



Case No.: 13-2367-EL-EEC

Mercantile Customer: **American Modern Insurance**

Electric Utility: **Duke Energy**

**Program Title or
Description:** **Prescriptive VFD HVAC Fan**

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: Mercantile Customer Information

Name: **American Modern Insurance Group**

Principal address: **7000 Midland Blvd
Amelia, OH 45102**

Address of facility for which this energy efficiency program applies:

**7000 Midland Blvd
Amelia, OH 45102**

Name and telephone number for responses to questions:

Megan Fox, (513)287-3367

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

- The customer uses more than seven hundred thousand kilowatt hours per year at the above facility. (Please attach documentation.)
- The customer is part of a national account involving multiple facilities in one or more states. (Please attach documentation.)

Section 2: Application Information

A) The customer is filing this application (choose which applies):

- Individually, without electric utility participation.
- Jointly with the electric utility.**

B) The electric utility is: **Duke Energy**

C) The customer is offering to commit (check any that apply):

- Energy savings from the customer's 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 capacity savings 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 (check those that apply):

- 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):
January 2013
- 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 the energy efficiency program:

- 1) If you checked the box indicating that the 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 the customer 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: 248,600 kWh

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

- 3) If you checked the box indicating that the 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: **XXXXX kWh (See Attachment 1 - Appendix 2)**

Please describe the less efficient new equipment that was 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.

Annual savings: **XXXXX kWh (See Attachment 1 - Appendix 2)**

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):
 - 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?

Month(s) and Year(s)

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

38.98 KW (See Attachment 1 - Appendix 2)

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 energy efficiency 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 **\$10,000 (See Attachment 1 - Appendix 3).**

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 the customer's ongoing efficiency program. (Attach documentation that establishes the ongoing nature of the program.) In order to continue the exemption beyond the initial 24 month period, the customer 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 11.98 (**See Attachment 1 - Appendix 4**)

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 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 **\$251,359 (See Attachment 1 - Appendix 5).**

The utility's program costs were **\$5,219(See Attachment 1 - Appendix 6).**

The utility's incentive costs/rebate costs were **\$10,000 (See Attachment 1 - Appendix 3).**

Section 7: Additional Information

Please attach the following supporting documentation to this application:

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

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

- 1) any confidentiality requirements associated with the agreement;
- 2) a description of any consequences of noncompliance with the terms of the commitment;
- 3) a description of coordination requirements between the customer and the electric utility with regard to peak demand reduction;
- 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,
- 5) a commitment by the customer to provide an annual report on your energy savings and electric utility peak-demand reductions achieved.

Refer to Offer Letter following this application

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.



DUKE ENERGY
Mercantile Self Direct Program
139 East Fourth Street
Cincinnati, OH 45202
513 629 5572 fax

November 15th, 2013

Rick Lawson
American Modern Insurance
7000 Midland Blvd
Amelia, OH 45102

Subject: Your Motor/Pump/VFD Application for a Duke Energy Mercantile Self-Direct Rebate

Dear Mr. Lawson:

Thank you for your Duke Energy Mercantile Self Direct rebate application. As noted in the Energy Conservation Measure (ECM) chart on page two, a total rebate of \$10,000 has been proposed for your VFD on HVAC Fan project completed in the 2013 calendar year. **All Self Direct Rebates are contingent upon approval by the Public Utilities Commission of Ohio (PUCO).**

At your earliest convenience, please indicate if you accept this rebate by

- providing your signature on page two
- completing the PUCO-required affidavit on page three.

Please return the documents to my attention via fax at 513-629-5572 or e-mail to SelfDirect@Duke-Energy.com. Upon receipt, Duke Energy will submit the necessary documentation to PUCO. Following PUCO's approval, Duke Energy will remit payment.

At Duke Energy, we value your business and look forward to working with you on this and future energy efficiency projects. We hope you will consider our Smart Saver® incentives, when applicable. Please contact me if you have any questions.

Sincerely,

A handwritten signature in cursive script that reads 'Megan Fox'.

Megan Fox
Product Manager
Mercantile Self Direct Rebates

cc: Mike Harp, Account Manager
Rob Jung, Ecova

Please indicate your response to this rebate offer within 30 days of receipt.

Rebate is accepted. Rebate is declined.

By accepting this rebate, American Modern Insurance affirms its intention to commit and integrate the energy efficiency projects listed on the following pages into Duke Energy's peak demand reduction, demand response and/or energy efficiency programs.

Additionally, American Modern Insurance also agrees to serve as joint applicant in any future filings necessary to secure approval of this arrangement as required by PUCO and to comply with any information and reporting requirements imposed by rule or as part of that approval.

Finally, American Modern Insurance affirms that all application information submitted to Duke Energy pursuant to this rebate offer is true and accurate. Information in question would include, but not be limited to, project scope, equipment specifications, equipment operational details, project costs, project completion dates, and the quantity of energy conservation measures installed.

If rebate is accepted, will you use the monies to fund future energy efficiency and/or demand reduction projects?

YES NO

If rebate is declined, please indicate reason (optional):



Customer Signature

ANTHONY W. SPENCE

Printed Name

12/3/13

Date

Proposed Rebate Amounts

Measure ID	Energy Conservation Measure (ECM)	Proposed Rebate Amount
ECM-1	VFD HVAC Fan 20 HP (Qty: 10)	\$10,000
Total		\$10,000



**Public Utilities
Commission**

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

13-2367-EL-EEC

Case No.: ____ - ____ -EL-EEC

State of OHIO :

ANTHONY W. SPENCE, Affiant, being duly sworn according to law, deposes and says that:

1. I am the duly authorized representative of:

AMERICAN MODERN INSURANCE GROUP

[insert customer or EDU company name and any applicable name(s) doing business as]

2. I have personally examined all the information contained in the foregoing application, including any exhibits and attachments. Based upon my examination and inquiry of those persons immediately responsible for obtaining the information contained in the application, I believe that the information is true, accurate and complete.

3. I am aware of fines and penalties which may be imposed under Ohio Revised Code Sections 2921.11, 2921.31, 4903.02, 4903.03, and 4903.99 for submitting false information.

