

Part 1 General

1.1 SECTION INCLUDES

- .1 Thermostats.
- .2 Carbon Dioxide Detection

1.2 RELATED SECTIONS

- .1 Section 23 05 48 - Vibration Isolation.
- .2 Section 23 21 00 - Hydronic Piping: Installation of control valves, flow switches, temperature sensor sockets, gauge taps.
- .3 Section 23 33 00 - Duct Work Accessories: Installation of automatic dampers.
- .4 Section 26 27 26 - Wiring Devices: Elevation of exposed components.

1.3 REFERENCES

- .1 AMCA 500 - Test Methods for Louvres, Dampers and Shutters.
- .2 ASME B16.22 - Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.
- .3 ASTM B32 - Solder Metal.
- .4 ASTM B280 - Seamless Copper Tube for Air Conditioning and Refrigeration Field Service.
- .5 ASTM D1693 - Environmental Stress - Cracking of Ethylene Plastics.
- .6 NEMA DC 3 - Residential Controls - Electric Wall-Mounted Room Thermostats.
- .7 NFPA 90A - Installation of Air Conditioning and Ventilation Systems.

1.4 SUBMITTALS FOR REVIEW

- .1 Section 21 05 00: Procedures for submittals.
- .2 Product Data: Provide description and engineering data for each control system component. Include sizing as requested. Provide data for each system component and software module.
- .3 Shop Drawings: Indicate complete operating data, system drawings, wiring diagrams, and written detailed operational description of sequences. Submit schedule of valves indicating size, flow, and pressure drop for each valve. For automatic dampers indicate arrangement, velocities, and static pressure drops for each system.

1.5 SUBMITTALS FOR INFORMATION

- .1 Section 21 05 00: Submittals for information.
- .2 Manufacturer's Instructions: Provide for all manufactured components.

1.6 SUBMITTALS AT PROJECT CLOSEOUT

- .1 Section 21 05 00: Submittals for project closeout.
- .2 Project Record Documents: Record actual locations of control components, including panels, thermostats, and sensors. Accurately record actual location of control components, including panels, thermostats, and sensors.
- .3 Revise shop drawings to reflect actual installation and operating sequences.
- .4 Operation and Maintenance Data: Include inspection period, cleaning methods, recommended cleaning materials, and calibration tolerances.
- .5 Warranty: Submit manufacturer's warranty and ensure forms have been filled out in the City's name and registered with manufacturer.

1.7 QUALITY ASSURANCE

- .1 The Installer shall have an established working relationship with the Control System Manufacturer, and be the authorized representative of the Manufacturer at bid time.
- .2 The Installer shall have successfully completed Control System Manufacturer's classes on the control system. The Installer shall present for review the certification of completed training, including the hours of instruction and course outlines upon request.
- .3 All products used in this installation shall be new, currently under manufacture, and shall be applied in standard off-the-shelf products. This installation shall not be used as a test site for any new products unless explicitly approved by the Contract Administrator in writing. Spare parts shall be available for at least 5 years after completion of this contract.

1.8 REGULATORY REQUIREMENTS

- .1 All work, materials, and equipment shall comply with the rules and regulations of all codes and ordinances of the local, provincial, and national authorities. Such codes, when more restrictive, shall take precedence over these plans and specifications. As a minimum, the installation shall comply with the current editions in effect 30 days prior to receipt of bids of the following codes:
 - .1 Canadian Electric Code (CEC)
 - .2 National Building Code (NBC)
 - .3 ASHRAE 135
 - .4 Underwriters Laboratories UL916

1.9 WARRANTY

- .1 Section 21 05 00: Submittals for project closeout.
- .2 Labor and materials for the control system specified shall be warranted free from defects for a period of 12 months after final completion and acceptance. Control system failures during the warranty period shall be adjusted, repaired, or replaced at no additional cost or reduction in service to the City. The Contractor shall respond to the City's request for warranty service within 24 hours during normal business hours.
- .3 All work shall have a single warranty date, even when the City has received beneficial use due to an early system start-up. If the work specified is split into multiple contracts or a multi-phase contract, then each contract or phase shall have a separate warranty start date and period
- .4 Exception: The Contractor shall not be required to warrant reused devices, except for those that have been rebuilt and/or repaired. The Contractor shall warrant all installation labour and materials, however, and shall demonstrate that all reused devices are in operable condition at the time of Contract Administrator review.

1.10 MAINTENANCE SERVICE

- .1 Section 21 05 00: Submittals for project closeout.
- .2 Provide service and maintenance of control system from Date of Substantial Completion.
- .3 Provide complete service of controls systems, including call backs. Make minimum of two complete normal inspections of approximately four (4) hours duration in addition to normal service calls to inspect, calibrate, and adjust controls, and submit written reports.

