Attachment 5 – Self Direct Program Project Calculation for peak demand reduction calculation, and 10-1599-EL-EEC 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) The customer is applying for:

☒ Option 1: A cash rebate reasonable arrangement.

OR

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

OR

☐ Commitment payment

B) The value of the option that the customer is seeking is:

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

☒ A cash rebate of $ 11,170.93. (Rebate shall not exceed 50% project cost. Attach documentation showing the methodology used to determine the cash rebate value 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

☐ A commitment payment valued at no more than $_____. (Attach documentation and calculations showing how this payment amount 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: 3.8 (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 (generation capacity, energy, and any transmission or distribution) by the sum of our program overhead and installation costs and any incremental measure costs paid by either the customer or the electric utility.

The electric utility's avoided supply costs were _____.

Our program costs were _____.

The utility's incremental measure 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 $ 45,234.94

The utility's program costs were $ 754.88

The utility's incentive costs/rebate costs were $ 11,170.93.

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 10-1599-EL-EEC 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 confidentially 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 the customer 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 the customer 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 10-1599-EL-EEC for the work papers that provide all methodologies, protocols, and practices used in this application for prescriptive measures, as needed.

Ohio | Public Utilities Commission

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

Case No.: 13-0186-EL-EEC

State of OHIO :

JEFFREY ROE, 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.

[signature] ENERGY EFFICIENCY ENGINEER
Signature of Affiant & Title

Sworn and subscribed before me this 11th day of January, 2013 Month/Year

[signature]
Signature of official administering oath

Craig Waugh Bunker
Print Name and Title

My commission expires on 06/14/16

CRAIG WAUGH - NOTARY PUBLIC
COMM. EXP. JUNE 14, 2016
STATE OF OHIO

Project # AEP-12-07978
Docket # 13-0186

AEP OHIO
A unit of American Electric Power

Attachment 1
Self Direct Project Overview & Commitment
Page 1 of 1

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.

Customer Name	**LIBERTY UNION LOCAL SCHOOLS**
Project Number	**AEP-12-07978**
Customer Premise Address	**500 W WASHINGTON ST, BALTIMORE, OH 43105-1180**
Customer Mailing Address	**1108 S. Main St., Baltimore, OH 43105**
Date Received	**8/28/2012**
Project Installation Date	**1/1/2011**
Annual kWh Reduction	**125,814**
Total Project Cost	**$29,789.15**
Unadjusted Energy Efficiency Credit (EEC) Calculation	**$14,894.58**
Simple Payback (yrs)	**2.4**
Utility Cost Test (UCT)	**3.8**

Please Choose One Option Below and Initial

Option 1 - Self Direct EEC: 75%	**$11,170.93**	☑	**Initial:** TM
Option 2 - EE/PDR Rider Exemption	**52 Months (After PUCO Approval)**	☐	**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:

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

Install 2-20 ton DX cooling units 10.9 EER
Install Occupancy Sensors to 3-Toilet room fans
Install 1-20hp & 1-10hp VFD on hot water pump
Install 1-7.5hp VFD on supply/return fan motor
Reduce Interior lighting power density by 27,350 watts
Reduce Exterior lighting power density by 5,823 watts

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: Jon F. Williams

Title: Manager

Date: 12/12/12

LIBERTY UNION LOCAL SCHOOLS

By: Brad E. Matthews

Title: Superintendent

Date: 12/11/12

AEP OHIO
A unit of American Electric Power

Self-Direct Program Project Application

RETROFIT AND NEW CONSTRUCTION

Step 1: Check Project, Equipment, and Customer Eligibility

- ✓ Project must be a facility improvement that results in a permanent reduction in electrical energy usage (kWh).
- ✓ Measures applying for credits must have a minimum operating hours of 2,245 hours per year. Projects with annual energy (kWh) savings greater than the facility's annual energy (kWh) consumption will not be eligible.
- ✓ All installed equipment must meet or exceed the specifications given in the application and be installed in facilities served by AEP Ohio: Customer must have a valid AEP Ohio account number on an eligible AEP Ohio non-residential rate (see terms and conditions for list of eligible rates eligibility requirements).

Step 2: Submit Application

- ✓ Fill out the Customer Information form and the Worksheet for the measures that you installed. You may submit the application via mail, fax, or e-mail.

Submit your application to:
Email: gridsmartohio@kema.com

AEP Ohio Business Incentives for Energy Efficiency
2740 Airport Drive Suite 160
Columbus, OH 43219
Call: (877) 607-0739
Fax: (877) 607-0740

Visit our web site at gridsmartohio.com

- ✓ Submit a completed application prior to November 16, 2012 for any projects completed on or after January 1, 2009. Any applications received after the dealines may not be submitted to the PUCO by December 31st, 2012 and could jeopardize approval of any credit. Complete the checklist page and attach the documentation listed: customer information page, a signed Final Payment Agreement page, measure worksheet, scope of work (type, quantity, and wattage of old and new equipment), dated and itemized invoices for the purchase and installation of all equipment installed and specification sheets for all equipment installed showing that it meets the program specifications.

Step 3: Project Review

- ✓ The program team will review your Application. For some projects, an inspection will be part of the review, and you will be contacted to schedule it.
- ✓ After approval by AEP Ohio, the customer will be sent an Overview and Commitment form to sign for all self-direct projects. After the Overview and Commitment form is returned the project will be submitted to the Public Utilities Commission of Ohio (PUCO) for consideration. The PUCO will assign case number and review the project details that were prepared by AEP Ohio. The PUCO may request additional information, approve or reject the energy efficiency credits.

Step 4: Receive Energy Efficiency Credits

- ✓ The program team will issue the energy efficiency credits, within four to six weeks after PUCO project approval.
- ✓ In lieu of a one-time energy efficiency credit, you may elect to seek an exemption from the Energy Efficiency/Peak Demand Reduction (EE/PDR) Rider for the associated electric account(s) for a defined period of time as stated on this Application. For this exemption the Energy Efficiency Efficiency Credit amount (Option 1) is compared to the estimated value of the estimated EE/PDR obligation (Option 2), as calculated by AEP Ohio. The value of Option 2 will be approximately equal to the value of Option 1. If exemption is elected, the affective account is not eligible for other programs offered by AEP Ohio during the exemption period. Unless additional resources are committed, you will, after the specified number of months exempted, be again subject to the EE/PDR Rider. New Construction projects are not eligible to elect Option 2. Major Renovation projects that do not have a representative billing history for three years prior to the project installation are also not eligible to elect Option 2.
- ✓ If the energy efficiency credit is elected, you remain in the EE/PDR rider for the period of time that an exemption would have been in effect and may also participate in the AEP Ohio programs. However, during that period of time, you will not be allowed to elect the Option 2 exemption for any additional self-direct projects for the same account number.
- ✓ You are allowed and encouraged to consider using all or a portion of the energy credits, as received from AEP Ohio under this program, to help fund other energy efficiency and demand reduction projects you choose to initiate in the future. Future projects can also qualify for credits under the Prescriptive or Custom programs.

If you are viewing this document in Microsoft Excel, please note that each section of the application is accessible through the tabs at the bottom of the Excel window. Highlighted cells are for inputting information.

AEP OHIO
A unit of American Electric Power

Self-Direct Program
Project Application

APPLICATION CHECKLIST

APPLICATION

Required Attachments

- ☐ Customer/Contractor Information (Completed and Signed)
- ☐ Completed Forms for Energy Efficiency Credits Requested AND Signed Final Payment Agreement Page
- ☐ Itemized Invoices
- ☐ Equipment Specifications
- ☐ Scope of Work
- ☐ W-9 (LLC, Individual, Partnership, Property Management Companies)

Worksheets

- ☐ Lighting
- ☐ HVAC
- ☐ Refrigeration
- ☐ Motors and VFD
- ☐ Custom

Application Date: _____

Completion Date: _____

Project Cost: _____

**Incomplete applications will delay processing and energy efficiency credits.*

Please complete and submit forms for above checked boxes.

Please fill out if this is a revised submittal

ORIGINAL SUBMITTAL DATE: _____

APPLICATION NUMBER (IF KNOWN): _____

AEP Ohio Business Incentives Program for Energy Efficiency
2740 Airport Drive Suite 160
Columbus, OH 43219

Phone: (877) 607-0739
Fax: (877) 607-0740
gridsmartohio@kema.com
www.gridsmartohio.com

AEP OHIO
A unit of American Electric Power

Self-Direct Program Project Application

TERMS AND CONDITIONS

AEP Ohio is offering prescriptive and custom incentives under the AEP Ohio Business Incentives for Energy Efficiency program to offer the implementation of past cost-effective energy efficiency improvements for non-residential (commercial and industrial) customers. AEP Ohio provides energy efficiency credits (EEC) for the purchase and installation of qualifying cost effective equipment in the customer's facility under the Terms and Conditions provided in this application and subject to regulatory approvals. Energy Efficiency credits will only be provided in the form of a check or an Energy Efficiency/Peak Demand Reduction (EE/PDR) Rider exemption under this program.

Please note that funds are limited and subject to availability.

All applications are subject to review and approval by AEP Ohio, its contractor(s)/agent(s), and the Public Utility Commission of Ohio (PUCO) prior to any EEC payments or exemptions from the EE/PDR rider in this program. Funds are limited and subject to availability.

Program Effective Dates
AEP Ohio Business Incentives for Energy Efficiency program EEC are offered until approved funds are exhausted or November 16th of each program year, whichever comes first. The effective dates of the current program year and application submittal requirements are as follows:

- Self-direct projects are projects completed since 1/1/2009. Self direct projects are eligible to apply for EEC with this application. Future projects that are not yet completed should apply on the Prescriptive/Custom application.
- All 2012 AEP Ohio Business Incentives for Energy Efficiency program Applications should be received no later than November 16, 2012. Any applications received after the deadlines may not be submitted to the PUCO by December 31st, 2012 and could jeopardize approval of any incentive. AEP Ohio reserves the right to extend or shorten this timeline.
- Subsequent program year budgets and plans will be made available towards the end of the existing program year. AEP Ohio currently has filed with the PUCO to offer this program through the 2014 program year.

Program and Project Eligibility
The Self-Direct Program applies to customer facilities served by 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 account involving multiple facilities in one or more states.
The AEP Ohio Business Incentives for Energy Efficiency program offers both prescriptive credits for some of the more common energy efficiency measures and custom credits for those eligible improvements not included on the list of prescriptive measures. Program credits are available under the AEP Ohio Business Incentives for Energy Efficiency program to include non-residential accounts served on AEP Ohio's regulated retail rates. Qualifying projects must be installed in a facility in AEP Ohio's electric service territory in Ohio. These credits are available to all non-residential customers who pay into the Energy Efficiency and Peak Demand Response (EE/PDR) rider and receive their electricity over AEP Ohio wires, regardless which retail electric supplier the customer has chosen to purchase power. A customer may neither apply for nor receive incentives for the same product, equipment or service from more than one utility.

Custom projects must involve measures, which result in a reduction in electric energy usage due to an improvement in system efficiency. Projects that result in reduced energy consumption without an improvement in system efficiency are not eligible for a custom credit. The project simple payback prior to the incentive payment generally should fall between 1 to 7 years, or pass cost effectiveness test(s) determined by AEP Ohio to qualify for an incentive. Incentives are calculated based on first-year energy savings and peak demand reduction. Peak demand reduction is defined as the reduction in average load over the Performance Hours by the replacement of existing electrical equipment with more efficient electrical equipment. Peak Performance Hours is defined as the time between June 1st and August 31st on weekday, non-holidays, between the hours 3:00 PM and 6:00 PM Eastern Time.

Projects involving measures covered by the prescriptive credit portion of the program are not eligible for a custom credit. However, the applicant has the option to apply for a custom incentive for whole building integrated projects or systems, even if they include prescriptive measures. The prescriptive elements may be capped at the deemed savings and/or incentive level.

AEP OHIO
A unit of American Electric Power

Self-Direct Program Project Application

TERMS AND CONDITIONS

Project requirements under the AEP Ohio Business Incentives for Energy Efficiency program include the following:

- Projects must involve a new facility improvement that results in a permanent reduction in electrical energy usage (kWh).
- Projects that are NOT eligible for a credit include the following:
  - Fuel switching (e.g. electric to gas or gas to electric)
  - Changes in operational and/or maintenance practices or simple control modifications not involving capital costs
  - Removal or termination of existing processes, facilities, and/or operations.
  - On-site electricity generation
  - Projects involving gas-driven equipment in place of or to replace electric equipment (such as a chiller)
  - Projects focused primarily on power factor improvement
  - Projects that involve peak-shifting (and not kWh savings)
  - Renewables (Please visit www.gridsmartohio.com for Renewables Program)
  - Are required by state or federal law, building or other codes, or are standard industry practice
  - Are easily reverted/removed or are installed entirely for reasons other than improving energy efficiency
  - Include other conditions to be determined by AEP Ohio
  - Renewables (Please visit www.gridsmartohio.com for Renewables Program)
- Any measures installed at a facility must produce verifiable and persistent energy reduction and must be sustainable and provide 100% of the energy benefits as stated in the Application for a period of at least five (5) years or for the life of the product, whichever is less. If the Customer ceases to be a delivery service customer of AEP Ohio or removes the equipment or systems at any time during the 5-year period or the life of the product, the Customer may be required to return a prorated amount of incentive funds to AEP Ohio.
- Customer cannot apply for incentives for future projects and elect after the fact to apply for credits under this program.
- Confidential information contained in any documents associated with this application will be protected from public filings. However, this information may be disclosed to the Public Utilities Commission of Ohio for further review and approval.
- Used or rebuilt equipment is generally NOT eligible for an incentive.
- All installed equipment must meet state, federal, and local codes and requirements.
- Costs associated with internal labor are not eligible.
- Projects must be installed on the AEP Ohio electric account in Ohio served by an eligible electric rate type listed on the application.
- Equipment must be purchased, installed, and operating (or capable of operating in the case of seasonal uses) prior to submitting a final application for an incentive.
- AEP Ohio will issue incentive payments in the form of checks, not utility bill credits.
- The incentive is paid as a one-time, one-program offer and cannot be combined with incentive payments from other AEP Ohio programs. The customer may be eligible to participate in other programs offered by AEP Ohio, as long as no project receives more than one incentive.

