



Legal Department

American Electric Power
1 Riverside Plaza
Columbus, OH 43215-2373
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March 25, 2014

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)
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yalami@aep.com

Re: **In the Matter of the Application of**)
Lima Refining Company)
and Ohio Power Company) **Case No. 14-0465-EL-EEC**
for Approval of a Special Arrangement)
Agreement with a Mercantile Customer)

Dear Chairman Snitchler,

Attached please find the Joint Application of Ohio Power Company (OPCo) and mercantile customer Lima Refining Company 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 2014.

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



Case No.: 14-0465-EL-EEC

Mercantile Customer: LIMA REFINING CO

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: LIMA REFINING CO

Principal address: 1150 S. Metcalf St., Lima, Oh 45804

Address of facility for which this energy efficiency program applies: 1150 S Metcalf St, Lima, Oh 45804-1145

Name and telephone number for responses to questions:

Justin Schroeder, Lima Refining Co, (419) 226-1278

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 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): 6/30/2010
- ☐ Installation of new equipment for new construction or facility expansion. The customer installed new equipment on the following date(s):
- ☐ 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:

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

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

Annual savings: 44,640 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.

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

- 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:

Annual savings: kWh

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

- 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 (check the one that 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):

$$\text{Unit Quantity (watts)} = \text{Existing (watts x units)} - \text{Installed (watts x units)}$$

$$\text{KW Demand Reduction} = \frac{\text{Unit Quantity (watts)}}{\text{(watts)}} \times \text{(Deemed KW/Unit)}$$

5.0 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 we are seeking is:

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

☒ A cash rebate of \$ 2,700.00. (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: 5.0 (Skip to Subsection 2.)

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

The TRC value of the program is calculated by dividing the value of our avoided supply costs (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 \$ 14,925.11

The utility's program costs were \$ 267.84

The utility's incentive costs/rebate costs were \$ 2,700.00.

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

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

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

- 3) a description of coordination requirements between 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.



Public Utilities Commission

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

Case No.: 14-0465-EL-EEC

State of Ohio :

Brian Lacey, 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.

Brian Lacey
Signature of Affiant & Title

Energy Efficiency Engineer

Sworn and subscribed before me this 24th day of March, 2014 Month/Year

Brenda Walke
Signature of official administering oath

Brenda Walke, Notary
Print Name and Title

My commission expires on 01-16-2018



Brenda Walke
Notary Public, State of Ohio
My Commission Expires 01-16-2018



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	LIMA REFINING CO	
Project Number	AEP-13-12154	
Customer Premise Address	1150 S METCALF ST, LIMA, OH 45804-1145	
Customer Mailing Address	1150 S. Metcalf St., Lima, OH 45804	
Date Received	12/23/2013	
Project Installation Date	6/30/2010	
Annual kWh Reduction	44,640	
Total Project Cost	\$8,553.82	
Unadjusted Energy Efficiency Credit (EEC) Calculation	\$3,600.00	
Simple Payback (yrs)	4.5	
Utility Cost Test (UCT) for EEC	5.03	
Utility Cost Test (UCT) for Exemption	N/A	
<i>Please Choose One Option Below and Initial</i>		
Self Direct EEC: 75%	\$2,700.00	<input checked="" type="checkbox"/> Initial: <i>PMC</i>
EE/PDR Rider Exemption	0 Months (After PUCO Approval)	<input type="checkbox"/> Initial:

Note: This is a one time selection. By selecting EEC, the customer will receive payment in the amount stated above. Selection of 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 EE/PDR rider exemption is subject to ongoing review for compliance and could be changed by the PUCO.

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

___ YES ___ NO

Note: Exemptions for periods beyond 24 months are subject to look-back or true-up adjustments every year to ensure that the exemption accurately reflects the EEDR savings. Applicants must file for renewal for any exemption beyond 12 months.

Project Overview:

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

Added a VFD to a 60 HP process pump motor.

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

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

Ohio Power Company

By: *John F. Williams*

Title: Manager

Date: 3/24/2014

LIMA REFINING CO

By: Patrick Conrath

Title: U.S. Refining-Bus Dev Director

Date: 3/13/14

Self-Direct Program Application

ENERGY IS PRECIOUS. LET'S NOT WASTE IT.



STEPS FOR SUBMITTING YOUR APPLICATION

Step 1: Verify Project, Equipment and Customer Eligibility

- ✓ Project must be a facility improvement that produces a permanent reduction in electrical energy usage (kWh).
- ✓ Facilities must be AEP electric customers that are considered "mercantile" under the definition of the Public Utilities Commission of Ohio (PUCO).
- ✓ Projects must operate at least 2,245 hours per year to qualify for credits. Projects with annual energy (kWh) savings greater than the facility's annual energy (kWh) consumption are not eligible.
- ✓ All installed equipment must meet or exceed the specifications outlined in the application.
- ✓ Equipment must be installed in facilities served by AEP Ohio.
- ✓ Customer must have a valid AEP Ohio account number on an eligible AEP Ohio non-residential account or approved agricultural account.

Step 2: Submit Application

- ✓ Complete the Checklist page.
- ✓ Read the Terms and Conditions.
- ✓ Attach the documentation listed:
 - Completed Applicant Information form
 - Completed and signed Customer Agreement form
 - Measure worksheet(s)
 - 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
 - Specifications for all equipment installed showing that it meets program specifications
- ✓ Submit a completed application via email, fax or mail prior to November 15, 2013, for any projects completed on or after January 1, 2010. Any applications received after the deadline may not be submitted to the Public Utilities Commission of Ohio (PUCO) by December 31, 2013, which may jeopardize approval.

Step 3: Project Review

- ✓ The program team will review your application. The review of some projects will require an inspection; the team will contact applicants requiring an inspection for scheduling.
- ✓ After approval by AEP Ohio, the customer will receive an Overview and Commitment form to sign and return. The project will then be submitted to the PUCO for consideration. The PUCO will assign a case number and review the project details prepared by AEP Ohio. The PUCO may request additional information, or approve or reject the energy efficiency credits.

Step 4: Receive Energy Efficiency Credits

- ✓ The program team will issue energy efficiency credits four to six weeks after the PUCO approves a project.
- ✓ 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 in this application. For this exemption, the energy efficiency credit amount (Option 1) is compared to the estimated value of the 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 affected 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, again be 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 also are 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 AEP Ohio programs. However, during that period of time, you are not 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 also can qualify for credits under the prescriptive or custom programs.