Anthony W. Spence HEAD OF CORPORATE FACILITIES
Signature of Affiant & Title

Sworn and subscribed before me this 3RD day of DECEMBER,
2013 Month/Year

Carol Lynn Cox
Signature of official administering oath

CAROL LYNN COX - NOTARY
Print Name and Title

My commission expires on April 1, 2015



CAROL LYNN COX
Notary Public, State of Ohio
My Commission Expires April 1, 2015

Attachment 1 – American Modern Insurance

Appendix 1 – Electric History

72102060 02		
AMERICAN MODERN INSURANCE GRP		
7000 MIDLAND BL		
AMELIA, OH 45102		
Date	Actual KWH	Bill KWH
10/9/2013	1,266,109	756,265
10/9/2013	1,266,109	756,265
9/10/2013	1,353,249	849,086
8/9/2013	1,261,682	790,650
7/11/2013	1,262,154	808,640
6/11/2013	1,297,342	786,327
5/10/2013	1,212,196	742,934
4/11/2013	1,270,961	751,743
3/12/2013	1,206,582	701,158
2/11/2013	1,213,261	729,767
1/11/2013	1,294,118	779,137
12/10/2012	1,366,438	797,568
11/7/2012	1,195,075	714,818
10/9/2012	1,198,749	689,688
9/10/2012	1,271,405	769,195
8/9/2012	1,197,259	727,924
7/11/2012	1,190,400	737,315
6/11/2012	1,251,961	742,200
5/10/2012	1,160,041	691,410
4/11/2012	1,241,854	721,928
3/12/2012	1,251,380	718,978
2/10/2012	1,146,370	693,076
1/12/2012	1,231,120	725,800
12/12/2011	1,348,598	779,995
11/9/2011	1,179,683	699,658
10/11/2011	1,176,696	667,965

Appendix 2 – Annual kWh and kW savings

Measure	Measure Amount	Unit of Measure	Annual kWh Gross with losses (per unit)	TOTAL Annual kWh Gross with losses	Saved Summer coincident kW with losses Per Unit	Total KW Gross with losses
VFD HVAC Fans ONLY (1.5-50 HP)	200	HP	1327.79	265558	0.21	42

Existing Equipment Assumptions	New Equipment Assumptions	Annual kWh Savings Per Measure	Annual KW Savings Per Measure	Total kWh Savings	Total kW Savings
Base efficiency is assumed to be a VAV inlet vane. A market average of building types and HVAC air distribution schemes are assumed.	New efficiency is assumed to be a VAV with VFD. A market average of building types and and HVAC air distribution schemes are assumed.	1243	0.1949	248,600	38.98

Appendix 3 – Cash Rebate

Measure	Amount
VFD HVAC Fans ONLY (1.5-50 HP)	\$10,000

Appendix 4 – Utility Cost Test

Measure	UCT
VFD HVAC Fans ONLY (1.5-50 HP)	11.98

Appendix 5 – Avoided Supply Costs

Measure	T&D	Production	Capacity	Quantity	Total Avoided Costs
VFD HVAC Fans ONLY (1.5-50 HP)	\$105.44	\$970.89	\$180.46	200	\$251,359

Appendix 6 – Utility Program Costs

Measure	Qty	Admin Costs	Total Costs
VFD HVAC Fans ONLY (1.5-50 HP)	200	\$26.09	\$5,219

Ohio Mercantile Self Direct Program

Application Guide & Cover Sheet

Questions? Call 1-866-380-9580 or visit www.duke-energy.com.

Email this form along with completed Mercantile Self Direct Prescriptive or Custom applications, proof of payment, energy savings calculations and spec sheets to SelfDirect@Duke-Energy.com. You may also fax to 1-513-629-5572.

Mercantile customers, defined as using at least 700,000 kWh annually or having an account in multiple locations are eligible for the Mercantile Self Direct program. Indicate which applies:

- a single Duke Energy Ohio account with 700,000 kWh annual usage
- an account with multiple locations

Please list Duke Energy account numbers below (attach listing of multiple accounts and/or billing history for other utilities as required):

Account Number	Annual Usage	Account Number	Annual Usage
7210-2060-02-5	9,897,781.00		

Self Direct rebates are available for completed Custom projects that have not previously received a Duke Energy Smart Saver® Custom Incentive. Self Direct rebates are applicable to Prescriptive measures that were installed more than 90 days prior to submission to Duke Energy and have not previously received a Duke Energy Prescriptive rebate.

Self Direct Program rules allow for, though do not require, certain projects that are Prescriptive in nature under the Smart Saver program to be evaluated using the Custom process in the Self Direct program. Use the list on page two as a guide to determine which Self Direct program best fits your project(s). Apply for Self Direct projects using the appropriate application forms in conjunction with this cover sheet.

Self Direct Program rules also allow for behaviorally based and/or no cost and low cost projects to receive rebates.

Please check each box to indicate completion/inclusion of the following program requirements:

<input checked="" type="checkbox"/> All sections of appropriate application(s) are completed	<input checked="" type="checkbox"/> Proof of payment.*	<input checked="" type="checkbox"/> Manufacturer's Spec sheets	<input type="checkbox"/> Energy model/calculations and detailed inputs for Custom applications
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*If a single payment record is intended to demonstrate the costs of both Prescriptive & Custom projects, please include an additional document with an estimated breakout of costs for each Prescriptive and Custom energy conservation measure.

**Behavioral energy efficiency and demand reduction projects must be both measurable and verifiable. Provide justification with your application. Rebates for such projects may be small in magnitude.



MERCANTILE SELF DIRECT Ohio Premium Motor/Pump/VFD Rebate Application

Questions? Call 1-866-380-9580 or visit www.duke-energy.com.

Email the complete, signed application with all required documents to SelfDirect@duke-energy.com or fax to 513-629-5572.

