

Allen-Bradley 1336VT Adjustable Frequency AC Motor Drives Variable Torque Loads

Sample Specification Guide

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AB PLCs

SECTION 16483

Variable Frequency Controllers

Part 1

General

1.01 Related Sections

A.

Section {03300} { } - Cast-in-place Concrete: Housekeeping pads.

B.

Section {16195} { } - Electrical Identification: Engraved

C.

Section { } - Motors

D.

Section { } - Instrumentation

E.

Section { } - Driven Equipment

1.02 References

A.

NFPA 70 - National Electrical Code

B.

NEMA ICS 3.1 - Safety Standards for Construction and Guide for Selection, Installation and Operation of Adjustable Speed Drive Systems.

C.

NEMA 250 - Enclosures for Electrical Equipment

D.

Underwriter's Laboratory (UL) 508

E.

Canadian Standards Association (CSA)

F.

International Electrical Code (IEC) 146

1.03 Submittals

A.

Submit under provisions of Section {01300} { }

B.

Shop Drawings: Include front and side views of enclosures with overall dimensions and weights shown, conduit entrance locations and requirements, and nameplate date. Include schematic diagrams showing all operators and interfaces as required per specification.

C.

Product Data: Provide catalog sheets showing voltage, controller size, and ratings. Provide information on current ratings, short circuit ratings, and protective devices.

D.

Test Reports: Providing factory and field test and inspection procedures.

E.

Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency specified under regulatory requirements. Include instructions for storage, handling, protection, examination, preparation, installation and starting of product.

F.

Operation Data: Including instructions for starting and operating controllers, and describe operation limits that may result in hazardous or unsafe conditions.

G.

Maintenance Data: Include routine preventative maintenance schedule.

1.04 Qualifications

A.

Manufacturer: Company specializing in the manufacturing of Adjustable Frequency Drives with a minimum of 10 years experience.

B.

Support: Company with factory trained and authorized service facilities within 100 miles of the project with a demonstrated record of service for the previous three years. Support personnel shall be employed by the manufacturer.

1.05 Regulatory Requirements

A.

Conform to requirements of NFPA 70.

B.

Furnish product as listed and classified by Underwriter's Laboratories as suitable for purpose specified and indicated.

C.

Furnish product as listed by Canadian Standards Association.

D.

Conform to the requirements of IEC 146

1.06 Delivery, Storage and Handling

A.

Deliver, store, protect and handle products to site under provisions of Section {01600} { }

B.

Accept controller onsite in original packing. Inspect for damage.

C.

Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.

D.

Handle in accordance with manufacturer's written instructions. Lift only with lugs provided for the purpose. Handle carefully to avoid damage to components, enclosure, and finish.

1.07 Field Measurements

A.

Verify that field measurements are as instructed by manufacturer.

1.08 Service

A.

Furnish parts and service for a period of 12 months after substantial completion, not to exceed 18 months from date of shipment. Service shall include all necessary expenses including travel and meals.

1.09 Extra Materials

A.

Furnish under provisions of Section {01700} { }

B.

Provide one spare printed circuit board for each type used.

C.

Provide three spare fuses for each size/type used.

D.

Provide three spare power semiconductors for each size/type used.

Part 2

Product

2.01 Manufacturers

A.

Allen-Bradley Model 1336 shall be the base bid. Other brands may be offered as a deduct alternate.

2.02 Description

A.

Provide enclosed variable frequency drives suitable for operating the indicated loads. Conform to requirements of NEMA ICS 3.1.

2.03 Ratings

A.

Rated input voltage: 460 VAC, three phase +10%, 48-62 hz.

B.

Motor Ratings: 460 VAC, three phase, 60 hz, { } RPM, { } horsepower, with a full load current rating of { } amps. {1.0} {1.15} service factor. NEMA design B with class {F} {B} insulation.

C.

Displacement Power Factor: Between 1.0 and .95, lagging, over the entire range of operating speed.

D.

Operating Ambient: 0 degrees C to 40 degrees C.

E.

Minimum Efficiency at Full Load, Full Speed: 97%

2.04 Design

A.

Shall employ microprocessor based inverter logic isolated from power circuits.

B.

Shall employ a diode or fully gated bridge on the input.

C.

Shall employ a DC bus inductor.

D.

Shall employ pulse width modulated inverter system.

E.

Shall employ switching power supply operating from the DC link.

F.

Shall employ phase to phase and phase to ground MOV protection.

G.

Shall employ gold plated plug-in connections on printed circuit boards.

H.

Shall employ "fast-on" or screw terminal connections on all power components.

I.

Shall be designed for ability to operate controller with motor disconnected from output.

J.

Shall be designed to have an adjustable PWM carrier frequency.

K.

Shall be designed to ensure that the DC bus is discharged to less than 50 VDC within 60 seconds per NFPA requirements. Provide indication when DC bus is above 50 VDC.

L.

Shall be designed such that the drive does not require an isolation transformer for protection from normal line transients.

M.

Shall be designed to operate on and AC line which may contain line notching and up to 10% harmonic distortion.

N.

Shall be designed to shut down with no component failure in the event of an output phase to phase or phase to ground. Provide annunciation of fault condition.

O.

