26 29 23_VARIABLE FREQUENCY CONTROLLERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Variable frequency controllers.

1.02 SUMMARY

A. This standard includes Variable Frequency Drives (VFD)

B. The intent of these standards are to provide input to the design team on the University's preference of manufacturers, design, equipment options, and quality assurance to maintain the longevity of its assets.

1.03 REFERENCE STANDARDS

A. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 DESIGN REQUIREMENTS

A. Drives are to be manufactured as standard commercial-grade products.

B. Third party testing certificates will be required for any drive not 100% sourced from acceptable manufactures listed.

C. Each drive shall be fed from a dedicated fused disconnect.

D. Separate electrical circuits shall be provided for each individual drive.

E. Specify drives designed for variable-torque HVAC applications (where appropriate)
   1. Constant torque applications shall be noted and appropriate drive specified and reviewed by the University.

F. Drives are to have protection against incoming power disturbances, such as over current, over/under voltage, phase loss, and surges.

G. Output waveform of the VFD (Variable Frequency Drive, Adjustable Frequency Drive, and Electronic Adjustable/Variable Speed Drive) shall be Pulse Width Modulated (PWM). Output switching devices shall be Insulated Gate Bipolar Transistors (IGBTS).

H. Drive Location:
   1. The VFD shall be located as close as possible to the motor in order to minimize the cable lead length.
   2. If the VFD is to be located outdoors, the equipment location submittal is to be approved by the University of Delaware.

I. The harmonic distortion produced by the VFD shall not exceed the limits as specified in IEEE-519.

J. Do not use power factor correction or surge suppression methods on the load side of the drive connected to a motor.

K. All drives shall be configured with the following mechanical contactor bypass capability:
   1. Two-Contactor Bypass for drives less than 150Hp.
   2. Three-Contactor Bypass for drives 150Hp and greater.

L. Specify drives with the following modes of operation:
   1. Hand/Manual
   2. Off
   3. Auto/VFD

M. Front panel lights shall provide indication of the following drive status:
   1. On
   2. Off
   3. VFD
   4. Bypass

N. Each drive shall have its own front panel display keypad to provide indication of speed/frequency signal and operating mode.

O. Ensure BAS signal compatibility for VFD control, i.e., 0-10VDC.

P. Drives shall be equipped with Modbus RTU (RS485), in addition to individual hardwired BAS controls requirements

Q. Include shaft grounding rings on motors connected to a VFD.

R. Do not control more than one motor with a single VFD.

S. Provide the following documentation:
   1. Set-up parameters as configured during start-up.
   2. Warranty information.
   3. 24 hour contact information for service technician.

T. Service technician (for non-warranty repair) must be located within 2 hour drive time.

U. Warranty to be in effect for at least one year **after** equipment turnover to the University of Delaware Operations and Maintenance.
   1. Warranty period to be reviewed by University of Delaware Operations and Maintenance.

1.05 SUBMITTALS

A. Product Data: Provide catalog sheets showing voltage, controller size, ratings and size of switching and overcurrent protective devices, short circuit ratings, dimensions, and enclosure details.

B. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

C. Maintenance Data: NEMA ICS 7.1. Include routine preventive maintenance schedule.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Basis of Design: Allen-Bradley
   1. ABB Industrial Systems Inc.: www.abb.com
   2. Allen-Bradley: www.rockwellautomation.com
   3. Yaskawa: www.yaskawa.com

END OF SECTION