Is this application: NEW (original) or REVISED (changes made to original application)

Building Type – Required (check one)		
<input type="checkbox"/> Data Centers	<input type="checkbox"/> Full Service Restaurant	<input checked="" type="checkbox"/> Office
<input type="checkbox"/> Education/K-12	<input type="checkbox"/> Healthcare	<input type="checkbox"/> Public Assembly
<input type="checkbox"/> Education Other	<input type="checkbox"/> Industrial	<input type="checkbox"/> Public Order/Safety
<input type="checkbox"/> Elder Care/Nursing Home	<input type="checkbox"/> Lodging	<input type="checkbox"/> Religious Worship/Church
<input type="checkbox"/> Food Sales/Grocery	<input type="checkbox"/> Retail (Small Box)	<input type="checkbox"/> Service
<input type="checkbox"/> Fast Food Restaurant	<input type="checkbox"/> Retail (Big Box)	<input type="checkbox"/> Warehouse
<input type="checkbox"/> Other:		

How did you hear about the program? (check one)		
<input checked="" type="checkbox"/> Duke Energy Representative	<input type="checkbox"/> Web Site	<input type="checkbox"/> Radio
<input type="checkbox"/> Contractor / Vendor	<input type="checkbox"/> Other _____	

Please check each box to indicate completion of the following program requirements:

<input type="checkbox"/> All sections of application	<input checked="" type="checkbox"/> Invoice with make, model number, quantity and equipment manufacturer	<input type="checkbox"/> Tax ID number for payee <input type="checkbox"/> W-9 for payee	<input type="checkbox"/> Customer/vendor agree to Terms and Conditions
------------------------------------------------------	----------------------------------------------------------------------------------------------------------	--------------------------------------------------------------------------------------------	------------------------------------------------------------------------

Customer Information					
Customer/Business	AMIG	Contact	Rick Lawson		
Phone	513-947-5411	Account Number	7210-2060-02-5		
Street Address (Where rebate should be mailed)		7000 Midland Blvd			
City	Ameilia	State	Ohio	Zip Code	45102
Installation Street Address		7000 Midland Blvd			
City	Ameilia	State	Phi	Zip Code	45102
E-mail Address	rlawson@amig.com				

*Failure to provide the account number associated with the location where the installation took place will result in rejection of the application.

Vendor Information					
Vendor	WRP Associates	Contact	Steve Weddendorf		
Phone	513-271-4977	Fax	513-321-5214		
Street Address		5668 Wooster Pike			
City	Cincinnati	State	Ohio	Zip Code	45227
E-mail Address					

If Duke Energy has questions about this application, who should we contact? Customer Vendor

Payment Information		
Who should receive rebate payment?	<input checked="" type="checkbox"/> Customer	<input type="checkbox"/> Vendor (Customer must sign below)
I hereby authorize payment of rebate directly to the vendor:	Customer Signature (written signature)	
	Date	
Provide Tax ID Number for Payee	Customer Tax ID #	
	Vendor Tax ID #	

Terms and Conditions			
I have read and hereby agree to the Terms & Conditions and Program Requirements.			
Customer Signature (written signature)	<i>[Signature]</i>	Vendor Signature (written signature)	<i>Steve Weddendorf</i>
Date	10/28/13	Date	1/24/13
Title	HEAD of CORPORATE FACILITIES	Title	Partner

Rebates are subject to change and may be discontinued at the sole discretion of Duke Energy. Equipment must be installed and operable to be eligible for rebates. As Federal Energy Policy Law changes, equipment efficiency requirements are subject to change.

The Equipment below is (check one):

Retrofit

Replacement of failed equipment or new construction is not eligible for rebates.

Variable Frequency Drives (VFDs) – Applied to HVAC Fans Only (Retrofit* Application only)

VFD HVAC Applications (please check one):

Supply Fan

Cooling Tower Fan

Return Fan

Exhaust Fan

VFD**	Make/Model or Catalog #	Quantity	Rebate***	Annual Operating Hrs (Minimum of 2000)	Project Cost	Date Installed and Operable (mm/yy)	Total Rebate
1.5 HP			\$50.00/HP	Hrs			
2 HP			\$50.00/HP	Hrs			
3 HP			\$50.00/HP	Hrs			
5 HP			\$50.00/HP	Hrs			
7.5 HP			\$50.00/HP	Hrs			
10 HP			\$50.00/HP	Hrs			
15 HP			\$50.00/HP	Hrs			
20 HP	ACH550-UH-031A-4	10	\$50.00/HP	3744Hrs	\$14,750.00	1/24/13	\$10,000.00
25 HP			\$50.00/HP	Hrs			
30 HP			\$50.00/HP	Hrs			
40 HP			\$50.00/HP	Hrs			
50 HP			\$50.00/HP	Hrs			

* Retrofit only – rebates are only available for new VFDs installed on existing HVAC fan systems.

**VFDs over 50 HP and VFD's on new equipment are not eligible for prescriptive rebates, but may qualify through the custom program.

***Rebates are capped at 50% of project cost (equipment and external labor).

- Installed equipment must be new. Used, rebuilt or rewound equipment is *not* eligible.
- Variable Frequency Drive Fans & Pumps qualifying equipment must have 2000 annual run hours or more.
- A 3% impedance reactor on the AC input to the VSD is recommended to prevent damage to the VSD due to overvoltage from power factor correction and should be properly sized by your supplier. A 5% reactor may be recommended if there is additional harmonic distortion on the AC input lines due to other plant-specific causes.
- VFDs on new equipment do not qualify under this program; but may qualify through the custom program. Please refer to the Custom website for guidance. Rebates will be paid for the installation of **NEW** VFDs on existing fan/pump systems and process equipment only.
- Replacement of existing VFDs does not qualify for rebates.
- VFDs installed on redundant pumps do not qualify.
- VFDs installed in newly constructed facilities do not qualify for rebates.
- VFD speed must be automatically controlled by differential pressure, flow, temperature, or other variable signal.
- Existing throttling devices including inlet vanes, bypass dampers, and throttling valves must be removed or permanently disabled.
- Duplicative to the first bullet point.

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Email the complete, signed application with all required documents to SelfDirect@duke-energy.com or fax to 513-629-5572.