AEP Ohio Business Incentives Program

2740 Airport Drive, Suite 160

Columbus, OH 43219

Phone: (877) 607-0739

Fax: (877) 607-0740

aepohioincentives@dnvkema.com

Visit our website at aepohio.com/incentives.

Self-Direct Program Application

ENERGY IS PRECIOUS. LET'S NOT WASTE IT.



CHECKLIST

FINAL APPLICATION

Required Attachments

- ☐ Completed and signed Applicant Information form
- ☐ Completed Final Payment Agreement form including Energy Efficiency Credits Requested section
- ☐ Itemized invoices
- ☐ Equipment specifications
- ☐ Scope of work
- ☐ W-9 (LLC, individual, partnership, property management companies)

Credit Worksheets¹

- ☐ Lighting
- ☐ HVAC
- ☐ Motors & Drives
- ☐ Compressed Air
- ☐ Refrigeration/Food Service
- ☐ Agriculture & Miscellaneous
- ☐ Transformer
- ☐ UPS
- ☐ Custom
- ☐ New Construction Lighting

Application date _____

Estimated project cost _____

Expected completion date _____

¹Incomplete applications will delay processing and receipt of energy efficiency credits.

Revised Submittal

Please complete below if this is a revised submittal.

Submittal date _____ AEP Project Number (if known) AEP - 1 ____ - ____ - ____ - ____

AEP Ohio Business Incentives Program

2740 Airport Drive, Suite 160

Columbus, OH 43219

Phone: (877) 607-0739

Fax: (877) 607-0740

aepohioincentives@dnvkema.com

Visit our website at aepohio.com/incentives.

TERMS AND CONDITIONS

AEP Ohio offers prescriptive and custom credits under the AEP Ohio Business Incentives Program to facilitate the implementation of past cost-effective energy efficiency improvements for non-residential 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. EEC 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.

Program Effective Dates

AEP Ohio Business Incentives Program offers credits until approved funds are exhausted or November 15, 2013, whichever comes first. The effective dates of the current AEP Ohio Business Incentives Program and application submittal requirements are as follows:

- Self-direct projects are projects completed since January 1, 2010. Self-direct projects are eligible to apply for EEC with this application. Current or future projects should apply using a prescriptive or custom application.
- All 2013 AEP Ohio Business Incentives Program applications should be received no later than November 15, 2013. Any applications received after the deadline may not be submitted to the Public Utility Commission of Ohio (PUCO) by December 31, 2013, which may jeopardize approval. AEP Ohio reserves the right to extend or shorten this timeline.

Program and Project Eligibility

The AEP Ohio Business Incentives Program offers both prescriptive credits for some of the more-common energy efficiency measures and custom credits for other eligible improvements not included on the list of prescriptive measures. Credits available under the AEP Ohio Business Incentives Program include non-residential accounts or approved agricultural 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. Credits are available to all non-residential accounts or approved agricultural accounts that pay into the EE/PDR rider and receive their electricity over AEP Ohio wires, regardless from which retail electric supplier the customer has chosen to purchase power. A customer may neither apply for nor receive credits for the same product, equipment or service from more than one utility.

Custom projects must involve measures that 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 credit payment generally should fall between 1 to 7 years, or pass cost-effectiveness test(s) determined by AEP Ohio to qualify for a credit.

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 credit for whole building integrated projects or systems, even if they include prescriptive measures. Prescriptive elements may be capped at the deemed savings and/or credit level.

The self-direct program applies to customer facilities served by AEP Ohio's retail electric rates that are defined as "mercantile" and meet the minimum energy usage requirements of 700,000 kWh per year, or that are part of a national account involving multiple facilities in one or more states.

Facilities must be eligible under the definition of "mercantile" as designated by the PUCO. All applications are subject to review and approval by AEP Ohio, its contractor(s)/agent(s) and the PUCO prior to any EEC payments or exemptions from the EE/PDR rider in this program.

Project requirements under the AEP Ohio Business Incentives Program include the following:

- Projects must involve a new facility improvement with capital improvements that results in a permanent reduction in electrical energy usage (kWh). Existing/old equipment must be functional and in operation.
- 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 credit funds to AEP Ohio.
- All equipment must be new.
- All installed equipment must meet state, federal and local codes and requirements.
- Projects must be installed on the AEP Ohio electric account in Ohio served by an eligible electric rate.
- Equipment must be purchased, installed and operating (or capable of operating in the case of seasonal uses) prior to submitting an application for a credit.

Self-Direct Program Application

ENERGY IS PRECIOUS. LET'S NOT WASTE IT.



TERMS AND CONDITIONS

- AEP Ohio will issue credit payments in the form of checks, not utility bill credits.
- The credit 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 credit or incentive.

Confidential information contained in any documents associated with this application will be protected from public filings. However, this information may be disclosed to the PUCO for further review and approval.

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 (Please visit aepohio.com/incentives for Retro-Commissioning Program or Continuous Improvement Program)
- 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)
- Used or rebuilt equipment
- Costs associated with internal labor
- Renewables (Please visit aepohio.com/save for Renewables Program)
- Projects required by state or federal law, building or other codes, or projects that are standard industry practice
- Projects easily reverted/removed or projects installed entirely for reasons other than improving energy efficiency
- Other conditions to be determined by AEP Ohio

Energy Efficiency Credit Limits

For both prescriptive and custom measures in this application, **total EEC 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). In calculating the savings and EEC for custom measures, please contact the AEP Ohio Business Incentives Program office to determine an appropriate baseline for savings. In addition to the above project cost limit, credit payment rates vary when a customer's calculated credit exceeds the tiers listed below:

PROGRAM ENERGY EFFICIENCY CREDITS	
Energy efficiency credit 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 one and seven years
Maximum payout	75% of 50% of the total cost (additional measure caps may apply)
Energy efficiency credit levels for projects completed since 1/1/2010	Calculated amount on the prescriptive or custom worksheets attached and subject to funding limits
Credit limit	See Credit 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. Lastly, 75% factor is applied to credit.