PROGRAM ENERGY EFFICIENCY CREDITS	
Energy efficiency cerdit levels for one-year energy savings	See tables for prescriptive credits. Custom credits $0.08/kWh X 75%
Minimum/Maximum simple payback before energy efficiency credit applied	Must pass cost effectiveness test(s) (determined by AEP Ohio). Generally between 1-7 years.
Maximum payout	75% of 50% of the total cost (additional measure caps may apply)
Energy efficiency credit levels for projects completed since 1/1/2009	calculated amount on the Prescriptive or Custom worksheets attached and subject to funding limits
Credit Limit	See Incentive Limits and Tiering section
Credit Calculation Order	Measure credit caps are applied first. Project cost credit limits are applied second. Credit tiering is applied third. And 75% factor applied to credit last.

AEP OHIO
A unit of American Electric Power

Self-Direct Program
Project Application

TERMS AND CONDITIONS

Energy Efficiency Credit Limits

For both the Prescriptive and Custom measures in this application, the total energy efficiency credits shall be 75% the lesser of: 1) The calculated credit as approved by AEP Ohio, or 2) 50% of Total Project Cost (not including internal labor cost). In calculating the savings and energy efficiency credits for Custom measures, please contact AEP Ohio Business Incentives for Energy Efficiency Program office to determine appropriate baseline for savings.

Incentive Limits and Tiering

- The limit for each self-direct project is $225,000.
- The limit for each business entity (corporation, LLC, partnership, etc) is based on their tariff, indicated below.

TARIFF	LIMIT PER BUSINESS ENTITY
General Service Tariffs 1, 2, 3 & 4	$900,000 per year

- A business entity with facilities in both categories can qualify for both limits. All facilities served in one category for a business entity are combined to determine the limit.
- The total credit paid for any self direct application cannot exceed 50% of the total project cost (not including internal labor). In addition to the above project cost limit, credit payment rates vary when a customer's calculated credit exceeds the tiers listed below:
- **Tier 1** $0 - $100,000 = 100% of eligible calculated credit value
- **Tier 2** $100,001 - $300,000 = 50% of eligible calculated credit value
- **Tier 3** $300,001 - $500,000 = 25% of eligible calculated credit value
- **Tier 4** $500,001 - Beyond = 10% of eligible calculated credit value

Application

Application should be submitted by November 16, 2012 for any projects completed or or after Jan 1, 2009 or later. Any applications received after the deadlines may not be submitted to the PUCO by November 16, 2012 and could jeopardize approval of any incentive. Project documentation, such as copies of dated invoices for the purchase and installation of the measure and/or product specification sheets, is required. AEP Ohio reserves the right to request additional backup information, supporting detail, calculations, manufacturer specification sheets or any other information to any credit payment.

The location or business name on the invoice must be consistent with the application information. Applications shall all required documentation should be received by November 16, 2012 to be applicable for the 2012 program year.

A signed application with documentation verifying installation of the project including, but not limited to, equipment, invoices, approvals, and other related information must be submitted to AEP Ohio prior to application approval.

The project invoice should provide sufficient detail to separate the project cost from the cost of other services such as repairs and building code compliance. AEP Ohio reserves the right to request additional supporting documentation as deemed necessary to ensure measure eligibility and verify that the expected energy savings will occur. Confidential information contained in any documents associated with this application will be protected from public filings. However, this information could include: equipment purchase dates, installation dates, proof that the equipment is operational, manufacturer specifications, warranty information, and proof of customer co-payment.

The customer understands and agrees that all other terms and conditions, as specified in the application, including all attachments and exhibits attached to this application, serves as a contract for the customer's commitment of energy resources to AEP Ohio, shall apply.

AEP OHIO
A unit of American Electric Power

Self-Direct Program
Project Application

TERMS AND CONDITIONS

Application Review Process

AEP Ohio will review Applications for eligibility and completeness. Completed applications will be reviewed in the order received. Funds are reserved for the project when AEP Ohio receives a complete application and determines that the project meets the program eligibility requirements. Applicants who submit incomplete applications will be notified of deficiencies upon review of the application, and may lose their place in line in the review process until all requested information is received. Applications must be completed and all information received by the deadlines defined above to begin processing. Applicants are encouraged to call the program hotline if they have any questions about documentation requirements.

Inspections

AEP Ohio reserves the right to inspect all projects to verify compliance with the program rules and verify the accuracy of project documentation. This may include installation inspections, verification of detailed lighting layout descriptions, metering, data collection, interviews, and utility bill or monitoring data analyses. The customers are required to allow access to project documents and the facility where the measures were installed for a period of five years after receipt of incentive payment by AEP Ohio. Customer understands and agrees that Program installations may also be subject to inspections by the PUCO or their designee, and photographs of installation may be required.

Tax Liability

Credits are taxable and, if more than $600, will be reported to the IRS unless the customer is exempt. AEP Ohio is not responsible for any taxes that may be imposed on your business as a result of your receipt of payment. W-9 (for LLC, Individual, Partnership, Property Management Companies) must be provided along with all applications.

Requirements for Custom Project Electricity Savings Calculation

The annual electricity savings must be calculated for custom projects using industry-accepted engineering algorithms or simulation models. The applicant may estimate the annual electricity usage of both the existing and proposed equipment based on the current operation of the facility. A listing of the pre-existing information requirements is provided at the end of the custom application section. If the previous equipment was at the end of its useful life, the applicant must use, as the baseline, the equipment that would meet the applicable federal and local energy codes unless an "as found" baseline is being used by the applicant. If the applicant is using an "as found" baseline, additional specific information on the pre-existing information must be provided.

The applicant must be able to clearly describe the method used to calculate the savings. The applicant must provide all assumptions used in the calculations and document the sources for these assumptions. If no savings analysis is provided by the customer/contractors, AEP Ohio reserves the right to utilize their approved methodology and analysis to determine energy savings.

The method and assumptions used by the applicant to calculate the annual savings will be reviewed by AEP Ohio. AEP Ohio is solely responsible for the final determination of the annual energy savings and peak demand reduction to be used in calculating the credit amount. AEP Ohio also reserves the right to require specific measurement and verification activities including monitoring the retrofit to determining the credit. Verification of the preexisting consumption may also be required.

AEP Ohio may need to conduct inspections of projects to verify equipment and operating conditions. For custom and "as found" projects, the applicant is required to provide information in order to allow AEP Ohio ti verify the baseline usage of the pre-existing equipment. Customers are encouraged to submit projects that warrant special treatnebt (i.e., non-typical projects) to be considered on a case-by-case basis by AEP Ohio.

Disclaimer

AEP Ohio does not guarantee the energy savings and does not make any warranties associated with the measures eligible for credits under this program. AEP Ohio has no obligations regarding and does not endorse or guarantee any claims, promises, work, or equipment made, performed, or furnished by any contractors or equipment vendors that sell or install any energy efficiency measures. AEP Ohio is not responsible for the proper disposal/recycling of any waste generated as a result of this project. AEP Ohio is not liable for any damage caused by the operation or malfunction of the installed equipment.

AEP OHIO
A unit of American Electric Power

Self-Direct Program Project Application

Important: Please read the terms and conditions before signing and submitting this application.
You must complete all information and provide required additional documentation to avoid processing delays.

CUSTOMER INFORMATION

Business Type *(select one)*

- LARGE OFFICE ☐
- SMALL OFFICE ☐
- SCHOOL ☐
- SMALL RETAIL/SERVICE ☐
- LARGE RETAIL/SERVICE ☐
- HOTEL/MOTEL ☐
- MEDICAL - Hospital ☐
- MEDICAL - Nursing Home ☐
- ASSEMBLY/MEETING PLACE ☐
- RESTAURANT ☐
- GROCERY ☐
- CONDITIONED WAREHOUSE ☐
- UNCONDITIONED WAREHOUSE ☐
- INDUSTRIAL/MANUFACTURING ☐
- COLLEGE/UNIVERSITY ☐
- GOVERNMENT/MUNICIPAL ☐
- OTHER/MISCELLANEOUS ☐ _____

Tax Status *(from W9)*

- CORPORATION (Inc., PC, Etc.) ☐
- Government Agency ☐
- Individual ☐
- Partnership ☐
- Exempt ☐
- OTHER (may receive 1099) _____

Operating Hours

- Low Hours (<8h /day) ☐
- One shift (8h /day) ☐
- Two shifts (16h/day) ☐
- Three shifts (24h/day) ☐
- Building Operating Hours _____
- Equipment Operating Hours _____

How Did You Hear?

- AEP Account Representative ☐ _____
- Contractor ☐ _____
- Distributor ☐ _____
- Website ☐
- Other ☐ _____

Operating Days

- Seven days/week ☐ _____
- Five days/week ☐ _____

Square Footage

- Affected Area S.F. _____

NAME OF APPLICANT'S BUSINESS		PROJECT NAME (IF APPLICABLE)		
NAME AS IT APPEARS ON UTILITY BILL	AEP OHIO ACCT #*	APPLICANT TAXPAYER ID # (SSN/FEDERAL ID)		
MAILING ADDRESS		CITY	STATE	ZIP
INSTALLATION ADDRESS		CITY	STATE	ZIP

CUSTOMER CONTACT

Please provide all contacts we may need to process for this project. The business contact should be the project decision maker, the technical contact, etc

NAME OF CONTACT PERSON - *Preferred Contact for Documentation*			TITLE OF CONTACT
CONTACT PHONE #	EXT.	CONTACT FAX #	CONTACT EMAIL ADDRESS

SOLUTION PROVIDER/CONTRACTOR INFORMATION**

NAME OF CONTRACTING COMPANY				
NAME OF CONTACT PERSON			TITLE OF CONTACT PERSON	
CONTACT PHONE #	EXT.	CONTACT FAX #	CONTACT EMAIL ADDRESS	
MAILING ADDRESS			CITY	STATE / ZIP

If there are questions about the application who should we contact? **Customer** ☐ **Contractor** ☐

As an eligible customer, I verify the information is correct and request consideration for participation under this program.

CUSTOMER SIGNATURE (AEP OHIO CUSTOMER)	PRINT NAME
TOTAL INCENTIVE REQUESTED***	DATE
ESTIMATED COMPLETION DATE	ESTIMATED PROJECT COST

* AEP Ohio Account Number where measure is installed

** Solution Provider/Contractor - Party involved in the application submittal (i.e. specs, scope of work, etc.)

*** Credit cannot exceed 50 percent of the total project cost or other caps described in the Terms and Conditions.

AEP OHIO
A unit of American Electric Power

Self-Direct Program
Project Application

SELF-DIRECT APPLICATION AGREEMENT

I understand that the location or business name on the invoice must be consistent with the application information. Final Applications and all required supporting documentation should be received by **November 16, 2012 for projects completed on or after January 1, 2009. Any applications received after the deadlines may not be submitted to the PUCO by December 31st, 2012 and could jeoparidize approval of any incentive by the PUCO.**

I agree to verification by the utility or their representatives of both sales transactions and equipment installation.

I understand that these credits are available to all non-residential customers who pay into the Energy Efficiency and Demand Response (EE/PDR) rider and receive their electricity over AEP Ohio wires regardless from which retail electric supplier the customer has chosen to purchase power.

I certify that the information on this application is true and correct, and that the Taxpayer ID Number, tax status, and W-9 are the applicant's.

I agree that if: I remove the related product(s) identified in my application before a period of 5 years or the end of the product life, whichever is less, I shall refund a prorated amount of energy efficiency credits to AEP Ohio based on the actual period of time in which the related product(s) were installed and operating. This is necessary to assure that the project's related energy benefits will be achieved.

I understand that the program may be modified or terminated without prior notice.

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 energy efficiency credits promised to customers as a result of misrepresentation of the Program.

Customer and customer's contractor shall be responsible to comply with any applicable codes or ordinances.

All submissions become the property of AEP Ohio. It is recommended for you to keep to a copy for your records.

I understand that this project must involve a facility improvement that results in improved energy efficiency. I also understand that all materials removed, including lamps and PCB ballasts, must be permanently taken out of service and disposed of in accordance with local codes and ordinances. I understand it is my responsibility to be aware of any applicable codes or ordinances. Information about hazardous waste disposal can be found at: http://www.epa.gov/epawaste/hazard/index.htm

I understand that the Application and all required documentation should be received by the AEP Ohio Business Incentives for Energy Efficiency program by November 16, 2012 for any projects completed on or after January 1, 2009. Any applications received after the deadlines may not be submitted to the PUCO by December 31, 2012 and could jeopardize approval of any credit by the PUCO. All equipment must be fully operational.

AEP Ohio will pay 75% of the lesser of: 1) The calculated credit as approved by AEP Ohio subject to funding limits or 2) 50% of the project cost (subject to application caps). I understand that AEP Ohio or their representatives have the right to ask for additional information at any time AEP Ohio's Business Incentives Program for Energy Efficiency will make the final determination of energy efficiency credit levels for this project.

The program has a limited budget. Applications will be processed within the budget limits. Applications and all supporting documentation required should be received by November 16, 2012 to be eligible for funding under the current program period.

AEP OHIO
A unit of American Electric Power

Self-Direct Program
Project Application

SELF-DIRECT APPLICATION AGREEMENT

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.

I understand that AEP Ohio does not guarantee the energy savings and does not make any warranties associated with the measure eligible for energy efficiency credits under this program, and, further, that AEP Ohio has no obligations regarding any claims, promises, work, or equipment made, performed, or furnished by any contractors or equipment vendors that sell or install any energy efficiency measures and does not endorse or guarantee same.

Energy efficiency credits will be based upon the final application and program terms and conditions, as well as the availability of funds.

