SECTION 230923.24 - SPEED INSTRUMENTS

Revise this Section by deleting and inserting text to meet Project-specific requirements.

Verify that Section titles referenced in this Section are correct for this Project's Specifications; Section titles may have changed.

1. GENERAL
   * + 1. RELATED DOCUMENTS

Retain or delete this article in all Sections of Project Manual.

* + - * 1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
      1. SUMMARY
         1. Section includes speed switches for direct-digital controls for HVAC.
         2. Related Requirements:

Retain subparagraphs below to cross-reference requirements Contractor might expect to find in this Section but are specified in other Sections.

Section 230923 "Direct-Digital Control System for HVAC" for control equipment and software, relays, electrical power devices, uninterruptible power supply units, wire, and cable.

Section 230993 "Sequence of Operations for HVAC Controls" for requirements that relate to Section 230923.24.

* + - 1. SUBMITTALS
         1. Submittals for this section are subject to the re-evaluation fee identified in Article 4 of the General Conditions.
         2. Manufacturer’s installation instructions shall be provided along with product data.
         3. Submittals shall be provided in the order in which they are specified and tabbed (for combined submittals).
         4. Product Data: For each type of product, including the following:

Operating characteristics, electrical characteristics, and furnished accessories indicating operating range, accuracy over range, control signal over range, default control signal with loss of power, calibration data specific to each unique application, electrical power requirements, and limitations of ambient operating environment, including temperature and humidity.

Product description with complete technical data and product specification sheets.

Installation operation and maintenance instructions, including factors affecting performance.

* + - * 1. Shop Drawings:

Include plans, elevations, sections, and[**mounting**] details.

Include details of product assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.

Include diagrams for power, signal, and control wiring.

Include number-coded identification system for unique identification of wiring.

* + - 1. CLOSEOUT SUBMITTALS
         1. Operation and Maintenance Data: To include in operation and maintenance manuals.

1. PRODUCTS

See Editing Instruction No. 1 in the Evaluations for cautions about named manufacturers and products. For an explanation of options and Contractor's product selection procedures, see Section 016000 "Product Requirements."

* + - 1. ROTATIONAL SPEED SWITCHES
         1. Rotational Speed Switch (Non-Contact Type):

[Manufacturers:](http://www.specagent.com/Lookup?ulid=9784) Subject to compliance with requirements, provide products by the following:

Direct Industry by Virtualexpo Group

Monarch Instrument

[Proximity Controls; Dwyer Instruments, Inc](http://www.specagent.com/Lookup?uid=123456944460).

Approved equivalent.

Requirements in remaining subparagraphs are based on Proximity's "Series NSS."

Description:

Speed switch, sensor, and electronics housed in enclosure.

Shaft-end-mounted disc, or split collar wrap generates an alternating magnetic field sensed by the switch.

Dust, dirt, and grease proof.

Retain first subparagraph below for hazardous environments. Requires cast aluminum enclosure.

Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for hazardous environments Class I, Group D; Class II, Groups E, F, and G; and Class III.

Performance:

Field-Adjustable Range: [**10 to 100**] [**100 to 5000**] rpm.

Temperature Limits: Minus 40 to 140 deg F.

Electrical Rating: 5 A at 115-V ac.

Switch Type: SPDT.

Gap Distance: Approximately 0.375 inch.

Operator Interface: Potentiometer.

Enclosure Construction:

[**PVC**] [**Cast aluminum**].

Removable cover.

NEMA 250, Type 4X.

Electrical Connection: Wiring, 12 inches long, furnished with switch.

Conduit Connection: 1-inch trade size.

Disc, Guard, and Mounting Bracket Construction:

Magnetic Disc: Nylon or PVC.

Disc Guard: Stainless steel.

Mounting Bracket: Aluminum with stainless-steel shaft.

* + - * 1. Rotational Speed Switch (Contact Type):

[Manufacturers:](http://www.specagent.com/Lookup?ulid=9785) Subject to compliance with requirements, provide products by the following:

Direct Industry by Virtualexpo Group

Monarch Instrument

[Proximity Controls; Dwyer Instruments, Inc](http://www.specagent.com/Lookup?uid=123456944461).

Approved equivalent.

Requirements in remaining subparagraphs are based on Proximity's "Series DSS."

Description:

Speed switch, sensor, and electronics housed in one enclosure.

Photoelectric technology.

Suitable for mounting in any orientation.

Retain first subparagraph below for hazardous environments.

Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for hazardous environments Class I, Groups C and D; and Class II, Groups F and G.

Performance:

Three Field-Adjustable Ranges: 0.1 to 10, 1 to 100, and 10 to 1000 rpm.

De-Energize Set Point: 15 to 20 percent lower than energize speed range.

Repeatability: Within 2 percent of maximum speed in range.