Is this application: NEW (original) or REVISED (changes made to original application)

Building Type – Required (check one)		
<input type="checkbox"/> Data Centers	<input type="checkbox"/> Full Service Restaurant	<input checked="" type="checkbox"/> Office
<input type="checkbox"/> Education/K-12	<input type="checkbox"/> Healthcare	<input type="checkbox"/> Public Assembly
<input type="checkbox"/> Education Other	<input type="checkbox"/> Industrial	<input type="checkbox"/> Public Order/Safety
<input type="checkbox"/> Elder Care/Nursing Home	<input type="checkbox"/> Lodging	<input type="checkbox"/> Religious Worship/Church
<input type="checkbox"/> Food Sales/Grocery	<input type="checkbox"/> Retail (Small Box)	<input type="checkbox"/> Service
<input type="checkbox"/> Fast Food Restaurant	<input type="checkbox"/> Retail (Big Box)	<input type="checkbox"/> Warehouse
<input type="checkbox"/> Other:		
How did you hear about the program? (check one)		
<input type="checkbox"/> Duke Energy Representative	<input type="checkbox"/> Web Site	<input type="checkbox"/> Radio
<input type="checkbox"/> Contractor / Vendor	<input type="checkbox"/> Other _____	

Please check each box to indicate completion of the following program requirements:

<input checked="" type="checkbox"/> All sections of application	<input checked="" type="checkbox"/> Invoice with make, model number, quantity and equipment manufacturer	<input type="checkbox"/> Tax ID number for payee <input type="checkbox"/> W-9 for payee	<input checked="" type="checkbox"/> Customer/vendor agree to Terms and Conditions
-----------------------------------------------------------------	----------------------------------------------------------------------------------------------------------	--------------------------------------------------------------------------------------------	-----------------------------------------------------------------------------------

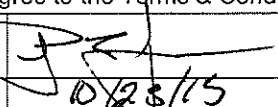
Customer Information			
Customer/Business	AMIG	Contact	Rick Lawson
Phone	513-947-5411	Account Number	7210-2060-02-5
Street Address (Where rebate should be mailed)		7000 Midland Blvd	
City	Ameilia	State	Ohio
		Zip Code	45102
Installation Street Address		7000 Midland Blvd	
City	Ameilia	State	Phi
		Zip Code	45102
E-mail Address	rlawson@amig.com		

*Failure to provide the account number associated with the location where the installation took place will result in rejection of the application.

Vendor Information			
Vendor	WRP Associates	Contact	Steve Weddendorf
Phone	513-271-4977	Fax	513-321-5214
Street Address		5668 Wooster Pike	
City	Cincinnati	State	Ohio
		Zip Code	45227
E-mail Address			

If Duke Energy has questions about this application, who should we contact? Customer Vendor

Payment Information	
Who should receive rebate payment?	<input checked="" type="checkbox"/> Customer <input type="checkbox"/> Vendor (Customer must sign below)
I hereby authorize payment of rebate directly to the vendor:	Customer Signature (written signature)
	Date
Provide Tax ID Number for Payee	Customer Tax ID #
	Vendor Tax ID #

Terms and Conditions			
I have read and hereby agree to the Terms & Conditions and Program Requirements.			
Customer Signature (written signature)		Vendor Signature (written signature)	
Date	10/23/15	Date	1/24/13
Title	HVAC; Elec. Tech.	Title	Partner

Rebates are subject to change and may be discontinued at the sole discretion of Duke Energy. Equipment must be installed and operable to be eligible for rebates. As Federal Energy Policy Law changes, equipment efficiency requirements are subject to change.

Submittal Schedule

This schedule includes the products supplied as part of this submittal.

Schedule			Motor Data ¹			Drive Data			
Tagging /						Output			
Item	Qty	Equipment ID	HP	FLA	Voltage	Product ID	HP	Amps	Voltage
1	10	Various AHU Supply Fans	20	27	460 VAC	ACH550-UH-031A-4	20	31	480 VAC
<p>Notes: 1. AC Motor Data is per National Electrical Code Table 430.250 for typical motors used in most applications and is provided as typical data only. DC motor data is per typical industry standards. Actual motor data may vary.</p>									

Project Submittal for The Midland Company

Project Number:

Specification: Standard ABB

Engineering Contact:

Contractor:

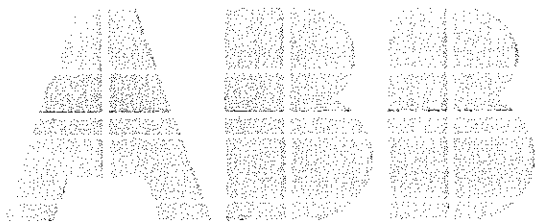
Architect:

End Customer (User): The Midland Company

Submitted By: WRP Associates, LLC

Revision:

Date: January 24, 2013



Submittal Schedule Details for Various AHU Supply Fans

Item	Tag / Equipment ID	Product ID
1	Various AHU Supply Fans	ACH550-UH-031A-4

Item Description
Input Voltage: 480 VAC Rated Output Current: 31 AMPS Construction: Drive Only Enclosure: NEMA 1 UL Type 1 Nominal Horsepower: 20 Frame Size: R3 Input Disconnecting Means: None Bypass: None Input Impedance: 5% Short Circuit Current Rating: 100 kA RMS Symetrical Communication Protocols: Johnson Controls N2, Siemens Buildings Technologies FLN (P1), Modbus RTU, BACnet Recommended Spare Parts Package : SPKACH-UH-PKG01/R03-x / 3AUA0000133435 Other Options:

Drive Input Fuse Ratings	
(Note: Drive is UL approved without the need for input fuses. Fuse rating information provided for customer reference)	
Amps (600 V)	Bussmann Type
40	JJS-40

Wire Size Capacities of Power Terminals				
Circuit Breaker	Disconnect Switch	Terminal Block	Overload Relay	Ground Lug
N/A	N/A	#3	N/A	#3
N/A	N/A	2 ft-lbs	N/A	2 ft-lbs

Dimensions and Weights				
Height in / mm	Width in / mm	Depth in / mm	Weight lbs / kg	Dimension Drawing
23 / 583	8 / 203	9.1 / 231	35 / 16	3AUA0000001571 Sheet 1

Heat Dissipation & Airflow Requirements			
Power Losses		Airflow	
Watts	BTU/Hr	CFM	CM/Hr
457	1560	79	134