Any and all energy savings generated by the project described in this application are hereby committed to AEP Ohio in oder to count against its respective companies' benchmark requirements in S.B.221.

ENERGY EFFICIENCY CREDITS REQUESTED

I have read and understand the program requirements and measure specifications, and Terms and Conditions set forth in this application and agree to abide by those requirements. Furthermore, I concur that I must meet all eligibility criteria in order to be paid under this program.

ALL EQUIPMENT MUST BE INSTALLED AND OPERATIONAL. A CUSTOMER SIGNATURE IS REQUIRED FOR PAYMENT. SIGNED APPLICATIONS RECEIVED BY FAX OR EMAIL WILL BE TREATED THE SAME AS ORIGINAL APPLICATIONS RECEIVED BY MAIL. All submissions become the property of AEP Ohio. Keep a copy for your records.

TOTAL PROJECT COST	TOTAL ENERGY EFFICIENCY CREDITS REQUESTED*

CUSTOMER SIGNATURE (AEP OHIO CUSTOMER)		
PRINT NAME	DATE	ACTUAL COMPLETION DATE

**AEP Ohio will pay the lesser of 1) The calculated credit as approved by AEP Ohio 2) 50% of the total project cost of the project.*

COMcheck Software Version 3.6.1
Interior Lighting and Power Compliance Certificate

90.1 (2004) Standard

Section 1: Project Information

Project Type: **Alteration**
Project Title : Liberty Union High School- Remodel

Construction Site:
500 Washington Street
Baltimore, OH 43105

Owner/Agent:
Liberty Union-Thurston School District
Baltimore, OH 43105

Designer/Contractor:
Nicole Reed
W.E. Monks & Co. Engineers
3073 N. High Street
Columbus, OH 43202
614-267-4928
nreed@wemonks.com

Section 2: General Information

Building Use Description by: **Activity Type**

Activity Area Compliance Exemption Qualifications

Activity Area	Total Wattage Pre-Alt.	Total Wattage Post-Alt.	Total Pre-Alt. Fixtures	# Fixtures Repl./Added
Common Space Types:Classroom/Lecture/Training (26776 sq.ft.): Compliance required.	---	---	---	---
Common Space Types:Office - Enclosed (2999 sq.ft.): Compliance required.	---	---	---	---
Common Space Types:Restrooms (4941 sq.ft.): Compliance required.	---	---	---	---
Common Space Types:Dining Area - General (4316 sq.ft.): Compliance required.	---	---	---	---
Gymnasium/Exercise Center;Exercise Center Audience/Seating Area (15593 sq.ft.): Compliance required.	---	---	---	---
Library:Reading Area (1958 sq.ft.): Compliance required.	---	---	---	---
Common Space Types:Active Storage (7199 sq.ft.): Compliance required.	---	---	---	---
Common Space Types:Workshop (7908 sq.ft.): Compliance required.	---	---	---	---
Common Space Types:Lobby (1509 sq.ft.): Compliance required.	---	---	---	---
Common Space Types:Corridor/Transition (12642 sq.ft.): Compliance required.	---	---	---	---
Common Space Types:Electrical/Mechanical (3640 sq.ft.): Compliance required.	---	---	---	---
Common Space Types:Conference/Meeting/Multipurpose (1054 sq.ft.): Compliance required.	---	---	---	---
Common Space Types:Food Preparation (1628 sq.ft.): Compliance required.	---	---	---	---
Common Space Types:Stairs-Active (1396 sq.ft.): Compliance required.	---	---	---	---
Common Space Types:Audience/Seating Area (5519 sq.ft.): Compliance required.	---	---	---	---
Common Space Types:Laboratory (880 sq.ft.): Compliance required.	---	---	---	---
Common Space Types:Inactive Storage (3361 sq.ft.): Compliance required.	---	---	---	---

Section 3: Requirements Checklist

Interior Lighting:

☑ 1. Total proposed watts must be less than or equal to total allowed watts.

Allowed Watts	Proposed Watts	Complies
102184	74834	Passes

☑ 2. Exit signs 5 Watts or less per sign.

Controls, Switching, and Wiring:

☑ 3. Independent manual or occupancy sensing controls for each space (remote switch with indicator allowed for safety or security).

☑ 4. Occupant sensing control in class rooms, conference/meeting rooms, and employee lunch and break rooms.
Exceptions:

Spaces with multi-scene control; shop classrooms, laboratory classrooms, and preschool through 12th grade classrooms.

☑ 5. Automatic shutoff control for lighting in >5000 sq.ft buildings by time-of-day device, occupant sensor, or other automatic control.
Exceptions:

24 hour operation lighting; patient care areas; where auto shutoff would endanger safety or security.

☐ 6. Master switch at entry to hotel/motel guest room. N/A

☑ 7. Separate control device for display/accent lighting, case lighting, task lighting, nonvisual lighting, lighting for sale, and demonstration lighting.

☑ 8. Tandem wired one-lamp and three-lamp ballasted luminaires (No single-lamp ballasts).
Exceptions:

Electronic high-frequency ballasts;

Luminaires not on same switch;

Recessed luminaires 10 ft. apart or surface/pendant not continuous;

Luminaires on emergency circuits.

Voltage Drop:

☑ 9. Feeder conductors have been designed for a maximum voltage drop of 2 percent.

☑ 10. Branch circuit conductors have been designed for a maximum voltage drop of 3 percent.

☑ 11 Voltage drop analysis must include the parts of the existing system extending#to the point of electrical supply at the transformer or service equipment entrance.

Section 4: Compliance Statement

Compliance Statement: The proposed lighting alteration project represented in this document is consistent with the building plans, specifications and other calculations submitted with this permit application. The proposed lighting alteration project has been designed to meet the 90.1 (2004) Standard, Chapter 8, requirements in COM*check* Version 3.6.1 and to comply with the mandatory requirements in the Requirements Checklist.

Nicole E Reed - electrical engineer	Nicole E Reed	6/8/09
Name - Title	Signature	Date

Section 5: Post Construction Compliance Statement

Record Drawings and Operating and Maintenance Manuals:

☐ 1. Construction documents with record drawings and operating and maintenance manuals provided to the owner.

Lighting Designer or Contractor Name	Signature	Date

COM*check* Software Version 3.6.1

Interior Lighting Application Worksheet

90.1 (2004) Standard

Section 1: Allowed Lighting Power Calculation

A Area Category	B Floor Area (ft2)	C Allowed Watts / ft2	D Allowed Watts (B x C)
Common Space Types:Classroom/Lecture/Training	26776	1.4	37486
Common Space Types:Office - Enclosed	2999	1.1	3299
Common Space Types:Restrooms	4941	0.9	4447
Common Space Types:Dining Area - General	4316	0.9	3884
Gymnasium/Exercise Center:Exercise Center Audience/Seating Area	15593	0.3	4678
Library:Reading Area	1958	1.2	2350
Common Space Types:Active Storage	7199	0.8	5759
Common Space Types:Workshop	7908	1.9	15025
Common Space Types:Lobby	1509	1.3	1962
Common Space Types:Corridor/Transition	12642	0.5	6321
Allowance: Decorative Appearance / Fix. ID: C	144(a)	1	144(b)
Common Space Types:Electrical/Mechanical	3640	1.5	5460
Common Space Types:Conference/Meeting/Multipurpose	1054	1.3	1370
Common Space Types:Food Preparation	1628	1.2	1954
Common Space Types:Stairs-Active	1396	0.6	838
Common Space Types:Audience/Seating Area	5519	0.9	4967
Common Space Types:Laboratory	880	1.4	1232
Common Space Types:Inactive Storage	3361	0.3	1008
		Total Allowed Watts =	102184

(a) Area claimed must not exceed the illuminated area permitted for this allowance type.
(b) Allowance is (B x C) or the actual wattage of the fixtures given in Section 2, whichever is less.

Section 2: Proposed Lighting Power Calculation

A Fixture ID : Description / Lamp / Wattage Per Lamp / Ballast	B Lamps/ Fixture	C # of Fixtures	D Fixture Watt.	E (C X D)
Common Space Types:Classroom/Lecture/Training (26776 sq.ft.)				
Linear Fluorescent 1: A: 48" T8 32W (Super T8) / Electronic	4	171	96	16416
Linear Fluorescent 2: A1: 48" T8 32W (Super T8) / Electronic	2	55	48	2640
Linear Fluorescent 3: A2: 48" T8 32W (Super T8) / Electronic	4	48	96	4608
Linear Fluorescent 4: B: 48" T8 32W (Super T8) / Electronic	2	4	48	192
Linear Fluorescent 5: B1: 48" T8 32W (Super T8) / Electronic	2	2	48	96
Compact Fluorescent 1: C: Triple 4-pin 26W / Electronic	1	2	26	52
Linear Fluorescent 6: G: 48" T8 32W (Super T8) / Electronic	2	2	48	96
Linear Fluorescent 7: H: 46" T5 28W / Electronic	4	7	126	882
Linear Fluorescent 8: H1: 46" T5 28W / Electronic	4	5	126	630
Incandescent 1: L: Other	1	5	150	750
Incandescent 2: L2: Other Exemption:Lighting Sales or Education	2	5	30	Exempt
Incandescent 3: T: Incandescent 50W Exemption:Display Lighting in Galleries/Museums	1	7	50	Exempt
Common Space Types:Office - Enclosed (2999 sq.ft.)				
Linear Fluorescent 11: A: 48" T8 32W (Super T8) / Electronic	4	3	96	288
Linear Fluorescent 12: A1: 48" T8 32W (Super T8) / Electronic	2	5	48	240

Linear Fluorescent 13: A2: 48" T8 32W (Super T8) / Electronic	4	3	96	288
Linear Fluorescent 14: B1: 48" T8 32W (Super T8) / Electronic	2	1	48	48
Linear Fluorescent 16: H1: 46" T5 28W / Electronic	4	13	126	1638
Linear Fluorescent 17: H2: 46" T5 28W / Electronic	2	4	63	252
Linear Fluorescent 95: 48" T8 32W (Super T8) / Electronic	2	2	48	96
Common Space Types:Restrooms (4941 sq.ft.)				
Linear Fluorescent 18: B: 48" T8 32W (Super T8) / Electronic	2	6	48	288
Linear Fluorescent 19: B1: 48" T8 32W (Super T8) / Electronic	2	5	48	240
Compact Fluorescent 2: C: Triple 4-pin 26W / Electronic	1	2	26	52
Compact Fluorescent 3: C1: Triple 4-pin 42W / Electronic	1	3	46	138
Compact Fluorescent 4: C2: Triple 4-pin 42W / Electronic	1	3	46	138
Linear Fluorescent 20: D2: 48" T8 32W (Super T8) / Electronic	2	1	48	48
Linear Fluorescent 21: G: 48" T8 32W (Super T8) / Electronic	2	8	48	384
Linear Fluorescent 22: G1: 48" T8 32W (Super T8) / Electronic	2	14	48	672
Linear Fluorescent 23: J: 48" T8 32W (Super T8) / Electronic	2	10	48	480
Linear Fluorescent 24: J1: 48" T8 32W (Super T8) / Electronic	2	8	48	384
Common Space Types:Dining Area - General (4316 sq.ft.)				
Linear Fluorescent 25: B2: 48" T8 32W (Super T8) / Electronic	4	2	96	192
Linear Fluorescent 26: B3: 48" T8 32W (Super T8) / Electronic	4	2	96	192
Linear Fluorescent 27: H: 46" T5 28W / Electronic	4	19	126	2394
Linear Fluorescent 28: H1: 46" T5 28W / Electronic	4	9	126	1134
Gymnasium/Exercise Center:Exercise Center Audience/Seating Area (15593 sq.ft.)				
Linear Fluorescent 29: D3: 48" T8 32W (Super T8) / Electronic	2	2	48	96
Linear Fluorescent 30: F: 48" T8 32W (Super T8) / Electronic	2	1	48	48
Linear Fluorescent 31: F1: 48" T8 32W (Super T8) / Electronic	2	1	48	48
Linear Fluorescent 32: M: 46" T5 HO 54W / Electronic	6	18	358	6444
Linear Fluorescent 33: M1: 46" T5 HO 54W / Electronic	6	17	358	6086
Library:Reading Area (1958 sq.ft.)				
Compact Fluorescent 5: C: Triple 4-pin 42W / Electronic	1	1	46	46
Linear Fluorescent 34: H: 48" T8 32W (Super T8) / Electronic	4	8	126	1008
Linear Fluorescent 35: H1: 48" T8 32W (Super T8) / Electronic	4	1	126	126
Linear Fluorescent 36: H3: 48" T8 32W (Super T8) / Electronic	2	1	63	63
Linear Fluorescent 37: D4: 46" T5 28W / Electronic	2	2	63	126
Common Space Types:Active Storage (7199 sq.ft.)				
Linear Fluorescent 38: A1: 48" T8 32W (Super T8) / Electronic	2	1	48	48
Linear Fluorescent 39: A2: 48" T8 32W (Super T8) / Electronic	4	1	96	96
Linear Fluorescent 40: B: 48" T8 32W (Super T8) / Electronic	2	1	48	48
Linear Fluorescent 41: B3: 48" T8 32W (Super T8) / Electronic	4	1	96	96
Linear Fluorescent 42: F: 48" T8 32W (Super T8) / Electronic	2	28	48	1344
Linear Fluorescent 43: F1: 48" T8 32W (Super T8) / Electronic	2	10	48	480
Linear Fluorescent 44: G: 48" T8 32W (Super T8) / Electronic	2	28	48	1344
Linear Fluorescent 45: G1: 48" T8 32W (Super T8) / Electronic	2	2	48	96
Common Space Types:Workshop (7908 sq.ft.)				
Linear Fluorescent 46: A: 48" T8 32W (Super T8) / Electronic	4	1	96	96
Linear Fluorescent 47: A1: 48" T8 32W (Super T8) / Electronic	2	3	48	144
Linear Fluorescent 48: A2: 48" T8 32W (Super T8) / Electronic	4	1	96	96
Linear Fluorescent 49: D2: 48" T8 32W (Super T8) / Electronic	2	1	48	48
Linear Fluorescent 50: F: 48" T8 32W (Super T8) / Electronic	2	2	48	96
Linear Fluorescent 51: F1: 48" T8 32W (Super T8) / Electronic	2	2	48	96
Linear Fluorescent 52: G: 48" T8 32W (Super T8) / Electronic	2	7	48	336
Linear Fluorescent 53: G1: 48" T8 32W (Super T8) / Electronic	2	3	48	144
Linear Fluorescent 54: M2: 46" T5 HO 54W / Electronic	4	13	234	3042
Linear Fluorescent 55: M3: 46" T5 HO 54W / Electronic	4	8	234	1872
Common Space Types:Lobby (1509 sq.ft.)				
Linear Fluorescent 56: B: 48" T8 32W (Super T8) / Electronic	2	2	48	96
Linear Fluorescent 57: B1: 48" T8 32W (Super T8) / Electronic	2	3	48	144
Linear Fluorescent 58: B3: 48" T8 32W (Super T8) / Electronic	4	2	96	192
Compact Fluorescent 6: C: Triple 4-pin 26W / Electronic	1	1	26	26
Compact Fluorescent 7: C1: Triple 4-pin 42W / Electronic	1	3	46	138
Common Space Types:Corridor/Transition (12642 sq.ft.)				
Linear Fluorescent 59: B: 48" T8 32W (Super T8) / Electronic	2	41	48	1968