Rotation: Clockwise or counterclockwise.

Temperature Limits: Minus 40 to 140 deg F.

Electrical Rating: 3 A at 120- or 240-V ac.

Switch Type: SPDT.

Operator Interface: Adjustment screw.

Enclosure Construction:

Aluminum.

Screw cover.

NEMA 250, Type 4X.

Electrical Connection: Screw terminals.

Conduit Connection: Two, 3/4-inch trade size.

1. EXECUTION
   * + 1. EXAMINATION
          1. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
          2. Prepare written report, endorsed by Installer, listing conditions detrimental to performance.
          3. Proceed with installation only after unsatisfactory conditions have been corrected.
       2. INSTALLATION, GENERAL

Retain "Speed-Switch Applications" paragraph below unless requirements are indicated on Drawings.

* + - * 1. Speed-Switch Applications:

Copy and edit subparagraphs below to suit each unique application requiring a different instrument type.

<**Insert application**>: Speed switch, [**contact**] [**non-contact**] type.

* + - * 1. Install products level, plumb, parallel, and perpendicular with building construction.
        2. Properly support speed-switch wiring and conduit to comply with requirements indicated. Brace all products to prevent lateral movement and sway or a break in attachment when subjected to a <**Insert value**> force.
        3. Fastening Hardware:

Stillson wrenches, pliers, and other tools that cause injury to or mar surfaces of rods, nuts, and other parts are prohibited for work of assembling and tightening nuts.

Tighten bolts and nuts firmly and uniformly. Do not overstress threads by excessive force or by oversized wrenches.

Lubricate threads of bolts, nuts, and screws with graphite and oil before assembly.

* + - * 1. Install products in locations that are accessible and that permit calibration and maintenance from floor, equipment platforms, or catwalks. Where ladders are required for Director’s Representative's access, confirm unrestricted ladder placement is possible under occupied condition.
        2. Corrosive Environments:

Use products that are suitable for environment to which they are subjected.

If possible, avoid or limit use of materials in corrosive environments.

When conduit is in contact with a corrosive environment, use Type 316 stainless-steel conduit and fittings or conduit and fittings that are coated with a corrosive-resistant coating that is suitable for environment.

Where instruments are located in a corrosive environment and are not corrosive resistant from manufacturer, field install products in a NEMA 250, Type 4X enclosure constructed of Type 316L stainless steel.

* + - 1. ELECTRIC POWER
         1. Provide electrical power to products requiring electrical connections.
         2. Provide circuit breakers. Comply with requirements in Section 262816 "Enclosed Switches and Circuit Breakers."
         3. Provide power wiring. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables."
         4. Provide raceways. Comply with requirements in Section 260533 "Raceways and Boxes for Electrical Systems."
      2. SPEED-SWITCH INSTALLATIONS
         1. Use manufacturer's mounting brackets to accommodate field mounting. Securely support and brace products to prevent vibration and movement.
         2. Seal penetrations to ductwork, plenums, and air-moving equipment to comply with duct static-pressure class and leakage and seal classes indicated using neoprene gaskets or grommets.
      3. IDENTIFICATION
         1. Identify system components, wiring, cabling, and terminals. Each piece of wire shall have the same designation at each end for operators to determine continuity at points of connection. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."
         2. Install engraved phenolic nameplate with instrument identification[**and on face of ceiling directly below instruments concealed above ceilings**].
      4. ADJUSTMENT, CALIBRATION, AND TESTING
         1. Description:

Calibrate each instrument installed that is not factory calibrated and provided with calibration documentation.

Provide a written description of proposed field procedures and equipment for calibrating each type of instrument. Submit procedures before calibration and adjustment.

Equipment and procedures used for calibration shall meet instrument manufacturer's written instructions.

Provide diagnostic and test equipment for calibration and adjustment.

Field instruments and equipment used to test and calibrate installed instruments shall have accuracy at least twice the instrument accuracy being calibrated. For example, an installed instrument with an accuracy of 1 percent shall be checked by an instrument with an accuracy of 0.5 percent.

Calibrate each instrument according to instrument instruction manual supplied by manufacturer.

If after calibration indicated performance cannot be achieved, replace out-of-tolerance instruments.

Comply with field-testing requirements and procedures indicated by ASHRAE Guideline 11, "Field Testing of HVAC Control Components," in the absence of specific requirements and to supplement requirements indicated.

* + - * 1. Digital Signals:

Check digital signals using a jumper wire.

Check digital signals using an ohmmeter to test for contact.

* + - * 1. Switches: Calibrate switches to make or break contact at set points indicated.
      1. ADJUSTING
         1. Occupancy Adjustments: When requested within [**12**] <**Insert number**> months from date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to [**two**] <**Insert number**> visits to Project during other-than-normal occupancy hours for this purpose.

END OF SECTION 230923.24