Reference Drawings		
Power Wiring	Connection Diagram	Dimension Detail
UH00R016PW-A	UH00R016CC-A	3AUA0000001571 Sheet 1

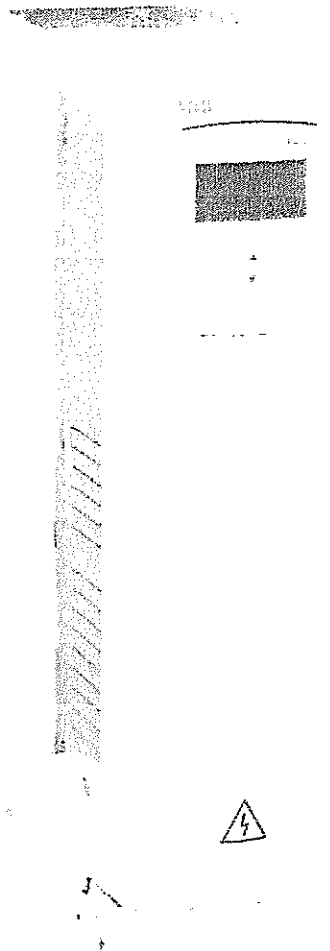
ACH550 Product Overview

Description

The ACH550 series is a microprocessor based Pulse Width Modulated (PWM) adjustable speed AC drive. The ACH550 drive takes advantage of sophisticated microprocessor control and advanced IGBT power switching technology to deliver high-performance control of AC motors for a wide range of HVAC applications.

With drives ranging from 1 to 550 HP, the ACH550 series features a universal full graphic interface that "speaks" to the operator in plain English phrases, greatly simplifying set-up, operation, and fault diagnosis. The ACH550 is also programmable in fourteen other languages.

Each ACH550 drive comes equipped with an extensive library of pre-programmed HVAC application macros which, at a touch of a button, allow rapid configuration of inputs, outputs, and performance parameters for specific HVAC applications to maximize convenience and minimize start-up time. The ACH550 series can handle the most demanding commercial applications in an efficient, dependable, and economic manner.



ACH550 Standard Features

UL, cUL labeled and CE marked, BTL listed
EMI/RFI Filter (1st Environment, Restricted Distribution)
Seismic Certificate of Compliance in accordance with
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
IBC 2009 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) / Motor Speed (RPM)
Motor Current
Calculated Energy Savings (\$, kWh/MWh, CO²)
Calculated % Motor Torque
Calculated Motor Power (kW)
DC Bus Voltage
Output Voltage
Heatsink Temperature
Elapsed Time Meter (reset-able)
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
BACnet (MS/TP)
Johnson Controls N2
Siemens Building Technologies FLN (P1)
Modbus RTU

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
Pre-magnetization (DC Brake) on Start
Automatic Torque Boost
Automatic Torque Boost with Flying Start
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 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

Input Impedance
5% Equivalent Impedance with Internal Reactor(s)
Patented Swinging Choke Design for Superior
Harmonic Mitigation (R1...R6 Frames)
3% Equivalent Impedance (R8 Frame)

ACH550 Specifications

Input Connection

Input Voltage (U ₁)	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%
Frequency:	48 - 63 Hz
Line Limitations:	Max +/-3% of nominal phase to phase input voltage
Fundamental Power Factor (cosφ):	0.98 at nominal load
Connection:	U ₁ , V ₁ , W ₁ (U ₁ , V ₁ , 1-phase)

Output (Motor) Connection

Output Voltage:	0 to U ₁ , 3-phase symmetrical, U ₂ at the field weakening point
Output Frequency:	~500 to 500 Hz
Frequency Resolution:	0.01 Hz
Continuous Output Current:	
Variable Torque:	1.0 * I _{2N} (Nominal rated output current, Variable Torque)
Short Term Overload Capacity:	
Variable Torque:	1.1 * I _{2N} , (1 min/10 min)
Peak Overload Capacity:	
Variable Torque:	1.35 * I _{2N} , (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:	U ₂ , V ₂ , W ₂

Enclosure

Style: UL (NEMA) Type 1, Type 12, or Type 3R

Agency Approval

Listing and Compliance: UL, cUL, CE

Ambient Conditions, Operation

Air Temperature:	-15 ^o to 40 ^o C (5 ^o to 104 ^o F), above 40 ^o C the maximum output current is de-rated 1% for every additional 1 ^o C (up to 50 ^o C (122 ^o 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/s ² (33 ft/s ²) 9 to 200 Hz sinusoidal Seismic Certified referencing IBC 2000, 2003, 2006 and 2009

Ambient Conditions, Storage (in Protective Shipping Package)

Air Temperature:	-40 ^o to 70 ^o C (-40 ^o to 158 ^o 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/s ² (330 ft/s ²) 11 ms

Ambient Conditions, Transportation (in Protective Shipping Package)

Air Temperature:	-40 ^o to 70 ^o C (-40 ^o to 158 ^o 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/s ² (49 ft/s ²) 9 to 200 Hz sinusoidal
Shock (IEC 60086-2-29):	Max 100 m/s ² (330 ft/s ²) 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

ACH550 Specifications (continued)

Analog Inputs

Quantity	Two (2) programmable
Voltage Reference:.....	0 (2) to 10 V, 312kOhm, 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.....	2.3mm ² / 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.....	2.3mm ² / 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.....	2.3mm ² / 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.....	2.3mm ² / 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.....	2.3mm ² / 14AWG

Protections

Single Phase	Protected (input & output)
Overcurrent Trip Limit:	3.5 x I _N instantaneous
Adjustable Current Regulation Limit:.....	1.1 x I _N (RMS) max.
Overvoltage Trip Limit:	1.30 x U _N
Undervoltage Trip Limit:.....	0.65 x U _N
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 (I _{2t}):.....	Protected
Input Power Loss of Phase:.....	Protected
Loss of Reference:	Protected
Short Circuit Current Rating:.....	100,000 RMS symmetrical Amperes
Input Line Impedance:.....	Swinging choke 5% equivalent R1-R6, 3% equivalent R8