Linear Fluorescent 60: B1: 48" T8 32W (Super T8) / Electronic	2	50	48	2400
Compact Fluorescent 8: C: Triple 4-pin 26W / Electronic	1	8	26	208
Compact Fluorescent 9: C1: Triple 4-pin 42W / Electronic	1	3	46	138
Linear Fluorescent 61: D: 22" T5 HO 24W / Electronic	1	2	27	54
Linear Fluorescent 62: D1: 22" T5 HO 24W / Electronic	1	3	27	81
Linear Fluorescent 63: D2: 22" T5 HO 24W / Electronic	2	2	48	96
Linear Fluorescent 64: F1: 48" T8 32W (Super T8) / Electronic	2	1	48	48
Linear Fluorescent 65: G: 48" T8 32W (Super T8) / Electronic	2	1	48	48
Linear Fluorescent 66: G1: 48" T8 32W (Super T8) / Electronic	2	6	48	288
Linear Fluorescent 67: K: 48" T8 32W (Super T8) / Electronic	3	1	72	72
Linear Fluorescent 68: K1: 48" T8 32W (Super T8) / Electronic	3	2	72	144
Linear Fluorescent 93: J1: 48" T8 32W (Super T8) / Electronic	2	1	48	48
Common Space Types:Electrical/Mechanical (3640 sq.ft.)				
Linear Fluorescent 69: D3: 48" T8 32W (Super T8) / Electronic	2	2	48	96
Linear Fluorescent 70: F: 48" T8 32W (Super T8) / Electronic	2	7	48	336
Linear Fluorescent 71: F1: 48" T8 32W (Super T8) / Electronic	2	16	48	768
Common Space Types:Conference/Meeting/Multipurpose (1054 sq.ft.)				
Linear Fluorescent 72: H: 46" T5 28W / Electronic	4	4	126	504
Linear Fluorescent 73: H1: 46" T5 28W / Electronic	3	3	126	378
Linear Fluorescent 74: H2: 46" T5 28W / Electronic	2	2	63	126
Linear Fluorescent 75: N: 48" T8 32W (Super T8) / Electronic	3	3	72	216
Linear Fluorescent 76: N1: 48" T8 32W (Super T8) / Electronic	3	1	72	72
Linear Fluorescent 94: G: 48" T8 32W (Super T8) / Electronic	2	1	48	48
Common Space Types:Food Preparation (1628 sq.ft.)				
Linear Fluorescent 77: B2: 48" T8 32W (Super T8) / Electronic	4	2	96	192
Linear Fluorescent 78: B3: 48" T8 32W (Super T8) / Electronic	4	2	96	192
Linear Fluorescent 79: G: 48" T8 32W (Super T8) / Electronic	2	1	48	48
Linear Fluorescent 80: G1: 48" T8 32W (Super T8) / Electronic	2	1	48	48
Linear Fluorescent 81: K: 48" T8 32W (Super T8) / Electronic	3	4	72	288
Linear Fluorescent 82: K1: 48" T8 32W (Super T8) / Electronic	3	5	72	360
Common Space Types:Stairs-Active (1396 sq.ft.)				
Linear Fluorescent 83: B1: 48" T8 32W (Super T8) / Electronic	2	6	48	288
Linear Fluorescent 85: D3: 48" T8 32W (Super T8) / Electronic	2	2	48	96
Common Space Types:Audience/Seating Area (5519 sq.ft.)				
Incandescent 7: CL4: Incandescent 60W Exemption:Theatrical Lighting	3	4	180	Exempt
Linear Fluorescent 86: P: 46" T5 HO 54W / Electronic	2	11	117	1287
Linear Fluorescent 87: P1: 46" T5 HO 54W / Electronic	2	9	117	1053
Linear Fluorescent 88: Q: 48" T8 32W (Super T8) / Electronic	2	8	48	384
Linear Fluorescent 89: Q1: 48" T8 32W (Super T8) / Electronic	2	6	48	288
Linear Fluorescent 90: R: Other / Electronic	3	2	72	144
Linear Fluorescent 93: R1: Other / Electronic	3	6	72	432
Incandescent 8: SR1: Incandescent 500W Exemption:Theatrical Lighting	1	11	500	Exempt
Incandescent 14: SR2: Incandescent 400W Exemption:Theatrical Lighting	1	3	400	Exempt
Incandescent 10: SR3: Other Exemption:Theatrical Lighting	1	7	200	Exempt
Incandescent 11: SL1: Incandescent 750W Exemption:Theatrical Lighting	1	16	750	Exempt
Incandescent 12: SL2: Incandescent 750W Exemption:Theatrical Lighting	1	2	750	Exempt
Incandescent 13: SL3: Incandescent 750W Exemption:Theatrical Lighting	1	2	750	Exempt
Incandescent 14: SL4: Incandescent 1000W Exemption:Theatrical Lighting	1	17	1000	Exempt
Common Space Types:Laboratory (880 sq.ft.)				
Linear Fluorescent 84: N: 48" T8 32W (Super T8) / Electronic	3	7	72	504
Linear Fluorescent 85: N1: 48" T8 32W (Super T8) / Electronic	3	3	72	216
Common Space Types:Inactive Storage (3361 sq.ft.)				
Linear Fluorescent 91: F: 48" T8 32W (Super T8) / Electronic	2	6	48	288
Linear Fluorescent 92: F1: 48" T8 32W (Super T8) / Electronic	2	9	48	432

Total Proposed Watts = 74834

Section 3: Compliance Calculation

If the Total Allowed Watts minus the Total Proposed Watts is greater than or equal to zero, the building complies.

Total Allowed Watts =	102184
Total Proposed Watts =	74834
Project Compliance =	27350

Interior Lighting PASSES

COMcheck Software Version 3.6.1
Exterior Lighting Compliance Certificate

90.1 (2004) Standard

Section 1: Project Information

Project Type: **Alteration**
Project Title : Liberty Union High School- Remodel

Construction Site:
500 Washington Street
Baltimore, OH 43105

Owner/Agent:
Liberty Union-Thurston School District
Baltimore, OH 43105

Designer/Contractor:
Nicole Reed
W.E. Monks & Co. Engineers
3073 N. High Street
Columbus, OH 43202
614-267-4928
nreed@wemonks.com

Section 2: Exterior Lighting Area/Surface Power Calculation

A Exterior Area/Surface	B Quantity	C Allowed Watts / Unit	D Tradable Wattage	E Allowed Watts (C x D)	F Proposed Watts
Main entry/exit	22 ft of door width	30	Yes	660	372
Other entry/exit	150 ft of door width	20	Yes	3000	2549
Plaza area	39865 ft2	0.2	Yes	7973	474
Walkway >= 10 feet wide	64 ft2	0.2	Yes	13	79
			Total Tradable Watts* =	11646	3474
			Total Allowed Watts =	11646	
			Total Allowed Supplemental Watts** =	582	

* Wattage tradeoffs are only allowed between tradable areas/surfaces.
** A supplemental allowance equal to 5% of total allowed wattage may be applied toward compliance of both non-tradable and tradable areas/surfaces.

Section 3: Exterior Lighting Fixture Schedule

A Fixture ID : Description / Lamp / Wattage Per Lamp / Ballast	B Lamps/ Fixture	C # of Fixtures	D Fixture Watt.	E (C X D)
Main entry/exit (22 ft of door width): Tradable Wattage				
Compact Fluorescent 1: OC: Triple 4-pin 42W / Electronic	2	4	93	372
Other entry/exit (150 ft of door width): Tradable Wattage				
HID 1: OB: Metal Halide 75W / Electronic	1	19	95	1805
Compact Fluorescent 2: OC: Triple 4-pin 42W / Electronic	2	8	93	744
Plaza area (39865 ft2): Tradable Wattage				
Incandescent 1: OA: LED / Other	1	6	79	474
Walkway >= 10 feet wide (64 ft2): Tradable Wattage				
Incandescent 2: OA: LED / Other	1	1	79	79
			Total Tradable Proposed Watts =	3474

Section 4: Requirements Checklist

Lighting Wattage:

1. Within each non-tradable area/surface, total proposed watts must be less than or equal to total allowed watts. Across all tradable areas/surfaces, total proposed watts must be less than or equal to total allowed watts.

Compliance: Passes.

Controls, Switching, and Wiring:

☐ 2. All exemption claims are associated with fixtures that have a control device independent of the control of the nonexempt lighting. N/A

☑ 3. All lighting fixtures are controlled by a photosensor or astronomical time switch that is capable of automatically turning off the fixture when sufficient daylight is available or the lighting is not required.
Exceptions:

Covered vehicle entrance/exit areas requiring lighting for safety, security and eye adaptation.

Exterior Lighting Efficacy:

☑ 4. All exterior building grounds luminaires that operate at greater than 100W have minimum efficacy of 60 lumen/watt.
Exceptions:

Lighting that has been claimed as exempt and is identified as such in Section 3 table above.

Lighting that is specifically designated as required by a health or life safety statue, ordinance, or regulation.

Emergency lighting that is automatically off during normal building operation.

Lighting that is controlled by motion sensor.

Exterior Lighting PASSES: Design 70% better than code.

Section 5: Compliance Statement

Compliance Statement: The proposed exterior lighting design represented in this document is consistent with the building plans, specifications and other calculations submitted with this permit application. The proposed lighting system has been designed to meet the 90.1 (2004) Standard requirements in COM*check* Version 3.6.1 and to comply with the mandatory requirements in the Requirements Checklist.

Nicole Reed - electrical engineer — Name - Title
Nicole E Reed — Signature
6/5/09 — Date

Occupancy Sensor Multi-Technology Wall/ Corner Sensor

OSW12-MOW

TYPE: OS3

With ultrasonic and infrared sensing, this top-of-the-line sensor provides the highest degree of immunity to false tripping. Auto-Adapting circuitry fine-tunes delay settings for "install and forget" simplicity.

OSW12-MOW

THE MULTI-TECHNOLOGY OSW12-M OCCUPANCY SENSOR

- INFRARED & ULTRASONIC SENSING
- HIGH SENSITIVITY, HIGH RELIABILITY
- TOP-OF-THE-LINE TECHNOLOGY
- SELF-ADJUSTING, SELF-CALIBRATING
- PHOTOCELL CONTROL
- 24VDC, CLASS 2 LOW VOLTAGE WIRING
- "TWIST-AND-LOCK BRACKET" INCLUDED

GENERAL OPERATION

The OSW12-M Occupancy Sensor uses ultrasonic sensing for maximum motion sensitivity and infrared sensing for highest lights-off reliability. The sensor continually analyzes and adjusts to changing conditions.

The OSW12-M Occupancy Sensor uses the latest microprocessor-based technology which permits the detector to continually adjust and optimize its performance. The detector requires a 24 volt OSPxx Series power pack.

By combining ultrasonic and infrared technology, the OSW12-M Occupancy Sensor provides excellent small motion sensitivity (US) and error immunity (IR). The mounting base, provided with the sensor, allows quick and easy mounting in corners, on wall or on ceilings.

FEATURES

Multi-Technology: By using both infrared and ultrasonic signals, the sensor minimizes false reading for high reliability.

Flexible Base Mounting: Supplied twist-and-lock base mount permits fast alignment. Supplied cover hides mounting hardware and wires. Can be used with raceways for hard surface installing. Wall or ceiling mount.

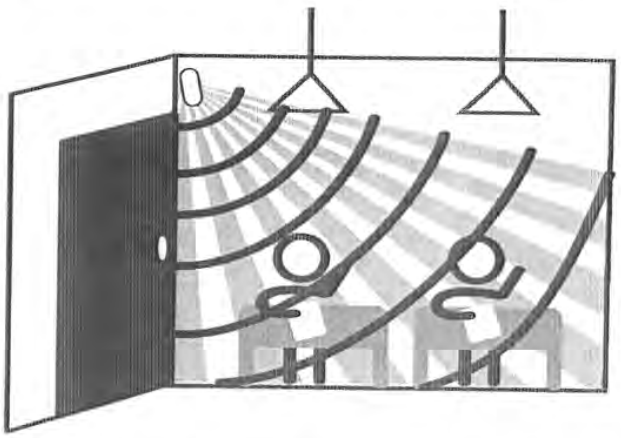
Wide Coverage: Over 1200 sq. ft of coverage.

Timer Settings: Automatic and Manual - 30s to 30 min. Test mode - 6 sec.

Self-Adjusting: Internal microprocessor continually analyzes, evaluates and adjusts settings. Performance is kept at a maximum and user complaints are eliminated.

