SECTION 220513.13 - VARIABLE FREQUENCY DRIVES FOR PLUMBING

PART 1 - GENERAL

1.1 SUBMITTAL REQUIRMENTS

A. Product Data:

1. Provide product datasheets for all products specified under this section.
2. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
3. Include diagrams for power, signal, and control wiring.
4. Clearly state full load amps (FLA), voltages and model numbers on all submittals.

1.2 WARRANTY

A. Manufacturer's Warranty: Manufacturer and Installer agree to repair or replace components of equipment that fail(s) in materials or workmanship within specified warranty period.

1. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 VARIABLE FREQUENCY DRIVES (VFD'S)

A. Manufacturers

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. ABB
b. Eaton Cutler Hammer
c. General Electric
d. Danfoss
e. Baldor
f. Siemens
g. Square D
h. Yaskawa

B. The DC voltage is processed to produce an output voltage waveform in a series of variable width pulses. Enclosure to be NEMA 1 for indoor use or NEMA 3R for outdoor use. Output current overload rating for 110% of motor FLA for 1 minute. Provide insulated gate bipolar transistors to limit motor noise or an output reactor. Correct power factor to 98% throughout the speed range. Unit to have current transformers to provide electronic thermal overloads. Provide a digital key pad and

display. Units to be UL 508C listed. Unit to be provided with DC injection braking and critical frequency rejection, circuit breaker, reactor and drive in common enclosure.

C. Provide drives with internal PID function to allow drive to act as controller if necessary. Provide controller with 8 field selectable output signals to temperature controls contractor. The signals shall include drive status, fault, actual speed, setpoint, and motor FLA. Provide controller to accept 0-10-vdc or 4-20 ma signal from the temperature control contractor accessories. Provide door interlock disconnect. Unit shall be designed so as not produce "noise" back into the electrical system.

D. Drive amps shall meet or exceed motor full load amps based on NEC table 430.250-2011.

E. Provide the following:

1. Minimum and maximum speed adjustment.
2. IEC Contactors
3. Adjustable linear acceleration.
4. Adjustable current limit.
5. Short circuit protection.
6. 4-20 mA current follower circuitry.
7. Under voltage and over voltage protection.
8. Over-temperature protection.
9. The drive shall not generate any electrical line noise back to the supply, which would adversely affect other electrical equipment.
10. A 5% AC Line Reactor shall be installed on the input side of the drive to provide for suppression of harmonics and transient voltages.
11. The drive is to be rated at design voltage, +10% and -5%.
12. Automatic restarting of the drive after a power outage or power dip.
13. LED drive status indicators to facilitate start-up and maintenance.
14. The following items shall be mounted to the enclosure door:

    a. Power "ON" light.
    b. Drive "TRIP" pilot light.
    c. Manual/Off/Automatic three position selector switch or Manual/Auto selector switch and start/stop selector switch.
    d. Manual speed potentiometer, via keypad, for operation in the manual mode.
    e. Speed indicator calibrated for 0-100% speed.
    f. Ammeter calibrated for 0-150% load.
    g. If analog meters are supplied, individual meters are required.
    h. If digital readout is supplied, one meter with a selector switch is acceptable.

F. Coordinate with temperature control contractor for interface into DDC system.

G. Provide the Following Options:

1. The VFD shall contain three (3) skip frequency ranges that can be programmed within a selectable range of 0-120 Hz, with a minimum bandwidth of 0.01 Hz. Each skip range shall be independently programmable.
2. Two normally open and one normally closed auxiliary contacts.
3. Acceleration Optimization
4. Load Operation Limitation

H. Provide factory installed load side door operated disconnect and NEC compliant line side disconnect which will disconnect all input power from all components. The load side disconnect handle shall be through the door and be pad-lockable in the OFF position.

I. Provide contact in variable frequency that will open when the motor disconnect opens to prevent damage to the variable frequency drive when its associated motor is electrically disconnected. Electrical contractor shall wire the remote disconnect to this contact.

PART 3 - EXECUTION

3.1 VARIABLE FREQUENCY DRIVE INSTALLATION

A. Coordinate mounting arrangements with electrical contractor. If not provided by electrical contractor, this contractor shall provide all necessary mounting hardware including, but not limited to, unistrut, fasteners, backer board, etc…

3.2 STARTUP PROCEDURES

A. Energize motor, verify proper operation of motor, and drive system.

B. Measure and record motor electrical values for voltage and amperage.

C. Start-up assistance, review of application and installation, set up and training in operation is to be provided by factory trained personnel.

D. Factory-authorized service representative to start each variable speed drive and train Owner's maintenance personnel on the following:

1. Procedures and schedules related to start-up and shut down, troubleshooting, servicing, preventative maintenance, and how to obtain replacement parts.

E. Program the variable speed drives. Include a points list of all points programmed into the variable speed drives.

END OF SECTION 220513.13