

Honeywell VRN2 / VRW2

SECTION 23 09 00 INSTRUMENTATION and CONTROL for HVAC

PART 1 GENERAL

1.1 SUMMARY

PART 2 MATERIALS

2.1 DYNAMIC PRESSURE-REGULATING CONTROL VALVES

- A. The valve and actuator combination product family shall be a factory assembled and tested unit. All valves and actuators shall be manufactured under ISO 9001 International Quality Control Standards.
- B. The valve shall have an integral differential pressure regulator to maintain constant pressure drop across valve seat to decouple valve flow from system pressure changes. Flow control accuracy shall be +/-5% or better. Regulator will be constructed from 316 stainless steel with a rolling diaphragm and operate under positive pressure. Regulator shall be located above axis of pipe with ¼" ISO test port fittings to allow pressure measurement and venting.
- C. The actuator shall provide two-position, floating, or proportional control. Proportional control refers to direct acceptance of 2-10 Vdc or a 4-20 mA input signal. Floating control refers to direct acceptance of 24Vac pulse-width modulated open and close commands from a tri-state (SP3T) controller. Two-position control of non-fail safe actuators shall be in the form of 24Vac power controlled by SPDT switch. Two-position control of failsafe actuators shall be in the form of 24Vac power controlled by SPST switch.
- D. Basis-of-Design: Honeywell VRN2 / VRW2. Products of other manufacturers will be considered for acceptance provided they equal or exceed the minimum requirements and functional qualities of the specified product. Requests for Architect/Engineer's approval must be accompanied by the "Substitution Request Form", all valves and actuators shall be from the same manufacture, with complete technical data, and the valve manufacture's flow testing documentation from an independently owned third-party testing agency for each valve size and model for evaluation. All materials for evaluation must be received by the Project Manager and Specification Department at least 10 days prior to bid due date. Additional approved manufacturers will be issued by Addendum.
- E. Control valves 1/2 to 3 inches: Valves shall be available with female national pipe thread pipe fittings in sizes from ½ up to 3 inches (DN15 to DN80).
 - 1. Minimum Requirements:
 - a. Flow control ball valve shall be individually flow tested at the factory and verified to deviate no more than +/-5% though the minimum to maximum pressure range.

- b. Flow control ball shall have minimum 50:1 rangeability with an equal percentage flow characteristic provided by a laser-milled, glass-filled polymer ball insert. Valve seat seals shall make contact with the ball only, and not the flow control element.
- c. Valve ball and stem construction shall be nickel-plated brass or stainless steel.
- d. Maximum operating differential pressure shall be no less than 35 psid. Close-off pressure shall be 100 psid with ANSI Class IV seat leakage.
- e. Threaded valves bodies shall have static pressure rating of 360 psig (2500 kPa) at 250°F (121 C).
- f. Valve stem assembly shall be of a pack-less design and be field-replaceable without removing the valve body from the piping. Teflon™ seals shall hold the stem in alignment, and protect the O-ring from system temperature fluctuations. Stem O-ring shall be made of peroxide-cured EPDM and be isolated from system treatment chemicals by a reservoir of silicon grease. Valve shall have a blow-out proof stem with minimum 600 psi rating.
- g. Multiple gpm flow ratings shall be available in each valve size, with 26 discrete values available in 1 gpm increments up to 1" and 5 gpm increments up to 3". Intermediate flow settings will be set using mechanical stop in the actuator, or by characterized control signal from the controller.
- h. Actuated valves shall be capable of closing off against their maximum operating differential pressure. Seat leakage when closed shall be ANSI/ASME Class IV, minimum.
- i. Actuators shall be direct coupled rotary type requiring neither crank-arm nor linkage and direct mount to the valve actuator bracket. The bracket shall provide for up to 2 inches (50mm) of pipe insulation.
- j. Actuators shall be capable of operating on 24Vac Class II power, or be UL Recognized or CSA Certified to U.S. and Canadian Standards where used with line voltage.
- k. Actuators shall provide screw terminal wiring connections with adapters for flexible conduit where mechanical protection is required by local codes.
- l. Proportional actuators shall have a rotation direction control switch accessible on the cover to change between proportional or floating control. Actuators that require to be electronically programmed by use of a handheld programming device or external computer software are NOT acceptable.
- m. All actuators shall be designed for a minimum of 60,000 full-stroke cycles at actuator rated torque and temperature, and 1,500,000 repositions.
- n. Two-position actuators shall be designed for a minimum of 100,000 full-stroke cycles at rated load and temperature.