Non-Volatile Memory: Learned and adjusted settings saved in protected memory are not lost during power outages.

Ambient Light Recognition: A photocell prevents lights from turning on when the room is adequately lit by natural light. Both "occupied" and "low-light-level and occupied" lights-on control wires are supplied.



The versatile OSW12-M Occupancy Sensor can be mounted on the wall to provide full room coverage when low-hanging lights or other obstacles are present. Infrared and ultrasonic signals are used for maximum reliability.

LEVITON SPECIFICATION SUBMITTAL

JOB NAME:	CATALOG NUMBERS:
JOB NUMBER:	OSW12-M0W

Leviton Mfg. Co., Inc.
59-25 Little Neck Pkwy • Little Neck, NY 11362-2591 • Tech Line: 1-800-824-3005 • Fax: 1-800-832-9538
Visit our Website at: www.leviton.com

LEVITON
Building a Connected World

Product Specifications

OSW12-MOW

PRODUCT SPECIFICATIONS

Models

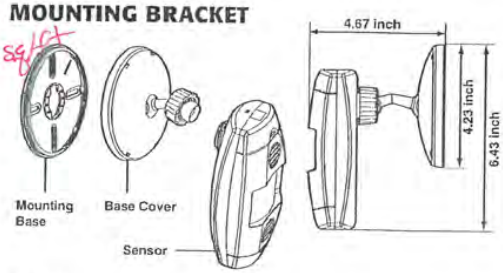
Part Number	Transducer Pairs	Coverage	Operating Frequency	Additional Features
OSW12-M	one	1200 sq. ft.	32kHz	Photocell

must be 2,000 sq/ft

SELF ADJUSTING FUNCTIONS

Timer Test Mode (6 sec.): Auto resets in 15 min to normal.
Operating Timer: Self-Adjusting
Air Current Compensation: Automatic, self-adjusting.
False-Off Correction: Timer increases temporarily over initial value.
False-On Corrections: Decrease delayed off-time.

MOUNTING BRACKET



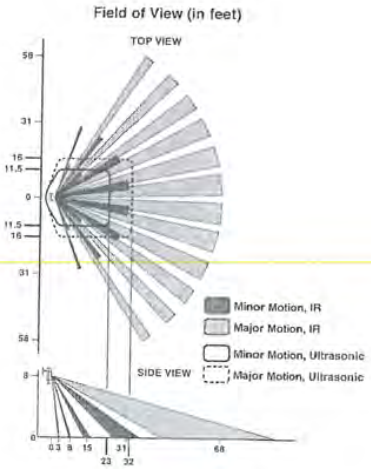
CONTROLS

Table 4: DIP switch settings

Switch	Switch Functions		Switch Settings
	Bank A	**OFF**	**ON**
A1	Single/Multi-Tech Mode	Multi-Tech	Single Tech
A2	PIR/Ultrasonic Mode	PIR	Ultrasonic
A3	Manual Mode	Auto Adapting Enabled	Auto Adapting Disabled
A4	Walk-Thru Disable	Walk-Thru Enabled	Walk-Thru Disabled
	Bank B		
B1	Override to On	Auto Mode	Lights forced On
B2	Override to Off	Auto Mode	Lights forced Off
B3	Test Mode	OFF-ON-OFF	Enter/Exit Test Mode
B4	LED Disable	LEDS Enabled	LEDS Disabled

Ultrasonic Sensitivity: 0 to 100%: green knob (factory setting: factory setting 50%).
Infrared Sensitivity: 0 to 100%: red knob (factory setting: 75%).
Photocell: Blue knob 20 to 3,000 Lux. Factory set at 3,000 Lux - (disable photocell).

RANGE



INDICATORS

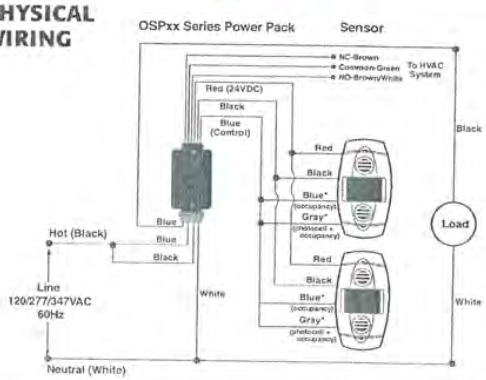
Red LED Lamp: Infrared motion.
Green LED Lamp: Ultrasonic motion.

SPECIFICATIONS

Construction: High-impact housing, injection molded plastic. Color coded wire leads are 6" long (16.24 cm).
Size & Weight: 5.5"H x 2.75"W x 1.65"D, without bracket
Infrared Detector: High sensitivity 9.8 micron dual element PIR, 16mm ultrasonic detectors.
Lens: 110° aperture, lens opening 2.2" x 1.47", 36 elements (72 zones) small motion range 31 ft, large motion 68 ft
Power Requirements: 24 VDC, 30 mA from OSPxx power pack or OPB15 Power Base Adaptor.
Output: 24 VDC active high logic control signal with short circuit protection.
Photocell: 20-3,000 Lux adjustable.
Operating Environment: 32°F to 104°F (0°C to 40°C); 0% to 95% relative humidity, non-condensing. For indoor use only.
Warranty: 5 years.

**When the photocell function is not being used, connect the Blue Occupancy Sensor lead to the Blue Power Pack lead. When using the Photocell function, connect the Gray Occupancy Sensor lead to the Blue Power pack lead–Do not use the Blue Occupancy Sensor lead for the photocell function.*

PHYSICAL WIRING



LEVITON SPECIFICATION SUBMITTAL

JOB NAME:	CATALOG NUMBERS:
JOB NUMBER:	

Leviton Mfg. Co., Inc.
59-25 Little Neck Pkwy • Little Neck, NY 11362-2591 • Tech Line: 1-800-824-3005 • Fax: 1-800-832-9538
Visit our Website at: www.leviton.com

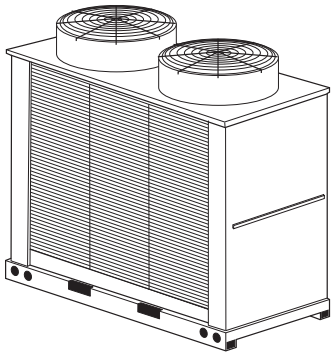
Carrier®

Product Data

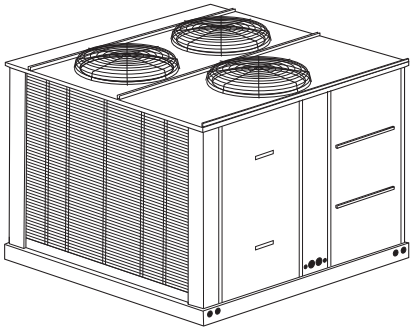
GEMINI™ SELECT 38APS025-065, 38APD025-130 Commercial Air-Cooled Condensing Units with PURON® Refrigerant (R-410A) 50/60 Hz

25 to 130 Nominal Tons (88 to 457 Nominal kW)

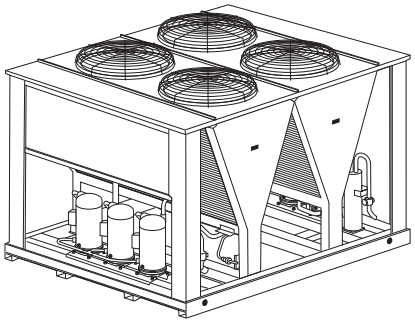
Gemini™ Select



025 UNIT WITH LOW SOUND OPTION



040-060 UNIT



070 UNIT

ASHRAE 90.1 COMPLIANT

Puron® the environmentally sound refrigerant

These dependable split systems match Carrier's 40RU or 39 Series indoor-air handlers with the versatile outdoor 38AP condensing units for a wide selection of commercial cooling solutions.

- Split condensing units compatible with ASHRAE 90.1
- Chlorine-free, non-ozone depleting Puron refrigerant (R-410A)
- Condenser coils feature the Novation® heat exchanger with microchannel coil technology
- 38APS single-circuit unit has up to 3 rotary scroll compressors
- 38APD unit has up to 6 rotary scroll compressors with 2 independent circuits
- Standard scroll compressor units operate as low as 33% (single circuit) or 13% (dual circuit) of nominal capacity
- Optional digital scroll compressors allow incremental unloading down to 16% (single circuit) or 6% (dual circuit) of nominal capacity for VAV applications. The digital scroll is always on the lead circuit (one per unit).
- Protection against high discharge and low suction refrigerant pressure, and low oil pressure

Features/Benefits

The 38AP condensing unit offers the utmost in system configuration and control adaptability. Its premium-quality standard components ensure durable, efficient, and reliable operation.

The 38AP units offer high unit EERs (Energy Efficiency Ratios) up to 11.5 and IPLVs (integrated part load values) up to 16.2.

Capacity ratings

38AP UNIT CAPACITY RATINGS

UNIT SIZE	CAPACITY NOMINAL TONS (60 Hz)	CAPACITY NOMINAL kW (60 Hz)	CAPACITY NOMINAL TONS (50 Hz)	CAPACITY NOMINAL kW (50 Hz)	EER (60 Hz)	EER (50 Hz)	IPLV (60 Hz)	IPLV (50 Hz)
38APS025	24.0	84.3	20.0	70.3	11.0	11.6	14.4	16.4
38APD025	24.0	84.3	20.0	70.3	11.0	11.6	13.1	14.9
38APS027	26.6	93.4	22.2	78.1	10.9	11.7	14.7	16.6
38APD027	26.6	93.4	22.2	78.1	10.9	11.7	14.0	15.4
38APS030	31.1	109.2	26.0	91.4	10.8	11.5	14.3	15.9
38APD030	31.1	109.2	26.0	91.4	10.8	11.5	12.8	14.2
38APS040	39.8	139.8	32.8	115.3	11.5	12.4	16.2	18.4
38APD040	39.2	137.7	32.6	114.6	11.5	12.1	15.3	17.4
38APS050	48.1	168.9	39.5	138.9	10.8	11.8	15.0	16.7
38APD050	50.0	175.6	41.6	146.3	11.1	11.4	14.9	16.7
38APD060	58.3	204.7	48.0	168.8	11.0	11.5	14.5	16.4
38APS065	59.6	209.6	49.4	173.7	11.1	11.5	15.1	17.0
38APD070	67.3	236.4	58.5	205.7	11.0	11.3	15.7	17.7
38APD080	78.0	273.9	64.5	226.8	11.1	11.5	15.6	17.5
38APD090	87.4	306.9	71.9	252.8	11.3	11.8	15.3	17.4
38APD100	96.0	337.2	79.8	280.6	11.1	11.6	15.0	16.9
38APD115	110.4	388.3	90.8	319.3	11.1	11.6	15.2	17.1
38APD130	125.1	442.3	103.7	364.6	11.1	11.5	15.2	17.1

LEGEND

EER — Energy Efficiency Ratio
IPLV — Integrated Part Load Value

NOTES:

1. Unit performance is rated in accordance with AHRI (Air Conditioning, Heating, and Refrigeration Institute) Standard 365.
2. Ratings are based on 45 F (7.2 C) saturated suction temperature and 95 F (35 C) outside-air temperature, standard fans, and include suction line losses.

Performance Summary For CU-8A 8B

Project: ~Untitled1 11/04/2009
Prepared By: 09:52AM

System: **38APD027**
Circuit: ..... **Dual Circuit**
System Quantity: **2**
Altitude: ..... **0.0** ft
EER @ ARI Conditions: **10.9**
IPLV: **14.0**
Linear Pipe Length: ..... **0.0** ft
Suction Line Size: ..... **1 1/8 (A), 1 1/8 (B)** in
Liquid Line Size: ..... **1/2 (A), 1/2 (B)** in
Condensing unit is rated in accordance with ARI 365.

Outdoor Unit Parameters
Unit Quantity: **1**
Unit Model: **38APD**
Unit Size: ..... **27 Tons**
Voltage: ..... **460-3-60** V-Ph-Hz
Total Clg Cap.(Gross): ..... **297.6** MBH
SDT: ..... **120.4** °F
SDT2: ..... **120.2** °F
Clg Ent Air DB: ..... **95.0** °F
Saturated Suction Temp: ..... **40.0** °F

Outdoor Electrical Data
Unit Voltage: ..... **460-3-60** V-Ph-Hz
Unit#1 MCA: ..... **58.6** Amps
Unit#1 MOCP: ..... **80.0** Amps
Compressor Power: ..... **25.80** kW
Voltage Range Min: ..... **414** V
Voltage Range Max: ..... **508** V
Compressor RLA: **23.1/23.1**
Compressor LRA: **150/150**
Compressor Quantity: ..... **1 (Circ A), 1 (Circ B)**
Fan Motors Qty: **2**
Notice: Outdoor unit elect. data is based on 460-3-60

Accessories and Installed Options
Low ambient FIOP operation down to -20 F.

Not Req'd

FIOPS and Accessories Information

FIOPS	Quantity
MCHX	
Low Ambient Head Pressure Control	2
Scrolling Marquee Display	2

Acoustic Information
A-Wgt Outdoor Sound Power Level: **94.8** dbA

An uncoated Novation condenser coil was selected for this product. This is based on an installed location with postal code: 43081 and a non-corrosive localized environment.

Bell & Gossett Submittal: B-226.1F

ITT

SUBMITTAL

B-226.1F

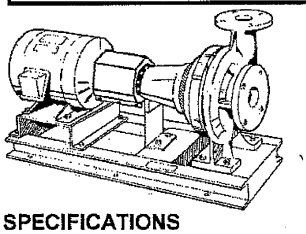
JOB: Liberty Union - Thursten H.S.

REPRESENTATIVE: Steffens-Shultz, Inc.

UNIT TAG: P-1, 2
ENGINEER: W.E. Monks Engineering
CONTRACTOR: Gutridge Plumbing Inc.