U₁ = Input Voltage

U₂ = Output Voltage

P_N = Power – Normal Duty (HP)

U_N = Nominal Motor Voltage

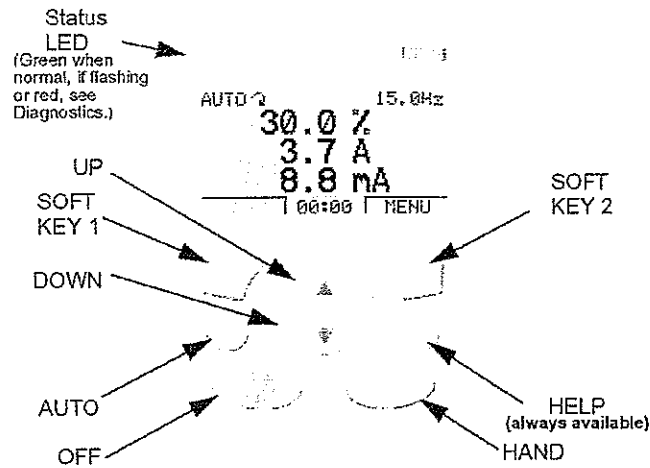
f_N = Nominal Motor Frequency


I_N = Nominal Motor Current – Normal Duty

Specifications are subject to change without notice. Please consult the factory when specifications are critical.

ACH550 Control Panel

The ACH550 Control Panel is a multifunction control panel with full graphic LCD display and multiple language capability. The control panel can be connected to and detached from the ACH550 at any time. The panel can be used to upload and copy parameters to other ACH550 drives.



Run Indication and Shaft Direction  located in upper left corner of display.

Control Panel Display	Significance
Rotating arrow (clockwise or counterclockwise)	Drive is running and at set point Shaft direction is forward or reverse
Rotating arrow blinking	Drive is operating but not at setpoint
Stationary arrow	Drive is stopped

LED Indicators

The green LED indicates that the power is on and the drive is operating normally. The red LED indicates a fault. A blinking green LED indicates an alarm condition. A blinking red LED indicates a fault that requires power to be cycled off and on to reset the drive.

Fault Indications

The ACH550 Control Panel can display over 20 alarm and fault messages. The last fault and previous faults (1 to 9) are retained in memory. The last fault and previous faults (1 & 2) also record important diagnostic information to assist in troubleshooting. Most faults can be reset by pressing the RESET key (Soft Key 1).

Parameters

Application specific parameters are immediately accessible through a selection of start-up "Assistants". A complete list of parameters is also available grouped by function in approximately 33 menu groups. One of the basic menu functions can be used to display the complete list of changed parameters.

Real Time Clock

The Operator Control Panel includes a real time clock which provides Day, Date and Time information, displayed in a choice of formats. The real time clock has a 10 year battery back up and provides time and date stamping of drive faults and other events. The clock is also used by the ACH550s internal timer functions, providing an integral time clock for start/stop control as well as other control operations.

Control Modes

When the HAND key is pressed, the drive starts and pressing the UP/DOWN keys can modify the reference frequency. The HAND (keypad) control mode is indicated.

When the OFF key is pressed, the drive stops and the OFF control mode is indicated.

When the AUTO key is pressed, the AUTO control mode is indicated. The drive can be started and stopped using whichever remote start/stop command has been configured, a contact closure applied to the start/stop input, a serial communication command or a process feedback signal. In AUTO mode the drive speed is typically controlled by the external speed reference input or by the PID controller.

If the HAND key is pressed while the drive is running in the AUTO control mode, the drive continues to run without changing speed, but ceases to respond to external input or PID speed reference changes. (Bumpless transfer) Pressing the UP/DOWN keys can modify the reference frequency.

If the AUTO key is pressed while the drive is running in the HAND control mode and an external start command is present, the drive continues to run and follows the acceleration or deceleration control ramp to the speed set by the external input or PID speed reference. (Bumpless transfer)

Cable Connections

Terminal	Description	Note
U1, V1, W1	3~ power supply input	Use of 1~ supply requires 50% derate of output current and is applicable for 208 to 240 VAC operation only.
PE / GND	Protective Ground	Follow local rules for cable size.
U2, V2, W2	Power output to motor	
Uc+, Uc-	DC bus	
X1 1 to 18	Control Wiring	Low voltage control – Use shielded cable
X1 19 to 27	Control Wiring	Low voltage or 115VAC
X1 28 to 32	Serial Communications	Use shielded cable

Follow local codes for cable size. To avoid electromagnetic interference, use separate metallic conduits for input power wiring, motor wiring, control and communications wiring. Keep these four classes of wiring separated in situations where the wiring is not enclosed in metallic conduit. Also, keep 115VAC control wiring separated from low voltage control wiring and power wiring.

Use shielded cable for control wiring.

Ampacity is based on the use of 60 °C rated power cable up to 100 Amps (75 °C over 100 Amps).

Refer to the included tables for current ratings, fuse recommendations and maximum wire size capacities and tightening torques for the terminals. The ACH550 is suitable for use on a circuit capable of delivering not more than 100,000 RMS symmetrical amperes, 480 V maximum. The ACH550 has an electronic motor protection feature that complies with the requirements of the National Electric Code (NEC). When this feature is selected and properly adjusted. Additional overload protection is not required unless more than one motor is connected to the drive or unless additional protection is required by applicable safety regulations.

For CE installation requirements, see ABB publication CE-US-02 "CE Council Directives and Variable Speed Drives." Contact your local ABB representative for specific IEC installation instructions.

Engineering Data and Ratings Tables

Fuses

Drive input fuses are recommended to disconnect the drive from power in the event that a component fails in the drive's power circuitry. Recommended drive input fuse specifications are listed in the *Submittal Schedule Details* and in the *Fuse Ratings Table*. Fuse rating information is provided for customer reference.