Energy Efficiency Credit Tiering

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 Review Process

Applications are not a guarantee of program acceptance and energy efficiency credits. 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 completed application and determines that the project meets the program eligibility requirements. Upon review of the application, the program will notify applicants who submit incomplete applications of deficiencies; applicants may lose their place in the review process until receipt of all requested information. Applications must be completed and all information received by the deadlines defined above to begin processing. Applicants are encouraged to call the program hotline with any questions about documentation requirements.

TERMS AND CONDITIONS

Application

Projects completed on or after Jan 1, 2010, must submit an application and all required supporting documentation by November 15, 2013, to be applicable for the 2013 program year. Any applications received after the deadline may not be submitted to the PUCO by December 31, 2013, and could jeopardize approval.

A signed application with supporting project documentation verifying project installation and capital improvements must be submitted to AEP Ohio prior to application approval. Project documentation, such as (but not limited to) copies of dated invoices for the purchase and installation of the measures, equipment specification sheets, energy-savings analysis, complete application and W-9 forms (LLC, individual, partnership, property management companies), is required. The invoice should provide sufficient detail to separate the project cost from the costs of other services not related to the energy efficiency project and other repairs. The location or business name on the invoice must be consistent with the application information.

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 may be disclosed to the PUCO and the evaluators. Requested information could include equipment purchase dates, installation dates, proof that the equipment is operational, manufacturer specifications, savings calculation documentation, monitoring data, warranty information and proof of customer co-payment.

Inspections

The AEP Ohio Business Incentives Program 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 analysis. 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 credit payment by AEP Ohio. In the event a building(s) are turned over to a new account holder/owner before AEP Ohio officially measures and verifies incentivized equipment, AEP Ohio reserves the right to do so under new ownership. Customer understands and agrees that program installations may also be subject to inspections by the PUCO or its designee, and photographs of installation may be required.

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 equipment is replaced prior to the end of its rated service life in order to achieve energy savings, the existing equipment performance may be used as the baseline in the energy-savings calculations. Documentation of early replacement decision and/or actual equipment energy usage will be required. If equipment is replaced due to failure or for other reasons (such as obsolescence or a need for more capacity), the baseline performance used in the savings calculation should be either the minimum performance that would be required by code for that equipment type and application (where a code applies) or the performance of the equipment that would have been selected as the customer's standard practice when a code does not apply.

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 its 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 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 pre-existing consumption may also be required.

For custom and "as found" projects, the applicant is required to provide information in order to allow AEP Ohio to verify the baseline usage of the pre-existing equipment. AEP Ohio may need to conduct inspections of projects to verify equipment and operating conditions.

TERMS AND CONDITIONS

Customers are encouraged to submit projects that warrant special treatment (i.e., non-typical projects) to be considered on a case-by-case basis by AEP Ohio.

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 credit. A W-9 (for LLC, individual, partnership, property management companies) must be provided with all applications.

Disclaimer

Any and all energy savings and coincident demand generated by the project described in this application are hereby committed to AEP Ohio. That retained demand can be used to count against AEP Ohio's benchmark requirements in S.B. 221, regardless; any retained demand provided to PJM generation auctions must be done so by AEP Ohio only.

Peak-demand reduction is defined as the reduction in average load over the performance hours as a result of replacing existing electrical equipment with more-efficient electrical equipment. Peak performance hours are defined as the time between June 1 and August 31 on weekdays and non-holidays, between the hours 3:00 p.m. and 6:00 p.m. Eastern Standard Time. PJM Peak Hours are defined as the time between June 1 and August 31 on weekdays and non-holidays, between the hours 2:00 p.m. and 6:00 p.m. Eastern Standard Time.

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.

Self-Direct Program Application

ENERGY IS PRECIOUS. LET'S NOT WASTE IT.



APPLICANT INFORMATION

Important: Please read the Terms and Conditions before signing and submitting this application. Complete all information and provide required documentation to avoid processing delays.

Project Information

Business Type

(Select One) _____

W-9 Tax Status

(Select One) _____

How Did You Hear About the Program?

(Select One) _____

Shift

(Select One) _____

Affected Area Square Footage

Dodge Report Number

Building Operating Hours

Equipment Operating Hours

Name of Applicant's Business _____

Project Name (if applicable) _____ Name as It Appears on Utility Bill _____

AEP Ohio Account Number Where Measure Installed _____ Taxpayer ID (SSN/FEIN) _____

Mailing Address _____ City _____ State ^{OH} Zip _____

☐ Check if mailing address and installation address are the same.

Installation Address _____ City _____ State ^{OH} Zip _____

Customer Contact

Please provide all contacts we may need to process this project. List the project decision-maker, the technical contact, etc. as the contractor contact.

Name of Contact (preferred contact for documentation) _____

Title of Contact _____ Phone # _____ Ext. _____

Contact Fax # _____ Contact Email _____

Solution Provider/Contractor Information¹

Name of Contracting Company _____

Name of Contact Person _____ Title of Contact _____

Mailing Address _____ City _____ State ^{OH} Zip _____

Phone # _____ Ext. _____ Contact Fax # _____ Contact Email _____

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

¹Solution provider/contractor is the party involved in the application submittal (i.e., specs, scope of work, etc.).

FINAL PAYMENT AGREEMENT

Final Payment Agreement

I understand that the application and all required documentation should be received by the AEP Ohio Business Incentives Program by November 15, 2013, for any projects completed on or after January 1, 2010. Any applications received after the deadline may not be submitted to the PUCO by December 31, 2013, and could jeopardize approval of any credit by the PUCO. All equipment must be purchased, installed and fully operational prior to submitting the application.

I understand that AEP Ohio or its representatives have the right to ask for additional information at any time. AEP Ohio Business Incentives Program will make the final determination of credit levels for this project.

I understand that this project must involve a facility improvement that results in improved energy efficiency.

As an eligible AEP Ohio account holder, I certify that decisions to acquire and install the indicated energy efficiency measures, which will be demonstrated with supporting documentation required by AEP Ohio, were made after January 1, 2010, and that work was completed on this project on or after January 1, 2010. The energy efficiency measures are for use in my business facility and not for resale.

I understand that the location and business name on the project documentation must be consistent with the application information. Project documentation, product specification sheets and details of measure installation are included. Documentation indicating contract dates prior to November 16, 2012, may render this application ineligible. I understand that all submissions become the property of AEP Ohio. It is recommended to keep a copy for your records.