ORDER NO.
SUBMITTED BY: Ed Sampson
APPROVED BY:

DATE: 12/9/2009
DATE:
DATE:



3E
Series 1510
Centrifugal Pumps - Base Mounted

SPECIFICATIONS

FLOW 300 (GPM) HEAD 110 (FT)
HP 20 RPM 1800
VOLTS 208-230/460
CYCLE 60 PHASE 3
ODP Energy Efficient
APPROX. WEIGHT 560
SPECIALS

Note: Equipped with EPDM coupling

MATERIALS OF CONSTRUCTION

☒ BRONZE FITTED ☐ ALL IRON

FEATURES

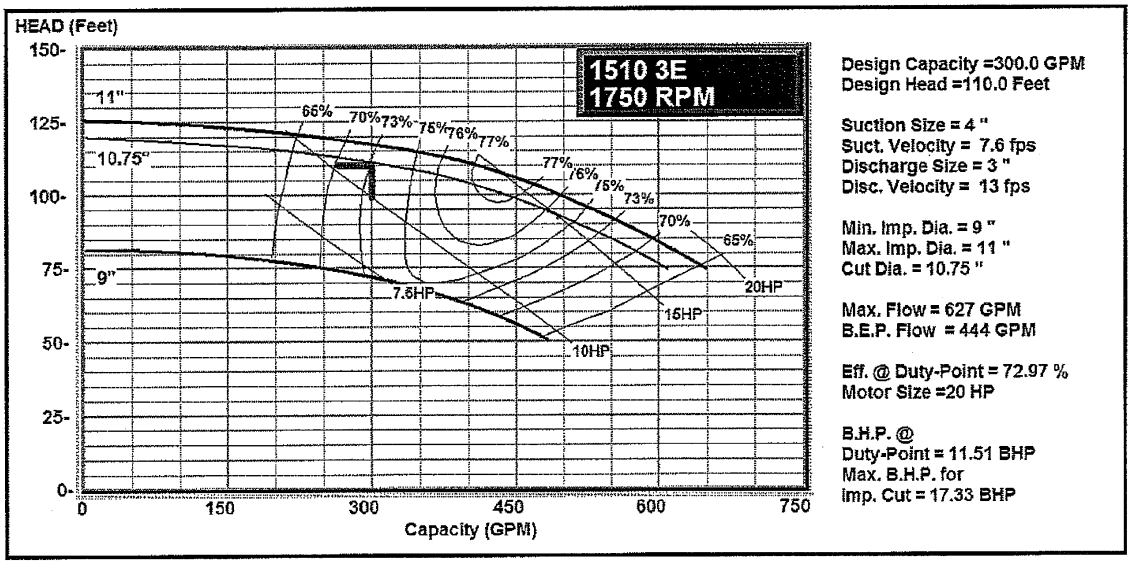
☒ ANSI/OSHA Coupling Guard
☒ Center Drop Out Spacer Coupling
☒ Fabricated Heavy Duty Baseplate

MAXIMUM WORKING PRESSURE

☒ 175 psi (12 bar) W.P.
w/ 125# ANSI flange drilling
☐ 250 psi (17 bar) W.P.
w/ 250# ANSI flange drilling (requires 1510-S)

TYPE OF SEAL

☒ 1510 Standard Seal
(Buna-Carbon/Ceramic)
☐ 1510 -F Standard Seal w/ Flush Line
(Buna-Carbon/Ceramic)
☐ 1510 -S Stuffing Box construction w/ Flushed Mechanical Single Seal
(EPR-Tungsten Carbide/Carbon)
☐ 1510 -D Stuffing Box construction w/ Flushed Double Mechanical Seal
(EPR-Carbon/Ceramic)
Requires external water source
☐ 1510 -PF Stuffing Box Construction w/ Packing
(Graphite Impregnated Teflon)



Design Capacity =300.0 GPM
Design Head =110.0 Feet

Suction Size = 4 "
Suct. Velocity = 7.6 fps
Discharge Size = 3 "
Disc. Velocity = 13 fps

Min. Imp. Dia. = 9 "
Max. Imp. Dia. = 11 "
Cut Dia. = 10.75 "

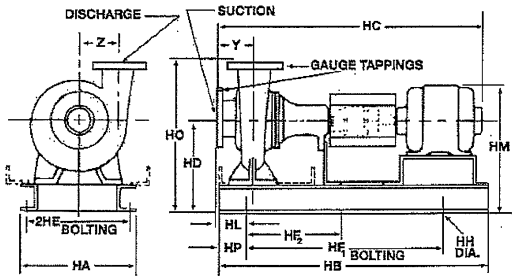
Max. Flow = 627 GPM
B.E.P. Flow = 444 GPM

Eff. @ Duty-Point = 72.97 %
Motor Size =20 HP

B.H.P. @
Duty-Point = 11.51 BHP
Max. B.H.P. for
Imp. Cut = 17.33 BHP

Series 1510 3E Centrifugal Pump Submittal

B-226.1F



FLANGE DIMENSIONS IN INCHES (MM)			
	SIZE	THICKNESS	O.D.
Discharge	3"	1-1/8 (29)	8 (203)
Suction	4"	1-1/4 (32)	9-1/2 (241)

FLANGES ARE 125# ANSI - STANDARD
250# ANSI - AVAILABLE

DIMENSIONS - Inches (mm) **STANDARD SEAL 1510, 1510-F**

MOTOR FRAME	HA	HB	HC MAX	HD	2HE	HF_1	HF_2	HH	HL	HM MAX	HO	HP	Y	Z
	"S" FRAME													
184T	16 (406)	42-1/4 (1073)	34-7/8 (886)	14 (356)	14 (356)	32-1/4 (819)	16-1/8 (410)	7/8 (22)	6-11/16 (170)	19-1/4 (489)	23-1/2 (597)	5 (127)	5-1/2 (140)	7-3/8 (187)
213T	16 (406)	42-1/4 (1073)	37-3/8 (949)	14 (356)	14 (356)	32-1/4 (819)	16-1/8 (410)	7/8 (22)	6-11/16 (170)	19-7/8 (505)	23-1/2 (597)	5 (127)	5-1/2 (140)	7-3/8 (187)
215T	16 (406)	42-1/4 (1073)	38-7/8 (987)	14 (356)	14 (356)	32-1/4 (819)	16-1/8 (410)	7/8 (22)	6-11/16 (170)	19-7/8 (505)	23-1/2 (597)	5 (127)	5-1/2 (140)	7-3/8 (187)
254T	16 (406)	42-1/4 (1073)	42-5/8 (1083)	14 (356)	14 (356)	32-1/4 (819)	16-1/8 (410)	7/8 (22)	6-11/16 (170)	20-7/8 (530)	23-1/2 (597)	5 (127)	5-1/2 (140)	7-3/8 (187)
	"L" FRAME													
256T	16 (406)	46-1/2 (1181)	48-1/4 (1226)	14 (356)	14 (356)	36-1/2 (927)	18-1/4 (464)	7/8 (22)	4-5/16 (110)	20-7/8 (530)	23-1/2 (597)	5 (127)	5-1/2 (140)	7-3/8 (187)
324TS	16 (406)	51-3/4 (1314)	51 (1295)	14 (356)	14 (356)	41-3/4 (1060)	20-7/8 (530)	7/8 (22)	4-5/16 (110)	23-1/8 (587)	23-1/2 (597)	5 (127)	5-1/2 (140)	7-3/8 (187)
326TS	16 (406)	51-3/4 (1314)	52-1/2 (1334)	14 (356)	14 (356)	41-3/4 (1060)	20-7/8 (530)	7/8 (22)	4-5/16 (110)	23-1/8 (587)	23-1/2 (597)	5 (127)	5-1/2 (140)	7-3/8 (187)
364TS	24 (610)	56 (1422)	54-3/8 (1381)	16-1/2 (419)	21-1/2 (546)	44 (1118)	22 (559)	1 (25)	4-15/16 (125)	26-3/4 (679)	26 (660)	6 (152)	5-1/2 (140)	7-3/8 (187)
365TS	24 (610)	56 (1422)	55 (1397)	16-1/2 (419)	21-1/2 (546)	44 (1118)	22 (559)	1 (25)	4-15/16 (125)	26-3/4 (679)	26 (660)	6 (152)	5-1/2 (140)	7-3/8 (187)
404TS	24 (610)	56 (1422)	57-1/4 (1454)	16-1/2 (419)	21-1/2 (546)	44 (1118)	22 (559)	1 (25)	4-15/16 (125)	28-3/8 (721)	26 (660)	6 (152)	5-1/2 (140)	7-3/8 (187)

STUFFING BOX 1510-PF, 1510-S, 1510-D

MOTOR FRAME	HA	HB	HC MAX	HD	2HE	HF_1	HF_2	HH	HL	HM MAX	HO	HP	Y	Z
	"S" FRAME													
184T	16 (406)	42-1/4 (1073)	38-1/2 (978)	14 (356)	14 (356)	32-1/4 (819)	16-1/8 (409)	7/8 (22)	6-11/16 (170)	19-1/4 (489)	23-1/2 (597)	5 (127)	5-1/2 (140)	7-3/8 (187)
213T	16 (406)	42-1/4 (1073)	41 (1041)	14 (356)	14 (356)	32-1/4 (819)	16-1/8 (409)	7/8 (22)	6-11/16 (170)	19-7/8 (505)	23-1/2 (597)	5 (127)	5-1/2 (140)	7-3/8 (187)
215T	16 (406)	42-1/4 (1073)	42-1/2 (1080)	14 (356)	14 (356)	32-1/4 (819)	16-1/8 (409)	7/8 (22)	6-11/16 (170)	19-7/8 (505)	23-1/2 (597)	5 (127)	5-1/2 (140)	7-3/8 (187)
254T	16 (406)	42-1/4 (1073)	46-1/4 (1175)	14 (356)	14 (356)	32-1/4 (819)	16-1/8 (409)	7/8 (22)	6-11/16 (170)	20-7/8 (530)	23-1/2 (597)	5 (127)	5-1/2 (140)	7-3/8 (187)
	"L" FRAME													
256T	16 (406)	51-3/4 (1314)	50-3/4 (1289)	14 (356)	14 (356)	41-3/4 (1060)	20-7/8 (530)	7/8 (22)	4-5/16 (109)	20-7/8 (530)	23-1/2 (597)	5 (127)	5-1/2 (140)	7-3/8 (187)
324TS	16 (406)	51-3/4 (1314)	53-3/8 (1356)	14 (356)	14 (356)	41-3/4 (1060)	20-7/8 (530)	7/8 (22)	4-5/16 (109)	23-1/8 (587)	23-1/2 (597)	5 (127)	5-1/2 (140)	7-3/8 (187)
326TS	16 (406)	51-3/4 (1314)	55 (1397)	14 (356)	14 (356)	41-3/4 (1060)	20-7/8 (530)	7/8 (22)	4-5/16 (109)	23-1/8 (587)	23-1/2 (597)	5 (127)	5-1/2 (140)	7-3/8 (187)
364TS	24 (610)	56 (1422)	56-3/4 (1441)	16-1/2 (419)	21-1/2 (546)	44 (1118)	22 (559)	1 (25)	4-15/16 (125)	26-3/4 (679)	26 (660)	6 (152)	5-1/2 (140)	7-3/8 (187)
365TS	24 (610)	56 (1422)	57-1/2 (1460)	16-1/2 (419)	21-1/2 (546)	44 (1118)	22 (559)	1 (25)	4-15/16 (125)	26-3/4 (679)	26 (660)	6 (152)	5-1/2 (140)	7-3/8 (187)
404TS	24 (610)	56 (1422)	59-3/4 (1518)	16-1/2 (419)	21-1/2 (546)	44 (1118)	22 (559)	1 (25)	4-15/16 (125)	28-3/8 (721)	26 (660)	6 (152)	5-1/2 (140)	7-3/8 (187)

Dimensions are subject to change. Not to be used for construction purposes unless certified.

ITT
8200 N. Austin Avenue
Morton Grove, IL 60053

ITT

SUBMITTAL

B-225I

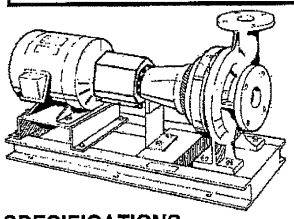
JOB: Liberty Union - Thursten H.S.

REPRESENTATIVE: Steffens-Shultz, Inc.

UNIT TAG: P-3, 4
ENGINEER: W.E. Monks Engineering
CONTRACTOR: Gutridge Plumbing Inc.