Item	Catalog Number	Drive Input Fuse Ratings	
		Amps (600V)	Bussmann Type
1	ACH550-UH-031A-4	40	JJS-40

Terminal Sizes / Cable Connection Requirements

Power and motor cable terminal sizes and connection requirements are shown in the *Submittal Schedule Details* and in the *Terminal Sizes / Cable Connection Requirements Table*. The information provided below is for connections to input power and motor cables. These connections may be made to an input circuit breaker or disconnect switch, a motor terminal block, overload relay, and/or directly to bus bars and ground lugs. The table also lists torque that should be applied when tightening terminals and spacing requirements where multiple mounting holes are provided in the bus bar.

Item	Catalog Number	Circuit Breaker	Disconnect Switch	Terminal Block	Overload Relay	Ground Lug
1	ACH550-UH-031A-4	N/A N/A	N/A N/A	#3 2 ft-lbs	N/A N/A	#3 2 ft-lbs

Heat Dissipation Requirements

The cooling air entering the drive must be clean and free from corrosive materials. The *Submittal Schedule Details* and the *Heat Dissipation Requirements table* below give the heat dissipated into the hot air exhausted from the drives. If the drives are installed in a confined space, the heat must be removed from the area by ventilation or air conditioning equipment.

Item	Catalog Number	Power Losses		Airflow	
		Watts	BTU/Hr	CFM	CM/Hr
1	ACH550-UH-031A-4	457	1560	79	134

Dimensions and Weights

Dimensions and weights of the drives provided are given in the *Submittal Schedule Details* and in the *Dimensions and Weights Table*. The table also lists the applicable dimension drawings that include additional detail. Dimension drawings may be provided in the back of this submittal.

Item	Catalog Number	Height mm / in	Width mm / in	Depth mm / in	Weight kg / lbs	Dimension Drawing
1	ACH550-UH-031A-4	583 / 23	203 / 8	231 / 9.1	16 / 35	3AUA0000001571 Sheet 1

Schematics and Wire Diagrams

Detailed wiring diagrams and schematics may be included for the products covered in this submittal. Please reference the following ABB part numbers for the drawings included with this submittal:

Item	Catalog Number	Power Wiring	Connection Diagram	Dimension Detail
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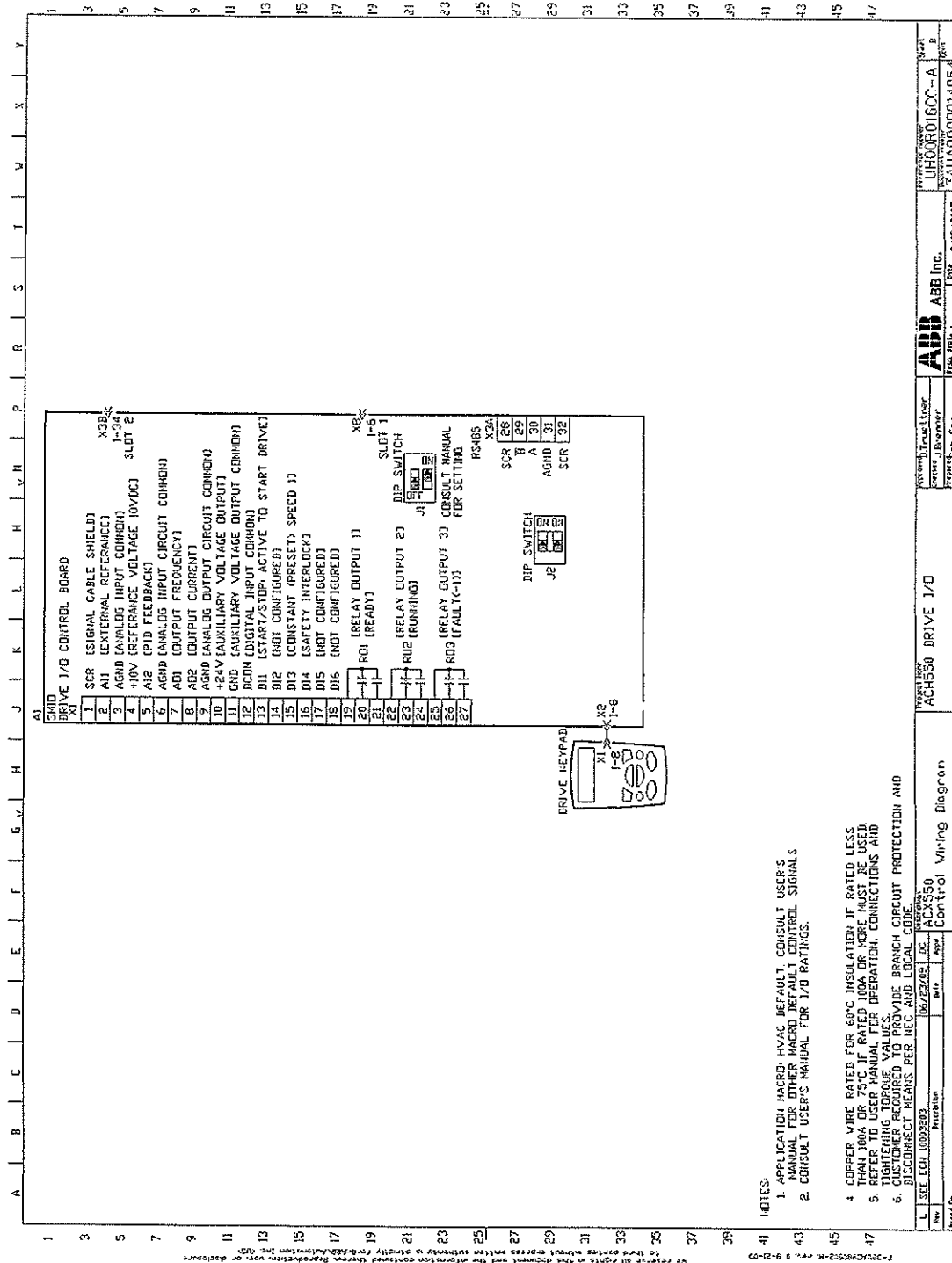
Item	Catalog Number	Power Wiring	Connection Diagram	Dimension Detail
1	ACH550-UH-031A-4	UH00R016PW-A	UH00R016CC-A	3AUA0000001571 Sheet 1