I agree that if: (1) I did not install the related product(s) identified in my application or (2) I remove the related product(s) identified in my application before a period of five (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 the related product(s) were installed and operating. This is necessary to assure that the project's related energy benefits will be achieved. (3) 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 its representatives have the right to ask for additional information at any time. AEP Ohio Business Incentives Program will make the final determination of energy efficiency credit levels for this project.

I agree to be responsible to comply with any applicable codes

or ordinances. 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 epa.gov/epawaste/hazard/index.htm.

I agree to verification by the utility or its representatives of both sales transactions and equipment installation. I understand that these credits are available to all non-residential accounts or approved agricultural accounts that 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 understand that 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.

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. Furthermore, 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.

I understand that the program has a limited budget. Applications will be processed until allocated funds are reserved or spent. Final Applications should be received by November 15, 2013, to be eligible for funding under the current program period.

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 understand that credits exceeding \$600 will be reported to the IRS, unless the applicant is exempt. I understand that credits assume related energy benefits over a period of five (5) years or for the life of the product, whichever is less.

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

I understand and agree that all other terms and conditions as specified in the application, including all attachments and exhibits

FINAL PAYMENT AGREEMENT

attached to this application, will serve as a contract for the customer's commitment of energy and demand resources to AEP Ohio and shall apply.

Any and all energy savings and coincident demand generated by the project described in this application are hereby committed to AEP Ohio. That retained demand can be used to count against AEP Ohio's benchmark requirements in S.B. 221, regardless; any retained demand provided to PJM generation auctions must be done so by AEP Ohio only.

Self-Direct Program Application

ENERGY IS PRECIOUS. LET'S NOT WASTE IT.



CUSTOMER AGREEMENT

- ☐ I have read and understand the program requirements, 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 email or fax 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.

Digital Signature Instructions

1. Click in the signature box.
2. Follow the digital signature directions displayed in the "Add Digital ID" pop-up box.
3. Establish a digital ID and password.
4. In the "Sign Document" pop-up box, you can select to change the signature appearance from typed font to an imported graphic.
5. Follow directions to save signed application; signature and verification information will appear in the signature box.

Total Project Cost

Customer Signature (AEP Ohio Customer)

Date

03/08/13

Total Credits Requested¹

Print Name

Project Completion Date

SUBMIT VIA EMAIL

PRINT APPLICATION

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

Technical Data



Allen-Bradley

APPROVED

PowerFlex 700 Adjustable Frequency AC Drive



Topic	Page
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LISTEN.
THINK.
SOLVE.

Additional Resources

These documents contain additional information concerning related products from Rockwell Automation.

Resource	Description
PowerFlex 700 Adjustable Frequency AC Drive Installation Instructions – Frames 0...6, publication 20B-IN0019	Provides detailed information about installation and start-up.
PowerFlex 700 Adjustable Frequency AC Drive Installation Instructions – Frames 7...10, publication 20B-IN0014	
PowerFlex 700 Standard Control User Manual, publication 20B-UM001	Provides detailed information on: • Parameters and programming • Faults, alarms, and troubleshooting
PowerFlex 700 Vector Control User Manual (v4.001 & up), publication 20B-UM002	
PowerFlex 70 and PowerFlex 700 Reference Manual, publication PFLEX-RM001	These publications provide detailed application specific information for programming and configuring the PowerFlex 700 drive.
PowerFlex 70 Enhanced Control and PowerFlex 700 Vector Control Reference Manual, publication PFLEX-RM004	
Wiring and Grounding Guidelines for Pulse Width Modulated (PWM) AC Drives, publication DRIVES-IN001	Provides basic information needed to properly wire and ground PWM AC drives.
Safety Guidelines for the Application, Installation and Maintenance of Solid State Control, publication SGI-1.1	Provides general guidelines for the application, installation, and maintenance of solid-state control.
Preventive Maintenance of Industrial Control and Drive System Equipment, publication DRIVES-TD001	Provides a guide to performing preventive maintenance.
Guarding Against Electrostatic Damage, publication 8000-4.5.2	Provides practices for guarding against Electrostatic damage (ESD)
Product Certifications website, http://ab.com	Provides declarations of conformity, certificates, and other certification details.

You can view or download publications at <http://www.rockwellautomation.com/literature/>. To order paper copies of technical documentation, contact your local Allen-Bradley distributor or Rockwell Automation sales representative.

Product Overview

The PowerFlex 700 AC drive offers outstanding performance in an easy-to-use drive that you have come to expect from Rockwell Automation. This world-class performance comes in a small and competitively priced package. The PowerFlex 700 AC drive is designed to control three-phase induction motors in applications with requirements ranging from the simplest speed control to the most demanding torque control. The drive has volts per hertz, sensorless vector and vector control. Vector control includes Allen-Bradley's patented Force™ Technology which provides world class motor control.



Flexible Packaging and Mounting

- **IP20, NEMA/UL Type 1** – For conventional mounting inside or outside a control cabinet. Conduit plate is removable for easy installation and replacement without disturbing conduit.
- **IP54, NEMA/UL Type 12** – Stand-alone, wall mount drives are available for dust tight applications with power ratings from 75 to 200 Hp (Frames 5 & 6).
- **IP54, NEMA/UL Type 12** – Flange mount drives with an IP00, NEMA/UL Type Open front. These can be installed in a user supplied cabinet to meet IP54, NEMA/UL Type 12. This allows the majority of heat to be exhausted out the back of the cabinet while keeping the cabinet protected. Power ratings range from 75 to 700 Hp (Frames 5...10).
- **Zero Stacking™** – Frame 0...6 drives can be mounted next to each other with no reduction of surrounding air temperature rating (50°C). This unique bookshelf design also allows access to one drive without disturbing another.