ORDER NO.
SUBMITTED BY: Ed Sampson
APPROVED BY:

DATE: 12/9/2009
DATE:
DATE:



3BC
Series 1510
Centrifugal Pumps - Base Mounted

SPECIFICATIONS

FLOW 350 (GPM) HEAD 60 (FT)
HP 10 RPM 1800
VOLTS 208-230/460
CYCLE 60 PHASE 3
ODP Energy Efficient
APPROX. WEIGHT 390
SPECIALS

Note: Equipped with EPDM coupling

MATERIALS OF CONSTRUCTION

☒ BRONZE FITTED ☐ ALL IRON

FEATURES

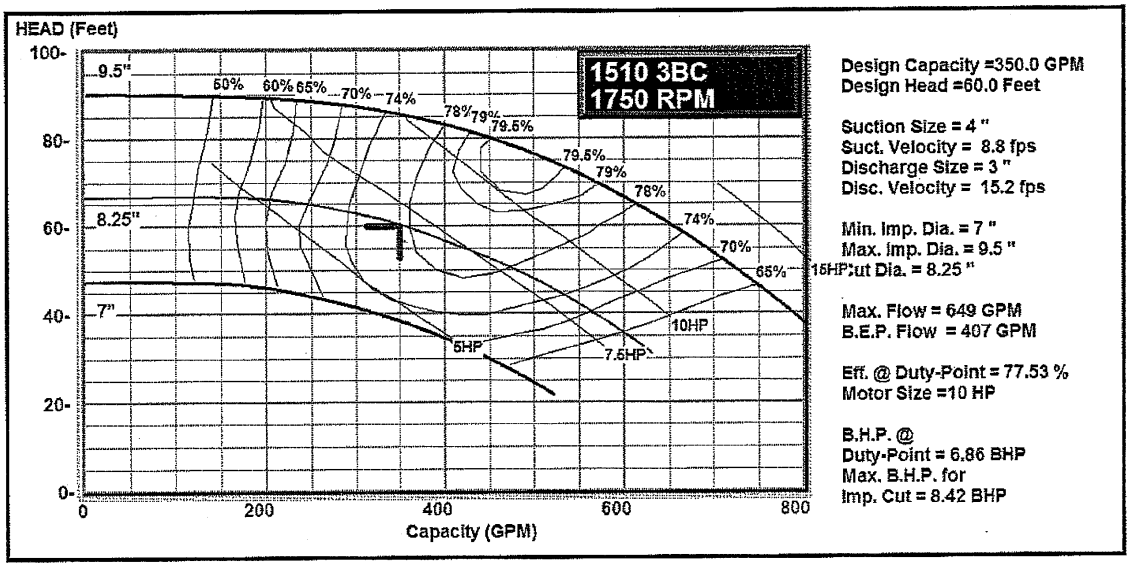
☒ ANSI/OSHA Coupling Guard
☒ Center Drop Out Spacer Coupling
☒ Fabricated Heavy Duty Baseplate

MAXIMUM WORKING PRESSURE

☒ 175 psi (12 bar) W.P.
w/ 125# ANSI flange drilling

TYPE OF SEAL

☒ 1510 Standard Seal
(Buna-Carbon/Ceramic)
☐ 1510 -F Standard Seal w/ Flush Line
(Buna-Carbon/Ceramic)
☐ 1510 -S Stuffing Box construction w/
Flushed Mechanical Single Seal
(EPR-Tungsten Carbide/Carbon)
☐ 1510 -D Stuffing Box construction w/
Flushed Double Mechanical Seal
(EPR-Carbon/Ceramic)
Requires external water source
☐ 1510 -PF Stuffing Box Construction w/
Packing
(Graphite Impregnated Teflon)



Design Capacity =350.0 GPM
Design Head =60.0 Feet

Suction Size = 4 "
Suct. Velocity = 8.8 fps
Discharge Size = 3 "
Disc. Velocity = 15.2 fps

Min. Imp. Dia. = 7 "
Max. Imp. Dia. = 9.5 "
Imp. Cut Dia. = 8.25 "

Max. Flow = 649 GPM
B.E.P. Flow = 407 GPM

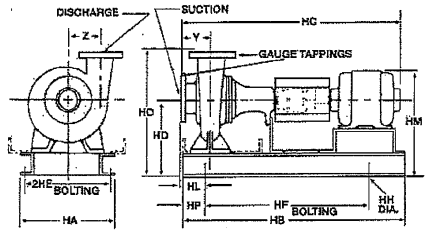
Eff. @ Duty-Point = 77.53 %
Motor Size =10 HP

B.H.P. @
Duty-Point = 6.86 BHP
Max. B.H.P. for
Imp. Cut = 8.42 BHP

Bell & Gossett Submittal: B-225I

Series 1510 3BC Centrifugal Pump Submittal

B-225I



FLANGE DIMENSIONS IN INCHES (MM)			
	SIZE	THICKNESS	O.D.
Discharge	3"	3/4" (25)	7-1/2" (191)
Suction	4"	15/16" (24)	9" (229)

FLANGES ARE 125# ANSI - STANDARD

DIMENSIONS – Inches (mm)

STANDARD SEAL 1510, 1510-F

MOTOR FRAME	HA	HB	HC MAX	HD	2HE	HF_1	HF_2	HH	HL	HM MAX	HO	HP	Y	Z
	"S" FRAME													
182T	14-5/8 (371)	31 (787)	34-7/8 (886)	10-3/4 (273)	12-7/8 (327)	25 (635)	-	3/4 (19)	3-11/16 (94)	16 (406)	18-1/4 (464)	3 (76)	4-3/4 (121)	6-1/8 (156)
184T	14-5/8 (371)	31 (787)	34-7/8 (886)	10-3/4 (273)	12-7/8 (327)	25 (635)	-	3/4 (19)	3-11/16 (94)	16 (406)	18-1/4 (464)	3 (76)	4-3/4 (121)	6-1/8 (156)
213T	14-5/8 (371)	34-5/8 (879)	37-1/2 (953)	10-3/4 (273)	12-7/8 (327)	28-5/8 (727)	-	3/4 (19)	3-11/16 (94)	16-5/8 (422)	18-1/4 (464)	3 (76)	4-3/4 (121)	6-1/8 (156)
215T	14-5/8 (371)	34-5/8 (879)	39 (991)	10-3/4 (273)	12-7/8 (327)	28-5/8 (727)	-	3/4 (19)	3-11/16 (94)	16-5/8 (422)	18-1/4 (464)	3 (76)	4-3/4 (121)	6-1/8 (156)
254T	14-5/8 (371)	39-3/8 (1000)	42-3/4 (1086)	10-3/4 (273)	12-7/8 (327)	33-3/8 (848)	-	3/4 (19)	3-11/16 (94)	17-5/8 (448)	18-1/4 (464)	3 (76)	4-3/4 (121)	6-1/8 (156)
	"L" FRAME													
284TS	16 (406)	46-1/2 (1181)	48-1/8 (1222)	13 (330)	14 (356)	36-1/2 (927)	18-1/4 (464)	7/8 (22)	4-13/16 (122)	21 (533)	20-1/2 (521)	5 (127)	4-3/4 (121)	6-1/8 (156)
286TS	16 (406)	46-1/2 (1181)	49-5/8 (1260)	13 (330)	14 (356)	36-1/2 (927)	18-1/4 (464)	7/8 (22)	4-13/16 (122)	21 (533)	20-1/2 (521)	5 (127)	4-3/4 (121)	6-1/8 (156)
324TS	16 (406)	46-1/2 (1181)	51-1/2 (1308)	12 (305)	14 (356)	36-1/2 (927)	18-1/4 (464)	7/8 (22)	4-13/16 (122)	21 (533)	19-1/2 (495)	5 (127)	4-3/4 (121)	6-1/8 (156)
326TS	16 (406)	46-1/2 (1181)	53 (1346)	12 (305)	14 (356)	36-1/2 (927)	18-1/4 (464)	7/8 (22)	4-13/16 (122)	21 (533)	19-1/2 (495)	5 (127)	4-3/4 (121)	6-1/8 (156)

STUFFING BOX 1510-PF, 1510-S, 1510-D

MOTOR FRAME	HA	HB	HC MAX	HD	2HE	HF_1	HF_2	HH	HL	HM MAX	HO	HP	Y	Z
	"S" FRAME													
182T	14-5/8 (371)	34-5/8 (879)	34-3/4 (959)	10-3/4 (273)	12-7/8 (327)	28-5/8 (727)	-	3/4 (19)	3-11/16 (93)	16 (406)	18-1/4 (464)	3 (76)	4-3/4 (121)	6-1/8 (156)
184T	14-5/8 (371)	34-5/8 (879)	38-1/2 (978)	10-3/4 (273)	12-7/8 (327)	28-5/8 (727)	-	3/4 (19)	3-11/16 (93)	16 (406)	18-1/4 (464)	3 (76)	4-3/4 (121)	6-1/8 (156)
213T	14-5/8 (371)	39-3/8 (1000)	41 (1041)	10-3/4 (273)	12-7/8 (327)	33-3/8 (848)	-	3/4 (19)	3-11/16 (93)	16-5/8 (422)	18-1/4 (464)	3 (76)	4-3/4 (121)	6-1/8 (156)
215T	14-5/8 (371)	39-3/8 (1000)	42-1/2 (1080)	10-3/4 (273)	12-7/8 (327)	33-3/8 (848)	-	3/4 (19)	3-11/16 (93)	16-5/8 (422)	18-1/4 (464)	3 (76)	4-3/4 (121)	6-1/8 (156)
254T	16 (406)	46-1/2 (1181)	46-1/4 (1175)	12 (305)	14 (356)	36-1/2 (927)	18-1/4 (464)	7/8 (22)	4-13/16 (122)	18-7/8 (479)	19-1/2 (495)	5 (127)	4-3/4 (121)	6-1/8 (156)
	"L" FRAME													
284TS	16 (406)	51-3/4 (1314)	50-1/2 (1283)	13 (330)	14 (356)	41-3/4 (1060)	20-7/8 (530)	7/8 (22)	4-13/16 (122)	21 (533)	20-1/2 (521)	5 (127)	4-3/4 (121)	6-1/8 (156)
286TS	16 (406)	51-3/4 (1314)	52 (1321)	13 (330)	14 (356)	41-3/4 (1060)	20-7/8 (530)	7/8 (22)	4-13/16 (122)	21 (533)	20-1/2 (521)	5 (127)	4-3/4 (121)	6-1/8 (156)
324TS	16 (406)	51-3/4 (1314)	54 (1372)	12 (305)	14 (356)	41-3/4 (1060)	20-7/8 (530)	7/8 (22)	4-13/16 (122)	21 (533)	19-1/2 (495)	5 (127)	4-3/4 (121)	6-1/8 (156)
326TS	16 (406)	51-3/4 (1314)	55-1/2 (1410)	12 (305)	14 (356)	41-3/4 (1060)	20-7/8 (530)	7/8 (22)	4-13/16 (122)	21 (533)	19-1/2 (495)	5 (127)	4-3/4 (121)	6-1/8 (156)

Dimensions are subject to change. Not to be used for construction purposes unless certified.
CONSULT FACTORY FOR DIMENSIONS ON PUMPS WITH MOTOR FRAMES 364TS AND ABOVE.

ITT
8200 N. Austin Avenue
Morton Grove, IL 60053

Product Bulletin

ABB drives for HVAC applications
ACH550, 1 to 550 Hp

Power and productivity
for a better world™

ACH550 Product Overview

The ACH550 is an variable frequency AC drive designed specifically for the HVAC market that achieves the ultimate in flexible motor control performance. Offering two modes of motor control: Scalar (V/Hz) and Sensorless Vector, the ACH550 provides accurate speed control for any standard squirrel cage motor.
With drives ranging from 1 to 550 HP, the ACH550 series features an 'intuitively obvious' multi-lingual, graphic display panel that also provides an assistant to aid users in start-up. The control panel can be mounted on the cover of the drive, or remotely, and can upload, store, and download parameters.
The ACH550 comes equipped with an extensive library of preprogrammed HVAC application macros that, at the touch of a button, allow rapid configuration of inputs, outputs, and parameters for specific HVAC applications to maximize convenience and minimize start-up time.

The ACH550 can be used for the simplest to the most demanding HVAC applications. Two internal option slots can be configured with additional relay outputs as well as a host of different communication bus adapters.

The ACH550 has a 110% short term overload rating for one (1) minute out of ten (10) and is capable of >130% short-term overload rating for 2 seconds out of each minute. This provides the torque you need to start high inertia fan(s).

Standard Features

UL, cUL labeled, CE marked, BTL listed (BACnet Testing Lab) & UL Plenum Rated
EMI/RFI Filter (1st Environment, Restricted Distribution)
Seismic Certification in accordance to
IBC 2000 referencing ASCE 7-98 and ICC AC156
IBC 2003 referencing ASCE 7-02 and ICC AC156
IBC 2006 referencing ASCE 7-05 and ICC AC156
Start-Up Assistants
Maintenance Assistants
Diagnostic Assistants
Real Time Clock
Includes Day, Date and Time
Operator Panel Parameter Backup (read/write)
Full Graphic and Multilingual Display
for Operator Control, Parameter Set-Up and Operating Data Display:
- Output Frequency (Hz)
- Speed (RPM)
- Motor Current
- Calculated % Motor Torque
- Calculated Motor Power (kW)
- DC Bus Voltage
- Output Voltage
- Heatsink Temperature
- Elapsed Time Meter (resettable)
- KWh (reset-able)
- Input / Output Terminal Monitor
- PID Actual Value (Feedback) & Error
- Fault Text
- Warning Text
- Three (3) Scalable Process Variable Displays
- User Definable Engineering Units

Two (2) Programmable Analog Inputs
Six (6) Programmable Digital Inputs
Two (2) Programmable Analog Outputs
Up to six (6) Programmable Relay Outputs (Three (3) Standard)
Adjustable Filters on Analog Inputs and Outputs
Mathematical Functions on Analog Reference Signals
All Control Inputs Isolated from Ground and Power
Four (4) Resident Serial Communication Protocols
- Johnson Controls N2
- Siemens Buildings Technologies FLN (P1)
- Modbus RTU
- BACnet (MS/TP)

Input Speed Signals
- Current 0 (4) to 20 mA
- Voltage 0 (2) to 10 VDC
- Increase/Decrease Reference Contacts (Floating Point)
- Serial Communications

Start/Stop
- 2 Wire (Dry Contact Closure)
- 3 Wire (Momentary Contact)
- Application of Input Power
- Application of Reference Signal (PID Sleep/Wake-Up)
- Serial Communications

Start Functions
- Ramp
- Flying Start
- Premagnetization (DC brake) on Start
- Automatic Torque Boost
- Automatic Torque Boost with Flying Start