Product short Circuit Current Rating

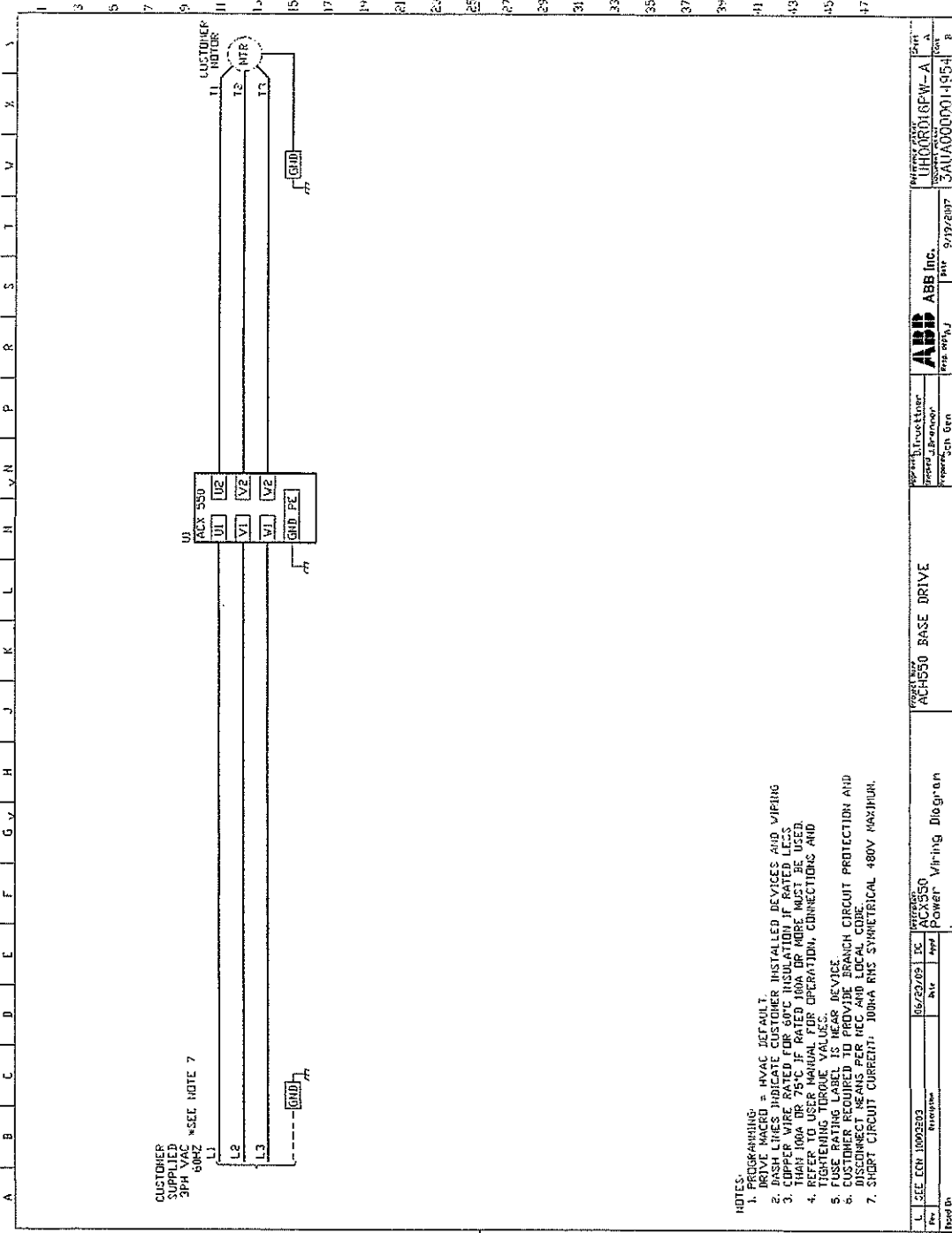
Short circuit ratings shown below are as show on the device rating label.

Item	Catalog Number	Short Circuit Current Rating
1	ACH550-UH-031A-4	100 kA RMS Symetrical

Connection Drawing for Various AHU Supply Fans



Power Drawing for Various AHU Supply Fans



CUSTOMER SUPPLIED 3PH VAC 60HZ *SEE NOTE 7

- NOTES:
1. PROGRAMMING
 2. DRIVE MACRO = HVAC DEFAULT.
 3. DASH LINES INDICATE CUSTOMER INSTALLED DEVICES AND WIRING.
 4. COPPER WIRE RATED FOR 90°C INSULATION IF RATED LESS THAN 100A OR 75°C IF RATED 100A OR MORE MUST BE USED.
 5. REFER TO THE CUSTOMER'S OPERATION, CONNECTION, AND TESTING MANUAL.
 6. FUSE RATING LABEL IS NEAR DEVICE.
 7. CUSTOMER REQUIRED TO PROVIDE BRANCH CIRCUIT PROTECTION AND DISCONNECT MEANS PER NEC AND LOCAL CODE.
 8. SHORT CIRCUIT CURRENT: 100kA RMS SYMMETRICAL 480V MAXIMUM.

Rev	1	Date	06/20/05	By	EC	Project	ACH550	Drawn By	Investment	ABB ABB Inc.	Sheet	1 of 1
Rev	2	Date	02/02/07	By	AWJ	Project	ACH550 BASE DRIVE	Drawn By	Investment	ABB ABB Inc.	Sheet	1 of 1
Rev	3	Date	02/02/07	By	AWJ	Project	ACH550 BASE DRIVE	Drawn By	Investment	ABB ABB Inc.	Sheet	1 of 1

WRP Associates, LLC

Invoice

5668 Wooster Pike
Cincinnati, OH 45227
Phone: 513-271-4977

Date Invoice #
12/18/2012 2819

Bill To

Midland Modern Insurance Group
7000 Midland Blvd.
Amelia, OH 45102

P.O. No. Terms Project

MIKE Net 30

Quantity	Description	Rate	Amount
10	ABB Model ACH550-UH-031A-4 VFD	1,475.00	14,750.00T

WRP-G615			
Out-of-state sale, exempt from sales tax		0.00%	0.00

Thank you for your business.

Phone #

513-271-4977

Total \$14,750.00