Space Saving Hardware Features

- **Integral EMC Filtering** plus built-in DC bus choke common mode cores and common mode capacitors provides a compact, all-in-one package solution for meeting EMC requirements, including CE in Europe. Frames 0...6 only (Frames 7...10 meet CE when installed per recommendations).
- **Internal Communications** allow the user to integrate the drive into the manufacturing process. Status indicators for all internal communication options are visible on the cover for easy setup and monitoring of drive communications. Users can easily manage information from shop floor to top floor and seamlessly integrate their complete system as they control, configure and collect data.
- **Integral Dynamic Brake Transistor** delivers a cost effective means of switching regenerative energy without costly external chopper circuits. These internal transistors are available in power ratings from 0.5 to 200 Hp.
- **Internal Dynamic Brake Resistor** (up to 25 Hp) requires no extra panel space, and supplies a large amount of braking torque for short periods.

Easy to Use Human Interface Tools

The PowerFlex 7-Class AC drives provide common Human Interface tools that are familiar and easy to use. These include the LCD Human Interface modules and PC-based configuration tools.

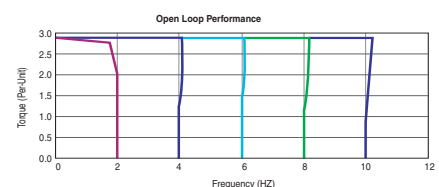
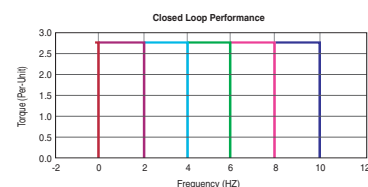
- LCD Human Interface modules provide:
 - Large and easy to read 7 line x 21 character backlit display
 - Variety of languages (English, French, German, Italian, Spanish, Portuguese, Dutch)
 - Alternate function keys for shortcuts to common tasks
 - “Calculator-like” number pad for fast and easy data entry (Full Numeric version only)
 - Control keys for local start, stop, speed, and direction
 - Remote versions for panel mount application

Outstanding Control and Performance

Multiple motor control algorithms allow performance matched to the application need:

- **Volts/Hertz** for simple Fan and Pump applications.
- **Sensorless Vector** for high torque production over a wide speed range.
- **Vector** for outstanding torque regulation and excellent low speed/zero speed performance (w/Vector Control cassette).

The PowerFlex 700 drive's Vector Control uses Allen-Bradley's patented Force™ Technology which provides excellent low-speed performance - whether it is operated with or without feedback. While this industry-leading control provides the highest level of drive performance, it is as easy to use as any general purpose drive available.



Drives Features

- Fast-acting **Current Limit** and **Bus Voltage Regulation** result in maximum accel/decel without tripping.
- **High speed analog inputs** improve drive response to torque or speed commands.
- **Programming flexibility** allows parameters to be linked within the drive.
- **Flying Start** delivers smooth and instantaneous connection into rotating loads, regardless of commanded direction, without the need for any speed feedback.
- **Integral Process PI Control** can eliminate the need for a separate process loop controller.
- **Inertia Ride-Through** offers tripless operation during a prolonged power outage by using the rotating energy stored in high inertia, low-friction loads.
- **Position Indexer/Speed Profiler** uses a 16 step indexer to provide point-to-point positioning or velocity profiling based on encoder counts, digital inputs, parameter levels or time.
- **TorqProve™** assures control of the load when transferring control between the drive and a mechanical brake.
- **Speed Regulation** - Open Loop or Closed Loop
 - **Slip Compensation** delivers a minimum 0.5% speed regulation without feedback hardware.
 - **Droop** allows drives to load share without fighting each other.
 - **Encoder Feedback** provides up to 0.001% speed regulation for the tightest application requirements.
- **Torque Regulation** - Open Loop or Closed Loop
 - **Open Loop** torque regulation provides $\pm 5\%$ regulation.
 - **Encoder Feedback** provides $\pm 2\%$ regulation and the ability to hold full load at zero speed.

Unsurpassed Capability in Network Communications

PowerFlex drives are fully compatible with the wide variety of Allen-Bradley DPI™ communication adapters, offering the following benefits:

BACnet®	ControlNet™	DeviceNet™	EtherNet/IP™	LonWorks™	Modbus RTU	PROFIBUS™	Remote I/O (1)	RS485 DF1	USB	Description
	✓	✓	✓							(Unconnected Messaging) permits other network devices (e.g. PanelView™) to communicate directly to a drive without routing the communication through the network scanner.
✓	✓	✓	✓					✓	✓	Adapter Routing - Plug PC into one drive and talk to all other Allen-Bradley drives on same network, without being routed through network scanner.
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Access to 100% of all parameters over the network.
✓		✓	✓			✓				AutoBaud capability makes initial connections less problematic.
		✓								Change of State significantly reduces network traffic by configuring control messages to be sent only upon customer defined states. Very flexible configuration for each node (Example: "reference must change by more than 5%").
		✓	✓							Peer Control provides master-slave type control between drives, where one or more slave drives (consumers) can run based on the status of a master drive (producer), which can also significantly reduce network traffic.
		✓								ADR (Automatic Device Replacement) saves significant time and effort when replacing a drive, by allowing the scanner to be configured to automatically detect a new drive and download the required parameter settings.
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Flexible Fault Configuration - Adapters can be programmed to take fault based actions as ramp to stop, coast-to-stop and hold last state, as well as send user configurable logic control and speed reference values. In addition, different actions can be taken based on whether the network experienced a serious problem (broken cable etc.) versus network idle condition (PLC set to "Program").

(1) This item has Silver Series status. For information, refer to <http://www.ab.com/silver>.

Catalog Number Explanation

20B

D

2P1

A

3

A

Y

N

A

E

C

0

NN

AD

a *b* *c1...c5* *d*

e *f* *g* *h* *i*

j *k* *l* *m* *n*

<i>a</i>	
Drive	
Code	Type
20B	PowerFlex 700

<i>b</i>				
Voltage Rating				
Code	Voltage	Ph.	Prechg.	Frames
B	240V AC	3	-	0...6
C	400V AC	3	-	0...10
D	480V AC	3	-	0...10
E	600V AC	3	-	0...6
F	690V AC	3	-	5...6
H	540V DC	-	N	5...6, 10
J	650V DC	-	N	5...6, 10
N	325V DC	-	Y	5...6
P	540V DC	-	Y	5...9
R	650V DC	-	Y	5...9
T	810V DC	-	Y	5...6
W	932V DC	-	Y	5...6