- o. Actuation shall be available with fail-safe operation capable of returning the valve to a normally open or normally closed position following loss of power.
 - p. All spring return actuators must be designed for either normally open or normally closed fail-safe operation with a continuously engaged mechanical return spring. This spring must return the actuator to a fail-safe position within 20-25 seconds of power loss.
 - q. All 5Nm torque, spring return actuators must be able to spring return from -40°F to 150°F.
 - r. Proportional and floating control actuators shall provide a 2-10 Vdc feedback signal. The signal shall represent the actual flow (gpm) to the associated coil, providing a gpm input to the DDC controller.
 - s. Actuators shall be available with SPST or SPDT switch for position verification feedback as an available option.
- F. Control valves 2 ½ to 6 inches: Valves shall be available with wafer-flanges for use with either ANSI/ASME 125/150 or ANSI/ASME 250/300 pipe flanges in sizes from 2 ½ up to 6 inches (DN65 to DN150). Each wafer flange shall be useable with either of two successive pipe sizes.
- 1. Minimum Requirements:
 - a. Flow control valve shall be individually flow tested at the factory and verified to deviate no more than +/-5% though the minimum to maximum pressure range.
 - b. Flow control valve shall have minimum 50:1 rangeability with an equal percentage flow characteristic provided by a multi-turn, non-rising stem, characterized plug.
 - c. Valve trim shall be stainless steel.
 - d. Maximum operating differential pressure rating shall be no less than 58 psid. Close-off pressure shall be 100 psid minimum, at no more than 0.2% leakage.
 - e. Valve bodies shall have static pressure rating of 580psig (4000kPa) at 248°F (120 C).
 - f. Valve stem seals shall be EPDM O-rings and be field-replaceable without removing the valve body from the piping.
 - g. Multiple gpm flow ratings shall be field-selectable in each valve size, with 50 unique settings.
 - h. Actuated valves shall be capable of closing off against their maximum operating differential pressure. Seat leakage when closed shall be ANSI/ASME Class IV, minimum.
 - i. Actuators shall be direct coupled six turn rotary type requiring neither crank-arm nor linkage and direct mount to the valve actuator bracket.
 - j. Actuators shall be capable of operating on 24Vac Class II power, in both electronic fail-safe and stay-in-place configurations. Actuator fail-

safe action in the event of power failure shall be field-selectable normally open or normally closed.

- k. Actuators shall provide screw terminal wiring connections with adapters for flexible conduit where mechanical protection is required by local codes.
- l. Actuators shall have a programming DIP switch accessible under the cover to change between proportional, floating, or pulse width modulation (PWM) control or two-position control through wiring options.
- m. Proportional actuators shall have field-adjustable signal zero and span adjustments.
- n. Actuation shall be available with electronic fail-safe operation capable of returning the valve to a normally open or normally closed position following loss of power.
- o. Proportional and floating control actuators shall provide a 2-10 Vdc feedback signal. The signal shall represent the actual flow (gpm) to the associated coil, providing a gpm input to the DDC controller.

G. General Requirements:

- 1. Valve Schedule: Valve take-off and selection shall be performed and a schedule created by the valve manufacture. Schedule including a separate line for each valve and a column for each of the valve attributes: Valve Identification Tag, Location, Valve Type, Valve Size, Pipe Size, Configuration, Flow Capacity, Minimum Design Pressure Drop, Maximum Pressure Drop, Fail Position, Close-off Pressure, Actuator Identification Tag, and Actuator Type. The valve manufacture's authorized distributor shall either, directly prepare the valve with actuator combination submittal or review and approve the submittal prepared by the contractor prior to submission for Architect/Engineer's approval.
- 2. Valves shall not be installed with stems below the horizontal plane to prevent actuator damage due to stem seal leakage, or accumulation of particulate in the stem packing.
- 3. Valves shall be capable for use only in cold, warm, and hot water system applications with diethylene glycol, ethylene glycol, or propylene glycol solutions up to 50% concentration.
- 4. A water filtration and treatment system shall be installed and operated according to the requirements of Division 23 25 13, Water Treatment for Closed-Loop Hydronic Systems. These requirements shall meet or exceed European Norm VDI 2035. The presence of excess rust in the system will void the manufacturer's warranty.
- 5. Run time shall be constant and independent of: load, temperature, and supply voltage (within specifications).
- 6. Accessories Identification tags shall be available for all valves; tags shall be indelibly marked with gpm, model number, and tag location.

Note to specifiers: Depending on the project configuration, the following should be included to provide detail for the deletion of balancing valves and associated balancing where pressure independent control valves are installed.

23 00 00 HEATING, VENTILATION, AND AIR-CONDITIONING (HVAC)

23 05 00 COMMON WORK RESULTS FOR HVAC

23 05 19 METERS AND GAGES FOR HVAC PIPING

“Balancing valves shall not be required where pressure independent modulating control valves are installed”.

23 05 23 GENERAL-DUTY VALVES FOR HVAC PIPING

“Balancing valves shall not be required where pressure independent modulating control valves are installed”.

23 05 93 TESTING, ADJUSTING, AND BALANCEING FOR HVAC

“Associated balancing shall not be required where pressure independent modulating control valves are installed”.

23 25 00 HVAC WATER TREATMENT

23 25 13 WATER TREATMENT FOR CLOSE-LOOP HYDRONIC SYSTEMS

“System side stream filter shall be provided with 50 micron filter (or finer)”.