Standard Features

- Auto Restart (Reset) – Customer Selectable and Adjustable
- Stop Functions
  - Ramp or Coast to Stop
  - Emergency Stop
  - DC Braking / Hold at Stop
  - Flux Braking
- Accel/Decel
  - Two (2) sets of Independently Adjustable Ramps
  - Linear or Adjustable 'S' Curve Accel/Decel Ramps
- HVAC Specific Application Macros
- Separate Safeties (2) and Run Permissive Inputs
- Damper Control
- Override Input (Fire Mode)
- Timer Functions
  - Four (4) Daily Start/Stop Time Periods
  - Four (4) Weekly Start/Stop Time Periods
  - Four Timers for Collecting Time Periods and Overrides
  - Seven (7) Preset Speeds
- Supervision Functions
- Adjustable Current Limit
- Electronic Reverse
- Automatic Extended Power Loss Ride Through (Selectable)
- Programmable Maximum Frequency to 500 Hz
- PID Control
  - Two (2) Integral Independent Programmable PID Setpoint Controllers (Process and External)
  - External Selection between Two (2) Sets of Process PID Controller Parameters
  - PID Sleep/Wake-Up
- Motor Control Features
  - Scalar (V/Hz) and Vector Modes of Motor Control
  - V/Hz Shapes
  - Linear
  - Squared
  - Energy Optimization
  - IR Compensation
  - Slip Compensation
  - Three (3) Critical Frequency Lockout Bands
- Preprogrammed Protection Circuits
  - Overcurrent
  - Short Circuit
  - Ground Fault
  - Overvoltage
  - Undervoltage
  - Input Phase Loss
  - Output Device (IGBT) Overtemperature
  - Adjustable Current Limit Regulator
  - UL508C approved Electronic Motor Overload (I2T)
- Programmable Fault Functions for Protection Include
  - Loss of Analog Input
  - Panel Loss
  - External Fault
  - Motor Thermal Protection
  - Stall
  - Underload
  - Motor Phase Loss
  - Ground Fault
- 5% Equivalent Impedance
- 5% Equivalent Impedance with Internal Reactor(s)
- Patented Swinging Choke Design for Superior Harmonic Mitigation in frame sizes (R1 to R6)
  - 3% Equivalent Impedance for frame R8

Available Options

- 3 Relay Extension Module (OREL-01)
- 115/230 V Digital input Interface Card (OHDI-01)
- Fieldbus Adapter Modules
  - LonWorks
  - Profibus
  - DeviceNet
  - Ethernet
  - ControlNet
  - BACnet IP to MS/TP router
- DriveWindow Light Start-up, Operation, Programming and Diagnostic Tool

Specifications

Input Connection

Input Voltage (U1)	208/220/230/240 VAC 3-phase +/-10% 208/220/230/240 VAC 1-phase +/-10% 380/400/415/440/460/480 VAC 3-phase +/-10% 500/575/600 VAC 3-phase +/- 10%
Frequency:	48 - 63 Hz
Line Limitations:	Max +/-3% of nominal phase to phase input voltage
Fundamental Power Factor (cosj):	0.98 at nominal load
Connection:	U1, V1, W1 (U1, V1, 1-phase)

Output (Motor) Connection

Output Voltage:	0 to U1, 3-phase symmetrical, U2 at the field weakening point
Output Frequency:	-500 to 500 Hz
Frequency Resolution:	0.01 Hz
Continuous Output Current:	
Variable Torque:	1.0 * I2N (Nominal rated output current, Variable Torque)
Short Term Overload Capacity:	
Variable Torque:	1.1 * I2N, (1 min/10 min)
Peak Overload Capacity:	
Variable Torque:	1.35 * I2N, (2 sec/1 min)
Base Motor Frequency Range:	10 to 500 Hz
Switching Frequency:	1, 4, 8 or 12 kHz
Acceleration Time:	0.1 to 1800 s
Deceleration Time:	0.1 to 1800 s
Efficiency:	0.98 at nominal power level
Short Circuit Withstand Rating:	100,000 AIC (UL) w/o fuses
Connection:	U2, V2, W2
Enclosure Style:	UL (NEMA) Type 1, Type 12, or Type 3R
Agency Approval Listing and Compliance:	UL, cUL, CE, BTL (BACnet Testing Laboratory), IBC2000, 2003, 2006

Ambient Conditions, Operation

Air Temperature:	-15° to 40°C (5° to 104°F), above 40°C the maximum output current is de-rated 1% for every additional 1°C (up to 50°C (122°F) maximum limit.
Relative Humidity:	5 to 95%, no condensation allowed, maximum relative humidity is 60% in the presence of corrosive gasses
Contamination Levels:	
IEC:	60721-3-1, 60721-3-2 and 60721-3-3
Chemical Gasses:	3C1 and 3C2
Solid Particles:	3S2
Installation Site Altitude:	0 to 1000 m (3300 ft) above sea level. At sites over 1000 m (3300 ft) above sea level, the maximum power is de-rated 1% for every additional 100 m (330 ft). If the installation site is higher than 2000 m (6600 ft) above sea level, please contact your local ABB distributor or representative for further information
Vibration:	Max 3.0 mm (0.12 in) 2 to 9 Hz, Max 10 m/s2 (33 ft/s2) 9 to 200 Hz sinusoidal Seismic Certified referencing IBC 2000, 2003 and 2006

Ambient Conditions, Storage (in Protective Shipping Package)

Air Temperature:	-40° to 70°C (-40° to 158°F)
Relative Humidity:	Less than 95%, no condensation allowed
Vibration:	In accordance with ISTA 1A and 1B specifications
Shock (IEC 60086-2-29):	Max 100 m/s2 (330 ft/s2) 11 ms

Ambient Conditions, Transportation (in Protective Shipping Package)

Air Temperature:	-40° to 70°C (-40° to 158°F)
Relative Humidity:	Less than 95%, no condensation allowed
Atmospheric Pressure:	60 to 106 kPa (8.7 to 15.4 PSI)
Vibration:	Max 3.5 mm (0.14 in) 2 to 9 Hz, Max 15 m/s2 (49 ft/s2) 9 to 200 Hz sinusoidal
Shock (IEC 60086-2-29):	Max 100 m/s2 (330 ft/s2) 11 ms
Free Fall:	R1: 76 cm (30 in) R2: 61 cm (24 in) R3: 46 cm (18 in) R4 31 cm (12 in) R5 & 6: 25 cm (10 in)

Cooling Information

Cooling Method:	Integral fan(s)
Power Loss:	Approximately 3% of rated power

Specifications

Analog Inputs

Quantity..... Two (2) programmable
Voltage Reference: ..... 0 (2) to 10 V, 250kOhm, single ended
Current Reference: ..... 0 (4) to 20 mA, 100Ohm, single ended
Potentiometer:..... 10 VDC, 10 mA (1K to 10KOhms)
Input Updating Time ..... 8 ms
Terminal Block Size..... 2.3mm2 / 14AWG

Reference Power Supply

Reference Voltage ..... +10 VDC, 1% at 25°C (77°F)
Maximum Load ..... 10 mA
Applicable Potentiometer..... 1 kOhm to 10 kOhm
Terminal Block Size..... 2.3mm2 / 14AWG

Analog Outputs

Quantity..... Two (2) programmable current outputs
Signal Level ..... 0 (4) to 20 mA
Accuracy ..... +/- 1% full scale range at 25°C (77°F)
Maximum Load Impedance ..... 500 Ohms
Output Updating Time ..... 2 ms
Terminal Block Size..... 2.3mm2 / 14AWG

Digital Inputs

Quantity..... Six (6) programmable digital inputs
Isolation..... Isolated as one group
Signal Level ..... 24 VDC, (10V Logic 0)
Input Current ..... 15 mA at 24 VDC
Input Updating Time: ..... 4 ms
Terminal Block Size..... 2.3mm2 / 14AWG

Internal Power Supply

Primary Use..... Internal supply for digital inputs
Voltage: ..... +24 VDC, max 250 mA
Maximum Current:..... 250 mA
Protection:..... Short circuit protected

Relay Outputs

Quantity..... Three (3) programmable relay (Form C) outputs
Switching Capacity:..... 8 A at 24 VDC or 250 VAC, 0.4 A at 120 VDC
Max Continuous Current:..... 2A RMS
Contact Material: ..... Silver Cadmium Oxide (AgCdO)
Isolation Test Voltage ..... 4 kVAC, 1 minute
Output Updating Time ..... 12 ms
Terminal Block Size..... 2.3mm2 / 14AWG

Protections

Single Phase ..... Protected (input & output)
Overcurrent Trip Limit:..... 3.5 x I2N instantaneous
Adjustable Current Regulation Limit: ..... 1.3 x I2N (RMS) max.
Overvoltage Trip Limit: ..... 1.30 x UN
Undervoltage Trip Limit: ..... 0.65 x UN
Overtemperature (Heatsink): ..... +115°C (+239°F)
Auxiliary Voltage:..... Short Circuit Protected
Ground Fault: ..... Protected
Short Circuit: ..... Protected
Microprocessor fault:..... Protected
Motor Stall Protection:..... Protected
Motor Overtemperature Protection (I2t):..... Protected
Input Power Loss of Phase:..... Protected
Loss of Reference:..... Protected
Short Circuit Current Rating:..... 100,000 RMS symmetrical Amperes
Input Line Impedance:..... 5% Equivalent Input Impedance with internal reactor(s)
Patented swinging choke design for superior harmonic mitigation in frame sizes R1-R6
Printed Circuit Boards..... Conformal coated

Notes

U1 = Input Voltage
U2 = Output Voltage
UN = Nominal Motor Voltage
fN = Nominal Motor Frequency
PN = Power – Normal Duty (HP)
2N = Nominal Motor Current Normal Duty

E-Clipse Bypass Product Options

ACH550 Drive Pack

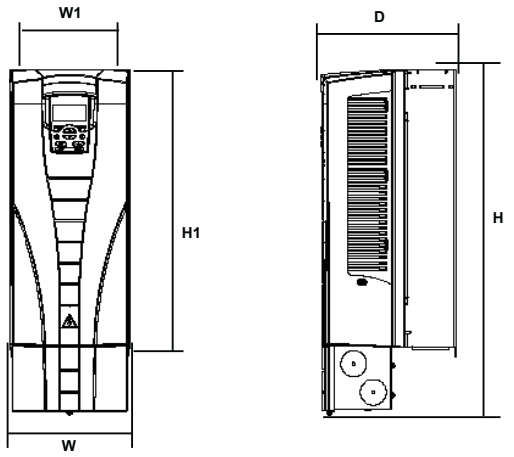
Introduction

The ACH550 Drive Pack is an ACH550 Drive packaged with an input disconnect device.

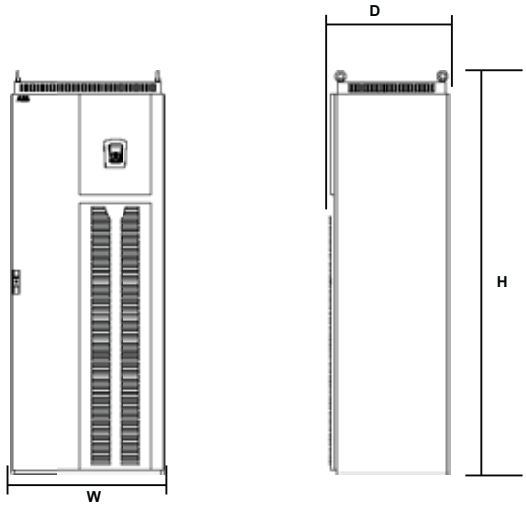
Enclosures and Horsepower Ranges

- **Available Enclosure Types**
  - UL Type 1 (NEMA 1)
  - UL Type 12 (NEMA 12)
  - UL Type 3R (NEMA 3R)
- **Wall mounted enclosures:**
  - 208/230V models: 1 to 100 HP
  - 480V models: 1 to 200 HP
  - 600V models: 2 to 150 HP
- **Floor mounted enclosures:**
  - 480V models: 250 to 550 HP
- **Door**
  - Door-mounted operator (padlockable in the OFF position)
  - Cover/door-mounted ACH550 Operator Panel
- **Available Input Disconnect Device**
  - Disconnect switch and fuses
  - Circuit breaker
- **Other semi-custom options include:**
  - 12 or 18 pulse rectifiers
  - Passive harmonic filters
  - Out put filters

Dimensions: ACH550-UH UL Type 1 / NEMA 1 R1 through R8 Frame Size



Wall Mount (UH1-1 - UH1-6)



Floor Mount (UH1-8)

Dimension Reference	UL Type 1 / NEMA 1 Mounting Dimensions mm [inches]			UL Type 1 / NEMA 1 Dimensions and Weights mm [inches] kg [lbs]				
	H1	W1	Mounting Hardware	Height (H)	Width (W)	Depth (D)	Weight	Dimension Drawing
UH1-1	318 [12.5]	98 [3.9]	M5 [#10]	369 [14.5]	125 [4.9]	212 [8.3]	6.5 [14]	3AUA0000001559 Sheet 1
UH1-2	418 [16.4]	98 [3.9]	M5 [#10]	469 [18.5]	125 [4.9]	222 [8.7]	9 [20]	3AUA0000001560 Sheet 1
UH1-3	473 [18.6]	160 [6.3]	M5 [#10]	583 [23]	203 [8]	231 [9.1]	16 [35]	3AUA0000001571 Sheet 1
UH1-4	578 [22.8]	160 [6.3]	M5 [#10]	689 [27.1]	203 [8]	262 [10.3]	24 [53]	3AUA0000001572 Sheet 1
UH1-5	588 [23.1]	238 [9.4]	M6 [0.25]	736 [29]	267 [10.5]	286 [11.2]	34 [75]	3AUA0000004629 Sheet 1
UH1-6	675 [26.6]	263 [10.3]	M6 [0.25]	881 [34.7]	302 [11.9]	400 [15.7]	69 [152]	3AUA0000004633 Sheet 1
UH1-8	Free Standing		Ø16 [Ø0.63]	2125 [83.7]	806 [31.7]	639 [25.2]	354 [780]	3AUA0000021150 Sheet 1

Drawing is not for engineering purposes.

A larger conduit box provided on units with ratings above 200 amps extends the Height (H) dimension an additional 107 mm [4.2 inches].

Drawing is not for engineering purposes.

This foregoing document was electronically filed with the Public Utilities

Commission of Ohio Docketing Information System on

1/16/2013 2:14:39 PM

in

Case No(s). 13-0186-EL-EEC

Summary: Application of Liberty Union Local Schools and Ohio Power Company for approval of a special arrangement agreement with a mercantile customer electronically filed by Mr. Yazen Alami on behalf of Ohio Power Company