<i>c1</i>				
ND Rating				
208/240V, 60 Hz Input				
Code	208V Amps	240V Amps	Hp	Frame
2P2	2.5	2.2	0.5	0
4P2	4.8	4.2	1.0	0
6P8	7.8	6.8	2.0	1
9P6	11	9.6	3.0	1
015	17.5	15.3	5.0	1
022	25.3	22	7.5	1
028	32.2	28	10	2
042	48.3	42	15	3
052	56	52	20	3
070	78.2	70	25	4
080	92	80	30	4
104	120	104	40	5
130	130	130	50	5
154	177	154	60	6
192	221	192	75	6
260	260	260	100	6

<i>c2</i>			
ND Rating			
400V, 50 Hz Input			
Code	Amps	kW	Frame
1P3	1.3	0.37	0
2P1	2.1	0.75	0
3P5	3.5	1.5	0
5P0	5.0	2.2	0
8P7	8.7	4.0	0
011	11.5	5.5	0
015	15.4	7.5	1
022	22	11	1
030	30	15	2
037	37	18.5	2
043	43	22	3
056	56	30	3
072	72	37	3
085	85	45	4
105	105	55	5
125	125	55	5
140	140	75	5
170	170	90	6
205	205	110	6
260	260	132	6
292	292	160	7
325	325	180	7
365	365	200	8
415	415	240	8
481	481	280	8
535	535	300	8
600	600	350	8
730	730	400	9
875	875	500	10

<i>c3</i>			
ND Rating			
480V, 60 Hz Input			
Code	Amps	Hp	Frame
1P1	1.1	0.5	0
2P1	2.1	1.0	0
3P4	3.4	2.0	0
5P0	5.0	3.0	0
8P0	8.0	5.0	0
011	11	7.5	0
014	14	10	1
022	22	15	1
027	27	20	2
034	34	25	2
040	40	30	3
052	52	40	3
065	65	50	3
077	77	60	4
096	96	75	5
125	125	100	5
156	156	125	6
180	180	150	6
248	248	200	6
292	292	250	7
325	325	250	7
365	365	300	8
415	415	350	8
481	481	400	8
535	535	450	8
600	600	500	8
730	730	600	9
875	875	700	10

<i>c4</i>			
ND Rating			
600V, 60 Hz Input			
Code	Amps	Hp	Frame
1P7	1.7	1.0	0
2P7	2.7	2.0	0
3P9	3.9	3.0	0
6P1	6.1	5.0	0
9P0	9.0	7.5	0
011	11	10	1
017	17	15	1
022	22	20	2
027	27	25	2
032	32	30	3
041	41	40	3
052	52	50	3
062	62	60	4
077	77	75	5
099	99	100	5
125	125	125	6
144	144	150	6

20B

D

2P1

A

3

A

Y

N

A

E

C

0

NN

AD

*a**b**c1...c5**d**e**f**g**h**i**j**k**l**m**n**c5*

ND Rating			
690V, 50 Hz Input			
Code	Amps	kW	Frame
052	52	45	5
060	60	55	5
082	82	75	5
098	98	90	6
119	119	110	6
142	142	132	6

d

Enclosure	
Code	Enclosure
A	IP20, NEMA/UL Type 1
F ♣	Open/Flange Mount Front: IP00, NEMA/UL Type Open Back/Heatsink: IP54, NEMA Type 12
N ♣	Open/Flange Mount Front: IP00, NEMA/UL Type Open Back/Heatsink: IP54, NEMA 12
G ♣	Stand-Alone/Wall Mount IP54, NEMA/UL Type 12
U	Roll-In Front: IP00, NEMA/UL Type Open Back/Heatsink: IP54, NEMA 12 Frames 8 & 9 Only

♣ Only available for Frame 5 & Frame 6 drives, 400...690V.

♣ Only available for Frames 7...10.

e

HIM	
Code	Operator Interface
0	Blank Cover
3	LCD Display, Full Numeric Keypad
J ♣	Remote (Panel Mount), IP66, NEMA/UL Type 12 Full Numeric LCD HIM
K ♣	Remote (Panel Mount), IP66, NEMA/UL Type 12 Prog. Only LCD HIM

♣ Available with Frames 5...6 Stand-Alone IP54 drives (Enclosure Code "G").

f

Documentation	
Code	Type
A	Manual
N	No Manual
Q	No Shipping Package (Internal Use Only)

g

Brake	
Code	w/Brake IGBT ‡
Y	Yes
N	No

‡ Brake IGBT is standard on Frames 0-3, optional on Frames 4-6 and not available on Frames 7...10.

h

Internal Braking Resistor	
Code	w/Resistor
Y	Yes ★
N	No

★ Not available for Frame 3 drives or larger.

i

Emission		
Code	CE Filter §	CM Choke
A	Yes	Yes
B #	Yes	No
N	No	No

§ Note: 600V class drives below 77 Amps (Frames 0-4) are declared to meet the Low Voltage Directive. It is the responsibility of the user to determine compliance to the EMC directive. Frames 7...10, 400/480V AC drives (Voltage Rating codes "C" and "D") meet CE certification requirements when installed per recommendations.

Only available for 208...240V Frame 0-3 drives.

j

Comm Slot	
Code	Network Type
C	ControlNet (Coax)
D	DeviceNet
E	EtherNet/IP
N	None

k

Control & I/O		
Code	Control	I/O Volts
A	Standard ♦	24V DC/AC
B	Standard ♦	115V AC
C	Vector △	24V DC
D	Vector △	115V AC
N	Standard	None

△ Vector Control Option utilizes DPI Only.

♦ Frame 0...6 drives only.

l

Feedback	
Code	Type
0	None
1	Encoder, 12V/5V

m

Future Use	
------------	--

n

Special Firmware (Frames 0...6 Only)	
Code	Type
AD ♦	60 Hz Maximum
AE ♦	Cascading Fan/Pump Control
AX ♦	82 Hz Maximum
BA ♦	Pump Off (for pump jack)

♦ Must be used with Vector Control option C or D (Position k). Positions m-n are only required when custom firmware is supplied.