Shall be designed such that the inverter section power semiconductors do not require commutation capacitors.

P.

Shall be designed to supply 115% of rated current for up to one minute.

Q.

Shall be designed to allow all adjustments to be made with the door closed.

R.

Shall be designed to have a K factor of 4.0 or less.

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2.05 Product Features

A.

Display: Provide integral digital display to indicate output voltage, output frequency, and output current as well as being the interface for all adjustments and fault indications. Display to be visible and operable without opening the enclosure door.

B.

Status Indicators: Provide indication of overcurrent, overvoltage, ground fault, overtemperature, and input power on.

C.

Volts per Hertz Adjustment: Provide the ability to fully configure the volts per hertz for a squared, cubed, or straight line load profile.

D.

Current Limit: Provide the ability to program the current limit from 50% to 115% of rating. During acceleration and deceleration, the drive shall extend the ramp as necessary to prevent excessive currents or excessive bus voltage.

E.

Acceleration/Deceleration: Provide separate adjustments to allow either to be adjusted from 0 to 600 seconds.

F.

Adjustments: Provide digital interface for all set-up operations and adjustments. All adjustments shall be stored in nonvolatile memory (EEPROM). Do not use analog or potentiometer adjustments.

G.

IR Compensation (DC Boost): Provide a selectable range for offsetting motor losses at low frequency operation.

H.

Restart: Provide up to nine automatic restarts following fault condition before locking out and requiring manual restart { or switching to bypass operation }.

I.

Skip Frequencies: Provide three adjustable set points to lock out operation at frequencies which may produce mechanical resonance.

J.

Automatic restart: Provide for automatic restart of equipment after restoration of power after an outage.

K.

Fault Indication: Provide means to maintain the last four faults after loss of power.

L.

Overload Protection: Provide NEC motor overload protection tested in accordance with UL standard 991.

M.

Disconnecting Means: Provide integral {circuit breaker} {disconnect switch} on the line side of each controller with through the door operator.

N.

Terminal Blocks: Provide separate terminal blocks for control and power wiring.

O.

Operator's Devices: Provide Hand-Off-Auto Selector Switch and manual speed control. Input signal in automatic shall be {4-20 mA} {3-15 PSI} {0-10 VDC}.

P.

Safety Interlocks: Provide terminals for remote contact to inhibit starting under both manual and automatic mode.

Q.

Control Interlocks: Provide terminals for remote contact to allow starting in automatic mode.

R.

{Manual Bypass: Provide application rated contactor, overload protection, and short circuit protection for full voltage, non-reversing operation of the motor}.

S.

{Input Contactor: Provide application rated contactor to isolate the controller from the AC line.}

2.06 Fabrication

A.

Enclosure: NEMA 250, {type 1} {type 12}

B.

Finish: Manufacturer's standard.

2.07 Source Quality Control

Vendor shall be certified to the 9000 series of standards from the International Standards Organization.

A.

All incoming material shall be inspected and/or tested for conformance to specification. All chips (CMOS, TTL, LINEAR, etc.) shall be functionally tested.

B.

All subassemblies shall be inspected and/or tested for conformance to specifications.

C.

All control printed circuit boards shall be dynamically tested for a minimum of 22 hours while heat cycled on hour at each temperature setting from 32 degree F (0 degrees C) to 140 degrees F (60 degrees C).

D.

Drives rated 96 Apm and greater shall be burned-in for a minimum of 48 hours, cycling load to simulate no load/full load and exercise drive power components.

E.

The completed drive shall be functionally testes with a motor before shipment to assure proper operation per specification.

Part 3

Execution

3.01 Examination

A.

Verify conditions under provisions of Section {01039} { }.

B.

Verify that the surface is suitable for controller installation.

C.

Do not install controller until building environment can be maintained within the service conditions required by the manufacturer.

3.02 Preparation

A.

Provide concrete housekeeping pad under provisions of Section {03300} { }.

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3.03 Installation

A.
Install controller where indicated, in accordance with manufacturer's written instructions and NEMA ICS 3.1.

B.
Tighten all accessible connections and mechanical fasteners after placing the controller.

C.
Install fuses as necessary.

D.
Install overload heater elements as required to match installed motor characteristics.

E.
Provide engraved plastic nameplates under the provisions of Section {16195} { }.

F.
Provide neatly type label inside each controller door identifying motor served, nameplate horsepower, full load amperes, code letter, service factor, and voltage/phase rated.

3.04 Field Quality Control

A.
Field inspection and testing shall be performed under the provisions of Section {01400} { }.

B.
Inspect complete installation for physical damage, proper alignment, anchorage and grounding.

3.05 Manufacturer's Field Services

A.
Prepare and start systems under provisions of Section {01400} { }.

B.
Make final adjustments to installed drive to assure proper operation of system. Obtain performance requirements from installer of driven loads.

3.06 Cleaning

A.
Remove all dirt, debris, scrap, etc., from the controller enclosure.

B.
Touch up scratched or marred surfaces to match original finish.

C.
Ensure all filters are cleaned as required for proper operation.

3.07 Demonstration

A.
Provide systems demonstration under provisions of Section {01650} { }.

B.
Demonstrate operation of controllers in both automatic and manual modes.