Part 2 Products

2.1 CARBON DIOXIDE SENSOR

- .1 Acceptable manufacturers.
 - .1 DCS Airsense
 - .2 Substitutions: Refer to Section 21 05 00.
- .2 Non-dispersive infrared (NDIR), Diffusion with a Measurement Range 0-2000 ppm
 - .1 Repeatability ± 20 ppm CO₂ Measurement Accuracy ± 30 ppm $\pm 2\%$ of reading,
 - .2 Power Requirements 18 - 30 VDC or 18 - 28 Vrms AC
 - .3 Operating Temperature Range 0 - 50 0C
 - .4 Operating Humidity Range 0 - 99% RH, non-condensing
 - .5 Voltage Output (linear) 0 - 10 VDC full-scale standard
 - .6 Optional Current Output (linear) 4-20 mA RLOOP $< 600 \Omega$
 - .7 Dimensions 4.5 x 2.8 x 0.9 inches
- .3 Model 308 – Wall or Duct Mount – No display

- .4 Model 350 – Wall or Duct Mount – With display

2.2 CONTROLLERS (Stand-alone)

- .1 Manufacturer: Honeywell Model T775 series 2000.
 - .1 Substitutions: Refer to Section 21 05 00.
- .2 Graphical Interface Operating programming, includes a keypad lockout.
- .3 Internal Time Clock Scheduler:
- .4 Independent Modulating Outputs: 0-10 Vdc, 2-10 Vdc, 4-20 mA or Series 90
- .5 Modulating High Or Low Limit Control
- .6 Configurable Integral And Derivative Times (PID)
- .7 Configurable Minimum Off Time
- .8 Sensor Calibration
- .9 Options
 - .1 NEMA 4X Enclosure
 - .2 Room Temperature Sensors
 - .3 Humidity sensors
 - .4 Pressure Sensors
 - .5 Economizer

2.3 CONTROL PANELS

- .1 Unitized cabinet type for each system under automatic control with relays and controls mounted in cabinet and temperature indicators, pressure gauges, pilot lights, push buttons and switches flush on cabinet panel face.
- .2 NEMA 250, general purpose utility enclosures with enamelled finished face panel.
- .3 Provide common keying for all panels.

2.4 THERMOSTATS (Stand Alone)

- .1 Electric Room Thermostats (Commercial Full Digital Display):
 - .1 Manufacturer: Honeywell Model TB8220.
 - .1 Substitutions: Refer to Section 21 05 00.
 - .2 Type: , 24 volts, with setback/setup temperature control.
 - .3 7 Day Programmable
 - .1 Conventional Service: Cooling and heating, two step cooling and two step heating.
 - .2 Heat pumps; Cooling and heating, two step cooling and three step heating

- .3 Auto Fan On/OFF, Optional Fan On based on schedule.
- .4 Covers: Locking with set point adjustment, with thermometer

Part 3 Execution

3.1 EXAMINATION

- .1 Section 21 05 00: Verification of existing conditions before starting work.
- .2 Verify that systems are ready to receive work.
- .3 Beginning of installation means installer accepts existing conditions.
- .4 Sequence work to ensure installation of components is complementary to installation of similar components in other systems.
- .5 Coordinate installation of system components with installation of mechanical systems equipment such as air handling units and air terminal units.
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- .7 Coordinate installation of system components with installation of mechanical systems equipment such as air handling units and air terminal units.

3.2 INSTALLATION

- .1 Install to manufacturers written instructions.
- .2 Check and verify location of thermostats, CO2 Detectors, and other exposed control sensors with plans and room details before installation. Locate 1 500 mm(60 inches) above floor. Align with lighting switches.
- .3 Provide guards or password protection on thermostats in entrances and other public areas.
- .4 Mount control panels adjacent to associated equipment on vibration free walls or free standing angle iron supports. One cabinet may accommodate more than one system in same equipment room. Provide engraved plastic nameplates for instruments and controls inside cabinet and engraved plastic nameplates on cabinet face.
- .5 Install "hand/off/auto" selector switches to override automatic interlock controls when switch is in "hand" position.
- .6 Provide conduit and electrical wiring to Section 26 05 19 and 26 05 33. Electrical material and installation to appropriate requirements of Division 26.
- .7 After installation of gas detection, test and calibrate equipment to demonstrate operation of functions described above under sequence of operation by manufactures certified service technician or authorized agent complete with commissioning reports

3.3 MANUFACTURER'S FIELD SERVICES

- .1 Section 21 05 00: Prepare and start systems.
- .2 Start and commission systems. Allow sufficient time for start-up and commissioning prior to placing control systems in permanent operation.

3.4 DEMONSTRATION AND INSTRUCTIONS

- .1 Section 21 05 00: Demonstrating installed work.
- .2 Demonstrate complete and operating system to the City.

END OF SECTION