Certifications and Specifications

Certifications

Certification ⁽¹⁾	Description	Frames			
		0...4		5...6	7...10
		230...480V	600V		
ABS	American Bureau of Shipping MA Certificate 08-HS303172B/1-PDA for auxiliary services on AB Classed vessels and offshore platforms	✓		✓	
CE	Certified by Rockwell Automation to be in conformity with the essential requirements of the applicable European Directives and the standards referenced below have been applied:				
	2006/95/EC (Low Voltage Directive) EN 50178 Electronic Equipment for use in Power Installations	✓	✓	✓	✓
	2004/108/EC (EMC Directive) EN 61800-3 Adjustable Speed electrical power drive systems - Part 3: EMC requirements and specific test methods.	✓		✓	✓ ⁽²⁾
C-Tick	Certified by Rockwell Automation to be in conformity with the requirements of the applicable Australian legislation and the standards referenced: IEC 61800-3.	✓		✓	✓
c-UL-us	Listed to UL508C and C22.2 No. 14. Packaged drives may be listed to UL508A.	✓	✓	✓	✓
EPRI /SEMIF47	EPRI Quality Star Certificates SEMIF47.115 and SEMIF47.127 for SEMI F47 compliance, 480V units tested	✓		✓	
Korean KC Registration	KCC-REM-RAA-20B Refer to the certificate of registration for specific drive catalog numbers that have this certification.	✓	✓	✓	✓
Lloyd's Register	Lloyd's Register Type Approval Certificate 08 / 60015 (marine certification)	✓		✓	
RINA	RINA Type Approval Certificate ELE283205CS (Registo Italiano Navale - marine certification)	✓	✓	✓	
Trentec	Tested by Trentec to be compliant with AC156 Acceptance Criteria for Seismic Qualification Testing of Nonstructural Components and 2003 International Building Code for worst-case seismic level for USA excluding site class F	✓	✓	✓	
TÜV ATEX	EC-Type-Examination Certificate TUV 05 ATEX 7153 for directive 94/9/EC: Safe turn off of certified ATEX motors used in Group II Category (2) GD potentially explosive atmospheres.	✓	✓	✓	✓
Designed to Meet Applicable Requirements	CMAA Specification #70 (Crane Manufacturers of America Assoc.)	✓	✓	✓	✓
	NFPA 70 - US National Electrical Code	✓	✓	✓	✓
	NEMA ICS 7.1 - Safety Standards for Construction and Guide for Selection, Installation, and Operation of Adjustable Speed Drive Systems	✓	✓	✓	✓
	IEC 61800-2 Adjustable Speed Electrical Power Drive Systems - Part 2: General Requirements - Rating specifications for low voltage adjustable frequency AC power drive systems.	✓	✓	✓	✓

(1) See the product certifications website, <http://www.rockwellautomation.com/products/certification> for declarations of conformity, certificates, and other certification details.

(2) Frames 7...10 provided as IP00 or NEMA/UL Open style must be installed in a supplementary enclosure which provides adequate attenuation of radiated emissions in order to be compliant with EN 61800-3.

Environmental

Category	Specification				
Environment	Altitude:	1000 m (3300 ft) max. without derating			
	Maximum Surrounding Air Temperature without Derating - IP20, NEMA/UL Type Open: Frames 0...6 Frames 7...10	0...50 °C (32...122 °F), typical. See Installation Instructions for details. 0...40 °C (32...104 °F) for chassis (heatsink) 0...65 °C (32...149 °F) for control (front of backplane)			
	Storage Temperature (all const.):	-40...70 °C (-40...158 °F)			
	Atmosphere:	Important: Drive must not be installed in an area where the ambient atmosphere contains volatile or corrosive gas, vapors or dust. If the drive is not going to be installed for a period of time, it must be stored in an area where it will not be exposed to a corrosive atmosphere.			
	Relative Humidity:	5 to 95% non-condensing			
	Shock:	15G peak for 11ms duration (±1.0 ms)			
	Vibration:	0.152 mm (0.006 in.) displacement, 1G peak			
	Surrounding Environment Pollution Degree Pollution Degree 1 & 2: Pollution Degree 3 & 4: (See page 11 for descriptions of each pollution degree rating.)	All enclosures acceptable. Enclosure that meets or exceeds IP54, NEMA/UL Type 12 required.			
	Sound:	Frame	Fan Velocity	Sound Level	Note: Sound pressure level is measured at 2 meters.
		0	30 CFM	58 dB	
1		30 CFM	59 dB		
2		50 CFM	57 dB		
3		120 CFM	61 dB		
4		190 CFM	59 dB		
5		200 CFM	71 dB		
6		300 CFM	72 dB		
7		756 CFM	74 dB		
8		1200 CFM	78 dB		
9		2800 CFM	82 dB		
10 Inv.		1850 CFM	78 dB		
10 Cnv.		1200 CFM	78 dB		

Technical Specifications

Category	Specification						
Protection	Drive	200...208V	240V	380/400V	480V	600V Frames 0...4	600/690V Frames 5...6
	AC Input Overvoltage Trip:	285V AC	285V AC	570V AC	570V AC	716V AC	818V AC
	AC Input Undervoltage Trip:	120V AC	138V AC	233V AC	280V AC	345V AC	345V AC
	Bus Overvoltage Trip:	405V DC	405V DC	810V DC	810V DC	1013V DC	1162V DC
	Bus Undervoltage Shutoff/Fault:	153V DC	153V DC	305V DC	305V DC	381V DC	437V DC
	Nominal Bus Voltage:	281V DC	324V DC	540V DC	648V DC	810V DC	932V DC
	All Drives						
	Heat Sink Thermistor:	Monitored by microprocessor overtemp trip					
	Drive Overcurrent Trip						
	Software Overcurrent Trip:	200% of rated current (typical)					
	Hardware Overcurrent Trip:	220...300% of rated current (dependent on drive rating)					
	Line transients:	up to 6000 volts peak per IEEE C62.41-1991					
	Control Logic Noise Immunity:	Showering arc transients up to 1500V peak					
	Power Ride-Thru:	15 milliseconds at full load					
	Logic Control Ride-Thru:	0.5 seconds minimum, 2 seconds typical					
	Ground Fault Trip:	Phase-to-ground on drive output					
	Short Circuit Trip:	Phase-to-phase on drive output					
Electrical	Voltage Tolerance:	See page 12 for full power and operating range					
	Input Frequency Tolerance:	47...63 Hz					
	Input Phases:	Three-phase input provides full rating for all drives. Single-phase operation possible on certain drives and provides 50% of rated current (see Installation Instructions for details). Frames 0...7: Drive can be supplied as 6 pulse or 18 pulse in an engineered package.					
	Displacement Power Factor:	0.98 across entire speed range					
	Efficiency:	97.5% at rated amps, nominal line volts					
	Maximum Short Circuit Rating:	200,000 Amps symmetrical					
	Actual Short Circuit Rating:	Determined by AIC rating of installed fuse/circuit breaker					
	Drive to Motor Power Ratio						
	Minimum	Recommended not less than 1:2 ratio					
	Maximum	Recommended not greater than 2:1 ratio					

Category	Specification	
Control	Method:	Sine coded PWM with programmable carrier frequency. Ratings apply to all drives (refer to the <i>Derating Guidelines</i> in the PowerFlex Reference Manual). The drive can be supplied as 6 pulse or 18 pulse in a configured package.
	Carrier Frequency:	2, 4, 8, and 10 kHz. Drive rating based on 4 kHz. See the Input Protection Device tables in the Installation Instructions for exceptions.
	Output Voltage Range:	0 to rated motor voltage
	Output Frequency Range:	Standard Control – 0 to 400 Hz., Vector Control – 0 to 420 Hz
	Frequency Accuracy Digital Input: Analog Input:	Within $\pm 0.01\%$ of set output frequency Within $\pm 0.4\%$ of maximum output frequency
	Frequency Control:	Speed Regulation - w/Slip Compensation (Volts per Hertz Mode) 0.5% of base speed across 40:1 speed range, 40:1 operating range 10 rad/sec bandwidth
		Speed Regulation - w/Slip Compensation (Sensorless Vector Mode) 0.5% of base speed across 80:1 speed range, 80:1 operating range 20 rad/sec bandwidth
		Speed Regulation - w/Feedback (Sensorless Vector Mode) 0.1% of base speed across 80:1 speed range, 80:1 operating range 20 rad/sec bandwidth
	Speed Control:	Speed Regulation - w/o Feedback (Vector Control Mode) 0.1% of base speed across 120:1 speed range, 120:1 operating range 50 rad/sec bandwidth
		Speed Regulation - w/Feedback (Vector Control Mode) 0.001% of base speed across 120:1 speed range, 1000:1 operating range, 250 rad/sec bandwidth
	Torque Regulation:	Torque Regulation - w/o Feedback $\pm 5\%$, 600 rad/sec bandwidth
		Torque Regulation - w/Feedback $\pm 2\%$, 2500 rad/sec bandwidth
	Selectable Motor Control:	Sensorless Vector with full tuning. Standard V/Hz with full custom capability. PF700 adds Vector Control.
	Stop Modes:	Multiple programmable stop modes including - Ramp, Coast, DC-Brake, Ramp-to-Hold and S-curve.
	Accel/Decel:	Two independently programmable accel and decel times. Each time may be programmed from 0...3600 seconds in 0.1 second increments.
	Intermittent Overload:	110% Overload capability for up to 1 minute, 150% Overload capability for up to 3 seconds.
	Current Limit Capability:	Proactive Current Limit programmable from 20...160% of rated output current. Independently programmable proportional & integral gain.
	Motor Overload Protection Frames 0...6 Standard Control:	PowerFlex 700 drives with standard control, identified by an N, A, or B in position 15 of the catalog number, only provide Class 10 motor overload protection according to NEC article 430. They do not provide speed sensitive overload protection, thermal memory retention and motor over-temperature sensing according to NEC article 430.126 (A) (2). If such protection is needed in the end-use product, it must be provided by additional means.
	Frames 0...6 Vector Control:	PowerFlex 700 drives with vector control, identified by a C or D in position 15 of the catalog number, provide class 10 motor overload protection according to NEC article 430 and motor over-temperature protection according to NEC article 430.126 (A) (2). UL 508C File E59272.
	Frames 7...10 Vector Control:	Class 10 motor overload protection according to NEC article 430 and motor over-temperature protection according to NEC article 430.126 (A)(2). UL 508C File E59272.

Category	Specification						
Control (continued)	Digital/Analog Input Latency	Signal		Motor Control	Latency		
					Min.	Max	Typical
		Digital Input	Start	FVC	8.4 ms	10.4 ms	8.4 ms
				SVC	9.2 ms	16.0 ms	9.2 ms
			Stop	FVC	10.0 ms	12.4 ms	10.4 ms
				SVC	10.0 ms	12.0 ms	10.4 ms
		Analog Input	Torque 4 kHz PWM	FVC	772 μ s	1.06 ms	840 μ s
			Torque 2 kHz PWM	FVC	1.008 ms	1.46 ms	1.256 ms
			Speed	FVC	4.6 ms	8.6 ms	4.8 ms
			Speed	SVC	4.8 ms	12.4 ms	6.4 ms
Encoder	Type:	Incremental, dual channel					
	Supply:	12V, 250 mA. 12V, 10 mA minimum inputs isolated with differential transmitter, 250 kHz maximum.					
	Quadrature:	90°, ± 27 degrees at 25 degrees C.					
	Duty Cycle:	50%, $\pm 10\%$					
	Requirements:	Encoders must be line driver type, quadrature (dual channel) or pulse (single channel), 8...15V DC output (4...6V DC when jumpers are in 5V position), single-ended or differential and capable of supplying a minimum of 10 mA per channel. Maximum input frequency is 250 kHz. The Encoder Interface Board accepts 12V DC square-wave with a minimum high state voltage of 7.0V DC. With the jumpers in the 5V position, the encoder will accept a 5V DC square-wave with a minimum high state voltage of 3.0V DC. In either jumper position, the maximum low state voltage is 0.4V DC.					

Pollution Degree Ratings According to EN 61800-5-1

Pollution Degree	Description
1	No pollution or only dry, non-conductive pollution occurs. The pollution has no influence.
2	Normally, only non-conductive pollution occurs. Occasionally, however, a temporary conductivity caused by condensation is to be expected, when the drive is out of operation.
3	Conductive pollution or dry non-conductive pollution occurs, which becomes conductive due to condensation, which is to be expected.
4	The pollution generates persistent conductivity caused, for example, by conductive dust, rain or snow.

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Case No(s). 14-0465-EL-EEC

Summary: Application Lima Refining 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